STUDER

A80 QC MK II

SERVICEANLEITUNG
SERVICE INSTRUCTIONS

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SICHERHEIT

Durch Entfernen von Gehäuseteilen, Abschirmungen etc. werden stromführende Teile freigelegt. Aus diesem Grunde müssen die folgenden Sicherheitsvorschriften unbedingt beachtet werden:

1. Eingriffe in ein Gerät
dürfen nur von Fachpersonal vorgenommen werden.

2. Vor Entfernen von Gehäuseteilen:
Gerät ausschalten und vom Netz trennen.

3. Bei geöffnetem Gerät:
- Netzteil- oder Motorkondensatoren mit einem passenden Widerstand entladen.
- Bauteile grosser Leistung, wie Leistungstransistoren und -widerstände sowie Magnetspulen und Wickelmotoren erst nach dem Abkühlen berühren.

4. Servicearbeiten bei geöffnetem, unter Spannung stehendem Gerät:
- Keine blanken Schaltungsteile berühren
- Isolierte Werkzeuge verwenden
- Metallene Halbleitergehäuse nicht berühren, da sie hohe Spannungen aufweisen können.

ERSTE HILFE (bei Stromunfällen)

1. Bei einem Stromunfall die betroffene Person raschmöglichst vom Strom trennen:
- Durch Ausschalten des Gerätes
- Ausziehen oder Unterbrechen der Netzzuleitung
- Betroffene Person mit isolierendem Material (Holz, Kunstoff) von der Gefahrenquelle wegstossen
- Nach einem Stromunfall sollte immer ein Arzt aufgesucht werden.

ACHTUNG
EINE UNTER SPANNUNG STEHENDE PERSON DARF NICHT BERÜHRT WERDEN, SIE KÖNNEN DABEI SELBST ELEKTRISIERT WERDEN!

2. Bei Bewusstlosigkeit des Verunfallten:
- Puls kontrollieren,
- bei ausgesetzter Atmung künstlich beatmen,
- Seitenlagerung des Verunfallten und Arzt verständigen.

SAFETY

There are no user serviceable components inside the equipment, live parts are laid open when removing protective covers and shieldings. It is essential therefore to ensure that the subsequent safety rules are strictly observed when performing service work or repairs.

1. Servicing of electronic equipment
must be performed by qualified personnel only.

2. Before removing covers:
Switch off the equipment and unplug the mains cable.

3. When the equipment is open:
- Discharge power supply- and motor capacitors through a suitable resistor.
- Components, that carry heavy electrical loads, such as power transistors and resistors as well as solenoid coils and motors should not be touched before a cooling off interval, as a precaution to avoid burns.

4. Servicing unprotected and operating equipment:
- Never touch bare wires or circuitry
- Use insulated tools only
- Never touch metal semiconductor cases because they may carry high voltages.

FIRST AID (in case of electric shock)

1. Separate the person as quickly as possible from the electric power source:
- by switching off the equipment,
- unplugging or disconnecting the mains cable,
- pushing the person away from the power source by using dry insulating material (such as wood or plastic).
- After having sustained an electric shock, always consult a doctor.

WARNING:
DO NOT TOUCH THE PERSON OR HIS CLOTHING BEFORE POWER IS TURNED OFF, OTHERWISE YOU STAND THE RISK OF SUSTAINING AN ELECTRIC SHOCK AS WELL!

2. If the person is unconscious
- Check the pulse,
- reanimate the person if respiration is poor,
- lay the body down and turn it to one side, call for a doctor immediately.

SÉCURITÉ

Si les couvercles de protection sont enlevés, les parties de l'appareil qui sont sous tension ne sont plus protégées. Il est donc d'une nécessitée absolue de suivre les instructions suivantes:

1. Les intervensions dans les appareils électriques
doivent être faites uniquement que par du personnel qualifié

2. Avant d'enlever les couvercles de protection:
Couper l'interrupteur principal et débrancher le câble secteur.

3. Après avoir enlevé les couvercles de protection:
- Les condensateurs de l'alimentation et des moteurs doivent être déchargés à l'aide d'une résistance appropriée.
- Il est prudent de laisser refroidir les composants de haute puissance, par ex.: transistors de puissance, résistances de puissances de même que des électroaimants et les moteurs de bobinage.

4. S'il faut que l'appareil soit sous tension pendent les réglages internes:
- Ne jamais toucher les circuits non isolés
- Travailler seulement avec des outils isolés

PREMIERS SECOURS (en cas d'électrocution)

1. Si la personne est dans l'impossibilité de se libérer:
- Couper l'interrupteur principal
- Couper le courant
- Repousser la personne de l'appareil à l'aide d'un objet en matière non conductrice (matière plastique ou boîs)
- Après une électrocution, consulter un médecin.

ATTENTION
NE JAMAIS TOUCHER UNE PERSONNE QUI EST SOUS TENSION, SOUS PEINE DE SUBIR ÉGALEMENT UNE ÉLECTROCUTION!

2. En cas de perte de connaissance de la personne électrocutée:
- Controller le pouls
- Si nécessaire, pratiquer la respiration artificielle
- Mettre l'accidenté sur le coté latérale et consulter un médecin.

1 ALLGEMEINES

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1.1
VARIANTEN DER A80/QC KASSETTENBAND-MASCHINEN

Die A80/QC Kassettenband- Maschine ist in drei Ausfuehrungen erhaeltlich. Als reine Wiedergabe-Maschine, als Zweispur- Aufnahme- und Wiedergabemaschine und als Vollspur- Aufnahme- und Zweispur- Wiedergabemaschine.

1.1.1
A80/QC-2REPRO

Die A80/QC-2REPRO ist ein Stereo- Zweispurgeraet, welches nur die Wiedergabe ermoeglicht. Die PLAY-Richtung ist vor- und rueckwaerts umschaltbar. Das Geraet ist mit zwei Wiedergabekoepfen bestueckt.

Bild Fig.1.1 zeigt den Kopftraeger von vorne mit den beiden Wiedergabekoepfen.
Der Wiedergabekopf {1>} ist fuer den PLAY- Betrieb VORWAERTS bestimmt. Beim Einschalten der Maschine oder bei Laufrichtungswechsel ist der PLAY-Betrieb erst moeglich, wenn beide Capstan Motoren hochgelaufen sind und die Audio-Stummschaltung abfaellt.
Der Betriebsmodus vor dem Laufrichtungswechsel ist nicht gespeichert, d.h. der gewuenschte Modus muss nach dem Hochlaufen der Capstanmotoren nochmals eingegeben werden.
Beim Einschalten des Geraetes laufen die Capstan-Motoren automatisch vorwaerts (bevorzugte PLAY-Richtung).

Kopftraeger		**1.020.699.00**
bestueckt mit:		-> Fig.1.1
2 Stereo-Wiedergabekoepfen	{1}	1.116.801.00
mit Vorverstaerker		1.080.709.00
(im Kpoftraeger eingebaut)		
Audiokorb		
bestueckt mit:		-> Fig.1.2
4 Wiedergabe-Verstaerkern	{4}	1.081.952.81

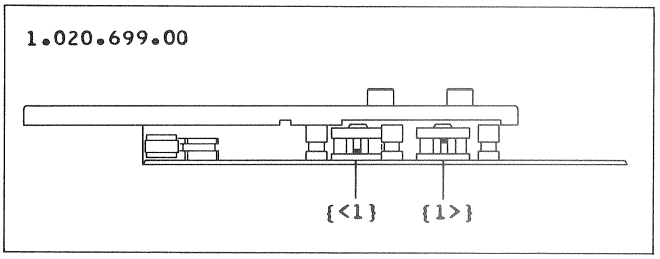


Fig.1.1

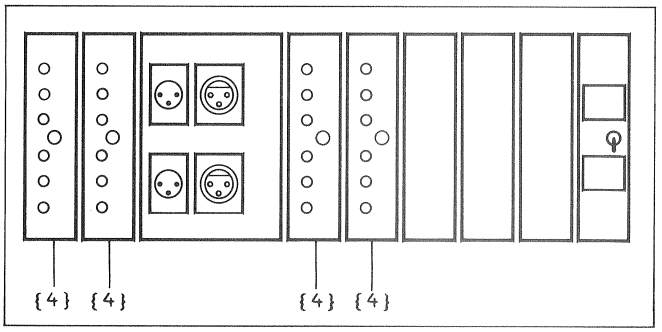


Fig.1.2

1.1.2
A80/QC-2REC/REPRO

Die A80/QC-2REC/REPRO ermoeglicht Aufnahme und Wiedergabe. Sie ist mit je einem Zweispur-Aufnahme- und Wiedergabekopf, sowie zwei Loeschkoepfen ausgeruestet. Auch diese Maschine besitzt zwei Capstanmotoren, ist jedoch nur fuer eine PLAY-Bandlaufrichtung bestimmt.

Kopftraeger		**1.020.689.00**
bestueckt mit:		-> Fig.1.3
1 2-Spur Wiedergabekopf	{1}	1.116.801.00
mit Vorverstaerker		1.020.708.00
(im Kopftraeger eingebaut)		
1 2-Spur Aufnahmekopf	{2}	1.116.800.00
2 Loeschkoepfe	{3}	1.116.712.01
Audiokorb		
bestueckt mit:		-> Fig.1.4
2 Wiedergabeverstaerkern	{4}	1.081.952.81
2 Aufnahmeverstaerkern	{5}	1.081.964.00
1 Oszillator	{6}	1.080.984.00

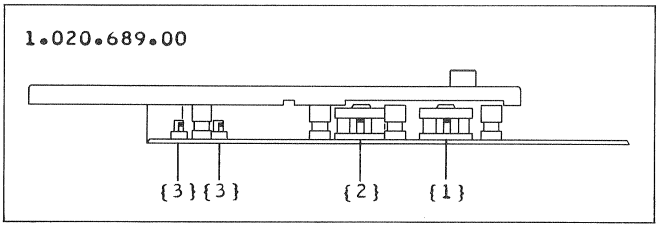


Fig.1.3

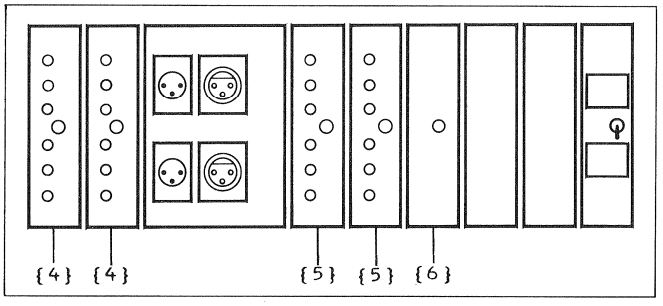


Fig.1.4

1.1.3
A80/QC-1REC/2REPRO

Die A80/QC-1REC/2REPRO ermoeglicht Aufnahme und Wiedergabe. Sie ist mit je einem Zweispur-Wiedergabe-, einem Vollspur-Aufnahme- und zwei Loeschkoepfen bestueckt.
Zwei Capstanmotoren gewaehrleisten den praeziesen Bandtransport fuer die regulaere PLAY-Bandlaufrichtung.

Kopftraeger		**1.020.687.00**
bestueckt mit:		-> Fig.1.5
1 2-Spur Wiedergabekopf	{1}	1.116.801.00
mit Vorverstaerker		1.020.708.00
(im Kopftraeger eingebaut)		
1 Vollspur-Aufnahmekopf	{2}	1.317.110.00
2 Loeschkoepfe	{3}	1.116.712.01
Audiokorb		
bestueckt mit:		-> Fig.1.6
2 Wiedergabe-Verstaerkern	{4}	1.081.952.81
1 Aufnahme-Verstaerker	{5}	1.081.964.00
1 Oszillator	{6}	1.080.984.00

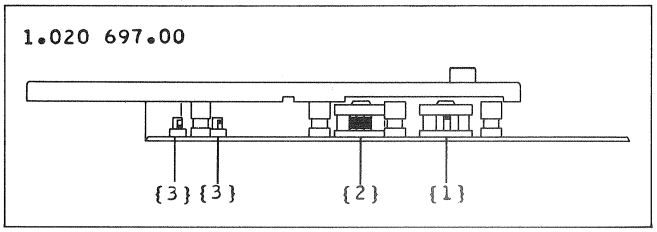


Fig.1.5

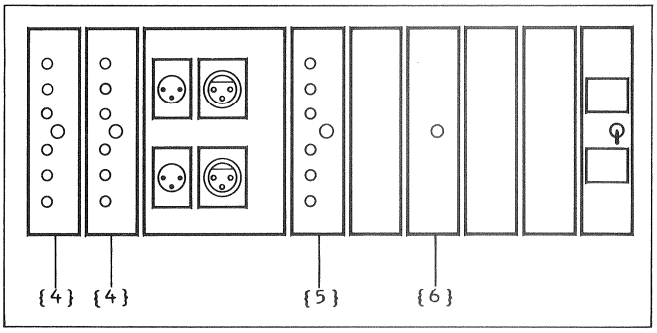


Fig.1.6

1.2
TECHNISCHE DATEN

Varianten

Typ A	A80/QC-1REC/2REPRO	Nr.60.120.11180
Typ B	A80/QC-2REC/2REPRO	Nr.60.120.11181
Typ C	A80/QC-2REPRO	Nr.60.120.11182

Bandgeschwindigkeit
4,76cm/s (1 7/8ips)

Wiedergaberichtung

Typ A	A80/QC-1REC/2REPRO	unidirektional
Typ B	A80/QC-2REC/2REPRO	unidirektional
Typ C	A80/QC-2REPRO	bidirektional

Spulenadapter

Dreizack	Durchmesser:	8.0mm	(0.31")
NAB	Durchmesser:	76.2mm	(3.0 ")
DIN	Durchmesser:	150.0mm	(5.91")

Bandschlupf *1
maximal 0,1%

Bandgeschwindigkeits-Abweichung
(abgleichbar) +/-0,2%

Bandbreite
3,81mm (0,15")

Tonhoehenschwankungen
(Typ C: Vorwaerts-/Rueckwearts- PLAY)
IEC 386 (DIN 45507),
bei 20 Grad C (68 Grad F)
Spitze bewertet max. 0,07%

Bandzaehler
Echtzeitanzeige Genauigkeit +/-0,2%
Anzeige mathematisch oder komplementaer

Bandzuege *1
einstellbar; 0.5...0.8N (50...80g)

Bandzug-Maximum *1
einstellbar; je nach Umspulzeit 1.4N (140g)

Umspulzeit *1
fuer 1800m (5800ft) Magnetband,
einstellbar; < 5 Min

Eingaenge
NF-Anschluesse entsprechend IEC268-14B
130-x IEC 04 (XLR-Buchse)
symmetrisch, erdfrei, Impedanz > 5 kOhm
30Hz...20kHz
Eingangspegel max. 22dBm
fuer 250nWb/m: min. 0dBm
max. 22dBm

Ausgaenge
NF-Anschluesse entspreched IEC268-14B
130-x IEC 02 (XLR-Stecker)
symmetrisch, erdfrei, Impedanz < 30 Ohm
30Hz...20kHz
Abschlusswiderstand min. 200 Ohm
Ausgangspegel (RL=600 Ohm) max. 22 dBm

Entzerrung *3
schaltbar Fe2 O3 120/3180 us
Cr O2 / Metall 70/3180 us

Bezugspegel
(315 Hz) 250 nWb/m

Spurbreite, Spurlage
gemaess IEC 94A (DIN 45516)
Aufnahmekopf A80/QC-1REC/2REPRO 6mm

Frequenzgang Wiedergabe *2
31,5Hz...18kHz +/-2 dB
40Hz...12,5kHz +/-1 dB
BASF HI-FI Bezugsband Fe2 O3/ Cr O2
DIN 45513, IEC 94 (IEC Standard, Prag 1981)

Frequenzgang Aufnahme-Wiedergabe
Fe2 O3 und Cr O2 und Metall
31,5 Hz ... 16 kHz +1/-3 dB
63 Hz ... 12,5 kHz +1 dB
16 kHz... 18 kHz +1dB/-5 dB

Stoerspannung
Effektivwerte
nach Bewertungsfilter DIN 45405 1967
bezogen auf 250nWb/m
Maschine in PLAY, ohne Band

Fe2 O3	bewertet	59 dB
	unbewertet	53 dB
Cr O2 und Metall	bewertet	62 dB
	unbewertet	56 dB

Stoerspannung Spitze bewertet
nach CCIR 468-2
bezogen auf 250nWb/m
Maschine in PLAY, ohne Band

Fe2 O3	50 dB
Cr O2 und Metall	53 dB

Stoerspannung bewertet
Effektivwerte,
bezogen auf 250nWb/m
Aufnahme-Wiedergabe

	Fe2 O3	Cr O2	Metall
unbewertet	48dB	52dB	50dB
bewertet	46dB	52dB	50dB
DIN 45405, 1967			
bewertet	38dB	44dB	42dB
CCIR 468-2			
bewertet ASA-A	52dB	56dB	54dB

Klirrfaktor
bezogen auf 250nWb/m, 315Hz
Aufnahme / Wiedergabe

Fe2 O3	ca.1.5%
Cr O2	ca.2.0%
Metall	ca.2.0%

Phasenstabilitaet
Aufnahme-Wiedergabe +/-25 Grad bei 10kHz

Azimuth-Einstellung
einstellbar mit Drehknopf am Kopftraeger
Nullpunkt justierbar
Geometrische Winkelangabe

Uebersprechen
Aufnahme / Wiedergabe
Stereo, bei 1 kHz min. 25 dB
Stereo, bei 10 kHz min. 20 dB
Wiedergabe, 1kHz CH1+CH2 zu CH3+CH4
typisch 80 dB

Loeschdaempfung
bei 1kHz min. 75 dB

Vormagnetisierungsfrequenz
150 kHz

Loeschfrequenz
150 kHz

Stromversorgung
(waehlbar) 100...120V, 200...240V +/-1-%
50 oder 60 Hz

Leistungs-Aufnahme
max. 320 VA

Umgebungstemperaturbereich
+10...+40 Grad C (50...104 Grad F)

Luftfeuchtigkeit
20...95% (kein Kondenswasser)

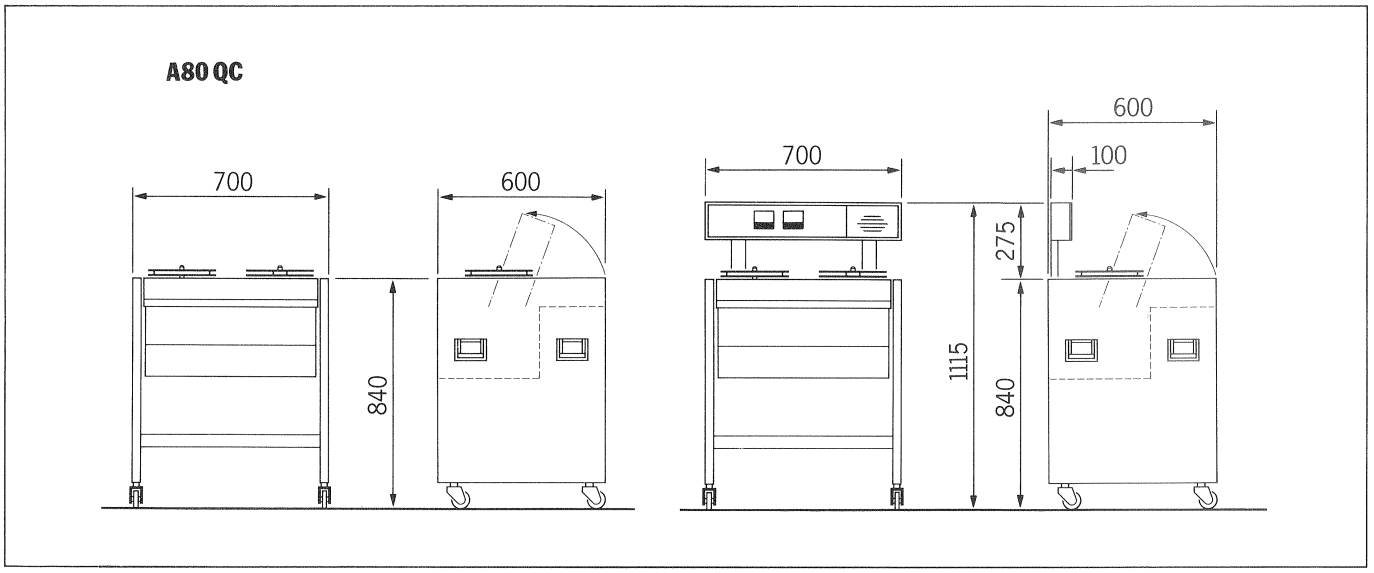
Sicherheitsstandard
gemaess IEC-Empfehlung
Publikation 65, Schutzklasse 1

Gewicht
(Masse)

netto	100 kg	(220lbs)
brutto (Luftfracht)	123 kg	(271lbs)
brutto (Seefracht)	233 kg	(513lbs)

Anmerkungen:
Alle Bandmaschinen aus der Typenreihe A80QC sind ab Werk fuer eine Banddicke von 18um eingestellt.
*1 Die Daten werden nur bei Verwendung von Bandspulen mit Kerndurchmesser von min. 115mm garantiert.
*2 Toleranz des Bezugsbandes nicht beruecksichtigt.
*3 Einstellung nur fuer Cr 02 oder Metallband moeglich.
Alle Aenderungen, die dem technischen Fortschritt dienen, bleiben vorbehalten.

ABMESSUNGEN (mm)



1 GENERAL

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1.1
VERSIONS OF THE A80/QC CASSETTE TAPE RECORDER

The A80/QC cassette tape recorder is available in three versions: for playback only, as two-channel playback and recording, as mono-track recording and dual-track playback equipment.

1.1.1
A80/QC-2REPRO

The A80/QC-2REPRO is a two-channel stereo recorder designed for playback only. The PLAY direction is switch-selectable (forward and reverse). The recorder is equipped with two reproduce heads.

Fig.1.1 shows a front view of the headblock with the two reproduce heads. Reproduce head {1>} is designed for forward PLAY mode. When the machine is switched on, or when the tape direction is reversed, it is only possible to work in PLAY mode after both capstan motors have reached their nominal speed and after the muting function drops out.
The mode in use before tape direction reversal is not retained. Thus the desired mode has to be reselected after the capstan motors have reached the nominal speed.
When the machine is switched on, the capstan motors are running in the forward direction (default PLAY direction).

Headblock		**1.020.699.00**
complete with:		-> Fig.1.1
2 Stereo reproduce heads	{1}	1.116.801.00
including preamplifier		1.080.709.00
(installed in the headblock assembly)		
Audio basket		
complete with:		-> Fig.1.2
4 Reproduce amplifiers	{4}	1.081.952.81

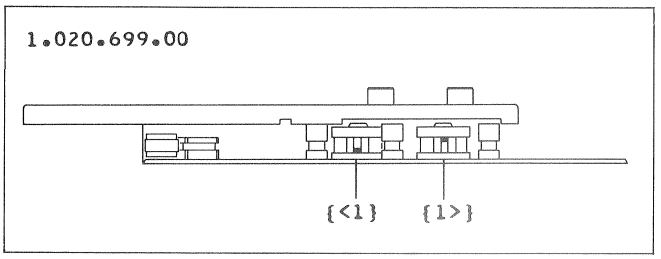


Fig.1.1

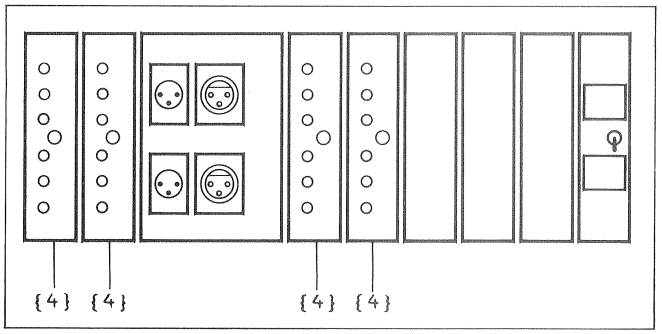


Fig.1.2

1.1.2
A80/QC-2REC/REPRO

The A80/QC-2REC/REPRO is designed for RECORD/PLAYBACK operations. It is equipped with separate two-channel playback and record heads, two erase heads and two capstan motors.
RECORD/PLAYBACK can only be selected for the normal PLAY direction.

Headblock		**1.020.699.00**
complete with:		-> Fig.1.3
1 2-track reproduce head	{1}	1.116.801.00
including preamplifier		1.020.708.00
(installed in headblock assembly)		
1 2-track record head	{2}	1.116.800.00
2 Erase heads	{3}	1.116.712.01
Audio basket		
complete with:		-> Fig.1.4
2 Reproduce amplifier	{4}	1.081.952.81
2 Record amplifiers	{5}	1.081.964.00
1 Oscillator	{6}	1.080.984.00

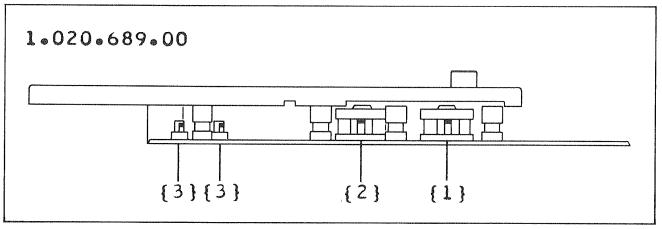


Fig.1.3

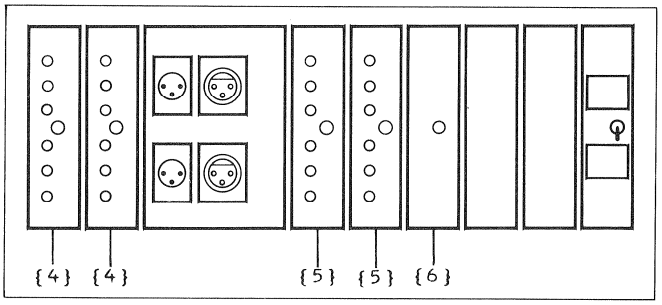


Fig.1.4

1.1.3
A80/QC-1REC/2REPRO

The A80/QC-1REC/2REPRO is designed for record/reproduce operation and is equipped with a full-track record head, a two-track reproduce head, and two erase heads.
This recorder features two capstan motors.
Record/reproduce is only possible in the normal PLAY direction.

Headblock		**1.020.687**
complete with:		-> Fig.1.5
1 Two-track reproduce head	{1}	1.116.801.00
including preamplifier		1.020.708.00
(installed in headblock assembly		
1 Full-track record head	{2}	1.317.110.00
2 Erase heads	{3}	1.116.712.01

Audio basket		
complete with:		-> Fig.1.6
2 Reproduce amplifiers	{4}	1.081.952.81
1 Record amplifier	{5}	1.081.964.00
1 Oscillator	{6}	1.080.984.00

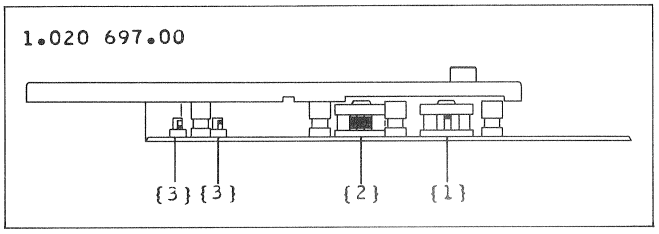


Fig.1.5

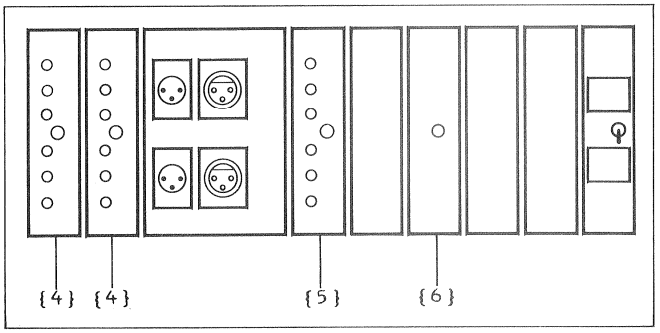


Fig.1.6

1.2
TECHNICAL SPECIFICATIONS

Versions
Type A A80/QC-1REC/2REPRO Nr.60.120.11180
Type B A80/QC-2REC/2REPRO Nr.60.120.11181
Type C A80/QC-2REPRO Nr.60.120.11182

Tape speed
(4,76cm/s) 1 7/8ips

Play direction
Type A A80/QC-1REC/2REPRO unidirectional
Type B A80/QC-2REC/2REPRO unidirectional
Type C A80/QC-2REPRO bidirectional

Hub adaptors
RETMA diameter: (8.0mm) 0.31"
NAB diameter: (76.2mm) 3.0 "
DIN diameter: (150.0mm) 5.91"

Tape slip *1
max. 0,1%

Speed deviation
(adjustable) +/-0,2%

Tape width
(3,81mm) 0,15"

Wow and flutter
(Type C: Play direction forward and backw.)
IEC 386 (DIN 45507),
at (20 degrees C) 68 degrees F
Peak weighted max. 0,07%

Tape timer
Real time indication tolerance +/-0,2%
Mathematical and complementary display sequ.

Tape tensions *1
adjustable (50...80g) 0.5...0.8N

Max. tape tension *1
adjustable; dep.on rewind time (140g) 1.4N

Rewind time *1
for 5800ft (1800m) tape length
adjustable < 5 Min

Inputs
AF-connections corresponding to IEC268-14B
130-x IEC 04 (XLR-socket)
balanced, floating Impedance > 5 kohms
30Hz...20kHz
Input level max. 22dBm
for 250nWb/m: min. 0dBm
max. 22dBm

Outputs
AF-connections corresponding to IEC268-14B
130-x IEC 02 (XLR-plug)
balanced, floating Impedance < 30 ohms
30Hz...20kHz
terminating impedance min. 200 ohms
Output level (RL=600 ohms) max. 22 dBm

Equalization *3
switchable Fe2 O3 120/3180 us
Cr O2 / metal 70/3180 us

Reference level
(315 Hz) 250 nWb/m

Track width, format of track
corresponding to IEC 94A (DIN 45516)
record head A80/QC-1REC/2REPRO 6mm

Frequency response playback *2
31,5Hz...18kHz +/-2 dB
40Hz...12,5kHz +/-1 dB
BASF HI-FI test tape Fe2 O3/ Cr O2
DIN 45513, IEC 94 (IEC standard, Prag 1981)

Frequency response recording / playback
Fe2 O3 and Cr O2 and metal
31,5 Hz ... 16 kHz +1/-3 dB
63 Hz ... 12,5 kHz +1 dB
16 kHz... 18 kHz +1dB/-5 dB

Signal to noise ratio
RMS value
with weighting filter DIN 45405, 1967
reffered to 250 nWb/m
recorder in PLAY mode, without tape
Fe2 O3 weighted 59 dB
unweighted 53 dB
Cr O2 and metal weighted 62 dB
weighted 56 dB

Signal to noise ratio, peak weighted
corresponding to CCIR 468-2
reffered to 250 nWb/m
recorder in PLAY mode, without tape
Fe2 O3 50 dB
Cr O2 and metal 53 dB

Signal to noise ratio, peak weighted
effective value
refer to 250nWb/m
recording and playback

	Fe2 O3	Cr O2	metal
unweighted	48dB	52dB	50dB
weighted	46dB	52dB	50dB
DIN 45405, 1967			
weighted	38dB	44dB	42dB
CCIR 468-2			
weighted ASA-A	52dB	56dB	54dB

Distortion
reffered to 250nWb/m, 315Hz
record / playback
Fe2 O3 approx. 1.5%
Cr O2 approx. 2.0%
metal approx. 2.0%

Phase stability
record - playback +/-25degrees at 10kHz

Azimuth adjustment
adjustable by means of a knob on the head
assembly; zero point adjustable
geometrical angle indicatio

Crosstalk
record / playback
stereo, at 1 kHz min. 25 dB
stereo, at 10 kHz min. 20 dB
playback, at 1kHz CH1+CH2 to CH3+CH4
typical 80 dB

Erase efficiency
at 1kHz min. 75 dB

Bias frequency
150 kHz

Erase frequency
150 kHz

Power supply
(selectable) 100...120V, 200...240V +/-1-%
50 or 60 Hz

Power consumption
max. 320 VA

Ambient temperature
(10...+40 degrees C) 50...104 degrees F

Humidity
20...95% (no condensation)

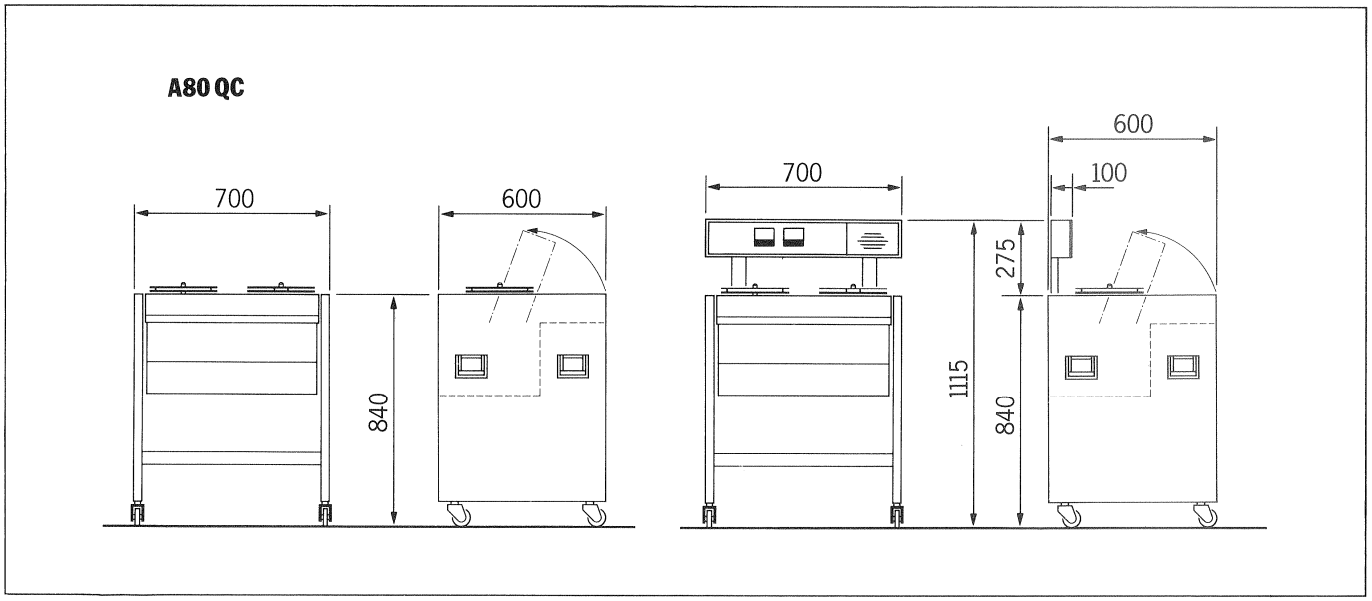
Security standard
corresponding to IEC recommendations, publication 65, class 1

Weight

net		(100 kg)	220 lbs
gross	(airfreight)	(123 kg)	271 lbs
gross	(seafreight)	(233 kg)	513 lbs

Remarks:
All tape recorders of the A80/QC series are factory adjusted for 18 um tape thickness.
*1 The specifications are guaranteed only if reels with a hub diameter of min. 115 mm are used.
*2 Reference tape errors not considered.
*3 Adjustment possible for chromium dioxide or metal tape only.
We reserve the right to make alterations as technical progress may warrant.

DIMENSIONS (mm)



2 BEDIENUNG

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2 OPERATING

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2.1
INBETRIEBNAHME

Kontrollen vor der Inbetriebnahme:

- Rueckwand oeffnen und Spannungswaehler kontrollieren. -> Fig.2.1
- Kontrolle von Steckerverbindungen auf festen Sitz (Gewaehrleistung der Kontakte).
- Verdrahtung der Phasenschieber-Kondensatoren -> Fig.2.2

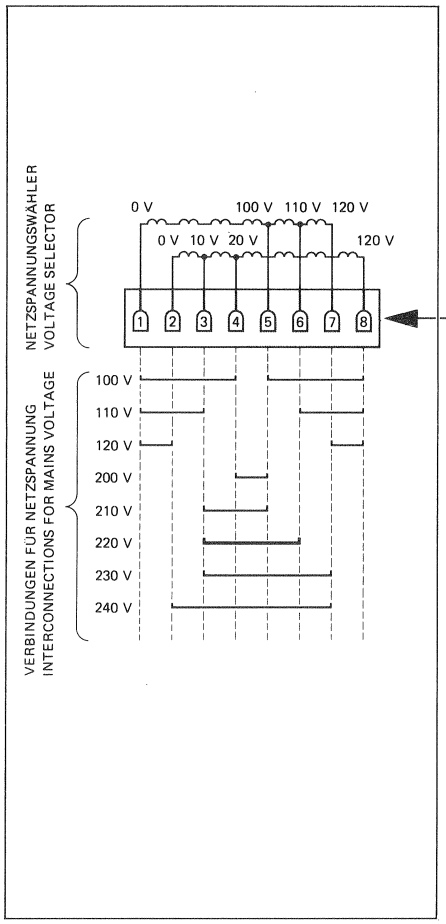

Fig.2.1

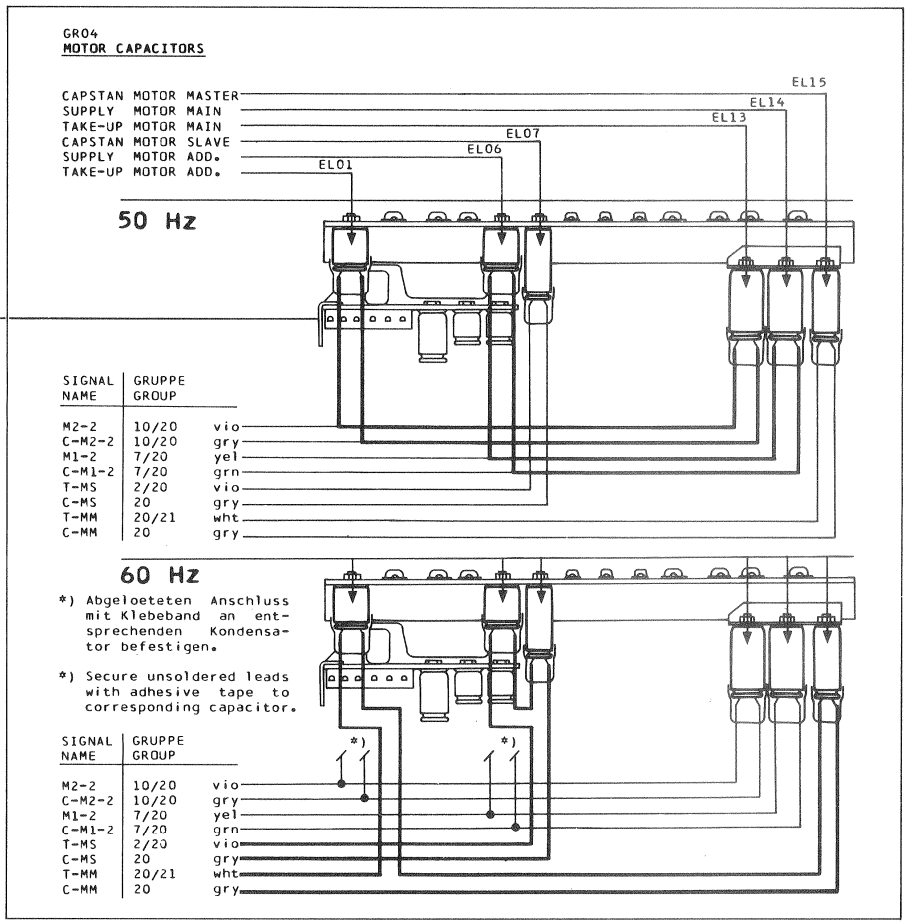

Fig.2.2

Erdung -> Fig.2.3

Der Anschluss der Studio-Erde erfolgt an der Bananenbuchse {A}.

{A} Erd-Anschluss
{B} Netz-Sicherung
{C} Netz-Anschluss

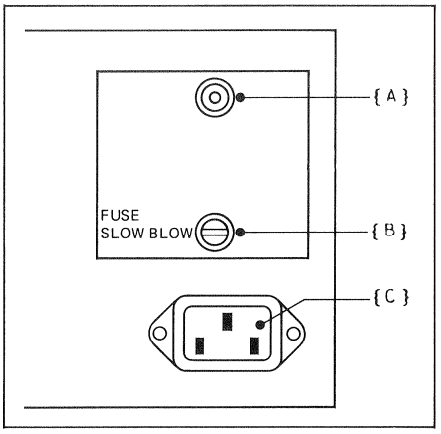

Fig.2.3

2.1.1
Funktionspruefung

-> Fig.2.4

Mit Netzschalter {12} Geraet einschalten.
Aufleuchten der Taste STOP {7} zeigt die Betriebsbereitschaft des Geraetes an. Gleichzeitig leuchtet der PLAY- Richtungsumschalter {3} PLAY "VORWAERTS" auf.

2.1.2
Drucktasten-Bedienung

-> Fig.2.4

Wiedergabe:
Taste PLAY {1} druecken; die Andruckrollen fahren in PLAY-Position.

Aufnahme: (A80/QC-REC/REPRO)
Taste PLAY {1} und REC {2} gleichzeitig druekken; die Andruckrollen fahren in PLAY-Position Maschine geht auf Aufnahme.

PLAY-Bandlaufrichtung **(nur A80/QC-REPRO)**
Gewuenschte Bandlaufrichtung mit Taste {3} oder {4} waehlen und Taste PLAY {1} druecken.
Achtung:
Nach dem Einschalten des Geraetes, oder nach dem Umschalten der Bandlaufrichtung ist der PLAY-Betrieb erst moeglich, wenn die Capstan-Motoren ihre Solldrehzahl erreicht haben.

Schnelles Vorspulen:
Taste {5} (FORW) druecken.

Schnelles Rueckspulen:
Taste {6} (REW) druecken.

Hinweis:
Fuer den Uebergang von einer Umspulrichtung in die andere, braucht die Taste STOP nicht gedrueckt zu werden. Die Steuerung speichert den vorgewaehlten Betriebsmodus. Der Uebergang erfolgt automatisch, sobald das Band stillsteht.
Einzig nach PLAY-Bandlaufrichtungswechsel muss mit der Eingabe des gewuenschten Betriebsmodus der Hochlauf der Capstan-Motoren abgewartet werden.

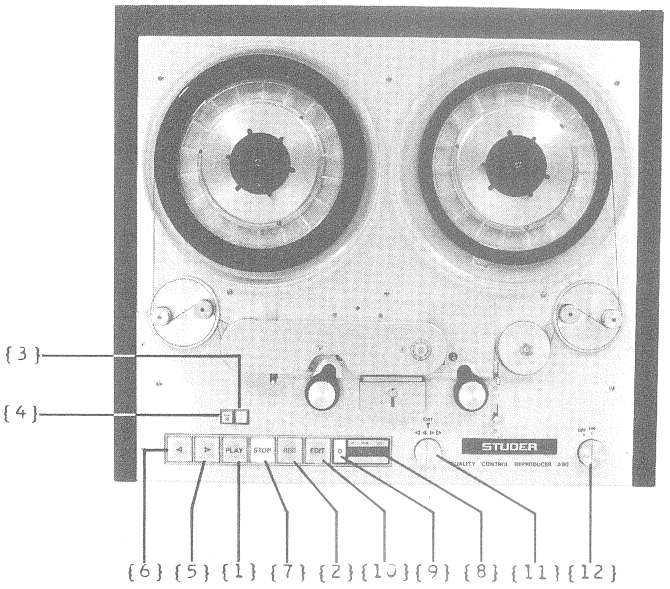

Fig.2.4

2.1.3
EDIT-Funktion

Die EDIT -Funktion wird nur bei stillstehendem ausgefuehrt.
Durch Druecken der Taste EDIT {10} fahren die Andruckrollen in EDIT- Position (Andruckaggregat nicht vollstaendig eingefahren), gleichzeitig werden die Bandzugwaagen blockiert. Das Band liegt auf den Tonkoepfen auf. In dieser Position koennen die Bandwickel von Hand gedreht werden (Suchen einer bestimmten Bandstelle).
Wird die Taste EDIT {10} waehrend dem schnellen Umspulen betaetigt, fahren die Andruckrollen in die EDIT-Position, bis die Taste wieder freigegeben wird (Zwischenhoeren).

Reglerknopf EDIT {11}
fuer variables Umspulen
Das Suchen einer Schnittstelle kann auch motorisch erfolgen (CUTAUT): Bei stehendem Band Taste EDIT {10} druecken und Reglerknopf EDIT {11} in die gewuenschte Laufrichtung (Uhrzeiger- oder Gegenuhrzeigersinn) drehen.
Die Band-Laufgeschwindigkeit ist abhaengig vom Drehwinkel des EDIT-Knopfes.
Sobald der Reglerknopf EDIT {11} gedreht wird, ist die Blockierung der Bandzugwaagen aufgehoben (geregelter Bandzug); bei Bandstillstand blockieren diese wieder (EDIT-Position).

2.1.4
Schnell-Start

Taste EDIT {10} druecken (Voreinstellung), -
Taste PLAY {1} druecken.

2.1.5
Elektronischer Bandzaehler

-> Fig.2.4/2.5
Der elektronische Bandzaehler misst die effektive Bandlaufzeit in Stunden, Minuten und Sekunden. Angezeigt wird die Zeit durch das fuenfstellige 7-Segment-Display {8}. Die Wahl der Darstellung erfolgt durch Positionieren des Brueckensteckers {S1}, DECOD.PCB 1.228.811

Mathematische Darstellung: {S1} = Position A
0.00.01 < 0.00.00 > -.00.01
Bei negativen Zeiten zeigt die Stunden- Stelle ein Minuszeichen.

Komplementaere Darstellung: {S1} = Position B
0.00.01 < 0.00.00 > 9.59.59
Negative Zeiten werden durch das Komplement dargestellt.

Mit der Taste 0 (Null) {9} kann die Zaehlerelektronik zurueckgestellt werden (0.00.00).

2.1.6
Laufwerk-Fernsteuerung

Die Fernsteuerung des Laufwerkes erfolgt ueber den Steckanschluss REMOTE MODE CONTROL (Fernsteuerung fuer alle Funktionen, mit Rueckmeldung. Zaehler ferngesteuert, inklusive Nullstellung). Die Fernsteuerung ist identisch mit der internen Steuerung. In normaler Schaltung hat die interne Steuerung Prioritaet vor der Fernbedienung. Am Fernsteuer- Anschluss darf hoechstens eine Fernbedienung mit Rueckmeldelampen angeschlossen werden. Hingegen sind zusaetzlich mehrere Fernbedienungen ohne Rueckmeldelampen zulaessig.

2.1.7
Audio-Anschluesse

-> Fig.2.6
XLR-Buchsen, nach IEC-Empfehlung 268-14

Leitungs -Eingang (INPUT) und -Ausgang (OUTPUT)
Nr.1 = Audio-Masse (Schirm)
Nr.2 = A-Leitung (heiss)
Nr.3 = B-Leitung (kalt)

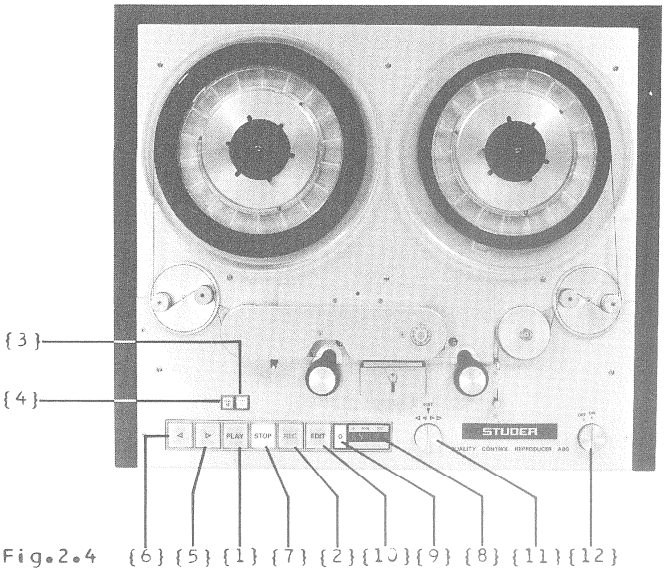

Fig.2.4

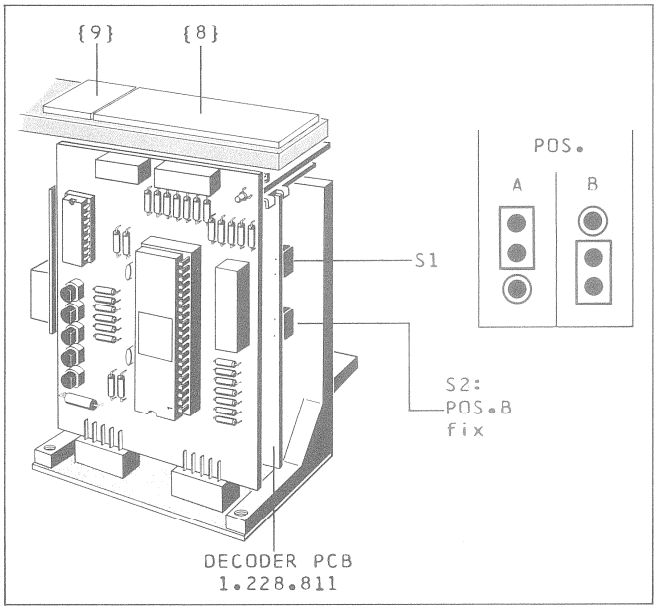

Fig.2.5

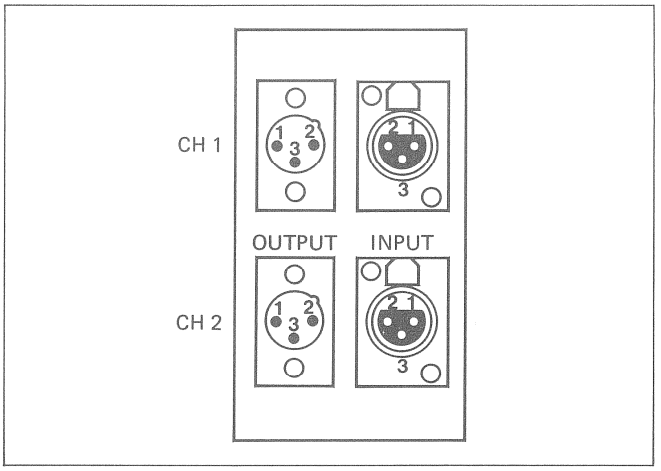

Fig.2.6

2 OPERATING

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2.1.6	Remote control for tape transport	2/ 8
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2.1
FIRST-TIME OPERATION

Checks before connecting machine to AC power:

- Check voltage selector at rear of machine -> Fig.2.1
- Check, that none of the plug connections have become loose during shipment.
- Check wiring of the phase-shift capacitors -> Fig.2.2

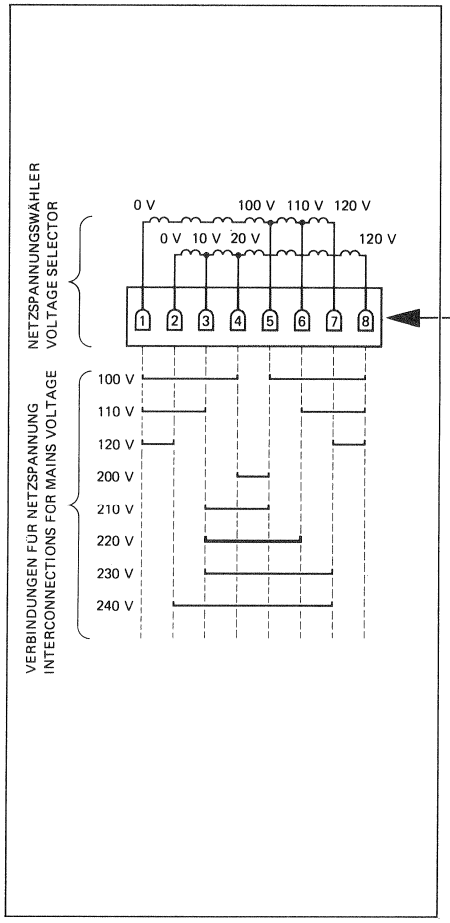


Fig.2.1

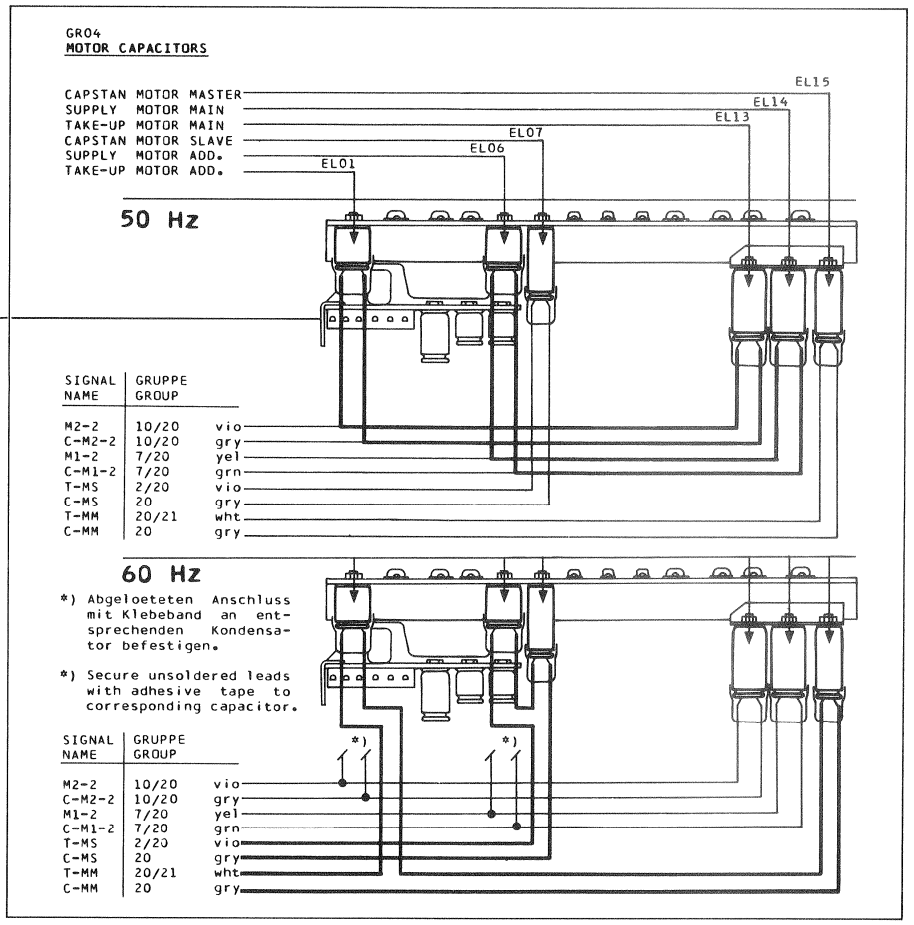


Fig.2.2

Earthing/Grounding -> Fig.2.3

The studio earth is connected to the banana plug {A}.

{A} Ground terminal
{B} Power fuse
{C} AC inlet

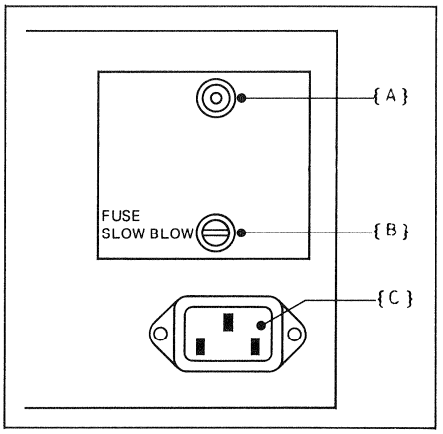


Fig.2.3

2.1.1
Function check

-> Fig.2.4

Switch on machine with mains switch {12} . Machine is operational when STOP button {7} lights up. The PLAY direction indicator {3} points forward.

2.1.2
Push button operation

-> Fig.2.4

Playback:
Press PLAY button {1}, pinch rollers move into PLAY position.

Record: A80/QC-REC/REPRO
Press PLAY {1} and REC {2} buttons simultaneously. Pinch rollers move in PLAY position. The machine switches to record mode.

Tape direction in PLAY mode (only A80QC-REPRO)
Select tape direction with button {3} or {4} and press PLAY button {1}.
Attention:
After the machine has been turned on or after the tape direction has been reversed, PLAY operation can not be activated until the capstan motors have reached their nominal speed.

Fast forward:
Press button {5} (FORW).

Fast rewind:
Press button {6} (REW).

Note:
When changing from one tape function to another there is no need to press the STOP button {7}. The control system automatically retains the previous setting. Reversal takes place as soon as the tape stops. Only when changing the tape direction on PLAY mode, the required function has to be keyed-in after the capstan motors have reached their nominal value.

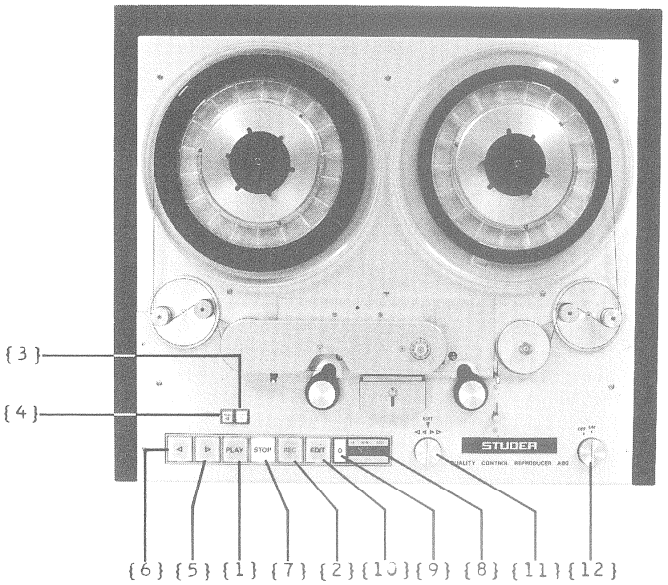
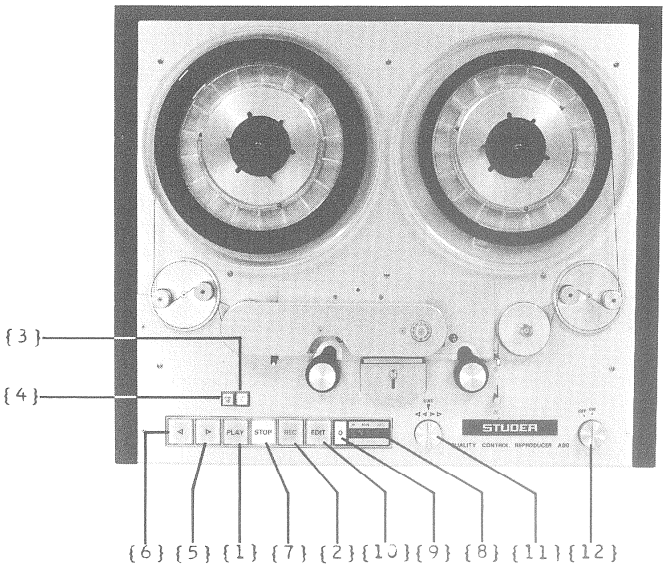


Fig.2.4

2.1.3
EDIT function

The EDIT function is operative only when the tape is stopped. By pressing the EDIT button {10} the pinch rollers move into the EDIT position (pinch roller assembly engaged at midpoint) and the tape tension sensors are blokked. The tape is pressed against the heads and the reels can be turned by hand to find the desired edit point.
If the EDIT button {10} is pressed during fast rewind, the pinch rollers move into EDIT position and the fast running tape can be audied until the push button is released.

EDIT control knob {11}
for variable speed winding
An edit point on the tape can also be found by using the motors (CUTAUT). When the tape is stopped, press the EDIT button {10} and turn the EDIT knob {11} clockwise or counterclockwise in the desired direction. The tape speed depends on the angular setting of the EDIT control knob.
As soon as the EDIT knob {11} is turned, the tape tension sensors are no longer blocked (controlled tape tension). They are blocked again when EDIT knob is returned to its neutral position (EDIT position) and the tape has stopped.



2.1.4
Fast tape start

Press EDIT button {10} (preset) - press PLAY button {1}.

2.1.5
Electronic tape timer

-> Fig. 2.4/2.5
The electronic tape timer counts the elapsed running time in hours, minutes and seconds by means of a 7-segment display {8} with five digits. Display mode is selected by positioning the jumper {S1} (DECODER PCB 1.228.811)

Display sequence: {S1} = Pos."A"
0.00.01 < 0.00.00 > -.00.01
Negative times are signalized by minus sign.

Complementary display sequence {S1} = Pos."B"
0.00.01 < 0.00.00 > 9.59.59
Negative times are signalized by complement.

Timer electronic is reset with the "0" button {9}.

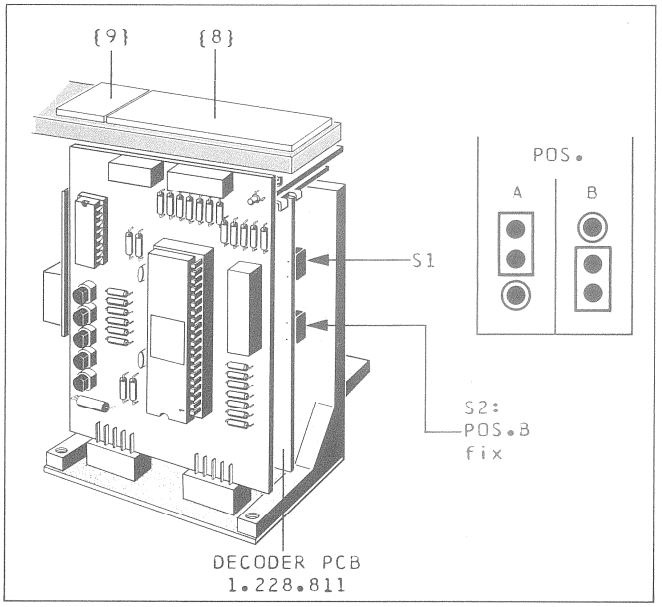


Fig.2.5

2.1.6
Remote control for tape transport

The remote control for tape transport is connected to the REMOTE MODE CONTROL socket (all functions with feedback signals can be remotely controlled, also the tape timer and its reset). The remote control facillity is identical to the local transport controls. When the remote control is connected to the machine the local control system has priority. No more than one remote control unit with indicator lamps can be connected.
It is possibel, through, to connect several remote controls without lamps.

2.1.7
Audio connections

-> Fig.2.6
XLR-type sockets conforming to the IEC recommendation 268-14.
Line INPUT and OUTPUT:
Nr.1 = Audio ground (screen)
Nr.2 = A-line (hot)
Nr.3 = B-line (cold)

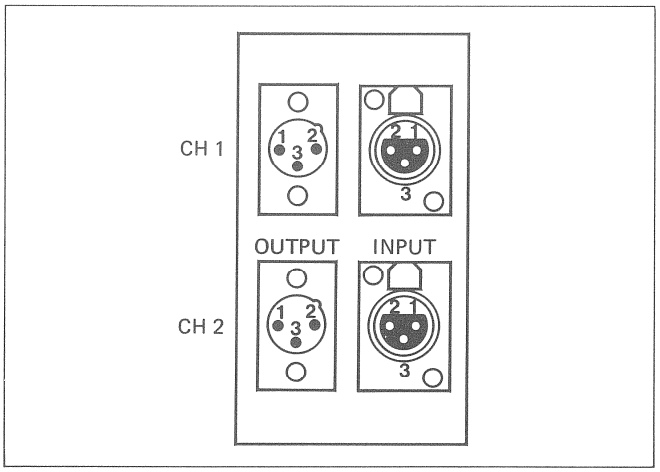


Fig.2.6

3	MECHANISCHE EINSTELLUNGEN LAUFWERK	Seite
3.1	AUSBAU DER BAUGRUPPEN	3/ 4
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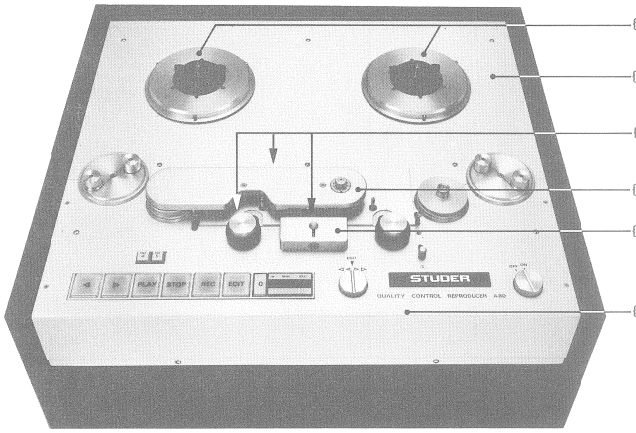
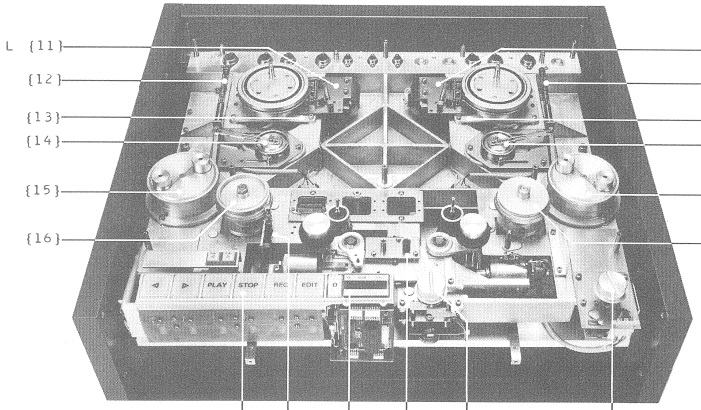
Fig.3


{1} L/R
{2}
{3}
{4}
{5}
{6}
STUDER
QUALITY CONTROL REPRODUCER A80


L {11}
{11} R
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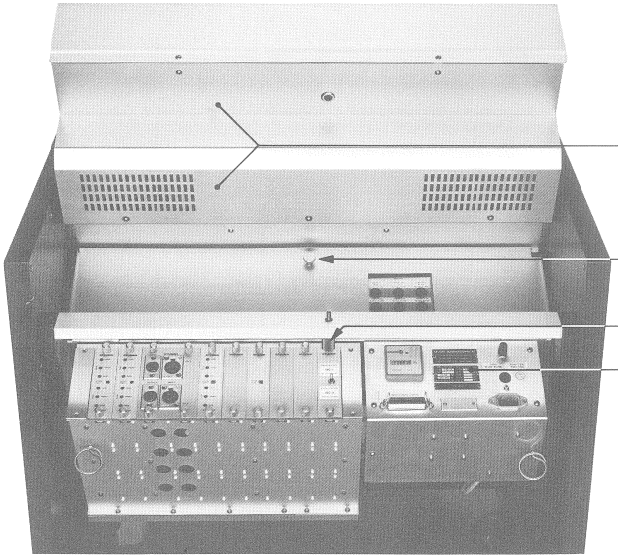
{16}
{16}
PLAY
STOP
REC
EDIT


{7}
{8}
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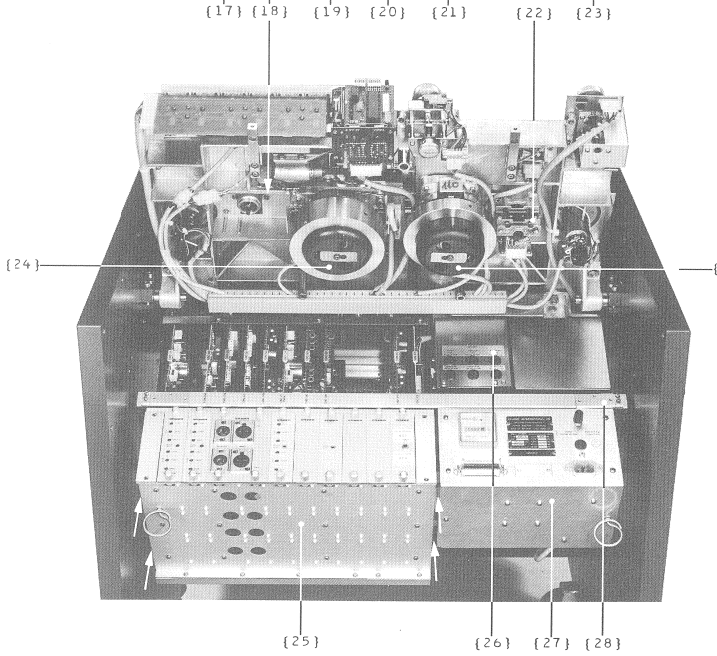

{17} {18} {19} {20} {21} {22} {23}
{24}
{24}
{25} {26} {27} {28}

3 MECHANISCHE EINSTELLUNGEN LAUFWERK

W A R N U N G Netzteil und Teile des Laufwerkes fuehren Netzspannung.
Um eine Elektrisierungs- Gefahr auszuschliessen, ist vor Ausbauarbeiten der Netz- Stecker zu ziehen.

Allgemeine Hinweise

- Fuer Service- Arbeiten kann das ganze Laufwerk hochgeschwenkt werden; hierfuer Raendelschraube vorne, unterhalb des Laufwerkes loesen.

- Die Baugruppen sind leicht zugaenglich; alle Aggregate koennen an mehrpoligen Steckverbindungen von der Steuerung getrennt werden.

Wichtig:
Bevor Steckkarten aus dem Rack gezogen, resp. eingeschoben werden, muss das Geraet mindestens 5 Sekunden ausgeschaltet sein.

Pflegehinweis:
Aluminiumflaechen sind mit ELOXAL, Spiritus oder Alkohol zu reinigen.

Benoetigte Werkzeuge und Hilfsmittel

- Innensechskant-Schluesselsatz 1,5...6mm
- Gabelschluessel, Schluesselweiten 7/8/14mm
- Federwaage oder Kontaktor 0...500g
- Federwaage oder Kontaktor 0...2500g
- 1 "Pancake"-Leerspule, Kerndurchmesser 6"
- 1 "Pancake"-Spule, mit Band bestueckt
- Bandstueck oder Schnur, mit einer kleinen Schlaufe am Ende: Laenge 2...3m

3.1
AUSBAU DER BAUGRUPPEN

siehe Klappseite, Fig.3

3.1.1
Kopftraeger {4}

V O R S I C H T Um eine Magnetisierungdsgefahr der Tonkoepfe zu vermeiden, ist das Geraet vor dem Entfernen des Kopftraegers auszuschalten.

Einstellungen an der Spurlage von Ton-, sowie Loeschkoepfen duerfen nur werkseitig ausgefuehrt werden.

- Kopftraeger-Abdeckung entfernen (2 Inbusschrauben).
- 3 Inbusschrauben {3} (3mm), von oben loesen.
- Kopftraeger vorsichtig nach oben ausfahren, ohne die Capstanwelle zu touchieren (Beschaedigungs-Gefahr).

3.1.2
Laufwerk-Abdeckbleche {2}/{6}/{7}

Hinteres Abdeckblech {2}
- Wickelkerne {1} abnehmen.
- 6 Schrauben loesen, Abdeckblech hinten anheben und nach hinten ausfahren.

Vorderes Abdeckblech {6}
- Abschirmung {5} nach oben abziehen.
- 4 Schrauben loesen.
- Andruckrollen in PLAY-Position halten; Abdeckblech ueber dem Tastenfeld anheben und nach vorne ausfahren.

Unteres Abdeckblech {7} (zweiteilig)
- Raendelschraube {8} des Klappdeckels, und 4 Schrauben loesen.

Konsolen-Rueckwand
- 2 Schrauben loesen (unverlierbar).

3.1.3
Andruck-Aggregat {20}

- Kopftraeger {4} nach Abschnitt 3.1.1 ausbauen.
- Mehrfach-Steckverbindung abziehen.
- 3 Schrauben (Inbus, 3mm) von oben loesen.
- Andruck-Aggregat vorsichtig nach oben ausfahren.

Montage-Hinweis
Beachte Kapitel 3.2.2, Abschnitt "Voraussetzungen"

Wartungs-Hinweis
Ein Austausch der Andruckrollen darf nur **paarweise** erfolgen.
Empfohlene Reinigungsmittel:
Spiritus, Wasser, Seifenloesung bis 70%.
Nicht zulaessige Reinigungsmittel sind Loesungsmittel jeder Art.

3.1.4
Bandende-Lichtschranke {18}

- Mehrfach-Steckverbindung abziehen.
- 4mm-Innensechskantschraube an Chassis-Unterseite loesen und Lichtschranke als Einheit nach oben ausfahren.

3.1.5
Band-Umlenkrollen {16}

Linke Band- Umlenkrolle {16/L}
- Zentrale Inbus-Senkschraube loesen; Kupplungsstueck und Umlenkrolle nach oben abheben.
- 3 Inbusschrauben an Lagerflansch loesen und nach oben ausfahren.

Rechte Band-Umlenkrolle {16/R}
(mit Bandbewegungs-Sensor {22})
- Mehrfach- Steckverbindung zu Bandbewegungssensor abziehen.
- Zentrale Inbus-Senkschraube loesen; Kupplungsstueck und Umlenkrolle nach oben abheben.
- 3 Inbusschrauben an Lagerflansch loesen und vorsichtig nach oben ausfahren (Vorsicht auf Bandbewegungssensor).

3.1.6
Feder-Element {12} L/R
Daempfungs-Element {14} L/R

A C H T U N G Das Daempfungselement {14} darf nicht zerlegt oder geoeffnet werden: Lufteinschluesse im eingefuellten Daempfungsmedium beeintraechtigen die Funktion.

Ausbau -> Fig.3/3.1
- Zentrale Inbus-Senkschraube an Bandzugwaageteller loesen und Fuehrungsrollen mit Waageteller abheben.
- Zugstangenbefestigung {15a} auf Ankerplatte loesen (2 Inbusschrauben).
- 3 Inbus-Schrauben zu Daempfer- Grundplatte {14a} loesen.
- Feder-/Daempfungselement nach oben ausfahren
- Federelement {12} von Grundplatte demontieren:
  Zentrale Klemmschraube {14b} an Daempfungselement loesen.
- 2 Inbusschrauben an Grundplatten- Unterseite loesen.

3.1.7
Bandzugwaagen {15}

-> Fig.3/3.1
- Zentrale Inbus-Senkschraube an Bandzugwaageteller loesen und Fuehrungsrollen mit Waageteller abheben.
- Zugstangenbefestigung {15a} auf Ankerplatte loesen (2 Inbusschrauben).
- Mehrfach-Steckverbindung (Chassis-Unterseite) abziehen.
- 3 Inbusschrauben {15b} loesen und Bandzugwaage vorsichtig nach oben ausfahren.

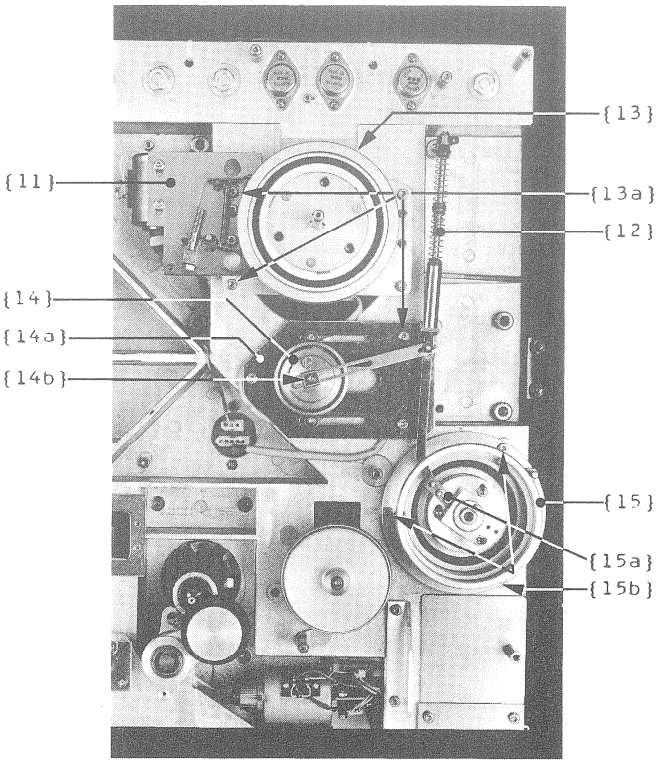


Fig.3.1

3.1.8
Wickelmotoren {13}
Bremsaggregate {11}

-> Fig.3/3.1

- 2 Steckverbindungen abziehen.
- 4 Inbusschrauben {15b} loesen und Wickelmotoren vorsichtig, und ohne zu verkanten, nach oben ausfahren.

3.1.9
Capstan-Motoren {24}

Chassis-Unterseite:
- Mehrfach-Steckverbindung abziehen.
- 4 Inbusschrauben loesen und Motor vorsichtig nach unten ausfahren (Vorsicht auf Capstan-Welle).

Montage-Hinweis
Beim Wiedereinbau muessen die Capstan-Motoren, soweit es die Toleranz in ihren Befestigungen erlaubt, in hinterster, horizontaler Einbaulage (in Richtung Wickel-Motoren) ausgerichtet sein.

Pflegehinweis
Die Capstan- Welle darf nur mit einem feuchten Lappen gereinigt werden.
Achtung:
Es ist darauf zu achten, dass kein Reinigungsmittel in die Capstan- Achslagerung fliesst.
Wartung:
Der Capstan- Motor ist wartungsfrei;
um jedoch dessen Lebensdauer zu erhoehen, ist eine jaehrliche Schmierung des Capstan- Lagers mit einem Tropfen Oel des Typs PDP 65* zu empfehlen. * Best.-Nr. 20.020.401.04

3.1.10
Drucktasten- Einheit {17}
Zaehler- Einheit {19}

-> Fig.3/3.2

Drucktasten- Einheit {17}
- Printstecker (links) ausziehen.
- 2 Inbusschrauben {17a} loesen und Einheit vorsichtig nach oben ausfahren.

Zaehler- Einheit {19}
- Printstecker abziehen.
- 2 Inbusschrauben (3mm) von oben loesen: Bei montiertem Andruck- Aggregat {20}, zugaenglich durch zwei, fuer diesen Zweck angebrachten Bohrungen {19a}.
- Zaehler vorsichtig nach vorne ausfahren.

3.1.11
EDIT- Regler {21}

-> Fig.3/3.2

- Mehrfach- Steckverbindung abziehen.
- 2 Inbusschrauben loesen.

3.1.12
Netzschalter {23}

-> Fig.3/3.2

- Mehrfach- Steckverbindung abziehen.
- 3 Inbusschrauben loesen.

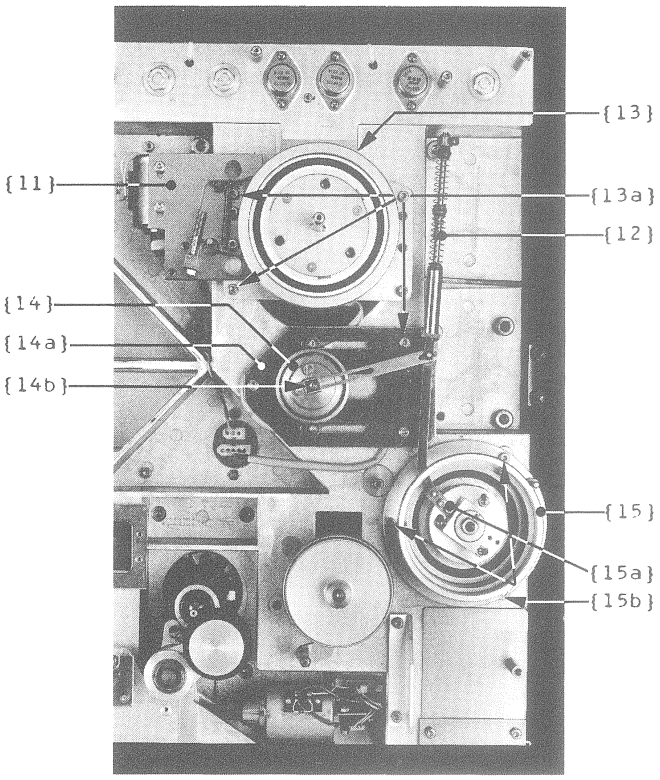


Fig.3.1

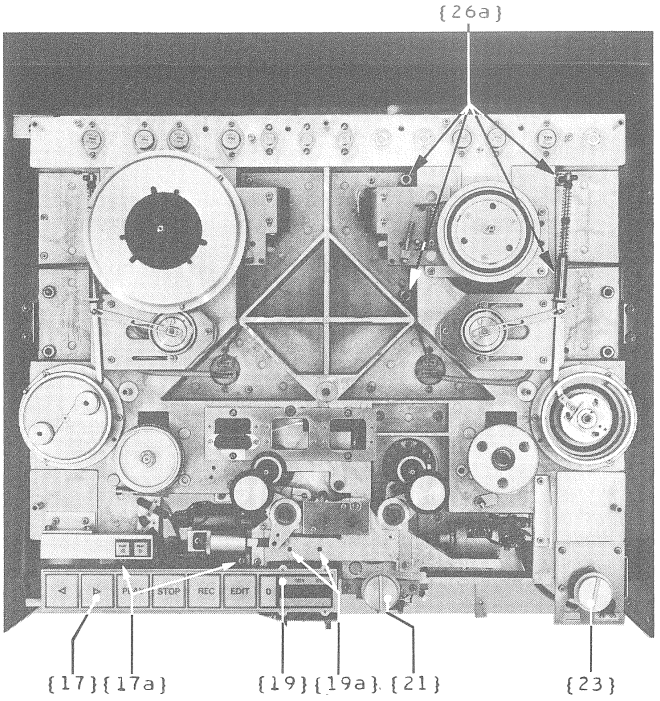


Fig.3.2

3.1.13
Netz- Eingangseinheit {27}

-> Fig.3

beinhaltet:
- Netzfilter
- Betriebsstunden- Zaehler
- Capstan- Transformator

Ausbau:
- Frontseitig des Gehaeuses 4 Linsenkopf- Inbusschrauben loesen.
- An Gehaeuse- Unterseite 1 Inbusschraube loesen und Kabelhalterung entfernen.

3.1.14
Netzteil {26}

Fig.3/3.2

- Netz- Eingangseinheit {27} ausbauen (Abschnitt 3.1.13).
- Audio- Kartentraeger {25} demontieren: Mittlere zwei, der beidseitig je 4 Inbusschrauben (2.5mm) loesen (siehe Hinweispfeile in Fig. 3).
  Vorsicht: Kartentraeger, waehrend dem Loesen der Schrauben, gegen oben festhalten.
  Kartentraeger nach unten ausfahren: Zugwirkung auf Kabelverbindungen vermeiden.
- Zwischenblech {28} demontieren: Befestigung zum Transformator- Gehaeuse (mit 6-kant-Distanzbolzen), durch Loesen der Linsenkopf- Inbusschraube (2.4mm) aufheben - Zwischenblech {28} entfernen.
- 4 Inbusschrauben {26a} (6mm) an Chassis-Oberseite loesen.
  Vorsicht: Netzteil, waehrend dem Loesen der Befestigungsschrauben, festhalten.
- Netzteil nach unten ausfahren.

3.2
EINSTELLUNGEN

3.2.1
Mechanische Wickelmotor-Bremsen {11}

Die Bremsung der Wickelmotoren erfolgt, bei normalem Betrieb, vornehmlich durch die geregelte Gleichstrom- Bremsung der Wickelmotoren. Beim Ausfall der Netzspannung treten die mechanischen Servo- Bremsen in Aktion. Diese Bremsen wirken auch im Stillstand, bzw. beim Betaetigen der Bandwickel von Hand. Es ist daher wichtig, dass die Bremsen richtig eingestellt sind.

Einstellung -> Fig.3.3

1. Das Bremsband {d} muss, bei manuell geloester Bremse, exakt ueber dem Trommel- Bremsbelag positioniert bleiben.
   Korrektur durch entdsprechendes Ausrichten (Verdrehen) des Bremsbandes {d} in seinen Nietverbindungen {f} zu den Bremshebeln.

   Das Spiel {k} zwischen Bremshebel und Hebelbolzen soll in Ruhelage 0,5...1mm betragen. Die Einstellung erfolgt durch paralleles, seitliches Schieben {a} der Traegerplatte, bei geloesten Befestigungsschrauben {e}.

2. Der Hub {h} des Abhebebolzens soll ca. 4mm betragen. Durch Andruecken des Magnetankers von Hand, kann dieser Hub kontrolliert werden. Zur Hub-Einstellung wird der Bremsmagnet {b} verschoben. Bei angehobenem Bremsband muss der Wickelmotor frei, ohne jede Bremsung drehen.

3. Das richtige Funktionieren der Bremse kann durch kurzes Vor- und Zurueckdrehen des Wikkeladapters {c} kontrolliert werden. Dabei sollen die Bremshebel wechselweise an den Anschlag, resp. den Abhebebolzen schlagen. (schnappendes Geraeusch).

4. **Bremszug- Einstellung in Aufwickel- Richtung** (schwache Bremsung): -> Fig.3.4
   Leerspule mit 2...3m Band oder Schnur in Gegenbetriebslage auf Bandadapter auflegen. Federwaage (0...500g) am Bandanfang einhaengen und zur Messung kontinuierlich vorziehen. Durch Umhaengen der Feder {g} wird der Bremszug auf 60g eingestellt. (DIN-Spule, Kerndurchmesser 10cm).

5. **Bremszug- Einstellung in Abwickel- Richtung** (starke Bremsung): -> Fig.3.5
   Leerspule mit 2...3m Band oder Schnur in Betriebslage auf Bandadapter legen. Federwaage (0...500g) am Bandanfang einhaengen und zur Messung kontinuierlich vorziehen. Mit Schraube {i} wird der Bremszug auf 120g eingestellt.
   Nach der Justierung des Federzuges soll der Haken am Ende der Feder horizontal stehen.

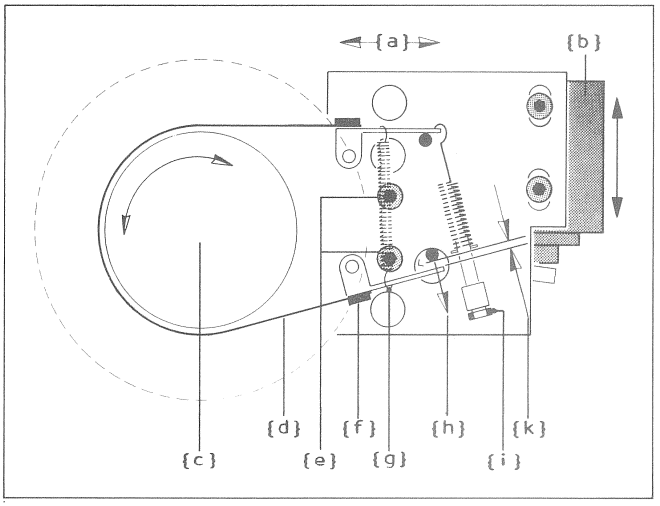


Fig.3.3

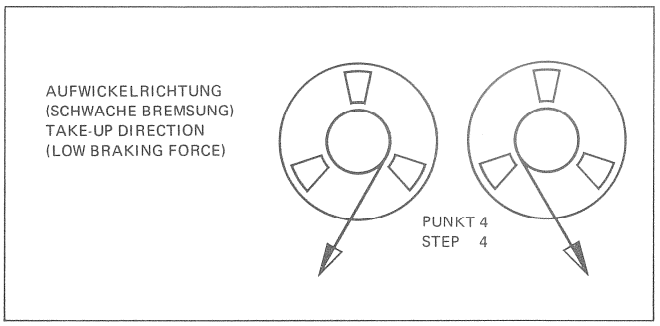


Fig.3.4

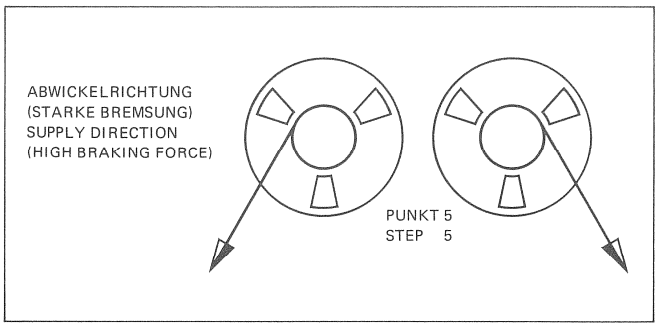


Fig.3.5

3.2.2
Andruckaggregat {20}

-> Fig.3/3.6...3.8

Das Andruckaggregat besitzt zwei Elektromagnete, den Andruckmagneten {n} (rechts) und den EDIT-Magneten {c} (links). Das Andruckaggregat arbeitet in zwei Stellungen. In Stellung PLAY sind die Andruckrollen {d} und {m} ganz eingefahren; sie liegen auf den Capstanwellen auf. In Stellung EDIT fahren die Andruckrollen nicht ganz ein, d.h. sie setzen nicht auf die Capstanwellen auf.

EINSTELLUNG

1.Voraussetzungen

- Die Capstan- Motoren muessen, soweit es die Toleranz in ihren Befestigungen erlaubt, in hinterster, horizontaler Einbaulage (in Richtung Wickelmotoren) ausgerichtet sein.
- Das Andruckaggregat muss, soweit es die Toleranz in ihrer Befestigung erlaubt, in vorderster, horizontaler Einbaulage (in Richtung Tastenfeld) ausgerichtet sein.

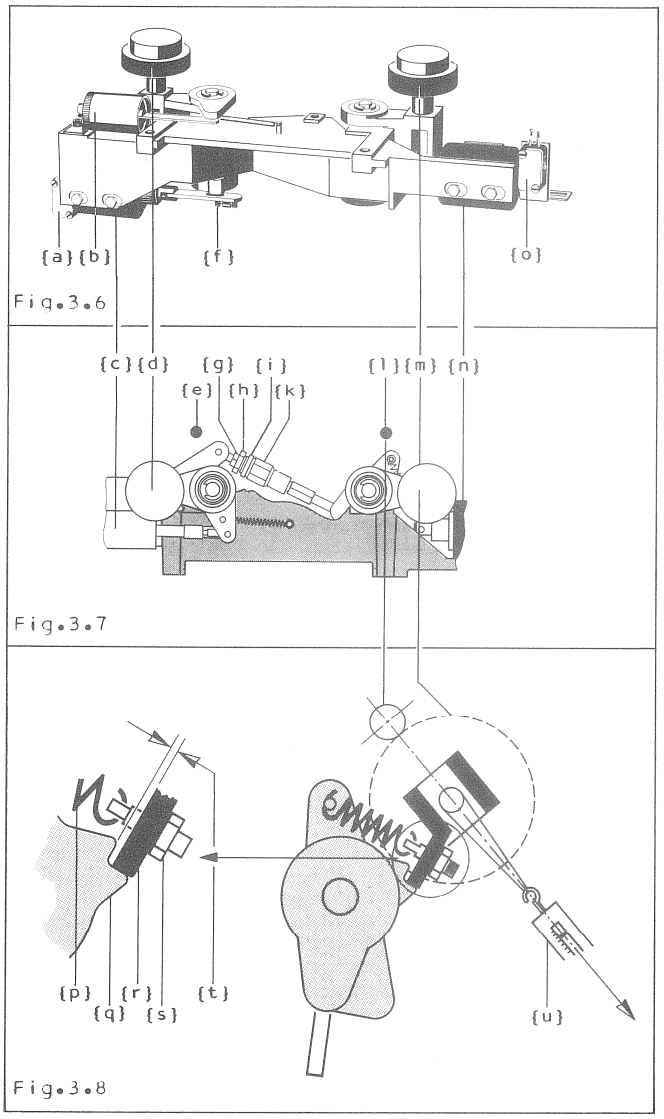
Vorbereitungen -> Fig.3
- Kopftraeger {4} demontieren (Kap.3.1.1)
- Vorderes {6} und unteres {7} Abdeckblech demontieren (Kap.3.1.2)
- Da die nachfolgenden Einstellungen ohne eingelegtes Band erfolgen, ist die Lichtschranke {18} mit einem lichtundurchlaessigen Klebebandstueck abzudecken.

2.Andruckarm-Daempfung -> Fig.3.6

Durch Drehen des Daempfer- Zylinders {b} kann die Rueckstellgeschwindigkeit der Andruckarme in ihre Ruhestellung beeinflusst werden:
Sie ist so zu waehlen, dass die Andruckarme, mit moeglichst geringer Verzoegerung (Daempfung), moeglichst sanft in ihre Ruhestellungen zurueckkehren (Wechselweise PLAY > STOP -Modus waehlen).

3.Andruckrollen-Einsaztpunkt -> Fig.3.7/3.8

Wichtigste Voraussetzung fuer eine exakte Bandfuehrung in der PLAY- Startphase ist das gleichzeitige Auftreffen beider Andruckrollen {d/m} auf ihre Capstan- Wellen {e/l}.
Die Einstellung ist in nachfolgender Reihenfolge durchzufuehren:



Voreinstellung

Im PLAY-Modus bestimmt der Vorspann der Zugfeder {p} die Andruckkraft der rechten Andruckrolle {m} auf ihre Capstanwelle {l} (Einstellung der Andruckkraft folgt im Abschnitt 4.) Deshalb muss, im PLAY-Modus, der Andruckarm {r} leicht vom Anschlag des Andruck- Hilfsarms {q} abheben:

- Linke Andruckrolle {d} durch Abschrauben der Kappe (Vorsicht, Linksgewinde) demontieren.
- Rechte Andruckrolle {m} von Hand, leicht an die Capstanwelle {l} druecken, und in dieser Position festhalten - bei eingeschalteter Maschine wechselweise PLAY / STOP Tasten betaetigen; beachte Andruckarm {r}: Er muss, beim Wechsel auf PLAY-Modus, 0,3...0,5mm vom Anschlag des Hilfsarms {q} abheben (Spiel {t}).
  Eine Justierung erfolgt durch seitliches Verschieben des PLAY- Magneten {n}, nach leichtem Loesen der Befestigungsschrauben (7mm).
- Linke Andruckrolle {d} wieder montieren.

Andruckrollen-Einsatzpunkt

Kontrolle:
Wechselweise linke und rechte Andruckrolle {d/m} unter langsamer, manueller Betaetigung, gegen die entsprechende Capstanwelle bewegen -
Bei der, jeweils manuell betaetigten Seite, muss die Andruckrolle zuerst zu drehen beginnen.

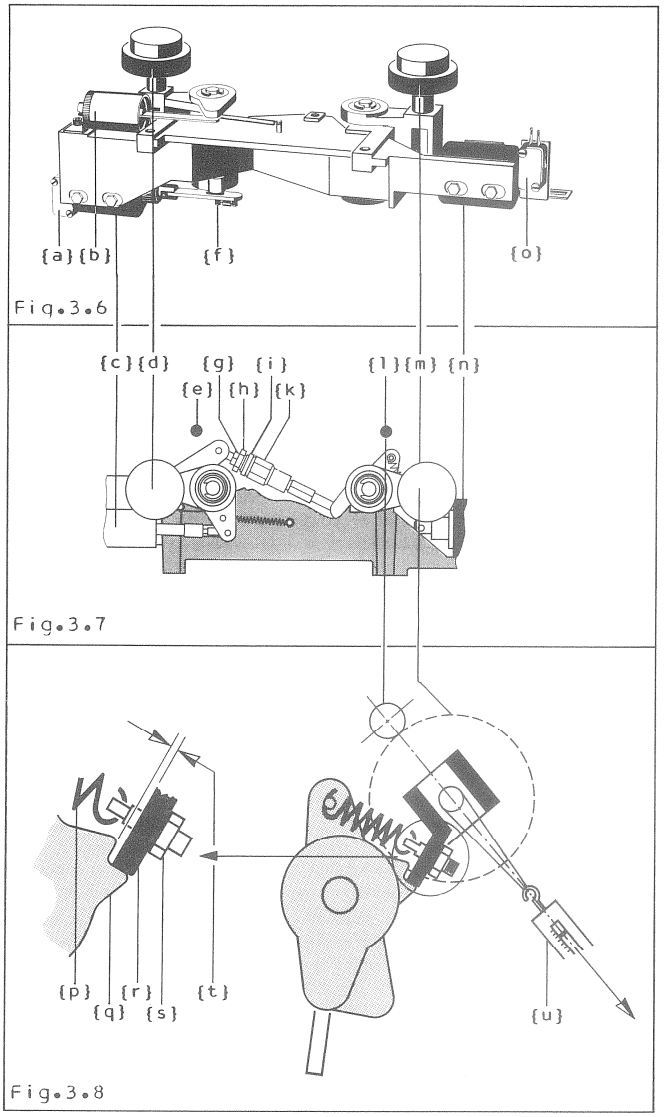
Korrektur:
- Kontermutter {g} (8mm) loesen.
  Als Folge laesst sich die Zugstange {h...k}, durch Drehen, in ihrer Laenge veraendern.
  Entsprechende Korrektur vornehmen, mit anschliessender Kontrolle bei festgezogener Kontermutter {g} wiederholen.
- Kontermutter {g} angemessen festziehen und mit Sicherungslack fixieren.

Eingangs des Abschnittes erlaeuterte Einstellung des Spiels {t} zwischen rechtem Andruckarm und Andruckhilfsarm nachkontrollieren und bei Bedarf korrigieren.

4.Andruckrollen-Andruckkraft -> Fig.3.7/3.8

Kontrolle:
- Federwaage (0...2,5kg) an entsprechender Andruckrollen-Achse einhaengen -> Fig.3.8
- Taste PLAY druecken und Andruckkraft messen: Andruckrolle durch Ziehen der Federwaage leicht von der Capstanwelle abheben - Zugkraft auf Federwaage sukzessive vermindern, bis die Andruckrolle auf die Capstanwelle aufsetzt und zu drehen beginnt: In diesem Moment muss die Federwaage eine Zugkraft von 600 +/-50g anzeigen.

Korrektur:
- Rechte Andruckrolle {m}
  durch Veraendern des Federvorspannes {p} an Spannmutter {s}.
- Linke Andruckrolle {d}
  durch Vorspannaenderung der gefederten Zugstange:
  Kontermutter {i} (14mm) zu Sechskantstueck {k} (14mm) loesen.
  Eindrehen der Schraube {h} hat eine Erhoehung der Andruckkraft zur Folge.
  Kontermutter {i} festziehen und mit Sicherungslack fixieren.



5.EDIT-Magnet {c} -> Fig.3.6

Er tritt, bei gewaehltem EDIT- Betriebsmodus, anstelle des PLAY- (Andruck-) Magneten in Einsatz und positioniert die Andruckrollen mit einem Abstand von ca. 4mm zu den Capstanwellen Aktiviert wird der EDIT- Magnet ueber den Mikro-Switch {o} (Ruhekontakt).

Schaltpunkt des Mikro-Switch {o}:
kurz vor Auftreffen der rechten Andruckrolle {m} auf die Capstanwelle {l}.

Kontrolle
- PLAY-Taste betaetigen.
  Der EDIT-Magnet darf nicht aktiviert sein. (Anker-Zugstange {f} muss frei spielen).

Spiel Ankerzugstange {f} > Mitnehmerbolzen

Im PLAY- Betriebsmodus darf der EDIT- Magnet ueber seine Ankerzugstange {f} keinen Einfluss auf die Stellung der Andruckrolle nehmen.

Kontrolle
- PLAY- Taste druecken.
  Der Mitnehmerbolzen muss zum linken Anschlag der Fuehrungsnut in der Ankerzugstange {f} ein Spiel von 0,3...0,5mm halten.

Korrektur
durch entsprechendes Schieben des EDIT- Magneten {c}, nach dem Loesen der Befestigungsschrauben.

Nachkontrolle
- Taste EDIT druecken.
- EDIT-Regler in Mittelstellung positionieren: Der Abstand zwischen Andruckrolle und Capstanwelle soll ca. 3...4mm betragen.

3.2.3
Bandzugwaagen {15}

-> Fig.3

Waehrend den verschiedenen Funktionszustaenden wird der Bandzug durch die Auslenkung der Bandzugwaagen und die eingestellte Referenzspannung bestimmt. Der Drehwinkel des Waagentellers wird durch ein mechanisch gekuppeltes Praezisions-Potentiometer {20} in ein analoges elektrisches Signal umgewandelt. Die erforderliche Rueckstellkraft der Bandzugwaage wird durch ein Federsystem aufgebracht das - zur Erziehlung einer annaehernd logarithmischen Bandzugkurve - zwei Druckfedern verschiedener Charakteristik enthaelt.

Ein Daempfungselement {14} unterdrueckt mechanische Schwingungen des Bandzugwaagen- Systems

In EDIT-Funktion arretieren elektromagnetische Feststellbremsen die Bandzugwaagen.
Dies verhindert unerwuenschte Pendelbewegungen der Bandzugwaagen und ermoeglicht das praeziese Positionieren einer gewuenschten Band-Modulationsstelle.

1.Federelement {12}, Feder-Rueckstellkraft

-> Fig.3.9

Montagehinweis:
- In Ruheposition der Bandzugwaage soll das Federelement und die Federelement- Zugstange in einer Flucht zueinander liegen.
  Korrektur
  bei leicht geloesten Befestigungsschrauben.

Rueckstellkraft (Grundeinstellung)
- Stellring {a} ganz an Axialsicherung anstellen. Feststellschraube, um ca. 45 Grad aus der Vertikalen neigend festziehen. (Vermeidung des Streifens an der Laufwerkabdeckung)

2.Daempfungs-Element {14}

A C H T U N G Das Daempfungs- Element {14} darf nicht zerlegt oder geoeffnet werden.

Einstellung -> Fig.3.9
Die Hebellaenge "X" vom Daempfungs- Element-Drehpunkt {d} bis zum Federelement- Kniegelenk {b} bestimmt die Intensitaet der Daempfung.
Die Hebellaenge laesst sich durch Verschieben des Daempfungs- Elementes bestimmen (Klemmschrauben und Zentralschraube {d} loesen):
Groessere Hebellaenge "X"= geringere Daempfung
Grundeinstellung: "X"= 55...65mm

Kontrollen:
- Bandzugwaage manuell in Endstellung, mit maximalem Federvorspann bringen und loslassen: Die selbsttaetig zurueckgestellte Bandzugwaage darf, bei moeglichst gering gewaehlter Daempfung, in der Endstellung nicht prellen.
- Unter Beobachtung des Kniegelenk-Bolzens {b} und dessen Spielraums in der Daempferhebel-Fuehrungsnut, Bandzugwaage manuell von einer Endstellung in die andere bewegen:
  Die Achse muss sich im Mittenbereich der Fuehrungsnut bewegen (keinesfalls darf der Daempferhebel mit Querkraft auf das Federgestaenge wirken).

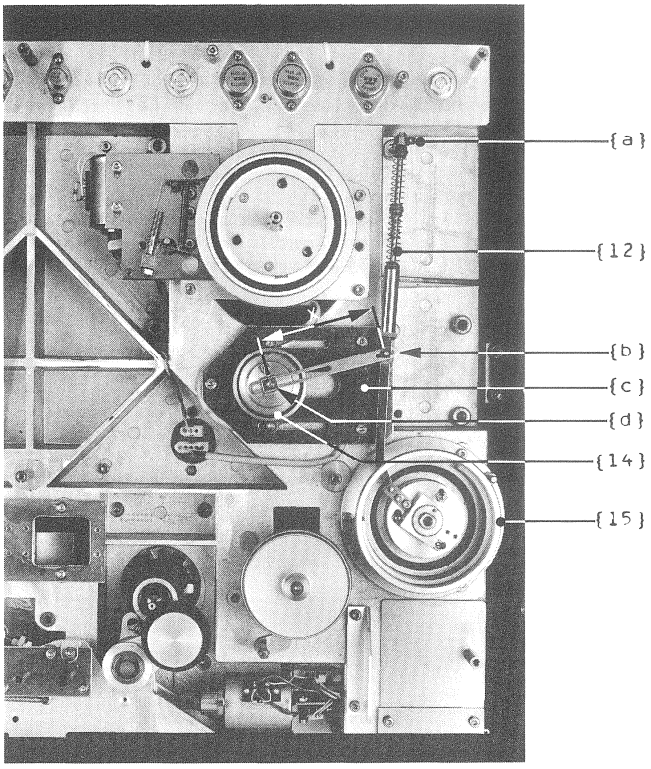


Fig.3.9

3.Elektromagnetische Feststellbremse

-> Fig.3.10

- Die Senkschraube {a} loesen und den Waagenteller abheben.
- Hebelflansch {b} von Hand niederdruecken und die drei Stiftschrauben {c} im Uhrzeigersinn vorsichtig drehen, bis die Ankerscheibe {d} gleichmaessig auf der Magnetglocke {e} aufliegt.
- Die drei Stiftschrauben {c} um je 1/4 Drehung im Gegenuhrzeigersinn loesen, damit sich ein Luftspalt von 0,12...0,15mm zwischen Ankerscheibe und Magnetglocke ergibt.
- Geraet einschalten und durch wechselweises Druecken der Tasten STOP und EDIT das korrekte Blockieren und Lueften der Magnete pruefen.
- Waagenteller wieder montieren und die Kontrolle EDIT - STOP wiederholen.

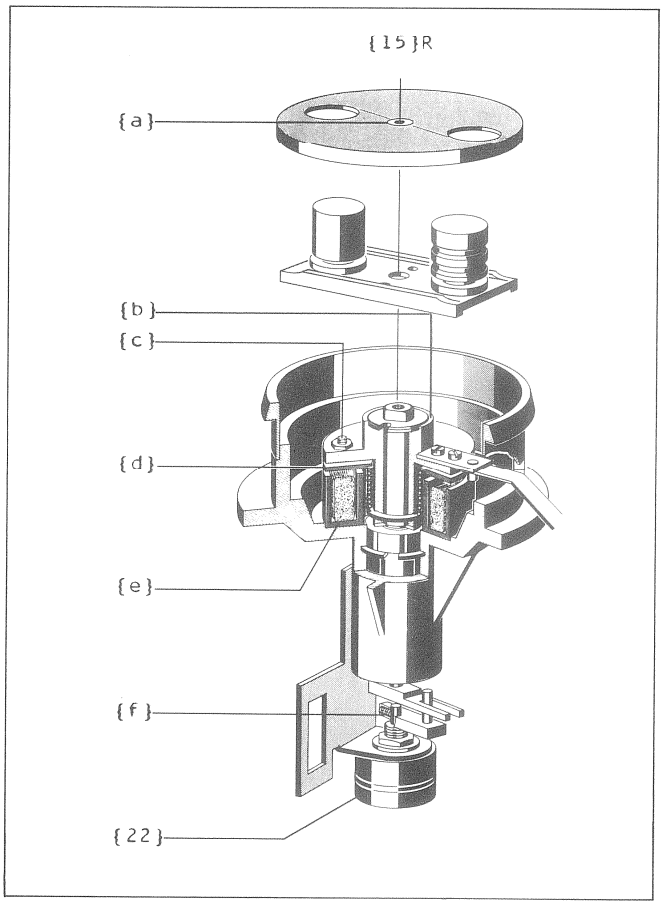


Fig.3.10

3 MECHANICAL ADJUSTMENTS: TAPE TRANSPORT

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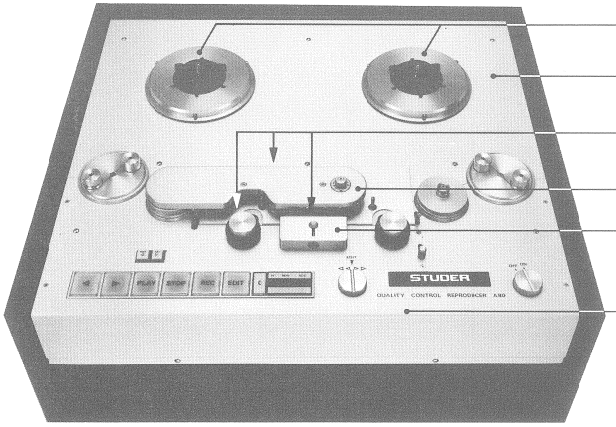
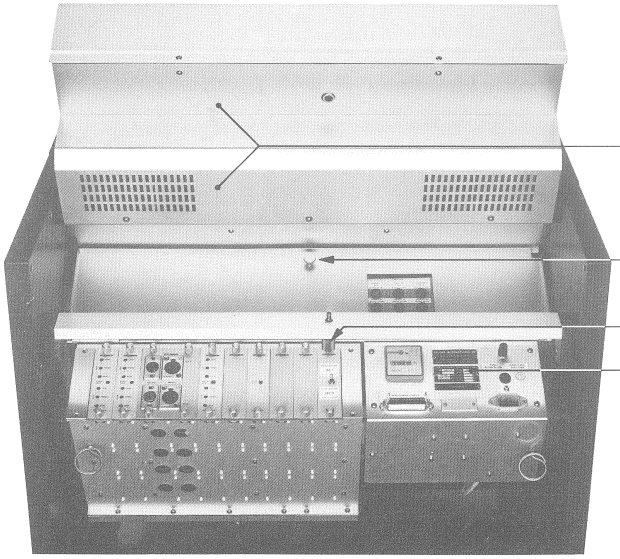
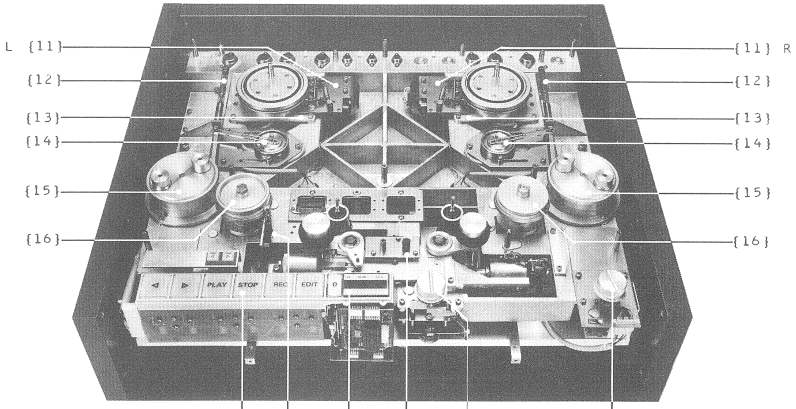
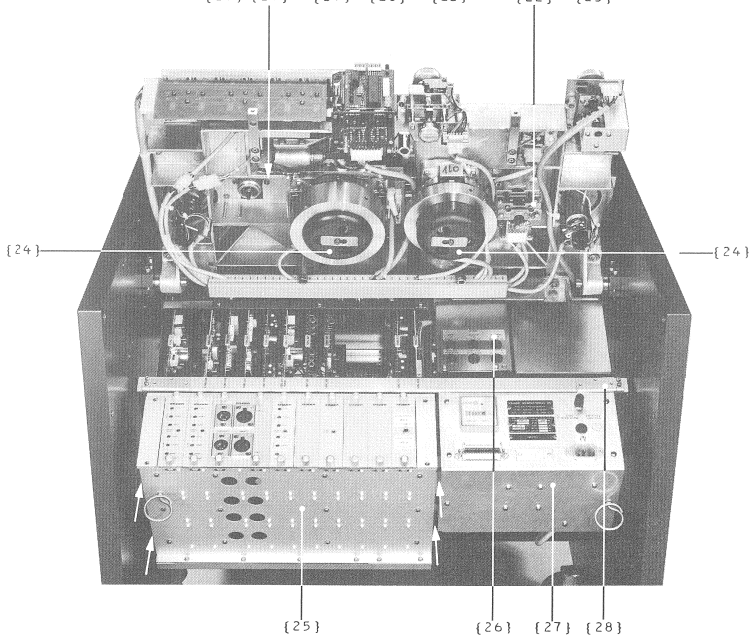
Fig.3


{1} L/R
{2}
{3}
{4}
{5}
{6}
STUDER
QUALITY CONTROL REPRODUCER A80


{7}
{8}
{9}
{10}


L {11}
{11} R
{12}
{12}
{13}
{13}
{14}
{14}
{15}
{15}
{16}
{16}
PLAY
STOP
REC
EDIT


{17} {18} {19} {20} {21} {22} {23}
{24}
{24}
{25} {26} {27} {28}

3 MECHANICAL ADJUSTMENTS TAPE TRANSPORT

C A U T I O N The power supply and certain tape transport components are under line voltage.
Disconnect the power plug before removing any parts!

General information

- The complete tape transport can be tilted 90 degree by unfastening the knurled thump screws in front of and below the tape transport.

- The assemblies are easily accessible; all modules can be separated through multipin connectors.

- The recorder must have been switched off for at least 5 seconds before any printed circuit boards are removed from or inserted into the rack.

Care instructions
Clean aluminium surfaces with aluminite cleaner, ethanol or alcohol.

Required tools and instruments

- Set of hexagon-socket-screw keys 1.5...6mm
- Open-end wrench size 7,8,14mm
- Spring dynamometer or contactor 0...500g
  Spring dynamometer or contactor 0...2500g
- 1 Pancake reel, empty, core diameter 6"
- 1 Pancake reel, with tape "
- Tape section or piece of string with a small loop on one end. Length 2...3m

3.1
REMOVING THE ASSEMBLIES

-> Fig.3

3.1.1
Headblock {4}

C A U T I O N Switch recorder off before removing the headblock in order to prevent magnetization of the soundheads!

Only the factory is authorized to adjust the track alignment of soundheads and erase heads!

- Remove headblock cover (2 socked-head-screws)
- Unfasten three 2mm socked head-screws {3} from the top.
- Carefully lift out the headblock without contracting the capstan shaft.

3.1.2
Tape transport covers {2}/{6}/{7}

Rear cover {2}
- Remove hubs {1}
- Unfasten 6 screws, lift back of cover and slide it out toward the rear.

Front cover {6}
- Pull screen {5} off toward the top.
- Unfasten 4 screws.
- Hold pinch rollers in PLAY position; raise cover past the controls and slide it out toward the front.

Lower cover {7} (two-part)
- Release knurled thumb screw {8} of the hinged cover and unfasten 4 screws.

Rear panel of console
- Unfasten 2 screws (captive).

3.1.3
Pinch roller assembly {20}

- Remove headblock {4} according to Section 3.1.1.
- Unplug multipin connector.
- Unfasten 3 screws (hexagon-socket, 3mm) from the top.
- Carefully slide out the pinch roller assembly toward the top.

Reinstallation instructions
Please refer to Section 3.2.2, par. "Prerequisites".

Care instructions
Pinch rollers must always be replaced **in pairs.**
Cleaning, recommended cleaners:
Ethanol, water, soap solution up to 70%.
Inadmissible cleaning aids:
solvents of any type.

3.1.4
Optical tape end sensor {18}

- Unplug multipin connector.
- Unfasten 4mm hexagon-socket-head screw on the underside of the chassis and slide out the light barrier as a complete assembly.

3.1.5
Guide rollers {16}

Left-hand guide roller {16L}
- Unfasten hexagon-socket countersunk-head center screw; lift out coupling piece and guide roller.
- Unfasten 3 hexagon-socket-head screws on bearing flange and slide the latter out toward the top.

Right-hand guide roller {16R}
(with tape move sensor {22})
- Unplug multipin connector to tape move sensor.
- Unfasten hexagon-socket countersunk-head center screw; slide coupling piece and guide roller out toward the top.
- Unfasten 3 hexagon-socket-head screws on bearing flange and slide the latter carefully out toward the top (carful with tape move sensor!).

3.1.6
Spring / Dashpot {12}/{14} L/R

C A U T I O N The dashpot {14} must not be disassembled or opened because the function of the dashpot is adversely affected, if any air trapped in the damping medium.

Removal -> Fig.3.31
- Unfasten hexagon-socket countersunk-head center screw on tape tension sensor plate and lift off guide rollers together with tape tension sensor plate.
- Unfasten pull rod mount {15a} on anchor plate (2 hexagon-socket-head screws).
- Unfasten 3 hexagon-socket-head screws in base plate of dashpot {14a}.
- Slide out spring/dashpot toward the top.
- Unplug spring element {12} from base plate: unfasten central clamping screw {14b} on the dashpot. Unfasten 2 hexagon-socket-head screws on the underside of the base plate.

3.1.7
Tape tension sensor {15}

-> Fig.3/3.1
- Unfasten hexagon-socket countersunk-head center screw on tape tension sensor plate and lift off guide rollers together with tape tension sensor plate.
- Unfasten pull rod mount {15a} on anchor plate (2 hexagon-socket-head screws).
- Unplug multipin connector (underside of chassis)
- Unfasten 3 hexagon-socket-head screws {15b} and carefully slide tape tension sensor out toward the top.

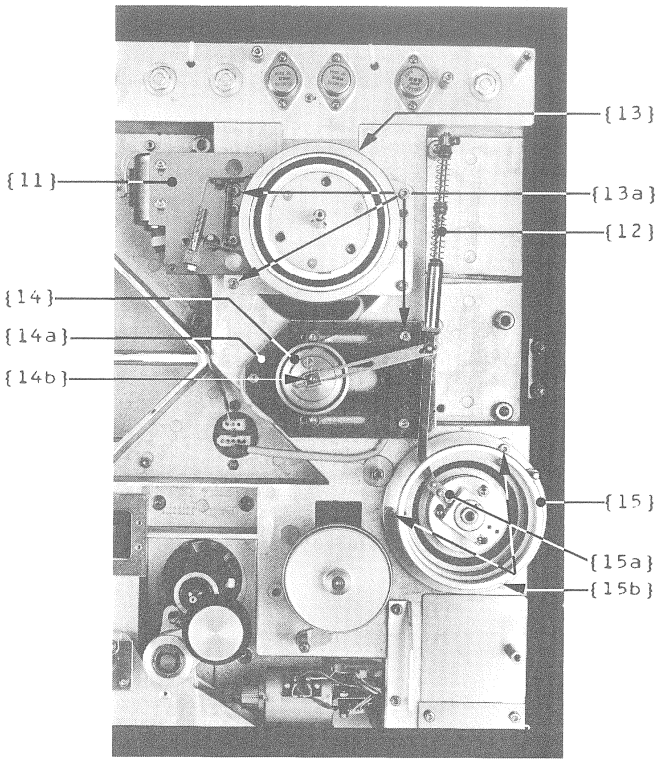


Fig.3.1

3.1.8
Spooling motors {13}
Brake assembly {11}

-> Fig.3/3.1

- Unplug 3 multipin connectors.
- Unfasten 4 hexagon-socket-head screws {15b} and carefully slide out spooling motor toward the top without twisting it.

3.1.9
Capstan motors {24}

-> Fig.3

Underside of chassis:
- Unplug multipin connector
- Unfasten 4 hexagon-socket-head screws and carefully slide out motor toward the bottom (careful with capstan shaft!)

Mounting instruction:
The capstan motors should be aligned in the rear-most horizontal mounting position (against spooling motors) as far as adjustments are possible within their mounts.

Care instruction
Clean capstan shaft only with a moist piece of cloth.
Note:
Ensure that no cleaner flows into the capstan shaft bearing.
Maintenance:
The capstan motor require no maintenance.
In order to extend its life it is recommended to lubricate the capstan bearing annually with one drop of oil (PDP 65; part No.20.020.401.04)

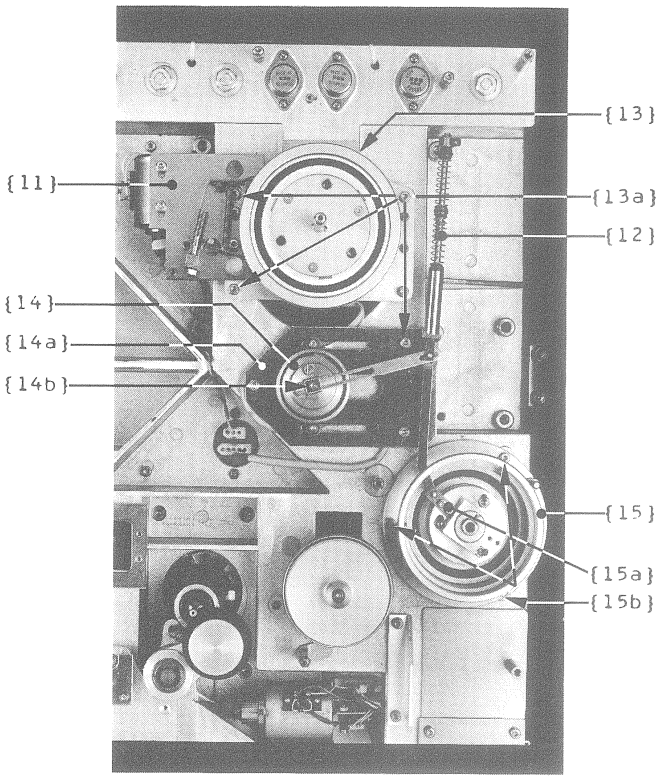


Fig.3.1

3.1.10
Push button unit {17}
Tape counter assembly {19}

-> Fig.3/3.2

Push button unit {17}
- Unplug card edge connector (left).
- Unfasten 2 hexagon-socket-head screws {17a} and carefully slide the push button unit out toward the top.

Tape counter assembly {19}
- Unplug card edge connector.
- Unfasten 2 hexagon-socket-head screws (3mm): Accessible on the mounted pinch roller assembly {20} through two holes provided for this purpose.
- Carefully slide counter out toward the front.

3.1.11
EDIT control {21}

-> Fig.3/3.2

- Unplug multipin connector.
- Unfasten 2 hexagon-socket-head screws.

3.1.12
Power switch {23}

-> Fig.3/3.2

- Unplug multipin connector.
- Unfasten 3 hexagon-socket-head screws.

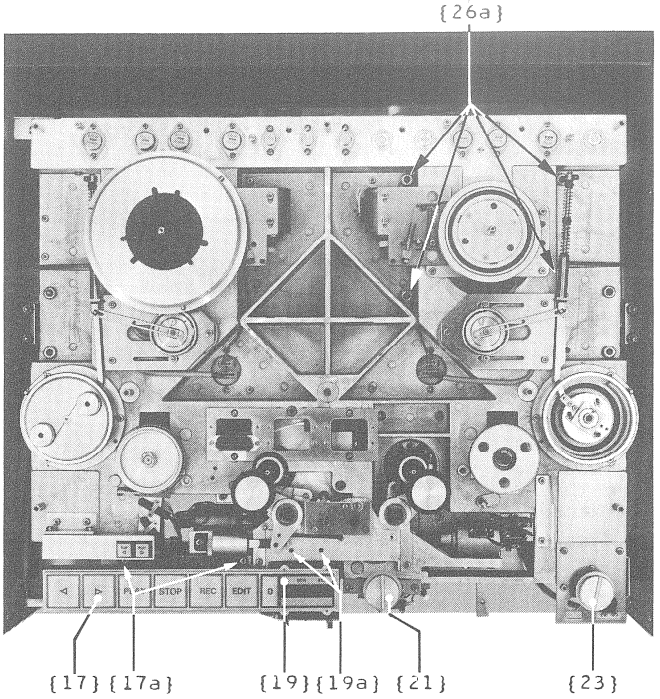


Fig.3.2

3.1.13
Power inlet assembly {27}

-> Fig.3

Comprises:
- Line filter
- Operating hours meter
- Capstan transformer

Disassembly:
- Unfasten 4 hexagon-socket oval-head screws on the front of the housing.
- Unfasten 1 hexagon-socket-head screw on the underside of the housing and remove cable retainer.

3.1.14
Power supply unit {26}

-> Fig.3/3.2

- Remove power inlet assembly {27}. (refer to 3.1.13)
- Remove audio board holder {25}: Unfasten the center 2 of the 4 hexagon-socket-head screws (2.5mm) on each side (see arrows in Fig.3). Careful! While unfastening the screws, lift card holder toward the top. Avoid any tension on cable connections.
- Remove shim {28}: separate the mounting to the transformer housing (with hexagon spacer pin) by unfastening the hexagon-socket oval-head screw (2.5mm) - then remove shim.
- Unfasten 4 hexagon-socket-head screws (6mm) on top of chassis. Caution! Hold power supply unit while unfastening the mounting screws.
- Slide power supply unit out toward the bottom.

3.2
ADJUSTMENTS

3.2.1
Mechanical spooling motor brake {11}

In normal operation , reel rotation is braked mainly by controlled DC braking of the spooling motors. The mechanical servo brakes come into operation in the event of a power failure. These brakes also act when the tape is stationary or the reels are turned by hand. It is therefore essential that the braking forces are correctly adjusted.

Brake adjustment -> Fig.3.3

1. When the brake {d} is released manually, the brake band must stay exactly above the brake lining.
   Correction is possible by alligning (twisting) the brake band in its rivet connections to the brake levers.

   The play {k} between brake lever and lifting pin should be 0.5...1.0mm in the neutral position. Adjustment is possible through parallel, lateral shifting {a} of the supporting plate {a} of the supporting plate while the mounting screws {e} are loosened.

2. The travel {h} of the lift pin should be approximately 4mm. This travel can be checked by pressing the solenoid plunger fully home by hand. The trvel is adjusted by moving the braking solenoid {b}. The spooling motor must turn completely freely when the brake band is released.

3. Correct operation of the brake can be checked by turning the reel adapter {c} slightly back and forth. The two brake levers should then alternately strike the end stop and the lift pin (a click sound).

4. **Braking force adjustment in take-up direction** (light braking) -> Fig.3.4
   Place empty reel with 2...3m of tape or string on adapter in opposite direction to normal operating position.
   Attach spring dynamometer (0...500g) to tape end and pull steadily in order to measure.
   The braking force is obtained by repositioning the spring {g} 60g for DIN reels with 10cm core.

5. **Braking force adjustment in supply direction** (heavy braking) -> Fig.3.5
   Place empty reel or string on adapter in normal operation position.
   Attach spring dynamometer (0...500g) to the tape end and pull steadily in order to measure. The breaking force of 120g is set by means of screw {i}.
   The hook at end of the spring must be horizontal when the spring tension has been adjusted.

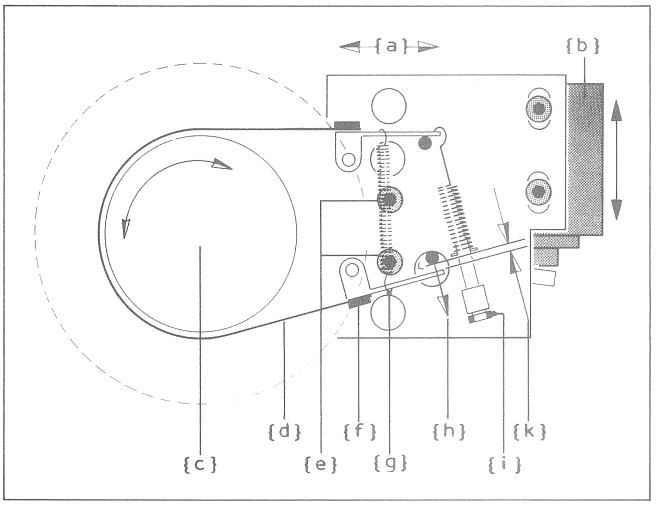


Fig.3.3

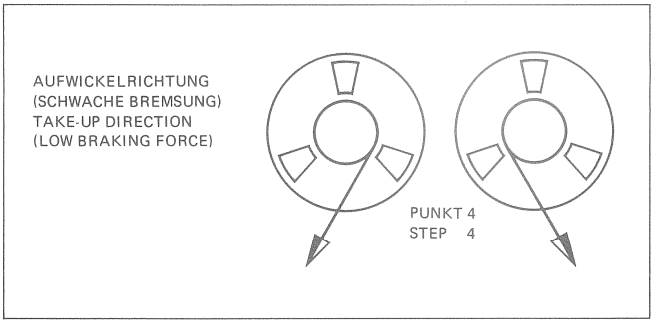


Fig.3.4

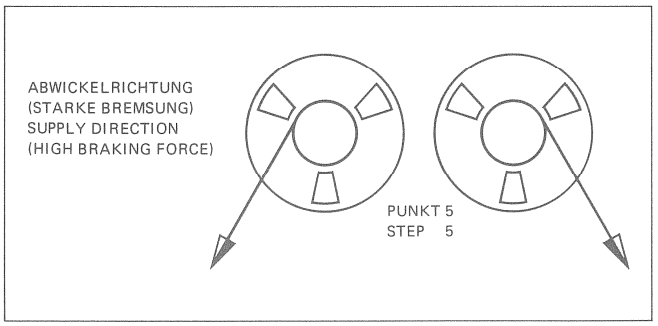


Fig.3.5

3.2.2
Pinch roller assembly {20}

-> Fig.3/3.6...3.8

The pinch roller assembly has two solenoids: the PLAY solenoid {n} on the right and the EDIT solenoid {c} on the left. Thus, there are two operating positions. In PLAY position the rolers {d} and {m} are fully extended and engage the capstan shafts. In EDIT mode the rollers are not fully extended and are not in contact with the capstan shafts.

ADJUSTMENT

1.Prerequisites

- The capstan motors must be aligned in their rear-most, horizontal mounting position (toward the spooling motors) as far as this possible within their mounting tolerances.
- The pinch rollers must be aligned in its foremost, horizontal mounting position (toward push button unit), as far as this is possible within its mounting tolerance.

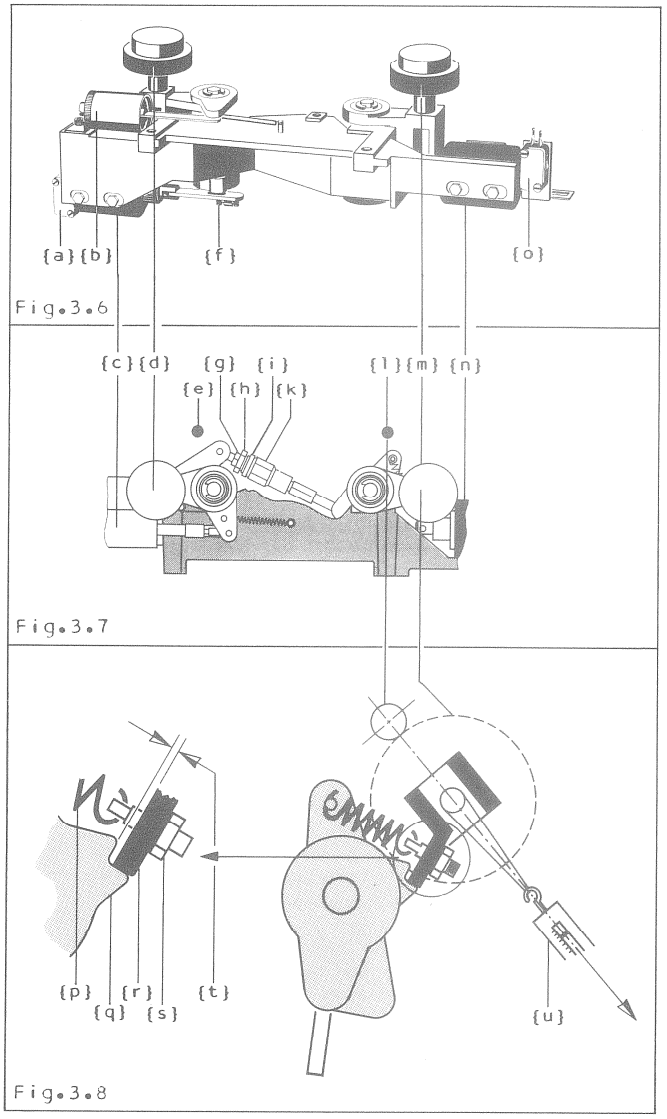
Preparatory steps -> Fig.3
- Remove headblock {4} (Section 3.1.1)
- Remove front {6} and lower {7} panel (Section 3.1.2)
- Since the subsequent adjustments are made without tape present, the light barrier {18} must be covered with a piece of nontransparent adhesive tape.

2.Pinch roller arm damping -> Fig.3.6

The speed at which the pinch roller arms are restored to their neutral position can be influenced by rotating the dashpot. The restoring speed should be adjusted in such a way that the pinch roller arms return as smoothly as possible and with minimal delay (damping) to their neutral position (alternately select PLAY - STOP mode).

3.Pinch roller contact point -> Fig.3.7/3.8

For accurate tape guidance in the PLAY start phase, both pinch rollers {d/m} must simultaneously contact their capstan shafts {e/l}. Perform the adjust in the following sequence:



Preliminary adjustments

In PLAY mode the initial compression of the extension spring {p} determines the pressure of the right-hand pinch roller {m} on its capstan shaft {l} (the pinch force is adjusted in Section 4). In PLAY mode, the pinch roller arm {r} must slightly lift off the tension arm {q}:

- Unfasten left-hand pinch roller {d} by unscrewing the cap (Caution! Left-hand thread).
- Press right-hand pinch roller {m} by hand lightly against the capstan shaft {l} and hold it in this position. Alternately press PLAY - STOP with the recorder under power. Observe pinch roller arm {r}: it should lift off the stop of tension arm {q} by 0.3 ... 0.5mm when switching to PLAY mode (play {t}). Adjustment is possible by shifting the PLAY solenoid {n} sideways after the mounting screw (7mm) has been loosened somewhat.
- Reinstall left-hand pinch roller {d}.

Contact point of pinch rollers

Check:

Alternately move the left-hand and right-hand pinch roller {d/m} by means of slow, manual actuation against the corresponding capstan shaft. The pinch roller of the manually actuated side should start to turn first.

Correction:

- Loosen lock nut {g} (8mm).
  The length of the pull rod {h...k} can be now varied by turning the rod. Correct its length as required and repeat check after the locknut {g} has been retightened.
- Tighten lock nut {g} reasonably well and secure it with locking paint.

Recheck the adjustment of the play {t} between the right-hand pinch roller arm and the tension arm, as mentioned in the beginning of this Section, and correct the play if necessary.

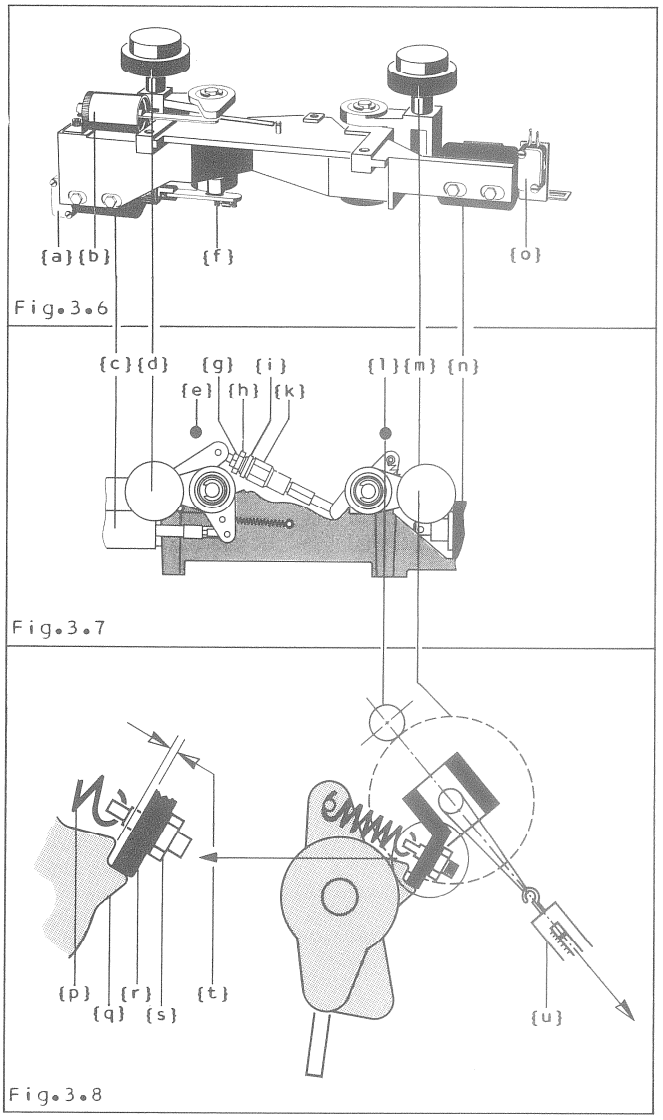
4.Pinch roller force -> Fig.3.7/3.8

Check:

- Hook spring dynamometer 0...2.5kg) to corresponding pinch roller shaft. -> Fig.3.8
- Press PLAY key and measure pinch roller force: Lift pinch roller lightly off the capstan shaft by pulling on the spring dynamometer. Gradually reduce the tension on the spring dynamometer until the pinch roller contacts the capstan shaft and starts to rotate: The spring dynamometer should indicate a tension of 600g +/-50g at this point.

Correction:

- Right-hand pressure roller {m}
  By varying the spring preload {p} an adjusting nut {s}.
- Left-hand pinch roller {d}
  By varying the preload of the spring-suspended pull rod:
  Loosen check nut {i} (14mm) of hexagon piece {k} (14mm). Turning in screw {h} increases the pinch force.
  Retighten check nut {i} and secure it with locking paint.



5.EDIT solenoid {c} -> Fig.3.6

This magnet is activated in EDIT mode in place of the PLAY (pinch roller) solenoid. It positions the pinch rollers with a clearance of approximately 4mm to the capstan shafts.
The EDIT solenoid is energized through microswitch {o} (break contact).

Switching point of microswitch {o}:
Shortly before the right-hand pinch roller {m} contacts the capstan shaft {l}.

Check:
- Press PLAY key. The EDIT solenoid should be deenergized (plunger rod {f} should move freely).

Play between plunger rod {f} and driving pin

In PLAY mode the EDIT solenoid should not influence the pinch roller position though its plunger rod {f}.

Check:
- Press PLAY key.
  The clereance between the driving pin and the left-hand stop of the guide groove in the plunger rod {f} should be 0.3...0.5mm.

Correction:
By shifting the EDIT solenoid {c}, after the mounting screw has been loosened.

Rechecking:
- Press EDIT key.
- Set edit control to its center position:
  The clereance between the pinch roller and the capstan shaft should be approximately 3...4mm.

3.2.3
Tape tension sensors {15}

-> Fig.3

The tape tension during the various operating modes is determined by the deflection of the tape tension sensors and the reference voltage. The angle of rotation of the roller plate is converted into an electrical analog signal by a mechanically coupled precision potentiometer {22}. The force needed to return the tape tension sensor is provided by a spring system comprising two compression springs of different rates to give an approximately logarithmic curve of tape tension.

A dashpot {14} prevents mechanical oscillation of the tension sensor system.

In EDIT mode the electromagnetic locking brakes block the tape tension sensors. This prevents unwanted oscillation of the tape tension sensors and permits accurate positioning at the desired tape modulation address.

1.Spring element {12} spring restoring force

-> Fig.3.9

Installation instructions:
- When the tape tension sensor is in neutral position, the spring element and the latter's pull rod should be in a straight line. Correction is possible by slightly loosening the mounting screws.

Restoring force (basic setting)
- Set adjusting ring {a} fully against the axial retainer. Turn locking screw by approximately 45 degree from the vertical (in order to prevent if from contacting the tape transport cover) and tighten screw.

2.Dashpot {14)

C A U T I O N Do not disassemble or open the dashpot!
The function of the dashpot is adversely affected if air is trapped in the damping medium.

Adjustment -> Fig.3.9
The lever length "X", measured from the dashpot fulcrum {d} to the toggle joint {b} of the spring element determines the damping intensity. The lever length can be adjusted by shifting the dashpot (unfasten clamping screws and center screw {d}):
Larger lever length "X" = weaker damping
Basic setting: "X" = 55...65mm.

Checks:
- Deflect tape tension sensor manually to the limit position with maximum spring preload, then release tape tension sensor: the automatically restored tape tension sensor should not bounce against the stop when minimal damping is selected.
- Observe toggle joint pin {b} and its play in the dashpot lever guide groove. Manually shift tape tension sensor from one limit position to the other:
  The shaft should move in the center region of the guide groove (under no circumstance should the dashpot lever apply transverse force to the spring-suspended linkage).

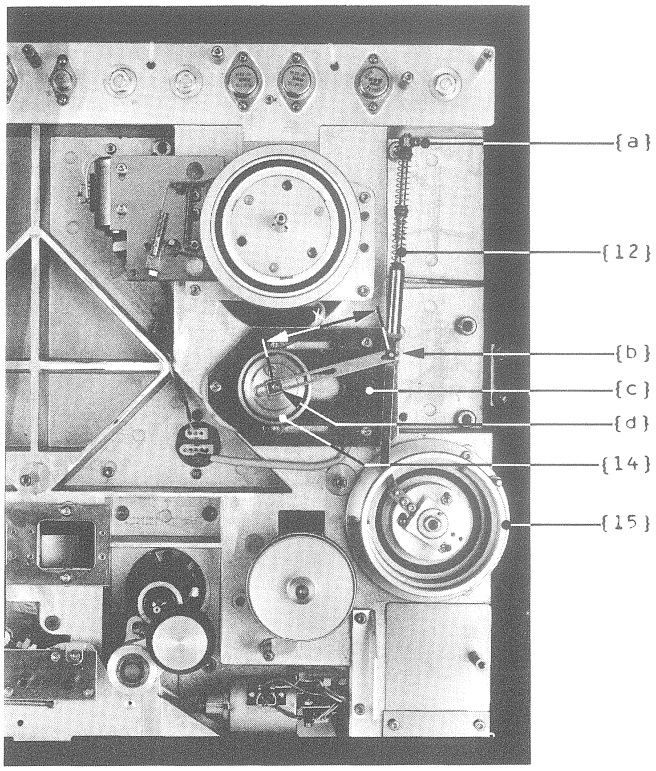


Fig.3.9

3.Electromagnetic locking brakes

-> Fig.3.10

- Loosen countersunk screw {a} and lift off roller plate.
- Press down armature flange {b} and carefully tirn the three anchor screws {c} clockwise until the armeture disc {d} rests evenly on the solenoid housing e}.
- Then loosen all three anchor screws {c} by 1/4 of a turn so that there is a gap of 0.12...0.15mm between armature disc and solenoid.
- Switch on the machine and alternately press the STOP and EDIT buttons to check that the solenoids lock release correctly.
- Refit roller plate and repeat EDIT - STOP check.

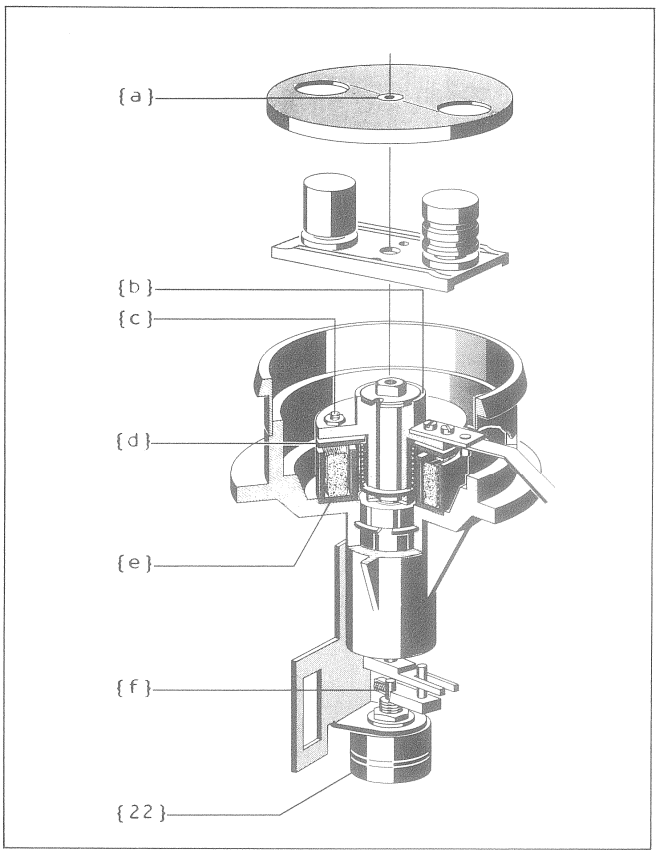


Fig.3.10

4 ELEKTRISCHE EINSTELLUNGEN LAUFWERKSTEUERUNG

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4 ELECTRIC TAPE TRANSPORT ALIGNMENTS

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4.1
FUNKTIONSBESCHREIBUNG DER LAUFWERK- STEUERUNG

4.1.1
Anordnung der Steuer- Elektronik

Die gesamte Laufwerksteuerung ist, im Interesse einer optimalen Service- Zugaenglichkeit, auf Steckkarten einheitlicher Groesse in einer Steuer- Einheit (Rack- Aufbau) konzentriert. Das Rack enthaelt folgende Steckkarten:

Bezeichnung	Schema-Nr.	EL
CAPSTAN SERVO / MASTER Capstanmotor-Steuerung	1.080.371	12
ATTENUATOR Eingangsabschwaecher	1.080.396	10
IC MEMORY AND COUNTER Speicher-Einheit	1.080.393	9
IC DECODER AND DRIVER IC Decoder und Treiber	1.080.391	8
DUAL CAPSTAN DIRECTION BOARD Laufrichtungssteuerung	1.080.369	7
CAPSTAN SERVO / SLAVE Capstanmotor-Steuerung	1.080.371	6
SPOOLING MOTOR CONTROL Wickelmotor-Steuerung	1.080.387	5
CONTACTOR Wickelmotor-Schuetzen	1.080.381	4
STABILIZER Spannungs-Stabilisator	1.080.370	2

Eine Reihe von Sensor- Elementen ueberwachen kontinuierlich folgende Zustaende:

Sensor/ Funktion	(Signal/Name)
TAPE END SENSOR Band-Praesenz/-Ende	YBI-END
TAPE MOVE SENSOR Bandbewegung	YBI-MOVE
TAPE DIRECTION SENSOR Bandlauf-Richtung	YBI-DIR
TAPE TENSION SENSORS Bandzug	R-TT1 / R-TT2
TACHO HEADS Capstan-Drehzahl	YAC-M3/YAC-M6

Diese Sensoren liefern der Steuerlogik der Wickelmotor- Steuerung und der Capstanmotor-Steuerung die, fuer Regelvorgaenge noetigen Daten. Damit wird ein optimaler Funktionsablauf und eine konstante Praezision im Bandtransport gewaehrleistet.

4.1.2
Drucktasten

Die Laufwerk- Ansteuerung erfolgt ueber grossflaechige, beleuchtete Impuls-Drucktasten (LOCAL CONTROL SWITCHES) oder ueber einen identischen Fernsteuersatz (REMOTE CONTROL SWITCHES) Die Tastenbeleuchtung des lokalen Tastensatzes wie auch des Fernsteuersatzes, signalisiert die Rueckmeldung des durchgeschalteten Steuerbefehls.
In gleicher Weise steht auch ein Rueckmeldesignal (FADER INDICATOR) fuer den Reglerstart zur Verfuegung.

Verriegelung

Die Tastensteuerung ist gegen Fehlbedienung verriegelt; eingetastete Befehle werden elektronisch gespeichert. Deshalb kann von der schnellen Umspulfunktion direkt die Wiedergabetaste PLAY gedrueckt werden. Waehrend dem Stop-Vorgang leuchten die Tasten STOP und PLAY; bei Band- Stillstand erlischt die Taste STOP und die Steuerlogik schaltet automatisch auf Wiedergabe PLAY.

EDIT-Taste

Die EDIT- Taste ist nur bei stillstehendem Band oder waehrend dem schnellen Umspulen wirksam. In letzterem Fall ist die Funktion jedoch nur bei gedrueckter Taste aktiv.
Nach Betaetigung der EDIT- Taste wird die EDIT Regelfunktion freigegeben. Bei eingerasteter Mittelstellung des EDIT- Reglers werden die Bandzugwaagen blockiert.
Die Andruckrollen bleiben jedoch in ihrer Ausgangsposition. Zur Heranfuehrung des Bandes an den Wiedergakopf ist zwischen der Andruckrolle und der rechten Umlenkrolle ein Schieber angebracht.

Zwischenhoeren

Wird die EDIT- Taste waehrend dem schnellen Umspulen betaetigt, fahren die Andruckrollen in EDIT- Position, wodurch die Bandaufzeichnung hoerbar wird. Die Bandzugwaagen werden dabei nicht blockiert.

Automatischer EDIT-Betrieb (CUTAUT)

In EDIT-Position koennen die Wickelmotoren mit dem EDIT-Regler stufenlos in beide Richtungen gesteuert werden.
Die Deblockierung der Bandzugwaagen erfolgt durch das Drehen des Reglers aus seiner Rast.
Die Bandgeschwindigkeit wird durch den gewaehlten Drehwinkel des Reglers bestimmt.

4.1.3
Eingangs-Abschwaecher
ATTENUATOR AND PREAMPLIFIER 1.080.396

Steuersignale, die vom Drucktastensatz, vom Fernsteuer- Tastensatz, vom Reglerstart- Relais und vom Geschwindigkeitsschalter eintreffen, werden im Eingangs- Abschwaecher abgeschwaecht. Die Befehlsgabe erfolgt dadurch, dass der entsprechende Eingang von den Tastenkontakten auf Potential Null gelegt wird. Am Ausgang des Abschwaechers entsteht, bei betaetigter Drucktaste, "Logisch Null".
Die entsprechenden Signalspannungen betragen fuer:
"L" (0) = max. +0,4V
"H" (1) = min. +2,4V
Die Prioritaet der Tastenfunktion ist durch die Reihenfolge der Tastenkontakte gegeben. Hoechste Prioritaet besitzt der Relaiskontakt Reglerstart- Relais, darauf folgt der Kontakt STOP, usw. Die Ansteuerung des Reglerstarr-Relais erfolgt ueber eine Graetz- Brueckenschaltung mittels interner Speisung (24V/FAD1/FAD2) oder externer Speisung, wobei die Polaritaet der Steuerspannung nicht beruecksichtigt werden muss. Die Reglerstart-Funktion kann auch zum "Aussteigen" aller Kanaele aus dem Aufnahme- in den Wiedergabemodus verwendet werden.

Die Steckkarte ATTENUATOR AND PREAMP" enthaelt auch die Vorverstaerker fuer den Bandendschalter und den Bandbewegungs-Sensor, sowie einen Sicherheitskreis, der die Logik auf STOP-Funktion schaltet, solange die Speisespannung ihren Sollwert nicht erreicht.

Band-Endschalter

Bei eingelegtem Band ist der Fotowiderstand RP-END dunkel, das resultierende Signal YBI-END ist "H".
Die Speisespannung fuer den Fotowiderstand (+16V) wird ueber den Laengstransistor (Q1)von der +24V Speisespannung geliefert.

Sicherheitskreis SAFETY CIRCUIT

Die Funktion des Fotoelement- Verstaerkers Q3, Q2, wird vom Schaltzustand von Q4 beeinflusst. Im Sicherheitskreis werden die Speisespannungen +24V und +5,8V ueberwacht. Solange nicht beide Spannungen ihren Sollwert erreicht haben ist einer der Transistoren Q6 oder Q7 gesperrt und Transistor Q4 wird leitend.
Das Bandend-Schalter-Signal YBI-END wird "L", was die STOP-Funktion bewirkt.
Gleichzeitig wird der Transistor Q8 gesperrt, ein allfaelliges Aufnahmesignal (YBI-REC ="H") wird blockiert und die Aufnahme- Relais in den Verstaerkerkanaelen fallen ab, bzw. koennen nicht anziehen.

Bandbewegungs-Sensor-Verstaerker

Da die Logik bei Lauffunktions- Uebergaengen selbsttaetig die gespeicherten Befehle weitergibt, muss sie ueber den Bandbewegungs-Zustand informiert sein. Zu diesem Zweck sind an der rechten Band- Umlenkrolle Sensoren angebracht, welche die benoetigten Signale erzeugen. Nach entsprechender Umwandlung geben diese Signale Auskunft ueber die Bandbewegung, Bandbewegungsrichtung und die durchlaufende Zeit (Bandzaehler).

Die Impulse, die vom Foto- Transistor QP-MOVE (QP2, TAPE MOVE SENSOR 1.080.185/186) bei laufendem Band geliefert werden, werden gleichgerichtet, integriert und verstaerkt und ergeben fuer das Signal Q-MOVE ein logisch "H".

Auf der Steckkarte 1.080.396-13 befindet sich eine Stufe (Q9), welche das Signal YPS-MOVE ueber den Fernsteuerstecker (GR22) fuer die A80-Vorwahleinheit liefert (fuer Geschwindigkeits-Auswertung).

4.1.4
IC-MEMORY AND COUNTER 1.080.393

Die integrierten Schaltungen sind numeriert, ebenso sind in den Schaltbildern die Anschluesse angegeben. Ein bestimmtes "Gate" wird in den folgenden Erklaerungen durch die IC-Nummer und den Anschluss des Ausganges bezeichnet, z.B. Gate 12-8.

Die Steckkarte "IC-MEMORY" enthaelt den integrierten Speicherbaustein, den Bandrichtungs-Sensor und die Elektronik fuer den Bandzaehler mit Takterzeugung, Zaehlrichtungs- Umschalter und Zaehlersignal-Regeneration.

IC-MEMORY

Der IC-Speicher hat die Aufgabe, die logischen Steuersignale vom Eingangs- Abschwaecher zu speichern und im Funktionsablauf gleichzeitig das Endschaltersignal YBI-END und das Bewegungssignal YBI-MOVE zu beruecksichtigen. Die Eingangssignale sind im Ruhezustand mit eingelegtem Band alle "H", mit Ausnahme des Einganges YBI-FAD dessen Ruhe- Signal = "L" ist.

Fuer die Steuersignal-Speicherung sind 4 Flip-Flops FF1...FF4 vorgesehen. Ein weiteres Flip-Flop (FF0) ist mit Gate 12-8 als Speicher-Element geschaltet und beruecksichtigt, neben dem Bandbewegungssignal, auch den Zustand , der vor dem Uebergang einer Funktion herrschte.

Bandrichtungs-Detektor

Beim Bremsvorgang werden die Wickelmotoren mit Gleichstrom gebremst. Damit auch der zulaessige Bandzug nicht ueberschritten wird, wird der Bremsstrom fuer den jeweils aufwickelnden Motor geregelt. Die Steuer-Elektronik muss daher informiert werden, in welcher Richtung sich das Band bewegt (Vor- oder Rueckspulen, angesteuert durch die Bedienungstasten oder den EDIT- Regler).
Diese Richtungsinformation wird zusaetzlich auch fuer den Bandzaehler benoetigt und deshalb direkt vom Band, ueber die rechte Bandumlenkrolle bezogen. Der Bandrichtungs- Sensor liefert zwei um 90 Grad phasenverschobene Rechtecksignale (QP-DIR1 und QP-DIR2). An den Gates 8-8 und 6-6 werden zwei, um 180 Grad phasenverschobene Rechteck- Spannungen abgezweigt, die fuer die Erzeugung des Takt-Impulses zur Zaehlersteuerung verwendet werden.
Eine Detektor-Schaltung erzeugt das Richtungssignal YBI-DIR, das einerseits fuer die Steuerung der Bremsstrom-Verteilung benoetigt wird und andererseits den Zaehlrichtungs-Umschalter fuer den Bandzaehler ansteuert.

Takt-Erzeugung fuer den Bandzaehler

Die abgezweigten, um 180 Grad phasenverschobenen Rechteckspannungen P2 und P3 werden durch die Kapazitaeten C16 und C21 differenziert.

Die positiven Flanken ergeben schmale Impulse, die bei der tiefen Bandgeschwindigkeit im Gate 2-6 zusammengesetzt werden. Bei der hohen Bandgeschwindigkeit ist einer der Ausgaenge von Gate 4-8 oder 4-11 (abhaengig von der Bandbewegungs-Richtung) dauernd "L", sodass die entsprechenden Impulse nicht wirksam werden.

Damit ist die Frequenzteilung entsprechend der Bandgeschwindigkeit gegeben, der Zaehler zeigt immer Echtzeit an. Diese Impulse werden in C18 nochmals differenziert, wobei die hintere, positive Flanke den Taktimpuls erzeugt. Im Gate 4-1 wird der Taktimpuls gesperrt, sobald YBI -END "L" wird, d.h. wenn das Bandende den Fotoendschalter passiert.
Der Taktimpuls steuert die Zaehler-Signal-Regeneration der D-Flip-Flops FF7.

Zaehlrichtungs-Umschalter

Das Richtungs-Signal YBI-DIR bestimmt zusammen mit den Rueckkoppelungssignalen der Zaehler-Signal-Regeneration, die Ausgangs-Signale der NOR-Gates 5-8 und 5-6, welche auf die Set-Eingaenge der D-Flip-Flops wirken. Die Taktimpulse (CLOCK) schalten diese Signal- Zustaende durch und bestimmen damit den Schritt-Rhythmus des Bandzaehlers.

4.1.5
IC-DECODER AND DRIVER 1.080.391

Die Steckkarte IC-DECODER AND DRIVER enthaelt *die Kontrollstufen fuer die Funktion der* Sensor-Leuchtdioden, den Bewegungs-Simulator und den IC-Decoder mit vorgeschalteter Freigabe-Stufe (ENABLE GATES), der die codierten Funktions-Signale entschluesselt und die Treiberstufen ansteuert.

Die Treiber-Ausgaenge mit den Signalen K-CUT und K-TT sind durch eine Diode verbunden.

Im EDIT-Betrieb bleiben die Andruckrollen in Ausgangsstellung.

Kontrollstufen fuer Sensor-Leuchtdioden

Die Sensor-Leuchtdioden werden ueber die Serie Widerstaende R1 und R2 (Bandrichtungs-Sensor), bzw. R9 und R10 (Bandbewegungs-Sensor) gespiesen. Die Verstaerkerstufen (Q1, Q2, bzw. Q3) liefern die, dem Funktionszustand entsprechenden digitalen Signale an die Logik. Bei defekten Leuchtdioden sind diese fuer Ausgang Q2 ="L", bzw. fuer Q3 ="H".

Beide Signale bewirken, dass TEST-B ="L" wird, was weiter zur Folge hat, dass ueber die Blinkautomatik (Steckkarte CONTACTORS 1.080.381) die betaetigten Drucktasten blinken.

Gleichzeitig wird das Signal K-BRAKE blockiert (bleibt ="H"), d.h. der Brems-Schuetz schaltet nicht mehr auf elektronisch gesteuerte Bremsung, wenn wegen fehlender Richtungs- Information die elektronische Bremsstrom- Verteilung nicht mehr arbeitet, oder das Bewegungssignal nicht mehr ueber den Status "Bandstillstand" informiert wird.

Die Bremsung erfolgt nur noch mechanisch. Mit dieser Einschraenkung ist der Betrieb aber weiterhin in saemtlichen Funktionen moeglich, wenn Leuchtdioden des Richtungssensors (K-DIRECTION) defekt sind. Dasselbe gilt jedoch nicht, wenn die Leuchtdiode des Bewegungs-Sensors ausfaellt. Daher ist fuer diesen Fall eine spezielle Simulation vorgesehen.

Bandbewegungs-Simulation

Weil bei defekten Leuchtdioden des Bandbewegungs-Sensors die Logik nicht mehr erkennen kann, wann das Band stillsteht, wird ein dauerndes Bewegungssignal simuliert (Gate-Eingang 9-1 ist "L", Ausgang 9-3 wird "H"). Somit ist YBI-MOVE konstant "H", was zur Folge hat, dass YBI-FF0 fuer die Steuerbefehle "Wiedergabe" und "Aufnahme" nicht mehr "H" werden kann (FF2 und FF3 ="H") und somit die Durchschaltung dieser Befehle blockiert ist.

Damit sind die Funktionen, die ueber STOP ablaufen, blockiert. Tritt der Ausfall einer Leuchtdiode waehrend einer bestehenden Funktion ein, bewirkt das simulierte Bewegungssignal, dass diese Funktion aufrecht erhalten bleibt, bis die Taste STOP gedrueckt wird oder das Bandende erreicht ist.

Die Funktionen fuer schnelles Umspulen koennen weiterhin aktiviert werden.

IC-DECODER AND DRIVER

Der IC-Decoder entschluesselt die Funktions-Signale FF1...FF4 und stellt die logischen Verknuepfungen fuer das Zusammenwirken der elektromechanischen Elemente wie Wickelmotoren, Elektromagnete, Schuetze und der Anzeigelaempchen her.

Der eigentlichen Decodierung ist eine Freigabestufe vorgelagert, welche die Aufgabe hat, bei YBI-FFO = "L" (Funktions-Uebergaenge die Bandstillstand erfordern) die Weiterschaltung der gespeicherten Befehle zu blockieren, bis YBI-MOVE ="L" wird.

4.1.6
Logische Ausgangssignale

Jede Kombination von Steuerbefehlen und Sensor-Signalen hat, zusammen mit dem vorausgegangenen Zustand eine bestimmte Signal- Kombination an den Ausgaengen des IC-Decoders zur Folge.

Die Kombination der Ausgangssignale loest die entsprechenden Arbeitsfunktionen der elektromechanischen Elemente aus.
Eingangs- und Ausgangssignale sind demzufolge logisch verknuepft. Diese Tatsache erleichtert die Pruefung und Fehlersuche betraechtlich, denn es ist nicht erforderlich die logischen Schaltungen zu verstehen. Es genuegt zu wissen, dass ein bestimmter Befehl eine bestimmte Reaktion in Form eines Ablaufs logischer Signale erzeugt.

Dieser Zusammenhang laesst sich in Tabellenform festhalten. Eine solche Tabelle enthaelt die Ausgangssignale der Steckkarten:
- ATTENUATOR 1.080.396
- IC-MEMORY AND COUNTER 1.080.393
- IC-DECODER AND DRIVERS 1.080.391

mit den entsprechenden Bezeichnungen der Anschlusspunkte (TP) sowie der Signal- Namen (linke Spalte). Weiter sind auch die Signal-Namen der Sensoren aufgefuehrt, deren Zuordnung alle drei Steckkarten betrifft.

In den senkrechten Kolonnen sind die logischen Zustaende der Signale aufgefuehrt; zur leichteren Unterscheidung sind die aktivierten Laempchen und Magnete mit "*" bezeichnet. Logische Zustaende sind nur aufgefuehrt, wenn sie fuer die entsprechende Funktion von Bedeutung sind.

Die Logik- Ansteuerung erfolgt normalerweise mit logisch "L" (Ausnahme Reglerstart, YBI-FAD logisch "H"). Fuer Bandbewegung vorwaerts ist das entsprechende Signal YBI-DIR = "H".
Fuer bewegtes Band ist das entsprechende Signal Q-MOVE oder YBI-MOVE = "H". Logisch "L" am Ausgang der Treiberstufen des IC-DECODERs bedeutet Aktivierung des angeschlossenen Elementes.

Die Testpunkte TP3, TP6 und TP11 liegen direkt an den Basen der Treiberstufen, sodass sie ein inverses Signal gegenueber dem entsprechenden Ausgang anzeigen. Diese TP- Nummern sind deshalb in der Tabelle mit dem Negationszeichen (Querbalken ueber der Ziffer) gekennzeichnet.
(Beispiel: ist K-CUT am Anschluss 8B des IC-DECODERs = "L", ist der entsprechende TP ="H")

Die waagrechten Zeilen enthalten die notwendigen logischen Zustaende einer Funktion. Diese stellen von Zeile zu Zeile einen Funktionsablauf dar.

LOGICAL OUTPUT SIGNALS

1

Diese Tabelle enthaelt einen gewoehnlichen Funktionsablauf, der mit dem Einschalten beginnt (Zeile 1) und mit dem Auflegen des Bandes fortsetzt (Zeile 2).

Die Zeile 3 zeigt den Zustand der Signale im Moment, bevor die Taste FORWARD (schnelles Vorspulen) gedrueckt wird.

Die naechste Zeile (PRESS FORWARD, Zeitzustand 1) zeigt die Signale bei gedrueckter Taste. Diese Taste bleibt nun gedrueckt (bis RELEASE FORWARD).

Die naechste Zeile zeigt die Signal- Zustaende sobald sich das Band bewegt (MOVE SENSOR "ON" YBI-MOVE = "H").

Die Zeile RELEASE FORWARD (Taste loslassen) zeigt, dass der Zustand der Signale nicht aendert, ausser Aktivierungssignal YPS-FORW, da der Steuerbefehl gespeichert ist und sich das Band in Bewegung befindet.

In diese feinen Schritte aufgeloest, gibt die Tabelle weitgehenden Aufschluss ueber die Ablaeufe beim Betaetigen einer Taste, beim Start (MOVE SENSOR "ON"), beim Anhalten des Bandes (MOVE SENSOR "OFF") oder beim Richtungswechsel des Bandes.

LOGICAL OUTPUT SIGNALS (NORMAL OPERATION)

(1)

		ATTENUATOR								SENSOR SIGNALS					MEMORY						IC-DECODER													
	TP														7	2	6	5	4		4	5	10	3	14	9	6	7	11	13		12	8	
	PT	A 17	B 16	B 14	B 12	B 8	B 19		B 20						B 7	A 5	B 8	B 9	B 10	A 21	B 12	B 13	A 12	A 8	B 22	A 18	B 8	A 15	B 20	B 18	A 20	A 22	B 14	B 3
SIGNAL NAMES / OPERATION		YPS-STOP	YPS-REW	YPS-FORW	YPS-REPR	YPS-REC	YPS-CUT	S-CUTAUT	YBI-FAD	YBI-END	YBI-DIR	Q-MOVE	B-MOVE	B-DIR	YBI-FF0	YBI-FF1	YBI-FF2	YBI-FF3	YBI-FF4	B-REC	B-STOP	B-FORW	B-REW	B-REPR	YBI-REC	B-CUT	K-CUT	K-PRESS	K-LIFT	K-BRAKE	K-DIR	K-TT	Y-CUTAUT	YBI-MOVE
SYMB.F.SIGNAL 0		0	0	0	0	0	0	0		0	0		*		0	0	0	0	0	*	*	*	*	*		*	*	*	*	*	*	*	0	
SYMB.F.SIGNAL 1									L		L	L		*	L	L	L	L	L						L									L
INITIALISATION	0																																		
	1									0	L		*	*	L	0	0	0	0		*														
LOAD TAPE	0										L		*	*	L	0	0	0	0		*														
PRESS FORWARD	0			0							L		*	*	L	0	0	0	0		*														
	1			0							L		*	*	L	L	L	0	0			*							*						
MOVE SENSOR ON	0			0							L	L	*	*	L	L	L	0	0			*							*						
	1			0							L	L	*	*	L	L	L	0	0			*							*						L
RELEASE FORWARD	0										L	L	*	*	L	L	L	0	0			*							*						L
PRESS REWIND	0		0								L	L	*	*	L	L	L	0	0			*							*						L
	1		0								L	L	*	*	L	L	0	0	0				*						*						L
RELEASE REWIND	0										L	L	*	*	L	L	0	0	0				*						*						L
CHANGE DIRECTION	0										0	L	*	*	L	L	0	0	0				*						*						L
	1										0	L	*	*	L	L	0	0	0				*						*		*				L
PRESS PLAY	0				0						0	L	*	*	L	L	0	0	0				*						*		*				L
	1				0						0	L	*	*	0	L	L	L	0		*			*						*	*				L
PRESS RECORD	0				0	0					0	L	*	*	0	L	L	L	0		*			*						*	*				L
	1				0	0					0	L	*	*	0	L	L	L	L	*	*			*						*	*				L
RELEASE PLAY	0					0					0	L	*	*	0	L	L	L	L	*	*			*						*	*				L
RELEASE RECORD	0										0	L	*	*	0	L	L	L	L	*	*			*						*	*				L
MOVE SENSOR OFF	0										0		*	*	0	L	L	L	L	*	*			*						*	*				L
	1										0		*	*	L	L	L	L	L	*				*	L		*	*	*		*				
MOVE SENSOR ON	0										0	L	*	*	L	L	L	L	L	*				*	L		*	*	*		*				
	1										0	L	*	*	L	L	L	L	L	*				*	L		*	*	*		*				L
CHANGE DIRECTION	0										L	L	*	*	L	L	L	L	L	*				*	L		*	*	*		*				L
	1										L	L	*	*	L	L	L	L	L	*				*	L		*	*	*						L
PRESS STOP	0	0									L	L	*	*	L	L	L	L	L	*				*	L		*	*	*						L
	1	0									L	L	*	*	L	0	0	0	0		*									*					L
RELEASE STOP	0										L	L	*	*	L	0	0	0	0		*									*					L
MOVE SENSOR OFF	0										L		*	*	L	0	0	0	0		*									*					L
	1										L		*	*	L	0	0	0	0		*														
PRESS EDIT	0						0				L		*	*	L	0	0	0	0		*														
	1						0				L		*	*	L	0	0	L	0							*	*					*			
RELEASE EDIT	0										L		*	*	L	0	0	L	0							*	*					*			
PRESS CUTAUT	0							0			L		*	*	L	0	0	L	0							*	*					*			
	6							0			L		*	*	L	0	0	L	0							*	*					*	0		
MOVE SENSOR ON	0							0			L	L	*	*	L	0	0	L	0							*	*					*	0		
	1							0			L	L	*	*	L	0	0	L	0							*	*					*	0	L	
RELEASE CUTAUT	0										L	L	*	*	L	0	0	L	0							*	*					*	0	L	
	6										L	L	*	*	L	0	0	L	0							*	*					*		L	
MOVE SENSOR OFF	0										L		*	*	L	0	0	L	0							*	*					*		L	
	1										L		*	*	L	0	0	L	0							*	*					*			
PRESS REWIND	0		0								L		*	*	L	0	0	L	0							*	*					*			
	1		0								L		*	*	L	L	0	0	0				*						*						
RELEASE REWIND	0										L		*	*	L	L	0	0	0				*						*						
MOVE SENSOR ON	0										L	L	*	*	L	L	0	0	0				*						*						
	1										L	L	*	*	L	L	0	0	0				*						*						L
CHANGE DIRECTION	0										0	L	*	*	L	L	0	0	0				*						*						L
	1										0	L	*	*	L	L	0	0	0				*						*		*				L
END OF TAPE	0									0	0	L	*	*	L	L	0	0	0				*						*		*				L
	1									0	0	L	*	*	L	0	0	0	0		*									*	*				L
MOVE SENSOR OFF	0									0	0		*	*	L	0	0	0	0		*									*	*				L
	1									0	0		*	*	L	0	0	0	0		*										*				

LOGICAL OUTPUT SIGNALS

(2)

Diese Tabelle zeigt, dass bei Regler- Start (Fader- Start) die anderen Funktionen gesperrt sind (z.B. REWIND).

LOGICAL OUTPUT SIGNALS (FADER OPERATION)

(2)		ATTENUATOR								SENSOR SIGNALS					MEMORY						IC-DECODER														
	TP														7	2	6	5	4		4	5	10	3	14	9	6	7	11	13		12	8	
	PT	A 17	B 16	B 14	B 12	B 8	B 19		B 20						B 7	A 5	B 8	B 9	B 10	A 21	B 12	B 13	A 12	A 8	B 22	A 18	B 8	A 15	B 20	B 18	A 20	A 22	B 44	B 3
SIGNAL NAMES / OPERATION		YPS-STOP	YPS-REW	YPS-FORW	YPS-REPR	YPS-REC	YPS-CUT	S-CUTAUT	YBI-FAD	YBI-END	YBI-DIR	Q-MOVE	B-MOVE	B-DIR	YBI-FF0	YBI-FF1	YBI-FF2	YBI-FF3	YBI-FF4	B-REC	B-STOP	B-FORW	B-REW	B-REPR	YBI-REC	B-CUT	K-CUT	K-PRESS	K-LIFT	K-BRAKE	K-DIR	K-TT	Y-CUTAUT	YBI-MOVE
SYMB.F.SIGNAL 0		0	0	0	0	0	0	0		0	0		*		0	0	0	0	0	*	*	*	*	*		*	*	*	*	*	*	*	0	
SYMB.F.SIGNAL 1									L		L	L		*	L	L	L	L	L						L									L
INITIALISATION	0																																	
	1									0	L		*	*	L	0	0	0	0		*													
LOAD TAPE	0										L		*	*	L	0	0	0	0		*													
PRESS FORWARD	0			0							L		*	*	L	0	0	0	0		*													
	1			0							L		*	*	L	L	L	0	0			*							*					
RELEASE FORWARD	0										L		*	*	L	L	L	0	0			*							*					
MOVE SENSOR ON	0										L	L	*	*	L	L	L	0	0			*							*					
	1										L	L	*	*	L	L	L	0	0			*							*					L
PRESS STOP	0	0									L	L	*	*	L	L	L	0	0			*							*					L
	1	0									L	L	*	*	L	0	0	0	0		*									*				L
RELEASE STOP	0										L	L	*	*	L	0	0	0	0		*									*				L
MOVE SENSOR OFF	0										L		*	*	L	0	0	0	0		*									*				L
	1										L		*	*	L	0	0	0	0		*													
SWITCH FADER ON	0								L		L		*	*	L	0	0	0	0		*													
	1								L		L		*	*	L	L	L	L	0					*			*	*	*					
MOVE SENSOR ON	0								L		L	L	*	*	L	L	L	L	0					*			*	*	*					
	1								L		L	L	*	*	L	L	L	L	0					*			*	*	*					L
PRESS REWIND	0		0						L		L	L	*	*	L	L	L	L	0					*			*	*	*					L
RELEASE REWIND	0								L		L	L	*	*	L	L	L	L	0					*			*	*	*					L
SWITCH FADER OFF	0										L	L	*	*	L	L	L	L	0					*			*	*	*					L
	1										L	L	*	*	L	0	0	0	0		*									*				L
MOVE SENSOR OFF	0										L		*	*	L	0	0	0	0		*									*				L
	1										L		*	*	L	0	0	0	0		*													
PRESS FORWARD	0			0							L		*	*	L	0	0	0	0		*													
	1			0							L		*	*	L	L	L	0	0			*							*					
RELEASE FORWARD	0										L		*	*	L	L	L	0	0			*							*					
MOVE SENSOR ON	0										L	L	*	*	L	L	L	0	0			*							*					
	1										L	L	*	*	L	L	L	0	0			*							*					L
END OF TAPE	0									0	L	L	*	*	L	L	L	0	0			*							*					L
	1									0	L	L	*	*	L	0	0	0	0		*									*				L
MOVE SENSOR OFF	0									0	L		*	*	L	0	0	0	0		*									*				L
	1									0	L		*	*	L	0	0	0	0		*													
PRESS PLAY	0				0					0	L		*	*	L	0	0	0	0		*													
	1				0					0	L		*	*	L	L	L	L	0					*			*	*	*					
RELEASE PLAY	0									0	L		*	*	L	L	L	L	0					*			*	*	*					
	1									0	L		*	*	L	0	0	0	0		*													

4.2
ELEKTRISCHE EINSTELLUNGEN LAUFWERK

4.2.1
Allgemeines

Benoetigte Messgeraete und Hilfsmittel

- Universal- Messinstrument
- Tentelometer 10.300.001.01
  (Bandzug-Messgeraet)
  mit Spezialhalterung QC 1.080.431.00
- Oszilloskop (mit Vorteil 2-Kanal)
- Quarz-Oszillator, 400 Hz
  oder Frequenzzaehler (quarzstabilisiert)
- Verlaengerungsprint 21.080.941.00

Hinweise

- Ausgangslage elektrischer Einstellungen an der Laufwerksteuerung ist die korrekte Einstellung der mechanischen Funktionselemente.
  -> Kap.2.2
- Bevor Steckkarten aus dem Rack gezogen, resp. in das Rack eingeschoben werden, muss das Geraet mindestens 5 Sekunden ausgeschaltet sein.
- Vor elektrischen Einstellungen an der Laufwerksteuerung sind die Speisespannungen, wie nachfolgend beschrieben, zu kontrollieren.
  -> Kap.4.2.2

4.2.2
Stabilisator (Voltage Regulator)

-> Fig.4.1

Die Speisespannungen werden an den Testpunkten TP1...TP5 der Stabilisator-Steckkarte gemessen und an den Trimmpotentiometern R1 (+20,0V) und R29 (+/-5,8V) eingestellt.
Am Potentiometer R2 wird die Strom- Begrenzung der +20V/+24V Speisung eingestellt.

-> Fig.4.2

Zur Messung ist ein Ampere-Meter (Bereich >4A) in Reihe mit einem Widerstand von 4...5 Ohm (50...75 Watt) an die Sammelschiene +0,0V und +24,0V, auf der Rueckseite des Steckkarten-Chassis anzuschliessen.

- Maschine einschalten, Laufwerkstatus STOP.
- Potentiometer R2 (I-MAX) so einstellen, dass das Amperemeter folgenden Wert anzeigt:
  mit Logik-Karten 3,5A
  ohne Logik-Karten 4A

W I C H T I G Diese Messung darf nicht an den Steckkarten- Testpunkten vorgenommen werden.

Hinweis:
Die Stabilisierung der +20V und +24V Speisespannungen enthaelt Automatikkreise fuer die begrenzung und die Abschaltung bei Kurzschluss. Bei Kurzschluss schaltet die Stabilisierung die Speisespannung +20V/+24V vollstaendig ab. Sie bleiben auch dann abgeschaltet, nachdem der Kurzschluss aufgehoben wurde.
Die Stabilisierung arbeitet erst wieder normal wenn das Geraet waehrend mindestens 15 Sekunden ausgeschaltet wurde.
Die Charakteristik dieser Schutzschaltung erlaubt es nicht, das Geraet ueber einen Netz-Regeltransformator langsam von 0 V unter Spannung zu setzen (Die Einschaltspannung muss mindestens die halbe Netzspannung betragen).

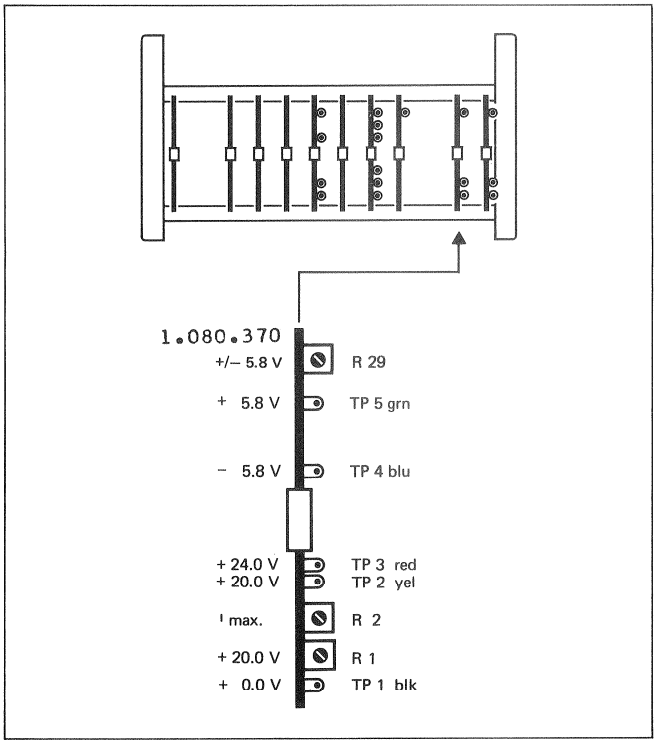

Fig.4.1

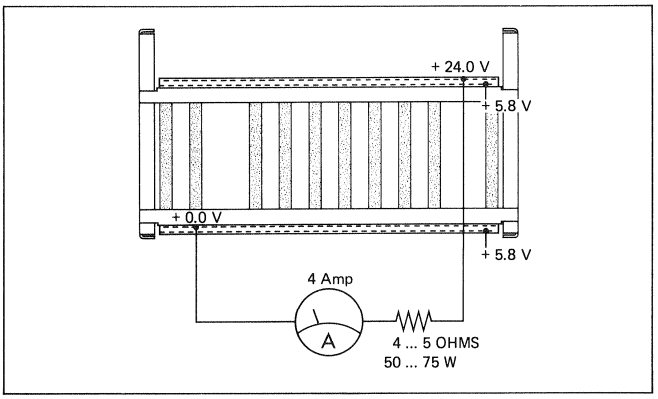

Fig.4.2

4.2.3
Bandzug-Einstellungen

-> Fig.4.3
Die Bandzuege der Wickelmotoren werden mit den Einstellreglern R70...R75 auf der Steckkarte SPOOLING MOTOR CONTROL 1.080.387 abgeglichen.
Die oberen drei Trimmpotentiometer beeinflussen den linken Wickelmotor (SUPPLY MOTOR), die unteren drei Trimmpotentiometer den rechten Wickelmotor (TAKE-UP MOTOR).

Vorbereitungen

- Kopftraeger demontieren -> Kap.3.1.1
- Vorderes Abdeckblech entfernen -> Kap.3.1.3
- Bandende-Sensor demontieren -> Kap.3.1.4 (behindert Band- Fuehrung bei demontiertem Kopftraeger).
- Tentelometer montieren -> Fig.4.4 Spezialhalterung anstelle des Kopftraegers einsetzen.
  Wichtig: Halterung genau in Bandlaufrichtung ausrichten.
  Tentelometer mit seinen Abtastrollen genau senkrecht ausrichten.
- Band auflegen
  Wichtig: Beide Wickelteller muessen mit Spulen gleichen Typs bestueckt sein (Abmessungen, Material)
  Kerndurchmesser: 150mm
- Band ordnungsgemaess ueber Bandzugwaagen und Umlenkrollen einfuehren.

Wichtig: **Alle Bandzugdaten beziehen sich auf das "Pancake"-Format.**

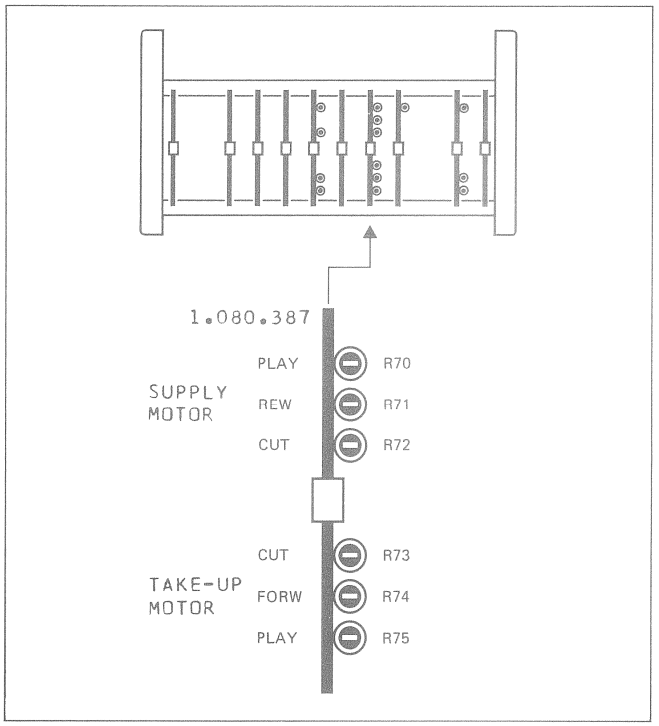

Fig.4.3

Fig.4.4

1.Bandzug im PLAY-Modus

Vorbereitung Gilt nur fuer Maschinen mit Aufnahme-Betriebsmodus (A80/QC-REC) und unterdruecktem RUECKWAERTS-PLAY-Modus.

Fuer die nachfolgende Einstellung muss, voruebergehend, der umschaltbare Betriebs- Modus mit waehlbarer PLAY- Bandlaufrichtung (PLAY >, PLAY <) erstellt werden.

-> Fig.4.5

Dies erfolgt durch Setzen des Brueckensteckers JS2 auf der Steckkarte
DUAL CAPSTAN DIRECTION BOARD 1.080.369
in Position "B".

Nach Beendigung der Einstellung ist der Bruekkenstecker wieder in seine Ausgangsposition "A" zurueckzusetzen.

Einstellung im PLAY-Modus "VORWAERTS" PLAY->

-> Fig.4.3

Voraussetzung:
Beide Bandspulen muessen gleiche Wickeldurchmesser aufweisen.

- Linke Andruckrolle durch Abschrauben der Kappe (Achtung: Linksgewinde) demontieren.
- Maschine im PLAY-Modus "PLAY->" starten. (Rechte Bandlaufrichtungs-Vorwahltaste leuchtet).

Beachte horizontale Bandfuehrung ueber die Andruckrollen:
Das Band muss genau zentriert ueber die definierte Laufflaeche am Andruckrollen- Umfang gefuehrt werden.
Eine Korrektur erfolgt durch entsprechendes, seitliches Neigen des Tentelometers in seiner senkrechten Befestigungslage.

- Trimmpotentiometer R70 (PLAY/SUPPLY MOTOR): Bandzug auf eine Anzeige am Tentelometer von 30g einstellen.
- linke Andruckrolle wieder montieren.

Einstellung im PLAY-Modus "RUECKWAERTS" PLAY<-

-> Fig.4.3

Voraussetzung:
Beide Bandspulen muessen gleiche Wickeldurchmesser aufweisen.

- Rechte Andruckrolle demontieren.
- Maschine im PLAY-Modus "PLAY<-" starten. (Linke Bandlaufrichtungs-Vorwahltaste leuchtet).

Beachte exakte, horizontale Bandfuehrung ueber die Andruckrollen (siehe oben).

- Trimmpotentiometer R75 (PLAY/TAKE-UP MOTOR): Bandzug auf eine Anzeige am Tentelometer von 30g einstellen.
- Rechte Andruckrolle wieder montieren.

Kontrolle:

- Bandvorrat auf beide Spulen gleichmaessig verteilen.
- Kontrolle im PLAY> und PLAY<:
  Das Band darf, waehrend die Andruckrollen manuell von den Capstan- Wellen abgehoben werden, keine Bewegung aufzeigen.

Bei Maschinen mit Aufnahme-Betriebsmodus:
Brueckenstecker JS2 auf Position "A" zuruecksetzen (Betriebs- Modus PLAY< unterdrueckt).

-> Fig.4.5

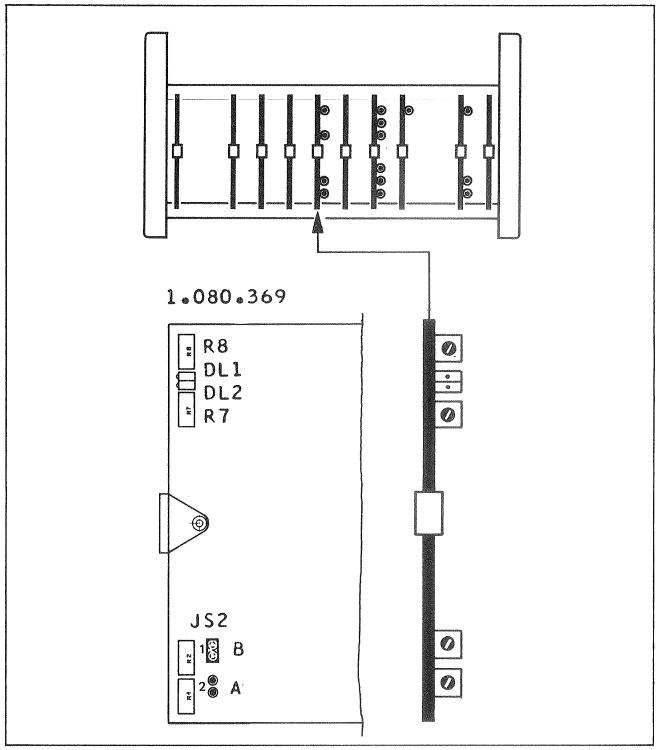

Fig.4.5

2.Bandzug-Begrenzung beim Vorspulen **(FORW)**
und Rueckspulen **(REW)**

-> Fig.4.3

An den Einstellreglern R71 und R74 ist die maximal zulaessige Belastung des Bandes beim Schnellen Umspulen einstellbar; diese ergibt sich beim Start zum Schnellen Umspulen (waehrend der Beschleunigungsphase) oder bei Richtungsaenderung waehrend des schnellen Umspulens.
Bei der Bestimmung des maximalen Bandzuges ist zu beachten: Eine starke Beschleunigung erfordert einen hohen Spitzen-Bandzugwert.
Aus niedrig gewaehlter Beschleunigung resultiert zwar eine laengere Reaktionszeit waehrend der Umspulfunktion, gewaehrleistet aber maximale Schonung des Tontraegers, was insbesondere bei der Verarbeitung von Master- Baendern von groesserer Wichtigkeit ist.

Vorbereitung:

Linke Bandzugwaage -> Fig.4.6
- im Uhrzeigersinn auf Anschlag drehen (Richtung maximaler Federvorspann).
- Diese Position, durch Setzen einer Markierung (mit weichem Bleistift) an der Peripherie des drehbaren Bandzug- Waagetellers {A} zum fixen Bandzugwaagen- Rand {B} zeichnen.
- Mit einer Distanz von 18mm, von der fixen Marke {B} in Gegenuhrzeigersinn (geringerer Federvorspann) neue Marke {B'} setzen.

Rechte Bandzugwaage -> Fig.4.7
- im Gegenuhrzeigersinn auf Anschlag drehen
- Markierung {A}-{B} setzen (siehe oben).
- Mit einer Distanz von 18mm, von der fixen Marke {B} in Uhrzeigersinn, neue Marke {B'} setzen.

Einstellung: -> Fig.4.3/4.6/4.7

Bedingung: Korrekte Einstellung der PLAY-Bandzuege, nach Abschnitt 1.
- Bandvorrat auf beide Spulen gleichmaessig verteilen (gleiche Wickeldurchmesser).
- **Rechte Bandzugwaage** in Position {B'} (18mm vor Endanschlag) festhalten oder mit Klebeband fixieren.
- Betriebsart FORW waehlen und Einstellung an Potentiometer R74 ermitteln, bei der das Band stillsteht.
  Bandzugwaage in Ruhestellung freigeben (Fixierung entfernen).
- Bandvorrat auf beide Spulen gleichmaessig verteilen.
- **Linke Bandzugwaage** in Position {B'} (18mm vor Endanschlag) festhalten oder mit Klebeband fixieren.
- Betriebsart REW waehlen und Einstellung an Potentiometer R71 ermitteln, bei der das Band stillsteht.
  Bandzugwaage in Ruhestellung freigeben (Fixierung entfernen).

Kontrolle mit Tentelometer:
- In der Beschleunigungsphase der Wickelmotoren darf der maximale Bandzug 120g nicht ueberschreiten.

Korrektur durch entsprechendes, proportionales Reduzieren des Bandzuges an R71 und R74 (entspricht einer Vergroesserung der Markendistanz {B}-{B'}).

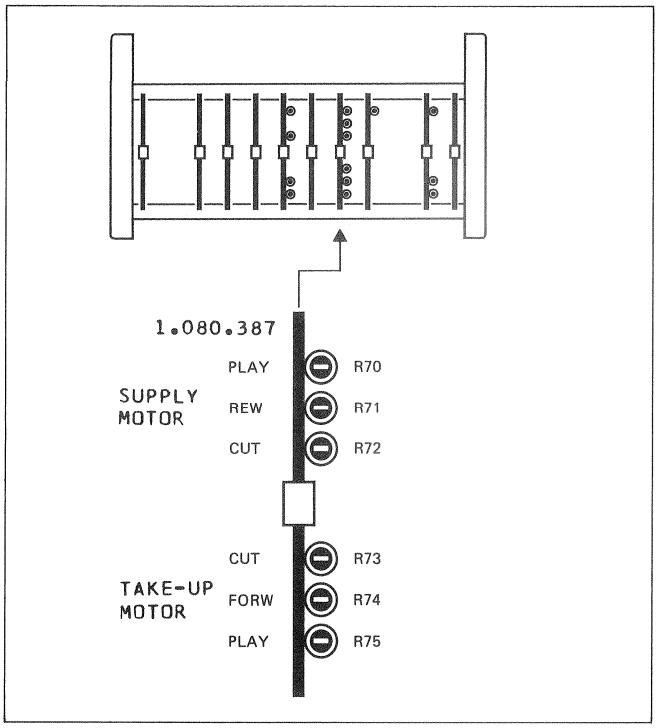

Fig.4.3

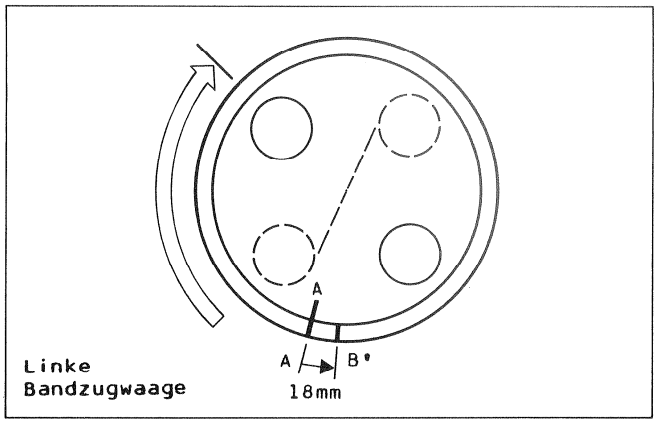

Fig.4.6

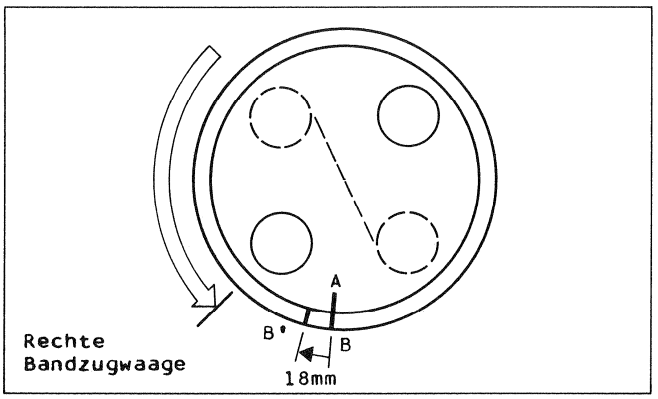

Fig.4.7

3.Bandzug-Begrenzung im Betriebsmodus **EDIT**

-> Fig.4.3/4.8

Voraussetzung: Korrekte Einstellung der Bandzuege fuer die Betriebsmodis PLAY/FORW/REW.

- Bandvorrat auf beide Spulen gleichmaessig verteilen (gleiche Wickeldurchmesser).
- R72 (CUT) fuer EDIT-"Rueckwaerts": Auf 1/5...1/4 des Einstellbereiches aufdrehen (Uhrzeigersinn CW). -> Fig.4.8
- EDIT-Taste druecken.
- Mikro-Switch zu EDIT- Drehknopf kurzschliessen (Anschluss mit schwarzer Litze mit unbelegtem Anschluss verbinden) - EDIT- Magnet faellt ab.
- EDIT- Drehknopf in Mittelstellung positionieren.
- R73 (CUT) fuer EDIT-"Vorwaerts": Einstellung ermitteln, in der das Band (bei gleichen Wickeldurchmessern) stillsteht.
- Kurzschluss an Mikro-Switch aufheben.

Kontrolle mit Tentelometer:
- Beim wechselseitigen Umspulen im EDIT-Modus, darf der Bandzug weder waehrend der Beschleunigungsphase, noch bei maximaler Umspulgeschwindigkeit, 120g uebersteigen.

Korrektur durch Reduktion des Bandzuges an R72 (Drehen in Gegenuhrzeigersinn CCW), mit anschliessendem Abgleich von R73, wie oben beschrieben.

Kontrolle mit Tentelometer wiederholen.

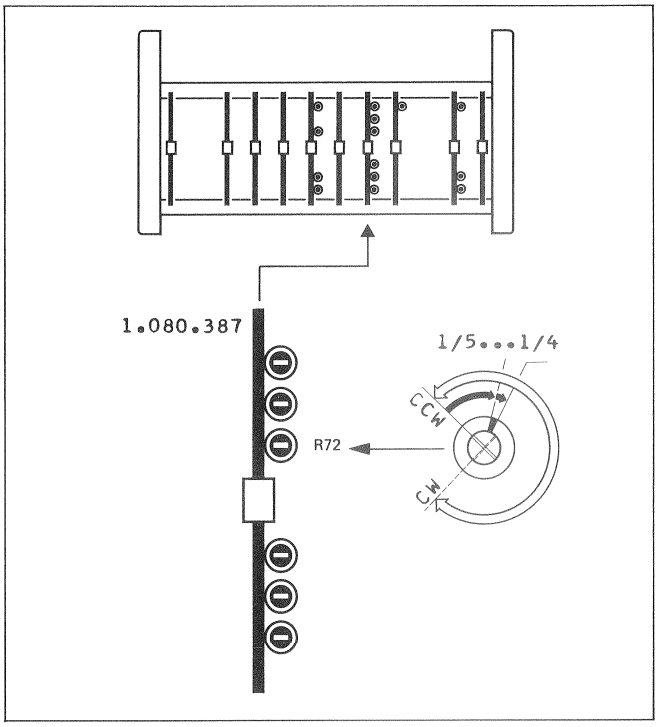

Fig.4.8

4.PLAY-Bandzug zwischen den Capstans

siehe Kapitel 4.2.5
Abgleich der Capstan-Motoren

4.2.4
Brems-Regelung

Die folgende Einstellung der Bremsregelung basiert auf dem Bandzug fuer Wiedergabe (PLAY).

Es ist daher wichtig, dass vor der Einstellung der Bremselektronik die Bandzuege fuer Wiedergabe (Kapitel 4.2.3) richtig eingestellt sind.

Die Bremsregelung tritt in Aktion, wenn aus Betriebsmodus REW, FORW oder PLAY die Taste STOP betaetigt wird (K-BRAKE). Dabei wird die rechte Bandzugwaage (T-TT2) als Regelglied (Sensor) verwendet.

In Abhaengigkeit der Bandbewegungs- Richtung wird der Wickelmotor der jeweiligen Aufwickelseite in den Stromkreis der Brems- Elektronik geschaltet.

-> Fig. 4.9

Der bei der Bremsung auftretende Bandzug laesst sich an R9 begrenzen (Der Begrenzungspunkt ist abhaengig vom Drehwinkel der rechten Bandzugwaage und der, an R9 eingestellten Referenzspannung).
Mit Hilfe eines Universalinstrumentes laesst sich die Bremsspannung nach Fig.4.10 einstellen.

Einstellung
Volle Bandspule auflegen und ca. 10...20m Band vorspulen. Taste PLAY druecken und die sich dabei ergebende Stellung der rechten Bandzugwaage markieren. Band abnehmen. Messinstrument an den Testpunkten TP2 (yel) und TP3 (+,wht) anschliessen (Messbereich >20V).

Zur Simulierung des Bandlaufes ist der Bandbewegungssensor mit einem Gummiband, welches ueber die Capstan-Welle und die rechte Umlenkrolle gespannt wird, anzutreiben.

Kurzzeitig Taste REW oder FORW druecken,
STOP- Taste betaetigen.

Achtung:
Geraet nicht laenger als 2 Minuten in Bremsstellung halten. Zum Aufheben der Bremsstellung, rechte Umlenkrolle (Bandbewegungssensor) stoppen.

Rechte Bandzugwaage in die zuvor markierte Stellung drehen und fixieren.
Einstellregler R9 auf eine Anzeige am Messinstrument von 4V einstellen.

Durch Bewegen der rechten Bandzugwaage kontrollieren, ob das Regelsignal der in Fig. 4.10 dargestellten Kurve entspricht.

Bei ansprechendem Foto- Endschalter (Lichtschranke nicht abgedeckt) und Ruhestellung der Bandzugwaage tritt volle Bremsung fuer beide Motoren ein, bis die rechte Bandumlenkrolle stillsteht (YBI-MOVE = "L").

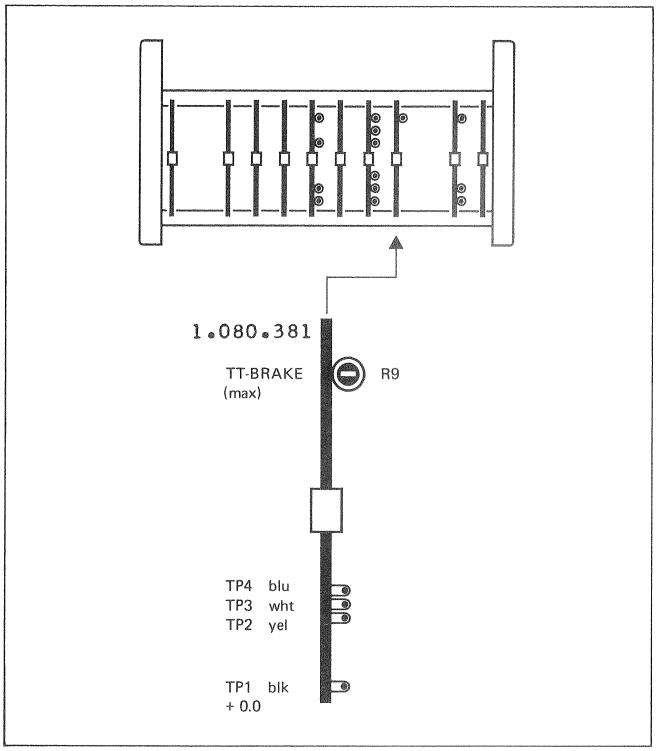

Fig.4.9

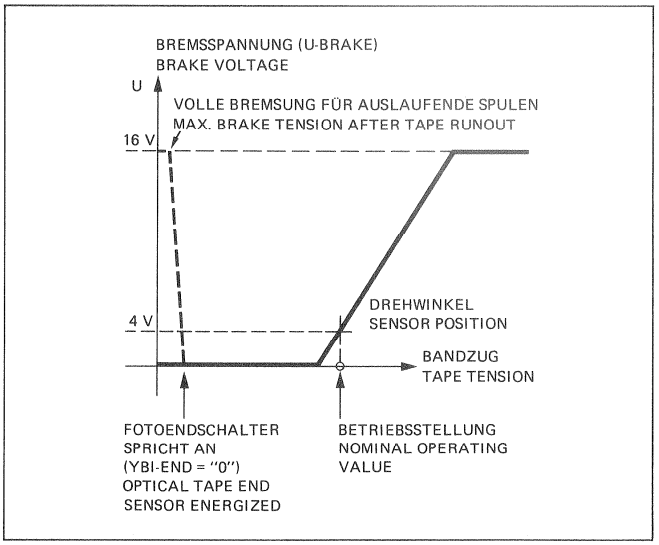

Fig.4.10

4.2.5
Abgleich der Capstan-Motorsteuerung

-> Fig.4.11

Capstan- Tachoabgleich und Bandzug zwischen den Capstan- Wellen, stehen in unmittelbarem Zusammenhang:
Die Drehzahlregelung der beiden Capstan- Motoren erfolgt ueber je eine separate Servo-Elektronik (Steckkarten CAPSTAN SERVO 1.080.371)

Die als **MASTER** definierte Steuereinheit regelt den, ihr zugeordneten Capstan-Motor exakt entsprechend der Band-Nenngeschwindigkeit.

Die als **SLAVE** definierte Steuereinheit regelt ihren zugeordneten Capstan-Motor auf eine Drehzahl, entsprechend einer leicht ueberhoehten Band-Nenngeschwindigkeit.

Diese einstellbare Drehzahl- Differenz bewirkt einen minimalen, kontrollierten Bandschlupf am SLAVE-gesteuerten Capstan und ermoeglicht die praeziese Bestimmung des Bandzuges zwischen den Capstan-Wellen.

Die Capstanmotor-Zuordnung der Steuereinheiten MASTER und SLAVE ist von der Vorwahl der PLAY-Bandlaufrichtung abhaengig (PLAY> / PLAY<).

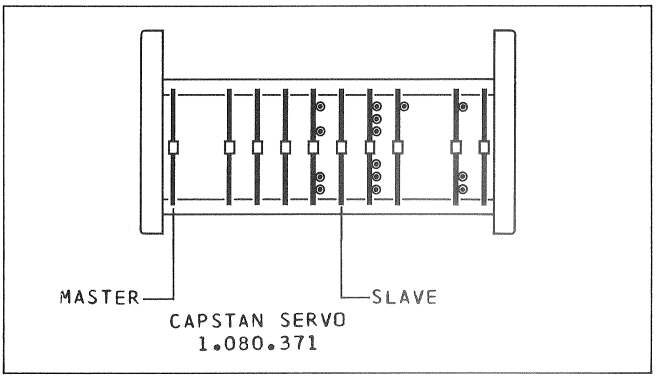

Fig.4.11

Wichtige Hinweise

Grundlegende Voraussetzung fuer den wirkungsvollen Abgleich der Capstan- Motorsteuerung sind:

- die gewissenhaft durchgefuehrten mechanischen Einstellungen des Laufwerkes nach Kap. 3.2.
- die korrekte Einstellung der vorgaengig beschriebenen Bandzuege und Bandzugbegrenzung der Wickelmotoren (Kapitel 4.2.3)
- Alle Abgleich-Vorgaenge muessen in betriebswarmem Zustand der Bandmaschine erfolgen.
- Waehrend Einstellarbeiten muss das Laufwerk in horizontaler Betriebslage positioniert sein.
- Bandlaufflaechen an Capstan- Wellen und Andruckrollen muessen sauber und fettfrei sein.

Benoetigte Messgeraete und Hilfsmittel

-> Fig.4.12

- Verlaengerungsprint 21.080.941.00

Messaufbau {A}
- Oszilloskop (mit Vorteil 2-Kanal)
- Quarz-Oszillator 400Hz

Messaufbau {B}
Steht kein 400Hz- Oszillator zur Verfuegung, kann die Einstellung des Capstan- Abgleichs, in eingeschraenktem Masse, mit einem
- Frequenzzaehler (ev. quarzstabilisiert) durchgefuehrt werden.

Fuer Wobbelmessungen wird ein Oszilloskop benoetigt.
Ein Hoehenschwankungs- Messgeraet stellt nur fuer Aufnahme- Maschinen eine Alternative.

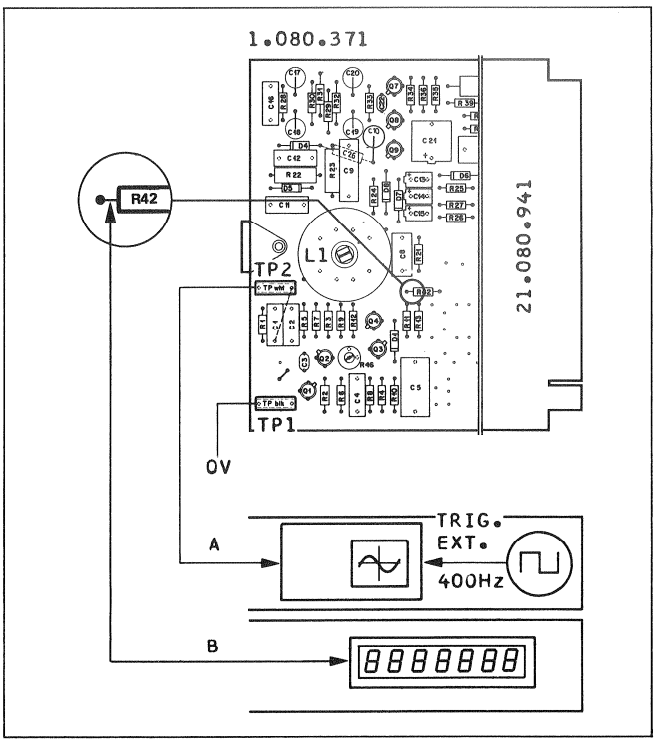

Fig.4.12

Einstellorgane

-> Fig.4.12

- Steckkarte CAPSTAN SERVO "MASTER" 1.080.371:
  CAPSTAN SERVO "SLAVE" 1.080.371:
  L1 Diskriminatorspule (Tachoabgleich grob)
  R46 Trimmpotentiometer (Tachoabgleich fein)
  TP1 Testpunkt Masse (+0.)V)
  Messaufbau A: TP2 Testpunkt Signal (Y-TAC)
  Messaufbau B: R42 Signal (Kollektor von Q4)

-> Fig.4.13

- Steckkarte DUAL CAPSTAN DIR. BOARD 1.080.369
  Regler fuer Wobbel- Abgleich:
  R1 SLAVE- Capstan
  R2 MASTER-Capstan
  Regler fuer Capstan- Hochlaufkontrolle:
  R7 SLAVE- Capstan, Signalisation durch DL1
  R8 MASTER-Capstan, Signalisation durch DL2

1.Voreinstellungen

Folgende Einstellungen bezwecken die Schaffung einer Ausgangslage, welche einen sukzessiven Einstellablauf erlauben (z.B. nach dem Ersetzen einer Steuerkarte).
Feinabgleiche, welche bei regulaeren Wartungszyklen vorgenommen werden, koennen direkt am entsprechenden Einstellorgan erfolgen.

-> Fig.4.12

Steckkarte CAPSTAN SERVO (MASTER und SLAVE):
- R46 auf Mitte Einstellbereich stellen.
- L1 Spulenkern ca.1mm tief in den Spulenkoerper eindrehen (entspricht einer Tachofrequenz von ca.400Hz).

-> Fig.4.13

Steckkarte DUAL CAPSTAN DIRECTION BOARD:
- R1, R2, R7 und R8 auf Mitte Einstellbereich stellen.

Nur bei Aufnahme-Maschinen (A80/QC-REC):

-> siehe Kapitel 4.2.3, Fig.4.5

- Brueckenstecker {JS2} auf Position {B} setzen (= bidirectionaler PLAY-Bandlauf).

2.Capstan-Hochlaufkontrolle

-> Fig.4.13

Waehrend der Hochlaufphase der Capstan-Motoren beim Einschalten der Maschine oder beim Bandlauf- Richtungswechsel, wird der Betriebsmodus PLAY (und (REC) verriegelt, bis die Capstanmotoren ihre Soll- Drehzahl erreicht haben.
Die Leuchtdioden DL1 und DL2 signalisieren, durch Aufleuchten, die Hochlaufphase. Sobald ein Capstanmotor seine Tachofrequenz von 400Hz innerhalb einer bestimmten Toleranz erreicht, erlischt die zugeordnete Leuchtdiode DL1/DL2.
Diese Zuordnung ist von der vorgewaehlten PLAY-Bandlaufrichtung abhaengig:

PLAY >	DL1 fuer rechten	Capstan (Slave)
	DL2 fuer linken	Capstan (Master)
PLAY <	DL1 fuer rechten	Capstan (Slave)
	DL2 fuer linken	Capstan (Master)

Voreinstellung (DUAL CAPSTAN DIRECTION BOARD)

-> Fig.4.13/4.14

- Betriebszustand STOP.
- Trimmpotentiometer R7 und R8 auf den linken Anschlag CCW drehen - DL1 und DL2 leuchten.
- Unter langsamem Aufdrehen von R7 und R8, Positionen ermitteln und markieren, in denen die zugeordnete Leuchtdiode erlischt {A} und beim Weiterdrehen wieder aufleuchtet {C}.
- Potentiometer auf Mitte der beiden Markierungen stellen {B}.

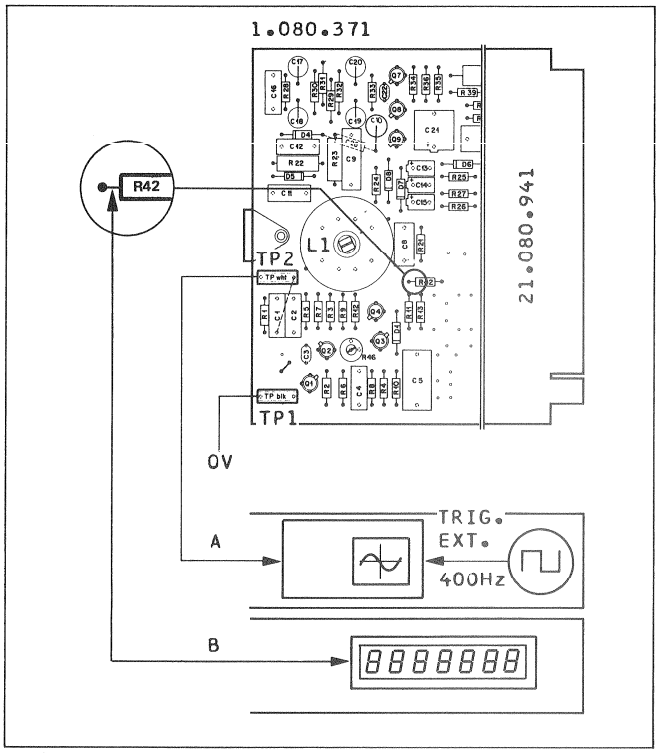

Fig.4.12

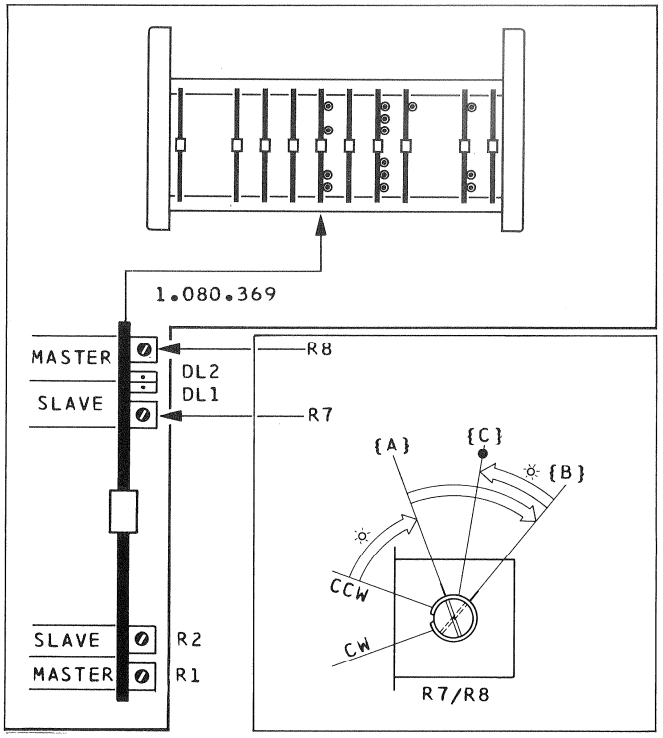

Fig.4.13 Fig.4.14

3.Tachoabgleich MASTER- Capstan

-> Fig.4.12

- Steckkarte MASTER CAPSTAN SERVO mit Verlaengerungsprint versehen in Rack einschieben.
- Messaufbau {A} oder {B} erstellen.
- Maschine einschalten (PLAY>).

Abgleich der MASTER-Tachofrequenz
Grobabgleich an Spulenkern L1
Feinabgleich an Potentiometer R46

- **Messaufbau {A}:**
  Sinuskurve auf Bildschirm (Tacho Signal) mit Quarzfrequenz (400Hz, extern getriggert) synchronisieren: L1 so einstellen, dass die Sinusdarstellung auf dem Bildschirm stillstent (kein horizontales Abwandern).
  Feinabgleich an R46.

- **Messaufbau {B}:**
  Abgleich von L1 (Grobeinstellung) und R46 (Feineinstellung) auf eine Anzeige am Frequenzzaehler von 400Hz, +/-0,1Hz.

Korrektur von Gleichlauf-Schwankungen

-> Fig.4.13

Steckkarte DUAL CAPSTAN DIRECTION BOARD:
- Oszilloskop an TP1 (0V) und TP2 des MASTER CAPSTAN PCB anschliessen.
- R1 (auf DUAL CAPSTAN DIRECTION BOARD): Abgleichen, bis die horizontale Zitterbewegung (Jitter) auf ein Minimum beschraenkt ist.

4.Tachoabgleich SLAVE-Capstan

Sinngemaess gleiche Einstellung wie beim MASTER-Capstan, beim SLAVE CAPSTAN SERVO-Einschub durchfuehren.
Die Korrektur von Gleichlaufschwankungen erfolgt an R2 der Steckkarte DUAL CAPSTAN DIRECTION BOARD.

Messaufbau fuer die nachfolgende Einstellung belassen.

5.Bandzug zwischen den Capstans

-> Fig.4.12

- Band einlegen und durch Vorspulen auf beide Spulen gleichmaessig verteilen (gleiche Wikkeldurchmesser).
- Band ueber Tentelometer fuehren
  -> Kap. 4.2.3, Abschnitt "Vorbereitungen"

Maschine starten "PLAY>":
- Steckkarte CAPSTAN SERVO "SLAVE":
  Einstellung des Bandzuges an R46, je nach verwendeter Bandsorte (18µ*): Fe 80g +/-5g
  Cr 60g +/-5g
  * (fuer duennere Baender entspr. reduzieren)

Nur bei Maschinentyp **ohne Aufnahmemodus:**
- Maschine starten "PLAY<".
- Bandzug messen.

Korrektur
...durch geziehlte Veraenderung der mechanischen Andruckkraft der Andruckrollen, im Bereich von 600g +/-50g -> Kap.3.2.2
Andruck linke Andruckrolle erhoehen = hoeherer Bandzug.
- Betriebsmodus "PLAY>":
Andruck der rechten Andruckrolle vermindern = kleinerer Bandzug.

6.Schlusskontrolle

Nach einer Betriebdauer von 1 Stunde im PLAY-Betriebsmodus:
Einstellungen, Kapitel 4.2.5, Punkte 2...5 nochmals ueberpruefen und bei Bedarf korrigieren.

Nur bei Aufnahme-Maschinen A80/QC-REC:
Brueckenstecker JS2 (DUAL CAPSTAN DIRECTION BOARD 1.080.369) auf Position {A} zurueck-setzen ("PLAY<" = unterdrueckt). -> Fig.4.5

4 ELECTRIC TAPE TRANSPORT ALIGNMENTS

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4.1
OPERATING OF TAPE TRANSPORT CONTROL

4.1.1
Arrangement of control electronics

For convenience and ease of servicing, all tape transport controls are mounted on PC boards of identical size in the control unit (rack construction).
The rack contains following PC boards:

Description	Diagram	EL
CAPSTAN SERVO / MASTER Capstanmotor-Steuerung	1.080.371	12
ATTENUATOR Eingangsabschwaecher	1.080.396	10
IC MEMORY AND COUNTER Speicher-Einheit	1.080.393	9
IC DECODER AND DRIVER IC Decoder und Treiber	1.080.391	8
DUAL CAPSTAN DIRECTION BOARD Laufrichtungssteuerung	1.080.369	7
CAPSTAN SERVO / SLAVE Capstanmotor-Steuerung	1.080.371	6
SPOOLING MOTOR CONTROL Wickelmotor-Steuerung	1.080.387	5
CONTACTOR Wickelmotor-Schuetzen	1.080.381	4
STABILIZER Spannungs-Stabilisator	1.080.370	2

A series of sensor elements continuously monitors the following features:

Sensor/ Function	(Signal/Name)
TAPE END SENSOR Photoelectric end-switch	YBI-END
TAPE MOVE SENSOR Tape motion	YBI-MOVE
TAPE DIRECTION SENSOR Direction of tape motion	YBI-DIR
TAPE TENSION SENSORS Tape tension	R-TT1 / R-TT2
TACHO HEADS Capstan motor speed	YAC-M3/YAC-M6

These sensors fully automatically supply the required control data to the control logic of the spooling motors and capstan motor controls. Thus, an optimum operation and accurate tape motion is ensured.

4.1.2
Push buttons

The tape transport is controlled by large-size illuminated push button (LOCAL CONTROL SWITCHES) or an identical remote control unit (REMOTE CONTROL SWITCHES). The local push buttons as well as those of the remote control unit are lighted by means of feedback logic.

Similary, a feedback signal is availlable (FADER INDICATOR) or fader start.

Interlocking

Push button control is interlocked against incorrect operation. Control commands are electrically stored. Therefore it is possible to switch from the fast wind mode directly to PLAY. During the STOP function the PLAY and STOP buttons are lit. As soon as the tape stops the STOP lamp is turned off and the PLAY function is released to the transport control from the memory.

EDIT button

The EDIT button is operative only when the tape is stopped or during fast wind. in the latter case, in funktion is onlt active when the button is depressed.
After depressing the EDIT button, the tape tension sensors are lockrd and the EDIT control function is actuated.

The pinch roller however, remain in their initial position. To raise the tape against the playback head, a tape defeater is installed between the pinch roller and the right-hand guide roller.

Fast wind monitoring

If the EDIT button is pressed during fast wind, the pinch roller moves to the EDIT position and the recording on the tape becomes audible.
The tape tension sensors are not locked during this operation.

Automatic EDIT operation

In the EDIT mode, the spooling motors can be continuously controlled in both directions by the EDIT control knob.
The tape tension sensors are unlocked by turning the EDIT control knob out of its neutral position.

The tape speed is proportional to the angular displacement of the EDIT control knob.

4.1.3
Attenuator and Preamplifier 1.080.396

The input attenuator attenuates control signals coming from either the push buttons board, the remote control unit, the fader start relay or the speed switch. Control is realized adjusting the respective input of the button contacts to potential zero. A logical level zero appears at the attenuator output by depressing a push button.
The corresponding signal voltages are:
Logic "L" (0) = max. +4.0V
Logic "H" (1) = min. +2.5V
The order of priority of the push buttons functions depends on the sequence of their contacts. First priority is given to the fader start relay, then to the push button contact of STOP, etc. The control of the fader start relay is realized by a Graetz full-wave bridge rectifier using an internal power supply (24V, FAD1, FAD2) or an external supply. The control voltage polarity is immaterial in this case.
The fader start function can also be used for dropping out of record mode on all channels, hence continuing in PLAY mode.

The ATTENUATOR AND PREAMP. PC board also comprises the preamplifiers of the tape end switch and the tape motion sensor as well as a logic cicuit switching the logic to STOP as long as the nominal supply voltage is not reached.

Tape end switch

When the tape is threaded, the RP-END photoresistor is dark and the resulting YBI-END signal is "H".
The supply voltage for the photo-resistor (+16V) is provided from the +24V supply voltage via the series transistor (Q1).

Safety circuit

The function of the Q3, Q2 photocell amplifier depends on the switching of Q4. The supply voltages of +24V and +5.8V are controlled in the safety circuit. As long as both voltages have not reached their nominal value, either the Q6 or Q7 transistor is locked and transistor Q4 is conducting. The tape end switch signal turns to "L" which is equivalent to the STOP mode.
AT THE SAME TIME THE Q8 TRANSISTOR IS LOCKED, any possible recording signal (YBI-REC = "H") is blocked and the recording relays in the amplifier channels are de-energised or cannot close.

Tape motion sensor amplifier

As the logic automatically transmits the memorized commands when transport functions are changing, the logic has to be informed of the curent tape motion. For this purpose, sensors producing the required signals are installed on the right-hand tape guide roller. After being converted, these signals indicate tape motion, direction of motion and running time (tape timer).

The impulses produced by the photo-transistor QP-MOVE (QP2, TAPE MOVE SENSOR 1.080.185/186) when the tape is running are rectified, integrated and amplified to produce a logic "H" for the Q-MOVE signal.

An additional stage (Q9) is mounted on the PC board 1.080.396-13 which supplies the YPS-MOVE signal via the remote control connector (GR22) for the A80 preselection unit (for speed evaluation).

4.1.4
IC MEMORY AND COUNTER 1.080.393

The integrated circuits are numbered and their connections given in the circuit diagrams.
In the following, a particular gate is identified by its IC number and the connection on its output, e.g. Gate 12-8.

The "IC MEMORY" PC board comprises the IC memory, the tape direction detector and the tape timer electronics which include the pulse generator, the counting direction as well as the counter signal regeneration.

IC MEMORY
The IC MEMORY has the function of storing and comparing the logic signals from the input attenuator and to process the YBI-END end switch signal and the YBI-MOVE motion signal. When the tape is threaded and the transport stopped all quiescent input signals are at "H" exept for the YBI-FAD input whose quiescent signal is "L".
4 Flip-flops, FF1...FF4, store the control signals. A further Flip-flop (FF0) is connected to gate 12-8 as a history element and monitors in addition to the tape motion signal, also the situation existing before a function change.

Tape direction detector

During the braking process, the spooling motors are braked with d.c. current. The braking current for the take-up motor is controlled in order to keep tape tension at the permissible value. The control electronics must, therefore, be informed of the direction in which the tape is moving (fast forward or rewind) as selected by the push buttons or EDIT control knob.
This information about the tape direction is also necessary for the tape timer and is therefore directly taken from the tape by means of the right-hand tape guide roller. The tape direction sensor produces two square-wave signals (QP-DIR1 and QP-DIR2) with a phase shift of 90 degree . Two square-wave signals with a phase shift of 108 degree are derived from the gates 8-8 and 6-6 to generate the timing pulses for the timer control.
The YBI-DIR signal, produced by the detector circuit is required for controlling braking current distribution and for driving the counting direction change-over logic of the tape timer.

Pulse generation for the tape timer

The derived square-wave voltage P2 and P3 with a phase shift of 108 degree are differentiated by the capacitances C16 and C21. The positive slopes produce narrow pulses which, at low tape speed, are assembled in gate 2-6. At high tape speed, one of the outputs of gate 4-8 or 4-11 (dependent upon the tape direction) is allways being "L" so that the respective pulses have no effect. Thus, the frequency division corresponding to the tape speed is given and the timer always shows real time. These pulses are differentiated once again in C18 and here the rear positive slope produces the time pulse. In gate 4-1 the time pulse is blocked as soon as YBI-END has become "L", i.e. when the tape end has passed over the photo-electric cell. The time pulse controls the counter signal regeneration of the D-flip-flops 7.

Counting direction change-over logic

The YBI-DIR direction signal together with the feedback signals of the counter signal regeneration determine the output signals of the NOR-gates 5-8 and 5-6 which act on the setting of the D-flip-flops 7. The time (CLOCK) pulses transmit these signals and, thus, determine the frequency of the tape timer logic.

4.1.5
IC DECODER AND DRIVERS 1.080.391

The "IC DECODER AND DRIVERS" PC board comprises the control stages for the sensor LED's operation, the motion simulator and the IC decoder including the ENABLE GATES connected in series which decodes the operating signals and controls the driver stages.

The driver outputs are connected to the K-CUT and K-TT signals by means of a diode.

In the EDIT mode the pinch rollers stay in start position.

Control stages for LEDs or lamps

The LEDs are powered by means of the series-resistors R1 and R2 (tape direction sensor), or R9 and R10 (tape motion sensor). The amplifier stages (Q1, Q2, resp. Q3) supply the digital signals corresponding with the operational mode to the logic. When diodes are faulty, these are "L" for output Q2 and "H" for output Q3.

Due to both signals, TEST-B is changed into "L" with the effect that, via the automatic blink circuit (PC board 1.080.381 - spooling motor contactors) the pressed button blink.

At the same time, the K-BRAKE signal is blocked (remains "H"), i.e. the braking contactor no longer switches to electronically controlled braking, if due to lack of direction information, the electronic current distribution is not working, or if the movement signal no longer informs of the "tape stop" situation.

Braking can be done mechanically. When the LEDs of the direction sensor (K-DIRECTION) are faultry, it still is possible to continue operation in all modes with the above restriction. The same is not true, however, if the motion sensor light diode fails. A special simulation is provided for this event.

Tape motion simulation

Since, due to a faulty tape motion sensor light diode, the logic can no longer recognize when tape is stopped a permanent motion signal is simulated (Gate input 9-1 is "L", output 9-3 chanches to "H"). Thus, YBI-MOVE constantly stays "H", which causes that YBI-FFO can no longer be changed into "H" for the control commands "PLAY" and "REC" (FF2 and FF3 = "H") and the transmission of these commands is blocked.

Thus, all functions operating by way of STOP are blocked. If the motion sensor light diode fails during the running of a function, the simulated motion signal maintains this function unaltered until the STOP button is pressed or the end of tape is reached.

The fast winding functions can still be activated, though.

IC DECODER AND DRIVERS

The IC decoder decodes the function signals FF1...FF4 for logical sequencing of the operation of electromechanical components such as the spooling motors, solenoids, contactors and indicator lamps.

An enable gate is inserted in front of the actual decoding and has the function of blocking the onward transmission of the stored commands until YBI-MOVE becomes "L" when YBI-FF0= "L" (transport mode changes which requires a tape stop).

4.1.6
Logical output signals

Each combination of control signals and sensor signals, together with the status, results in a certain signal combination at the output of the IC decoder.

This combination of output signals causes a corresponding action by the electromechanical elements.
Therefore, input and output signals are logically linked. This fact facilitates tracing of errors since it is not necessary to comprehend the layout of the logic circuits. It suffices to know that a given command will generate, specific reactions in form of a sequence of logical signals.

The interrelationship can be presented in tabular form. Such a table contains the output signals of the PCBs:
- ATTENUATOR 1.080.396
- MEMORY 1.080.393
- IC DECODER 1.080.391

with the corresponding labels of the transfer points (PT) and the signal names (listet vertically). In addition, the signal names of the sensors, whose functions are spread across all 3 PCBs are also included.

The vertical columns shows the logical signal states. The activated indicator lights and magnets are identified with "*". Only the logical states relevant to the corresponding function are indicated. It should be remembered that the logic is generally accessed with a logical "L" (exept fader start, YBI-FAD = logical "H").
The signal for forward tape motion is YBI-DIR = "H".
For moved tape the corresponding signal for Q-MOVE or YBI-MOVE = "H". A logical "L" at the output of the driver stage to the IC decoder calls for activation of the element connected.

Testpoints (TP) 3, 6 and 11 are located directly at the base of the driver stages. For this reason, their signal is inverse to the one of the corresponding output. These TP numbers, therefore, are identified with the negation sign (crossbar above digit).
(Example: if K-CUT at connection point 8B of the IC decoder is = "L", the corresponding TP = "H").

The horizontal rows contains the necessary logical states of a function. From row to row we optain a complete sequence of operations.

LOGICAL OUTPUT SIGNALS (1)

The Table LOGICAL OUTPUTS NO.1 represents a normal sequence of operation starting with power ON (row 1) and continuing with the treading of tape (row 2).

Row 3 shows the status of the signals immediately before the FAST FORWARD key is depressed.

The next row (DEPRESS FORWARD, time status 1) shows the signals with depressed key. The key remains depressed until RELEASE FORWARD occurs.

The next row shows the signal states occuring when the tape begins to move (MOVE SENSOR"ON") and YBI-MOVE changes to "H".

The row RELEASE FORWARD (key released) shows that no change in signal occours (except for activation signals YBS-FORW), because command is stored and the tape is still in motion.

When breaking down an operation into such individual steps, the table provides far-reaching information on the processes to be performed when a key is depressed, when starting the tape (MOVE SENSOR "ON"), when stopping the tape (MOVE SENSOR "OFF") or when changing the running direction.

LOGICAL OUTPUT SIGNALS (NORMAL OPERATION)

①		ATTENUATOR								SENSOR SIGNALS					MEMORY						IC-DECODER													
	TP														7	2	6	5	4		4	5	10	3	14	9	6	7	11	13		12	8	
	PT	A 17	B 16	B 14	B 12	B 8	B 19		B 20						B 7	A 5	B 8	B 9	B 10	A 21	B 12	B 13	A 12	A 8	B 22	A 18	B 8	A 15	B 20	B 18	A 20	A 22	B 14	B 3
SIGNAL NAMES / OPERATION		YPS-STOP	YPS-REW	YPS-FORW	YPS-REPR	YPS-REC	YPS-CUT	S-CUTAUT	YBI-FAD	YBI-END	YBI-DIR	Q-MOVE	B-MOVE	B-DIR	YBI-FF0	YBI-FF1	YBI-FF2	YBI-FF3	YBI-FF4	B-REC	B-STOP	B-FORW	B-REW	B-REPR	YBI-REC	B-CUT	K-CUT	K-PRESS	K-LIFT	K-BRAKE	K-DIR	K-TTT	Y-CUTAUT	YBI-MOVE
SYMB.F.SIGNAL 0		0	0	0	0	0	0	0		0	0		*		0	0	0	0	0	*	*	*	*	*		*	*	*	*	*	*	*	0	
SYMB.F.SIGNAL 1									L		L	L		*	L	L	L	L	L						L									L
INITIALISATION	0																																	
	1									0	L		*	*	L	0	0	0	0		*													
LOAD TAPE	0										L		*	*	L	0	0	0	0		*													
PRESS FORWARD	0			0							L		*	*	L	0	0	0	0		*													
	1			0							L		*	*	L	L	L	0	0			*							*					
MOVE SENSOR ON	0			0							L	L	*	*	L	L	L	0	0			*							*					
	1			0							L	L	*	*	L	L	L	0	0			*							*					L
RELEASE FORWARD	0										L	L	*	*	L	L	L	0	0			*							*					L
PRESS REWIND	0		0								L	L	*	*	L	L	L	0	0			*							*					L
	1		0								L	L	*	*	L	L	0	0	0				*						*					L
RELEASE REWIND	0										L	L	*	*	L	L	0	0	0				*						*					L
CHANGE DIRECTION	0										0	L	*	*	L	L	0	0	0				*						*					L
	1										0	L	*	*	L	L	0	0	0				*						*		*			L
PRESS PLAY	0				0						0	L	*	*	L	L	0	0	0				*						*		*			L
	1				0						0	L	*	*	0	L	L	L	0		*			*						*	*			L
PRESS RECORD	0				0	0					0	L	*	*	0	L	L	L	0		*			*						*	*			L
	1				0	0					0	L	*	*	0	L	L	L	L	*	*			*						*	*			L
RELEASE PLAY	0					0					0	L	*	*	0	L	L	L	L	*	*			*						*	*			L
RELEASE RECORD	0										0	L	*	*	0	L	L	L	L	*	*			*						*	*			L
MOVE SENSOR OFF	0										0		*	*	0	L	L	L	L	*	*			*						*	*			L
	1										0		*	*	L	L	L	L	L	*				*	L		*	*	*		*			
MOVE SENSOR ON	0										0	L	*	*	L	L	L	L	L	*				*	L		*	*	*		*			
	1										0	L	*	*	L	L	L	L	L	*				*	L		*	*	*		*			L
CHANGE DIRECTION	0										L	L	*	*	L	L	L	L	L	*				*	L		*	*	*		*			L
	1										L	L	*	*	L	L	L	L	L	*				*	L		*	*	*					L
PRESS STOP	0	0									L	L	*	*	L	L	L	L	L	*				*	L		*	*	*					L
	1	0									L	L	*	*	L	0	0	0	0		*									*				L
RELEASE STOP	0										L	L	*	*	L	0	0	0	0		*									*				L
MOVE SENSOR OFF	0										L		*	*	L	0	0	0	0		*									*				L
	1										L		*	*	L	0	0	0	0		*													
PRESS EDIT	0						0				L		*	*	L	0	0	0	0		*													
	1						0				L		*	*	L	0	0	L	0							*	*					*		
RELEASE EDIT	0										L		*	*	L	0	0	L	0							*	*					*		
PRESS CUTAUT	0							0			L		*	*	L	0	0	L	0							*	*					*		
	6							0			L		*	*	L	0	0	L	0							*	*					*	0	
MOVE SENSOR ON	0							0			L	L	*	*	L	0	0	L	0							*	*					*	0	
	1							0			L	L	*	*	L	0	0	L	0							*	*					*	0	L
RELEASE CUTAUT	0										L	L	*	*	L	0	0	L	0							*	*					*	0	L
	6										L	L	*	*	L	0	0	L	0							*	*					*		L
MOVE SENSOR OFF	0										L		*	*	L	0	0	L	0							*	*					*		
	1										L		*	*	L	0	0	L	0							*	*					*		
PRESS REWIND	0		0								L		*	*	L	0	0	L	0							*	*					*		
	1		0								L		*	*	L	L	0	0	0				*						*					
RELEASE REWIND	0										L		*	*	L	L	0	0	0				*						*					
MOVE SENSOR ON	0										L	L	*	*	L	L	0	0	0				*						*					
	1										L	L	*	*	L	L	0	0	0				*						*					L
CHANGE DIRECTION	0										0	L	*	*	L	L	0	0	0				*						*					L
	1										0	L	*	*	L	L	0	0	0				*						*		*			L
END OF TAPE	0									0	0	L	*	*	L	L	0	0	0				*						*		*			L
	1									0	0	L	*	*	L	0	0	0	0		*									*	*			L
MOVE SENSOR OFF	0									0	0		*	*	L	0	0	0	0		*									*	*			L
	1									0	0		*	*	L	0	0	0	0		*										*			

LOGICAL OUTPUT SIGNALS ②

This table shows that other functions (such as REWIND) are inhibited when activating fader start.

LOGICAL OUTPUT SIGNALS (FADER OPERATION)

②		ATTENUATOR								SENSOR SIGNALS					MEMORY						IC-DECODER												
	TP														7	2	6	5	4		4	5	10	3	14	9	6	7	11	13		12	8	
	PT	A 17	B 16	B 14	B 12	B 8	B 19		B 20						B 7	A 5	B 8	B 9	B 10	A 21	B 12	B 13	A 12	A 8	B 22	A 18	B 8	A 15	B 20	B 18	A 20	A 22	B 44	B 3
SIGNAL NAMES / OPERATION		YPS-STOP	YPS-REW	YPS-FORW	YPS-REPR	YPS-REC	YPS-CUT	S-CUTAUT	YBI-FAD	YBI-END	YBI-DIR	Q-MOVE	B-MOVE	B-DIR	YBI-FF0	YBI-FF1	YBI-FF2	YBI-FF3	YBI-FF4	B-REC	B-STOP	B-FORW	B-REW	B-REPR	YBI-REC	B-CUT	K-CUT	K-PRESS	K-LIFT	K-BRAKE	K-DIR	K-TT	Y-CUTAUT	YBI-MOVE
SYMB.F.SIGNAL 0		0	0	0	0	0	0	0		0	0		*		0	0	0	0	0	*	*	*	*	*		*	*	*	*	*	*	*	0	
SYMB.F.SIGNAL 1									L		L	L		*	L	L	L	L	L						L									L
INITIALISATION	0																																	
	1									0	L		*	*	L	0	0	0	0		*													
LOAD TAPE	0										L		*	*	L	0	0	0	0		*													
PRESS FORWARD	0			0							L		*	*	L	0	0	0	0		*													
	1			0							L		*	*	L	L	L	0	0			*							*					
RELEASE FORWARD	0										L		*	*	L	L	L	0	0			*							*					
MOVE SENSOR ON	0										L	L	*	*	L	L	L	0	0			*							*					
	1										L	L	*	*	L	L	L	0	0			*							*					L
PRESS STOP	0	0									L	L	*	*	L	L	L	0	0			*							*					L
	1	0									L	L	*	*	L	0	0	0	0		*									*				L
RELEASE STOP	0										L	L	*	*	L	0	0	0	0		*									*				L
MOVE SENSOR OFF	0										L		*	*	L	0	0	0	0		*									*				L
	1										L		*	*	L	0	0	0	0		*													
SWITCH FADER ON	0								L		L		*	*	L	0	0	0	0		*													
	1								L		L		*	*	L	L	L	L	0					*			*	*	*					
MOVE SENSOR ON	0								L		L	L	*	*	L	L	L	L	0					*			*	*	*					
	1								L		L	L	*	*	L	L	L	L	0					*			*	*	*					L
PRESS REWIND	0		0						L		L	L	*	*	L	L	L	L	0					*			*	*	*					L
RELEASE REWIND	0								L		L	L	*	*	L	L	L	L	0					*			*	*	*					L
SWITCH FADER OFF	0										L	L	*	*	L	L	L	L	0					*			*	*	*					L
	1										L	L	*	*	L	0	0	0	0		*									*				L
MOVE SENSOR OFF	0										L		*	*	L	0	0	0	0		*									*				L
	1										L		*	*	L	0	0	0	0		*													
PRESS FORWARD	0			0							L		*	*	L	0	0	0	0		*													
	1			0							L		*	*	L	L	L	0	0			*							*					
RELEASE FORWARD	0										L		*	*	L	L	L	0	0			*							*					
MOVE SENSOR ON	0										L	L	*	*	L	L	L	0	0			*							*					
	1										L	L	*	*	L	L	L	0	0			*							*					L
END OF TAPE	0									0	L	L	*	*	L	L	L	0	0			*							*					L
	1									0	L	L	*	*	L	0	0	0	0		*									*				L
MOVE SENSOR OFF	0									0	L		*	*	L	0	0	0	0		*									*				L
	1									0	L		*	*	L	0	0	0	0		*													
PRESS PLAY	0				0					0	L		*	*	L	0	0	0	0		*													
	1				0					0	L		*	*	L	L	L	L	0					*			*	*	*					
RELEASE PLAY	0									0	L		*	*	L	L	L	L	0					*			*	*	*					
	1									0	L		*	*	L	0	0	0	0		*													

4.2
ELECTRIC TAPE TRANSPORT ALIGNMENTS

4.2.1
General

Required instruments and aids

- Multimeter
- Tentelometer 10.300.001.01
  (tape tension meter)
  with special holder QC 1.080.431.00
- Oscilloscope (preferably 2-channel)
- Quartz oscillator 400Hz
  or
- Frequency counter (preferably quartz-stab.)
- Extender board 21.080.941.00

Note

- Ensure that all mechanical elements function correctly before making any electrical adjustements to the tape transport control (see Section 2.2).
- The recorder must have been powered off for at least five seconds before any circuit boards are removed from or installed in the rack.
- Check the supply voltages as follows before making any electrical adjustments to the tape transport control (see Section 4.2.2)

4.2.2
Stabilizer (Voltage regulator)

-> Fig.4.1

The supply voltages are measured at the test points 1...5 of the stabilizer PCB, and adjusted with trimmers R1 for +20.0V and R29 for +5.8V / -5.8V.
The current limit for the +20V / +24V supply is set on potentiometer R2.

-> Fig.4.2

For measuring purposes, connect an ammeter (range > 4A) in series with the 4...5 ohm resitor (50...75W) across the +0.0V and +24 .0V busbars at the rear of the PCB chassis.
- Switch on machine, STOP mode.
- Adjust the potentiometer R2 (I-MAX) so that the ammeter shows the following values:
  with logic PCBs 3.5A
  without logic PCBs 4.0A

CAUTION This measurement must be carried out on the test points of the PB boards.

Note:
The stabilizer system for the +20.0V and +24.0V supply includes circuits for current limiting and disconnection in the event of a short circuit.
If a short circuit occurs, the stabilizing system cuts off the +20.0V and +24.0V supplies completely. The voltages remain disconnected after the short circuit has been cleared.
The stabilizing system does not resume normal operation until the machine has been switched off for at least 15 seconds. Also, the nature of this protection circuit does not allow the use of a variable power transformer to raise the voltage slowly from 0V (The voltage must be at least half the specified supply voltage when switching on the machine.

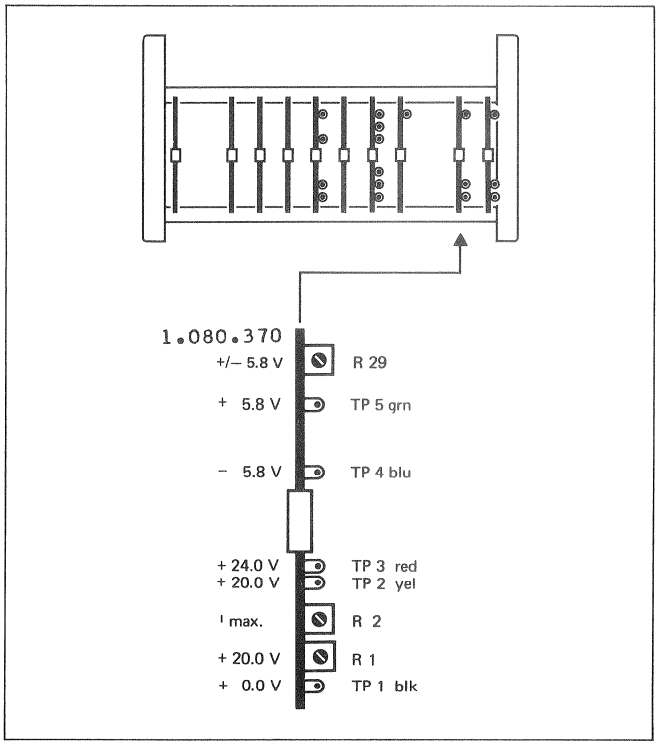

Fig.4.1

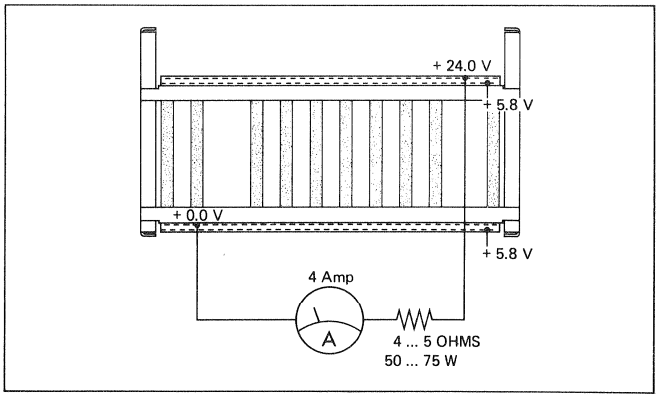

Fig.4.2

4.2.3
Tape tension adjustments

-> Fig.4.3

The tape tension of the spooling motors are aligned with the trimmer potentiometers R70... R75 on the
SPOOLING MOTOR CONTROL PCB 1.080.386:
The upper three potentiometers influence the left-hand spooling motor (SUPPLY MOTOR), the lower three trimmer potentiometers influence the right hand spooling motor (TAKE-UP MOTOR).

Preparatory steps

- Remove head block -> Section 3.1.1
- Remove front cover -> Section 3.1.3
- Remove tape end sensor -> Section 3.1.4 (obstructs tape guidance when the headblock is removed)
- Mount tentelometer (tape tension meter) with the aid of the special holder in place of the headblock -> Fig.4.4
  Position tentelometer with its sensing rollers exactly perpendicular.
  Important Reels of the same type (size, material) with a core diameter of 150mm must be mounted on both spindles.
- Thread tape normally across tape tension sensor and guide roller.

Important: All tape tension data refer to the pancake format

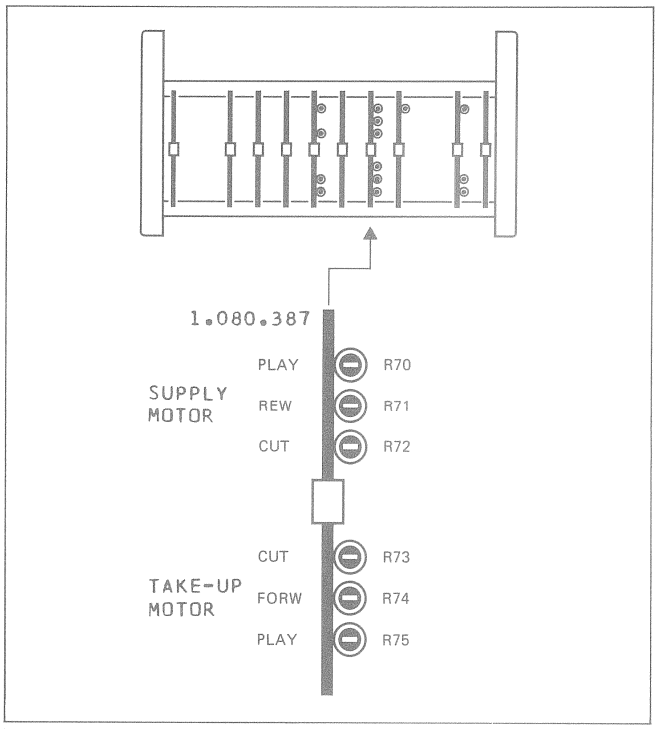

Fig.4.3

Fig.4.4

1.Tape tension in PLAY mode

Note: Applies only to recorders equipped for recording disabled PLAY REVERSE mode.
-> Fig.4.5

The switch-selectable PLAY direction (forward/reverse) has to be established for the following adjustments by setting the jumper JS2 on the circuit board
DUAL CAPSTAN DIRECTION BOARD 1.080.369
in position "B".

Restore the jumper to the previous setting "A" after the adjustments have been made.

Adjustment in PLAY FORWARD mode PLAY>

Prerequisites
Both reels should contain the same amount of tape.

- Remove left-hand pinch roller by unscrewing the cap (Caution! Left-hand thread).
- Start recorder in PLAY FORWARD mode (the right-hand direction preselection button is illuminated).

Observe horizontal tape guidance across pinch rollers:
The tape should be guided accurately centered across the defined running surface of the pinch roller perimeter.
Correction is possible by lateral inclination from the perpendicular mounting position.

- Adjust trimmer potentiometer R70 (PLAY/SUPPLY MOTOR) in such a way that a reading of 30g is obtained on the tentelometer.
- Reinstall left-hand pinch roller.

Adjustment in PLAY REVERSE mode PLAY<
-> Fig.4.3

Prerequisites
Both reels should contain the same amount of tape.

- Remove right-hand pinch roller.
- Start recorder in PLAY REVERSE mode (left-hand direction preselector button is illuminated).

Observe horizontal tape guidance across pinch rollers (see above).

- Adjust trimmer potentiometer R75 (PLAY/TAKE-UP MOTOR) in such a way that a reading of 30g is obtained on the tentelometer.
- Reinstall right-hand pinch roller.

Checks:
- Distribute tape supply evenly to both reels.
- Check in PLAY FORWARD and PLAY REVERSE mode: The tape should not move when the pinch rollers are lifted manually off the capstan shaft.

On machines equipped for RECORD mode:
Reset jumper JS2 to position "A": (disables reverse PLY mode). -> Fig.4.5

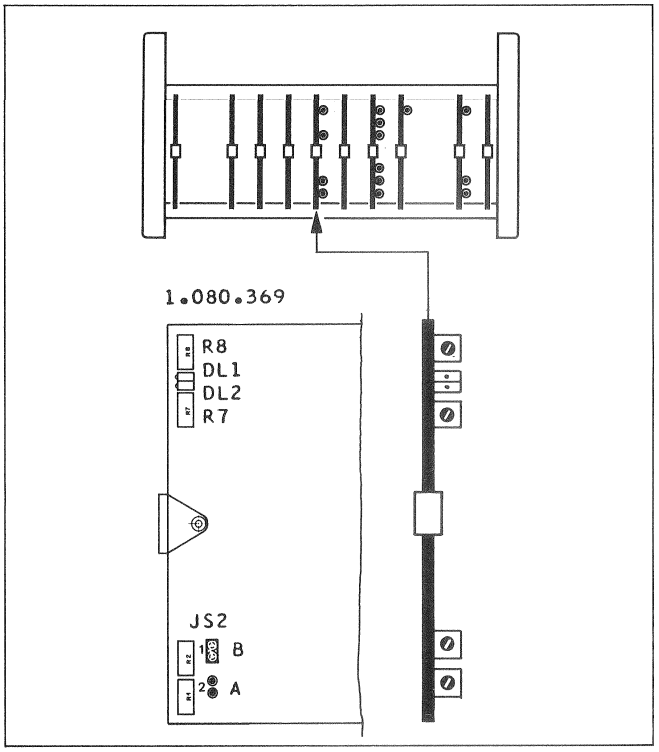

Fig.4.5

2.Limiting the tape tension in spooling mode
FORW (fast forward) **REW** (fast rewind)

-> Fig.4.3

The maximum tension applied to the tape in spooling mode can be adjusted with the trimmer-potentiometer R71 and R74. This peak tension occurs during the acceleration phase and when reversing the tape direction during fast winding.
Note that a high peak tape tension is required for rapid acceleration.
Although lower peak tape tension result in longer response time during spooling functions the tape will be threated more gently, a fact that is very important when processing master tapes.

Preparatoty steps

Left-hand tape tension sensor -> Fig.4.6
- Turn clockwise to the stop (direction of maximum spring preload)
- Identify this position by setting a mark (with a soft pencil) on the circumference of the rotatable tape tension sensor plate {A} relative to the stationary tape tension edge {B}.
- Set a new mark {B'} at a distance of 18mm in the CCW direction of the fixed marking {B} (lower spring preload).

Right-hand tape tension sensor -> Fig.4.7
- Turn counterclockwise to the stop (direction of maximum spring preload).
- Set mark, as described above.
- Set a new mark {B'} at a distance of 18mm in the CW direction from the fixed mark {B} (lower spring preload).

Adjustments -> Fig.4.3/4.6/4.7

Prerequisite: correct PLAY tape tension according to Section 1.
- Evenly distribute tape supply to both reels (same pancake diameter)
- Hold right-hand tape tension sensor in position {B'} (18mm before stop) or secure it there with ashesive tape.
- Select fast forward mode (FORW) and determine setting of potentiometer R74 at which the tape stands still.
  Restore tape tension sensor to its neutral position (remove adhesive tape).
- Evenly distribute tape supply to both reels.
- Retain left-hand tape tension sensor in position {B'} (18mm before stop) or secure it there with adhesive tape.
- Select fast rewind (REW) and determine the setting of potentiometer R71 in which the tape stands still.
  Restore tape tension sensor to its neutral position (remove adhesive tape).

Check with tentelometer:
- The maximum admissible tension of 120g should not be exceeded during the acceleration phase of the spooling motors.

Correction is possible by proportional reduction of tape tension on R71/R74 (corresponds to an increase of the distance between the marks {B} and {B'})

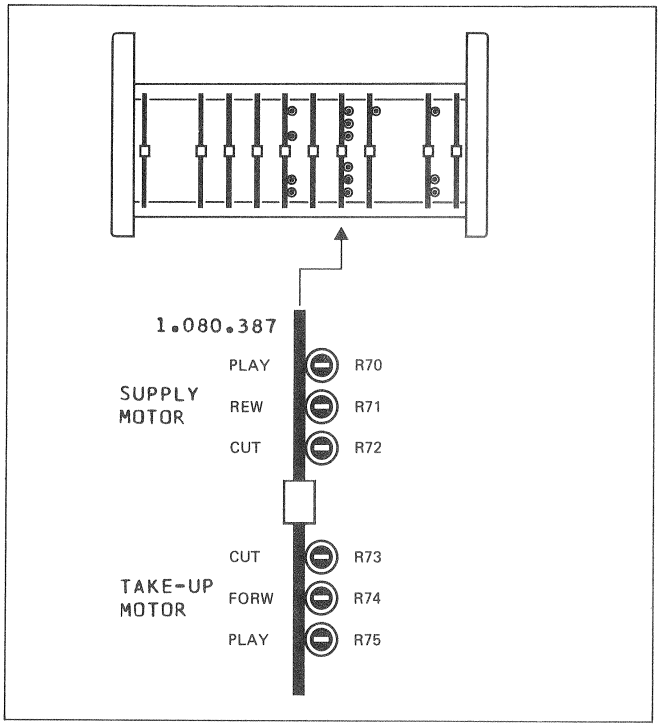

Fig.4.3

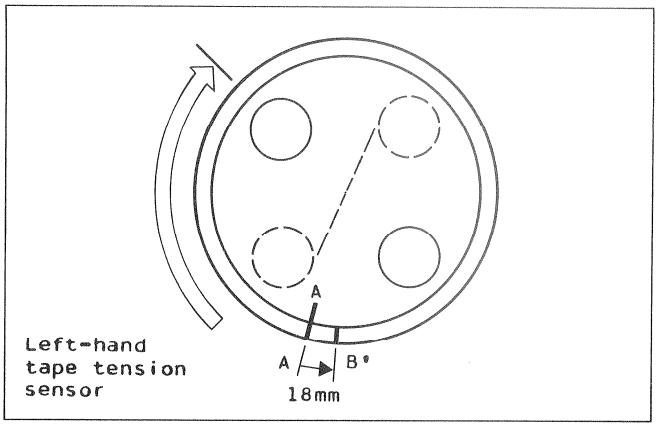

Fig.4.6

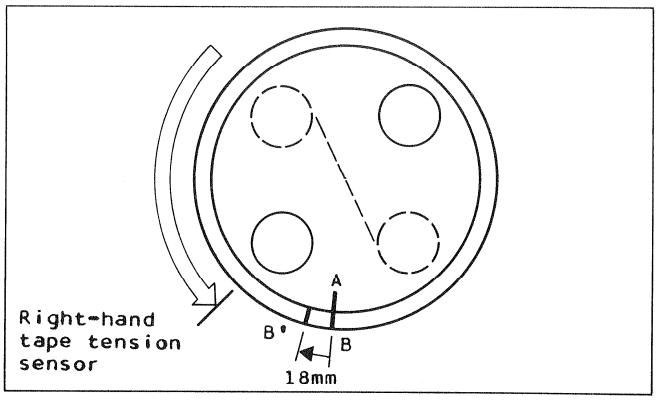

Fig.4.7

3.Limiting the tape tension in EDIT mode

-> Fig. 4.3/4.8

Prerequisites: The tape tension for PLAY and spooling mode (FORW/REW) should be correct.

- Evenly distribute tape supply to both reels (same pancake diameter).
- Open (turn clockwise) R72 (CUT) for EDIT REVERSE to 1/5...max.1/4 of the setting range. -> Fig.4.8
- Press EDIT button.
- Short-circuit EDIT knob microswitch (interconnect terminal to which black wire is soldered and vacant terminal) - EDIT solenoid becomes deenergized.
- Turn EDIT knob to its center position.
- Determine setting of R73 (CUT) for EDIT FORWARD in which the tape (same diameter) stands still.
- Remove short-circuit of microswitch.

Check with tentelometer:
- The maximum admissible tape tension of 120g should not be exceeded when alternating the spooling direction in EDIT mode.

Correction is possible by reducing the tape tension on R72 (counterclockwise) and subsequent alignment with R73 as described above.
Repeat check with tentelometer.

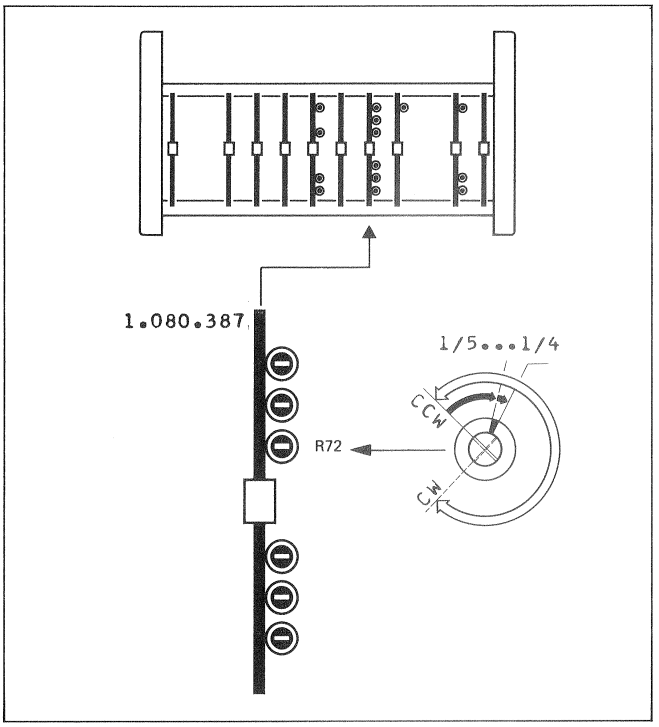

Fig.4.8

4.PLAY tape tension between the capstans

Refer to Section 4.2 5 "Capstan motor alignment".

4.2.4
Brake control

The following procedure for adjusting brake control is based on the tape tension for playback.
It is therefore most important that the tape tensions for PLAY/REPRODUCE are set correctly before adjusting the brake control electronics (Section 4.2.3).
The brake control system comes into operation when the STOP button is depressed while in fast wind or PLAY mode (K-BRAKE). The right-hand tape tension sensor (T-TT2) is employed as the control element (sensor).

Depending on the direction the tape is moving, the spooling motor on the respective take-up side is connected to the circuit of the brake control electronics.
-> Fig.4.9
Tape tension occuring during braking can be limited at trimmer potentiometer R9.
(The limiting point depends on the angle of rotation of the right-hand tape tension sensor and the reference voltage set R9).
The braking voltage can be adjusted with the aid of a multimeter as shown in Fig.4.10.

Adjustment
Fit a full reel and wind forward some 10 to 20m. Press PLAY button and mark the resulting position of the right-hand tape tension sensor. Remove tape. Connect meter to test points TP2 (yel,-) and TP3 (wht,+) (measuring range >20V)

To simulate movement of tape, drive the motion sensor with a eubber band fitted over the capstan shaft and the right-hand guide roller.

Briefly depress REW or FORW button.

Caution:
Do not keep the machine in the braked condition longer than 2 minutes. To discontinue the braking action, stop right-hand guide roller (remove rubber band).

Turn right-hand tape tension sensor to the previously marked PLAY position.
Adjust trimmer potentiometer R9 to a meter reading of 4V.

Check that the control signal corresponds to the curve shown in the opposite diagram (Fig.4.10) moving the right-hand tape tension sensor.

When the optical tape end sensor responds light barrier not covered) and the tape tension sensor is at rest, full braking is applied to both motors until the right-hand guide roller stops, i.e. YBI-MOVE becomes "L".

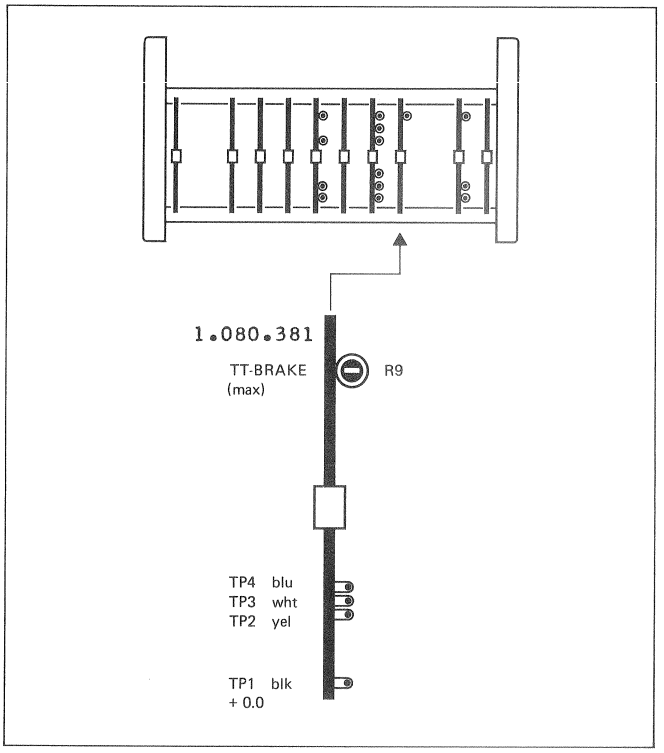

Fig.4.9

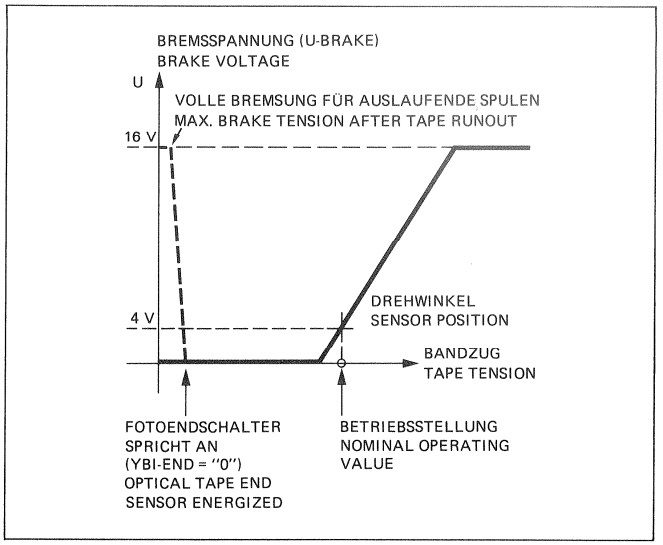

Fig.4.10

4.2.5
Capstan motor control alignment

-> Fig.4.11

The alignments of the capstan tacho and the tape tension between the capstan shafts are interrelated:
The speed of the two capstan motors is controlled through separate servo electronics
CAPSTAN SERVO PCB 1.080.371.
The control unit defined as the **MASTER** ensures that the corresponding capstan motor runs exactly at the nominal tape speed.

The control unit defined as the **SLAVE** ensures that the corresponding capstan motor runs at a speed that is slightly higher than the nominal tape speed.

The effect of this adjustable speed deviation is a small, controllable tape slip on the SLAVE-controlled capstan and permits accurate setting of the tape tension between the capstan shafts.

The assignment of the capstan motor to the MASTER and the SLAVE control depends on the preselected PLAY direction (PLAY forward / PLAY (PLAY forward / PLAY reverse).

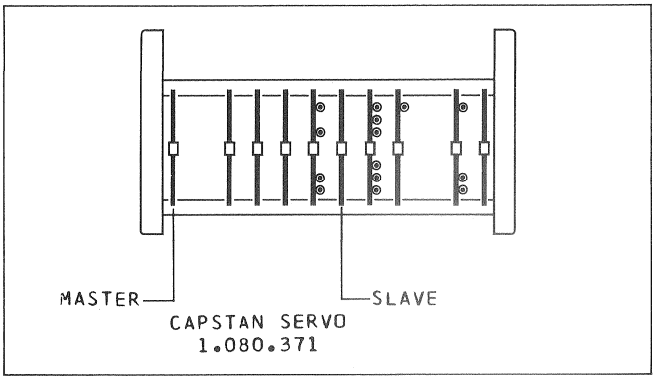

Fig.4.11

Important notes

The following are basic preconditions for effective alignment of the capstan motor control:

- All mechanical adjustments have been performed conscientiously -> Section 3.2
- The previously described tape tensions and tension limitations of the spooling motors are correct -> Section 4.2.3
- All alignment are to be made with the recorder at operating temperature.
- The tape transport must be positioned horizontally while alignments are made.
- The tape contact surfaces of the capstan shafts and the pinch rollers must be clean and free of grease.

Required measuring instruments and aids

-> Fig.4.12

- Extender board 21.080.941.00

Measuring arrangement {A}
- Oscilloscope (preferably 2-channel model)
- Quartz oscillator 400Hz

Measuring arrangement {B}
If no 400Hz oscillator is available, capstan alignment is to a limited extend possible with a
- Frequency counter (preferably quartz-stab.)

An oscilloscope is required for wobble measurement. A wow-and-flutter meter is a possible alternative, however only for record/reproduce machines.

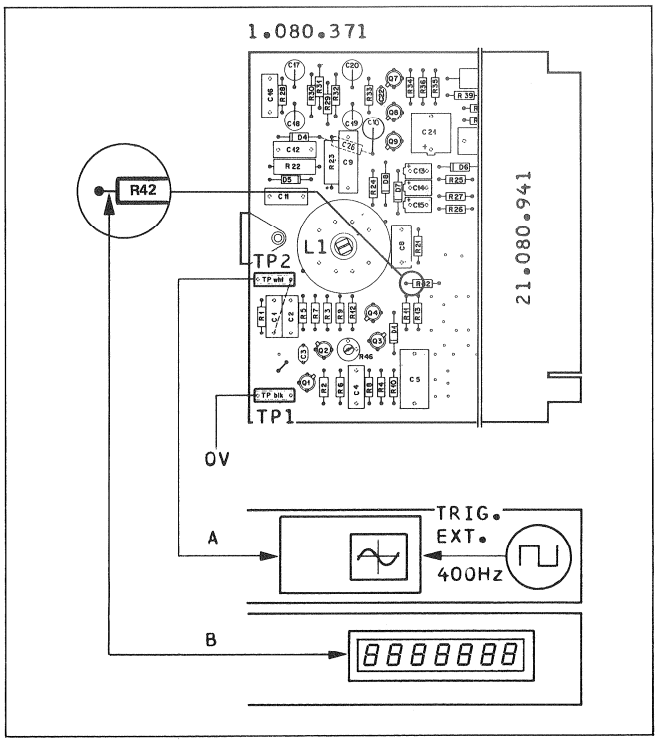

Fig.4.12

Alignment elements

-> Fig.4.12

- CAPSTAN SERVO PCB "MASTER" 1.080.371
  CAPSTAN SERVO PCB "SLAVE" 1.080.371
  L1 Discriminator coil
  (Tacho alignment, coarse)
  R46 Trimmer potentiometer
  (Tacho alignment, fine)
  TP1 Test point ground (+0.0V)
  M.alignment A: TP2 test point signal (Y-TAC)
  M.alignment B: R42 signal (collector Q4)

-> Fig.4.13

- DUAL CAPSTAN DIRECTION PCB 1.080.369
  Regulator for wobble alignment:
  R1 SLAVE capstan
  R2 MASTER capstan
  Regulator for capstan acceleration control:
  R7 SLAVE capstan, signalization through DL1
  R8 MASTER capstan, " " DL2

1.Preliminary adjustments

The following adjustments establish the basic condition from the alignment procedure can be initiated (e.g. after replacement of a control PCB).
Fine-adjustments necessary during normal maintenance intervals can be made directly on the corresponding elements.

-> Fig.4.12

CAPSTAN SERVO PCB (MASTER and SLAVE):
- Set R46 to the middle of its range of travel.
- Screw trimmer slug L1 approximately 1mm into the coil body (corresponds to a tacho frequency of approximately 400Hz).

-> Fig.4.13

DUAL CAPSTAN DIRECTION PCB:
- Set R1, R2, R7 and R8 to the middle of their adjustment ranges.

Only record machines (A80/QC-REC):

-> Section 4.2.3, Fig.4.5

- Set jumper {JS2} to the position {B} (forward and reverse PLAY).

2.Capstan acceleration control

-> Fig.4.13

During the acceleration phase of the capstan motors, or when the machine is switched on, or when changing the capstan direction, PLAY (and REC) mode is interlocked until the capstan motors have attained the desired speed.
The acceleration phase is signalled by LEDs DL1 and DL2. As soon as a capstan motor has attained its tacho frequency of 400Hz within a certain tolerance, the corresponding LED turns off again. The motor assignment depends on the preselected PLAY direction:

PLAY > DL1, Capstan right in Slave function
DL2, Capstan left in Master function
PLAY < DL1, Capstan right in Slave function
DL2, Capstan left in Master function

Preliminary adjustments
(DUAL CAPSTAN DIRECTION PCB) -> Fig.4.13/4.14

- Select STOP mode.
- Set trimmer potentiometer R7 and R8 to the CCW limit position - DL1 and DL2 turn on.
- Slowly open R7 and R8 and determine and mark the position in which the corresponding LED {A},{B} turns off and subsequently on again when the potentiometers are turned further.
- Set potentiometers midway {C} between the two markings.

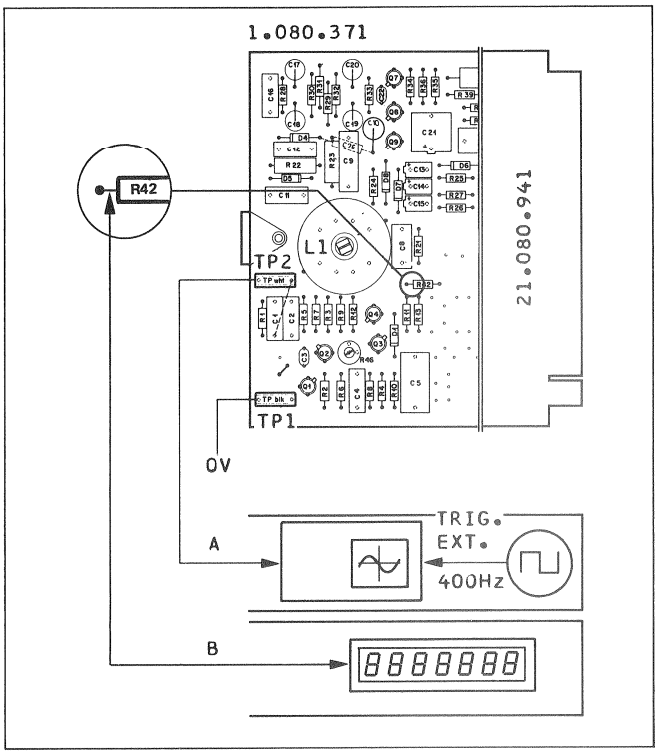

Fig.4.12

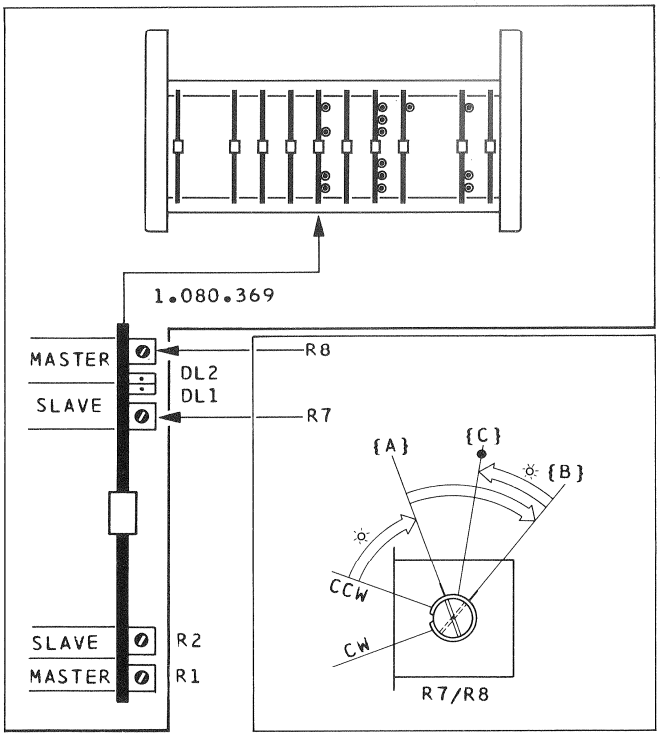

Fig.4.13 Fig.4.14

3.MASTER capstan tacho alignment

-> Fig.4.12

- Mount MASTER CAPSTAN SERVO PCB on extender board and slide it into the rack.
- Establish measuring arrangement {A} or {B}.
- Switch machine on and press preselector PLAY forward.

Aligning the tacho frequency

Coarse-adjustment with slug L1
Fine-adjustment with potentiometer R46

- **Measuring arrangement {A}:**
  Synchronize sine wave on screen (tacho signal) with quartz frequency (400Hz, externally triggered):
  adjust L1 in such a way that the sine-wave representation on the screen stands still (no horizontal drift).
  Fine-adjust with R46.

- **Measuring arrangement {B}:**
  Coarse-adjust with L1 and fine-adjust with R46 to obtain a reading of 400Hz +/-0.1Hz on the frequency counter.

Wow-and-flutter correction

-> Fig.4.13

DUAL CAPSTAN DIRECTION PCB:
- Connect oscilloscope to TP1 (0V) and TP2 on the MASTER CAPSTAN PCB.
- Adjust with R1 on the DUAL CAPSTAN DIRECTION PCB for minimal horizontal jitter.

4.SLAVE capstan alignment

Same alignments as for MASTER capstan, but with SLAVE CAPSTAN SERVO PCB.

Wow-and-flutter is corrected with R2 on the DUAL CAPSTAN DIRECTION PCB.

Retain measuring arrangement for the subsequent alignment.

5.Tape tension between capstans

-> Fig.4.12

- Thread tape and distribute tape supply evenly to both reels (same pancake diameter).
- Guide tape across tentelometer
  -> Section 4.2.3 "Preparatory steps"

Start machine in PLAY FORWARD (PLAY>) mode:
- CAPSTAN SERVO SLAVE PCB:
  Adjust tape tension with R46, depending on the type of tape (18u*): Fe 80g +/-5g
  Cr 60g +/-5g

* (for thinner tapes, reduce correspondingly)

Only for A80/QC-REPRO **without record mode:**
- Start machine in PLAY REVERSE mode.
- Measure tape tension.
  Correct if necessary
  by varying the mechanical pressure of the pinch rollers within 600g +/-50g
  -> Section 3.2.2, paragraph 4, PLAY< mode.
  Increasing the pressure of the left-hand pinch roller = greater tape tension.
- PLAY> mode:
  Decreasing the pressure of the right-hand pinch roller = lower tape tension.

6.Final inspections

After one hour's operation in PLAY mode:
Recheck the alignments in Section 4.2.5,
items 2...5 and correct if necessary.

Only for A80/QC-REC:
Restore jumper JS2 (DUAL CAPSTAN DIRECTION
PCB 1.080.369) to position {A} (disables
PLAY REVERSE (PLAY<) mode). -> Fig.4.5

5 AUDIO ELEKTRONIK

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5.1
ALLGEMEINES

5.1.1
Varianten Uebersicht

A80/QC-2REPRO

Wiedergabemaschine
mit 2 Stereo-Halbspur-Wiedergabekoepfen

Audio-Elektronik bestehend aus: -> Fig.5.1

{1}	4 Wiedergabe-Verstaerker	1.081.952.81
	mit Entzerrung (IEC I/II-IV)	1.081.965.00
	1 Wiedergabe-Vorverstaerker 2x2CH	
	im Kopftraeger eingebaut	1.020.709.00
{2}	1 Anschlussfeld	1.081.959.00
	mit Stummschaltkreis)	
	1 Stabilisator-Steckkarte	1.080.988.00
	(hinter Anschlussfeld)	
{4}	1 Umsetzer	
	fuer Geschwindigkeits-Signal	1.080.979.81
{6}	1 Entzerrungs-Umschalter	1.081.355.81

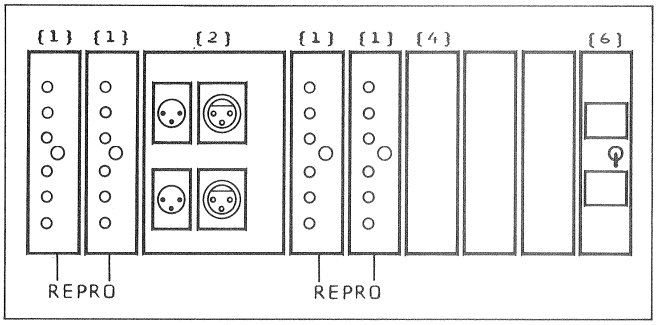


Fig.5.1

A80/QC-2REC/2REPRO

mit Vollspur-Aufnahmekopf
und Stereo-Halbspur-Wiedergabekopf

Audio-Elektronik bestehend aus: -> Fig.5.2

{1}	2 Wiedergabe-Verstaerker	1.081.952.81
	mit Entzerrung (IEC I/II-IV)	1.081.965.00
	1 Wiedergabe-Vorverstaerker 2CH	
	im Kopftraeger eingebaut	1.020.708.00
{2}	1 Anschlussfeld	1.080.989.00
	mit Stummschaltkreis)	/1.080.997.00
	1 Stabilisator-Steckkarte	1.080.988.00
	(hinter Anschlussfeld)	
{3}	2 Aufnahmeverstaerker	1.081.960.81
	mit Entzerrung (IEC I/II-IV)	1.081.964.00
{5}	1 Oszillator	1.080.984.00
{6}	1 Entzerrungs-Umschalter	1.081.955.81

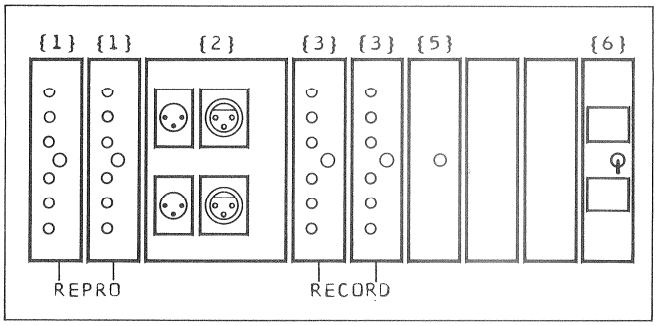


Fig.5.2

A80/QC-1REC/2REPRO

mit Stereo-Halbspur-Aufnahme-
und Wiedergabekoepfen

Audio-Elektronik bestehend aus: -> Fig.5.3

{1}	2 Wiedergabe-Verstaerker	1.081.952.81
	mit Entzerrung (IEC I/II-IV)	1.081.965.00
	1 Wiedergabe-Vorverstaerker 2CH	
	im Kopftraeger eingebaut	1.020.708.00
{2}	1 Anschlussfeld	1.081.989.00
	mit Stummschaltkreis)	/1.080.997.00
	1 Stabilisator-Steckkarte	1.080.988.00
	(hinter Anschlussfeld)	
{3}	1 Aufnahmeverstaerker	1.081.960.81
	mit Entzerrung (IEC I/II-IV)	1.081.964.00
{5}	1 Oszillator	1.080.984.00
{6}	1 Entzerrungs-Umschalter	1.081.955.81

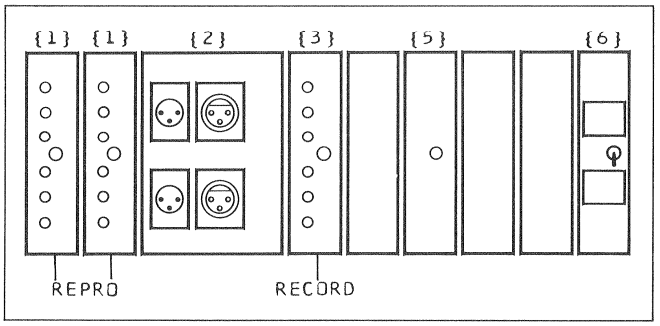


Fig.5.3

5.1.2
Bezeichnung der Regler und Anschluesse

Auf der mit FAST beschriebenen, oberen Haelfte der Einschub- Frontplatte befinden sich die Einstellregler fuer die IEC-I Entzerrungsnorm.

Wiedergabe-Verstaerker		**REPRO AMP**	**-> Fig.5.4**
{1}	Pegelregler	LEVEL	
{2}	Hoehenregler	TREBLE	IEC-I
{3}	Tiefenregler	BASS	
{4}	Uebersprechregler	CROSSTALK	
{5}	Pegelregler	LEVEL	
{6}	Hoehenregler	TREBLE	IEC-I/IV
{7}	Tiefenregler	BASS	
Aufnahme-Verstaerker		**RECORD AMP**	**-> Fig.5.5**
{8}	Pegelregler	LEVEL	
{9}	Hoehenregler	TREBLE	IEC-I
{10}	Vormagnetisierungs-regler	BIAS	
	Anschluss fuer	RECORD CURR	
{11}	Aufnahmestrom-Messung	RECORD CURR	
{12}	Pegelregler	LEVEL	
{13}	Hoehenregler	TREBLE	IEC-I/IV
{14}	Vormagnetisierungs-regler	BIAS	
Anschlussfeld			**-> Fig.5.6**
{15}	Leitungs-Eingang CH1		
{16}	Leitungs-Ausgang CH1		
{17}	Leitungs-Eingang CH2		
{18}	Leitungs-Ausgang CH2		
Oszillator			**-> Fig.5.6**
{19}	Anschluss fuer Loeschstrom-Messung	ERASE CURR	

5.1.3
Benoetigte Messgeraete und Hilfsmittel

- Tonfrequenz-Generator (Klirrfaktor 0,5%)
- Tonfrequenz-Millivoltmeter (Frequenzbereich bis max.20kHz)
- Messbaender
- 2-Kanal-Oszilloskop
- Digital-Frequenzzaehler
- Frequenz-Analysator (nur fuer Uebersprech- Einstellungen erforderlich)
- Entmagnetisierungsdrossel 10.042.002.01
- Verlaengerungsprint 1.080.940
- Abgleich-Schraubenzieher

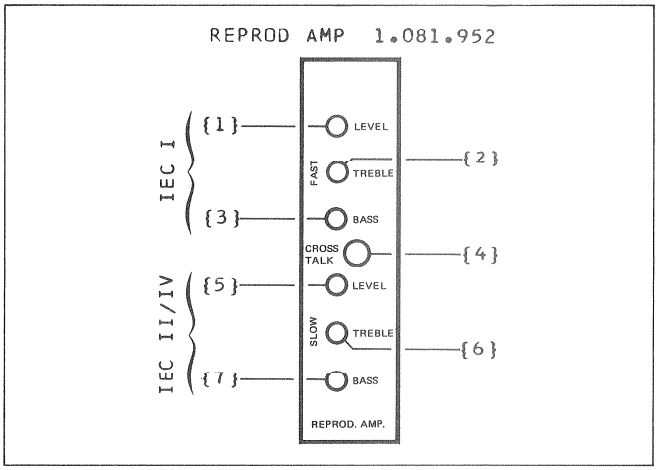


Fig.5.4

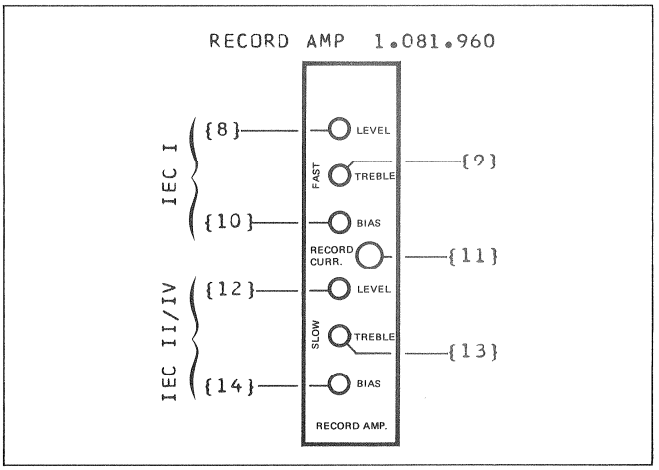


Fig.5.5

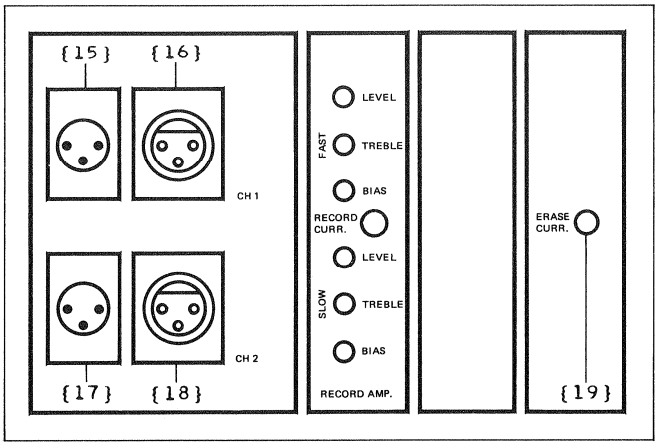


Fig.5.6

5.1.4
Wichtige Hinweise

- Bevor Steckkarten aus dem Rack gezogen, resp. in das Rack eingeschoben werden, muss das Geraet mindestens 5 Sekunden ausgeschaltet sein.

- Entriegeln der Einschuebe: Randrierte Knoepfe durch eine Vierteldrehung gegen den Uhrzeigersinn loesen.

- Vor Einstellungen an der Audio- Elektronik sind die Speisespannungen, wie in Kap. 4.2.2 beschrieben, zu kontrollieren.

- Vor Einstellarbeiten sind die Bandfuehrungs-Elemente und Tonkoepfe sorgfaeltig zu reinigen und zu entmagnetisieren.

5.1.5
Kontrolle der Audio-Speisespannungen

Wichtig
Vor Einstellungen an der Audio- Elektronik muss die Spannungs-Stabilisierung von +/-12V auf korrekten Wert ueberprueft werden.

Vorgehen:
Nach dem Entfernen des Audio- Anschlussfeldes (4 Raendelschrauben entriegeln), wird die Stabilisator-Steckkarte STABILIZER 1.980.988 zugaenglich.
-> Fig.5.7

- DC-Voltmeter an Testpunkte TP blk (0.0V) und TP red anschliessen und an Trimmpotentiometer R5 auf +12V abgleichen.
- DC-Voltmeter an Testpunkte TP blk (0.0V) und TP blu anschliessen und an Trimmpotentiometer R11 auf -12V abgleichen.

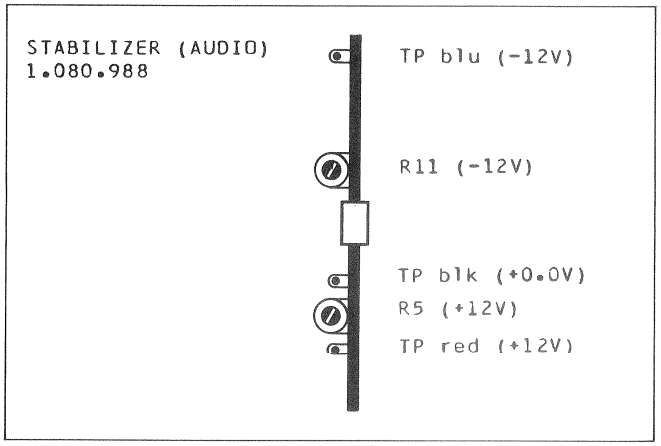


Fig.5.7

5.2
WIEDERGABE-EINSTELLUNGEN

5.2.1
Pegeleinstellungen an Wiedergabe- Verstaerker

-> Fig.5.8

1. Geraet einschalten.
2. Band einlegen und Entzerrungswahlschalter {20} auf die, der verwendeten Bandsorte entsprechende Entzerrung IEC-I oder -II/IV einstellen.
3. Tonfrequenz- Millivoltmeter am Leitungsausgang CH1 {16} anschliessen (Ausgang mit 200 Ohm, resp. 600 Ohm abschliessen).
4. Messband auf Wiedergabe starten (Abschnitt Bezugspegel 333Hz).
5. Erforderlichen Leitungspegel einstellen:
   IEC-I Einschub REPROD AMP. CH1
   Regler {1} LEVEL (FAST)
   IEC-II/IV Einschub REPROD AMP. CH1
   Regler {5} LEVEL (SLOW)
6. Bei 2-Kanal-Geraeten:
   Einstellung analog 1...5
   jedoch am Einschub REPROD. AMP. CH2

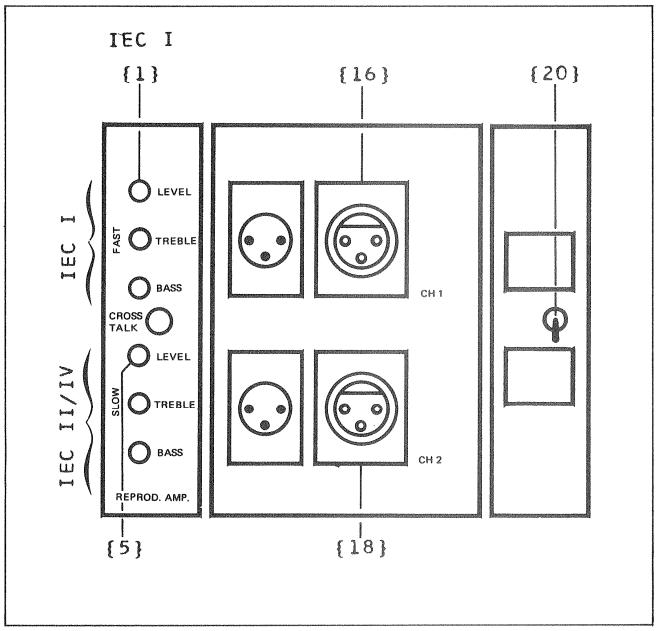


Fig.5.8

5.2.2
Wiedergabe- Kopfspalteinstellung (Azimuth)

Die folgende Phaseneinstellung kann mit einem 2- Kanal- Oszilloskop (Abschnitt A) oder nach der Phasen- Methode (Abschnitt B) durchgefuehrt werden. Die Wahl der Methode richtet sich nach den verfuegbaren Messgeraeten.

A Messmethode mit 2-Kanal-Oszilloskop

-> Fig.5.9

1. Geraet einschalten.
2. Oszilloskop an Leitungsausgaenge {16} CH1 und CH2 anschliessen.
3. Testband im Abschnitt "Spalteinstellung 10kHz" auf Wiedergabe starten.
4. Die beiden Ausgangspegel des Geraetes auf identische Amplitude vorabgleichen
   Einschuebe REPRO AMP
   Regler {2} TREBLE/IEC-I (FAST)
5. Wiedergabekopf mittels Azimuth- Einstellknopf auf maximalen Ausgangspegel und auf geringste Phasenwinkel-Differenz einstellen.

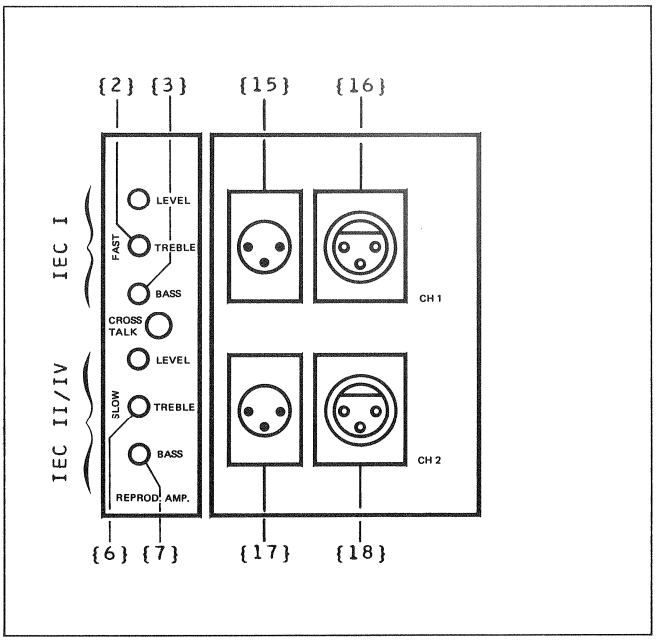


Fig.5.9

B Phasenmethode

-> Fig.5.9...5.11

1. Geraet einschalten.
2. Testband im Abschnitt "Spalteinstellung" 10kHz auf Wiedergabe starten.
3. Tonfrequenz-Millivoltmeter an Leitungs-Ausgang {16} CH1 und nachfolgend an {18} CH2 anschliessen. Mit den entsprechenden Reglern {2} TREBLE/IEC-I, an den Einschueben REPROD AMP. auf identische Ausgangspegel vorabgleichen.
4. Tonfrequenz- Millivoltmeter **gegenphasig** an die beiden Leitungsausgaenge CH1 {16} und CH2 {18} anschliessen -> Fig.5.10b
5. Wiedergabekopf mit dem Azimuth- Einstellknopf auf minimale Anzeige abgleichen. Diesen Differenzpegel Pd ablesen und notieren (dB).
6. Tonfrequenz- Millivoltmeter **gleichphasig** an die beiden Leitungsausgaenge CH1 {16} und CH2 {18} anschliessen -> Fig.5.10a
7. Ablesen des Summenpegels Ps.
8. Fuer die Ermittlung der Phasenwinkel-Differenz gemaess Fig.5.11 ist die Pegeldifferenz Ps-Pd zu bilden. Die vorhandene Phasenwinkeldifferenz kann aus dieser Kurve herausgelesen werden.

5.2.3
Wiedergabe- Frequenzgang Abgleich

-> Fig.5.9

1. Geraet einschalten.
2. Messband auflegen.
3. Tonfrequenz-Millivoltmeter an Leitungs-Ausgang CH1 {16} anschliessen.
4. Messband im Abschnitt "Bezugspegel" auf Wiedergabe starten und Leitungspegel kontrollieren.
5. Messband im Abschnitt "Frequenzgang" auf Wiedergabe starten.
6. Hoehenkorrektur bei 10kHz vornehmen: Regler {2} TREBLE, Einschub REPROD AMP. CH1
7. Tiefenkorrektur im unteren Tonfrequenzbereich (100Hz) vornehmen: Regler {3} BASS, Einschub REPROD AMP. CH1
8. Fuer die Einstellungen des Verstaerkers CH2 gilt das gleiche Vorgehen.

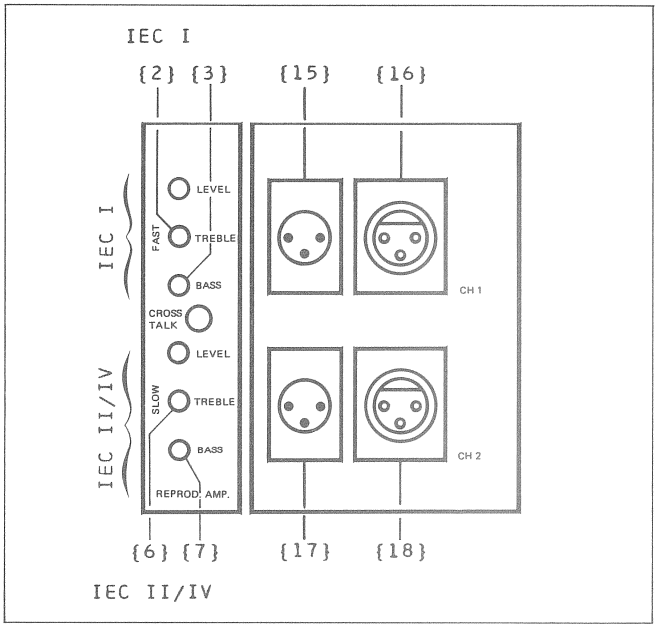


Fig.5.9

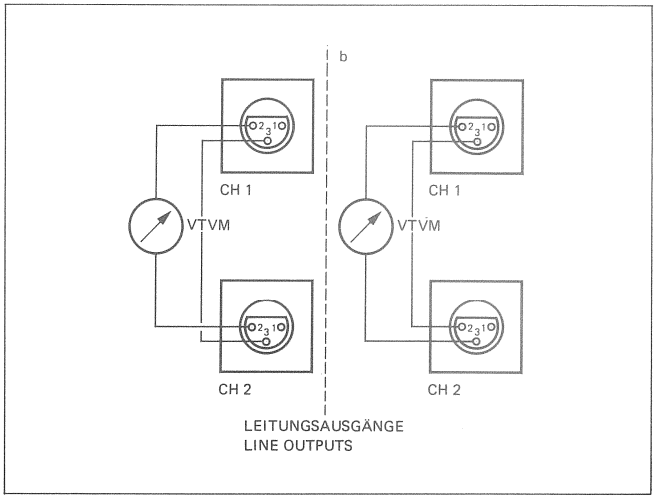


Fig.5.10

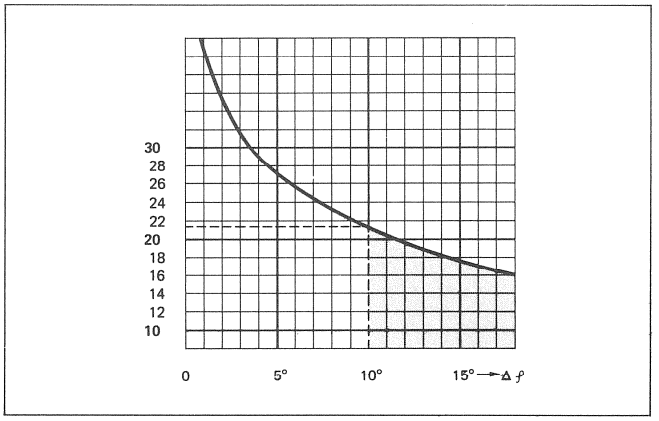


Fig.5.11

5.3
AUFNAHME-EINSTELLUNGEN

Hinweis
Wo die Anwendung von neuem Band vorgeschrieben ist, kann auch bespieltes Band verwendet werden. Die Aufzeichnung wird beim Aufnahmevorgang geloescht.

5.3.1
Kontrolle der Oszillator-Frequenz

-> Fig.5.13/5.14

1. Geraet einschalten.
2. Digital- Frequenzzaehler an Anschluss {19} (ERASE CURR) anschliessen.
3. Neues, unbespieltes Band der gewuenschten Bandsorte auflegen und das Geraet auf Aufnahme starten.
4. Oszillatorfrequenz messen.
   Diese soll 150kHz +/-3kHz betragen.
   Liegt die Oszillatorfrequenz ausserhalb des Toleranzbereiches, muss der Oszillator justiert werden.
5. Geraet ausschalten.
   Oszillator-Einschub 1.080.984 herausziehen.
   Verlaengerungsprint 1.080.940 einsetzen und Oszillatorkarte aufstecken.
6. Geraet einschalten und auf Aufnahme starten
7. Oszillatorspule L2 auf 150kHz abgleichen.
8. Geraet ausschalten. Verlaengerungsprint herausziehen und Oszillatoreinschub in Verstaerkerkorb einstecken.
9. Geraet einschalten und auf Aufnahme starten.
10. Kontrollmessung der Oszillatorfrequenz:
    Liegt die Frequenz ausserhalb des Toleranzbereiches, sind die Einstellungen gemaess Position 5...7 zu wiederholen.

5.3.2
Pegeleinstellung der Aufnahme- Verstaerker

1. Geraet einschalten.
2. Tonfrequenz-Millivoltmeter an Leitungs-Ausgang {16} CH1 anschliessen.
3. Tonfrequenz- Generator an Leitungs- Eingang {15} CH1 anschliessen.
   Frequenz: 1kHz, Pegel: Leitungspegel
4. Neues, leeres Band auflegen und auf Aufnahme starten.
5. Regler LEVEL {8} oder {12} am Einschub RECORD AMP. CH1 auf Leitungspegel einstellen.
6. Bei zwei Aufnahmekanaelen: Pegeleinstellung bei Kanal CH2 analog den Positionen 1...5 vornehmen.

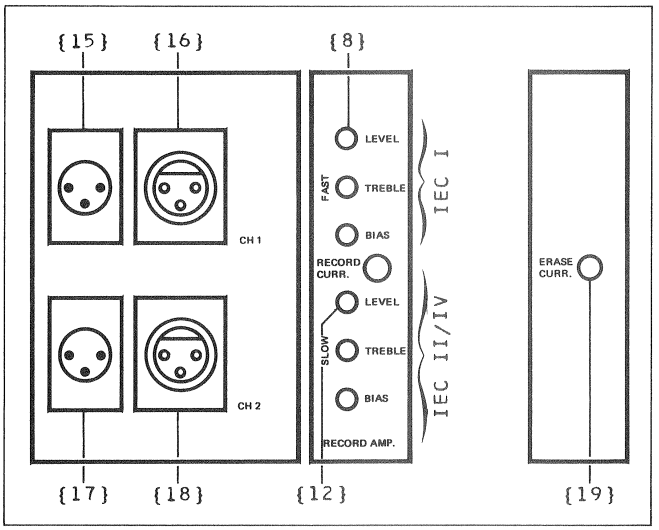


Fig.5.13

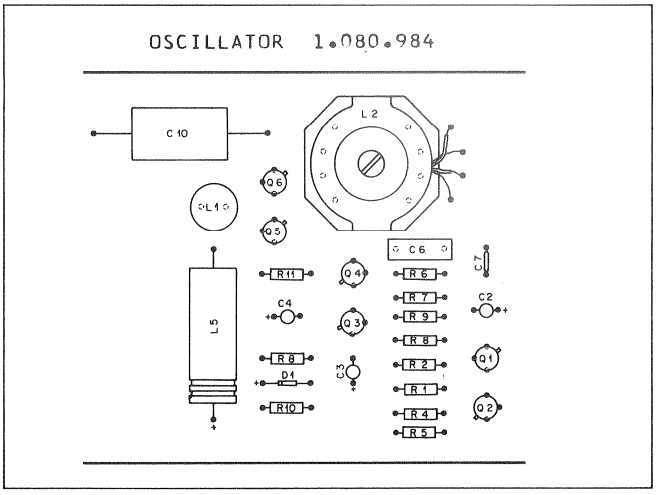


Fig.5.14

5.3.3
Aufnahme-Kopfspalteinstellung (Azimuth)

-> Fig.5.15/5.16

Die folgende Phaseneinstellung kann mit einem 2-Kanal- Oszilloskop (Abschnitt A) oder nach der Phasenmethode (Abschnitt B) durchgefuehrt werden. Die Wahl der Methode richtet sich nach den verfuegbaren Messgeraeten.

A Messmethode mit 2-Kanal-Oszilloskop

1. Geraet einschalten.
2. Tonfrequenz-Generator parallel an die beiden Leitungs- Eingaenge Kanal CH1 {15} und Kanal CH2 {17} (CH1+CH2) anschliessen (Pegel 26dB unter Bezugspegel, Frequenz 1...10kHz).
3. 2-Kanal- Oszilloskop an Leitungs- Ausgaenge Kanal CH1 {16} und Kanal CH2 {18} (CH1+CH2) anschliessen.
4. Neuwertiges, leeres Band auflegen und auf Aufnahme starten.
5. Die beiden Ausgangspegel des Geraetes auf identische Amplitude abgleichen: Regler TREBLE {9} oder {13} der Einschuebe RECORD AMP.
6. Aufnahmekopf mittels Spaltjustier- Schraube {A} auf geringste Phasenwinkel- Differenz einstellen; bei schrittweiser Erhoehung der Frequenz von 1...10kHz. (Anzeigeverzoegerung beachten, deshalb besonders langsam einstellen).

B Phasenmethode

1. Geraet einschalten.
2. Tonfrequenz-Generator an die beiden Leitungs-Eingaenge Kanal CH1 {15} und CH2 {17} (CH1+CH2) anschliessen. Pegel 15dB, Frequenz 10kHz
3. Neuwertiges, leeres Band auflegen und das Geraet auf Aufnahme starten.
4. Die weiteren Einstell- und Messvorgaenge sind analog dem Kapitel 5.2.2, Abschnitt B durchzufuehren (anstelle Azimuth- Einstellknopf, Spaltjustierschraube A, Fig.5.15).

   Zugehoerige Anschluesse und Regler:
   Leitungs-Ausgaenge {16} und {18},
   Regler TREBLE {9} oder {13}.

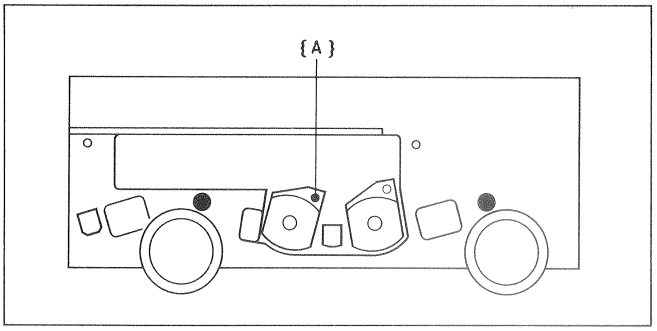


Fig.5.15

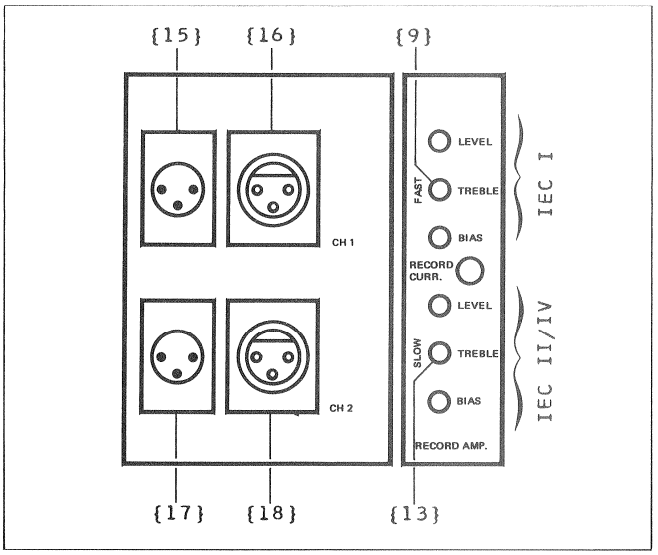


Fig.5.16

5.3.4
Vormagnetisierung (BIAS)

Bei der Wahl der Vormagnetisierungs- Einstellung ist ein Kompromiss zu schliessen zwischen Verzerrungsgrad, Frequenzgang, Modulationsrauschen und Aussteuerungsgrad. Die Vormagnetisierungs-Einstellung wird weiter nicht allein durch die Bandsorte bestimmt, sondern ist stark abhaengig von der Spaltbreite des Aufnahmekopfes.
Bei der Vormagnetisierungs- Einstellung wird der HF-Strom (bei konstantem NF-Signal) soweit ueber das Empfindlichkeits- Maximum des entsprechenden Bandes erhoeht, bis die NF- Ausgangs-Spannung um einen bestimmten Betrag, (Delta U) abgesunken ist. -> Fig. 5.17
Fuer die ueblicherweise verwendeten Bandsorten betraegt diese Absenkung ca. -5dB.
Die Vormagnetisierungs-Einstellung erfolgt mit einer Modulationsfrequenz von 8kHz. Um Uebersteuerungen und Fehlmessungen zu vermeiden, ist der Eingangspegel auf -26dB gegenueber dem Bezugspegel (Operating Level) zu reduzieren.

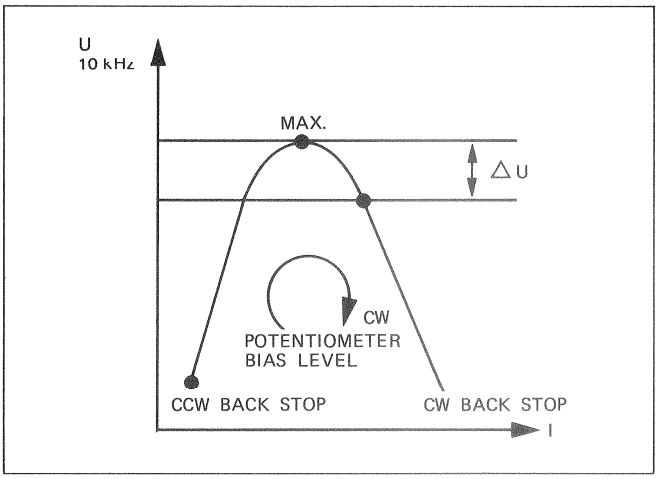


Fig.5.17

Vormagnetisierung
-> Fig.5.17

1. Geraet einschalten.
2. Tonfrequenz-Millevoltmeter an Leitungs-Ausgang {16} Kanal CH1 anschliessen.
3. Tonfrequenz- Generator an Leitungs- Eingang {17} Kanal CH1 anschliessen.
   Frequenz: 8kHz,
   Pegel: 26dB unter Bezugspegel
4. Neuwertiges oder leeres Band auflegen und Geraet auf Aufnahme starten.
5. Regler LEVEL, {8} oder {12}
   Einschub RECORD AMP, CH1 vorlaeufig so einstellen, dass das Tonfrequenz- Millivoltmeeinen Ausschlag von 26dB unter Bezugspeanzeigt.
6. Regler BIAS, {10} oder {14}
   Einschub RECORD AMP., CH1: -> Fig.5.17
   vom linken Anschlag {CCW BACK STOP} im Uhrzeigersinn {CW} aufdrehen, bis die Maxianzeige {MAX.} am Tonfrequenz- Millivoltmeter erreicht ist (=Empfindlichkeits- Maximum des Tonbandes). Den Regler im Uhrzeigersinn {CW} weiterdrehen, bis die Anzeige am Millivoltmeter um -5dB gesunken ist.
7. Tonfrequenz-Generator auf 1kHz einstellen und Pegeleinstellung kontrollieren.
8. Bei 2-Kanal-Geraeten:
   Vormagnetisierungs- Abgleich fuer Kanal CH2 analog dem Einstellablauf 1...7 ausfuehren.
   Anschluesse: Leitungs- Eingang {17}
   Leitungs- Ausgang {18}

Achtung
Die Kanaele beeinflussen sich gegenseitig.

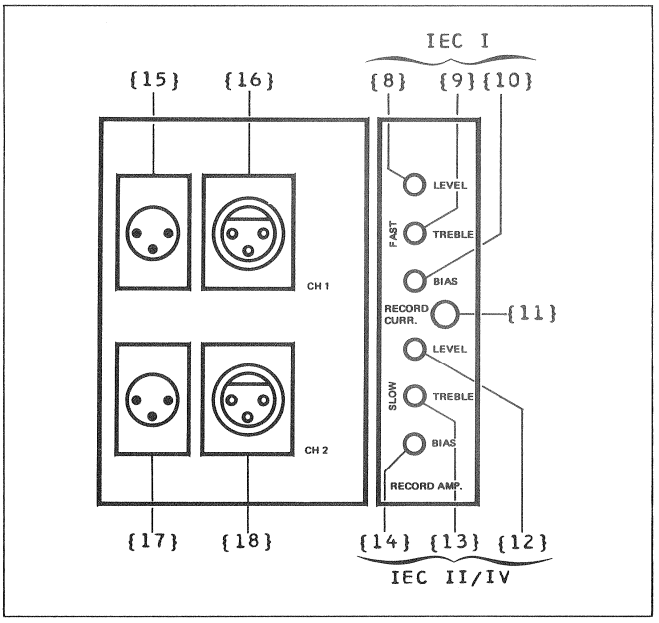


Fig.5.18

5.3.5
Frequenzgang-Abgleich

-> Fig.5.19

1. Tonfrequenz- Generator an Leitungs- Eingang {15}, Kanal CH1 anschliessen.
   Frequenz: 10kHz
   Pegel: 26dB unter Bezugspegel
2. Neuwertiges, leeres Band auflegen und auf Aufnahme starten.
3. Hoehenkorrektur mit Regler TREBLE {9} oder {13}, Einschub RECORD AMP., CH1 vornehmen.
4. Tonfrequenz- Generator im unteren Frequenzbereich (30...100Hz) variieren.
5. Tiefenkorrektur mit Regler BASS {3} oder {7} , Einschub REPROD AMP., CH1 vornehmen. Auf linearen Ausgangspegel einstellen.
6. Bei 2-Kanal-Geraeten:
   Frequenzgang-Abgleich fuer Kanal CH2 analog dem Einstellvorgang 1...5 ausfuehren.
   Anschluesse: Leitungs- Eingang {17}
   Leitungs- Ausgang {18}

Frequenzgang "Ueber Band" kontrollieren

1. Geraet einschalten.
2. Tonfrequenz-Millivoltmeter an Leitungs-Ausgang {16}, Kanal CH1 anschliessen.
3. Neuwertiges Band der gewuenschten Bandsorte auflegen.
4. Tonfrequenz- Generator an Leitungs- Eingang {15}, Kanal CH1 anschliessen.
5. Geraet auf Aufnahme starten.
6. Tonfrquenz- Generator innerhalb des gesamten Tonspektrums (30...18000Hz) durchstimmen; positive und negative Abweichungen notieren.
7. Bei 2-Kanal-Geraeten:
   Frequenzgang-Kontrolle fuer Kanal CH2 analog dem Einstellablauf 1...6 vornehmen.
   Anschluesse: Leitungs- Eingang {17}
   Leitungs- Ausgang {18}

80 Hz...12 kHz	+/-1 dB	
30 Hz...16 kHz	+1,5 dB	-3 dB
16 Hz...18 kHz	+1,5 dB	-5 dB

Anmerkung

Liegt der Frequenzgang nicht innerhalb der garantierten Daten, so sind zunaechst folgende Punkte zu ueberpruefen:

- Tonkoepfe verschmutzt oder magnetisiert.
- Spalteinstellung des Aufnahmekopfes nicht korrekt.
- Aufnahmepegel fuer die verwendete Bandsorte zu hoch; das Band arbeitet bei hohen Frequenzen im Saettigungsbereich.
- Vormagnetisierungs-Einstellung nicht korrekt durchgefuehrt oder falsche Bandsorte.
- Hoeheneinstellung (TREBLE) nicht korrekt.

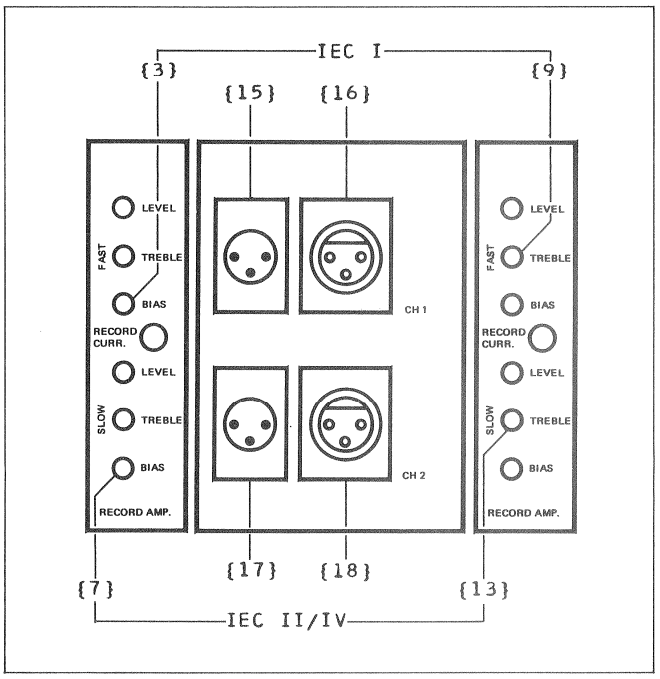


Fig.5.19

5.3.6
Einstellung der Uebersprech- Kompensation

-> Fig.5.20

1. Geraet einschalten.
2. Tonfrequenz- Generator an Leitungs- Eingang {15}, Kanal CH1 anschliesen.
   Pegel: Bezugspegel
   Frequenz: 3kHz
3. Frequens- Analysator an Leitungs- Ausgang {18}, Kanal CH2 anschliessen.
4. Neuwetiges, leeres Band der gewuenschten Bandsorte auflegen und Geraet auf Aufnahme starten.
5. Mit Regler {4} CROSSTALK, Einschub REPROD AMP. CH1, Uebersprechen auf Minimum Anzeige am Frequenz- Analysator einstellen.
6. Uebersprechen in vertauschter Reihenfolge: Tonfrequenz- Generator an Leitungs- Eingang {17}, Kanal CH2, Frequenz- Analysator an Leitungs- Ausgang {16}, Kanal CH1 anschliessen. Mit Regler {4} CROSSTALK, Einschub REPROD AMP. , Uebersprechen auf Minimum Anzeige abgleichen (analog dem Einstellvorgang 1...5).

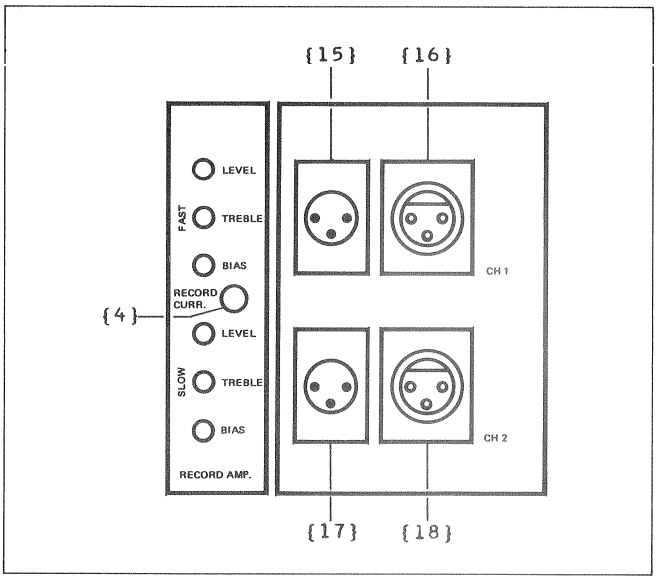


Fig.5.20

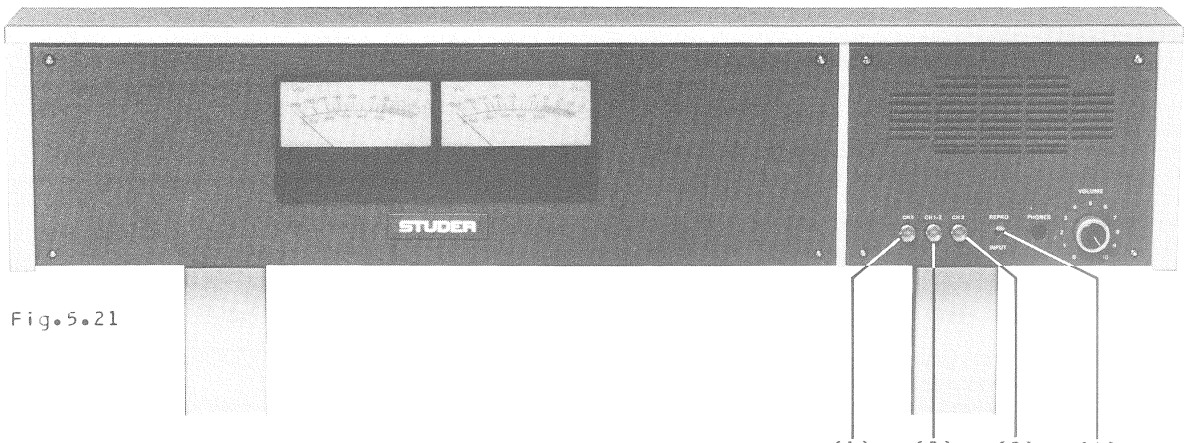


Fig.5.21

	{1}	{2}	{3}	{4}
A80/QC-REC/REPRO	CH1	CH1+2	CH2	REPRO INPUT
A80/QC-REPRO	CH1 CH3	CH1+2 CH3+4	CH2 CH4	CH1+2 CH3+4

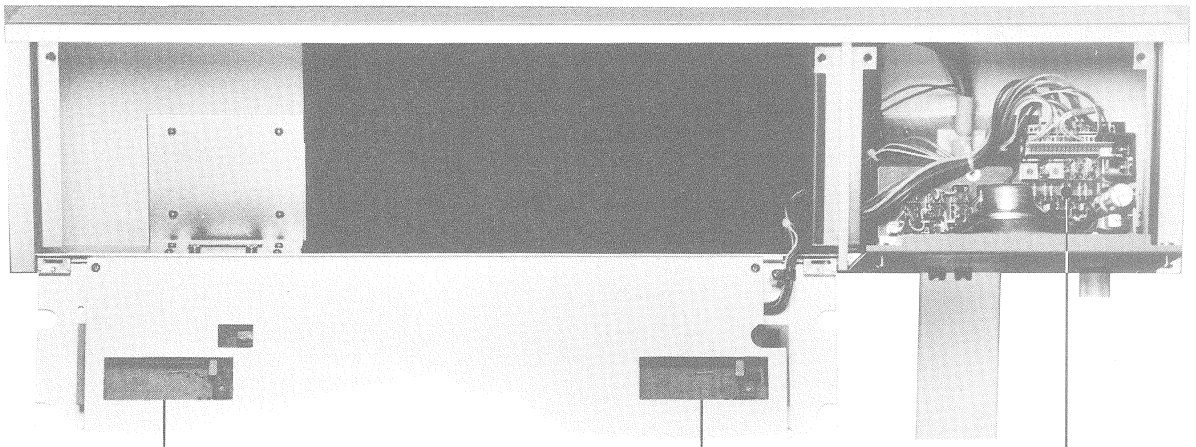
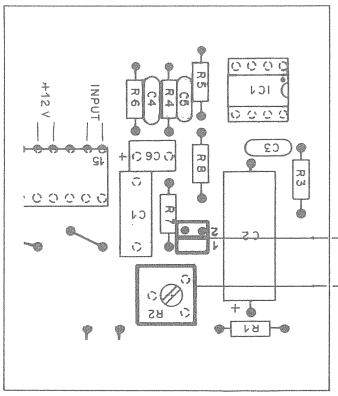


Fig.5.22

VU-METER AMP. 1.167.750

MONITOR BOARD 1.081.900



JS1

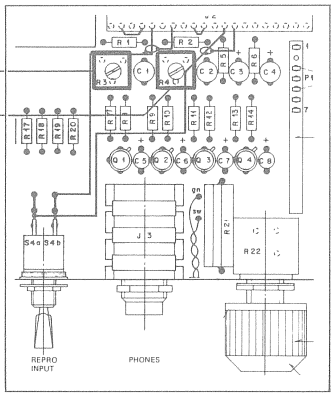
2 (0dB)

1 (6dB)

R2

R3

R4



5.4
VU-MONITOR (OPTION)

-> Fig.5.21/5.22

Hinweis
Alle Standard- Ausfuehrungen der Bandmaschine A80/QC koennen, unter Verwendung des Nachruestsatzes,
Bestell- Nummer 220.020.301.31
mit dem VU-Panel erweitert werden.

5.4.1
Bedienungshinweise

Die beiden VU- Meter zeigen die Leitungs- Ausgangspegel der, mit dem Umschalter {4} angewaehlten Kanaele an.

Wichtiger Hinweis fuer A80/QC-REPRO
mit umschaltbarar PLAY-Bandlaufrichtung:

Die Bandlaufrichtungs- Umschaltung PLAY > - PLAY < hat keinen Einfluss auf die Kanal- Anwahl der VU- Meter;
Folge: -> Fig.5.23
Bei entgegengesetzt zur Modulationsrichtung {<} oder {>} gewaehlter PLAY-Richtung {>} oder {<} erfolgt die Wiedergabe invers zur Aufnahme {<>/><}, mit entsprechender Aussteuerungs- Anzeige an den VU-Metern.
Gleichgerichtete Pfeile bedeuten Aufnahme-gerechte Wiedergabe.

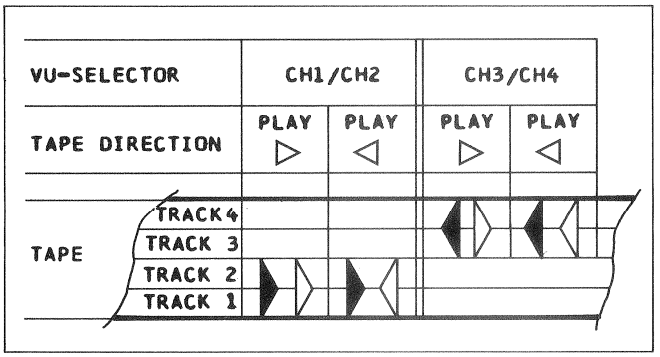


Fig.5.23

5.4.2
Abgleich der VU-Meter

Voraussetzung
Korrekte Einstellung der Audio- Elektronik, nach Kapitel 5.

Vorbereitung
Brueckenstecker JS1 (VU-METER AMP 1.167.750) auf Position 1 setzen (+6dB).

Aufnahme/Wiedergabe-Maschinen A80/QC-REC/REPRO

Wahlschalter {4} in Stellung REPRO:
- Maschine mit Testband, im Abschnitt "Bezugspegel", starten.
- Potentiometer R2 (VU-METER AMP 1.167.750): Abgleich der Anzeige auf o VU.

Wahlschalter {4} in Stellung INPUT:
- Leitungspegel in Leitungs-Eingang einspeisen
- Potentiometer R3 und R4 (MONITOR BOARD 1.081.900.81): Abgleich der Anzeige auf 0 VU.

Wiedergabe-Maschinen A80/QC-REPRO

Wahlschalter {4} in Stellung CH1+2.
- Maschine mit Testband, im Abschnitt "Bezugspegel" starten.
- Potentiometer R2 (VU-METER AMP 1.167.750): Abgleich der Anzeige auf 0 VU.

Wahlschalter {4} in Stellung CH3+4.
- Maschine mit Testband, im Abschnitt "Bezugspegel" starten.
- Potentiometer R3 und R4 (MONITOR BOARD 1.081.900.00): Abgleich der Anzeige auf 0 VU.

5 AUDIO ELECTRONICS

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5.1
GENERAL

5.1.1
Summary of machine versions

A80/QC-2REPRO

Reproduce-only version
with 2 stereo half-track reproduce heads

Audio-Electronics comprising: -> Fig.5.1

{1}	4 Reproduce amplifiers	1.081.952.81
	with equalization IEC I/II-IV	1.081.965.00
	1 Reproduce preamplifier 2x2CH	
	(installed in headblock)	1.020.709.00
{2}	1 Line connection panel	1.081.959.00
	(with muting circuit)	
	1 Stabilizer PCB	1.080.988.00
	(behind connector panel)	
{4}	1 Tacho signal converter	1.080.979.81
{6}	1 Equalization selector	1.081.355.81

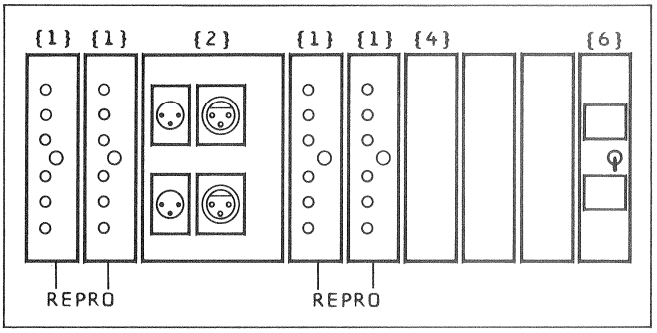


Fig.5.1

A80/QC-2REC/2REPRO

With full-track record head
and stereo half-track reproduce head

Audio electronics comprising: -> Fig.5.2

{1}	2 Reproduce amplifiers	1.081.952.81
	with equalization IEC I/II-IV	1.081.965.00
	1 Reproduce preamplifier 2CH	
	(installed in headblock)	1.020.708.00
{2}	1 Line connection panel	1.080.989.00
		/1.080.997.00
	1 Stabilizer PCB	1.080.988.00
	(behind connector panel)	
{3}	2 Record amplifiers	1.081.960.81
	with equalization IEC I/II-IV	1.081.964.00
{5}	1 Oscillator	1.080.984.00
{6}	1 Equalization selector	1.081.955.81

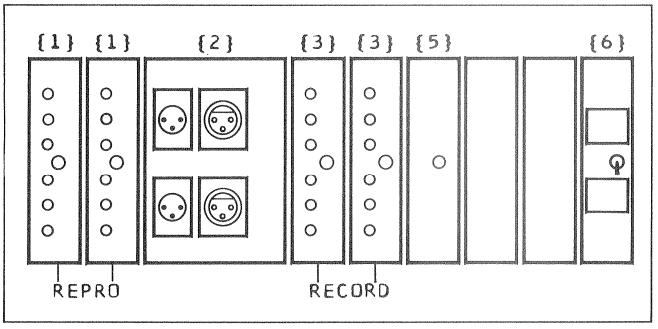


Fig.5.2

A80/QC-1REC/2REPRO

With stereo half-track record
and reproduce heads.

Audio electronics comprising: -> Fig.5.3

{1}	2 Reproduce amplifiers	1.081.952.81
	with equalization IEC I/II-IV	1.081.965.00
	1 Reproduce amplifier 2CH	
	(installed in headblock)	1.020.708.00
{2}	1 Line connection panel	1.081.989.00
		/1.080.997.00
	1 Stabilizer PCB	1.080.988.00
	(behind connector panel)	
{3}	1 Record amplifier	1.081.960.81
	with equalization IEC I/II-IV	1.081.964.00
{5}	1 Oscillator	1.080.984.00
{6}	1 Equalization selector	1.081.955.81

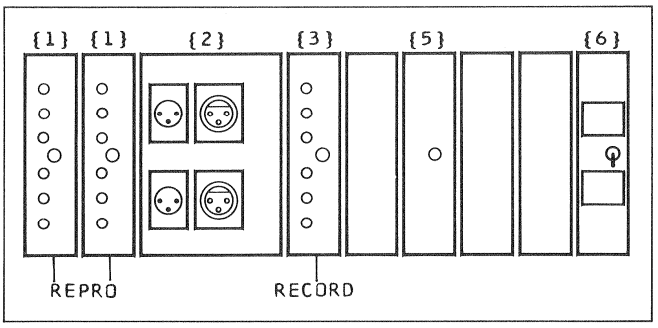


Fig.5.3

5.1.2
Identification of controls and connections

The controls for tape in accordance with IEC-I are located on the upper front side of module (inscription FAST)

Reproduce amplifier		REPRO AMP	-> Fig.5.4
{1}	Level control	LEVEL	
{2}	Treble control	TREBLE	IEC-I
{3}	Bass control	BASS	
{4}	Crosstalk control	CROSSTALK	
{5}	Level control	LEVEL	
{6}	Treble control	TREBLE	IEC-I/IV
{7}	Bass control	BASS	

Record amplifier		RECORD AMP	-> Fig.5.5
{8}	Level control	LEVEL	
{9}	Treble control	TREBLE	IEC-I
{10}	Bias control	BIAS	
{11}	Connection for record current measurement	RECORD CURR	
{12}	Level control	LEVEL	
{13}	Treble control	TREBLE	IEC-I/IV
{14}	Bias control	BIAS	

Line connection panel			-> Fig.5.6
{15}	Line input	CH1	
{16}	Line output	CH1	
{17}	Line input	CH2	
{18}	Line output	CH2	
Oscillator			-> Fig.5.6
{19}	Connector for erase current measurements	ERASE CURR	

5.1.3
Measuring instruments and aids

- Audio generator (distortion 0,5%)
- AF millivoltmeter (frequency range up to 20kHz)
- Calibration tapes
- 2-channel oscilloscope
- Digital frequency counter
- Frequency analyzer (only required for cross-talk alignments)

- Demagnetizing chocke 10.042.002.01
- Extender board (audio) 1.080.940
- Alignment screwdrivers

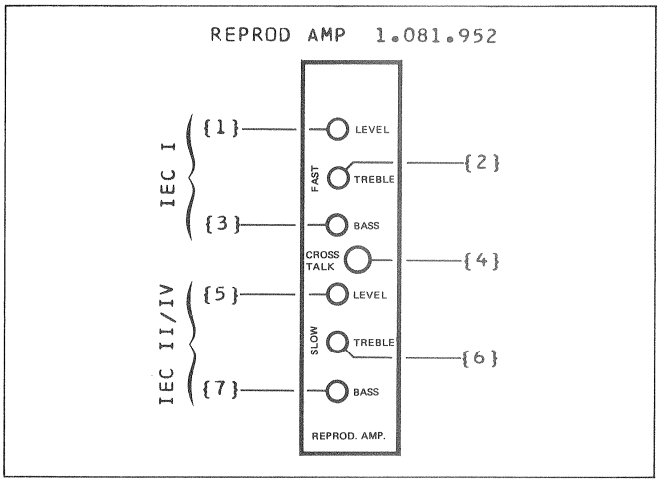


Fig.5.4

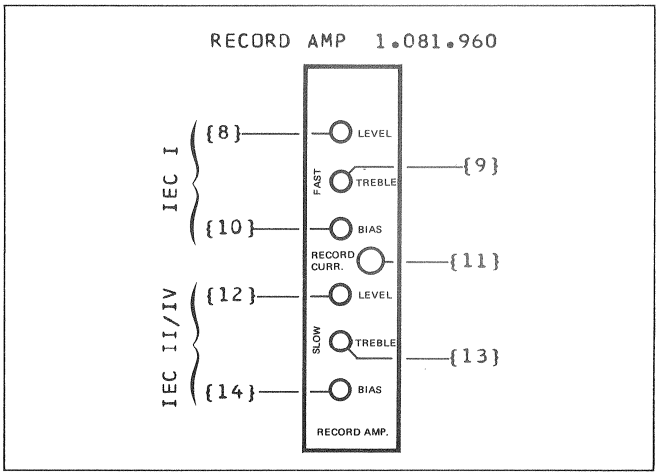


Fig.5.5

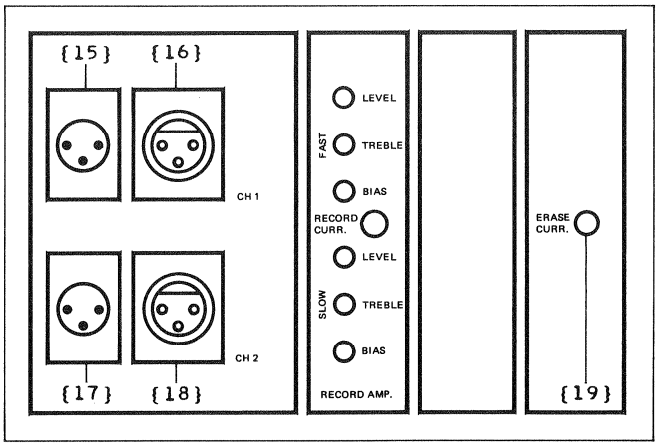


Fig.5.6

5.1.4
Important hints

- The recorder must have been switched off for at least 5 seconds before any circuit boards are removed from or inserted into the rack.

- Unlatching the moduls: unfasten the knurled knobs by giving them 1/4 CCW turn.

- Check the supply voltages according to Section 4.2.2 before making any adjustments to the audio electronics.

- Carefully clean and demagnetize the tape guidance elements and the soundheads before proceding with the alignment.

5.1.5
Checking the audio supply voltages

Important!
Check that the +/-12V stabilization is correct before making any adjustments to the audio electronics .

Procedure:
The STABILIZER PCB 1.980.988 becomes accessible after the audio connector panel has been removed (releasing 4 knurled thump screws).
-> Fig.5.7

- Connect DC voltmeter to TP blk (0.0V) and TP red and adjust with trimmer potentiometer R5 to +12V.
- Connect DC voltmeter to TP blk (0.0V) and TP blu and adjust with trimmer potentiometer R11 to -12V.

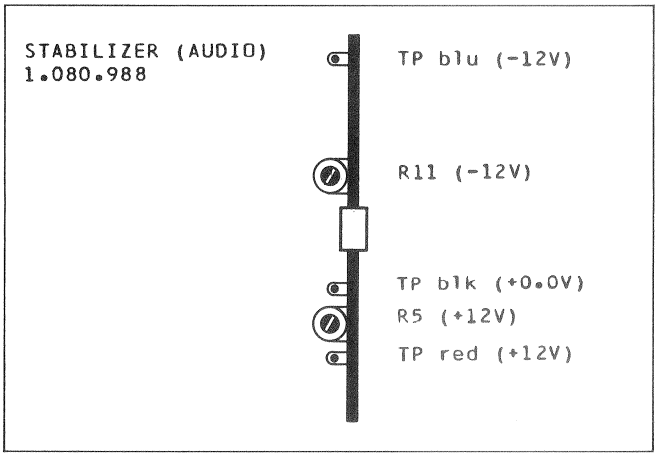


Fig.5.7

5.2
REPRODUCE ADJUSTMENTS

5.2.1
Adjusting the level of the reproduce amplifier

-> Fig.5.8

1. Switch recorder on.
2. Thread tape and set equalization selector {20} to the position that corresponds to the mounted tape IEC-I or IEC II/IV.
3. Connect AF millivoltmeter to line output CH1 {16} (terminate output with 200ohms or 600ohms respectively).
4. Play "reference level 333Hz" section of calibration tape.
5. Adjust required line level:

IEC-I	module	REPROD AMP. CH1
	control	LEVEL FAST {1}
IEC-II/IV	module	REPROD AMP. CH1
	control	LEVEL SLOW {5}

6. For 2-channel versions:
   Adjustments similar to steps 1...5, however on module REPROD AMP. channel CH2.

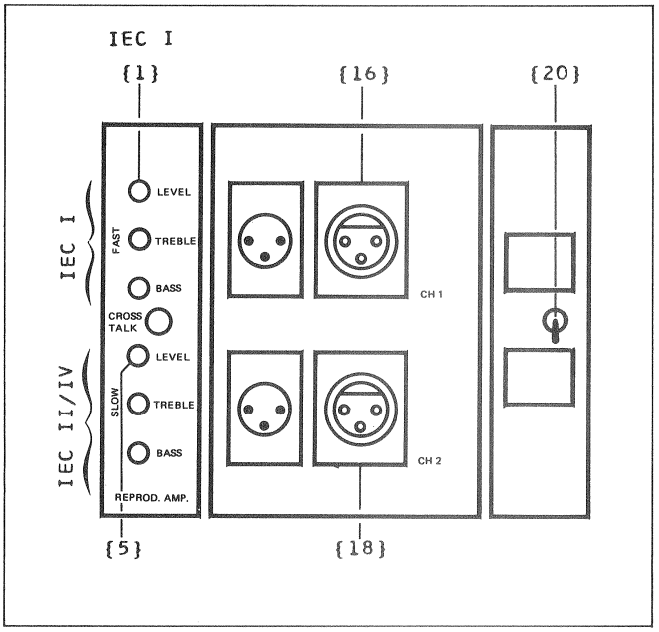


Fig.5.8

5.2.2
Reproduce head azimuth alignment

The following phase adjustment can be carried out either with a 2-channel scope (section A) or according to the phase method (section B). The method chosen depends on the test equipment available.

A Test method with 2-channel oscilloscope

-> Fig.5.9

1. Switch on machine.
2. Connect scope to line outputs {16} CH1 and CH2.
3. Start test tape with playback at section "azimuth adjustment 10kHz adjustment 10kHz".
4. Preadjust the two machine output levels to the same amplitude with controls {2} on REPROD AMP modules.
5. Align reproduce head with azimuth adjustment knob to maximum output level and minimum phase angle difference between the channels.

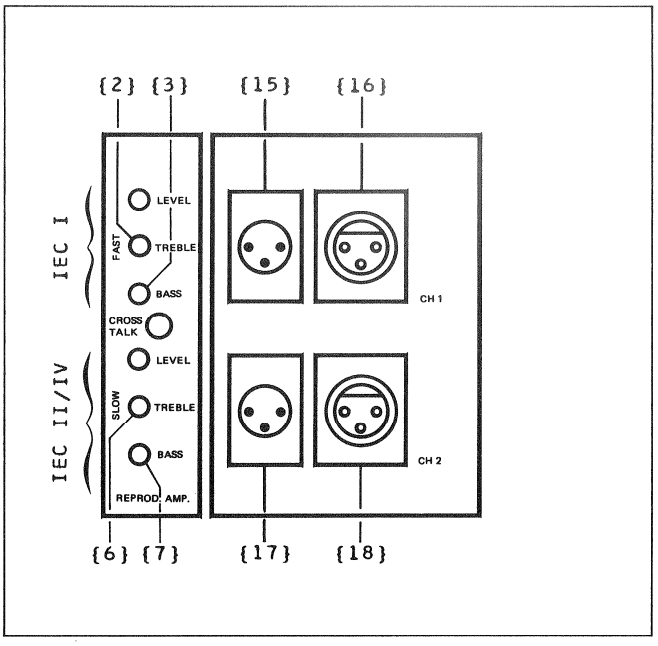


Fig.5.9

B Counter phase method

-> Fig.5.9...5.11

1. Switch on machine.
2. Start test tape with playback at section "azimuth adjustment 10kHz".
3. Connect AF millivoltmeter to line output {16} CH1 and then to line output {18} CH2. Preadjust to identical output levels with the corresponding controls {2} TREBLE/IEC-I
4. Conect AF millivoltmeter with reversed phases to the two line outputs {16} CH1 and {18} CH2 according to fig. 5.10b
5. Align reproduce head with azimuth adjustment screw to minimum reading. Make a note of the difference in level Pd (dB).
6. Connect AF millivoltmeter with correct phasing to the two line outputs {16} CH1 and {18} CH2 according to fig. 5.10a.
7. Read total level Ps.
8. To find the phase angle difference according to fig.5.11 take the difference in level Ps - Pd. The angle of error can be read from the curve.

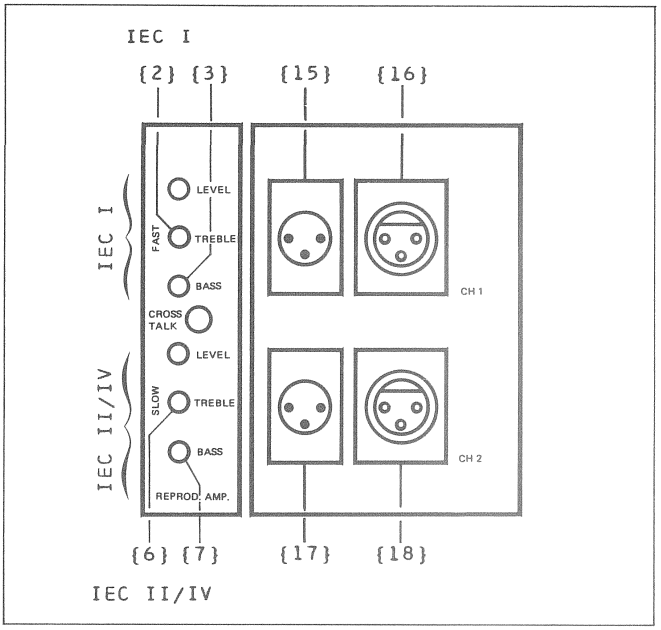


Fig.5.9

5.2.3
Reproduce frequency response alignment

-> Fig.5.9

1. Switch on machine.
2. Thread test tape.
3. Connect AF millivoltmeter to line output {16} CH1.
4. Start test tape with playback at section "operation level" and check line level.
5. Start test tape with playback at section "frequency response".
6. Correct treble with control {2} TREBLE on REPROD AMP module CH1 at 10kHz.
7. Correct bass in lower frequency range (100Hz) with control {3} BASS on REPROD AMP module CH1.
8. Same procedure for further amplifiers.

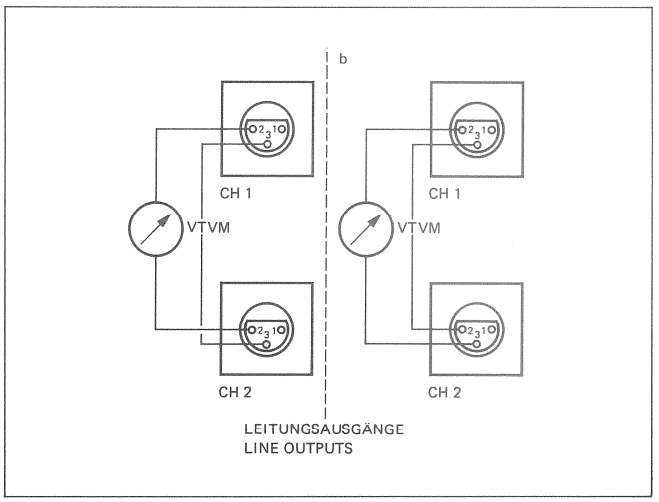


Fig.5.10

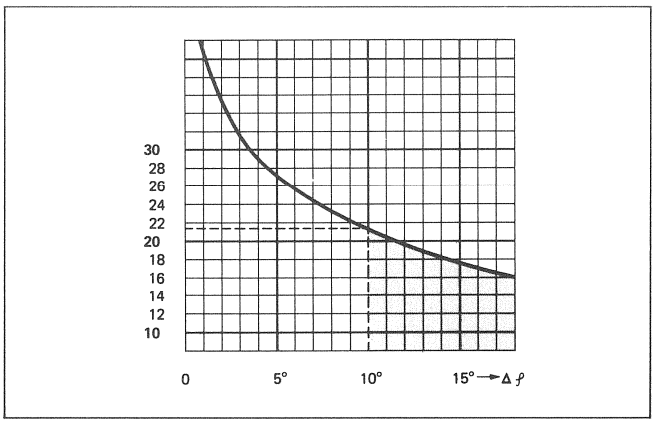


Fig.5.11

5.3
RECORD ADJUSTMENTS

Note
Whereever the use of blank tape is specified, prerecorded tape can also be used. The recording is erased during the recording process.

5.3.1
Check of oscillator frequency

1. Switch on machine.
2. Connect a digital frequency meter to socket {19} ERASE CURR.
3. Thread a blank tape of the required type and start on record.
4. Measure the oscillator frequency which should be 150kHz +/- 3kHz.
   If the frequency lies beyond the tolerance, the oscillator must be adjusted.
5. Switch off machine. Take out oscillator module 1.080.984.
   Insert extension board 1.080.940 and plug oscillator module into extension board.
6. Switch on machine and start on record.
7. Adjust oscillator coil L2 to 150kHz.
8. Switch off machine.
   Take out extension board. Insert oscillator module in amplifier bay.
9. Switch on machine and start on record.
10. Check measurement of oscillator frequency.
    If the frequency of the fitted oscillator module lies beyond tolerance, repeat adjustments 5...7.

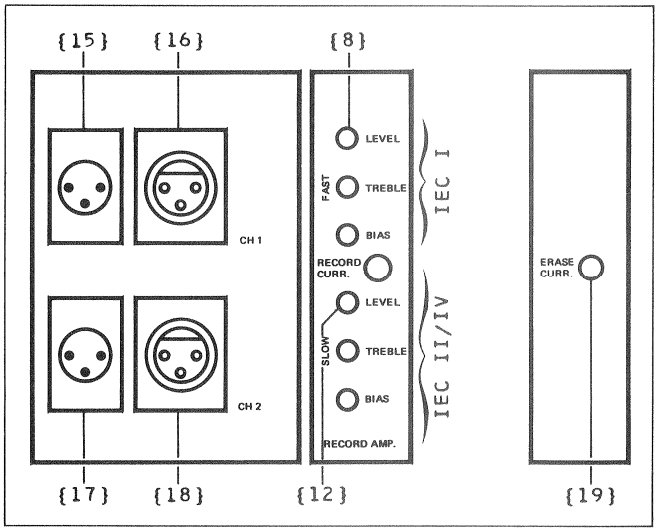


Fig.5.13

5.3.2
Record amplifier level adjustments

1. Switch on machine.
2. Connect AF millivoltmeter to line output {16} CH1.
3. Connect AF oscillator to line input {15} CH1
   Frequency: 1kHz
   Level: line level
4. Thread a blank tape of the required type and start on record.
5. Set control {8} resp. {12} LEVEL on RECORD AMP module CH1 to line level.
6. With two record channels: Adjust level of channel 2 (CH1) according to steps 1...5 above.

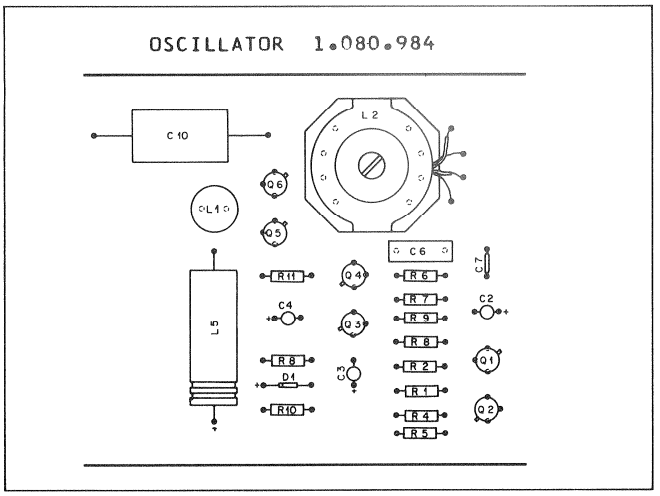


Fig.5.14

5.3.3
Record head azimuth alignment

-> Fig.5.15/5.16

The following phase adjustment can be carried out either with a 2-channel scope (section A) or according to the phase method (section B). The method can chosen depends on the test equipment available.

A Test method with 2-channel oscilloscop

1. Switch on machine.
2. Connect AF oscillator in parallel to the two line inputs channel 1 {15} and channel 2 {17} (CH1+CH2). Level: 26dB below reference level. Frequency: 1...10kHz.
3. Connect 2-channel scope to line outputs channel 1 {16} and channel 2 {18} (CH1+CH2)
4. Thread blank tape of the required type and start machine on record.
5. Adjust the two machine output levels to the same amplitude (control {9} resp. {13} TREBLE on RECORD AMP modules).
6. Adjust record head with azimuth adjusting screw {A} to minimum phase angle difference, starting at 1kHz and raising the frequency step by step to 10kHz.
   (Note: the reading is delayed, therefore, adjust especially slowly).

B Counter phase method

1. Switch on machine.
2. Connect AF oscillator to the two line input channels 1 {15} and 2 {17} (CH1+CH2)
   Level: 15dB Frequency: 10kHz
3. Thread blank tape of the required type and start the machine on record.
4. The subsequent measuring and adjusting procedure is carried out according to section 5.2.2 (instead of azimuth adjustment knob, azimuth adjustment screw {A} fig.5.15).

   The corresponding controls and connections are: line outputs {16} and {18}, control TREBLE {9} resp. {13}.

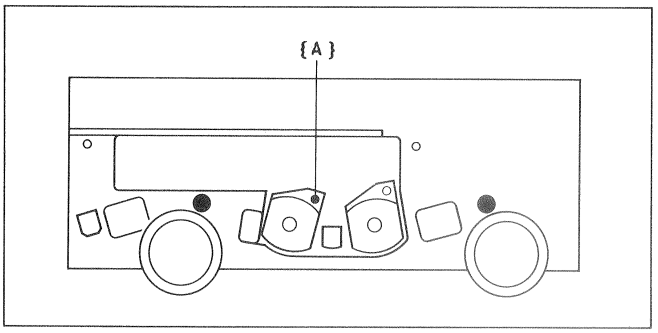


Fig.5.15

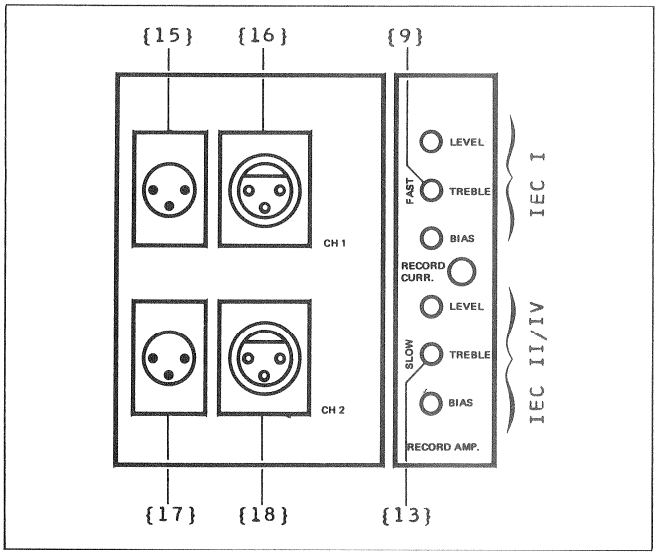


Fig.5.16

5.3.4
Bias

When chosing a bias setting a compromise has to be made between distortion, frequency response, modulation noise and modulation level.

Also the bias setting is determined not only by the kind of tape, but to large extend also by the gab width of the recording head.

To adjust the bias, the HF curent is raised (while the AF signal is constant) beyond the maximum output level of the tape in question until the AF output voltage falls by an amount ? U. -> fig.5.17
Bias is adjusted at a modulation frequency of 8kHz. To avoid saturation and incorrect measurements, the input level has to be reducted -26dB below the operating level.

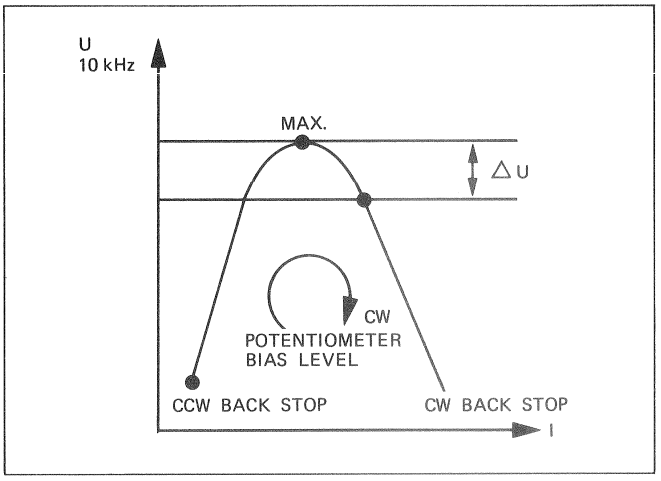


Fig.5.17

Bias
-> Fig.5.17

1. Switch on machine.
2. Connect AF millivoltmeter to line output channel CH1 {16}.
3. Connect AF oscillator to line input channel CH1 {17}.
   Frequency: 8kHz
   Level: 26dB below operating level.
4. Thread blank tape and start on record.
5. Adjust control LEVEL {8} resp. {12} on module RECORD AMP CH1 provisionally so that the AF millivoltmeter indicates 26dB below operating level.
6. Turn control BIAS {10} resp. {14} on RECORD AMP module CH1 clockwise from its left stop until AF millivoltmeter shows maximim reading (maximum tape sensitivity).
   Continue turning AF millivoltmeter clockwise until reading has dropped by -5dB.
7. Set AF oscillator to 1kHz and check level adjustment.
8. With 2-channel machines:
   Adjust bias for channel CH2 according to steps 1...7 above.
   The corresponding connections and controls are:
   Line input {17}
   Line output {18}

Caution:
The two channels interfere with each other.

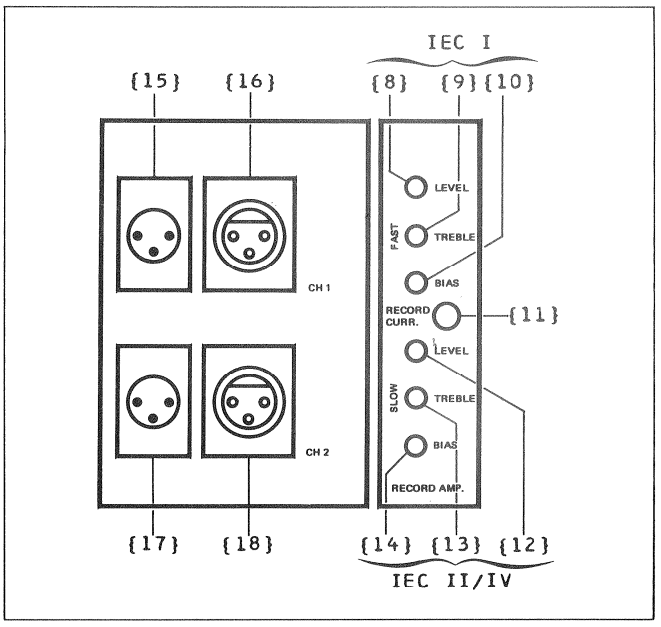


Fig.5.18

5.3.5
Frequency response alignment

-> Fig.5.19

1. Connect AF oscillator to line input channel CH1 {16}.
   Level: 26dB below operating level
   Frequency: 10kHz
2. Thread tape and start machine on record.
3. Correct treble with control TREBLE {9} resp. {13} on RECORD AMP modul CH1.
4. Sweep AF oscillator in the lower frequency range (30...100Hz).
5. Correct bass with control BASS {3} resp. {7} on REPROD AMP. modul CH1.
   Adjust on linear output level.
6. With 2-channels machines:
   Adjust frequency response for channel CH2 as described in steps 1...5.
   The corresponding connections are:
   Line input {17}
   Line output {18}

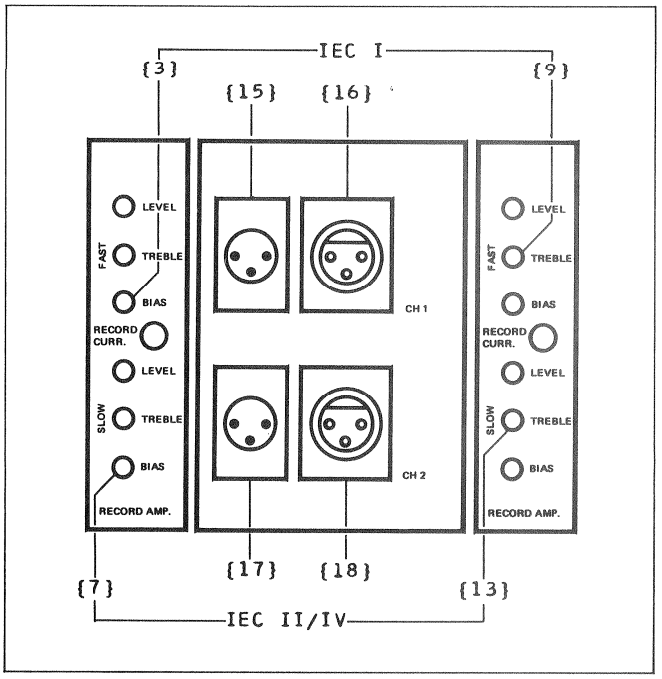


Fig.5.19

Checking the overall frequency response

1. Switch on machine.
2. Connect AF millivoltmeter to line output {16} channel CH1.
3. Thread blank tape of required tape.
4. Connect AF oscillator to line input {15} channel CH1.
5. Start machine on record.
6. Sweep AF oscillator across the whole audio range (30...18000Hz) and note the positive and negative deviations.
7. With 2-channel machines:
   Check frequency response of channel CH2 as describet in steps 1...6.
   The corresponding connections are:
   Line input: {17}
   Line output: {18}

80Hz...12kHz	+/-1dB	
30Hz...16kHz	+1.5dB	-3dB
16Hz...18kHz	+1.5dB	-5dB

Note
If the frequency response does not lie within guaranteed range, check the following:
- Heads soiled or magnetized.
- Azimuth adjustment of record head not correct
- Record level to high for the type of tape used. Tape is saturated at high frequencies.
- Bias not correctly adjusted or wrong type of tape.
- Treble adjustment not correct.

5.3.6
Crosstalk adjustment

-> Fig.5.20

1. Switch on machine.
2. Connect AF oscillator to line input {15} channel CH1.
   Level: operating level
   Frequency: 3kHz
3. Connect frequency analyser to line output {18} channel CH2.
4. Thread blank tape of the required type and start machine on record.
5. With control {4} CROSSTALK on REPROD AMP. CH1 adjust crosstalk to give minimum reading on frequency analyser.
6. Crosstalk in reverse sequence:
   Connect AF oscillator to line input {17} channel CH2, frequency analyser to line output {16} channel CH1 .
   Adjust crosstalk with control {4} on REPROD AMP. module CH2 to give minimum reading on frequency analyser (as in steps 2...5).

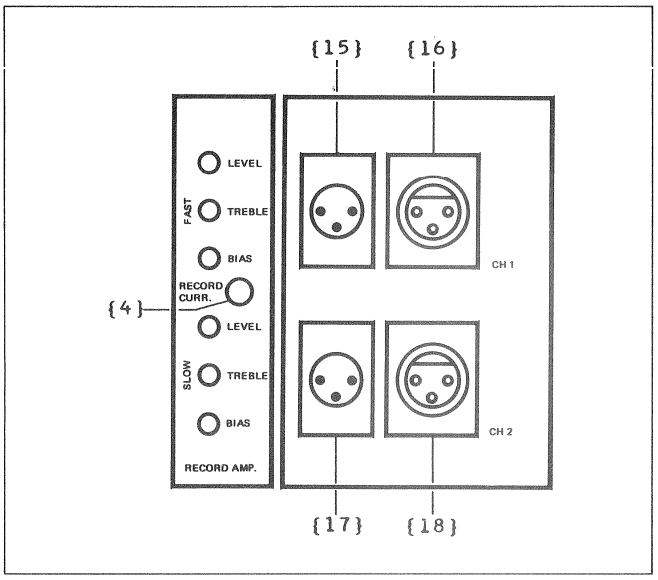


Fig.5.20

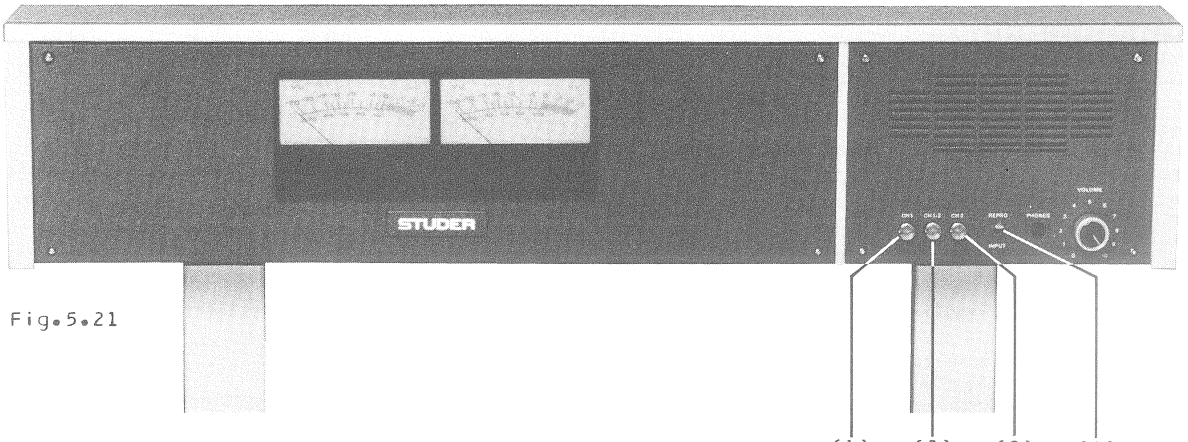


Fig.5.21

	{1}	{2}	{3}	{4}
A80/QC-REC/REPRO	CH1	CH1+2	CH2	REPRO INPUT
A80/QC-REPRO	CH1 CH3	CH1+2 CH3+4	CH2 CH4	CH1+2 CH3+4

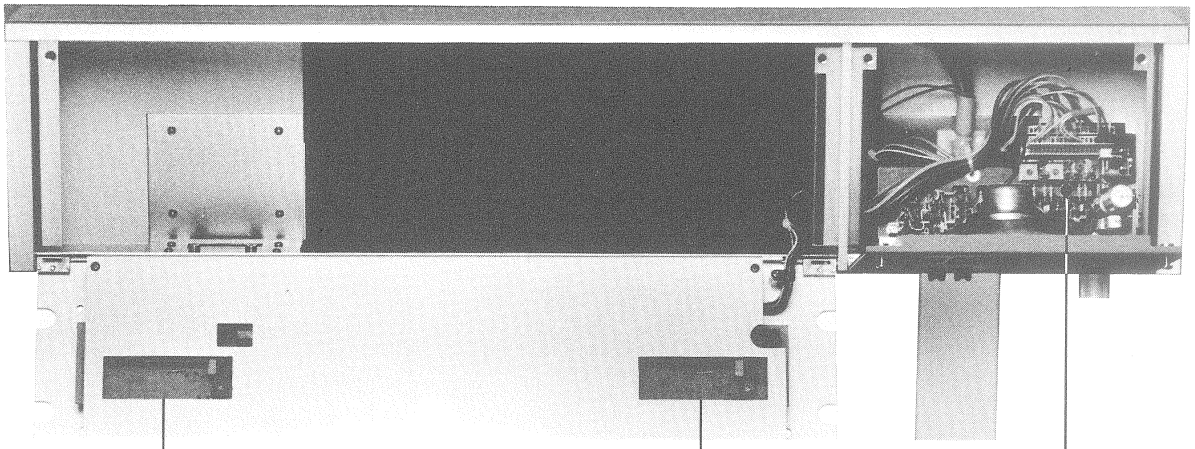
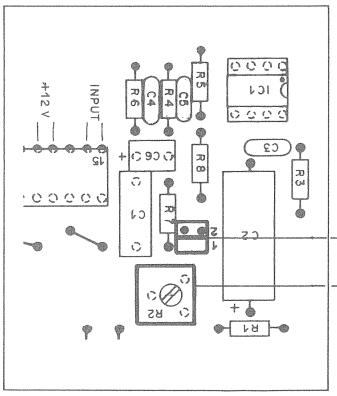


Fig.5.22

VU-METER AMP. 1.167.750

MONITOR BOARD 1.081.900



JS1

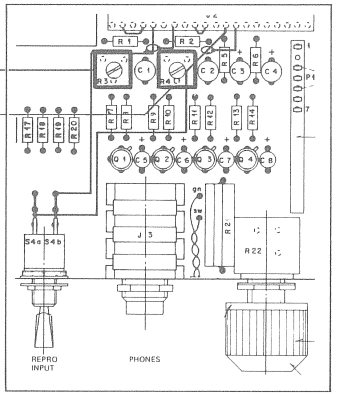
2 (0dB)

1 (6dB)

R2

R3

R4



5.4
VU MONITOR (OPTION)

-> Fig.5.21/5.22

Note
All standard versions of the A80QC tape machine can be retrofitted with a VU panel (kit No. 20.020.301.31).

5.4.1
Operating hints

The two VU meters display the line output levels of the channels selected with switch {4}.

Important note concerning A80/QC-REPRO
with switch-selectable tape direction:

Changing over the tape direction (PLAY>/PLAY<) has no influence on the channel assignment of the VU meters.
Consequence: -> Fig.5.23
If the selected PLAY direction {</>} is opposed to the modulation direction {</>}, reproduction is inverse to the recording {></</>} with the corresponding output indicated on the VU meters. Arrows pointing in the same direction indicate that the PLAY direction is the same as the record direction.

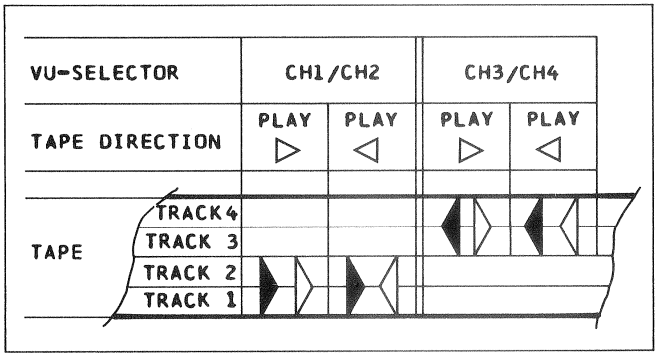


Fig.5.23

5.4.2
Calibration of VU meters

-> Fig.5.21/5.22

Prerequisite
Correct allignment of the audio electronics according to section 5.

Preparatory steps
Set jumper JS1 (VU-METER AMP 1.167.750.00) to position 1 (+6dB).

Record/reproduce version A80/QC-REC/REPRO

Set selector {4} to REPRO position:
- Play "reference level" section of calibration tape.
- Adjust potentiometer R2 (VU METER AMP 1.167.750.00) to optain a VU Meter reading of 0 VU.

Set selector {4} to input position:
- Feed line level into line input.
- Adjust potentiometer R3 and R4 (MONITOR BOARD 1.081..900.81) to obtain a VU-meter reading of 0 VU.

Reproduce-only machines A80/QC-REPRO

Channel selector {4} in position CH1+2
- Play "reference level" section of calibration tape.
- Adjust potentiometer R2 (VU METER AMP 1.167.750.00) to obtain a VU-meter reading of 0 VU.

Channel selector {4} in position CH3+4:
- Play "reference level" section of calibration tape.
- Adjust potentiometer R3 and R4 (MONITOR BOARD 1.081.900.00) to obtain a VU-meter reading of 0 VU.

6 VERDRAHTUNG LAUFWERK-ELEKTRONIK

Bei Geraeten mit umfangreicher Elektronik sind Verdrahtungs-Schaltbilder unuebersichtlich und geben Anlass zu Fehlinterpretationen.
Deshalb wurde die zuverlaessigere Methode mit Computer-Verdrahtungslisten gewaehlt.
Diese informieren lueckenlos ueber jede Verbindung innerhalb der Laufwerk-Elektronik.

Es wird zwische zwei, zur Verfuegung stehenden Listen unterschieden:

1.LOCATION PIN LIST -> Kap.6.2
Nach Funktionsgruppen (GR) numerisch geordnet.
Die Kenntnis der **Gruppen-Nummer** oder Gruppen-Benennung, gibt Aufschluss ueber
- Aufgliederung in Funktions-Elemente (EL)
- Anschluss- Bezeichning (PT)
- Signal- Namen

2.SIGNAL WIRE LIST -> Kap.6.3
Signal- Namen, alfanumerisch geordnet.
Die Kenntnis des **Signal- Namens** gibt Aufschluss ueber dessen gesamte Signal- Verknuepfungen zwischen den Gruppen (GR) und Elementen (EL), bis hin zur Spezifikation der Anschlusspunkte (PT).

6 WIRING TAPE TRANSPORT ELECTRONICS

For equipment with complex electronics, wiring diagrams would be difficult to follow and could possibly be missinterpreted.
This is why the more reliable computer wiring lists are used.
These lists provide complete information on each connection within the tape transport electronics.

Two different wiring lists are available:

1.LOCATION PIN LIST -> Section 6.2
Arranged in numeric sequence by group.
The **group mumber** or group designation provides information concerning.
- Breakdown into function elements (EL)
- Designations of connecting points (PT)
- Signal names.

2.SIGNAL WIRE LIST -> Section 6.3
Signal names, arranged in alphanumeric sequence.
The **signal name** provides information concerning complete signal gating between the groups (GR) and the elements (EL) up to the specification of the connecting points (PT).

6.1
GRUPPEN-UEBERSICHT

GR01	Netz- Eingangseinheit
GR02	Netz- Einheit
GR03	Verbindung Netzteil - Netzschalter
GR04	Leistungs- Transistoren und Phasenschieber- Kondensatoren
GR05	Netzschalter- Einheit
GR06	---
GR07	Steuerung Wickelmotor, links SUPPLY MOTOR M1
GR08	Brems- Lueftungsmagnet, links
GR09	Brems- Luefytungsmagnet, rechts
GR10	Steuerung Wickelmotor, rechts TAKE-UP MOTOR M2
GR11	Bandzug- Steuerung, links
GR12	Bandzug- Steuerung, rechts
GR13	Bandende- Lichtschranke
GR14	Bandrichtungs-Sensor Bandbewegungs-Sensor
GR15	Andruckaggregat
GR16	Capstan-Motoren M3 / M6
GR17	Laufwerk- Bedienungstasten, lokal
GR18	Bandzaehler
GR19	Steuerung zu EDIT- Betriebsmodus
GR20	Laufwerksteuerung
GR21	Capstan- Transformator
GR22	Anschluss fuer Fernsteuerung
GR23	Steuerung fuer Betriebsstunden-Zaehler

6.1
SURVEY OF GROUPS

GR01	Power input assembly
GR02	Power supply assembly
GR03	Intercon. power supply - mains switch
GRC4	Power transistors and phase shift capacitors
GR05	Power switch assembly
GR06	---
GR07	Control unit, supply motor. left SUPPLY MOTOR M1
GR08	Brake lift solenoid, left
GR09	Brake lift solenoid, right
GR10	Control unit spooling motor TAKE-UP MOTOR M2
GR11	Tape tension control, left
GR12	Tape tension control, right
GR13	Tape-end sensor
GR14	Tape-direction sensor Tape-move sensor
GR15	Tape pressure roller assembly
GR16	Capstan motors M3 / M6
GR17	Local command switches
GR18	Tape timer
GR19	control unit, cutter control
GR20	Tape transport control
GR21	Capstan transformer (additional)
GR22	remot mode control (connection)
GR23	Time elapse meter

6.2 LOCATION PIN LIST

```
*****************************************************
* S T U D E R * L O C A T I O N   P I N   L I S T *
*****************************************************

GR: 20
CONTROL UNIT, CARD CHASSIS
*************************************

EL: 09  IC MEMORY & COUNTER PC CARD
-------------------------------------------------
TYPE | PT  | LV | SIG.NAME | COLOR | F  X    Y
---- | --- | -- | -------- | ----- | - ----- -----
WT   | 18B | 3  | K-BRAKE  | 4
WT   | 19A | 3  | B-CUT    | 7
WT   | 19B | 3  | YBI-DIR  | 6
```

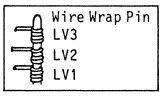
DRAHTFARBE

0 = schwarz
1 = braun
2 = rot
3 = orange
4 = gelb
5 = gruen
6 = blau
7 = violett
8 = grau
9 = weiss
- farblos (transparent)

SIGNAL NAME

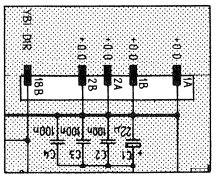
siehe
- rueckseitige Auflistung der Signalnamen
- SIGNAL WIRE LIST

VERDRAHTUNGS-POSITION



auf Wire-Wrap-Stift,
Gueltigkeit bei Anschluss- Typ "W", exkl. "WT" (TERMI POINT)

ANSCHLUSS-PUNKT



Numerisch geordnet.
Korrespondiert mit Anschlussbezeichnung auf Schaltbild.
Fuer Printstecker gilt:
..A = Bestueckungsseite
..B = Loetseite

ANSCHLUSS-TYP

Beispiele:
F = MOLEX-Stecker
G = Loetstift
H = Litze/Draht 6mm, verzinnt
K = " abisoliert
L = " 4mm, verzinnt
M = MOLEX Kontaktstift
P = Print-Federleiste
S = Litze/Draht 4mm, abisoliert, verzinnt
T = TERMI POINT (Steckkontakt auf Wire-Wrap-Stift)
W = Wire-Wrap-Verbindung
Y = AMP-Flachstecker

Erklaerung / Explanation

WIRE COLOR

0 = black (blk)
1 = brown (brn)
2 = red (red)
3 = orange (org)
4 = yellow (yel)
5 = green (grn)
6 = blue (blu)
7 = violet (vio)
8 = grey (gry)
9 = white (wht)
- colourless (transp.) (unc)

SIGNAL NAME

please refer
- table of signal names (on reverse page)
- SIGNAL WIRE LIST

WIRING POINT

on wire wrap pin,
applicable to connection type "w", excl. "WT" (TERMI POINT)

CONNECTION POINT

In numeric sequence.
Corresponds with terminal numbering on the circuit diagram.
Applicable to card edge connectors: ..A = component side
..B = solder side

CONNECTION TYPE

Examples:
F = MOLEX connector
G = Solder pin
H = Stranded/solid wire, tinned
K = " stripped
L = " tinned
M = MOLEX contact pin
P = Multipin card edge connector
S = Stranded/solide wire 4mm, stripped and tinned
T = TERMI POINT (plug contact on wire wrap pin)
W = Wire wrap connection
Y = AMP flat-pin terminal

SIGNAL-NAMES

AC	alternierend	alternating
ACCEL	beschleunigend	accelerate
AN	analog	analog
B	Laempchen	bulb
BRAKE	Bremse	brake
C	Kondensator	capacitor
CAPLFT	Kapstan links	capstan left
CAPRGT	Kapstan rechts	capstan right
CLK	Takt	clock
CUT	editieren (manuell)	edit
CUTAUT	editieren (automatisch)	auto-edit
DIR1	Bandbewegung vorwaerts	tape move direction forward
DIR2	Bandbewegung rueckwaerts	tape move direction reverse
END	Bandende	tape end
EQUAL	Entzerrung	equalizing
F	Sicherung	fuse
FAD	Regler-Start	fader start
FF	Flip-Flop	flip-flop
FL	Filter	filter
FORW	Band Vorspulen	
GRD MAIN	Haupt-Erdung	main ground
GROUND	Masse/Erde	grounding/earthing
IC	Integrierte Schaltung	integrated circuit
INDIC	Signalisations-Lampe	indicator
K	Elektromagnet, Relais	solenoid, relay
LIFT	abheben (Bremsen)	lift brake
LINE1	Netzanschluss: Null-Leiter	power neutral wire
LINE2	Netzanschluss: Phase	power phase wire
LINE3	Schutzerde	safety earth
LOW	niedrige Bandgeschwindigkeit	low tape speed
M1	linker Wickelmotor (SUPPLY)	SUPPLY spooling motor l.h.
M2	rechter Wickelmotor (TAKE-UP)	TAKE-UP " " r.h.
M3	linker Kapstanmotor (SLAVE)	capstan motor l.h. (SLAVE)
M4	Bandzaehler	counter
	-1 -> Y-CLK	-1 -> Y-CLK
	-2 -> Y-REVRS	-2 -> Y-REVRS
	-3 -> Y-ICLK	-3 -> Y-ICLK
	-4 -> Y-FORW	-4 -> Y-FORW
M5	(wird nicht benutzt)	(not used)
M6	rechter Kapstanmotor (MASTER)	capstan motor l.h. (MASTER)
MM	Kapstan-Servo MASTER	capstan servo MASTER
MOVE	(Band-) Bewegung	tape move
MS	Kapstan-Servo SLAVE	capstan servo SLAVE
P	Stecker	plug
PRESS	Andruck (Andruckrolle)	pressure
PS	Impuls	pulse
Q	Transistor	transistor
	-1 = Emiter	-1 = emitter
	-2 = Basis	-2 = base
	-3 = Kollektor	-3 = collector
QP	Foto-Transistor	photo transistor
QPWR	Leistungs-Transistor	power transistor
REC	Aufnahme	recording
R	Widerstand	resistor
REM	Fernsteuerung	remote
REPR	Wiedergabe	reproduce
RESET	Rueckstellen	reset
RP	Foto-Widerstand	photo resistor
S	Schalter (Mikroswitch)	micro switch
	-1 = Gemeinsamer Anschluss	- 1 = common
	-2 = Ruhekontakt	- 2 = closed
	-3 = Arbeitskontakt	- 3 = open
STOP	Band-Stop	stop (tape)
T	Transformator	transformator
TT	Bandzug-Regelung	tape tension
Y	Signal	signal

```
*****************************************************************************************************
*   S T U D E R   *      L O C A T I O N    P I N    L I S T      *    84/05/03 *
*****************************************************************************************************
PROFESSIONAL TAPE TRANSPORT DECK ** STUDER A 80 Q/C **        1.080.002.00              83/01/26
```

GR: 01 1.080.730.81
POWER INPUT ASSEMBLY
****

EL: 02 GROUND POST, EXTERNAL

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	GRD MAIN	4/5			

EL: 04 MAIN FUSE, TAPE DECK

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	2	F-LINE2	1			
L	02	2	LINE2	1			

EL: 05 MAINS FILTER

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
Z	01	2	LINE1	6			
Z	01'	2	FL-LINE1	6			
Z	02	2	F-LINE2	1			
Z	02'	2	FL-LINE2	1			
K	03	2	GRD MAIN	4/5			

EL: 08 POWER FEED CONNECTOR, MAINS

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
F	01	1	FL-LINE1	6			
	02	1					
F	03	1	FL-LINE2	1			
	04	1					
	05	1					
	06	1					
	07	1					
	08	1					

EL: 09 POWER INPUT CONNECTOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	2	LINE1	6			
L	02	2	LINE2	1			
L	03	2	GRD MAIN	4/5			

EL: 10 GROUND CONNECTOR SCREW

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
LS	01	2	GRD MAIN	4/5			

GR: 02 1.080.322.00
POWER SUPPLY ASSEMBLY
****

EL: 01 POWER INPUT FEED CONNECTOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
M	01	1	FL-LINE1	6			
	02	1					
M	03	1	FL-LINE2	1			
	04	1					
M	05	1N	GROUND	4/5			
	06	1					
	07	1					
	08	1					

EL: 02 VOLTAGE SELECTOR TERMINAL BLOCK

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	3*	S-LINE1	6			
L	02	2	T-5	1			
L	03	2	T-6	4			
L	04	2	T-7	6			
L	05	2	T-2	0			
L	06	2	T-3	8			
L	07	3*	T-4	3			
L	08	2*	S-LINE2	1			

EL: 03 SCREEN CHASSIS CONNECTION

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
LS	01	1	SCREEN	0			

EL: 04 POWER TRANSFORMER

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	S-LINE1	2			
L	02	1	T-2	0			
L	03	1	T-3	8			
L	04	1	T-4	(5)			
L	05	1	T-5	1			
L	06	1	T-6	4			
L	07	1	T-7	6			
L	08	1	S-LINE2	9			
L	09	1	SCREEN	0			
L	10	1	T-10	0			
L	11	1	T-11	0			
L	12	1	T-12	2			
L	13	1	T-13	2			
L	14	1	T-14	6			
L	15	1	T-15	6			
L	16	1	T-16	4			
L	17	1	T-17	4			
L	18	1	T-18	5			
L	19	1	T-19	5			
L	20	1	T-20	8			
L	21	1	T-21	6			
L	22	1	T-22	8			
L	23	1	T-23	8			
L	24	1	T-24	0			
L	25	1	T-25	0			
L	26	1	T-26	1			
L	27	1	T-27	1			
L	28	1	T-28	2			
L	29	1	T-29	2			
L	30	1	T-30	9			
L	31	1	T-31	9			

EL: 05 RECTIFIER & CONNECTOR PC CARD

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	Y-CAPLFT	1			
L	02	1@	B-STOP	0			
L	03	1N	RES 2	3			
L	04	1@	K-PRESS	0			
L	05	1	Y-REC	5			
L	06	1@	+24.0	2			
L	07	1N	RES 1	4			
L	08	1@	S-EQUAL	5			
L	09	1	F-M2	9			
L	10	1	F-M1	4			
L	11	1	T-M1	1			
L	12	1@	+ 0.0	0			
L	13	1@	+ 0.0	0			
L	14	1@	+ 0.0	0			
L	15	1	F-M3	5			
L	16	1	T-M2	6			
L	17	1@	+31.0	9			
L	18	1	-10.0	6			
L	19	1	+10.0	8			
L	20	1@	+ 5.8	5			
L	21	1@	T-MS	7			
Y	31	2	Y-CAPLF	1			
Y	32	2N	RES 1'	4			
Y	33	2*	Y-STOP	0			
Y	34	2*	S-EQUAL'	3			
Y	35	2N	RES 2'	8			
Y	36	2*	Y-PRESS	0			
Y	37	2*	Y-RECORD	9			

EL: 05 (CONTINUATION)

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
Y	38	1	O-AC1	6			
Y	39	1	O-AC2	7			
Y	40	1	AC1	6			
Y	41	1	AC2	7			
Y	42	1N	O-AC3	6			
Y	43	1N	O-AC4	7			
Y	44	1N	AC3	6			
Y	45	1N	AC4	7			
L	51	1	T-24	0			
L	52	1	T-25	0			
L	53	1	T-26	1			
L	54	1	T-27	1			
L	55	1	T-28	2			
L	56	1	T-29	2			
L	57	1	T-30	9			
L	58	1	T-31	9			
Y	59	1	+24.0(1)	2			
Y	60	1	+ 0.0(1)	0			
L	61	1	F-M1(0)	4			
L	62	1	T-17	4			
L	63	1	T-18	5			
L	64	1	T-20	8			
L	65	1	T-21	6			
L	66	1	F-M2(0)	5			
L	67	1	T-23	8			
L	68	1	F-M3(0)	8			
Y	69	1N	M5-1	9			
Y	70	1N	M5-2	9			
Y	71	1	+31.0(0)	9			
Y	72	1	+31.0(0)	9			
Y	73	1	+ 0.0(2)	0			
Y	74	1	+ 0.0(2)	0			
L	75	1	F(+24.0)	9			
L	76	1	T-11	0			
Y	77	1	T-17/18	1			
L	78	1	T-17/18	1			
Y	79	1	T-20/21	6			
L	80	1	T-20/21	6			
Y	81	1	+ 0.0(3)	0			
Y	82	1	+ 0.0(3)	0			
Y	83	1	-10.0(0)	6			
Y	84	1	-10.0(0)	6			
L	85	1	F(- 5.8)	6			
L	86	1	T-15	6			
Y	91	1	+10.0(0)	8			
Y	92	1	+10.0(0)	8			
Y	93	1	+ 0.0(4)	0			
Y	94	1	+ 0.0(4)	0			
L	95	1	F(+ 5.8)	2			
L	96	1	T-13	2			

EL: 06 GROUND CHASSIS CONNECTION

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
LS	01	1	GROUND	4/5			

EL: 08 POWER SWITCH FEED, RECEPTACLE

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
F	01	1	FL-LINE1	6			
F	02	1	FL-LINE2	1			
	03	1					
F	04	1	S-LINE2	1			
F	05	1	S-LINE1	6			

EL: 10 FUSE, SUPPLY MOTOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	F-M1(0)	4			
L	02	1	T-16	4			

EL: 11 FUSE, TAKE-UP MOTOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	F-M2(0)	5			
L	02	1	T-19	5			

EL: 12 FUSE, CAPSTAN

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	F-M3(0)	8			
L	02	1	T-22	8			

EL: 13 (CONTINUATION) ▶

GR: 02 (CONTINUATION)

EL: 13 FUSE, - 5.8 V

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	F(- 5.8)	6			
L	02	1	T-14	6			

EL: 14 FUSE, + 5.8 V

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	F(+ 5.8)	2			
L	02	1	T-12	2			

EL: 15 FUSE, +24.0 V

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	F(+24.0)	9			
L	02	1	T-10	0			

EL: 16 CHARGE CAPACITOR, +24.0 V (1)

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	3*	+31.0(0)	9			
L	02	3*	+ 0.0(2)	0			

EL: 17 CHARGE CAPACITOR, +24.0 V (2)

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	+31.0(0)	9			
L	02	1	+ 0.0(2)	0			

EL: 18 CHARGE CAPACITOR, + 5.8 V

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	2*	+10.0(0)	8			
L	02	2*	+ 0.0(4)	0			

EL: 19 CHARGE CAPACITOR, - 5.8 V

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	2*	+ 0.0(3)	0			
L	02	2*	-10.0(0)	6			

EL: 20 CHANNEL FEED CONNECTOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	Y-CAPLF	1			
L	02	1	Y-STOP	0			
L	03	1	S-EQUAL'	3			
L	04	1N	RES 1'	4			
L	05	1	+24.0(1)	2			
L	06	1	0-AC1	6			
L	07	1	0-AC2	7			
L	08	1N	RES 2'	8			
L	09	1	Y-PRESS	0			
L	10	1					
L	11	1	Y-RECORD	9			
L	12	1					
L	13	1	AC1	6			
L	14	1	AC2	7			

GR: 03 1.080.288.00
EXTENSION CABLE,PWR SUPPLY-MAINS SWITCH
****

EL: 01 EXTENSION CABLE, SUPPLY SIDE

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
M	01	1	FL-LINE1	6			
M	02	1	FL-LINE2	1			
	03	1					
M	04	1	S-LINE2	1			
M	05	1	S-LINE1	6			

EL: 02 EXTENSION CABLE, SWITCH SIDE

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
F	01	1	FL-LINE1	6			
F	02	1	FL-LINE2	1			
	03	1					
F	04	1	S-LINE2	1			
F	05	1	S-LINE1	6			

GR: 04 1.080.411.00
PWR TRANSISTORS & PHASE SHIFT CAPACITORS
****

EL: 01 TAKE-UP MOTOR CAPACITOR, ADD.

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	2	M2-2	7			
L	02	2	C-M2-2	8			

EL: 03 DC CHASSIS CONNECTION

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
SL	01	1@	+ 0.0	0			

EL: 04 +24.0 V STABILIZER TRANSISTOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
H	01	1	+24.0	2			
H	02	1	QPWR7-2	1			
L	03	2D	+31.0	9			

EL: 05 TAKE-UP MOTOR TRANSISTOR PAIR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	2	QPWR2-1	1			
L	02	2	QPWR2-2	4			
L	03	2	QPWR2-3	9			

EL: 06 SUPPLY MOTOR CAPACITOR, ADD.

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	2	M1-2	4			
L	02	2	C-M1-2	5			

EL: 07 CAPSTAN MOTOR CAPACITOR (SLAVE)

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	T-MS	7			
L	02	1	C-MS	8			

EL: 08 +20.0 V STABILIZER TRANSISTOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
H	01	1	+20.0	3			
H	02	1	QPWR6-2	6			
L	03	1@	+24.0	2			

EL: 09 + 5.8 V STABILIZER TRANSISTOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
H	01	1	QPWR5-1	5			
H	02	1	QPWR5-2	7			
L	03	1	QPWR5-3	9			

EL: 10 - 5.8 V STABILIZER TRANSISTOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
H	01	1	QPWR4-1	1			
H	02	1	QPWR4-2	8			
L	03	1	QPWR4-3	6			

EL: 11 CAPSTAN PWR TRANS. SLAVE MOTOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
H	01	1	QPWR3-1	4			
H	02	1	QPWR3-2	9			
L	03	1	QPWR3-3	7			

EL: 12 SUPPLY MOTOR TRANSISTOR PAIR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	2	QPWR1-1	2			
L	02	2	QPWR1-2	5			
L	03	2	QPWR1-3	8			

EL: 13 TAKE-UP MOTOR CAPACITOR, MAIN

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	M2-2	7			
L	02	1	C-M2-2	8			

EL: 14 SUPPLY MOTOR CAPACITOR, MAIN

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	M1-2	4			
L	02	1	C-M1-2	5			

EL: 15 CAPSTAN MOTOR CAPACITOR (MASTER)

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	T-MM-2	9			
L	02	1	C-MM	8			

EL: 16 CAPSTAN PWR TRANS. MASTER MOTOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
H	01	1	QPWR0-1	4			
H	02	1	QPWR0-2	9			
L	03	1	QPWR0-3	7			

GR: 05 1.080.284.00
POWER SWITCH ASSEMBLY
****

EL: 01 POWER SWITCH FEED, JACK

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
M	01	1	FL-LINE1	6			
M	02	1	FL-LINE2	1			
	03	1					
M	04	1	S-LINE2	1			
M	05	1	S-LINE1	6			

EL: 02 POWER SWITCH, REAR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	FL-LINE1	6			
	02	1					
L	03	1	S-LINE1	6			

EL: 03 POWER SWITCH, FRONT

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	FL-LINE2	1			
	02	1					
L	03	1	S-LINE2	1			

GR: 07 1.080.412.00
CONTROL UNIT, SUPPLY MOTOR, CABLE PLUG
****

EL: 01 SUPPLY MOTOR (M1)

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
F	01	1	M1-1	1			
	02	1					
F	03	1	M1-2	4			
	04	1					
F	05	1	C-M1-2	5			

GR: 08 1.080.412.00
FEED TO BRAKE LIFT SOLENOID LEFT
****

EL: 01 BRAKE LIFT SOLENOID, LEFT

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
F	01	1@	+24.0	2			
F	02	1	K-LIFT	3			
	03	1					

GR: 09 1.080.412.00
FEED TO BRAKE LIFT SOLENOID RIGHT
****

EL: 01 BRAKE LIFT SOLENOID, RIGHT

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
F	01	1@	+24.0	2			
F	02	1	K-LIFT	3			
	03	1					

GR: 10 1.080.412.00
FEED TO TAKE-UP MOTOR, CABLE PLUG
****

EL: 01 TAKE-UP MOTOR (M2)

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
F	01	1	M2-1	6			
	02	1					
F	03	1	C-M2-2	8			
	04	1					
F	05	1	M2-2	7			

GR: 11 1.080.412.00
FEED TO TAPE TENSION CONTROL LEFT
****

EL: 01 TAPE TENSION CONTROL ASSY, LEFT

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
M	01	1@	+20.0	3			
M	02	1	R-TT1	1			
M	03	1@	+ 0.0	0			
M	04	1	K-TT1/2	7			
M	05	1	S-TT	4			

GR: 12 1.080.412.00
FEED TO TAPE TENSION CONTROL RIGHT
****

EL: 01 TAPE TENSION CONTRCL ASSY, RIGHT

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
M	01	1@	+20.0	3			
M	02	1	R-TT2	2			
M	03	1@	+ 0.0	0			
M	04	1	K-TT	9			
M	05	1	K-TT1/2	7			

GR: 13 1.080.412.00
FEED TO OPTICAL TAPE SENSOR
****

EL: 01 OPTICAL TAPE END SENSOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
M	01	1	+16.0	3			
M	02	1	+0-END	0			
M	03	1	RP-END	8			
	04	1					
F	05	1	B-END	7			

GR: 14 1.080.412.00
FEED TO TAPE MOVE & DIRECTION SENSOR
****

EL: 01 TAPE MOVE SENSOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
P	01	1@	+24.0	2			
P	02	1@	+ 5.8	5			
P	03	1	QP-MOVE	4			
P	04	1	+0-MOVE	0			
P	05	1					
P	06	1	B-MOVE	6			

EL: 02 TAPE DIRECTION SENSOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
P	01	1@	+24.0	2			
P	02	1@	+ 5.8	5			
P	03	1	QP-DIR2	7			
P	04	1	+0-DIR1	0			
P	05	1	QP-DIR1	8			
P	06	1	B-DIR	9			

GR: 15 1.080.412.00
FEED TO PRESSURE ROLLER ASSEMBLY
****

EL: 01 PRESSURE ROLLER ASSEMBLY

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
F	01	1@	+24.0	2			
M	02	1	K-PRESS	8			
M	03	1	Y-ACCEL	6			
M	04	1	K-CUT	5			
M	05	1	S-TT	4			

GR: 16 1.080.412.00
FEED TO TWO CAPSTAN MOTORS
****

EL: 01 CAPSTAN MOTOR ASSEMBLY M3

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
M	01	1	M3-1	6			
M	02	1	M3-3	1			
M	03	1	M3-2	8			
M	04	1	OYAC1-M3	0			
M	05	1	YAC1-M3	4			
M	06	1					
M	07	1	OYAC2-M3	0			
M	08	1	YAC2-M3	5			

EL: 02 CAPSTAN MOTOR ASSEMBLY M6

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
M	01	1	M6-1	6			
M	02	1	M6-3	1			
M	03	1	M6-2	8			
M	04	1	OYAC1-M6	0			
M	05	1	YAC1-M6	4			
M	06	1					
M	07	1	OYAC2-M6	0			
M	08	1	YAC2-M6	5			

GR: 17 1.080.412.00
FEED TO LOCAL COMMAND SWITCHES
****

EL: 01 COMMAND SWITCHES, LOCAL

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
P	01	1	B-INDIC	9			
P	02	1	B-CUT	6			
P	03	1	B-REC	5			
P	04	1@	B-STOP	1			
P	05	1	B-REPR	4			
P	06	1	B-FORW	3			
P	07	1	B-REW	2			
P	08	1	S-STOP	1			
P	09	1	S-REW	2			
P	10	1	S-FORW	3			
P	11	1	S-REPR	4			
P	12	1	S-REC	5			
P	13	1	S-CUT	6			
P	14	1	REM-IN	7			
P	15	1	K-FAD-1	8			

EL: 02 FEED TO TAPE DIRECTION SWITCHES

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
F	01	1@	+ 0.0	0			
F	02	1@	+24.0	2			
F	03	1	S-CAPLFT	6			
F	04	1	B-CAPLFT	9			
F	05	1	B-CAPRGT	8			
F	06	1	S-CAPRGT	7			

GR: 18 1.080.412.00
FEED TO LOCAL TAPE TIMER
****

EL: 01 TIMER FEED PC-CARD PLUG

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
P	01	1@	- 5.8	6			
P	02	1@	+ 0.0	0			
P	03	1	K-RESET	1			
P	04	1@	+24.0	2			
P	05	1	M4-1	3			
P	06	1	M4-2	4			
P	07	1	M4-3	5			
P	08	1	M4-4	6			
P	09	1@	+ 5.8	5			

GR: 19 1.080.412.00
CONTROL UNIT, CUTTER CONTROL, CABLE PLUG
****

EL: 01 CUTTER CONTROL ASSEMBLY

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
M	01	1	R-CUT-1	5			
M	02	1@	+20.0	3			
F	03	1	R-CUT-3	7			
M	04	1	S-CUTAUT	1			
M	05	1	+0-CUTAU	0			

GR: 20 1.080.349.00
CONTROL UNIT, CARD CHASSIS
****

EL: 01 POWER CONNECTOR PC CARD

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
WTL	01	3D	+ 0.0	0			
WTL	02	3D	+ 0.0	0			
WTL	03	3N	RES 1	4			
WTL	04	3	S-EQUAL	5			
WTL	05	3	Y-REC	5			
WTL	06	3	K-PRESS	0			
WTL	07	3N	RES 2	3			
WTL	08	3	B-STOP	0			
WTL	09	3	Y-CAPLFT	1			
WTL	10	3					
WTL	11	0	T-MS	7			
WTL	12	3	F-M3	5			
WTL	13	3					
WTL	14	3	T-M2	6			
WTL	15	3	F-M2	9			
WTL	16	3*	T-M1	1			
WTL	17	3*	F-M1	4			
WTL	18	3					
WTL	19	3#	+31.0	9			
WTL	20	3	+31.0	9			
WTL	21	3	-10.0	6			
WTL	22	3	+10.0	8			
WTL	23	3	+24.0	2			
WTL	24	3	+ 0.0	0			
WTL	25	3	+ 5.8	5			

EL: 02 +24/+20/+6/-6V STABIL. PC CARD

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
WT	01	3	+ 0.0				
WT	02	3	+ 0.0				
WT	03	3	QPWR6-2	6			
WT	04	3					
WT	05	3N	+31.0(N)				
WT	06	3	+31.0				
WT	07	3	QPWR7-2	1			
WT	08	3	QPWR7-2				
WT	09	3	+20.0	3			
WT	10	3	+20.0				
WT	11	3	+24.0				
WT	12	3	+24.0	2			
WT	13	3	S-EQUAL	5			
WT	14	3	- 5.8	6			
WT	15	3	QPWR4-3	6			
WT	16	3	QPWR4-2	8			
WT	17	3	QPWR4-1	1			
WT	18	3	-10.0				
WT	19	3	+ 0.0				
WT	20	3	+ 0.0				
WT	21	3	+10.0				
WT	22	3	QPWR5-3	9			
	22K	0	KEY				
WT	23	3	QPWR5-2	7			
WT	24	3	QPWR5-1	5			
WT	25	3	+ 5.8				

EL: 04 CONTACTOR PC CARD

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
WT	01	3	+ 0.0				
WT	02	3	+ 0.0				
WT	03	3	+24.0	2			
WT	04	3	+24.0	2			
WT	05	3	YAN-M2				
WT	06	3#	M2-2	7			
	06K	0	KEY				
WT	07	3	F-M2				
WT	08	3	M2-1	6			
WT +	09	3#	C-M2-2	8			
WT	10	3#	M1-2	4			
WT	11	3	YAN-M1				
WT	12	3	M1-1	1			
WT	13	3	F-M1				
WT +	14	3#	C-M1-2	5			
WT	15	3	K-BRAKE				
WT	16	3	K-DIR				
WT	17	3	+20.0	3			
WT	18	3	R-TT2	2			
WT	19	3	YBI-END				
WT	20	3	TEST-B				
WT	21	3	B-INDIC	9			
WT	22	3					
WT	23	3	+24.0				
WT	24	3	- 5.8				
WT	25	3	+ 5.8				

EL: 05 (CONTINUATION) ▶

GR: 20 (CONTINUATICN)
CONTROL UNIT, CARD CHASSIS
****

EL: 05 SPOOLING MOTOR CONTROL PC CARD

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
WT	01	3	+ 0.0	0			
WT	02	3	+ 0.0	0			
WT	03	3	QPWR2-1	1			
WT	04	3	QPWR2-2	4			
WT	05	3	B-FORW				
WT	06	3	T-M2				
WT	07	3	YAN-M2				
WT	08	3	QPWR2-3	9			
WT	09	3	R-TT2				
WT	10	3	Y-ACCEL	6			
WT	11	3	YBI-MOVE				
WT	12	3	Y-CUTAUT				
	12K	0	KEY				
WT	13	3	R-CUT-3	7			
WT	14	3	K-LIFT				
WT	15	3	R-CUT-1	5			
WT	16	3	R-TT1	1			
WT	17	3	B-REW				
WT	18	3	T-M1				
WT	19	3	YAN-M1				
WT	20	3	QPWR1-3	8			
WT	21	3	QPWR1-2	5			
WT	22	3	QPWR1-1	2			
WT	23	3	+20.0	3			
WT	24	3	- 5.8				
WT	25	3					

EL: 06 SLAVE CAPSTAN SERVO PC CARD

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
WT	01A	3					
WT	01B	3	+ 0.0				
WT	01B	3	OYAC1-M3	0		&	
WT	02A	3					
WT	02B	3	+ 0.0				
WT	02B	3	OYAC2-M3	0		&	
WT	02K	0	KEY				
WT	03A	3					
WT	03B	3					
WT	04A	3					
WT	04B	3	YTAC-MS				
WT	05A	3					
WT	05B	3					
WT	06A	3					
WT	06B	3					
WT	07A	3					
WT	07B	3					
WT	08A	3					
WT	08B	3					
WT	09A	3	YAC-MS-1				
WT	09B	3					
WT	10A	3					
WT	10B	3					
WT	11A	3					
WT	11B	3					
WT	12A	3					
WT	12B	3					
WT	13A	3					
WT	13B	3					
WT	14A	3					
WT	14B	3	+20.0				
WT	15A	3					
WT	15B	3					
WT	16A	3					
WT	16B	3					
WT	17A	3					
WT	17B	3	F-M3				
WT	18A	3					
WT	18B	3	MS-1				
WT	19A	3					
WT	19B	3					
WT	20A	3					
WT	20B	3	QPWR3-3	7			
WT	21A	3					
WT	21B	3	QPWR3-2	9			
WT	22A	3					
WT	22B	3	QPWR3-1	4			
WT	23A	3					
WT	23B	3	+24.0				
WT	24A	3					
WT	24B	3	- 5.8				
WT	25A	3					
WT	25B	3	+ 5.8				

EL: 07 DUAL CAPSTAN DIRECTION PC CARD

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
WT	01A	3	+ 0.0				
WT	01B	3	+ 0.0				
WT	02A	3	+ 0.0				
WT	02B	3	+ 0.0				
WT	03A	3	YAC2-M3	5			
WT	03B	3	YAC2-M6	5			
WT	04A	3	YAC1-M3	4			
WT	04B	3	YAC1-M6	4			
WT	05A	3	C-MM	8			
WT	05B	3	YTAC-MS				
WT	06A	3	S-REC*				
WT	06B	3	M3-3	1			
WT	07A	3					
WT	07B	3	M3-2	8			
WT	08A	3	T-MM-2	9			
WT	08B	3	S-CAPLFT	6			

EL: 07 (CONTINUATION)

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
WT	09A	3	MM-1				
WT	09B	3	YAC-MS-1				
WT	10A	3					
WT	10B	3	M3-1	6			
WT	11A	3	MS-1				
WT	11B	3	M6-1	6			
WT	12A	3	C-MS	8			
WT	12B	3	M6-3	1			
WT	13A	3					
WT	13B	3	Y-REPR				
WT	14A	3	T-MS				
WT	14B	3	S-REPR	4			
WT	15A	3	QPWRO-2				
WT	15B	3	M6-2	8			
WT	16A	3					
WT	16B	3	S-CAPRGT	7			
WT	17A	3	QPWR3-2				
WT	17B	3	YTAC-MM				
WT	18A	3					
WT	18B	3	B-REPR				
WT	18K	0	KEY				
WT	19A	3					
WT	19B	3	S-REC	5			
WT	20A	3	Y-CAPLFT				
WT	20B	3	S-STOP				
WT	21A	3	B-CAPRGT	8			
WT	21B	3					
WT	22A	3	B-CAPLFT	9			
WT	22B	3	YAC-MM-1				
WT	23A	3	+24.0				
WT	23B	3	+24.0				
WT	24A	3					
WT	24B	3	- 5.8				
WT	25A	3	+ 5.8				
WT	25B	3	+ 5.8				

EL: 08 IC DECODER PC CARD

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
WT	01A	3	+ 0.0				
WT	01B	3	+ 0.0				
WT	02A	3	+ 0.0				
WT	02B	3	+ 0.0				
WT	03A	3					
WT	03B	3	YBI-MOVE				
WT	04A	3					
WT	04B	3	Q-MOVE				
WT	05A	3					
WT	05B	3	YBI-CUT				
WT	06A	3	B-DIR	9			
WT	06B	3	YBI-FFO				
WT	07A	3	B-MOVE	6			
WT	07B	3	YBI-FF2				
WT	08A	3*	B-REPR	4			
WT	08B	3	K-CUT	5			
WT	09A	3					
WT	09B	3	YBI-FF3				
WT	10A	3					
WT	10B	3	YBI-FF1				
	10K	0	KEY				
WT	11A	3					
WT	11B	3	YBI-FF4				
WT	12A	3#	B-REW	2			
WT	12B	3	B-STOP	1			
WT	13A	3					
WT	13B	3#	B-FORW	3			
WT	14A	3					
WT	14B	3	Y-CUTAUT				
WT	15A	3#	K-PRESS	8			
WT	15B	3	TEST-B				
WT +	16A	3#	S-TT	4			
WT	16B	3	+ 0.0				
WT +	17A	3#	K-TT1/2	7			
WT	17B	3N	YBI-'L'				
WT	18A	3*	B-CUT	6			
WT	18B	3	K-BRAKE				
WT	19A	3					
WT	19B	3	YBI-DIR				
WT	20A	3	K-DIR				
WT	20B	3#	K-LIFT	3			
WT	21A	3	+0-CUTAU	0			
WT	21B	3	S-CUTAUT	1			
WT	22A	3	K-TT	9			
WT	22B	3	YBI-REC				
WT	23A	3	+24.0	2			
WT	23B	3	+24.0	2			
WT	24A	3	- 5.8	6			
WT	24B	3	- 5.8				
WT	25A	3	+ 5.8	5			
WT	25B	3	+ 5.8				

EL: 09 IC MEMORY & COUNTER PC CARD

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
WT	01A	3	+ 0.0	0			
WT	01B	3	+ 0.0				
WT	02A	3	+ 0.0				
WT	02B	3	+ 0.0				
WT	03A	3	YBI-END				
WT	03B	3					
WT	04A	3	YPS-REC				
WT	04B	3	YBI-CUT				
WT	05A	3	YBI-FF1				
WT	05B	3	YBI-MOVE				
WT	06A	3	YPS-STOP				
WT	06B	3N	YBI-MOV2				
WT	07A	3	YPS-REPR				
WT	07B	3	YBI-FFO				
WT	08A	3	YPS-FORW				
WT	08B	3	YBI-FF2				
WT	09A	3	YPS-REW				
WT	09B	3	YBI-FF3				
WT	10A	3	YPS-CUT				
WT	10B	3	YBI-FF4				
WT	11A	3					
WT	11B	3	YBI-FAD				
WT	12A	3	+0-DIR1	0			
WT	12B	3	QP-DIR1	8			
WT	13A	3N	+0-DIR2				
WT	13B	3	QP-DIR2	7			
WT	14A	3					
WT	14B	3					
WT	15A	3					
WT	15B	3	M4-3	5			
WT	16A	3	M4-4	6			
WT	16B	3					
WT	17A	3N	+0-CLK				
WT	17B	3N	YBI-CLK				
WT	18A	3					
WT	18B	3	YBI-DIR				
WT	19A	3					
WT	19B	3					
WT +	20A	3	K-RESET	1			
WT	20B	3					
	20K	0	KEY				
WT	21A	3	B-REC	5			
WT	21B	3	+ 0.0				
WT	22A	3	M4-1	3			
WT	22B	3	M4-2	4			
WT	23A	3	+24.0	2			
WT	23B	3	+24.0	2			
WT	24A	3					
WT	24B	3					
WT	25A	3	+ 5.8				
WT	25B	3	+ 5.8	5			

EL: 10 ATTENUATOR & PREAMP. PC CARD

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
WT	01A	3	+ 0.0	0			
WT	01B	3	+ 0.0	0			
WT	02A	3	+ 0.0				
WT	02B	3	+ 0.0				
WT	03A	3	+0-MOVE	0			
WT	03B	3	QP-MOVE	4			
WT	04A	3	+0-END	0			
WT	04B	3	RP-END	8			
WT	05A	3	Y-REC				
WT	05B	3	Q-MOVE				
WT	06A	3	YBI-REC				
WT	06B	3	YBI-END				
WT	07A	3	K-PRESS				
WT	07B	3	+16.0	3			
WT	08A	3	B-FAD	1			
WT	08B	3	YPS-REC				
WT +	09A	3	REM-IN	7			
WT	09B	3	B-CUT				
WT	10A	3					
WT	10B	3	S-CUT	6			
WT	11A	3					
WT	11B	3	S-REC*				
WT	12A	3					
WT	12B	3	YPS-REPR				
WT	13A	3	FAD-2	9			
WT	13B	3	Y-REPR				
WT	14A	3					
WT	14B	3	YPS-FORW				
WT	15A	3	FAD-1	8			
WT	15B	3	S-FORW	3			
WT	16A	3	YPS-MOVE	7			
WT	16B	3	YPS-REW				
	16K	0	KEY				
WT	17A	3	YPS-STOP				
WT	17B	3	S-REW	2			
WT	18A	3N	S-LOW				
WT	18B	3*	S-STOP	1			
WT	19A	3					
WT	19B	3	YPS-CUT				
WT	20A	3					
WT	20B	3	YBI-FAD				
WT	21A	3N	YBI-LOW				
WT	21B	3	K-FAD-1	8			
WT	22A	3					
WT	22B	3	B-END	7			

EL: 10 (CONTINUATION) ▶

GR: 20 (CONTINUATION)
CONTROL UNIT, CARD CHASSIS
****

EL: 10 (CONTINUATION)

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
WT	23A	3	+24.0	2			
WT	23B	3	+24.0	2			
WT	24A	3	- 5.8				
WT	24B	3	- 5.8				
WT	25A	3	+ 5.8				
WT	25B	3	+ 5.8	5			

EL: 12 MASTER CAPSTAN SERVO PC CARD

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
WT	01A	3					
WT	01B	3	+ 0.0				
WT	01B	3	OYAC1-M6	0		&	
WT	02A	3					
WT	02B	3	+ 0.0				
WT	02B	3	OYAC2-M6	0		&	
WT	02K	0	KEY				
WT	03A	3					
WT	03B	3					
WT	04A	3					
WT	04B	3	YTAC-MM				
WT	05A	3					
WT	05B	3					
WT	06A	3					
WT	06B	3					
WT	07A	3					
WT	07B	3					
WT	08A	3					
WT	08B	3					
WT	09A	3					
WT	09B	3	YAC-MM-1				
WT	10A	3					
WT	10B	3					
WT	11A	3					
WT	11B	3					
WT	12A	3					
WT	12B	3					
WT	13A	3					
WT	13B	3					
WT	14A	3					
WT	14B	3	+20.0				
WT	15A	3					
WT	15B	3					
WT	16A	3					
WT	16B	3					
WT	17A	3					
WT	17B	3	T-MM-1	3			
WT	18A	3					
WT	18B	3	MM-1				
WT	19A	3					
WT	19B	3					
WT	20A	3					
WT	20B	3	QPWRO-3	7			
WT	21A	3					
WT	21B	3*	QPWRO-2	9			
WT	22A	3					
WT	22B	3	QPWRO-1	4			
WT	23A	3					
WT	23B	3	+24.0				
WT	24A	3					
WT	24B	3	- 5.8				
WT	25A	3					
WT	25B	3	+ 5.8				

EL: 13 BUSS BARS, UPPER

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
WL	01	9#	+24.0	2			
W	02	9#	+ 5.8				

EL: 14 BUSS BARS, LOWER

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
W	01	9#	+ 0.0				
W	02	9#	- 5.8				

GR: 21 1.080.410.00
ADDITIONAL CAPSTAN TRANSFORMER
****

EL: 01 TRANSFORMER FOR MASTER CAP.MOTOR

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	0	T-M1	1			
L	02	0	F-M1	4			
L	03	0					
L	04	0	T-MM-1	3			
L	05	0	T-MM-2	9			
L	06	0					

GR: 22 1.080.410.00
MODE CONTROL CONNECTOR, REMOTE
****

EL: 22 MODE CONTROL CONNECTOR, REMOTE

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
L	01	1	B-INDIC	9			
L	02	1	B-REW	2			
L	03	1	B-FORW	3			
L	04	1	B-REPR	4			
L	05	1	B-STOP	1			
L	06	1	B-REC	5			
L	07	1	B-CUT	6			
L	08	1	B-CAPRGT	8			
L	09	1	YPS-MOVE	7			
L	10	1	B-FAD	1			
L	11	1	FAD-1	8			
L	12	1@	+24.0	2			
L	13	1					
L	14	1	B-CAPLFT	9			
L	15	1@	- 5.8	6			
L	16	1	M4-2	4			
L	17	1	M4-4	6			
L	18	1@	+24.0	2			
L	19	1	REM-IN	7			
L	20	1	S-REW	2			
L	21	1	S-FORW	3			
L	22	1	S-REPR	4			
L	23	1	S-STOP	1			
L	24	1	S-REC	5			
L	25	1	S-CUT	6			
L	26	1	S-CAPRGT	7			
L	27	1	S-EQUAL	5			
L	28	1	S-CAPLFT	6			
L	29	1	FAD-2	9			
L	30	1@	+ 0.0	0			
L	31	1R	+O-TYPE				
L	32	1@	+ 5.8	5			
L	33	1	K-RESET	1			
L	34	1	M4-1	3			
L	35	1	M4-3	5			
L	36	1@	+ 0.0	0			

GR: 23 1.080.410.00
FEED TO TIME ELAPSE METER
****

EL: 23 FEED TO TIME ELAPSE METER

TYPE	PT	LV	SIG.NAME	COLOR	F	X	Y
G	01	1@	+24.0	2			
G	02	1	K-LIFT	3			

****
* S T U D E R * L O C A T I O N S U M M A R Y * 84/05/03
****
PROFESSIONAL TAPE TRANSPORT DECK ** STUDER A 80 Q/C ** 1.080.002.00 83/01/26

GR #	USED PINS	UNUSED PINS	TOTAL PINS	COD. KEYS	ELE-MNTS	DESCRIPTION OF GROUP	PART # OF GR
01	14	6	20	0	6	POWER INPUT ASSEMBLY	1.080.730.81
02	158	8	166	0	18	POWER SUPPLY ASSEMBLY	1.080.322.00
03	8	2	10	0	2	EXTENSION CABLE,PWR SUPPLY-MAINS SWITCH	1.080.288.00
04	37	0	37	0	15	PWR TRANSISTORS & PHASE SHIFT CAPACITORS	1.080.411.00
05	8	3	11	0	3	POWER SWITCH ASSEMBLY	1.080.284.00
07	3	2	5	0	1	CONTROL UNIT, SUPPLY MOTOR, CABLE PLUG	1.080.412.00
08	2	1	3	0	1	FEED TO BRAKE LIFT SOLENOID LEFT	1.080.412.00
09	2	1	3	0	1	FEED TO BRAKE LIFT SOLENOID RIGHT	1.080.412.00
10	3	2	5	0	1	FEED TO TAKE-UP MOTOR, CABLE PLUG	1.080.412.00
11	5	0	5	0	1	FEED TO TAPE TENSION CONTROL LEFT	1.080.412.00
12	5	0	5	0	1	FEED TO TAPE TENSION CONTROL RIGHT	1.080.412.00
13	4	1	5	0	1	FEED TO OPTICAL TAPE SENSOR	1.080.412.00
14	11	1	12	0	2	FEED TO TAPE MOVE & DIRECTION SENSOR	1.080.412.00
15	5	0	5	0	1	FEED TO PRESSURE ROLLER ASSEMBLY	1.080.412.00
16	14	2	16	0	2	FEED TO TWO CAPSTAN MOTORS	1.080.412.00
17	21	0	21	0	2	FEED TO LOCAL COMMAND SWITCHES	1.080.412.00
18	9	0	9	0	1	FEED TO LOCAL TAPE TIMER	1.080.412.00
19	5	0	5	0	1	CONTROL UNIT, CUTTER CONTROL, CABLE PLUG	1.080.412.00
20	292	116	408	9	12	CONTROL UNIT, CARD CHASSIS	1.080.349.00
21	4	2	6	0	1	ADDITIONAL CAPSTAN TRANSFORMER	1.080.410.00
22	35	1	36	0	1	MODE CONTROL CONNECTOR, REMOTE	1.080.410.00
23	2	0	2	0	1	FEED TO TIME ELAPSE METER	1.080.410.00
TOT.	647	148	795	9	75	DISTRIBUTED IN 22 GROUPS	

6.3 SIGNAL WIRE LIST

Erklaerung

Explanation

```
*****************************************************
*  S T U D E R   *   S I G N A L   W I R E   L I S T  *
*****************************************************

SIG.NAME  COLOR  TYPE  GR  EL  PT  S  DESCRIPTION OF ELEMENT
--------  -----  ----  --  --  --  -  ----------------------
YBI-DIR   6      WT    20  08  19B     IC DECODER PC BOARD
          3      WT    20  09  18B     IC MEMORY
```

ANSCHLUSS-PUNKT

Numerisch geordnet.
Korrespondiert mit Anschlussbezeichnung auf Schaltbild.
Fuer Printstecker gilt:
..A = Bestueckungsseite
..B = Loetseite

CONNECTION POINT

In numeric sequence.
Corresponds with terminal numbering on the circuit diagram.
Applicable to card edge connectors: ..A = component side
..B = solder side

ELEMENT

mit Benennung

ELEMENT

with designation

GRUPPE

siehe
- Gruppen-Uebersicht, Kap. 6.1

GROUP

please refer
- Survey Of Groups, Section 6.1

ANSCHLUSS-TYP

Beispiele:
F = MOLEX-Stecker
G = Loetstift
H = Litze/Draht 6mm, verzinnt
K = " abisoliert
L = " 4mm, verzinnt
M = MOLEX Kontaktstift
P = Print-Federleiste
S = Litze/Draht
4mm, abisoliert, verzinnt
T = TERMI POINT (Steckkontakt auf Wire-Wrap-Stift)
W = Wire-Wrap-Verbindung
Y = AMP-Flachstecker

CONNECTION TYPE

Examples:
F = MOLEX connector
G = Solder pin
H = Stranded/solid wire, tinned
K = " stripped
L = " tinned
M = MOLEX contact pin
P = Multipin card edge connector
S = Stranded/solide wire
4mm, stripped and tinned
T = TERMI POINT (plug contact on wire wrap pin)
W = Wire wrap connection
Y = AMP flat-pin terminal

DRAHTFARBE

0 = schwarz (blk)
1 = braun (brn)
2 = rot (red)
3 = orange (org)
4 = gelb (yel)
5 = gruen (grn)
6 = blau (blu)
7 = violett (vio)
8 = grau (gry)
9 = weiss (wht)
- farblos (transparent) (unc)
..A = Bestueckungsseite
..B = Loetseite

WIRE COLOR

0 = black (blk)
1 = brown (brn)
2 = red (red)
3 = orange (org)
4 = yellow (yel)
5 = green (grn)
6 = blue (blu)
7 = violet (vio)
8 = grey (gry)
9 = white (wht)
- colourless (transp.) (unc)
tors: ..A = component side
..B = solder side

SIGNAL NAME

(alphabetisch geordnet)
Erklaerung der Abkuerzungen:
Siehe rueckseitige Auflistung
Beispiel: YBI-DIR
Y : Signal / \ Richtung
BI: binaer

SIGNAL NAME

(in alphabetic order)
For explanation of abbreviations please turn over
Example: YBI-DIR
Y : signal / \ direction
BI: binary

SIGNAL-NAMES

AC	alternierend	alternating
ACCEL	beschleunigend	accelerate
AN	analog	analog
B	Laempchen	bulb
BRAKE	Bremse	brake
C	Kondensator	capacitor
CAPLFT	Kapstan links	capstan left
CAPRGT	Kapstan rechts	capstan right
CLK	Takt	clock
CUT	editieren (manuell)	edit
CUTAUT	editieren (automatisch)	auto-edit
DIR1	Bandbewegung vorwaerts	tape move direction forward
DIR2	Bandbewegung rueckwaerts	tape move direction reverse
END	Bandende	tape end
EQUAL	Entzerrung	equalizing
F	Sicherung	fuse
FAD	Regler-Start	fader start
FF	Flip-Flop	flip-flop
FL	Filter	filter
FORW	Band Vorspulen	
GRD MAIN	Haupt-Erdung	main ground
GROUND	Masse/Erde	grounding/earthing
IC	Integrierte Schaltung	integrated circuit
INDIC	Signalisations-Lampe	indicator
K	Elektromagnet, Relais	solenoid, relay
LIFT	abheben (Bremsen)	lift brake
LINE1	Netzanschluss: Null-Leiter	power neutral wire
LINE2	Netzanschluss: Phase	power phase wire
LINE3	Schutzerde	safety earth
LOW	niedrige Bandgeschwindigkeit	low tape speed
M1	linker Wickelmotor (SUPPLY)	SUPPLY spooling motor l.h.
M2	rechter Wickelmotor (TAKE-UP)	TAKE-UP " " r.h.
M3	linker Kapstanmotor (SLAVE)	capstan motor l.h. (SLAVE)
M4	Bandzaehler	counter
	-1 -> Y-CLK	-1 -> Y-CLK
	-2 -> Y-REVRS	-2 -> Y-REVRS
	-3 -> Y-ICLK	-3 -> Y-ICLK
	-4 -> Y-FORW	-4 -> Y-FORW
M5	(wird nicht benutzt)	(not used)
M6	rechter Kapstanmotor (MASTER)	capstan motor l.h. (MASTER)
MM	Kapstan-Servo MASTER	capstan servo MASTER
MOVE	(Band-) Bewegung	tape move
MS	Kapstan-Servo SLAVE	capstan servo SLAVE
P	Stecker	plug
PRESS	Andruck (Andruckrolle)	pressure
PS	Impuls	pulse
Q	Transistor	transistor
	-1 = Emiter	-1 = emitter
	-2 = Basis	-2 = base
	-3 = Kollektor	-3 = collector
QP	Foto-Transistor	photo transistor
QPWR	Leistungs-Transistor	power transistor
REC	Aufnahme	recording
R	Widerstand	resistor
REM	Fernsteuerung	remote
REPR	Wiedergabe	reproduce
RESET	Rueckstellen	reset
RP	Foto-Widerstand	photo resistor
S	Schalter (Mikroswitch)	micro switch
	-1 = Gemeinsamer Anschluss	- 1 = common
	-2 = Ruhekontakt	- 2 = closed
	-3 = Arbeitskontakt	- 3 = open
STOP	Band-Stop	stop (tape)
T	Transformator	transformator
TT	Bandzug-Regelung	tape tension
Y	Signal	signal

****
* S T U D E R * S I G N A L W I R E L I S T * 84/05/03 *
****
PROFESSIONAL TAPE TRANSPORT DECK ** STUDER A 80 Q/C ** 1.080.002.00 83/01/26

SIG.NAME	COLOR	TYPE	GR	EL	PT	S	DESCRIPTION OF ELEMENT
0-AC1	6	Y	02	05	38		RECTIFIER & CONNECTOR PC CARD
	6	L	02	20	06		CHANNEL FEED CONNECTOR
0-AC2	7	Y	02	05	39		RECTIFIER & CONNECTOR PC CARD
	7	L	02	20	07		CHANNEL FEED CONNECTOR
0-AC3	6	Y	02	05	42	N	RECTIFIER & CONNECTOR PC CARD
0-AC4	7	Y	02	05	43	N	RECTIFIER & CONNECTOR PC CARD
+ 0.0	0	L	02	05	12	@	RECTIFIER & CONNECTOR PC CARD
	0	L	02	05	13	@	RECTIFIER & CONNECTOR PC CARD
	0	L	02	05	14	@	RECTIFIER & CONNECTOR PC CARD
	0	SL	04	03	01	@	DC CHASSIS CONNECTION
	0	M	11	01	03	@	TAPE TENSION CONTROL ASSY, LEFT
	0	M	12	01	03	@	TAPE TENSION CONTROL ASSY, RIGHT
	0	F	17	02	01	@	FEED TO TAPE DIRECTION SWITCHES
	0	P	18	01	02	@	TIMER FEED PC-CARD PLUG
	0	WTL	20	01	01	D	POWER CONNECTOR PC CARD
	0	WTL	20	01	02	D	POWER CONNECTOR PC CARD
	0	WTL	20	01	24		POWER CONNECTOR PC CARD
		WT	20	02	01		+24/+20/+6/-6V STABIL. PC CARD
		WT	20	02	02		+24/+20/+6/-6V STABIL. PC CARD
		WT	20	02	19		+24/+20/+6/-6V STABIL. PC CARD
		WT	20	02	20		+24/+20/+6/-6V STABIL. PC CARD
		WT	20	04	01		CONTACTOR PC CARD
		WT	20	04	02		CONTACTOR PC CARD
	0	WT	20	05	01		SPOOLING MOTOR CONTROL PC CARD
	0	WT	20	05	02		SPOOLING MOTOR CONTROL PC CARD
		WT	20	06	01B		SLAVE CAPSTAN SERVO PC CARD
		WT	20	06	02B		SLAVE CAPSTAN SERVO PC CARD
		WT	20	07	01A		DUAL CAPSTAN DIRECTION PC CARD
		WT	20	07	01B		DUAL CAPSTAN DIRECTION PC CARD
		WT	20	07	02A		DUAL CAPSTAN DIRECTION PC CARD
		WT	20	07	02B		DUAL CAPSTAN DIRECTION PC CARD
		WT	20	08	01A		IC DECODER PC CARD
		WT	20	08	01B		IC DECODER PC CARD
		WT	20	08	02A		IC DECODER PC CARD
		WT	20	08	02B		IC DECODER PC CARD
		WT	20	08	16B		IC DECODER PC CARD
	0	WT	20	09	01A		IC MEMORY & COUNTER PC CARD
		WT	20	09	01B		IC MEMORY & COUNTER PC CARD
		WT	20	09	02A		IC MEMORY & COUNTER PC CARD
		WT	20	09	02B		IC MEMORY & COUNTER PC CARD
		WT	20	09	21B		IC MEMORY & COUNTER PC CARD
	0	WT	20	10	01A		ATTENUATOR & PREAMP. PC CARD
	0	WT	20	10	01B		ATTENUATOR & PREAMP. PC CARD
		WT	20	10	02A		ATTENUATOR & PREAMP. PC CARD
		WT	20	10	02B		ATTENUATOR & PREAMP. PC CARD
		WT	20	12	01B		MASTER CAPSTAN SERVO PC CARD
		WT	20	12	02B		MASTER CAPSTAN SERVO PC CARD
		W	20	14	01	#	BUSS BARS, LOWER
	0	L	22	22	30	@	MODE CONTROL CONNECTOR, REMOTE
	0	L	22	22	36	@	MODE CONTROL CONNECTOR, REMOTE
+ 0.0(1)	0	Y	02	05	60		RECTIFIER & CONNECTOR PC CARD
+ 0.0(2)	0	Y	02	05	73		RECTIFIER & CONNECTOR PC CARD
	0	Y	02	05	74		RECTIFIER & CONNECTOR PC CARD
	0	L	02	16	02	*	CHARGE CAPACITOR, +24.0 V (1)
	0	L	02	17	02		CHARGE CAPACITOR, +24.0 V (2)
+ 0.0(3)	0	Y	02	05	81		RECTIFIER & CONNECTOR PC CARD
	0	Y	02	05	82		RECTIFIER & CONNECTOR PC CARD
	0	L	02	19	01	*	CHARGE CAPACITOR, - 5.8 V
+ 0.0(4)	0	Y	02	05	93		RECTIFIER & CONNECTOR PC CARD
	0	Y	02	05	94		RECTIFIER & CONNECTOR PC CARD
	0	L	02	18	02	*	CHARGE CAPACITOR, + 5.8 V
+ 5.8	5	L	02	05	20	@	RECTIFIER & CONNECTOR PC CARD
	5	P	14	01	02	@	TAPE MOVE SENSOR
	5	P	14	02	02	@	TAPE DIRECTION SENSOR
	5	P	18	01	09	@	TIMER FEED PC-CARD PLUG
	5	WTL	20	01	25		POWER CONNECTOR PC CARD
		WT	20	02	25		+24/+20/+6/-6V STABIL. PC CARD
		WT	20	04	25		CONTACTOR PC CARD
		WT	20	06	25B		SLAVE CAPSTAN SERVO PC CARD
		WT	20	07	25A		DUAL CAPSTAN DIRECTION PC CARD
		WT	20	07	25B		DUAL CAPSTAN DIRECTION PC CARD
	5	WT	20	08	25A		IC DECODER PC CARD
		WT	20	08	25B		IC DECODER PC CARD
		WT	20	09	25A		IC MEMORY & COUNTER PC CARD
	5	WT	20	09	25B		IC MEMORY & COUNTER PC CARD
		WT	20	10	25A		ATTENUATOR & PREAMP. PC CARD
	5	WT	20	10	25B		ATTENUATOR & PREAMP. PC CARD
		WT	20	12	25B		MASTER CAPSTAN SERVO PC CARD
		W	20	13	02	#	BUSS BARS, UPPER
	5	L	22	22	32	@	MODE CONTROL CONNECTOR, REMOTE
+0-CLK		WT	20	09	17A	N	IC MEMORY & COUNTER PC CARD
+0-CUTAU	0	M	19	01	05		CUTTER CONTROL ASSEMBLY
	0	WT	20	08	21A		IC DECODER PC CARD
+0-DIR1	0	P	14	02	04		TAPE DIRECTION SENSOR
	0	WT	20	09	12A		IC MEMORY & COUNTER PC CARD
+0-DIR2		WT	20	09	13A	N	IC MEMORY & COUNTER PC CARD
+0-END	0	M	13	01	02		OPTICAL TAPE END SENSOR
	0	WT	20	10	04A		ATTENUATOR & PREAMP. PC CARD
+0-MOVE	0	P	14	01	04		TAPE MOVE SENSOR
	0	WT	20	10	03A		ATTENUATOR & PREAMP. PC CARD
+0-TYPE		L	22	22	31	R	MODE CONTROL CONNECTOR, REMOTE
+10.0	8	L	02	05	19		RECTIFIER & CONNECTOR PC CARD
	8	WTL	20	01	22		POWER CONNECTOR PC CARD
		WT	20	02	21		+24/+20/+6/-6V STABIL. PC CARD
+10.0(0)	8	Y	02	05	91		RECTIFIER & CONNECTOR PC CARD
	8	Y	02	05	92		RECTIFIER & CONNECTOR PC CARD
	8	L	02	18	01	*	CHARGE CAPACITOR, + 5.8 V
+16.0	3	M	13	01	01		OPTICAL TAPE END SENSOR
	3	WT	20	10	07B		ATTENUATOR & PREAMP. PC CARD
+20.0	3	H	04	08	01		+20.0 V STABILIZER TRANSISTOR
	3	M	11	01	01	@	TAPE TENSION CONTROL ASSY, LEFT
	3	M	12	01	01	@	TAPE TENSION CONTROL ASSY, RIGHT
	3	M	19	01	02	@	CUTTER CONTROL ASSEMBLY
	3	WT	20	02	09		+24/+20/+6/-6V STABIL. PC CARD
		WT	20	02	10		+24/+20/+6/-6V STABIL. PC CARD
	3	WT	20	04	17		CONTACTOR PC CARD
	3	WT	20	05	23		SPOOLING MOTOR CONTROL PC CARD
		WT	20	06	14B		SLAVE CAPSTAN SERVO PC CARD
		WT	20	12	14B		MASTER CAPSTAN SERVO PC CARD
+24.0	2	L	02	05	06	@	RECTIFIER & CONNECTOR PC CARD
	2	H	04	04	01		+24.0 V STABILIZER TRANSISTOR
	2	L	04	08	03	@	+20.0 V STABILIZER TRANSISTOR
	2	F	08	01	01	@	BRAKE LIFT SOLENOID, LEFT
	2	F	09	01	01	@	BRAKE LIFT SOLENOID, RIGHT
	2	P	14	01	01	@	TAPE MOVE SENSOR
	2	P	14	02	01	@	TAPE DIRECTION SENSOR
	2	F	15	01	01	@	PRESSURE ROLLER ASSEMBLY
	2	F	17	02	02	@	FEED TO TAPE DIRECTION SWITCHES
	2	P	18	01	04	@	TIMER FEED PC-CARD PLUG
	2	WTL	20	01	23		POWER CONNECTOR PC CARD
		WT	20	02	11		+24/+20/+6/-6V STABIL. PC CARD
	2	WT	20	02	12		+24/+20/+6/-6V STABIL. PC CARD
	2	WT	20	04	03		CONTACTOR PC CARD
	2	WT	20	04	04		CONTACTOR PC CARD
		WT	20	04	23		CONTACTOR PC CARD
		WT	20	06	23B		SLAVE CAPSTAN SERVO PC CARD
		WT	20	07	23A		DUAL CAPSTAN DIRECTION PC CARD
		WT	20	07	23B		DUAL CAPSTAN DIRECTION PC CARD
	2	WT	20	08	23A		IC DECODER PC CARD
	2	WT	20	08	23B		IC DECODER PC CARD
	2	WT	20	09	23A		IC MEMORY & COUNTER PC CARD
	2	WT	20	09	23B		IC MEMORY & COUNTER PC CARD
	2	WT	20	10	23A		ATTENUATOR & PREAMP. PC CARD
	2	WT	20	10	23B		ATTENUATOR & PREAMP. PC CARD
		WT	20	12	23B		MASTER CAPSTAN SERVO PC CARD
	2	WL	20	13	01	#	BUSS BARS, UPPER
	2	L	22	22	12	@	MODE CONTROL CONNECTOR, REMOTE
	2	L	22	22	18	@	MODE CONTROL CONNECTOR, REMOTE
	2	G	23	23	01	@	FEED TO TIME ELAPSE METER
+24.0(1)	2	Y	02	05	59		RECTIFIER & CONNECTOR PC CARD
	2	L	02	20	05		CHANNEL FEED CONNECTOR
+31.0	9	L	02	05	17	@	RECTIFIER & CONNECTOR PC CARD
	9	L	04	04	03	D	+24.0 V STABILIZER TRANSISTOR
	9	WTL	20	01	19	#	POWER CONNECTOR PC CARD
	9	WTL	20	01	20		POWER CONNECTOR PC CARD
		WT	20	02	06		+24/+20/+6/-6V STABIL. PC CARD
+31.0(N)		WT	20	02	05	N	+24/+20/+6/-6V STABIL. PC CARD
+31.0(0)	9	Y	02	05	71		RECTIFIER & CONNECTOR PC CARD
	9	Y	02	05	72		RECTIFIER & CONNECTOR PC CARD
	9	L	02	16	01	*	CHARGE CAPACITOR, +24.0 V (1)
	9	L	02	17	01		CHARGE CAPACITOR, +24.0 V (2)
- 5.8	6	P	18	01	01	@	TIMER FEED PC-CARD PLUG
	6	WT	20	02	14		+24/+20/+6/-6V STABIL. PC CARD
		WT	20	04	24		CONTACTOR PC CARD
		WT	20	05	24		SPOOLING MOTOR CONTROL PC CARD
		WT	20	06	24B		SLAVE CAPSTAN SERVO PC CARD
		WT	20	07	24B		DUAL CAPSTAN DIRECTION PC CARD
	6	WT	20	08	24A		IC DECODER PC CARD
		WT	20	08	24B		IC DECODER PC CARD
		WT	20	10	24A		ATTENUATOR & PREAMP. PC CARD
		WT	20	10	24B		ATTENUATOR & PREAMP. PC CARD
		WT	20	12	24B		MASTER CAPSTAN SERVO PC CARD
		W	20	14	02	#	BUSS BARS, LOWER
	6	L	22	22	15	@	MODE CONTROL CONNECTOR, REMOTE
-10.0	6	L	02	05	18		RECTIFIER & CONNECTOR PC CARD
	6	WTL	20	01	21		POWER CONNECTOR PC CARD
		WT	20	02	18		+24/+20/+6/-6V STABIL. PC CARD
-10.0(0)	6	Y	02	05	83		RECTIFIER & CONNECTOR PC CARD
	6	Y	02	05	84		RECTIFIER & CONNECTOR PC CARD
	6	L	02	19	02	*	CHARGE CAPACITOR, - 5.8 V
AC1	6	Y	02	05	40		RECTIFIER & CONNECTOR PC CARD
	6	L	02	20	13		CHANNEL FEED CONNECTOR
AC2	7	Y	02	05	41		RECTIFIER & CONNECTOR PC CARD
	7	L	02	20	14		CHANNEL FEED CONNECTOR
AC3	6	Y	02	05	44	N	RECTIFIER & CONNECTOR PC CARD
AC4	7	Y	02	05	45	N	RECTIFIER & CONNECTOR PC CARD

SIG.NAME	COLOR	TYPE	GR	EL	PT	S	DESCRIPTION OF ELEMENT
B-CAPLFT	9	F	17	02	04		FEED TO TAPE DIRECTION SWITCHES
	9	WT	20	07	22A		DUAL CAPSTAN DIRECTION PC CARD
	9	L	22	22	14		MODE CONTROL CONNECTOR, REMOTE
B-CAPRGT	8	F	17	02	05		FEED TC TAPE DIRECTION SWITCHES
	8	WT	20	07	21A		DUAL CAPSTAN DIRECTION PC CARD
	8	L	22	22	08		MODE CONTROL CONNECTOR, REMOTE
B-CUT	6	P	17	01	02		COMMAND SWITCHES, LOCAL
	6	WT	20	08	18A	*	IC DECODER PC CARD
		WT	20	10	09B		ATTENUATOR & PREAMP. PC CARC
	6	L	22	22	07		MODE CONTROL CONNECTOR, REMOTE
B-DIR	9	P	14	02	06		TAPE DIRECTION SENSOR
	9	WT	20	08	06A		IC DECODER PC CARD
B-END	7	F	13	01	05		OPTICAL TAPE END SENSOR
	7	WT	20	10	22B		ATTENUATOR & PREAMP. PC CARD
B-FAD	1	WT	20	10	08A		ATTENUATOR & PREAMP. PC CARD
	1	L	22	22	10		MODE CONTROL CONNECTOR, REMOTE
B-FORW	3	P	17	01	06		COMMAND SWITCHES, LOCAL
		WT	20	05	05		SPOOLING MOTOR CONTROL PC CARD
	3	WT	20	08	13B	#	IC DECODER PC CARD
	3	L	22	22	03		MODE CONTROL CONNECTOR, REMOTE
B-INDIC	9	P	17	01	01		COMMAND SWITCHES, LOCAL
	9	WT	20	04	21		CONTACTOR PC CARD
	9	L	22	22	01		MODE CONTROL CONNECTOR, REMOTE
B-MOVE	6	P	14	01	06		TAPE MOVE SENSOR
	6	WT	20	08	07A		IC DECODER PC CARD
B-REC	5	P	17	01	03		COMMAND SWITCHES, LOCAL
	5	WT	20	09	21A		IC MEMORY & COUNTER PC CARD
	5	L	22	22	06		MODE CONTRCL CONNECTOR, REMOTE
B-REPR	4	P	17	01	05		COMMAND SWITCHES, LOCAL
		WT	20	07	18B		DUAL CAPSTAN DIRECTION PC CARD
	4	WT	20	08	08A	*	IC DECODER PC CARD
	4	L	22	22	04		MODE CONTROL CONNECTOR, REMOTE
B-REW	2	P	17	01	07		COMMAND SWITCHES, LOCAL
		WT	20	05	17		SPOOLING MOTOR CONTROL PC CARD
	2	WT	20	08	12A	#	IC DECODER PC CARD
	2	L	22	22	02		MODE CONTROL CONNECTOR, REMOTE
B-STOP	0	L	02	05	02	@	RECTIFIER & CONNECTOR PC CARD
	1	P	17	01	04	@	COMMAND SWITCHES, LOCAL
	0	WTL	20	01	08		POWER CONNECTOR PC CARD
	1	WT	20	08	12B		IC DECODER PC CARD
	1	L	22	22	05		MODE CONTROL CONNECTOR, REMOTE
C-MM	8	L	04	15	02		CAPSTAN MOTOR CAPACITOR (MASTER)
	8	WT	20	07	05A		DUAL CAPSTAN DIRECTION PC CARD
C-MS	8	L	04	07	02		CAPSTAN MOTOR CAPACITOR (SLAVE)
	8	WT	20	07	12A		DUAL CAPSTAN DIRECTION PC CARD
C-M1-2	5	L	04	06	02		SUPPLY MOTOR CAPACITOR, ADD.
	5	L	04	14	02		SUPPLY MOTOR CAPACITOR, MAIN
	5	F	07	01	05		SUPPLY MOTOR (M1)
	5	WT +	20	04	14	#	CONTACTOR PC CARD
C-M2-2	8	L	04	01	02		TAKE-UP MOTOR CAPACITOR, ADD.
	8	L	04	13	02		TAKE-UP MOTOR CAPACITOR, MAIN
	8	F	10	01	03		TAKE-UP MOTOR (M2)
	8	WT +	20	04	09	#	CONTACTOR PC CARD
F(+ 5.8)	2	L	02	05	95		RECTIFIER & CONNECTOR PC CARD
	2	L	02	14	01		FUSE, + 5.8 V
F(+24.0)	9	L	02	05	75		RECTIFIER & CONNECTOR PC CARD
	9	L	02	15	01		FUSE, +24.0 V
F(- 5.8)	6	L	02	05	85		RECTIFIER & CONNECTOR PC CARD
	6	L	02	13	01		FUSE, - 5.8 V
F-LINE2	1	L	01	04	01		MAIN FUSE, TAPE DECK
	1	Z	01	05	02		MAINS FILTER
F-M1	4	L	02	05	10		RECTIFIER & CONNECTOR PC CARD
	4	WTL	20	01	17	*	POWER CCNNECTOR PC CARD
		WT	20	04	13		CONTACTOR PC CARD
	4	L	21	01	02		TRANSFORMER FOR MASTER CAP.MOTOR
F-M1(0)	4	L	02	05	61		RECTIFIER & CONNECTOR PC CARD
	4	L	02	10	01		FUSE, SUPPLY MOTOR
F-M2	9	L	02	05	09		RECTIFIER & CONNECTOR PC CARD
	9	WTL	20	01	15		POWER CCNNECTOR PC CARD
		WT	20	04	07		CONTACTOR PC CARD
F-M2(0)	5	L	02	05	66		RECTIFIER & CONNECTOR PC CARD
	5	L	02	11	01		FUSE, TAKE-UP MOTOR
F-M3	5	L	02	05	15		RECTIFIER & CONNECTOR PC CARD
	5	WTL	20	01	12		POWER CONNECTOR PC CARD
		WT	20	06	17B		SLAVE CAPSTAN SERVO PC CARD
F-M3(0)	8	L	02	05	68		RECTIFIER & CONNECTOR PC CARD
	8	L	02	12	01		FUSE, CAPSTAN

SIG.NAME	COLOR	TYPE	GR	EL	PT	S	DESCRIPTION OF ELEMENT
FAD-1	8	WT	20	10	15A		ATTENUATCR & PREAMP. PC CARD
	8	L	22	22	11		MODE CONTROL CONNECTOR, REMOTE
FAD-2	9	WT	20	10	13A		ATTENUATCR & PREAMP. PC CARD
	9	L	22	22	29		MODE CONTROL CONNECTOR, REMOTE
FL-LINE1	6	Z	01	05	01'		MAINS FILTER
	6	F	01	08	01		POWER FEED CONNECTOR, MAINS
	6	M	02	01	01		POWER INPUT FEED CONNECTOR
	6	F	02	08	01		POWER SWITCH FEED, RECEPTACLE
	6	M	03	01	01		EXTENSION CABLE, SUPPLY SIDE
	6	F	03	02	01		EXTENSICN CABLE, SWITCH SIDE
	6	M	05	01	01		POWER SWITCH FEED, JACK
	6	L	05	02	01		POWER SWITCH, REAR
FL-LINE2	1	Z	01	05	02'		MAINS FILTER
	1	F	01	08	03		POWER FEED CONNECTOR, MAINS
	1	M	02	01	03		POWER INPUT FEED CONNECTOR
	1	F	02	08	02		POWER SWITCH FEED, RECEPTACLE
	1	M	03	01	02		EXTENSION CABLE, SUPPLY SIDE
	1	F	03	02	02		EXTENSION CABLE, SWITCH SIDE
	1	M	05	01	02		POWER SWITCH FEED, JACK
	1	L	05	03	01		POWER SWITCH, FRONT
GRD MAIN	4/5	L	01	02	01		GROUND POST, EXTERNAL
	4/5	K	01	05	03		MAINS FILTER
	4/5	L	01	09	03		POWER INPUT CONNECTOR
	4/5	LS	01	10	01		GROUND CONNECTOR SCREW
GROUND	4/5	M	02	01	05	N	POWER INPUT FEED CONNECTOR
	4/5	LS	02	06	01		GROUND CHASSIS CONNECTION
K-BRAKE		WT	20	04	15		CONTACTOR PC CARD
		WT	20	08	18B		IC DECODER PC CARD
K-CUT	5	M	15	01	04		PRESSURE ROLLER ASSEMBLY
	5	WT	20	08	08B		IC DECODER PC CARD
K-DIR		WT	20	04	16		CONTACTOR PC CARD
		WT	20	08	20A		IC DECODER PC CARD
K-FAD-1	8	P	17	01	15		COMMAND SWITCHES, LOCAL
	8	WT	20	10	21B		ATTENUATOR & PREAMP. PC CARD
K-LIFT	3	F	08	01	02		BRAKE LIFT SOLENOID, LEFT
	3	F	09	01	02		BRAKE LIFT SOLENOID, RIGHT
		WT	20	05	14		SPOOLING MOTOR CONTROL PC CARD
	3	WT	20	08	20B	#	IC DECODER PC CARD
	3	G	23	23	02		FEED TO TIME ELAPSE METER
K-PRESS	0	L	02	05	04	@	RECTIFIER & CONNECTOR PC CARD
	8	M	15	01	02		PRESSURE ROLLER ASSEMBLY
	0	WTL	20	01	06		POWER CONNECTOR PC CARD
	8	WT	20	08	15A	#	IC DECODER PC CARD
		WT	20	10	07A		ATTENUATCR & PREAMP. PC CARD
K-RESET	1	P	18	01	03		TIMER FEED PC-CARD PLUG
	1	WT +	20	09	20A		IC MEMORY & COUNTER PC CARD
	1	L	22	22	33		MODE CONTROL CONNECTOR, REMOTE
K-TT	9	M	12	01	04		TAPE TENSION CONTROL ASSY, RIGHT
	9	WT	20	08	22A		IC DECODER PC CARD
K-TT1/2	7	M	11	01	04		TAPE TENSION CONTROL ASSY, LEFT
	7	M	12	01	05		TAPE TENSION CONTROL ASSY, RIGHT
	7	WT +	20	08	17A	#	IC DECODER PC CARD
LINE1	6	Z	01	05	01		MAINS FILTER
	6	L	01	09	01		POWER INPUT CONNECTOR
LINE2	1	L	01	04	02		MAIN FUSE, TAPE DECK
	1	L	01	09	02		POWER INPUT CONNECTOR
MM-1		WT	20	07	09A		DUAL CAPSTAN DIRECTION PC CARD
		WT	20	12	18B		MASTER CAPSTAN SERVO PC CARD
MS-1		WT	20	06	18B		SLAVE CAPSTAN SERVO PC CARD
		WT	20	07	11A		DUAL CAPSTAN DIRECTION PC CARD
M1-1	1	F	07	01	01		SUPPLY MOTOR (M1)
	1	WT	20	04	12		CONTACTOR PC CARD
M1-2	4	L	04	06	01		SUPPLY MOTOR CAPACITOR, ADD.
	4	L	04	14	01		SUPPLY MOTOR CAPACITOR, MAIN
	4	F	07	01	03		SUPPLY MOTOR (M1)
	4	WT	20	04	10	#	CONTACTOR PC CARD
M2-1	6	F	10	01	01		TAKE-UP MOTOR (M2)
	6	WT	20	04	08		CONTACTOR PC CARD
M2-2	7	L	04	01	01		TAKE-UP MOTOR CAPACITOR, ADD.
	7	L	04	13	01		TAKE-UP MOTOR CAPACITCR, MAIN
	7	F	10	01	05		TAKE-UP MOTOR (M2)
	7	WT	20	04	06	#	CONTACTCR PC CARD
M3-1	6	M	16	01	01		CAPSTAN MCTOR ASSEMBLY M3
	6	WT	20	07	10B		DUAL CAPSTAN DIRECTION PC CARD
M3-2	8	M	16	01	03		CAPSTAN MOTOR ASSEMBLY M3
	8	WT	20	07	07B		DUAL CAPSTAN DIRECTION PC CARD
M3-3	1	M	16	01	02		CAPSTAN MOTOR ASSEMBLY M3
	1	WT	20	07	06B		DUAL CAPSTAN DIRECTION PC CARD

SIG.NAME	COLOR	TYPE	GR	EL	PT	S	DESCRIPTION OF ELEMENT
M4-1	3	P	18	01	05		TIMER FEED PC-CARD PLUG
	3	WT	20	09	22A		IC MEMORY & COUNTER PC CARD
	3	L	22	22	34		MODE CONTROL CONNECTOR, REMOTE
M4-2	4	P	18	01	06		TIMER FEED PC-CARD PLUG
	4	WT	20	09	22B		IC MEMORY & COUNTER PC CARD
	4	L	22	22	16		MODE CONTROL CONNECTOR, REMOTE
M4-3	5	P	18	01	07		TIMER FEED PC-CARD PLUG
	5	WT	20	09	15B		IC MEMORY & COUNTER PC CARD
	5	L	22	22	35		MODE CONTROL CONNECTOR, REMOTE
M4-4	6	P	18	01	08		TIMER FEED PC-CARD PLUG
	6	WT	20	09	16A		IC MEMORY & COUNTER PC CARD
	6	L	22	22	17		MODE CONTROL CONNECTOR, REMOTE
M5-1	9	Y	02	05	69	N	RECTIFIER & CONNECTOR PC CARD
M5-2	9	Y	02	05	70	N	RECTIFIER & CONNECTOR PC CARD
M6-1	6	M	16	02	01		CAPSTAN MOTOR ASSEMBLY M6
	6	WT	20	07	11B		DUAL CAPSTAN DIRECTION PC CARD
M6-2	8	M	16	02	03		CAPSTAN MOTOR ASSEMBLY M6
	8	WT	20	07	15B		DUAL CAPSTAN DIRECTION PC CARD
M6-3	1	M	16	02	02		CAPSTAN MOTOR ASSEMBLY M6
	1	WT	20	07	12B		DUAL CAPSTAN DIRECTION PC CARD
Q-MOVE		WT	20	08	04B		IC DECODER PC CARD
		WT	20	10	05B		ATTENUATOR & PREAMP. PC CARD
QP-DIR1	8	P	14	02	05		TAPE DIRECTION SENSOR
	8	WT	20	09	12B		IC MEMORY & COUNTER PC CARD
QP-DIR2	7	P	14	02	03		TAPE DIRECTION SENSOR
	7	WT	20	09	13B		IC MEMORY & COUNTER PC CARD
QP-MOVE	4	P	14	01	03		TAPE MOVE SENSOR
	4	WT	20	10	03B		ATTENUATOR & PREAMP. PC CARD
QPWRO-1	4	H	04	16	01		CAPSTAN PWR TRANS. MASTER MOTOR
	4	WT	20	12	22B		MASTER CAPSTAN SERVO PC CARD
QPWRO-2	9	H	04	16	02		CAPSTAN PWR TRANS. MASTER MOTOR
		WT	20	07	15A		DUAL CAPSTAN DIRECTION PC CARD
	9	WT	20	12	21B	*	MASTER CAPSTAN SERVO PC CARD
QPWRO-3	7	L	04	16	03		CAPSTAN PWR TRANS. MASTER MOTOR
	7	WT	20	12	20B		MASTER CAPSTAN SERVO PC CARD
QPWR1-1	2	L	04	12	01		SUPPLY MOTOR TRANSISTOR PAIR
	2	WT	20	05	22		SPOOLING MOTOR CONTROL PC CARD
QPWR1-2	5	L	04	12	02		SUPPLY MOTOR TRANSISTOR PAIR
	5	WT	20	05	21		SPOOLING MOTOR CONTROL PC CARD
QPWR1-3	8	L	04	12	03		SUPPLY MOTOR TRANSISTOR PAIR
	8	WT	20	05	20		SPOOLING MOTOR CONTROL PC CARD
QPWR2-1	1	L	04	05	01		TAKE-UP MOTOR TRANSISTOR PAIR
	1	WT	20	05	03		SPOOLING MOTOR CONTROL PC CARD
QPWR2-2	4	L	04	05	02		TAKE-UP MOTOR TRANSISTOR PAIR
	4	WT	20	05	04		SPOOLING MOTOR CONTROL PC CARD
QPWR2-3	9	L	04	05	03		TAKE-UP MOTOR TRANSISTOR PAIR
	9	WT	20	05	08		SPOOLING MOTOR CONTROL PC CARD
QPWR3-1	4	H	04	11	01		CAPSTAN PWR TRANS. SLAVE MOTOR
	4	WT	20	06	22B		SLAVE CAPSTAN SERVO PC CARD
QPWR3-2	9	H	04	11	02		CAPSTAN PWR TRANS. SLAVE MOTOR
	9	WT	20	06	21B		SLAVE CAPSTAN SERVO PC CARD
		WT	20	07	17A		DUAL CAPSTAN DIRECTION PC CARD
QPWR3-3	7	L	04	11	03		CAPSTAN PWR TRANS. SLAVE MOTOR
	7	WT	20	06	20B		SLAVE CAPSTAN SERVO PC CARD
QPWR4-1	1	H	04	10	01		- 5.8 V STABILIZER TRANSISTOR
	1	WT	20	02	17		+24/+20/+6/-6V STABIL. PC CARD
QPWR4-2	8	H	04	10	02		- 5.8 V STABILIZER TRANSISTOR
	8	WT	20	02	16		+24/+20/+6/-6V STABIL. PC CARD
QPWR4-3	6	L	04	10	03		- 5.8 V STABILIZER TRANSISTOR
	6	WT	20	02	15		+24/+20/+6/-6V STABIL. PC CARD
QPWR5-1	5	H	04	09	01		+ 5.8 V STABILIZER TRANSISTOR
	5	WT	20	02	24		+24/+20/+6/-6V STABIL. PC CARD
QPWR5-2	7	H	04	09	02		+ 5.8 V STABILIZER TRANSISTOR
	7	WT	20	02	23		+24/+20/+6/-6V STABIL. PC CARD
QPWR5-3	9	L	04	09	03		+ 5.8 V STABILIZER TRANSISTOR
	9	WT	20	02	22		+24/+20/+6/-6V STABIL. PC CARD
QPWR6-2	6	H	04	08	02		+20.0 V STABILIZER TRANSISTOR
	6	WT	20	02	03		+24/+20/+6/-6V STABIL. PC CARD
QPWR7-2	1	H	04	04	02		+24.0 V STABILIZER TRANSISTOR
	1	WT	20	02	07		+24/+20/+6/-6V STABIL. PC CARD
		WT	20	02	08		+24/+20/+6/-6V STABIL. PC CARD

SIG.NAME	COLOR	TYPE	GR	EL	PT	S	DESCRIPTION OF ELEMENT
R-CUT-1	5	M	19	01	01		CUTTER CONTROL ASSEMBLY
	5	WT	20	05	15		SPOOLING MOTOR CONTROL PC CARD
R-CUT-3	7	F	19	01	03		CUTTER CONTROL ASSEMBLY
	7	WT	20	05	13		SPOOLING MOTOR CONTROL PC CARD
R-TT1	1	M	11	01	02		TAPE TENSION CONTROL ASSY, LEFT
	1	WT	20	05	16		SPOOLING MOTOR CONTROL PC CARD
R-TT2	2	M	12	01	02		TAPE TENSION CONTROL ASSY, RIGHT
	2	WT	20	04	18		CONTACTOR PC CARD
		WT	20	05	09		SPOOLING MOTOR CONTROL PC CARD
REM-IN	7	P	17	01	14		COMMAND SWITCHES, LOCAL
	7	WT +	20	10	09A		ATTENUATOR & PREAMP. PC CARD
	7	L	22	22	19		MODE CONTROL CONNECTOR, REMOTE
RES 1	4	L	02	05	07	N	RECTIFIER & CONNECTOR PC CARD
	4	WTL	20	01	03	N	POWER CONNECTOR PC CARD
RES 1'	4	Y	02	05	32	N	RECTIFIER & CONNECTOR PC CARD
	4	L	02	20	04	N	CHANNEL FEED CONNECTOR
RES 2	3	L	02	05	03	N	RECTIFIER & CONNECTOR PC CARD
	3	WTL	20	01	07	N	POWER CONNECTOR PC CARD
RES 2'	8	Y	02	05	35	N	RECTIFIER & CONNECTOR PC CARD
	8	L	02	20	08	N	CHANNEL FEED CONNECTOR
RP-END	8	M	13	01	03		OPTICAL TAPE END SENSOR
	8	WT	20	10	04B		ATTENUATOR & PREAMP. PC CARD
S-CAPLFT	6	F	17	02	03		FEED TO TAPE DIRECTION SWITCHES
	6	WT	20	07	08B		DUAL CAPSTAN DIRECTION PC CARD
	6	L	22	22	28		MODE CONTROL CONNECTOR, REMOTE
S-CAPRGT	7	F	17	02	06		FEED TO TAPE DIRECTION SWITCHES
	7	WT	20	07	16B		DUAL CAPSTAN DIRECTION PC CARD
	7	L	22	22	26		MODE CONTROL CONNECTOR, REMOTE
S-CUT	6	P	17	01	13		COMMAND SWITCHES, LOCAL
	6	WT	20	10	10B		ATTENUATOR & PREAMP. PC CARD
	6	L	22	22	25		MODE CONTROL CONNECTOR, REMOTE
S-CUTAUT	1	M	19	01	04		CUTTER CONTROL ASSEMBLY
	1	WT	20	08	21B		IC DECODER PC CARD
S-EQUAL	5	L	02	05	08	@	RECTIFIER & CONNECTOR PC CARD
	5	WTL	20	01	04		POWER CONNECTOR PC CARD
	5	WT	20	02	13		+24/+20/+6/-6V STABIL. PC CARD
	5	L	22	22	27		MODE CONTROL CONNECTOR, REMOTE
S-EQUAL'	3	Y	02	05	34	*	RECTIFIER & CONNECTOR PC CARD
	3	L	02	20	03		CHANNEL FEED CONNECTOR
S-FORW	3	P	17	01	10		COMMAND SWITCHES, LOCAL
	3	WT	20	10	15B		ATTENUATOR & PREAMP. PC CARD
	3	L	22	22	21		MODE CONTROL CONNECTOR, REMOTE
S-LINE1	6	L	02	02	01	*	VOLTAGE SELECTOR TERMINAL BLOCK
	2	L	02	04	01		POWER TRANSFORMER
	6	F	02	08	05		POWER SWITCH FEED, RECEPTACLE
	6	M	03	01	05		EXTENSION CABLE, SUPPLY SIDE
	6	F	03	02	05		EXTENSION CABLE, SWITCH SIDE
	6	M	05	01	05		POWER SWITCH FEED, JACK
	6	L	05	02	03		POWER SWITCH, REAR
S-LINE2	1	L	02	02	08	*	VOLTAGE SELECTOR TERMINAL BLOCK
	9	L	02	04	08		POWER TRANSFORMER
	1	F	02	08	04		POWER SWITCH FEED, RECEPTACLE
	1	M	03	01	04		EXTENSION CABLE, SUPPLY SIDE
	1	F	03	02	04		EXTENSION CABLE, SWITCH SIDE
	1	M	05	01	04		POWER SWITCH FEED, JACK
	1	L	05	03	03		POWER SWITCH, FRONT
S-LOW		WT	20	10	18A	N	ATTENUATOR & PREAMP. PC CARD
S-REC	5	P	17	01	12		COMMAND SWITCHES, LOCAL
	5	WT	20	07	19B		DUAL CAPSTAN DIRECTION PC CARD
	5	L	22	22	24		MODE CONTROL CONNECTOR, REMOTE
S-REC*		WT	20	07	06A		DUAL CAPSTAN DIRECTION PC CARD
		WT	20	10	11B		ATTENUATOR & PREAMP. PC CARD
S-REPR	4	P	17	01	11		COMMAND SWITCHES, LOCAL
	4	WT	20	07	14B		DUAL CAPSTAN DIRECTION PC CARD
	4	L	22	22	22		MODE CONTROL CONNECTOR, REMOTE
S-REW	2	P	17	01	09		COMMAND SWITCHES, LOCAL
	2	WT	20	10	17B		ATTENUATOR & PREAMP. PC CARD
	2	L	22	22	20		MODE CONTROL CONNECTOR, REMOTE
S-STOP	1	P	17	01	08		COMMAND SWITCHES, LOCAL
		WT	20	07	20B		DUAL CAPSTAN DIRECTION PC CARD
	1	WT	20	10	18B	*	ATTENUATOR & PREAMP. PC CARD
	1	L	22	22	23		MODE CONTROL CONNECTOR, REMOTE
S-TT	4	M	11	01	05		TAPE TENSION CONTROL ASSY, LEFT
	4	M	15	01	05		PRESSURE ROLLER ASSEMBLY
	4	WT +	20	08	16A	#	IC DECODER PC CARD

SIG.NAME	COLOR	TYPE	GR	EL	PT	S	DESCRIPTION OF ELEMENT
SCREEN	0	LS	02	03	01		SCREEN CHASSIS CONNECTION
	0	L	02	04	09		POWER TRANSFORMER
T-MM-1	3	WT	20	12	17B		MASTER CAPSTAN SERVO PC CARD
	3	L	21	01	04		TRANSFORMER FOR MASTER CAP.MOTOR
T-MM-2	9	L	04	15	01		CAPSTAN MOTOR CAPACITOR (MASTER)
	9	WT	20	07	08A		DUAL CAPSTAN DIRECTION PC CARD
	9	L	21	01	05		TRANSFORMER FOR MASTER CAP.MOTOR
T-MS	7	L	02	05	21	@	RECTIFIER & CONNECTOR PC CARD
	7	L	04	07	01		CAPSTAN MOTOR CAPACITOR (SLAVE)
	7	WTL	20	01	11		POWER CONNECTOR PC CARD
		WT	20	07	14A		DUAL CAPSTAN DIRECTION PC CARD
T-M1	1	L	02	05	11		RECTIFIER & CONNECTOR PC CARD
	1	WTL	20	01	16	*	POWER CONNECTOR PC CARD
		WT	20	05	18		SPOOLING MOTOR CONTROL PC CARD
	1	L	21	01	01		TRANSFORMER FOR MASTER CAP.MOTOR
T-M2	6	L	02	05	16		RECTIFIER & CONNECTOR PC CARD
	6	WTL	20	01	14		POWER CONNECTOR PC CARD
		WT	20	05	06		SPOOLING MOTOR CONTROL PC CARD
T-10	0	L	02	04	10		POWER TRANSFORMER
	0	L	02	15	02		FUSE, +24.0 V
T-11	0	L	02	04	11		POWER TRANSFORMER
	0	L	02	05	76		RECTIFIER & CONNECTOR PC CARD
T-12	2	L	02	04	12		POWER TRANSFORMER
	2	L	02	14	02		FUSE, + 5.8 V
T-13	2	L	02	04	13		POWER TRANSFORMER
	2	L	02	05	96		RECTIFIER & CONNECTOR PC CARD
T-14	6	L	02	04	14		POWER TRANSFORMER
	6	L	02	13	02		FUSE, - 5.8 V
T-15	6	L	02	04	15		POWER TRANSFORMER
	6	L	02	05	86		RECTIFIER & CONNECTOR PC CARD
T-16	4	L	02	04	16		POWER TRANSFORMER
	4	L	02	10	02		FUSE, SUPPLY MOTOR
T-17	4	L	02	04	17		POWER TRANSFORMER
	4	L	02	05	62		RECTIFIER & CONNECTOR PC CARD
T-17/18	1	Y	02	05	77		RECTIFIER & CONNECTOR PC CARD
	1	L	02	05	78		RECTIFIER & CONNECTOR PC CARD
T-18	5	L	02	04	18		POWER TRANSFORMER
	5	L	02	05	63		RECTIFIER & CONNECTOR PC CARD
T-19	5	L	02	04	19		POWER TRANSFORMER
	5	L	02	11	02		FUSE, TAKE-UP MOTOR
T-2	0	L	02	02	05		VOLTAGE SELECTOR TERMINAL BLOCK
	0	L	02	04	02		POWER TRANSFORMER
T-20	8	L	02	04	20		POWER TRANSFORMER
	8	L	02	05	64		RECTIFIER & CONNECTOR PC CARD
T-20/21	6	Y	02	05	79		RECTIFIER & CONNECTOR PC CARD
	6	L	02	05	80		RECTIFIER & CONNECTOR PC CARD
T-21	6	L	02	04	21		POWER TRANSFORMER
	6	L	02	05	65		RECTIFIER & CONNECTOR PC CARD
T-22	8	L	02	04	22		POWER TRANSFORMER
	8	L	02	12	02		FUSE, CAPSTAN
T-23	8	L	02	04	23		POWER TRANSFORMER
	8	L	02	05	67		RECTIFIER & CONNECTOR PC CARD
T-24	0	L	02	04	24		POWER TRANSFORMER (ST)
	0	L	02	05	51		RECTIFIER & CONNECTOR PC CARD
T-25	0	L	02	04	25		POWER TRANSFORMER (ST)
	0	L	02	05	52		RECTIFIER & CONNECTOR PC CARD
T-26	1	L	02	04	26		POWER TRANSFORMER (ST)
	1	L	02	05	53		RECTIFIER & CONNECTOR PC CARD
T-27	1	L	02	04	27		POWER TRANSFORMER (ST)
	1	L	02	05	54		RECTIFIER & CONNECTOR PC CARD
T-28	2	L	02	04	28		POWER TRANSFORMER (ST)
	2	L	02	05	55		RECTIFIER & CONNECTOR PC CARD
T-29	2	L	02	04	29		POWER TRANSFORMER (ST)
	2	L	02	05	56		RECTIFIER & CONNECTOR PC CARD
T-3	8	L	02	02	06		VOLTAGE SELECTOR TERMINAL BLOCK
	8	L	02	04	03		POWER TRANSFORMER
T-30	9	L	02	04	30		POWER TRANSFORMER (ST)
	9	L	02	05	57		RECTIFIER & CONNECTOR PC CARD
T-31	9	L	02	04	31		POWER TRANSFORMER (ST)
	9	L	02	05	58		RECTIFIER & CONNECTOR PC CARD

SIG.NAME	COLOR	TYPE	GR	EL	PT	S	DESCRIPTION OF ELEMENT
T-4	3	L	02	02	07	*	VOLTAGE SELECTOR TERMINAL BLOCK
	(5)	L	02	04	04		POWER TRANSFORMER
T-5	1	L	02	02	02		VOLTAGE SELECTOR TERMINAL BLOCK
	1	L	02	04	05		POWER TRANSFORMER
T-6	4	L	02	02	03		VOLTAGE SELECTOR TERMINAL BLOCK
	4	L	02	04	06		POWER TRANSFORMER
T-7	6	L	02	02	04		VOLTAGE SELECTOR TERMINAL BLOCK
	6	L	02	04	07		POWER TRANSFORMER
TEST-B		WT	20	04	20		CONTACTOR PC CARD
		WT	20	08	15B		IC DECODER PC CARD
Y-ACCEL	6	M	15	01	03		PRESSURE ROLLER ASSEMBLY
	6	WT	20	05	10		SPOOLING MOTOR CONTROL PC CARD
Y-CAPLF	1	Y	02	05	31		RECTIFIER & CONNECTOR PC CARD
	1	L	02	20	01		CHANNEL FEED CONNECTOR
Y-CAPLFT	1	L	02	05	01		RECTIFIER & CONNECTOR PC CARD
	1	WTL	20	01	09		POWER CONNECTOR PC CARD
		WT	20	07	20A		DUAL CAPSTAN DIRECTION PC CARD
Y-CUTAUT		WT	20	05	12		SPOOLING MOTOR CONTROL PC CARD
		WT	20	08	14B		IC DECODER PC CARD
Y-PRESS	0	Y	02	05	36	*	RECTIFIER & CONNECTOR PC CARD
	0	L	02	20	09		CHANNEL FEED CONNECTOR
Y-REC	5	L	02	05	05		RECTIFIER & CONNECTOR PC CARD
	5	WTL	20	01	05		POWER CONNECTOR PC CARD
		WT	20	10	05A		ATTENUATOR & PREAMP. PC CARD
Y-RECORD	9	Y	02	05	37	*	RECTIFIER & CONNECTOR PC CARD
	9	L	02	20	11		CHANNEL FEED CONNECTOR
Y-REPR		WT	20	07	13B		DUAL CAPSTAN DIRECTION PC CARD
		WT	20	10	13B		ATTENUATOR & PREAMP. PC CARD
Y-STOP	0	Y	02	05	33	*	RECTIFIER & CONNECTOR PC CARD
	0	L	02	20	02		CHANNEL FEED CONNECTOR
YAC-MM-1		WT	20	07	22B		DUAL CAPSTAN DIRECTION PC CARD
		WT	20	12	09B		MASTER CAPSTAN SERVO PC CARD
YAC-MS-1		WT	20	06	09A		SLAVE CAPSTAN SERVO PC CARD
		WT	20	07	09B		DUAL CAPSTAN DIRECTION PC CARD
YAC1-M3	4	M	16	01	05		CAPSTAN MOTOR ASSEMBLY M3
	4	WT	20	07	04A		DUAL CAPSTAN DIRECTION PC CARD
YAC1-M6	4	M	16	02	05		CAPSTAN MOTOR ASSEMBLY M6
	4	WT	20	07	04B		DUAL CAPSTAN DIRECTION PC CARD
YAC2-M3	5	M	16	01	08		CAPSTAN MOTOR ASSEMBLY M3
	5	WT	20	07	03A		DUAL CAPSTAN DIRECTION PC CARD
YAC2-M6	5	M	16	02	08		CAPSTAN MOTOR ASSEMBLY M6
	5	WT	20	07	03B		DUAL CAPSTAN DIRECTION PC CARD
YAN-M1		WT	20	04	11		CONTACTOR PC CARD
		WT	20	05	19		SPOOLING MOTOR CONTROL PC CARD
YAN-M2		WT	20	04	05		CONTACTOR PC CARD
		WT	20	05	07		SPOOLING MOTOR CONTROL PC CARD
YBI-'L'		WT	20	08	17B	N	IC DECODER PC CARD
YBI-CLK		WT	20	09	17B	N	IC MEMORY & COUNTER PC CARD
YBI-CUT		WT	20	08	05B		IC DECODER PC CARD
		WT	20	09	04B		IC MEMORY & COUNTER PC CARD
YBI-DIR		WT	20	08	19B		IC DECODER PC CARD
		WT	20	09	18B		IC MEMORY & COUNTER PC CARD
YBI-END		WT	20	04	19		CONTACTOR PC CARD
		WT	20	09	03A		IC MEMORY & COUNTER PC CARD
		WT	20	10	06B		ATTENUATOR & PREAMP. PC CARD
YBI-FAD		WT	20	09	11B		IC MEMORY & COUNTER PC CARD
		WT	20	10	20B		ATTENUATOR & PREAMP. PC CARD
YBI-FF0		WT	20	08	06B		IC DECODER PC CARD
		WT	20	09	07B		IC MEMORY & COUNTER PC CARD
YBI-FF1		WT	20	08	10B		IC DECODER PC CARD
		WT	20	09	05A		IC MEMORY & COUNTER PC CARD
YBI-FF2		WT	20	08	07B		IC DECODER PC CARD
		WT	20	09	08B		IC MEMORY & COUNTER PC CARD
YBI-FF3		WT	20	08	09B		IC DECODER PC CARD
		WT	20	09	09B		IC MEMORY & COUNTER PC CARD
YBI-FF4		WT	20	08	11B		IC DECODER PC CARD
		WT	20	09	10B		IC MEMORY & COUNTER PC CARD
YBI-LOW		WT	20	10	21A	N	ATTENUATOR & PREAMP. PC CARD

SIG.NAME	COLOR	TYPE	GR	EL	PT	S	DESCRIPTION OF ELEMENT
YBI-MOVE		WT	20	05	11		SPOOLING MOTOR CONTROL PC CARD
		WT	20	08	03B		IC DECODER PC CARD
		WT	20	09	05B		IC MEMORY & COUNTER PC CARD
YBI-MOV2		WT	20	09	06B	N	IC MEMORY & COUNTER PC CARD
YBI-REC		WT	20	08	22B		IC DECODER PC CARD
		WT	20	10	06A		ATTENUATOR & PREAMP. PC CARD
YPS-CUT		WT	20	09	10A		IC MEMORY & COUNTER PC CARD
		WT	20	10	19B		ATTENUATOR & PREAMP. PC CARD
YPS-FORW		WT	20	09	08A		IC MEMORY & COUNTER PC CARD
		WT	20	10	14B		ATTENUATOR & PREAMP. PC CARD
YPS-MOVE	7	WT	20	10	16A		ATTENUATOR & PREAMP. PC CARD
	7	L	22	22	09		MODE CONTROL CONNECTOR, REMOTE
YPS-REC		WT	20	09	04A		IC MEMORY & COUNTER PC CARD
		WT	20	10	08B		ATTENUATOR & PREAMP. PC CARD
YPS-REPR		WT	20	09	07A		IC MEMORY & COUNTER PC CARD
		WT	20	10	12B		ATTENUATOR & PREAMP. PC CARD
YPS-REW		WT	20	09	09A		IC MEMORY & COUNTER PC CARD
		WT	20	10	16B		ATTENUATOR & PREAMP. PC CARD
YPS-STOP		WT	20	09	06A		IC MEMORY & COUNTER PC CARD
		WT	20	10	17A		ATTENUATOR & PREAMP. PC CARD
YTAC-MM		WT	20	07	17B		DUAL CAPSTAN DIRECTION PC CARD
		WT	20	12	04B		MASTER CAPSTAN SERVO PC CARD
YTAC-MS		WT	20	06	04B		SLAVE CAPSTAN SERVO PC CARD
		WT	20	07	05B		DUAL CAPSTAN DIRECTION PC CARD
OYAC1-M3	0	M	16	01	04		CAPSTAN MOTOR ASSEMBLY M3
	0	WT	20	06	01B		SLAVE CAPSTAN SERVO PC CARD
OYAC1-M6	0	M	16	02	04		CAPSTAN MOTOR ASSEMBLY M6
	0	WT	20	12	01B		MASTER CAPSTAN SERVO PC CARD
OYAC2-M3	0	M	16	01	07		CAPSTAN MOTOR ASSEMBLY M3
	0	WT	20	06	02B		SLAVE CAPSTAN SERVO PC CARD
OYAC2-M6	0	M	16	02	07		CAPSTAN MOTOR ASSEMBLY M6
	0	WT	20	12	02B		MASTER CAPSTAN SERVO PC CARD

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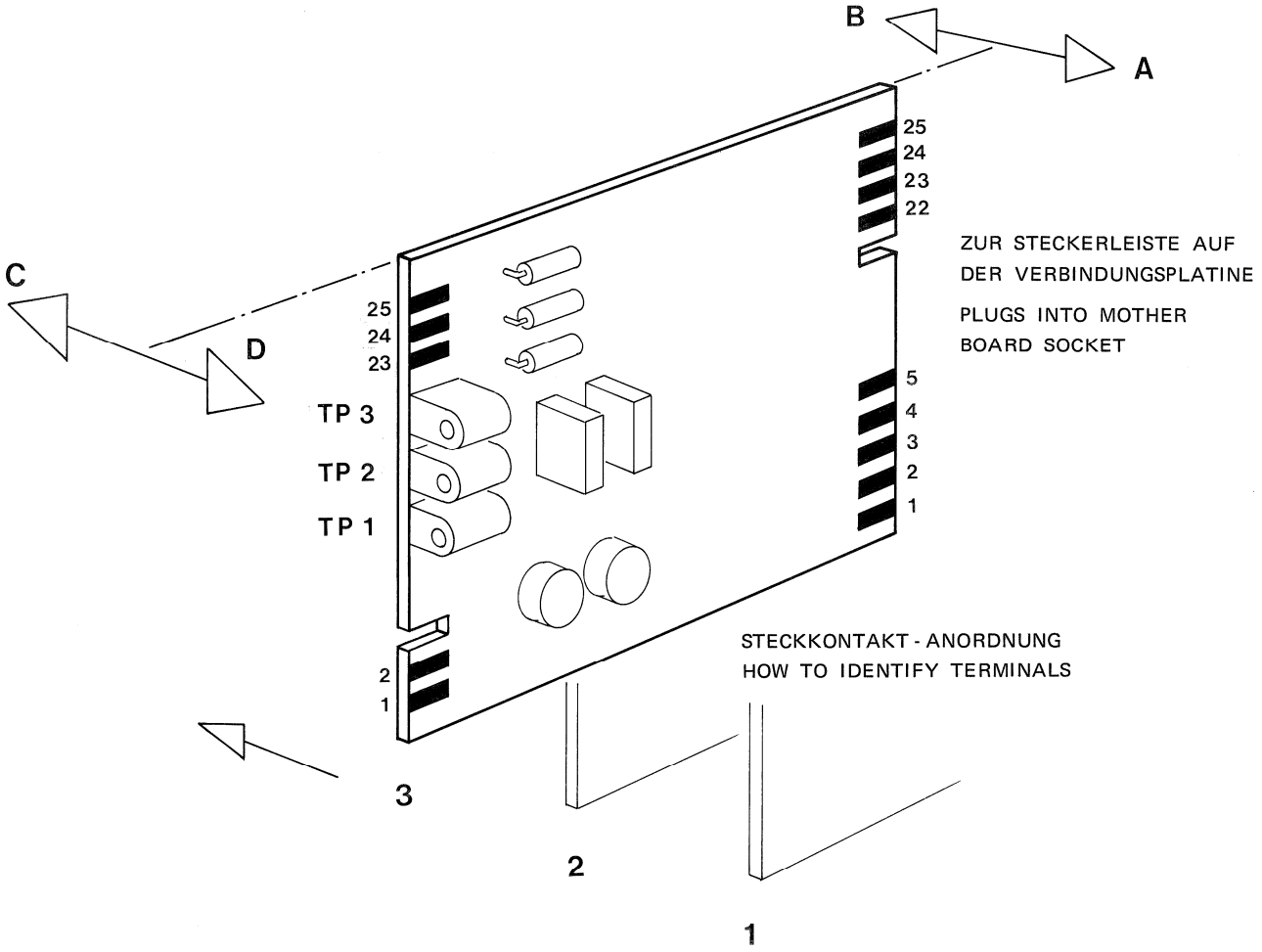
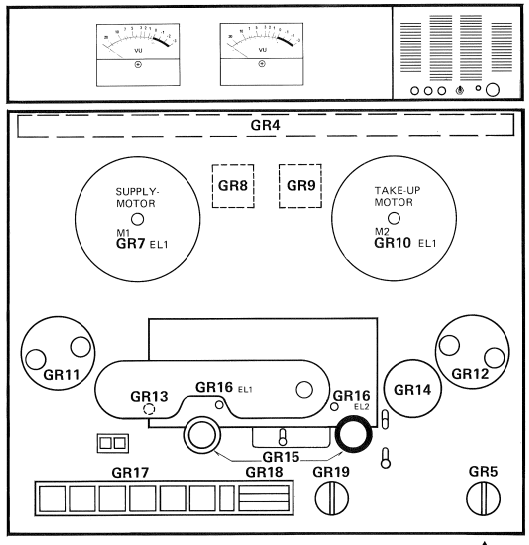
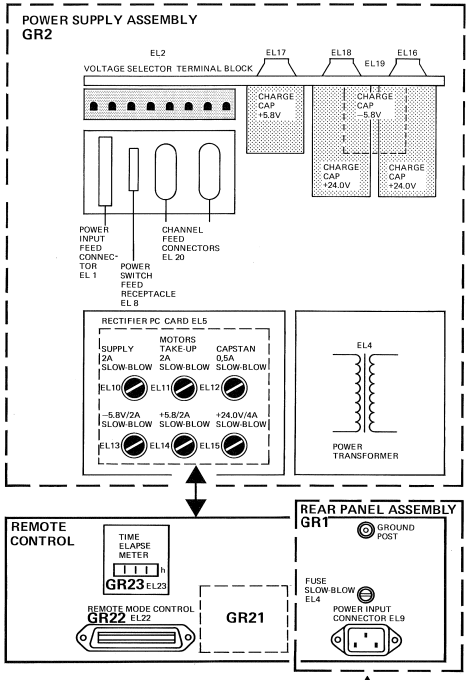
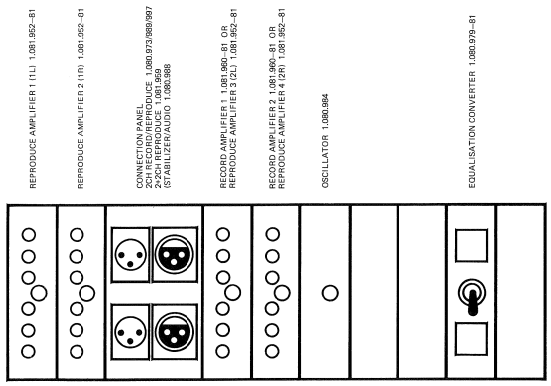
STUDER ELECTRONIC CARDS



PRESENTATION OF GROUPS

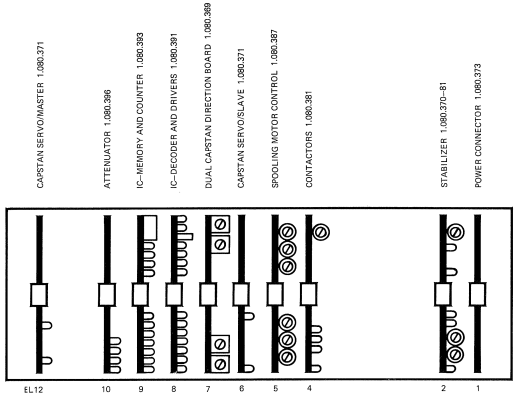






AUDIO SECTION

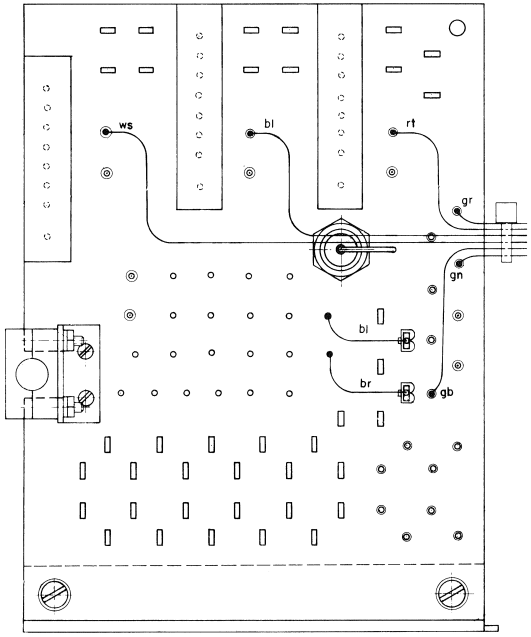
GROUP	DESCRIPTION
01	POWER INPUT ASSEMBLY
02	POWER SUPPLY ASSEMBLY
03	EXTENSION CABLE, PWR SUPPLY–MAINS SWITCH
04	PWR TRANSISTORS & PHASE SHIFT CAPACITORS
05	POWER SWITCH ASSEMBLY
07	CONTROL UNIT, SUPPLY MOTOR, CABLE PLUG
08	FEED TO BRAKE LIFT SOLENOID LEFT
09	FEED TO BRAKE LIFT SOLENOID RIGHT
10	FEED TO TAKE–UP MOTOR, CABLE PLUG
11	FEED TO TAPE TENSION CONTROL LEFT
12	FEED TO TAPE TENSION CONTROL RIGHT
13	FEED TO OPTICAL TAPE SENSOR
14	FEED TO TAPE MOVE & DIRECTION SENSOR
15	FEED TO PRESSURE ROLLER ASSEMBLY
16	FEED TO TWO CAPSTAN MOTORS
17	FEED TO LOCAL COMMAND SWITCHES
18	FEED TO LOCAL TAPE TIMER
19	CONTROL UNIT, CUTTER CONTROL, CABLE PLUG
20	CONTROL UNIT, CARD CHASSIS
21	ADDITIONAL CAPSTAN TRANSFORMER
22	MODE CONTROL CONNECTOR, REMOTE
23	FEED TO TIME ELAPSE METER



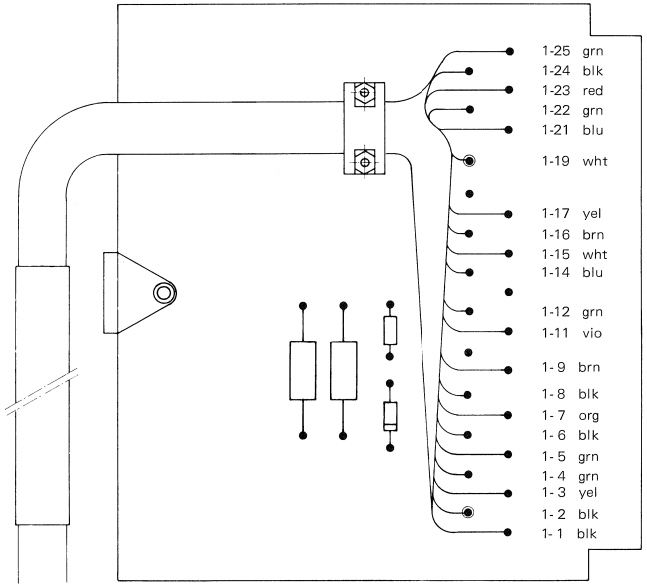
GR20 CONTROL UNIT CARD CHASSIS

POWER SUPPLY UNIT 1.080.320

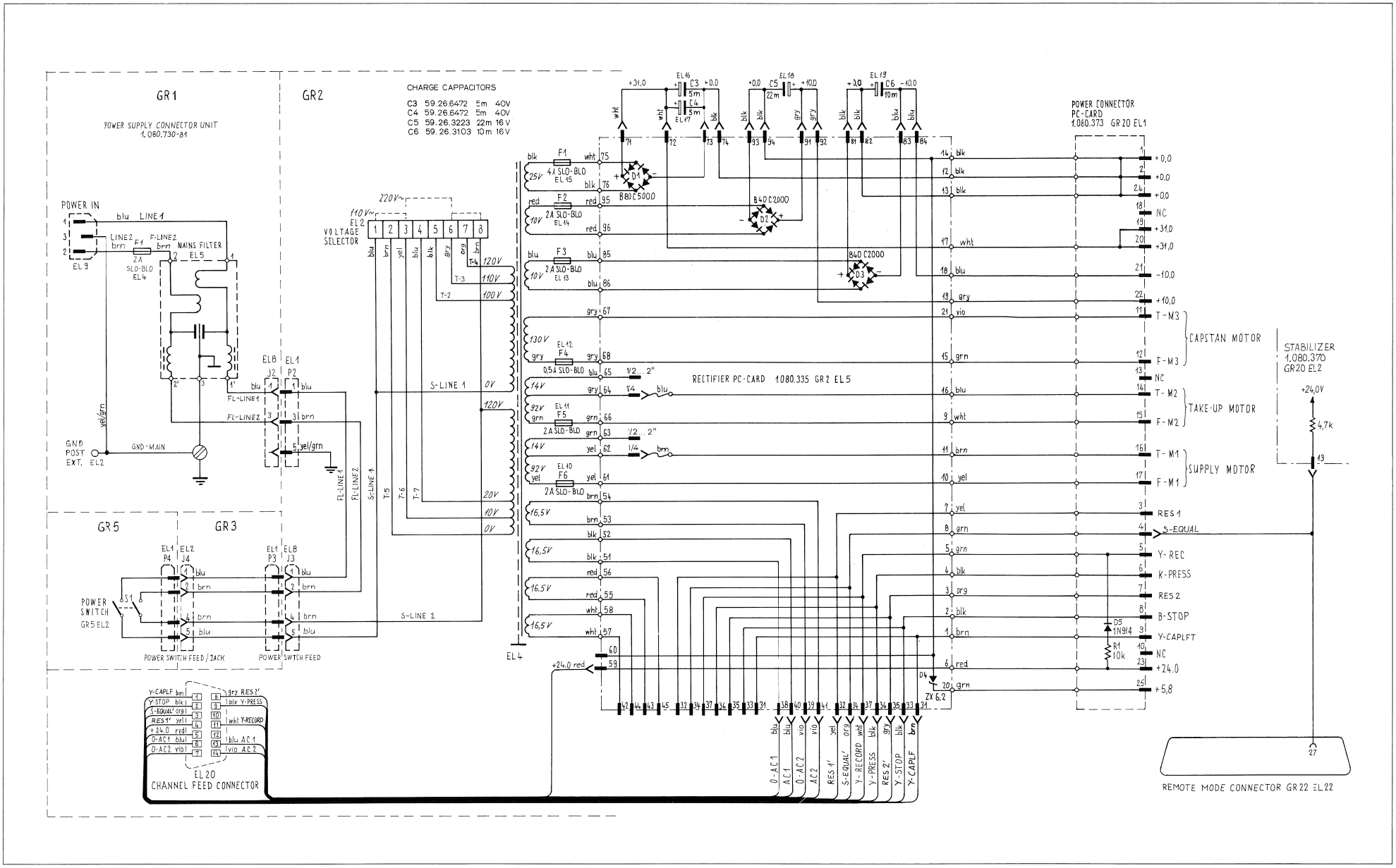
RECTIFIER PC 1.080.335 GR 2 EL 5



POWER CONNECTOR 1.080.373 GR 20 EL 1



POWER SUPPLY UNIT 1.080.322



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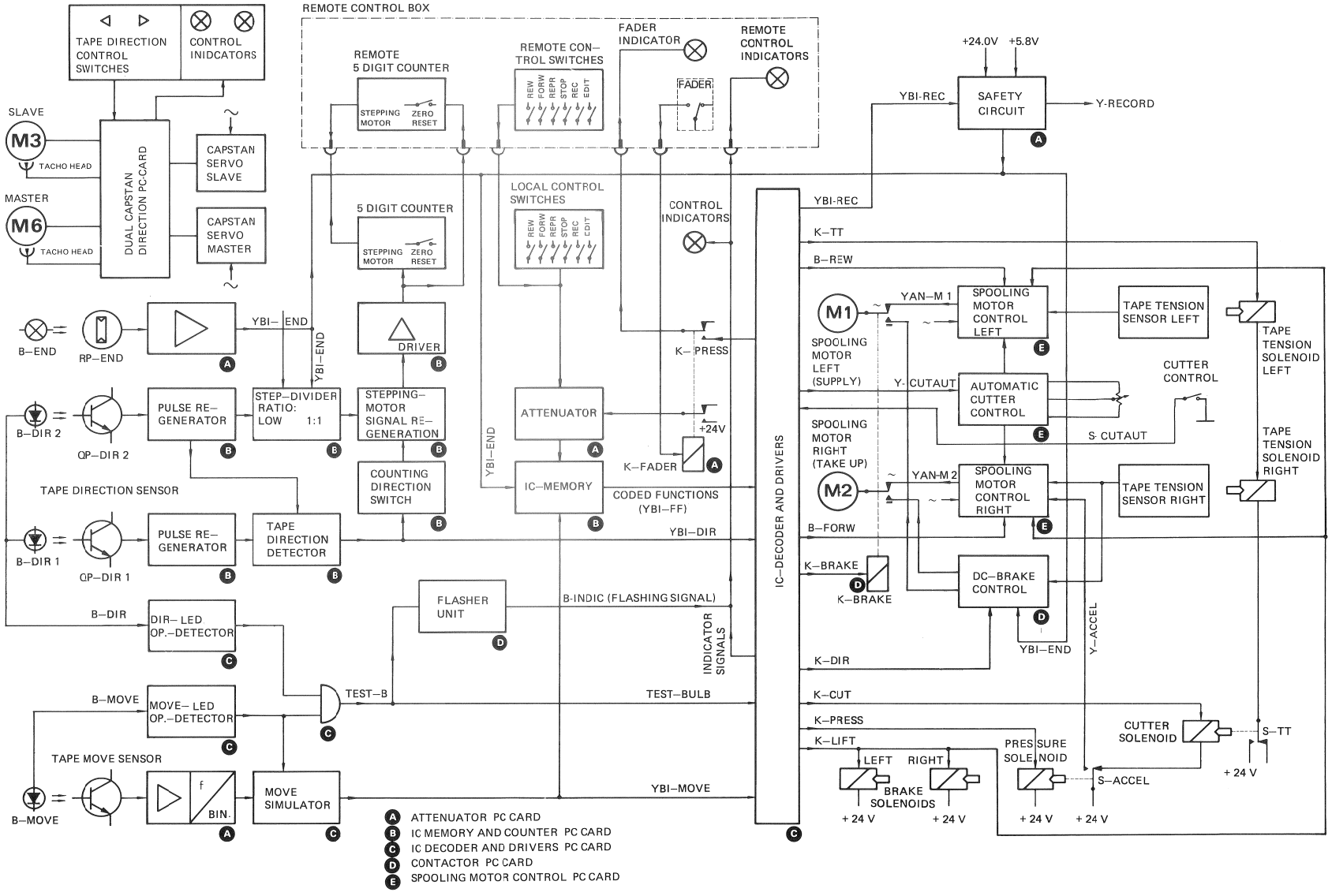
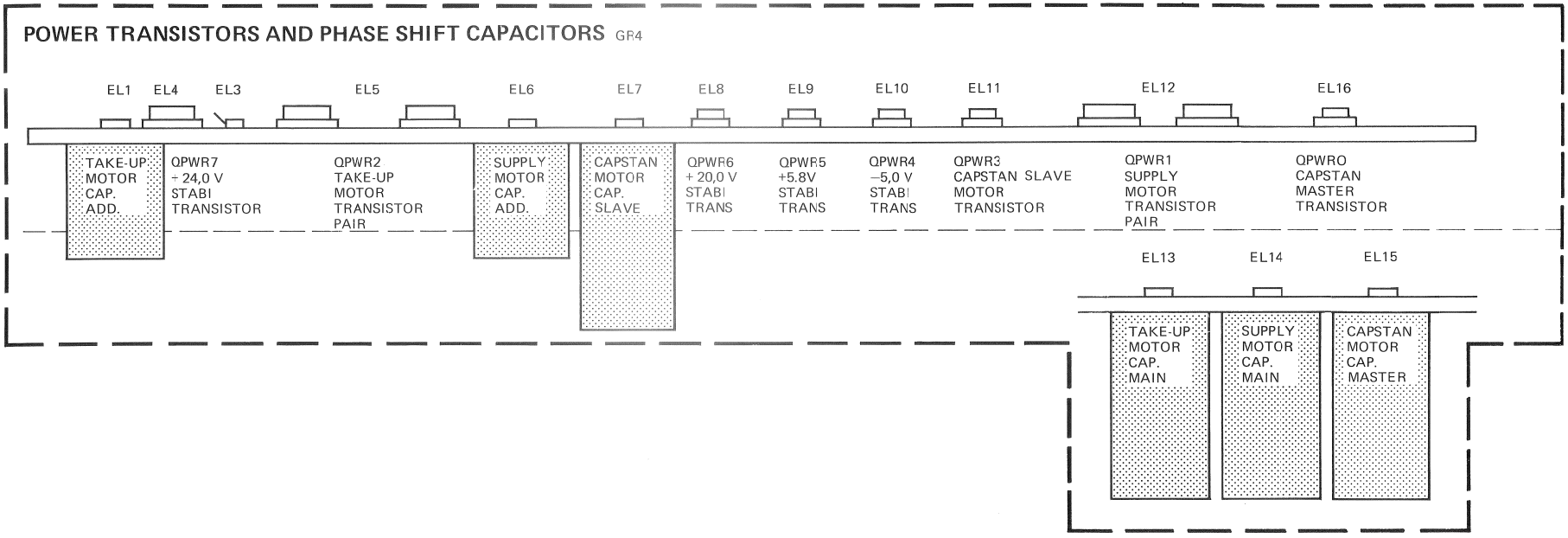
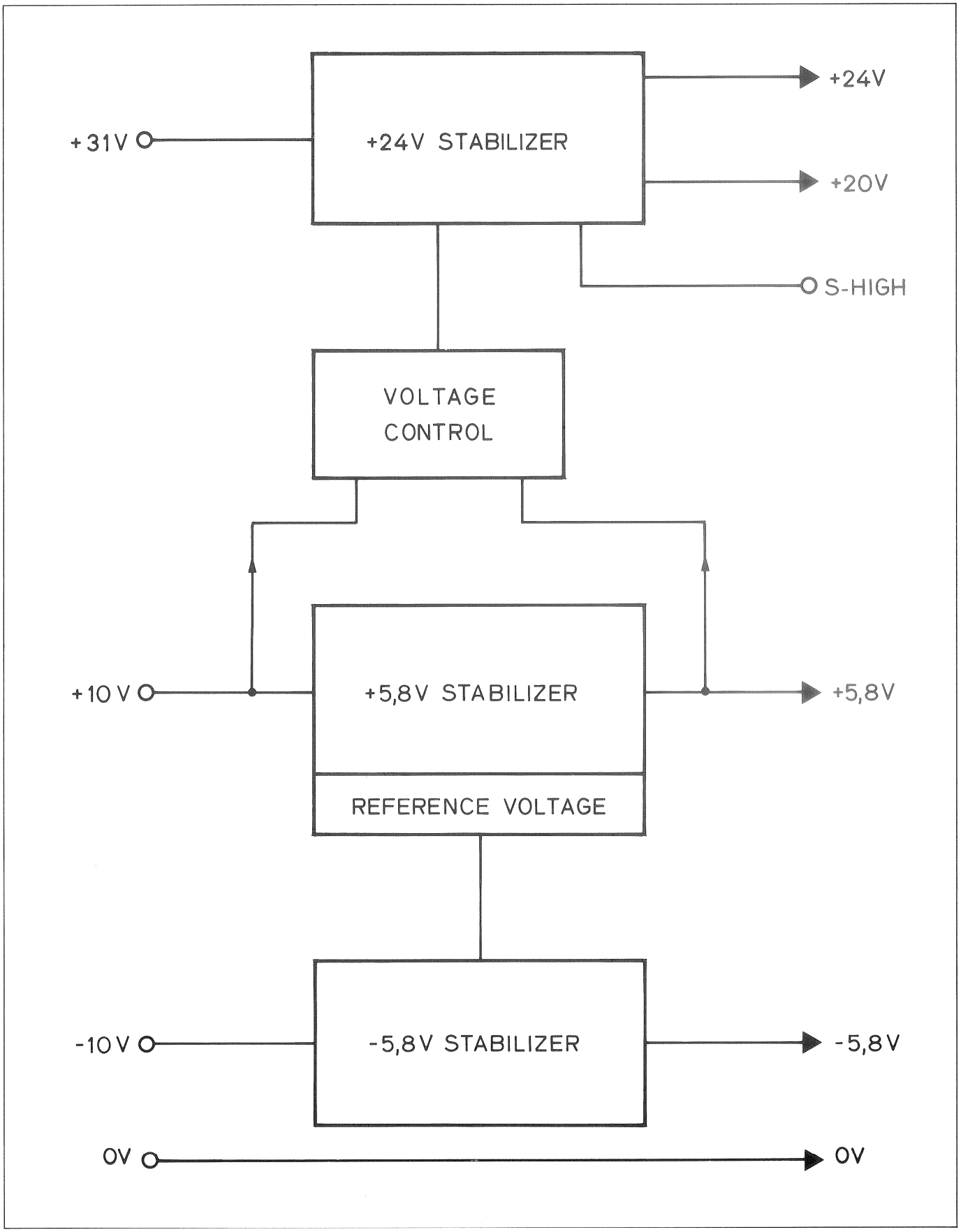
TAPE TRANSPORT CONTROL/BLOCK DIAGRAM A80 QC



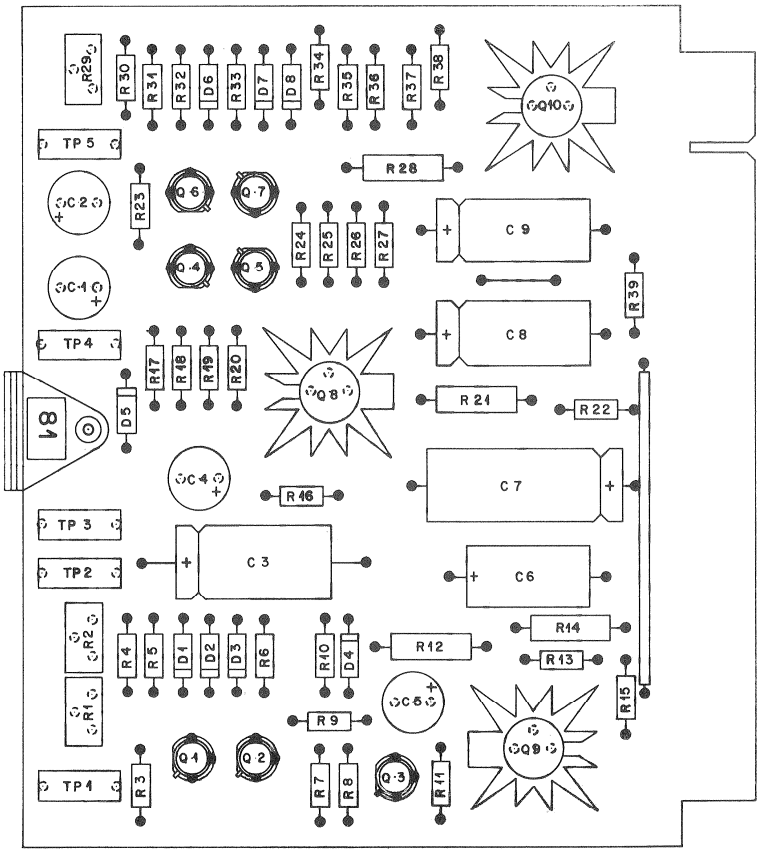
POWER TRANSISTORS AND PHASE SHIFT CAPACITORS GR4



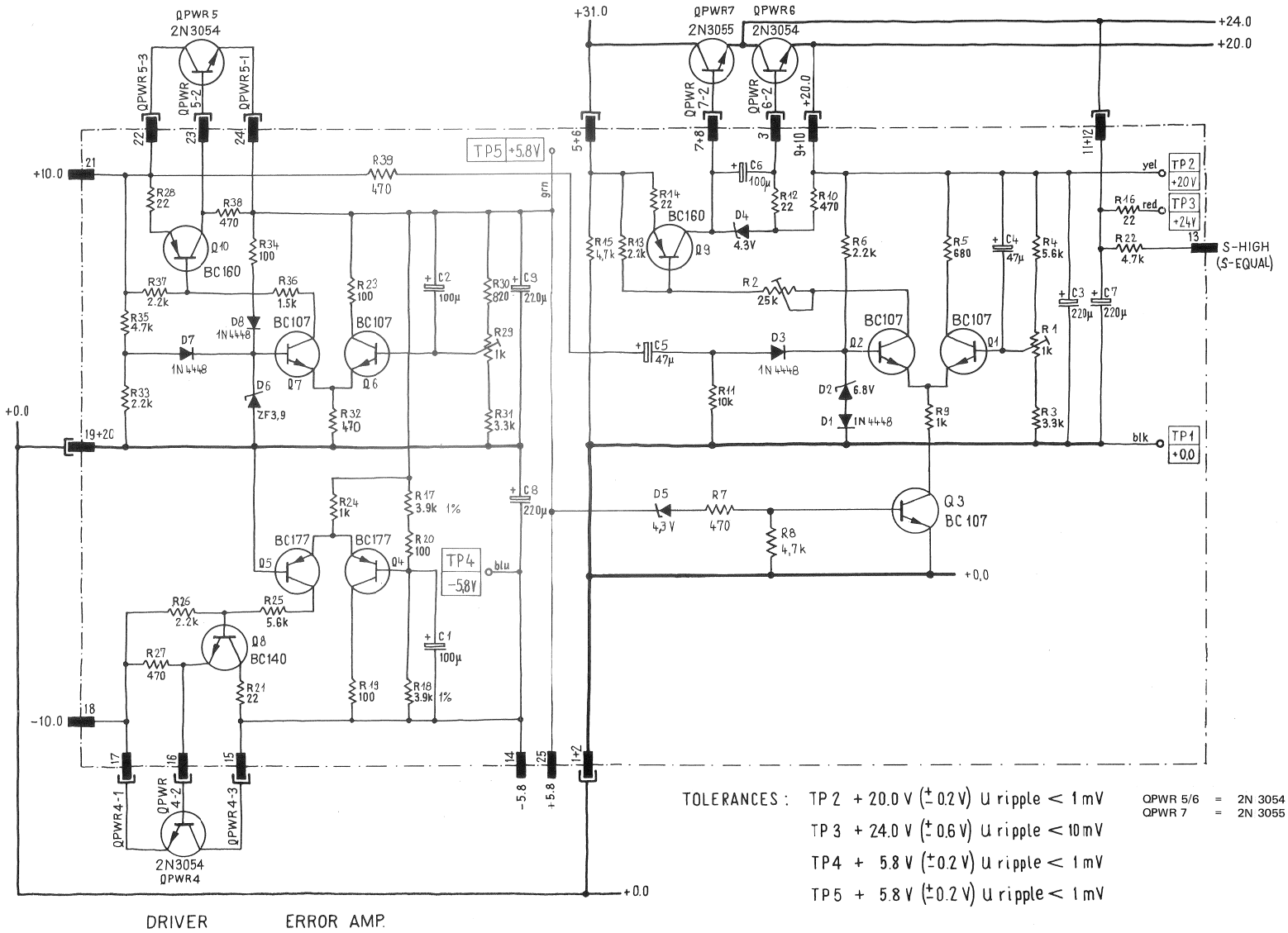
STABILIZER (TAPE TRANSPORT) / BLOCK DIAGRAM 1.080.370-81 GR 20 EL 2



STABILIZER (TAPE TRANSPORT) 1.080.370-81 GR 20 EL 2



STABILIZER (TAPE TRANSPORT) 1.080.370-81 GR 20 EL 2



TOLERANCES:
TP 2 + 20.0 V (± 0.2 V) U ripple < 1 mV
TP 3 + 24.0 V (± 0.6 V) U ripple < 10 mV
TP 4 + 5.8 V (± 0.2 V) U ripple < 1 mV
TP 5 + 5.8 V (± 0.2 V) U ripple < 1 mV

QPWR 5/6 = 2N 3054 20.500.304.80
QPWR 7 = 2N 3055 20.500.304.14

STABILIZER (TAPE TRANSPORT) 1.080.370-81 GR 20 EL 2

IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	C 01	59.22.3101	100 µF	-10% 12V EL	
	C 02	59.22.3101			
	C 03	59.25.4221	220 µF	-10% 25V EL	
	C 04	59.22.5470	47 µF	-10% 25V EL	
	C 05	59.22.5470			
	C 06	59.25.3101	100 µF	-10% 16V EL	
	C 07	59.25.5221	220 µF	-10% 40V EL	
	C 08	59.25.3221	220 µF	-10% 16V EL	
	C 09	59.25.3221	220 µF		
	D 01	50.04.0125	1N4448	SI	
	D 02	50.04.1102	6,8 V	5% .40W Z	
	D 03	50.04.0125	1N4448	SI	
	D 04	50.04.1120	4,3 V	5% .40W Z	
	D 05	50.04.1123	4,7 V	5% .40W Z	
	D 06	50.04.1101	3,9 V	5% .40W Z	
	D 07	50.04.0125	1N4448	SI	
	D 08	50.04.0125	1N4448	SI	
	Q 01	50.03.0428	BC107A		
	Q 02	50.03.0428	BC107A		
	Q 03	50.03.0428	BC107A		
	Q 04	50.03.0307	BC177A		
	Q 05	50.03.0307	BC177A		
	Q 06	50.03.0428	BC107A		
	Q 07	50.03.0428	BC107A		
	Q 08	50.03.0316	BC140-16		
	Q 09	50.03.0315	BC160-16		
	Q 10	50.03.0315	BC160-16		

IND	DATE	NAME	
④			EL = Electrolytic
③			
②			
①			
○	30.10.78	Schn/gv	

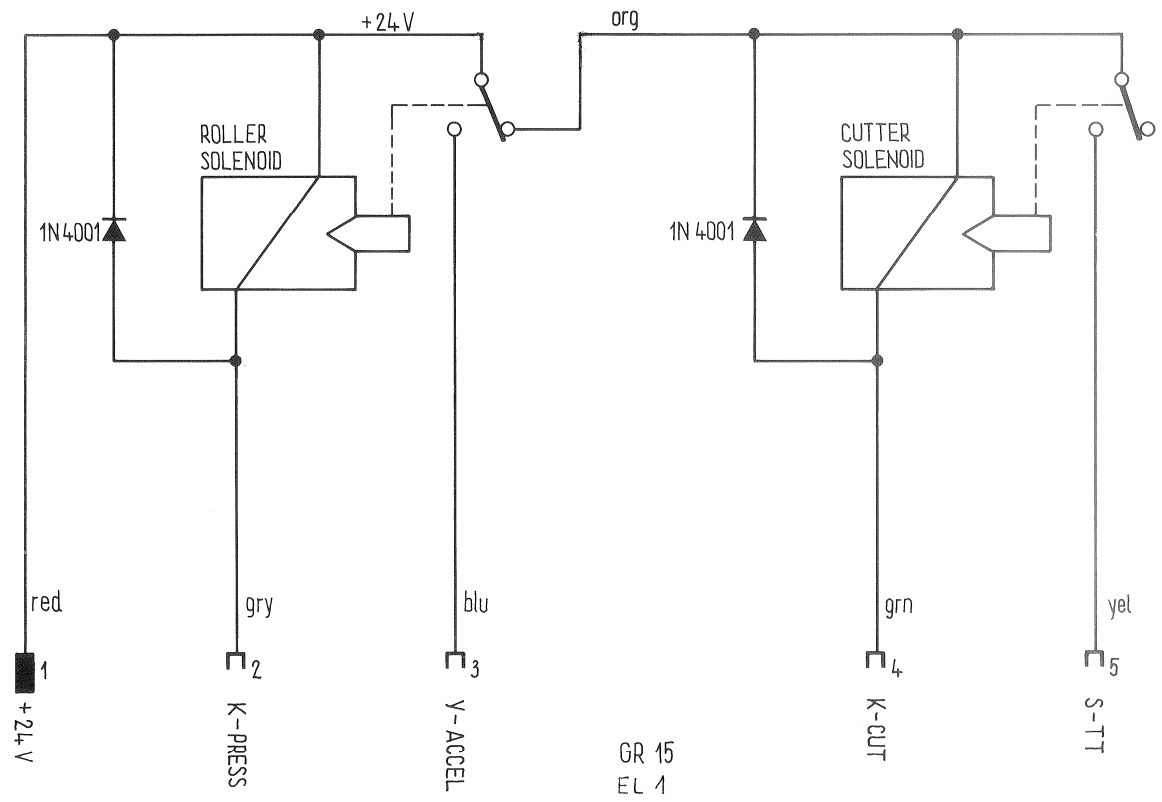
IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	R 01	58.01.7102	1 k	10% .5W LIN	
	R 02	58.01.7203	20 k	10% .5W LIN	
	R 03	57.41.4332	3,3 k	5% .25W CF	
	R 04	57.41.4562	5,6 k		
	R 05	57.41.4681	680		
	R 06	57.41.4222	2,2 k		
	R 07	57.41.4471	470		
	R 08	57.41.4472	4,7 k		
	R 09	57.41.4102	1 k		
	R 10	57.41.4471	470		
	R 11	57.41.4103	10 k		
	R 12	57.42.4220	22	5% .33W CF	
	R 13	57.41.4222	2,2 k	5% .25W CF	
	R 14	57.42.4220	22	.33W	
	R 15	57.41.4472	4,7 k	.25W	
	R 16	57.41.4220	22		
	R 17	57.39.3901	3,9 k	1% .25W MF	
	R 18	57.39.3901	3,9 k		
	R 19	57.41.4101	100	5% .25W CF	
	R 20	57.41.4101	100		
	R 21	57.42.4220	22	.33W	
	R 22	57.41.4472	4,7 k	.25W	
	R 23	57.41.4101	100		
	R 24	57.41.4102	1 k		
	R 25	57.41.4562	5,6 k		
	R 26	57.41.4222	2,2 k		
	R 27	57.41.4471	470		
	R 28	57.42.4220	22	.33W	
	R 29	58.01.7102	1 k	10% .5W LIN	
	R 30	57.41.4821	820	5% .25W CF	

IND	DATE	NAME	
④			CF = Carbon-Film
③			MF = Metal-Film
②			
①			
○	30.10.78	Schn/gv	

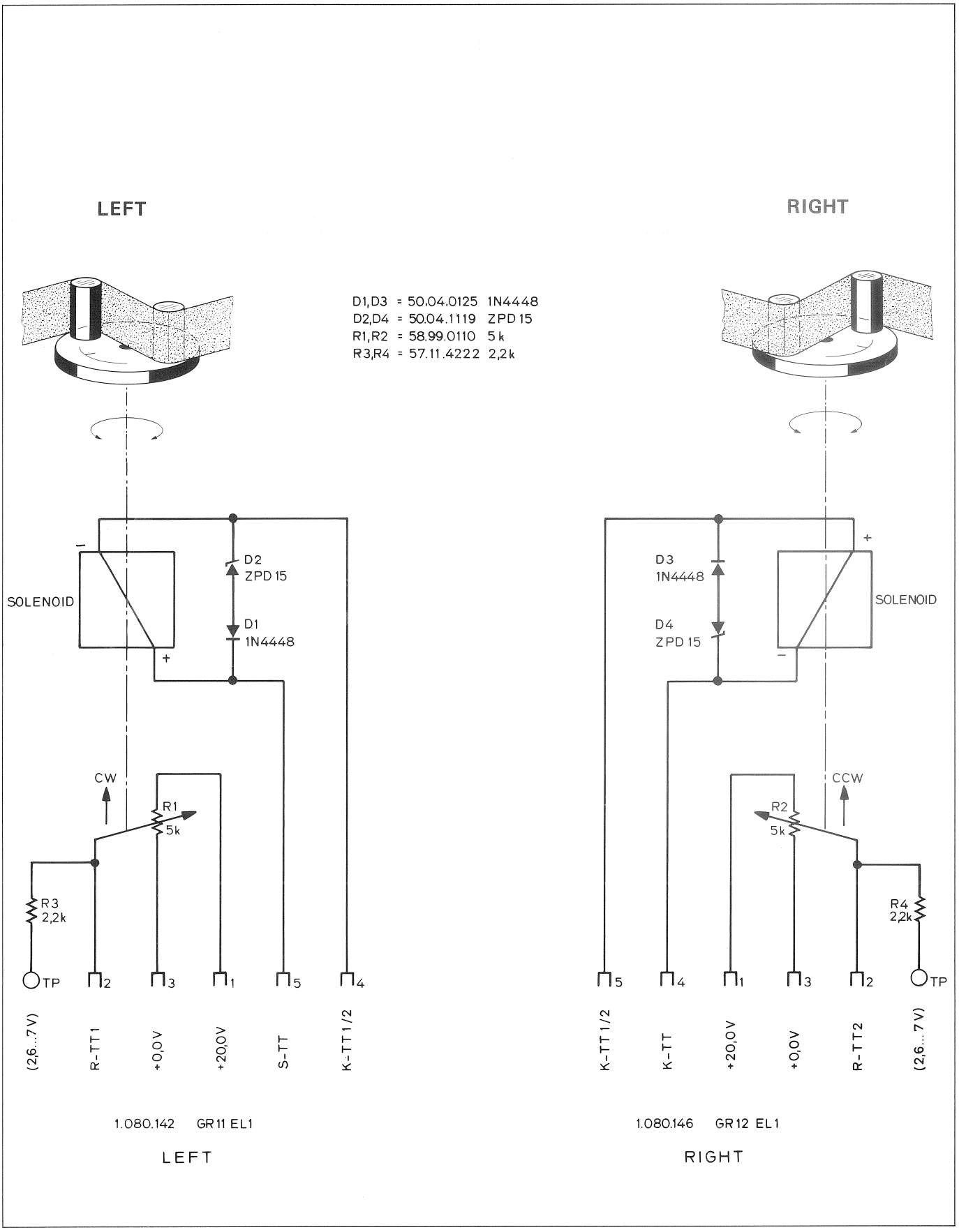
IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	R 31	57.41.4332	3,3 k	5% .25W CF	
	R 32	57.41.4471	470		
	R 33	57.41.4222	2,2 k		
	R 34	57.41.4101	100		
	R 35	57.41.4472	4,7 k		
	R 36	57.41.4152	1,5 k		
	R 37	57.41.4222	2,2 k		
	R 38	57.41.4471	470		
	R 39	57.41.4471	470		
	TP 1	54.01.0010		Jack 2mm blk	
	TP 2	54.01.0014		yel	
	TP 3	54.01.0012		red	
	TP 4	54.01.0016		blu	
	TP 5	54.01.0015		grn	

IND	DATE	NAME	
④			CF = Carbon-Film
③			
②			
①			
○	30.10.78	Schn/gv	

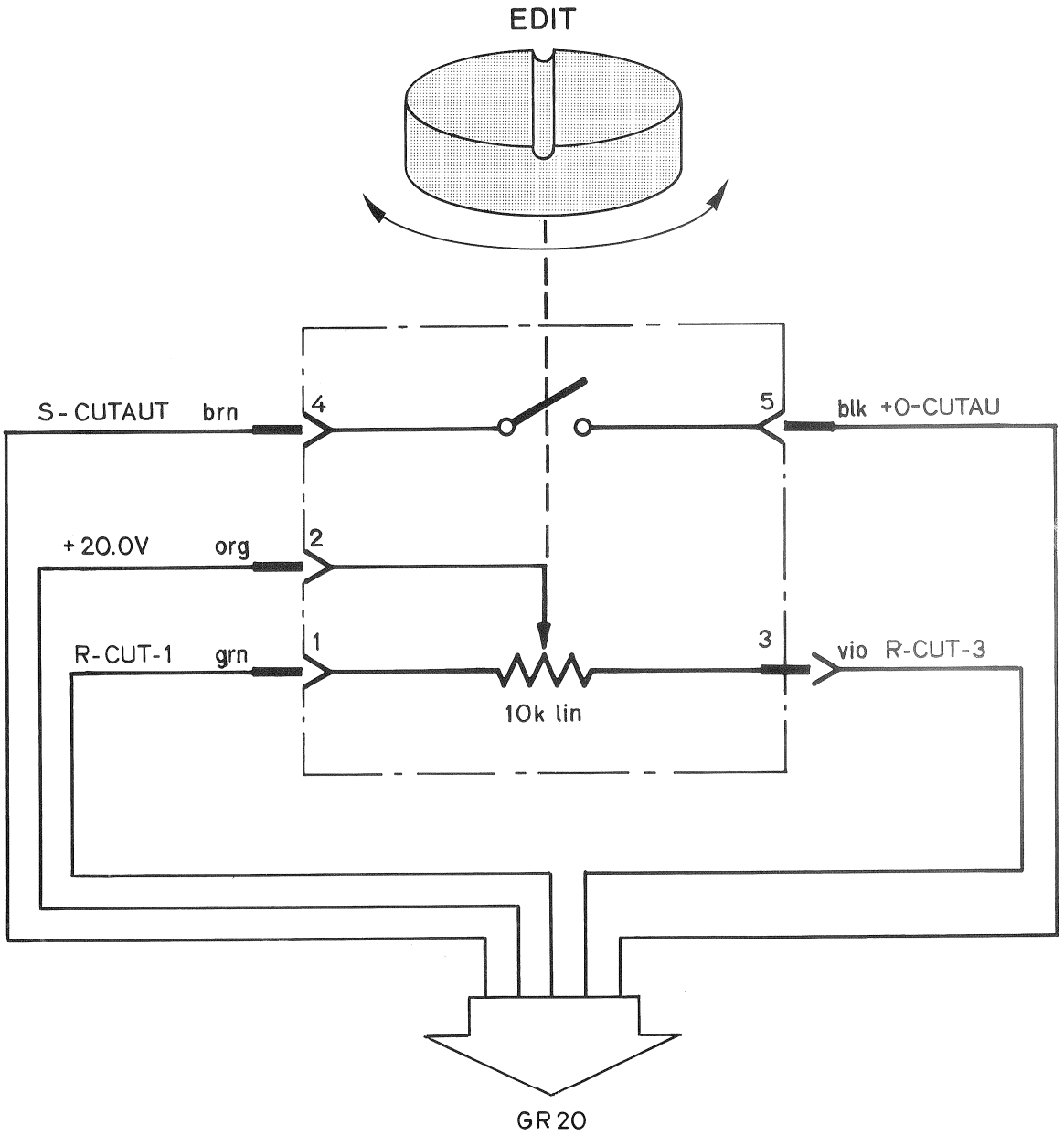
PRESSURE ROLLER ASSEMBLY 1.080.122 GR15 EL1



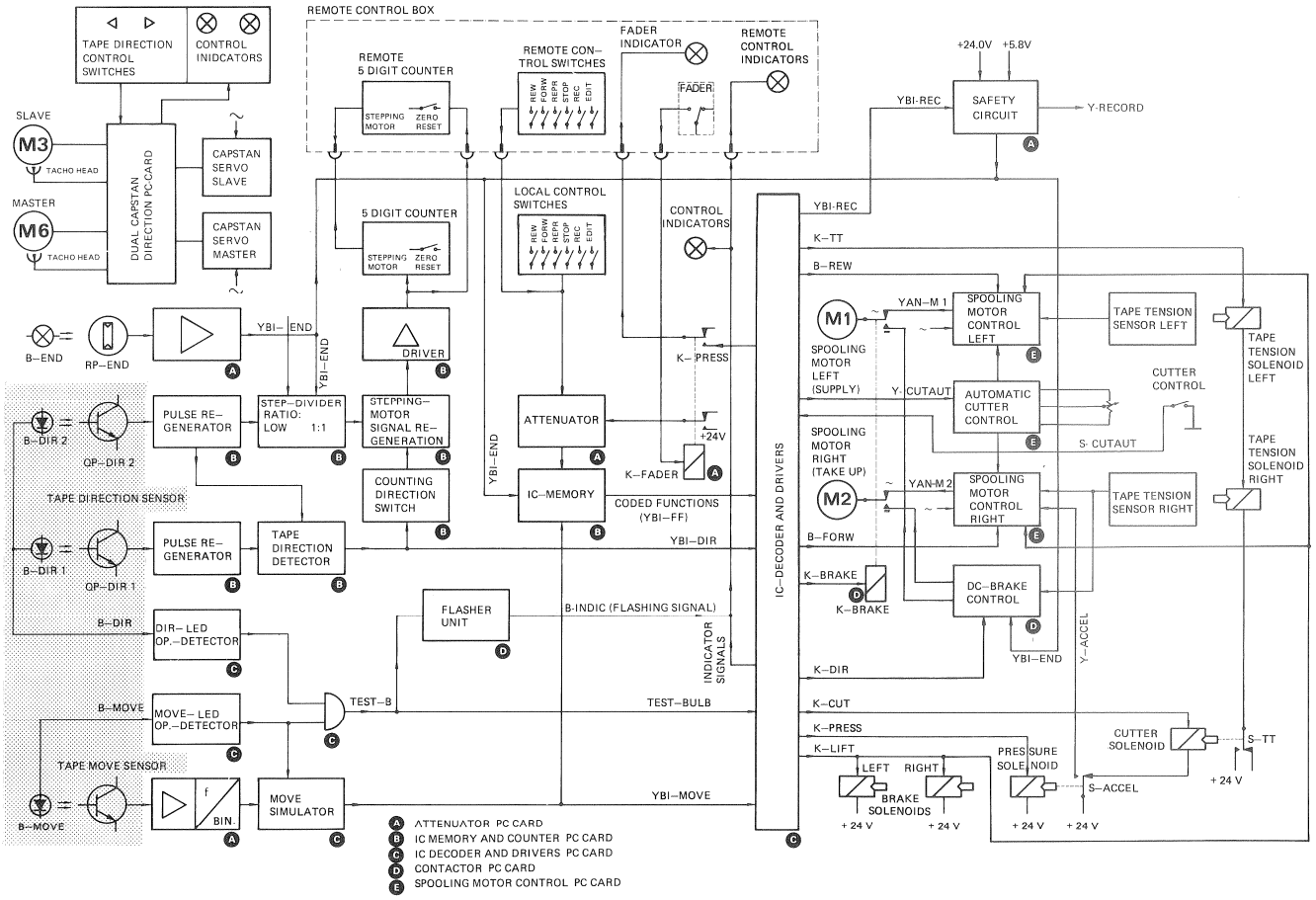
TAPE TENSION CONTROL ASSEMBLIES 1.080.142/1.080.146 GR11/12



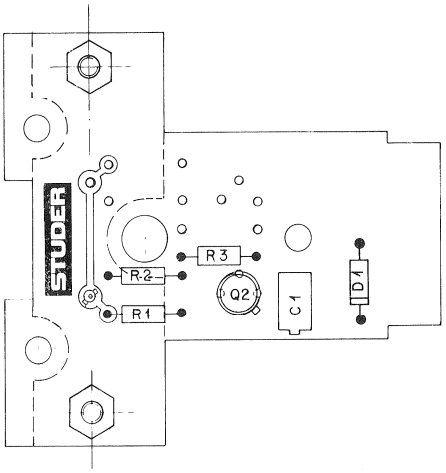
CUTTER CONTROL ASSEMBLY 1.080.311 GR19 EL1



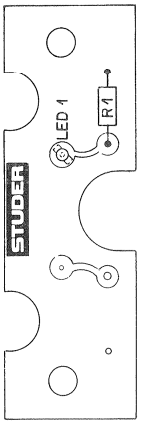
TAPE MOVE AND DIRECTION SENSOR UNIT 1.080.179 GR14



TAPE MOVE AND DIRECTION SENSOR UNIT 1.080.179 GR14

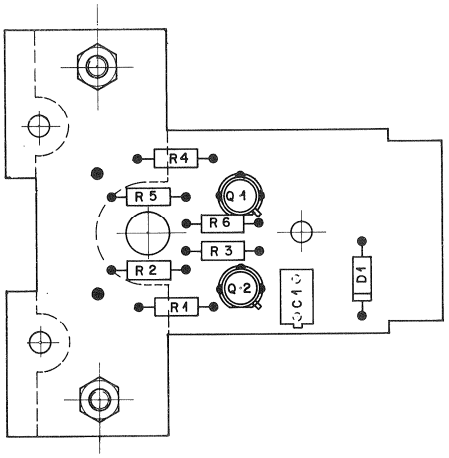


TAPE MOVE SENSOR 1.080.186-12

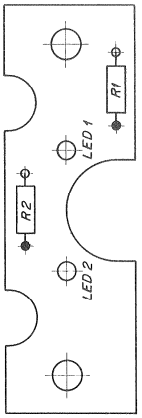


TAPE SENSOR 1.080.188–00
(LAYOUT 1.080.187–12)

TAPE MOVE SENSOR UNIT 1.080.186-00



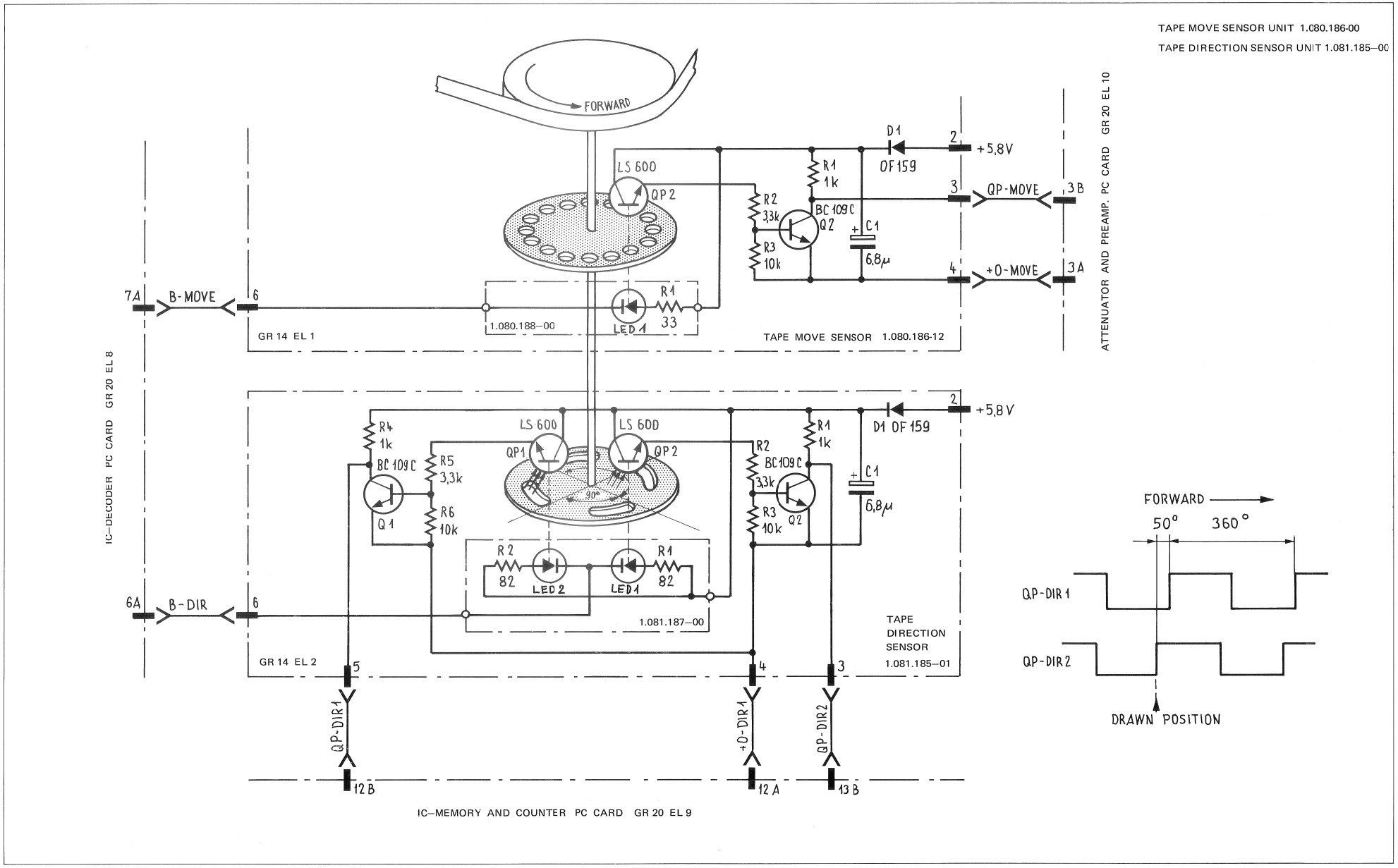
TAPE DIRECTION SENSOR 1.081.185–01
(LAYOUT 1.081.186–11)



TAPE SENSOR 1.081.187–00
(LAYOUT 1.081.187–11)

TAPE DIRECTION SENSOR UNIT 1.081.185–00

TAPE MOVE AND DIRECTION SENSOR UNIT 1.080.179 GR14



TAPE MOVE AND DIRECTION SENSOR UNIT 1.080.179 GR14

Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
C C1	59.10.5689	C 6.8 µ, 20%, 20 V=, TA	1	
D C1	50.04.0109	D 1N 4448 AEQUIV., SI	1	
Q C2	50.03.0407	Q BC 109 C, NPN	1	
QP C2	50.03.0433	QP LS 600, NPNSI	1	
R C1	57.02.4102	R 1.0 K, 5%, .25 W, CMA	1	
R C2	57.02.5332	R 3.3 K, 10%, .25 W,	1	
R C3	57.02.4103	R 10 K, 5%, .25 W,	1	

Aenderungen ① ② ③ ④ ⑤

TAPE MOVE SENSOR 1.080.186–12
(LAYOUT 1.080.186–12)

Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
① LED 01	50.04.2103	LE-Diode, Infrarot TIL 23	1	
R 01	57.41.4330	R 33 5%, .25 W, CSCH	1	

Aenderungen ① 18.12.74 ② ③ ④ ⑤

TAPE SENSOR 1.080.188–00
(LAYOUT 1.080.187–12)

POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
C 1	59.10.5689	6.8.uF	20 % 20 V	TA	
D 1	50.04.0109	1 N 4448	AEQUIV.	SI	
Q 1	50.03.0407	BC 109 C		NPN	
Q 2	50.03.0407	BC 109 C		NPN	
QP 1	50.03.0433	LS 600		NPNSI	
QP 2	50.03.0433	LS 600		NPNSI	
R 1	57.02.4102	1,0 k	5 % .25 w	CMA	
R 2	57.02.5332	3,3 k	10 % .25 w		
R 3	57.02.4103	10 k	5 % .25 w		
R 4	57.02.4102	1,0 k	5 % .25 w		
R 5	57.02.5332	3,3 k	10 % .25 w		
R 6	57.02.4103	10 k	5 % .25 w		

IND	DATE	NAME
① ② ③ ④	2.10.74	

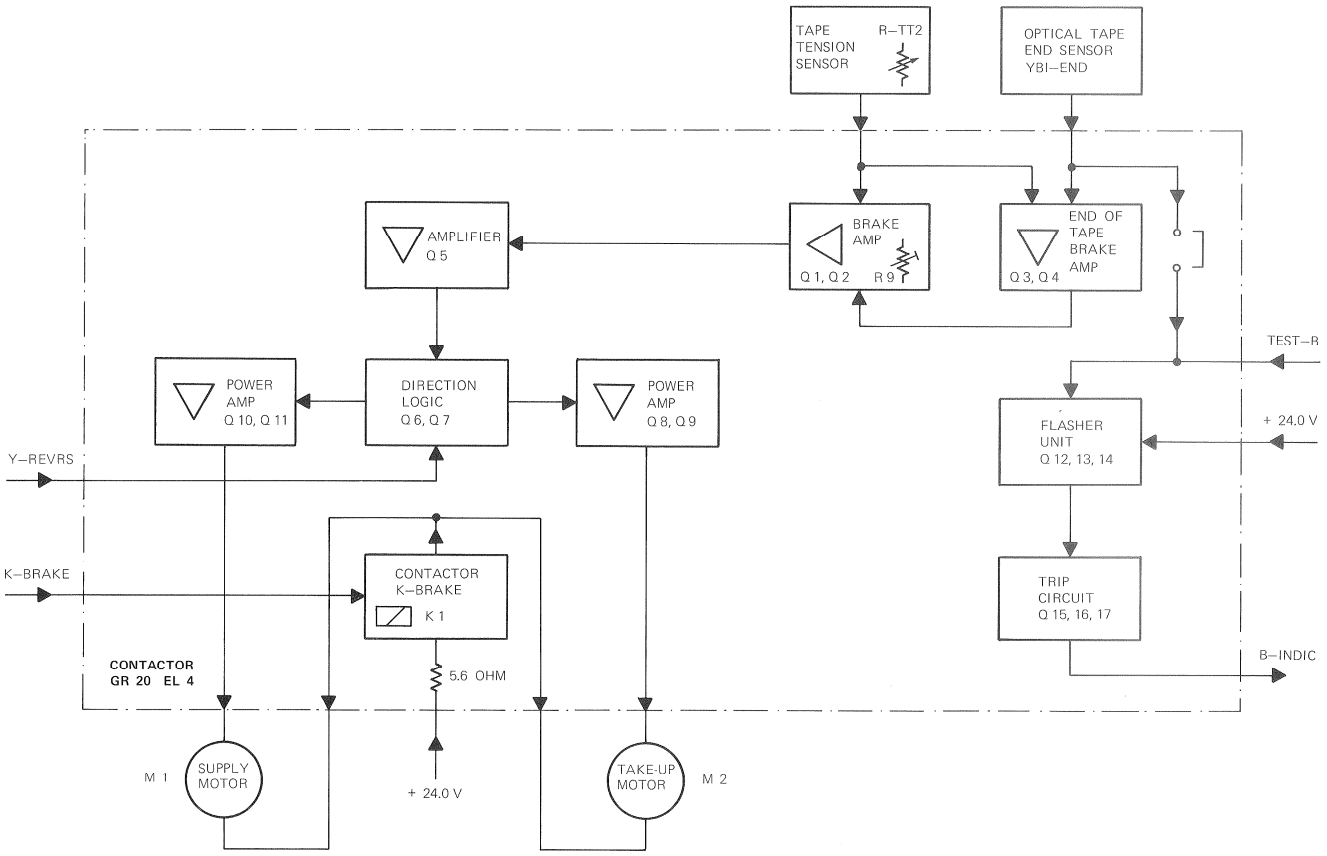
TAPE DIRECTION SENSOR 1.081.185–01
(LAYOUT 1.081.186–11)

Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
LED 01	50.04.2103	LE-Diode, Infrarot TIL 23	1	
LED 02	50.04.2103	LE-Diode, Infrarot TIL 23	1	
R 01	57.02.4101	R 100, 5%, .25 W, CSCH	1	
R 02	57.02.4101	R 100, 5%, .25 W, CSCH	1	

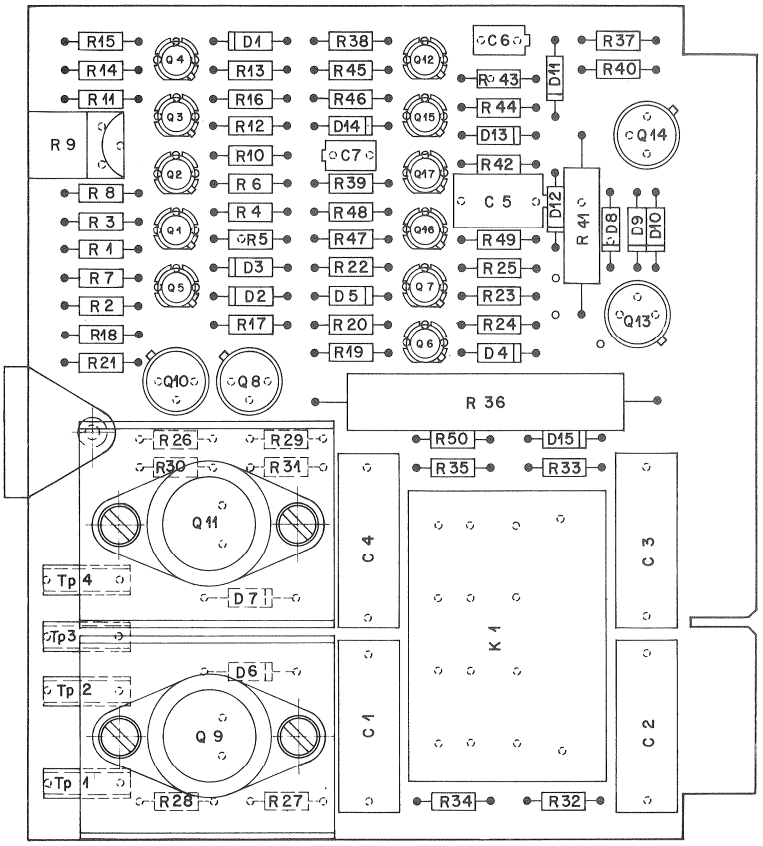
Aenderungen ① ② ③ ④ ⑤

TAPE SENSOR 1.081.187–00
(LAYOUT 1.081.187–11)

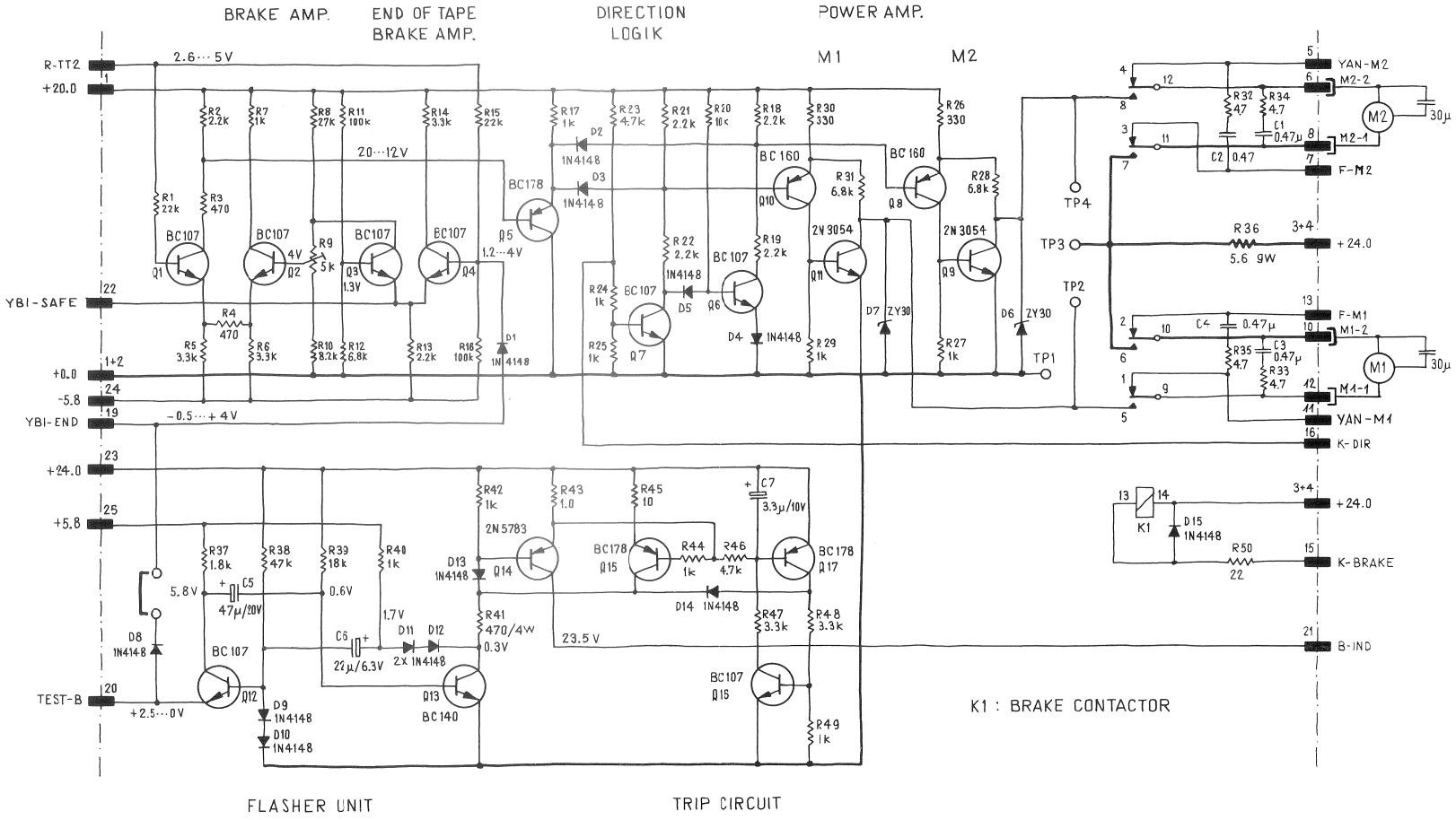
CONTACTOR/BLOCK DIAGRAM 1.080.381 GR 20 EL 4



CONTACTOR 1.080.381 GR 20 EL 4



CONTACTOR 1.080.381 GR 20 EL 4



CONTACTOR 1.080.381 GR 20 EL 4

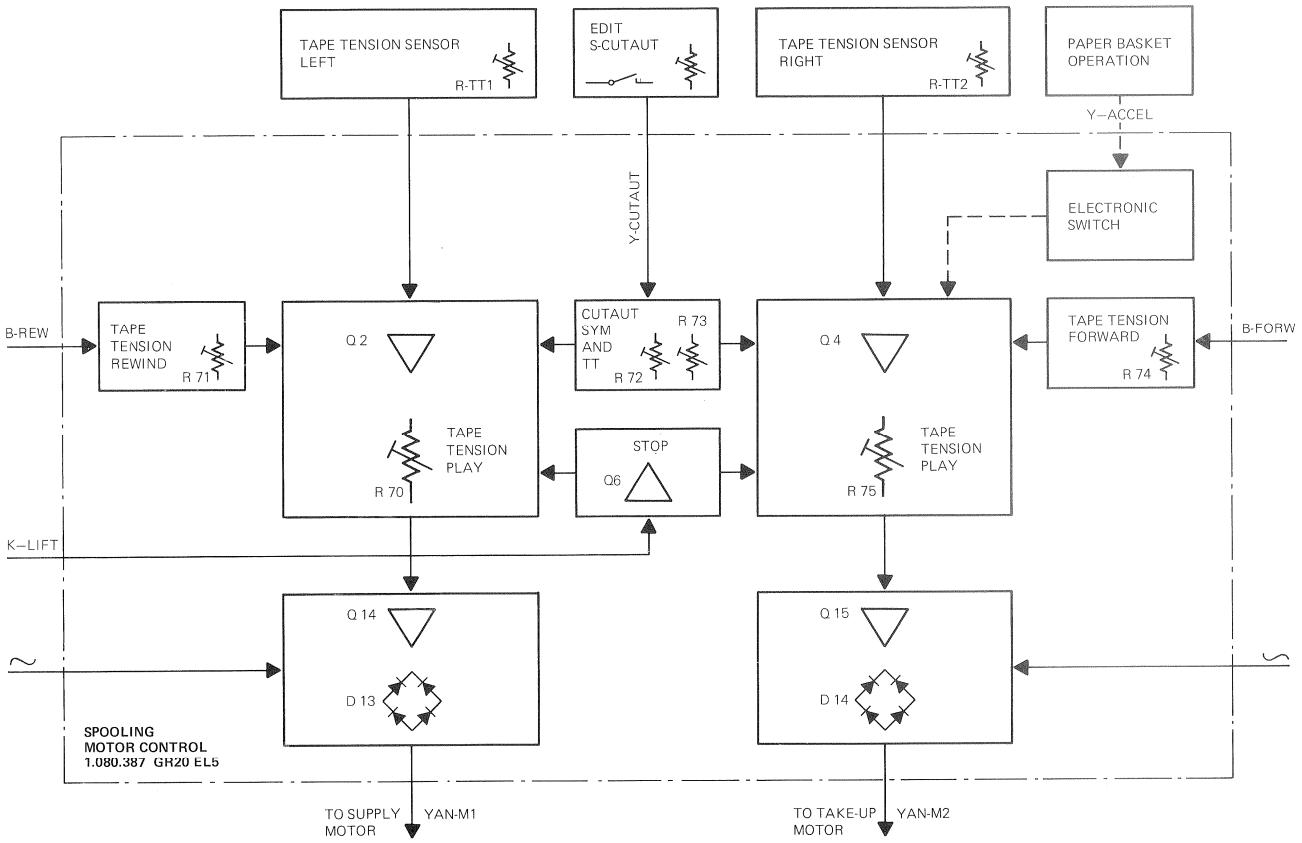
Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
C 01	59.99.0450	C .47 µF 150 V~ MP	1	
C 02	59.99.0450		1	
C 03	59.99.0450		1	
C 04	59.99.0450		1	
C 05	59.10.5470	C 47 µF 20 V TA	1	
C 06	59.10.2220	C 22 µF 6.3 V TA	1	
C 07	59.10.5339	C 3,3 µF 20 V TA	1	
D 01	50.04.0102	D 1 N 914, 1 N 4148 SI	1	
D 02	50.04.0102		1	
D 03	50.04.0102		1	
D 04	50.04.0102		1	
D 05	50.04.0102		1	
D 06	50.04.1506	D 30 V, 1,3 W, Z	1	
D 07	50.04.1506		1	
D 08	50.04.0102	D 1 N 914, 1 N 4148 SI	1	
D 09	50.04.0102		1	
D 10	50.04.0102		1	
D 11	50.04.0102		1	
D 12	50.04.0102		1	
D 13	50.04.0102		1	
D 14	50.04.0102		1	
D 15	50.04.0102		1	
K 01	56.02.0108	K 24 V, 10 A, 4 U,	1	
Q 01	50.03.0428	Q BC 107 A, NPN	1	
Q 02	50.03.0428		1	
Q 03	50.03.0428		1	
Q 04	50.03.0428		1	
Q 05	50.03.0306	Q BC 178 B, PNP	1	
Q 06	50.03.0428	Q BC 107 A, NPN	1	
Q 07	50.03.0428	Q BC 107 A, NPN	1	
Q 08	50.03.0315	Q BC 160 - 16, Siemens	1	
Q 09	50.03.0480	Q 2 N 5054, NPN	1	auf Kühlblech
Q 10	50.03.0315	Q BC 160 - 16, Siemens	1	
Q 11	50.03.0480	Q 2 N 5054, NPN	1	auf Kühlblech
Q 12	50.03.0428	Q BC 107 A, NPN	1	
Q 13	50.03.0316	Q BC 140 - 16, Siemens	1	
Q 14	50.03.0336	Q 2 N 5783, BSS 18	1	
Q 15	50.03.0306	Q BC 178 B PNP	1	
Q 16	50.03.0428	Q BC 107 A NPN	1	
Q 17	50.03.0306	Q BC 178 B PNP	1	
R 01	57.41.4223	R 22 K, 5%, .12 W, CSCH	1	
R 02	57.41.4222	R 2,2 K,	1	
R 03	57.41.4471	R 470	1	
R 04	57.41.4471		1	
R 05	57.41.4332	R 3.3 K,	1	
R 06	57.41.4332	R 3.3 K,	1	
R 07	57.41.4102	R 1 K,	1	
(1) R 08	57.41.4273	R 27 K, 5%, .12 W CSCH	1	
R 09	58.01.3502	R 5 K, LIN, .5 W P	1	
R 10	57.41.4822	R 8.2 K, 5%, .12 W, CSCH	1	
R 11	57.41.4104	R 100 K,	1	
R 12	57.41.4682	R 6.8 K,	1	
R 13	57.41.4222	R 2.2 K,	1	
R 14	57.41.4332	R 3.3 K,	1	
R 15	57.41.4223	R 22 K,	1	
R 16	57.41.4104	R 100 K,	1	
R 17	57.41.4102	R 1 K,	1	
R 18	57.41.4222	R 2.2 K, 5%, .12 W, CSCH	1	
R 19	57.41.4222		1	
R 20	57.41.4103	ϑ 10 K,	1	
R 21	57.41.4222	ϑ 2.2 K,	1	
R 22	57.41.4222		1	
R 23	57.41.4472	ϑ 4.7 K,	1	
R 24	57.41.4102	ϑ 1 K,	1	

Aenderungen (1) ff.7.Fw.Fp4 (2) 24.1.78 Fp (3) (4) (5)

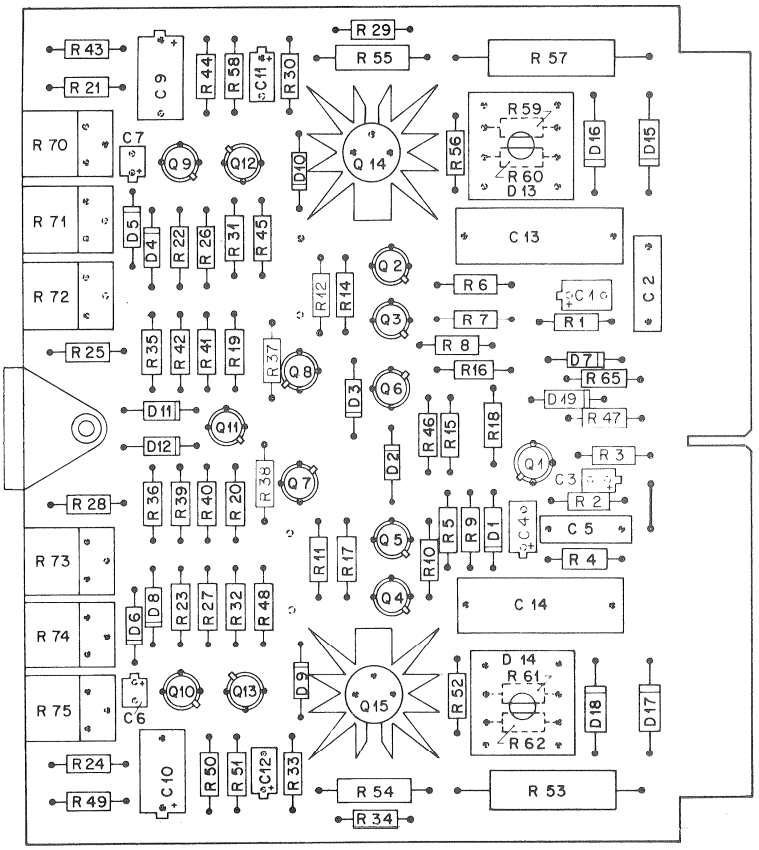
Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
R 25	57.41.4102	R 1 K, 5%, .12 W, CSCH	1	
R 26	57.02.5331	R 330,	1	
R 27	57.02.5102	R 1 K, 10%, .25 W, CMA	1	
R 28	57.02.5682	R 6.8 K,	1	
R 29	57.02.5102	R 1 K,	1	
R 30	57.02.5331	R 330 ,	1	
R 31	57.02.5682	R 6.8 K,	1	
R 32	57.02.5479	R 4.7 ,	1	
R 33	57.02.5479		1	
R 34	57.02.5479		1	
R 35	57.02.5479		1	
(2) R 36	57.99.0194	R 5.6 , 10%, 10 W, DR	1	erhöht montiert
R 37	57.41.4182	R 1.8 K, 5%, .12 W, CSCH	1	
R 38	57.41.4473	R 47 K,	1	
R 39	57.41.4183	R 18 K,	1	
R 40	57.41.4102	R 1 K, .12 W,	1	
R 41	57.56.4471	R 470, 5%, 4.2 W, DR	1	
R 42	57.41.4102	R 1 K, .12 W, CSCH	1	
R 43	57.41.4109	R 1 ,	1	
R 44	57.41.4102	R 1 K,	1	
R 45	57.41.4100	R 10 ,	1	
R 46	57.41.4472	R 4.7 K,	1	
R 47	57.41.4332	R 3.3 K,	1	
R 48	57.41.4332		1	
R 49	57.41.4102	R 1.0 K,	1	
R 50	57.02.5229	R 22 , 10%, .25 W, CMA	1	
TP 01	54.01.0010	Buchse 2 mm, sw	1	
TP 02	54.01.0014	Buchse 2 mm, gb	1	
TP 03	54.01.0019	Buchse 2 mm, ws	1	
TP 04	54.01.0016	Buchse 2 mm, bl	1	

Aenderungen (1) (2) 24.1.78 Fp (3) (4) (5)

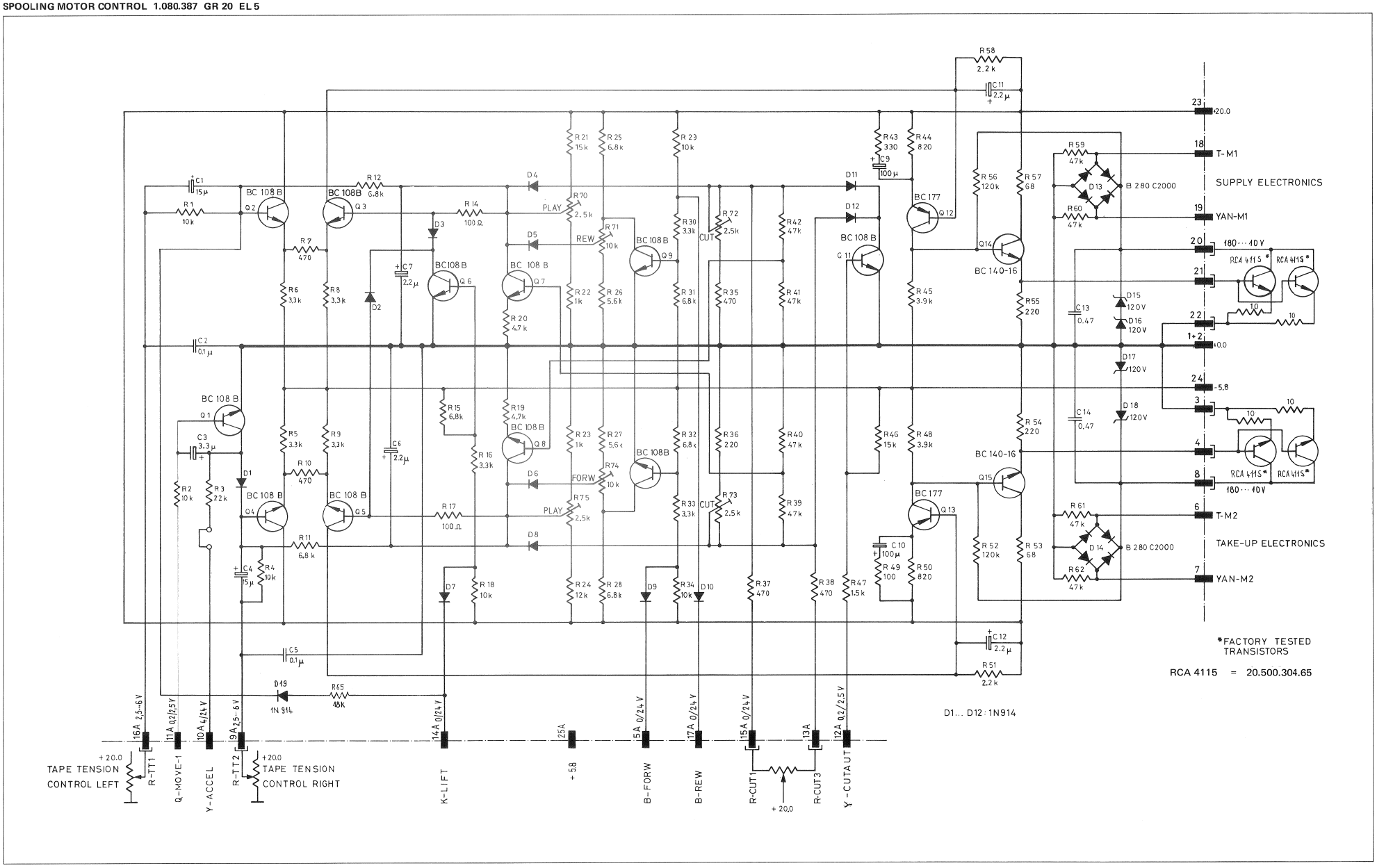
SPOOLING MOTOR CONTROL/BLOCK DIAGRAM 1.080.387 GR 20 EL 5



SPOOLING MOTOR CONTROL 1.080.387 GR 20 EL 5



SPOOLING MOTOR CONTROL 1.080.387 GR 20 EL 5



SPOOLING MOTOR CONTROL 1.080.387 GR 20 EL 5

IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	C 01	59.10.5150	15 U	20% 10V TA	
	C 02	59.05.2104	0.1 U	10% 100V PC	
	C 03	59.10.4339	3.3 U	20% 16V TA	
	C 04	59.10.5150	15 U	10V	
	C 05	59.05.2104	0.1 U	10% 100V PC	
	C 06	59.10.5229	2.2 U	20% 20V TA	
	C 07	59.10.5229	2.2 U		
	C 09	59.10.3101	100 U	10V	
	C 10	59.10.3101	100 U		
	C 11	59.10.7229	2.2 U	35V	
	C 12	59.10.7229	2.2 U		
	C 13	59.99.0450	0.47 U	10% 150V MP	
	C 14	59.99.0450	0.47 U		
	D 01	50.04.0125	1 N 4448	SI	
	D 02	50.04.0125	1 N 4448		
	D 03	50.04.0125	1 N 4448		
	D 04	50.04.0125	1 N 4448		
	D 05	50.04.0125	1 N 4448		
	D 06	50.04.0125	1 N 4448		
	D 07	50.04.0125	1 N 4448		
	D 08	50.04.0125	1 N 4448		
	D 09	50.04.0125	1 N 4448		
	D 10	50.04.0125	1 N 4448		
	D 11	50.04.0125	1 N 4448		
	D 12	50.04.0125	1 N 4448	SI	
	D 13	70.01.0226	2A, 280V	Gleichrichter	
	D 14	70.01.0226	2A, 280V	Gleichrichter	

IND	DATE	NAME
4		
3		
2		
1		
0	9.7.76	Nielsen/gv

IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	D 15	50.04.1505	120 V	5% 1.3W Z	
	D 16	50.04.1505	120 V		
	D 17	50.04.1505	120 V		
	D 18	50.04.1505	120 V		
	D 19	50.04.0125	1 N 4448	SI	
	Q 01	50.03.0408	BC107B	NPN	
	Q 02	50.03.0408	BC107B	NPN	
	Q 03	50.03.0408	BC107B	NPN	
	Q 04	50.03.0408	BC107B	NPN	
	Q 05	50.03.0408	BC107B	NPN	
	Q 06	50.03.0408	BC107B	NPN	
	Q 07	50.03.0408	BC107B	NPN	
	Q 08	50.03.0408	BC107B	NPN	
	Q 09	50.03.0408	BC107B	NPN	
	Q 10	50.03.0408	BC107B	NPN	
	Q 11	50.03.0408	BC107B	NPN	
	Q 12	50.03.0307	BC177A	PNP	
	Q 13	50.03.0307	BC177A	PNP	
	Q 14	50.03.0316	BC140-16	NPN	
	Q 15	50.03.0316	BC140-16	NPN	
	R 01	57.41.4103	10 k	5% .12W CSCH	
	R 02	57.41.4103	10 k		
	R 03	57.41.4223	22 k		
	R 04	57.41.4103	10 k		
	R 05	57.41.4332	3.3 k		
	R 06	57.41.4332	3.3 k		

IND	DATE	NAME
4		
3		
2		
1		
0	9.7.76	Nielsen/gv

IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	R 07	57.41.4471	470	5% .12W CSCH	
	R 08	57.41.4332	3.3 k		
	R 09	57.41.4332	3.3 k		
	R 10	57.41.4471	470		
	R 11	57.41.4682	6.8 k		
	R 12	57.41.4682	6.8 k		
	R 14	57.41.4101	100		
	R 15	57.41.4682	6.8 k		
	R 16	57.41.4332	3.3 k		
	R 17	57.41.4101	100		
	R 18	57.41.4103	10 k		
	R 19	57.41.4472	4.7 k		
	R 20	57.41.4472	4.7 k		
	R 21	57.41.4153	15 k		
	R 22	57.41.4102	1.0 k		
	R 23	57.41.4102	1.0 k		
	R 24	57.41.4123	12 k		
	R 25	57.41.4682	6.8 k		
	R 26	57.41.4562	5.6 k		
	R 27	57.41.4562	5.6 k		
	R 28	57.41.4682	6.8 k		
	R 29	57.41.4103	10 k		
	R 30	57.41.4332	3.3 k		
	R 31	57.41.4682	6.8 k		
	R 32	57.41.4682	6.8 k		
	R 33	57.41.4332	3.3 k		
	R 34	57.41.4103	10 k		
	R 35	57.41.4471	470		
	R 36	57.41.4221	220		

IND	DATE	NAME
4		
3		
2		
1		
0	9.7.76	Nielsen/gv

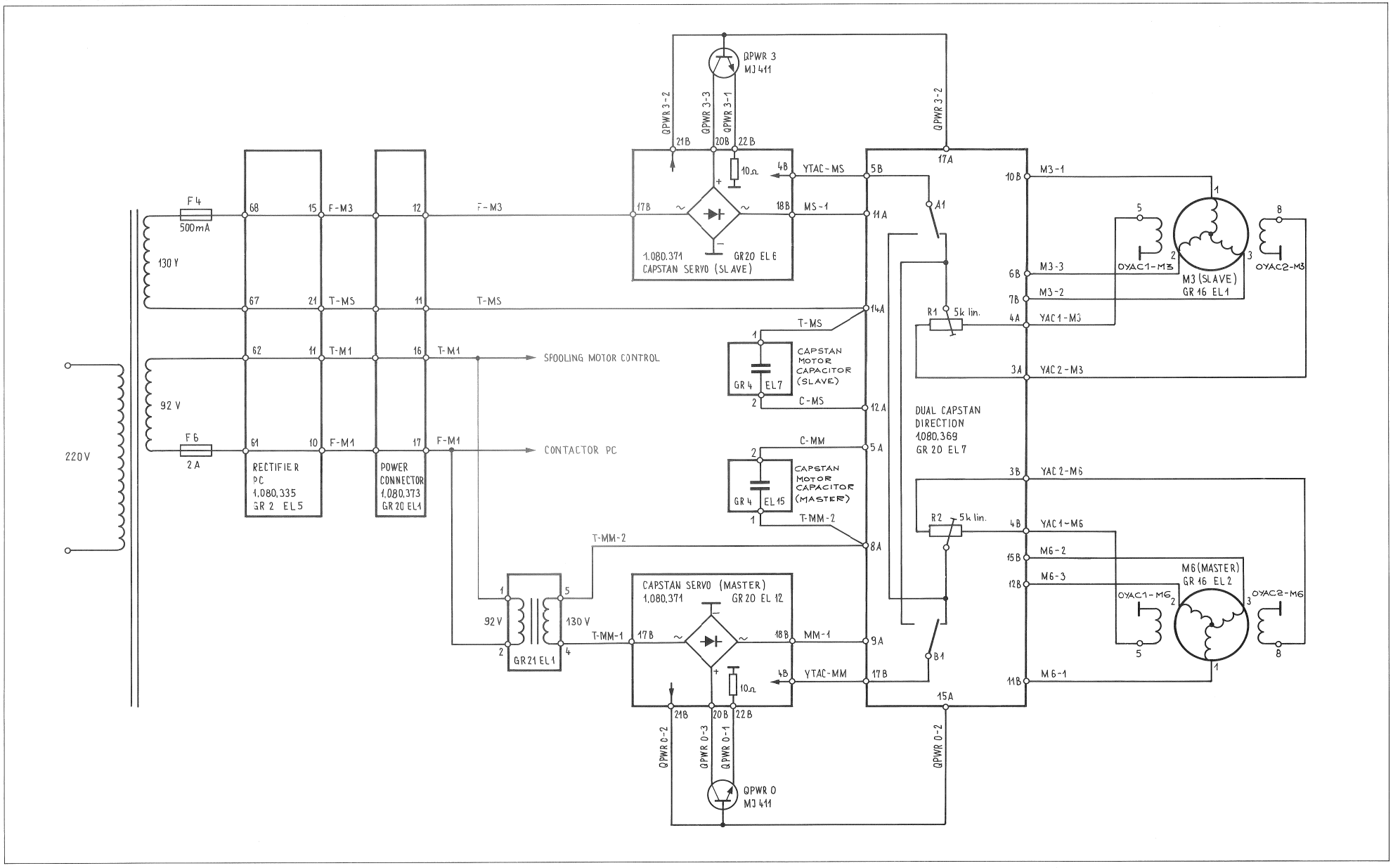
IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	R 37	57.41.4471	470	5% .12W CSCH	
	R 38	57.41.4471	470		
	R 39	57.41.4473	47 k		
	R 40	57.41.4473	47 k		
	R 41	57.41.4473	47 k		
	R 42	57.41.4473	47 k		
	R 43	57.41.4331	330		
	R 44	57.41.4821	820		
	R 45	57.41.4392	3.9 k		
	R 46	57.41.4153	15 k		
	R 47	57.41.4152	1.5 k		
	R 48	57.41.4392	3.9 k		
	R 49	57.41.4101	100		
	R 50	57.41.4821	820		
	R 51	57.41.4222	2.2 k		
	R 52	57.41.4124	120 k		
	R 53	57.56.4680	68	5.5W DR	
	R 54	57.42.4221	220	.33W CSCH	
	R 55	57.42.4221	220		
	R 56	57.41.4124	120 k	.12W	
	R 57	57.56.4680	68	5.5W DR	
	R 58	57.41.4222	2.2 k	.12W CSCH	
	R 59	57.41.4473	47 k		
	R 60	57.41.4473	47 k		
	R 61	57.41.4473	47 k		
	R 62	57.41.4473	47 k		
	R 65	57.41.4183	18 k		

IND	DATE	NAME
4		
3		
2		
1		
0	9.7.76	Nielsen/gv

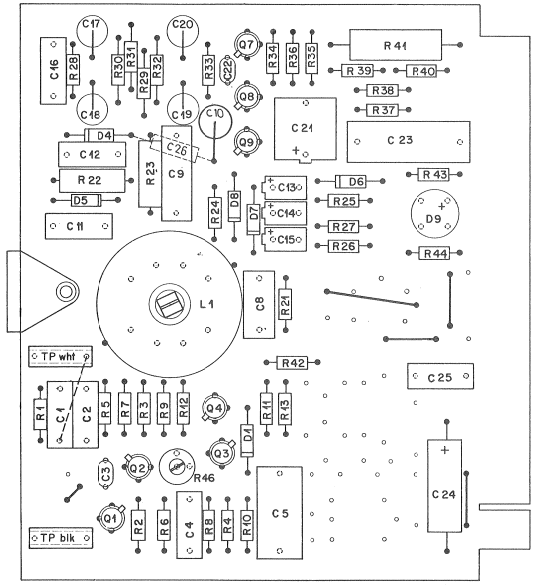
IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	R 70	58.01.3252	2.5 k	10% .5W PCSCH	
	R 71	58.01.3103	10 k		
	R 72	58.01.3252	2.5 k		
	R 73	58.01.3252	2.5 k		
	R 74	58.01.3103	10 k		
	R 75	58.01.3252	2.5 k		

IND	DATE	NAME
4		
3		
2		
1		
0	9.7.76	Nielsen/gv

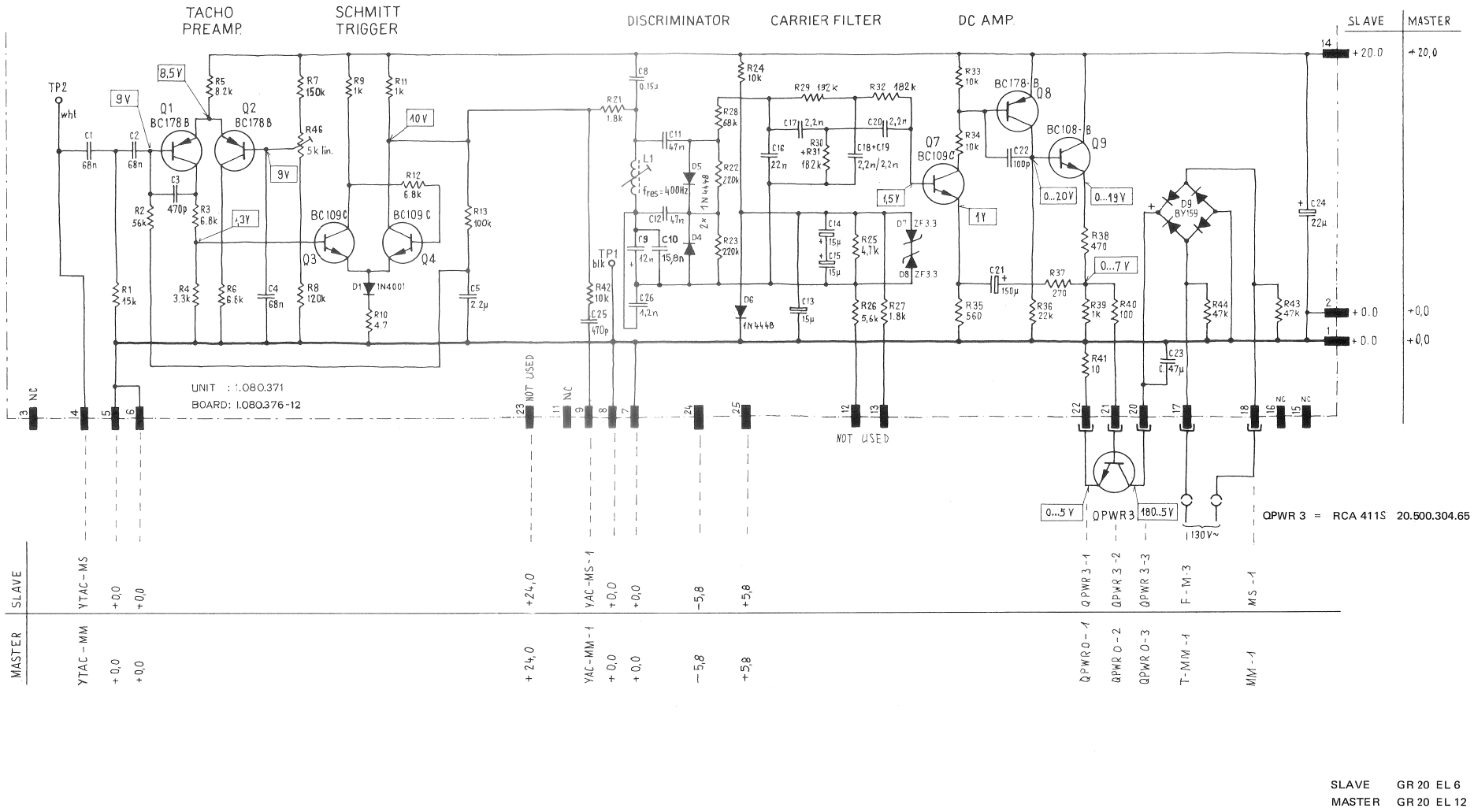
CAPSTAN MOTOR CONTROL DIAGRAM



CAPSTAN SERVO 1.080.371 SLAVE GR 20 EL 6 / MASTER GR 20 EL 12



CAPSTAN SERVO 1.080.371 SLAVE GR 20 EL 6 / MASTER GR 20 EL 12



CAPSTAN SERVO 1.080.371 SLAVE GR 20 EL 6 MASTER GR 20 EL 12

POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
C 01	59.05.2683	68 n	±10% 100V	MPC	
C 02	59.05.2683	68 n			
C 03	59.32.1471	470 p	500V	KER	
C 04	59.05.2683	68 n	100V	MPC	
C 05	59.05.1225	2,2 µ	63V		
C 08	59.05.2154	150 n	100V	MPC	
C 09	59.12.7123	12 n	1% 63V	PS	
C 10	59.99.0307	13,8 n			
C 11	59.31.6473	47 n	10% 100V	MPETP	
C 12	59.31.6473	47 n			
C 13	59.10.5150	15 µ	±20% 20V	TA	
C 14	59.10.5150	15 µ			
C 15	59.10.5150	15 µ			
C 16	59.05.4223	22 n	10% 250V	MPC	
C 17	59.12.7222	2,2 n	1% 63V	PS	
C 18	59.12.7222	2,2 n			
C 19	59.12.7222	2,2 n			
C 20	59.12.7222	2,2 n			
C 21	59.10.4151	150 µ	±20% 16V	TA	
C 22	59.32.0101	100 p	±10% 500V	KER	
C 23	59.99.0450	470 n	150V	MP	
C 24	59.25.5220	22 µ	+50% 40V=	EL	
⑦ C 25	59.11.6471	470 p	± 5% 400V	PC	
C 26	59.12.7122	1,2 n	± 1% 63V	PS	Lötseite
D 01	50.04.0122	1 N 4001			
D 04	50.04.0102	1 N 4148			
D 05	50.04.0102	1 N 4148			
D 06	50.04.0102	1 N 4148			
D 07	50.04.1107	3,3 V	5% .4W	Z	
D 08	50.04.1107	3,3 V			
D 09	70.01.0223	BY 159/400		SI	
L 01	1.080.378.00		Diskriminatorspule		

MPC = met. polycarbonate
KER = ceramic
PS = polystyrene
TA = tantalum
MP = met. paper
EL = electrolytic
MPETP = met. polyester
Z = zener
SI = silicon

IND	DATE	NAME
⑧ ⑦ ⑥ ⑤ ④	7.12.77	
③ ② ① ○	2.2.77 AB	A.St/gv

POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
Q 01	50.03.0306	BC 178 B			
Q 02	50.03.0306	BC 178 B			
Q 03	50.03.0407	BC 109 C			
Q 04	50.03.0407	BC 109 C			
Q 07	50.03.0407	BC 109 C			
Q 08	50.03.0306	BC 178 B			
Q 09	50.03.0409	BC 108 B			
R 01	57.41.4153	15 k	± 5% .25W	CSCH	
R 02	57.41.4563	56 k			
R 03	57.41.4682	6,8 k			
R 04	57.41.4332	3,3 k			
R 05	57.41.4822	8,2 k			
R 06	57.41.4682	6,8 k			
R 07	57.41.4154	150 k			
R 08	57.41.4124	120 k			
R 09	57.41.4102	1 k			
R 10	57.41.4479	4,7			
R 11	57.41.4102	1 k			
R 12	57.41.4682	6,8 k			
⑦ R 13	57.41.4104	100 k			
R 14					
R 15					
R 16					
R 17					
R 18					
R 19					
R 20					
R 21	57.41.4182	1,8 k	± 5% .25W	CSCH	
R 22	57.02.4224	220 k	.5W	CM	
R 23	57.02.4224	220 k			
R 24	57.41.4103	10 k	.25W	CSCH	
R 25	57.41.4472	4,7 k			
R 26	57.41.4562	5,6 k			
R 27	57.41.4182	1,8 k			
R 28	57.41.4683	68 k			
R 29	57.39.1823	182 k	1%	MP	
R 30	57.39.1823	182 k			
R 31	57.39.1823	182 k			
R 32	57.39.1823	182 k			
R 33	57.41.4103	10 k	± 5%	CSCH	

CM = solid carbon
MP = metal film
CSCH = carbon film

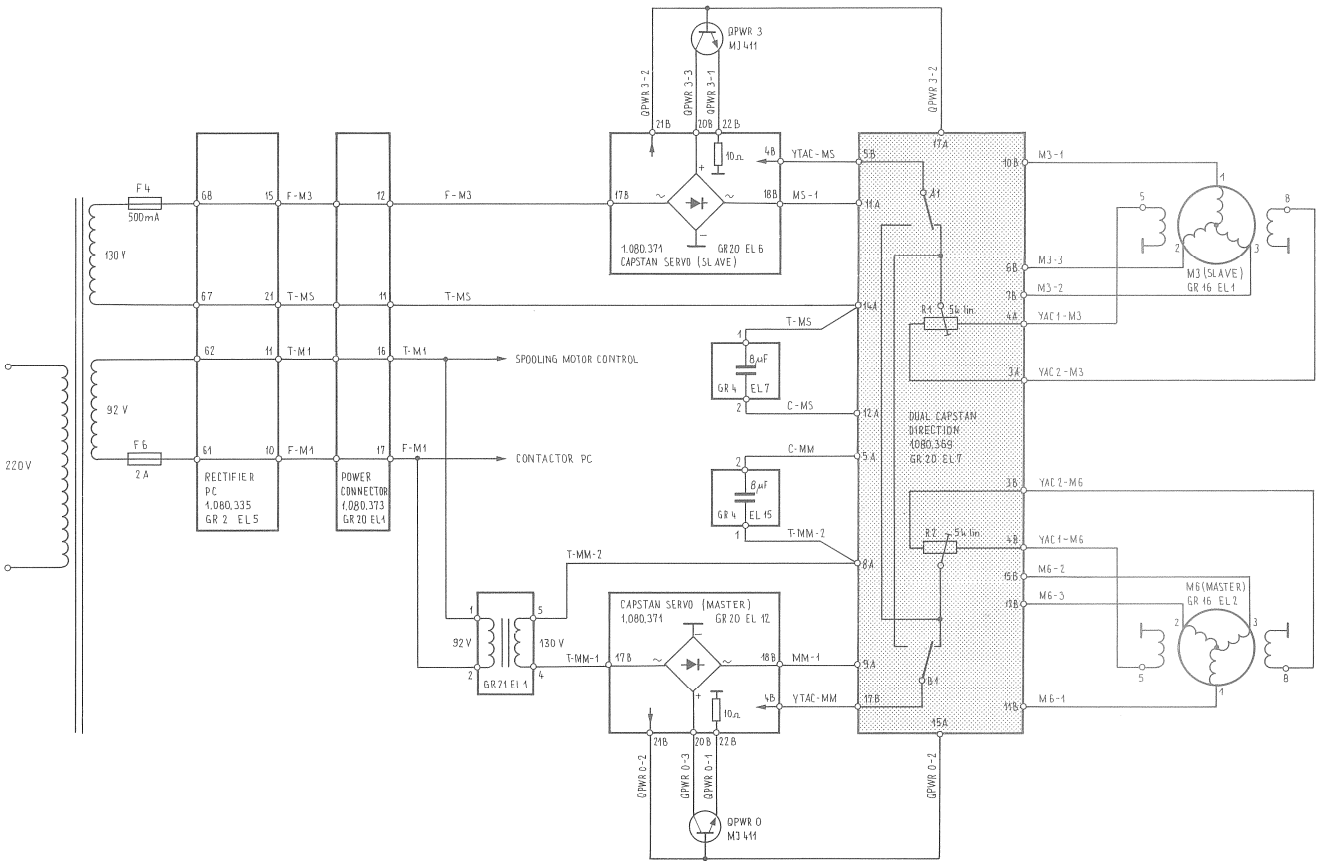
IND	DATE	NAME
⑧ ⑦ ⑥ ⑤ ④	7.12.77	
③ ② ① ○	2.2.77 AB	A.St/gv

POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
R 34	57.41.4103	10 k	± 5% .25W	CSCH	
R 35	57.41.4561	560			
R 36	57.41.4223	22 k			
R 37	57.41.4271	270			
R 38	57.41.4471	470			
R 39	57.41.4102	1 k			
R 40	57.41.4101	100			
R 41	57.56.4100	10	±10% 4.2W		
R 42	57.41.4103	10 k	± 5% .25W	CSCH	
R 43	57.41.4473	47 k			
R 44	57.41.4473	47 k			
R 45					
R 46	58.11.6502	5 k	30% .5 W		
TP 01	54.01.0010		Buchse, 2mm, SW		
TP 02	54.01.0019		Buchse, 2mm, WS		

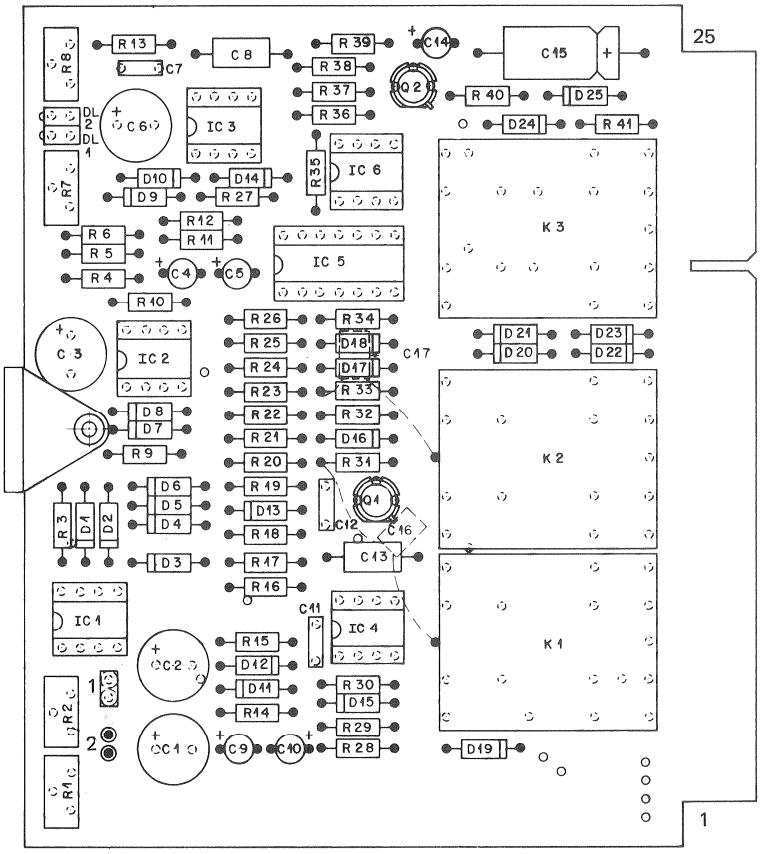
CSCH = carbon film

IND	DATE	NAME
⑧ ⑦ ⑥ ⑤ ④	7.12.77	
③ ② ① ○	2.2.77 AB	A.St/gv

DUAL-CAPSTAN DIRECTION BOARD 1.080.369 GR 20 EL 7



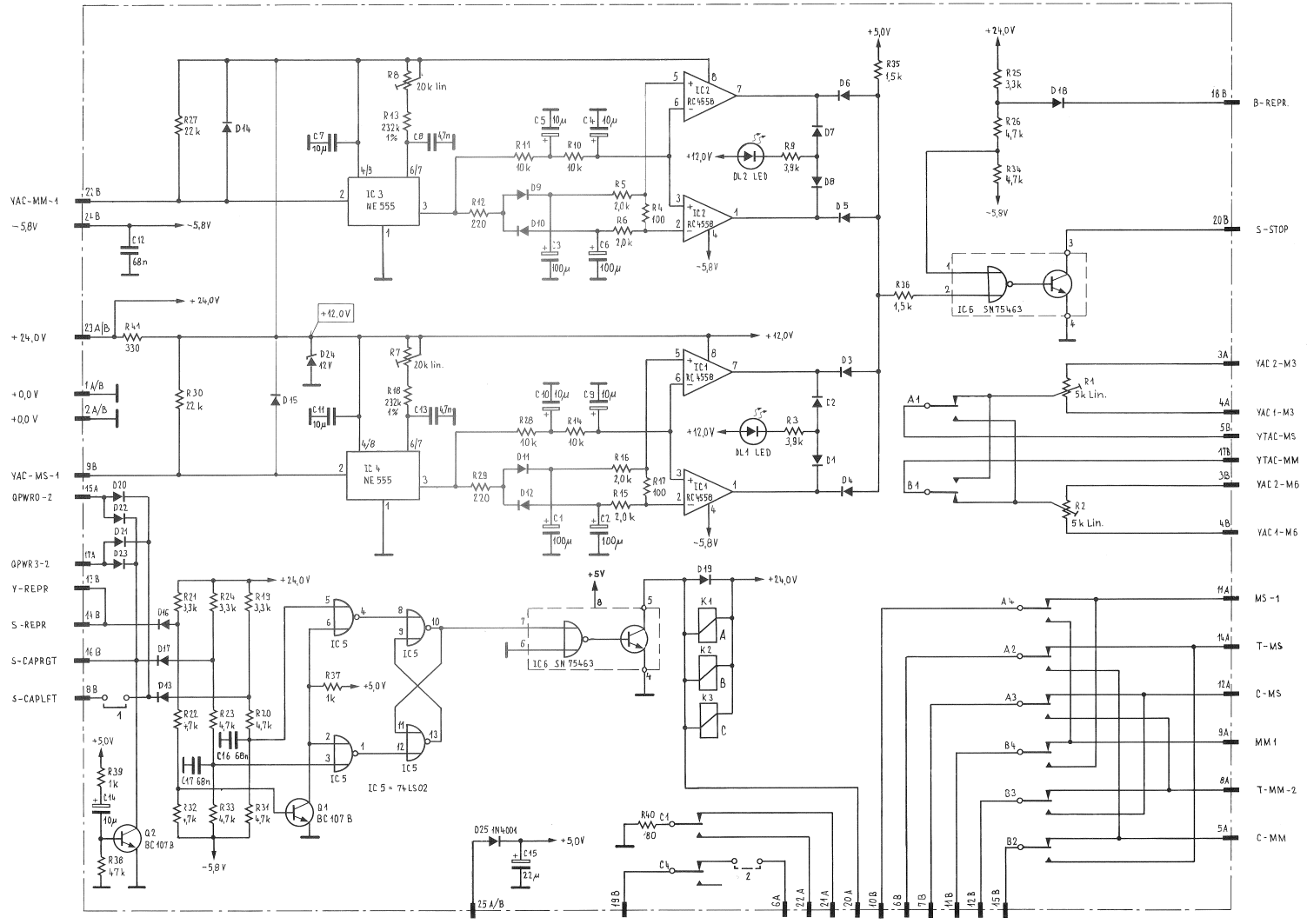
DUAL CAPSTAN DIRECTION BOARD 1.080.369 GR 20 EL 7



1 JUMPER INSERTED = BIDIRECTIONAL OPERATION
JUMPER OUT = ORDINARY PLAY DIRECTION ONLY

2 JUMPER INSERTED = RECORD OPERATION POSSIBLE
JUMPER OUT = NO RECORD MODE

DUAL-CAPSTAN DIRECTION BOARD 1.080.369 GR 20 EL 7



1 JUMPER INSERTED = BIDIRECTIONAL OPERATION
JUMPER OUT = ORDINARY PLAY DIRECTION ONLY

2 JUMPER INSERTED = RECORD OPERATION POSSIBLE
JUMPER OUT = NO RECORD MODE

+5,8V S-REC S-REC * B-CAPLFT B-CAPRGT Y-CAPLFT M3-1 M3-3 M3-2 M6-1 M6-3 M6-2

D1...19 = 1N4448
D20...23 = AAZ 18

DUAL CAPSTAN DIRECTION BOARD 1.080.369 GR 20 EL 7

	POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
	C 01	59.22.4101	100 µF	16 V -10+100% EL		
	C 02	59.22.4101	100 µF			
	C 03	59.22.4101	100 µF			
	C 04	59.30.4100	10 µF	-20+ 50% TA		
	C 05	59.30.4100	10 µF			
	C 06	59.22.4101	100 µF	-10+100% EL		
3)	C 07	59.25.4100	10 µF	25 V EL		
	C 08	59.12.7472	4700 pF	63 V 1% PS		
	C 09	59.30.4100	10 µF	16 V -20+ 50% TA		
	C 10	59.30.4100	10 µF			
3)	C 11	59.25.4100	10 µF	25 V EL		
	C 12	59.99.0205	0,068µF			
	C 13	59.12.7472	4700 pF	63 V 1% PS		
	C 14	59.30.4100	10 µF	16 V -20+ 50% TA		
	C 15	59.25.5220	22 µF	40 V -10+ 50% EL		
	D 01	50.04.0125	1 N 4448	50V, 100mA	N 103	
	D 02	50.04.0125	1 N 4448			
	D 03	50.04.0125	1 N 4448			
	D 04	50.04.0125	1 N 4448			
	D 05	50.04.0125	1 N 4448			
	D 06	50.04.0125	1 N 4448			
	D 07	50.04.0125	1 N 4448			
	D 08	50.04.0125	1 N 4448			
	D 09	50.04.0125	1 N 4448			
	D 10	50.04.0125	1 N 4448			
	D 11	50.04.0125	1 N 4448			
	D 12	50.04.0125	1 N 4448			
	D 13	50.04.0125	1 N 4448			
	D 14	50.04.0125	1 N 4448			
	D 15	50.04.0125	1 N 4448			
	D 16	50.04.0125	1 N 4448			
	D 17	50.04.0125	1 N 4448			
	D 18	50.04.0125	1 N 4448			
	D 19	50.04.0125	1 N 4448			
4)	D 20	50.04.0954	AAZ 18			
	D 21	50.04.0954	AAZ 18			
	D 22	50.04.0954	AAZ 18			
	D 23	50.04.0954	AAZ 18			
	D 24	50.04.1117	12 V 5%			
4)	D 25	50.04.0122	1 N 4001	50 V, 1 A		
	DL 01	50.04.2107	LED	RED, 5V, 3 mA		
	DL 02	50.04.2107	LED	RED, 5V, 3 mA		
	IC 01	50.05.0245	RC 4558	DUAL OP.AMP		
	IC 02	50.05.0245	RC 4558			
	IC 03	50.05.0158	NE 555	TIMER		

TA = Tantal
CER = Ceramic
PS = Polystyrol
EL = Electrolytic

IND	DATE	NAME
a	15.9.82	/vgl
b	3.1.80	
c	5.12.78	
d	19.1.78	
e	20.4.77	Schn./gv

STUDER Capstan Direction 1.080.369 PAGE 1 of 3

	POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
	IC 04	50.05.0158	NE 555	TIMER		
	IC 05	50.06.0002	SN74LS02	4 NOR		
	IC 06	50.05.0203	SN75463	DUAL OR DRIVER		
4)	E 01	56.04.0144	NF4-24V	RELAIS 24V, 4xU		MA
4)	E 02	56.04.0144	NF4-24V			
4)	E 03	56.04.0144	NF4-24V			
	Q 01	50.03.0408	BC 107 B		BC 237 B	
	Q 02	50.03.0408	BC 107 B		BC 237 B	
	R 01	58.01.7502	5 K	LIN. 10% .5W		
	R 02	58.01.7502	5 K			
	R 03	57.41.4392	3,9 K	5 % .25W		
	R 04	57.41.4101	100 Ω			
	R 05	57.39.2001	2 K	1 % .25W MF		
	R 06	57.39.2001	2 K			
	R 07	58.01.7203	20 K	LIN. 10% .5W		
	R 08	58.01.7203	20 K			
	R 09	57.41.4392	3,9 K	5 % .25W		
	R 10	57.41.4103	10 K			
	R 11	57.41.4103	10 K			
	R 12	57.41.4221	220 Ω			
	R 13	57.39.2323	232 K	1 % .25W MF		
	R 14	57.41.4103	10 K	5 % .25W		
	R 15	57.39.2001	2 K	1 % .25W MF		
	R 16	57.39.2001	2 K			
	R 17	57.41.4101	100 Ω	5 % .25W		
	R 18	57.39.2323	232 K	1 % .25W MF		
	R 19	57.41.4332	3,3 K	5 % .25W		
	R 20	57.41.4472	4,7 K			
	R 21	57.41.4332	3,3 K			
	R 22	57.41.4472	4,7 K			
	R 23	57.41.4472	4,7 K			
	R 24	57.41.4332	3,3 K			
	R 25	57.41.4332	3,3 K			
	R 26	57.41.4472	4,7 K			
	R 27	57.41.4223	22 K			
	R 28	57.41.4103	10 K			
	R 29	57.41.4221	220 Ω			
	R 30	57.41.4223	22 K			
	R 31	57.41.4472	4,7 K			
	R 32	57.41.4472	4,7 K			
	R 33	57.41.4472	4,7 K			

MF= Metalfilm MA= Matsushita

IND	DATE	NAME
a	15.9.82	/vgl
b	3.1.80	
c	5.12.78	
d	19.1.78	
e	20.4.77	Schn./gv

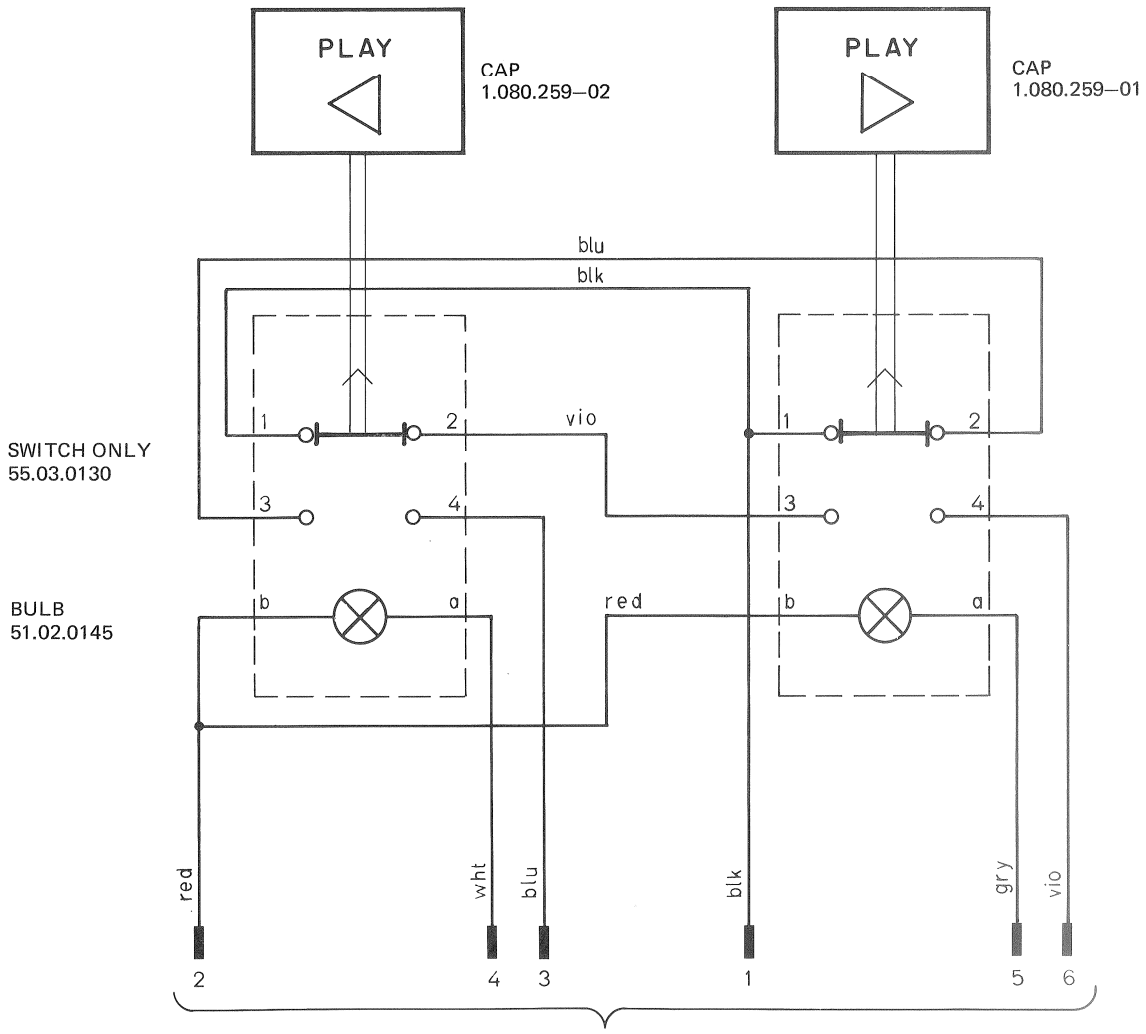
STUDER Capstan Direction 1.080.369 PAGE 2 of 3

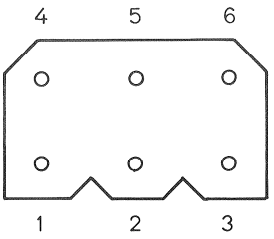
	POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
	R 34	57.41.4472	4,7 K	5 % .25W		
	R 35	57.41.4152	1,5 K			
	R 36	57.41.4152	1,5 K			
	R 37	57.41.4102	1 K			
4)	R 38	57.41.4473	47 K			
4)	R 39	57.41.4102	1 K			
	R 40	57.41.4181	180 Ω			
	R 41	57.41.4331	330 Ω			
	XIC	53.03.0166	DIL	IC-Socket 8 - PIN		
	XIC	53.03.0167	DIL	IC-Socket 14 - PIN		
	XIC	50.03.9921		Transistor-Socket		
(2)	C 16	59.99.0205	0,068µF	50V CER		
(2)	C 17	59.99.0205	0,068µF			

IND	DATE	NAME
a	15.9.82	/vgl
b	3.1.80	
c	5.12.78	
d	19.1.78	
e	20.4.77	Schn./gv

STUDER Capstan Direction 1.080.369 PAGE 3 of 3

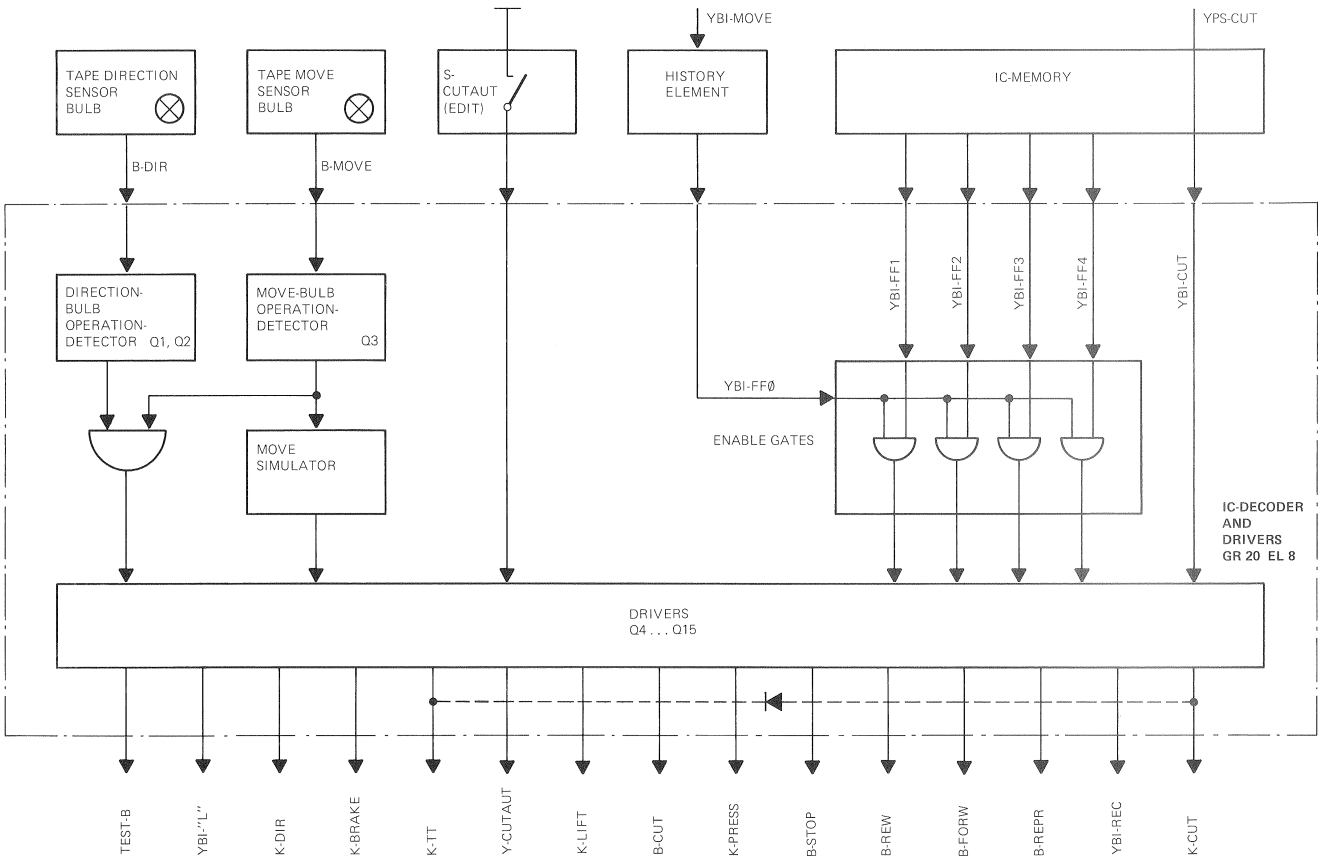
DIRECTION SWITCH 1.080.259 GR17 EL2



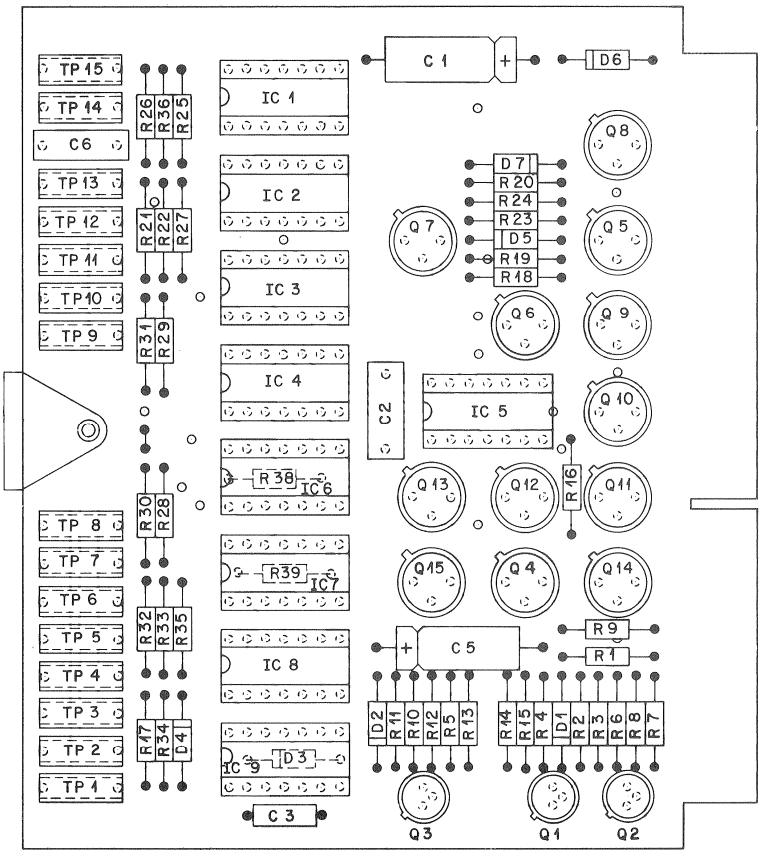


DIRECTION SWITCH			DUAL CAPSTAN BOARD	REMOTE MODE
1	blk	0.0V		
2	red	+24V		
3	blu	S-CAPLFT	8B	P 28
4	wht	B-CAPLFT	22A	P 14
5	gry	B-CAPRGT	21A	P 8
6	vio	S-CAPRGT	16B	P 26

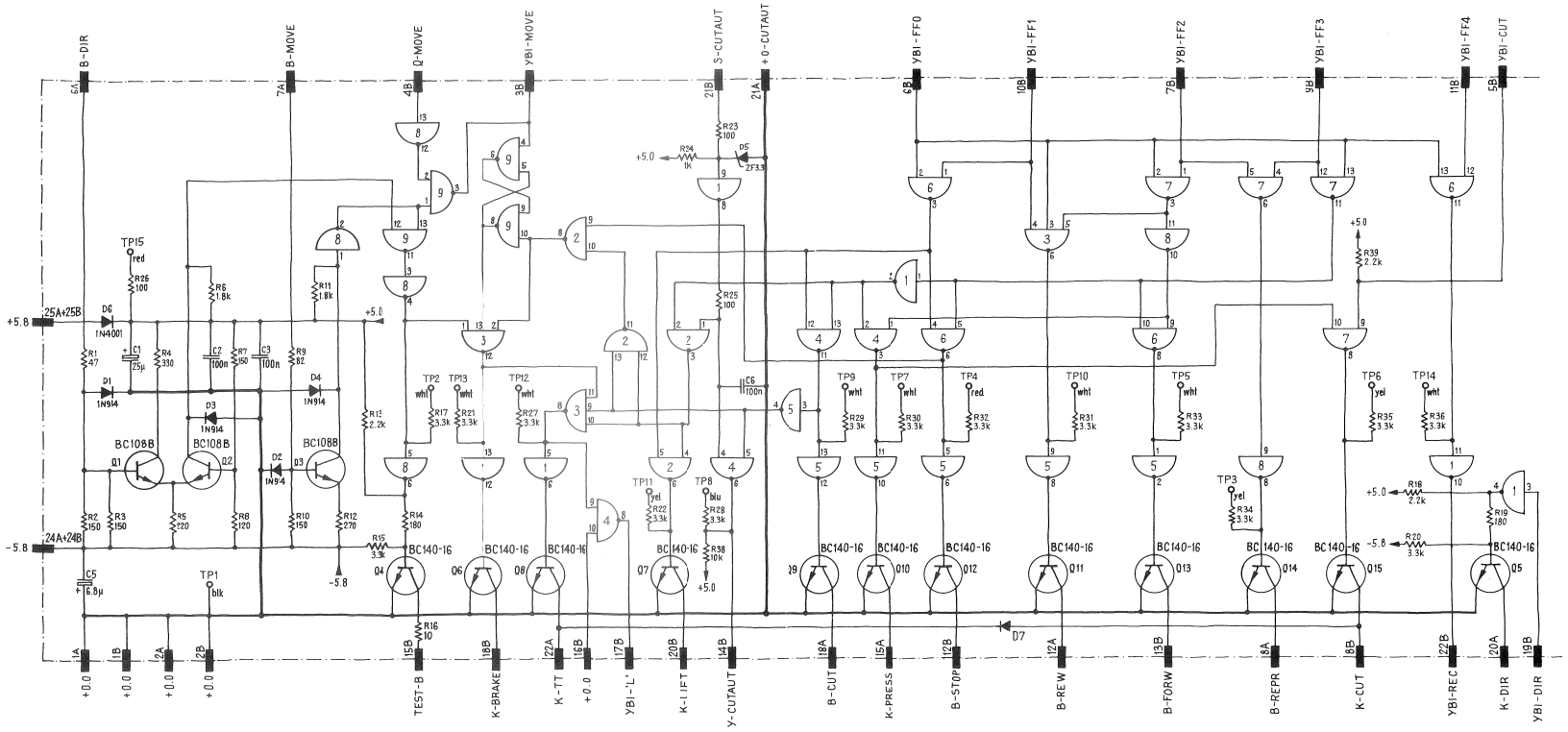
IC DECODER AND DRIVER/BLOCK DIAGRAM 1.080.391 GR 20 EL 8



IC DECODER AND DRIVER 1.080.391 GR 20 EL 8



IC DECODER AND DRIVER 1.080.391 GR 20 EL 8

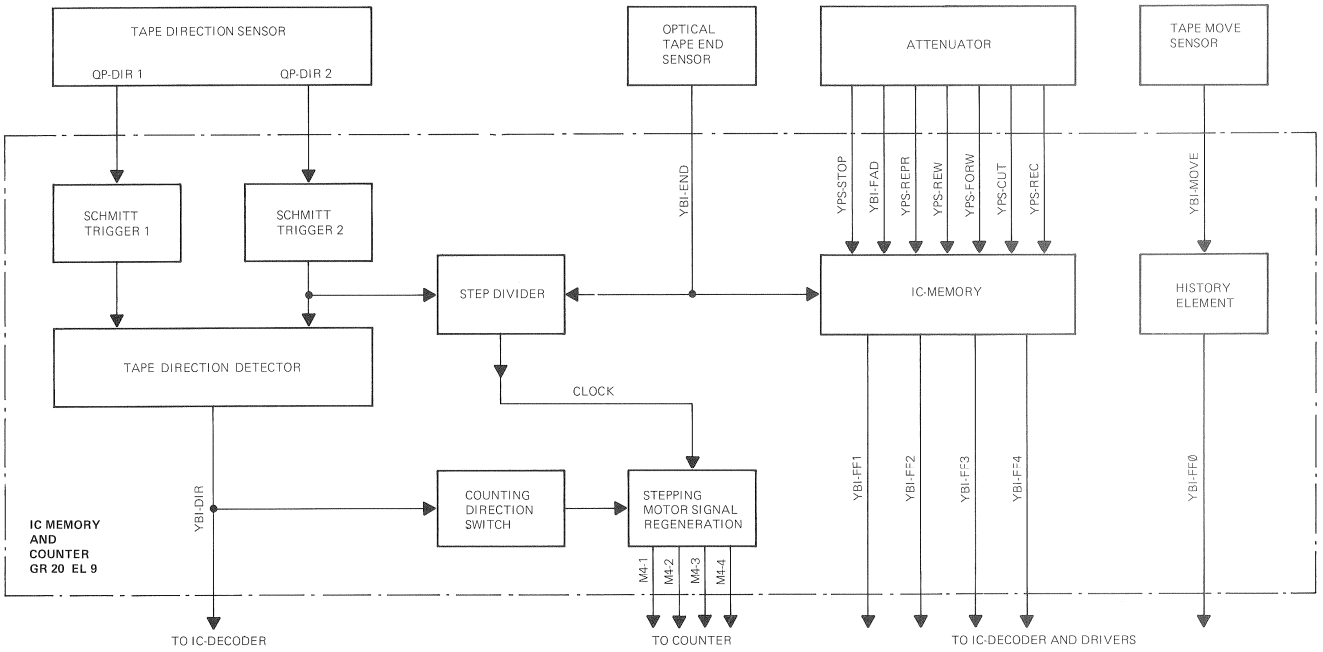


IC DECODER AND DRIVER 1.080.391 GR 20 EL 8

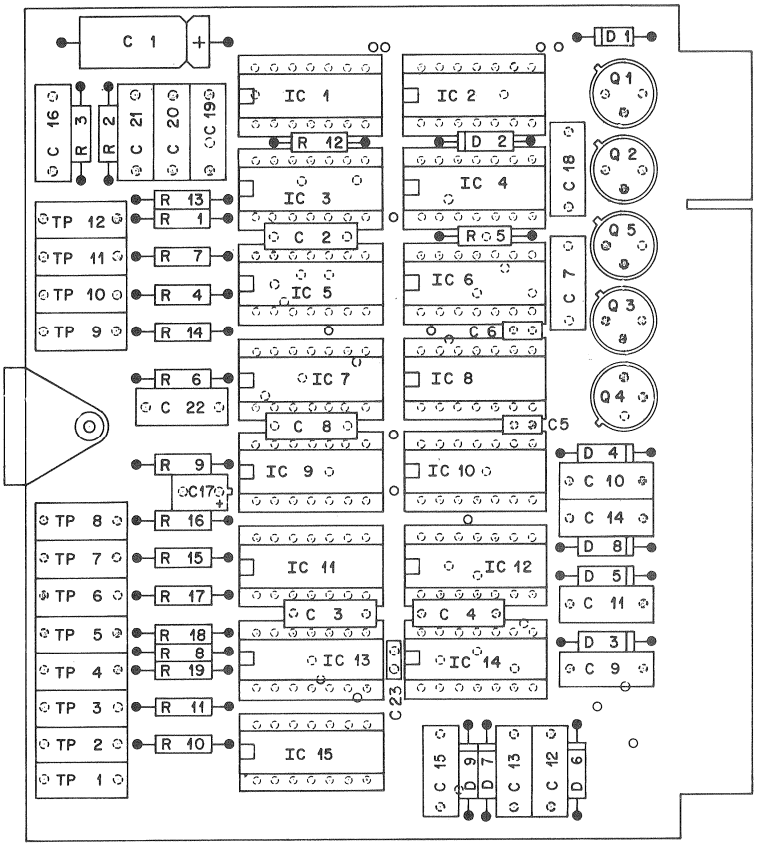
	Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
	C 1	59.25.5220	22 µ, +50 %, 40 V=, EL	1	
②	C 2	59.05.Z104	100 n, 10 %, 100 V, MPC	1	
①	C 3	59.99.0197	100 n, +80 %, 25 V, KER	1	
	C 5	59.25.5220	22 µ, +50 %, 40 V=, EL	1	
②	C 6	59.05.Z104	100 n, 10 %, 100 V, MPC	1	
	E 1	50.04.0102	1 N 914	1	
	E 2	50.04.0102	1 N 914	1	
	E 3	50.04.0102	1 N 914	1	
	E 4	50.04.0102	1 N 914	1	
	E 5	50.04.1107	3.3 V, 5 %, .4 W, Z	1	
	E 6	50.04.0122	1 N 4001	1	
	E 7	50.04.0122	1 N 4001	1	
	Q 1	50.03.0409	BC 108 b,	1	
	Q 2	50.03.0409	BC 108 b,	1	
	Q 3	50.03.0409	BC 108 b,	1	
	Q 4	50.03.0316	BC 140 / 16	1	
	Q 5	50.03.0316	BC 140 / 16	1	
	Q 6	50.03.0316	BC 140 / 16	1	
	Q 7	50.03.0316	BC 140 / 16	1	
	Q 8	50.03.0316	BC 140 / 16	1	
	Q 9	50.03.0316	BC 140 / 16	1	
	Q 10	50.03.0316	BC 140 / 16	1	
	Q 11	50.03.0316	BC 140 / 16	1	
	Q 12	50.03.0316	BC 140 / 16	1	
	Q 13	50.03.0316	BC 140 / 16	1	
	Q 14	50.03.0316	BC 140 / 16	1	
	Q 15	50.03.0316	BC 140 / 16	1	
	R 1	57.31.3470	47 , 2 %, .25 W, MF	1	
	R 2	57.31.3151	150 ,		
	R 3	57.31.3151	150 ,		
	R 4	57.02.5331	330 , 10 %, .25 W, CMA	1	AB
	R 5	57.02.5221	220,	1	AB
	R 6	57.02.5182	1.8 k,	1	AB
	R 7	57.31.3151	150 , 2 %, .25 W, MF	1	
	R 8	57.31.3121	120 ,	1	
	R 9	57.02.5820	82 , 10 %, .25 W, CMA	1	AB
	R 10	57.02.5151	150 ,	1	AB
	R 11	57.02.5182	1.8 k,	1	AB
	R 12	57.02.5271	270 ,	1	AB
	R 13	57.02.5222	2.2 k,	1	AB
	R 14	57.02.5181	180 ,	1	AB
	R 15	57.02.5332	3.3 k,	1	AB
	R 16	57.02.5100	10 ,	1	AB
	R 17	57.02.5332	3.3 k,	1	AB
	R 18	57.02.5222	2.2 k,	1	AB
	R 19	57.02.5181	180 ,	1	AB
	R 20	57.02.5332	3.3 k,	1	AB
	R 21	57.02.5332	3.3 k,	1	AB
	R 22	57.02.5332	3.3 k,	1	AB
	R 23	57.02.5101	100 ,	1	AB
	R 24	57.02.5102	1.0 k,	1	AB
	R 25	57.02.5101	100 ,	1	AB
	R 26	57.02.5101	100 ,	1	AB
	R 27	57.02.5332	3.3 k,	1	AB
	R 28	57.02.5332	3.3 k,	1	AB
	R 29	57.02.5332	3.3 k,	1	AB
	R 30	57.02.5332	3.3 k,	1	AB
	R 31	57.02.5332	3.3 K,	1	AB
	R 32	57.02.5332	3.3 K,	1	AB
	R 33	57.02.5332	3.3 K,	1	AB
	R 34	57.02.5332	3.3 K,	1	AB
	R 35	57.02.5332	3.3 K,	1	AB
	Aenderungen	①	② ③ ④		⑤

Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
R 36	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	AB
R 37				
R 38	57.02.5103	10 k,	1	
R 39	57.02.5222	2.2 k,	1	
TP 1	54.01.0010	Buchse, 2 mm, sw	1	
TP 2	54.01.0019	ws	1	
TP 3	54.01.0014	gb	1	
TP 4	54.01.0012	rt	1	
TP 5	54.01.0019	ws	1	
TP 6	54.01.0014	gb	1	
TP 7	54.01.0019	ws	1	
TP 8	54.01.0016	bl	1	
TP 9	54.01.0019	ws	1	
TP 10	54.01.0019	ws	1	
TP 11	54.01.0014	gb	1	
TP 12	54.01.0019	ws	1	
TP 13	54.01.0019	ws	1	
TP 14	54.01.0019	ws	1	
TP 15	54.01.0012	rt	1	
IC 1	50.05.0109	SN 7404 N	1	
IC 2	50.05.0108	SN 7400 N	1	
IC 3	50.05.0110	SN 7410 N	1	
IC 4	50.05.0108	SN 7400 N	1	
IC 5	50.05.0109	SN 7404 N	1	
IC 6	50.05.0108	SN 7400 N	1	
IC 7	50.05.0108	SN 7400 N	1	
IC 8	50.05.0109	SN 7404 N	1	
IC 9	50.05.0108	SN 7400 N	1	
Aenderungen	①	② ③ ④		⑤

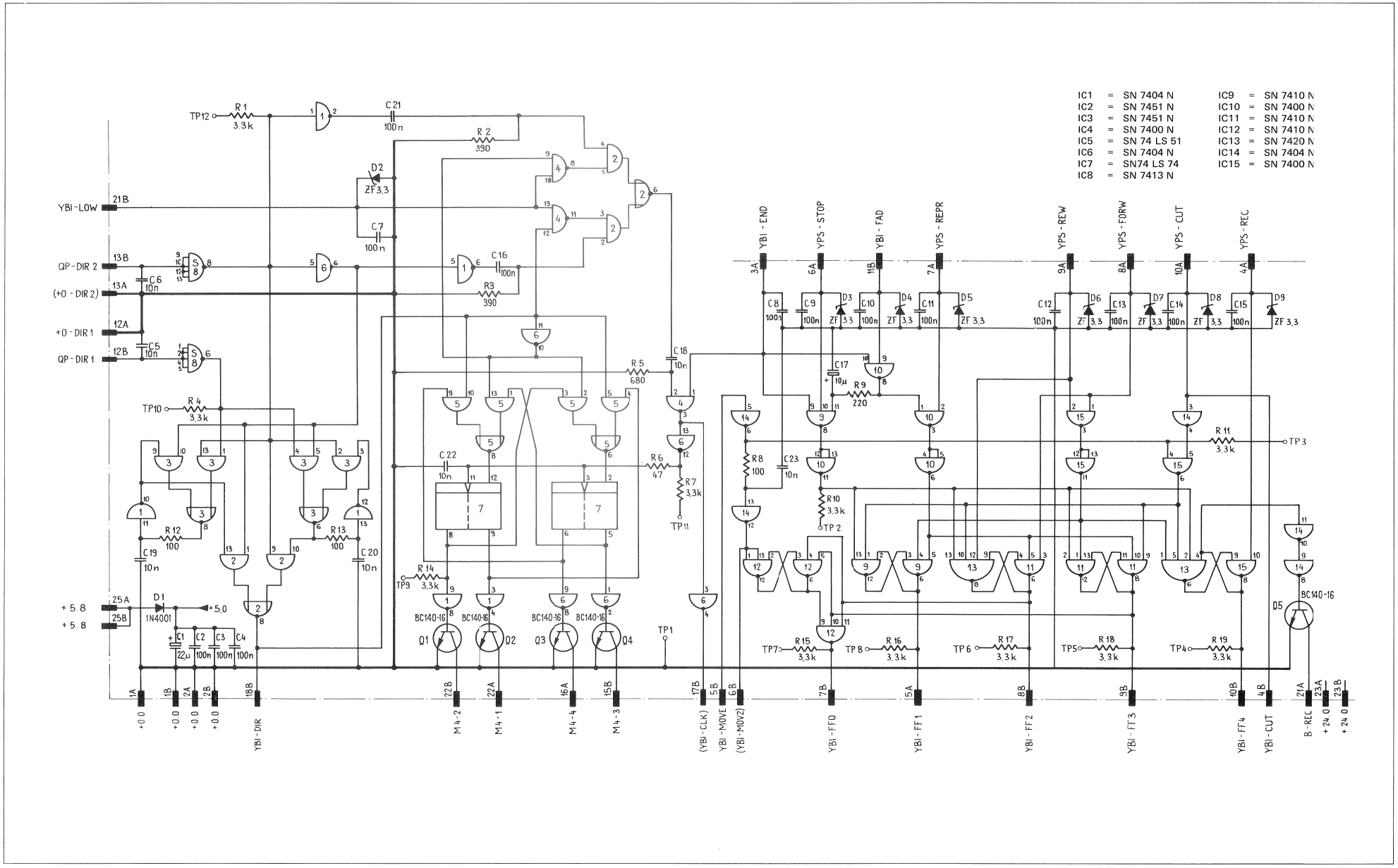
IC MEMORY AND COUNTER/BLOCK DIAGRAM 1.080.393 GR 20 EL 9



IC MEMORY AND COUNTER 1.080.393 GR 20 EL 9



IC MEMORY AND COUNTER 1.080.393 GR 20 EL 9



IC MEMORY AND COUNTER 1.080.393 GR 20 EL 9

	Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
4	C 01	59.25.5220	22 µ, +50 %, 40 V=, EL	1	
2 3	C 02	59.99.0197	100 n, +80 %, KER	1	
2 3	C 03	59.99.0197	100 n,	1	
2 3	C 04	59.99.0197	100 n,	1	
	C 05	59.99.0181	10 n, +80 %, 50 V,	1	
	C 06	59.99.0181	10 n,	1	
5	C 07	59.05.2104	100 n, 10 %, 100 V, MPC	1	
2 3	C 08	59.99.0197	100 n, +80 %, 25 V=, KER	1	
5	C 09	59.05.2104	100 n, 10 %, 100 V, MPC	1	
5	C 10	59.05.2104	100 n,	1	
5	C 11	59.05.2104	100 n,	1	
5	C 12	59.05.2104	100 n,	1	
5	C 13	59.05.2104	100 n,	1	
5	C 14	59.05.2104	100 n,	1	
5	C 15	59.05.2104	100 n,	1	
5	C 16	59.05.2104	100 n,	1	
	C 17	59.10.4100	10 µ, 20 %, 16 V=, TA	1	
	C 18	59.05.4103	10 n, 10 %, 250 V, MPC	1	
	C 19	59.05.4103	10 n,	1	
	C 20	59.05.4103	10 n,	1	
5	C 21	59.05.2104	100 n, 100 V,	1	
	C 22	59.05.4103	10 n, 250 V,	1	
6	C 23	59.32.3103	10 n, +80 % 40 V, KER	1	
	D 01	50.04.0122	1 N 4001,	1	
	D 02	50.04.1107	3.3 V, 5 %, .4 W, Z	1	
	D 03	50.04.1107	3.3 V,	1	
	D 04	50.04.1107	3.3 V,	1	
	D 05	50.04.1107	3.3 V,	1	
	D 06	50.04.1107	3.3 V,	1	(7) 22.12.82
	D 07	50.04.1107	3.3 V,	1	(2) 22.9.75

Aenderungen: (1) 1.9.71 (2) 16.11.72 (3) 13.7.73 (4) 27.2.74 (5) 10.7.74

STUDER REGENSDORF ZÜRICH — **Positionsliste**

IC Memory-Print bestückt

Erstellt: 23.8.71 Bz
Geprüft:
Blatt: 1 Blätter 3

Kopie für:
Ersatz für:
Ersetzt durch:

1.080.393.00

	Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
	D 08	50.04.1107	3.3 V, 5 %, .4 W, Z	1	
	D 09	50.04.1107	3.3 V, 5 %, .4 W, Z	1	
2	IC 01	50.05.0200	SN 7404 N,	1	
	IC 02	50.05.0112	SN 7451 N,	1	
	IC 03	50.05.0112	SN 7451 N,	1	
	IC 04	50.05.0108	SN 7400 N,	1	
(7)	IC 05	50.06.0051	SN 74LS51 N,	1	
2	IC 06	50.05.0200	SN 7404 N,	1	
(7)	IC 07	50.06.0074	SN 74LS74 N,	1	
	IC 08	50.05.0121	SN 7413 N,	1	
	IC 09	50.05.0110	SN 7410 N,	1	
	IC 10	50.05.0108	SN 7400 N,	1	
	IC 11	50.05.0110	SN 7410 N,	1	
	IC 12	50.05.0110	SN 7410 N,	1	
	IC 13	50.05.0111	SN 7420 N,	1	
2	IC 14	50.05.0200	SN 7404 N,	1	
	IC 15	50.05.0108	SN 7400 N,	1	
	Q 01	50.03.0316	BC 140 / 16,	1	
	Q 02	50.03.0316	BC 140 / 16,	1	
	Q 03	50.03.0316	BC 140 / 16,	1	
	Q 04	50.03.0316	BC 140 / 16,	1	
	Q 05	50.03.0316	BC 140 / 16,	1	
					(7) 22.12.82
					(6) 22.9.75

Aenderungen: (1) 1.9.71 (2) 12.9.74 (3) 13.7.73 (4) 27.2.74 (5) 10.7.74

STUDER REGENSDORF ZÜRICH — **Positionsliste**

IC Memory-Print bestückt

Erstellt: 23.8.71 Bz
Geprüft:
Blatt: 2 Blätter 3

Kopie für:
Ersatz für:
Ersetzt durch:

1.080.393.00

Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
R 01	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	
R 02	57.02.5391	390, 10 %, .25 W, CMA	1	
R 03	57.02.5391	390, 10 %, .25 W, CMA	1	
R 04	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	
R 05	57.02.5681	680, 10 %, .25 W, CMA	1	
R 06	57.02.5470	47, 10 %, .25 W, CMA	1	
R 07	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	
R 08	57.02.5101	100, 10 %, .25 W, CMA	1	
R 09	57.02.5221	220, 10 %, .25 W, CMA	1	
R 10	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	
R 11	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	
R 12	57.02.5101	100, 10 %, .25 W, CMA	1	
R 13	57.02.5101	100, 10 %, .25 W, CMA	1	
R 14	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	
R 15	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	
R 16	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	
R 17	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	
R 18	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	
R 19	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	
TP 01	54.01.0010	Buchse, 2 mm, sw,	1	
TP 02	54.01.0012	Buchse, 2 mm, rt,	1	
TP 03	54.01.0019	Buchse 2 mm, ws,	1	
TP 04	54.01.0014	Buchse, 2 mm, gb,	1	
TP 05	54.01.0014	Buchse, 2 mm, gb,	1	
TP 06	54.01.0014	Buchse, 2 mm, gb,	1	
TP 07	54.01.0016	Buchse, 2 mm, bl,	1	
TP 08	54.01.0014	Buchse, 2 mm, gb,	1	
TP 09	54.01.0019	Buchse, 2 mm, ws,	1	
TP 10	54.01.0019	Buchse, 2 mm, ws,	1	
TP 11	54.01.0019	Buchse, 2 mm, ws,	1	
TP 12	54.01.0019	Buchse, 2 mm, ws,	1	(7) 22.12.82
				(6) 22.9.75

Aenderungen: (1) 1.9.71 (2) 15.10.71 (3) 13.7.73 (4) 27.2.74 (5) 10.7.74

STUDER REGENSDORF ZÜRICH — **Positionsliste**

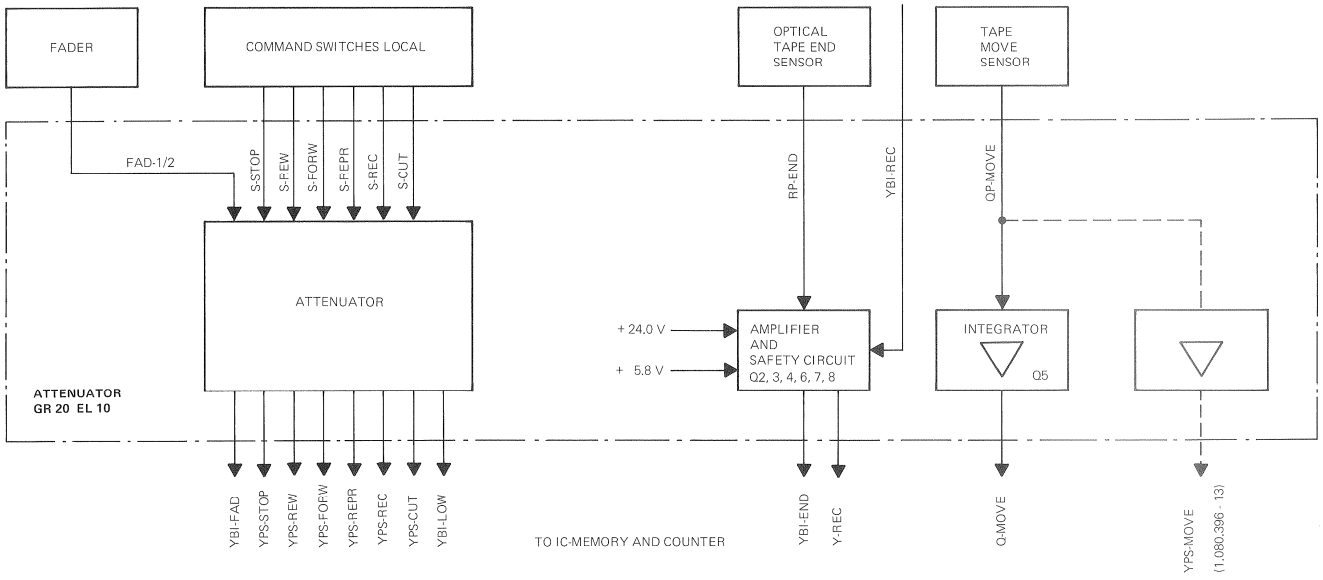
IC Memory-Print bestückt

Erstellt: 23.8.71 Bz
Geprüft:
Blatt: 3 Blätter 3

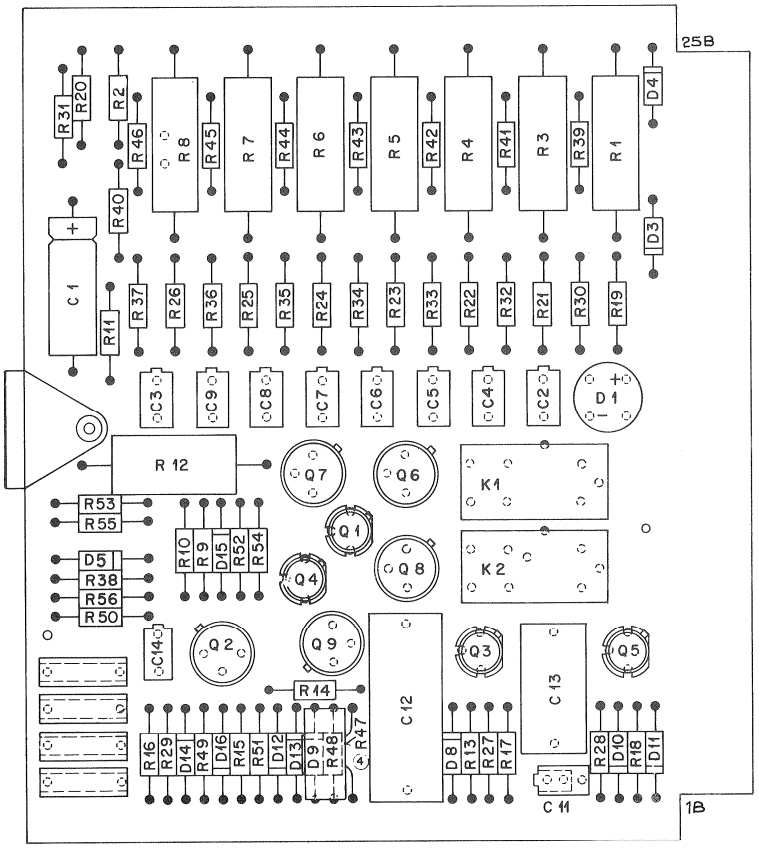
Kopie für:
Ersatz für:
Ersetzt durch:

1.080.393.00

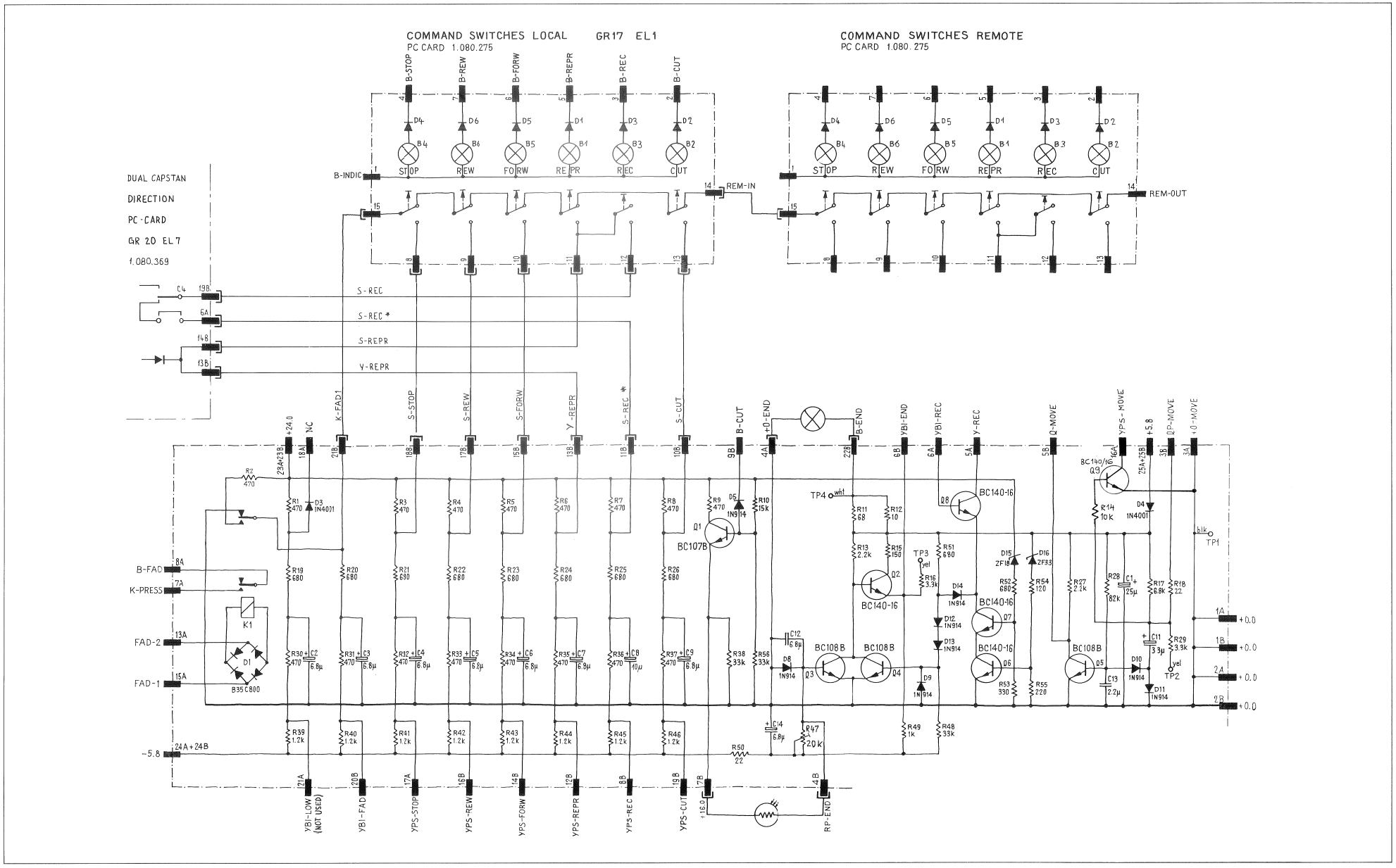
ATTENUATOR AND PREAMPLIFIER/BLOCK DIAGRAM 1.080.396 GR 20 EL 10



ATTENUATOR AND PREAMPLIFIER 1.080.396 GR 20 EL 10



ATTENUATOR AND PREAMPLIFIER 1.080.396 GR 20 EL 10

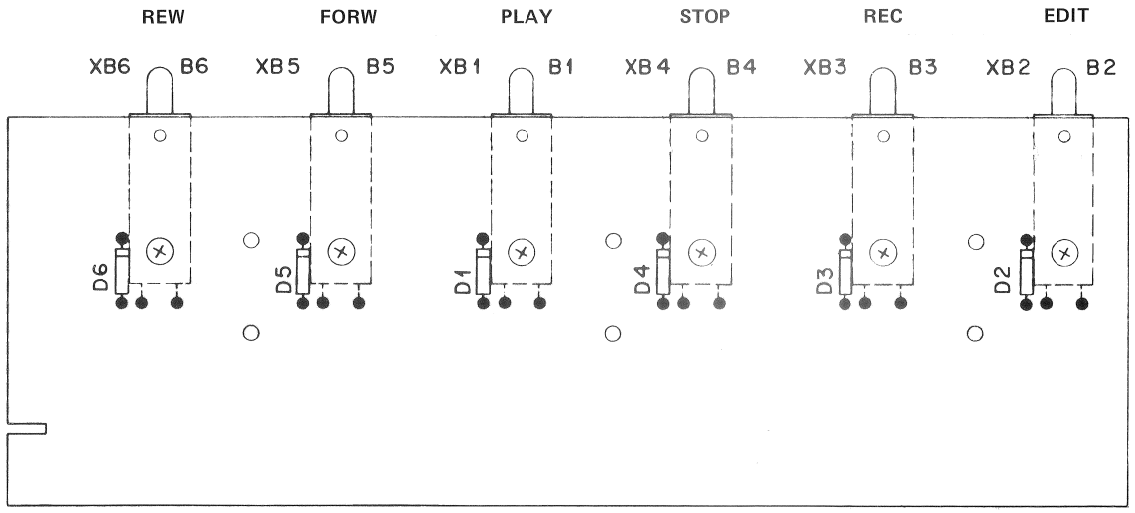


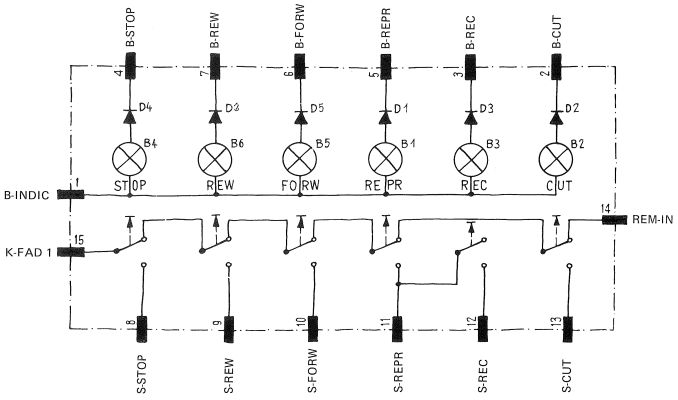
ATTENUATOR AND PREAMPLIFIER 1.080.396 GR 20 EL 10

	Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
②	C 1	59.25.5220	22 µ, +50 %, 40 V=, EL	1	
	C 2	59.10.7689	6.8 µ, 20 %, 35 V=, TA	1	
	C 3	59.10.7689	6.8 µ, 20 %, 35 V=, TA	1	
	C 4	59.10.7689	6.8 µ, 20 %, 35 V=, TA	1	
	C 5	59.10.7689	6.8 µ, 20 %, 35 V=, TA	1	
	C 6	59.10.7689	6.8 µ, 20 %, 35 V=, TA	1	
	C 7	59.10.7689	6.8 µ, 20 %, 35 V=, TA	1	
	C 8	59.10.7689	6.8 µ, 20 %, 35 V=, TA	1	
	C 9	59.10.7689	6.8 µ, 20 %, 35 V=, TA	1	
	C 11	59.10.5339	3.3 µ, 20 %, 20 V=, TA	1	
	C 12	59.05.1685	6.8 µ, 10 %, 63 V, MPC	1	
	C 13	59.05.1225	2.2 µ, 10 %, 63 V, MPC	1	
	C 14	59.10.5689	6.8 µ, 20 %, 20 V=, TA	1	
①	D 1	70.01.0222	B 35 C 800, SI	1	
	D 3	50.04.0122	1 N 4001,	1	
	D 4	50.04.0122	1 N 4001,	1	
	D 5	50.04.0102	1 N 914	1	
	D 8	50.04.0102	1 N 914,	1	
④	D 9	50.04.0102	1 N 914,	1	nicht gesickt
	D 10	50.04.0102	1 N 914,	1	
	D 11	50.04.0102	1 N 914,	1	
④	D 12	50.04.0102	1 N 914,	1	nicht gesickt
④	D 13	50.04.0102	1 N 914,	1	nicht gesickt
	D 14	50.04.0102	1 N 914,	1	
	D 15	50.04.1122	18 V, 5 %, .4 W, Z	1	
	D 16	50.04.1107	3.3 V, 5 %, .4 W, Z	1	
③	K 1	56.02.1001	24 V=, 1 A, 1 U,	1	
③	K 2	56.02.1001	24 V=, 1 A 1 U,	1	
	Q 1	50.03.0408	BC 107 B	1	
	Q 2	50.03.0316	BC 140 / 16	1	
	Q 3	50.03.0409	BC 108 b,	1	
	Q 4	50.03.0409	BC 108 b,	1	
	Q 5	50.03.0409	BC 108 b,	1	
	Q 6	50.03.0316	BC 140 / 16,	1	
	Q 7	50.03.0316	BC 140 / 16,	1	
	Q 8	50.03.0316	BC 140 / 16,	1	
③	Q 9	50.03.0316	BC 140 / 16,	1	
	R 1	57.56.4471	470, 5 %, 5.5 W, DR	1	
	R 2	57.02.5471	470, 10 %, .25 W, CMA	1	
	R 3	57.56.4471	470, 5 %, 5.5 W, DR	1	
	R 4	57.56.4471	470, 5 %, 5.5 W, DR	1	
	R 5	57.56.4471	470, 5 %, 5.5 W, DR	1	
	R 6	57.56.4471	470, 5 %, 5.5 W, DR	1	
	R 7	57.56.4471	470, 5 %, 5.5 W, DR	1	
	R 8	57.56.4471	470, 5 %, 5.5 W, DR	1	
	R 9	57.02.5471	470, 10 %, .25 W, CMA	1	
	R 10	57.02.5153	15 10 %, .25 W, CMA	1	
	R 11	57.02.5680	68, 10 %, .25 W, CMA	1	
②	R 12	57.56.4100	10, 10 %, 5.5 W, DR	1	
	R 13	57.02.5222	2.2 k, 10 %, .25 W, CMA	1	
③	R 14	57.02.5103	10 k, 10 %, .25 W CMA	1	
	R 15	57.02.5151	150, 10 %, .25 W, CMA	1	
	R 16	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	
	R 17	57.02.5682	6.8 k, 10 %, .25 W, CMA	1	
	R 18	57.02.5220	22, 10 %, .25 W, CMA	1	
	R 19	57.02.5681	680, 10 %, .25 W, CMA	1	
	R 20	57.02.5681	680, 10 %, .25 W, CMA	1	
	Aenderungen	① 5.5.71	② 14.3.72 ③ 23.3.73 ④		⑤

	Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
	R 21	57.02.5681	680, 10 %, .25 W, CMA	1	
	R 22	57.02.5681	680, 10 %, .25 W, CMA	1	
	R 23	57.02.5681	680, 10 %, .25 W, CMA	1	
	R 24	57.02.5681	680, 10 %, .25 W, CMA	1	
	R 25	57.02.5681	680, 10 %, .25 W, CMA	1	
	R 26	57.02.5681	680, 10 %, .25 W, CMA	1	
	R 27	57.02.5222	2.2 k, 10 %, .25 W, CMA	1	
	R 28	57.02.5823	82 k, 10 %, .25 W, CMA	1	
	R 29	57.02.5332	3.3 k, 10 %, .25 W, CMA	1	
	R 30	57.02.5471	470, 10 %, .25 W, CMA	1	
	R 31	57.02.5471	470, 10 %, .25 W, CMA	1	
	R 32	57.02.5471	470, 10 %, .25 W, CMA	1	
	R 33	57.02.5471	470, 10 %, .25 W, CMA	1	
	R 34	57.02.5471	470, 10 %, .25 W, CMA	1	
	R 35	57.02.5471	470, 10 %, .25 W, CMA	1	
	R 36	57.02.5471	470, 10 %, .25 W, CMA	1	
	R 37	57.02.5471	470, 10 %, .25 W, CMA	1	
	R 38	57.02.5333	33 k, 10 %, .25 W, CMA	1	
	R 39	57.02.5122	1.2 k, 10 %, .25 W, CMA	1	
	R 40	57.02.5122	1.2 k, 10 %, .25 W, CMA	1	
	R 41	57.02.5122	1.2 k, 10 %, .25 W, CMA	1	
	R 42	57.02.5122	1.2 k, 10 %, .25 W, CMA	1	
	R 43	57.02.5122	1.2 k, 10 %, .25 W, CMA	1	
	R 44	57.02.5122	1.2 k, 10 %, .25 W, CMA	1	
	R 45	57.02.5122	1.2 k, 10 %, .25 W, CMA	1	
	R 46	57.02.5122	1.2 k, 10 %, .25 W, CMA	1	
	R 47	58. 01. 5203	20 k, 20 % lin	1	② ③
③	R 48	57.02.5333	33 k, 10 %, .25 W, CMA	1	nicht gesickt
	R 49	57.02.5102	1 k, 10 %, .25 W, CMA	1	
	R 50	57.02.5220	22, 10 %, .25 W, CMA	1	
	R 51	57.02.5681	680, 10 %, .25 W, CMA	1	
	R 52	57.02.5681	680, 10 %, .25 W, CMA	1	
	R 53	57.02.5331	330, 10 %, .25 W, CMA	1	
	R 54	57.02.5121	120, 10 %, .25 W, CMA	1	
	R 55	57.02.5221	220, 10 %, .25 W, CMA	1	
	R 56	57.02.5333	33 k, 10 %, .25W, CMA	1	
	TP 1	54.01.0010	Buchse, 2 mm, sw,	1	
	TP 2	54.01.0014	Buchse, 2 mm, gb,	1	
	TP 3	54.01.0014	Buchse, 2 mm, gb,	1	
	TP 4	54.01.0019	Buchse, 2 mm, ws,	1	
	Aenderungen	① 5.5.71	② ③ ④		⑤

COMMAND SWITCH BOARD 1.080.275 GR17 EL1

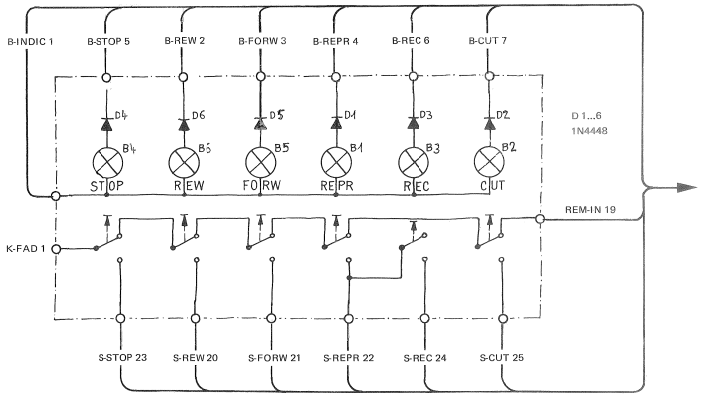




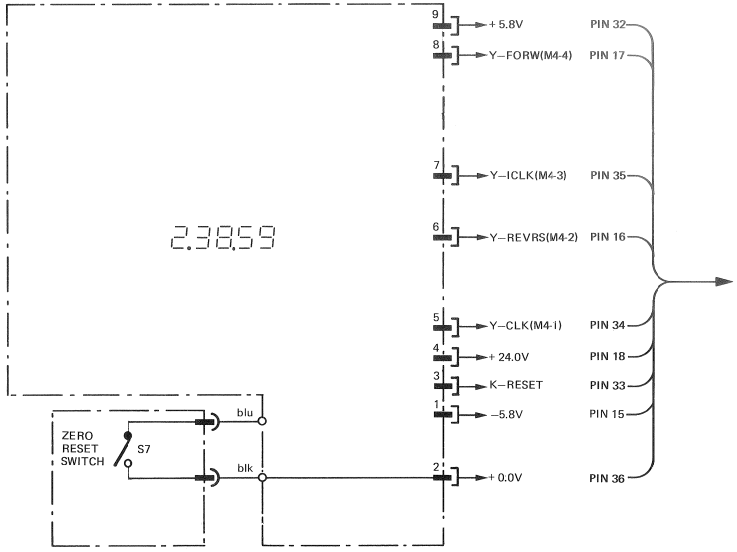
COMMAND SWITCH BOARD 1.080.275 GR17 EL1

Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
B 1	51.02.0145	24 V, .04 A, T 5.5	1	
B 2	51.02.0145	24 V, .04 A, T 5.5	1	
B 3	51.02.0145	24 V, .04 A, T 5.5	1	
B 4	51.02.0145	24 V, .04 A, T 5.5	1	
B 5	51.02.0145	24 V, .04 A, T 5.5	1	
B 6	51.02 0145	24 V, .04 A, T 5.5	1	
D 1	50.04.0102	1 N 914	1	
D 2	50.04.0102	1 N 914	1	
D 3	50.04.0102	1 N 914	1	
D 4	50.04.0102	1 N 914	1	
D 5	50.04.0102	1 N 914	1	
D 6	50.04.0102	1 N 914	1	
Aenderungen	1	2 3 4		5

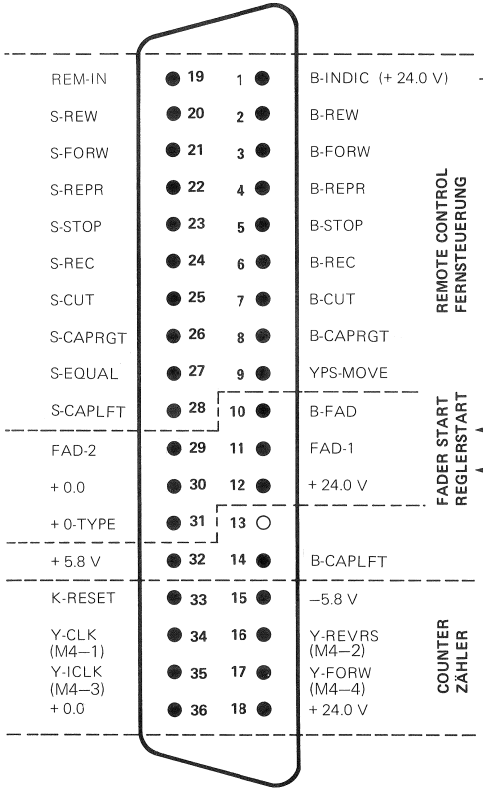
REMOTE MODE CONTROL



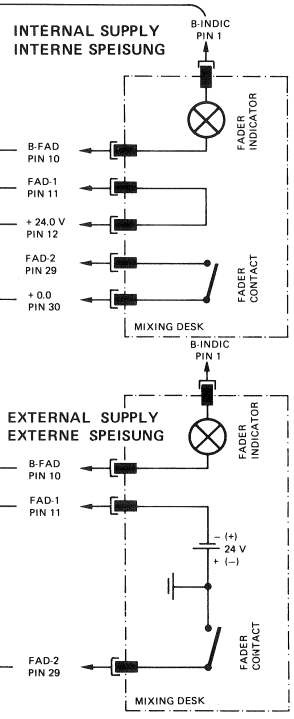
REMOTE CONTROL
FERNSTEUERUNG, LAUFWERK



TAPE TIMER ASSEMBLY (REMOTE)
FERN–ZAHLER
1.228.810

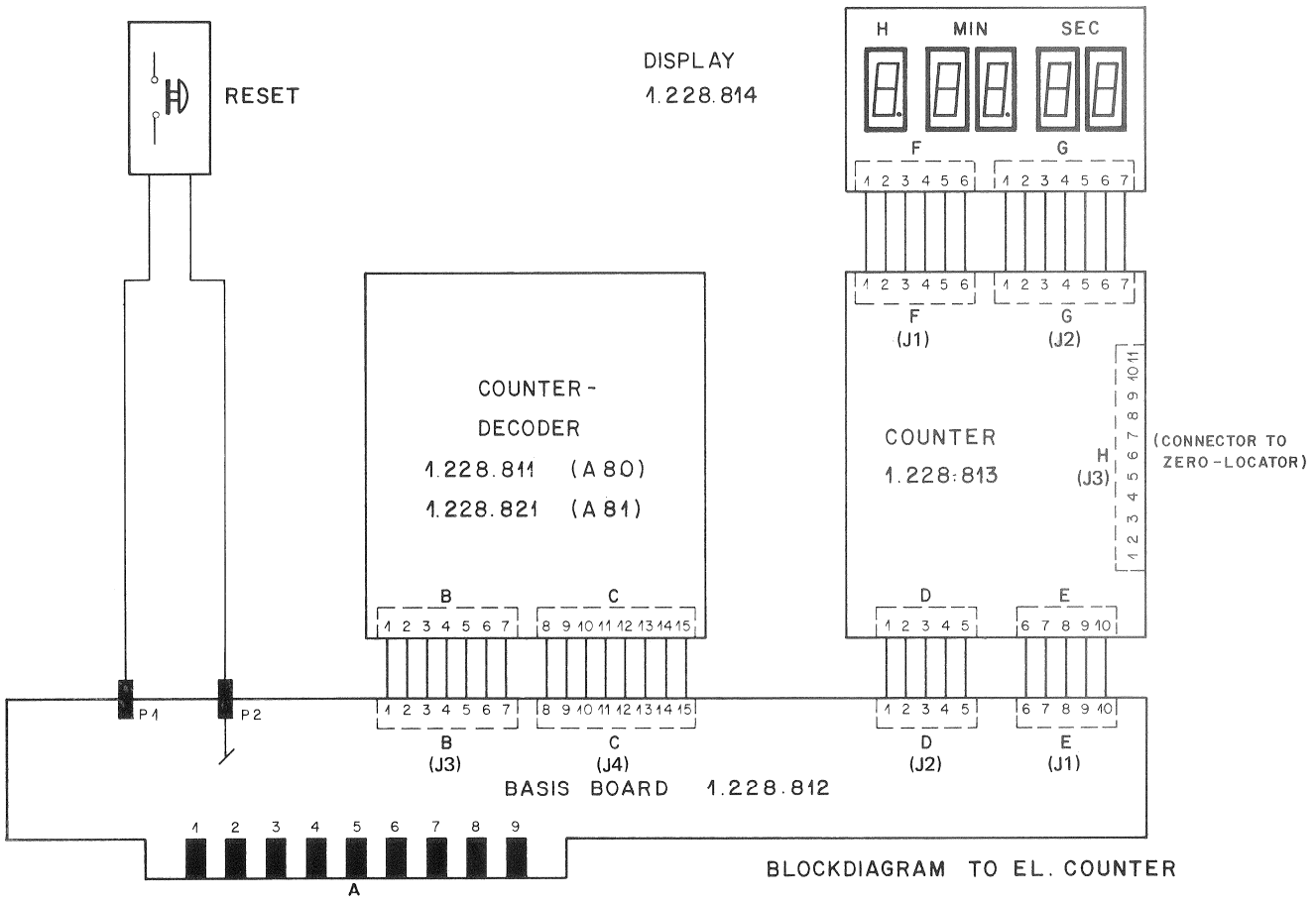


REMOTE MODE CONTROL CONNECTOR
FERNSTEUER-ANSCHLUSS
GR22 EL22

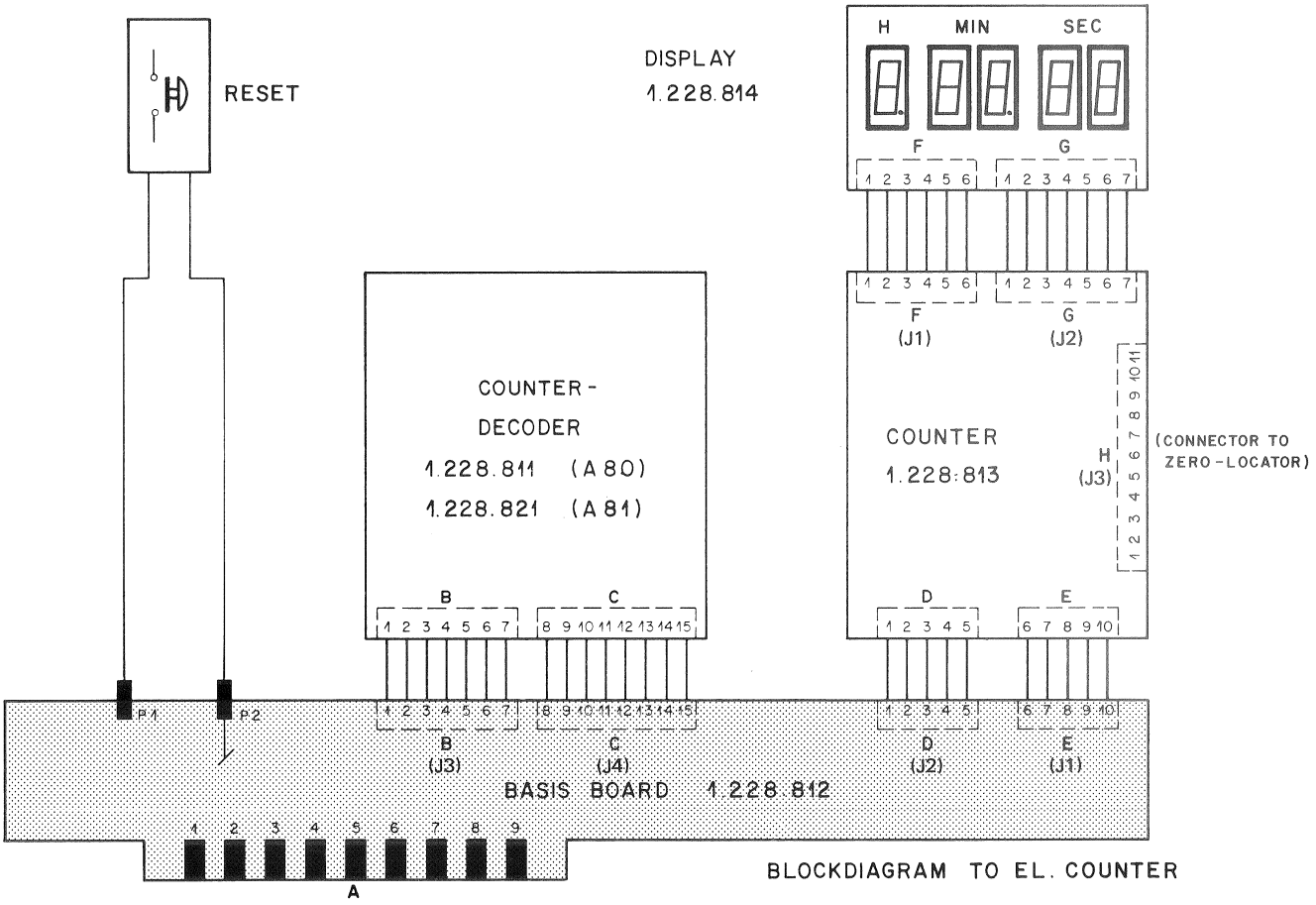


FADER START CIRCUITS
REGLERSTART-SCHALTKREISE

TAPE TIME COUNTER UNIT/BLOCK DIAGRAM 1.228.810 GR18

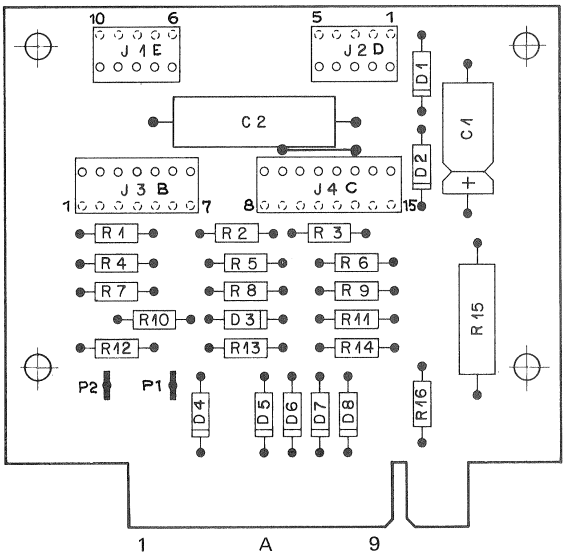


BASIS BOARD/COUNTER 1.228.812

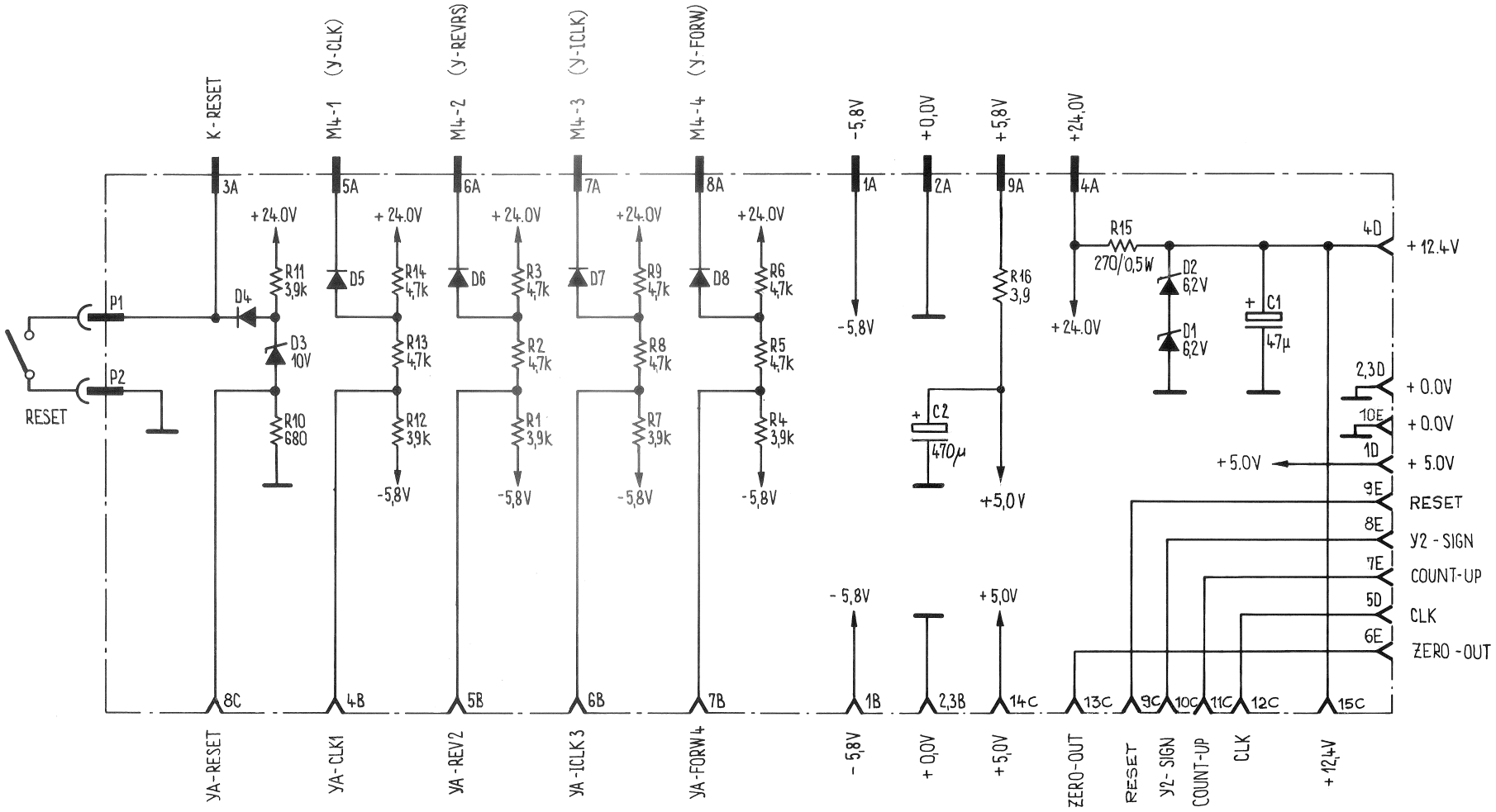


BLOCKDIAGRAM TO EL. COUNTER

BASIS BOARD/COUNTER 1.228.812



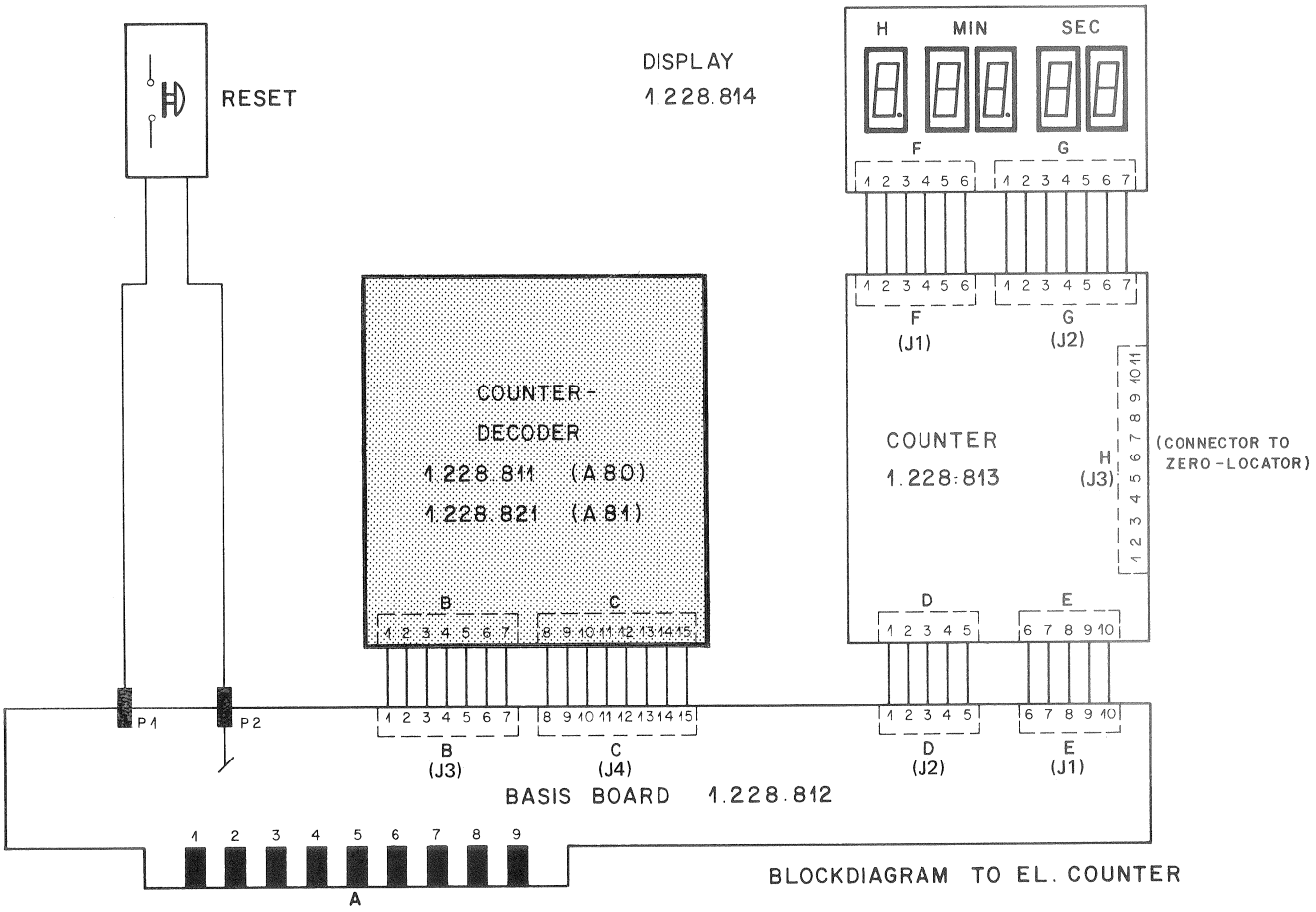
BASIS BOARD/COUNTER 1.228.812



BASIS BOARD/COUNTER 1.228.812

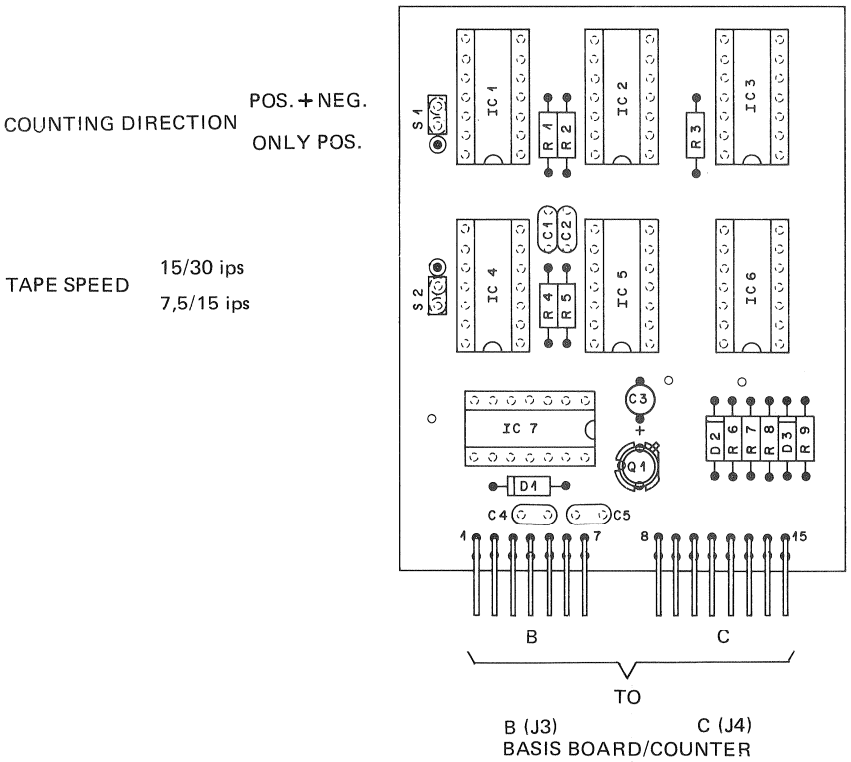
	Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
	C 1	59.25.3470	C 47 U -10% 16 V TA	1	
(2)	C 2	59.25.1471	C 470 U -10% 6 V EL	1	
	D 1	50.04.1118	D 6,2V 5% .4W Z	1	
	D 2	50.04.1118	D	1	
	D 3	50.04.1114	D 10V	1	
	D 4	50.04.0109	D N 103	1	
	D 5	50.04.0109	D	1	
	D 6	50.04.0109	D	1	
	D 7	50.04.0109	D	1	
	D 8	50.04.0109	D	1	
(2)	~~D 9~~	~~50.04.0122~~	~~D 1 N 4001~~	~~1~~	
	J 1	54.01.0228	J Buchsenleiste 5-Pol.	1	
	J 2	54.01.0228	J 5-Pol.	1	
	J 3	54.01.0218	J 7-Pol.	1	
	J 4	54.01.0289	J 8-Pol.	1	
	R 1	57.41.4392	R 3,9K 5% .25W CSCH	1	
	R 2	57.41.4472	R 4,7K	1	
	R 3	57.41.4472	R 4,7K	1	
	R 4	57.41.4392	R 3,9K	1	
	R 5	57.41.4472	R 4,7K	1	
	R 6	57.41.4472	R 4,7K	1	
	R 7	57.41.4392	R 3,9K	1	
	R 8	57.41.4472	R 4,7K	1	
	R 9	57.41.4472	R 4,7K	1	
	R 10	57.41.4681	R 680	1	
	R 11	57.41.4392	R 3,9K	1	
	R 12	57.41.4392	R 3,9K	1	
	R 13	57.41.4472	R 4,7K	1	
	R 14	57.41.4472	R 4,7K	1	
(1)	R 15	57.13.4271	R 270 5% .5 W	1	
(2)	R 16	57.11.4399	R 3,9 5% .25W CSCH	1	
	Aenderungen	① 24.1.78 JK	② 18.9.78 JK ③	④	⑤

COUNTER DECODER 1.228.811

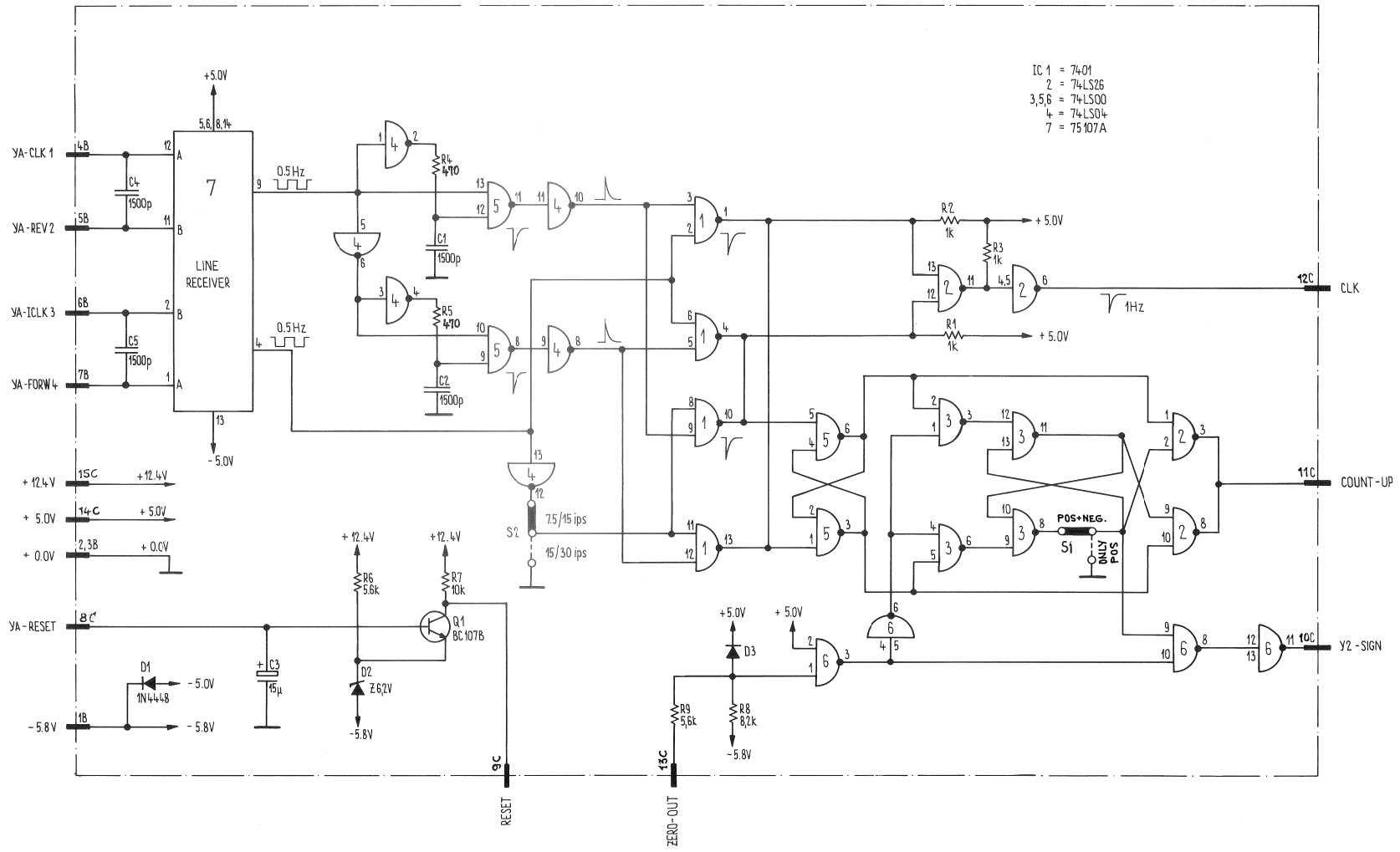


BLOCKDIAGRAM TO EL. COUNTER

COUNTER DECODER 1.228.811



COUNTER DECODER 1.228.811

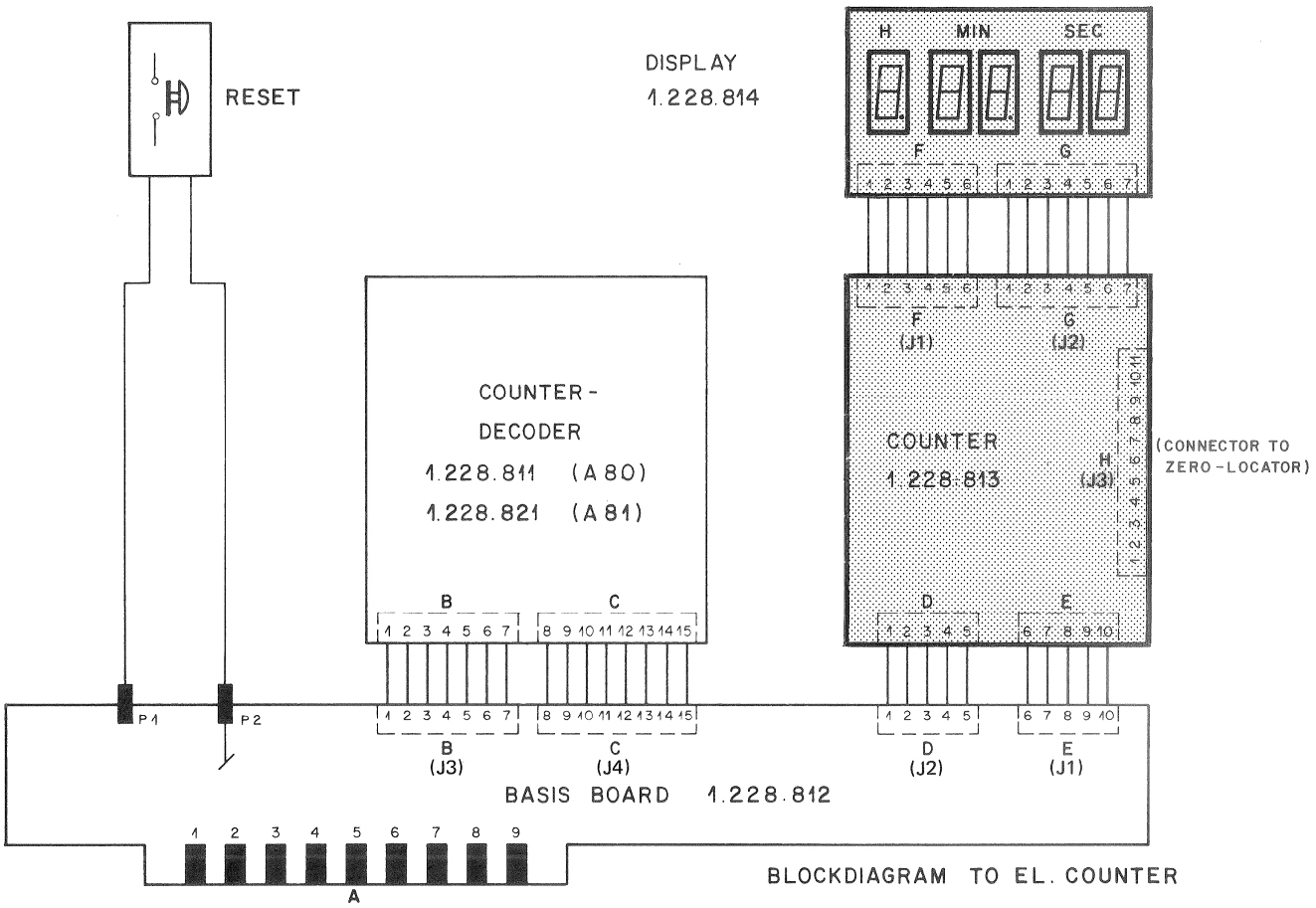


COUNTER DECODER 1.228.811

	Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
	C 01	59.32.4152	C 1.5 N, 50V KER	1	
	C 02	59.32.4152	C 1.5 N,	1	
	C 03	59.36.2150	C 15 U, 20% 10V TA	1	
	C 04	59.32.4152	C 1.5 N, 50V KER	1	
	C 05	59.32.4152	C 1.5 N,	1	
	E 01	50.04.0125	D 1 N 4448 SI	1	
	E 02	50.04.1118	D 6.2 V 5% .4W Z	1	
	E 03	50.04.0125	D 1 N 4448 SI	1	
	IC 1	50.05.0136	IC SN 7401	1	
	IC 2	50.06.0026	IC SN 74 LS 26	1	
	IC 3	50.06.0000	IC SN 74 LS 00	1	
	IC 4	50.06.0004	IC SN 74 LS 04	1	
	IC 5	50.06.0000	IC SN 74 LS 00	1	
	IC 6	50.06.0000	IC SN 74 LS 00	1	
	IC 7	50.05.0228	IC SN 75107 A	1	
(2)	Q 01	50.03.0436	Q BC 237 B	1	
(2)	R 01	57.11.4102	R 1 K, 2% .25W, MF	1	
(2)	R 02	57.11.4102	R 1 K,	1	
(2)	R 03	57.11.4102	R 1 K,	1	
(2)	R 04	57.11.4471	R 470 ,	1	
(2)	R 05	57.11.4471	R 470 ,	1	
(2)	R 06	57.11.4562	R 5.6 K,	1	
(2)	R 07	57.11.4103	R 10 K,	1	
(2)	R 08	57.11.4822	R 8.2 K,	1	
(2)	R 09	57.11.4562	R 5.6 K,	1	
				7	
				1	

Aenderungen	①23.6.76AM ② 14.7.81MF ③	④	⑤
STUDER REGENSDORF ZÜRICH	Positionsliste	Erstellt: 21.10.75 Schn/gv	
	Zähler-Decoder Print A 80	Geprüft: 31.8.76	
		Blatt: 1 Blätter 1	
Kopie für:	Ersetzt für:	1.228.811	
	Ersetzt durch:		

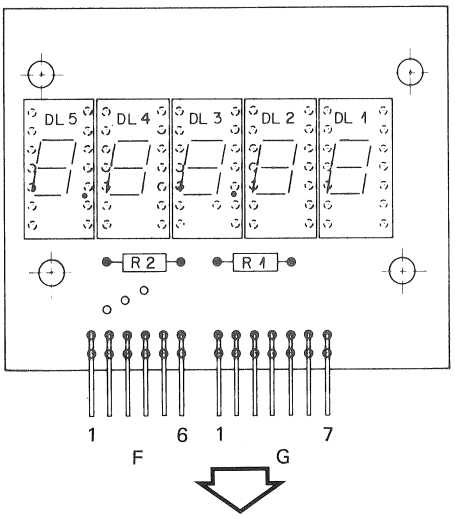
COUNTER 1.228.813 DISPLAY 1.228.814



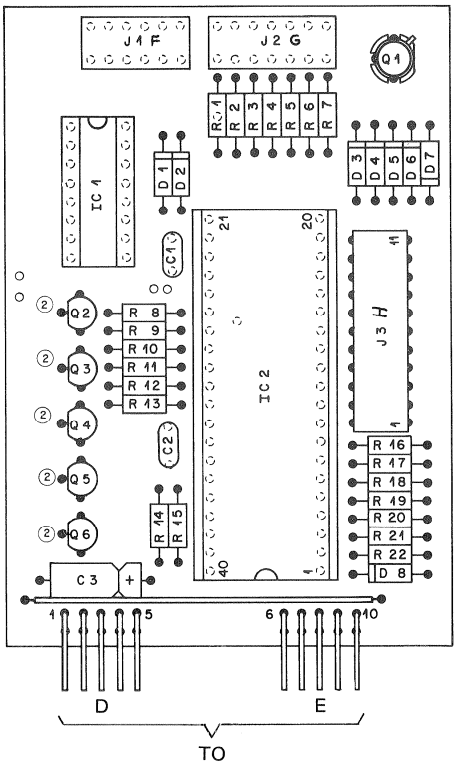
BLOCKDIAGRAM TO EL. COUNTER

COUNTER 1.228.813 **DISPLAY 1.228.814**

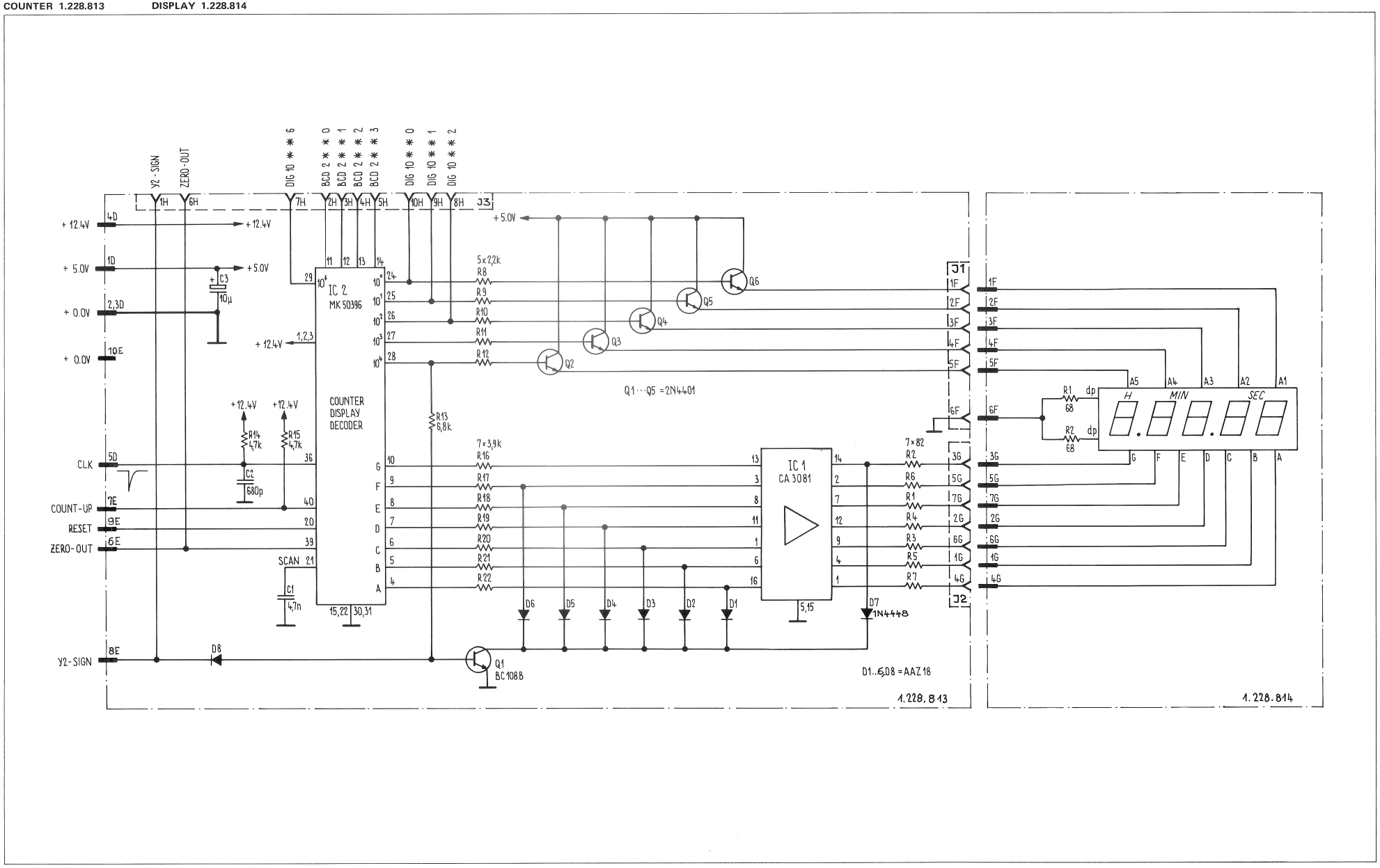
DISPLAY 1.224.814–00



COUNTER 1.228.813–00



COUNTER 1.228.813 DISPLAY 1.228.814



COUNTER 1.228.813

Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
C 01	59.32.3472	C 4.7 N, +100% 40V KER	1	
C 02	59.32.2681	C 680 P, ± 10%	1	
C 03	59.25.4100	C 10 U, +100% 25V TA	1	
D 01	50.04.0954	D AAZ 18 GE	1	
D 02	50.04.0954	D AAZ 18	1	
D 03	50.04.0954	D AAZ 18	1	
D 04	50.04.0954	D AAZ 18	1	
D 05	50.04.0954	D AAZ 18	1	
D 06	50.04.0954	D AAZ 18	1	
D 07	50.04.0109	D 1 N 4448 SI	1	
D 08	50.04.0954	D AAZ 18 GE	1	
IC 1	50.05.0229	IC CA 3081 (RCA)	1	
IC 2	50.99.0121	IC MK 50396 (Mostek)	1	
J 01	54.01.0238	J Buchsenleiste 6-Pol.	1	
J 02	54.01.0263	J Buchsenleiste 7-Pol.	1	
J 03	54.01.0308	J Buchsenleiste 11-Pol.	1	
Q 01	50.03.0409	Q BC 108 B	1	
Q 02	50.03.0340	Q 2 N 4401	1	
Q 03	50.03.0340	Q 2 N 4401	1	
Q 04	50.03.0340	Q 2 N 4401	1	
Q 05	50.03.0340	Q 2 N 4401	1	
Q 06	50.03.0340	Q 2 N 4401	1	
R 01	57.02.5820	R 82 , 10% .25W CMA	1	
R 02	57.02.5820	R 82 ,	1	
R 03	57.02.5820	R 82 ,	1	
R 04	57.02.5820	R 82 ,	1	
R 05	57.02.5820	R 82 ,	1	
R 06	57.02.5820	R 82 ,	1	
R 07	57.02.5820	R 82 ,	1	
R 08	57.02.5222	R 2.2 K, 10% .25W CMA	1	
R 09	57.02.5222	R 2.2 K,	1	
R 10	57.02.5222	R 2.2 K,	1	
R 11	57.02.5222	R 2.2 K,	1	
R 12	57.02.5222	R 2.2 K,	1	
R 13	57.02.5682	R 6.8 K,	1	
R 14	57.02.5472	R 4.7 K,	1	
R 15	57.02.5472	R 4.7 K,	1	
R 16	57.02.5392	R 3.9 K,	1	
R 17	57.02.5392	R 3.9 K,	1	
R 18	57.02.5392	R 3.9 K,	1	
R 19	57.02.5392	R 3.9 K,	1	
R 20	57.02.5392	R 3.9 K,	1	
R 21	57.02.5392	R 3.9 K,	1	
R 22	57.02.5392	R 3.9 K,	1	
XIC	53.03.0168	XIC DIL 16-Pol.	1	
XIC	53.03.0172	XIC 40-Pol.	1	
X Q	50.03.9921	X Q TS-Unterlage	6	

Aenderungen ① 23.6.76 ② ③ ④ ⑤

DISPLAY 1.228.814

Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
DL 1	73.01.0120	7 - Segment Display	5	
DL 2	73.01.0120		5	
DL 3	73.01.0120		5	
DL 4	73.01.0120		5	
DL 5	73.01.0120		5	
R 1	57.02.5680	R 68 10% .25W CMA	5	
R 2	57.02.5680		5	
X IC	53.03.0167	DIL - 14 Pol.	5	

Aenderungen ① ② ③ ④ ⑤

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BASIS BOARD / AUDIO A80 QC VU	1.081.950–00	9/49
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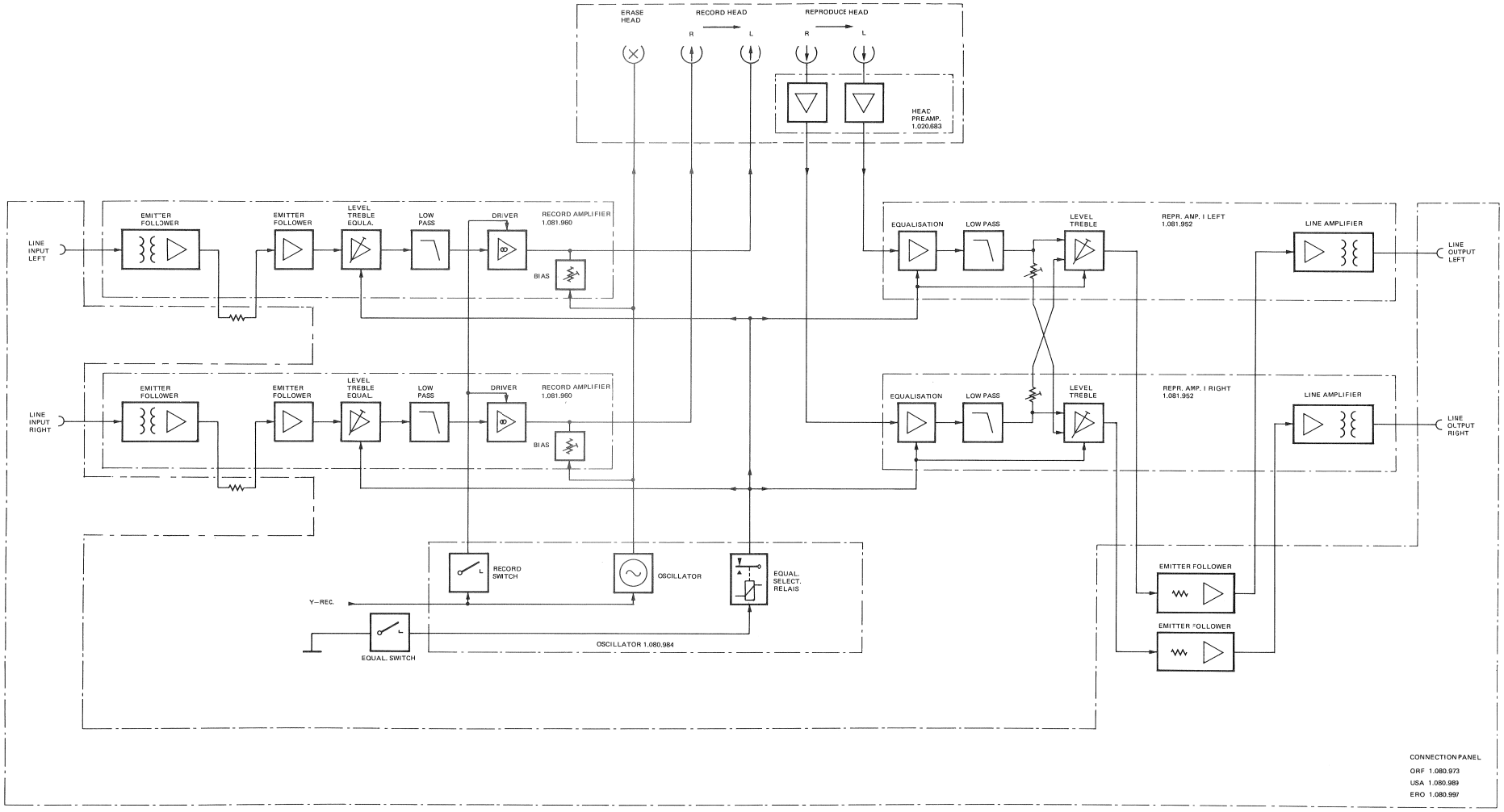
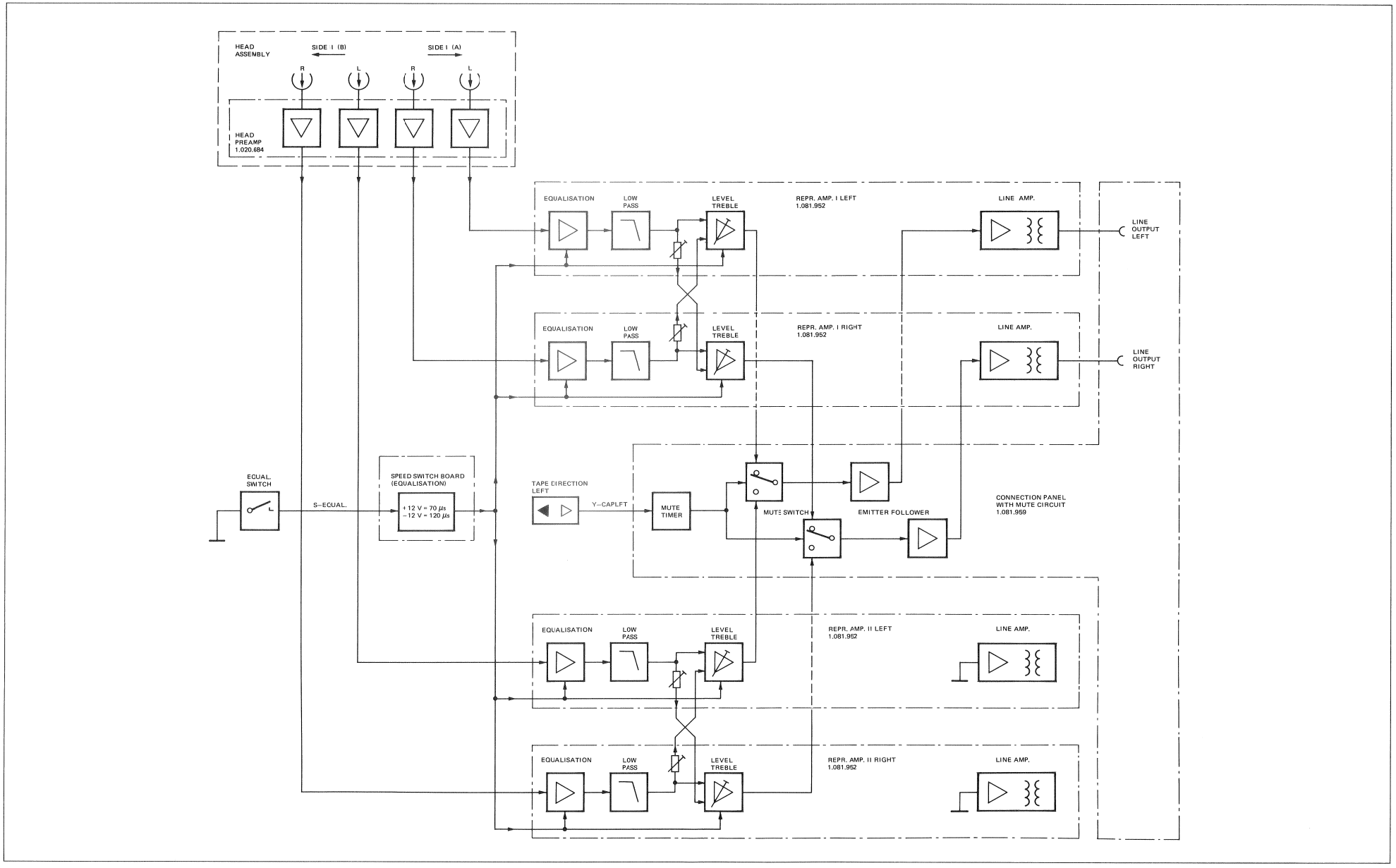
– MONITOR AMPLIFIER	1.081.908–00	
VU–METER BOARD A80 QC	1.167.750–00	9/53
WIRE HARNESS VU/MONITOR PANEL	10.023.170.01	9/54

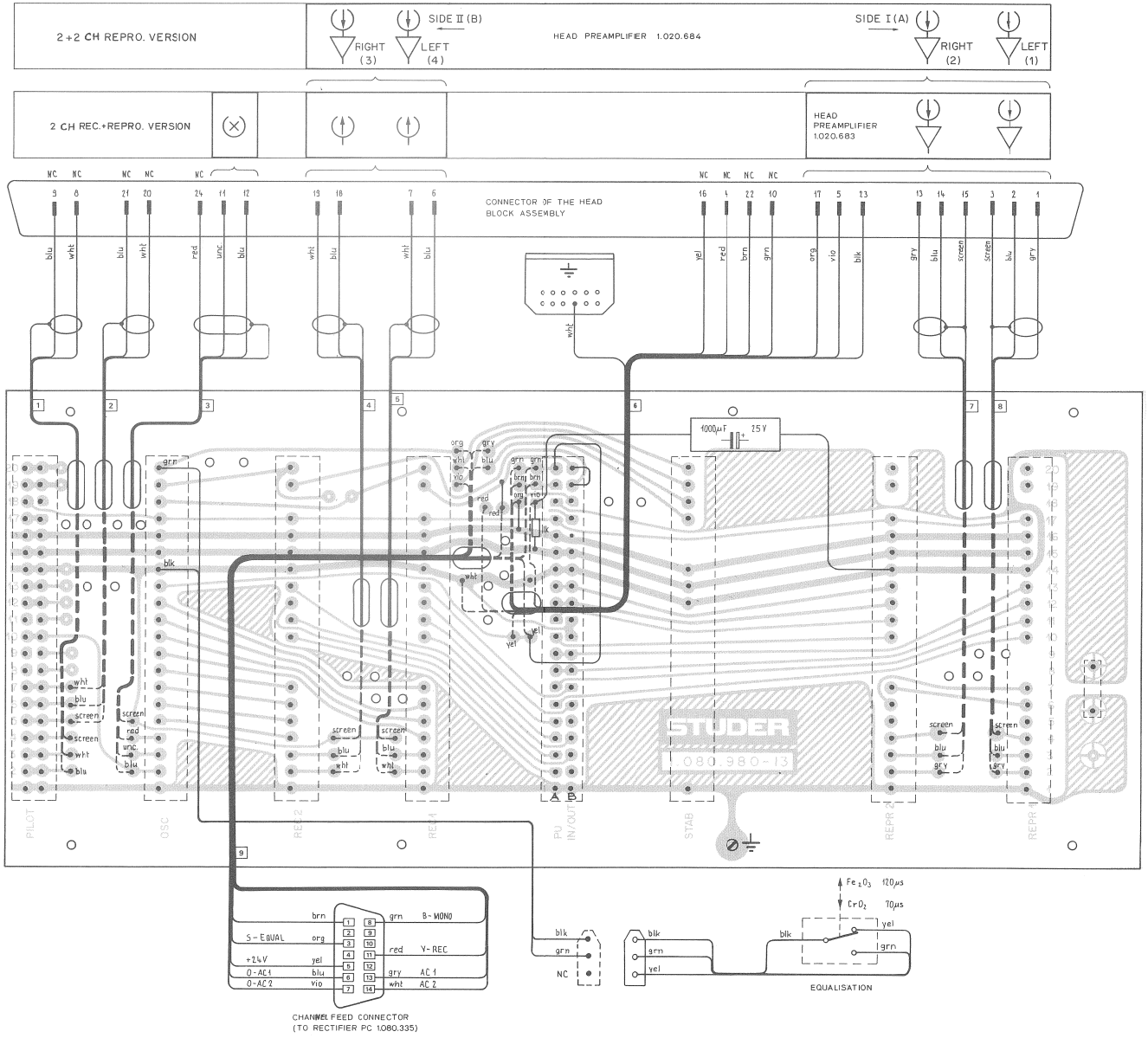
AUDIO BLOCK DIAGRAM 2-CH REC./REPR. VERSION



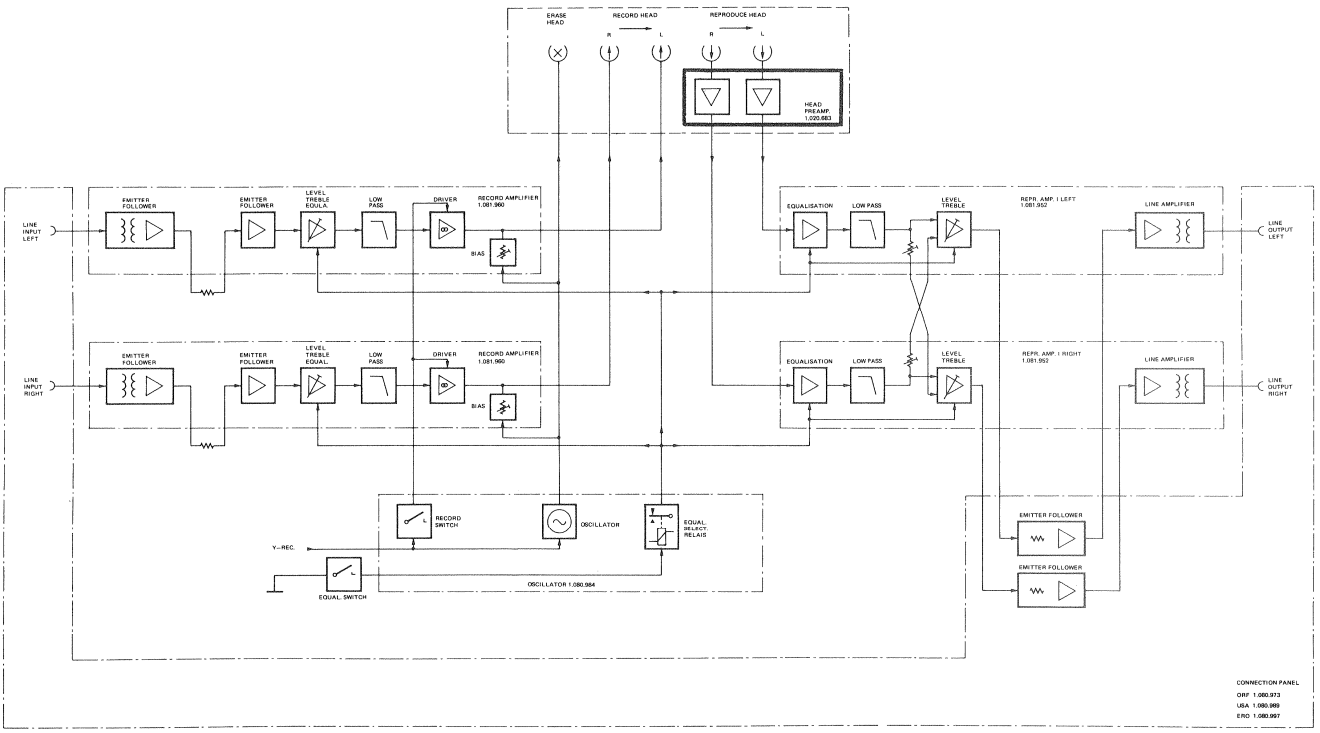
AUDIO BLOCK DIAGRAM 2+2-CH REPR. VERSION



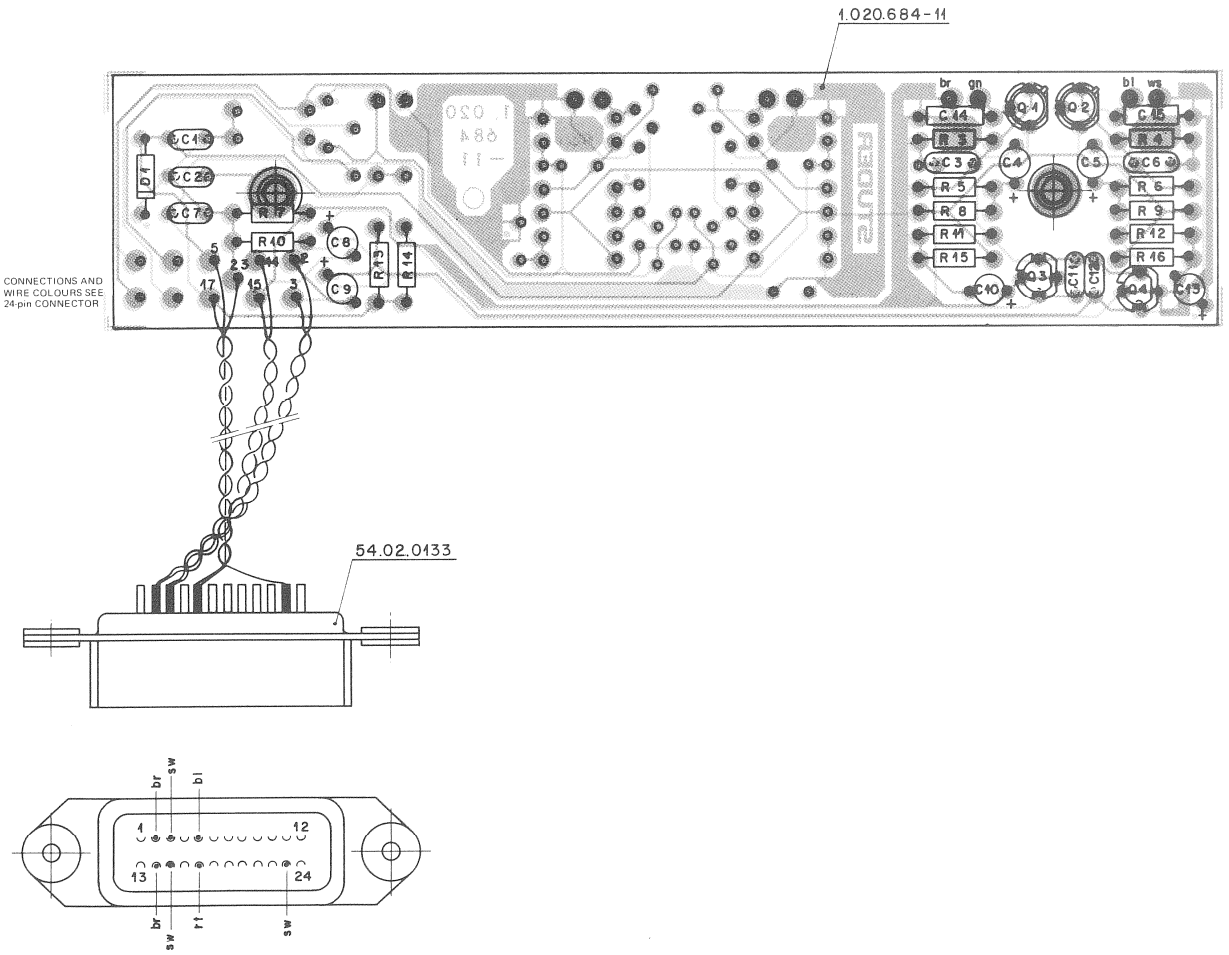
BASIS BOARD UNIT / AUDIO A80 QC 1.081.950-00



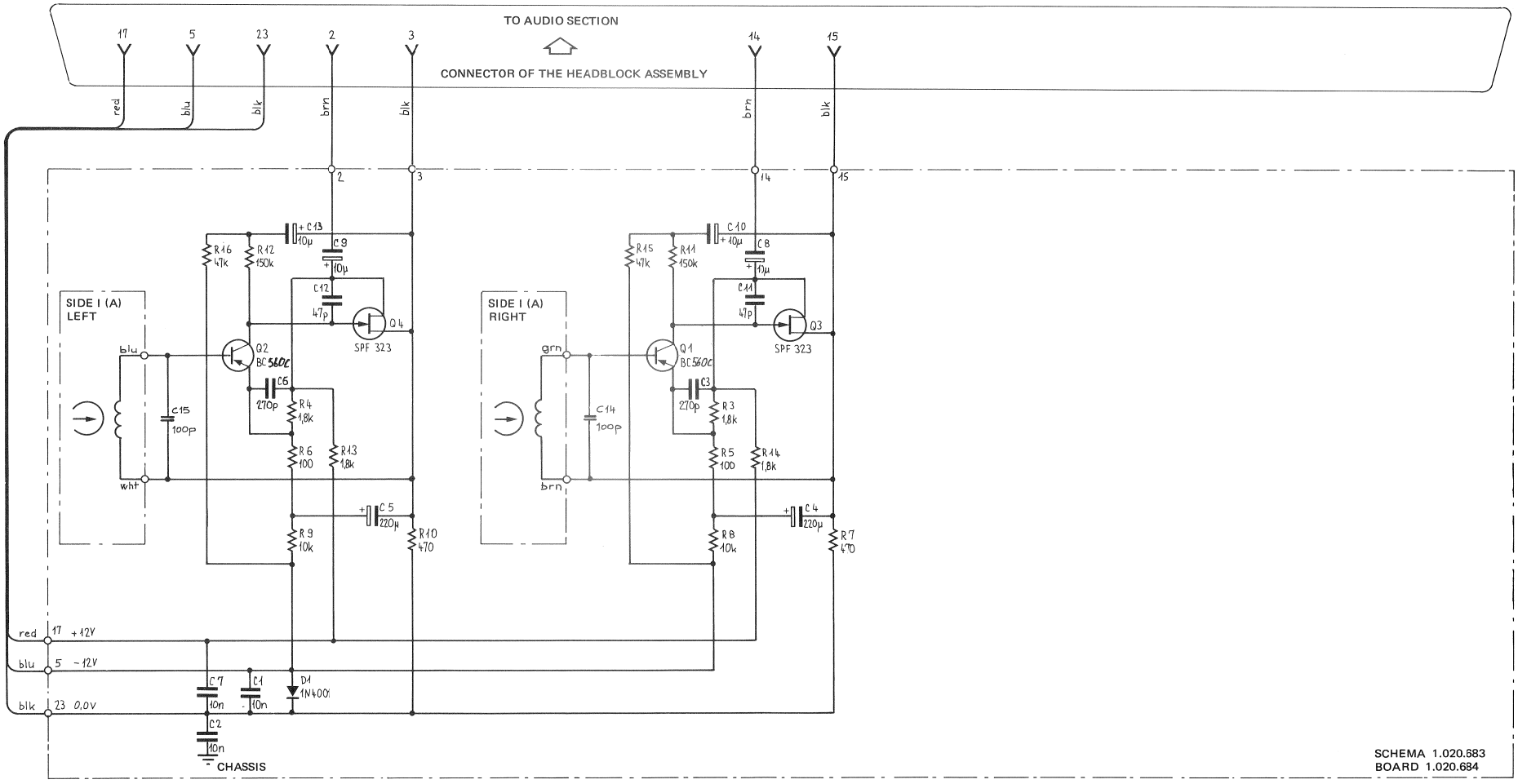
REPRODUCE PREAMPLIFIER 2-CH 1.020.683–00



REPRODUCE PREAMPLIFIER 2-CH 1.020.683–00



REPRODUCE PREAMPLIFIER 2-CH 1.020.683–00



REPRODUCE PREAMPLIFIER 2-CH 1.020.683–00

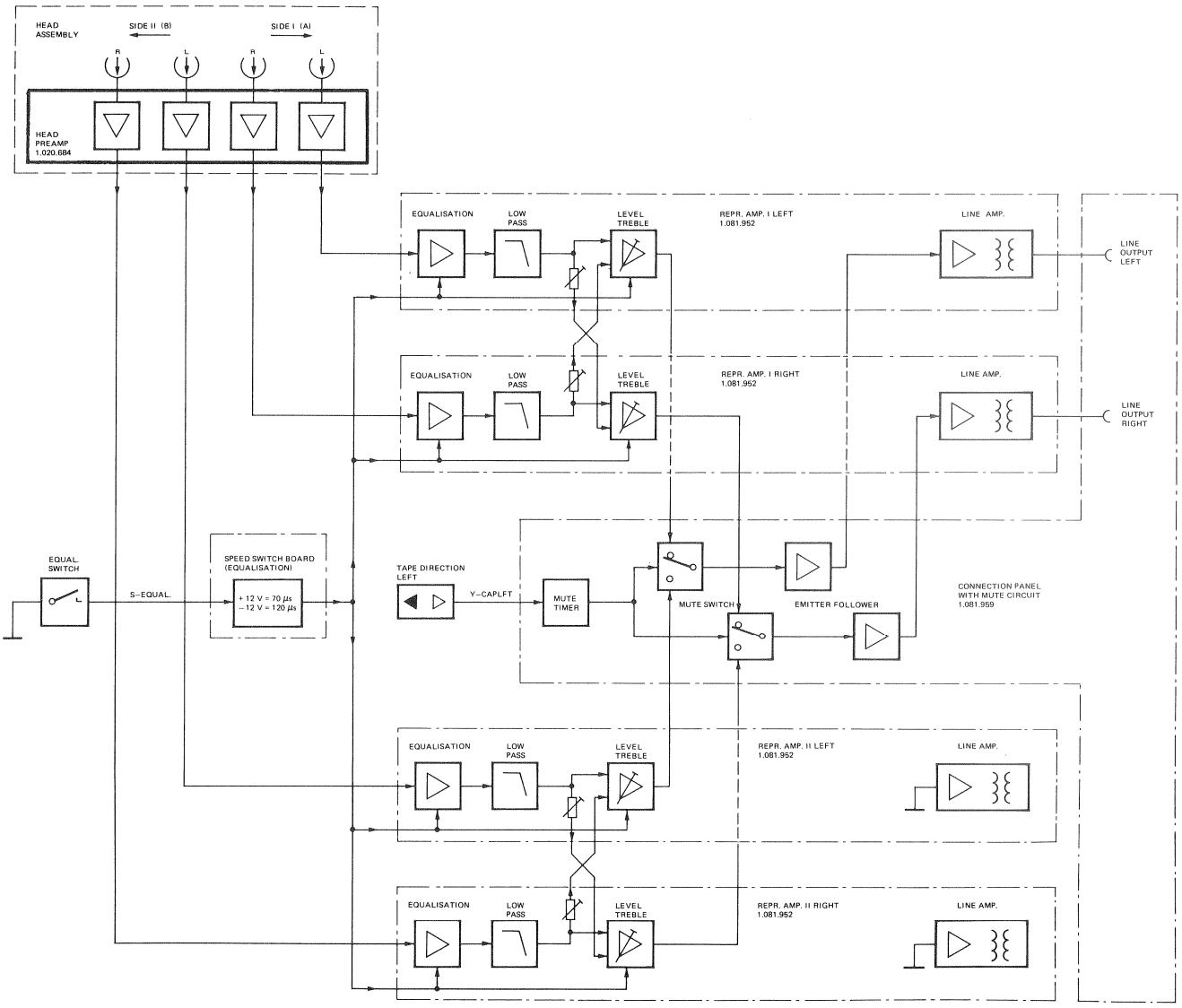
POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
C 1	59.22.3103	10 nF	80% 40V KER		
C 2	59.22.3102	10 nF	80% 40V KER		
C 3	59.34.4271	270 pF	5% N750 KER		
C 4	59.30.1221	220 µF	20% 3V TA		
C 5	59.30.1221	220 µF	20% 3V TA		
C 6	59.34.4271	270 pF	5% N750 KER		
C 7	59.22.3103	10 nF	80% 40V KER		
C 8	59.30.7100	10 µF	20% 25V TA		
C 9	59.30.7100	10 µF	20% 25V TA		
C 10	59.30.7100	10 µF	20% 25V TA		
C 11	59.34.2470	47 pF	5% N150 KER		
C 12	59.34.2470	47 pF	5% N150 KER		
C 13	59.30.7100	10 µF	20% 25V TA		
(1) 014-15	59.08.7101	100 pF	2.5% 63V PP		
D 1	50.04.0122	1N 4004			
(2) Q 1	50.03.0496	BC 560 C			P,S,M
(2) Q 2	50.03.0496	BC 560 C			P,S,M
Q 3	50.03.0442	SPF 523			M
Q 4	50.03.0442	SPF 523			M
(2) (2) R 2	57.41.4182	1.8 k	5% .25W		
R 4	57.41.4182	1.8 k	5% .25W		
R 5	57.41.4101	100	5% .25W		
R 6	57.41.4101	100	5% .25W		
R 7	57.41.4471	470	5% .25W		
R 8	57.41.4103	10 k	5% .25W		
R 9	57.41.4103	10 k	5% .25W		
R 10	57.41.4471	470	5% .25W		
R 11	57.41.4154	150 k	5% .25W		
R 12	57.41.4154	150 k	5% .25W		
R 13	57.41.4182	1.8 k	5% .25W		
R 14	57.41.4182	1.8 k	5% .25W		
R 15	57.41.4473	47 k	5% .25W		
R 16	57.41.4473	47 k	5% .25W		

M = MOTOROLA
P = PHILIPS
S = SIEMENS

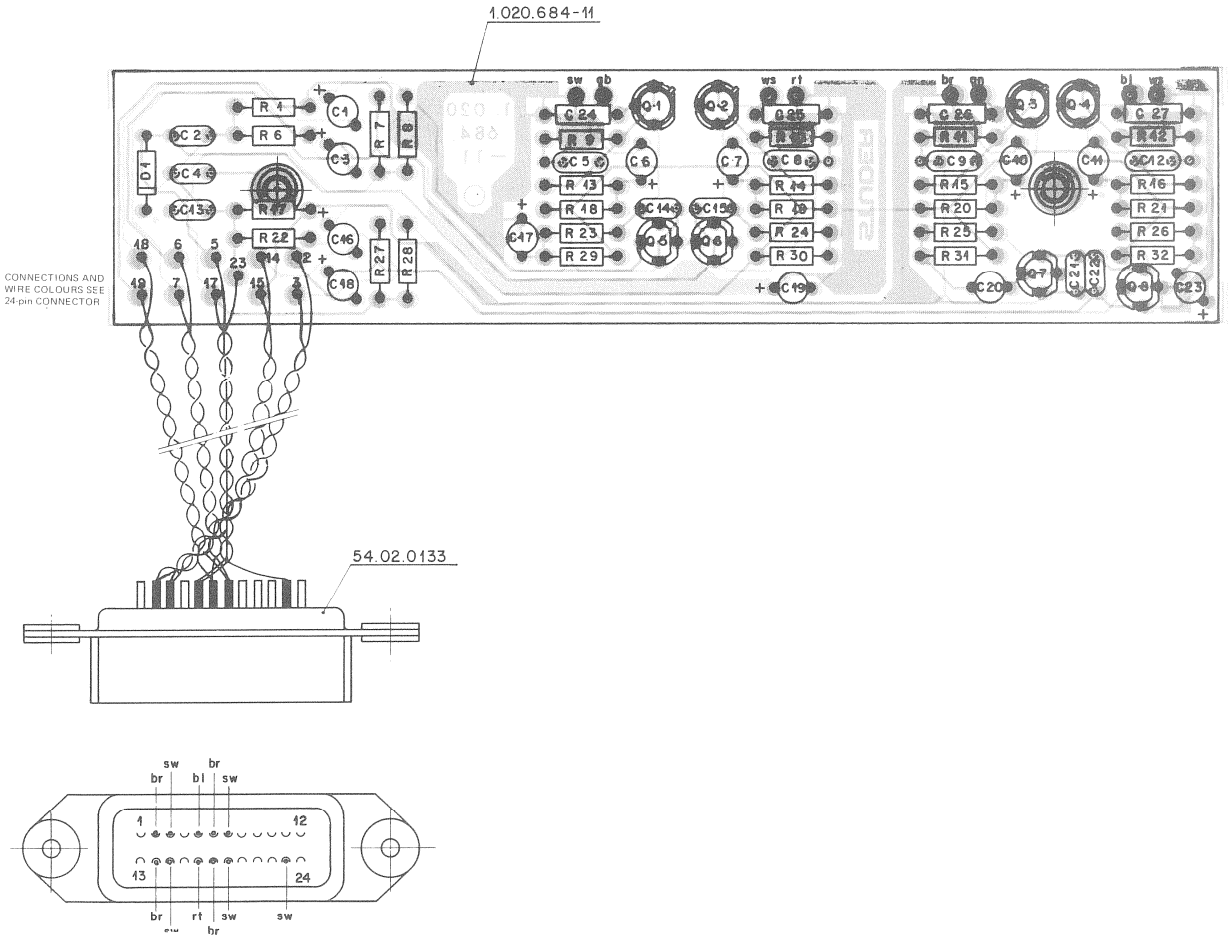
IND	DATE	NAME
⑥		
⑤		
④	9.12.74	Zinkeisen
③	28.9.1976	[illegible]
②	2. JUNI 1977	Zinkeisen

STUDER | Reproduce - Preamplifier, 2 CH | 1.020.683 | PAGE 1 of 1

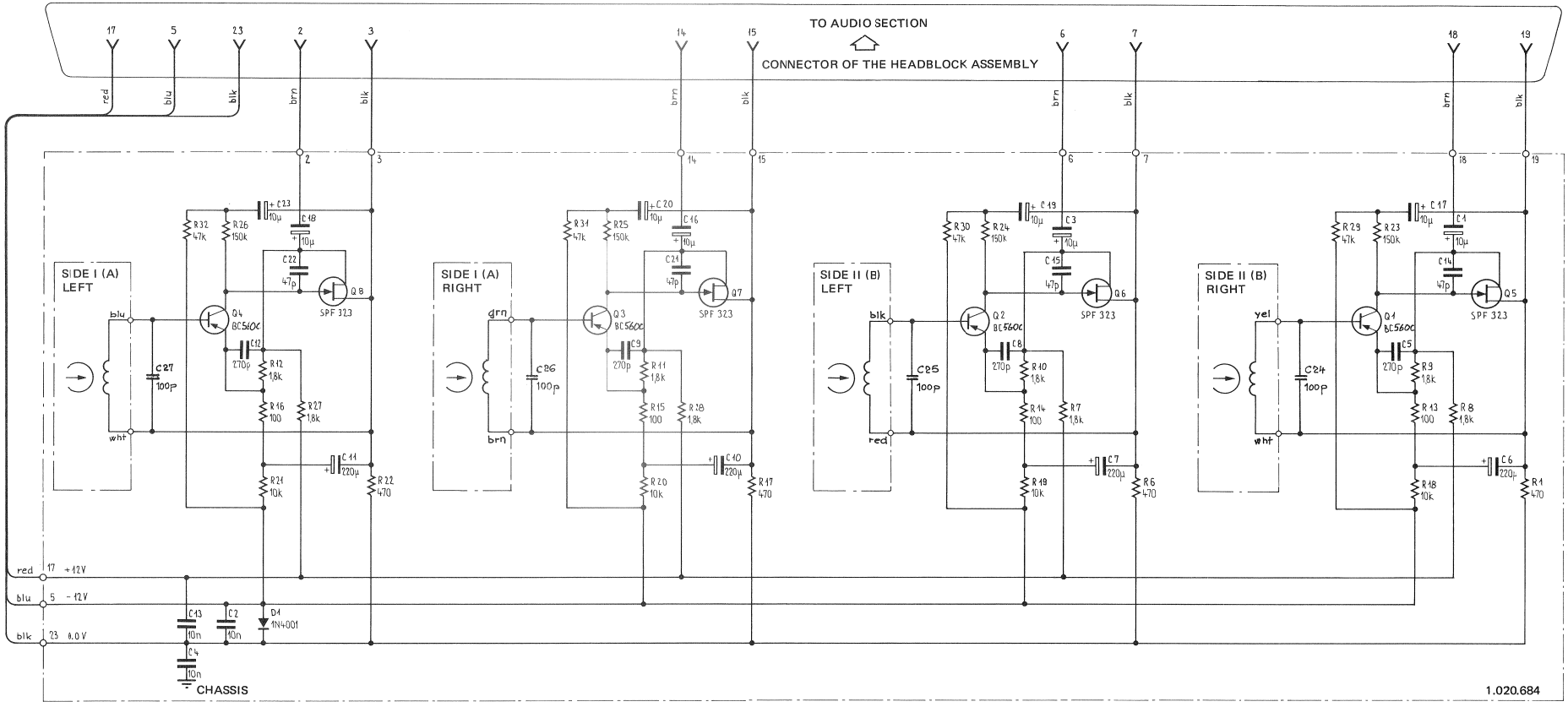
REPRODUCE PREAMPLIFIER 2+2-CH 1.020.684–00



REPRODUCE PREAMPLIFIER 2+2-CH 1.020.684–00



REPRODUCE PREAMPLIFIER 2+2 CH 1.020.684–00



REPRODUCE PREAMPLIFIER 2+2 CH 1.020.684–00

POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
C 1	59.30.7100	10µF	20% 25V TA		
C 2	59.32.3103	10nF	80% 40V KER		
C 3	59.30.7100	10µF	20% 25V TA		
C 4	59.32.3103	10nF	80% 40V KER		
C 5	59.34.4271	270pF	5% N750 KER		
C 6	59.30.7221	220µF	20% 3V TA		
C 7	59.30.7221	220µF	20% 3V TA		
C 8	59.34.4271	270pF	5% N750 KER		
C 9	59.34.4271	270pF	5% N750 KER		
C 10	59.30.7221	220µF	20% 3V TA		
C 11	59.30.7221	220µF	20% 3V TA		
C 12	59.34.4271	270pF	5% N750 KER		
C 13	59.32.3103	10nF	80% 40V KER		
C 14	59.34.2470	47pF	5% N150 KER		
C 15	59.34.2470	47pF	5% N150 KER		
C 16	59.30.7100	10µF	20% 25V TA		
C 17	59.30.7100	10µF	20% 25V TA		
C 18	59.30.7100	10µF	20% 25V TA		
C 19	59.30.7100	10µF	20% 25V TA		
C 20	59.30.7100	10µF	20% 25V TA		
C 21	59.34.2470	47pF	5% N150 KER		
C 22	59.34.2470	47pF	5% N150 KER		
C 23	59.30.7100	10µF	20% 25V TA		
① C 24-27	59.08.7101	100pF	2.5% 63V PP		
D 1	50.04.0122	1N4001			
Q 1	50.03.0496	BC 560 C			P.S.M
② Q 2	50.03.0496	BC 560 C			P.S.M
③ Q 3	50.03.0496	BC 560 C			P.S.M
④ Q 4	50.03.0496	BC 560 C			P.S.M
Q 5	50.03.0442	SPF 323			M
Q 6	50.03.0442	SPF 323			M
Q 7	50.03.0442	SPF 323			M
Q 8	50.03.0442	SPF 323			M
R 1	57.41.4471	470	5% .25W		
① — ①					
R 6	57.41.4471	470	5% .25W		
R 7	57.41.4112	1.8k	5% .25W		
R 8	57.41.4182	1.8k	5% .25W		

M = MOTOROLA
P = PHILIPS
S = SIEMENS

IND	DATE	NAME
⑥		
⑤	4.12.81	Bachmann
④	18.3.1980	Bachmann
③	2. JUNI 1977	Zinkernagel

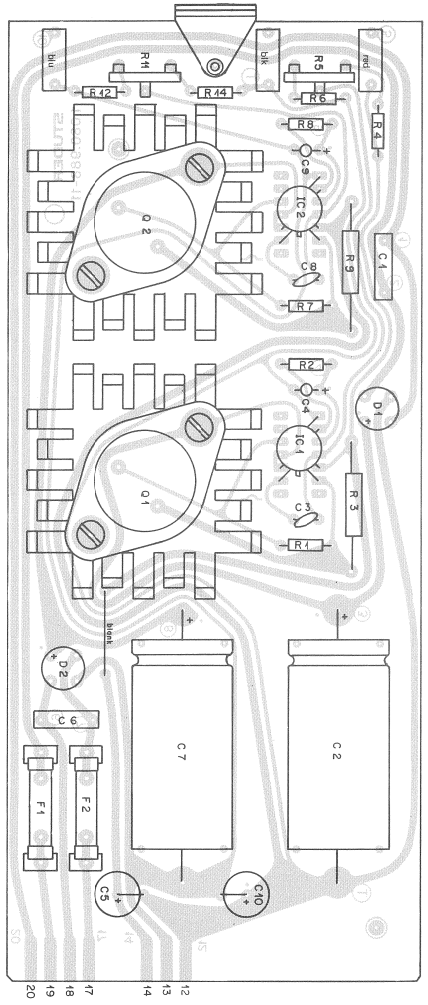
STUDER Reproduce - Preamplifier, 4 CH 1.020.684 PAGE 1 of 2

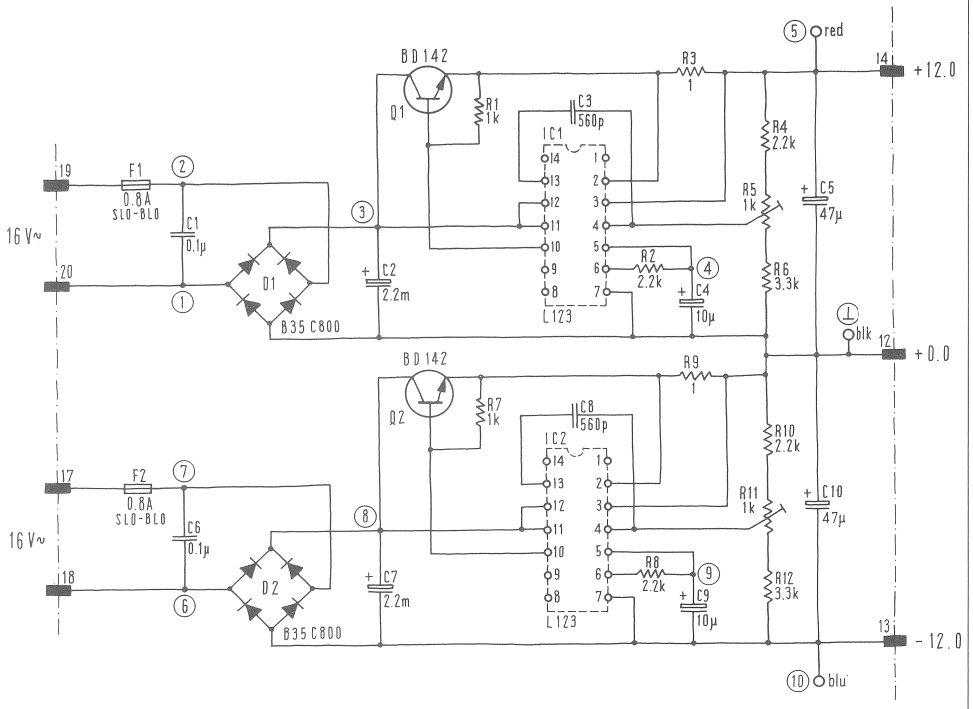
POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
R 9	57.41.4182	1.8k	5% .25W		
R 10	57.41.4182	1.8k	5% .25W		
R 11	57.41.4182	1.8k	5% .25W		
R 12	57.41.4182	1.8k	5% .25W		
R 13	57.41.4101	100	5% .25W		
R 14	57.41.4101	100	5% .25W		
R 15	57.41.4101	100	5% .25W		
R 16	57.41.4101	100	5% .25W		
R 17	57.41.4471	470	5% .25W		
R 18	57.41.4103	10k	5% .25W		
R 19	57.41.4103	10k	5% .25W		
R 20	57.41.4103	10k	5% .25W		
R 21	57.41.4103	10k	5% .25W		
R 22	57.41.4471	470	5% .25W		
R 23	57.41.4154	150k	5% .25W		
R 24	57.41.4154	150k	5% .25W		
R 25	57.41.4154	150k	5% .25W		
R 26	57.41.4154	150k	5% .25W		
R 27	57.41.4182	1.8k	5% .25W		
R 28	57.41.4182	1.8k	5% .25W		
R 29	57.41.4473	47k	5% .25W		
R 30	57.41.4473	47k	5% .25W		
R 31	57.41.4473	47k	5% .25W		
R 32	57.41.4473	47k	5% .25W		

IND	DATE	NAME
⑥		
⑤	4.12.81	Bachmann
④	18.3.1980	Bachmann
③	2. JUNI 1977	Zinkernagel

STUDER Reproduce - Preamplifier, 4 CH 1.020.684 PAGE 2 of 2

STABILIZER (AUDIO) 1.080.988 –00





TEST POINTS	1	2	3	4	5	6	7	8	9	10	
V~	16		—	—	—	16		—	—	—	AC-voltmeter, min. 100 kΩ
V =	—	—	(+22)	+7.3	+12.0	—	—	(+10)	–4.7	–12.0	DC-voltmeter, min. 40 kΩ/V

STABILIZER (AUDIO) 1.080.988–00

	Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
	C 01	59.31.4104	C 0.1 U, 20%, 160 V, MPETP	1	
	C 02	59.25.4222	C 2.2 M, 50%, 25 V, EL	1	
	C 03	59.32.0561	C 560 P, 20%, 500 V, KER	1	
	C 04	59.30.4100	C 10 U, 50%, 16 V, TA	1	
1)	C 05	59.27.4470	C 47 U, 50%, 35 V, EL	1	
	C 06	59.31.4104	C 0.1 U, 20%, 160 V, MPETP	1	
	C 07	59.25.4222	C 2.2 M, 50%, 25 V, EL	1	
	C 08	59.32.0561	C 560 P, 20%, 500 V, KER	1	
	C 09	59.30.4100	C 10 U, 50%, 16 V, TA	1	
1)	C 10	59.27.4470	C 47 U, 50%, 35 V, EL	1	
	D 01	70.01.0222	D B 35 C 800, SI	1	
	D 02	70.01.0222	D B 35 C 800, SI	1	
	F 01	51.01.0116	F 800 M, 5 x 20, T	1	
	F 02	51.01.0116	F 800 M, 5 x 20, T	1	
	IC 01	50.05.0119	IC VA 723, TO 100, LIN	1	
	IC 02	50.05.0119	IC VA 723, TO 100, LIN	1	
	Q 01	50.03.0475	Q BD 142-5L, NPN	1	
	Q 02	50.03.0475	Q BD 142-5L, NPN	1	
	R 01	57.41.4102	R 1.0 K, 5%, .12 W, CSCH	1	
	R 02	57.41.4222	R 2.2 K, 5%, .12 W, CSCH	1	

Aenderungen ① 19.3.73 ② 2.11.83 ③ ④ ⑤

STUDER REGENSDORF ZÜRICH — **Positionsliste** — Stabilizer

Erstellt: 16.8.72 Bz
Geprüft: 21.8.72 RZ
Blatt: 1 Blätter: 2

Kopie für: Ersatz für: Ersetzt durch:

1.080.988.00

	Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
2)	R 03	57.56.5109	R 1.0 , 10%, 1 W, DR	1	
	R 04	57.41.4222	R 2.2 K, 5%, .12 W, CSCH	1	
	R 05	58.19.0102	R 1.0 K, 20%, .15 W, PCSCH	1	
	R 06	57.41.4332	R 3.3 K, 5%, .12 W, CSCH	1	
	R 07	57.41.4102	R 1.0 K, 5%, .12 W, CSCH	1	
	R 08	57.41.4222	R 2.2 K, 5%, .12 W, CSCH	1	
2)	R 09	57.56.5109	R 1.0 , 10%, 1 W, DR	1	
	R 10	57.41.4222	R 2.2 K, 5%, .12 W, CSCH	1	
	R 11	58.19.0102	R 1.0 K, 20%, .15 W, PCSCH	1	
	R 12	57.41.4332	R 3.3 K, 5%, .12 W, CSCH	1	

Aenderungen ① 19.3.73 ② 2.11.83 ③ ④ ⑤

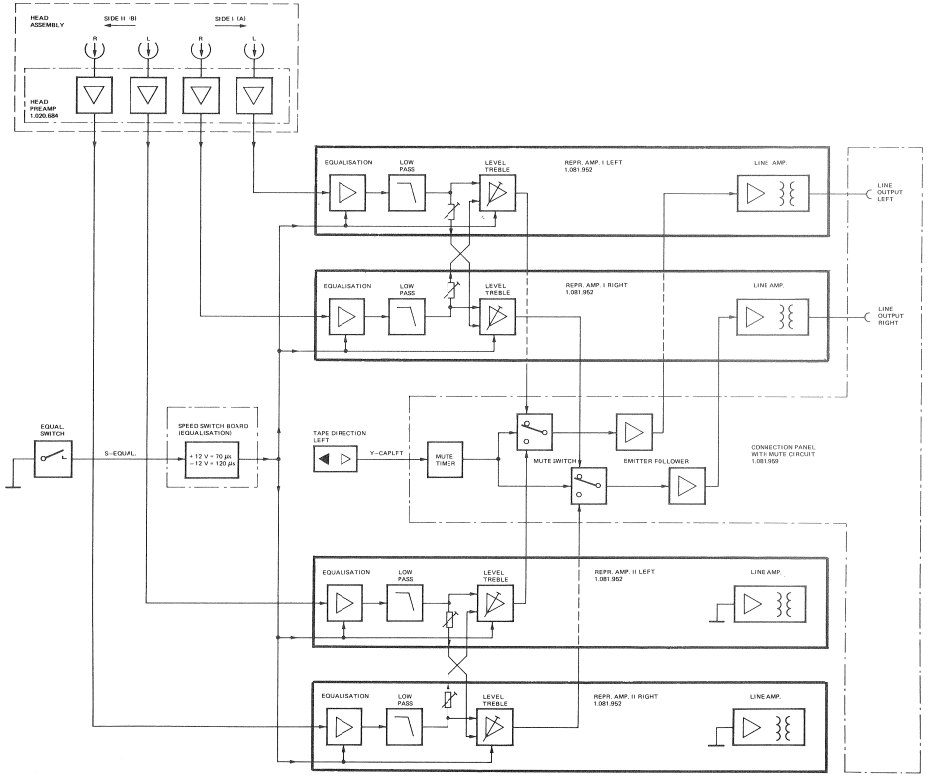
STUDER REGENSDORF ZÜRICH — **Positionsliste** — Stabilizer

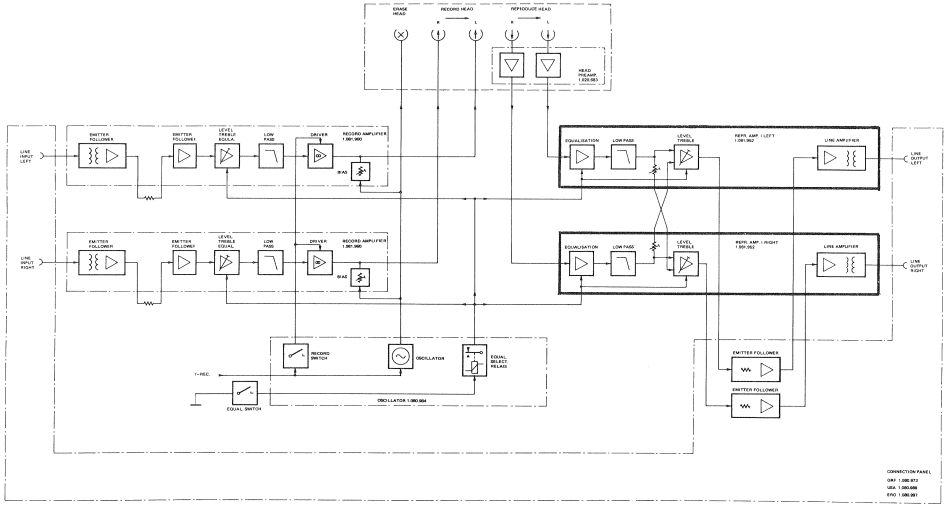
Erstellt: 16.8.72 Bz
Geprüft: 21.8.72 RZ
Blatt: 2 Blätter: 2

Kopie für: Ersatz für: Ersetzt durch:

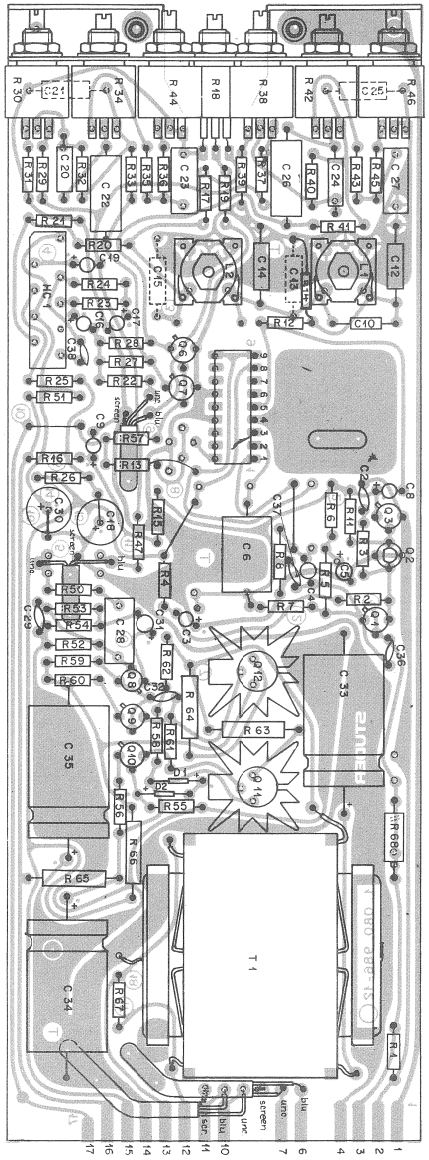
1.080.988.00

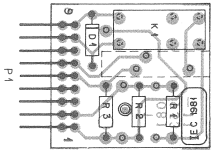
REPRODUCE AMPLIFIER 1.081.952-81





REPRODUCE AMPLIFIER 1.081.952-81



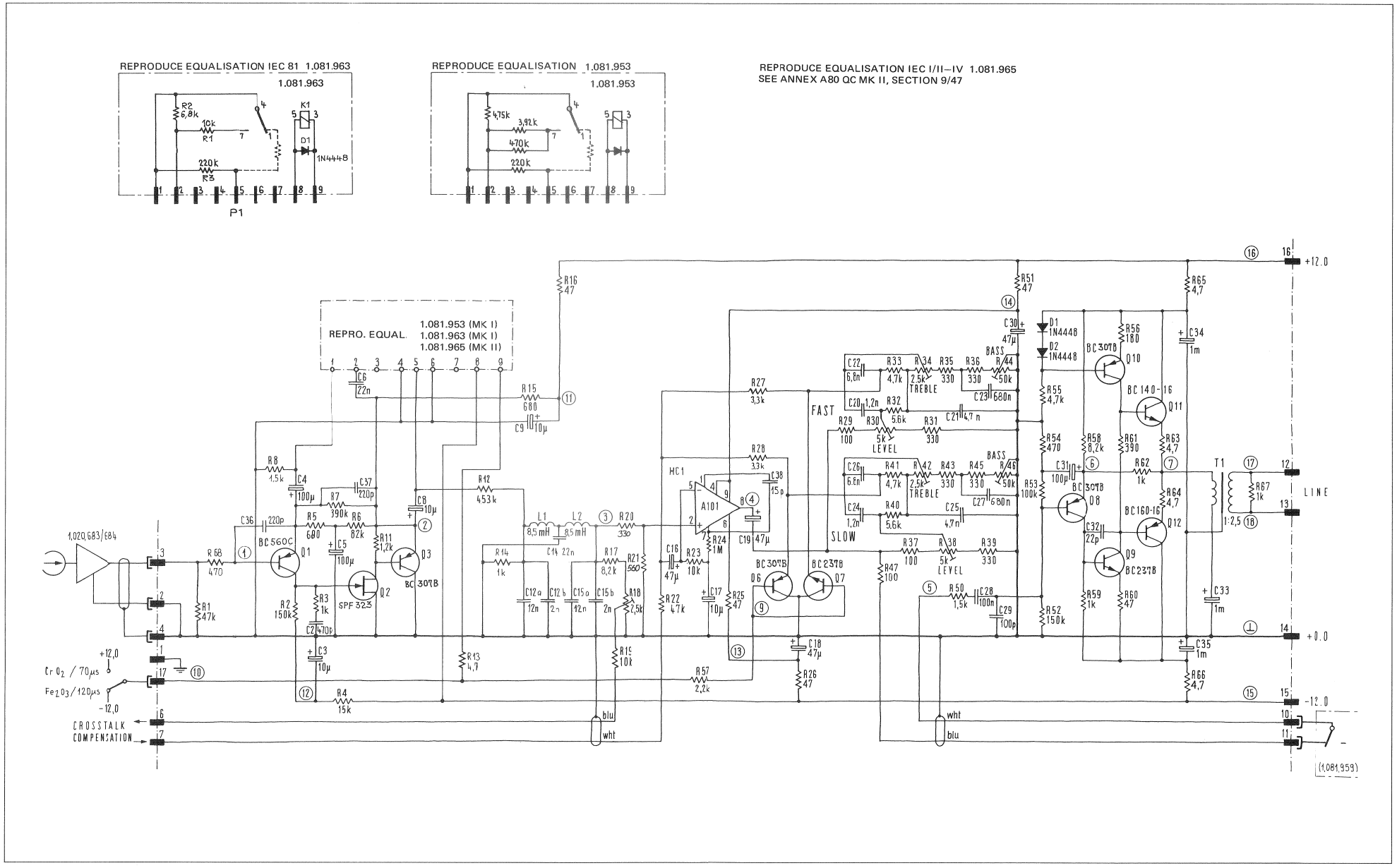


INC.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	D.....1	50.04.0125	1 N 4448		
	K.....1	56.02.1001		National RSD Z4 V	
	P.....1	54.01.0220	9 cont.	AMP Nr. 163.740-7	
	R.....1	57.11.4103	10 kOhm	5%	
	R.....2	57.11.4682	6.8 kOhm	5%	
	R.....3	57.11.4224	220 kOhm	5%	

ORIG 83/02/23

S T U D E R 83/02/23 GAE REPRO. EQUAL. QC, IEC 1981 1.081.963.00 PAGE 1

REPRODUCE AMPLIFIER 1.081.952-81 **REPRODUCE EQUALISATION 1.081.953/963**



REPRODUCE AMPLIFIER 1.081.952–81

POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
C 1	59.32.1471	470pF	20% 25V KER		
C 2	59.30.4100	10µF	50% 16V TA		
C 3	59.30.1101	100µF	50% 6V TA		
C 4	59.30.1101	100µF	50% 6V TA		
C 5	59.08.7223	22nF	1% 63V PS		
C 7					
C 8	59.30.4100	10µF	50% 16V TA		
C 9	59.30.4100	10µF	50% 16V TA		
③ C 12	59.12.7123	12nF	5% 63V PS		
C 13	59.12.7202	2nF	1% 63V PS		
C 14	59.08.7223	22nF	2.5% 63V PS		
C 15	59.12.7123	12nF	1% 63V PS		
① C 16	59.12.7202	2nF	1% 63V PS		
C 18	59.30.1470	47µF	50% 6V TA		
C 19	59.30.4100	10µF	50% 16V TA		
C 20	59.27.1470	47µF	50% 25V EL		
C 19	59.30.1470	47µF	50% 3V TA		
C 23	59.04.7122	1.2nF	5% 63V PS		
C 24	59.04.7472	4.7nF	5% 63V PS		
C 12	59.06.7622	6.8nF	5% 63V PS		
C 22	59.02.0684	680nF	5% 63V HDC		
C 24	59.04.7122	1.2nF	5% 63V PS		
C 25	59.04.7472	4.7nF	5% 63V PS		
C 26	59.06.7622	6.8nF	5% 63V PS		
C 27	59.02.0684	680nF	5% 63V HDC		
C 28	59.21.4106	100µF	2% 40V HDC		
② C 29	59.32.0101	100pF	20% 500V KER		
C 30	59.27.1470	47µF	20% 25V EL		
C 31	59.30.1101	100µF	50% 3V TA		
C 32	59.12.0220	22pF	20% 500V KER		
C 33	59.25.4102	1000µF	50% 16V EL		
C 34	59.25.4102	1000µF	50% 16V EL		
C 35	59.25.4102	1000µF	50% 16V EL		
C 36	59.12.0221	220pF	20% 500V KER		
C 37	59.12.0221	220pF	20% 500V KER		
C 38	59.12.1150	15pF	2% NPO KER		
D 1	50.04.0125	1N4148		SI	
D 2	50.04.0125	1N4148		SI	

IND	DATE	NAME	IND	DATE	NAME
			⑥	19.7.79	GA
			⑤	13.12.78	KR
			④	4.4.78	
			③	1. JUN. 1977	
			②	6. MAI. 1977	
⑤	3.12.81	GA			

STUDER Reproduce Amplifier 1.081.952-81 PAGE 1 of 3

POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
① ② R 22	57.11.1102	1.0k	5% .25W		
R 24	57.11.4105	4M	5% .25W		
R 25	57.11.4470	47	5% .25W		
R 27	57.11.4332	3.3k	5% .25W		
R 28	57.11.4152	1.5k	5% .25W		
R 29	57.11.4101	100	5% .25W		
R 30	58.32.3103	5k	-log. 10% Typ W		AB
R 31	57.11.4221	220	5% .25W		
R 32	57.11.4562	5.6k	5% .25W		
R 33	57.11.4472	4.7k	5% .25W		
R 34	58.32.2252	2.5k	lin. 10% Typ W		AB
R 35	57.11.4221	220	5% .25W		
R 36	57.11.4221	220	5% .25W		
R 37	57.11.4101	100	5% .25W		
R 38	58.32.3103	5k	-log. 10% Typ W		AB
R 39	57.11.4221	220	5% .25W		
R 40	57.11.4562	5.6k	5% .25W		
R 41	57.11.4472	4.7k	5% .25W		
R 42	58.32.2252	2.5k	lin. 10% Typ W		AB
R 43	57.11.4221	220	5% .25W		
R 44	58.32.3201	500	lin. 10% Typ W		AB
R 45	57.11.4221	220	5% .25W		
R 46	58.32.3201	500	lin. 10% Typ W		AB
R 47	57.11.4101	100	5% .25W		
R 48					
R 49					
R 50	57.11.4153	15k	5% .25W		
R 51	57.11.4470	47	5% .25W		
R 52	57.11.4154	150k	5% .25W		
R 53	57.11.4104	100k	5% .25W		
R 54	57.11.4474	470k	5% .25W		
R 55	57.12.4479	4.7	5% .25W		
R 56	57.11.4221	220	5% .25W		
R 57	57.11.4222	2.2k	5% .25W		
R 58	57.11.4222	2.2k	5% .25W		
R 59	57.11.4104	1k	5% .25W		
R 60	57.11.4470	47	5% .25W		
R 61	57.11.4221	220	5% .25W		
R 62	57.11.4104	1k	5% .25W		
R 63	57.12.4479	4.7	5% .25W		
R 64	57.12.4479	4.7	5% .25W		
R 65	57.12.4479	4.7	5% .25W		
R 66	57.12.4479	4.7	5% .25W		
R 67	57.11.4472	4.7k	5% .25W		
R 68	57.12.4479	4.7	5% .25W		

IND	DATE	NAME	IND	DATE	NAME
			⑥	19.7.79	GA
			⑤	13.12.78	KR
			④	4.4.78	
			③	1. JUN. 1977	
			②	6. MAI. 1977	
		AB-ALLEN BRADLEY			
④	2.7.79	GA			

STUDER Reproduce Amplifier 1.081.952-81 PAGE 2 of 3

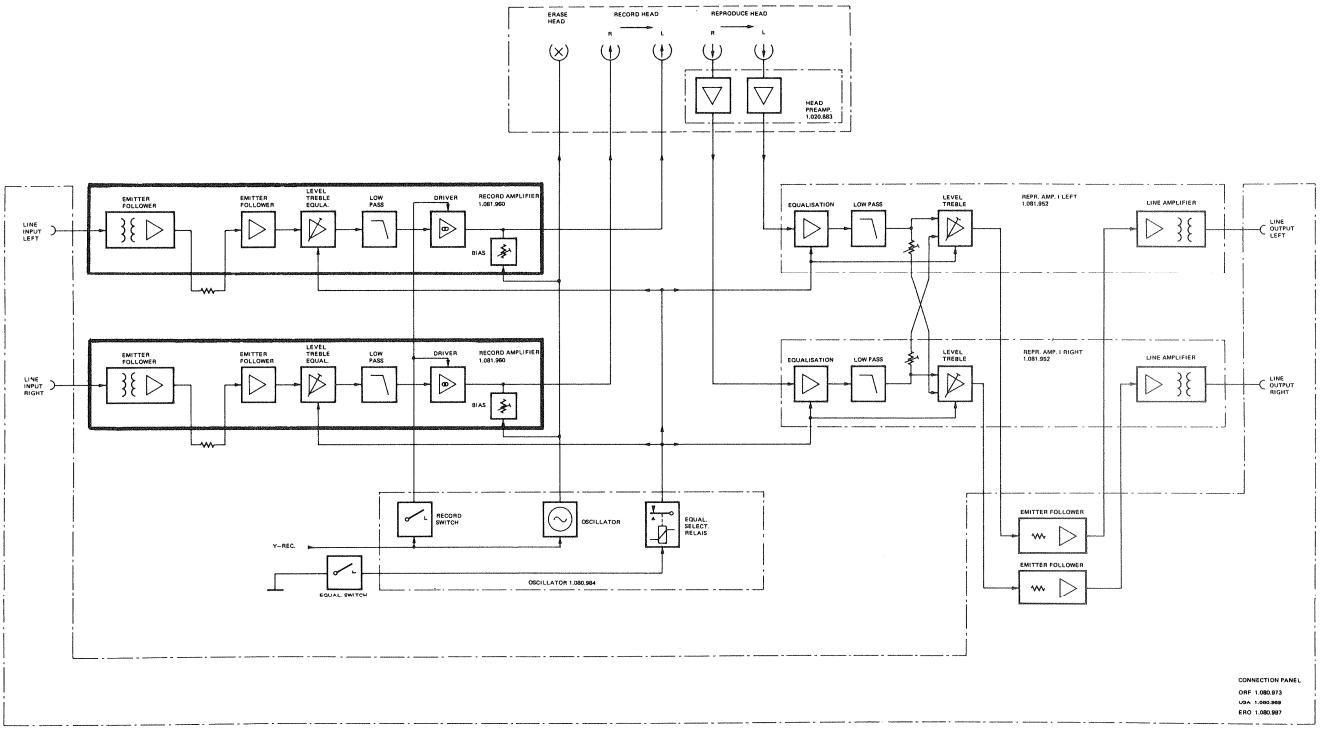
POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
4C 1	1.040.401.50	4.101			ST
L 1	1.022.128	9 mH			ST
L 2	1.022.128	9 mH			ST
⑤ Q 1	50.03.0496	BC 560 C	PNP		P,SM
Q 2	50.02.0448	SPF 129	NDFET		M
⑤ Q 3	50.03.0515	BC 307 B	PNP		P,S,M
Q 4					
Q 5					
⑤ Q 6	50.02.0515	BC 307 B	PNP		P,S,M
⑤ Q 7	50.02.0426	BC 237 B	NPN		P,S,M
⑤ Q 8	50.02.0515	BC 307 B	PNP		P,S,M
⑤ Q 9	50.02.0426	BC 237 B	NPN		P,S,M
⑤ Q 10	50.03.0515	BC 307 B	PNP		P,S,M
Q 11	50.02.0516	BC 140-16	NPN		I
Q 12	50.02.0515	BC 160-16	PNP		I
R 1	57.11.4472	4.7k	5% .25W		
R 2	57.11.4153	150k	5% .25W		
R 3	57.11.1122	1k	5% .25W		
R 4	57.11.4153	15k	5% .25W		
④ R 5	57.11.4681	680	5% .25W		
R 6	57.11.4223	22k	5% .25W		
R 7	57.11.1224	220k	5% .25W		
R 8	57.29.9201	9.1k	1% .25W		
R 9					
R 10					
R 11	57.11.4122	1.2k	5% .25W		
① R 12	57.31.4631	463Ω	1% .25W	MF	
R 13	57.12.4473	47k	5% .25W		
③ R 14	57.31.1001	1k	1% .25W	MF	
R 15	57.11.4681	680	5% .25W		
R 16	57.11.4479	47	5% .25W		
① R 17	57.11.4112	8.2k	5% .25W		
R 18	58.32.2252	2.5k	lin. 10% Typ W		AB
R 19	57.11.4103	10k	5% .25W		
① R 20	57.11.4303	330	5% .25W		
④ ① R 21	57.31.3560	560	1% .25W	MF	
② R 22	57.11.4473	47k	5% .25W		

D = PHILIPS ST = STUDER
I = SIEMENS AB = ALLEN BRADLEY
M = MOTOROLA

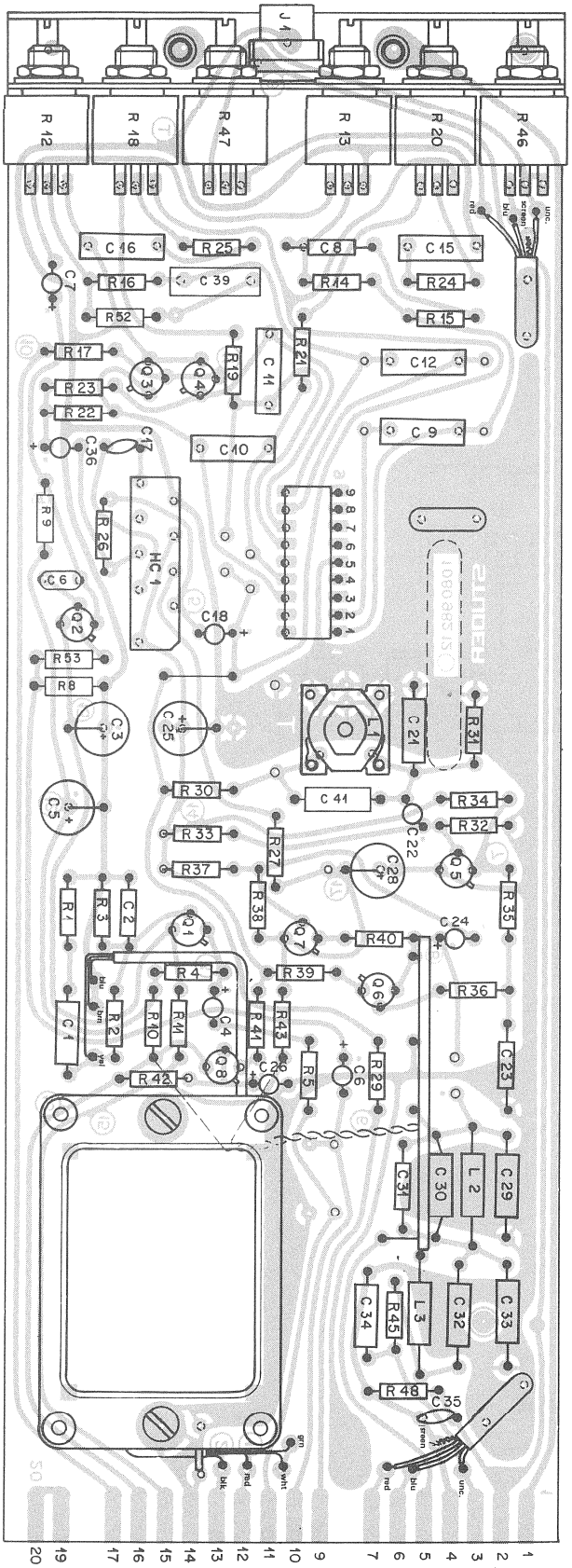
IND	DATE	NAME	IND	DATE	NAME
			⑥	19.7.79	GA
			⑤	13.12.78	KR
			④	4.4.78	
			③	1. JUN. 1977	
			②	6. MAI. 1977	
⑤	3.12.81	GA			

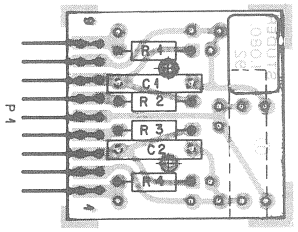
STUDER Reproduce Amplifier 1.081.952-81 PAGE 3 of 3

RECORD AMPLIFIER 1.081.960



RECORD AMPLIFIER 1.081.960–00/960–81





IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	C.....1	59.11.3682	6.8 nF		
	C.....2	59.11.6102	1 nF	PC	
	P.....1	54.01.0220	9 cont.	AMP Nr. 163.740-7	
	R.....1	57.11.4392	3.9 kOhm	5%	
	R.....2	57.11.4333	33 kOhm	5%	
	R.....3	57.11.4104	100 kOhm	5%	
	R.....4	57.11.4103	10 kOhm	5%	

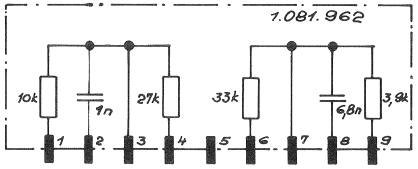
ORIG 83/02/23

S T U D E R 83/02/23 GAE REC. EQUAL. QC, IEC 1981 1.081.962.00 PAGE 1

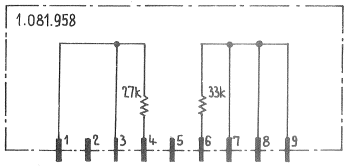
RECORD AMPLIFIER 1.081.960–00/–81 **RECORD EQUALISATION 1.081.958/962**

VERSION 1.081.960–00 : C8 = 4,7n

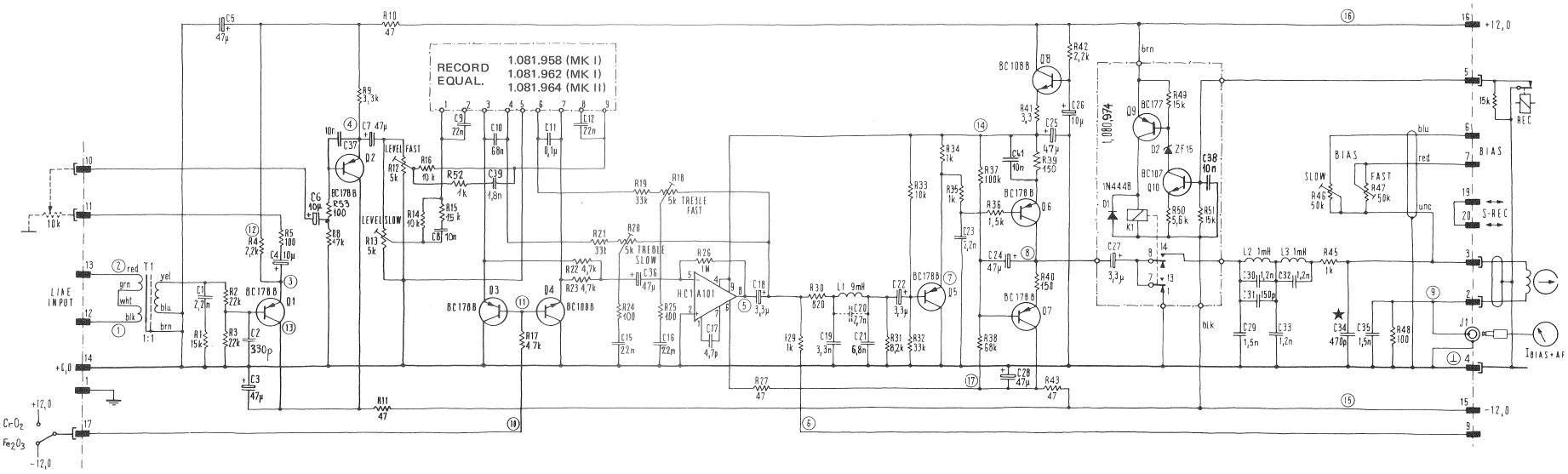
RECORD EQUALISATION IEC 81 1.081.962



RECORD EQUALISATION 1.081.958



RECORD EQUALISATION IEC I/II–IV 1.081.964
SEE ANNEX A80 QC MK II, SECTION 9/48



Inpu: 1500 mV, 1 kHz Position "FAST"

TEST POINTS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
mV ~	1500		750	225	430	340	270	820	70	—	—	—	—	—	—	—	—	AC-voltmeter, min. 100 kΩ
V =	—		+ 0.8	+ 1	−0.5	—	+9.2	−0.5	—	−12	−0.7	+11.6	−11.6	+11.2	−12	+12	−11.6	DC-voltmeter, min. 40 kΩ/V

★ IN CASE OF MONO RECORDING HEAD 1.317.110 AND THE TAPE TYPE IEC IV, C34 IS NOT EQUIPED.

RECORD AMPLFIEIR 1.081.960–00/–81

IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	C 01	59.04.7222	2,2 nF		
	C 02	59.11.6331	330 pF		
	C 03	59.27.4470	47 µF	16V	
	C 04	59.30.4100	10 µF	16V	
	C 05	59.27.4470	47 µF	16V	
	C 06	59.30.4100	10 µF		
	C 07	59.30.1470	47 µF		
1	C 08	59.11.3103	10 nF	See note 1	
	C 09	59.12.2223	22 nF		
	C 10	59.31.6683	68 nF		
	C 11	59.31.9104	100 nF		
	C 12	59.12.2223	22 nF		
	C 13				
	C 14				
	C 15	59.12.2223	22 nF	5%	
	C 16	59.12.2223	22 nF	5%	
	C 17	59.34.0479	4,7 pF		
	C 18	59.30.6339	3,3 µF		
	C 19				
	C 20				
	C 21	59.12.7682	6,8 nF		
	C 22	59.30.6339	3,3 µF		
	C 23	59.04.7222	2,2 nF		
	C 24	59.30.1470	47 µF		
	C 25	59.27.4470	47 µF	16V	
	C 26	59.30.4100	10 µF	16V	
	C 27	59.30.6339	3,3 µF	35V Board 1.080.974	
	C 28	59.27.4470	47 µF	16V	
	C 29	59.04.8152	1,5 nF		
	C 30	59.04.7122	1,2 nF		

IND	DATE	NAME
4		
3		
2		
1	22.2.83	GÄ (81)
0	23.10.78	R.G /gv

Note 1: New standard for equalization IEC II (Praque) 1981: 10nF
Value for equalization 70µs CrO_2:4,7nF
59.11.4472

STUDER | Record Amplifier QC | 1.081.960.81 | PAGE 1 OF 4

IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	C 31	59.04.8151	150 pF		
	C 32	59.04.8122	1,2 nF		
	C 33	59.04.8122	1,2 nF		
	C 34	59.04.7471	470 pF		
	C 35	59.32.1152	1,5 nF		
	C 36	59.30.1470	47 µF		
	C 37	59.32.3103	10 nF		
	C 38	59.32.3103	10 nF	Board 1.080.974	
	C 39	59.11.6182	1,8 nF		
	C 40				
	C 41	59.12.7103	10 nF		
	D 01	50.04.0125	1N4448	Board 1.080.974	
	D 02	50.04.1119	ZP 15	Board 1.080.974	
	HC 01	1.010.101.50	A 101		
	K 01	56.02.1002	Reed	24V Board 1.080.974	
	L 01	1.022.128.00	9 mH		
	L 02	62.01.0114	1 mH	5%	
	L 03	62.01.0114	1 mH	5%	
	Q 01	50.03.0306	BC178B	PNP	
	Q 02	50.03.0306	BC178B	PNP	
	Q 03	50.03.0306	BC178B	PNP	
	Q 04	50.03.0409	BC108B	NPN	
	Q 05	50.03.0306	BC178B	PNP	
	Q 06	50.03.0306	BC178B	PNP	

IND	DATE	NAME
4		
3		
2		
1	22.2.83	GÄ (81)
0	23.10.78	R.G /gv

STUDER | Record Amplifier QC | 1.081.960.81 | PAGE 2 OF 4

IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	Q 07	50.03.0306	BC178B	PNP	
	Q 08	50.03.0409	BC108B	NPN	
	Q 09	50.03.0307	BC177A	Board 1.080.974 PNP	
	Q 10	50.03.0428	BC107A	Board 1.080.974 NPN	
	R 01	57.41.4153	15 k	5% .25W	
	R 02	57.41.4223	22 k		
	R 03	57.41.4223	22 k		
	R 04	57.41.4222	2,2 k		
	R 05	57.41.4101	100		
	R 06				
	R 07				
	R 08	57.41.4473	47 k		
	R 09	57.41.4332	3,3 k		
	R 10	57.41.4470	47		
	R 11	57.41.4470	47		
	R 12	58.03.1502	5 k	10% log.	
	R 13	58.03.1502	5 k	log.	
	R 14	57.41.4103	10 k	5% .25W	
	R 15	57.41.4153	15 k		
	R 16	57.41.4103	10 k		
	R 17	57.41.4472	4,7 k		
	R 18	58.03.0502	5 k	10% lin.	
	R 19	57.41.4333	33 k	5% .25W	
	R 20	58.03.0502	5 k	10% lin.	
	R 21	57.41.4333	33 k	5% .25W	
	R 22	57.41.4472	4,7 k		
	R 23	57.41.4472	4,7 k		
	R 24	57.41.4101	100		

IND	DATE	NAME
4		
3		
2		
1	22.2.83	GÄ (81)
0	23.10.78	R.G /gv

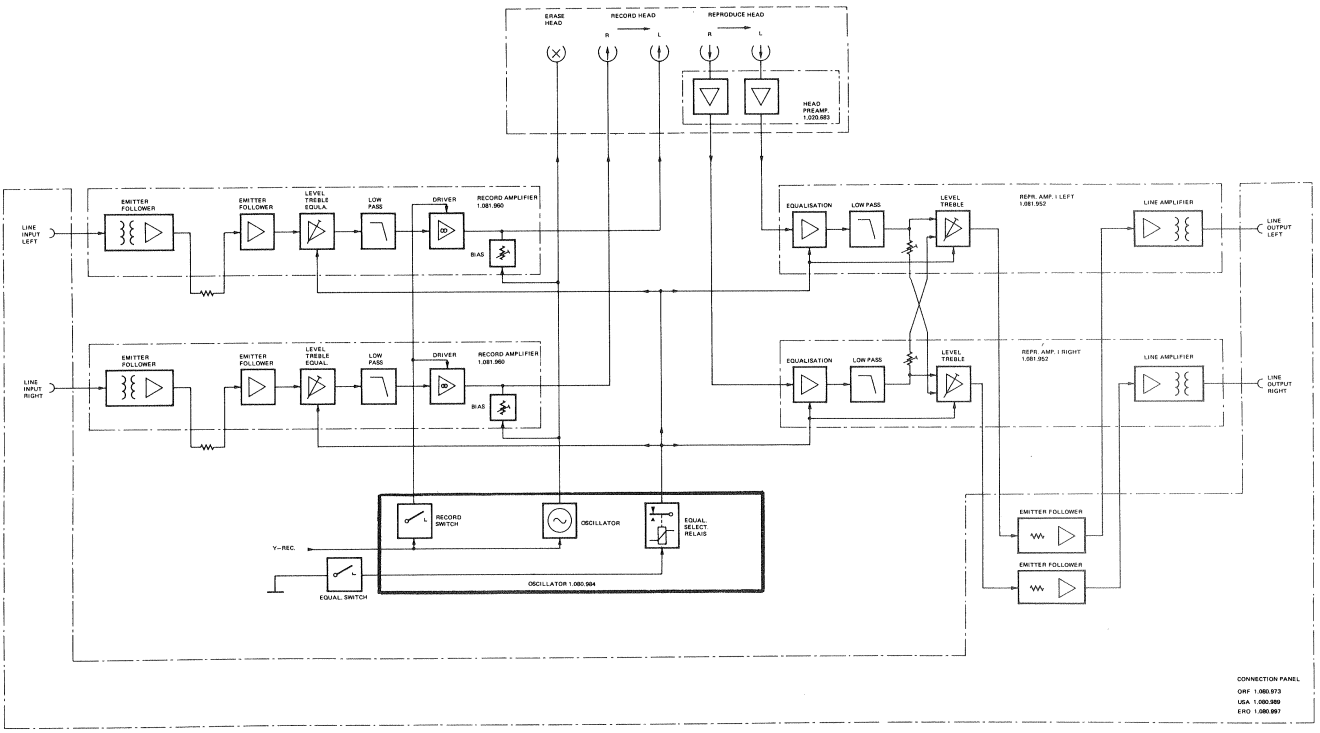
STUDER | Record Amplifier QC | 1.081.960.81 | PAGE 3 OF 4

IND	POS NO	PART NC	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	R 25	57.41.4101	100	5% .25W	
	R 26	57.41.4105	1 M		
	R 27	57.41.4470	47		
	R 28				
	R 29	57.41.4102	1 k		
	R 30	57.41.4821	820		
	R 31	57.41.4822	8,2 k		
	R 32	57.41.4333	33 k		
	R 33	57.41.4103	10 k		
	R 34	57.41.4102	1 k		
	R 35	57.41.4102	1 k		
	R 36	57.41.4152	1,5 k		
	R 37	57.41.4104	100 k		
	R 38	57.41.4683	68 k		
	R 39	57.41.4151	150		
	R 40	57.41.4151	150		
	R 41	57.41.4339	3,3		
	R 42	57.41.4222	2,2 k		
	R 43	57.41.4470	47		
	R 44				
	R 45	57.41.4102	1 k		
	R 46	58.03.2503	50 k	10% neg.log.	
	R 47	58.03.2503	50 k	neg.log.	
	R 48	57.41.4101	100	5% .25W	
	R 49	57.41.4153	15 k	Board 1.080.974	
	R 50	57.41.4562	5,6 k	Board 1.080.974	
	R 51	57.41.4153	15 k	Board 1.080.974	
	R 52	57.41.4102	1 k		
	R 53	57.41.4101	100		
	T 01	1.022.302.00		p = 1 : 1	

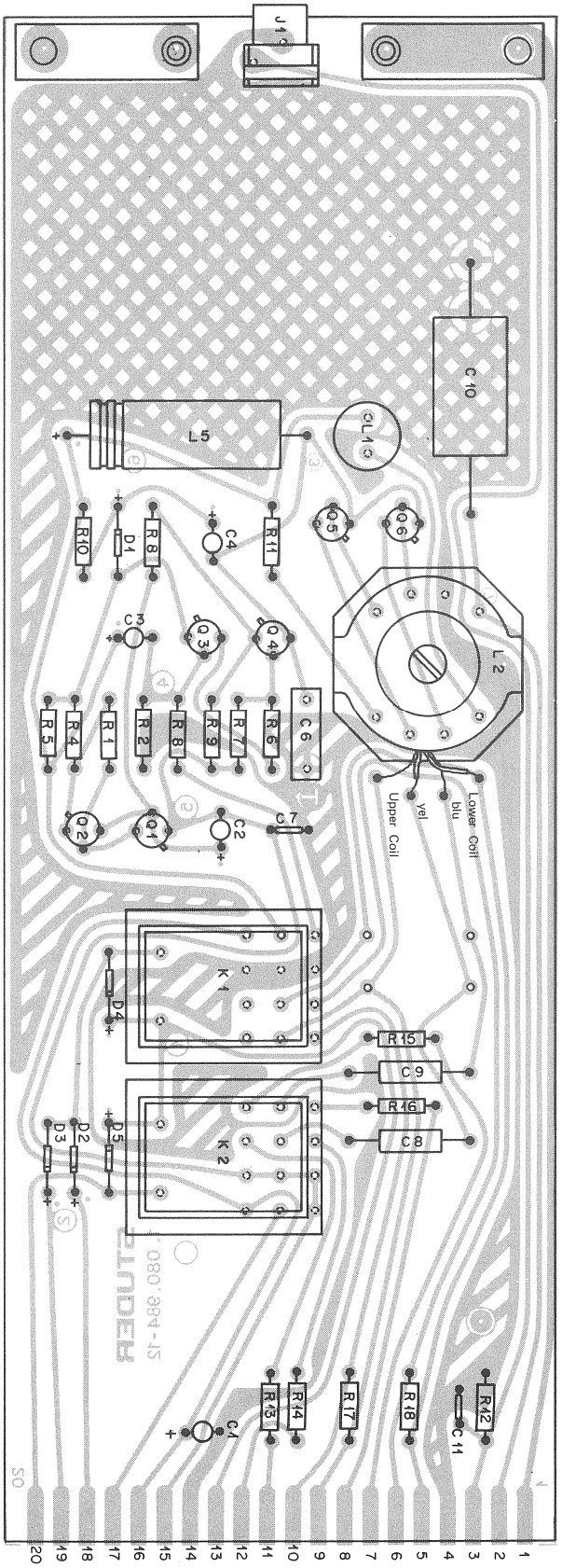
IND	DATE	NAME
4		
3		
2		
1	22.2.83	GÄ (81)
0	23.10.78	R.G /gv

STUDER | Reccrd Amplifier QC | 1.081.960.81 | PAGE 4 OF 4

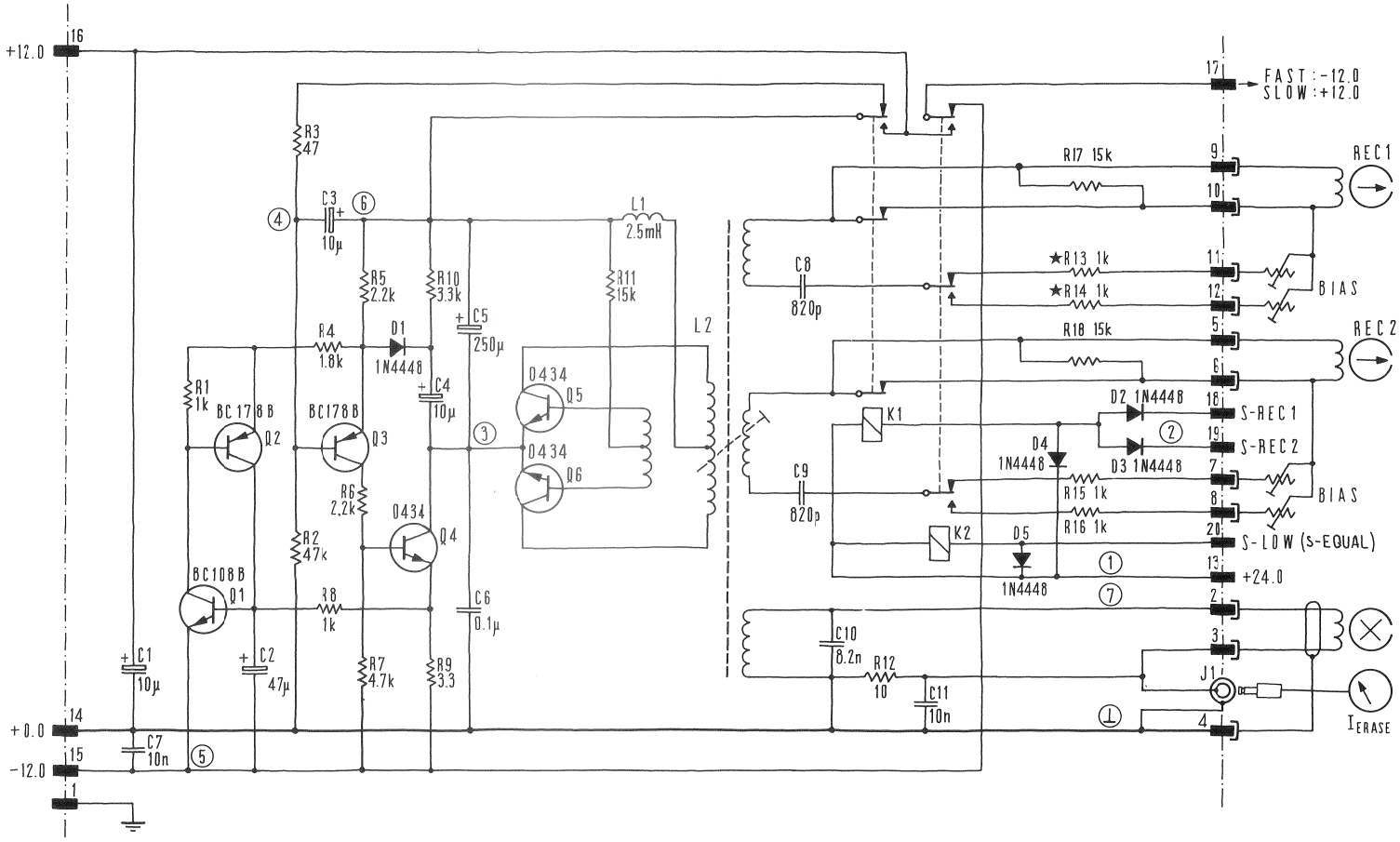
OSCILLATOR 1.080.984



OSCILLATOR 1.080.984



OSCILLATOR 1.080.984



★ IN CASE OF MONO RECORDING HEAD 1.317.110 AND THE TAPE TYPE IEC I / IEC IV, R13 CHANGE TO 200Ω, R14 CHANGE TO 10k.

Position "FAST"

TEST POINTS	1	2	3	4	5	6	7	
V =	+ 24	–	–11.6	0.5	–12	+12	—	DC-voltmeter, min. 100 kΩ
					V~ 150 kHz		96V	AC-voltmeter, mir. 1 MΩ

OSCILLATOR 1.080.984

	Pos	Bauteil No.	Bezeichnung	Stk	Bemerung
(4)	C 01	59.26.2100	C 10 U, 20 %, 16V, ELSAL	1	(1)
	C 02	59.26.0470	C 47 U, 20 %, 6,3V, ELSAL	1	(1)
(4)	C 03	59.26.2100	C 10 U, 20 %, 16V, ELSAL	1	(1)
(4)	C 04	59.22.8100	C 10 U, 20 %, 63V, EL	1	(1)
	C 05	59.25.5221	C 220 U, 100%, 35 V, EL	1	
	C 06	59.31.4104	C 0.1 U, 20%, 160 V, MPETP	1	
	C 07	59.32.3103	C 10 N, 80%, 40 V, KER	1	(3)
(2)	C 08	59.04.9821	C 820 P, 5%, 630 V, PS	1	
(2)	C 09	59.04.9821	C 820 P, 5%, 630 V, PS	1	
(2)	C 10	59.04.9822	C 8.2 N, 5%, 630 V, PS	1	
	C 11	59.32.3103	C 10 N, 80%, 40 V, KER	1	(3)
	D 01	50.04.0125	D 1N 4148, SI	1	
	D 02	50.04.0125	D 1N 4148, SI	1	
	D 03	50.04.0125	D 1N 4148, SI	1	
	D 04	50.04.0125	D 1N 4148, SI	1	
	D 05	50.04.0125	D 1N 4148, SI	1	
	X 01	54.02.0106	Jack-Socket R 32408	1	
	K 01	56.04.0120	K 24V=, .03 A, 4U, AU/AG	1	
	K 02	56.04.0120	K 24V=, .03 A, 4U, AU/AG	1	
(1)	L 01	62.02.2122	HF-Drossel	1	
	L 02	1.022.130.00	Oszillatorspule	1	

Aenderungen (1) 10.5.73 (2) 17.3.75 (3) 22.9.75 (4) 12.12.78 (5) 30.11.81

STUDER REGENSDORF ZURICH — **Positionsliste** — Oszillator Mono/Stereo

Erstellt: 18.8.72 Bz
Geprüft: 24.8.72
Blatt: 1 Blätter: 2
Kopie für:
Ersatz für:
Ersetzt durch:
1.080.984.00

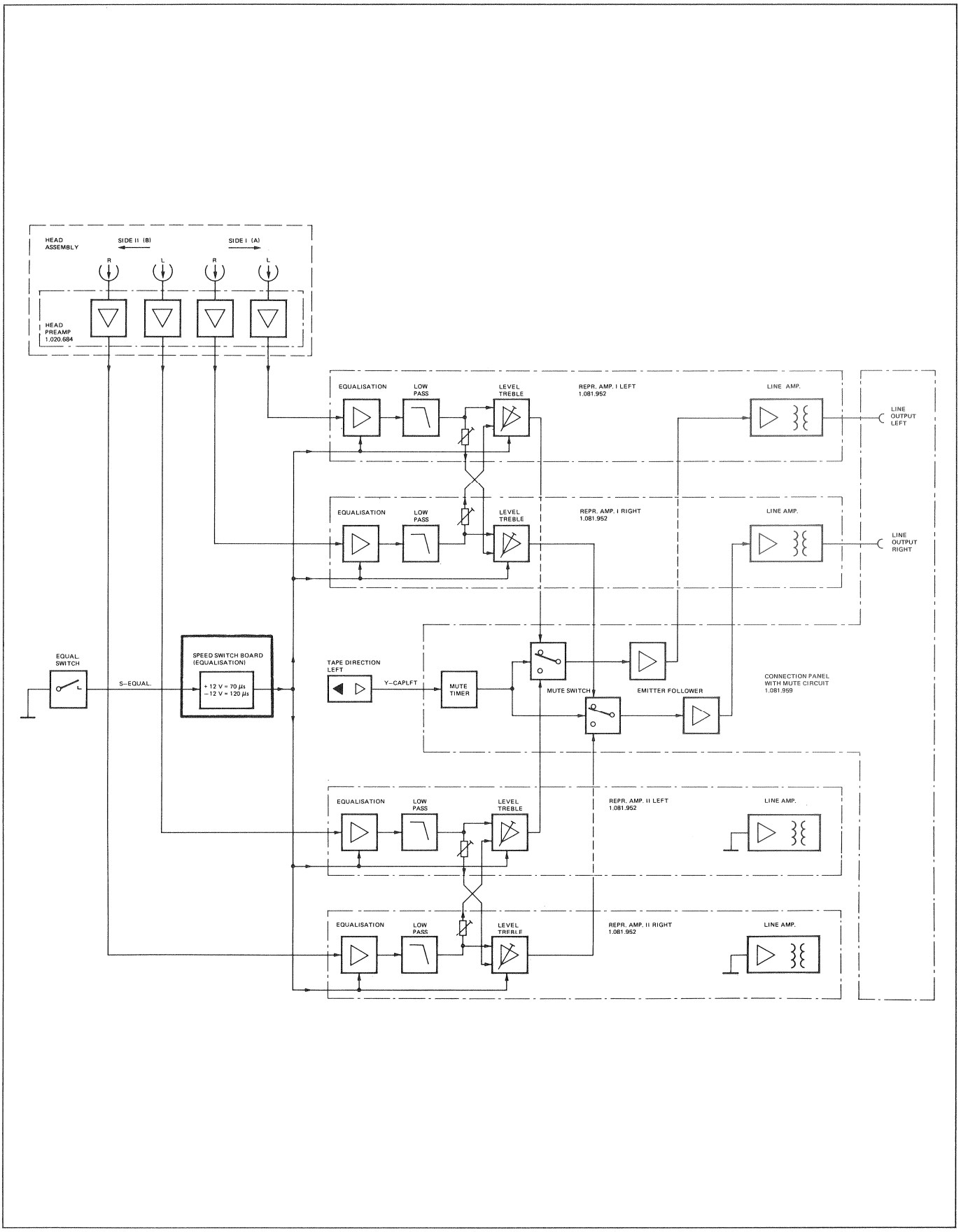
Pos.	Bauteil No.	Bzeichnung	Stk.	Bemerung
Q 01	50.03.0409	Q BC 108 B, NPN	1	
Q 02	50.03.0306	Q BC 178 B, PNP	1	
Q 03	50.03.0306	Q BC 178 B, PNP	1	
Q 04	50.03.0434	Q ATES 0434, NPN	1	
Q 05	50.03.0434	Q ATES 0434, NPN	1	
Q 06	50.03.0434	Q ATES 0434, NPN	1	
R 01	57.41.4102	R 1.0 K, 5%, .12 W, CSCH	1	
R 02	57.41.4473	R 47 K,	1	
R 03	57.41.4470	R 47 ,	1	
R 04	57.41.4182	R 1.8 K,	1	
R 05	57.41.4222	R 2.2 K,	1	
R 06	57.41.4222	R 2.2 K,	1	
R 07	57.41.4472	R 4.7 K,	1	
R 08	57.41.4102	R 1.0 K,	1	
R 09	57.41.4339	R 3.3 ,	1	
R 10	57.41.4332	R 3.3 K,	1	
R 11	57.41.4153	R 15 K,	1	
R 12	57.41.4100	R 10 ,	1	
R 13	57.41.4102	R 1.0 K,	1	
R 14	57.41.4102	R 1.0 K,	1	
R 15	57.41.4102	R 1.0 K,	1	
R 16	57.41.4102	R 1.0 K,	1	
(1) R 17	57.02.5153	R 15 K, 10%, .25 W, CM	1	
(1) R 18	57.02.5153	R 15 K, 10%, .25 W, CM	1	

Aenderungen (1) 10.5.73 (2) 17.3.75 (3) 22.9.75 (4) 12.12.78 (5) 30.11.81

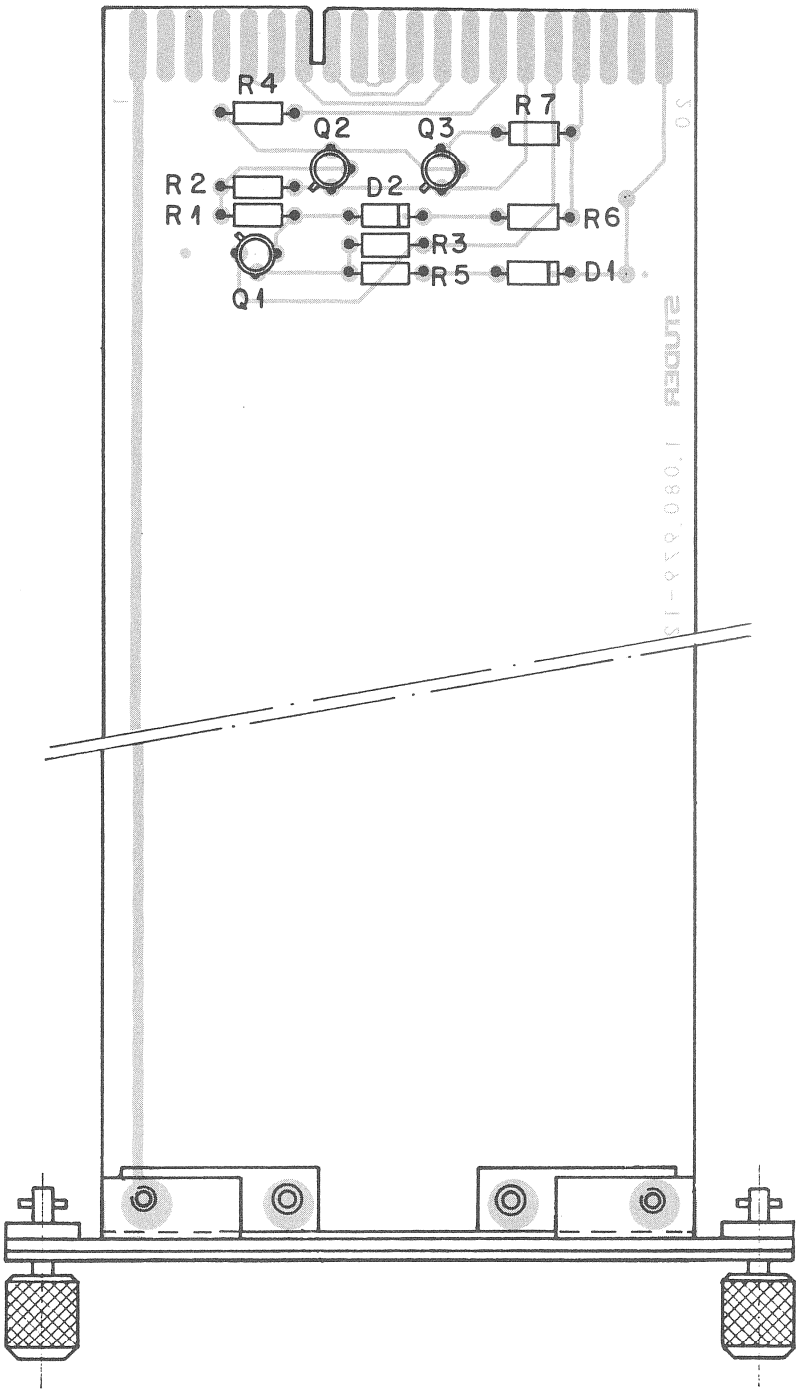
STUDER REGENSDORF ZURICH — **Positionsliste** — Oszillator Mono/Stereo

Erstellt: 18.8.72 Bz
Geprüft: 24.8.72
Blatt: 2 Blätter: 2
Kopie für:
Ersatz für:
Ersetzt durch:
1.080.984.00

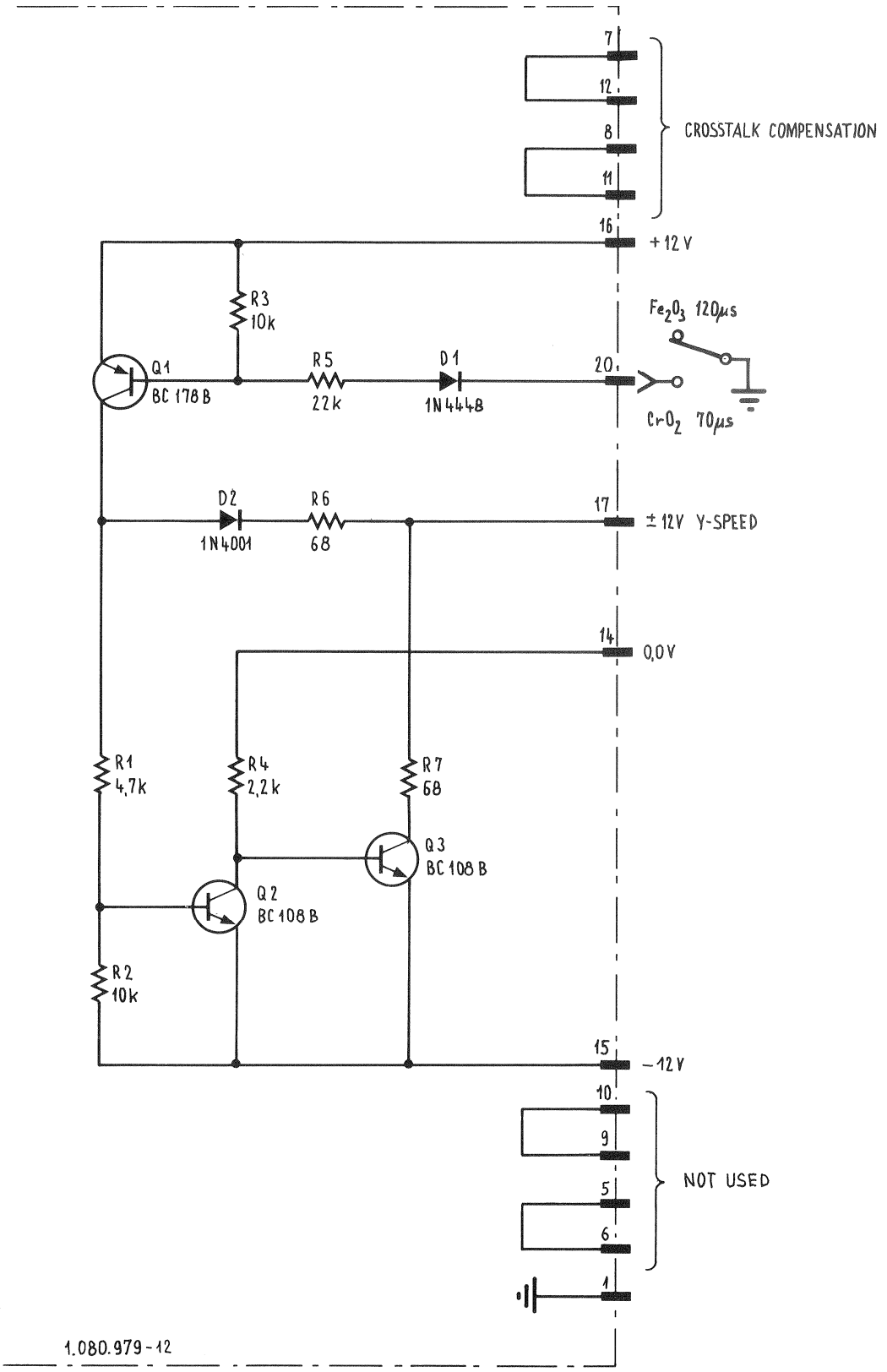
EQUALIZATION CONVERTER BOARD 1.080.979-81



EQUALISATION CONVERTER BOARD 1.080.979-81



EQUALISATION CONVERTER BOARD 1.080.979-81

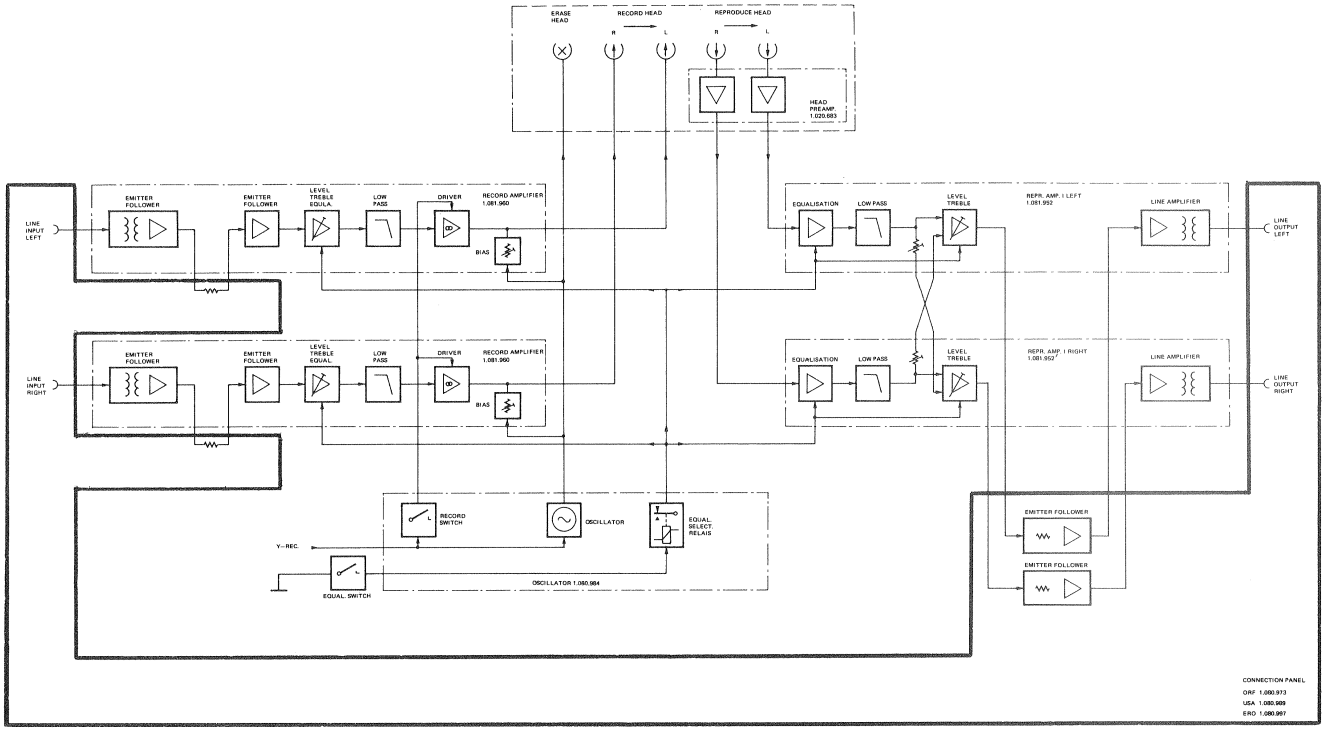


IN 2 + 2 TRACK REPRODUCE VERSION INSTEAD OF OSCILLATOR

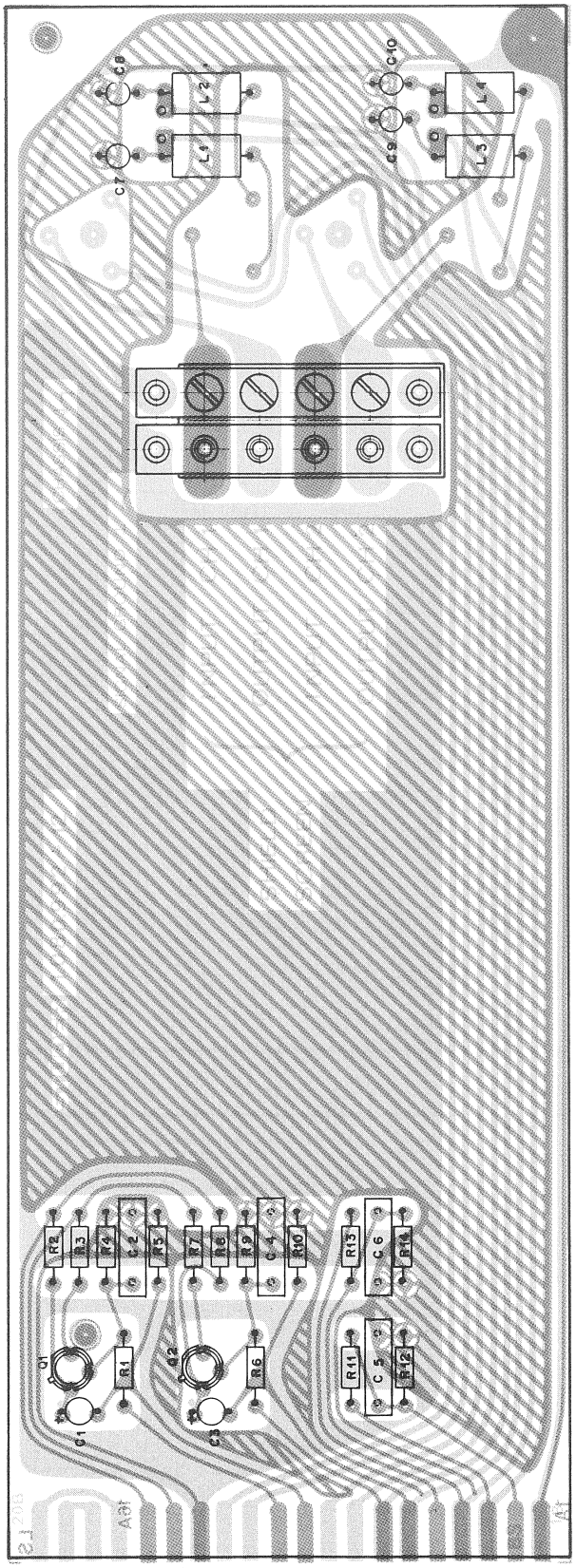
EQUALISATION CONVERTER BOARD 1.080.979-81

Pos.	Bauteil No.	Bezeichnung	Stk.	Bemerkung
D 01	50.04.0109	D 1N 4448, SI	1	
D 02	50.04.0122	D 1N 4001, SI	1	
Q 01	50.03.0306	Q BC 178 B, PNP	1	
Q 02	50.03.0409	Q BC 108 B, NPN	1	
Q 03	50.03.0409	Q BC 108 B, NPN	1	
R 01	57.41.4472	R 4.7 K, 5%, .12 W, CSCH	1	
R 02	57.41.4103	R 10 K,	1	
R 03	57.41.4103	R 10 K,	1	
R 04	57.41.4222	R 2.2 K,	1	
R 05	57.41.4222	R 2.2 K,	1	
R 06	57.41.4680	R 68 ,	1	
R 07	57.41.4680	R 68 ,	1	
Aenderungen	①	② ③ ④	⑤	

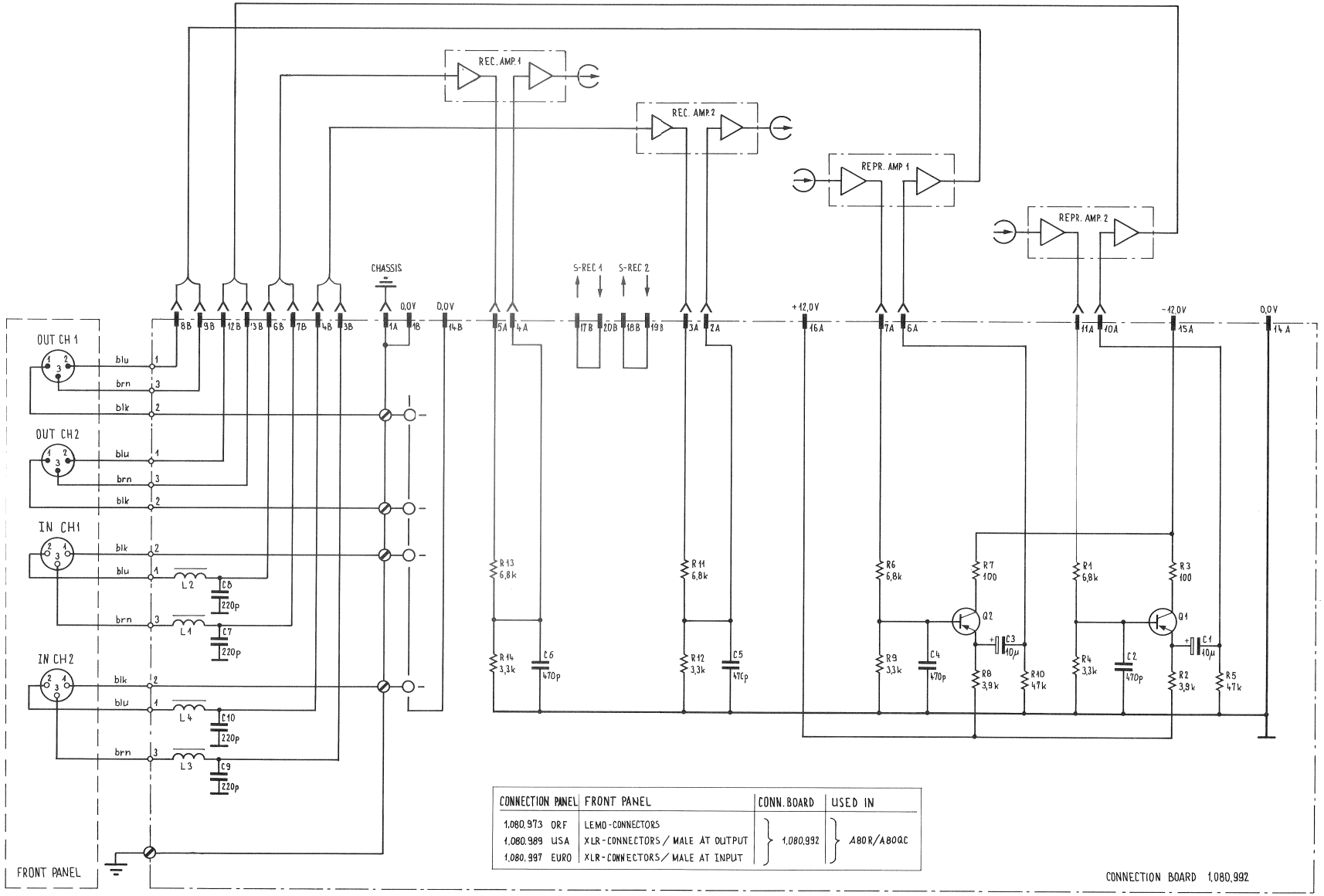
CONNECTION PANEL 2-CH REC./REPR. VERSION 1.080.973/989/997



CONNECTION PANEL 2-CH REC./REPR. VERSION 1.080.973/989/997

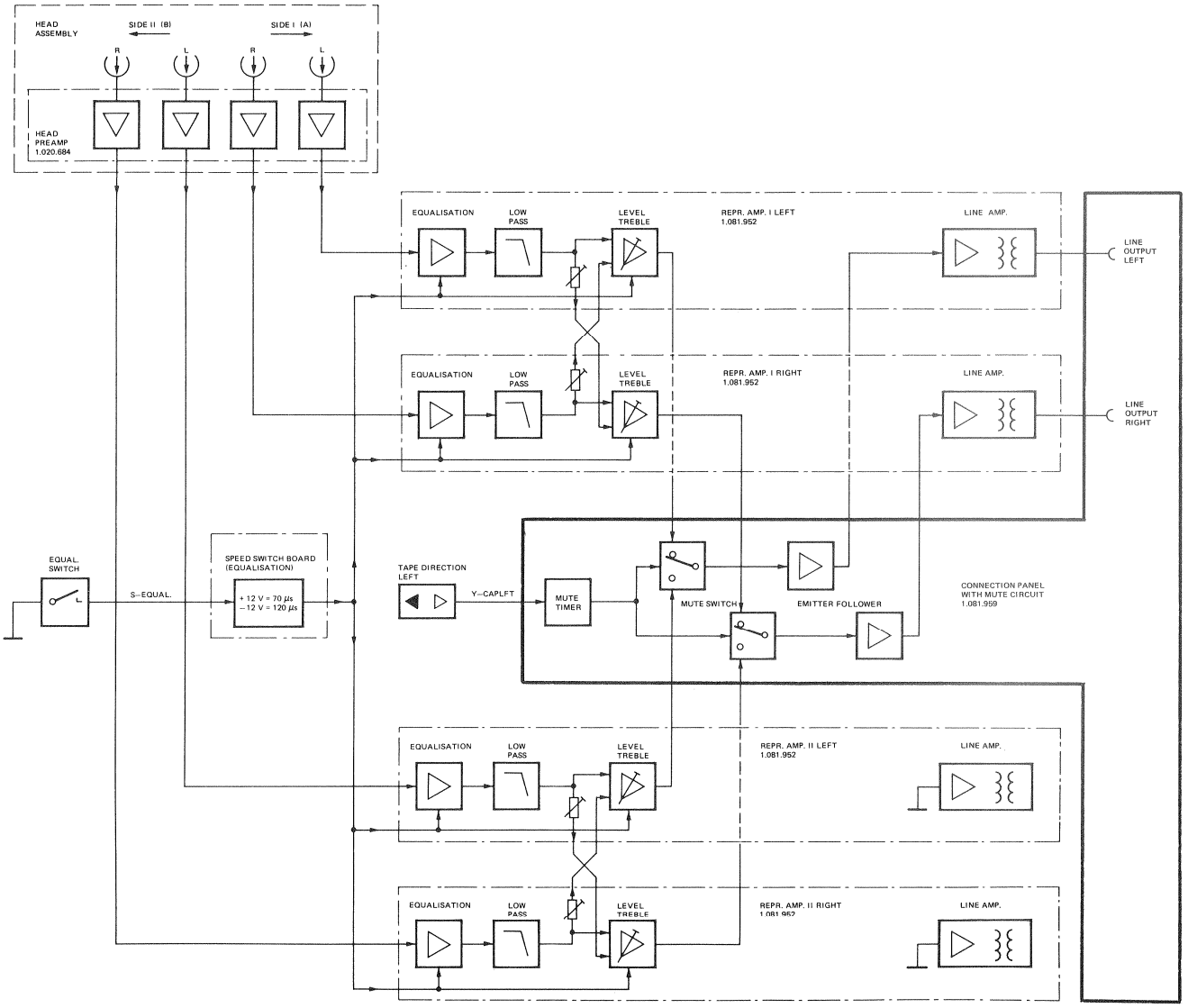


CONNECTION PANEL 2-CH REC./REPR. VERSION 1.080.973/989/997

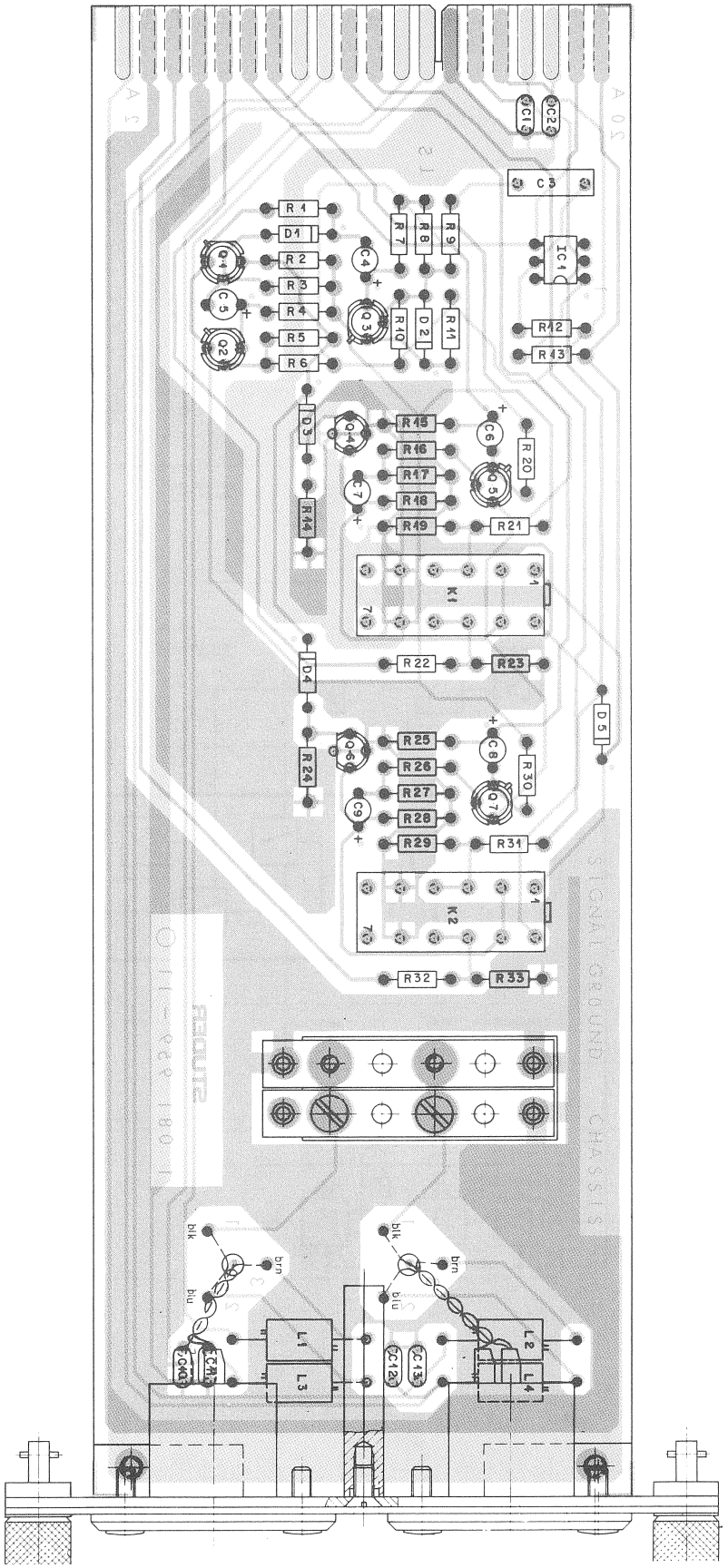


CONNECTION PANEL		FRONT PANEL	CONN. BOARD	USED IN
1.080.973	ORF	LEMO-CONNECTORS	1.080.992	A80R/A80QC
1.080.989	USA	XLR-CONNECTORS / MALE AT OUTPUT		
1.080.997	EURO	XLR-CONNECTORS / MALE AT INPUT		

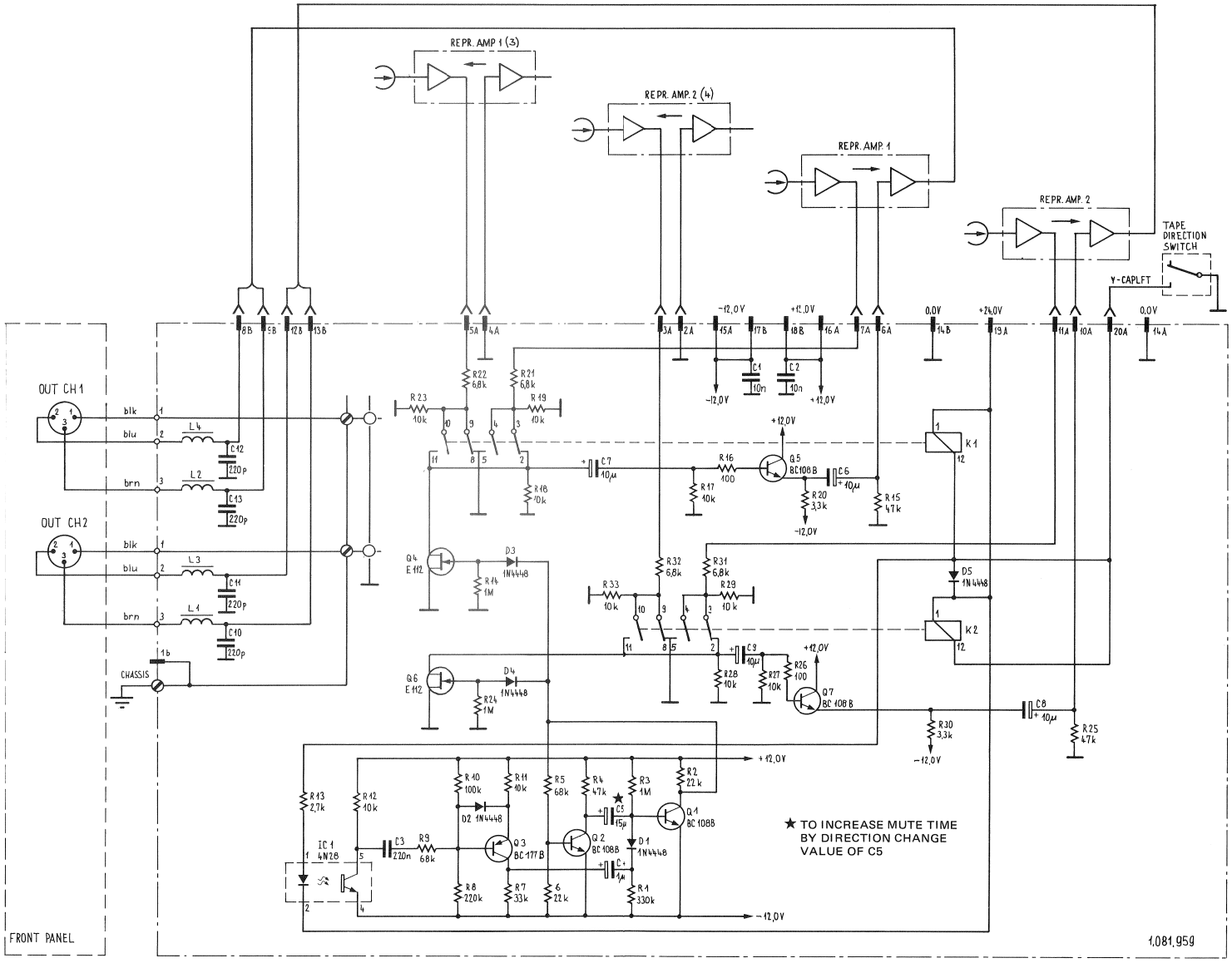
CONNECTION PANEL WITH MUTE CIRCUIT 2+2-CH REPR. VERSION 1.081.959–00



CONNECTION PANEL WITH MUTE CIRCUIT 2+2-CH REPR. VERSION 1.081.959–00



CONNECTION PANEL WITH MUTE CIRCUIT 2+2-CH REPR. VERSION 1.081.959–00



CONNECTION PANEL WITH MUTE CIRCUIT 2+2-CH REPR. VERSION 1.081.959–00

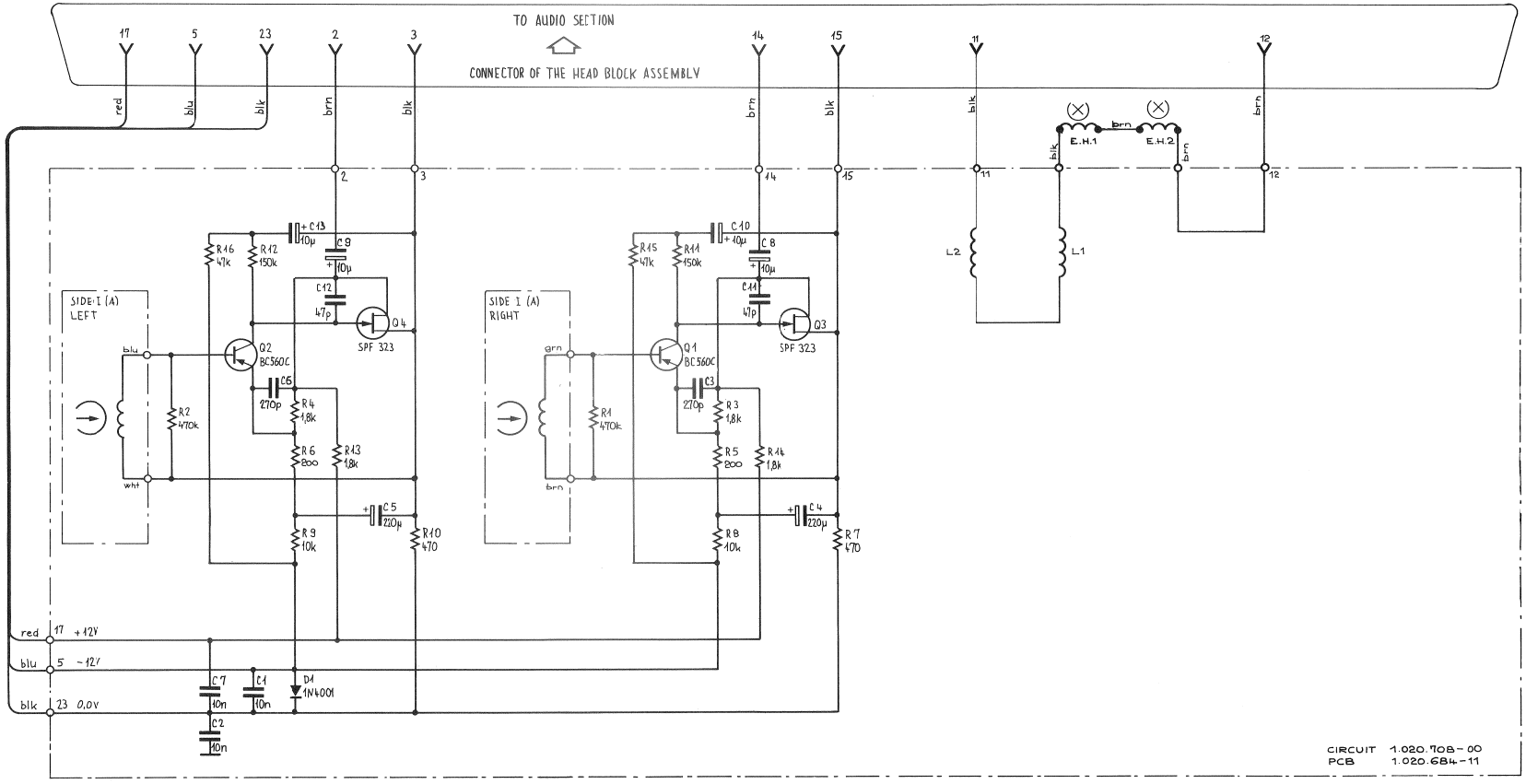
POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
C 1	59.32.3103	0,01 uF	KER		
C 2	59.32.3103	0,01 uF	KER		
C 3	59.31.6224	0,22 uF	MPETP 100 V 10 %		
C 4	59.36.4109	1 uF	TA		
C 5	59.36.4150	15 uF	TA		
C 6	59.30.4100	10 uF	TA		
C 7	59.30.4100	10 uF	TA		
C 8	59.30.4100	10 uF	TA		
C 9	59.30.4100	10 uF	TA		
C 10	59.32.0221	220 pF	KER		
C 11	59.32.0221	220 pF	KER		
C 12	59.32.0221	220 pF	KER		
C 13	59.32.0221	220 pF	KER		
D 1	50.04.0109	1N4448			
D 2	50.04.0109	1N4448			
D 3	50.04.0109	1N4448			
D 4	50.04.0109	1N4448			
D 5	50.04.0109	1N4448			
IC 1	50.99.0126	4N28	Optko		
K 1	56.04.0130		24 V 5 A 2A+2R		
K 2	56.04.0130		24 V 5 A 2A+2R		
L 1	62.01.0115				
L 2	62.01.0115				
L 3	62.01.0115				
L 4	62.01.0115				
Q 1	50.03.0409	BC 108 B			
Q 2	50.03.0409	BC 108 B			
Q 3	50.03.0324	BC 177 B			
Q 4	50.03.0350	N-FET	J 112		
Q 5	50.03.0409	BC 108 B			
Q 6	50.03.0350	N-FET	J 112		
Q 7	50.03.0409	BC 108 B			
R 1	57.41.4334	330 kohms	CSCH 5 %		
R 2	57.41.4223	22 kohms			
R 3	57.41.4105	1 Mohms			
R 4	57.41.4473	47 kohms			
R 5	57.41.4683	68 kohms			
R 6	57.41.4223	22 kohms			
R 7	57.41.4333	33 kohms			
R 8	57.41.4224	220 kohms			

IND	DATE	NAME
	21.4.'78	Weibel/al

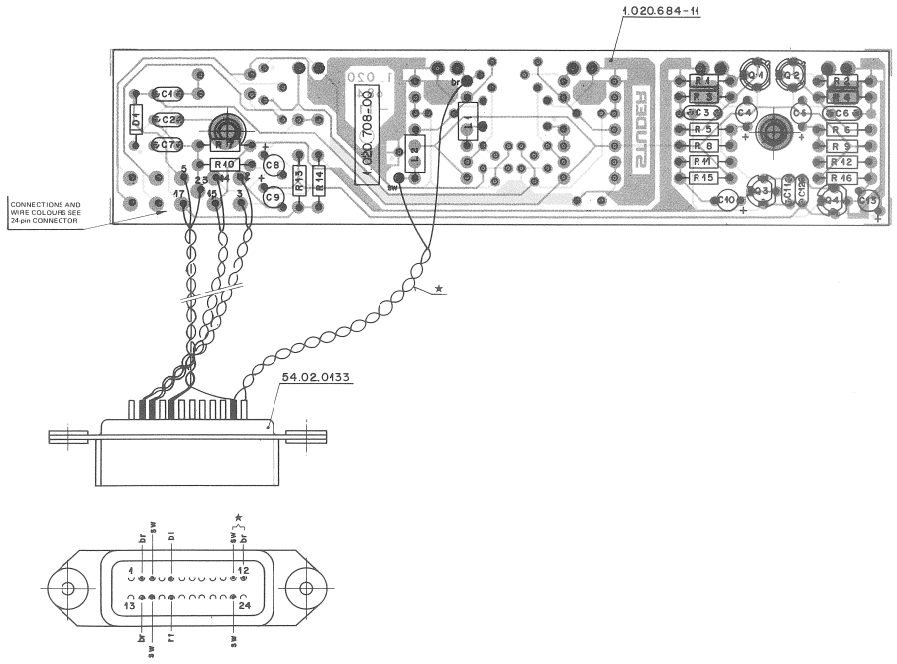
POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
R 9	57.41.4683	68 kohms	CSCH 5 %		
R 10	57.41.4104	100 kohms			
R 11	57.41.4103	10 kohms			
R 12	57.41.4103	10 kohms			
R 13	57.41.4272	2,7 kohms			
R 14	57.41.4105	1 Mohms			
R 15	57.41.4473	47 kohms			
R 16	57.41.4101	100 kohms			
R 17	57.41.4103	10 kohms			
R 18	57.41.4103	10 kohms			
R 19	57.41.4103	10 kohms			
R 20	57.41.4332	3,3 kohms			
R 21	57.41.4682	6,8 kohms			
R 22	57.41.4682	6,8 kohms			
R 23	57.41.4103	10 kohms			
R 24	57.41.4105	1 Mohms			
R 25	57.41.4473	47 kohms			
R 26	57.41.4101	100 kohms			
R 27	57.41.4103	10 kohms			
R 28	57.41.4103	10 kohms			
R 29	57.41.4103	10 kohms			
R 30	57.41.4332	3,3 kohms			
R 31	57.41.4682	6,8 kohms			
R 32	57.41.4682	6,8 kohms			
R 33	57.41.4103	10 kohms			

IND	DATE	NAME
	21.4.78	Weibel/al

REPRODUCE PREAMPLIFIER 2 CH 1.020.708–00



REPRODUCE PREAMPLIFIER 2 CH 1.020.708–00



IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	C..0001	59.12.3103	10 nF	80%, 40V, Ce	
	C..0002	59.12.3103	10 nF	80%, 40V, Ce	
	C..0003	59.34.4271	270 pF	5%, N750, Ce	
	C..0004	59.30.1221	220 uF	20%, 3V, Ta	
	C..0005	59.30.1221	220 uF	20%, 3V, Ta	
	C..0006	59.34.4271	270 pF	5%, N750, Ce	
	C..0007	59.12.3103	10 nF	80%, 40V, Ce	
	C..0008	59.30.7100	10 uF	20%, 25V, Ta	
	C..0009	59.30.7100	10 uF	20%, 25V, Ta	
	C..0010	59.30.7100	10 uF	20%, 25V, Ta	
	C..0011	59.34.2473	47 pF	5%, N150, Ce	
	C..0012	59.34.2473	47 pF	5%, N150, Ce	
	C..0013	59.30.7100	10 uF	20%, 25V, Ta	
	G..0001	50.04.0122	14 4001		
	L..0001	67.02.1101	3.1 mH		
	L..0002	67.02.1101	3.1 mH		
	Q..0001	50.03.0496	BC560C		Phi,Sie,Mot
	Q..0002	50.03.0496	BC560C		Phi,Sie,Mot
	Q..0003	50.03.0447	SPF323		Mot
	Q..0004	50.03.0447	SPF323		Mot
	R..0001	57.11.4474	470 kOhm		
	R..0002	57.11.4474	470 kOhm		
	R..0003	57.11.4182	1.8 kOhm		
	R..0004	57.11.4182	1.8 kOhm		
	R..0005	57.11.3201	200 Ohm		
	R..0006	57.11.3201	200 Ohm		
	R..0007	57.11.4471	470 Ohm		
	R..0008	57.11.4103	10 kOhm		
	R..0009	57.11.4103	10 kOhm		
	R..0010	57.11.4471	470 Ohm		
	R..0011	57.11.4154	150 kOhm		
	R..0012	57.11.4154	150 kOhm		
	R..0013	57.11.4182	1.8 kOhm		

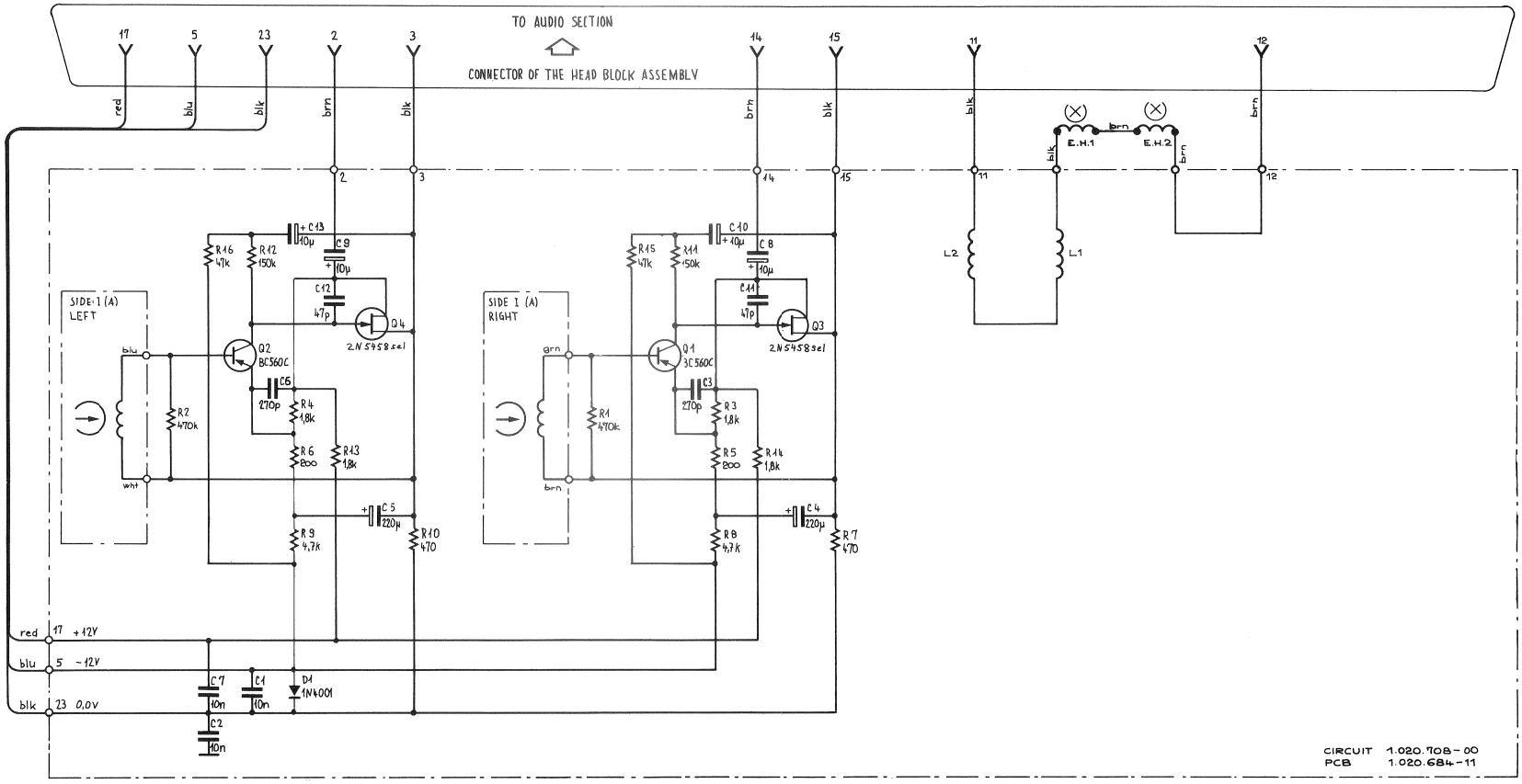
IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	R..0014	57.11.4182	1.8 kOhm		
	R..0015	57.11.4473	47 kOhm		
	R..0016	57.11.4473	47 kOhm		

Ce:Ceramic, Ta:Tantalum

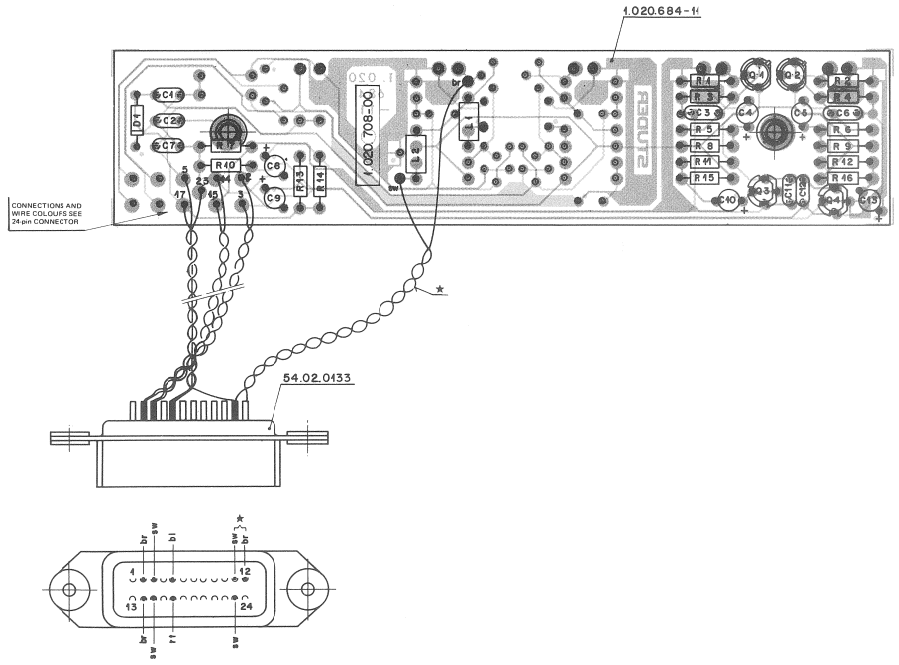
MANUFACTURER: Mot=Motorola, Phi=Philips, Sie=Siemens

Date 94/06/19

REPRODUCE PREAMPLIFIER 2CH 1.020.708–81



REPRODUCE PREAMPLIFIER 2CH 1.020.708–81



IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	C..0001	59.32.3103	10 nF	80%, 40V, Ce	
	C..0002	59.32.3103	10 nF	80%, 40V, Ce	
	C..0003	59.34.4271	270 pF	5%, N750, Ce	
	C..0004	59.30.1221	220 uF	20%, 3V, Ta	
	C..0005	59.30.1221	220 uF	20%, 3V, Ta	
	C..0006	59.34.4271	270 pF	5%, N750, Ce	
	C..0007	59.32.3103	10 nF	80%, 40V, Ce	
	C..0008	59.30.7100	10 uF	20%, 25V, Ta	
	C..0009	59.30.7100	10 uF	20%, 25V, Ta	
	C..0010	59.30.7100	10 uF	20%, 25V, Ta	
	C..0011	59.34.2470	47 pF	5%, N150, Ce	
	C..0012	59.34.2470	47 pF	5%, N150, Ce	
	C..0013	59.30.7100	10 uF	20%, 25V, Ta	
	D..0001	50.34.0122	1N 4001		
	L..0001	62.02.1101	0.1 mH		
	L..0002	62.02.1101	0.1 mH		
	Q..0001	50.03.0496	BC560C		Ph,Sie,Mot
	Q..0002	50.03.0496	BC560C		Ph,Sie,Mot
	Q..0003	50.03.0442	2N 5458	selected ID = 2.5 mA @ UG 0.5...1.5 V	Mot
	Q..0004	50.03.0442	2N 5458	selected ID = 2.5 mA @ UG 0.5...1.5 V	Mot
	R..0001	57.11.4474	470 kOhm		
	R..0002	57.11.4474	470 kOhm		
	R..0003	57.11.4182	1.8 kOhm		
	R..0004	57.11.4182	1.8 kOhm		
	R..0005	57.11.3201	200 Ohm		
	R..0006	57.11.3201	200 Ohm		
	R..0007	57.11.4471	470 Ohm		
	R..0008	57.11.4472	4.7 kOhm		
	R..0009	57.11.4472	4.7 kOhm		
	R..0010	57.11.4471	470 Ohm		
	R..0011	57.11.4154	150 kOhm		
	R..0012	57.11.4154	150 kOhm		
	R..0013	57.11.4182	1.8 kOhm		

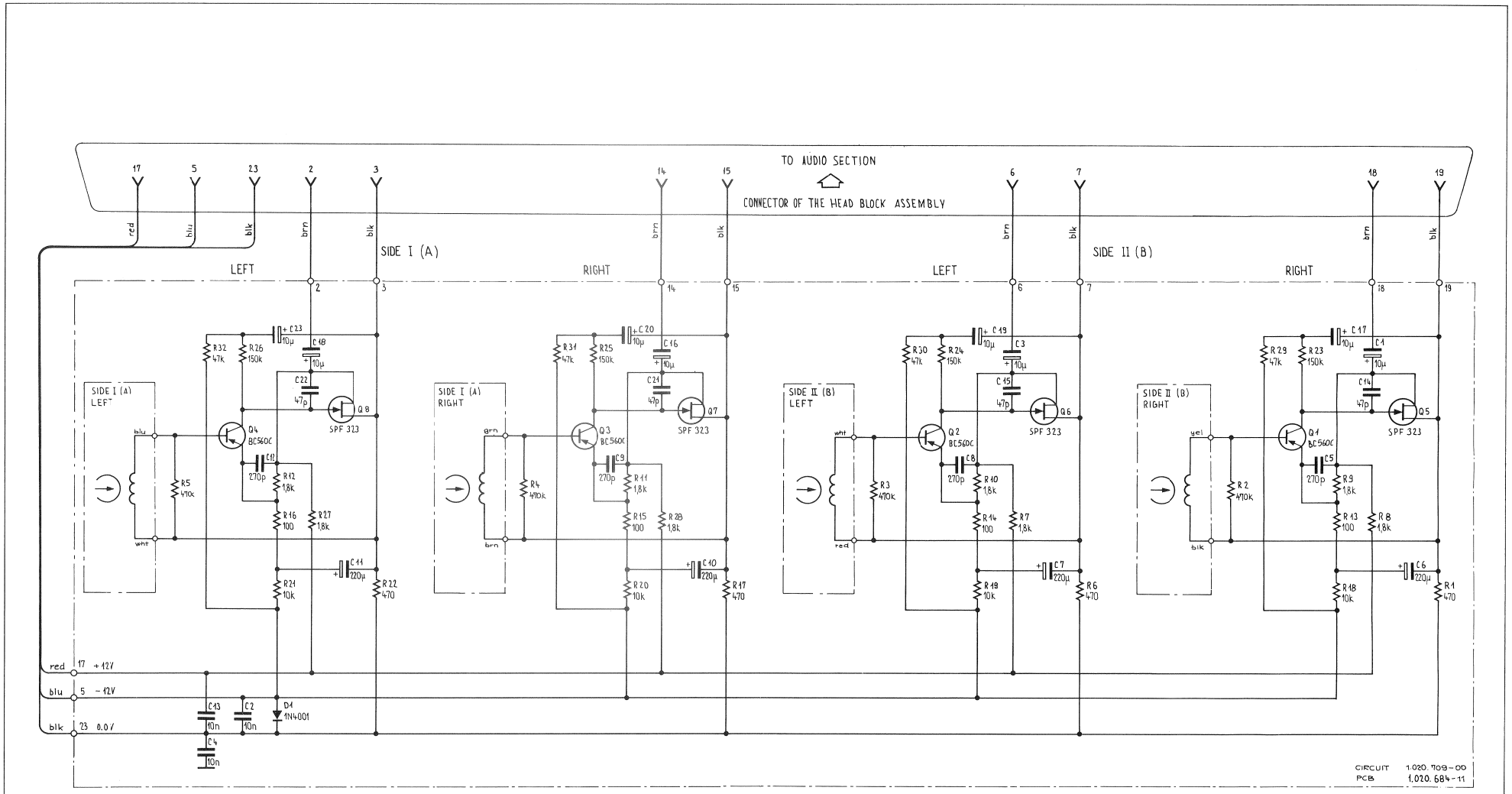
IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	R..0014	57.11.4182	1.8 kOhm		
	R..0015	57.11.4473	47 kOhm		
	R..0016	57.11.4473	47 kOhm		

Ce=Ceramic, Ta=Tantalum

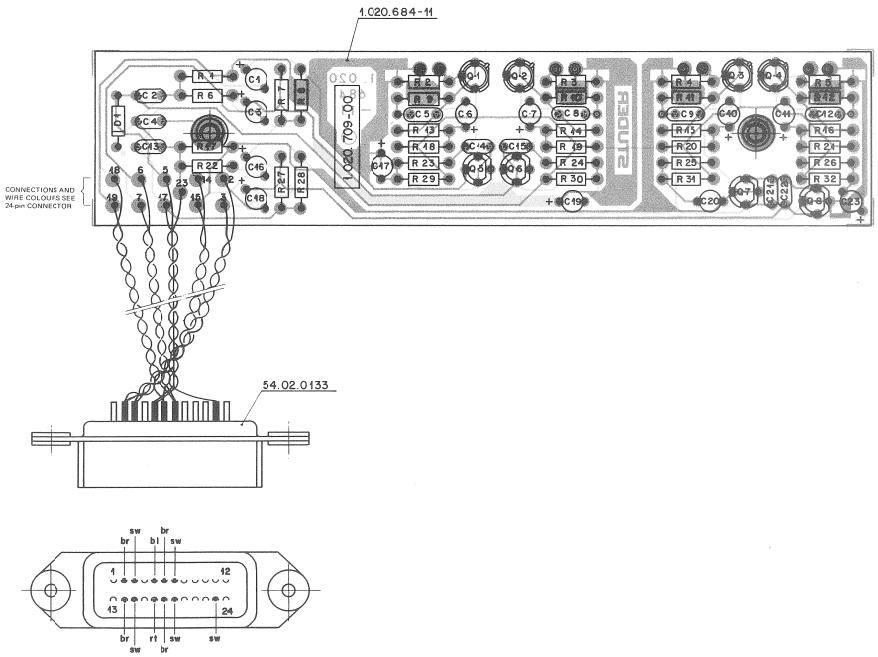
MANUFACTURER: Mot=Motorola, Ph=Philips, Sie=Siemens

ORIG 86/11/20

REPRODUCE PREAMPLIFIER 2+2 CH 1.020.709–00



REPRODUCE PREAMPLIFIER 2+2 CH 1.020.709–00



IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	C..0001	59.30.7100	.0 uF	20%, 25V, Ta	
	C..0002	59.32.3103	.0 nF	80%, 40V, Ce	
	C..0003	59.30.7100	.0 uF	20%, 25V, Ta	
	C..0004	59.32.3103	.0 nF	80%, 40V, Ce	
	C..0005	59.34.4271	270 pF	5%, N750, Ce	
	C..0006	59.30.1221	220 uF	20%, 3V, Ta	
	C..0007	59.30.1221	220 uF	20%, 3V, Ta	
	C..0008	59.34.4271	270 pF	5%, N750, Ce	
	C..0009	59.34.4271	270 pF	5%, N750, Ce	
	C..0010	59.30.1221	220 uF	20%, 3V, Ta	
	C..0011	59.30.1221	220 uF	20%, 3V, Ta	
	C..0012	59.34.4271	270 pF	5%, N750, Ce	
	C..0013	59.32.3103	.0 nF	80%, 40V, Ce	
	C..0014	59.34.2470	47 pF	5%, N150, Ce	
	C..0015	59.34.2470	47 pF	5%, N150, Ce	
	C..0016	59.30.7100	.0 uF	20%, 25V, Ta	
	C..0017	59.30.7100	.0 uF	20%, 25V, Ta	
	C..0018	59.30.7100	.0 uF	20%, 25V, Ta	
	C..0019	59.30.7100	.0 uF	20%, 25V, Ta	
	C..0020	59.30.7100	.0 uF	20%, 25V, Ta	
	C..0021	59.34.2470	47 pF	5%, N150, Ce	
	C..0022	59.34.2470	47 pF	5%, N150, Ce	
	C..0023	59.30.7100	.0 uF	20%, 25V, Ta	
	D..0001	50.04.0122	1N 4001		Mot
	Q..0001	50.03.0496	BC560C		Ph+Sie+Mot
	Q..0002	50.03.0496	BC560C		Ph+Sie+Mot
	Q..0003	50.03.0496	BC560C		Ph+Sie+Mot
	Q..0004	50.03.0496	BC560C		Ph+Sie+Mot
	Q..0005	50.03.0442	SPF323		Mot
	Q..0006	50.03.0442	SPF323		Mot
	Q..0007	50.03.0442	SPF323		Mot
	Q..0008	50.03.0442	SPF323		Mot
	R..0001	57.11.4471	470 Ohm		
	R..0002	57.11.4474	470 kOhm		

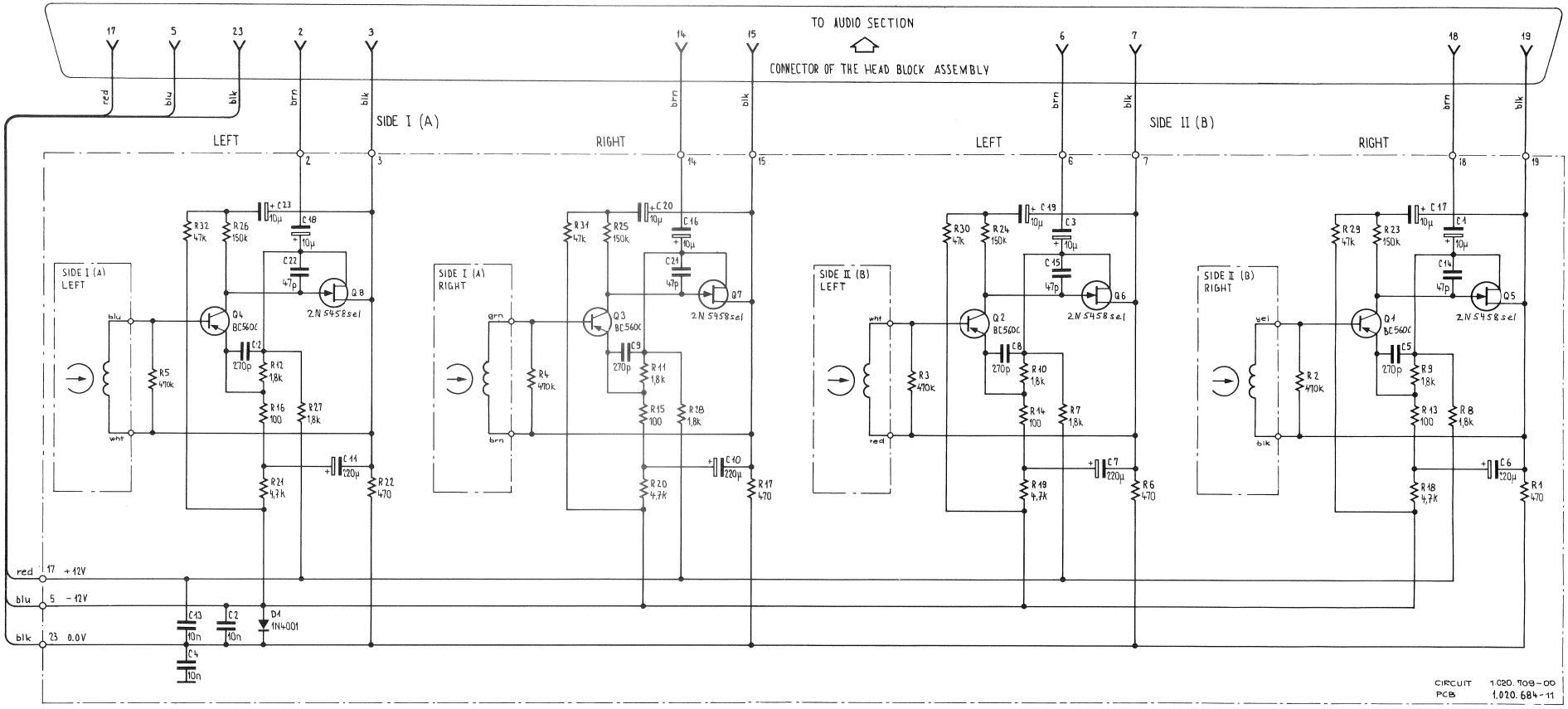
IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	R..0003	57.11.4474	470 kOhm		
	R..0004	57.11.4474	470 kOhm		
	R..0005	57.11.4474	470 kOhm		
	R..0006	57.11.4471	470 Ohm		
	R..0007	57.11.4182	1.8 kOhm		
	R..0008	57.11.4182	1.8 kOhm		
	R..0009	57.11.4182	1.8 kOhm		
	R..0010	57.11.4182	1.8 kOhm		
	R..0011	57.11.4182	1.8 kOhm		
	R..0012	57.11.4182	1.8 kOhm		
	R..0013	57.11.3201	200 Ohm		
	R..0014	57.11.3201	200 Ohm		
	R..0015	57.11.3201	200 Ohm		
	R..0016	57.11.3201	200 Ohm		
	R..0017	57.11.4471	470 Ohm		
	R..0018	57.11.5103	10 kOhm		
	R..0019	57.11.4103	10 kOhm		
	R..0020	57.11.4103	10 kOhm		
	R..0021	57.11.4103	10 kOhm		
	R..0022	57.11.4471	470 Ohm		
	R..0023	57.11.4154	150 kOhm		
	R..0024	57.11.4154	150 kOhm		
	R..0025	57.11.4154	150 kOhm		
	R..0026	57.11.4154	150 kOhm		
	R..0027	57.11.4182	1.8 kOhm		
	R..0028	57.11.4182	1.8 kOhm		
	R..0029	57.11.4473	47 kOhm		
	R..0030	57.11.4473	47 kOhm		
	R..0031	57.11.4473	47 kOhm		
	R..0032	57.11.4473	47 kOhm		

Ce=Ceramic, Ta=Tantalum

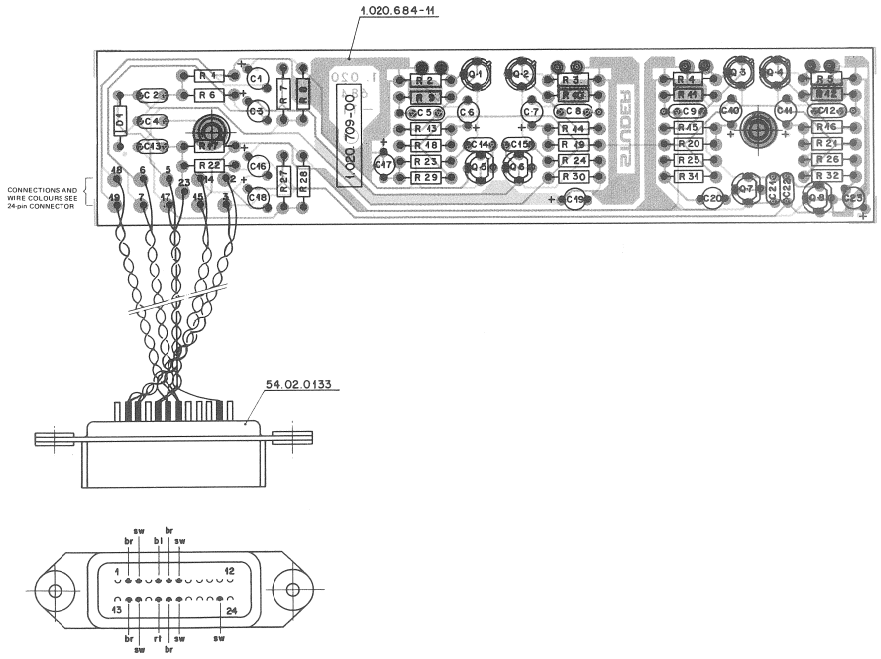
MANUFACTURER: Mot=Motorola, Ph=Philips, Sie=Siemens

ORIG 84/06/19

REPRODUCE PREAMPLIFIER 2+2 CH 1.020.709–81



REPRODUCE PREAMPLIFIER 2+2 CH 1.020.709–81



IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	C..0001	59.30.7100	10 uF	20%, 25V, Ta	
	C..0002	59.32.3103	10 nF	80%, 40V, Ce	
	C..0003	59.30.7100	10 uF	20%, 25V, Ta	
	C..0004	59.32.3103	10 nF	80%, 40V, Ce	
	C..0005	59.34.4271	210 pF	5%, N750, Ce	
	C..0006	59.30.1221	220 uF	20%, 3V, Ta	
	C..0007	59.30.1221	220 uF	20%, 3V, Ta	
	C..0008	59.34.4271	210 pF	5%, N750, Ce	
	C..0009	59.34.4271	210 pF	5%, N750, Ce	
	C..0010	59.30.1221	220 uF	20%, 3V, Ta	
	C..0011	59.30.1221	220 uF	20%, 3V, Ta	
	C..0012	59.34.4271	210 pF	5%, N750, Ce	
	C..0013	59.32.3103	10 nF	80%, 40V, Ce	
	C..0014	59.34.2470	47 pF	5%, N150, Ce	
	C..0015	59.34.2470	47 pF	5%, N150, Ce	
	C..0016	59.30.7100	10 uF	20%, 25V, Ta	
	C..0017	59.30.7100	10 uF	20%, 25V, Ta	
	C..0018	59.30.7100	10 uF	20%, 25V, Ta	
	C..0019	59.30.7100	10 uF	20%, 25V, Ta	
	C..0020	59.30.7100	10 uF	20%, 25V, Ta	
	C..0021	59.34.2470	47 pF	5%, N150, Ce	
	C..0022	59.34.2470	47 pF	5%, N150, Ce	
	C..0023	59.30.7100	10 uF	20%, 25V, Ta	
	D..0001	50.04.0122	1N 4001		Mot
	Q..0001	50.03.0496	BC560C		Ph,Sie,Mot
	Q..0002	50.03.0496	BC560C		Ph,Sie,Mot
	Q..0003	50.03.0496	BC560C		Ph,Sie,Mot
	Q..0004	50.03.0496	BC560C		Ph,Sie,Mot
	Q..0005	50.03.0442	2N 5458	selected ID = 2.5 mA @ UG 0.5...1.5 V	Mot
	Q..0006	50.03.0442	2N 5458	selected ID = 2.5 mA @ UG 0.5...1.5 V	Mot
	Q..0007	50.03.0442	2N 5458	selected ID = 2.5 mA @ UG 0.5...1.5 V	Mot
	Q..0008	50.03.0442	2N 5458	selected ID = 2.5 mA @ UG 0.5...1.5 V	Mot
	R..0001	57.11.4471	470 Ohm		
	R..0002	57.11.4474	470 kOhm		

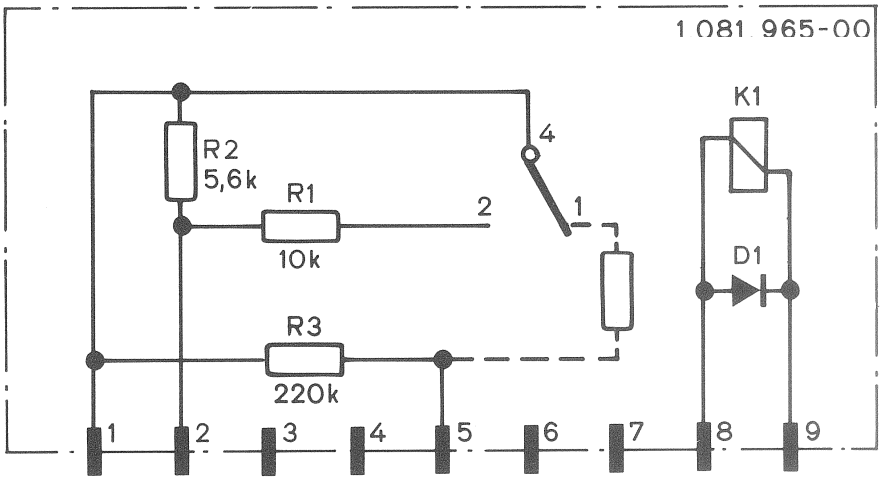
IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	R..0003	57.11.4474	470 kOhm		
	R..0004	57.11.4474	470 kOhm		
	R..0005	57.11.4474	470 kOhm		
	R..0006	57.11.4471	470 Ohm		
	R..0007	57.11.4182	1.8 kOhm		
	R..0008	57.11.4182	1.8 kOhm		
	R..0009	57.11.4182	1.8 kOhm		
	R..0010	57.11.4182	1.8 kOhm		
	R..0011	57.11.4182	1.8 kOhm		
	R..0012	57.11.4182	1.8 kOhm		
	R..0013	57.11.3201	200 Ohm		
	R..0014	57.11.3201	200 Ohm		
	R..0015	57.11.3201	200 Ohm		
	R..0016	57.11.3201	200 Ohm		
	R..0017	57.11.4471	470 Ohm		
	R..0018	57.11.4472	4.7 kOhm		
	R..0019	57.11.4472	4.7 kOhm		
	R..0020	57.11.4472	4.7 kOhm		
	R..0021	57.11.4472	4.7 kOhm		
	R..0022	57.11.4471	470 Ohm		
	R..0023	57.11.4154	150 kOhm		
	R..0024	57.11.4154	150 kOhm		
	R..0025	57.11.4154	150 kOhm		
	R..0026	57.11.4154	150 kOhm		
	R..0027	57.11.4182	1.8 kOhm		
	R..0028	57.11.4182	1.8 kOhm		
	R..0029	57.11.4473	47 kOhm		
	R..0030	57.11.4473	47 kOhm		
	R..0031	57.11.4473	47 kOhm		
	R..0032	57.11.4473	47 kOhm		

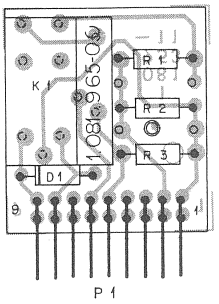
Ce=Ceramic, Ta=Tantalum

MANUFACTURER: Mot=Motorola, Ph=Philips, Sie=Siemens

ORIG 86/11/20

REPRODUCE EQUALISATION IEC I/II–IV 1.081.965–00



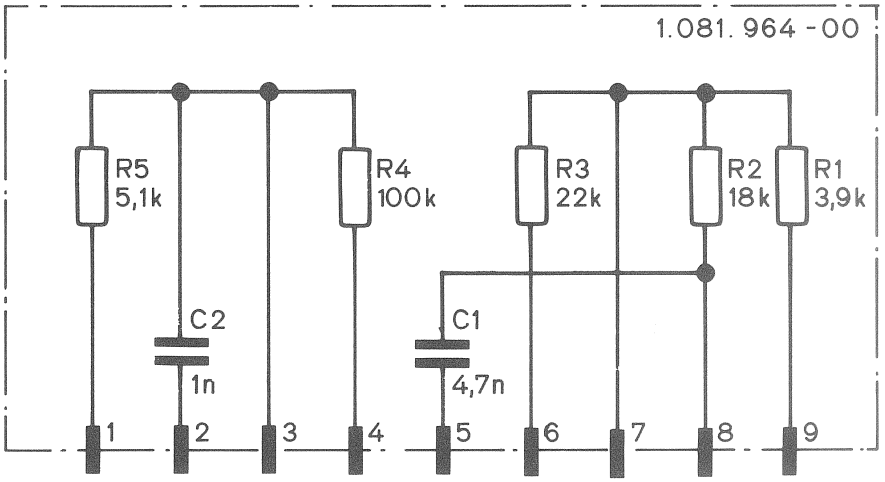


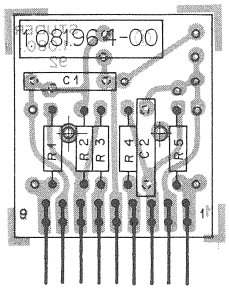
IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	D.....1	50.04.0125	1 N 4448		
	K.....1	56.02.1031		National RSL 24 V	
	P.....1	54.01.0220	9 cont.	AMP Nr. 163.740-7	
	R.....1	57.11.4103	10 kOhm	5%	
	R.....2	57.11.4562	5.6 kOhm	5%	
	R.....3	57.11.4224	220 kOhm	5%	

ORIG 84/05/15

S T U D E R (00) 84/05/15 GAF REPRO. EQ. IEC I/II-IV 1.081.965.00 PAGE 1

RECORD EQUALISATION IEC I/II–IV 1.081.964–00





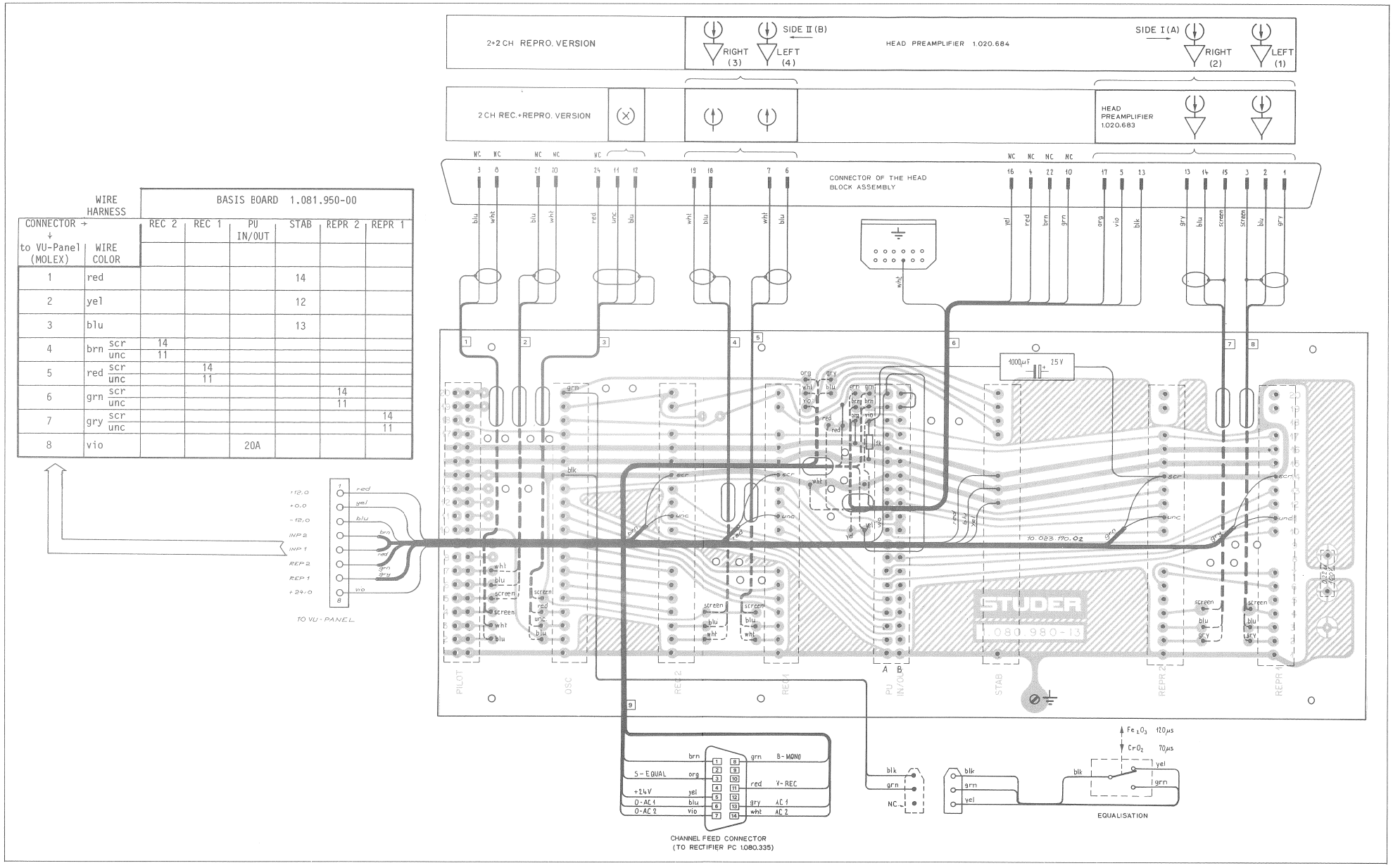
P 1

IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	C.....1	59.11.4472	4.7 nF		
	C.....2	59.11.6102	1 nF		
	P.....1	54.01.0220	9 cont.	AMP Nr. 163.740-7	
	R.....1	57.11.4392	3.9 kOhm	5%	
	R.....2	57.11.4183	18 kOhm	5%	
	R.....3	57.11.4223	22 kOhm	5%	
	R.....4	57.11.4104	100 kOhm	5%	
	R.....5	57.11.3512	5.1 kOhm	5%	

ORIG 84/05/15

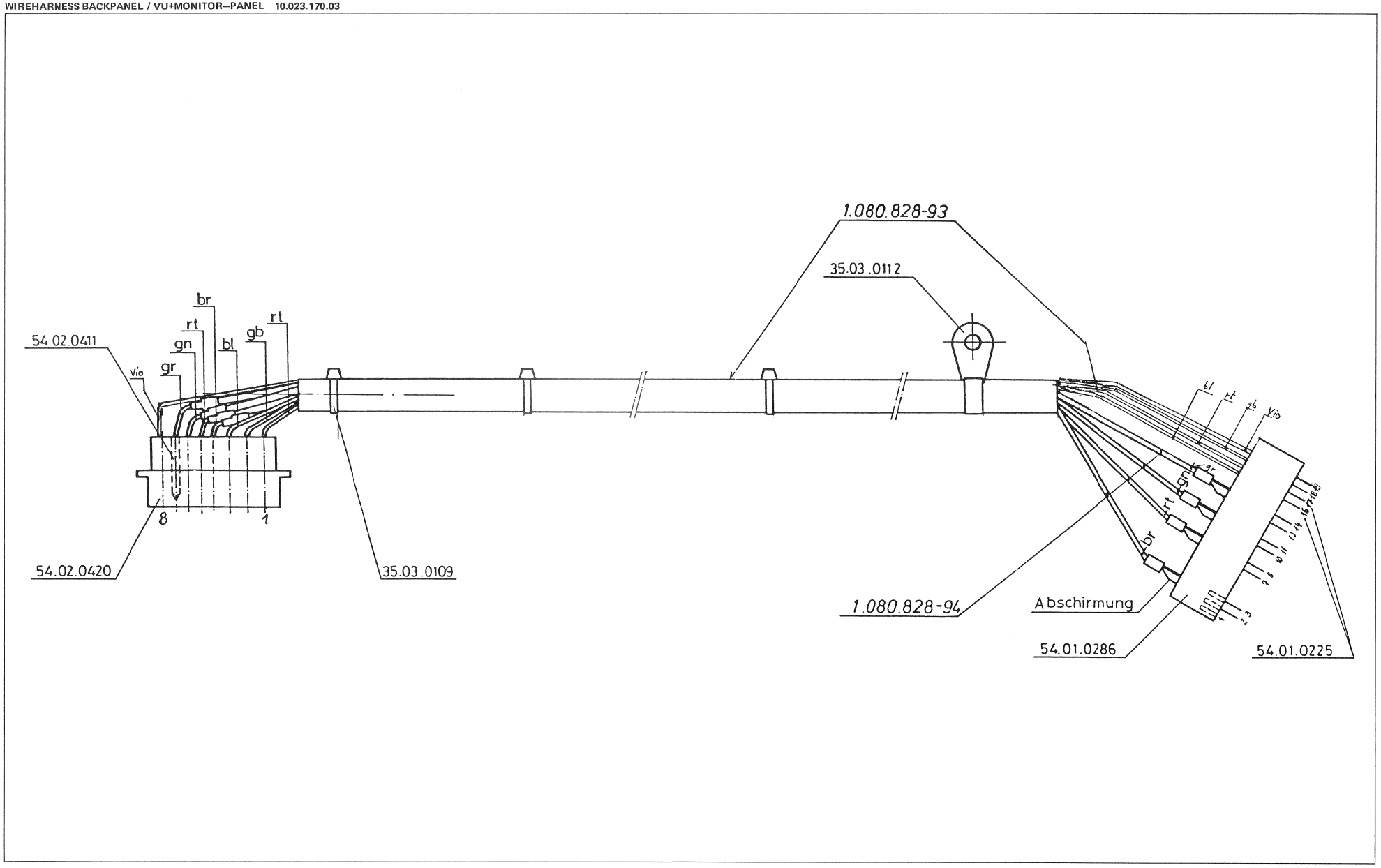
S T U D E R (03) 84/05/15 SA REC. F.. IEC I/II-IV 1.081.964.00 PAGE 1

BASIS BOARD / AUDIO A80 QC/VU 1.081.950–00

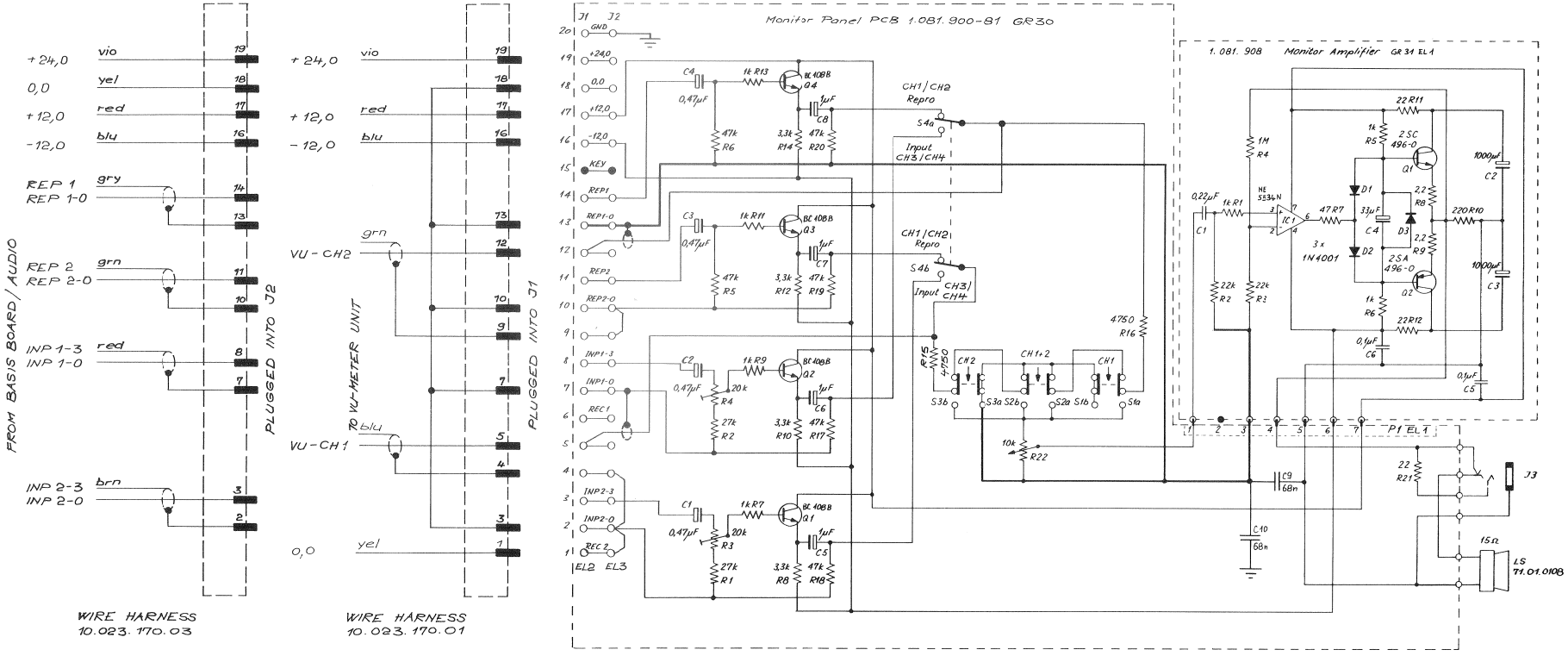


WIRE HARNESS CONNECTOR → ↓ to VU-Panel (MOLEX)	WIRE COLOR		BASIS BOARD 1.081.950-00 REC 2	REC 1	PU IN/OUT	STAB	REPR 2	REPR 1
1	red					14		
2	yel					12		
3	blu					13		
4	brn	scr	14					
		unc	11					
5	red	scr		14				
		unc		11				
6	grn	scr					14	
		unc					11	
7	gry	scr						14
		unc						11
8	vio				20A			

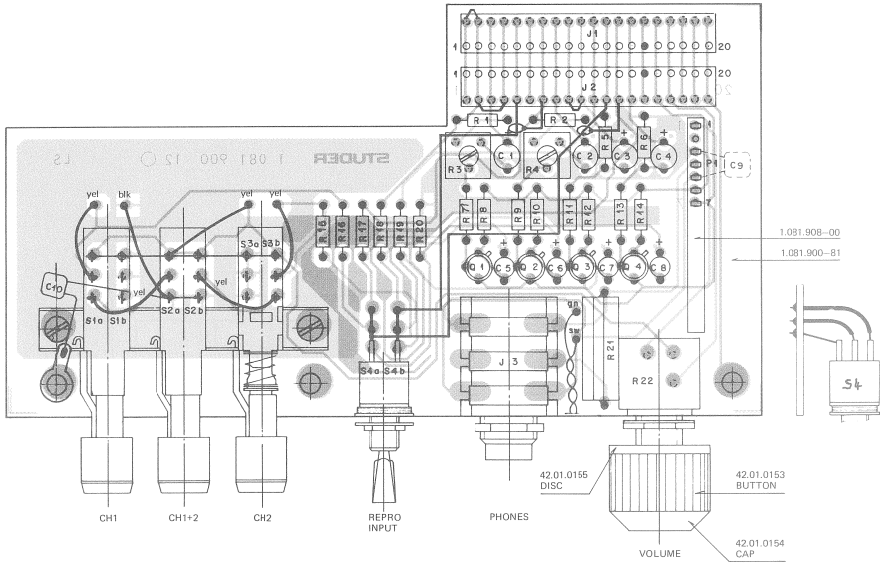
WIREHARNESS BACKPANEL / VU+MONITOR–PANEL 10.023.170.03

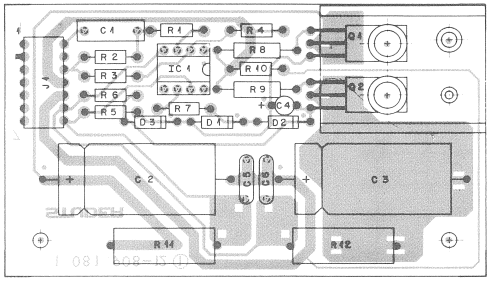


MONITOR PANEL A80 QC 1.081.900–81
MONITOR AMPLIFIER 1.081.908–00



MONITOR PANEL A80 QC 1.081.900–81
MONITOR AMPLIFIER 1.081.908–00





IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	C1	59.30.6478	0.47µF	16V TA	
	C2	59.30.6478	0.47µF	16V TA	
	C3	59.30.6478	0.47µF	16V TA	
	C4	59.30.6478	0.47µF	16V TA	
	C5	59.30.6109	1µF	16V TA	
	C6	59.30.6109	1µF	16V TA	
	C7	59.30.6109	1µF	16V TA	
	C8	59.30.6109	1µF	16V TA	
②	C9	59.99.0205	68nF	KER	
③	C10	59.99.0264	68nF	KER	
	Q1	50.03.0409	BC 108B		
	Q2	50.03.0409	BC 108B		
	Q3	50.03.0409	BC 108B		
	Q4	50.03.0409	BC 108B		
	R1	57.11.4273	27kΩ	5% 0.25W	
	R2	57.11.4273	27kΩ	5% 0.25W	
	R3	58.01.8203	20kΩ	10% 0.25W lin.	
	R4	58.01.8203	20kΩ	10% 0.25W lin.	
	R5	57.11.4473	47kΩ	5% 0.25W	
	R6	57.11.4473	47kΩ	5% 0.25W	
	R7	57.11.4102	1kΩ	5% 0.25W	
	R8	57.11.4332	3.3kΩ	5% 0.25W	
	R9	57.11.4102	1kΩ	5% 0.25W	
	R10	57.11.4332	3.3kΩ	5% 0.25W	
	R11	57.11.4102	1kΩ	5% 0.25W	
	R12	57.11.4332	3.3kΩ	5% 0.25W	

IND	DATE	NAME
④	7.6.83	[illegible]
③	21.8.80	Zwiebegger
②	2.11.79	[illegible]
①	13.9.79	Zwiebegger
○	18.2.77	Frey

STUDER | Monitor-Panel-Board | 1.081.900-81 | PAGE 1 OF 2

IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	R13	57.11.4102	1kΩ	5% 0.25W	
	R14	57.11.4332	3.3kΩ	5% 0.25W	
	R15	57.39.4751	4750Ω	1% 0.25W	
	R16	57.39.4751	4750Ω	1% 0.25W	
	R17	57.11.4473	47kΩ	5% 0.25W	
	R18	57.11.4473	47kΩ	5% 0.25W	
	R19	57.11.4473	47kΩ	5% 0.25W	
	R20	57.11.4473	47kΩ	5% 0.25W	
	R21	57.56.5220	22Ω	10% 4W	
	R22	58.04.0103	10kΩ	10% 0.25W lin.	
	P1	54.01.0226	20 contacts		AMP
	P2	54.01.0226	20 contacts		AMP
②	P3	56.28.0102			P
	P1	54.01.0217	7 contacts		AMP
↓	S1				
↓	S2	1.081.906-07			
↓	S3				
	S4	55.01.0153			

IND	DATE	NAME
④	7.6.83	[illegible]
③	21.8.80	Zwiebegger
②	2.11.79	[illegible]
①	13.9.79	Zwiebegger
○	18.2.77	Frey

R = Rendar Instruments LTD

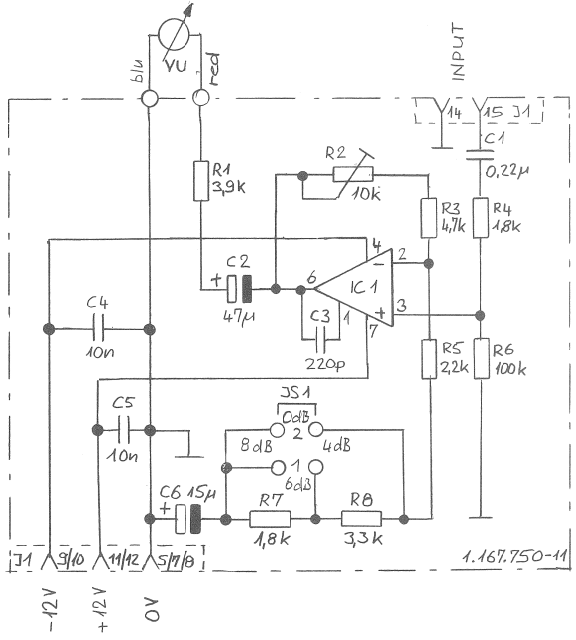
STUDER | Monitor-Panel-Board | 1.081.900-81 | PAGE 2 OF 2

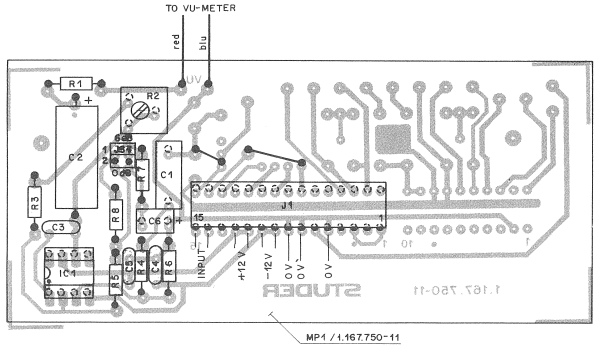
POS NO	PART NO	VALUE	SPECIFICATIONS	EQUIVALENT	MFR
C 1	59.12.2224	22µ	5% 63V		
C 2	59.25.4102	1000µ	-10% 25V		
C 3	59.25.4102	1000µ	-10% 25V		
C 4	59.30.3330	33µ	-20% 10V		
C 5	59.32.3104	1µ	-20% 40V		
C 6	59.32.3104	1µ	-20% 40V		
D 1	50.04.0122	1N4001			
D 2	50.04.0122	1N4001			
D 3	50.04.0122	1N4001			
① IC 1	50.05.0243	NE 5534			
R 1	57.41.4102	1k	5% .25W		
R 2	57.41.4223	22k	5% .25W		
R 3	57.41.4223	22k	5% .25W		
R 4	57.41.4105	1M	5% .25W		
R 5	57.41.4102	1k	5% .25W		
R 6	57.41.4102	1k	5% .25W		
R 7	57.41.4470	47	5% .25W		
R 8	57.03.5229	2.2	10% .5W		
R 9	57.03.5229	2.2	10% .5W		
R 10	57.41.4221	220	5% .25W		
R 11	57.56.4220	22	10% 4W		
R 12	57.56.4220	22	10% 4W		
Q 1	50.03.0470	BD 135-10	NPN		
Q 2	50.03.0474	BD 136-10	PNP		

IND	DATE	NAME
④	21.8.80	[illegible]
③	18.2.77	Frey

STUDER | Monitorverstärker | 1.081.908 | PAGE 1 of 1

VU–METER BOARD A80 QC 1.167.750–00



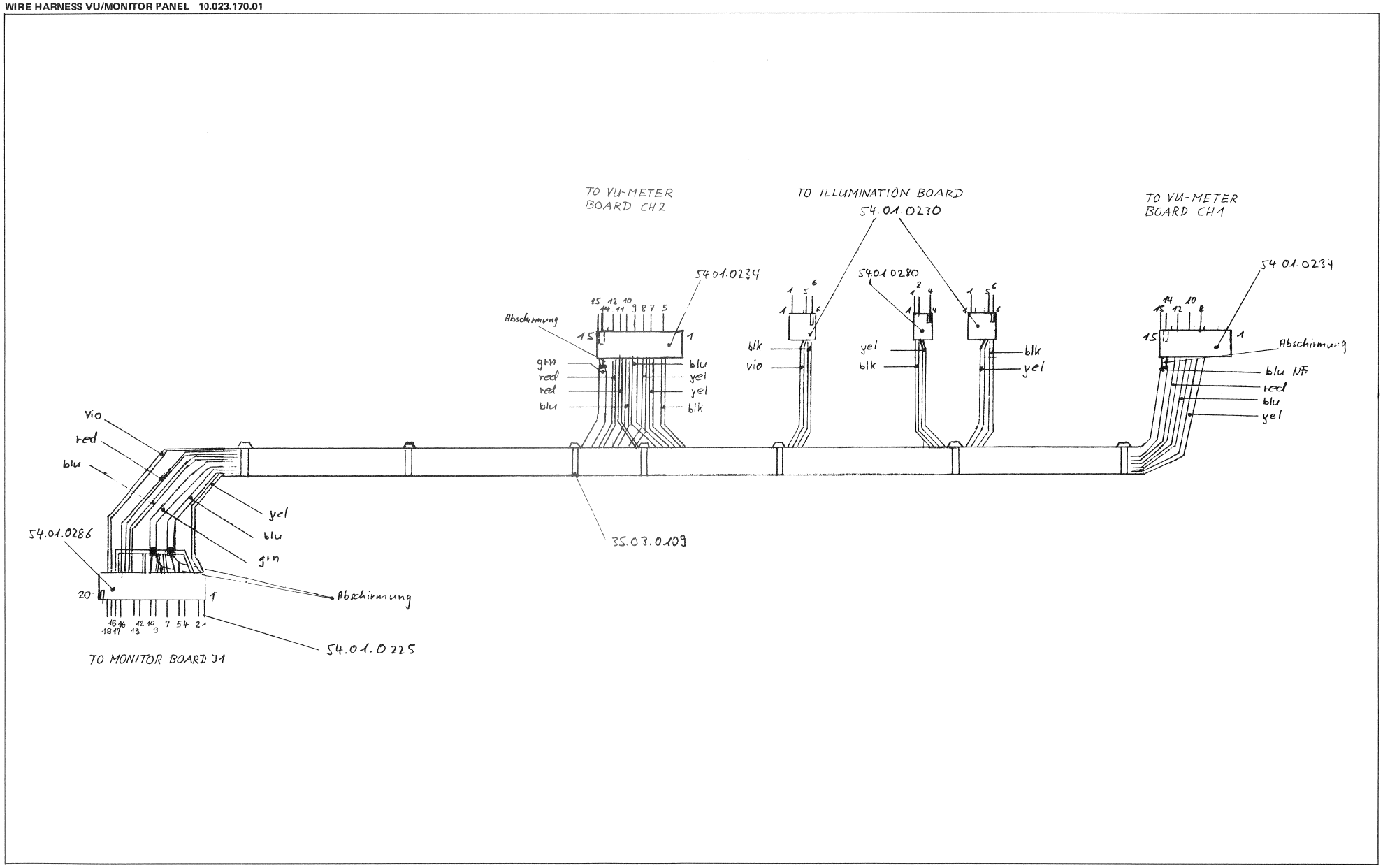


IND	POS NO	PART NO	VALUE	SPECIFICATIONS/EQUIVALENT	MFR
	C 01	59.31.6224	0.22u		
	C 02	59.25.4470	47u		
	C 03	59.34.4221	220p		
	C 04	59.32.3103	10n		
	C 05	59.32.3103	10n		
	C 06	59.36.0150	15u		
	IC 1	50.05.0243	NE5534	(TDA 1034)	
	J 01	54.01.0243	15 Pol	CIS-Socket-Strip	
	JS 1	54.01.0021		Jumper	
		54.01.0020		Jumper-Pin	
	MP 1	1.167.750-11		PCB	
	R 01	57.11.4392	3.9k		
	R 02	58.01.8103	10k lin	Potentioneter	
	R 03	57.11.4472	4.7k		
	R 04	57.11.4182	1.8k		
	R 05	57.11.4222	2.2k		
	R 06	57.11.4104	100k		
	R 07	57.11.4182	1.8k		
	R 08	57.11.4332	3.3k		
	XIC1	53.03.0166		IC-Socket	

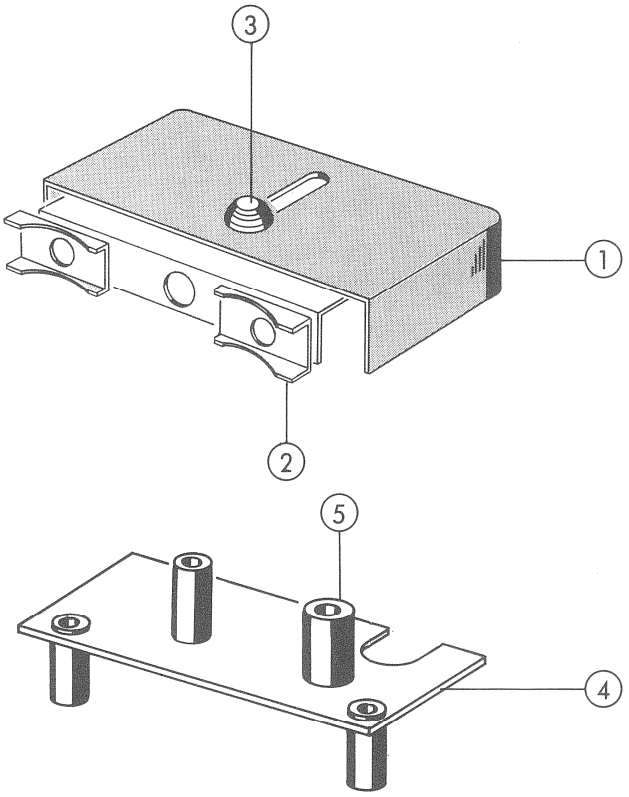
IND	DATE	NAME
4		
3		
2		
1		
0	15.05.84	HO

STUDER	VU-METER BOARD	PL	1.167.750-00	PAGE 1 OF 1

WIRE HARNESS VU/MONITOR PANEL 10.023.170.01



HEAD SHIELD



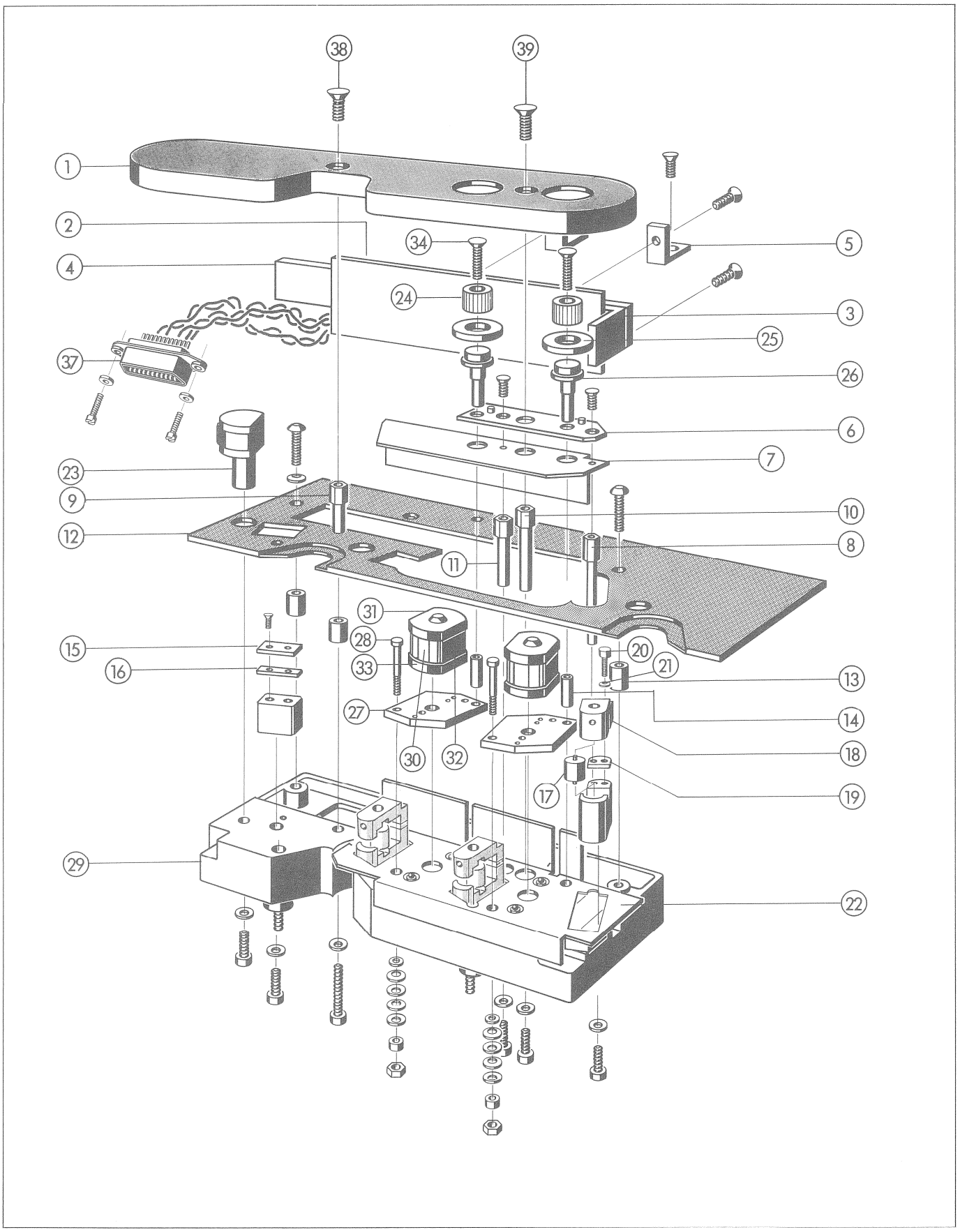
Mounting accessories to POS 4

	3	21.53.0371	Screw M3x14
	3	24.16.1030	Lock washer

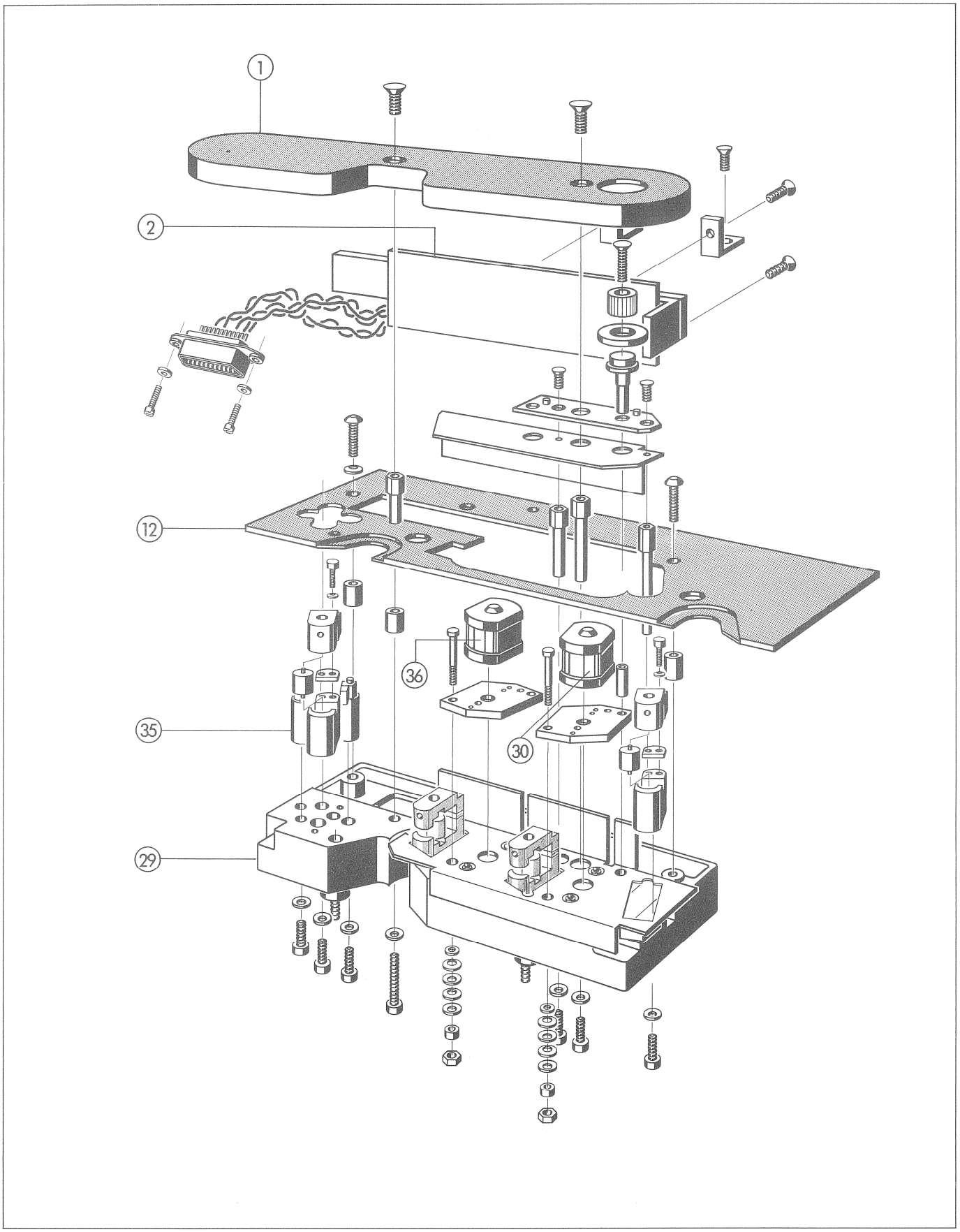
HEAD SHIELD

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.080.245.00	**Head shield, compl.**
to above	2	24.16.3023	Circlip
01	1	1.080.245.01	Head shield housing
	1	1.080.245.02	Guide bolt
02	1	1.080.246.00	Head shield
	1	1.080.315.06	Spring bolt
	1	1.080.315.07	Retaining bolt
	1	1.080.315.08	Guide bolt
03	1	1.080.315.09	Knob
	1	1.080.315.10	Tension spring
	1	1.080.315.11	Washer
04	1	1.080.247.00	Mounting plate compl.
05 to above	1	1.077.100.05	Socket plug
	1	1.077.100.21	Clamping sleeve
	1	21.01.0354	Screw M3x6
	1	24.16.1030	Lock washer

HEAD BLOCK ASSEMBLY REPRODUCE



HEAD BLOCK ASSEMBLY REC/REPRO



HEAD BLOCK ASSEMBLY

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.020.699.00	**Headblock assembly (REPRODUCE)**
01	1	1.020.694.06	Head block cover
to			
above	1	21.51.2472	Screw M4x16
	1	21.51.2456	Screw M4x10
02	1	1.020.709.00	Preamplifier Reproduce
03	1	1.020.680.05	Angle bracket
04	1	1.020.680.04	Cover strip
to			
above	2	21.51.2354	Screw
05	2	1.020.680.03	Angle bracket
to			
above	4	21.51.2354	Screw
06	1	1.020.682.05	Guiding plate
to			
above	2	21.51.2355	Screw
07	1	1.020.682.04	Screen plate (top)
08	1	1.020.682.07	Spindle
to			
above	1	21.53.0355	Screw
	1	24.16.1030	Lock washer
09	1	1.020.682.09	Spindle
to			
above	1	21.53.0461	Screw
	1	24.16.1040	Lock washer
10	1	1.020.682.10	Spindle
to			
above	1	21.53.0456	Screw
	1	24.16.1040	Lock washer
11	1	1.020.682.08	Spindle
to			
above	1	21.53.0456	Screw
	1	24.16.1040	
12	1	1.020.692.05	Cover plate
to			
above	2	21.51.8460	Screw
	1	24.16.2040	Fan disk
13	3	1.010.020.27	Spacer sleeve
14	2	1.020.680.26	Sleeve
15	1	1.020.680.13	Guide **(Reproduce Version)**
16	1	1.020.680.11	Spacer shim **(Reproduce Version)**
17	1	1.020.891.00	Guide roller
18	1	1.020.692.04	Guide
to			
above		41.99.0108	Sinter bearing
19	1	1.020.692.03	Spacer shim
20	2	21.53.0372	Screw
21	2	24.16.1030	Lock washer

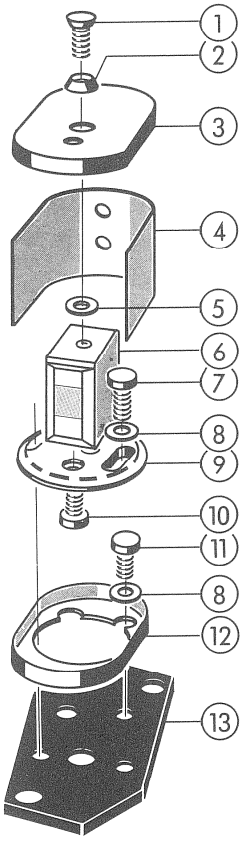
HEAD BLOCK ASSEMBLY

INDEX	QTY	ARTICLE NUMBER	PART NAME
22	1	1.020.692.01	Screen plate 0.15" (bottom)
23	1	1.020.680.15	Guide 0.15"
to			
above	1	21.53.0456	Screw
	1	24.16.1040	Lock washer
24	2	1.020.680.22	Knob
25	2	1.020.680.23	Scale
to			
above	2	1.020.680.24	Pin
26	2	1.020.680.25	Guiding nut
to			
above	2	25.06.5155	Pin
27	2	1.020.680.50	Adjusting plate
to			
above	4	41.01.0130	Ball
	4	1.020.710.03	Adjusting screw
28	2	1.020.768.13	Bolt
to			
above	2	1.337.958.04	Pressure spring
	28	37.01.0101	Plate spring
	2	1.010.004.27	Spacer sleeve
	2	22.01.8030	Nut
29	1	1.020.691.00	Headblock assembly
30	2	1.116.801.00	Reproduce head
31	2	1.216.001.01	Screen cover
32	2	1.216.001.03	Screen case
33	2	1.020.680.51	Screen cover
34	2	21.51.2472	Screw
37	1	54.02.0133	24 - Pin socket
38	1	21.53.2472	Screw M4x16
39	1	21.53.2456	Screw M4x10
		1.020.698.00	**Headblock assembly (REC/REPRO)**
			as 1.020.699.00 however:
01	1	1.020.692.06	Headblock cover
02	1	1.020.708.00	Preamplifier Reproduce
12	1	1.020.697.05	Cover plate
29	1	1.020.679.00	Head block assembly
35	2	1.116.712.01	Erase head
to			
above	1	1.710.122.02	Spacer shim
	1	1.020.691.07	Lower part to Erase head
36	1	1.116.800.00	Record head

HEAD BLOCK ASSEMBLY

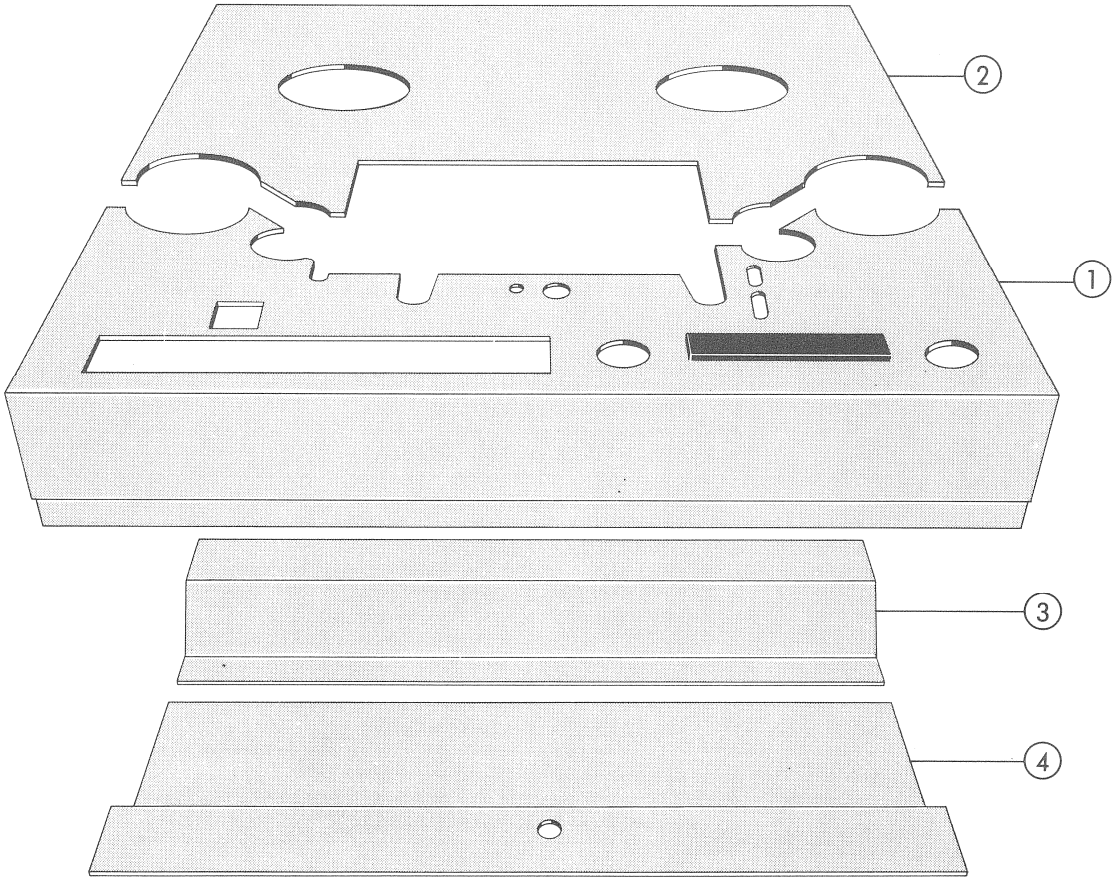
INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.020.697.00	Headblock assembly fulltrack (REC/REPRO)
			as 1.020.698.00 however
36	1	1.317.110.00	Record head

Accessory set for Philips ferrite heads



01	1	21.02.2278	Screw
02	1	23.99.0110	Washer
03	1	1.216.001.01	Top screen
04	1	1.216.001.03	Screen
05	1	23.01.2043	Washer
	1	1.116.800.00	Record head
06	1	1.116.801.00	Reproduce head
	1	1.317.110.00	Record head (Fulltrack)
07	2	21.01.0278	Screw
08	4	24.16.1025	Lock washer
09	1	1.020.680.52	Spacer shim
10	2	1.020.680.54	Screw spec.
11	2	21.01.0277	Screw
12	1	1.020.680.51	Bottom screen
13	1	1.020.680.50	Swivel plate

COVER



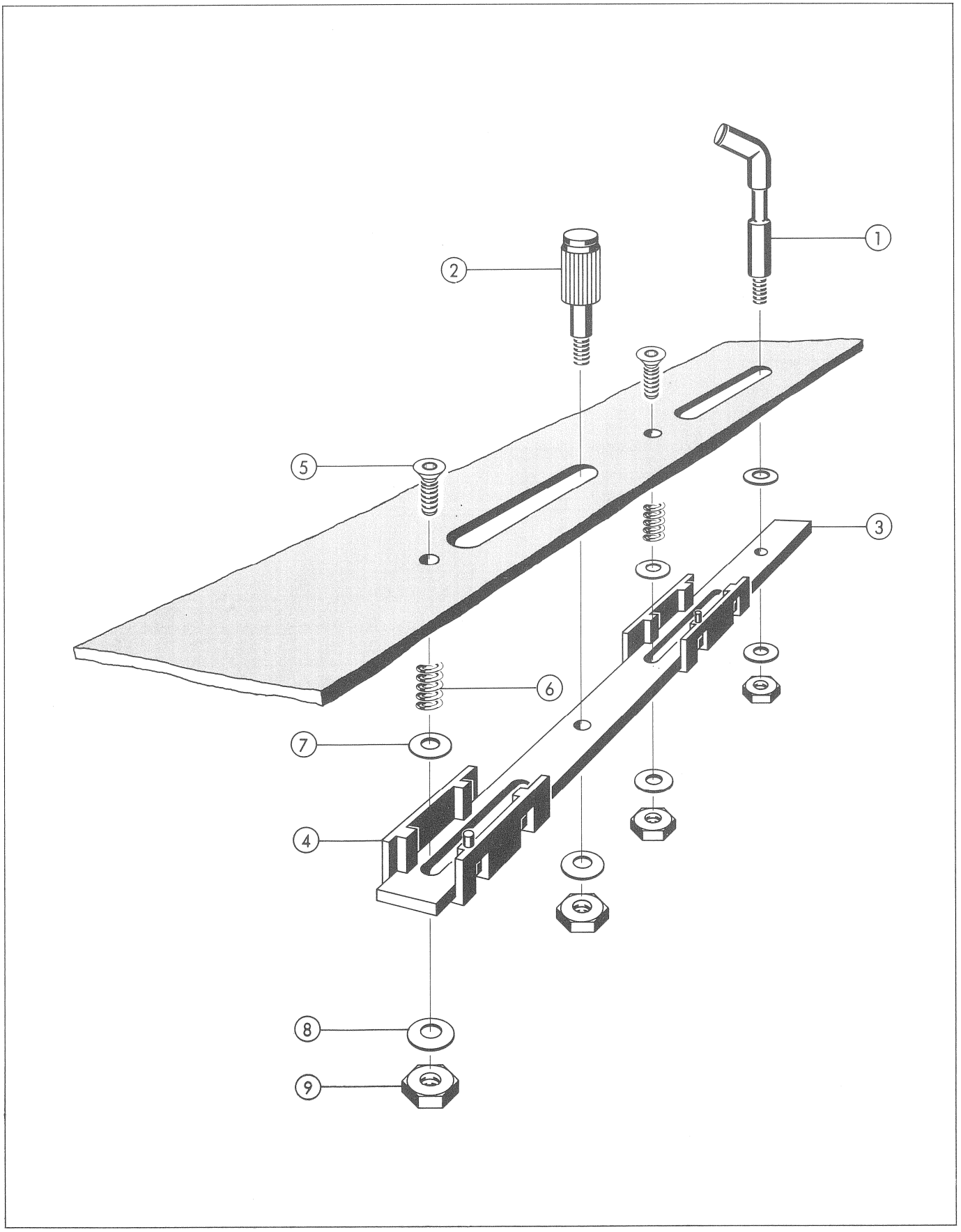
Mounting accessories

	10	21.51.8455	Screw M4x8
	3	21.51.8454	Screw M4x6
	3	24.16.1040	Lock washer
	3	23.01.2043	Washer

COVER

INDEX	QTY	ARTICLE NUMBER	PART NAME
01	1	1.081.613.00	Tape deck cover (front)
02	1	1.081.602.00	Tape deck cover (rear)
03	1	1.080.362.00	Lower cover (rear)
04	1	1.080.362.02	Lower cover (front)

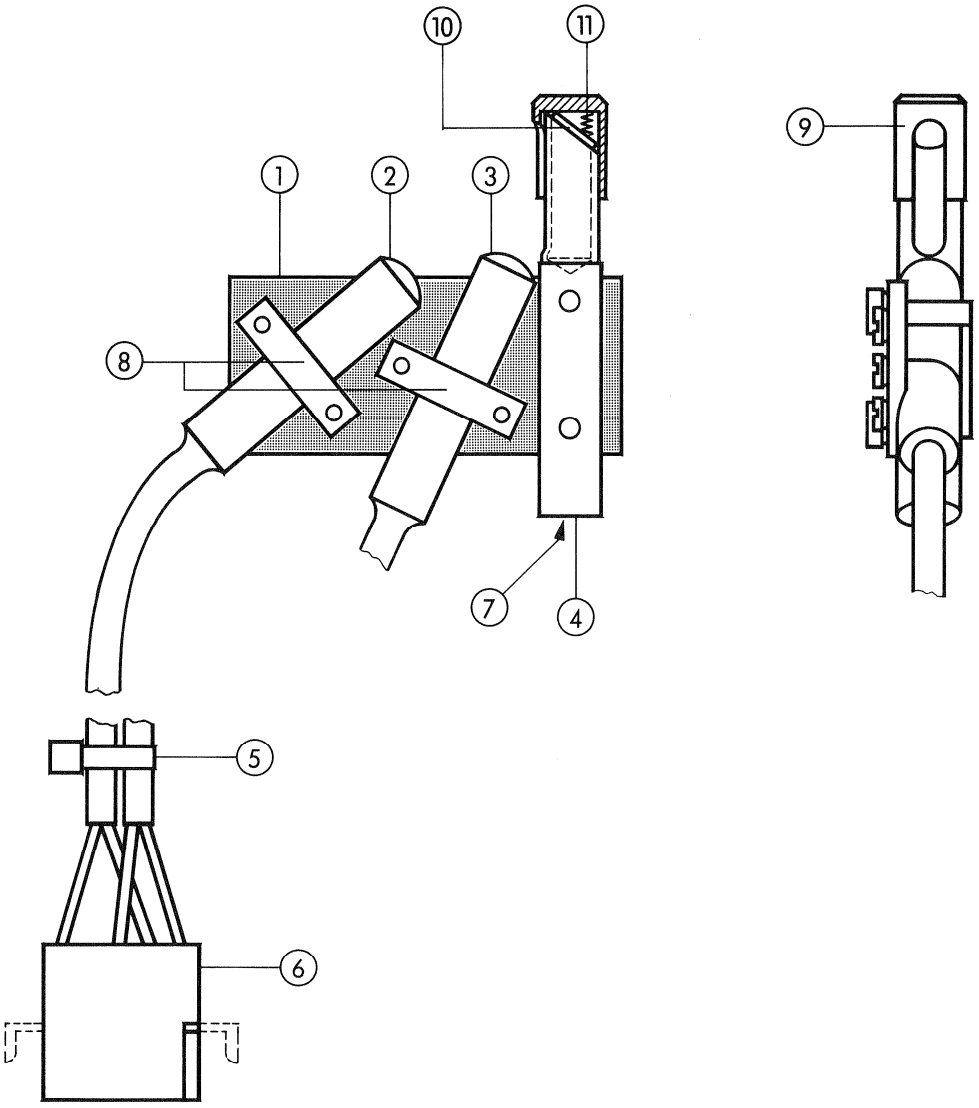
EDIT SLIDER



EDIT SLIDER

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.080.319.00	**EDIT slider 0.25"**
01 to above	1	1.080.319.01	Tape lifter bolt 0.25"
	1	24.16.1030	Lock washer
	1	22.01.8030	Nut
02 to above	1	1.080.318.06	Knob
	1	24.16.1030	Lock washer
	1	22.01.8030	Nut
03	1	1.080.318.01	Slider
04	2	1.020.820.03	Slider case
05	2	21.01.2357	Screw
06	2	1.080.319.02	Spring
07	2	1.010.029.23	Washer
08	2	23.01.2032	Washer
09	2	22.01.8030	Nut

TAPE END SWITCH



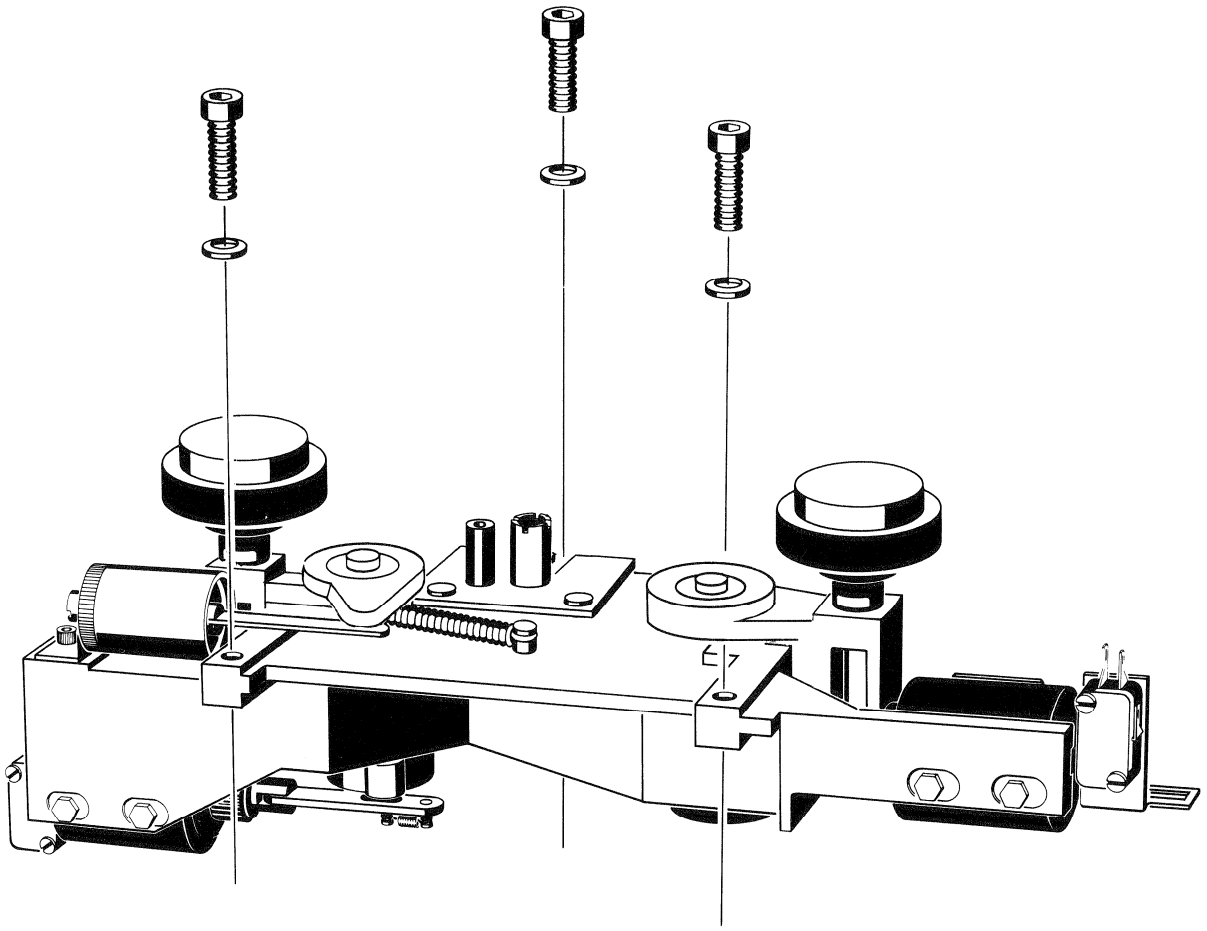
Mounting accessories

	1	21.53.0521	Screw M5x14
	1	24.16.1050	Lock washer

TAPE END SWITCH

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.080.313.00	Tape end switch
01	1	1.080.300.01	Base plate
02	1	1.080.300.03	Light projector
03	1	1.080.300.04	Light detector
04	1	1.080.313.01	Mount
to			
above	2	21.01.0355	Screw
	2	24.16.1030	Lock washer
05	1	35.03.0109	Securing strap
06	1	54.02.0403	Molex connector
to			
above	1	54.02.0411	Molex pin
	3	54.02.0412	Molex femal
07		21.53.0471	Fixing screw
08	1	1.080.300.02	Clamp
	2	21.01.0204	Screw
	2	24.16.1020	Lock washer
09	1	1.080.313.02	Bush
10	1	1.080.300.07	Mirror
11	1	1.080.303.04	Pressure spring

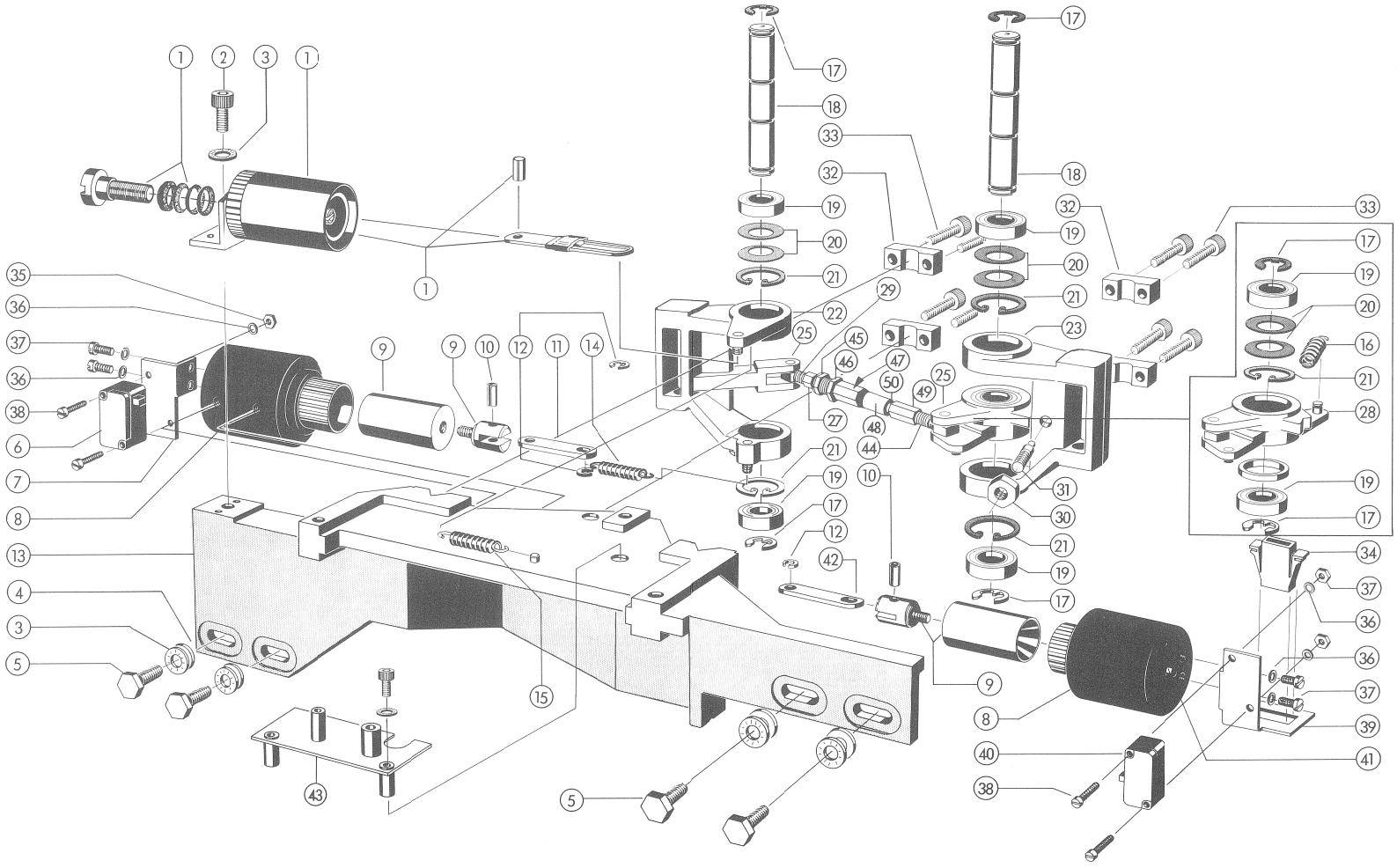
PINCH ROLLER ASSEMBLY



Mounting accessories

3	21.53.0461	Screw M4x22
3	24.16.1040	Lock washer

PINCH ROLLER ASSEMBLY

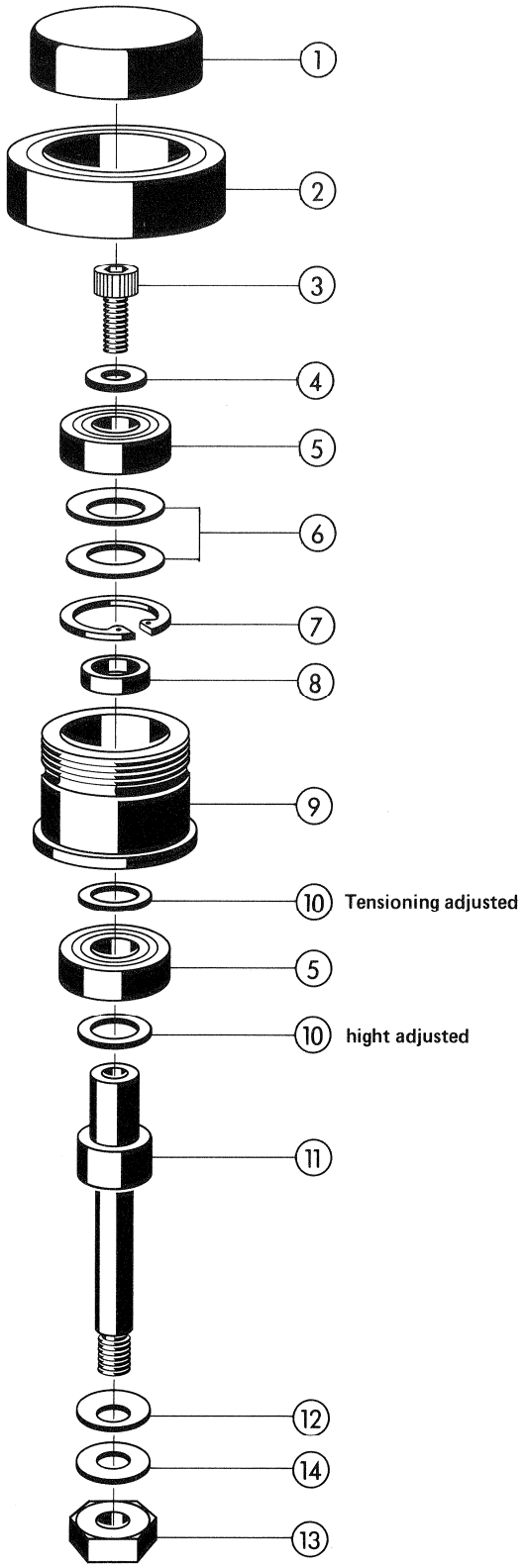


PINCH ROLLER ASSEMBLY

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.080.122.00	**Pinch roller assembly 0.15"**
01	1	1.080.138.00	Dashpot, compl.
02	1	21.53.0455	Screw
03	13	24.16.1040	Lock washer
04	4	1.010.018.23	Washer
05	4	21.60.4456	Screw M4x10
06	1	55.01.0124	Microswitch
07	1	1.080.120.10	Bracket
08	2	1.014.745.00	Pressure solenoid
09	2	1.014.743.00	Solenoid armature, compl.
10	2	25.06.8356	Cylindrical pin
11	1	1.080.123.00	Rod
12	2	24.16.3023	Circlip
13	1	1.080.124.01	Die cast chassis
14	1	1.080.120.14	Tension spring
15	1	1.080.230.05	Tension spring
16	1	1.080.125.04	Tension spring
17	6	24.16.3080	Circlip
18	2	1.080.126.01	Spindle
19	6	41.99.0111	Ball bearing
20	6	37.02.0206	Spring washer K
21	5	24.16.4220	Retaining ring D22
22	1	1.080.140.01	Stabilizer arm
23	1	1.080.139.01	Andruckarm 0.15"
24	1	1.080.135.02	Eye screw, right - hand thread
25	2	1.080.135.03	Spindle
26	1	1.080.130.02	Eye screw, left - hand thread
27	1	22.01.8050	Nut M5
28	1	1.080.130.01	Pressure lever
29	1	1.080.135.02	Eye screw, right-hand thread
30	1	22.01.8040	Nut M4
31	1	1.080.125.03	Eye screw
32	4	1.080.124.02	Clamp

INDEX	QTY	ARTICLE NUMBER	PART NAME
33	8	21.53.0472	Screw
34	1	54.02.0403	Molex plug housing
to			
above	1	54.02.0411	Molex pin
	4	54.02.0412	Molex femal
35	4	22.01.8030	Nut
36	8	24.16.1030	Lock washer
37	4	21.53.0353	Screw
38	4	21.53.0372	Screw
39	1	1.080.120.08	Bracket
40	1	55.01.0124	Microswitch
41	2	1.080.120.09	Switching bolt
42	1	1.080.120.06	Rod
43	1	1.080.247.00	Mounting plate
44	1	1.080.130.02	Eye Screw, left-hand thread
45	1	1.080.115.04	Collar
46	1	1.080.115.05	Hexagonal M12
47	1	1.010.056.37	Pressure spring
48	1	1.080.115.03	Clamping sleeve
49	1	1.080.115.01	Collar M5 left handed thread
50	1	1.080.115.02	Shank screw M5 handed thread

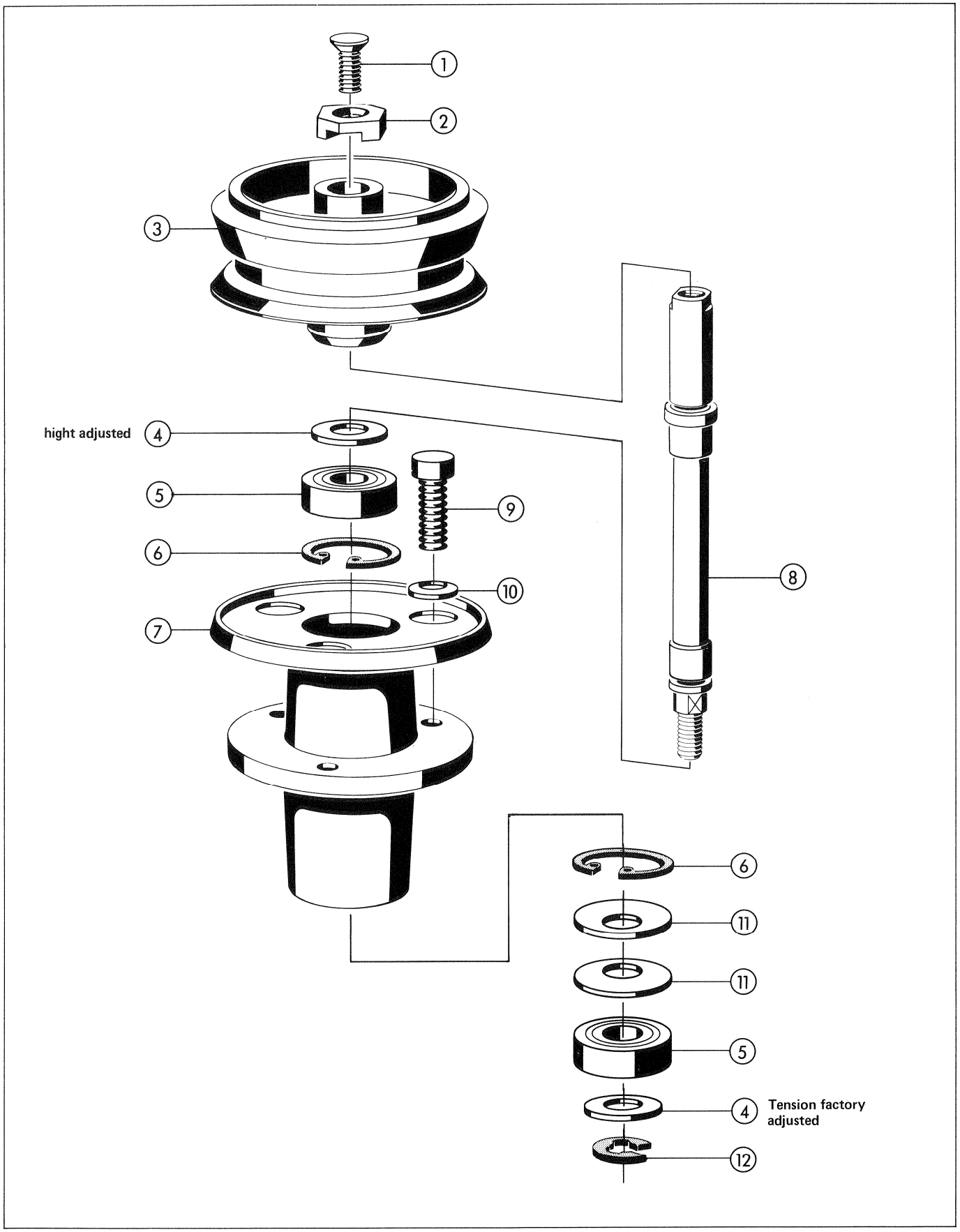
PINCH ROLLER



PINCH ROLLER

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.080.549.00	**Pinch roller compl. 0.15"**
01	1	1.080.530.05	Cover nut
02	1	1.080.549.01	Pinch roller polished, 015"
03	1	21.53.0456	Screw
04	1	23.01.3043	Washer
05	2	41.99.0103	Ball bearing
06	2	37.02.0206	Spring washer
07	1	24.16.4220	Circlip D22
08	1	1.080.530.03	Spacer shim
09	1	1.080.550.01	Bearing housing 0.25"
10		1.080.530.06 /07 /08 /09 /10	Spacer shim (Factory adjusted)
11	1	1.080.530.02	Spindle 0.25"
12	1	24.16.1060	Lock washer
13	1	22.01.8060	Nut
14	1	23.01.2064	Washer

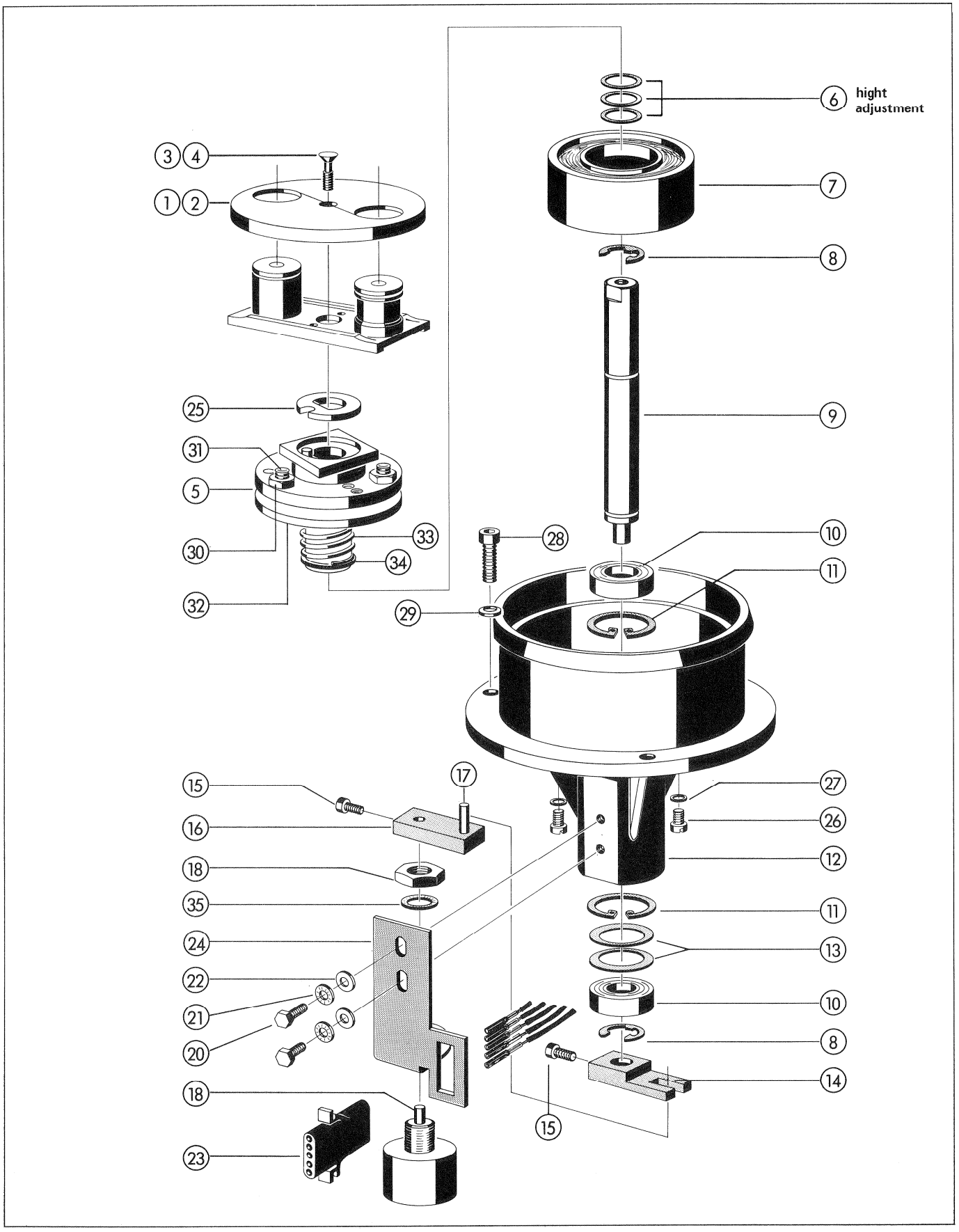
GUIDE ROLLER, LEFT



GUIDE ROLLER, LEFT

INDEX	QTY	ARTICLE NUMBER	PART NAME
01	1	21.53.2456	Screw M4x10
02	1	1.080.105.04	Clamp
03	1	1.080.595.02	Guide roller left 0.15"
		1.080.196.00	**Idler roller bearing compl.**
04		1.080.530.06	Spacer shim (Factory adjusted)
		/07	
		/08	
		/09	
		/10	
05	2	41.99.0111	Ball bearing
06	2	24.16.4220	Retaining ring, internal
07	1	1.080.205.00	Bearing housing, compl.
08	1	1.080.196.01	Shaft
09	3	21.53.0472	Screw M4x16
10	3	24.16.1040	Lock washer
11	2	37.02.0206	Spring washer
12	1	24.16.5100	Retaining ring external D10

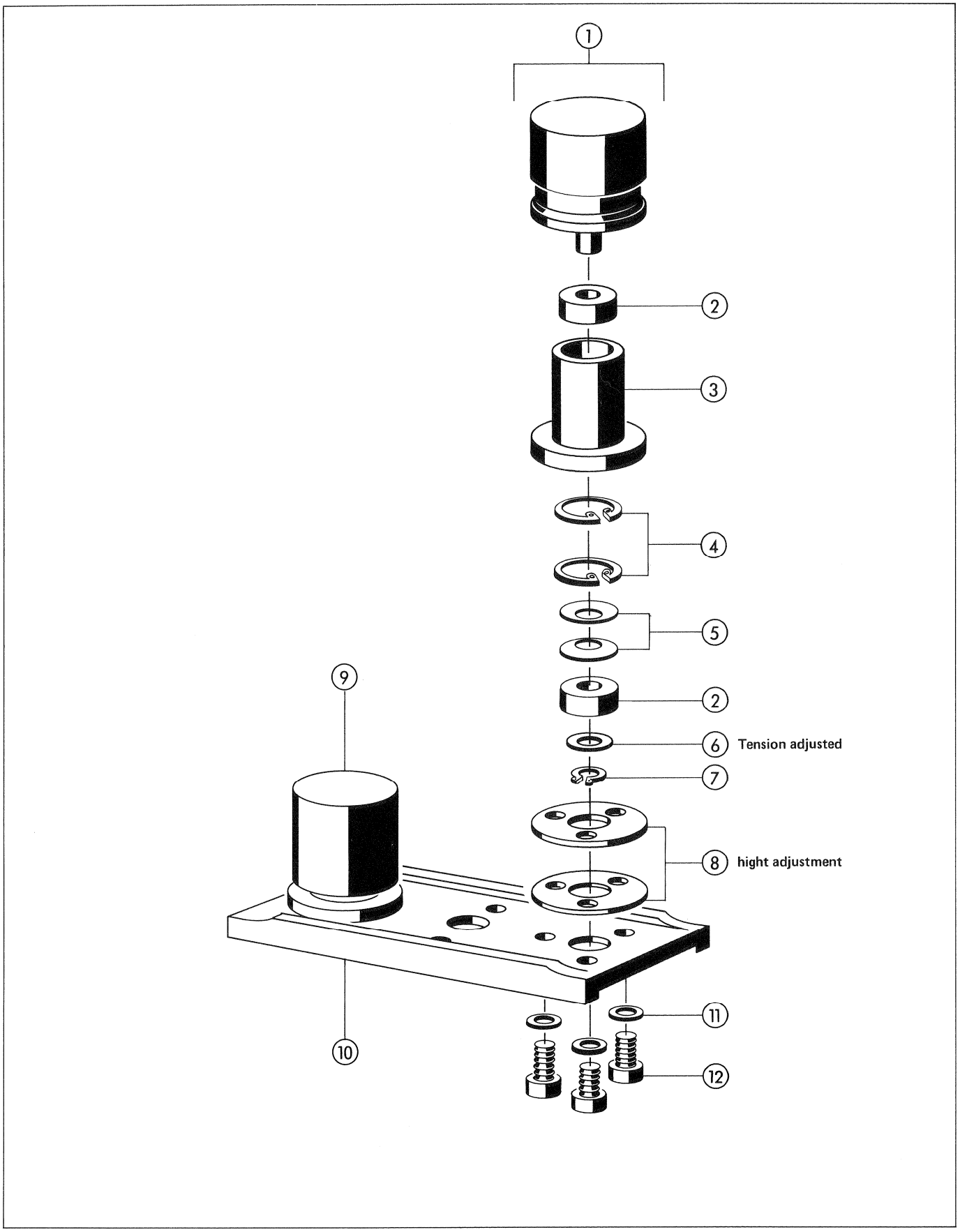
TAPE TENSION SENSOR, LEFT



TAPE TENSION SENSOR, LEFT 1.080.142.00, RIGHT 1.080.146.00

INDEX	QTY	ARTICLE NUMBER	PART NAME
01	1	1.080.595.08	Engraved cover, left
02	1	1.080.595.07	Engraved cover, right
03	1	1.080.142.10	Countersunk screw, special
04	1	24.16.3032	Circlip
05	1	1.080.148.00	Lock wheel, with bolt
06	1	1.080.530.06 -/10	Spacer shim
07	1	1.080.153.00	Holding magnet, compl.
08	2	24.16.3080	Circlip
09	1	1.080.142.07	Spindle
10	2	41.99.0111	Ball bearing
11	2	24.16.4220	Retaining ring, internal Ø22
12	1	1.080.150.00	Bearing housing, compl.
13	2	37.02.0206	Spring washer
14	1	1.080.310.08	Coupling fork
15	2	21.53.0355	Screw
16	1	1.080.142.08	Coupling lever
17	1	25.06.8208	Cylindrical pin
18	1	58.99.0110	Potentiometer with nut
19	2	37.02.0105	Spring washer K
20	2	21.60.4455	Hexagonal - head screw
21	2	24.16.1040	Lock washer
22	2	23.01.2043	Washer
23 to above	1	54.02.0403 54.02.0412	Connector housing Molex femal
24	1	1.080.142.06	Angle bracket
25	1	1.080.142.11	Coupling washer
26	3	21.53.0354	Screw
27	3	24.16.1030	Lock washer
28	3	21.53.0472	Screw M4x16
29	3	24.16.1040	Lock washer
30	3	22.01.5040	Nut M4
31	3	1.080.142.03	Treded stud
32	1	1.080.142.02	Blocking disc
33	1	1.080.142.04	Spring (pressure)
34	1	24.16.5160	Retaining ring
35	2	37.02.0206	Spring washer

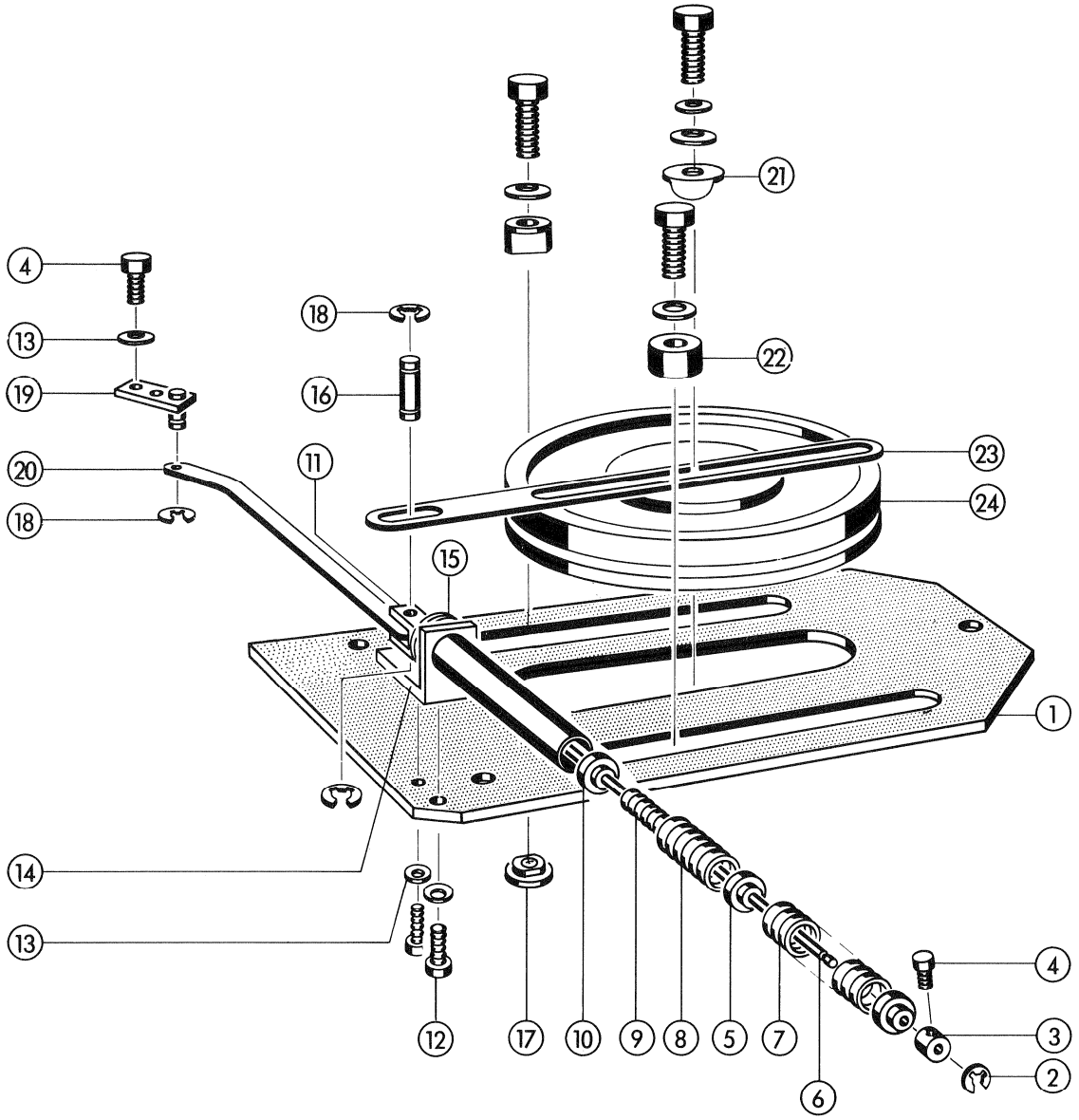
TAPE TENSION SENSOR ROLLERS



TAPE TENSION SENSOR ROLLERS

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.080.449.81	**Tape tension sensor rollers 0.15"**
	1	1.080.454.00	Guide roller 0.15" compl. mounted
01	1	1.080.457.00	Guide roller with spindle
02	2	41.04.0102	Ball bearing
03	1	1.080.453.01	Bearing housing
04	2	24.16.4100	Retaining housing, internal
05	2	37.02.0201	Spring washer
06		1.080.453.03	Spacer shim
07	1	24.16.5030	Retaining ring, external
08		1.080.450.02	Spacer shim (Factory adjusted)
		/03	
		/04	
		/05	
	1	1.080.460.00	Roller compl. mounted
09	1	1.080.463.00	Roller with spindel
10	1	1.080.450.01	Roller support
11	3	24.16.1030	Lock washer
12	3	21.53.0354	Screw

DASHPOT ASSEMBLY



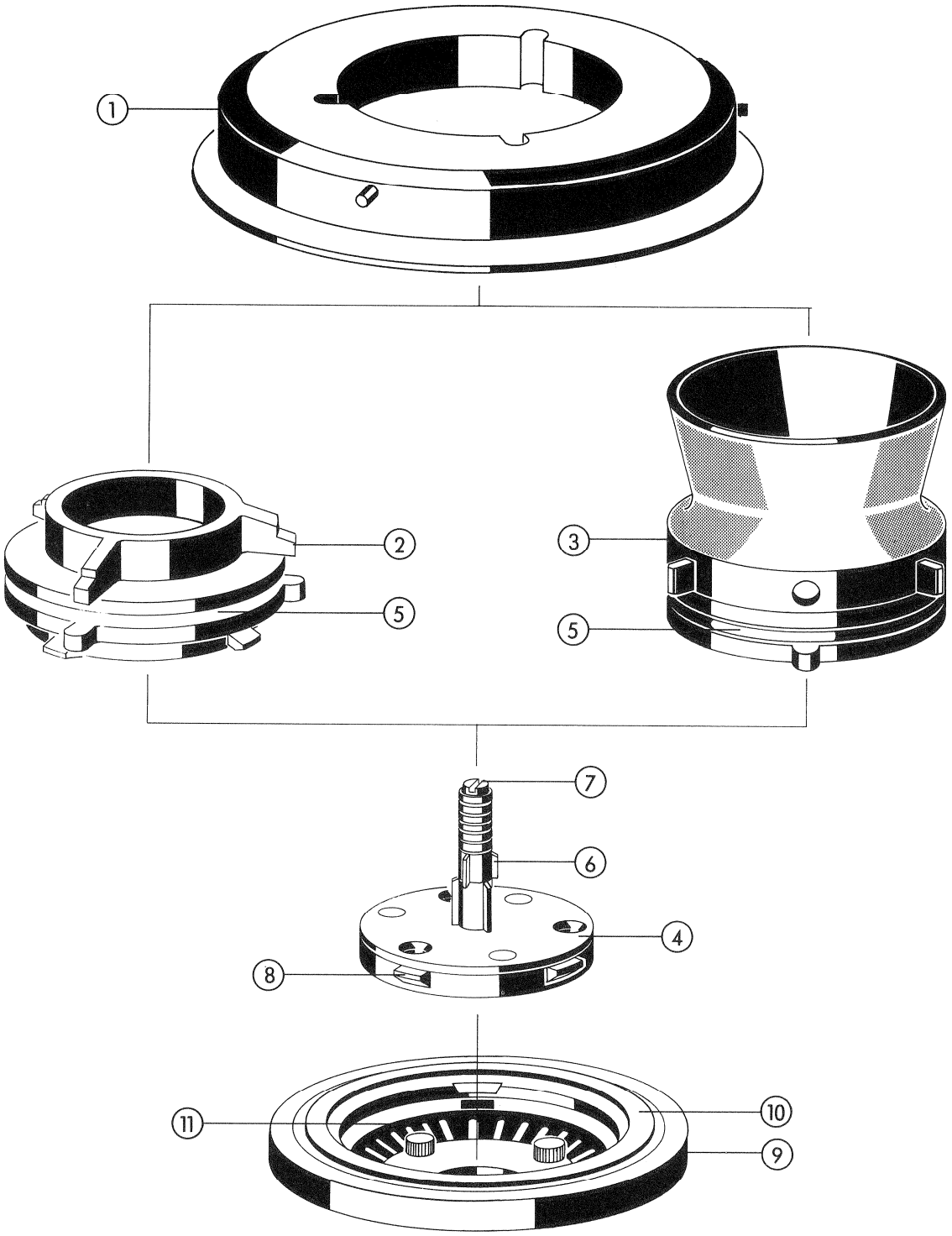
Mounting accessories

	3	21.53.0454	Screw M4x6
	3	24.16.1040	Lock washer

DASHPOT ASSEMBLY

INDEX	QTY	ARTICLE NUMBER	PART NAME
01	1	1.080.164.25	Mounting plate
	1	**1.080.169.00**	**Spring assembly, compl.**
02	1	24.16.3032	Circlip
03	1	1.080.170.10	Adjusting ring
04	2	21.53.0353	Screw
05	1	1.080.170.08	Guide sleeve
06	1	1.080.169.01	Axle
07	1	1.080.170.06	Pressure spring
08	1	1.080.170.06	Pressure spring
09	1	1.080.170.09	Pressure spring
10	3	1.080.170.05	Guiding sleeve
11	1	1.080.170.01	Linkage
12		21.01.0354	Screw
13		24.16.1030	Lock washer
14	1	1.080.175.00	Bearing
15	1	1.080.170.11	Guiding sleeve
16	1	1.080.170.02	Pivot pin
17	2	1.080.166.27	Nut spec.
18	4	24.16.3023	Circlip
19	1	1.080.158.00	Lever riveted
20	1	1.080.142.05	Rod
21	1	1.080.166.29	Clamping ring
22	2	1.080.166.28	Clamping part
23	1	1.080.166.26	Lever
24	1	1.080.162.81	Dashpot 0.15", compl.

ADAPTOR



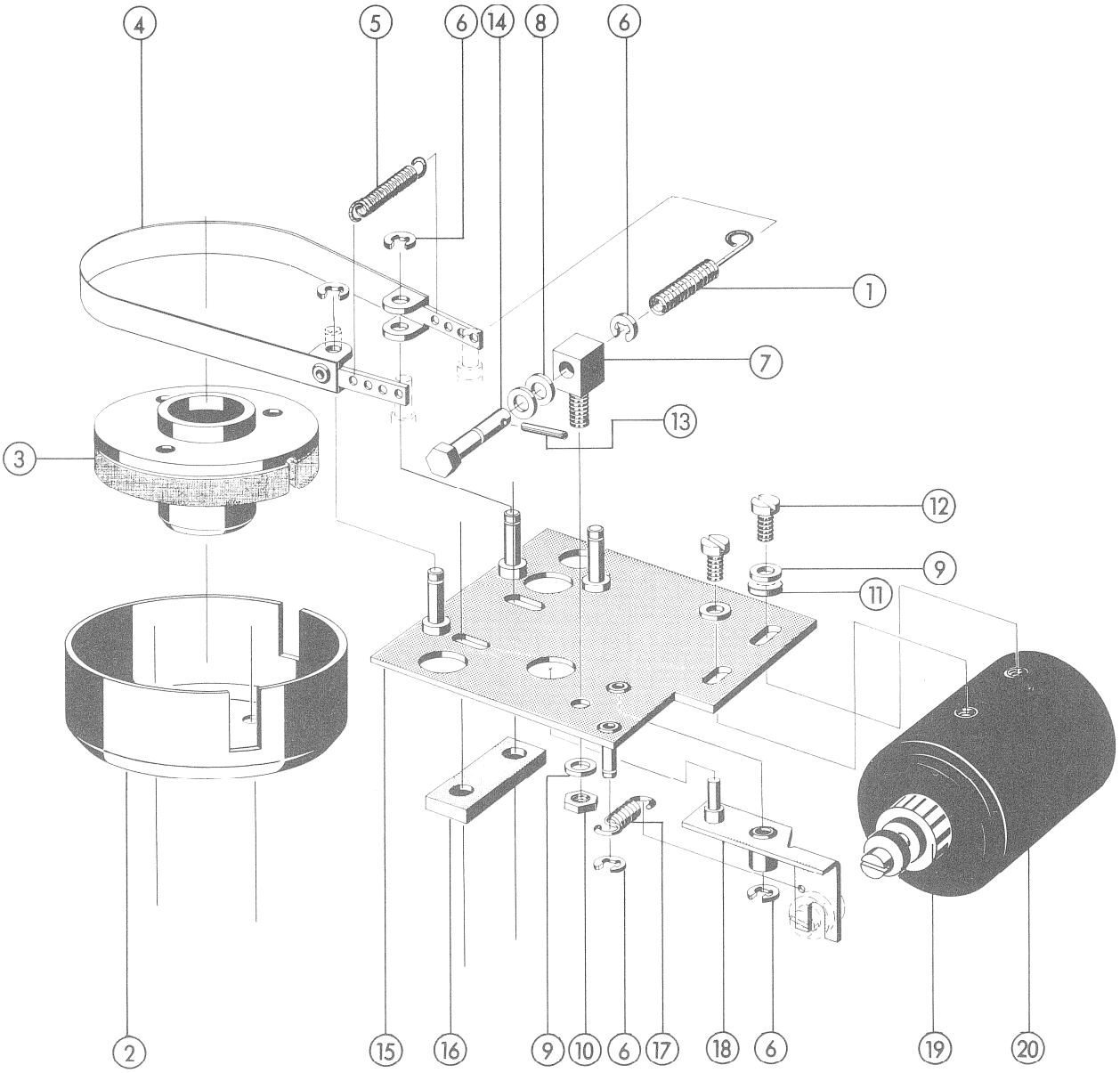
Mounting accessories

	3	21.51.0456	Screw M4x10
	3	24.16.1040	Lock washer

ADAPTOR

INDEX	QTY	ARTICLE NUMBER	PART NAME
01	1	1.013.350.00	Adaptor compl.
02	1	89.01.0354	NAB Adaptor
03	1	1.013.331.00	NAB Adaptor with grip slave
04	1	1.013.326.00	Three - pronged adaptor
05	1	10.039.001.00	rubber ring
06	1	1.062.390.01	Guiding sleeve
07	1	1.013.326.06	Adaptor screw
to			
above	3	1.736.794.03	Spring
08	1	1.013.326.03	Bolt
09	1	1.013.325.00	Adaptor support
10	1	1.013.325.03	Rubber ring
11	1	37.02.0216	Spring washer

BRAKES



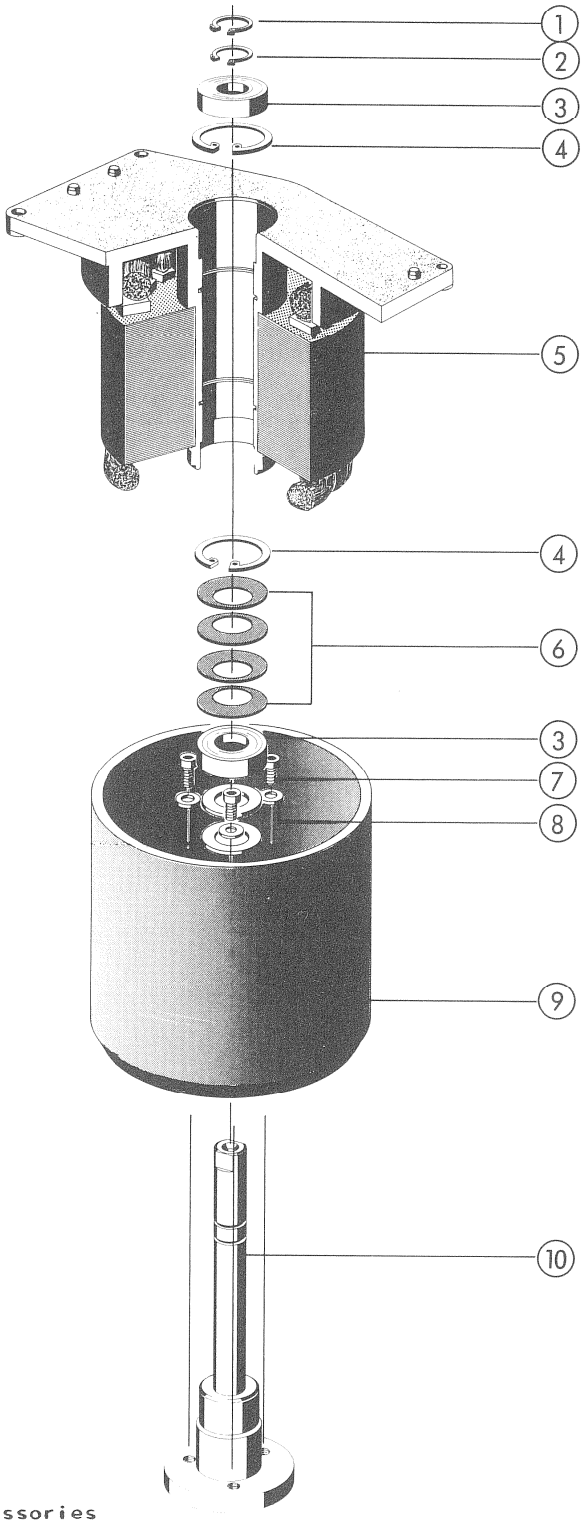
Mounting accessories

	2	21.53.0455	Screw M4x8
	2	24.16.1040	Lock washer
	2	23.01.2043	Washer

BRAKES

INDEX	QTY	ARTICLE NUMBER	PART NAME
01	1	1.080.230.06	Tension spring
02	1	1.080.105.03	Protective hood
03	1	1.080.250.00	Brake drum, compl.
04	1	1.080.238.00	Brake band, compl.
		1.080.230.00	**Brake chassis left, compl.**
		1.080.240.00	**Brake chassis right, compl.**
05	1	1.080.230.05	Tension spring
06	5	24.16.3032	Circlip
07	1	1.080.230.01	Bearing bolt
08	2	37.01.0102	Spring washer K
09	3	24.16.1040	Lock washer
10	1	22.01.8040	Hexagonal nut
11	4	23.01.1043	Washer
12	2	21.53.0454	Screw
13	1	25.16.2106	Spring pin
14	1	1.080.230.02	Adjusting bolt
15	1	1.080.233.00	Brake chassis (left)
	1	1.080.243.00	Brake chassis (right)
16	1	1.080.105.21	Spacer plate
17	1	1.080.112.02	Tension spring
18	1	1.080.236.00	Brake lever
19	1	1.014.753.00	Solenoid armature, compl.
20	1	1.014.750.00	Solenoid
	1	54.02.0400	Molex plug
	2	54.02.0411	Molex pin

SPOOLING MOTOR



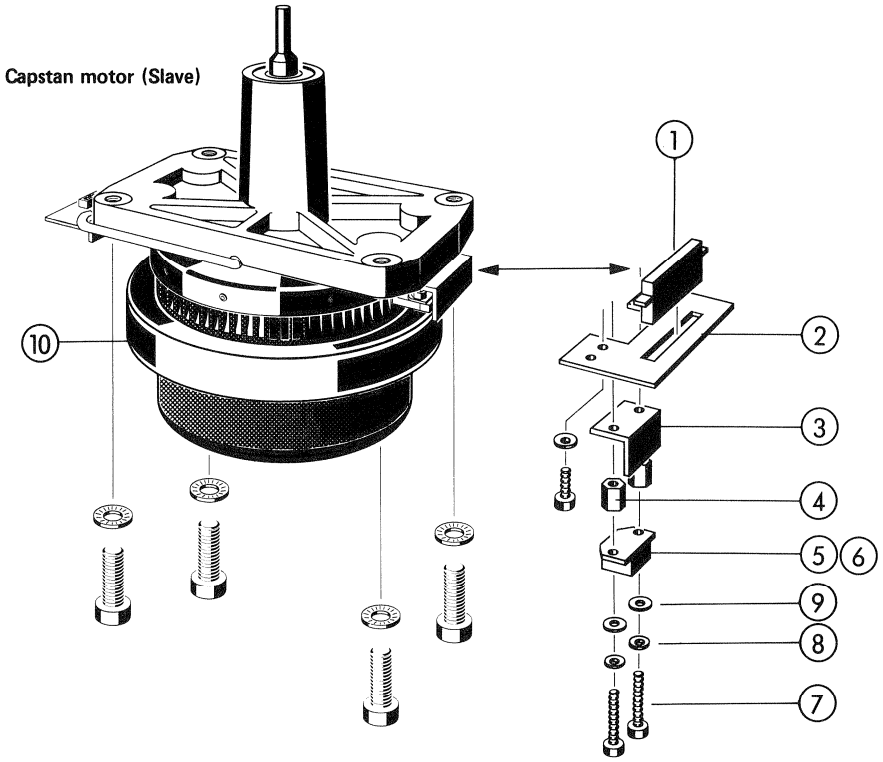
Mounting accessories

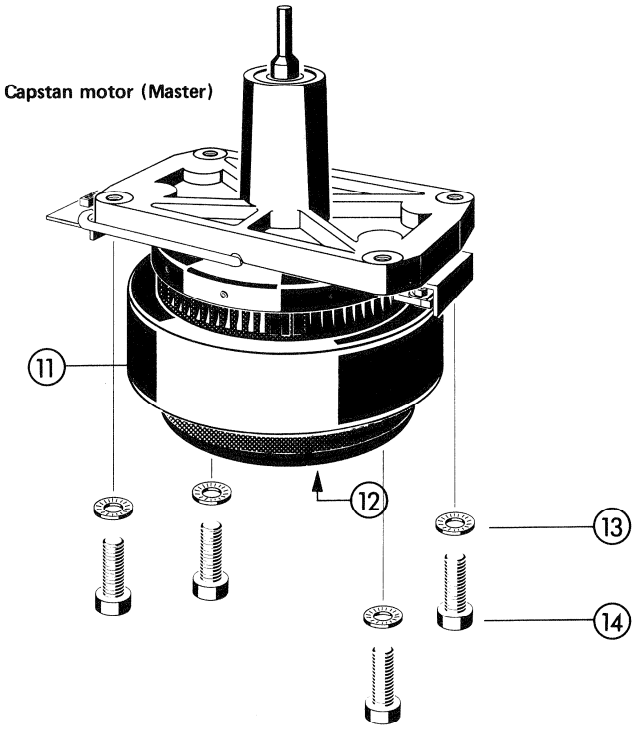
	4	21.53.0472	Screw M4x16
	4	24.16.1040	Lock washer

SPOOLING MOTOR

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.021.240.00	**Spooling motor, compl.**
01	1	1.021.240.06	Circlip surface polished
02	1	24.16.5100	Retaining ring D10, external
03	2	41.99.0103	Ball bearing
04	2	24.16.4220	Retaining ring D22, internal
05	1	1.021.242.00	Bearing flange with stator
06	4	37.02.0106	Spring washer
07	3	21.53.0456	Screw
08	3	24.16.1040	Lock washer
09	1	1.021.240.05	Rotor polished
10	1	1.021.241.00	Spooling motor spindle, compl.
	1	54.02.0402	Plug Molex
	3	54.02.0411	Molex pin

CAPSTAN MOTOR

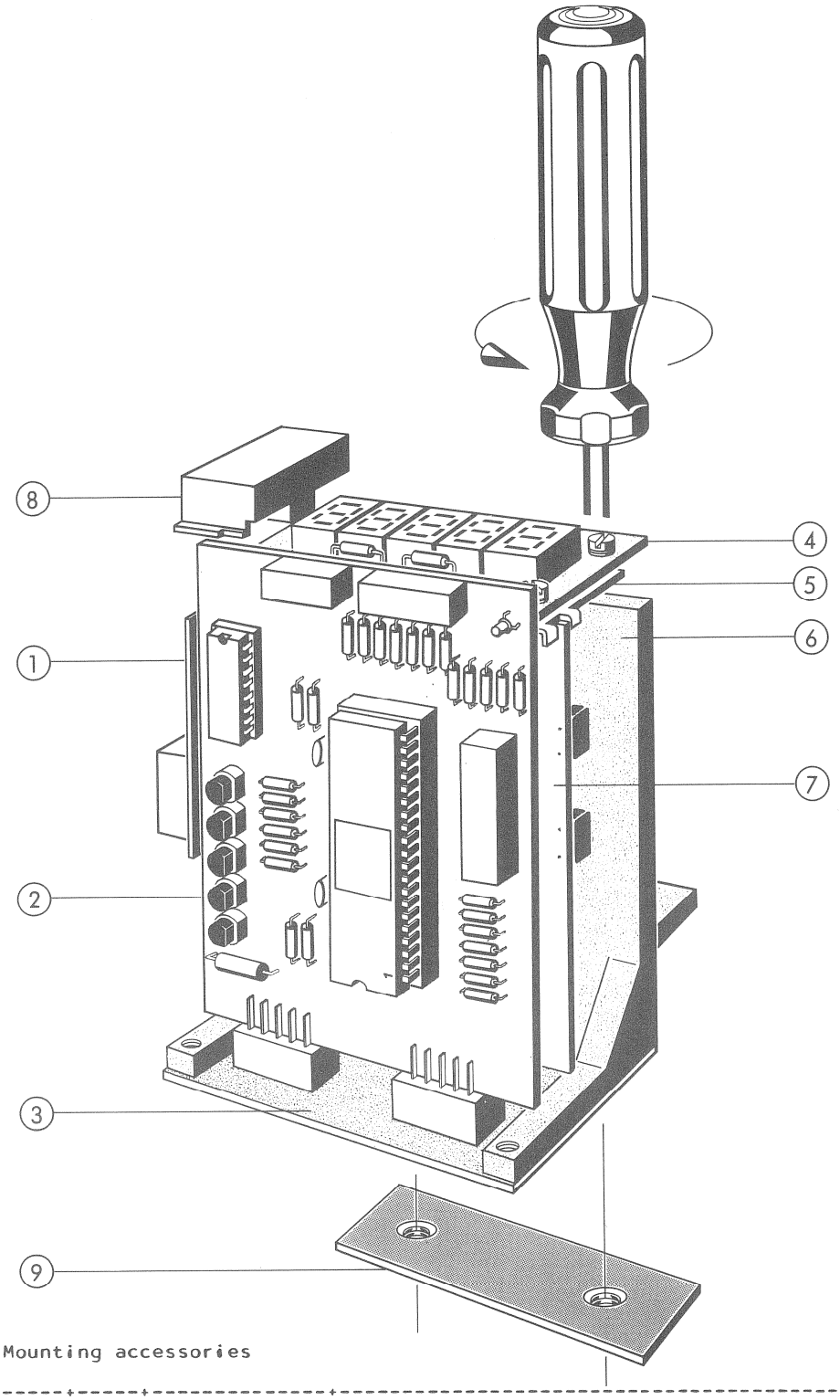




CAPSTAN MOTOR

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.021.192.00	**Capstan motor 0.15" (Master)**
		1.021.193.00	**Capstan motor 0.15" (Slave)**
01 to above	1	54.02.0421	Molex case
		54.02.0412	Molex femal
02 to above	1	1.021.140.05	Supporting sheet metal
	1	21.53.0353	Screw
	1	24.16.1030	Lock washer
03	2	1.021.186.01	Bracket
04	4	1.021.186.07	Spacer bolt
05	1	1.021.186.00	Scanner head 7.5/15 ips, (left)
06	1	1.021.188.00	Scanner head, (right)
07	4	21.01.0278	Screw
08	4	24.16.1025	Lock washer
09	4	1.228.211.02	Washer
10	1	1.021.183.01	Rotor compl. with flywheel
11	1	1.021.183.02	Rotor compl. with flywheel
12	1	1.021.160.10	Shaft lock
13	4	24.16.1040	Lock washer
14	4	21.53.0461	Screw

COUNTER



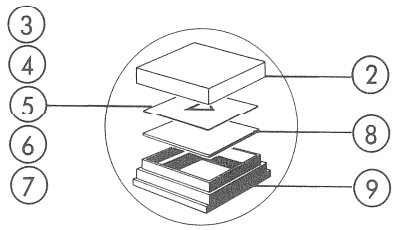
Mounting accessories

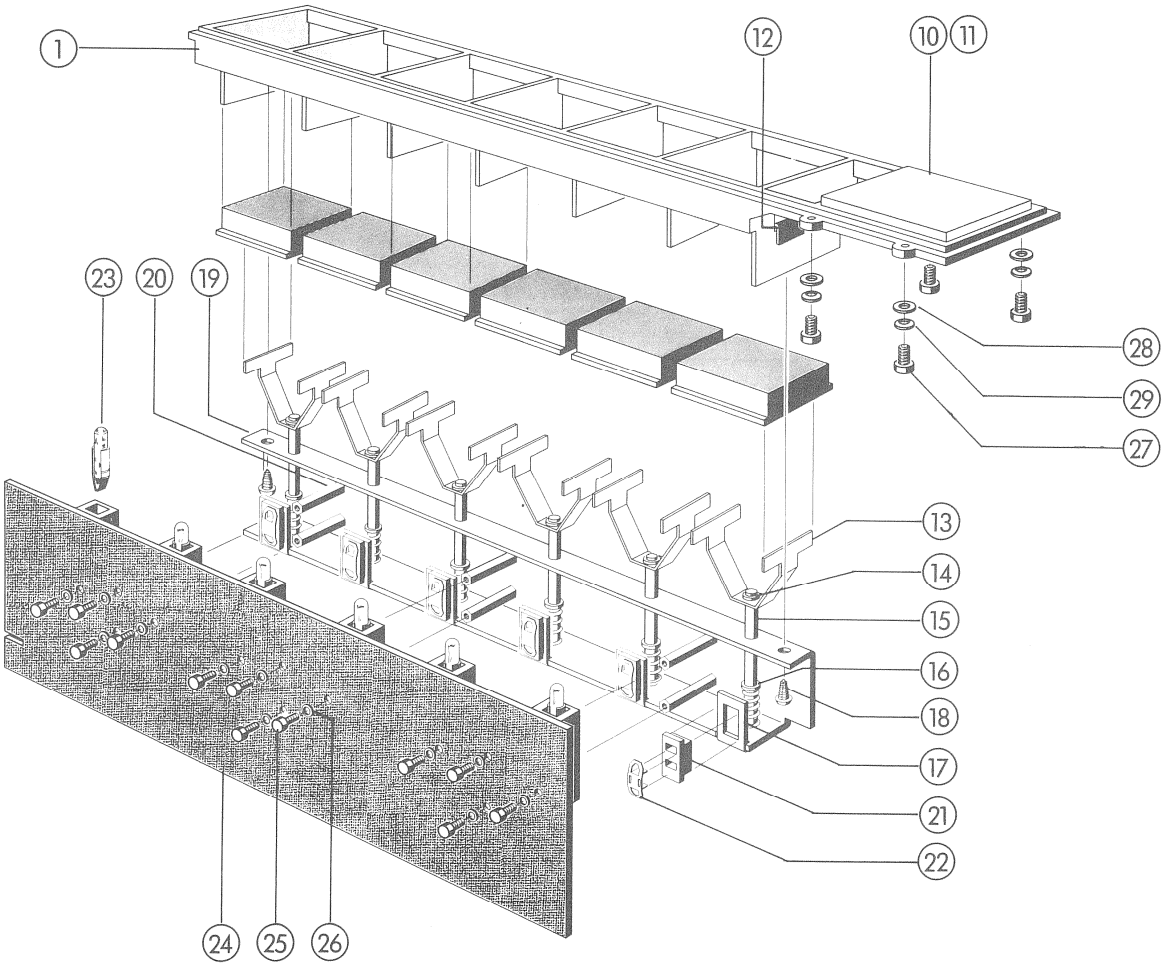
	2	21.53.0460	Screw M4x20
	2	24.16.1040	Lock washer
	2	23.01.2043	Washer

COUNTER

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.228.810.00	**5 - digit counter**
01 to above	1	1.228.220.00	Counter reset assembly
	1	55.01.0124	Microswitch
	1	55.01.0126	Roll spring lever
	1	1.080.260.12	Pressure spring
	1	1.228.205.09	Counter reset button support
	1	1.010.104.27	Threaded bolt
	2	24.16.1030	Lock washer
	2	23.01.2032	Washer
02	1	1.228.813.00	Counter p.c. board
03	1	1.228.812.00	Basis board
04 to above	1	1.228.814.00	Display board
	4	21.53.0356	Screw
	4	24.16.1030	Lock washer
	4	1.010.015.27	Spacer bush
05 to above	1	1.228.810.01	Display support
	2	21.53.0355	Screw
	2	24.16.1030	Lock washer
06	1	1.228.205.08	Supporting bracket
07	1	1.228.811.00	Counter decoder A 80
08 to above	1	1.080.260.05	Counter reset button cover
	1	1.080.260.20	Labeled zero button lower part
09	1	1.080.105.61	Threadedplate

PUSH BUTTON ASSEMBLY





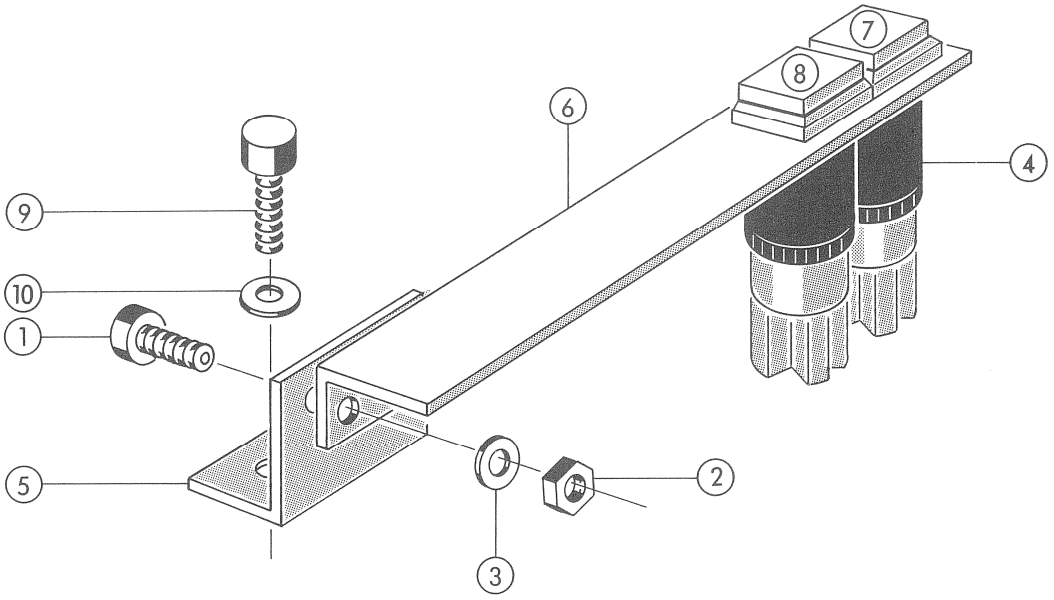
Mounting accessories

	2	21.53.0472	Screw M4x16
	2	24.16.1040	Lock washer

PUSH BUTTON ASSEMBLY

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.080.260.00	**Push button assembly**
01	1	1.080.260.01	Push button support
02	6	1.080.260.03	Push button top part
03	2	1.080.260.14	Symbol "Forward - Rewind"
04	1	1.080.260.15	Symbol "Play"
05	1	1.080.260.18	Symbol "Edit"
06	1	1.080.260.16	Symbol "Record"
07	1	1.080.260.17	Symbol "Stop"
08	6	1.080.260.19	Mask
09	6	1.080.260.02	Push button lower part
10	1	1.080.260.26	Timer cover
11	1	1.228.810.02	Anti - glare glass printed
12	2	22.16.2501	Clip - on nut
13	6	1.080.260.09	Button holder
14	6	24.16.3019	Circlip
15	6	1.080.270.00	Contact holder
16	12	24.16.3032	Circlip
17	6	1.080.260.12	Pressure spring
18	2	20.21.7355	Screw
19	1	1.080.260.08	Bearing rail
20	6	1.010.034.27	Threaded bolt
21	6	55.02.0101	Wiper holder
22	6	1.010.007.55	Wiper contact
23	6	51.02.0145	Bulb
24	1	1.080.275.00	Push button print, assembled
25	12	21.26.0355	Screw
26	12	24.16.1030	Lock washer
27	4	21.01.0201	Screw
28	4	1.228.211.02	Spec. washer
29	4	24.16.1020	Lock washer

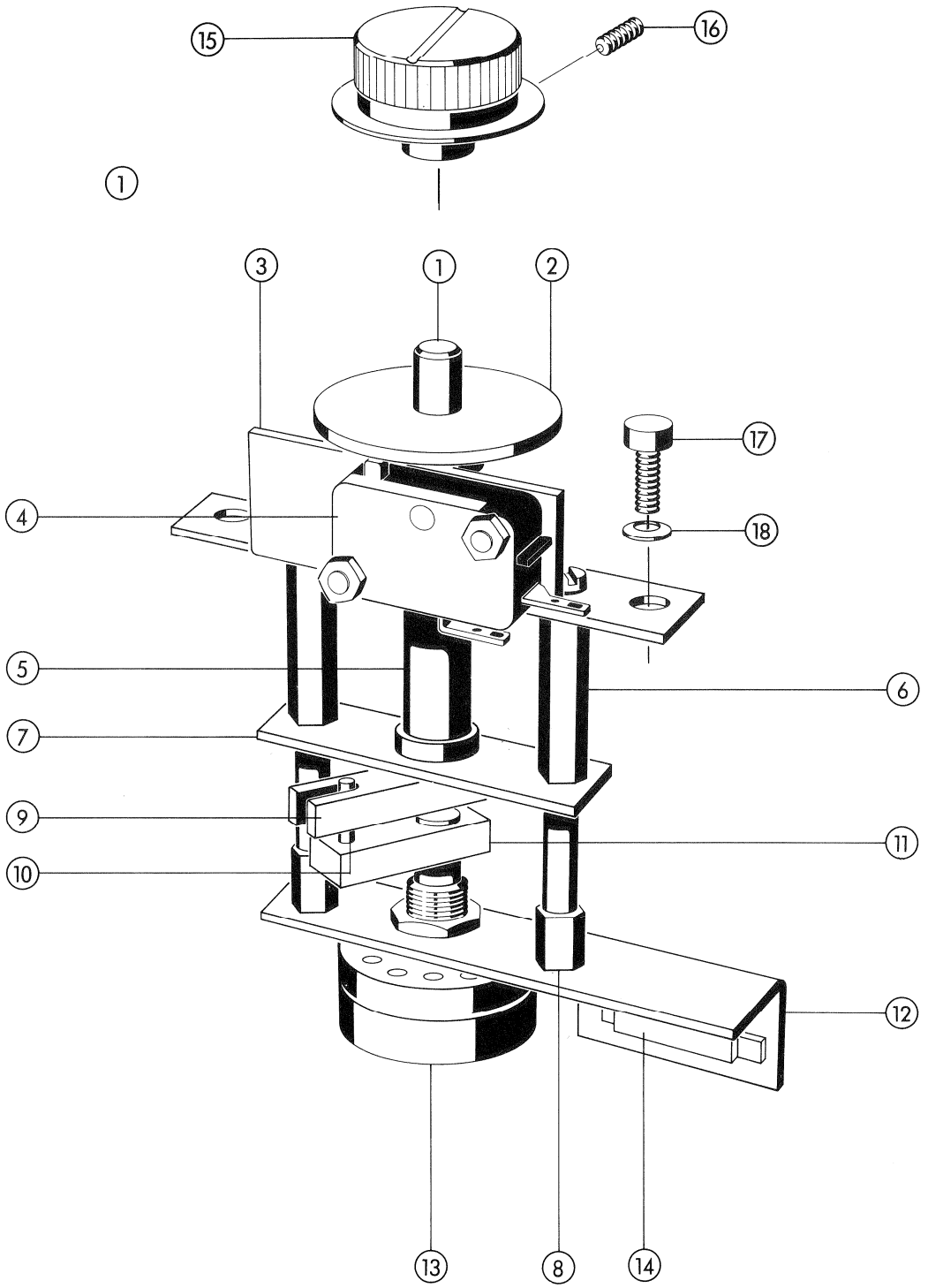
TAPE DIRECTION SWITCH



TAPE DIRECTION SWITCH

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.080.259.00	Tape direction switch
01	2	21.53.0457	Screw
02	2	22.01.8040	Nut
03	4	24.16.1040	Lock washer
04	2	55.03.0130	Illuminated push button switch
to above	2	51.02.0145	Bulb 24V, 0,04A
05	1	1.080.104.12	Bracket
06	1	1.080.104.13	Holder
07	1	1.080.259.01	Kalotte "Play forward"
08	1	1.080.259.02	Kalotte "Play reverse"
09	2	21.53.0471	Screw M4x14
10	2	24.16.1040	Lock washer
	1	54.02.0418	Molex plug case
	6	54.02.0411	Molex pin

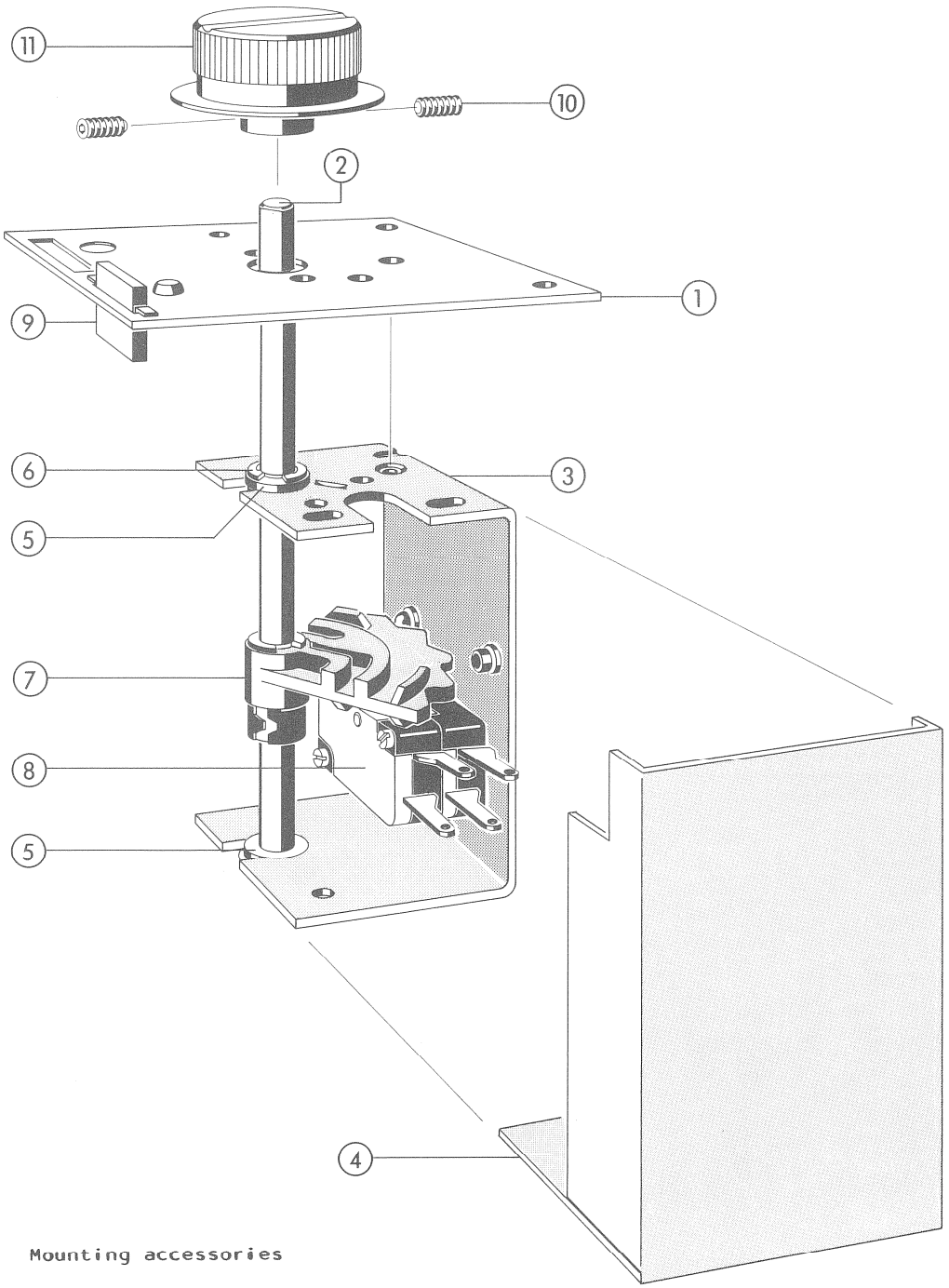
CUTTER CONTROL ASSEMBLY



CUTTER CONTROL ASSEMBLY

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.080.311.00	Cutter control assembly
01	1	1.080.310.06	Shaft
02	1	1.080.311.01	Cam wheel
to			
above	1	21.53.0355	Screw M3x8
	1	1.080.310.04	Pressure spring
03	1	1.080.310.01	Bracket
to			
above	1	1.077.450.04	Bush
04	1	55.01.0124	Microswitch
to			
above	2	21.01.0372	Screw M3x16
	2	24.16.1030	Lock washer
	2	22.01.8030	Hexagonal nut
05	1	1.010.017.27	Spacer bush
06	2	1.010.025.27	Threaded stud
to			
above	2	21.53.0354	Screw
	2	24.16.1030	Lock washer
07	1	1.080.310.02	Bearing bracket
08	2	1.080.310.07	Threaded bolt
09	1	1.080.310.08	Driving fork
to			
above	1	1.077.450.04	Bush
	1	21.53.0355	Screw
	1	23.01.1064	Washer
10	1	25.06.8208	Cylindrical pin
11	1	1.080.310.09	Coupling lever
to			
above	1	21.53.0355	Screw
12	1	1.080.310.03	Mounting bracket
to			
above	2	21.53.0354	Screw
	2	24.16.1030	Lock washer
13	1	58.10.9002	Potentiom R 10
14	1	54.02.0403	Molex case
to			
above	1	54.02.0411	Molex pin
	4	54.02.0412	Molex femal
15	1	1.080.105.10	Knob
16	1	21.59.5452	Set screw
17	2	21.53.0457	Screw M4x12
18	2	24.16.1040	Lock washer

MAINS SWITCH



Mounting accessories

	3	21.53.0457	Screw M4x12
	3	24.16.1040	Lock washer

MAINS SWITCH

INDEX	QTY	ARTICLE NUMBER	PART NAME
		1.080.284.00	**Mains and tape speed switch**
01	1	1.080.284.01	Base plate
02	1	1.080.280.01	Shaft
03	1	1.080.286.00	Mounting bow, compl.
04	1	1.080.283.01	Protection cover
to			
above	1	1.080.283.02	Isulating plate
	1	28.21.1440	Pipe rivet
05	2	1.077.440.04	Bush
06	4	24.16.3040	Circlip
07	1	1.077.450.00	Switching disk
08	2	55.01.0124	Microswitch
to			
above	2	1.077.440.08	Bush
	2	21.01.0213	Screw
	2	23.01.1022	Washer
	2	24.99.0109	Spring washer
	2	22.01.8020	Nut
09	1	54.02.0403	Molex case 5 pole
to			
above	4	54.02.0411	Molex pin
10	2	21.59.5452	Set screw
11	1	1.080.105.10	Knob