

# STUDER

PROFESSIONAL AUDIO EQUIPMENT

## Service Information

Conversion Instructions to Software  
and Hardware up-date kit A820 MCH

2" 20.100.820.60

1" 20.100.820.30

SI 120a/88 2nd Edition E 10.85.6061

## 1. Application

The modifications described hereunder must be performed on all A820 multi-track tape recorders 1" and 2" version with delivery from STI up to 5th September 1988, which are equipped with the software versions mentioned below. Replace move roller, lifter pin and modify the spooling motor drive amplifier if not already replaced.

The software contained in the conversion kit replaces the software versions mentioned below and any other software versions that were issued in the past.

Software versions to be replaced:

TD software	14/10/87 or 06/88
Master software	10/10/87
Audio software	14/10/87
Capstan software	17/87
VU-panel software (X-Panel)	41/87
Parallel Channel Control IF	41/87

### Please note:

- When a STUDER TLS 4000 Synchronizer is used together with the A820 Multitrack, the A820 MCH Interface of the TLS 4000 has to be equipped with the new software 1.812.968.22. (In preparation) Operation with software index .21 is however possible with the limitation that the machine might drop out of Lock-mode after some hours of operation due to overload of the serial remote control software.

- 8 Channel Machines (1" transports): The new software 35/88 works only together with the tape tension sensors 1.820.385.00 (left) and 1.820.386.00 (right). Please make sure that they are installed. If not, they can be exchanged at STUDER INTERNATIONAL.

## 2. Summary of hard- and software changes

- New move roller with extremely low tape slippage for precise tape counting/locating and more accurate reel size inertia detection.
- New tape lifter with high wear-resistant tape guiding surface.
- Enlarged clearance between pinch roller and capstan shaft prevents tape slippage in play-mode.
- New tacho-roller sensing concept gives more reliability in case of tacho sensor failure during operation.
- New stop-position, left-hand roller retracted and mechanical brakes activated, no tape-head contact.
- New edit-position, left-hand roller engaged and mechanical brakes inactive, tape-head contact.

Summary of newly implemented functions:

- Comprehensive manual and automatic NR-System alignment features with indication display similar to "Dolby Level dot". See attached alignment instructions.

- F 247 Program Disable A/B  
 Program Disable A; Programming enable switch disables entry into status tree diagram.  
 Program Disable B; Programming enable switch disables entry into status tree diagram, except for the following functions:  
 SET LIB WIND SPEED, SET MAX. WIND SPEED, SET ROLLBACK TIME,  
 SET MAX. REEL 12.5"/14"
- F 255 Rec Indic Mode A/B  
 Rec Indic MODE A; Record indication and record tally is only active, if at least one channel is switched to record mode.  
 Rec Indication B; Record indication and record tally switch independently from audio record-status.  
 Application: "Follow External Record" with TLS 4000.
- The "REMOTE"-Key (F 345 or F 346) now also switches the RS 232 Interface. If one of the above "REMOTE"-Keys is programmed, it must be depressed for the operation with the TLS 4000.
- Set Library Wind Speed A/B ; Set Max Wind Speed A/B  
 A new value set with the cue wheel is directly taken over by the tape deck without the need to press STORE. If the new value is to be remembered, then STORE has to be pressed.  
 (Similar to the Varispeed operation)
- F 257 Lifter Remote A/B  
 (see function "Lifter" No.332)  
Position A: the state of the audio channels (INPUT, REPRO, SYNC) is not affected when the button is pressed.  
 This position is meant to read Time Code during spooling.  
Position B: with AUTOINPUT selected, the audio channels which are switched to INPUT during spooling are switched back to SYNC when the button is pressed. This position is meant to listen to the audio signals during spooling.  
Remote designates the keyboard of the Parallel Remote Controller.
- F 258 Lifter Local A/B  
 Position A and B as above.  
Local designates the local keyboard on the machine itself and the keyboard of the Serial Remote Controller.
- RS 232 Interface  
 The ASCII protocol of the RS 232 Interface now contains 3 commands relating to the Lifter function:
  - EDT: Lifter mode off (tape on heads), as position B above
  - LFN: Lifter mode off (tape on heads), as position A above
  - LFT: Lifter mode on (tape not on heads).

3. Contents of the conversion kits

Update kit for 2" transports order no. 20.100.820.60:

- 1 SI 120/88 2nd Edition 10.85.6061
- 1 Move Roller 1.820.450.08
- 1 Resistor 680 Ohm 57.11.4681
- 2 Common Suppression Adjust kit 1.820.878.00
- 3 label index .81 1.010.081.43
- 1 label index .21 1.101.002.21
- 2 label index .22 1.101.002.22
- 3 label index .23 1.101.002.23
- 1 label index .26 1.101.002.26
  
- 1 TD software 35/88 1.820.985.22  
 consisting of 2 EPROMs IC 16 (8000) checksum: 06E9  
 IC 18 (C000) checksum: 3F7F
  
- 1 Master software 35/88 1.820.986.21  
 consisting of 3 EPROMs IC 15 (4000) checksum: 8CCA  
 IC 16 (8000) checksum: 6C14  
 IC 18 (C000) checksum: 129B
  
- 1 Audio software 35/88 1.820.987.22  
 consisting of 3 EPROMs IC 15 (4000) checksum: 4BA9  
 IC 16 (8000) checksum: 6F75  
 IC 18 (C000) checksum: AA3B
  
- 1 Capstan software 35/88 1.820.994.25  
 consisting of 1 EPROM IC 17 (C000) checksum: D71A
  
- 1 VU-Panel software (X Panel) 35/88 1.820.988.23  
 consisting of 1 EPROM IC 18 (C000) checksum: AEOA
  
- 1 Audio Remote software (X Panel) 35/88 1.820.988.23  
 consisting of 1 EPROM IC 18 (C000) checksum: AEOA
  
- 1 Parallel Ch. Control IF softw. 22/88 1.820.984.23  
 consisting of 1 EPROM IC 18 (C000) checksum: C4A2

All EPROMs are of the type 27128 (16k) 50.14.0125

Due to delays in production, the new lifter pin will be delivered later (November-December 1988).

- 1 Lifter Pin 2" 1.820.129.00

Update kit for 1" transports order no. 20.100.820.30:

- 1 SI 120/88 2nd Edition 10.85.6061
- 1 Move Roller 1.820.440.08
- 1 Resistor 680 Ohm 57.11.4681
- 2 Common Suppression Adjust kit 1.820.878.00
- 3 label index .81 1.010.081.43
- 1 label index .21 1.101.002.21
- 2 label index .22 1.101.002.22
- 3 label index .23 1.101.002.23
- 1 label index .26 1.101.002.26
  
- 1 TD software 35/88 1.820.985.22  
 consisting of 2 EPROMs IC 16 (8000) checksum: 06E9  
 IC 18 (C000) checksum: 3F7F
  
- 1 Master software 35/88 1.820.986.21  
 consisting of 3 EPROMs IC 15 (4000) checksum: 8CCA  
 IC 16 (8000) checksum: 6C14  
 IC 18 (C000) checksum: 129B
  
- 1 Audio software 35/88 1.820.987.22  
 consisting of 3 EPROMs IC 15 (4000) checksum: 4BA9  
 IC 16 (8000) checksum: 6F75  
 IC 18 (C000) checksum: AA3B
  
- 1 Capstan software 35/88 1.820.994.25  
 consisting of 1 EPROM IC 17 (C000) checksum: D71A
  
- 1 VU-Panel software (X Panel) 35/88 1.820.988.23  
 consisting of 1 EPROM IC 18 (C000) checksum: AEOA
  
- 1 Audio Remote software (X Panel) 35/88 1.820.988.23  
 consisting of 1 EPROM IC 18 (C000) checksum: AEOA
  
- 1 Parallel Ch. Control IF softw. 22/88 1.820.984.23  
 consisting of 1 EPROM IC 18 (C000) checksum: C4A2
  
- All EPROMs are of the type 27128 (16k) 50.14.0125
  
- Due to delays in production, the new lifter pin will be delivered  
 later (November-December 1988).
  
- 1 Lifter Pin 1" 1.820.128.00

4. Modification instructionsPreparatory Steps

- Carry out an audio parameter back up (see manual A820 MCH Section 4.8).

Attention: Audio-parameter back-up only possible if audio software 14/10/87 equipped and only possible from audio software 14/10/87 to audio software 24/88 and to future software versions.

Write down audio parameters before software up-date or realign the audio after the software up-date if an intermediate audio software dated between 14.10.87 and 24/88 is equipped.

- Write down tape deck alignment data:

. SET LIBRARY WIND	A:		B:	
. SET MAX. WIND SPEED	A:		B:	
. SET ROLLBACK TIME	:			
. SET MAX. REEL	:			
. SET PLAY TENSION	A: Left:	Right:	B: Left:	Right
. SET WIND TENSION	A:		B:	
. SET EDIT TENSION	A:		B:	
. SET REV PLAY TENSION	A: Left:	Right:	B: Left:	Right
. SET BUS ADDRESS	:			
. SERIAL REMOTE FORMAT	:			
. ASCII RS 232 BAUD RATE	:			
. ASCII RS 232 MODE	:			
. TRIM NOMINAL SPEED	:			
(Default value)				

- Write down Audio Keys/Mode data:

. 009 L RANGE 0/6	:
. 010 L RANGE 4/10	:
. 011 L RANGE 8/14	:
. 012 L RANGE 10/16	:
. 052 AUTO INPUT A/B	:
. 053 METERING VU/PPM	:
. 054 NRS DOLBY/TELCOM	:
. 055 DOLBY A/SR	:
. 056 TELCOM c4D/c4E	:

- Write down Tape Deck Keys/Mode data:

- . 201 TAPE GUARD A :
- . 202 TAPE GUARD B :
- . 212 7.5 IPS :
- . 213 15 IPS :
- . 214 30 IPS :
- . 216 7.5/15 IPS :
- . 217 15/30 IPS :
- . 219 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 :
- . 252 SHUTTLE A/B :
- . 253 WIND A/B :
- . 254 EDIT A/B :
- . 255 REC. IND. MODE A/B :

MPU-Audio 1.820.782

1. Remove RAM IC 8 and erase its contents by short-circuiting the pins with each other.  
All variable parameters will now be lost. Insert RAM again.  
Please note: This device is electrostatically sensitive.
2. Remove EPROMs IC 15 (4000), IC 16 (8000), IC 18 (C000) and replace by software 1.820.987.22 35/88 IC 15 (4000), IC 16 (8000), IC 18 (C000).
3. Insert jumper JS 17 again and insert JS 9 instead of JS 8 (see attached layout).
4. MPU-Audio 1.820.782.xx changes to index .22.
5. Attach label .22 (1.101.002.22).

MPU-Master 1.820.784

1. Remove RAM IC 8 and erase its contents by short-circuiting the pins with each other.  
All variable parameters will now be lost. Insert RAM again.  
Please note: This device is electrostatically sensitive.
2. Remove EPROMs IC 15 (4000), IC 16 (8000), IC 18 (C000) and replace by software 1.820.986.21 35/88 IC 15 (4000), IC 16 (8000), IC 18 (C000).
3. MPU-Master 1.820.784.xx changes to index .21.
4. Attach label .21 (1.101.002.21).

MPU-TD Control 1.820.781

1. Remove EPROMs IC 16 (8000), IC 18 (C000) and replace by new software 1.820.985.22 35/88 IC 16 (8000), IC 18 (C000).
3. MPU-TD Control 1.820.781.xx changes to index .22.
4. Attach label .22 (1.101.002.22).

MPU-Capstan Control 1.820.764

1. Remove EPROM IC 17 (C000) and replace by new software 1.820.994.25 35/88 IC 17 (C000).
3. MPU-Capstan Control 1.820.764.xx changes to index .26.
4. Attach label .26 (1.101.002.26).



MPU-VU-Panel 1.820.783

1. Remove RAM IC 8 and erase its contents by short-circuiting the pins with each other.  
All variable parameters will now be lost. Insert RAM again.  
Please note: This device is electrostatically sensitive.
2. Remove EPROMs IC 16 (8000), IC 18 (C000) and replace by new software 1.820.988.23 35/88 IC 18 (C000).

Attention: IC 16 not inserted anymore!

3. MPU-VU-Panel 1.820.783.xx changes to index .23.
4. Attach label .23 (1.101.002.23).

MPU-VU-Panel 1.820.783

Audio Remote Control 21.328.501.00 8CH / 21.328.503.00 24CH

1. Remove RAM IC 8 and erase its contents by short-circuiting the pins with each other.  
All variable parameters will now be lost. Insert RAM again.  
Please note: This device is electrostatically sensitive.
2. Remove EPROMs IC 16 (8000), IC 18 (C000) and replace by new software 1.820.988.23 35/88 IC 18 (C000).

Attention: IC 16 not inserted anymore!

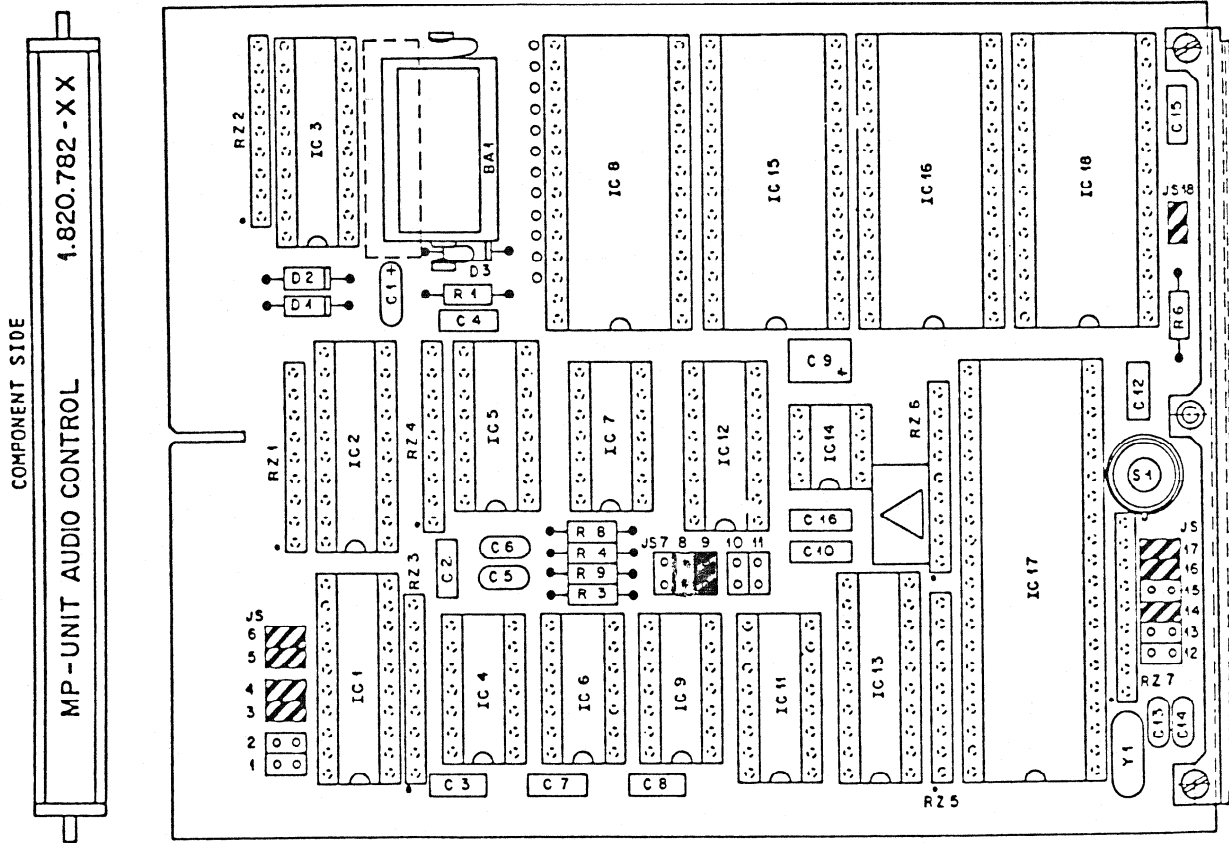
3. MPU-VU-Panel 1.820.783.xx changes to index .23.
4. Attach label .23 (1.101.002.23).

MPU-Audio Remote IF 1.820.787.22

Parallel Channel Control Interface 21.328.500.00

1. Remove EPROM IC 18 (C000) and replace by new software 1.820.984.23 22/88 IC 18 (C000).
2. MPU-Audio Remote IF 1.820.787.22 changes to index .23.
3. Attach label .23 (1.101.002.23).

MP UNIT AUDIO CONTROL PCB 1.820.782.20 ASY 1, GRP 21 ELM 21



Spooling Motor Drive Amplifier 1.820.875.00

Modification:

1. Remove resistor R7
2. Install Common Suppression Adjust Kit 1.820.878.00 :  
(see Schematics and Layout)
  - 2.1. Remove screw and mount the 12 mm - bolt.
  - 2.2. Solder the two pieces of wire into the holes on the additional print 1.820.878.00.
  - 2.3. Screw the additional print 1.820.878.00 onto the previously mounted bolt.
  - 2.4. Solder the two pieces of wire into the holes of R7.  
Check for good connection.
3. Attach label index .81 (1.010.081.43).

Common Mode Adjustment:

1. Connect only flat cable connector P1 to Spooling Motor Drive Amplifier. (All other connectors are unplugged.)
2. Switch tape recorder ON.
3. Measure offset voltage at TP2 (TP1 = ground) and write down offset voltage (voltage is between +/- 60 mV.)
4. Switch tape recorder OFF.
5. Apply a DC-voltage of +26 Volt to J1, Pin 1 with reference to TP1 (ground).  
Use for this purpose the +26 Volt on TP7 (TP3 = ground) of the Fuse/Supply Failure Detector 1.820.866.00.  
Make therefore the cable connections indicated in Fig.
6. Switch tape recorder ON.
7. Measure offset voltage at TP2 (TP1 = ground).  
Adjust with potentiometer R101 (10kohm) to the same offset voltage as measured under step 3 (tolerance +/- 10mV).
8. Switch tape recorder OFF.
9. Secure potentiometer with locking-paint.
10. Repeat steps 1 - 9 for the second Spooling Motor Drive Amplifier.

Power Fail Sense Board 1.820.869.00

Due to a production error, resistor R4 is not inserted in the power fail sense board. (see attached schematics)

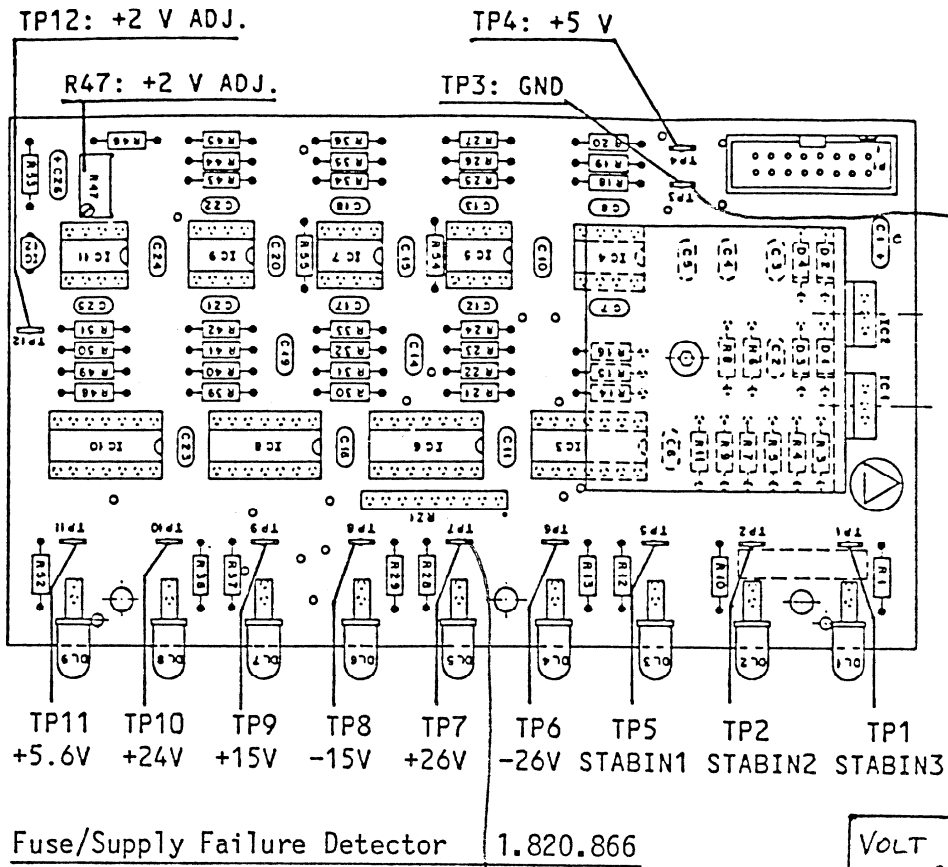
Modification:

The resistor R4 must be inserted in all power fail sense boards in the existing A820 multi-track machines. The power fail sense board is located between the two spooling motors.

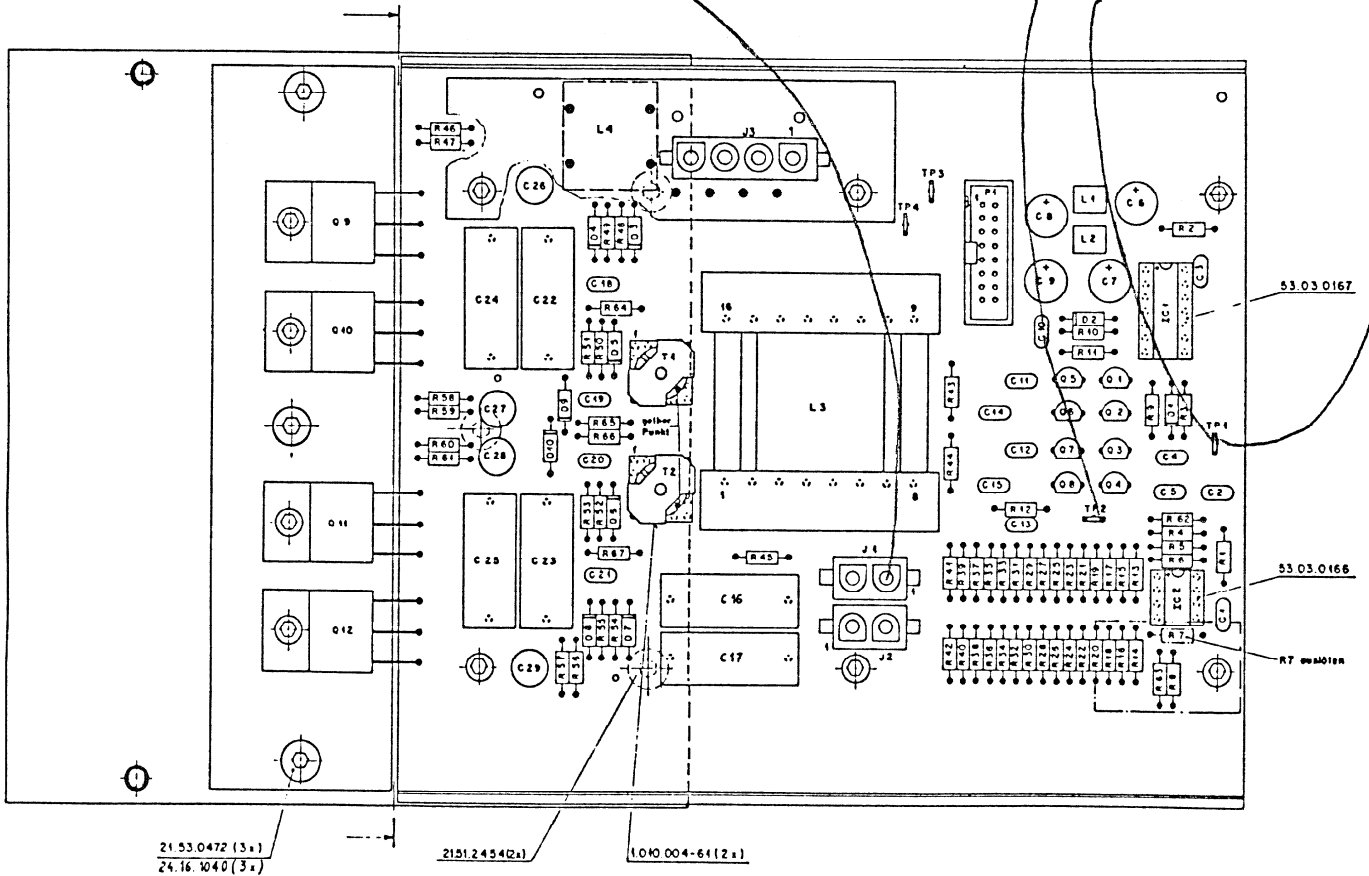
1. Tilt up the tape deck section for easy access.
2. Take out the Power Fail Sense Board 1.820.869.00.
3. Insert R4 680 Ohm (57.11.4681).
4. Put the Power Fail Sense Board back.

Component:

1 Resistor 680 Ohm (57.11.4681)

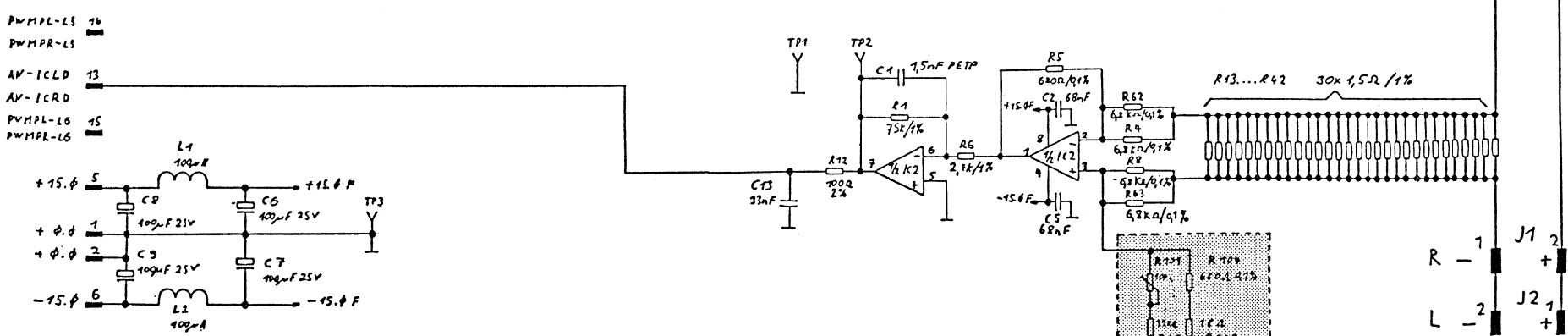
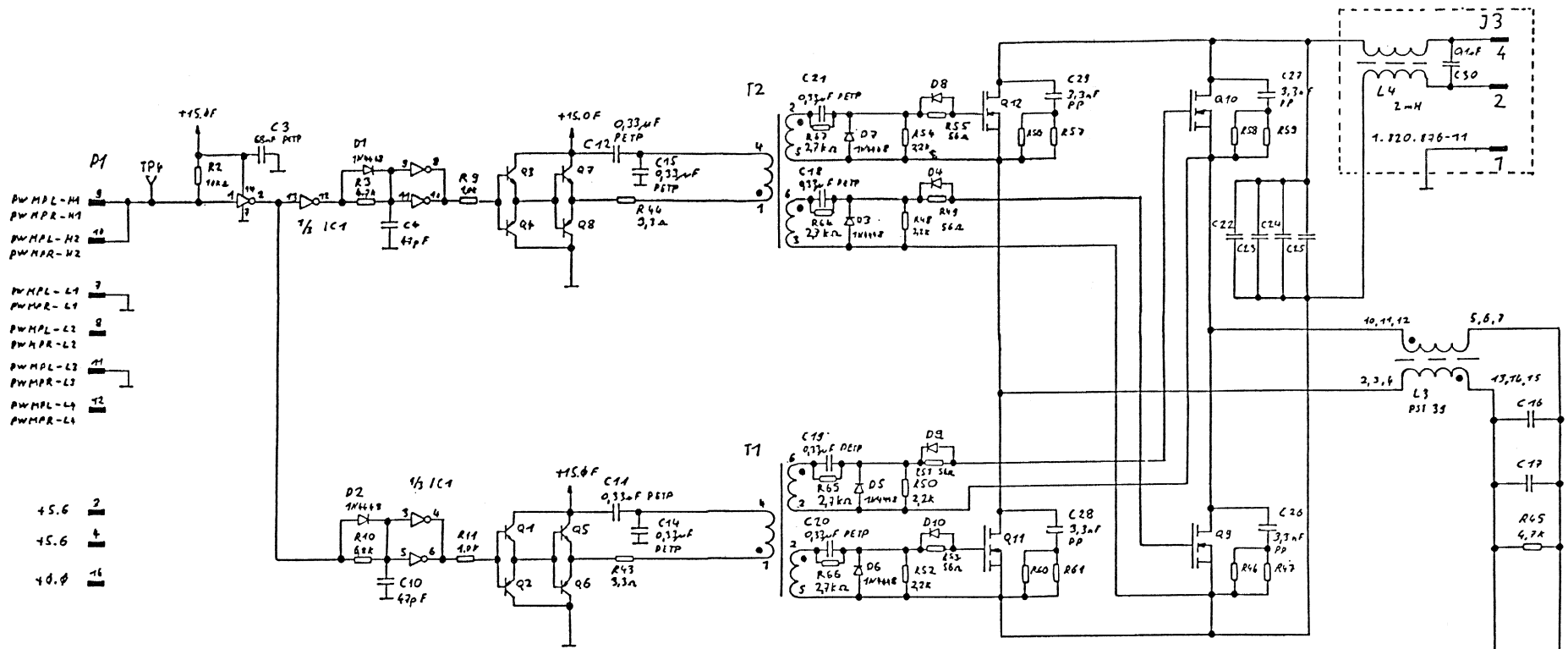


VOLT METER



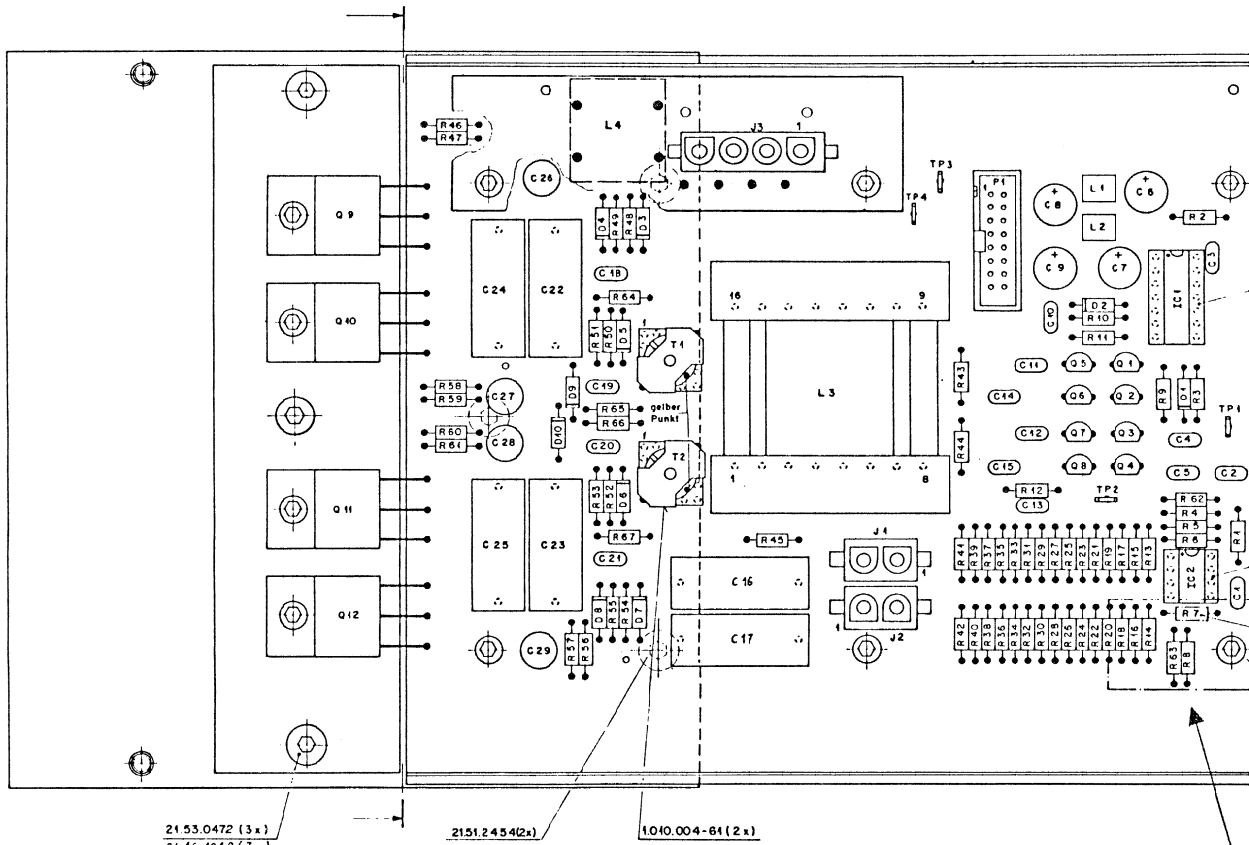
Spooling Motor Drive Amplifier 1.820.875.81

Fig. 4.1, Common Mode Adjustment



- IC1 : 4074 CMOS 6-bit Trigger  
 IC2 : NE 5532 14 CIP  
 Q2, Q4, Q6, Q8 : BC 327  $\frac{C86}{Q2}$  Bottom view  
 Q1, Q3, Q5, Q7 : BC 327  $\frac{C86}{Q1}$  Bottom view  
 Q9... Q12 :  $\frac{C85}{---$  Bottom view
- R76, 77; 56... 61 : 4,7  $\Omega$   
 C16, C17; C22... C25 : 6,8  $\mu$ F MFC  
 D4, D8, D9, D10 : 1N4448

28.388 VA	A820 TAPE TRANSPORT SECTION		PAGE 7 OF 7
STUDER	SPOOLING MOTOR DRIVE AMPLIFIER SC		1.820.875.87

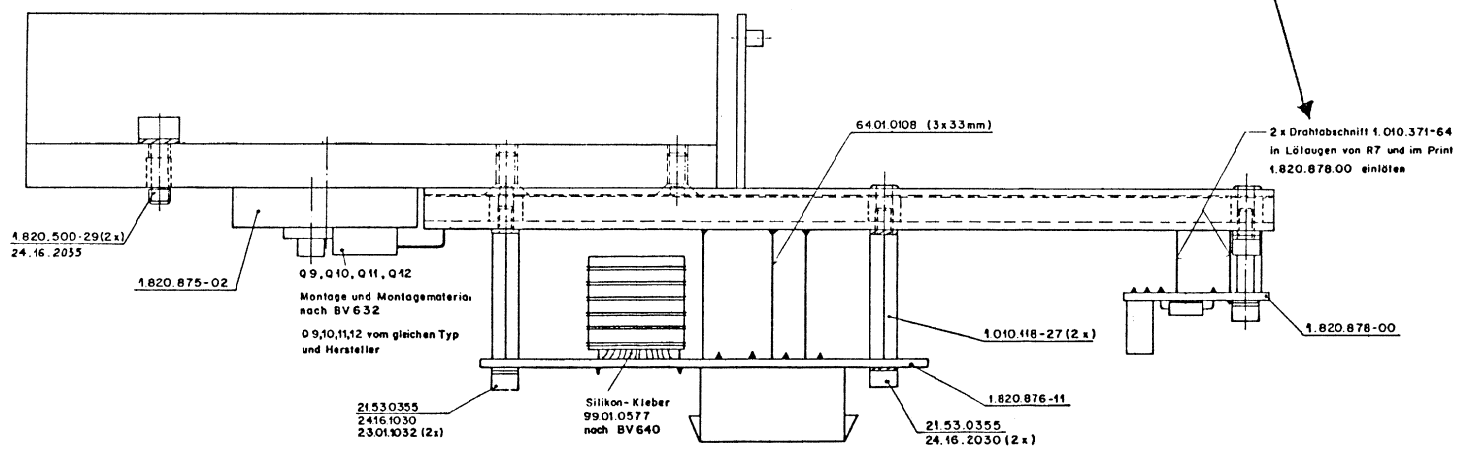
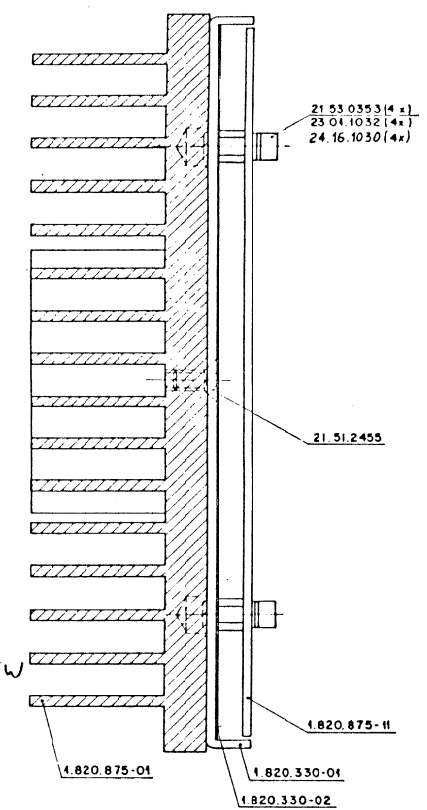


53.03.0167

53.03.0466

REMOVE R7  
R7 auslöten

REMOVE SCREW  
&  
MOUNT THE  
BOLT



Q9, Q10, Q11, Q12  
Montage und Montagematerial  
nach BV 632  
Q 9,10,11,12 vom gleichen Typ  
und Hersteller

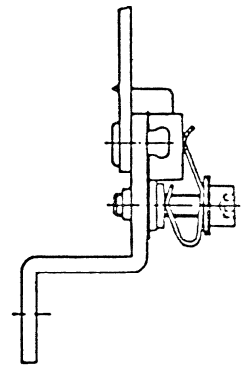
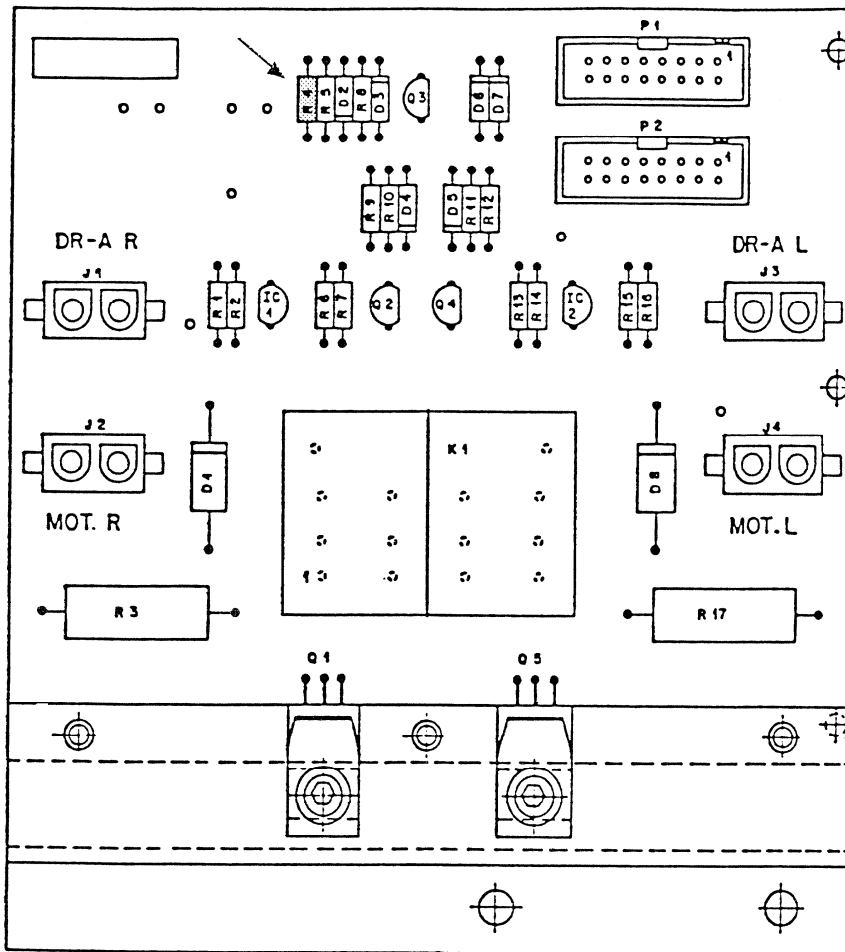
Silikon-Kleber  
99.01.0577  
nach BV 640

2 x Drahtabschnitt 1.010.371-64  
in Lötösen von R7 und im Print  
1.820.878.00 einlöten

Schilder 1.820.875-04 / 43 01 0108  
aufgeklebt nach Fabrikationsmuster.

Name Nr.		Größe		Menge	
Chm. Bez.		Bezeichnung		Lsg.	
Abmessung		Material		Menge	
Zugehörige Unterlagen		Transistorliste		6.5.88	
PL, BV632, BV652		Mitarbeiter		2.4	
Erstellt von		Erstellt durch		Kreiert von	
STUDEM		SPOOLING MOTOR		1.820.875-81	
RECHENUNGS		DRIVE AMPL. ESE			
ZUSATZ					

POWER FAIL SENSE PCB A.820.869.00



QTY	PCS NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
B.....1	96-04-0707	1M 5402	1M 5403, MR 502ML		GI/Mot
B.....2	96-04-1109	25 W Z	827 55-C20		ITT/Mot.Pho.Tha.Tf
B.....3	96-04-1110	6.2 W Z	828 55-C47Z		ITT/Mot.Pho.Tha.Tf
B.....4	96-04-1114	10 W Z	828 55-C10		ITT/Mot.Pho.Tha.Tf
B.....5	96-04-1116	10 W Z	828 55-C10		ITT/Mot.Pho.Tha.Tf
B.....6	96-04-0125	1W 4048			Pc.ITT/Mot.Pho.Tha.Tf
B.....7	96-04-1119	15 W Z	828 55-C15		ITT/Mot.Pho.Tha.Tf
B.....8	96-04-0707	1M 3402	1M 3403, RA 302ML		GI/Mot
IC.....1	96-10-0100	4N 317 LZ			Mot/Mot
IC.....2	96-10-0108	4N 317 LZ			Mot/Mot
J.....1	94-25-0002		see note 1		
J.....2	94-25-0002		see note 1		
J.....3	94-25-0002		see note 1		
J.....4	94-25-0002		see note 1		
K.....1	96-02-0108	24 V DC	Ly 4		Duron
P.....1	94-16-2002		see note 2		
P.....2	94-16-2002		see note 2		
R.....1	98-03-0512	80 099 A	80R 93 B		Mot/SGS
R.....2	96-03-0348	8C 337-25			ITT/Hi.Pho.Sio
R.....3	96-03-0348	8C 337-25			ITT/Hi.Pho.Sio
R.....4	96-03-0348	8C 337-25			ITT/Hi.Pho.Sio
R.....5	98-03-0512	80 099 A	80R 93 B		Mot/SGS
R.....6	97-11-4499	68 Ohm	5% 68		5%
R.....7	97-11-4331	330 Ohm	5% 330		5%
R.....8	97-56-3478	10% 4 Watt			10% 4 Watt
R.....9	97-11-4491	640 Ohm	5% 640		5%
R.....10	97-11-4274	270 Ohm	5% 270		5%
R.....11	97-11-4471	470 Ohm	5% 470		5%
R.....12	97-11-4271	270 Ohm	5% 270		5%
R.....13	97-11-4152	1-3 100m	5% 100m		5%
R.....14	97-11-4342	5-6 100m	5% 100m		5%

QTY	PCS NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
B.....10	97-11-4163	10 100m	5% 10		5%
B.....11	97-11-4103	1C 400m	5% 400		5%
B.....12	97-11-4342	5-6 100m	5% 100m		5%
B.....13	97-11-4271	270 Ohm	5% 270		5%
B.....14	97-11-4431	470 Ohm	5% 470		5%
B.....15	97-11-4331	330 Ohm	5% 330		5%
B.....16	97-11-4440	68 Ohm	5% 68		5%
B.....17	97-20-3478	0.47 Ohm	5% 0.47		5% 0.47

Note 1 - Connector: 2 contacts: AMP Mr. 82666-3

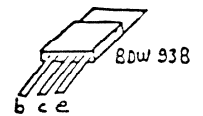
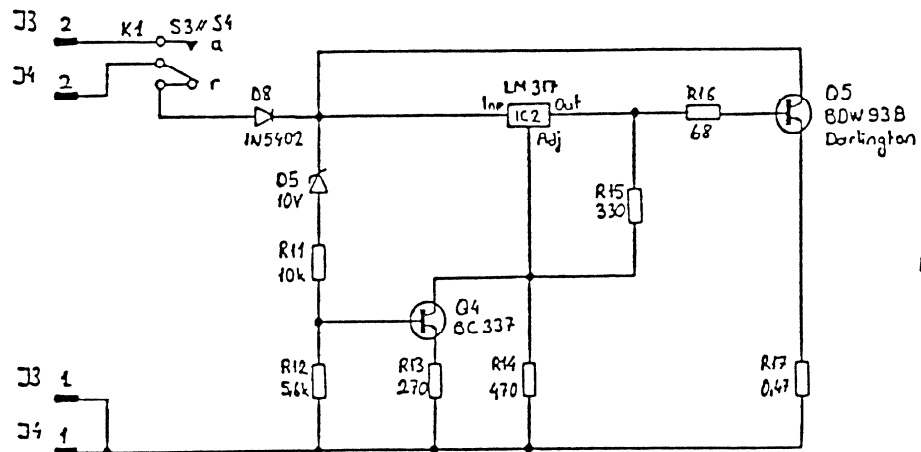
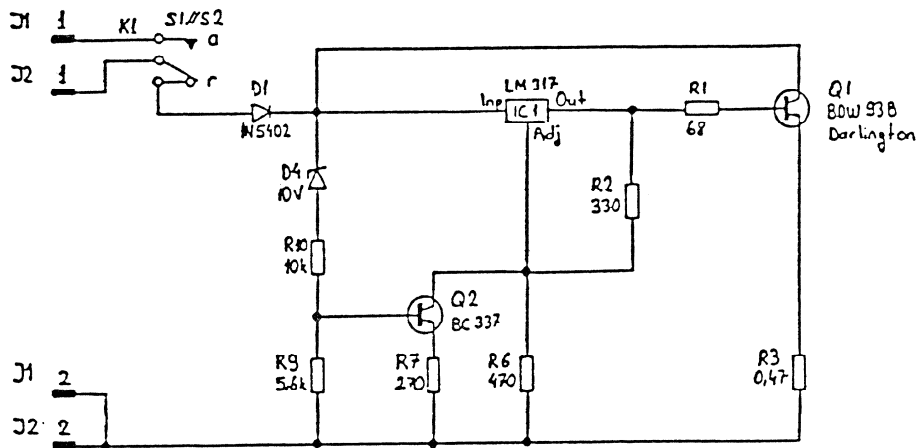
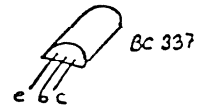
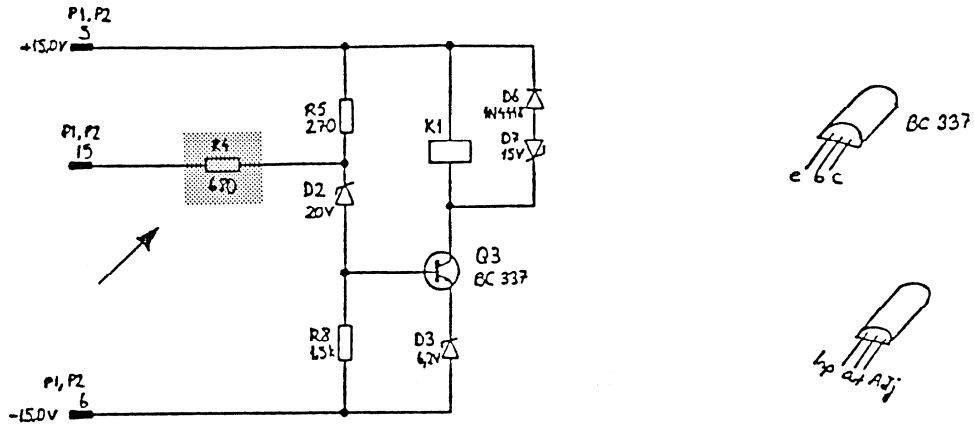
Note 2 - Connector: 24 contacts: Yamachi Mr. PAF-10-05-035  
Burdet Mr. BPH 9 816 800 CS  
JM Mr. 7610-002 72

MANUFACTURERS: FujiPhoto, General Instruments, ITT/Intermetal,  
Pac-Metrol, Motorola, National, Philips, Sanyo, Siemens,  
Pneumatic, Serotec, Sylvania, Sylvania, Sylvania,  
Sylvania, Sylvania, Sylvania

DATE: 07/04/82

PUBLISHED: 06/87

POWER FAIL SENSE PCB 1.820.869.00



12.2.37 ND			
ESTM (N) (S) (R)	POWER FAIL SENSE BOARD	1.820.869.00	PAGE 1 OF 1



Motor Assembly Right 1.820.141.00

Insufficient stroke length of the pinch roller assembly may result in tape slippage.

Modification:

The clearance of the pressure spring has to be increased to 0.5 ... 1mm.

1. Tilt up tape transport and remove right-hand Motor Assembly 1.820.141.00.
2. With a diagonal cutter or other suitable tool, shorten the right hand side control cam 1.820.141.06 by 3mm at the point indicated on the attached drawing. (Fig. X.X)
3. Motor assembly right 1.820.141.00 changes to 1.820.141.81. Attach index label .81 (1.010.081.43).

Adjustment:

The modification necessitates a readjustment of the distance between the pinchroller shaft and the headblock plate.

Adjusting the distance between pinchroller shaft and headblock plate: (see Fig. )

1. Switch tape recorder OFF.
2. Remove pinch roller.
3. Insert allen key (3mm) into the hole [1] and turn the pinch roller assembly clockwise to the end stop (Play - Position).
4. Loosen locknut (opening between flats 7mm) [2] on the tie rod at the pinch unit and turn tie rod [3] until a distance of ca.0.1mm between pinchroller shaft and headblock plate is obtained.
5. Retighten locknut and secure with locking paint.
6. Install pinch roller.

Checking the pinch roller force:

1. Switch tape recorder ON.
2. Press EDIT then PLAY (Pinch roller is now in PLAY - Position).
3. Unscrew fixing screw by a few turns [4].
4. Hook spring dynamometer 0 - 20N to the screw, and pull in the direction of the connecting line between the centers of the capstan shaft and the pinch roller. While pulling, lightly brake the pinch roller with your finger.
5. The spring dynamometer should indicate 1.2 - 1.3kp at the point where the pinch roller just lifts off the tape (and consequently stops).

Adjusting the pinching force:

If the above value is not attained, the pinch roller spring has to be readjusted.

1. Tilt recorder to service position.
2. Switch recorder to EDIT then PLAY.
3. The adjusting nut [5] (prevailing torque type nut, opening across flats 7mm) of the pinch unit is accessible through a hole in the cast chassis. Adjust until the requested value is attained.
4. Reinstall pinch roller cover after the adjustment.

\* IMPORTANT NOTE:

- Machines that are equipped with a 4-section pinch roller and are delivered after September 1988 the following holds:
  - the machines are modified as per SI 120/88.
  - the pinch roller shaft is straight.
  - the pinch roller pressure force is 0.9 - 1 kg.
  - the distance between the pinch roller shaft and the capstan shaft should be 13.5 - 13.8 mm.  
It is factory adjusted !
  - the machines are equipped with 2 gas springs to hold back the chassis in tilt-up position. (each one having a pressure force of 25 Kg.)

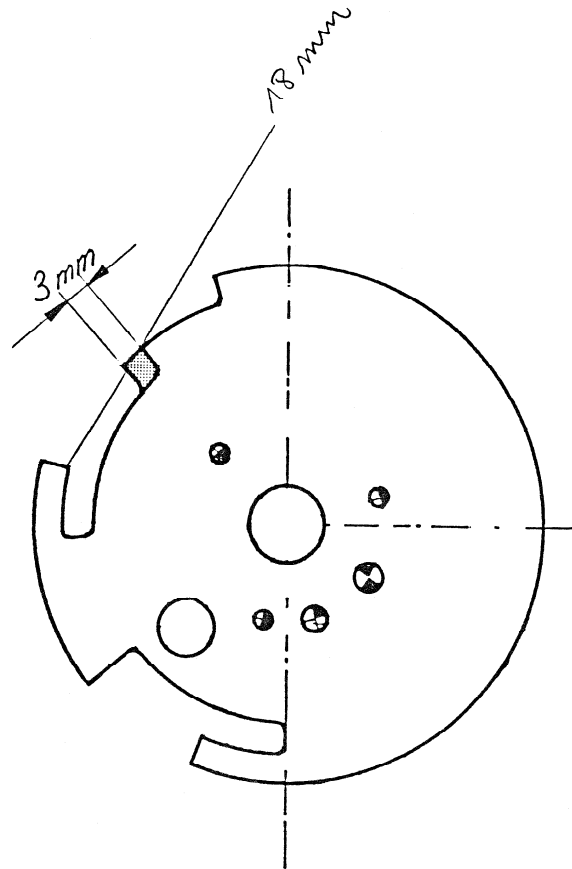


Fig. 4.2.

Werkstoff	Norm-Nr.: 14.04.0207	Oberfläche	Güte:	Änderung					③
	DIN-Bez.: AlMgSi 1 F32		Beh.:		8.3.88	DM	Ally.	Ally.	②
	Abmessung: 0,6 mm				9.4.85	JH	JH	JH	①
Zugehörige Unterlagen:	Freimasstoleranz:	Maßstab:	Ausgabe	14.3.84	JH	JH	JH	①	
	± 0,1	1:1	Datum	Gez.	Gepr.	Ges.	Index		
Ersatz für: 5589-61	Ersetzt durch:	Kopie für:							
STUDER REGENSDORF ZÜRICH	Benennung: <i>Steuerscheibe rechts</i>	Nummer: <i>1.820.141-06</i>							

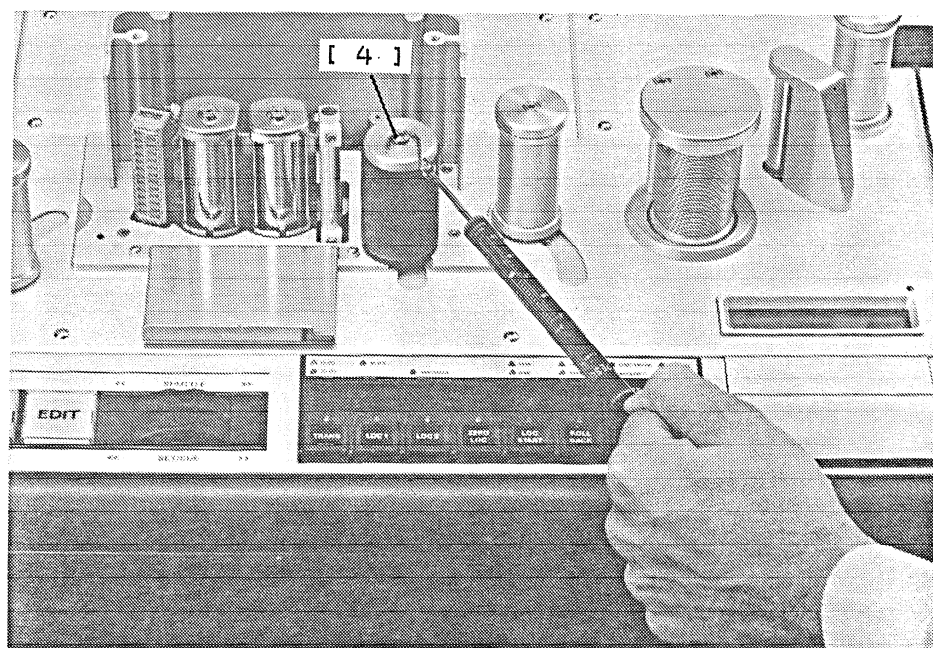
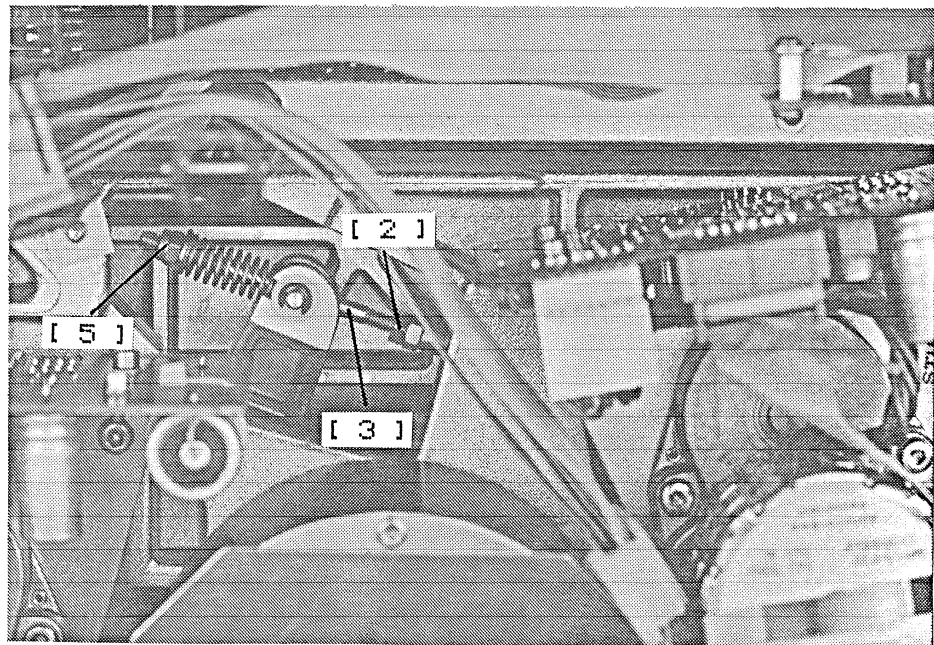
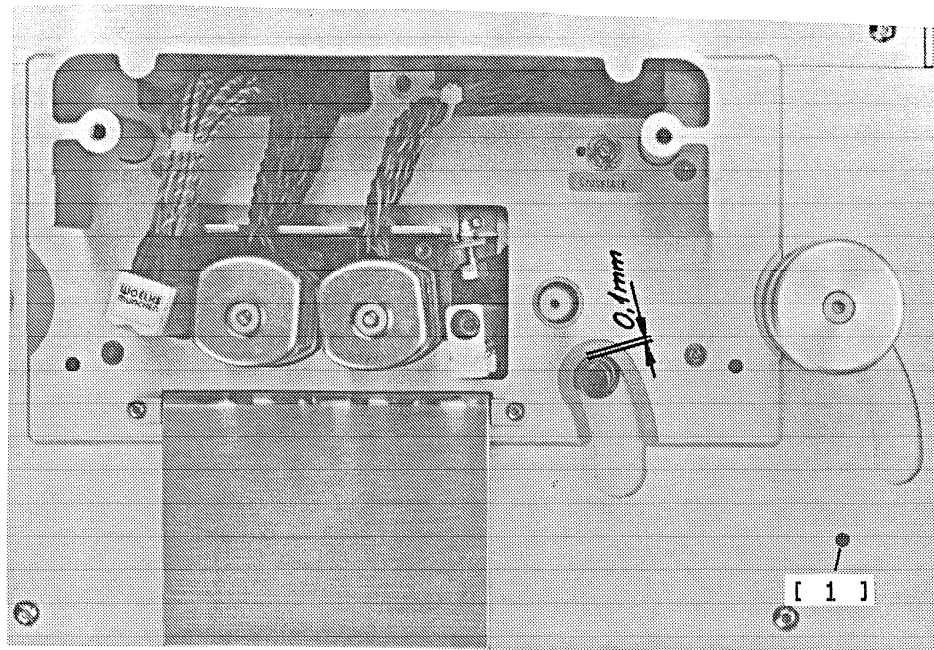


Fig. 4.3.

Lifter Pin 1.820.124.00 2"/ 1.820.123.00 1"

1. Remove headblock cover and old lifter pin.
2. Replace old lifter pin by the new lifter pin 1.820.129.00 (2") or 1.820.128.00 (1").

Adjusting the lifter pin

1. Load a tape.
2. Remove the headblock cover.
3. Switch recorder to EDIT. The tape must be separated from the capstan shaft by a few tenths of a millimeter. (the tape just does not touch the capstan shaft).
4. Should this not be the case, loosen the locknut (opening across flats 5,5 mm) and adjust screw (opening across flats 7 mm) to such a point where the tape just does not touch the capstan shaft in EDIT mode.
5. Retighten locknut.
6. Reinstall headblock cover.

Move Roller 1.820.450.04 2"/ 1.820.440.04 1"

1. Remove old move roller.
2. Replace old move roller by new move roller 1.820.450.08 (2") or 1.820.440.08 (1").
3. Check the tape transport and readjust if necessary. (see Service Information SI 110/87 or 115/88 or Manual 10.27.0663 section 3.3.15)

## 5. Putting into operation

1. Switch tape recorder ON. After a short time the error message "Data lost" will appear on the LC-display and the message "ERROR" will appear on the counter display. Switch the recorder OFF and ON again. The recorder is now ready for operation. Press both STORE buttons to clear the error messages.

2. Load audio parameter again.

3. Load and check tape deck alignment:

- . SET LIBRARY WIND A/B
- . SET MAX. WIND SPEED A/B
- . SET ROLLBACK TIME
- . SET MAX. REEL
- . SET PLAY TENSION A/B
- . SET WIND TENSION A/B
- . SET EDIT TENSION A/B
- . SET REV PLAY TENSION A/B
- . SET BUS ADDRESS
- . SERIAL REMOTE FORMAT
- . ASCII RS 232 BAUD RATE
- . ASCII RS 232 MODE
- . TRIM NOMINAL SPEED

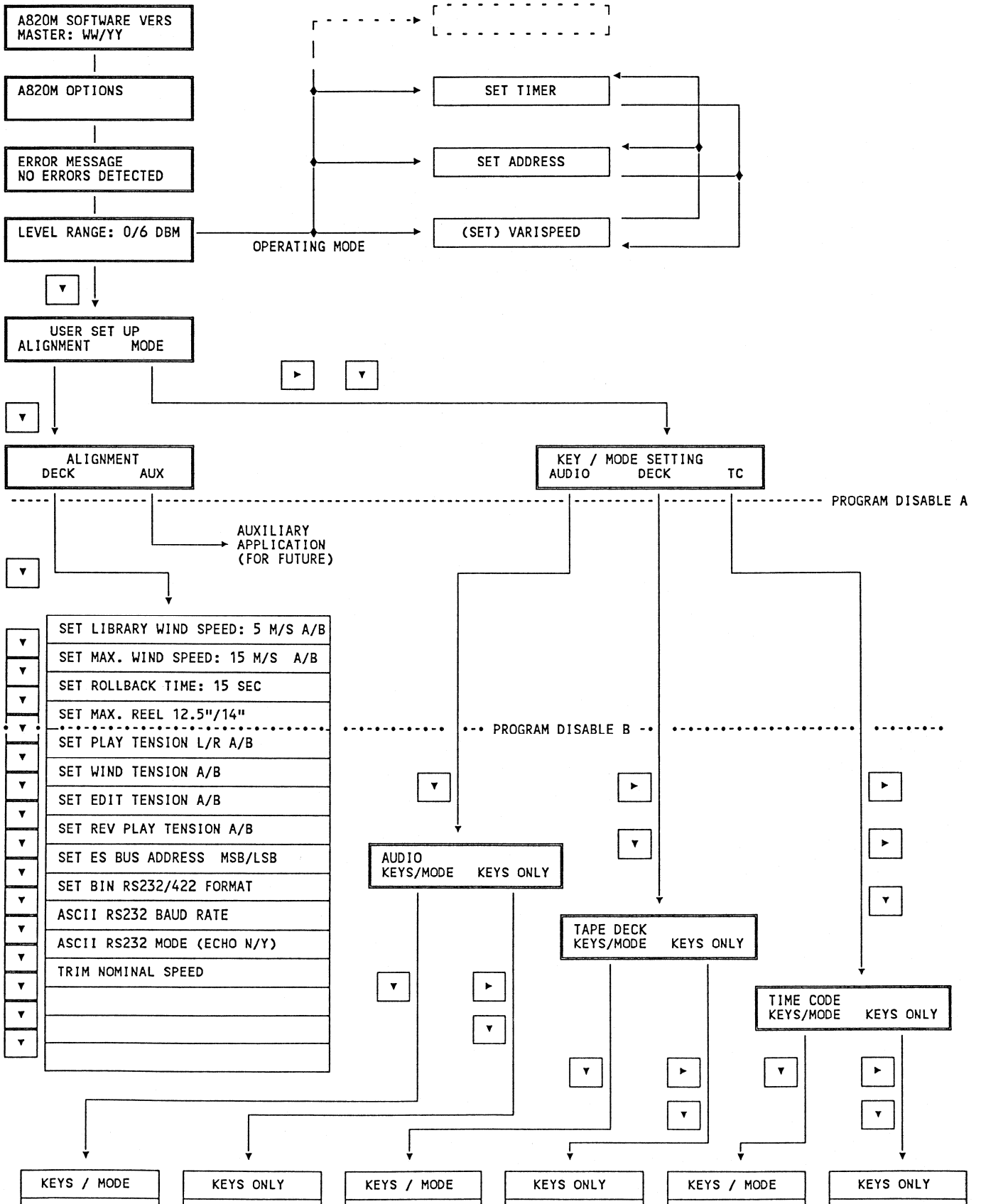
4. Check programming of soft keys:

- . F 009 to F 056
- . F 102 to F 104
- . F 211 to F 255
- . F 301 to F 351

Select function F 054 according to external NR-System (See enclosed description section 2.6.2)

5. Reprogram one key. This action deletes the error message "Default keys loaded".

### 2.6 Soft Keys, Status Tree Diagram for A820MCH 1" and 2" Versions



CONTINUE







## 2.6.2 Additional Functions for A820 MCH 1" and 2" Version

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

Selection of the VU-meter indication-mode: either VU characteristic or PPM characteristic.

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

Selection of the logic level (HIGH/LOW) at the external noise reduction system connector (15 pole, D-Type). (Only possible if machine is equipped with option 20.820.385, noise reduction system interface for controlling external noise reduction system).

- Open collector output is active LOW in position DOLBY.
- Open collector output is active HIGH in position TELCOM.

Selection of internal noise reduction system: either Dolby A (Cat. No. 22) and Dolby SR (Cat. No. 280) or Telecom c4D/c4E.

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

Selection of Dolby noise reduction card: either Dolby A (Cat. No. 22) or Dolby SR (Cat. No. 280).

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

Selection of TELCOM noise reduction card: either c4D or c4E.

SPOT ERASE (No. 102) KEYS ONLY

After activating SPOT ERASE, the corresponding LED lights up for approximately 2-3 seconds. If the EDIT and the REC keys are simultaneously pressed during this period, the manual erase operation is activated, i.e. the erase heads of all channels with preselected READY mode are now active. These tracks can be erased by manually reciprocating the tape in front of the heads. Minor speech faults, switching clicks etc. can thus be deleted in a simple manner.

The SPOT ERASE mode is indicated by the flashing SPOT ERASE LED and the flashing REC and EDIT keys.

Pressing STOP switches SPOT ERASE off.

AUDIO REM IF (No. 104) KEYS ONLY

Activates the Parallel Channel Control Interface 21.328.500.00; the local VU-Panel and the Audio Remote Control are disabled.

The LC-Display in the VU-Panel indicates "AUDIO REMOTE IF ENABLED" if the function is activated.

Canceling the function: by pressing the key again.

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

- Program Disable A: Programming enable switch disables entry into status tree diagram.
- Program Disable B: Programming enable switch disables entry into status tree diagram, except for the following functions: SET LIBRARY WIND SPEED, SET MAX. WIND SPEED, SET ROLLBACK TIME, SET MAX. REEL.

SHUTTLE A/B	(No. 252) KEYS/MODE
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Selection of tape-head contact during shuttle mode: Shuttle A mode, tape is in contact with heads, shuttle B mode, tape is retracted from heads.

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

Selection of tape-lifter pin contact during wind mode: Wind A, tape is contact with lifter pin, Wind B, tape is retracted from lifter pin (all rollers are completely retracted).

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

Selection of tape tension control during edit mode: Edit A; tape tension control is active during Edit mode (one-hand cueing is possible), Edit B; no tape tension control during edit mode.

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

- Rec Indic Mode A: Record indication and record tally is only active, if at least one channel is switched to record-mode.
- Rec Indic Mode B: Record indication and record tally switch independently from audio record-status.

Application: "Follow External Record" with TLS 4000.

4.6.5 A820 MCH Dolby/Telcom Alignment Instructions

Instructions for the use of:

- Dolby A
- Dolby SR (Spectral Recording)
- Telcom c4Dm

Noise Reduction modules with STUDER A820 Multitrack machines starting with the following combination of software versions:

TD software	22/88
Master software	22/88
Audio software	24/88
Capstan software	22/88
VU-Panel/Audio Remote software	22/88

Default setting:

NR SYSTEM Functions 054/055	Indication of the LC display on the meter bridge:	
	VU metering mode	PEAK metering mode
Dolby A	+0.0 VU	-6 dB
Dolby SR	-15.0VU	-15.0dB
Telcom	+6.0 VU	0 dB

Remarks:

- The TELCOM system is related to peak recording level. The DOLBY systems are related to operating level.
- Channels with activated NR system will switch automatically from REPRO to INPUT at drop-in, and back to REPRO at drop-out. It is possible, however, to select REPRO manually during recording.
- In "NRS TONE" and "NRS ALIGN" modes, the NR system will automatically switch to "BYPASS" for alignment and measuring purposes (Audio Alignment). The Record- and Reproduce adjustments of the machine are not influenced by the Noise Reduction System.
- The function "UNCAL MODE (ON/OFF)" allows in position "UNCAL MODE" (LED shines) an individual level setting for each channel. In position "CAL MODE" the same level setting is used for all channels. Both level settings are totally independent and do not influence each other.  
The CAL MODE may be used as the "In-House Standard" whereas the UNCAL MODE is used for incoming customer tapes which need individual channel setting.

ATTENTION:

The key "UNCAL MODE (ON/OFF)" is also an operating key. This means that it must be selected according to the desired mode (CAL/UNCAL MODE) in normal operation mode (NRS ALIGN=OFF).

The following instructions are intended to explain the alignment and use of Dolby Laboratories Cat. No. 22 A-type and Cat. No. 280 SR modules when fitted in STUDER A820 MCH recorders. These instructions are intended for the above software release (and future software releases) which includes both automatic and comprehensive manual alignment facilities.

### NRS Level Indication

\* DOLBY SR : When the Dolby Tone button is pressed, the meter will read on the Dolby Level dot for noise recorded at 15 dB below Dolby Level.

On any of the units manufactured by Dolby Laboratories, the meter gain of the unit is changed so that this will be the case.

\* DOLBY A : The meter will read on the Dolby Level dot for Dolby Tone recorded at Dolby Level.

The same feature is provided by the A820MCH software, when "NRS ALIGN" is pressed and the NR-Systems are switched ON: The VU-Meter will read on the flashing middle LED (which represents the Dolby Level Dot) for noise recorded at 15 dB below Dolby Level in case of Dolby SR or for Dolby Level in case of Dolby A.

### Circuit description

The NR interface circuitry of the A820 MCH contains two digitally controlled gain stages, one before the NR module and one after. The machine software sets the gain of these stages in such a way that the overall gain of the NR system (see Note 1) is always unity. The advantage of such an arrangement is that the program levels are independent of the setting of the NR system. The disadvantage is that any changes to the "NRS LEVEL" are not reflected by changes on either the machine or the console meters. The current settings of the "NRS LEVEL" may only be viewed or changed by using the LC display on the meter bridge.

### Note 1:

Other than any gain intentionally introduced by the NR process. The Dolby A system for example has a gain of  $-1/2$  dB in record mode and  $+1/2$  dB in play mode at Dolby Level. Such gain differences will be apparent if tones are measured when the NR is switched on and may cause confusion. When recording with noise reduction switched on, the signal "off tape" will be encoded, giving the impression of a level difference between INPUT and REPRO. On reproduce, however, once the signal has been decoded the level will be the same as the original INPUT signal. The same effect can be seen when the noise reduction unit is external to the tape machine, except that on the tape machine both INPUT and REPRO signals are encoded, giving a difference between the console and tape machine meters.

Using Cat. No. 22 A-type modules:

Set functions No. 053 to "METERING VU", No. 054 to "NRS DOLBY", and No. 055 to "DOLBY A".

Using TELCOM c4D/c4E-type modules:

Set functions No. 053 to "METERING PPM", No. 054 to "NRS Telcom", and No. 056 to "TELCOM c4D or c4E".

Note:

The following alignment instructions are written for Dolby NR-Systems. They also apply for TELCOM NR-Systems but Dolby Level is replaced by TELCOM Level and the LC-Display indicates in "dB" instead of "VU".

RECORD:

\* Dolby Level = 0 VU:

This is the most frequently used alignment method.  
Set "NR TONE UNCAL CH 1-XY" to +0.0 VU on the LCD:

1. Press "NRS ON" and "ALL SAFE" to switch all NR-Systems on.
2. Press "NRS ALIGN".
3. Press "MANUAL ALIGN"; "UNCAL MODE" is automatically switched ON.
4. Switch the "UNCAL MODE" ON or OFF depending on whether the NR system has to be aligned for all channels (CAL MODE, In-house Standard) or for individual channels (UNCAL MODE, adjusting to a tape coming in from outside).
5. Set for +0.0 VU with the "PARAM UP/PARAM DOWN" buttons.
6. Press "STORE" if the level is reached.
7. Repeat the alignment for the remaining channels if "UNCAL MODE" is selected.
8. Press "NRS ALIGN" again to return to normal operating mode.

To double check the level setting, press the "NRS TONE" button and record a section of tone on blank tape. The tone should read 0 VU when played back (either with the "NRS TONE" button still pressed or NR switched off).

\* Dolby Level does not match 0 VU:

Example: 0 VU corresponds to a flux level of 320 nWb/m and Dolby Level corresponds to 200 nWb/m. Playing a 200 nWb/m test tape on a machine which has been aligned for 320 nWb/m would give a reading of -4 VU.

Set "NR TONE UNCAL CH 1-XY" to -4.0 VU on the LCD:

1. Press "NRS ON" and "ALL SAFE" to switch all NR-Systems on.
2. Press "NRS ALIGN".
3. Press "MANUAL ALIGN"; "UNCAL MODE" is automatically switched ON.
4. Switch the "UNCAL MODE" ON or OFF depending on whether the NR system has to be aligned for all channels (CAL MODE), or for individual channels (UNCAL MODE).
5. Set for -4.0 VU with the "PARAM UP/PARAM DOWN" buttons.
6. Press "STORE" if the level is reached.
7. Repeat the alignment for the remaining channels if "UNCAL MODE = ON" is selected.
8. Press "NRS ALIGN" again to return to normal operating mode. To double check the level setting, press the "NRS TONE" button and record a section of tone on blank tape. The tone should read -4 VU when played back (either with the "NRS TONE" button still pressed or NR switched off).

#### REPRODUCE:

\* Dolby Level = 0 VU;

Press "NRS ON" and "ALL SAFE" to switch all NR-Systems on. With the "NRS ALIGN" button pressed, Dolby Tone reproduced from tape should read "0" (on channels with flashing middle LED). If this is the case then all is well.

\* Dolby Level does not match 0 VU;

If Dolby Tone from tape does not read "0" then the machine can be adjusted in 2 different ways:

#### A) Manual Alignment

1. Press "NRS ON" and "ALL SAFE" to switch all NR-Systems on.
2. Press "NRS ALIGN".
3. Press "MANUAL ALIGN"; "UNCAL MODE" is automatically switched ON.
4. Switch the "UNCAL MODE" ON or OFF depending on whether the NR system has to be aligned for all channels (CAL MODE), or for individual channels (UNCAL MODE).
5. Play the Dolby Tone section of the tape.
6. Set for "0" (flashing middle LED) with the "PARAM UP/PARAM DOWN" buttons.
7. Press "STORE" if the level is reached.
8. Repeat the alignment for the remaining channels if "UNCAL MODE" is selected.
9. Press "NRS ALIGN" again to return to normal operating mode.

## B) Automatic Alignment

1. Press "NRS ON" and "ALL SAFE" to switch all NR-Systems on.
2. Press "NRS ALIGN".
3. Press "AUTO ALIGN"  
ATTENTION: switches automatically to UNCAL MODE !
4. Play the Dolby Tone section of the tape.
5. Press "STORE START"
6. Press "NRS ALIGN" again to return to normal operating mode.

### Remarks:

- If the Dolby Tone section on the tape is too short to complete the automatic alignment process in one cycle, then press "LOC START" (LOC START PLAY must be programmed) before the end of the Dolby Tone in order to rewind and automatically continue the alignment process.
- If one (or more) of the active channels cannot be aligned by the "AUTO ALIGN" routine, then the NR-System on the concerned channel(s) will be switched OFF and the error message "nr tone align failed" appears.
- If the machine has been adjusted to a pre-recorded tape with the automatic alignment procedure in UNCAL MODE, then the key "UNCAL MODE" must remain active (i.e. LED must shine) in normal operating mode !



Using Cat. No. 280 Spectral Recording modules:

Set functions No. 053 to "METERING VU", No. 054 to "NRS DOLBY", and No. 055 to "DOLBY SR".

The alignment of SR differs from A-type in two aspects.

1. The alignment signal is pink noise rather than the familiar Dolby Tone. This noise signal known as "Dolby Noise" has short "gaps" every two seconds, similar to the warble in the Dolby Tone.

2. Dolby Noise serves not only as a level reference but can be used to check frequency response as well. To facilitate frequency response checks, all SR processors include a facility known as AUTO COMPARE.

AUTO COMPARE works as follows:

- In RECORD, the module will output the following sequence: 4 seconds of noise from the tape followed by 4 seconds of noise from the internal generator. This sequence reveals audibly any level or response errors in the recorder including any Dolby Level misalignment. The "tape" section of the noise has a 20 ms gap after 2 seconds; the "ref." section from the internal generator is continuous. Lights on the front of each Cat. No. 280 indicate which signal is being heard at any time.

On the rear of each Cat No 280 is a frame configuration switch used to configure the AUTO COMPARE system as appropriate for different types of interfaces. The switch is labeled "360", "361", and "M" for use with Dolby Laboratories models 360, 361, and M series. For use in the STUDER A820 MCH the switch should be set to the "360" position (to the edge).

On any of the units manufactured by Dolby Laboratories the meter gain of the unit is changed so that when the Dolby Tone button is pressed the meter will read on the Dolby Level dot for noise recorded 15 dB below Dolby Level. The same feature is provided by the A820MCH software, when "NRS ALIGN" is pressed and the NR-Systems are switched ON: the VU-Meter will read on the flashing middle LED for noise recorded at 15 dB below Dolby Level.

RECORD:

\* Dolby Level = 0 VU (Dolby Noise at -15 dB):

This is the most frequently used alignment method.

Set "SR NOISE UNCAL CH 1-XY" to -15.0 VU if VU metering mode is switched ON, or to -15.0 dB if PEAK metering mode is switched ON.

1. Press "NRS ON" and "ALL SAFE" to switch all NR-Systems on.
2. Press "NRS ALIGN".
3. Press "MANUAL ALIGN"; "UNCAL MODE" is automatically switched ON.
4. Switch the "UNCAL MODE" ON or OFF depending on whether the NR system has to be aligned for all channels (CAL MODE, In-house Standard) or for individual channels (UNCAL MODE, adjusting to a tape coming in from outside).
5. Set for -15.0 VU (in VU metering mode), or -15.0 dB (in PEAK metering mode) with the "PARAM UP/PARAM DOWN" buttons.
6. Press "STORE" if the level is reached.
7. Repeat the alignment for the remaining channels if "UNCAL MODE" is selected.
8. Press "NRS ALIGN" again to return to normal operating mode.

To double check the level setting, press the "NRS TONE" button and record a section of Dolby Noise on blank tape. The Dolby Noise will be recorded at a level of -15 dB (either with the "NRS TONE" button still pressed or NRS switched off). Rewind the tape. With the "NRS ALIGN" button pressed, Dolby Tone reproduced from tape should read "0" (on channels with flashing middle LED). If this is the case then all is well.

\* Dolby Level does not match 0 VU  
(Dolby Noise other than -15dB):

Example: 0 VU corresponds to a flux of 320 nWb/m and Dolby Level corresponds to 200 nWb/m. Playing a 200 nWb/m test tape on a machine which has been aligned for 320 nWb/m would give a reading of -4 VU.

Set "SR NOISE UNCAL CH 1-XY" to -19.0 VU on the LCD:

1. Press "NRS ON" and "ALL SAFE" to switch all NR-Systems on.
2. Press "NRS ALIGN".
3. Press "MANUAL ALIGN"; "UNCAL MODE" is automatically switched ON.
4. Switch the "UNCAL MODE" ON or OFF depending on whether the NR system has to be aligned for all channels (CAL MODE), or for individual channels (UNCAL MODE).
5. Set for -19.0 VU (in VU metering mode), or -19.0 dB (in PEAK metering mode) with the "PARAM UP/PARAM DOWN" buttons.
6. Press "STORE" if the level is reached.
7. Repeat the alignment for the remaining channels if "UNCAL MODE" is selected.
8. Press "NRS ALIGN" again to return to normal operating mode.

To double check the level setting, press the "NRS TONE" button and record a section of Dolby Noise on blank tape. The Dolby Noise should read -4 dB below -15dB, i.e. -19 dB when played back (either with the "NRS TONE" button still pressed or NRS switched off).

With the "NRS ALIGN" button pressed, Dolby Tone reproduced from tape should read "0" (on channels with flashing middle LED). If this is the case then all is well.

#### REPRODUCE:

\* Dolby Level = 0 VU (Dolby Noise at -15 dB):

Press "NRS ON" and "ALL SAFE" to switch all NR-Systems on. With the "NRS ALIGN" button pressed, Dolby Tone reproduced from tape should read "0" (on channels with flashing middle LED). If this is the case then all is well.

\* Dolby Level does not match 0 VU  
(Dolby Noise other than -15dB):

If Dolby Noise from tape does not read "0" (with the "NRS ALIGN" button pressed) then the machine can be adjusted in 2 different ways:

#### A) Manual Alignment

1. Press "NRS ON" and "ALL SAFE" to switch all NR-Systems on.
2. Press "NRS ALIGN".
3. Press "MANUAL ALIGN"; "UNCAL MODE" is automatically switched ON.
4. Switch the "UNCAL MODE" ON or OFF depending on whether the NR system has to be aligned for all channels (CAL MODE), or for individual channels (UNCAL MODE).
5. Play the Dolby Noise section of the tape.
6. Set for "0" (flashing middle LED) with the "PARAM UP/PARAM DOWN" buttons.
7. Press "STORE" if the level is reached.
8. Repeat the alignment for the remaining channels if "UNCAL MODE" is selected.
9. Press "NRS ALIGN" again to return to normal operating mode.

#### B) Automatic Alignment

1. Press "NRS ON" and "ALL SAFE" to switch all NR-Systems on.
2. Press "NRS ALIGN".
3. Press "AUTO ALIGN".  
ATTENTION: switches automatically to UNCAL MODE !
4. Play the Dolby Noise section of the tape.
5. Press "STORE START".
6. Press "NRS ALIGN" again to return to normal operating mode.

Remarks:

- If the Dolby Noise section on the tape is too short to complete the alignment process in one cycle, then press "LOC START" (LOC START PLAY must be programmed) before the end of the Dolby Noise in order to rewind and automatically continue the alignment process.
- If one (or more) of the active channels cannot be aligned with the "AUTO ALIGN" routine, then the NR-System on the corresponding channel(s) will be switched OFF and the error message "nr tone align failed" appears.
- If the machine has been adjusted to a pre-recorded tape with the automatic alignment procedure in UNCAL MODE, then the key "UNCAL MODE" must remain active (i.e. LED must shine) in normal operating mode !

AUTO COMPARE MODE:

In either of the above cases you can check the level of the Dolby Noise on tape by pressing first "NRS ALIGN" and then "NRS TONE" ("AUTO COMPARE" mode) during reproduction of the Dolby Noise and "soloing" each monitor channel in turn. Both the "tape" and "ref." sections of Dolby Noise should be at the same level. The recorder meters will also alternate between "tape" and "ref.". You can see this on the Dolby cartridges in the machine. Differences between the two will show up as periodic changes in level. Set for minimum difference for each channel either by using the above AUTO ALIGN process or by using the Manual Alignment process described below.

Manual Alignment during AUTO COMPARE MODE

1. Press "NRS ON" and "ALL SAFE" to switch all NR-Systems on.
2. Press "NRS ALIGN" and "NRS TONE"
3. Press "MANUAL ALIGN"; "UNCAL MODE" is automatically switched ON.
4. Play the Dolby Noise section of the tape.
5. "Soloing" each monitor channel in turn. Both the "tape" and the "ref." sections of the Dolby Noise should be at the same level. This may be done by ear or by using the meters.
6. Set for minimum level difference for each channel with the "PARAM UP/PARAM DOWN" buttons.
7. Press "STORE" if the level is reached.
8. Repeat the alignment for the remaining channels.
9. Press "NRS ALIGN" again to return to normal operating mode.