STUDER A820 MCH

Operating and Service Instructions

Prepared and edited by STUDER INTERNATIONAL (a division of STUDER REVOX AG) TECHNICAL DOCUMENTATION
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2. Installation, Operating

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2.1 Unpacking and Testing

The A820 MCH tape recorder is delivered in a special packing that protects it from damage in transit. Care should be exercised when unpacking the recorder so that the equipment surfaces will not become marred.
Compare the content with the packing slip to ensure that the equipment is complete. Save the original packing material because it provides the best protection for your recorder for subsequent shipment.
Examine the complete content for possible shipping damage. The shipping company and the nearest STUDER dealer should be notified immediately in the event of damage.

2.2 Installation Site

The A820 MCH tape recorder should be installed in a dust-free, well ventilated location. The recorder specifications are guaranteed for ambient temperatures ranging from 0 to 40°C. The relative humidity (non condensing) should range between 20 and 90%.
Install the recorder in a place where there is sufficient space for unobstructed ventilation. Localization of heat can occur when the recorder is installed in a recess. The air circulation zone should not be used as a storage area for manuals etc. when the recorder is being used.
The recorder should not be placed in close proximity to strong electromagnetic fields. General sources of interference are: strong load fluctuations on adjacent power lines, high-power transformers, elevator motors, as well as nearby radio and television transmitters.
The back of the recorder should remain accessible for maintenance purposes. If the recorder is installed in a recess, sufficient clearance for shifting the recorder should remain also when the cables are attached.

2.3 Connections

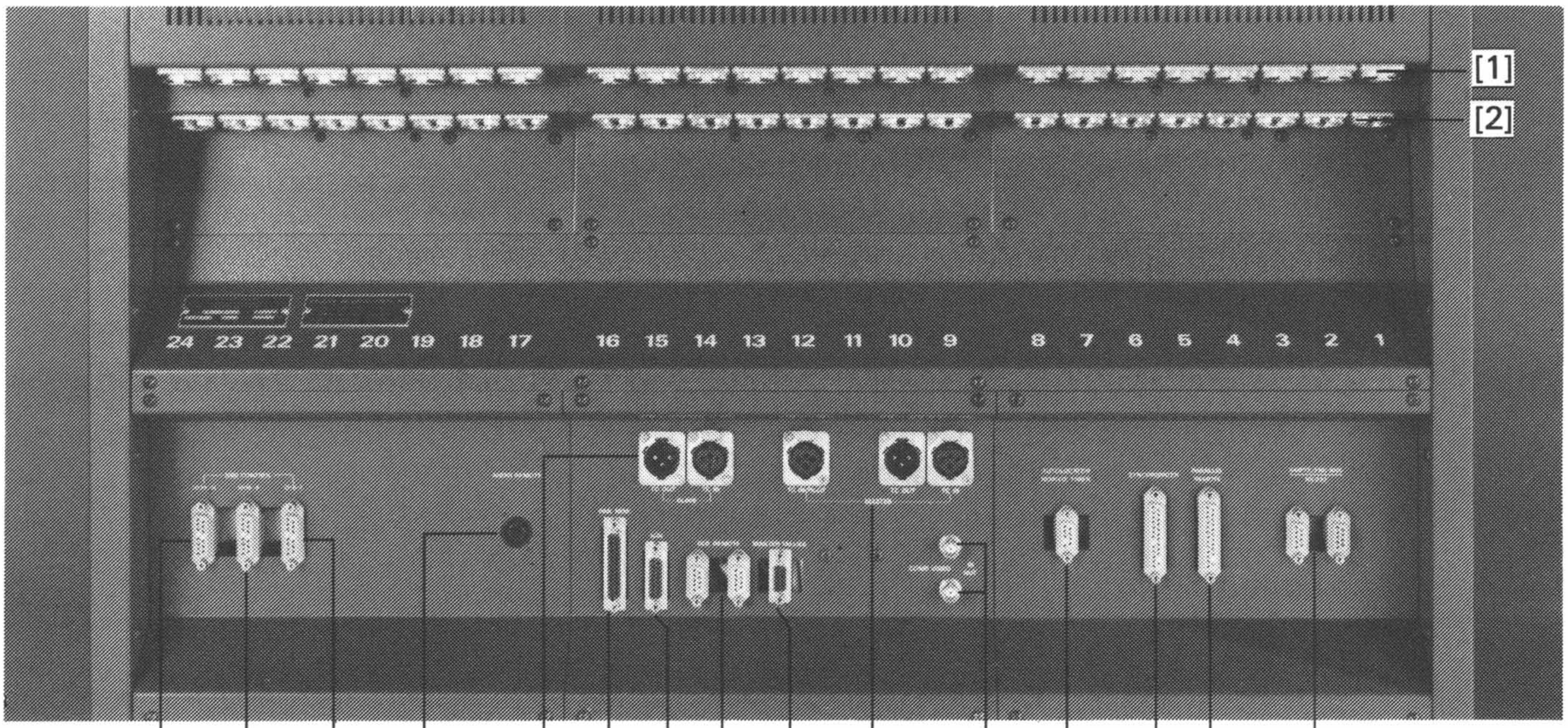

Fig. 2.3

[1] Audio inputs
[2] Audio outputs
[3] Serial connector. The two connectors are parallel for SMPTE/EBU bus, RS 232 interface (Option)
[4] Parallel remote
[5] Synchronizer
[6] Autolocator / Remote timer / Serial remote controller
[7] Composite video IN/OUT
[8] Time code Master IN/OUT
[9] Master tallies
[10] Serial remote
[11] LCU
[12] Parallel remote
[13] Time code Slave IN/OUT
[14] Audio remote (Option)
[15] NRS control channels 1 .. 8
[16] NRS control channels 9 .. 16
[17] NRS control channels 17 .. 24

Option (20.820.395.00)

2.3.1 Mains Connection, Line Voltage Selector

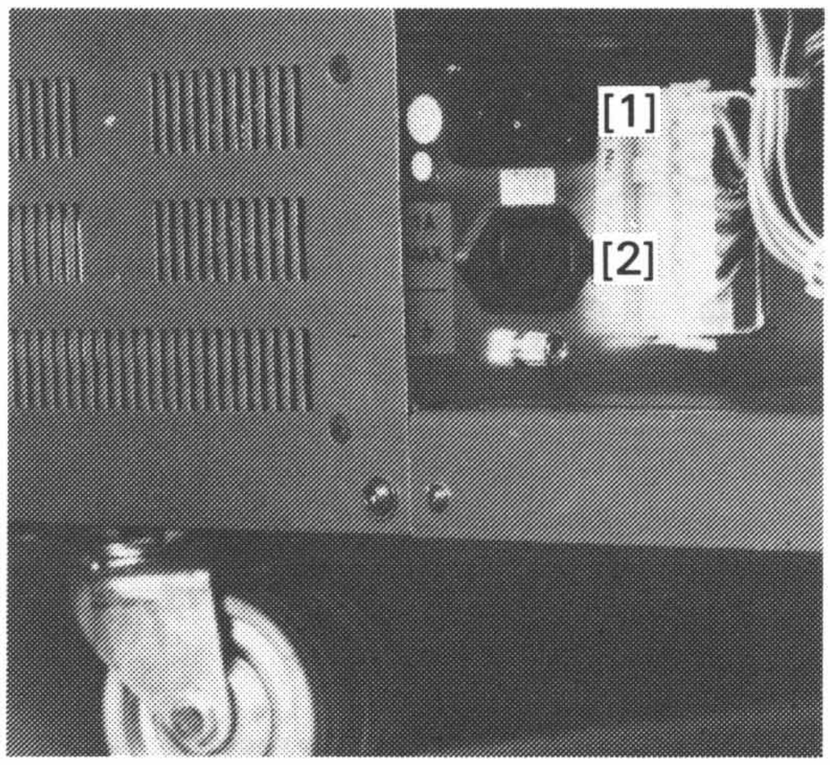

Fig. 2.3.1-1 [1] Mains connector
[2] Power connector for TLS 4000

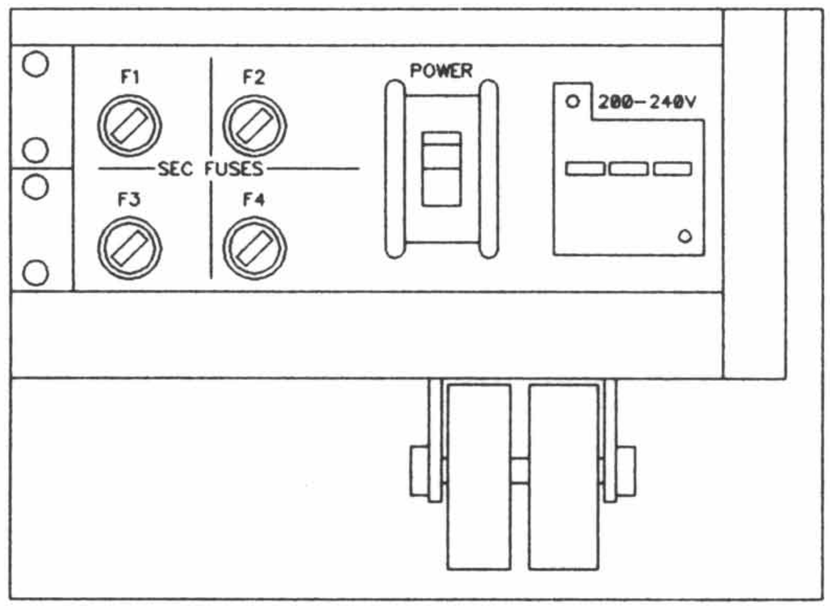

Fig. 2.3.1-2 Line voltage selector

Caution Before the recorder is connected for the first time, verify that the setting of the voltage selector on the front of the recorder matches the local line voltage.
The following line voltages can be selected:
100 ... 140 or 200 ... 240 VAC, ±10%.
Disconnect the recorder from the AC supply before you change the voltage selector setting! Unfasten the cover of the voltage selector (2 screws, Allen key No. 2.5), change over three switches and reinstall the cover, rotated by 180°.

2.3.2 Line Input and Output

The balanced inputs and outputs are terminated on XLR male or female sockets (described in the IEC recommendation 268–14).

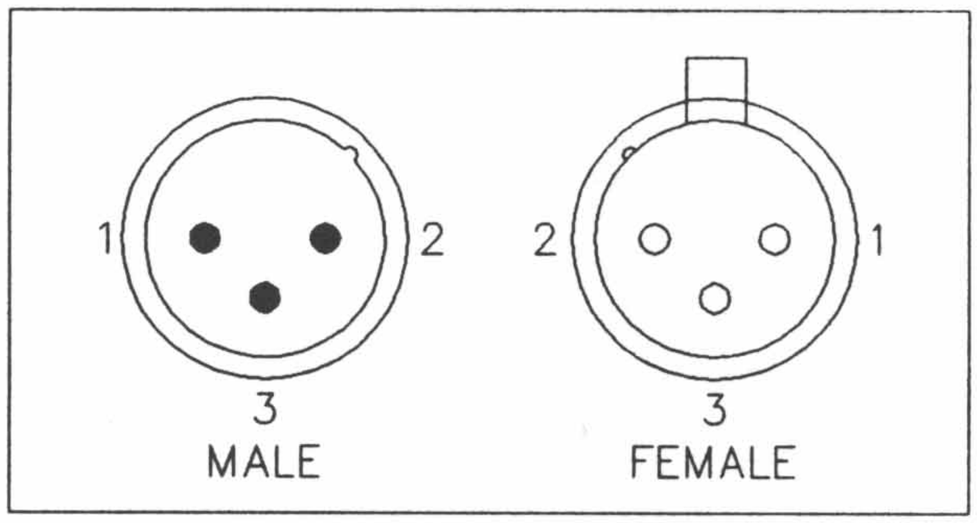

Fig. 2.3.2 **[1] = Audio ground**
[2] = A–line (hot)
[3] = B–line (cold)
1 The A–line is hot if the recorder is connected to an unbalanced source.

2.3.3 Remote Control Connectors

Parallel remote control connector

A parallel remote control unit with the following features can be interfaced via this 25–pin connector (female, D–type):

- Remote control of the tape deck functions with feedback (◄, ►, PLAY, STOP, and REC)
- RESET TIMER (resets the tape counter)
- ZERO LOC (automatically searches the tape counter address 0.00.00.0)
- LOC START (automatically searches the tape counter address at which the last PLAY command was entered)
- LIFTER (cancels the tape lifting during spooling for as long as this key is pressed)
- FADER (enables the fader start circuit)
- VARISPEED (variable tape speed)

Pin assignment of the PARALLEL REMOTE CONTROL connector:

Pin	Signal name		Designation
01	+0.0		Ground
02	BR-REW	*	Pilot lamp, REWIND
03	BR-FORW	*	Pilot lamp, FORWARD
04	BR-VRSPD	*	Pilot lamp, VARISPEED (alternatingly HIGH and LOW when active)
05	SR-VRSPD	+	Switch for VARISPEED command
06	SR-FADRY	+	Switch for FADER START READY command
07	BR-LOCST	*	Pilot lamp, LOC START
08	BR-FADRY	*	Pilot lamp, FADER START READY
09	BR-REC	*	Pilot lamp, RECORD
10	SR-RESET	+	Switch for RESET TIMER command
11	FAD1		Input FADER START command, line A
12	FAD2		Input FADER START command, line B (FADER START active if 5..24 VAC or DC are present between pins 11 and 12)
13	IR-REFEX		Input for external capstan PLL reference (nominal 9,6 kHz, TTL level recommended; maximum input voltage +12 V)
14	SR-OLOC	+	Switch for ZERO LOC command
15	BR-PLAY	*	Pilot lamp, PLAY
16	BR-STOP	*	Pilot lamp, STOP
17	SR-LIFT	+	Switch for LIFTER command
18	SR-LOCST	+	Switch for LOC START command
19	SR-REC	+	Switch for RECORD command
20	SR-REW	+	Switch for REWIND command
21	SR-FORW	+	Switch for FORWARD command
22	SR-PLAY	+	Switch for PLAY command
23	SR-STOP	+	Switch for STOP command
24	KEY		Coding
25	+24.0		+24 V supply (max. 300 mA)

* Open collector output active LOW. No internal pull-up resistor, max. HIGH level = +30 V. Max. load current 200 mA, internal current limiting resistor 22 Ω.

\+ Switch input, LOW level activates the command. Internal pull-up resistor 4.7 kΩ connected to +24 V supply, max. HIGH input level = +30 V, logic level: LOW = 0..+4 V, HIGH = +7.5..+30 V.

	Order Number
Connector complete	20.020.303.16
Connector housing, 25-pin	54.13.7022
Connector, 25-pin, coded	10.217.001.06

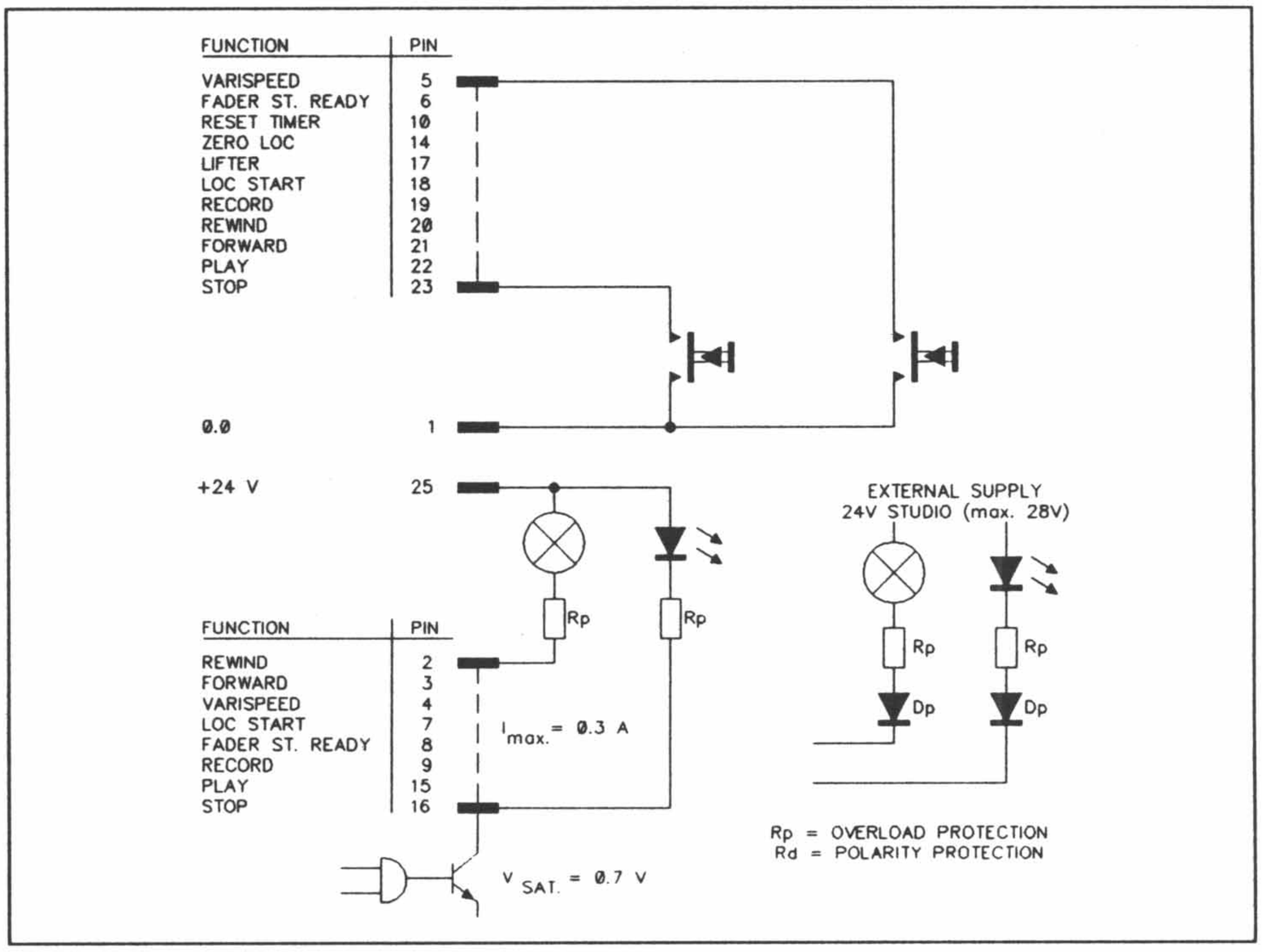

Fig. 2.3.3–1 Remote control circuit

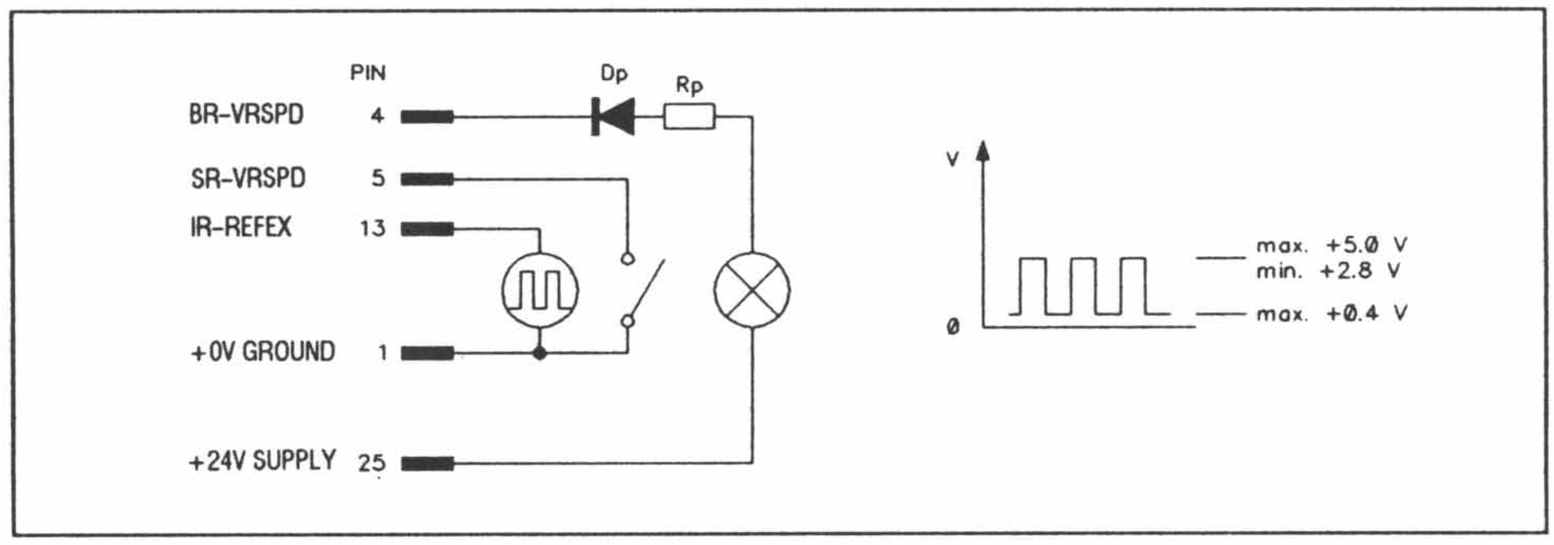

Fig. 2.3.3–2 Varispeed circuit

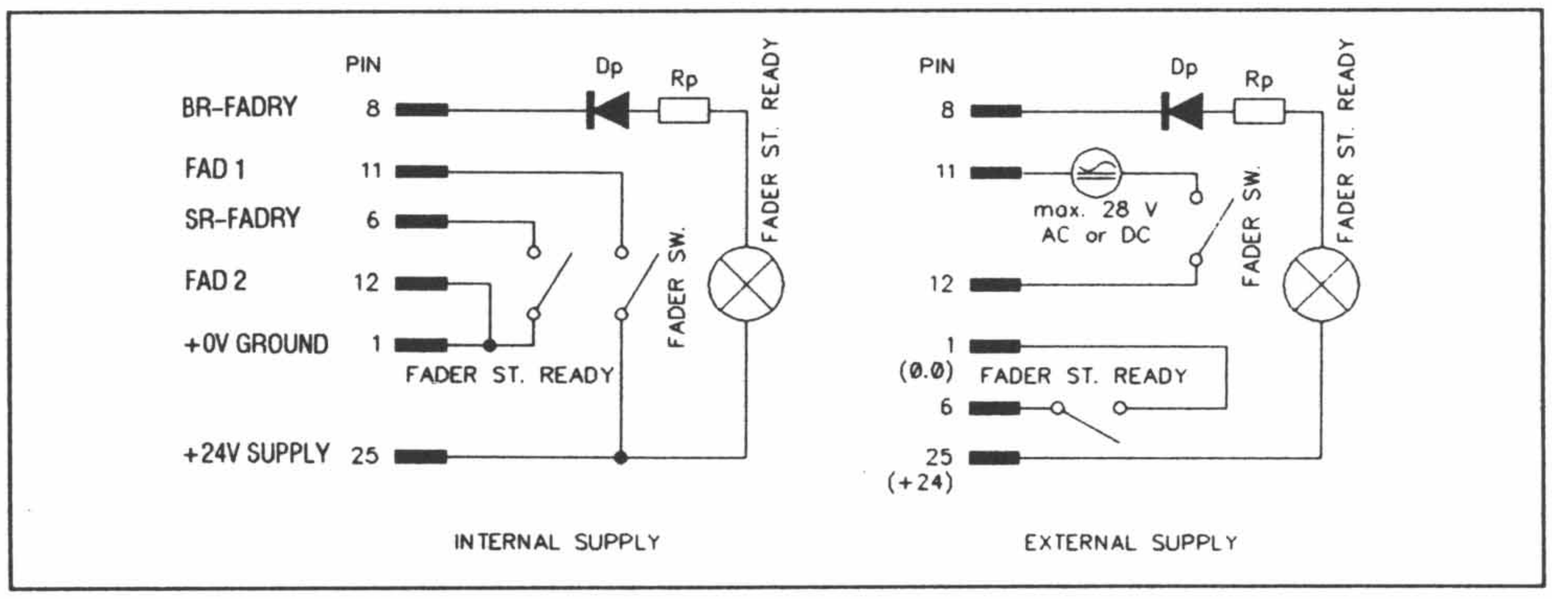

Fig. 2.3.3–3 Fader start circuit

Caution! If light bulbs are used as pilot lamps, their inrush current should not exceed 0.3 A.

External synchronizer connector

An external synchronizer with the following facilities can be connected to this 25-pin connector (female, D-type):

Pin assignment of the EXTERNAL SYNCHRONIZER connector:

Pin	Signal name		Designation
01	+0.0		Ground
02	BR-REW	*	Pilot lamp, REWIND
03	BR-FORW	*	Pilot lamp, FORWARD
04	BR-VRSPD	*	Pilot lamp, VARISPEED (alternatingly HIGH and LOW when active)
05	SR-VRSPD	+	Switch for VARISPEED command
06	SR-REHSL	+	Switch for REHEARSAL command
07	OR-MVCLK	*	Output for TAPE MOVE CLOCK signal (512 pulses/15 inch, pulse duty factor 50%)
08	KEY		Coding
09	BR-REC	*	Pilot lamp RECORD
10	OR-MVDIR	*	Output for TAPE MOVE DIRECTION signal (rewind = LOW, forward = HIGH)
11	OR-CMCLK	*	Output for CAPSTAN M. MOVE CLOCK signal (1200 impulses/sec at 7.5 ips)
12	OR-SYENB		Output for SYNCHRONIZER ENABLE signal (LOW if tape is threaded and recorder ready; HIGH when tape not tensioned)
13	IR-REFEX		Input for external capstan PLL reference (nominal 9.6 kHz, TTL level recommended; max. input voltage = +30 V)
14	+0.0		Ground
15	BR-PLAY	*	Pilot lamp, PLAY
16	BR-STOP	*	Pilot lamp, STOP
17	SR-LIFT	+	Switch for LIFTER command
18	SR-MUTE	+	Switch for MUTE command (no influence on TC channel)
19	SR-REC	+	Switch for RECORD command
20	SR-REW	+	Switch for REWIND command
21	SR-FORW	+	Switch for FORWARD command
22	SR-PLAY	+	Switch for PLAY command
23	SR-STOP	+	Switch for STOP command
24	KEY		Coding
25	+24.0		+24 V supply (max. 300 mA)

* Open collector output active LOW. No internal pull-up resistor, max. HIGH level = +30 V. Max. load current 200 mA, internal current limiting resistor 22 Ω.

\+ Switch input, LOW level activates the command. Internal pull-up resistor 4.7 kΩ connected to +24 V supply, max. HIGH input level = +30 V, logic level: LOW = 0..+4 V, HIGH = +7.5..+30 V.

	Order Number
Connector complete	20.020.303.15
Connector housing, 25-pin	54.13.7022
Connector, 25-pin, coded	10.217.001.05

Connector for RS232C interface (binary protocol) and SMPTE/EBU bus or RS232C interface (ASCII protocol)

The following can be connected to this 9-pin (female, D-type) connector:
A terminal with RS232C interface (ASCII protocol) or a TLS 4000 (via the serial remote controller 1.810.751, option 20.820.393.00)

or a terminal with RS232C interface (binary protocol) or the SMPTE/EBU bus (RS422) via the SMPTE/EBU interface 1.820.751, (option 20.820.394.00).

Option 1.820.751

- Pin assignment of the RS232&SMPTE/EBU connectors.
  (9 Pin D-type)

RS422 (SMPTE/EBU-Protocol)	
Pin	signal name
01	Shield
02	Transmit A
03	Receive B
04	Receive Common
05	---
06	Transmit Common
07	Transmit B
08	Receive A
09	Shield

RS 422 (SMPTE/EBU Protocol)	
Pin	signal name
01	SHIELD
02	---
03	RX Receive Data
04	0V Ground
05	---
06	0V Ground .....
07	TX Transmit Data
08	---
09	Shield

- SMPTE/EBU application with *NRZ-format.

Option 1.810.751

- Pin assignment of the RS232&SMPTE/EBU connectors.
  (9 Pin D-type)

RS232 (ASCII-Protocol)	
Pin	signal name
01	---
02	TX Transmit Data
03	---
04	---
05	---
06	---
07	---
08	RX Receive Data
09	0V Ground

- normal RS 232 application with *NRZ-format.

RS 232 (ASCII-Protocol)	
Pin	signal name
01	0V Ground
02	---
03	---
04	RX Receive Data
05	---
06	TX Transmit Data
07	---
08	---
09	---

- normal RS 232 application but with *Bi-Phase format.

Communication Controller

- Pin assignment of the Communication Controller.
  (9 Pin D-type)

RS232 (ASCII-Protocol)	
Pin	signal name
01	0V Ground
02	TX Transmit Data
03	---
04	---
05	---
06	---
07	---
08	RX Receive Data
09	---

- Save datas on a PC with *NRZ-format.

RS 232 (ASCII-Protocol)	
Pin	signal name
01	0V Ground
02	---
03	Receive Data
04	---
05	---
06	---
07	Send Data
08	---
09	---

- Save datas on tape with *Bi-Phase-format.

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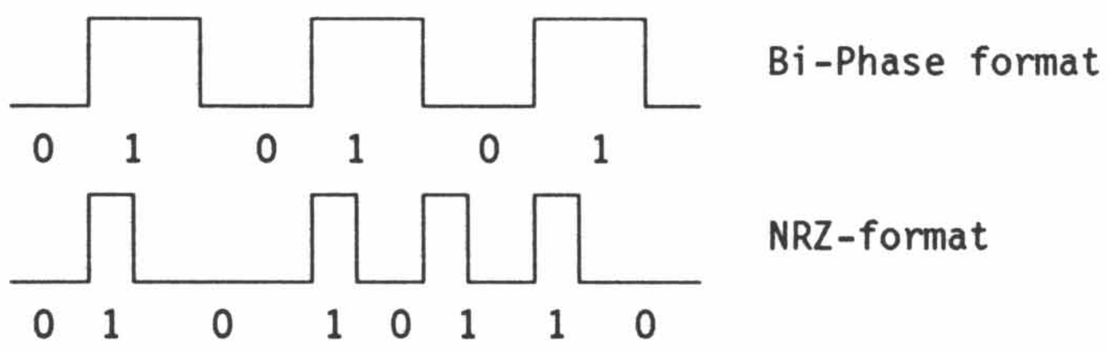
*



2.3.4 Audio Remote Connector (serial)

A channel remote control module (Part No. 21.328.501.00 for 8-channel machines, 21.328.503.00 for 16- und 24-channel machines) can be interfaced via the serial AUDIO REMOTE connector (Neutrik, 8-pin).

Pin assignment of the AUDIO REMOTE connector

Pin	Signal name	Conn. cable wire color
1	OSTABIN	screen
2	OSTABIN	blue
3	OSTABIN	violet
4	+STABIN4	red
5	+STABIN4	yellow
6	+STABIN4	brown
7	PNLBUS1	white
8	PNLBUS2	black

		Order Number
Connector, complete:	Neutrik, 8-pin, male	20.020.303.23
Cable	screened, 10 x 0.14 mm^2	64.03.0149

If problems occur with cables longer than 50 m, a termination resistor can be connected between pins 7 and 8 at both cable ends. Typical rating (depending on cable resistance): 220 ohms ¼ W. Max. cable length 100 m.

2.3.5 Parallel Channel Remote Control Interface

A parallel channel remote control device of a mixing console can be connected via the PARALLEL AUDIO CHANNEL CONTROL INTERFACE (Order No. 21.328.500.00) to the serial AUDIO REMOTE connector of the A820 MCH tape recorder. The pin assignment of the AUDIO REMOTE connector is described in Section 2.3.4.

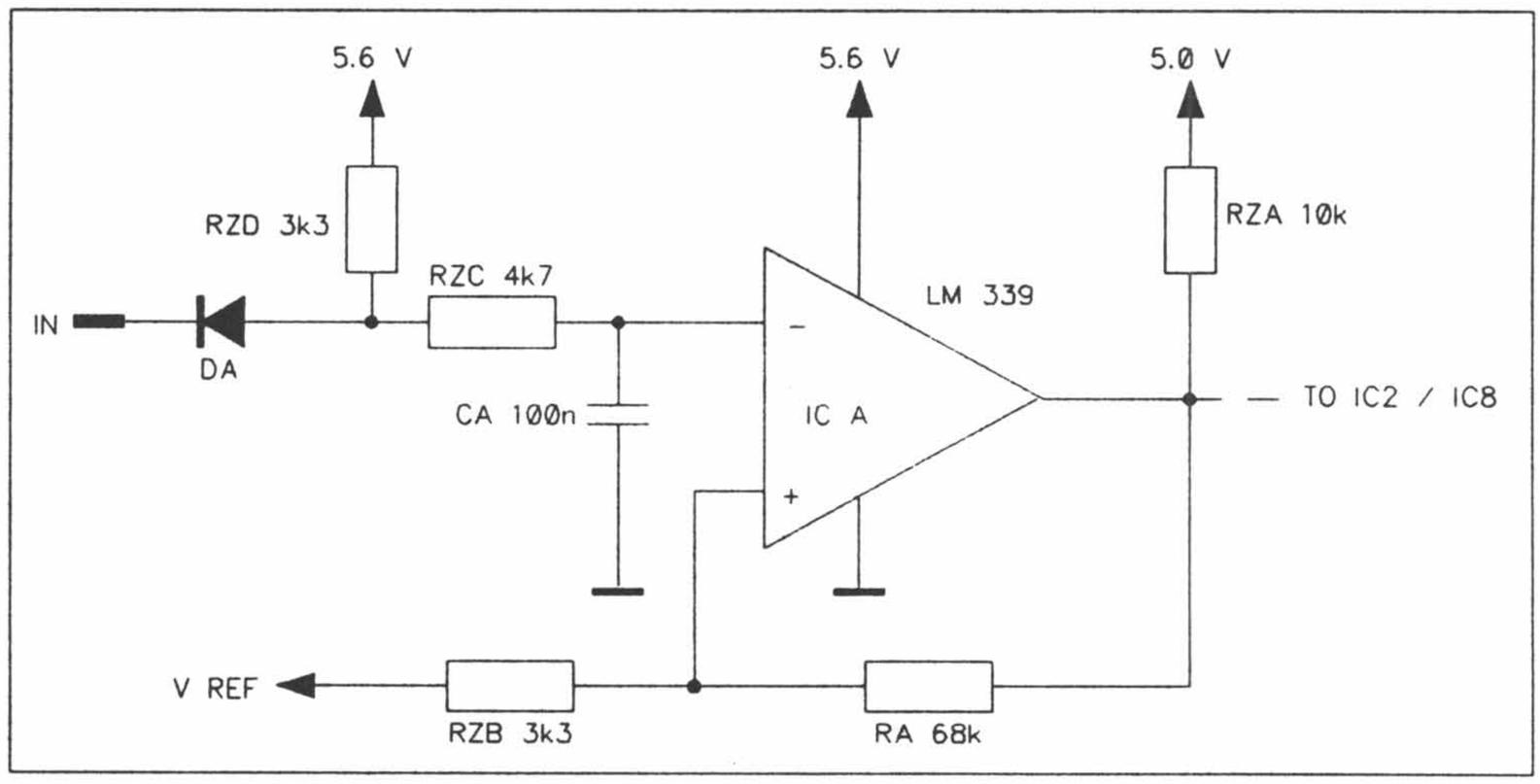


Fig. 2.3.5–1 Input circuit

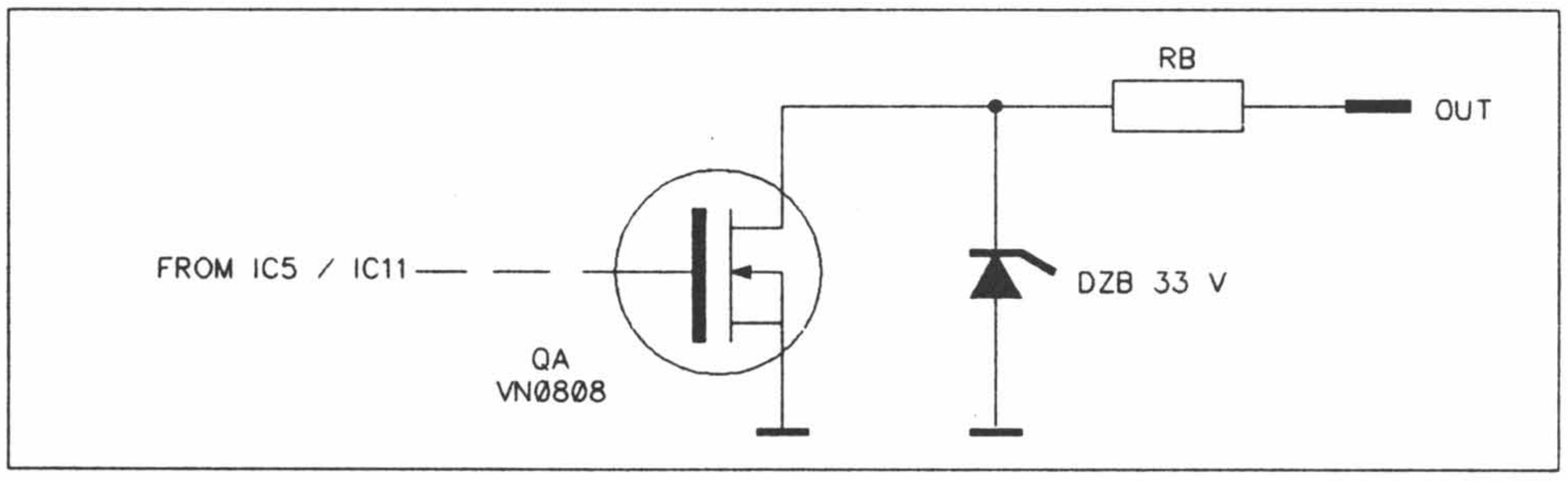


Fig. 2.3.5–2 Output circuit

Connector Configuration:

AUDIO CHANNELS 1...8			AUDIO CHANNELS 9...16			AUDIO CHANNELS 17..24		
D-type 78-pin POINT	SIG. NAME	COLOR	D-type 78-pin POINT	SIG. NAME	COLOR	D-type 78-pin POINT	SIG. NAME	COLOR
1	S-REA-01	br	1	S-REA-09	br	1	S-REA-17	br
2	S-REA-02	rt	2	S-REA-10	rt	2	S-REA-18	rt
3	S-REA-03	or	3	S-REA-11	or	3	S-REA-19	or
4	S-REA-04	rt	4	S-REA-12	rt	4	S-REA-20	rt
5	S-REA-05	gn	5	S-REA-13	gn	5	S-REA-21	gn
6	S-REA-06	rt	6	S-REA-14	rt	6	S-REA-22	rt
7	S-REA-07	bl	7	S-REA-15	bl	7	S-REA-23	bl
8	S-REA-08	rt	8	S-REA-16	rt	8	S-REA-24	rt
25	B-REA-01	br	25	B-REA-09	br	25	B-REA-17	br
26	B-REA-02	sw	26	B-REA-10	sw	26	B-REA-18	sw
27	B-REA-03	or	27	B-REA-11	or	27	B-REA-19	or
28	B-REA-04	sw	28	B-REA-12	sw	28	B-REA-20	sw
29	B-REA-05	gn	29	B-REA-13	gn	29	B-REA-21	gn
30	B-REA-06	sw	30	B-REA-14	sw	30	B-REA-22	sw
31	B-REA-07	bl	31	B-REA-15	bl	31	B-REA-23	bl
32	B-REA-08	sw	32	B-REA-16	sw	32	B-REA-24	sw
33	B-RCD-01	br	33	B-RCD-09	br	33	B-RCD-17	br
34	B-RCD-02	rt	34	B-RCD-10	rt	34	B-RCD-18	rt
35	B-RCD-03	or	35	B-RCD-11	or	35	B-RCD-19	or
36	B-RCD-04	rt	36	B-RCD-12	rt	36	B-RCD-20	rt
37	B-RCD-05	gn	37	B-RCD-13	gn	37	B-RCD-21	gn
38	B-RCD-06	rt	38	B-RCD-14	rt	38	B-RCD-22	rt
39	B-RCD-07	bl	39	B-RCD-15	bl	39	B-RCD-23	bl
40	B-RCD-08	rt	40	B-RCD-16	rt	40	B-RCD-24	rt
53	0.0-DIG	or	53	0.0-DIG	sw	53	0.0-DIG	sw
54	+5.0-A	or	54	+5.0-B	or	54	+5.0-C	or
55	B-RES1							
56	S-REMIN	sw	56	S-REMIN	sw	56	S-REMIN	sw
57	B-RES2							
58	B-RES3							
59	B-INPM	Note 1						
60	B-SYNM	Note 2						
61	B-REPM	Note 3						
62	B-REMENB	Note 4						
63	B-M.SAFE	Note 5						
64	B-RES4							
65	S-RES2							
66	S-RES3							
67	S-REMENB	Note 6						
68	S-M.SAFE	Note 7						
69	S-RES1							
71	S-REPM	Note 8						
72	S-RES4	or						
73	S-INPM	Note 9						
76	KEY		76	KEY		76	KEY	
77	KEY		77	KEY		77	KEY	

Notes:

1: ON if switch S-INPM closed
2: ON if switch S-REPM not closed
3: ON if switch S-REPM closed
4: ON if parallel inputs active
5: ON if switch S-M.SAFE closed
6: Pulse input (flip-flop) interlocked with tape transport key (if available)
7: When this switch is closed, READY can no longer be selected or the READY function can no longer be activated (conductor color: red).
8: Switch open: M-SYNC, Switch closed: M-REP (conductor color: brown).
9: If switch closed: input with highest priority

2.3.6 Control Connectors of the Noise Reduction System

Noise reduction systems can be interfaced via the control connectors of the noise reduction system (one connector for 8 channels). The encode/decode changeover is controlled via these connectors.

Connector configuration:

CHANNELS 1...8		
D-type 15-pin POINT	SIG. NAME	COLOR
1	B-RCD-01	br
2	B-RCD-02	rt
3	B-RCD-03	or
4	KEY	
5	B-RCD-04	rt
6	B-RCD-05	gn
7		
8		
9		
10	B-RCD-06	rt
11	B-RCD-07	bl
12	KEY	
13	B-RCD-08	rt
14	+24.0	br
15	0.0-DIG-A	sw

CHANNELS 9...16		
D-type 15-pin POINT	SIG. NAME	COLOR
1	B-RCD-09	br
2	B-RCD-10	rt
3	B-RCD-11	or
4	KEY	
5	B-RCD-12	rt
6	B-RCD-13	gn
7		
8		
9		
10	B-RCD-14	rt
11	B-RCD-15	bl
12	KEY	
13	B-RCD-16	rt
14	+24.0	br
15	0.0-DIG-B	sw

CHANNELS 17...24		
D-type 15-pin POINT	SIG. NAME	COLOR
1	B-RCD-17	br
2	B-RCD-18	rt
3	B-RCD-19	or
4	KEY	
5	B-RCD-20	rt
6	B-RCD-21	gn
7		
8		
9		
10	B-RCD-22	rt
11	B-RCD-23	bl
12	KEY	
13	B-RCD-24	rt
14	+24.0	br
15	0.0-DIG-C	sw

		Order Number
Connector, complete	D-type, 15-pin, male, screw-on	20.020.303.08

2.3.7 Autolocator/Remote Timer Connector

A serial remote control, a remote counter, or an autolocator can be connected via this 9-pin connector (female, D-type).
The keys of the serial remote control can be programmed by the user as desired. All functions available on the local keyboard can also be executed from the remote control. The functions programmed for the serial remote control do not necessarily have to be the same as those of the local keyboard.

Pin assignment of the AUTOLOCATOR/REMOTE TIMER connector:

Pin	Signal name	Conn. cable wire color
1	SHIELD	screen
2	N.C.	---
3	TR-A	green
4	KEY	---
5	+0.0	grey
6	N.C.	---
7	TR-B	blue
8	SIG.GND	red
9	+REMSUP	black

		Order Number
Connector, complete:	D-type, 9-pin, male, solderable, for cable end at the machine	20.020.303.20
	D-type, 9-pin, female, solderable, for remote cable end	20.020.303.21
	Cable: screened, 10 x 0.14 mm2	64.03.0149

2.3.8 VU-Meter Panel Connector

The panel with the VU-meters can be connected to the tape recorder via the serial VU-METER PANEL connector (Neutrik, 8-pin).

Pin assignment of the VU-METER PANEL connector

Pin	Signal name	Conn. cable wire color
1	OSTABIN	screen
2	OSTABIN	blue
3	OSTABIN	violet
4	+STABIN4	red
5	+STABIN4	yellow
6	+STABIN4	brown
7	PNLBUS1	white
8	PNLBUS2	black

		Order Number
Connector, complete:	Neutrik, 8-pin, male	20.020.303.23
	Neutrik, 8-pin, female	20.020.303.24
	Cable: screened, 10 x 0.14 mm2	64.03.0149

If problems occur with cables longer than 50 m, a termination resistor can be inserted between pins 7 and 8 at both cable ends. Typical rating (depending on cable resistance): 220 ohm ¼ W, max. cable length 100 m.

2.4 Operating Instructions

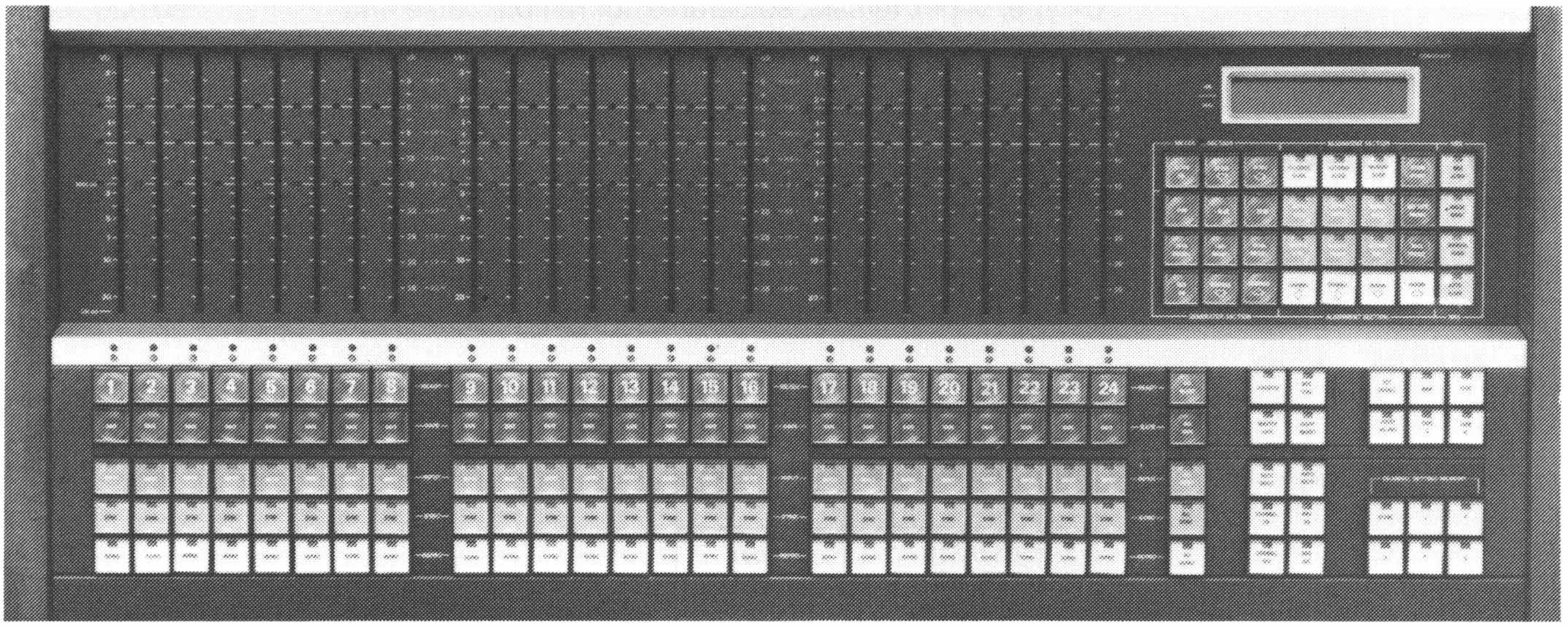


Fig. 2.4–1 Panel

Fig. 2.4–2 Tape Deck

[1] Splicing block
[2] Head shield, can be closed or opened manually.
[3] Service LC display; alphanumeric display for indicating the software status, speed deviation in varispeed mode, error messages, programming of tape deck parameters, etc.
service display
[4] Switch for enabling the MENU-Entry (must be unlocked with an Allen key size 2.5 as a protection against inadvertent modification of functions and parameters).
Screw unlocked: Programming enabled.
Screw locked: programming generally disabled (programming disable A).
Programming disabled exept:
SET LIBRARY WIND SPEED
SET MAX. WIND SPEED
SET ROLLBACK TIME
SET MAX. REEL
(PROGRAM DISABLE B).
Acknowledgment of error messages (with STORE key) is also permitted.

2.4.1 Power Switch

Caution! Before you switch on the recorder for the first time, check that the setting of the line voltage selector on the bottom right of the machine front matches the local line voltage.

The power switch is located on the bottom right of the machine front.

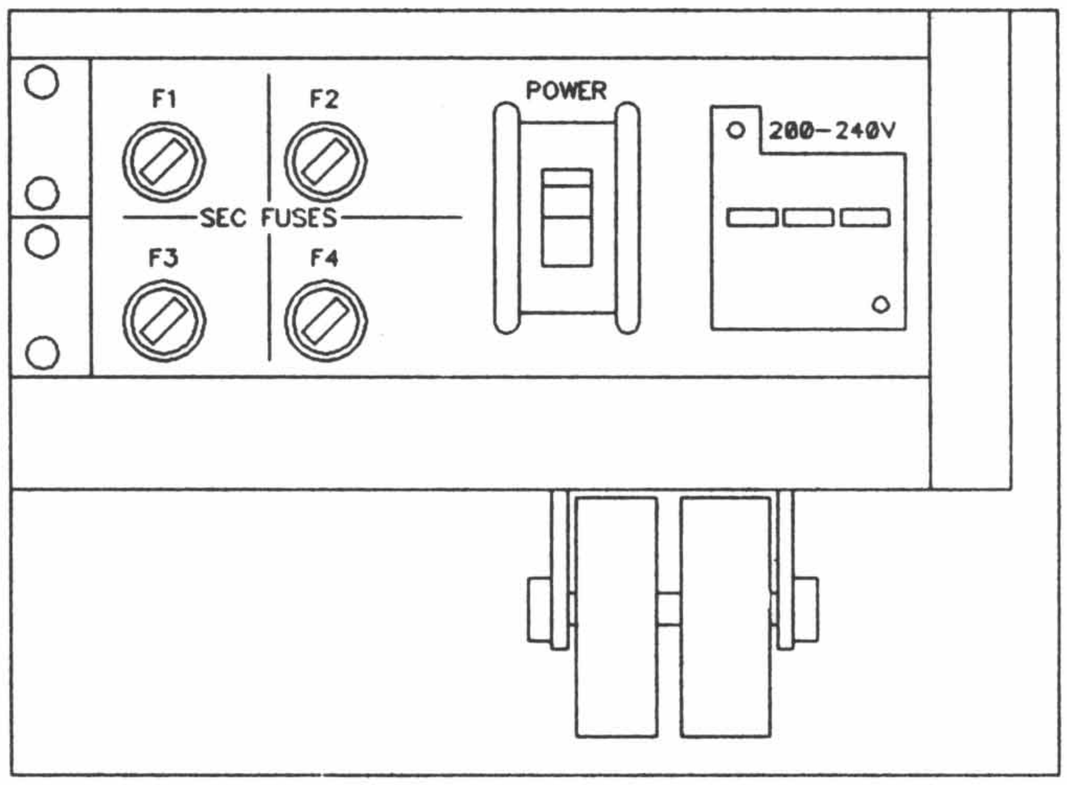


Fig. 2.4.1

The last operating state is automatically reestablished and indicated after the power is switched on.

Exceptions: the recorder is always switched to STOP mode (the STOP key flashes if no tape is mounted or if the tape is mounted loosely). When the recorder is switched on, the microprocessor automatically tests the main functions; any error is indicated on the service display (see Section 2.6).

2.4.2 Control Keys

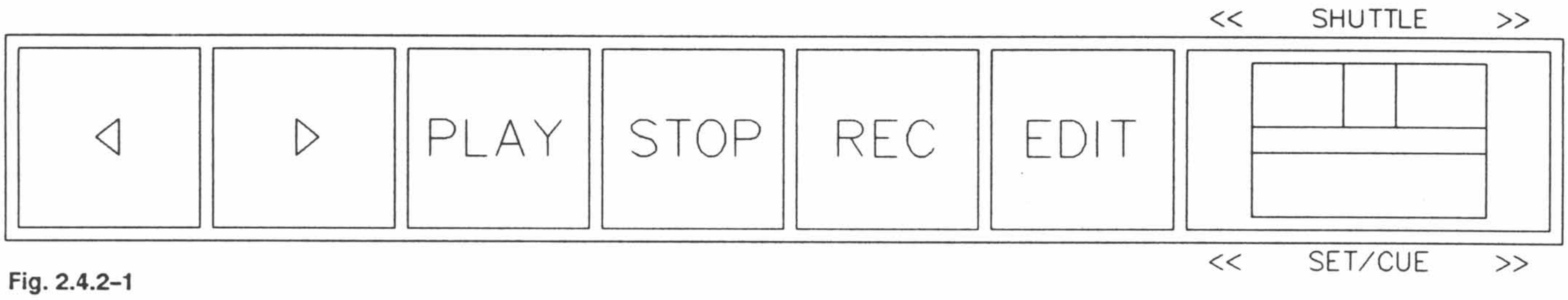


Fig. 2.4.2-1

◄ : fast rewind

► : fast forward

PLAY: reproduce mode

STOP: has priority over all tape deck keys or cancels a synchronizer LOOP. The stored locator addresses can be displayed by pressing STOP plus LOCSTART or LOC1...5.

REC: record key, only effective together with PLAY. (Prerequisite: the recording channel is switched to READY). In reproduce mode it is possible to switch directly to record by pressing REC (RECORD B), or PLAY + REC (RECORD A) depending on the programming.

EDIT: edit function, enables the SET/CUE wheel, and the position of the flutter roller is set in such a way that the tape can be easily gripped on the left-hand side of the headblock.

SHUTTLE: for positioning the tape with continuously variable spooling speed. Center position = STOP, counterclockwise limit position = maximum SHUTTLE rewind speed, clockwise limit position = maximum SHUTTLE forward speed.

SHUTTLE BAR: bar between SHUTTLE wheel and SET/CUE wheel. The spooling speed selected with the SHUTTLE wheel can be stored by pressing the SHUTTLE BAR.

SET/CUE: multifunction wheel:

- In conjunction with the EDIT key: permits positioning of the tape; the tape moves in synchronism with the SET/CUE wheel.
- In conjunction with the service display [3] and the cursor keys: either for "paging" through the menu or as a potentiometer knob for adjusting various tape deck parameters.
- In conjunction with the VARISPEED function: knob for adjusting the desired tape speed.
- In conjunction with the functions SET ADDRESS and SET TIMER: for entering the locator addresses and for setting the tape counter display.

STATUS FIELD

DISPLAY

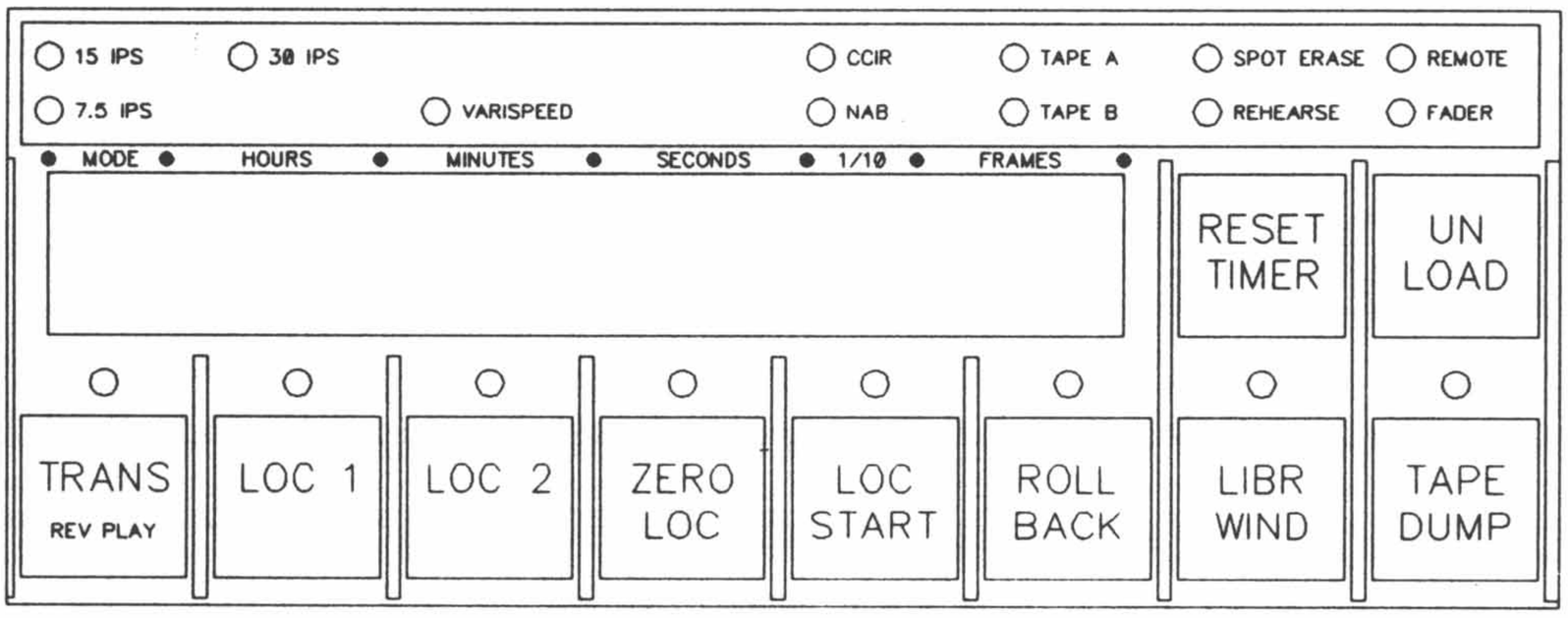


Fig. 2.4.2-2 (Standard Configuration)

Display: Tape timer LED display. Real-time indication at all tape speeds in hours, minutes, seconds, and tenths of seconds; switchable to indication of a second timer with user-selectable reference (LAP Counter).

RESET TIMER: reset button for the tape counter display.

UNLOAD: key for retracting pinch roller assembly

TRANS: preparation key for storing ("Transfer") a tape address in one of the (max.) five memory locations; storing the current address by pressing one of the keys LOC1...LOC5.
If pressed simultaneously with PLAY: reverse play.

LOC 1: the address stored with [TRANS] is searched automatically. This LOCATE address is displayed for as long as this key is pressed. The internal memory relates to the actual tape address, i.e. when the tape counter is set to zero with RESET TIMER, the LOCATE address is automatically recomputed.

LOC 2: the address stored with [TRANS] is searched automatically. This LOCATE address is displayed for as long as this key is pressed. The internal memory relates to the actual tape address, i.e. when the tape counter is set to zero with RESET TIMER, the LOCATE address is automatically recomputed.

LOC ZERO: the tape address corresponding to the timer reading 0.00.00.0 is searched automatically. Relates to the actual zero position, both in normal mode as well as in LAP mode.

LOC START: automatically searches the tape address at which the last PLAY command (with tape stopped) was entered. Depending on the programming, the machine subsequently enters PLAY, STOP or RECORD mode (LOC START PLAY, LOC START STOP or LOC START REC function).

ROLLBACK: rewinds the tape by a programmable amount that can range from 1 to 99 seconds. Default value: 15 sec. Followed by three programmable possibilities: STOP (ROLLBACK-STOP), PLAY (ROLLBACK-PLAY) or RECORD (ROLLBACK-REC). Default: ROLLBACK-STOP.

LIBR WIND: library wind reduces the spooling speed for library pancakes. In conjunction with one of the spooling keys it initiates spooling at reduced speed. This preselection can be cancelled by pressing the LIBRARY WIND key a second time. Programmable for 0.1 to 15 m/s in steps of 0.1 m/s). Default value 5 m/s.

TAPE DUMP: Dump edit mode. Switches the right spooling motor off.
Four programmable possibilities:
TAPE DUMP–A: Tape Counter active (supplied by the Capstan Motor Tacho).
TAPE DUMP–B: Tape Counter off.
TAPE DUMP–C: Tape dump edit mode is preselected, starts with PLAY. Tape Counter active (supplied by the Capstan Motor Tacho).
TAPE DUMP–D: TAPE DUMP preselected, start with PLAY. Tape Counter off.

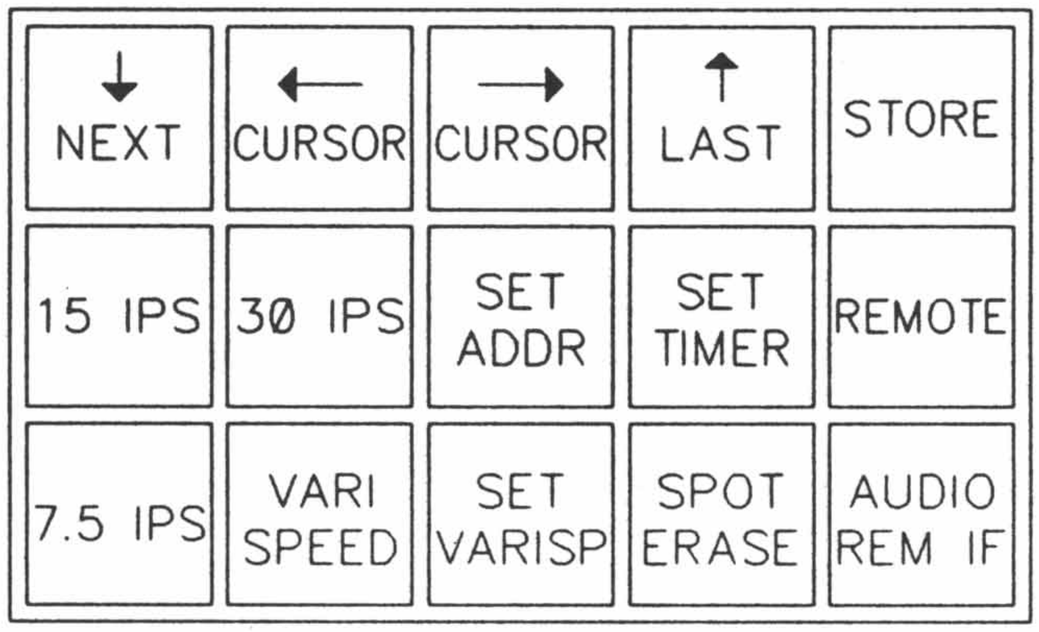


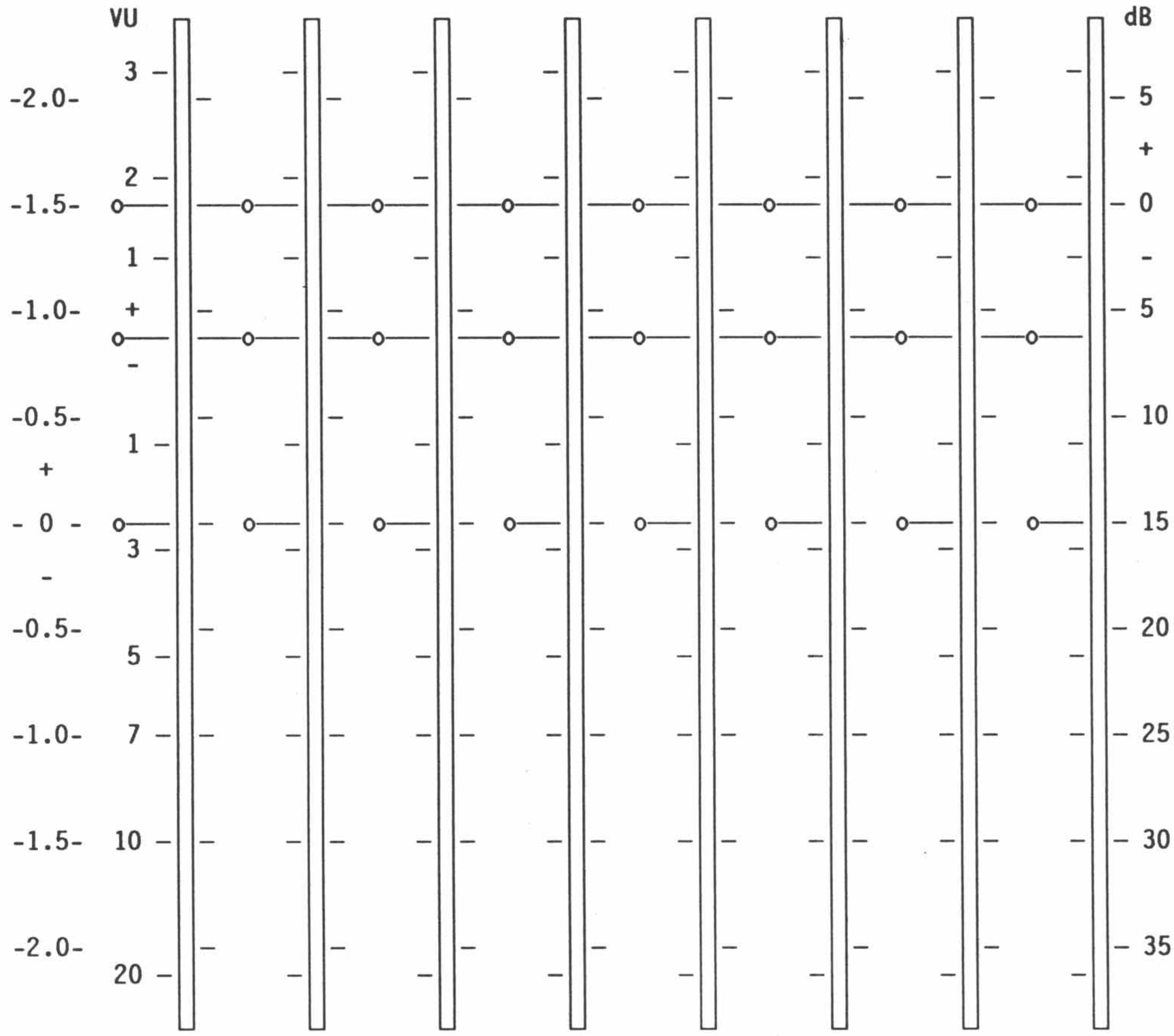
Fig. 2.4.2–3 **(Standard Configuration)**

↓/NEXT:
CURSOR/←:
CURSOR/→:
↑/LAST:
keys for paging through the menu and for moving the cursor on the service display

STORE: key for storing a changed tape deck parameter, for changing over a function that is not assigned to any key, for reprogramming a push button function (when pressed together with the corresponding key) or for acknowledging an error message.

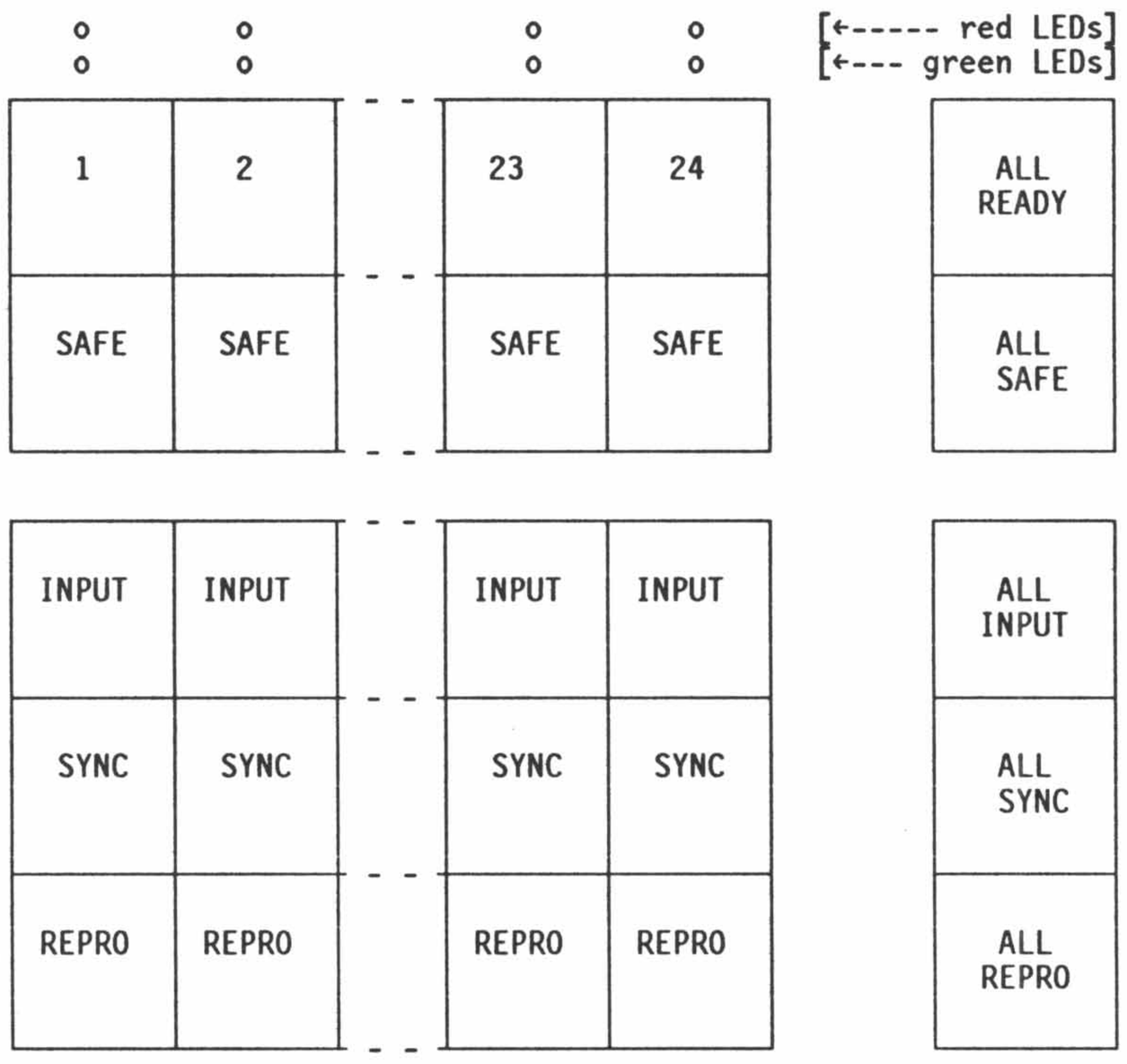
15 IPS: speed selection (38 cm/s).
30 IPS: speed selection (76 cm/s)
SET ADDR: set address
SET TIMER: set timer
REMOTE: activates the remote controls
7.5 IPS: speed selection (19 cm/s)
VARISPEED: on/off switch for variable tape speed
SET VARISP: enables VARISPEED input with the aid of the SET/CUE wheel.
SPOT ERASE: spot erase
AUDIO REM IF: activates the Parallel Channel Control Interface; the VU–meter Panel is disabled

2.4.3 VU-Meter Panel



- The level is indicated by a 50-segment bargraph display.
- The METER ON mode changes the resolution to 0.1 dB on a scale of = 2.5 dB.
- The characteristic of the meter (VU-mode or PPM-mode) is selectable in the menu with the function No. 053.
- Each meter-characteristic indicates the zero-point by its own LED-row.
  - Upper LED-row: zero reading in PPM-mode (yellow scale).
  - Medium LED-row: zero reading in VU-mode (white scale).
  - Lower LED-row: zero reading in METER ON-mode (blue scale).
  - Lower LED-row: zero reading in METER ON mode (blue scale) or flashes if the NR-System is on at the same time. Or it lits up when NR-System is on in another meter mode than METER ON (i.e. only in VU or PPM-mode).
- The LED at the bottom of each bargraph indicates the channel-on status.

2.4.4 Channel Selector Keys



Individual channel selection key:

- Red LED: HF-Driver is active, i.e. RECORD is indicated as well as SPOT ERASE.
- Green LED: Flashes when the channel is switched to READY (enable) and is off as soon as the HF-Driver is on.
- SAFE: Channel inhibited for recording

Individual output selector switches:

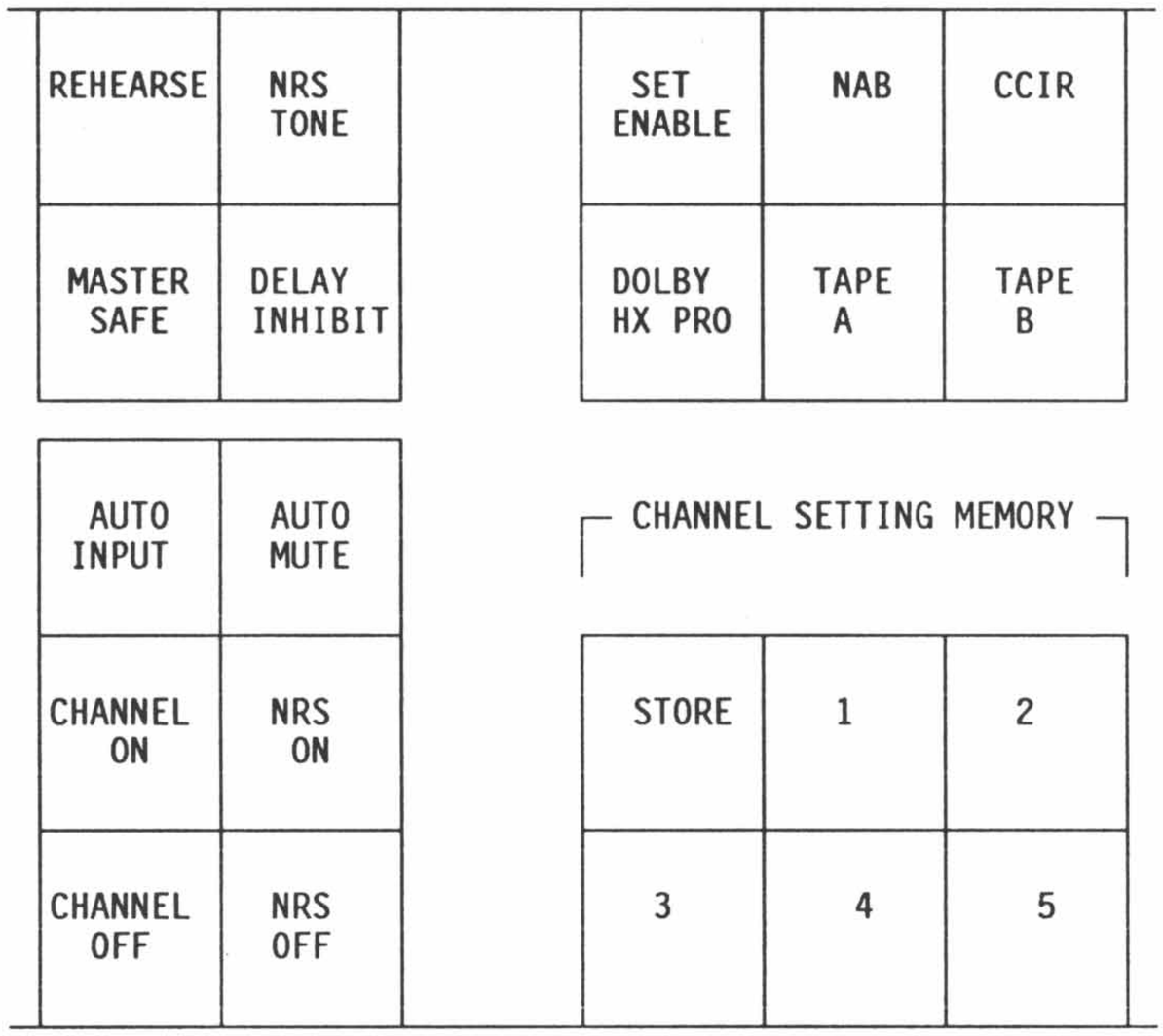
- INPUT: Connects the input signal to the output and to the metering-panel.
- SYNC: Connects the SYNC reproduction signal (from the record head) to the output and the metering panel. This mode can be preselected for the RECORD function. As long as the corresponding channel operates in record mode, it is switched to INPUT because reproduction via record head is not possible during a recording. SYNC reproduction is automatically activated as soon as the channel is switched to READY or SAFE.
- REPRO: Connects the reproduce signal to the output and the metering panel.

Source/tape monitoring can be activated while a recording is in progress by pressing the INPUT and REPRO keys.
INPUT, SYNC, and REPRO are mutually self-cancelling.

Master switch:

- ALL READY, ALL SAFE, ALL INPUT, ALL SYNC, ALL REPRO: Same as above, but for all channels together.

2.4.5 Audio Mode Selectors



REHEARSE:

Simulates the electronic editing. The PLAY and the REC keys flash in play mode. When REC + PLAY are selected, SYNC is switched to INPUT, however, RECORD is not activated. In order to switch back to SYNC, press the PLAY key.
Precondition for REHEARSE: the corresponding channel must be switched to SYNC and READY, and DELAY INHIBIT must be OFF (i.e. the corresponding LED is dark).
To cancel the REHEARSE function, press this key a second time.

MASTER SAFE:

Record inhibition, switches all channels to SAFE. The READY function is disabled.

NRS TONE:

Activates the tone/noise generator of the built-in noise reduction system.

DELAY INHIBIT:

Time delay compensation. Delays the on/off switching (relative to the erase head) of the record head when the drop-in/drop-out is performed.
When this key is pressed (i.e. the LED is lit), the time delay is switched off.
Delay Inhibit = OFF is required for the REHEARSE function.

AUTO INPUT:

All channels switched to SYNC (AUTO INPUT A) or SYNC and READY (AUTO INPUT B) are switched to INPUT in the operating modes STOP, REWIND, FORWARD, LOC, AND ROLLBACK.
Normal setting: AUTO INPUT B.
Activation of AUTO INPUT A OR B: see programmable function No. 052 AUTO INPUT A/B.

AUTO MUTE:

Automatic muting in spooling mode (exception: tape lifter for cueing engaged) and during the start phase (until the nominal tape speed is attained).

CHANNEL ON:

Press the CHANNEL ON key and simultaneously the SAFE key of the channel to be activated (1-24). With CHANNEL ON + ALL SAFE, all channels can be switched on. --> CH on LED indicates the status on.

CHANNEL OFF:

Switches an audio channel off. The channel can be reactivated with the CHANNEL ON function. To switch off a channel, press CHANNEL OFF and simultaneously the SAFE key (1...24) of the channel to be switched off. With CHANNEL OFF + ALL SAFE, all channels can be switched off.

NRS ON:

Activates the internal noise reduction system. Press the NRS ON key and simultaneously the SAFE key of the desired channel (1...24). With NRS ON + ALL SAFE, the noise reduction systems of all channels are activated. The center LED of the VU-meter indicates the NRS status:
LED ON: noise reduction system switched ON
LED OFF: noise reduction system switched OFF

NRS OFF:

Disables the internal noise reduction system. Press the NRS OFF key and simultaneously the SAFE key of the desired channel (1...24). With NRS OFF + ALL SAFE, the noise reduction systems of all channels are disabled. The center LED of the VU-meter indicates the NRS status:
LED ON: noise reduction system switched ON
LED OFF: noise reduction system switched OFF

NAB:

Switches the equalization to NAB standard. While holding down the SET ENABLE key, also press NAB.

CCIR:

Switches the equalization to CCIR standard. While holding down the SET ENABLE key, also press CCIR.

DOLBY HX-PRO:

Activates all channels of the DOLBY HX-PROFESSIONAL headroom extension circuit (standard feature). While holding down the SET ENABLE key, also press DOLBY HX-PRO.

TAPE A:

Selector switch for tape type A. While holding down the SET ENABLE key, also press TAPE A.

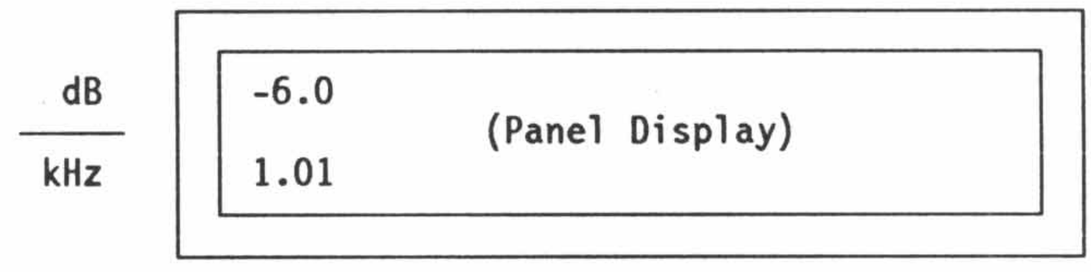
TAPE B:

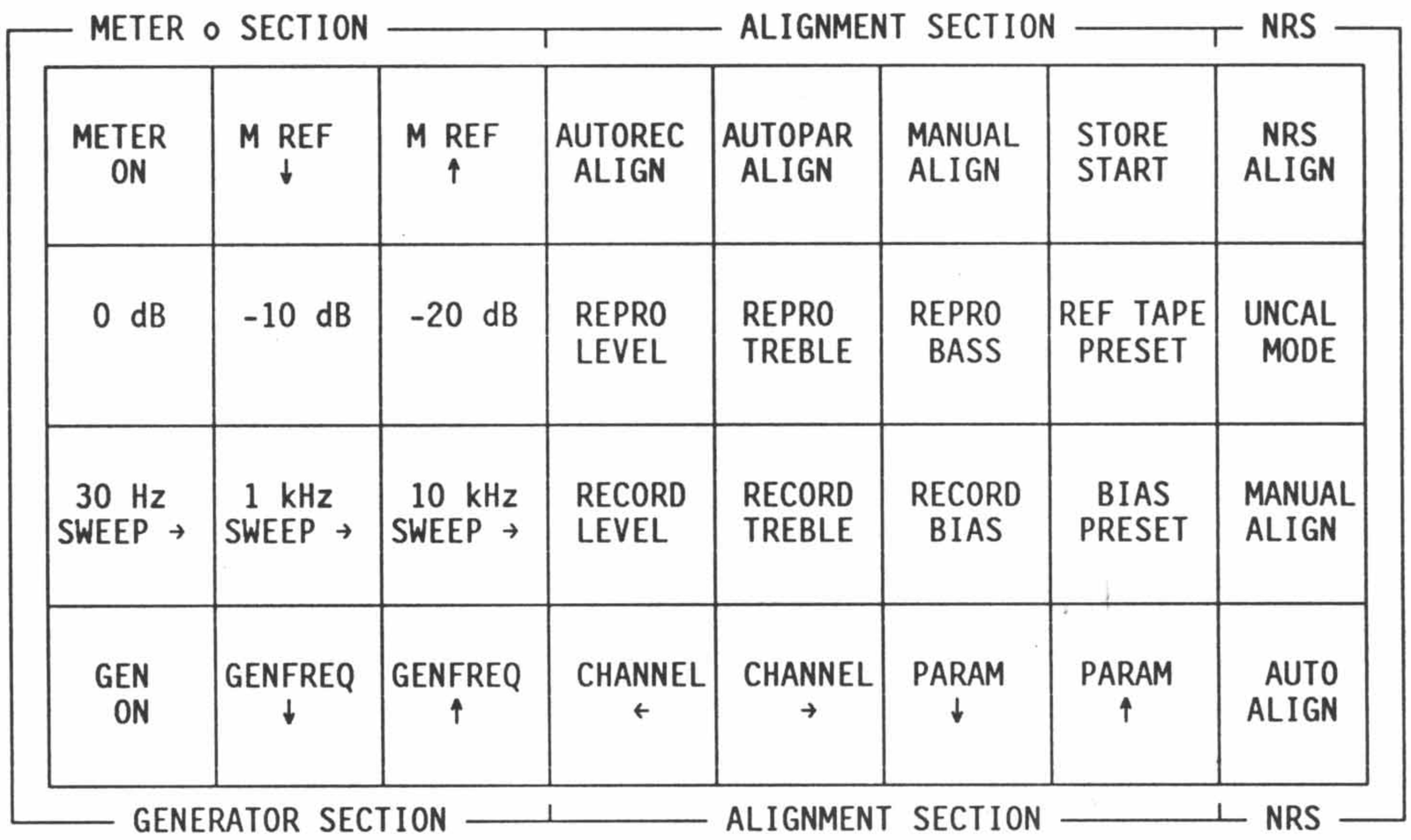
Selector switch for tape type B. While holding down the SET ENABLE key, also press TAPE B.

CHANNEL SETTING MEMORY:

Five memory areas (1...5) are available for storing 5 different channel settings. The current channel setting can be transferred into a memory by holding down the STORE key and simultaneously pressing the desired memory key (1...5). The stored channel settings can be recalled by pressing the corresponding memory key (1...5).

2.4.6 Metering and Audio Generator





Meter section

METER ON: Switches all bar graph indicators to metering mode with an improved resolution of 0.1 dB per segment on a scale of ±2.5 dB.

M REF ↓, M REF ↑: Sets the reference point for the high resolution metering. The current reference point on the dB scale is shown in the upper left corner of the LC display (e.g. -6.0). The measuring range is -30...+6 dB for PPM characteristic, and -24...+12 dB for VU characteristic.

Generator section

GEN ON:
Activates the internal frequency generator. The current frequency is shown in the lower left corner of the LC display (e.g. 1.01 kHz). The generator range is 30 Hz...25.01 kHz.

GEN FREQ ↓, GEN FREQ↑:
Permits manual setting of the generator frequency in steps of 10 Hz.

30 Hz SWEEP, 1 kHz SWEEP, 10 kHz SWEEP:
Pressed once: the generator frequency is set to the corresponding frequency (30 Hz, 1.01kHz, 10.01 kHz).
Pressed twice: the generator SWEEPs the range starting at the corresponding frequency (30 Hz, 1.01 kHz, 10.01 kHz) up to 25.01 kHz.

0 dB, -10 dB, -20 dB:
Selects the attenuation of the internal generator with reference to the measurement scale for VU or PPM characteristic (e.g. 0 dB on the generator = 0 VU on the VU-meter or 0 dB on the PPM output meter).
The attenuation keys set the reference point of the high resolution meter to the corresponding level when the generator and the meter (METER ON) are simultaneously activated (i.e. when the generator is set to -10 dB, the reference point of the meter is automatically set to -10 dB).

2.5 Operation

2.5.1 Pilot Lamps

During the power-on sequence, i.e. while the processor is being initialized, certain keys and indicator lamps may turn on, i.e also READY and REC. However, the record function is electronically disabled during this time. After powering-up, the following keys or pilot lamps (LEDs) turn on and indicate the current operating state of the recorder:

- The STOP function is active. If this key flashes this means that both tape tension sensors are in their limit positions (no tape or tape mounted loosely).
- Tape speed: e.g. 15 ips.
- CCIR or NAB: indication of the selected equalization.
- TAPE A or TAPE B: tape type selection.
- VU-meters
- Channel selector set to: SAFE
- Channel selector set either to (INP, SYNC or REP).

For a few seconds, the service display (LCD) indicates the software version of the tape recorder (creation date of the master software, calendar week / year), followed by the possible option SMPTE/EBU Interface options with which the recorder can be equipped plus possible error messages in plain text, or the message "no errors detected" and subsequently the current machine status (line level, as well as the type of noise reduction system that is connected and which channel, if any, has been assigned to the time code).
On the right-hand side of the electronics rack, six green LEDs indicate that the supply voltages are available: (+5.6 V, +24 V, +15 V, -15 V, +26 V, -26 V). Three of four fuses are also checked (see Fig. 2.4.1). If they are allright, one LED each (F1, F2, F3) is lit.

2.5.2 Threading the Tape

Thread the tape as illustrated in Fig. 2.4–2 The start of the tape is wound on the empty reel and secured by giving the reel a few turns. As soon as the tape is tensioned, the tape transport mechanism engages. The STOP key is off. The tape tension control circuit is activated as soon as one of the tape transport keys is pressed; the A820 MCH is now ready for operation. The STOP key is on now.
Reset the tape timer to zero by pressing the RESET TIMER key. Close the head shield in front of the heads, if necessary.

Important: The head shield in front of the heads must be tilted downward to thread the tape.

2.5.3 Tape Speeds

Up to three tape speeds are available 7.5 ips / 15 ips / 30 ips (see menue: function 212–219). The speed can be selected by pressing the corresponding speed selector key below the flap cover; the corresponding pilot lamp lights up.

2.5.4 Play Mode

The built–in PLAY key, a remote control key, or a fader start device starts the tape recorder in PLAY mode. The PLAY pilot lamp lights up.
The PLAY function can be cancelled by pressing the STOP key or any other transport key.
If the PLAY key is pressed while a recording is in progress, the tape recorder switches to PLAY mode without interruption. If the PLAY key is pressed in winding, the tape decelerates and the preselected PLAY key flashes until the right speed is achieved.

2.5.5 Reverse Play Mode

By simultaneously pressing the TRANS and PLAY keys, the tape recorder can be switched to REVERSE PLAY mode. It is also possible to use a key with the programmed function REVERSE PLAY.

2.5.6 Varispeed Control

With the built-in varispeed control it is possible to deviate up to ±7.5 semitones from the nominal tape speed.
The speed change can be preselected with the SET VARISP key and the SET/CUE wheel which in this case acts as a "potentiometer". This has no influence on the current nominal speed. The deviation is indicated on the service display either in semitones, percent of the nominal speed, or as the actual tape speed in inches per second (ips), depending on the programming.
The changeover from nominal speed to varispeed is performed with the VARISPEED key; the VARISPEED pilot lamp in the STATUS FIELD flashes.
When the SET VARISP and the VARISPEED functions are activated at the same time, the speed can be changed directly (with the SET/CUE wheel). The result is immediately audible during playback.
The timing correction for the drop-in and drop-out (see 2.5.7) is set for the nominal speed; a corresponding offset results when recordings are made in varispeed mode.

2.5.7 Record Mode

When the REC and the PLAY keys are pressed simultaneously, the tape recorder switches to record mode and the PLAY and REC keys lit up.
If PLAY and REC are pressed in spooling mode, the tape is decelerated. The record function is preselected, the REC and PLAY keys flash. As soon as the tape has reached the nominal speed, the recording mode is initiated and the two keys are continuously light.
From record mode it is possible to switch directly to fast wind, play or a locator function.

SAFE/READY keys:

With the SAFE key the corresponding channel can be disabled for recording. The yellow SAFE pilot lamp lights up; if PLAY and REC are pressed together, the tape deck starts; recordings already existing on the audio track protected with the SAFE key are retained and can be monitored (REP or SYNC).
In order to prepare a channel for recording, the corresponding READY key must be pressed. The green READY pilot lamp lights up. When the recording is started with PLAY and REC, the red REC pilot lamp lights up to signal that the recording mode is active.
While a recording is in progress, recording on the channels can be inhibited directly with SAFE. In order to renable them for recording again, it is necessary to first press the READY key; when the READY pilot lamp lights up, either the PLAY and the REC key or only the REC key must be pressed, depending on the programming.

MASTER SAFE key:

The MASTER SAFE function is a higher ranking record inhibition. As long as MASTER SAFE is active, the tape recorder can not be prepared for recording with the READY key.

Drop in:

Click-free changeover from reproduction or sync reproduction to record is possible. Two modes can be programmed: in play mode, PLAY and REC must be pressed together (RECORD A), or the recording function is activated by pressing only the REC key (RECORD B). Depending on the settings, the erase and record heads are switched on simultaneously (DELAY INHIBIT active) or the record head switches on with a speed dependent delay in such a way, that there is no gap between the erased- and the nearly recorded part on tape (gapless recording with DELAY INHIBIT off).

Drop out:

Click-free changeover from RECORD mode to PLAY or SYNC mode is possible. Depending on the settings, the erase and record heads are switched off simultaneously (DELAY INHIBIT active) or the record head switches off with a speed dependent delay in such a way, that there is no gap between the erased- and the previously recorded-part on tape (DELAY INHHIBIT off).
Dropping out by pressing SAFE always switches both heads off simultaneously.
Dropping out by pressing STOP completes the drop-out process before the tape is subsequently stopped.

2.5.8 Sync Reproduction

The SYNC key switches the machine to sync reproduction. This means that the audio signals are not supplied by the reproduce head but by the record head via the reproduce amplifier. Since there is no time offset between the record head and the reproduce head in this mode, accurate drop-in is possible.
For technical reasons, the reproduce frequency response in sync mode is limited to approx. 12 kHz. For special mixdowns, the bandwidth can be increased to 20 kHz by means of a jumper on the REPRODUCE AMPLIFIER (see Section 4.8.2). However, strong crosstalk from the record channel to the sync reproduce channel must be expected at frequencies above 12 kHz.

SYNC preselection:

SYNC reproduction can be preselected for a channel that has been enabled for recording mode. When the SYNC key is pressed while a recording is in progress, the output of the corresponding channel is connected to the input (INP). This channel is automatically switched to SYNC reproduction when the drop-out occurs (PLAY, SAFE, STOP).

2.5.9 Wind Mode

The ► key activates the fast wind in the forward direction, the ◄ key in the rewind direction. The tape will be wound at the programmed spooling speed. The corresponding pilot lamp lights up.
The wind functions are cancelled by STOP, PLAY, REC+PLAY, SHUTTLE, LOC functions, and by winding in the opposite direction.
It is admissible to switch from rewind directly to fast forward and vice versa, or from play or record to wind.
From wind mode it is admissible to switch directly to play or record mode. In this case the keys of the preselected function flash; the tape is decelerated, and the preselected function is activated as soon as the tape has reached the nominal speed.

Tape lifting In spooling mode the tape is automatically lifted off the heads in order to minimize the wear of the tape and the heads.
By activating the LIFTER function (see section 2.5.2), the lifter pin is retracted and the pinch roller assembly engages so that the tape contacts the head and the modulation becomes audible.

2.5.10 Producing Pancakes at Reduced Spooling Speeds, Library Wind

The reduced spooling speed (LIBRARY WIND) is intended for pancakes that are to be stored in a library, the speed can be adjusted in steps of 0.1 m/s between 0.1 m and 15 m/s (default 5 m/s). This function is activated by pressing the LIBRARY WIND key, followed by one of the wind keys ◄ or ►. Also the locator functions will be performed at the reduced spooling speed as long as LIBRARY WIND is active.
This function can be cancelled by pressing LIBRARY WIND a second time or by switching the tape recorder off and on.

2.5.11 Stop Mode

The STOP key has the highest priority and cancels all operating states such as play, record, spooling, and autolocator. The tape is immediately decelerated after this function has been selected. The STOP key flashes until the tape has come to a stop after which this pilot lamp changes to steady light.
The tape tension control loop is always active (exception: tape unthreaded), and this is essential for manual editing.

- When STOP is held down while one of the keys LOC1...LOC5 is also pressed, the corresponding locator address is shown on the display.

2.5.12 Editing, Cutting the Tape

Searching a tape address in fast wind When the desired tape address is approximately known (e.g. start or end of a selection) it can be searched by means of the fast forward or rewind key. Actuate the programmable LIFTER key so that the tape lifter is retracted and the modulation becomes audible. As soon as the desired location is found, the tape can be accurately positioned by repetitively pressing ◄ or ►, by actuating the SHUTTLE wheel, or by pressing EDIT and turning the SET/CUE wheel. Press the STOP key and move the tape to the exact edit position by carefully turning one of the two reel flanges (manual editing).

Searching a tape address in PLAY: If certain segments with unknown addresses are to be eliminated from a production, they can be searched in normal PLAY mode. When an edit point is found, press the STOP key and position the tape accurately by carefully turning one of the two reel flanges (manual editing).

Searching a tape address with the Autolocator:

With the ZERO-LOC key it is possible to search the tape address 0.00.00.0 automatically in spooling mode. The start of a production is automatically stored and if the recording has not been interrupted, it can be automatically searched with the LOC START key.
Up to 5 addresses (depend on the programming of the keys) can be stored directly by pressing TRANS and LOC1...5 at the desired address. When the corresponding LOC key is pressed, the stored address is automatically searched and the exact edit point can be manually adjusted.

Marking the tape, cutting in the splicing block

Mark the tape, as it is located in front of the reproduce head, on the reverse side of the tape, by using a grease pen or a soft pencil. Place the marked tape in the splicing block so that you can cut the tape on the given slit with a razor blade.

Splicing the tape

The two tape sections to be joined are inserted with the reverse (marked) side facing up into the splicing block. The ends are butted together (without overlap!) and spliced with an adhesive tab that is approx. 20 mm long and 1" or 2" wide.

2.5.13 Tape Dump Mode

In TAPE-DUMP mode the right-hand spooling motor is disabled. Unwanted tape segments can thus be played into the waste basket.
When the TAPE-DUMP key is pressed, the machine switches either to play or preselects the "TAPE DUMP mode", see below. The right-hand spooling motor is switched off. Four versions are available:

- TAPE DUMP A (default programming): Tape timer active, function can be cancelled with STOP or by pressing TAPE-DUMP again.
- TAPE DUMP B: Same as tape dump A but the tape timer is switched off.
- TAPE DUMP C: The TAPE DUMP key preselects the TAPE DUMP mode which is activated by pressing PLAY and cancelled with STOP. Tape timer is active. Can be cancelled only in STOP mode by pressing TAPE DUMP a second time.
- TAPE DUMP D: Same as TAPE DUMP C but the tape timer is switched off.

Retracting a loose tape segment

If too much tape has been inadvertently unwound, it is not necessary to rewind it manually. Thread or leave the tape threaded as shown in Fig. 2.5.13-1 Tension the tape with two fingers of your right hand (preferably gloved) and continually hold down the REWIND key. The left-hand spooling motor rotates and slowly takes up the loose tape. This process can be stopped by releasing the REWIND key.

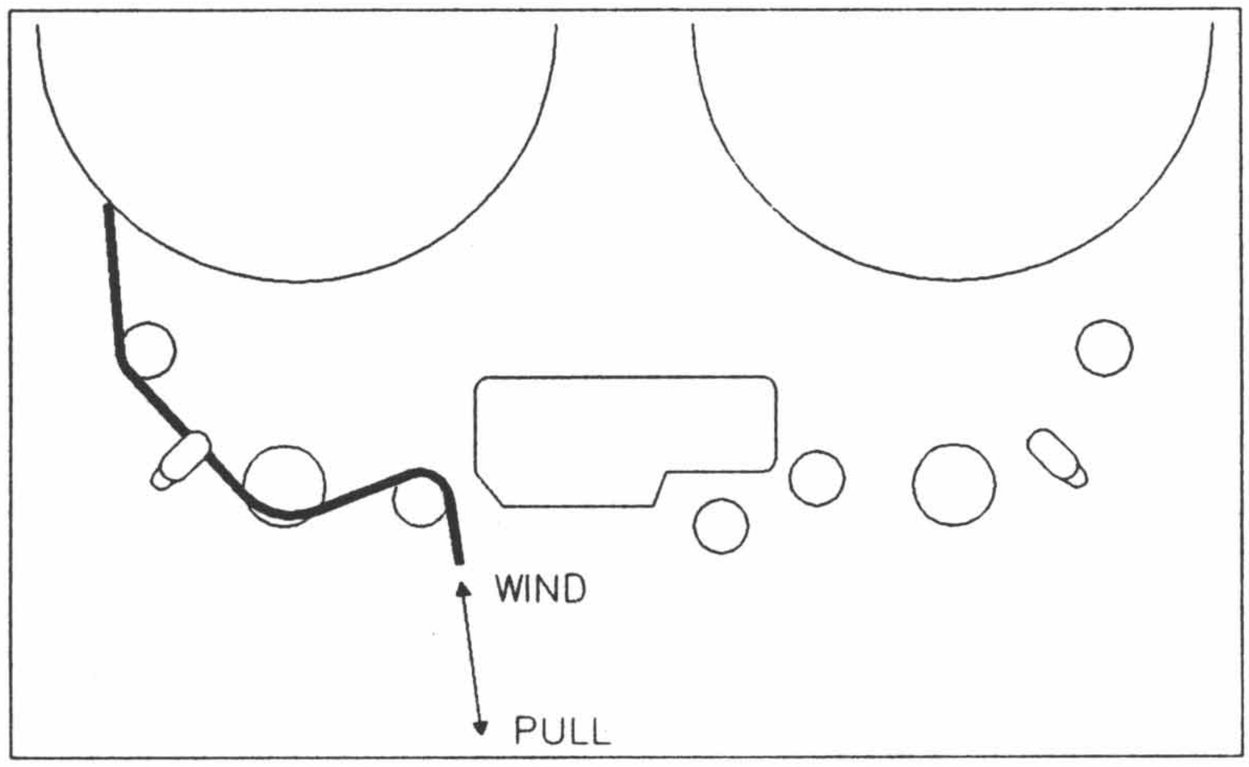


Fig. 2.5.13-1

The torque of the motor is limited and controlled in such a way that the tape can be easily stopped by hand. If you let loose of the tape, the motor turns very slowly; its speed increases as soon as some tension is applied to the tape.
The same applies also to the rewinding of a tape segment with the right-hand spooling motor. It is important, however, that the tape segment to be wound is threaded across the tape tension sensor and the adjacent guide roller so that the tape tension control circuit can function correctly.

Playing a discarded tape segment

After a long editing session it may happen that many tape sections have been cut and that you are not certain whether or not they contain some usable material. With the A820 MCH tape recorder you can play cut segments without first splicing them and winding them on a reel.

Procedure: Press the EDIT key, the tape lifter and the pinch roller engage. The EDIT pilot lamp is active, STOP flashes. Insert a tape segments as illustrated in Fig. 2.5.13-2.

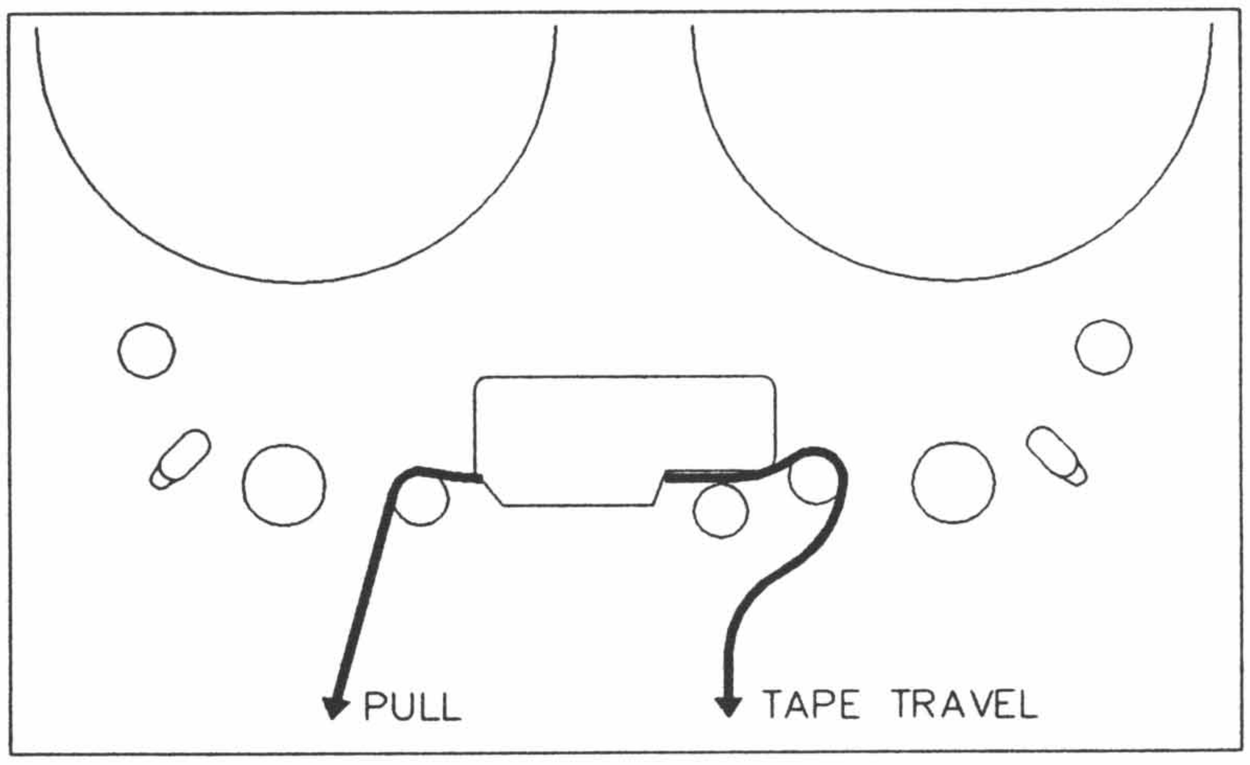


Fig. 2.5.13-2

With your left hand, slightly tension the tape on the left-hand side of the head-block and press PLAY with your right hand. The tape segment is drawn over the reproduce head and can be monitored. If slight backtension is created with your left hand, the contact of the tape with the head is improved (better reproduction), and any dust particles that the tape may have picked up in the waste basket are removed.
The PLAY function can be interrupted by pressing the EDIT key. If the STOP key is pressed the tape lifter disengages.

2.5.14 Locator

The locator supports the following modes:

- ZERO LOC: Zero locator. This key initiates a rewind (or fast forward) to the tape address that corresponds to the tape timer reading 0.00.00.0, regardless of whether the zero position of the main timer or the second timer is to be searched.
- LOC START (programmable): This key initiates a rewind (or fast forward) to the address at which PLAY was last activated (prerequisite: the tape must have been at standstill). Depending on the programming, either STOP (LOC START STOP function), play (LOC START PLAY function) or record (LOC START REC) is subsequently activated.
- LOC1...LOC5 (programmable): Transfer locator. Up to five tape addresses can be stored and automatically searched in spooling mode by pressing the corresponding key.

The locator function is cancelled by pressing: ◄, ►, STOP, or EDIT.

Programming: Search the desired tape address. When it has been approximately reached, press the TRANS key. The address can be stored while the TRANS pilot lamp is active. When the exact position has been reached, press the corresponding LOC key. The TRANS lamp switches off to acknowledge that the address has been stored. The TRANS key must be pressed again if a new address is to be stored.

Reading out an address: During a LOC operation: by pressing the corresponding LOC key a second time, or in STOP mode by pressing the STOP key together with the corresponding LOC key.

PLAY or REC preselection: If the PLAY key is pressed once during a locate function (ZERO LOC, LOC START, LOC1...5) or if PLAY is pressed together with REC, the tape recorder switches automatically to play or record when the corresponding tape address is reached.

All locate addresses remain stored even when the tape recorder is switched off.

Important: The locator addresses are not recomputed when the timer display is reset to zero or changed with the SET TIMER function.

2.5.15 Tape Timer

The electronic tape timer always displays the real tape time in hours, minutes, seconds, and tenths of seconds relative to the selected nominal tape speed.

The timer has a display range of -9 h 59 min 59.9 s to 23 h 59 min 59.9 s. Figures that are outside this range are indicated by a "u" (underflow, negative value too small) or a "o" (overflow, positive value too large) in the tens of hours position e.g. o4.00.00.0 or u3.03.35.7.

Fractional tenths of a second are rounded. The timer is set to 0.00.00.0 when the RESET TIMER key is pressed.

At the end of the tape or if the tape is torn the timer stops automatically. In TAPE DUMP mode the timer continues to run or stops, depending on which of the four TAPE DUMP modes has been programmed. (Standard programming: TAPE DUMP A, timer continues to count with the tacho information supplied by the capstan motor).

2.5.16 Auxiliary Tape Timer

With the LAP key (function No. 334) the tape counter display can be switched to a second (auxiliary) tape timer with a user-selectable reference. The auxiliary timer mode is signalled by an "L" in the first position of the display.
The auxiliary timer can be set to zero (RESET TIMER key) at any tape address and can thus be used for determining the exact playing time of a selection without having to compute the difference between the start and the end time. When the LAP key is pressed a second time, the display switches back to the main timer, the "L" in the first position disappears.
Locator addresses will remain unchanged when switching between times.

2.5.17 Remote Control

The following functions can be remote controlled by means of the **parallel remote control** unit: play, record, winding, stop, RESET TIMER, ZERO LOC, LOC START, BACKSPACE (rewinding for as long as the key is pressed, followed by PLAY) or LIFTER (defeating the tape lift during winding), and FADER (FADER START ready).
The keys of the **serial remote control** can be assigned to any function that could be programmed on the local keypad, regardless of the programming of the local keypad; i.e. it is not necessary to program the same functions on the serial remote control as on the keypad of the tape recorder. In addition, the serial remote control features a tape timer and a SHUTTLE wheel. The functions of the remote control keys are programmed in the same way as the keys on the local keypad.

- Operation with programmable function REMOTE A:
  When the REMOTE key is pressed, the corresponding pilot lamp lights up and the local keypad is disabled. When the REMOTE key is pressed again, the local keypad is reactivated and the pilot lamp switches off. The keys of the remote control are dead in this condition.
- Operation with the programmable function REMOTE B:
  When the REMOTE key is pressed, the corresponding pilot lamp lights up and the remote control keys and the local keys are equivalent. When the REMOTE key is pressed again, only the local keypad is active and the pilot lamp switches off.
- Operation without the REMOTE A or REMOTE B function:
  The REMOTE LED is continuously on, the keys of the local keypad and the remote control are equivalent.

2.5.18 Time Code Channel (Option)

- The channel equipped with the time code option is automatically indicated on the LC display of the tape deck.
- Any changes in the parameters of the time code channel (equipped with high-speed reader) have no influence on the audio data.
- Neither are the time code parameters influenced when the audio parameters of the same channel are changed.

Time code recording:

While holding down SET ENABLE simultaneously press READY on the channel equipped with the time code electronics. The READY lamp lights up. The recording is started by pressing REC + PLAY.

Time code reproduction:

Press REPRO or SYNC on the channel equipped with the time code electronics and start the tape recorder in play mode. For reading the time code at high speed or in wind mode, SYNC should preferably be used.

Time code level indication:

INPUT mode: The bar graph indicates 0 VU ±1 segment (VU characteristic) or -6 dB ±1 segment (PPM characteristic) when the level of the time code signal is within 0.250Vpp ... 4Vpp (nom. 2Vpp) on the time code input.
SYNC mode: The bar graph indicates the current time code level from tape (record head).

2.6 Soft Keys, Status Tree Diagram for A820 MCH 1" and 2" Version

Each operating key of the A820 MCH tape recorder (except the four blue and red keys of the function and programming key pad below the hinged cover) can be assigned to any of the approx. 100 possible functions or operating modes. This applies to the functions identified as "KEYS ONLY" as well as to those with the designation "KEYS/MODE".
KEYS ONLY: functions that can be operated only if they are assigned to a key.
KEYS/MODE: functions that can also be operated via the programming keypad, without the function being assigned to a key.
In order to simplify the function assignment, the service display (alphanumeric LC display on the right front of the tape deck) and the following downward branching status tree diagram is used.

This diagram consists of ╔blocks╗ and ┌selections┐

For programming examples refer to Section 2.5.3

Important: Programming is only possible when the tape recorder is in STOP or TAPE OUT mode!
After the tape recorder has been powered on, the first four (possibly five) blocks appear consecutively on the display for several seconds:

```
A820M MULTI CH VERS:
MASTER: WW/YY
```

Creation date of the MASTER software, calendar week/year,

```
A820M OPTIONS
```

The SMPTE/EBU interface will be displayed if installed.

```
= = = = = = = = = = =
  DEFAULT AUDIO
 PARAMETERS LOADED
= = = = = = = = = = =
```

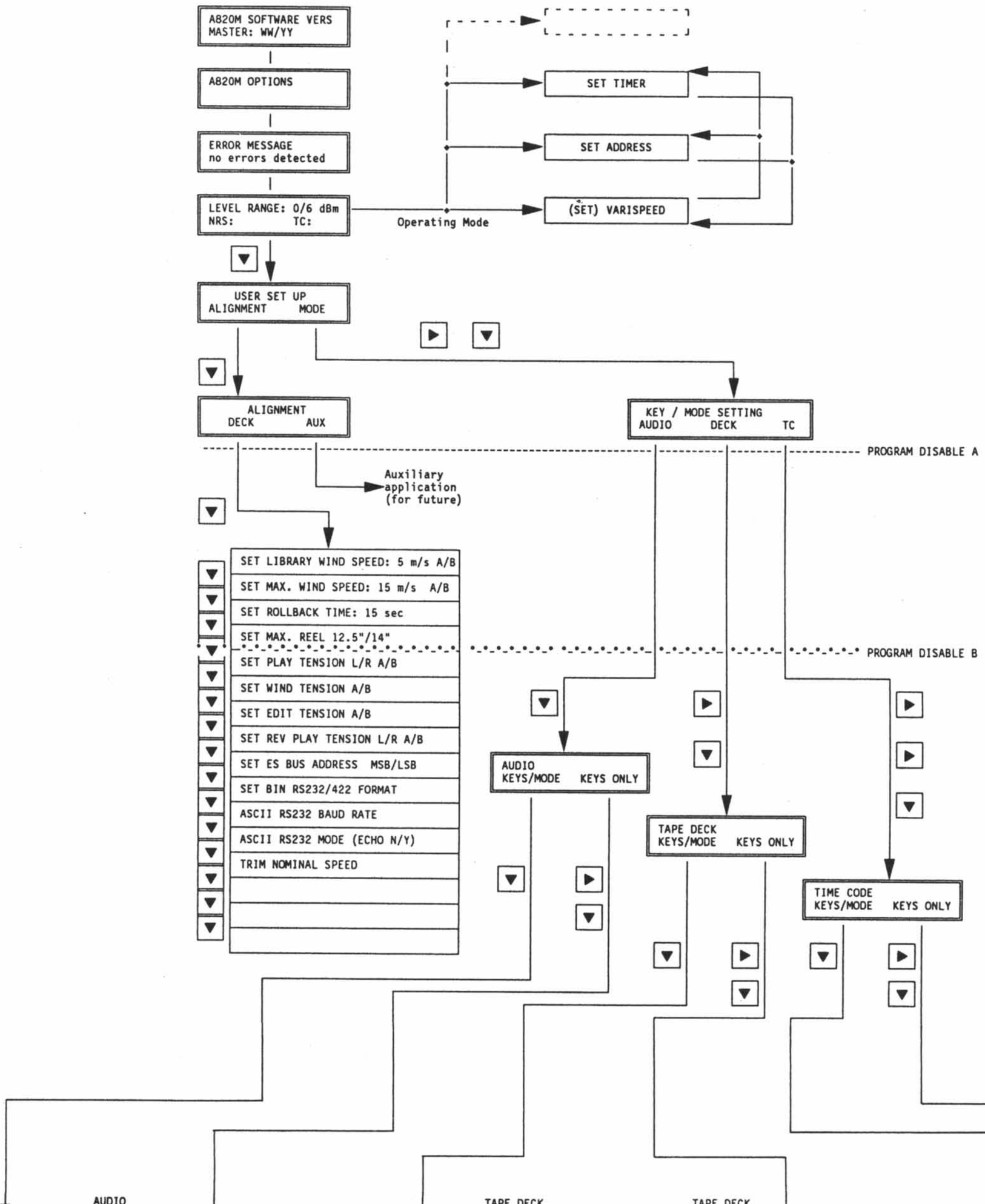
If this message appears, the default audio parameters have been loaded after a RAM error. These parameters can deviate somewhat from the machine-dependent parameters. The tape recorder can be operated, but deviations from the optimum calibration data are inevitable. If the machine-dependent parameters have been written down or saved on tape, they can be reentered or reloaded.

```
ERROR LIST
```

Plain-text error messages (if any) resulting from the automatic self-test, or the message "no errors detected", and

```
L RANGE 0/6 dBm
NRS: NONE  TC: NONE
```

The first line specifies the line level at which the tape recorder operates. The second line specifies the type of internal noise reduction system that is installed (if any). If the time code option is installed, the corresponding channel number is displayed here.
The process stops here. The above four (or five) blocks can be recalled in normal operation by pressing the keys ↑LAST.
When the programming lock [..] is closed (Allen key size 2.5; clockwise limit position), the status tree cannot be accessed and the various parameters cannot be modified (F247 = program disable A). If function 247 is set to "program disable B", the tape deck parameters "reduced and maximum wind speed, ROLLBACK time, maximum reel diameter" can still be changed and stored. Error messages can be acknowledged with STORE when the programming lock is closed (exept: serious problems).
It is not possible to reprogram any key functions when the lock is closed. Any attempt will be signalled on the service display with the message "program mode not enabled". To open the programming lock: give the screw 2–3 counter-clockwise turns.
The keys ↓NEXT, ←CURSOR, →CURSOR, and ↑LAST are used for navigating up and down within the tree diagram. In order to branch off, position the cursor below the desired menu.



KEYS / MODE
009 L RANGE 0/6 dBm
010 L RANGE 4/10 dBm
011 L RANGE 8/14 dBm
012 L RANGE 10/16 dBm
052 AUTO INPUT A/B
053 METERING VU/PPM
054 NRS DOLBY/TELCOM
055 DOLBY A/SR
056 TELCOM c4D/c4E
057 NRS REP → INP Y/N
059 READY RECORD Y/N
061 DROUP OUT DELAY Y/N
071 COPY REP/SYN PAR A>B
072 COPY REP/SYN PAR A>B
073 COPY REP/SYN PAR A>B

KEYS ONLY
102 SPOT ERASE
104 AUDIO REMOTE IF

KEYS / MODE
201 TAPE GUARD A Y/N
202 TAPE GUARD B Y/N
203 TIMER RESOLUTION A/B
211 3.75 IPS
212 7.5 IPS
213 15 IPS
214 30 IPS
215 3.75/7.5 IPS
216 7.5/15 IPS
217 15/30 IPS
218 3.75/7.5/15 IPS
219 7.5/15/30 IPS
220 3.75/7.5/15/30 IPS
230 FADER MASTER ENABLE
231 FADER A
232 FADER B
233 FADER C
234 FADER D
241 VARISPEED %
242 VARISPEED HT
243 VARISPEED IPS
244 IPS/HT/ -"- %
245 -"- IND. ENHANCED
246 SAVE KEY SETTING
247 PROGRAMM DISABLE A/B
252 SHUTTLE A/B
253 WIND A/B
254 EDIT A/B
255 REC. INDIC. MODE A/B
257 LIFTER REMOTE A/B
258 LIFTER LOCAL A/B
259 SINGLE LOOP MODE A/B

KEYS ONLY
301 REWIND
302 FORWARD
303 LIBRARY WIND
304 PLAY
305 REVERSE PLAY
306 STOP
307 RECORD A
308 RECORD B
309 EDIT
311 TRANSFER
312 HOLD
313 LOCATE 1
314 LOCATE 2
315 LOCATE 3
316 LOCATE 4
317 LOCATE 5
318 LOCATE ZERO
319 LOC START PLAY
320 LOC START STOP
321 LOC START REC
322 ROLLBACK PLAY
323 ROLLBACK STOP
324 ROLLBACK REC
325 BACKSPACE STOP
327 TAPE DUMP A
328 TAPE DUMP B
329 TAPE DUMP C
330 TAPE DUMP D
332 LIFTER
334 LAP/WATCH DISPLAY
335 RESET TIMER
336 SET TIMER
337 SET ADDRESS
338 SET VARISPEED
339 VARISPEED ON/OFF
345 REMOTE A R CTL ONLY
346 REMOTE B REM+LOCAL
347 SHUTTLE BAR
348 UNLOAD
351 NO FUNCTION
355 SINGLE LOOP
356 AUTO LOOP
357 INSTANT LOOP

KEYS / MODE
401 FUTURE USE

KEYS ONLY
501 FUTURE USE

2.6.1 Key Numbering

The operator keypad is designed as a matrix comprising 5 rows with up to 10 keys each.

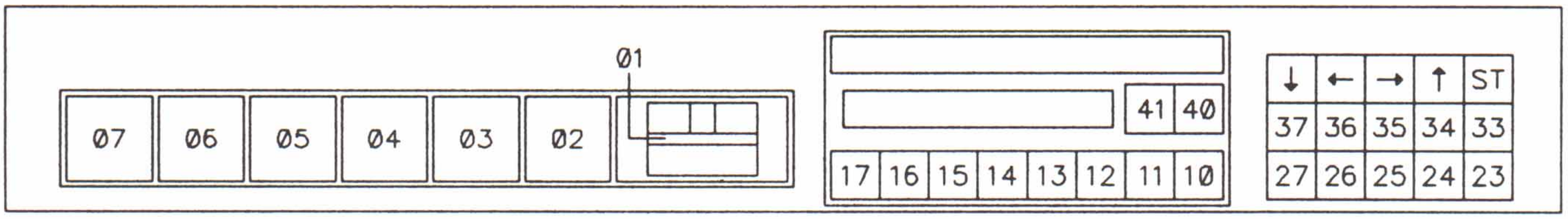


Fig. 2.6.1

2.6.2 Description of the Functions

```
L RANGE  0/ 6 dBm Y/N (No. 009) KEYS/MODE
L RANGE  4/10 dBm Y/N (No. 010) KEYS/MODE
L RANGE  8/14 dBm Y/N (No. 011) KEYS/MODE
L RANGE 10/16 dBm Y/N (No. 012) KEYS/MODE
```

Definition of the line level at which the tape recorder works.
The first of the two level indications is valid if the meter are programmed for VU characteristic, the second is valid for PPM characteristic.
In case the line level in the studio deviates from the four available graduations, the closest value to the studio level should be selected and the internal record and reproduce levels should be adjusted in such a way that the tape recorder operates with the desired magnetic flux (for examples see 4.2.6).

```
AUTO INPUT A/B          (No. 052) KEYS/MODE
```

Selection of the AUTO INPUT function. Switches all channels in SYNC (AUTO INPUT A), or only the channels in SYNC and READY (AUTO INPUT B), to INPUT in the operating modes STOP, REWIND, FORWARD, LOC AND ROLLBACK.
Default: AUTO INPUT B.

```
METERING VU/PPM         (No. 053) KEYS/MODE
```

Selects VU or PPM characteristic for the meters.

```
NRS DOLBY/TELCOM        (No. 054) KEYS/MODE
```

Selects your preferably NR-system for internal or external use such as Dolby A, Dolby SR, Dolby A/SR or TELCOM C4D, C4E. It selects also the right logic level (HIGH/LOW) on the 15-pin D-Type connectors for the control of an external noise reduction system. Prerequisite: machine equipped with the option 20.820.385 (Ext. NRS-controller).

- In position DOLBY, the open collector output is active LOW.
- In position TELCOM, the open collector output is active HIGH.

NRS DOLBY A/SR	(No. 055) KEYS/MODE

Selects the DOLBY noise reduction module: DOLBY A (Cat. 22/Cat. 450), DOLBY SR (Cat. 280/Cat. 350) or the combined one DOLBY A/SR (Cat. 300).

TELCOM c4D/c4E	(No. 056) KEYS/MODE

Selects the TELCOM noise reduction system: either TELCOM c4D or c4E.

GROUP SELECT Y/N	(No. 59) KEYS/MODE

Not functional yet.

DROUP OUT DELAY Y/N	(No. 61) KEYS/MODE

Drop Out delay activated ("YES") or not activated ("NO") in DELAY INHIBIT mode.

SPOT ERASE	(No. 102) KEYS ONLY

Important: SPOT ERASE can only be activated if the tape transport is in EDIT mode.
After SPOT ERASE has been activated, the corresponding LED lights up for approx. 2–3 seconds. If the EDIT and REC keys are pressed simultaneously during this time, the manual erase function is activated, i.e. the erase head is active on all channels with preselected READY mode. The tracks can be erased manually by shuttling the tape in front of the heads. This method is suited for eliminating minor speech faults, switching clicks, etc.
The SPOT ERASE function is indicated by the flashing SPOT ERASE LED and the flashing REC and EDIT keys.
To cancel SPOT ERASE press the STOP key.
"DON'T LEAVE THE HEAD ACTIVE FOR TO LONG (HEAT MAY DAMAGE THE HEAD)!"

AUDIO REM IF	(No. 104) KEYS ONLY

Activates the parallel channel control interface 21.328.500.00; the local meter panel and the audio remote control are disabled.
When this function is active, the message "AUDIO REMOTE IF ENABLED" is displayed on the LC display of the meter panel.
Cancellation: press the key a second time.

TAPE GUARD A NO/RED	(No. 201) KEYS/MODE

Reduction of the wind speed shortly before the tape unthreads.
From the difference in the speed between the two spooling motors, the tape deck microprocessor knows that only little tape is left on the corresponding feed reel. The wind speed is reduced under the following conditions:

- The hub diameter is correctly defined in the ALIGNMENT DECK block (see 2.6.3, example 1)

■ The TAPE GUARD A function is switched on.

To suppress this function,hold down the fast forward or rewind key continuously.

TAPE GUARD B NO/STOP (No. 202) KEYS/MODE

Activate stop shortly before the tape unthreads.
From the difference in the speed between the two spooling motors, the tape deck microprocessor knows that only little tape is left on the corresponding feed reel. The stop is initiated under the following conditions:

■ The hub diameter is correctly defined in the ALIGNMENT DECK block (see 2.6.3, example 1)
■ The TAPE GUARD B function is switched on.

To suppress this function,hold down the fast forward or rewind key continuously.

TIMER RESOLUTION A/B (No. 203) KEYS/MODE

Tape counter indicates with a resolution of seconds ("B") or tenths of seconds ("A"). Works also with transport remote controls.

7.5 IPS	(No. 212) KEYS/MODE
15 IPS	(No. 213) KEYS/MODE
30 IPS	(No. 214) KEYS/MODE
7.5/15 IPS	(No. 216) KEYS/MODE
15/30 IPS	(No. 217) KEYS/MODE
7.5/15/30 IPS	(No. 219) KEYS/MODE

Speed selection keys. It is possible to program either one key for each speed (functions 212...214), or combination keys (changeover with each key press, (functions 216...217) or a "wraparound key" (the next speed is selected whenever this key is pressed, function 219).

FADER MASTER ENABLE (No. 230) KEYS/MODE

When the FADER MASTER is disabled, the FADER START operation can not be activated. When the tape recorder is operated in conjunction with the TLS 4000 synchronizer, the FADER MASTER is disabled by the TLS4000 so that the synchronizer has control over the machine.

FADER A	(No. 231) KEYS/MODE
FADER B	(No. 232) KEYS/MODE
FADER C	(No. 233) KEYS/MODE
FADER D	(No. 234) KEYS/MODE

With the FADER START circuit the tape recorder can be remotely switched to PLAY, e.g. with a fader of the mixing console.

Fader Start operation:

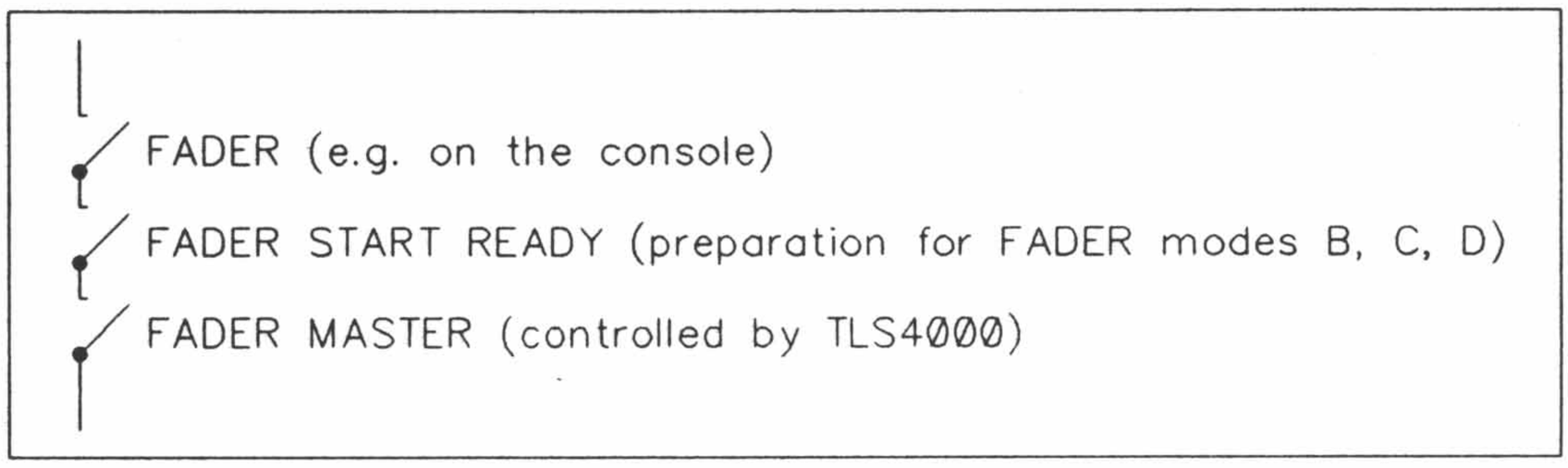


Fig. 2.6.2

In FADER modes B, C, D, the FADER START operation has to be prepared (FADER START READY) by a switch which interconnects pin 6 (SR-FADRY) with pin1 (Ground) of the PARALLEL REMOTE connector.
The FADER START is then initiated by applying 5 to 24V AC or DC between pins 11 and 12 (see section 2.3.3).
The same preparation can also be done with the programmable FADER key (functions No. 231, 232, 233, 234) on the local keypad or on the serial remote control, or with the FADER key on the parallel remote control.
The FADER mode (A, B, C or D) on the parallel remote control is always the same as the one selected on the machine itself, whereas the FADER mode on the serial remote control can be different from the one selected on the machine.
There are four different FADER START mode:

FADER A: FADER START without the preparation. The local keypad is disabled, except for the speed keys. The FADER switch must be reactuated after the tape has unthreaded.

FADER B: FADER START with preparation (FADER START READY), the local keypad remains active when preparation is on. The local keypad is disabled after the FADER START has been initiated; this is the default programming.

FADER C: Same as FADER B, except that the local keypad is disabled when the preparation is on.

FADER D: Same as FADER B, except that the local keypad remains active after the FADER START has been initiated.
While a recording is in progress, neither the FADER START switch nor the FADER switch influence the tape deck.

```
VARISPEED %          (No. 241) KEYS/MODE
VARISPEED HT         (No. 242) KEYS/MODE
VARISPEED IPS        (No. 243) KEYS/MODE
VARISPEED IPS/HT%    (No. 244) KEYS/MODE
```

Defines the VARISPEED display format. The deviation from the nominal speed is indicated in percent, in semitones, or the actual speed in ips is displayed. For each format a separate key (functions 241...243) or a "wraparound key" (the next function is selected with each keystroke, function 244) can be programmed.
For setting or on/off-switching of the variable tape speed: see functions No. 338 and 339.

```
VARISPEED IND. ENH.   (No. 245) KEYS/MODE
```

If selected, this on/off function causes the fast forward and rewind keys to flash in VARISPEED mode in addition to the VARISPEED LED.
For setting or on/off-switching of the variable tape speed: see functions No. 338 and 339.

SAVE KEY SETTING Y/N (No. 246) KEYS/MODE

A change of the headblock (e.g. if converted from 2" to 1" format), the programming of the function keys is automatically set to the default setting when "NO" is selected. "YES" saves the programmed functions.

PROGRAM DISABLE A/B (No. 247) KEYS/MODE

- Program disable A: programming lock inhibits the entry to the menu.
- Program disable B: programming lock inhibits the entry to the menu except for: SET LIBRARY WIND SPEED, SET MAX. WIND SPEED, SET ROLLBACK TIME, SET MAX. REEL.

SHUTTLE A/B (No. 252) KEYS/MODE

SHUTTLE A: Tape contacts the heads in shuttle mode.
SHUTTLE B: Tape is lifted off the heads in shuttle mode.

WIND A/B (No. 253) KEYS/MODE

WIND A: Tape contacts the lifter pin in spooling mode.
WIND B: The tape is retracted from the lifter pin (all rollers are completely retracted).

EDIT A/B (No. 254) KEYS/MODE

EDIT A: Tape tension control is active in edit mode (one-hand cueing possible).
EDIT B: No tape tension control in edit mode.

REC INDIC MODE A/B (No. 255) KEYS/MODE

- Rec Indic Mode A: record indication and record tally are only active if at least one channel is in record mode.
- Rec Indic Mode B: record indication and record tally are independent of the record status of the audio section.
  Application: "Follow external record" with TLS 4000.

LIFTER REMOTE A/B (No. 257) KEYS/MODE

Also refer to function LIFTER No. 332 and function AUTOINPUT No. 052.

Remote: Identifies the keypad of the parallel remote control.
Pos. A: The status of the audio channels (INPUT, REPRO, SYNC) is not influenced when the LIFTER function is activated.
Application: reading the time code in wind mode.
Pos. B: When AUTOINPUT is selected, the audio channels are switched from INPUT back to SYNC as soon as the LIFTER function is activated.
Application: monitoring the audio channels during wind.

LIFTER LOCAL A/B	(No. 258) KEYS/MODE

See also functions LIFTER No. 332 and AUTOINPUT No. 052

Local: Identifies the local keypad and the serial remote control.

Pos. A: The status of the audio channel (INPUT, REPRO, SYNC) is not influenced when the LIFTER function is activated.
Application: reading the time code in wind mode.

Pos. B: When AUTOINPUT is selected, the audio channels are switched from INPUT back to SYNC as soon as the LIFTER function is activated.
Application: monitoring the audio channels during wind.

REWIND (◄)	(No. 301) KEYS ONLY

Rewind with maximum (programmed) wind speed.
This function can be selected from: FORWARD, STOP, PLAY/REC, SHUTTLE stored, any LOC function, CUE.
Cancellation: press FORWARD, STOP, PLAY, SHUTTLE, SHUTTLE BAR, any LOC function; in synchronizer mode by pressing LOCK.
Wind speed can be defined in the ALIGNMENT DECK block; default: 15 m/s.

FORWARD (►)	(No. 302) KEYS ONLY

Fast forward with maximum (programmed) wind speed. Activation/cancellation conditions: same as REWIND.

LIBRARY WIND	(No. 303) KEYS ONLY

In conjunction with FORWARD or REWIND, preselection of this function causes the tape to be wound with defined, reduced speed (programmable from 0.1 to 15 m/s in increments of 0.1 m/s).
Cancellation: press LIBRARY WIND key a second time.
The reduced wind speed can be defined in the ALIGNMENT DECK block; default: 5m/s.

PLAY	(No. 304) KEYS ONLY

Playback with the selected tape speed.
Cancellation: press REC/PLAY, FORWARD, REWIND, STOP, EDIT, SHUTTLE, or any LOC function.

REVERSE PLAY	(No. 305) KEYS ONLY

Playback in the reverse direction.
This function is selected either with a correspondingly programmed function key or by simultaneously pressing TRANSFER and PLAY.
Cancellation: see PLAY.

STOP	(No. 306) KEYS ONLY

Has priority over all tape transport functions.

RECORD A	(No. 307) KEYS ONLY

Record mode, only possible in conjunction with PLAY.
Activation: simultaneously press REC and PLAY.
Cancellation: see PLAY, drop-out is possible by pressing PLAY (the recorder switches to play mode without interruption).
This command is not accepted and not acknowledged by illuminating the key if:

- MASTER SAFE is switched on,
- No HF driver is installed,
- If none of the channels is switched to READY.

RECORD B	(No. 308) KEYS ONLY

Record mode, only possible in conjunction with PLAY; analogous to RECORD A.
Difference: If the recorder already operates in play mode, REC can be activated by pressing only the REC key.

EDIT	(No. 309) KEYS ONLY

EDIT changes the tape transport status to have TAPE/HEAD contact!
Depending now on the function No. 254 EDIT A/B:

- EDIT A: One-hand cueing tape tension controlled, SHUTTLE possible and SET/CUE.
- EDIT B: Cueing possible but no tape tension control.

This function is also used to playback cut tape segments.

TRANSFER	(No. 311) KEYS ONLY

Multifunction key:

- Preparation for storing the current tape timer address in a locator memory. When one of the keys LOC1...LOC5 is pressed after the TRANSFER key, the momentary address is transferred into the corresponding LOC memory, regardless of whether the main timer or the auxiliary timer is active.
  Activation: this function can be selected at any time.
  Cancellation: by storing an address in a LOC memory or by pressing TRANSFER a second time.
- Pressed together with PLAY: playback in the reverse direction, see REVERSE PLAY.

HOLD	(No. 312) KEYS ONLY

Key for "freezing" the momentary tape timer reading (also works with the auxiliary tape timer). The frozen timer reading can then be transferred into the LOC memory by pressing one of the keys LOC1...5. The tape timer continues to count. When the same LOC key is pressed a second time, the tape is positioned at the stored address.
If the TRANSFER key is pressed after the HOLD key, followed by one of the keys LOC1...5, the tape timer reading remains frozen.
Cancellation: By pressing the HOLD key a second time or by storing in LOC1...5.

LOC1	(No. 313) KEYS ONLY
LOC2	(No. 314) KEYS ONLY
LOC3	(No. 315) KEYS ONLY
LOC4	(No. 316) KEYS ONLY
LOC5	(No. 317) KEYS ONLY

Locator Memories:

Automatic locating to the stored address; preselection of PLAY or PLAY + REC is possible (the keys of the preselected function flash while the LOC process is still in operation).
Indication of the target address: in STOP mode by simultaneously pressing STOP and the corresponding LOC key; while the LOC process is running: by continuously holding down the corresponding LOC key.
All LOC addresses remain stored when the tape recorder is switched off!
Activation: from PLAY/REC, REWIND, FORWARD, LOC, SHUTTLE, EDIT.
Cancellation: by pressing STOP, LOC, REWIND, FORWARD, SHUTTLE, SHUTTLE BAR,

LOC ZERO	(No. 318) KEYS ONLY

Automatic locating to the address 0.00.00.0; preselection of PLAY + REC possible.
Activation/cancellation: see LOC1...LOC5.

LOC START-PLAY	(No. 319) KEYS ONLY
LOC START-STOP	(No. 320) KEYS ONLY
LOC START-REC	(No. 321) KEYS ONLY

Automatic locating to the address at which the last STOP to PLAY transition was entered, (i.e. Tape in STOP-mode and then command PLAY).
When the target address is reached, the PLAY or STOP or RECORD command is automatically initiated.
Activation/cancellation: see LOC1...LOC5.

ROLLBACK-PLAY	(No. 322) KEYS ONLY
ROLLBACK-STOP	(No. 323) KEYS ONLY
ROLLBACK-REC	(No. 324) KEYS ONLY

The tape recorder winds automatically backward by a preselectable time (01..99) ROLLBACK always relates to the current tape timer content (even if other display modes are selected).
When the target address is reached, the PLAY or STOP or RECORD command is automatically initiated.
Activation: from STOP, PLAY, RECORD, EDIT mode.
Cancellation: by pressing STOP, REWIND, FORWARD, PLAY, PLAY + REC, SHUTTLE, SHUTTLE BAR, any LOC function.
The ROLLBACK TIME can be defined in the ALIGNMENT DECK block.

BACKSPACE STOP	(No. 325) KEYS ONLY

This function permits rewinding with tape/head contact at four times the play speed.

TAPE DUMP A	(No. 327) KEYS ONLY
TAPE DUMP B	(No. 328) KEYS ONLY

TAPE DUMP-mode switches the right spooling motor off.

TAPE DUMP A: The tape timer is active and the required information is supplied by the capstan motor tacho

TAPE DUMP B: The tape timer is disabled.
Activation: only possible from STOP or EDIT.
Cancellation: by pressing TAPE DUMP a second time or any tape transport function.

TAPE DUMP C	(No. 329) KEYS ONLY
TAPE DUMP D	(No. 330) KEYS ONLY

TAPE DUMP-mode with preparation switches the right spooling motor off.

TAPE DUMP C: The tape timer is active and the required information is supplied by the capstan motor tacho.

TAPE DUMP D: The tape timer is disabled.
Activation: only possible from STOP or EDIT. Preparation with TAPE DUMP, start of the TAPE DUMP-mode with PLAY, interruption with STOP.
Cancellation: by pressing TAPE DUMP a second time or any tape transport function.

LIFTER	(No. 332) KEYS ONLY

Also refer to the functions LIFTER REMOTE A/B No. 257 and LIFTER LOCAL A/B No. 258.
In wind mode, activating this function causes the lifter pin to be retracted and the rollers to engage so that the tape contacts the reproduce head and the modulation becomes audible. Momentary-action key. If AUTO MUTE is selected, muting will be cancelled for as long as the tape contacts the heads.
Activation: in REWIND, FORWARD, LOC AND ROLLBACK mode.
Cancellation: by releasing the LIFTER key.

LAP/WATCH DISPLAY (No. 334) KEYS ONLY

Function to activate a second timer, LAP/WATCH.
Press WATCH to switch over to the LAP/WATCH timer. The LAP/WATCH timer status is indicated through an "L" as the first digit. Both timer, normal a LAP/WATCH can be reset independently from each other.

RESET TIMER (No. 335) KEYS ONLY

Function to RESET the actual timer.
Press RESET TIMER to set the tape timer or if selected, the LAP-timer to zero "0.00.00.0".

SET TIMER (No. 336) KEYS ONLY

Function to modify the content of the normal timer or LAP-timer.
Press SET TIMER to get the display for setting. Use the CURSOR-keys to select the position (hours. min. sec. dsec). The desired time value can be entered now by using the SET/CUE-wheel. Press STORE aftwards.

Cancellation: press SET TIMER again, SET ADDRESS, SET VARISPEED, VARISPEED, LOC1..5, LOCSTART or ROLLBACK.

SET ADDRESS (No. 337) KEYS ONLY

Function to refresh the LOCATOR-memory.
Press SET ADDRESS to get the display for setting. Use the CURSOR-keys to select the position (hours. min. sec. dsec). The desired time value can be entered now by using the SET/CUE-wheel. Press TRANS and one of the LOC-memories. The LOC1 (e.g.) contains now a new address.

Cancellation: press SET ADDRESS again, SET TIMER, SET VARISPEED, VARISPEED, LOC1..5, LOCSTART or ROLLBACK.

SET VARISPEED (No. 338) KEYS ONLY

Function to change the VARISPEED in IPS/HT or % depend on the display format.
Press SET VARISPEED to get the display for setting. The selected nominal speed apears in the display. Use the SET/CUE-wheel to change the speed of the capstan motor. The range varies between -35.15% and +54.22% (-7.5 half tones and +7.5 half tones HT).
The new speed becomes active only with the function VARISPEED.

Cancellation: press SET VARISPEED again, SET TIMER, SET ADDRESS or VARISPEED.

LAP/WATCH DISPLAY (No. 334) KEYS ONLY

Function to activate a second timer, LAP/WATCH.
Press WATCH to switch over to the LAP/WATCH timer. The LAP/WATCH timer status is indicated through an "L" as the first digit. Both timer, normal a LAP/WATCH can be reset independently from each other.

RESET TIMER (No. 335) KEYS ONLY

Function to RESET the actual timer.
Press RESET TIMER to set the tape timer or if selected, the LAP-timer to zero "0.00.00.0".

SET TIMER (No. 336) KEYS ONLY

Function to modify the content of the normal timer or LAP-timer.
Press SET TIMER to get the display for setting. Use the CURSOR-keys to select the position (hours. min. sec. dsec). The desired time value can be entered now by using the SET/CUE-wheel. Press STORE aftwards.

Cancellation: press SET TIMER again, SET ADDRESS, SET VARISPEED, VARISPEED, LOC1..5, LOCSTART or ROLLBACK.

SET ADDRESS (No. 337) KEYS ONLY

Function to refresh the LOCATOR-memory.
Press SET ADDRESS to get the display for setting. Use the CURSOR-keys to select the position (hours. min. sec. dsec). The desired time value can be entered now by using the SET/CUE-wheel. Press TRANS and one of the LOC-memories. The LOC1 (e.g.) contains now a new address.

Cancellation: press SET ADDRESS again, SET TIMER, SET VARISPEED, VARISPEED, LOC1..5, LOCSTART or ROLLBACK.

SET VARISPEED (No. 338) KEYS ONLY

Function to change the VARISPEED in IPS/HT or % depend on the display format.
Press SET VARISPEED to get the display for setting. The selected nominal speed apears in the display. Use the SET/CUE-wheel to change the speed of the capstan motor. The range varies between -35.15% and +54.22% (-7.5 half tones and +7.5 half tones HT).
The new speed becomes active only with the function VARISPEED.

Cancellation: press SET VARISPEED again, SET TIMER, SET ADDRESS or VARISPEED.

2.6.3 Programming Examples

Example 1: Set reel diameter to 14"

Operator action	Service display indicates
Enable the MENU-entry lock [4] (use allen key size 2,5)	
Switch machine to STOP	L RANGE ../.. dBm NRS: TC:
↓/NEXT	USER SET UP ALIGMENT MODE
↓/NEXT	ALIGNMENT DECK AUX
↓/NEXT	SET LIBR WND SPEED 05.0 m/s
↓/NEXT	SET MAX WIND SPEED 15.0 m/s
↓/NEXT	SET ROLLBACK TIME 15 sec
↓/NEXT	MAX REEL DIAMETER SET: 12.5" (318 mm)
Set desired diameter with the SET/CUE wheel	MAX REEL DIAMETER SET: 14" (356 mm)
Press STORE	
Press ↑ / LAST 6 times	L RANGE ../.. dBm NRS: TC:
or	
proceed to next setup with ↓	SET PLAY TENSION LEFT: RIGHT:

Example 2: Set metering to PPM characteristic (function 053):

Operator action	Service display indicates
Turn the programming lock [..] to the counterclockwise limit position (Allen key size 2.5)	
Switch machine to STOP	L RANGE ../.. dBm NRS: TC:
↓/NEXT	USER SET UP ALIGNMENT MODE
→/CURSOR	USER SET UP ALIGNMENT MODE
↓/NEXT	KEY / MODE SETTING AUDIO DECK TC
↓/NEXT	AUDIO KEYS/MODE KEYS ONLY
↓/NEXT	F009 0/1 no key L RANGE 0/6 dBm Y/N
Page to function 053 with the SET/CUE wheel	F 053 1/0 no key METERING VU/PPM
Change over with STORE	F 053 0/1 no key METERING VU/PPM
Press ↑ / LAST 4 times	L RANGE ../.. dBm NRS: TC:

Example 3:

Reprogramming the RESET TIMER key (key 41, function 335) to the REVERSE PLAY function (No. 305):

Operator action	Service display indicates
Turn the programming lock [..] to the counterclockwise limit position (Allen key size 2.5)	
Switch machine to STOP	L RANGE ../.. dBm NRS: TC:
↓/NEXT	USER SET UP ALIGNMENT MODE
→/CURSOR	USER SET UP ALIGNMENT MODE
↓/NEXT	KEY / MODE SETTING AUDIO DECK TC
→/CURSOR	KEY / MODE SETTING AUDIO DECK TC
↓/NEXT	TAPE DECK KEYS/MODE KEYS ONLY
→/CURSOR	TAPE DECK KEYS/MODE KEYS ONLY
↓/NEXT	F301 L07,R27 REWIND
Page to function 305 with the SET/CUE wheel	F305 no key REVERSE PLAY
Press STORE	F305 PRESS 2nd KEY REVERSE PLAY
While holding the STORE key, also press the RESET TIMER key	F305 key assigned REVERSE PLAY
Change the lettering on the key	
Press ↑ / LAST 4 times	L RANGE ../.. dBm NRS: TC:

2.6.4 How to perform a software up-date

An A820 MCH has 5 microprocessor-units with a total of 10 EPROMs.

Capstan MPU	:	1 EPROM
Tape Deck MPU	:	2 EPROMs
Master MPU	:	3 EPROMs
Audio MPU	:	3 EPROMs
Panel MPU	:	1 EPROM

Only the Master MPU and Audio MPU are storing important parameters. The Master-RAM holds parameters for Tape Deck (Tape Tensions etc.) and the key assignment.
The Audio-RAM holds all the audio-parameters for a max. of 48 channels.
(i.e. Tape A and Tape B or 2 Headblocks 24 channel or 24ch/16ch and a 8 channel configuration).

Preparatory steps

Write the following parameters down:

- Master:
  - Tape Tension parameters
  - Key assignment (if not default)
    We recommend to write down notes into the "status tree", section 2.6
- Audio:
  - Audio parameters can be stored on tape (see section 4.7)
    the charts in section 4.1.7 can be used if audio parameters should be written down.
  - Panel setting (Channel setting memory)
    see last paragraph in section 2.4.5

Perfoming the up-date

1. Step: change the EPROMs.
   (lift them off by using a screwdriver No.2)
2. Step: erase the RAM.
   (short-circuit each pin-side of the RAM by using a screwdriver No.2)
3. Step: load all audio parameters back from tape.
4. Step: set the machine up as it was before (key assignment).

2.7 Degraded Operation

This Section describes the steps to be taken if any faults occur within individual modules.

Important: If any fault occurs, the machine should always be switched off for approximately 10 seconds and then powered on again. If the same error messages reoccurs, one of the remedies described in 2.7.1 will have be to be taken.
If any faults occur, the tape recorder should be operated only if absolutely necessary and be repaired or forwarded to the nearest service center as soon as possible.

2.7.1 Error Messages of the Service Display

There are three error categories:

- **ERRORS OF THE CATEGORY 1** are faults that make it impossible to operate the equipment (e.g. hardware malfunctions). Such an error message can only be reset by switching the machine off and switching it on again after approx. 10 seconds. If the error reappears, it must be remedied, if not the tape recorder should function correctly.
- **ERRORS OF THE CATEGORY 2** adversely affect the operation of the machine, however degraded operation is still possible. Error messages of this category remain on the display for information purposes even when the cause of the malfunction has disappeared. The error message can be cancelled by pressing the STORE key. If the malfunction persists, the message will reappear and can be cancelled again (if necessary), as described above. The machine can still be operated.
- **ERRORS OF THE CATEGORY 3** also influence the function of the machine, but degraded operation is possible. The error message is automatically cancelled when the source of the error disappears. If the LC display is needed for other purposes (e.g. varispeed indication), the error message can be cancelled by pressing STORE even though the error may possibly persist.

CATEGORY 1

Display:

```
ERR: SUPPLY
     VOLTAGE
```

Recorder: switches to STOP, does not respond to keys
Cause: One (or several) supply voltages are missing (Signal T-SUPVON missing).
Remedy: The FUSE/SUPPLY VOLTAGE FAILURE DETECTOR 1.820.866 indicates which voltage(s) are missing or out of range.

- Switch off the tape recorder
- Check the secondary fuses and replace them, if necessary.
- Repair or replace the corresponding SWITCHING STABILIZER PCB:
  - 1.820.871 (±15V), or 1.820.873 (±15V)
  - 1.820.872 (+ 5.6 V, ± 27 V, + 24 V)

Display:

```
ERR: EPROM 1
```

```
ERR: EPROM 2
```

```
ERR: EPROM 3
```

Cause: Fault in one of the three EPROMs on the MASTER MPU 1.820.784.

Remedy:
- Switch the tape recorder off and on. If the message does not reappear, continue to work with the machine.
- Replace the software: 3 Eproms (IC 15, 16, 18)

Display:

```
ERR: MASTER DATA
     LOST
```

Cause: Tape tension data lost, key assignment lost

Remedy:
- Switch the tape recorder off and on. The default parameters are now loaded, the error message disappears.
- Check the buffer battery on the MASTER MPU 1.820.784 and replace it, if necessary.
- Check the supply voltages.

Display:

```
ERR: NO COMMUNICAT.
   MASTER-TAPE DECK
```

Cause:
- No feedback to status request.
- Software of the MASTER MPU 1.820.784 and TAPE DECK MPU 1.820.781 not compatible.

Remedy:
- Replace the MASTER SERIAL INTERFACE 1.820.753 and/or the TAPE DECK SERIAL INTERFACE 1.820.763
- Replace the software: 3 Eproms on each MPU card (IC 15, 16, 18)

Display:

```
ERR: TACHO
     SENSOR
```

Recorder: switches to STOP

Cause: No output signal from one of the three tacho sensors (SPOOLING MOTORS 1.820.771, MOVE SENSOR 1.820.770), the three directions of rotation do not agree or no tacho signal of the spooling motors with motor current > 4 A.

Remedy:
- Check the flat cable connectors to the sensors.
- Check the sensors and replace them, if necessary
- Check that the spindles and the tacho roller rotate without binding.

Display:

```
ERR: TAPE TENSION
     CONTROL
```

Cause: Deviation of the tape tension from the reference is too large for approx. 1 second.

Remedy: Check whether the friction of the tape transport and the spindle is too large.

Display:

```
ERR: NO COMMUNICAT.
  CAPSTAN-TAPE DECK
```

Recorder: Switches to STOP.

Cause:
- No data exchange via the parallel interface of the CAPSTAN INTERFACE 1.820.727.
- Capstan processor does not start.
- Remedy: replace the CAPSTAN INTERFACE.

Display:

```
ERR: MOVE-SENSOR
     HARDWARE
```

Recorder: Switches to STOP.

Cause: MOVE SENSOR PCB 1.820.770 or MOTOR TACHO PCB 1.820.771 defective or too frequent direction changes detected.

Remedy: replace, repair, or realign (refer to section 3.3.3 and 3.3.11).

Display:

```
ERR: NO COMMUNICAT.
     MASTER-AUDIO
```

Cause:
- Status request is not answered.
- The software of the MASTER MPU 1.820.784 and the AUDIO MPU 1.820.782 are not compatible.

Remedy:
- Replace the MASTER AUDIO INTERFACE 1.820.756 and/or the COMMUNICATIONS CONTROLLER 1.820.718.
- Replace the software: 3 Eproms on each MPU card (IC 15, 16, 18)

Display:

```
ERR: SPOOLING MOTOR
     TACHO LEFT
```

Cause: Left Spooling Motor tacho 1.820.771 shows too frequent direction changes or no tacho signal.

Remedy: Replace, repair or realign (if possible).

Display:

```
ERR: SPOOLING MOTOR
     TACHO RIGHT
```

Cause: Right Spooling Motor tacho 1.820.771 shows too frequent direction changes or no tacho signal.

Remedy: Replace, repair or realign (if possible).

Display:

```
ERR: SPOOLING MOTOR
     SERVO HARDWARE
```

Cause: Fault in the analog control circuit of the spooling motors or voltage missing or current feedback open.

Remedy: Check voltages and signal on the following PCBs:
- Move Sensor 1.820.770
- Sp. Motor Drive Amp. 1.820.875
- Tape Tension Sensors 1.820.772 / 1.820.877

CATEGORY 2

Display:

```
ERR: POWER
     DROP OUT
```

Recorder: Switches to STOP.
Cause: Transient line voltage failure > 100 ms (Signal T-PWRON)
Remedy: Acknowledge with STORE.

CATEGORY 3

Display:

```
ERR: MOTOR SUPPLY
     VOLTAGE LOW
```

Cause: Spooling motor supply voltage failure (Signal PWMPR-L6)
Remedy: Wait 10 seconds. If the error persists:

- Switch the tape recorder off.
- Check fuses F1 and F2 (next to the power-on switch) and replace, if necessary.
- Repair or replace the SPOOLING MOTOR DRIVE AMPLIFIER 1.820.875.

Display:

```
ERR: INCORRECT
RADIUS MEASUREMENT
```

Recorder: Switches to STOP.
Cause:

- The computed radius of the tape pancakes is not within the admissible limits.
- Tacho sensors defective.

Remedy:

- Switch the recorder (with tape) to PLAY for a few seconds. This message normally disappears as soon as sufficient tacho pulses for computing the pancake radius are available.
- Check the tacho sensors, repair or replace them.
- Set 'Max. Reel Size' in the ALIGNMENT DECK block of the software menue to 14".

Display:

```
ERR: SHUTTLE VALUE
     INVALID
```

Cause: Incorrect values have been supplied by the SHUTTLE potentiometers during the initialization phase.
Remedies:

- The SHUTTLE wheel may not be actuated during the initialization of the machine.
- Readjust the SHUTTLE potentiometer (refer to section 3.3.12).

Display:

```
ERR: PINCH ROLLER
     SLIPPING
```

Recorder: Switches to STOP.
Cause: Excessive slip of pinch roller; capstan speed does not agree with the tape speed.
Remedy:
- Clean the pinch roller and the capstan shaft, replace the pinch roller, if necessary
- Adjust the pinch roller force to the correct value.

Display:

```
ERR: INCORRECT
     INERTIA
```

Recorder: Switches to STOP.
Cause: The last three inertia computations produced inadmissible values.
Remedy: Check that all rollers and motors rotate without binding and that the tape travels smoothly through all the guidance elements, and that the reel diameter has been set correctly (MAX. REEL DIAMETER) in the ALIGNMENT DECK block of the software menue.

Display:

```
ERR: NOT IDENTIFIED
```

Cause: Unknown fault.
Remedy:
- Switch the recorder off and on again. The machine can be used normally if the error message does not reappear.
- Unplug and reinsert the RAM (IC 8) of the MASTER MPU 1.820.784.

Important: The tape tension data and the key programming are lost, and the default parameters are loaded in their place!
- Either continue to operate with the default data,
- Load the parameters specified in the log, or
- Recalibrate the tape tensions.

Display:

```
ERR: AUDIO EPROM 1
```

```
ERR: AUDIO EPROM 2
```

```
ERR: AUDIO EPROM 3
```

Cause: Fault in one of the three EPROMs on the AUDIO MPU 1.820.782.
Remedy:
- Switch the tape recorder off and on. The machine can be used normally if the message does not reappear.
- Replace the software: 3 Eproms (IC 15, 16, 18)

Display:

```
ERR: AUDIO DATA
     LOST
```

Cause: Audio data lost

Remedy:
- Switch the tape recorder off and on. The default parameters are now loaded, the error message disappears.
- Check the buffer battery on the AUDIO MPU 1.820.782 and replace it, if necessary.
- Continue to work either with the default parameters (minor deviations from the optimum frequency response are unavoidable), or
- Load the parameters saved on tape, or
- Recalibrate the machine.

Display:

```
ERR: NO DATA FOUND
     ON TAPE
```

Cause: Backup stored on tape not readable.

Remedy: Check the input signal (level and shape). The yellow LED (LEVEL) on the COMMUNICATIONS CONTROLLER 1.820.718 should be on. Adjustable with the nearby potentiometer.

Display:

```
ERR: DEFAULT AUDIO
     PAR LOADED
```

Cause: The default parameters have been loaded after a loss of audio data.

Remedy: Reload the audio data from tape or recalibrate the machine.

Display:

```
ERR: VERIFY FAILED
```

Cause: The data read from tape do not agree with the machine data.

Remedy: Reload the audio data from tape because an error has occurred during the previous load operation.

Display:

```
ERR: HEAD NOT
     INDENTIFIED
```

Cause: Machine switched on with no head block mounted or wrong identification code coming from the Head Assembly Identifier PCB 1.820.795.00 (on the head block).

Remedy: Put head block on the machine or check Head Assembly ID PCB.

2.7.2 Additional Messages of the Service Display (Warnings)

Headblock Exchange:

e.g. After a headblock exchange from 24 to 16ch has been carried out, the audio and tape tension parameters as well as the key assignment are changed automatically to the default values. The display shows:

```
WARN: DEFAULT KEYS
& PARAMETER LOADED
```

To save the key assignment, activate the function "SAVE KEY SETTING" No. 246 in the menu before the headblock is removed. The display shows only:

```
WARN: DEFAULT
  PARAMETER LOADED
```

- DEFAULT KEYS: means having the default key assignment (changes with the headblock for 24/16 or 8ch).
- DEFAULT PARAMETER: means having the default tape tension parameters (changes with the headblock for 1" and 2" format).

Display:

```
WARN: REFERENCE
FREQUENCY WRONG
```

Recorder: Does not achieve the selected nominal speed in PLAY mode.

Cause: The frequency of the external varispeed reference signal is outside the admissible range (6.4 kHz to 14.4 kHz), or the signal is missing.

Remedy: Correct the reference signal.

Remarks: The keep the DEFAULT KEYS confirm the assignment of only one key to get the message as shown above. The same can be done with the DEFAULT PARAMETER* for the tape tensions. Confirm one Hex-value in the alignment section of the menu with STORE to get no message "WARNING...." anymore.

*=message

2.8 Operation with Serial Interfaces

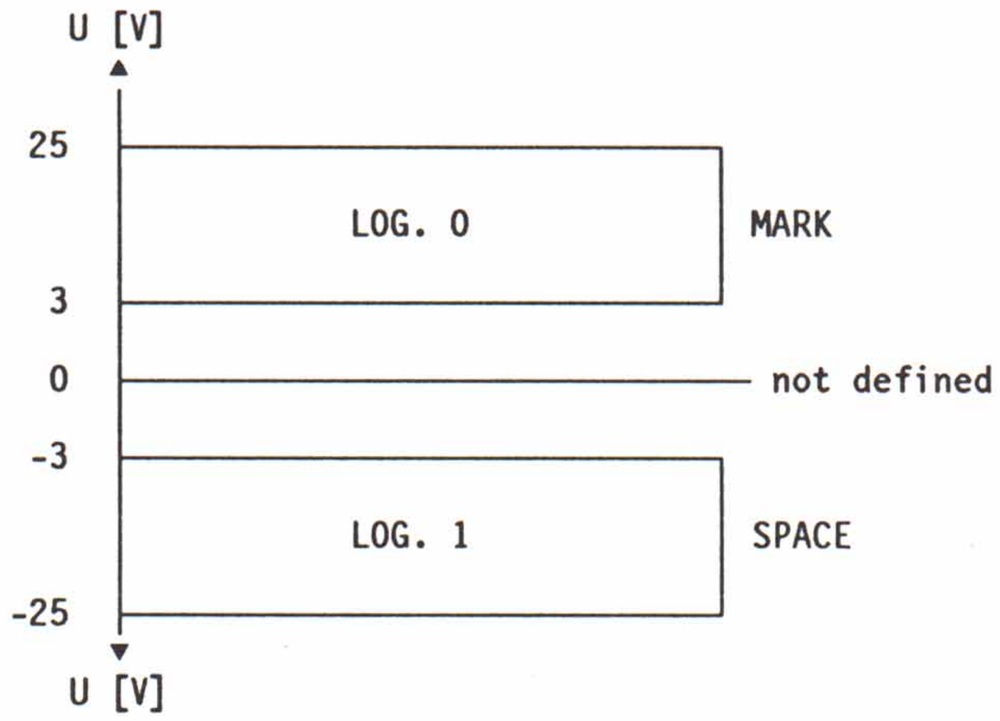
- The version Serial Remote Controller 1.810.751 supports the ASCII-protocol in RS 232 standard and is needed for the communication with the TLS4000 synchronizer or a Personal Computer.
- The version SMPTE/EBU – Interface 1.820.751 supports the SMPTE/EBU-protocol in RS232 or RS422 standard (selectable with Jumper).

2.8.1 RS 232 and RS 422 Interface Standard

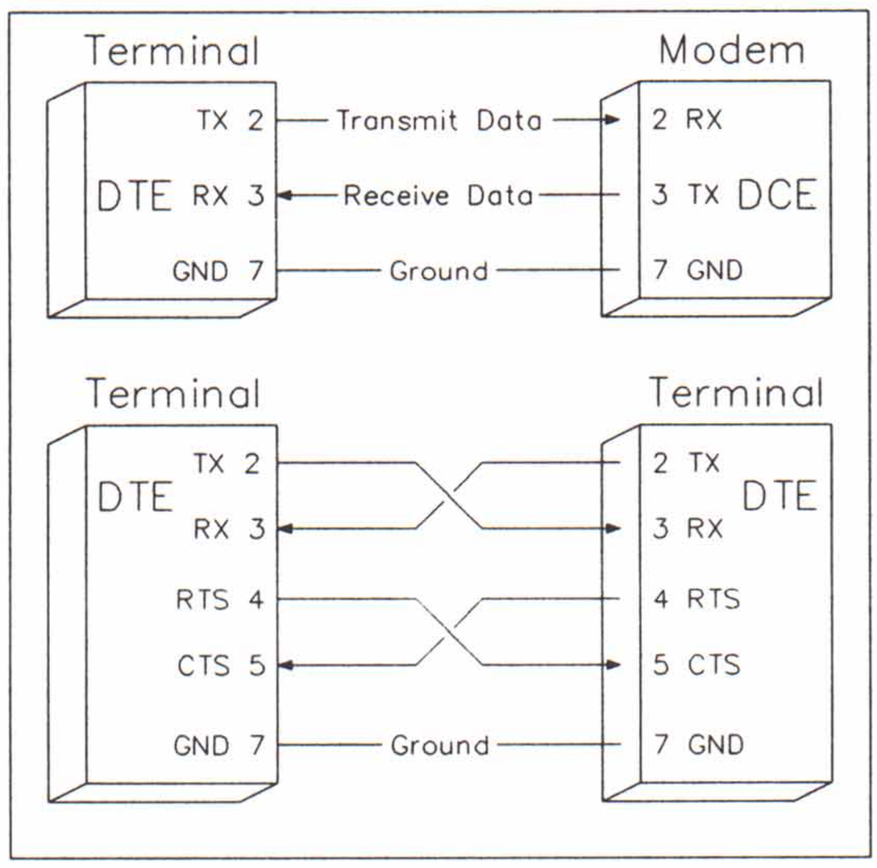
RS 232 The term "RS232" defines a connection between two points.
This standard also defines:
- electrical characteristics (lines, level)
- mechanical characteristics (connectors)
- signal descriptions
- standard connections

Lines The interface supports data rages up to 19,2 kBaud (for A820 MCH: 9,6 kBaud) and cable lengths up to 15m.

Level The levels are defined as follows:



Connection The connections for the asymmetrical standard RS 232:



- connection between a terminal and a modem.
(no handshake lines parallel wired)

- connection between two points without modem.
(with handshake lines and usually crossed)

The serial remote interface of the A820 MCH users the two 9–pin connectors according to SMPTE/EBU rather than the 25–pin connector. The user can thus define whether the unit is used as a terminal or as a modem.

RECORDER 9–pin		TERMINAL 25–pin		MODEM 25–pin	
SNDATA	2	TRANS. DATA	2	TRANS. DATA	3
RCVDATA	8	REC. DATA	3	REC. DATA	2
GROUND	9	SIG. GROUND	7	SIG. GROUND	7

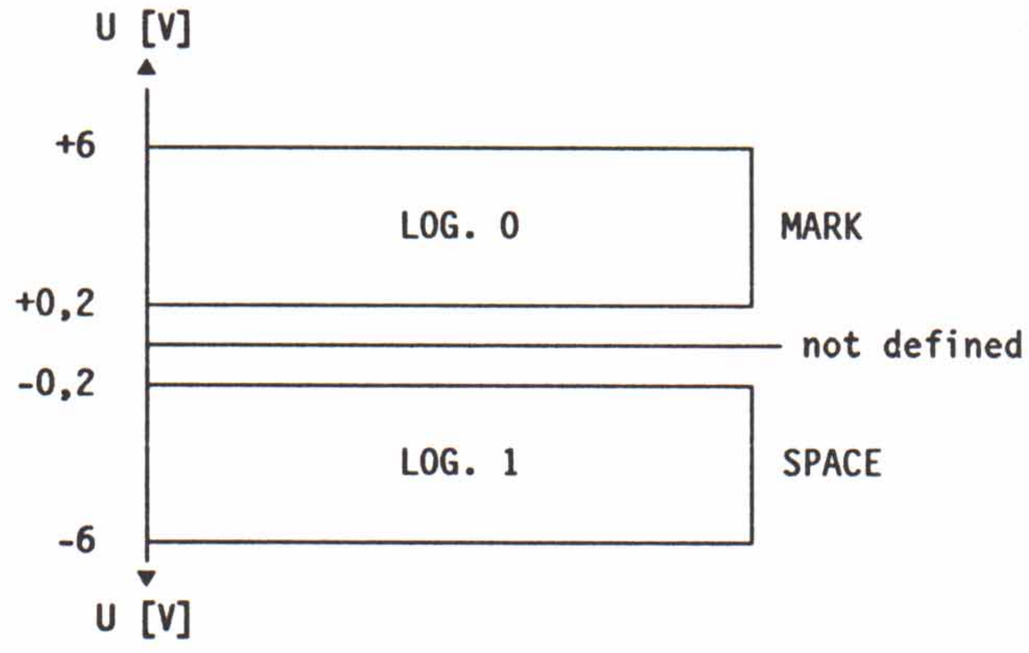
No additional handshake lines are used. A software handshake (X on / X off–protocol) is implemented for all Baud–rates, but only necessary for 9,6 kBaud.

X on = 0001 0001 (ASCII DC1) → continue
X off = 0001 0011 (ASCII DC3) → interrupt

RS 422 The term "RS422" defines a connection between two points. This standard is symmetrical in contrast to the asymmetrical RS232.

Lines The interface "SMPTE/EBU 1.820.751" supports data rates with 38,4 kBaud and cable lengths up to 1200m.

Level



The SMPTE/EBU – interface 1.820.751 uses the two 9–pin connectors according to SMPTE/EBU rather than the 25–pin connector.

Connection The connection for the symmetrical standard RS422:

RECORDER 9-pin	
SHIELD	1
TRANSMIT A	2
RECEIVE B	3
RECEIVE COMMON	4
–	5
TRANSMIT COMMON	6
TRANSMIT B	7
RECEIVE A	8
SHIELD	9

2.8.2 Installation of the Serial Remote Controller 1.810.751

THIS BOARD USES THE ASCII-PROTOCOL

Standard Set Up:

- 1 Stop bit
- 1 Start bit
- 8 Data bits
- NO parity bit
- NO echo mode
- 9600 Baud
- Jumper H

The interface can send/receive either in a NRZ-format (non return to zero) or in a Bi-phase-format.

- NRZ-format with the ASCII-protocol.
- Bi-phase-format with the ASCII-protocol.

The format depends on the application or the specification from the manufacturer.

- Connect the computer or the terminal via the adapter cable to one of the two 9-pin RS232 sockets on the rear of the A820MCH. If the connection is correct, the RX and the TX LEDs turn dark.
- Program the baud rate to match the computer or terminal.
  After a RESET (switching the A820 MCH off and on again) the display shows:

  ********* A820 MCH MONITOR **********
  ****** ALL PROCESSES STARTED *******

  The desired commands (see command list below) can be entered via the keyboard of the terminal. The commands are executed when the line feed key (enter or line feed) is pressed.

Important:

- Only upper case characters are accepted!
- The REMOTE function (No. 345 or 346) has to be active!

Command list

TAPE DECK COMMANDS		
Command (_ = blank, 7 = CR, * = blank or CR)	Response of the tape recorder	Description
STP*	<CR><LF>	Stop
RWD*	<CR><LF>	Rewind
FWD*	<CR><LF>	Fast forward
PLY*	<CR><LF>	Play
RPL*	<CR><LF>	Reverse play
REC*	<CR><LF>	Record (directly, without preceding PLAY command)
EDI*	<CR><LF>	Edit
SSA*	<CR><LF>	Select tape spead 3.75 ips (>4/91 SW)
SSB*	<CR><LF>	Select tape speed 7.5 ips
SSC*	<CR><LF>	Select tape speed 15 ips
SSD*	<CR><LF>	Select tape speed 30 ips
SVP_<XXXXX>	<CR><LF>	Set varispeed parameter 00A5FE <= XXXXXX <= 018ACE (hex) parameter refers to nominal speed, signless, independent of td status, 010000=nominal (fixed) speed
WNR_<XXXX>	<CR><LF>	Rewind with selectable speed (0 ≤ XXXX ≤ 5FFF)
WNF_<XXXX>	<CR><LF>	Spool forward with selectable speed (0 ≤ XXXX ≤ 5FFF)
NS?*	7.5 IPS <CR><LF>, oder 15 IPS<CR><LF> oder 30 IPS<CR><LF> xx IPS<CR><LF> xx =3.75, 7.5, 15, or 30	Read out the nominal speed
VS?*	xxxxxx<CR><LF>	Varispeed parameter? 00A5FE <= xxxxxx <= 018ACE (hex) parameter refers to nominal speed, signelles, independent of td status, 010000 = nominal (fixed) speed
SVS*	<CR><LF>	Varispeed on
CVS*	<CR><LF>	Varispeed off
VEN*	<CR><LF>	External varispeed on
VEF*	<CR><LF>	External varispeed off
FEN*	<CR><LF>	FADER START ENABLE ON
FEF*	<CR><LF>	FADER START ENABLE OFF
LOC_<address>	<CR><LF>	Spool to <(-)hh(:)( )mm(:)( )ss(:)( )n> (n = 1/10 second) e.g. LOC_01:20:15:0 LOC_-00_35_25_1
LMV_<T.-count>	<CR><LF>	Spool according to the tacho roller signals <XXXXXXXX>, 4 Bytes HEX z.B. LMV_00AE4F00
MV?*	XX XX XX XX <CR><LF> 4 Bytes HEX	Read out the tacho roller signals
STM_<address>	<CR><LF>	Set counter to (-)hh(:)( )mm(:)( )ss(:)( )nnn (nnn = milliseconds) (-9:59:59:999 ≤ address ≤ 23:59:59:999) e.g. STM_01_20_15_000 STM_-00:35:25:125
TM?*	hh:mm:ss:z <CR><LF>, or -hh:mm:ss:z <CR><LF> z = 1/10 sec	Read out the tape timer u = underflow, o = overflow

Continued on next page

TAPE DECK COMMANDS		
Command (= blank, 7 = CR, * = blank or CR)	Response of the tape recorder	Description
DST*	<CR><LF>< hh:mm:ss:z Y XXXXX XXXXXXXXXXXXX> z = 1/10 Sek. Y= Status, 1 Byte HEX X = Status im Klartext, z.B. PLAY	Display the equipment status on the screen and update it continually (Cancel with CNTL X)
SD?*	dd:ww:yy <CR> <LF>	Software date?
ST?*	X<CR><LF> X = 1 Byte HEX	Status inquiry e.g.:
	X = 01	TAPE OUT
	X = 81	TAPE OUT ACHIEVED
	X = 02	STOP NOT ACHIEVED
	X = 82	STOP ACHIEVED
	X = 03	REWIND NOT ACHIEVED
	X = 83	REWIND ACHIEVED
	X = 04	FORWARD NOT ACHIEVED
	X = 84	FORWARD ACHIEVED
	X = 05	PLAY NOT ACHIEVED
	X = 85	PLAY ACHIEVED
	X = 06	PLAY VARISPEED NOT ACHIEVED
	X = 86	PLAY VARISPEED ACHIEVED
	X = 07	PLAY INT. REF. NOT ACHIEVED
	X = 87	PLAY INT. REF. ACHIEVED
	X = 08	PLAY EXT. REF. NOT ACHIEVED
	X = 88	PLAY EXT. REF. ACHIEVED
	X = 09	RECORD NOT ACHIEVED
	X = 89	RECORD ACHIEVED
	X = 0B	EDIT NOT ACHIEVED
	X = 8B	EDIT ACHIEVED
	X = 25	REVERSE PLAY
	X = A5	REVERSE PLAY ACH.
	X = 26	REVERSE PLAY VARI
	X = A6	REVERSE PLAY VARI ACH.
	X = 27	REVERSE PLAY INT REF
	X = A7	REVERSE PLAY INT REF ACH.
	X = 28	REVERSE PLAY EXT REF
	X = A8	REVERSE PLAY EXT REF ACH.
	X = 29	REVERSE REC OR REHEARS REVERSE REC
	X = A9	REVERSE RECORD ACH. OR REH REV REC ACH.
	X = 40	SHUTTLE BACKWARD
	X = C0	SHUTTLE BACHWARD ACHIEVED
	X = 41	SHUTTLE FORWARD NOT ACHIEVED
	X = C1	SHUTTLE FORWARD ACHIEVED
	X = 42	LOCATE WIND REVERSE NOT ACHIEVED
	X = C2	LOCATE WIND REVERSE ACHIEVED
	X = 43	LOCATE WIND FORWARD NOT ACHIEVED
	X = C3	LOCATE WIND FORWARD ACHIEVED
	X = 44	LOCATE PLAY REVERSE NOT ACHIEVED
	X = C4	LOCATE PLAY REVERSE ACHIEVED
	X = 45	LOCATE PLAY FORWARD NOT ACHIEVED
	X = C5	LOCATE PLAY FORWARD ACHIEVED
	X = 46	CUEING REVERSE NOT ACHIEVED
	X = C6	CUEING REVERSE ACHIEVED
	X = 47	CUEING FORWARD NOT ACHIEVED
	X = C7	CUEING FORWARD ACHIEVED
	X = 48	POSITION PLAY REVERSE NOT ACHIEVED
	X = C8	POSITION PLAY REVERSE ACHIEVED
	X = 49	POSITION PLAY FORWARD NOT ACHIEVED
	X = C9	POSITION PLAY FORWARD ACHIEVED
	X = 4A	REWIND CONTROLLED NOT ACHIEVED
	X = CA	REWIND CONTROLLED ACHIEVED
	X = 4B	WIND FORWARD CONTROLLED NOT ACHIEVED
	X = CB	WIND FORWARD CONTROLLED ACHIEVED
	X = 59	TAPE DUMP NOT ACHIEVED
	X = D9	TAPE DUMP ACHIEVED
	X = 5A	CUT
	X = DA	CUT ACHIEVED
	X = DD	BURN IN TEST ACHIEVED

Continued on next page

TAPE DECK COMMANDS		
Command (= blank, 7 = CR, * = blank or CR)	Response of the tape recorder	Description
TP?*	aabbccddeeff gghhiijjkkll mmnnooppqqrr <CR><LF> tape width 1": aa: bb: cc: dd: ee: ff: tape width 2": gg: hh: ii: jj: kk: ll: tape width adopted: mm: nn: oo: pp: qq: rr:	Tape tension parameter? TAPE TENSION PLAY LEFT TAPE TENSION PLAY RIGTH TAPE TENSION WIND TAPE TENSION EDIT TAPE TENSION REV PLAY LEFT TAPE TENSION REV PLAY RIGHT TAPE TENSION PLAY LEFT TAPE TENSION PLAY RIGHT TAPE TENSION WIND TAPE TENSION EDIT TAPE TENSION REV PLAY LEFT TAPE TENSION REV PLAY RIGHT TAPE TENSION PLAY LEFT TAPE TENSION PLAY RIGHT TAPE TENSION WIND TAPE TENSION EDIT TAPE TENSION REV PLAY LEFT TAPE TENSION REV PLAY RIGHT
RTI*	<CR><LF>	Reset Timer
ZLO*	<CR><LF>	Spool to address 00:00:00
EDT*	<CR><LF>	Lifter mode on/audio on, Sync (tape against heads)
LFT*	<CR><LF>	Lifter mode off (tape not against heads)
LFN*	<CR><LF>	Lifter mode on/audio on, Input (tape against heads)

AUDIO COMMANDS		
Command (= blank, 7 = CR, * = blank or CR)	Response of the tape recorder	Description
EMC*	<CR><LF>	Set enable memory change
DMC*	<CR><LF>	Set disable memory change
SNB*	<CR><LF>	NAB equalization
SCR*	<CR><LF>	CCIR equalization
STA*	<CR><LF>	Switch to tape type A
STB*	<CR><LF>	Switch to type type B
MSN*	<CR><LF>	MASTER SAFE on
MSF*	<CR><LF>	MASTER SAFE off
SRH*	<CR><LF>	REHEARSAL (Schnittprobe) ein
CRH*	<CR><LF>	REHEARSAL off
DDN*	<CR><LF>	Drop in/out delay on
DDF*	<CR><LF>	Drop in/out delay off
AA?*	aabbccdd CR LF aa: 0 = Safe 1 = Ready/ Record bbcc:00 =rep 01 =sync 1x =input dd: 0 = demute 1 = mute	Channel 1..8 status? MSB (xx) = Channel 8 LSB (xx) = Channel 1 xx = aa .. dd
AB?*	aabbccdd CR LF aa: 0 = Safe 1 = Ready/ Record bbcc:00 =rep 01 =sync 1x =input dd: 0 = demute 1 = mute	Channel 9...16 status? MSB (xx) = Channel 16 LSB (xx) = Channel 9 xx = aa .. dd
AC?*	aabbccdd CR LF aa: 0 = Safe 1 = Ready/ Record bbcc:00 =rep 01 =sync 1x =input dd: 0 = demute 1 = mute	Channel 17...24 status? MSB (xx) = Channel 24 LSB (xx) = Channel 17 xx = aa .. dd
REA i/	<CR><LF>	Channel i READY (i= 1..18 [hex] or FF for all
SAF i/	<CR><LF>	Channel i SAFE (i= 1..18 [hex] or FF for all
INP i/	<CR><LF>	Channel i INPUT (i= 1..18 [hex] or FF for all
SYN i/	<CR><LF>	Channel i SYNC (i= 1..18 [hex] or FF for all
REP i/	<CR><LF>	Channel i REPRO (i= 1..18 [hex] or FF for all
MTN i/	<CR><LF>	Channel i MUTE (i= 1..18 [hex] or FF for all
MTF i/	<CR><LF>	Channel i cancel-mute (i= 1..18 [hex] or FF for all
CHN i/	<CR><LF>	Channel i on (i= 1..18 [hex] or FF for all
CHF i/	<CR><LF>	Channel i off (i= 1..18 [hex] or FF for all (i= 1..18 [hex] or FF for all (FF = all Channel)

Additional Table

Index i

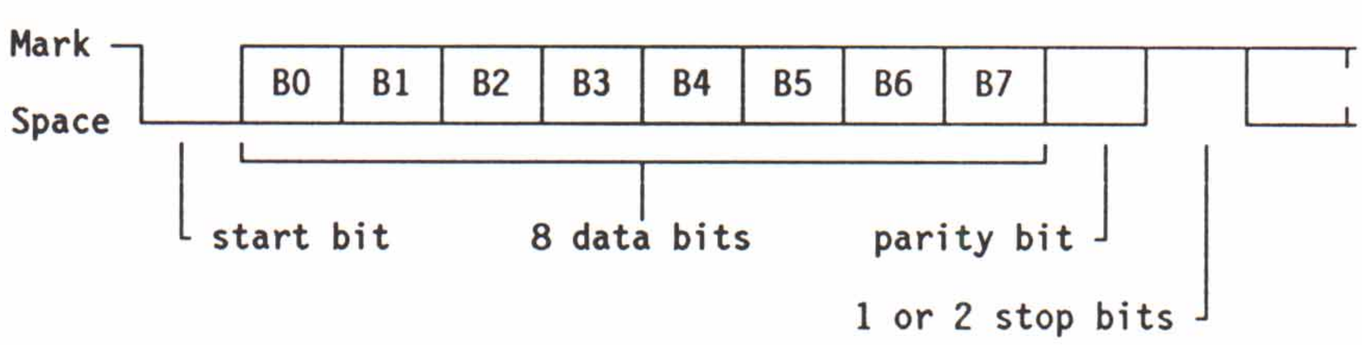
Channel	i [hex]	Channel	i [hex]
1	01	13	0D
2	02	14	0E
3	03	15	0F
4	04	16	10
5	05	17	11
6	06	18	12
7	07	19	13
8	08	20	14
9	09	21	15
10	0A	22	16
11	0B	23	17
12	0C	24	18
		ALL	FF

TAPE DECK AND TIMECODE COMMANDS		
Command (_ = blank, 7 = CR, * = blank or CR)	Response of the tape recorder	Description
LCE*	<CR><LF>	Built-in keyboard enabled
LCD*	<CR><LF>	Built-in keyboard disabled
RME*	<CR><LF>	Remote control keyboard enabled
RMD*	<CR><LF>	Remote control keyboard disabled
MK?*	aa <CR><LF>	Mark nr of software version? aa=mark number: 00,01, "?" =mark I, 02=mark II
MT?*	aa <CR><LF>	Machine type? aa=machine type number 01=820, 02=812, 03=820MCH, 04=827MCH, 05=807, 06=816, 07=810
SBA_<address>	<CR><LF>	Set bus address to <XXXX> (4 HEX digits, 8280 ≤ XXXX ≤ FFFF)
BA?*	<XXXX><CR><LF>	Read out bus address

2.8.3 Installation of the SMPTE/EBU- Interface 1.820.751

THIS BOARD USES THE SMPTE/EBU- PROTOCOL

- Electrical standards according to RS 232C or RS422A (selectable with jumpers)
- Full-duplex
- Asynchronous transmission of the data, bit-serial and word-serial, according to the following diagram:



  Odd or even parity and the number of stop bits (1 or 2) can be programmed.
- Baud rates for RS 232 and RS422 programmable as 9600 or 1200 baud, for operation in conjunction with an SMPTE/EBU-bus it is preset to 38400 baud.

Standard Set up:

- RS232
- 1 start bit
- 8 data bits
- even parity
- 1 stop bit
- 9600 baud.

Jumper:

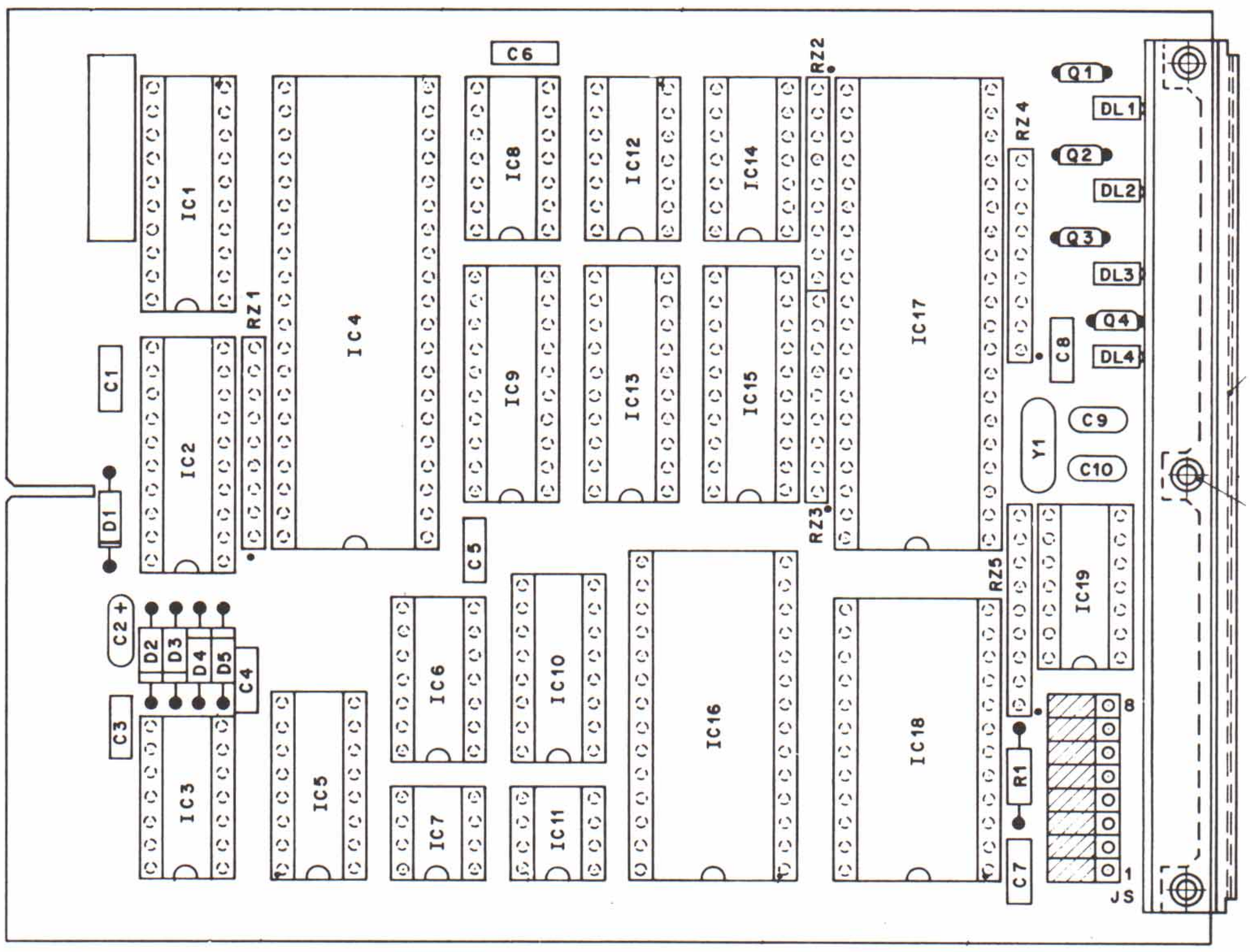


Fig. 2.8.3

	J1	J2	J3	J4	J5	J6	J7	J8
SMPTE/EBU BUS	BC	BC		BC	BC	BC	BC	BC
SERIAL RS232	AB	AB		AB	AB	AB	AB	AB
SERIAL RS422	BC	BC		AB	BC	BC	BC	AB

		J3
SMPTE/EBU BUS	38,4 kBd	BC
RS232/RS422	9600 Bd	BC
	1200 Bd	AB

Status-LED's

The four status-LEDs on the front bracket of the module 1.820.751 are used for indicating different states, depending on whether the module is used as a serial interface (RS232/RS422) or as an SMPTE/EBU interface (programmable with jumpers as described above).

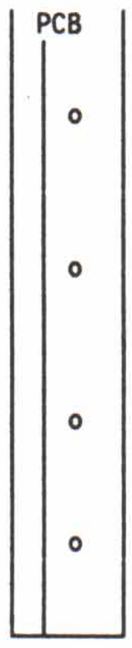
SMPTE/EBU bus:

INTERFACE SELECTED
Is on when the interface receives an SEL ADDR and as long as it remains in the SELECT status.

INTERFACE POLLED
Is on when the interface receives a POLL ADDR and as long as it remain in the POLL status.

INTERFACE IDLE/ACTIVE
Is on as long as the interface waits for STX (control byte).

FIFO TX/RX ACTIVE
Is on when the interface receives data from the FIFO or transmits data to the FIFO.



RS232/RS422:

RX ACTIVE
Is on as soon as the interface receives STX (control byte) and as long as it receives a message.

TX ACTIVE
Is on as long as the interface transmits a message.

INTERFACE ACTIVE
Is on as long as the interface waits for a BREAK signal or its own answer.

FIFO TX/RX ACTIVE
Is on when the interface receives data from the FIFO or transmits data to the FIFO.

Software protocol: The host control system can transmit commands (function or parameter commands) or status requests to the A820 MCH.
The A820 MCH acknowledges the commands and supplies status messages on request.

- Commands from the control system to the A820 MCH:

STX	BC	CB	CC	CPs....	CS

STX: is a control character and is transmitted as a start character (according to SMPTE recommendation: STX = 02H).
BC (byte count): contains the number of bytes that follow (excluding checksum).
CB (control byte):

```
Bit Nr. 7 6 5 4 3 2 1 0
                      |  1 = Message for MASTER
                      |  1 = Message for TAPE DECK
                      |  1 = Message for AUDIO
                      |  1 = Message for int. synchronizer
        0 X  ---------|  Message without status request
```

CC (command code): function or parameter command; refer to corresponding instruction set.
CP (parameter bytes): only for parameter commands; if more than one parameter byte exists, the MSB is transmitted first.
CS (checksum): Two's complement of the sum of all data transmitted before the checksum, excluding STX.

- Status request from the control system to the A820 MCH:

STX	BC	CB	SBA	SBC	CS

STX: is a control character and is transmitted as the start character (according to SMPTE recommendation: STX = 02H).
BC (byte count): = 3 (fixed). CB (control byte):

```
Bit Nr. 7 6 5 4 3 2 1 0
                      |  1 = Message from MASTER
                      |  1 = Message from TAPE DECK
                      |  1 = Message from AUDIO
                      |  1 = Message from int. synchronizer
        1 0  ---------|  Unconditional status request (immediate)
        1 1  ---------|  Conditional status request (only when status
                         changes)
```

SBA, SBC (status request byte): SBA contains the base address, SBC the number of bytes of the requested status. CS (checksum): two's complement of the sum of all data transmitted before the checksum, excluding STX.

- Acknowledgment and status messages of the A820 MCH to the control system:
  After the control system has transmitted a command block, it must wait for an acknowledgment from the A820 MCH before a new command block may be transmitted.
  This acknowledgment can consist of a control character or a status message.
  If no acknowlegment arrives within the time-out period (10 ms), the control system considers the transmission as faulty.

Possible acknowledgments:
Acknowledgment after correct transmission of commands or status change request with unchanged status:

ACK	(= 04H according to SMPTE draft)

Acknowledgment after the following errors:
- Transmission error (framing, parity overrun) wrong command codes
- Time-out (2 sec) during the command transmission)

NAK	(= 05H according to SMPTE draft)

Status message as an acknowledgment to:
- Unconditional status request
- Status change request with changed status

STX	BC	CB	SBA	SBC	STATUS	CS

STX: is a control character and is transmitted as the start character (according to SMPTE recommendation: STX = 02H).
BC (byte count): contains the number of bytes that follow (without checksum).
CB (control byte):

```
Bit Nr. 7 6 5 4 3 2 1 0
                      |  1 = Message from MASTER
                      |  1 = Message from TAPE DECK
                      |  1 = Message from AUDIO
                      |  1 = Message from int. synchronizer
        1 0 ----------|  Unconditional status request (immediate)
        1 1 ----------|  Conditional status request (only when status
                         changes)
```

SBA, SBC (status request byte): SBA contains the base address, SBC the number of bytes of the requested status.
CS (checksum): two's complement of the sum of all data transmitted before the checksum, excluding STX.

- Command list
  In preparation

2.9 Care Instructions

General

Daily care is limited to cleaning the heads, the capstan shaft, and the tape guidance elements.
Dust and oxide particles of the magnetic coating tend to accumulate on the heads and tape guides and can lead to dead gaps (so-called drop-outs).
Cleaning should be performed daily, or if contamination is visible, even more frequently.
Cleaning is best performed with a STUDER cleaning kit (Part No. 10.496.010.00) which contains all utensils required for cleaning the tape recorder, as well as a head cleaning fluid and aluminite cleaner.

Procedure:

Moisten the yellow piece of cloth with the head cleaning fluid and clean all guidance elements that come in contact with the tape. Then wipe the cleaned parts with a dry section of the yellow piece of cloth.
The capstan shaft normally does not rotate when the recorder is not switched to play mode. A special function is available, however, to put the capstan motor in operation. For this purpose, unthread the tape and press the PLAY key.

Important:

When you clean the capstan, make sure that no cleaning fluid penetrates into the bearing!

Capstan motor maintenance

Capstan:
1.021.602.00
1.021.603.00
no sticker-label

The capstan motor requires no maintenance. Lubricate the motor every six mouth with one or two drops of oil type PDP 65 with the aid of the oiler (Part No. 20.020.401.04) to extend the life of the motor.

Capstan:
1.021.602.81
1.021.603.81
red sticker-label

Capstan motors manufactered after January 1988 (red label on the bottom of the motor) must be lubricated with a few drops of Liquid grease CONSTANT GLY 2100 (Part No. 20.020.401.10).

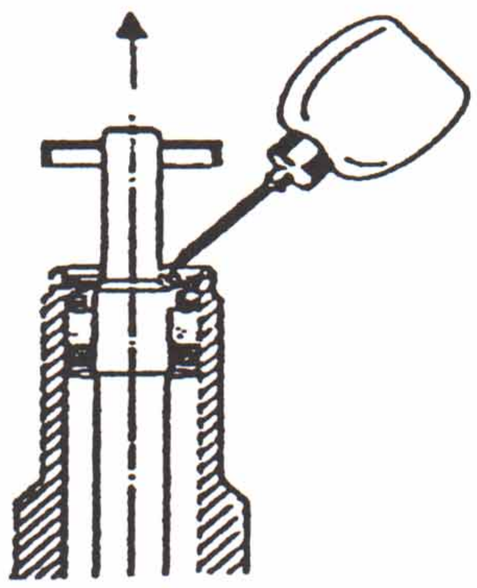


Fig. 2.9

Capstan:
1.021.622.00
1.021.623.00
whit sticker-label

The new capstan motor is equipped with ball bearings instead of having sinter bearings. This motor needs no oil anymore. Do not apply oil in this case.