

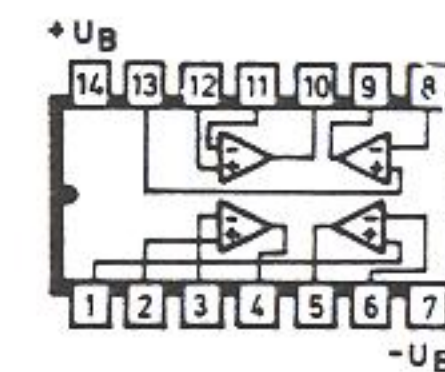
Schiebeschalter
Sliding switch



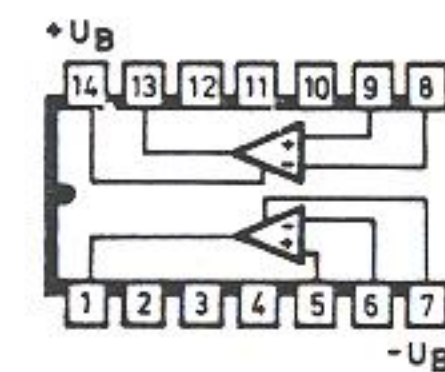
Monitor
Ansicht der Bestückungsseite
View of Components Side



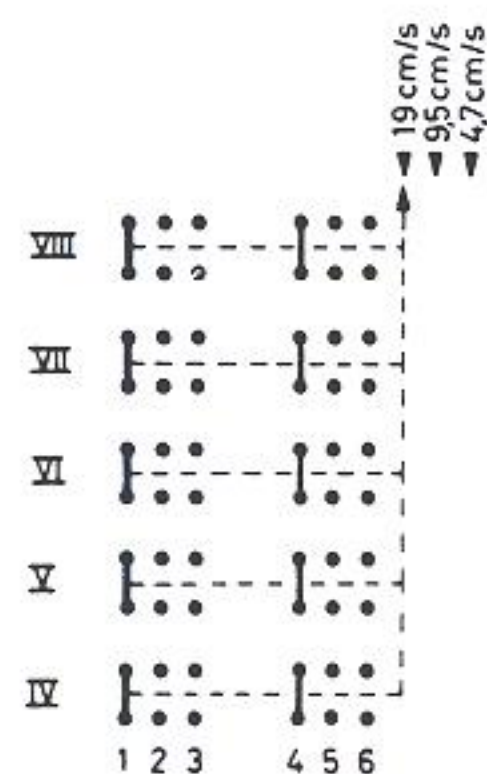
Limiter



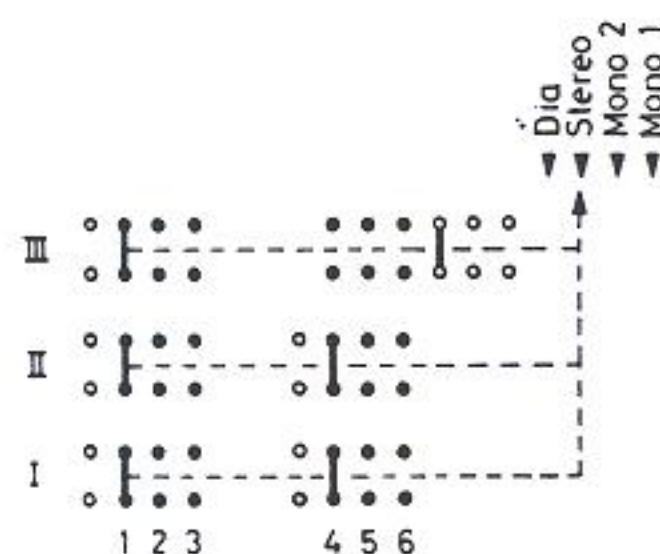
LM 3900
IC 302, IC 1101



RC 4739
IC 301, IC 601,
IC 901

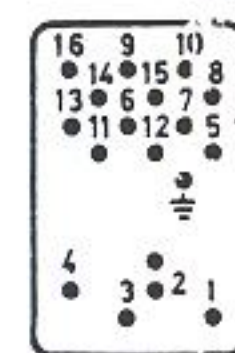


Geschwindigkeitsumschalter
Speed selector



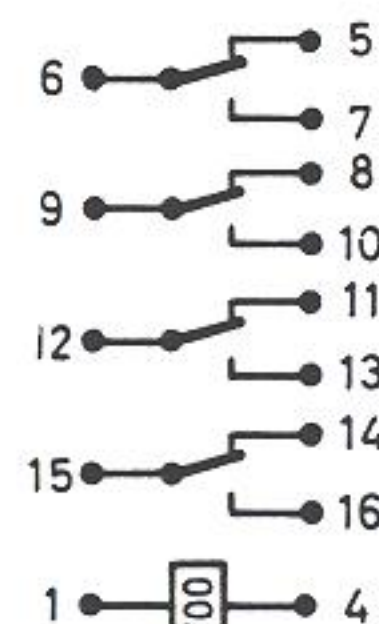
Spurwahlschalter
Track selector

Rel. A

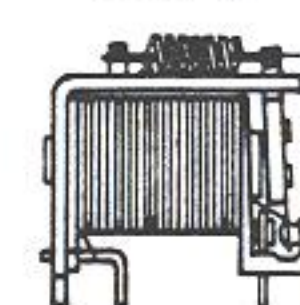


Sockelschaltung
Lötseite

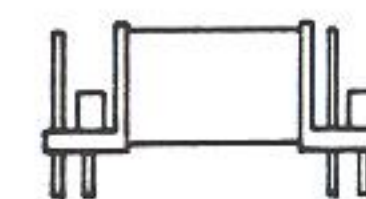
Base connection
Printed side



Rel. B

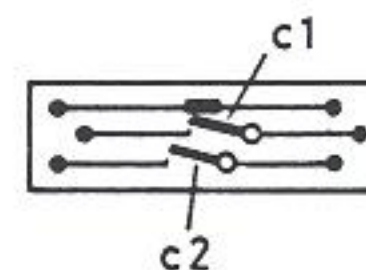


Rel. C



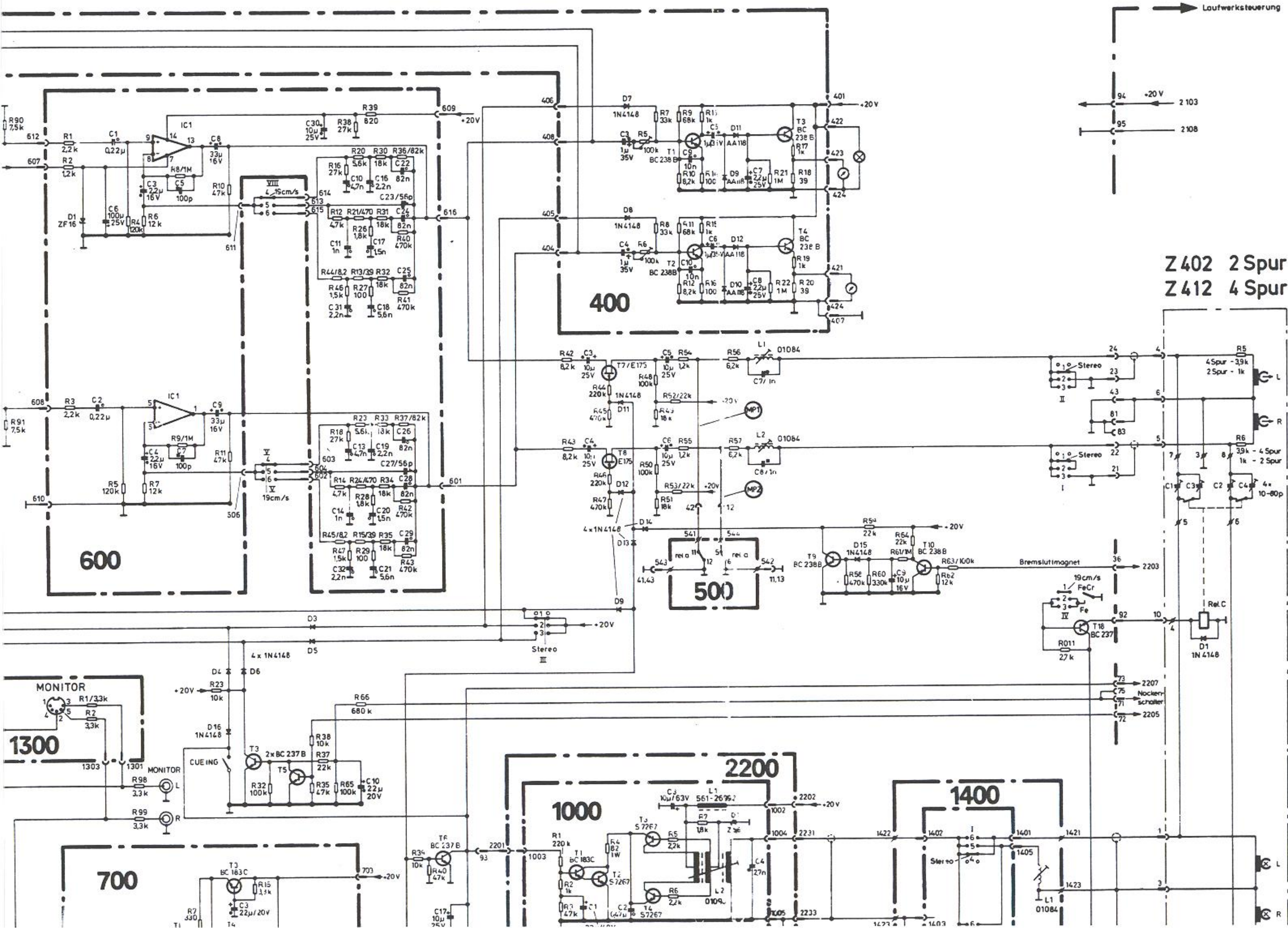
Sockelschaltung
Lötseite

Base connection
Printed side

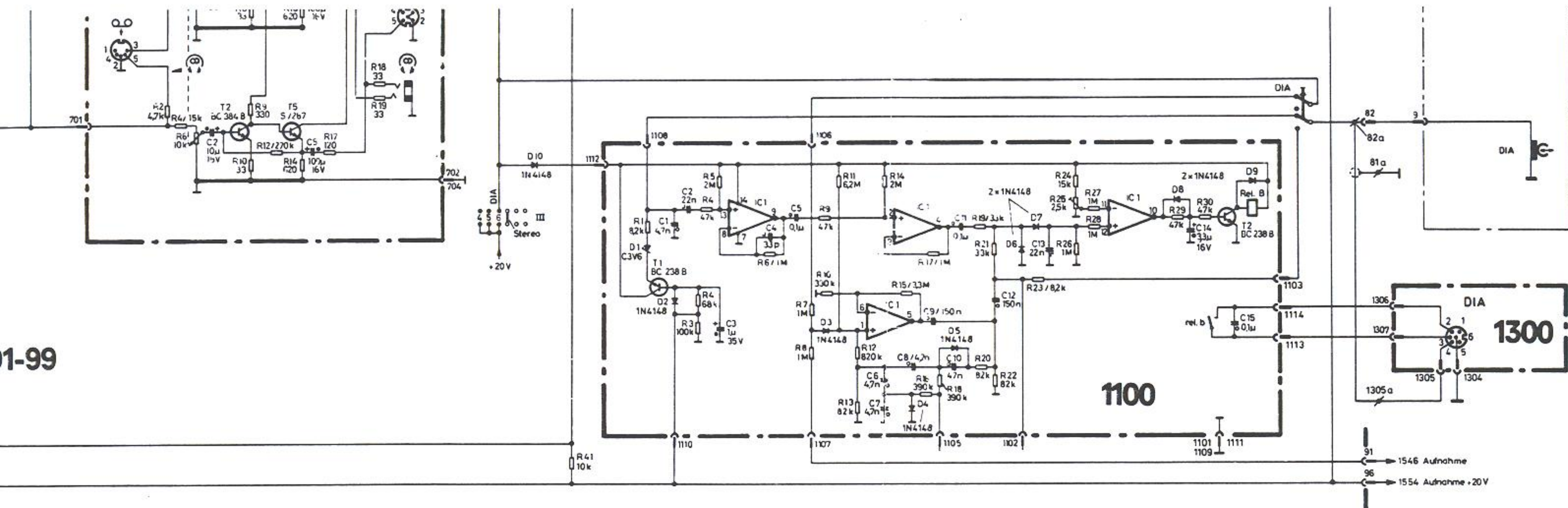


Wir behalten
von abweich

We reserve
basing varia



1-99



B, BC 237 B
B, BC 183 C

—□— 1/4 Watt

+||— Elko

+||— Tantal

—||— Bipolar

—||— Keramik

—||— Styroflex

—○— Kunststoffolie

—▶— 1N 4148

die Lieferung von Äquivalenttypen und
in Sockelschaltungen der Transistoren vor.

ght to supply equivalent types and
r transistors.

Leiterplatten

Kennz.	Benennung
001-99	Grundverdrahtung
100	Mikrofon-Verstärker
200	Radio-Verstärker
300	Begrenzer
400	Instrumenten-Verstärker
500	Aufnahme-Wiedergabe Relais
600	Aufnahme-Verstärker
700	Kopfhörer-Verstärker
800	Anzeige
900	Wiedergabe-Verstärker
1000	HF-Oszillator
1100	Dia-Steuerung
1200	Radio-Phono-Buchsen
1300	Monitorbuchsen
1400	Ersatzlast
2200	Steuerung-Tonmotor

PC Boards

No.	Designation
001-99	basic wiring
100	micro amplifier
200	radio amplifier
300	limiter
400	instrument amplifier
500	recording-playback relay
600	recording amplifier
700	earphone amplifier
800	reading
900	playback amplifier
1000	RF generator
1100	DIA control
1200	radio-phono sockets
1300	Monitor sockets
1400	equivalent load
2200	control capstan motor

Alle Schalter und Kontakte in Ruhe-
stellung (bzw. Wiedergabe) gezeichnet.

All switches and contacts are shown in
rest position (resp. playback position).

UHER

SG 631 LOGIC

**Stromlaufpläne
und Servicehinweise**

NF-Teil

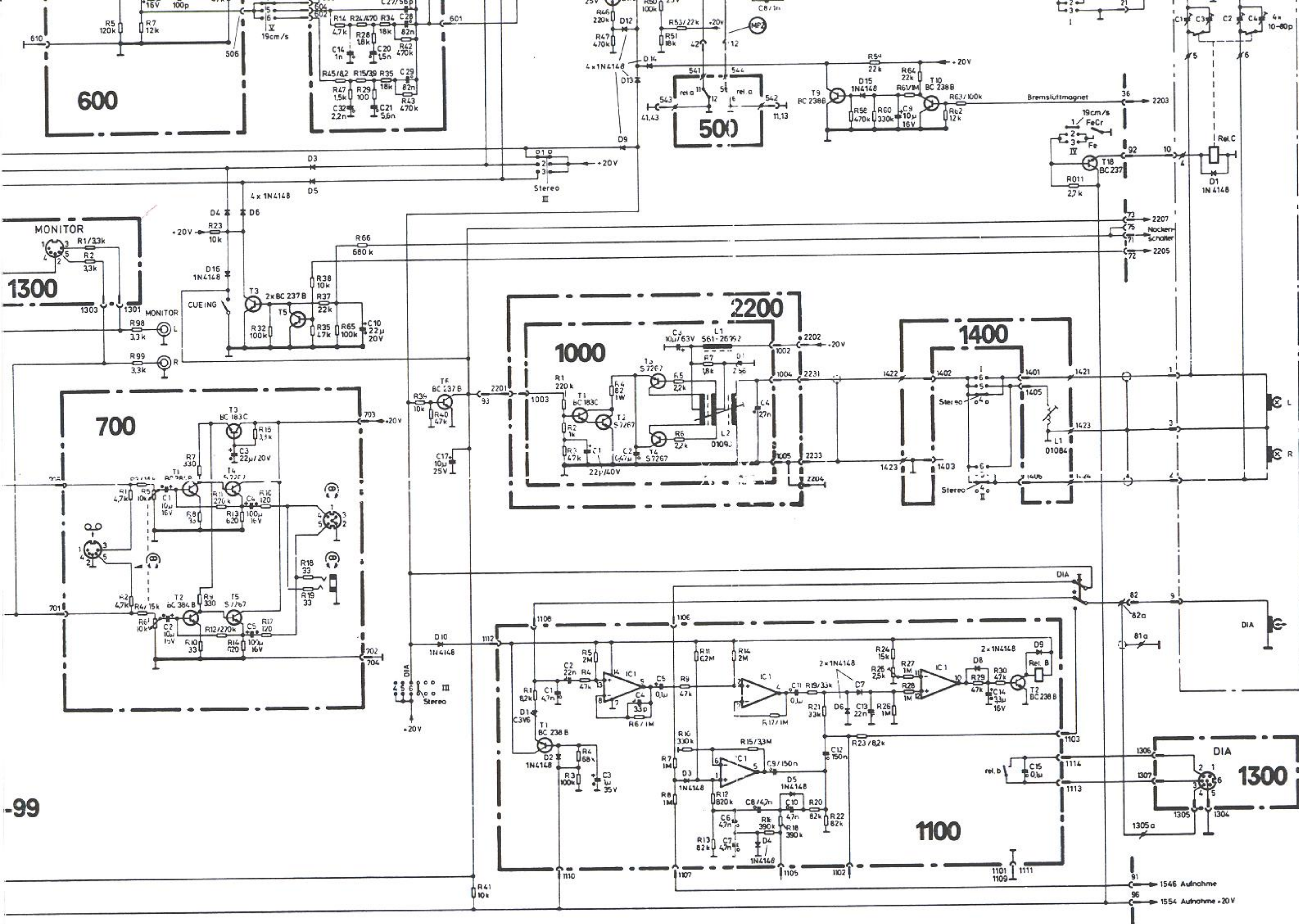
**Circuit Diagrams and
Servicing Instructions**

LF-Section

Gültig ab Gerät Nr.: 2865016001 (4 Spur)
Gültig ab Gerät Nr.: 2863016001 (2 Spur)
Änderungen vorbehalten!

Valid from ser.no.: 2865016001 (4 Track)
Valid from ser.no.: 2863016001 (2 Track)
Alterations reserved!

UHER WERKE MÜNCHEN 363-48259-I/002/1278-R



3, BC 237 B
3, BC 183 C

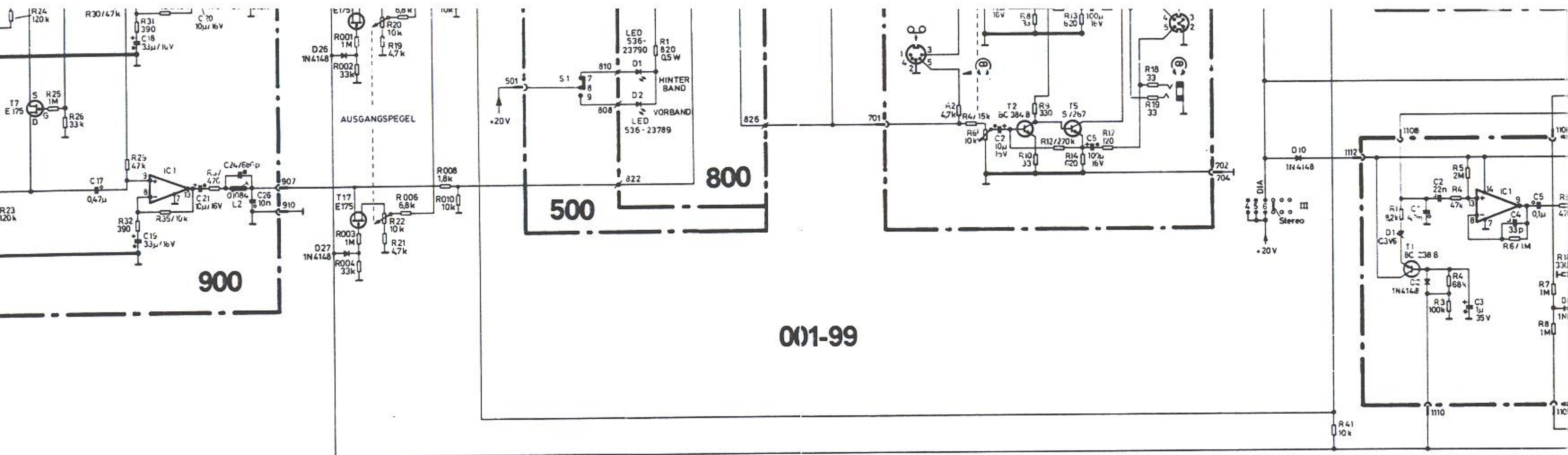
— 1/4 Watt

Leiterplatten

PC Boards

UHER

SG 631 LOGIC



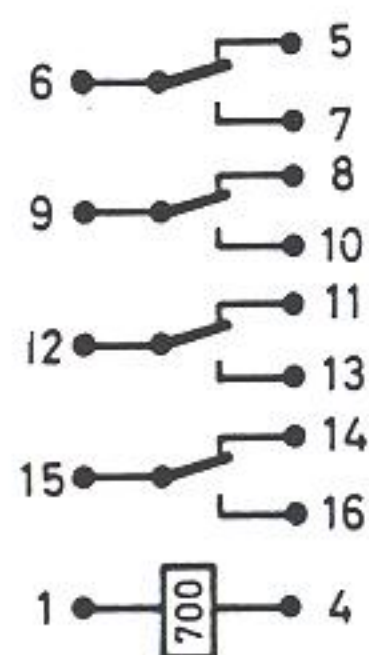
Schiebeschalter
Sliding switch



Limiter

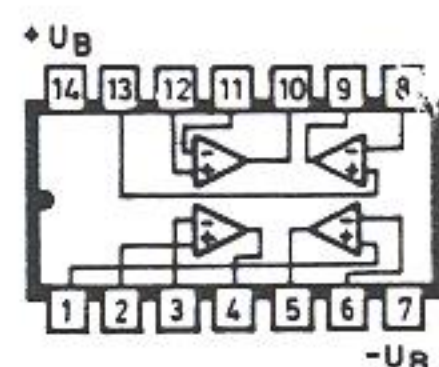
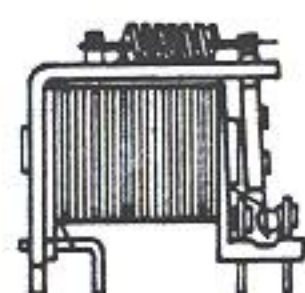
der Bestückungsseite
Components Side

Rel. A

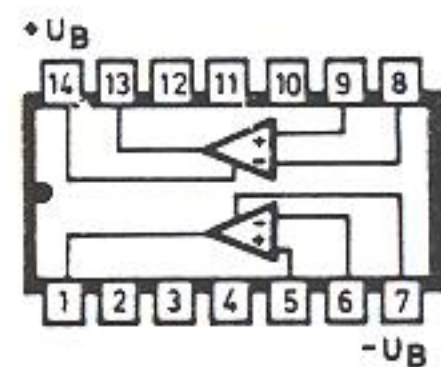


Rel. B

Rel. B

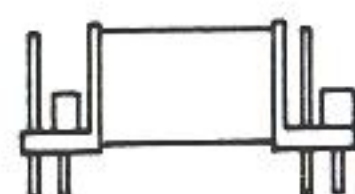


LM 3900
IC 302, IC 1101



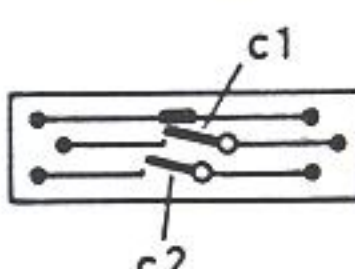
RC 4739
IC 301, IC 601,
IC 901

Rel. C



Sockelschaltung
Lötseite

Base connection
Printed side



BC 239 B, BC 237 B
BC 381 B, BC 183 C



E 175



S 7267



S 2417, (BC 214 B)



1/4 Watt



Elko



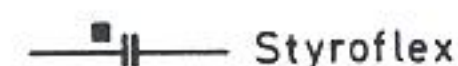
Tantal



Bipolar



Keramik



Styroflex



Kunststoffolie



1N 4148

Leiterplatten

Kennz.	Benennung
001-99	Grundverdrahtung
100	Mikrofon-Verstärker
200	Radio-Verstärker
300	Begrenzer
400	Instrumenten-Verstärker
500	Aufnahme-Wiedergabe Relais
600	Aufnahme-Verstärker
700	Kopfhörer-Verstärker
800	Anzeige
900	Wiedergabe-Verstärker
1000	HF-Oszillator
1100	Dia-Steuerung
1200	Radio-Phono-Buchsen
1300	Monitorbuchsen
1400	Ersatzlast
2200	Steuerung-Tonmotor

PC Board

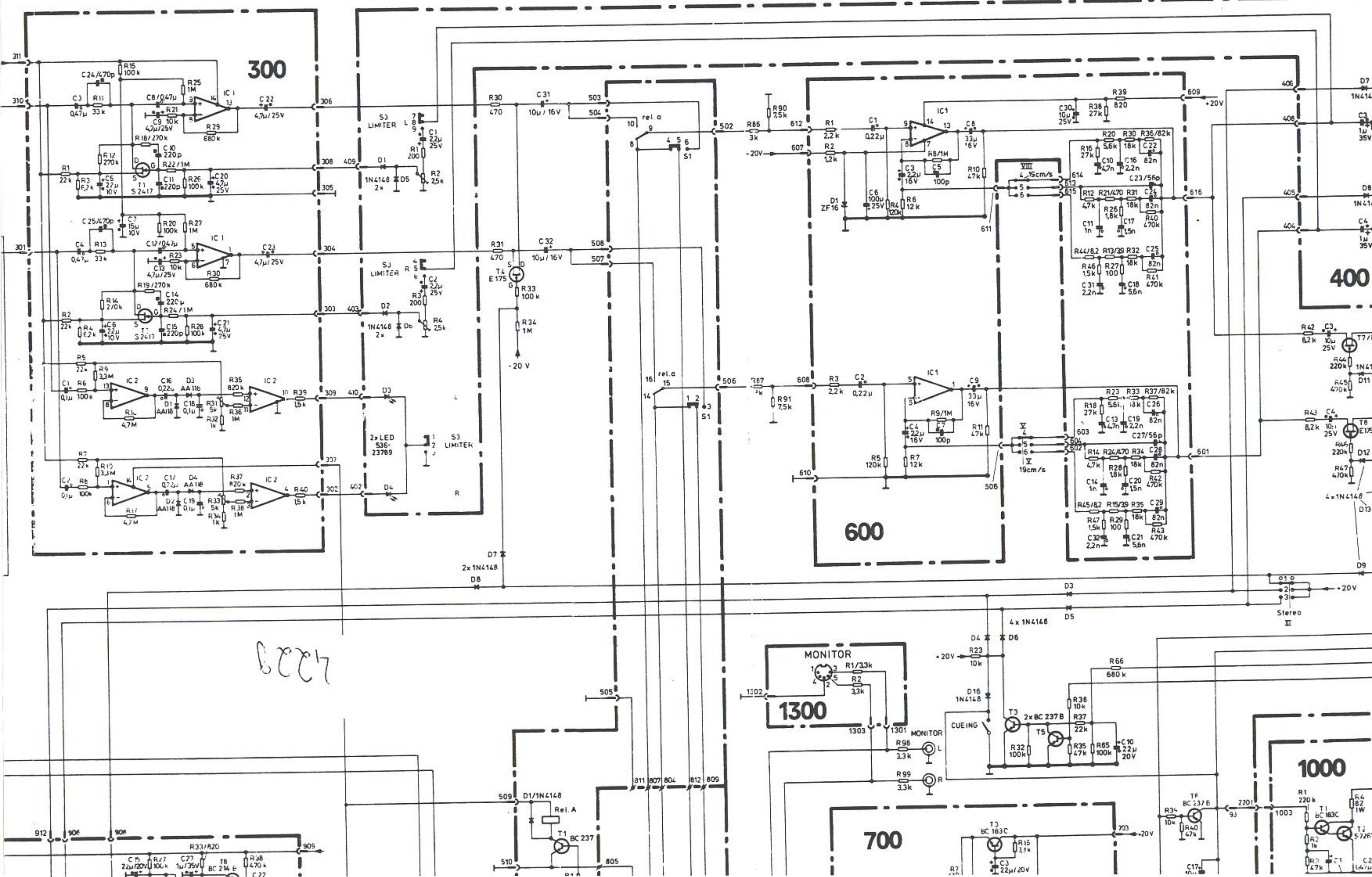
No.	Benennung
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300	Begrenzer
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900	Wiedergabe-Verstärker
1000	HF-Oszillator
1100	Dia-Steuerung
1200	Radio-Phono-Buchsen
1300	Monitorbuchsen
1400	Ersatzlast
2200	Steuerung-Tonmotor

Wir behalten uns die Lieferung von Äquivalenttypen und von abweichenden Sockelschaltungen der Transistoren vor.

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Alle Schalter und Kontakte in Ruhe-
stellung (bzw. Wiedergabe) gezeichnet

All switches and contacts are shown in
rest position (resp. playback position)



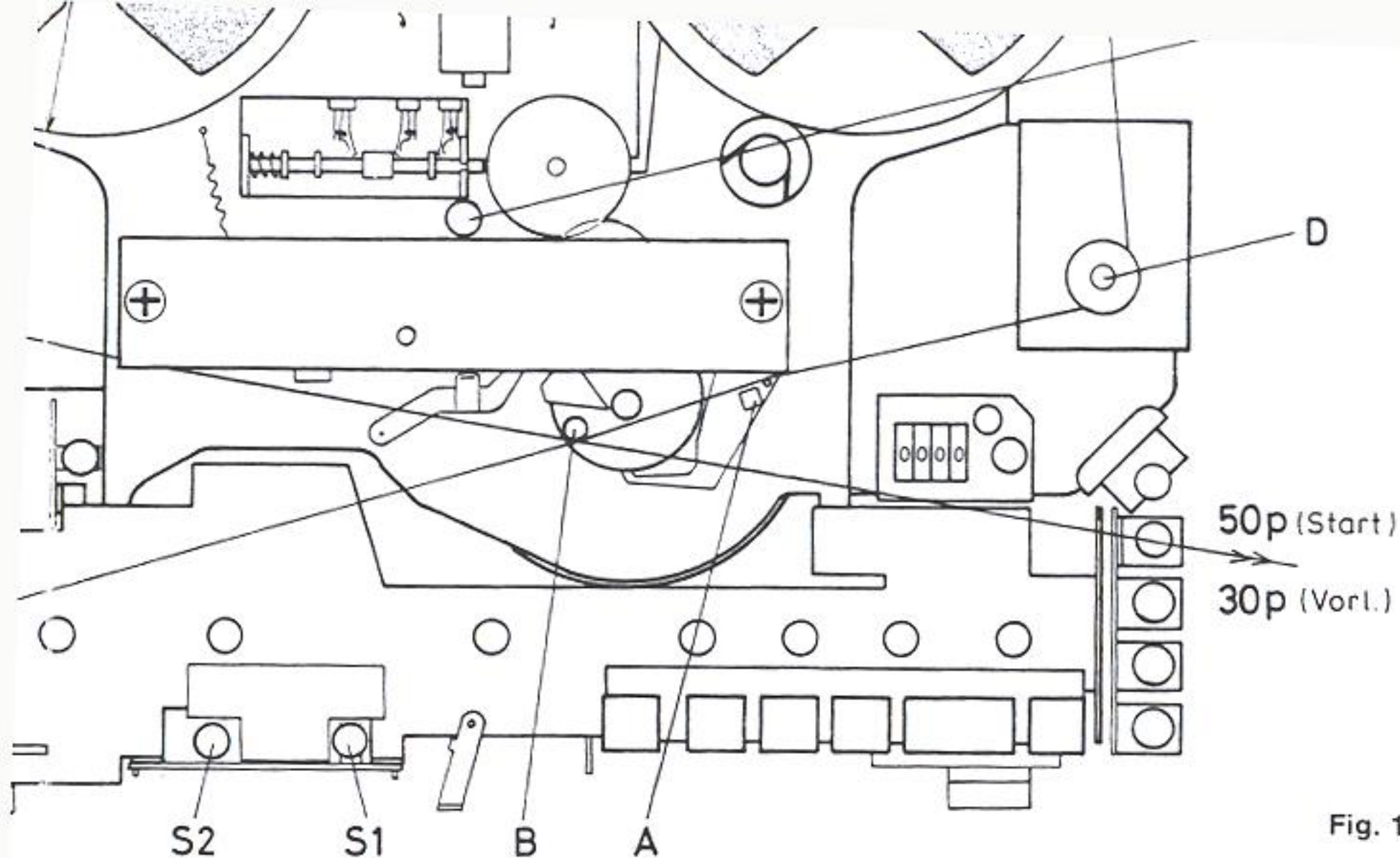
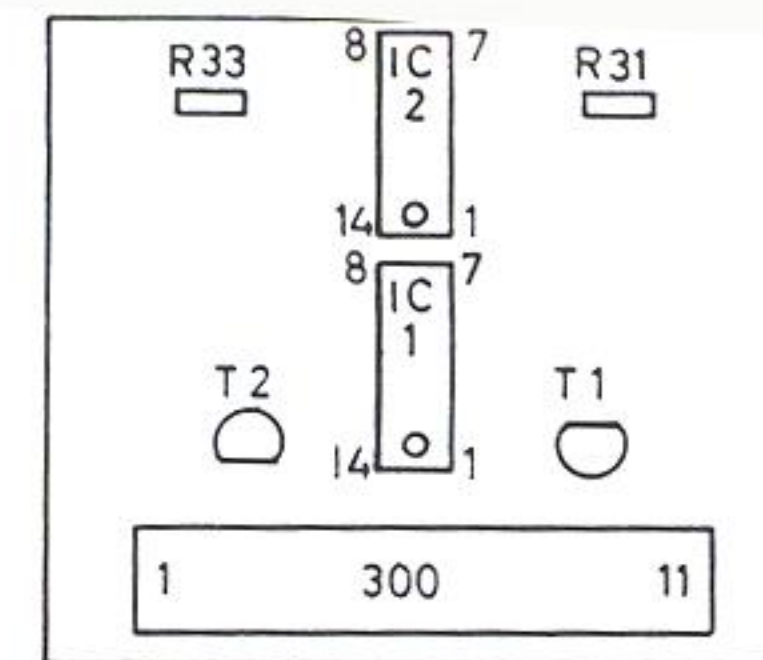


Fig. 1

As measurement output for the connection of a LF voltmeter ($R_i = 10 \text{ MOhm}$) and an oscillator use socket MONITOR contact 3 (left channel), contact 5 (right channel) and contact 2 (chassis). All measurements involving the tape have to be performed using the UHER test tape (= unrecorded section of DIN test tape 19 h/9.5).

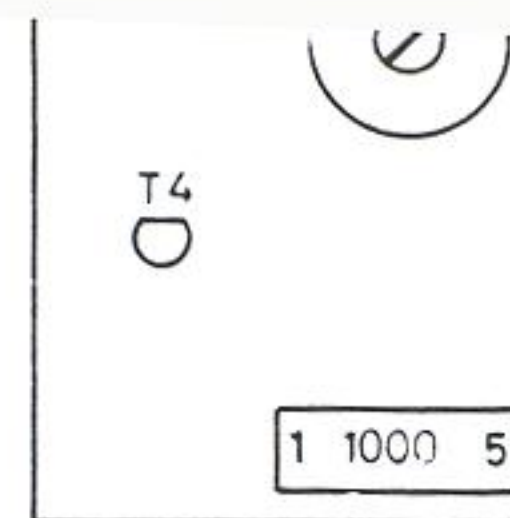
4.1 R 405 and R 406 Adjustment of the level control

Use tape speed 9.5 cm/s. Set unit with tape inserted of with the light barrier for the automatic tape end switch off being covered to recording and press MONITOR pushbutton. Adjust output voltage of the audio oscillator to get 20 mV/333 Hz being applied to socket RADIO. Adjust master control to the right hand stop. Adjust level precontrol RADIO L and R to get 0.775 V at the LF



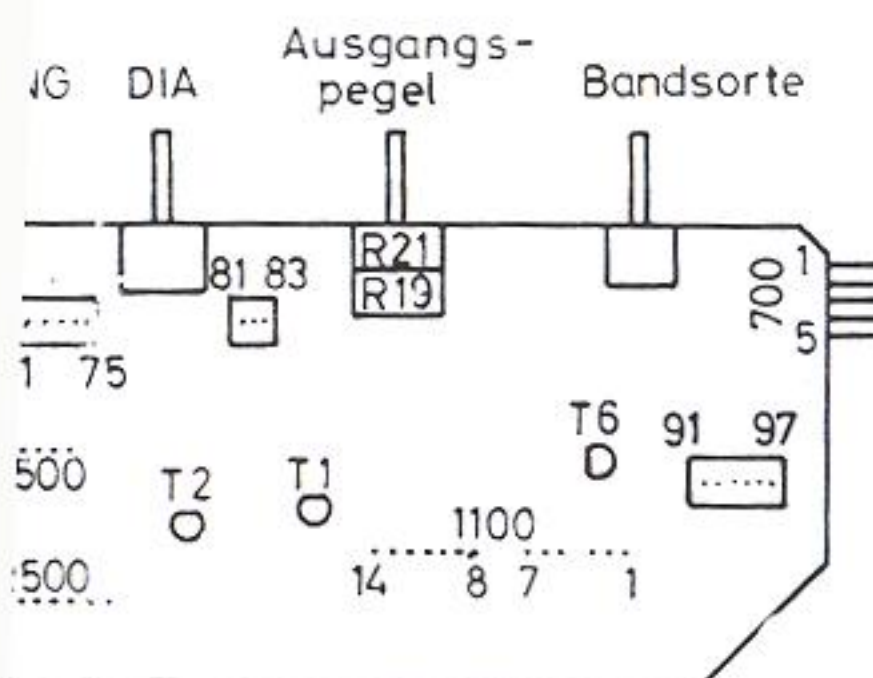
4.4 C 1, C 2, C 3 and C 4 Adjustment of the RF premagnetization

After exchange of the pc board "RF generator 1000" or integrated parts of this component the RF generator has to be aligned according to figure 5.

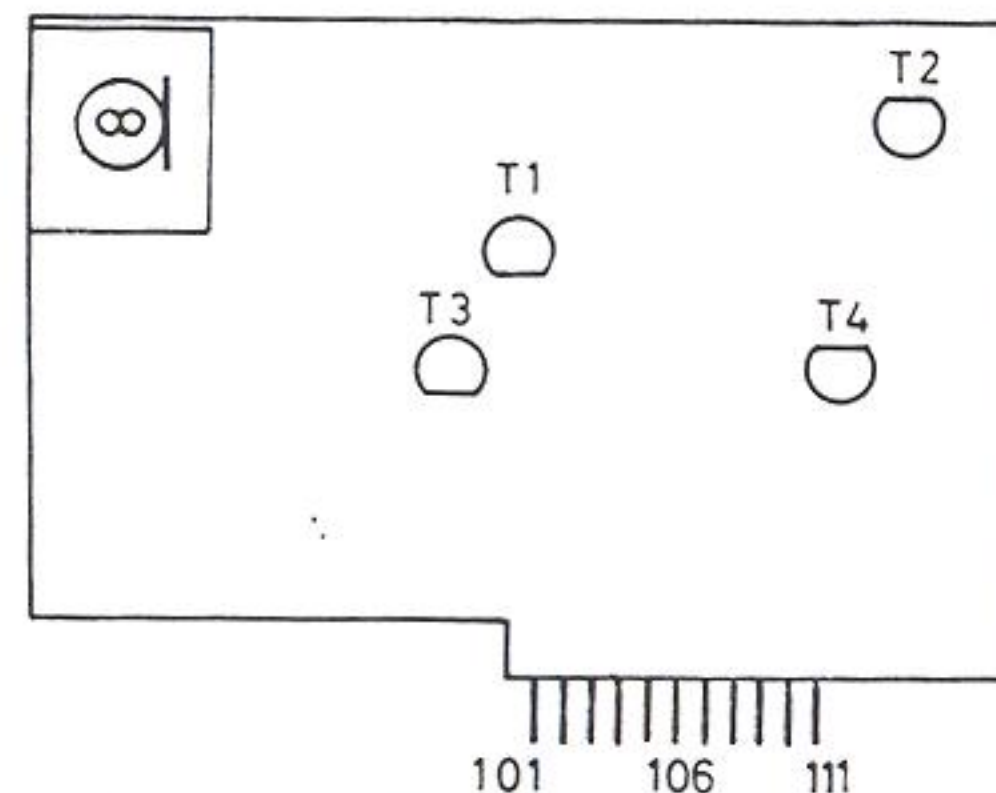


5.2 Alignment of the erasure load L 1401 and L 1402

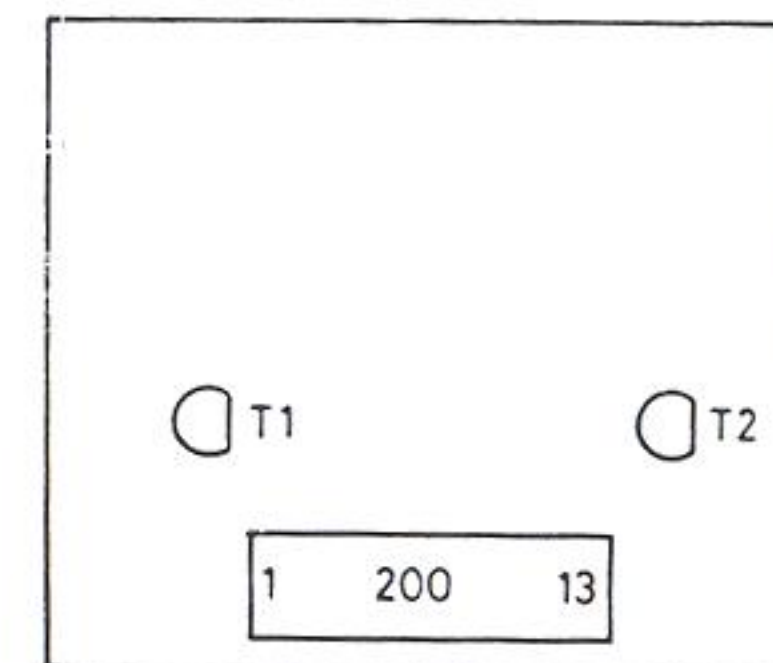
Measurement setup as described unit to MONO 1. Adjust equilibrium by turning the core in such a way that the nominal frequency gets the nominal frequency $\pm 2 \text{ kHz}$. Set unit to MONO load L 1401 as described with



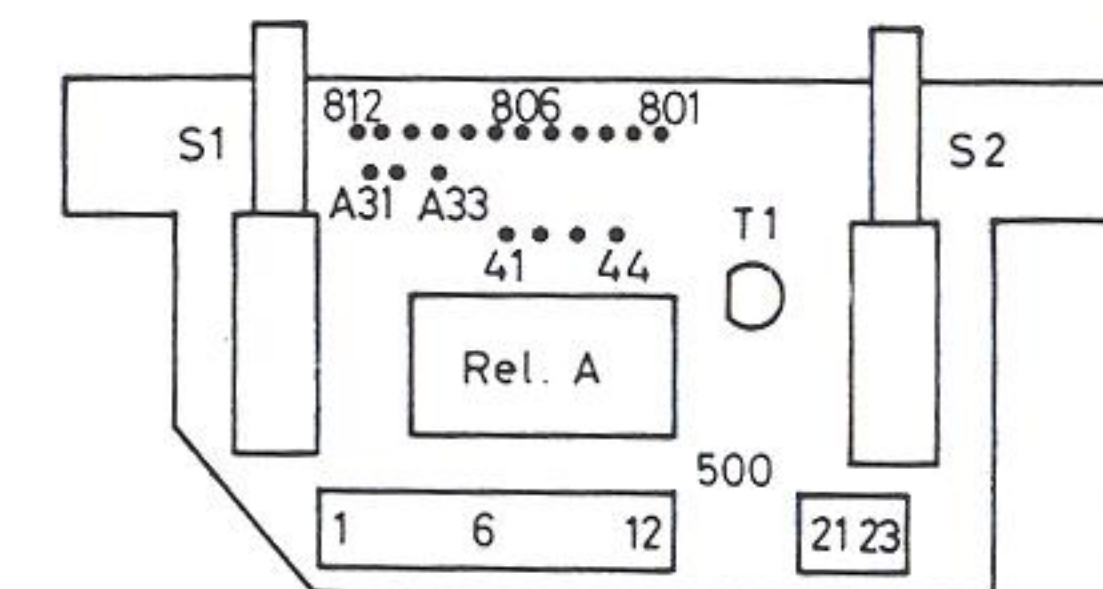
micro amplifier 100



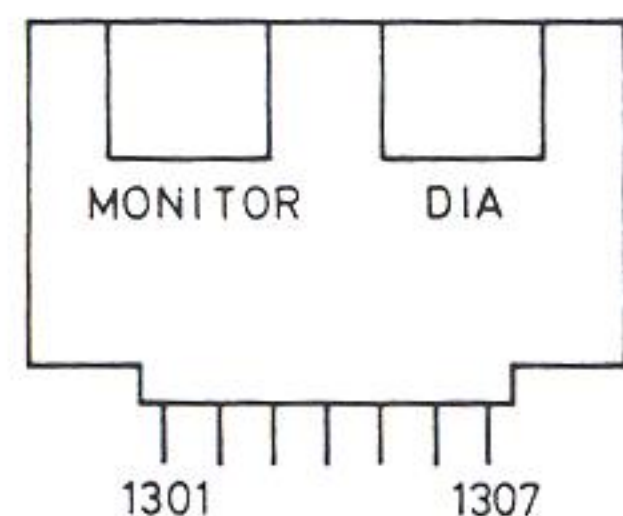
radio amplifier 200



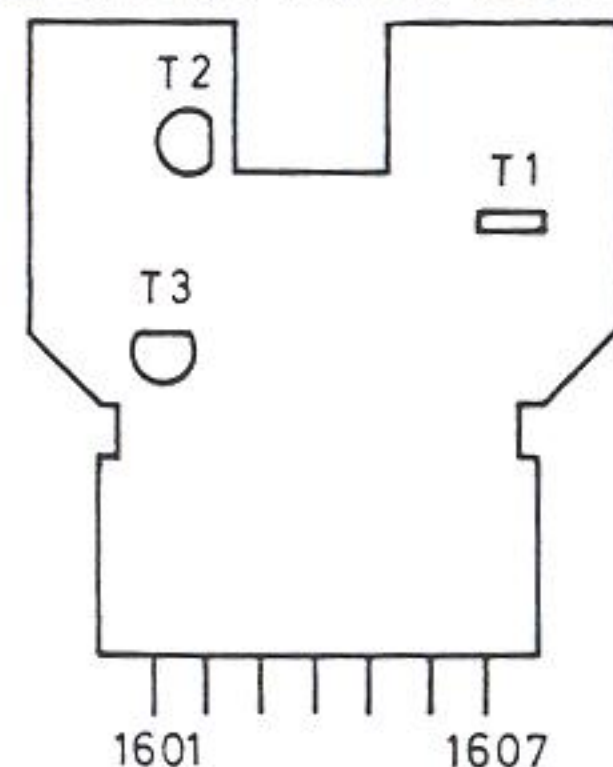
recording-playback relay 50



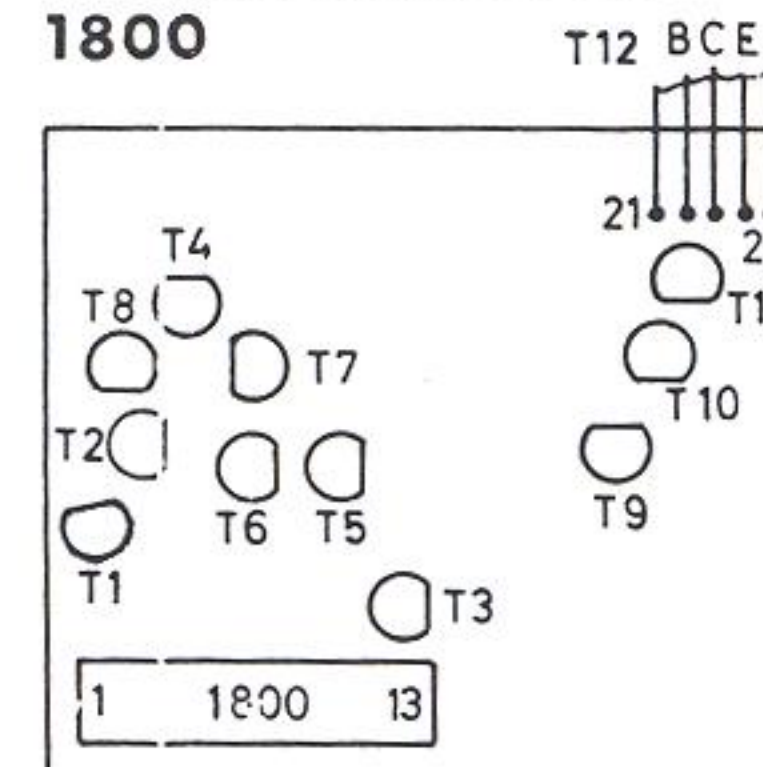
Monitor sockets 1300



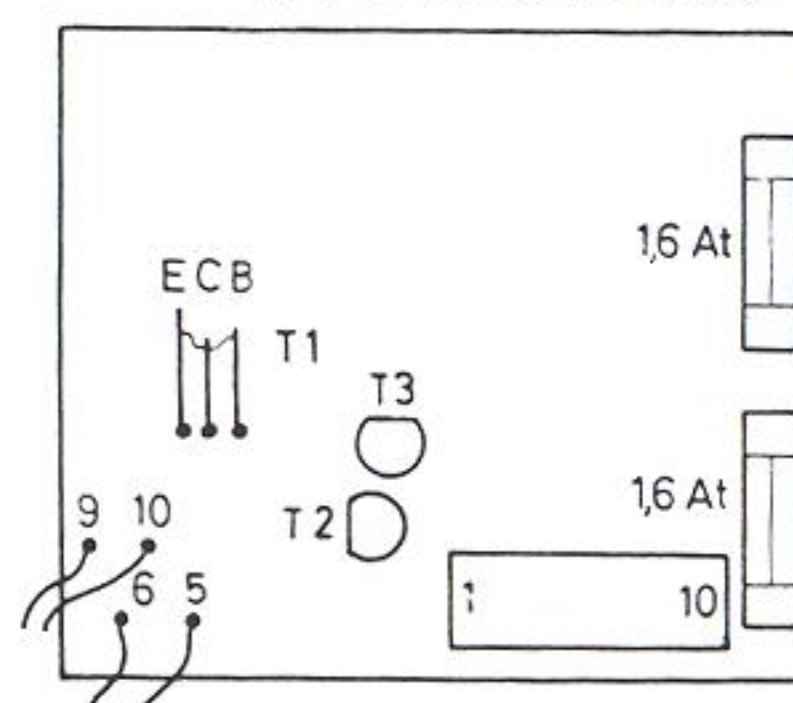
Tension Sensor Control (without light barrier) 1600

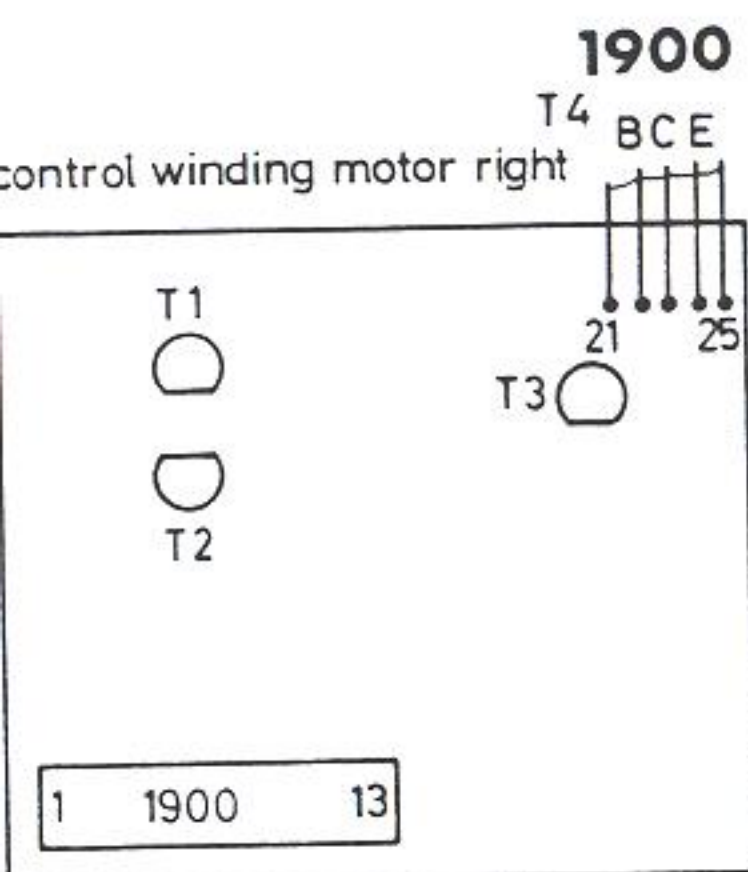


control winding meter left 1800



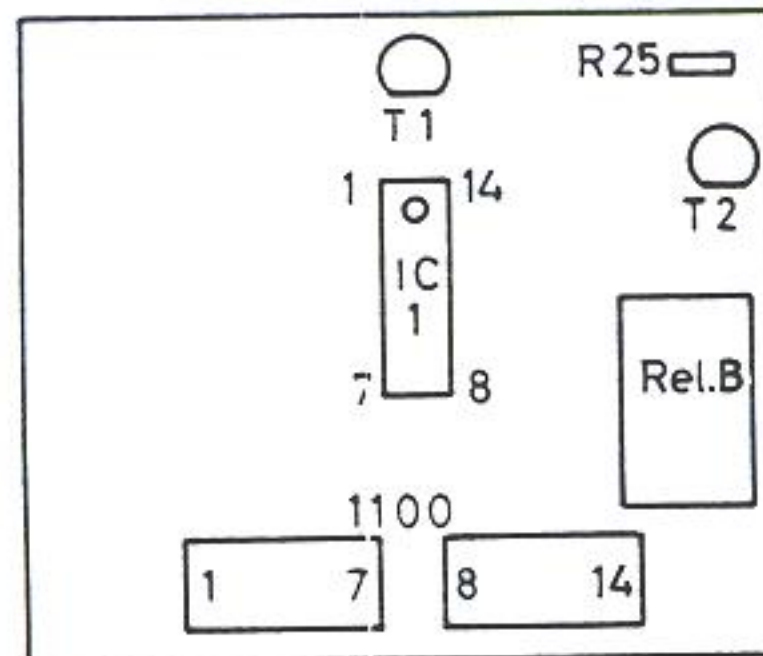
power supply LF and servo motor 2100





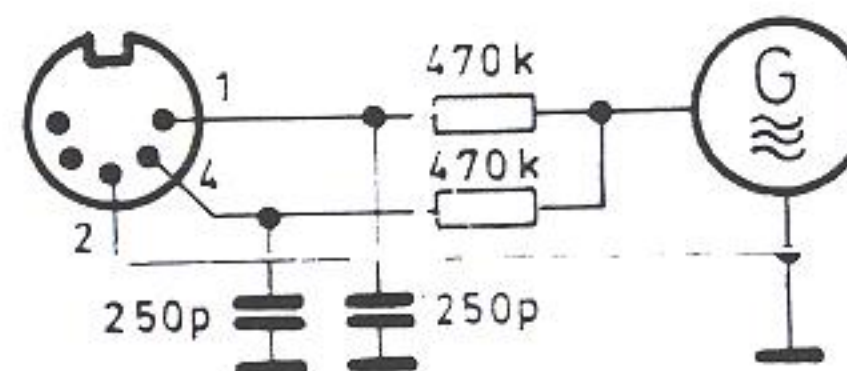
2. R 2226, R 2227 and R 2228 Adjustment of the tape speed (see figure 1)

For the adjustment of the tape speed in the individual speed steps the UHER speed measurement tape is being used (requisition number 029650). The adjustment has to be performed according to the manual enclosed to the measurement tape by means of the variable resistors R 2226 (4.75 cm/s), R 2227 (9.5 cm/s) and R 2228 (19 cm/s). When aligning the tape speed 19 cm/s it is necessary to take care for the adjusting resistor R 2230 (E) being in the middle position. The variable resistors R 2226, R 2227 and R 2228 become accessible on the printed circuit board "control capstan motor 2200" by an opening in the unit bottom, closed by a stopper.



4. Alignment of the variable resistors in the LF section

During all measurements an audio oscillator is connected with socket RADIO using the equivalent circuit shown below: The output level control has to be in the locking middle position.



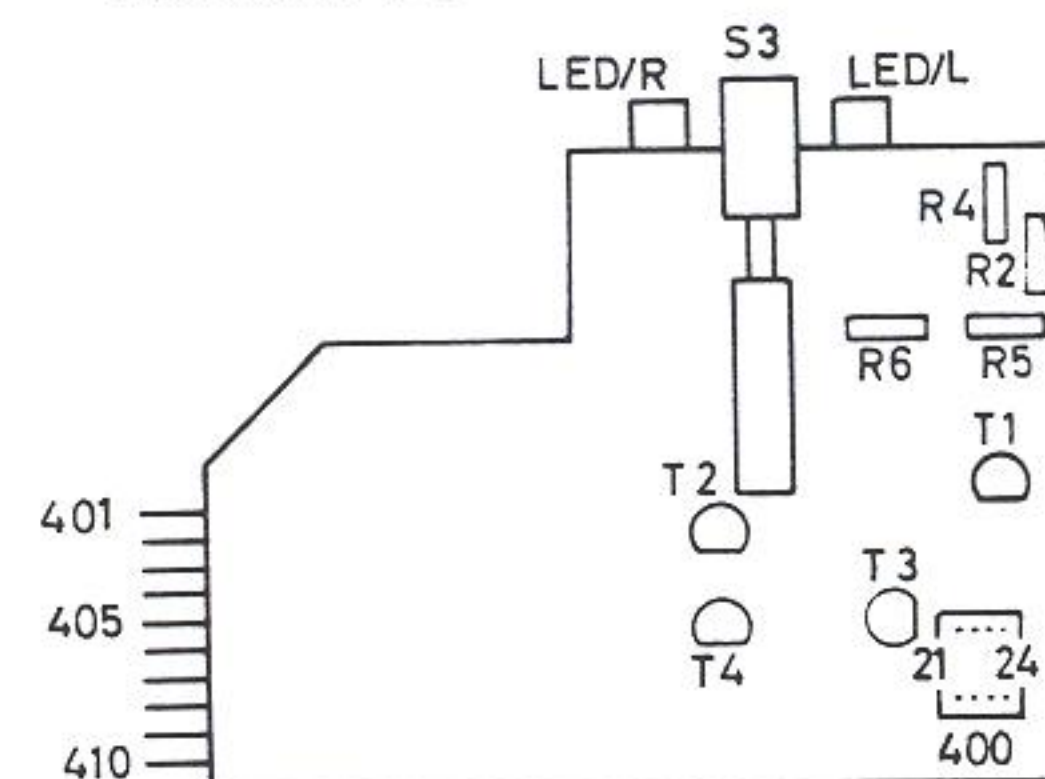
As measurement output for the connection of a LF voltmeter ($R_i = 10 \text{ MOhm}$) and an oscillator use socket MONITOR contact 3 (left channel), contact 5 (right channel) and contact 2 (chassis). All measurements involving the tape have to be performed using the UHER test tape (= unrecorded section of DIN test tape 19 h/9.5).

4.1 R 405 and R 406 Adjustment of the level control

Use tape speed 9.5 cm/s. Set unit with tape inserted of with the light barrier for the automatic tape end switch off being covered to recording and press MONITOR pushbutton. Adjust output voltage of the audio oscillator to get 20 mV/333 Hz being applied to socket RADIO. Adjust master control to the right hand stop. Adjust level precontrol RADIO L and R to get 0.775 V at the LF

Fig. 1

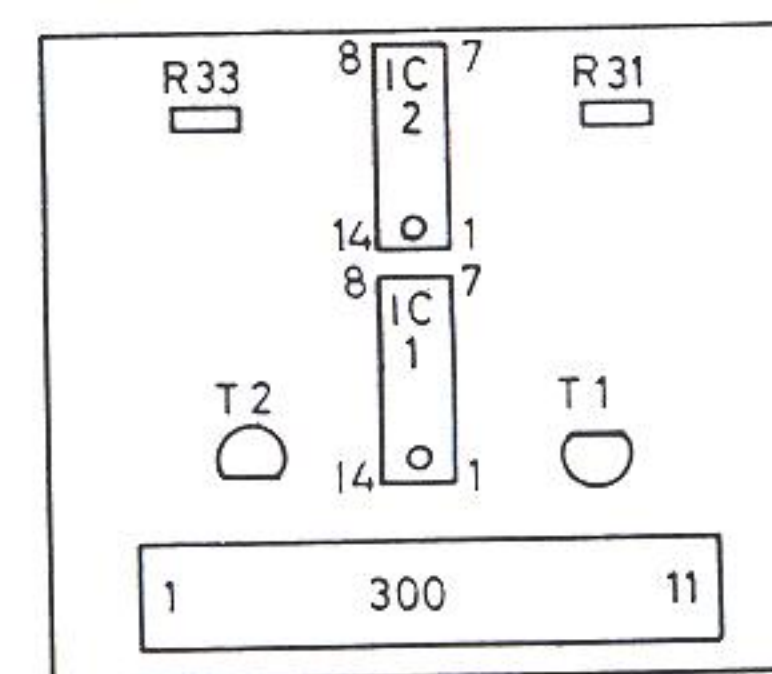
instrument amplifier 400



4.3 R 331 and R 333 Adjustment of the limiter indication

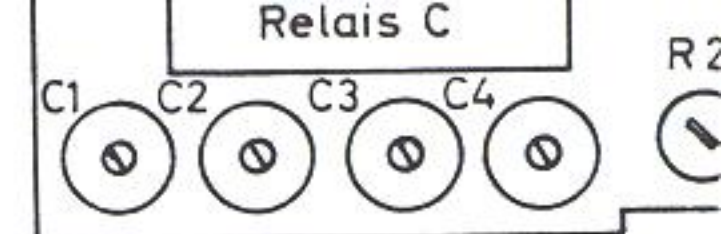
Measurement setup as described under 4.2. Reduce output voltage of the audio oscillator until at the measurement output there is a reading of 0.775 V. Adjust the variable resistors R 331 and R 333 on the pc board until the LED indicating too high recording levels just goes out.

limiter 300



4.4 C 1, C 2, C 3 and C 4 Adjustment of the RF premagnetization

After exchange of the pc board "RF generator 1000" or integrated parts of this component the RF generator has to be aligned according to figure 5.



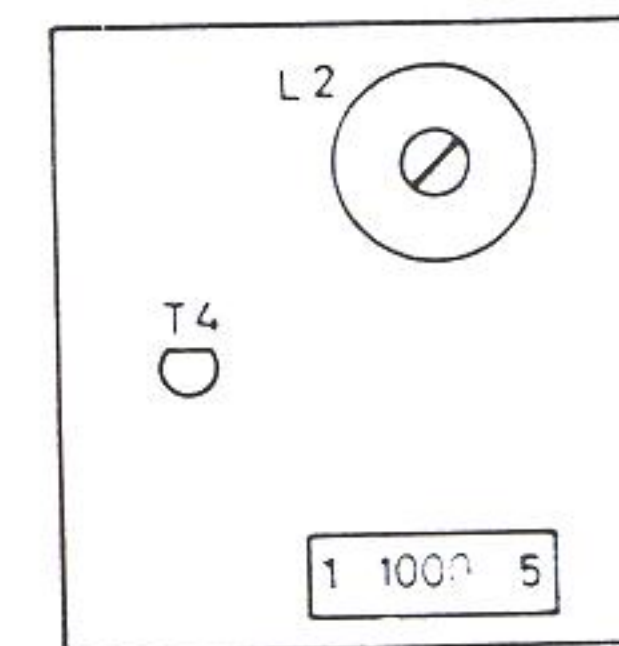
5. Alignment of the RF generator and the rejector circuits

The adjustment of the nominal comes only necessary after the exchange of the printed circuit board "RF generator" and other components influencing the alignment of this modul. The alignment of the rejector in the playback amplifier has to be performed after the exchange of the printed circuit board "playback amplifier 900".

5.1 L 1002 Alignment of the nominal frequency

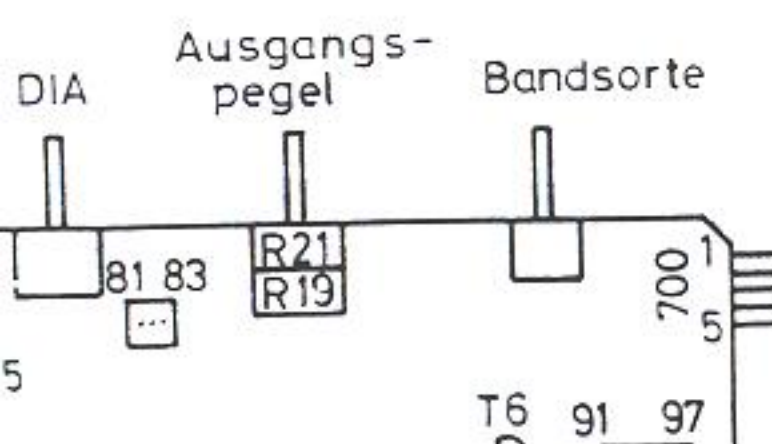
Connect frequency indicator to contact 1 of the printed circuit board "RF generator". Set unit to recording and stereo. The nominal frequency of the generator coil L 1002 is adjusted to 100 kHz.

RF generator 1000

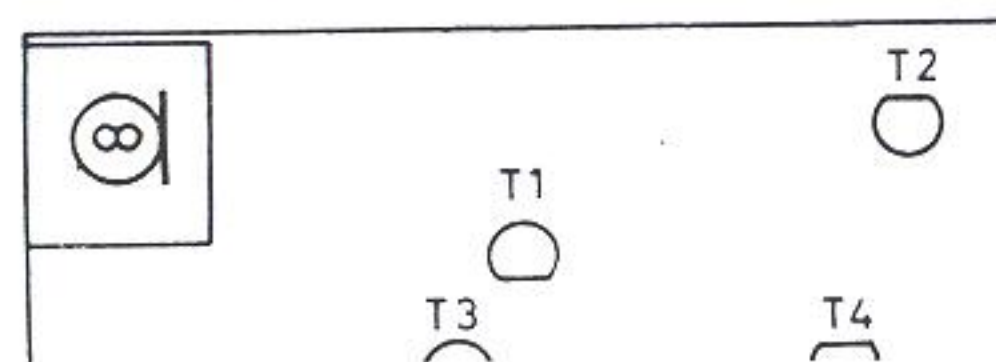


5.2 Alignment of the erasure head load L 1401 and L 1402

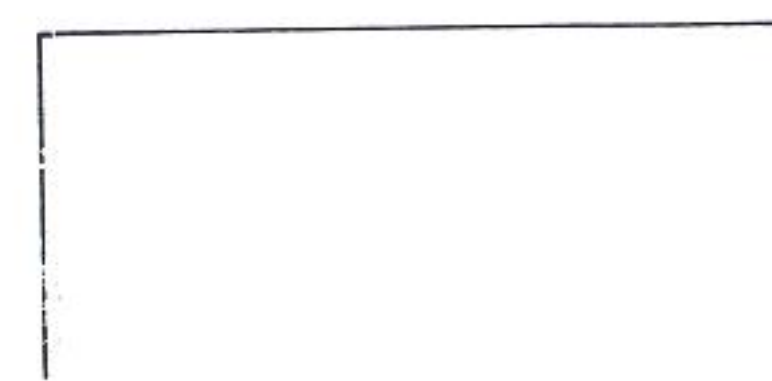
Measurement setup as described under 4.2. Set unit to MONO 1. Adjust equivalent circuit by turning the core in such a way that the nominal frequency is $\pm 2 \text{ kHz}$. Set unit to MONO 2. Adjust load L 1401 as described with M



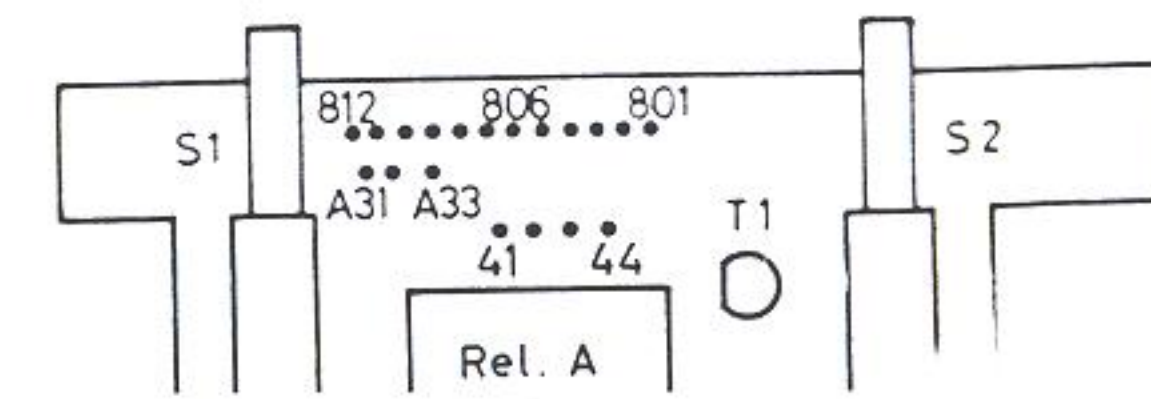
micro amplifier 100



radio amplifier 200



recording-playback relay 500



ior with the spring balance and adjust a tape tension of 70 p by means of the variable resistor R 1565 on the printed circuit board "impuls store with unwinding control right 1500". Set unit to REWIND with the same measurement setup and pull spring balance. Adjust a tape tension of 30 p during this acting by means of the coarse variable resistor R 1554 and the precision variable resistor R 1550.

1.4 Checking of the winding time

With the tape tensions exactly adjusted the winding time has to range between 120 and 150 seconds using a tape (double) with 1200 m.

1.5 Checking of the intensity of the winding impuls for the right hand winding motor

The checking is performed using two reels with 26.5 cm diameter each. First, with the full tape on the right hand reel the unit is set to START and PAUSE. Actuating the key STOP the tape section of the omega loop must be wound to the right hand reel without any loop. In case of too high intensity of the winding impuls there is a tape tension of more than 0.3 N (30 p) (see chapter 1.3.2). If there is a tape tension of less than 0.3 N (30 p) the intensity of the winding impuls is too small or lacking at all. This winding impuls is needed for the tension of the tape while the omega loop of the capstan is formed.

1.6 R 1706 and R 1707 Adjustment of the start-up time when switching from PAUSE to START (see figure 1)

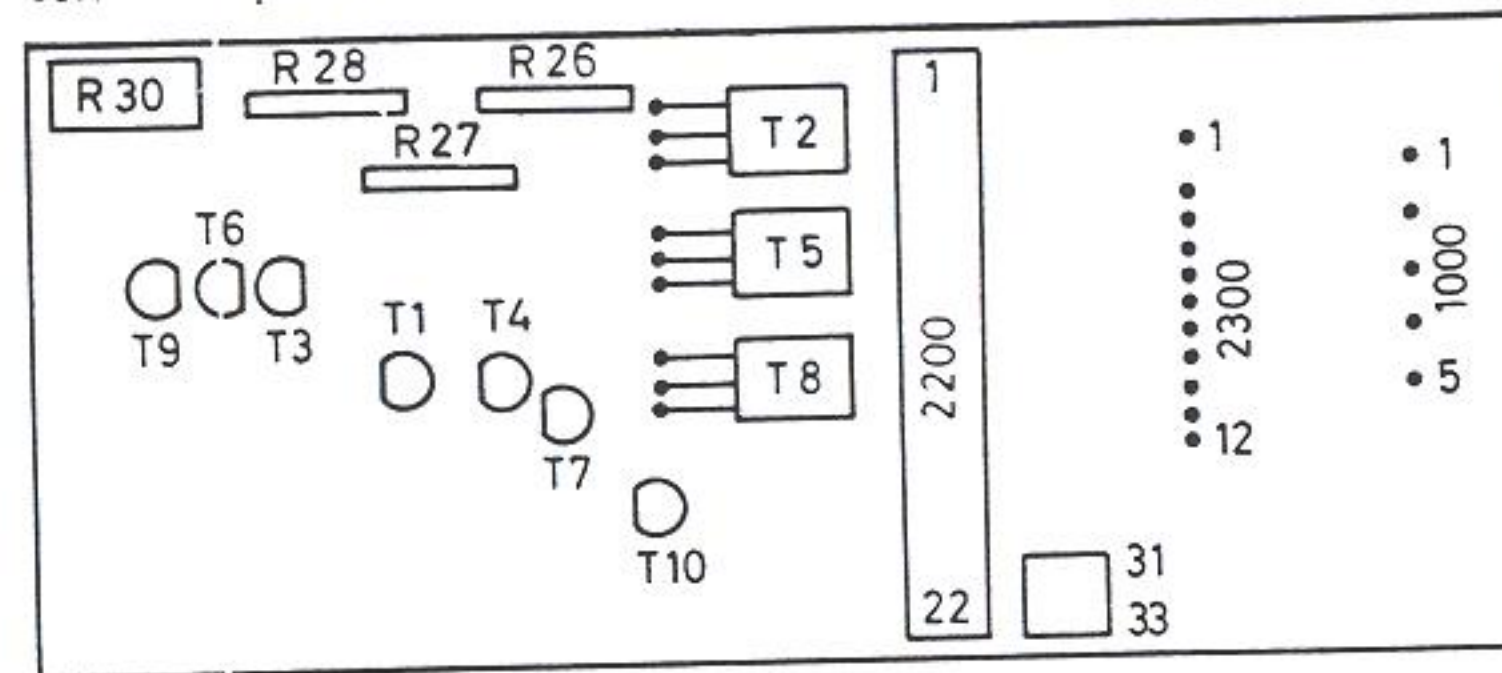
This adjustment has to be performed in a horizontal operating position. The preadjustment is done at the contact 1602 of the printed circuit board "unwinding control left 1700" by measuring and adjusting the voltage. Set unit to START and PAUSE and set switch S2 to position "tape reel diameter 27 cm". Adjust a voltage of 4.5 V by means of the variable resistor R 1706. Set switch S2 to position "tape reel diameter 13-18 cm" and adjust a voltage of 5.5 V by means of the variable resistor R 1707.

The final precision adjustment is performed likewise with reels of a diameter of 26.5 cm by means of resistor R 1706 and with reels of a diameter of 18 cm by means of resistor 1707, in both cases with the almost full reel on the left unwinding reel and while watching the 50 Hz stroboscope roller (C) or the 60 Hz stroboscope roller (D) in corresponding artificial lighting. Switching from position START and PAUSE to position START the tape must reach its nominal speed without any noticeable delay. That is the case with the graduation on the corresponding stroboscope roller seeming to stand still at once. To check the correct adjustment of the start-up time a checking has to be performed with an almost empty unwinding reel.

2. R 2226, R 2227 and R 2228 Adjustment of the tape speed (see figure 1)

For the adjustment of the tape speed in the individual speed steps the UHER speed measurement tape is being used (requisition number 029650). The adjustment has to be performed according to the manual enclosed to the measurement tape by means of the variable resistors R 2226 (4.75 cm/s), R 2227 (9.5 cm/s) and R 2228 (19 cm/s). When aligning the tape speed 19 cm/s it is necessary to take care for the adjusting resistor R 2230 (E) being in the middle position. The variable resistors R 2226, R 2227 and R 2228 become accessible on the printed circuit board "control capstan motor 2200" by an opening in the unit bottom, closed by a stopper.

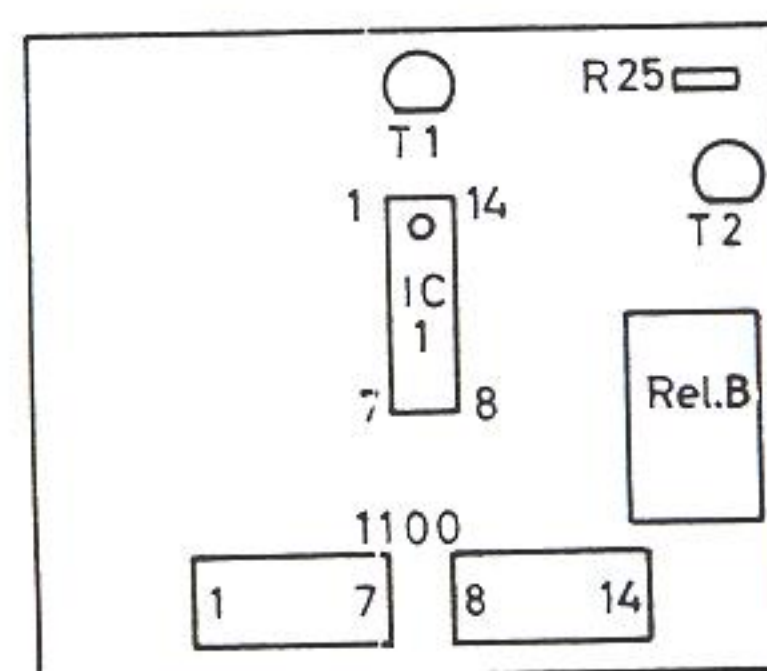
control capstan motor 2200



3. R 1125 Adjustment of the sensitivity of response of the DIA relay

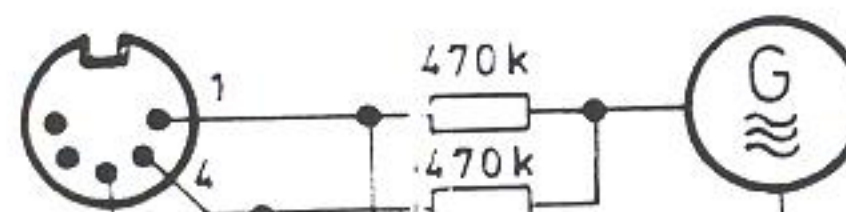
Set tape recorder to position DIA. Turn the variable resistor R 1125 on the pc board "DIA control 1100" to the right until the DIA relay responds. Now turn the resistor slowly to the left until the DIA relay drops. Turn the resistor again for 10° to the right. After this a test recording has to be performed at the tape speed of 9.5 cm/sec.

DIA control 1100



4. Alignment of the variable resistors in the LF section

During all measurements an audio oscillator is connected with socket RADIO using the equivalent circuit shown below: The output level control has to be in the locking middle position.

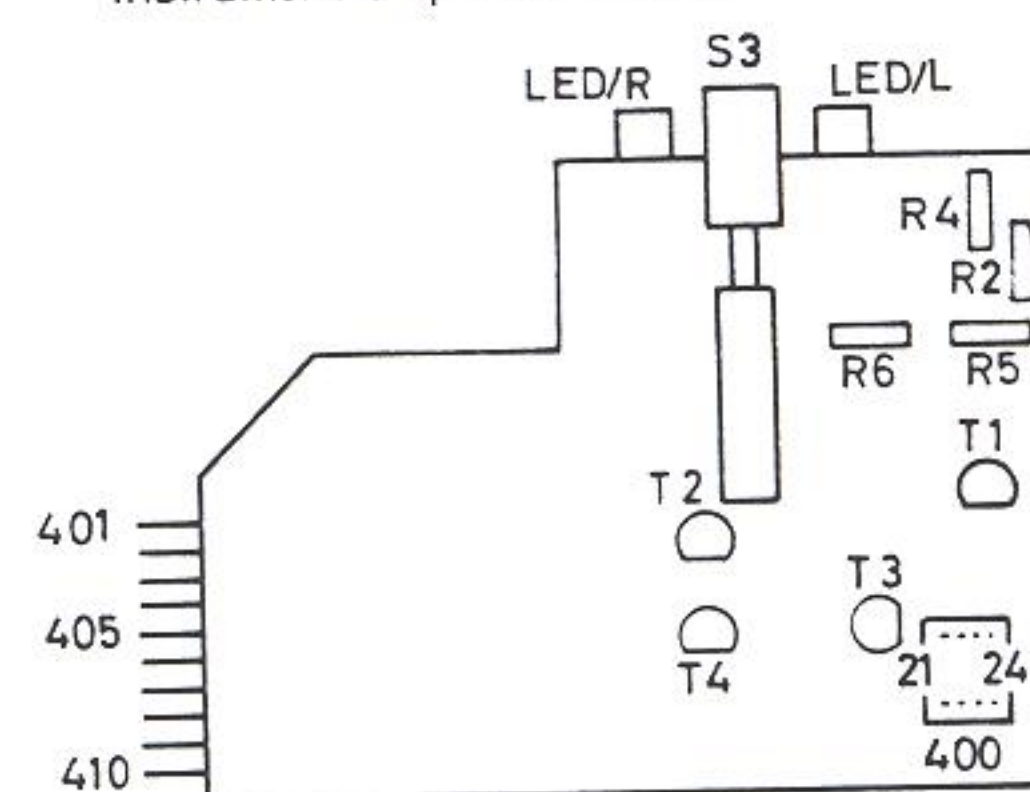


voltmeter. Adjust both instrument systems with the variable resistors R 405 and R 406 on the pc board "instrument amplifier 400" to a 0 dB reading.

4.2 R 402 and R 404 Adjustment of the limiter

Increase output voltage of the audio oscillator with the limiter turned on to get 60 mV being applied to socket RADIO. Do not change position of the level controls in relation to 4.1. Adjust the limiters in both channels with the variable resistors R 402 and R 404 on the pc board "instrument amplifier 400" to get 0.85 V at the measurement output.

instrument amplifier 400



4.3 R 331 and R 333 Adjustment of the limiter indication

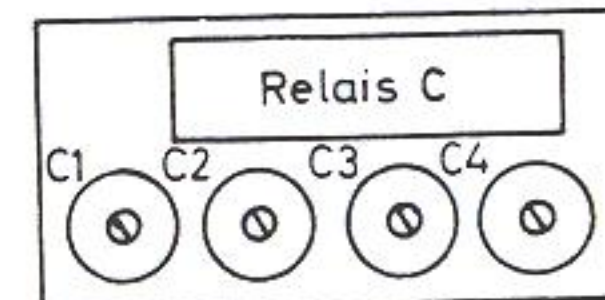
Measurement setup as described under 4.2. Reduce output voltage of the audio oscillator until at the measurement output there is a reading of 0.775 V. Adjust the variable resistors R 331 and R 333 on the pc board until the LED indicating too high recording levels just goes out.

Measurement setup as described under 4.2. Reduce output voltage at the measurement output by 30 dB = 0.65 mV. Set unit to recording and set tape speed to position Fe and tape speed to position 19 cm/s. Adjust the variable RF capacitors C 1 and C 2 on the printed circuit board "head assembly 400" respectively to get a frequency of 333 Hz. After this, adjust variable RF capacitor C 4 at a tape speed of 19 cm/s until the response from +1 to -1 at 333 Hz. If necessary, adjust the level controls exactly by means of the adjustment controls (see figure 1).

4.5 R 1 and R 2 Adjustment of the level

Record 333 Hz at a recording speed of 9.5 cm/s and set unit to playback. With the key MONITOR not being pressed adjust the level controls R 1 and R 2 on the printed circuit board "head assembly 400" respectively to get 0.85 V at the measurement output.

tape head assembly Z 402 (2 track) or Z 403 (4 track)



5. Alignment of the RF generator and the rejector circuits

The adjustment of the RF generator and the rejector circuits comes only necessary after the exchange of the printed circuit board "RF generator and rejector" or other components influencing the RF section of this modul. The alignment of the RF generator has to be performed in the playback amplifier head after the exchange of the printed circuit board "playback amplifier 900".

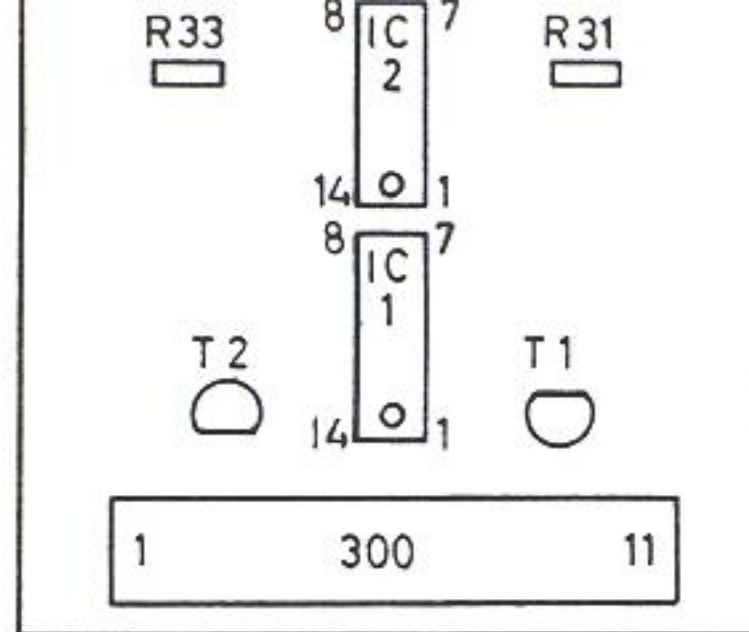
5.1 L 1002 Alignment of the frequency

Connect frequency indicator to the measurement output of the printed circuit board "RF generator and rejector". Set unit to recording and set tape speed to position 19 cm/s. The frequency of the generator coil is adjusted to 1000 Hz.

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p. Adjust level precon-
get 0.775 V at the LF

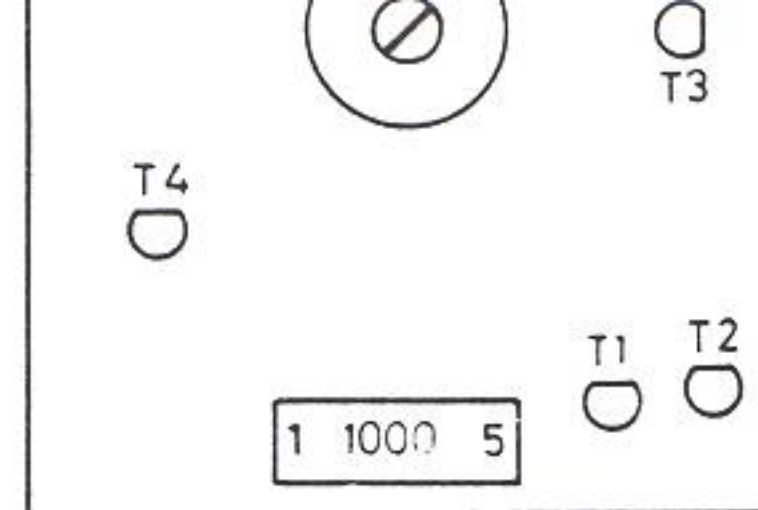


4.4 C 1, C 2, C 3 and C 4 Adjustment of the RF premagnetization

After exchange of the pc board "RF generator 1000" or integrated parts of this component the RF generator has to be aligned according to figure 5.

5.2 Alignment of the erasure head equivalent load L 1401 and L 1402

Measurement setup as described under 5.1. Set unit to MONO 1. Adjust equivalent load L 1402 by turning the core in such a way that the generator gets the nominal frequency of 100 kHz ± 2 kHz. Set unit to MONO 2. Adjust equivalent load L 1401 as described with MONO 1.



is done by bending the levers (C). The measurement of the brake effect is performed using a tape reel (core diameter 60 mm) to which about 5 m tape is wound. Hook a spring balance to the free end of the tape (measuring range of about 1 kp). Nominal value 400–450 p.

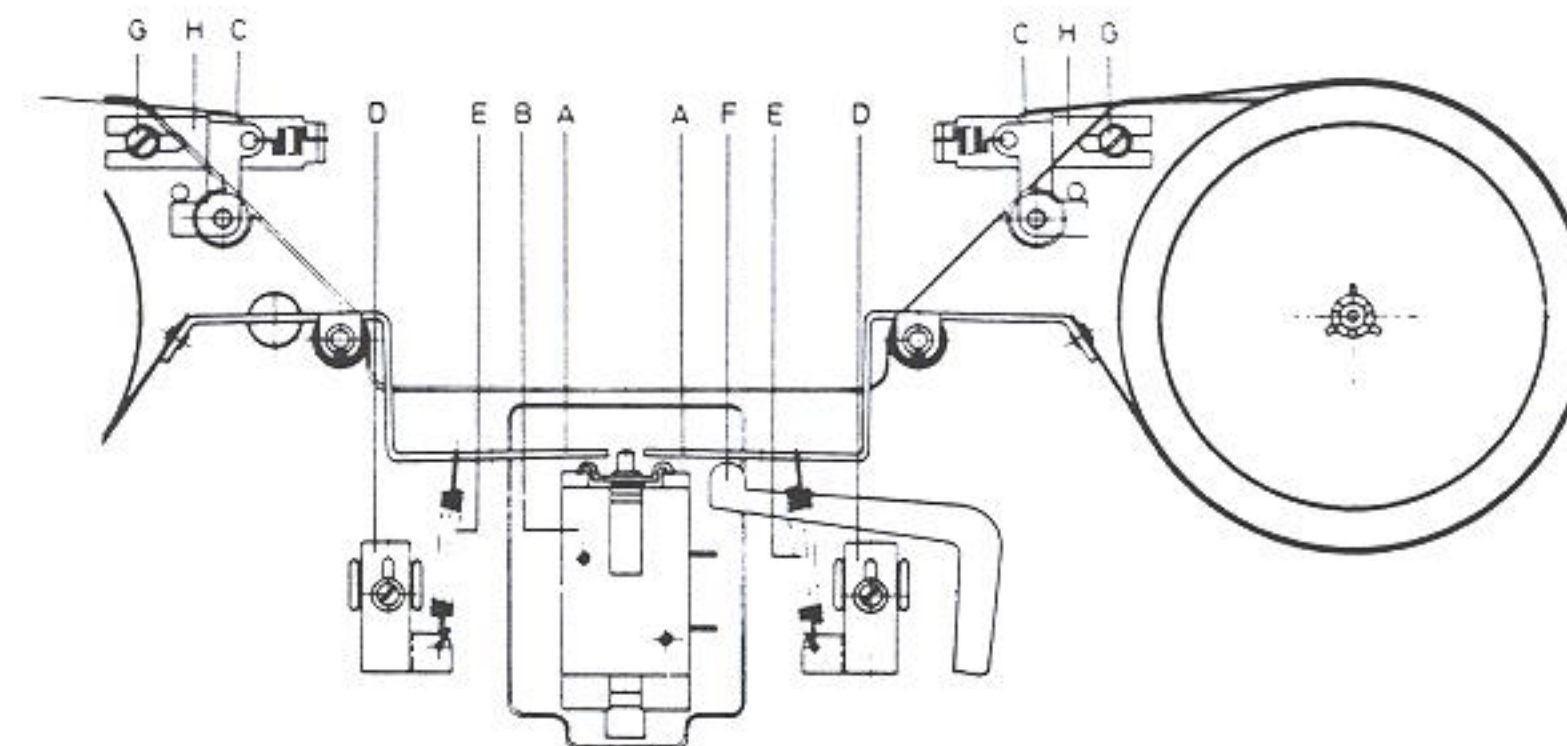
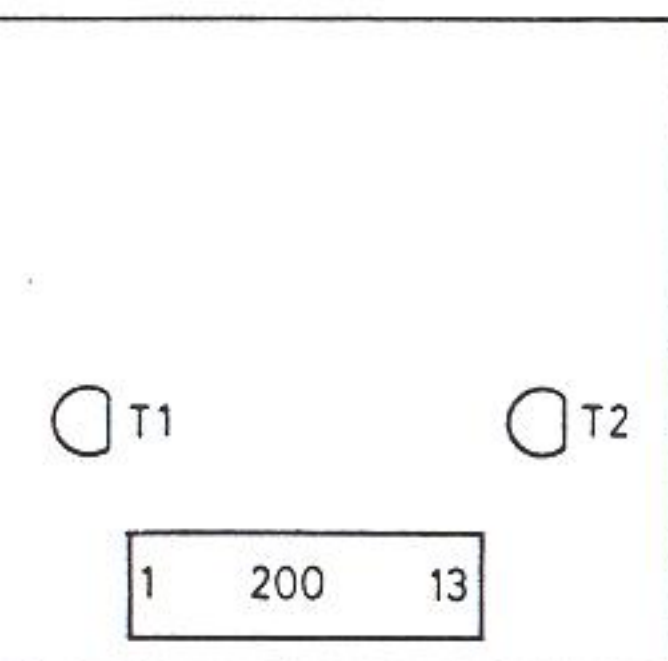


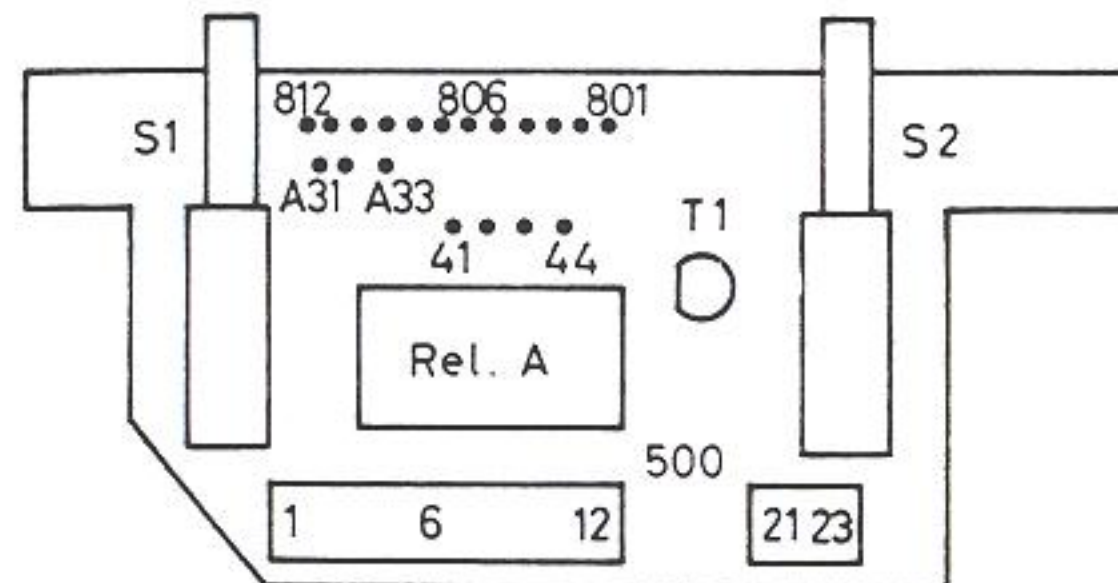
Fig. 2

io amplifier 200

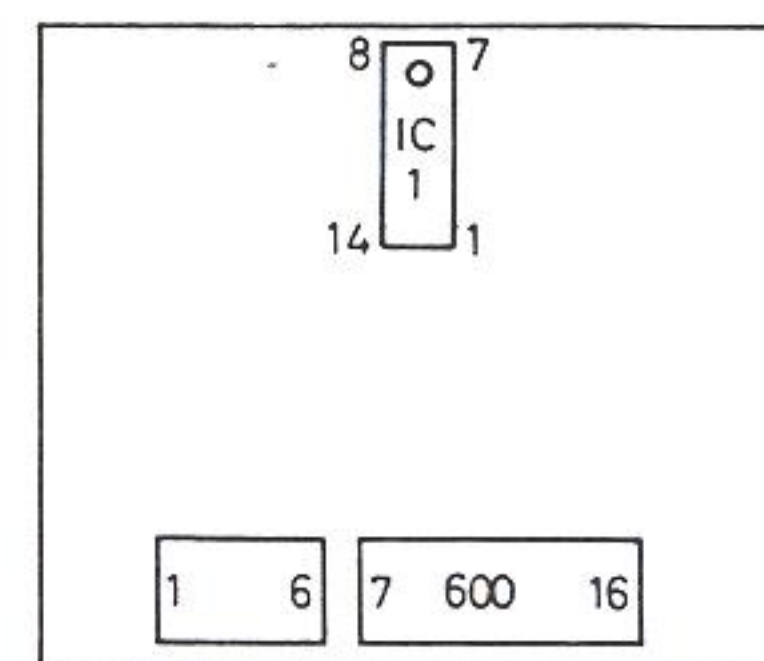


recording - playback relay

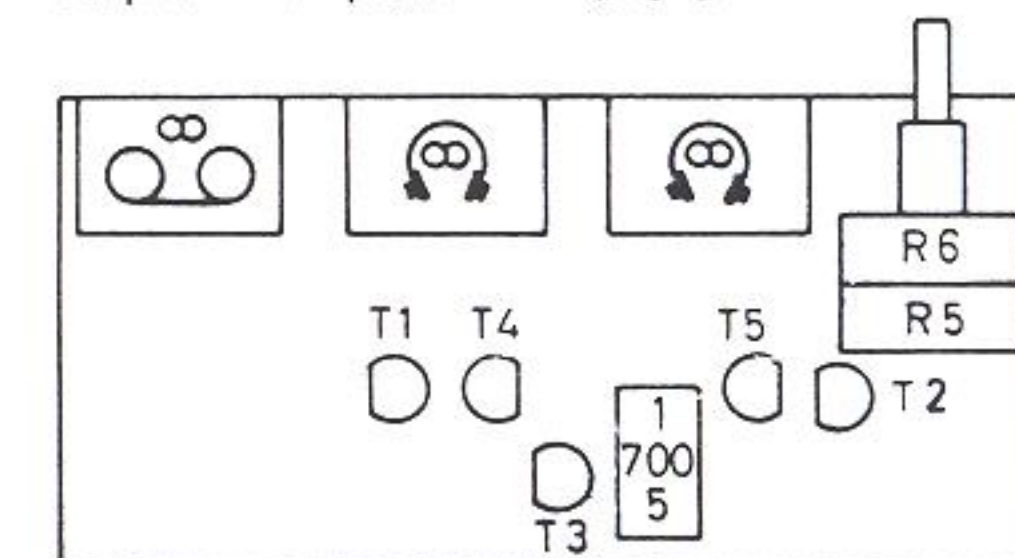
500



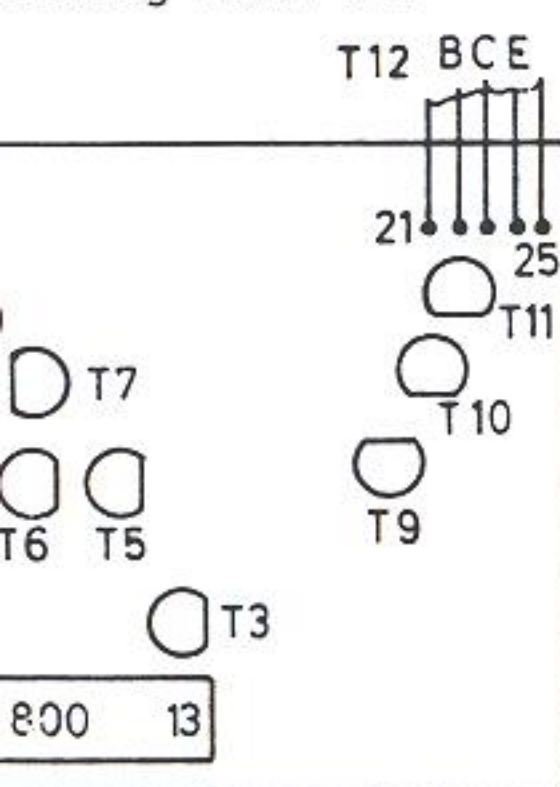
recording amplifier 600



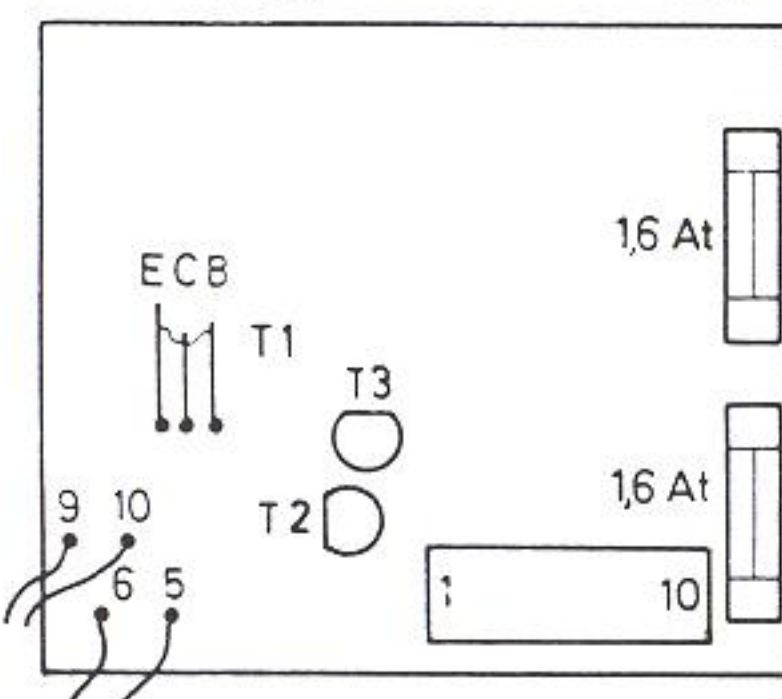
earphone amplifier 700



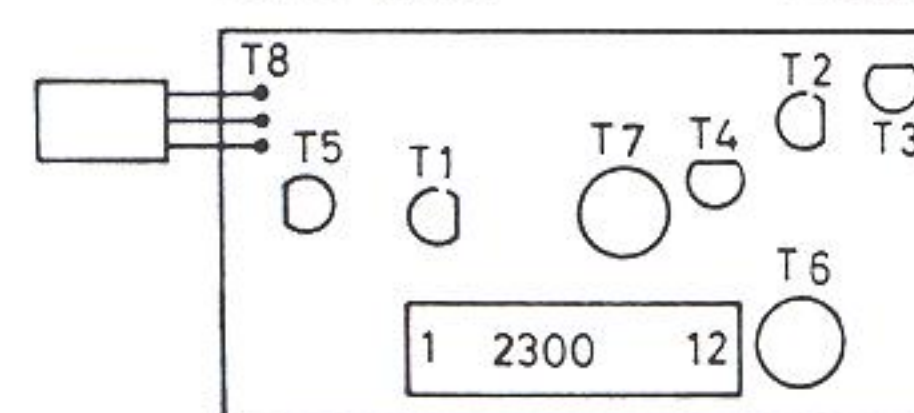
winding meter left



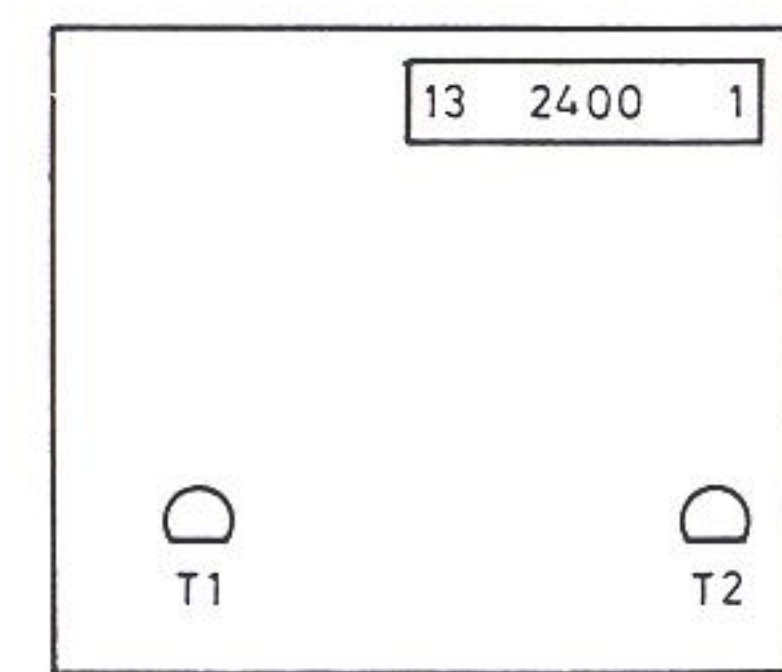
power supply LF and servo motor 2100

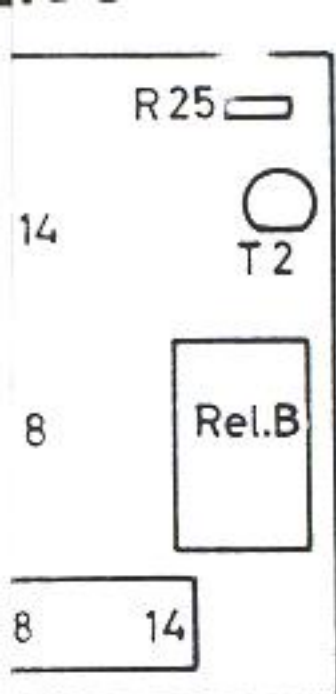


servo motor 2300



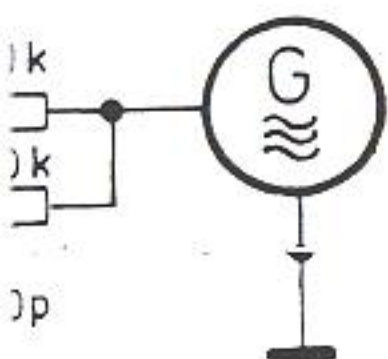
Take-Up impulse intensity control 2400





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an audio oscillator is
ADIO using the equi-
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cking middle position.

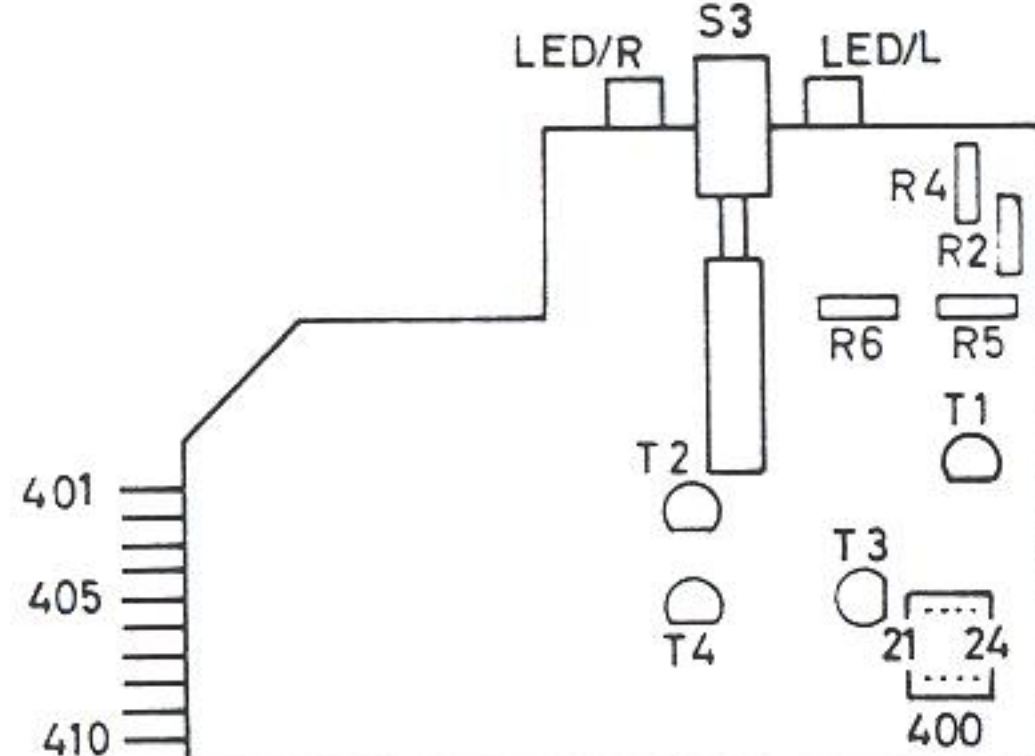


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MOhm) and an oscil-
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annel) and contact 2
its involving the tape
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et 0.775 V at the LF

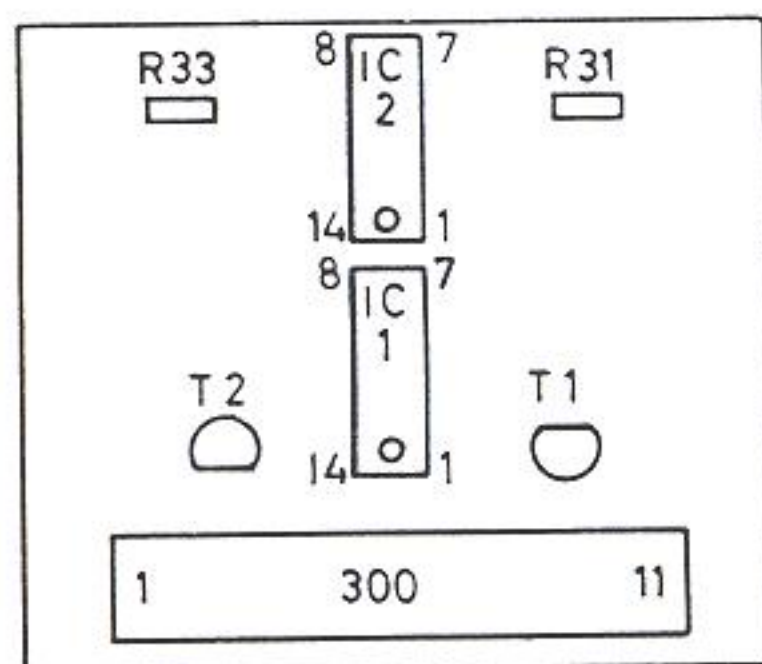
instrument amplifier 400



4.3 R 331 and R 333 Adjustment of the limiter indication

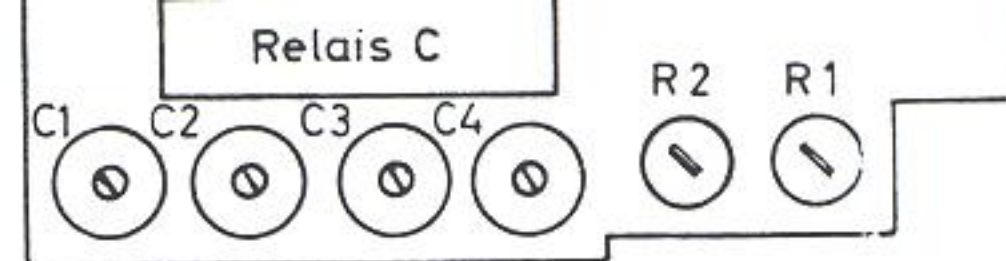
Measurement setup as described under 4.2. Reduce output voltage of the audio oscillator until at the measurement output there is a reading of 0.775 V. Adjust the variable resistors R 331 and R 333 on the pc board until the LED indicating too high recording levels just goes out.

limiter 300



4.4 C 1, C 2, C 3 and C 4 Adjustment of the RF premagnetization

After exchange of the pc board "RF generator 1000" or integrated parts of this component the RF generator has to be aligned according to figure 5.



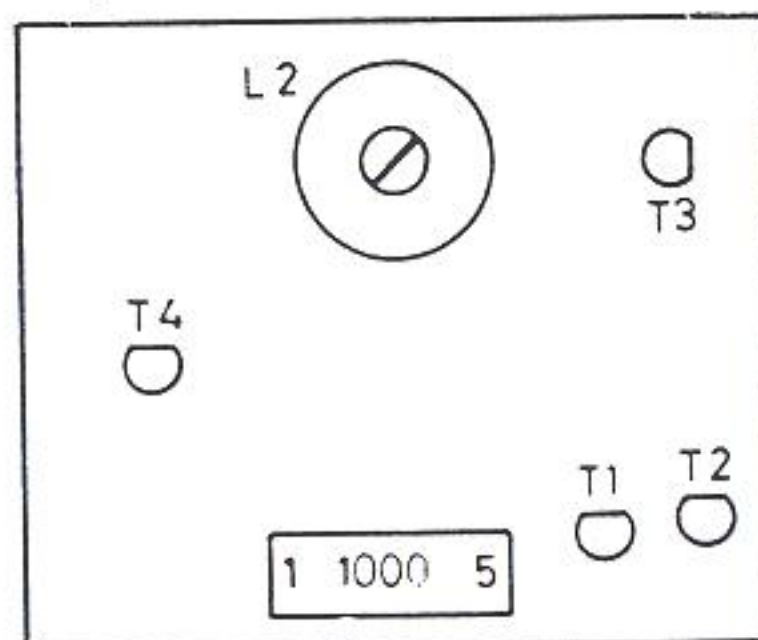
5. Alignment of the RF generator and of the rejector circuits

The adjustment of the nominal frequency becomes only necessary after the exchange of the printed circuit board "RF generator 1000" of any other components influencing the frequency on this modul. The alignment of the rejector circuits in the playback amplifier has to be performed after the exchange of the printed circuit board "playback amplifier 900".

5.1 L 1002 Alignment of the nominal frequency

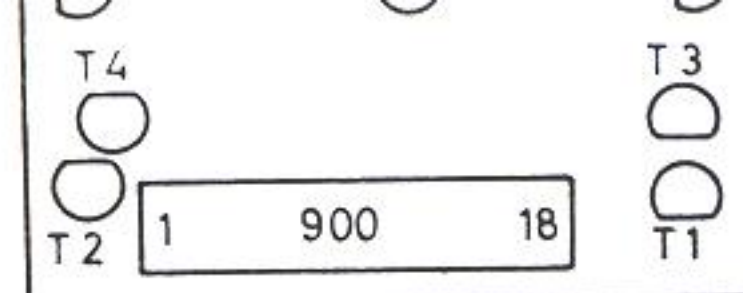
Connect frequency indicator to contact 1004 of the printed circuit board "RF generator 1000". Set unit to recording and stereo. By turning the core of the generator coil L 1002 the nominal frequency is adjusted to 100 kHz \pm 2 kHz.

RF generator 1000



5.2 Alignment of the erasure head equivalent load L 1401 and L 1402

Measurement setup as described under 5.1. Set unit to MONO 1. Adjust equivalent load L 1402 by turning the core in such a way that the generator gets the nominal frequency of 100 kHz \pm 2 kHz. Set unit to MONO 2. Adjust equivalent load L 1401 as described with MONO 1.



5.4 L 901 and L 902 RF rejector circuits in the playback amplifier

Set unit to RECORDING. Do not press the MONITOR button (S 1). Connect LF voltmeter to socket MONITOR.

Adjust RF minimum by turning the cores of the RF rejector coils L 901 and L 902 on the printed circuit board "playback amplifier 900".

6. Adjustment of the tape brakes (see figure 2)

The braking levers (A) must have a bending resulting in position STOP in a distance of 2 mm on the left side and 1 mm on the right side to the brake release pot (B).

Between the right hand braking lever and the brake release lever (F) there must be a distance of 0.1 to 0.2 mm with the right hand braking lever being pressed against the brake release pot (B).

The braking strips must lie in the center of the fabric strips on the turntables. The adjustment is done by bending the levers (C).

The measurement of the brake effect is performed using a tape reel (core diameter 60 mm) to which about 5 m tape is wound. Hook a spring balance to the free end of the tape (measuring range of about 1 kp). Nominal value 400-450 p.

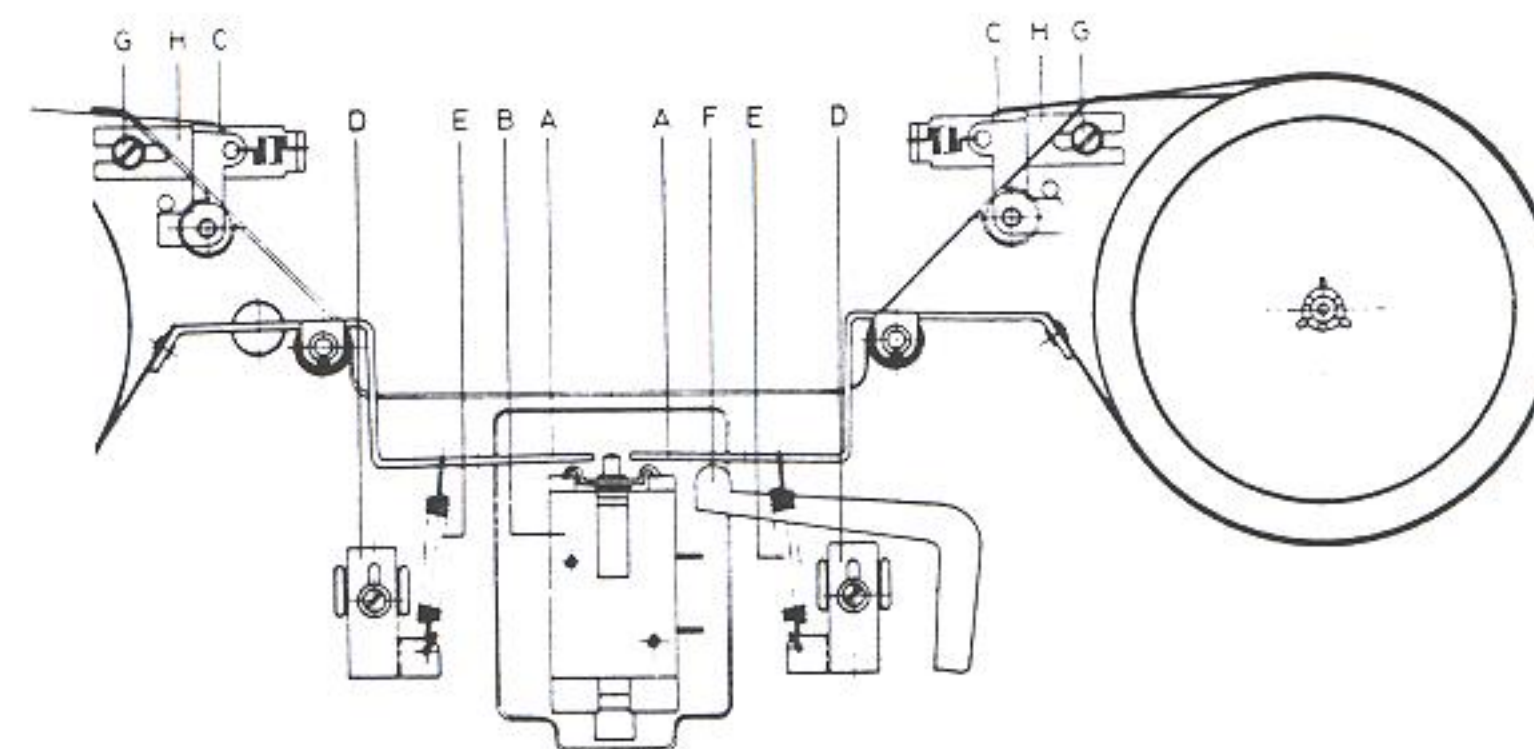


Fig. 2

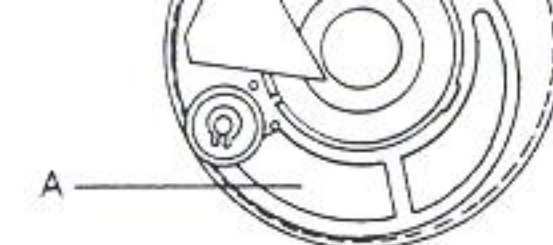


Fig. 3

7.1 Removal of the gear wheels

To remove the gear wheel (A) with the oam plate the locking ring has to be destroyed (B). The idler gear can be removed after removal of the Seeger ring (D) and of the gear wheel (E) with the release clutch and after removal of the plastic nut (F).

7.2 Installment and adjustment of the gear wheels

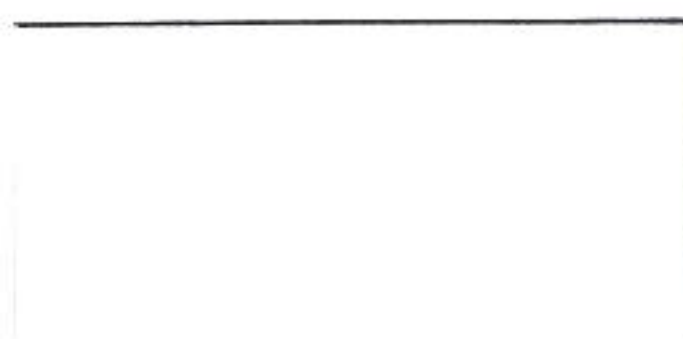
The installment has to be performed in position START. The markings at the gear wheel (A) and at the idler gear (C) have to face each other; the marking at the gear wheel (E) has to be shifted to the right by three teeth related to the idler gear (C).

The gear wheel (A) and the gear wheel (C) have to be secured by a new locking ring (B) and a Seeger ring (D) respectively.

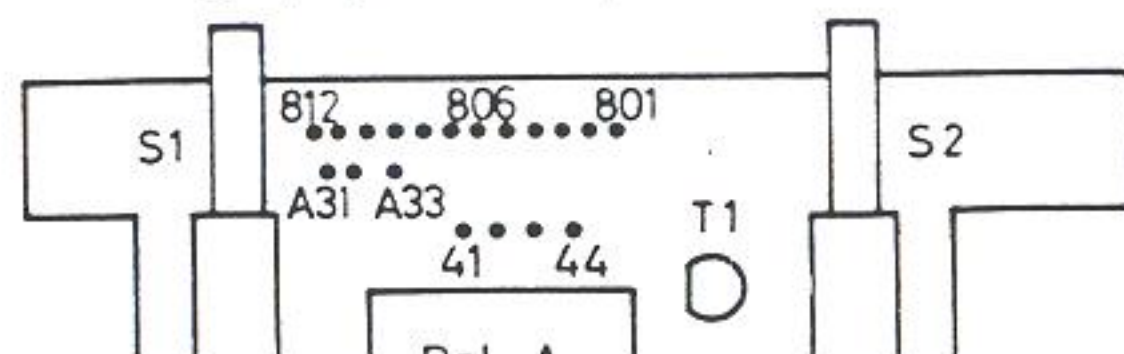
7.3 Adjustment of the release clutch in the gear wheel (C)

Set unit to START and PAUSE. Bridge contact K 1. The servo motor must start up. Fasten the gear wheel (E) by means or the plastic nut until the release clutch is just turning. After this secure nut (F) with lacquer against undesired twisting.

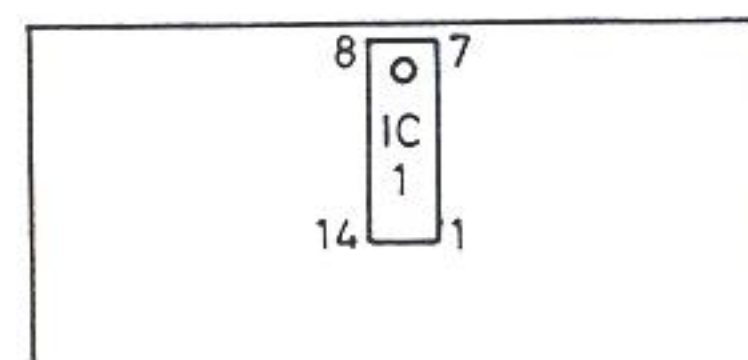
o amplifier 200



recording-playback relay 500



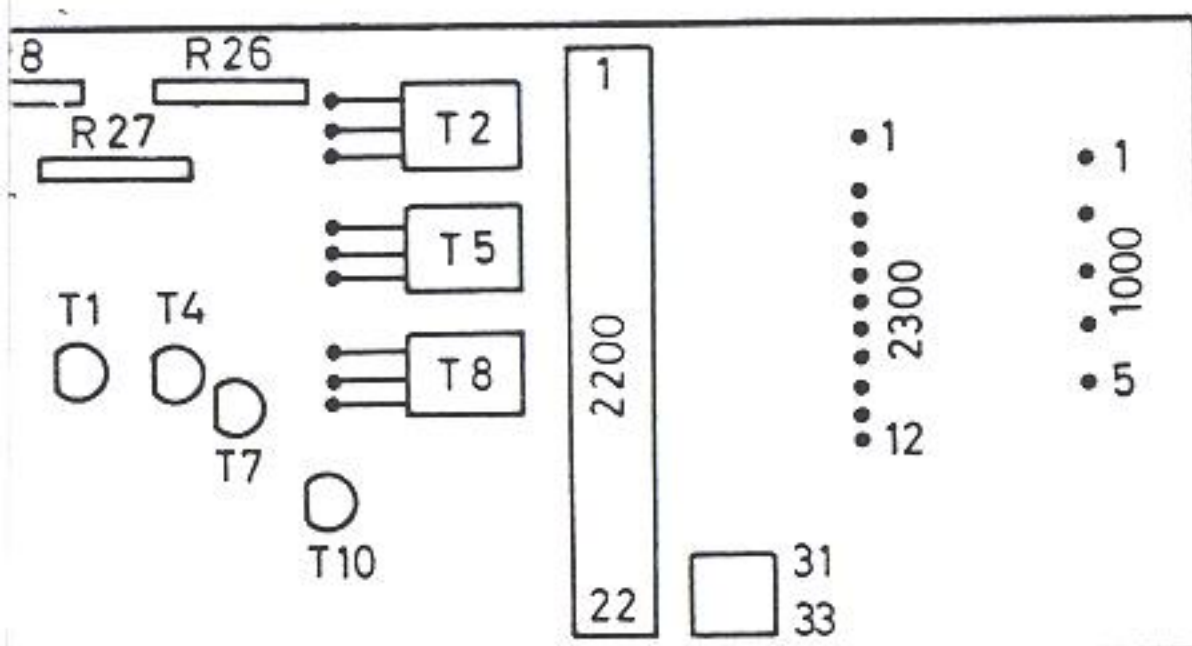
recording amplifier 600



earphone amplifier 700



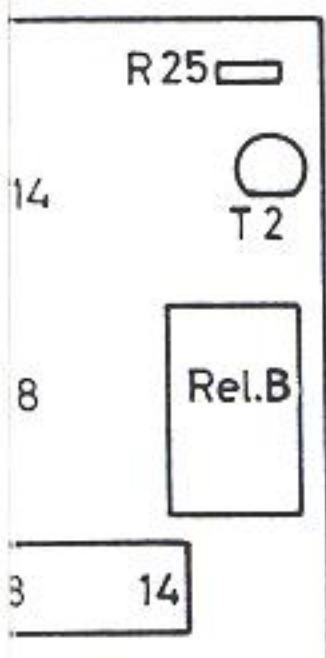
an motor **2200**



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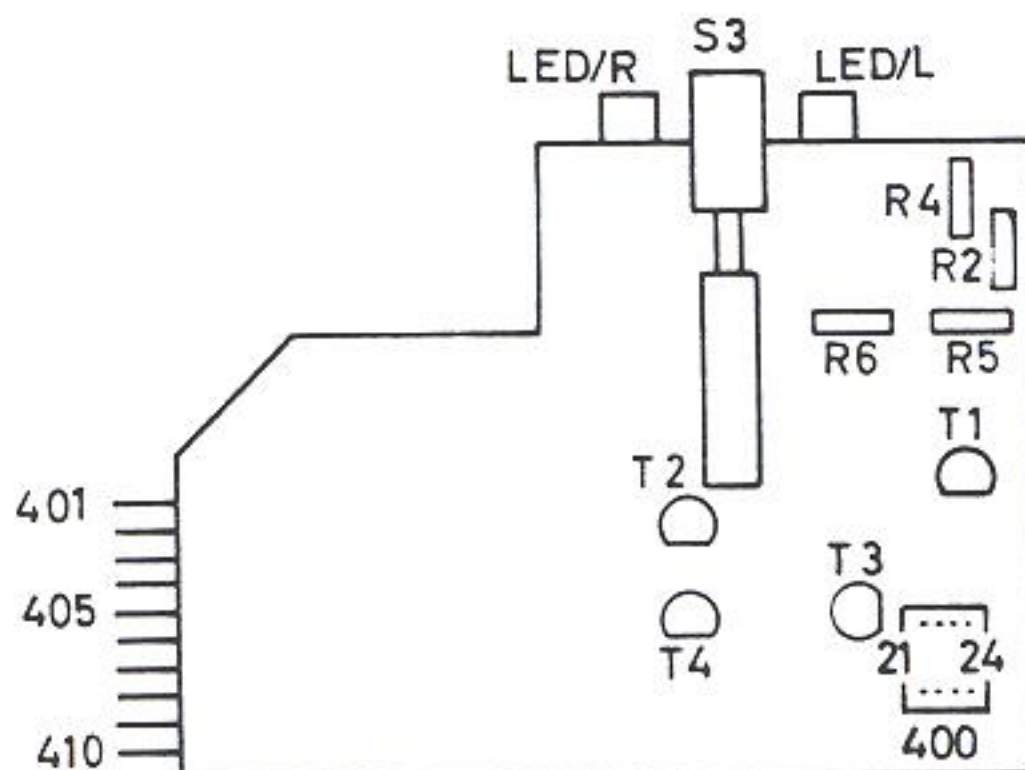


voltmeter. Adjust both instrument systems with
the variable resistors R 405 and R 406 on the
pc board "instrument amplifier 400" to a 0 dB
reading.

4.2 R 402 and R 404 Adjustment of the limiter

Increase output voltage of the audio oscillator
with the limiter turned on to get 60 mV being
applied to socket RADIO. Do not change position
of the level controls in relation to 4.1. Adjust
the limiters in both channels with the variable
resistors R 402 and R 404 on the pc board
"instrument amplifier 400" to get 0,85 V at the
measurement output.

instrument amplifier **400**



4.3 R 331 and R 333 Adjustment of the limiter indication

Measurement setup as described under 4.2. Re-
duce output voltage of the audio oscillator until
at the measurement output there is a reading
of 0.775 V. Adjust the variable resistors R 331
and R 333 on the pc board until the LED in-

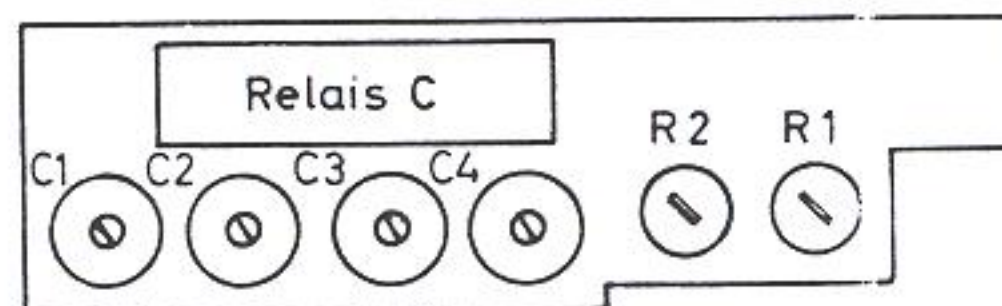
Measurement setup as described under 4.1.
Reduce output voltage at the audio oscillator
by 30 dB = 0.65 mV. Set tape selector switch
to position Fe and tape speed to 9.5 cm/s. Adjust
variable RF capacitors C 1 and C 2 on the printed
circuit board "head assembly Z 402 or Z 412
respectively" to get a frequency response of -3
until -5 dB at 20 kHz at the socket MONITOR,
related to 333 Hz.

After this, adjust variable RF capacitors C 3 and
C 4 at a tape speed of 19 cm/s to get a frequency
response from +1 to -1 at 20 kHz, related to
333 Hz. If necessary, adjust tape speed 13 cm/s
exactly by means of the adjust control (E) (see
figure 1).

4.5 R 1 and R 2 Adjustment of the playback level

Record 333 Hz at a recording level of 0 dB and
at a tape speed of 9.5 cm/s. Rewind recording
and set unit to playback. With pushbutton MONI-
TOR not being pressed adjust 0.775 V at the
socket MONITOR with the variable resistors R 1
and R 2 on the printed circuit board "Head as-
sembly Z 402 or Z 412 respectively.

tape head assembly **Z 402** (2 track) or **Z 412** (4 track)



5. Alignment of the RF generator and of the rejector circuits

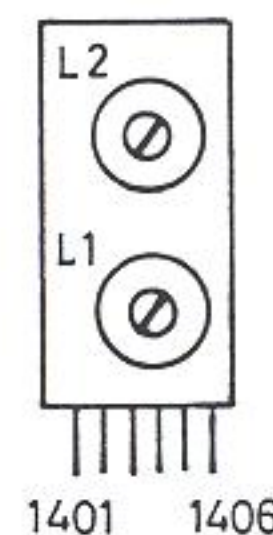
The adjustment of the nominal frequency be-
comes only necessary after the exchange of the
printed circuit board "RF generator 1000" of any
other components influencing the frequency on
this modul. The alignment of the rejector circuits
in the playback amplifier has to be performed
after the exchange of the printed circuit board
"playback amplifier 900".

5.1 L 1002 Alignment of the nominal frequency

Connect frequency indicator to contact 1004 of
the printed circuit board "RF generator 1000".
Set unit to recording and stereo. By turning the
core of the generator coil L 1002 the nominal
frequency is adjusted to 100 kHz \pm 2 kHz.

equivalent load

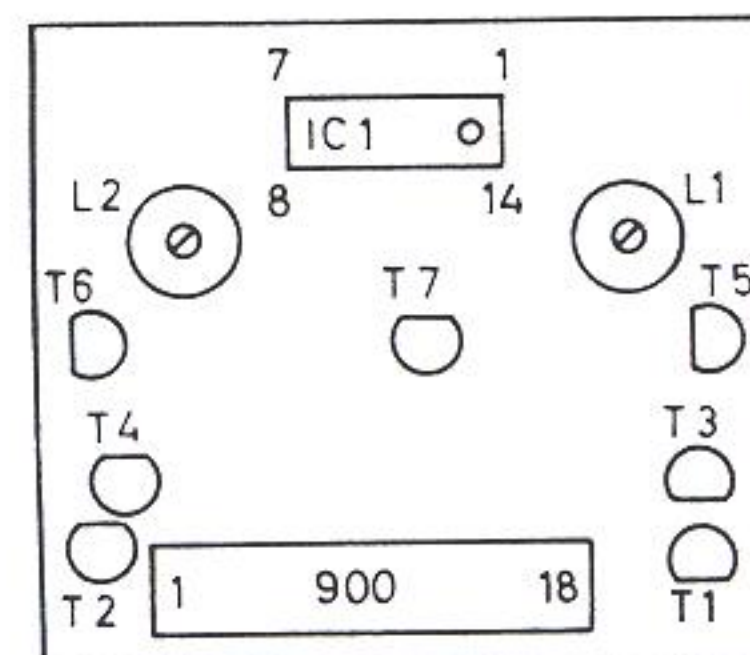
1400



5.3 L 1 and L 2 RF rejector circuits in the recording amplifier

Set unit to RECORDING and STEREO. Connect
LF voltmeter to the measure points MP 1 and
MP 2 on the printed circuit board "basic wiring
1-99".

playback amplifier **900**



5.4 L 901 and L 902 RF rejector circuits in the playback amplifier

Set unit to RECORDING. Do not press the MONI-
TOR button (S 1). Connect LF voltmeter to socket
MONITOR.

Adjust RF minimum by turning the cores of the
RF rejector coils L 901 and L 902 on the printed
circuit board "playback amplifier 900".

6. Adjustment of the tape brakes (see figure 2)

The braking levers (A) must have a bending re-
sulting in position STOP in a distance of 2 mm
on the left side and 1 mm on the right side to
the brake release pot (B).
Between the right hand braking lever and the
brake release lever (F) there must be a distance
of 0.1 to 0.2 mm with the right hand braking

The adjustment is done by shifting the clevis
hooks (D) or by changing the position of the
springs (E). The right hand spring must be hooked
in such a way that there is no danger of its
hooking to the brake release lever (F). Finally
press the braking lever (A) to the brake release
pot (B).

Nominal value of the braking strength 600-700 p.

The adjustment is done after loosening the
screws (G) by shifting the adjustment plates (H).

7. Exchange of the gear wheels of the servo-gear (see figure 3)

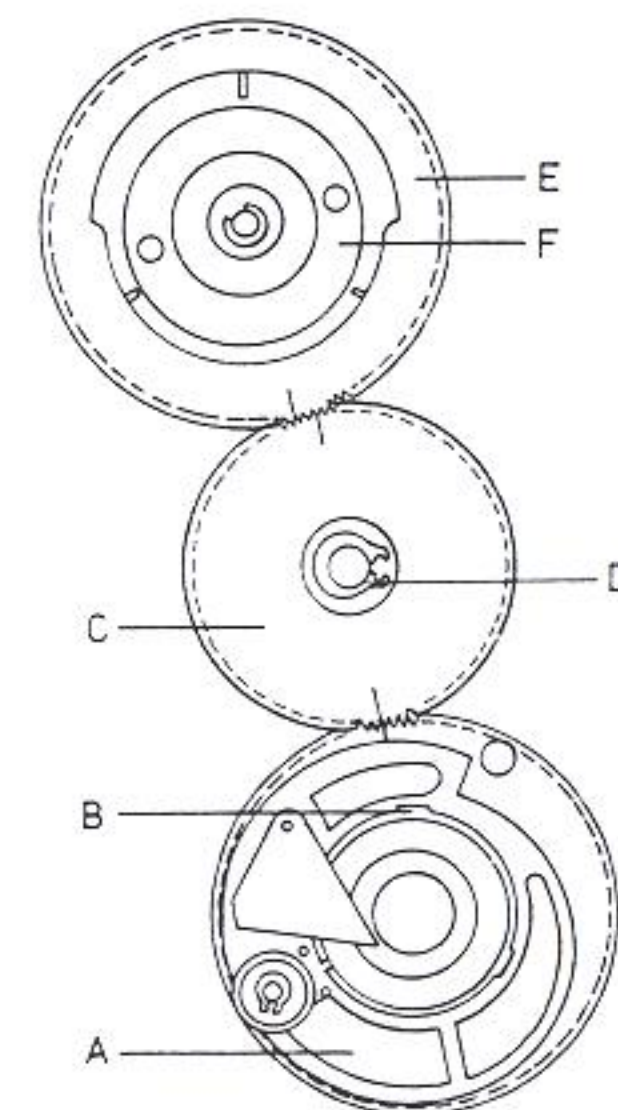


Fig. 3

7.1 Removal of the gear wheels

To remove the gear wheel (A) with the cam plate
the locking ring has to be destroyed (B). The idler
gear can be removed after removal of the Seeger
ring (D) and of the gear wheel (E) with the release
clutch and after removal of the plastic nut (F).

7.2 Installment and adjustment of the gear wheels

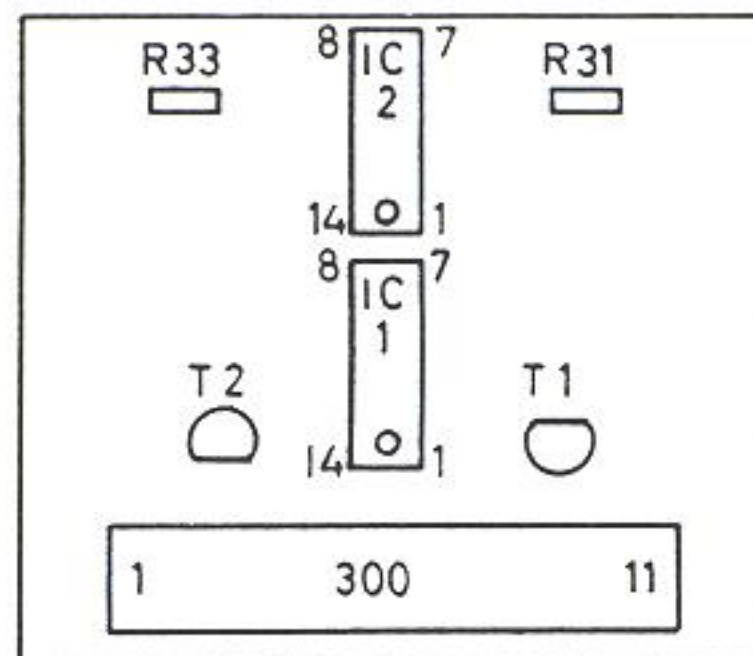
The installment has to be performed in position
START. The markings at the gear wheel (A) and
at the idler gear (C) have to face each other;
the marking at the gear wheel (E) has to be
shifted to the right by three teeth related to the
idler gear (C).

The gear wheel (A) and the gear wheel (C) have
to be secured by a new locking ring (B) and
a Seeger ring (D) respectively.

for the connection of
MOhm) and an oscil-
R contact 3 (left chan-
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Adjustment of the

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4.4 C 1, C 2, C 3 and C 4 Adjustment of the RF premagnetization

After exchange of the pc board "RF generator 1000" or integrated parts of this component the RF generator has to be aligned according to figure 5.

5.2 Alignment of the erasure head equivalent load L 1401 and L 1402

Measurement setup as described under 5.1. Set unit to MONO 1. Adjust equivalent load L 1402 by turning the core in such a way that the generator gets the nominal frequency of 100 kHz ± 2 kHz. Set unit to MONO 2. Adjust equivalent load L 1401 as described with MONO 1.

is done by bending the levers (C). The measurement of the brake effect is performed using a tape reel (core diameter 60 mm) to which about 5 m tape is wound. Hook a spring balance to the free end of the tape (measuring range of about 1 kp). Nominal value 400–450 p.

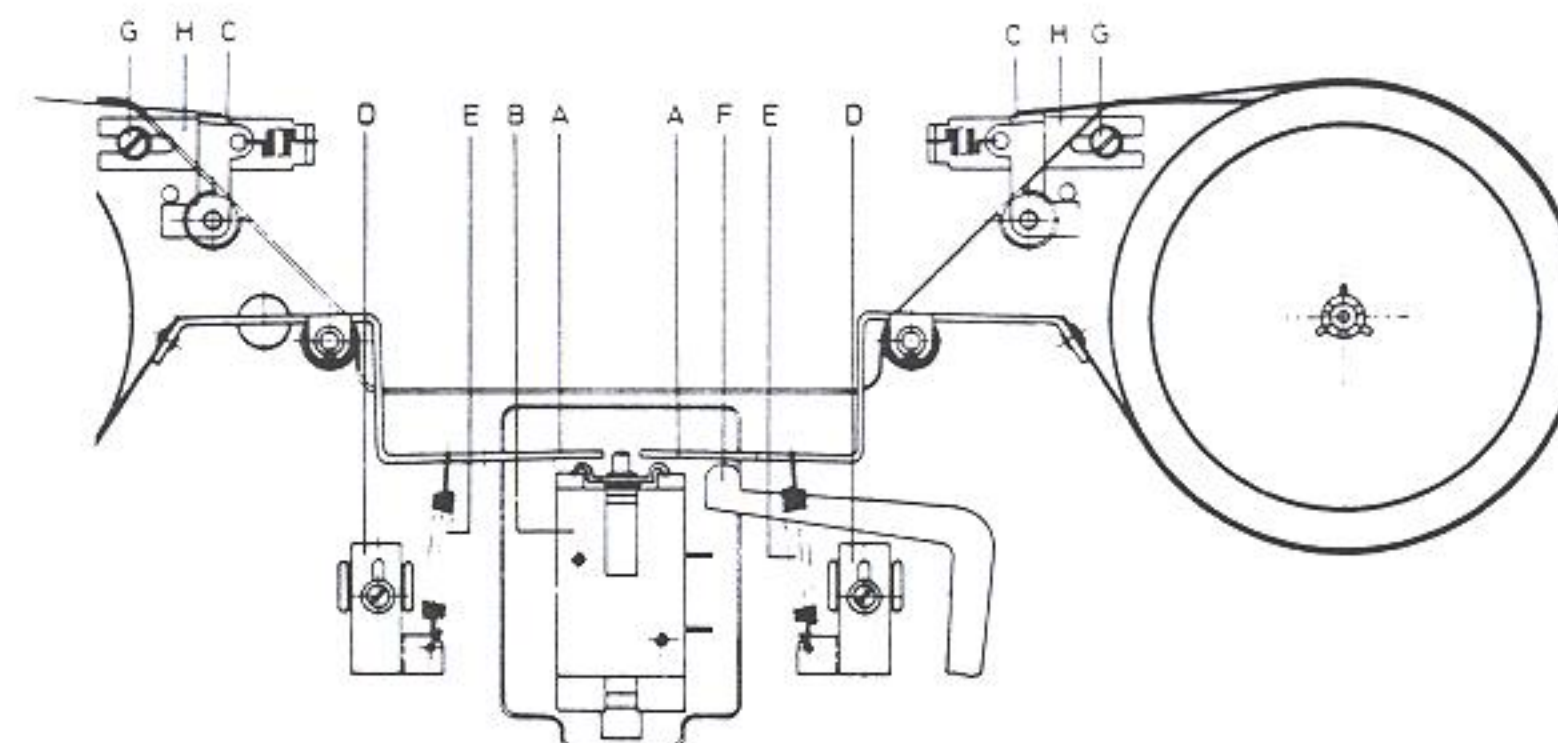
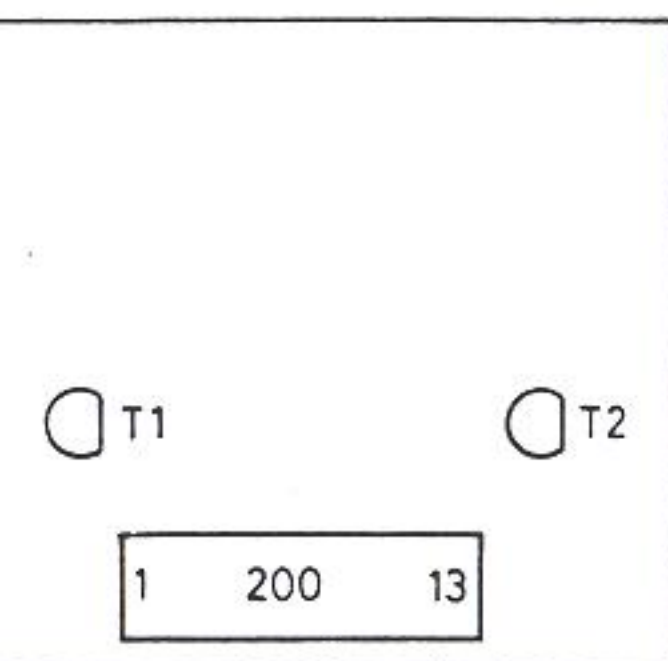
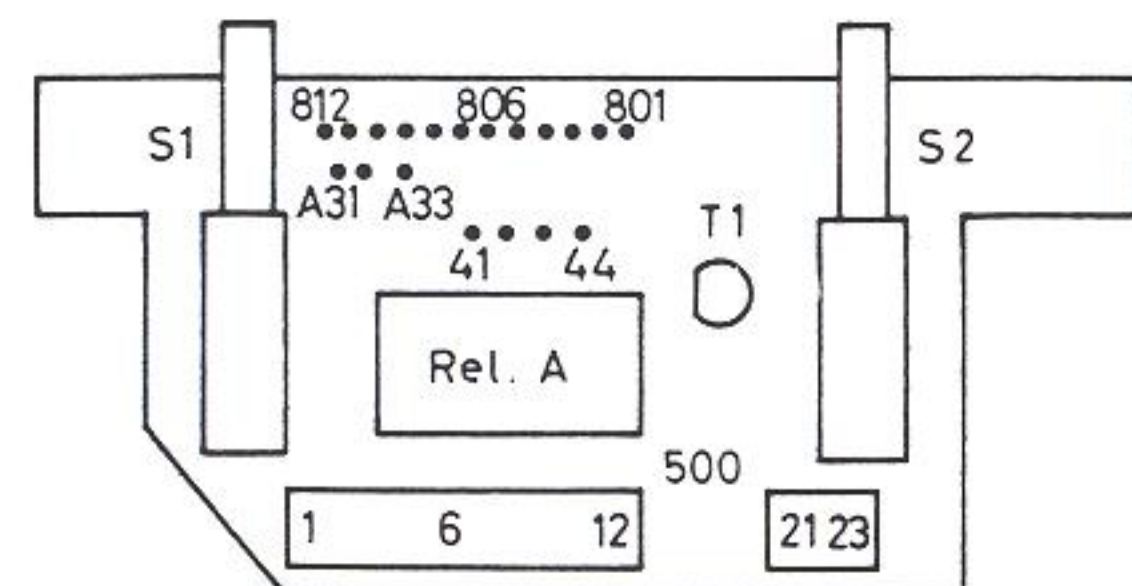


Fig. 2

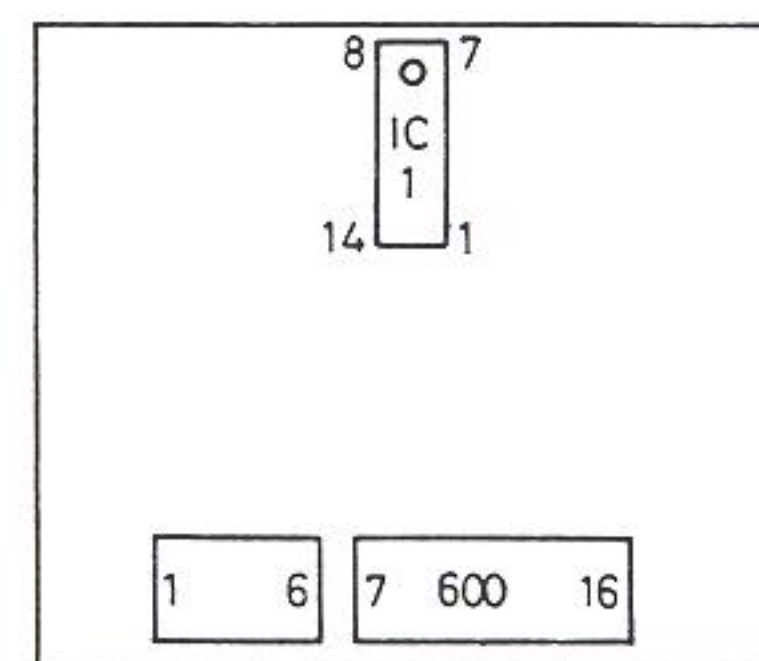
Pre-amplifier 200



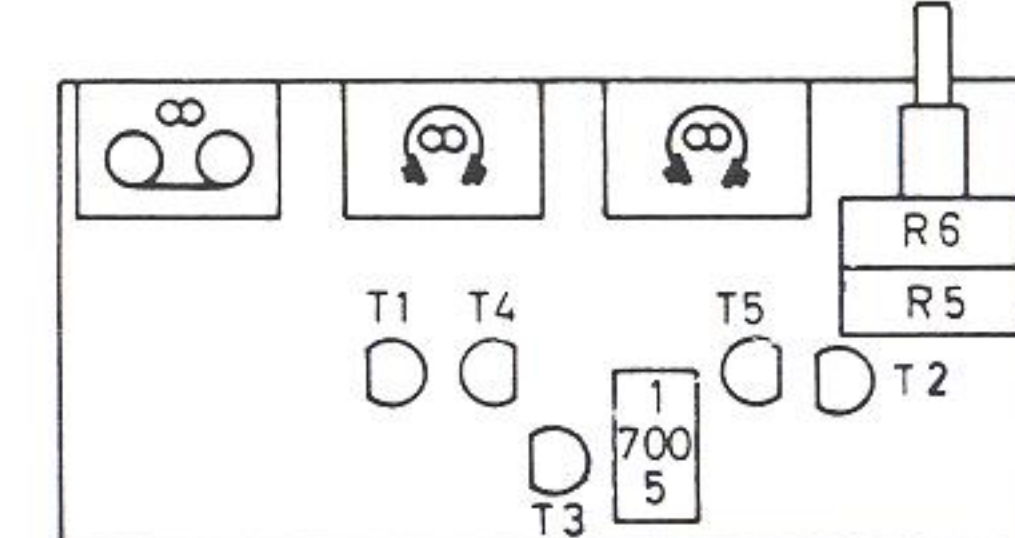
Recording-playback relay 500



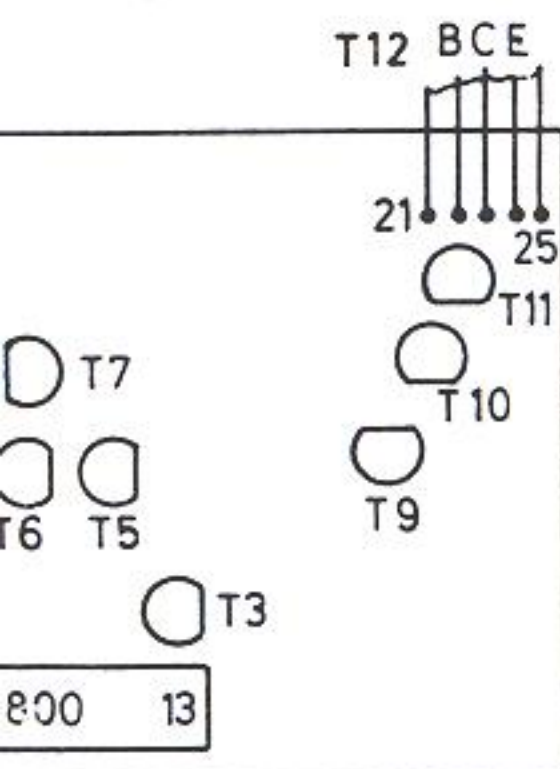
Recording amplifier 600



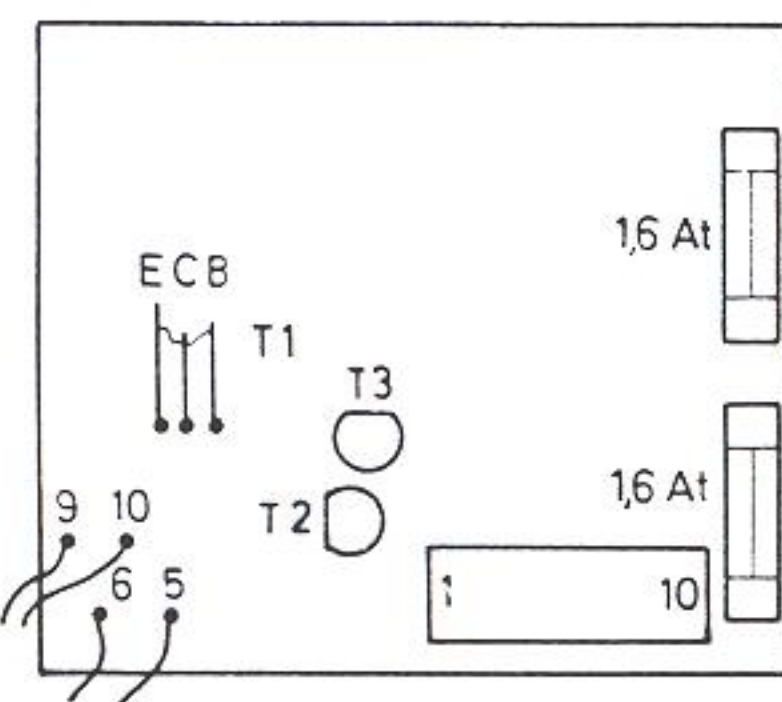
Earphone amplifier 700



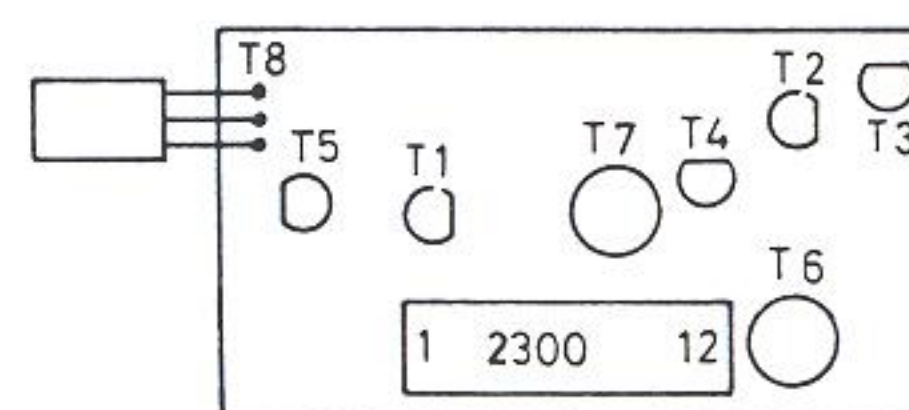
Winding meter left



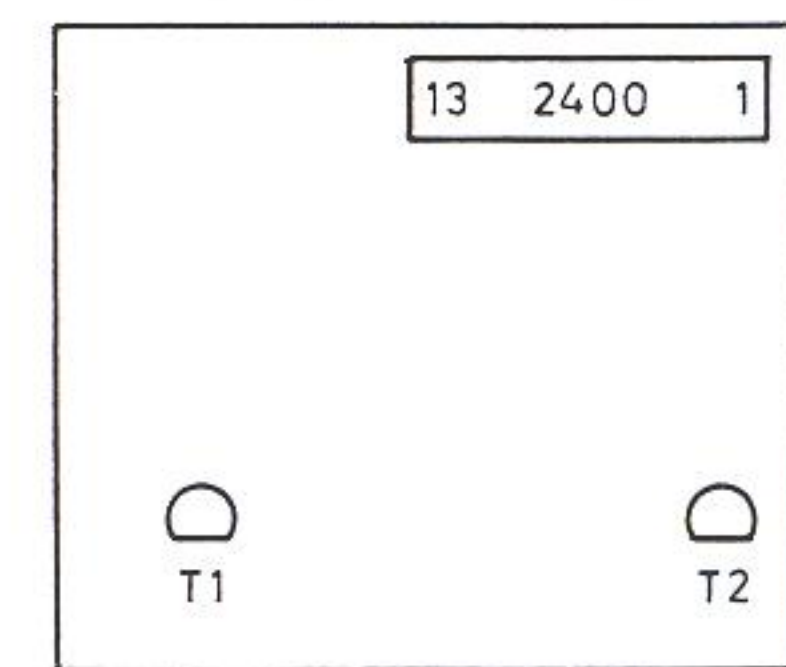
Power supply LF and servo motor 2100

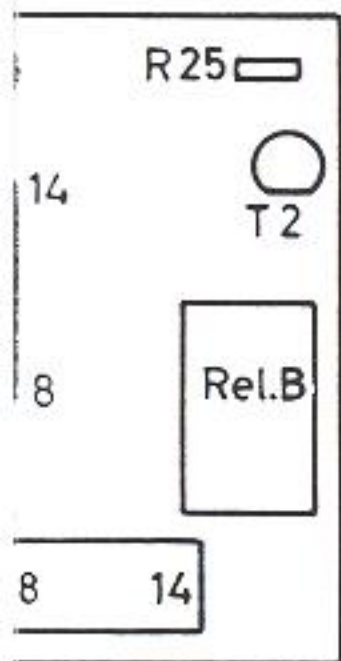


Servo motor 2300



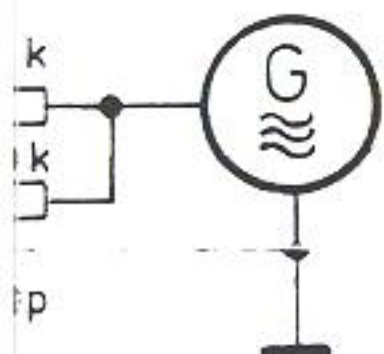
Take-Up impulse intensity control 2400





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an audio oscillator is
ADIO using the equi-
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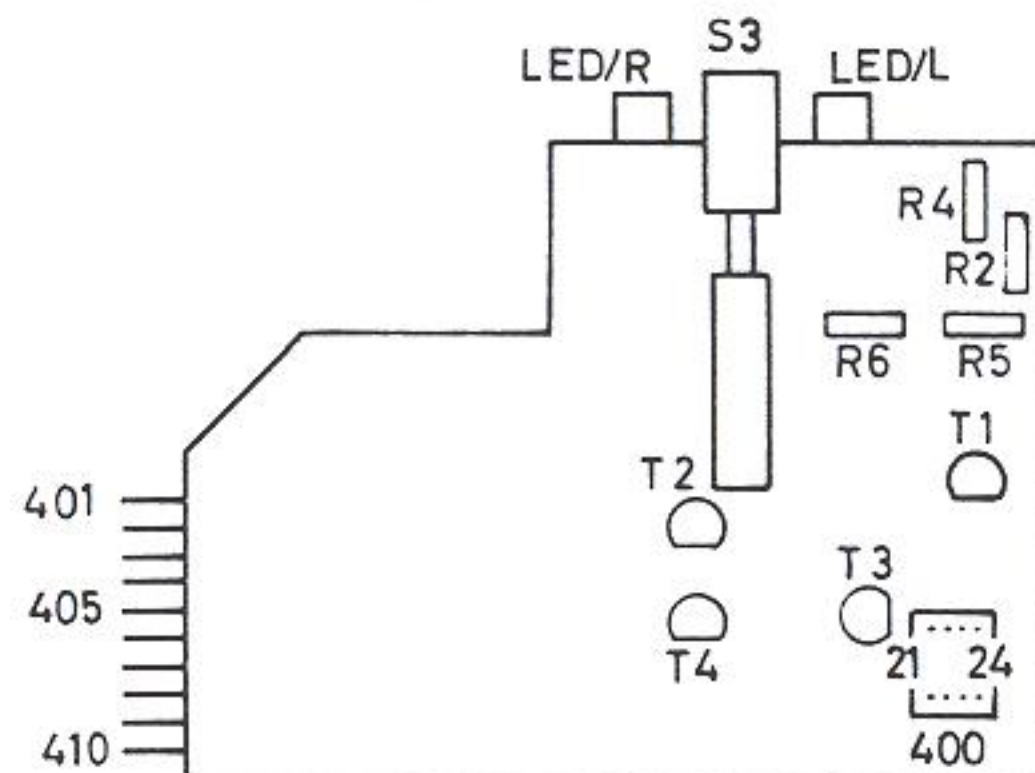
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applied to socket RADIO. Do not change position
of the level controls in relation to 4.1. Adjust
the limiters in both channels with the variable
resistors R 402 and R 404 on the pc board
"instrument amplifier 400" to get 0,85 V at the
measurement output.

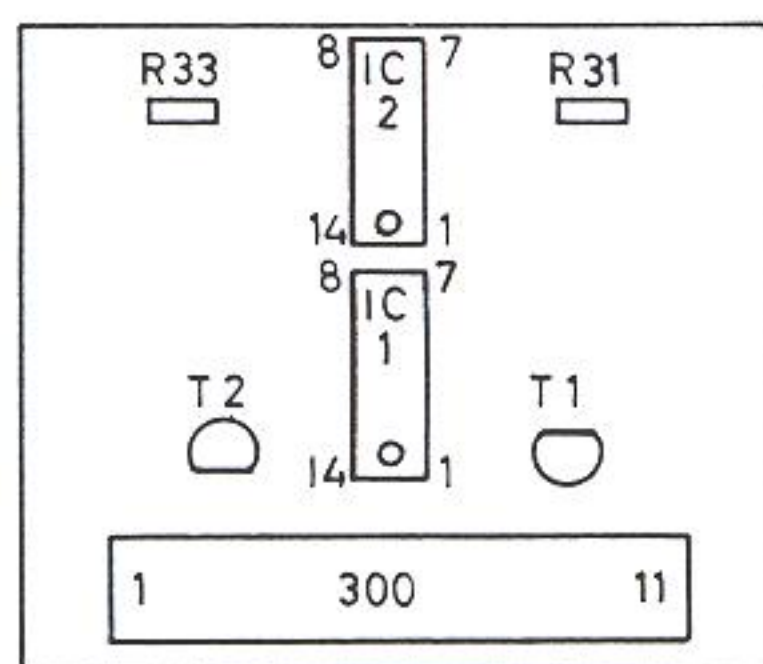
instrument amplifier 400



4.3 R 331 and R 333 Adjustment of the limiter indication

Measurement setup as described under 4.2. Re-
duce output voltage of the audio oscillator until
at the measurement output there is a reading
of 0.775 V. Adjust the variable resistors R 331
and R 333 on the pc board until the LED in-
dicating too high recording levels just goes out.

limiter 300

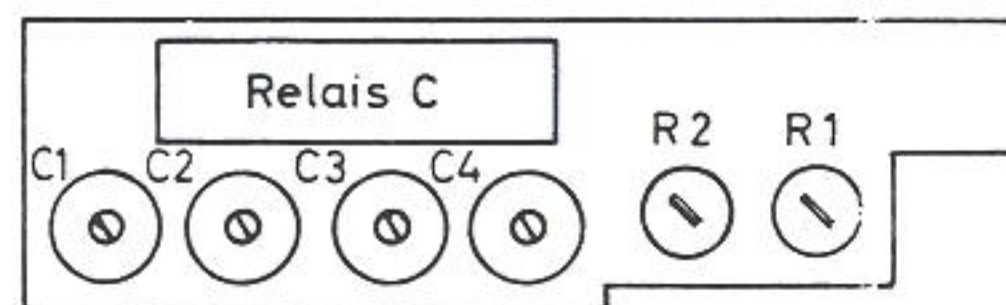


4.4 C 1, C 2, C 3 and C 4 Adjustment of the RF premagnetization

After exchange of the pc board "RF generator
1000" or integrated parts of this component the
RF generator has to be aligned according to
figure 5.

tape head assembly

Z 402 (2 track) or **Z 412** (4 track)



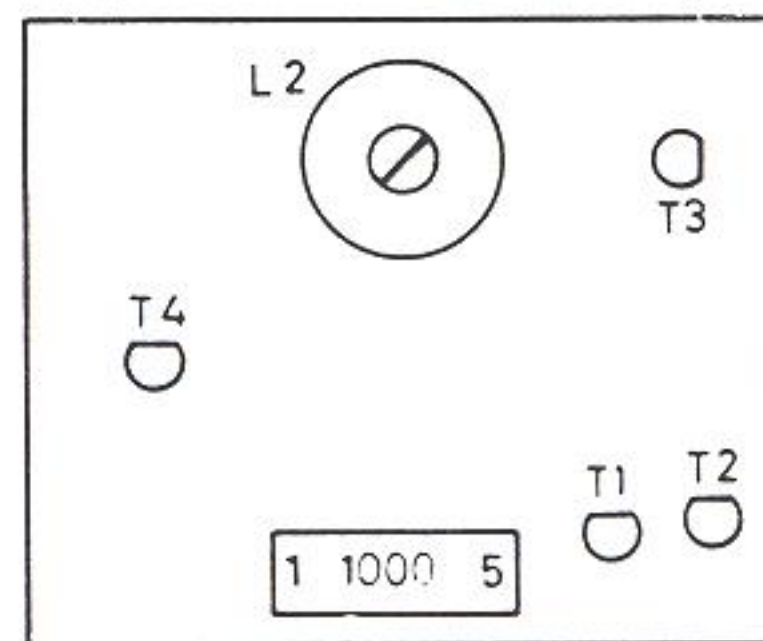
5. Alignment of the RF generator and of the rejector circuits

The adjustment of the nominal frequency be-
comes only necessary after the exchange of the
printed circuit board "RF generator 1000" of any
other components influencing the frequency on
this modul. The alignment of the rejector circuits
in the playback amplifier has to be performed
after the exchange of the printed circuit board
"playback amplifier 900".

5.1 L 1002 Alignment of the nominal frequency

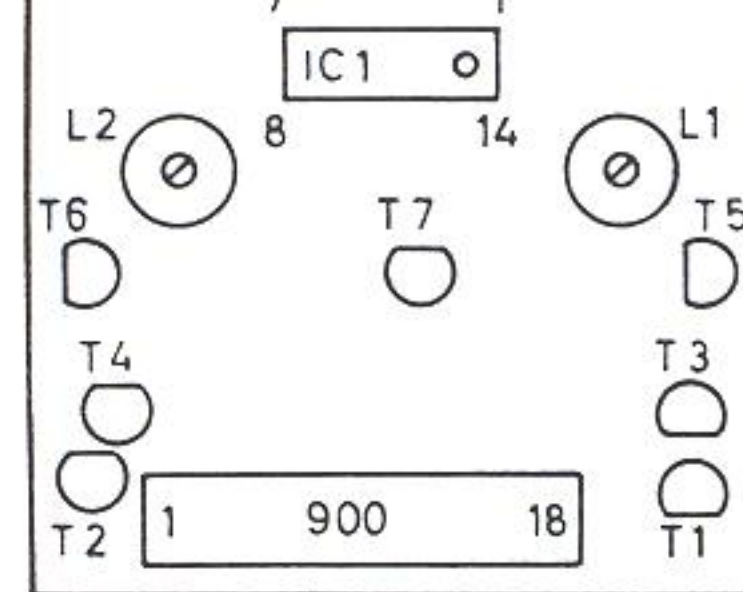
Connect frequency indicator to contact 1004 of
the printed circuit board "RF generator 1000".
Set unit to recording and stereo. By turning the
core of the generator coil L 1002 the nominal
frequency is adjusted to 100 kHz \pm 2 kHz.

RF generator 1000



5.2 Alignment of the erasure head equivalent load L 1401 and L 1402

Measurement setup as described under 5.1. Set
unit to MONO 1. Adjust equivalent load L 1402
by turning the core in such a way that the gener-
ator gets the nominal frequency of 100 kHz
 \pm 2 kHz. Set unit to MONO 2. Adjust equivalent
load L 1401 as described with MONO 1.



5.4 L 901 and L 902 RF rejector circuits in the playback amplifier

Set unit to RECORDING. Do not press the MONI-
TOR button (S 1). Connect LF voltmeter to socket
MONITOR.
Adjust RF minimum by turning the cores of the
RF rejector coils L 901 and L 902 on the printed
circuit board "playback amplifier 900".

6. Adjustment of the tape brakes (see figure 2)

The braking levers (A) must have a bending re-
sulting in position STOP in a distance of 2 mm
on the left side and 1 mm on the right side to
the brake release pot (B).
Between the right hand braking lever and the
brake release lever (F) there must be a distance
of 0.1 to 0.2 mm with the right hand braking
lever being pressed against the brake release
pot (B).
The braking strips must lie in the center of the
fabric strips on the turntables. The adjustment
is done by bending the levers (C).
The measurement of the brake effect is per-
formed using a tape reel (core diameter 60 mm)
to which about 5 m tape is wound. Hook a spring
balance to the free end of the tape (measuring
range of about 1 kp). Nominal value 400-450 p.

Fig. 2

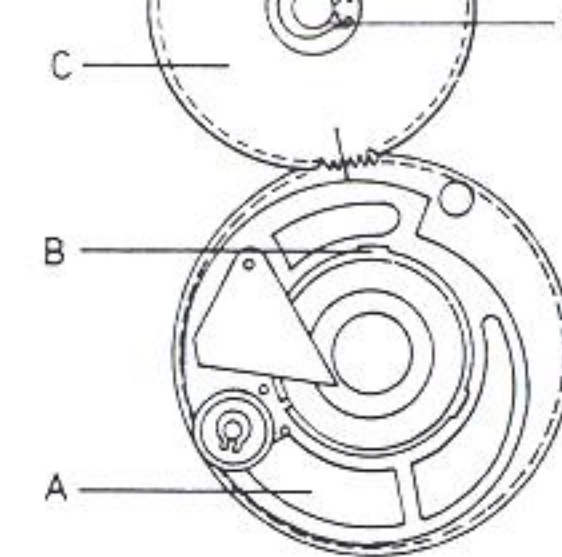
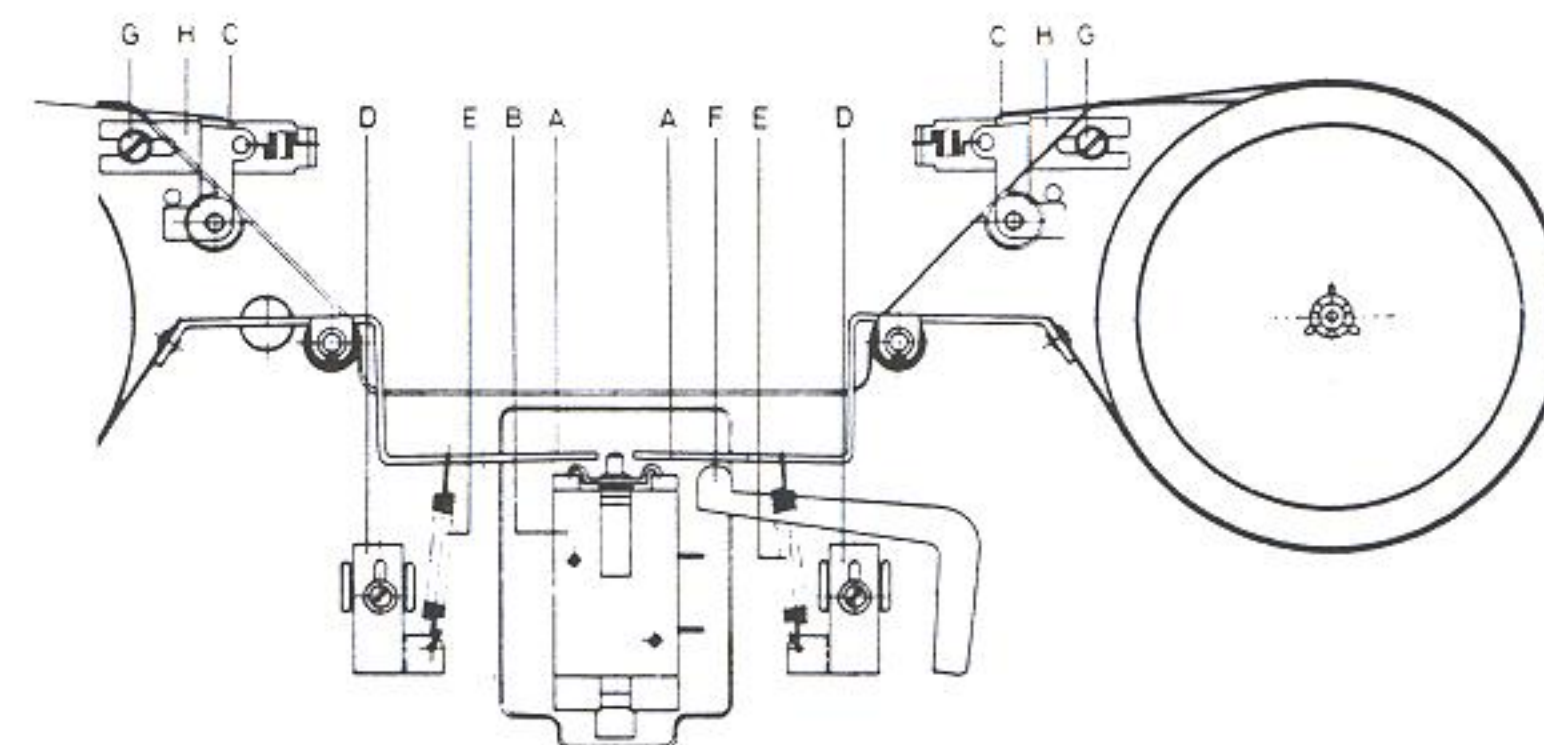


Fig. 3

7.1 Removal of the gear wheels

To remove the gear wheel (A) with the cam plate
the locking ring has to be destroyed (B). The idler
gear can be removed after removal of the Seeger
ring (D) and of the gear wheel (E) with the release
clutch and after removal of the plastic nut (F).

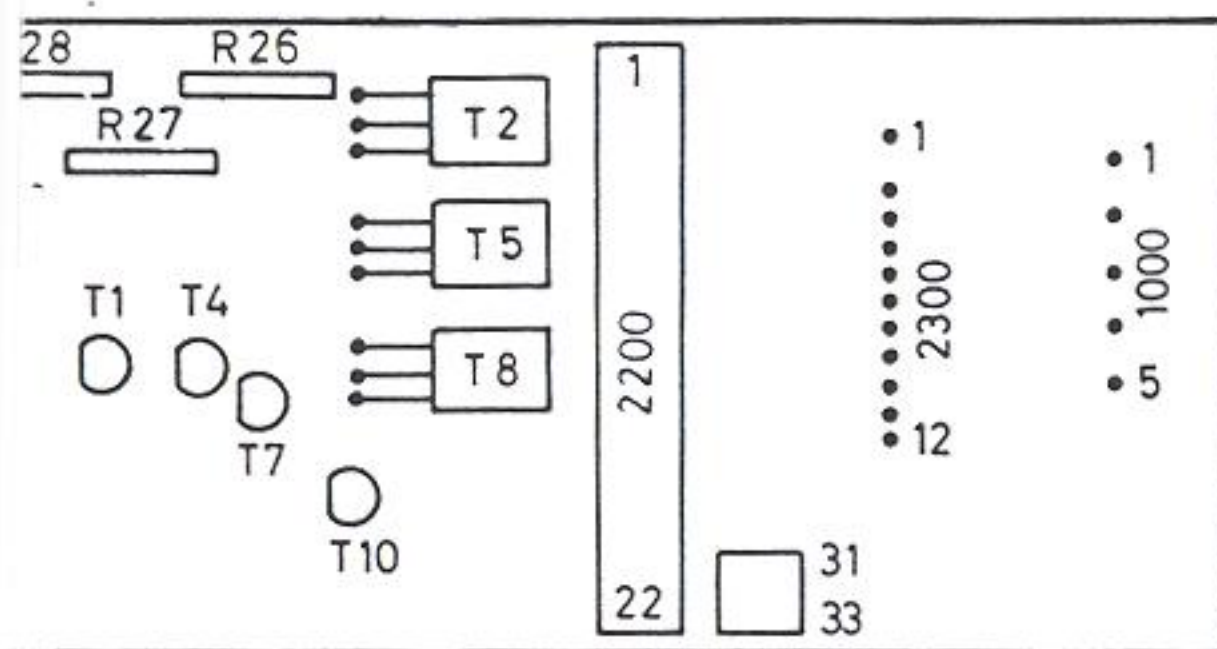
7.2 Installment and adjustment of the gear wheels

The installment has to be performed in position
START. The markings at the gear wheel (A) and
at the idler gear (C) have to face each other;
the marking at the gear wheel (E) has to be
shifted to the right by three teeth related to the
idler gear (C).
The gear wheel (A) and the gear wheel (C) have
to be secured by a new locking ring (B) and
a Seeger ring (D) respectively.

7.3 Adjustment of the release clutch in the gear wheel (C)

Set unit to START and PAUSE. Bridge con-
tact K 1. The servo motor must start up. Fasten
the gear wheel (E) by means of the plastic nut
until the release clutch is just turning. After this
secure nut (F) with lacquer against undesired
twisting.

an motor **2200**

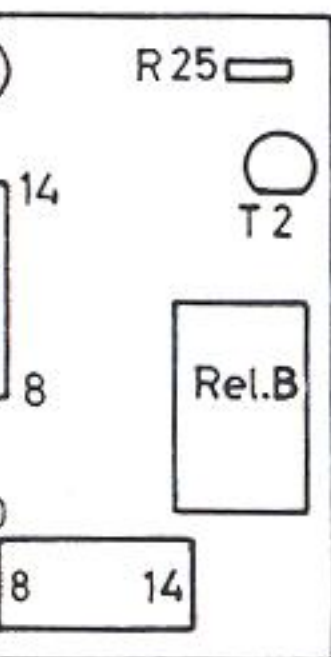


the sensitivity of
elay

on DIA.
1125 on the pc board
ight until the DIA relay
sistor slowly to the left
turn the resistor again

has to be performed
n/sec.

1100



variable resistors in

an audio oscillator is
RADIO using the equi-
low: The output level
locking middle position.

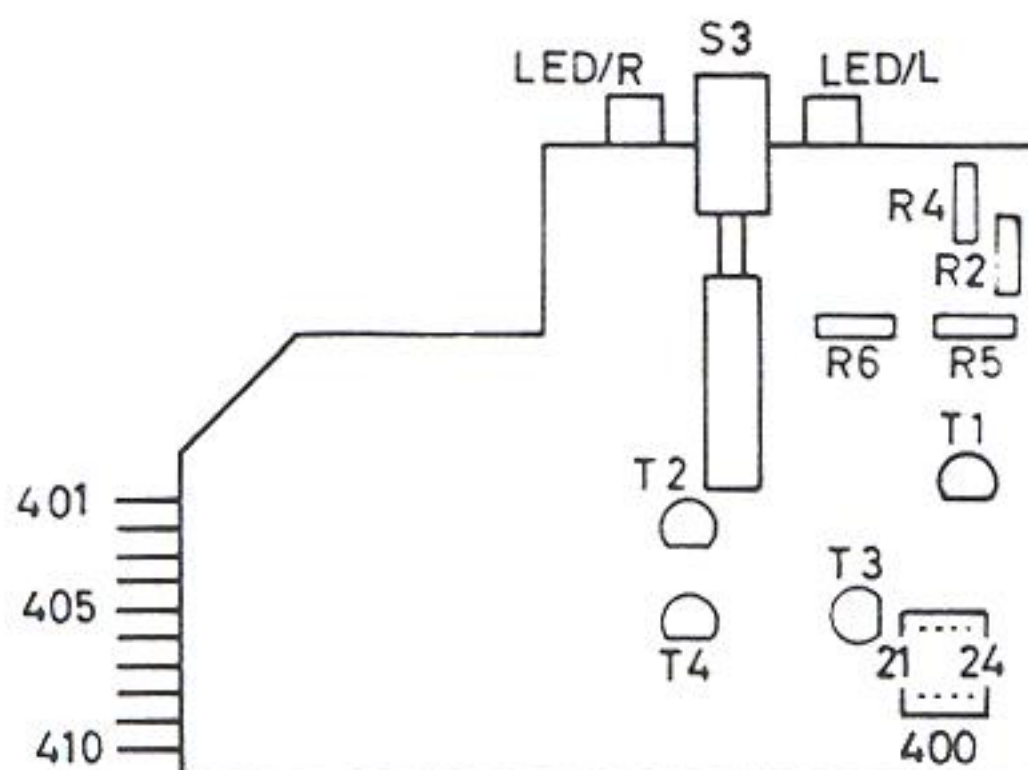


voltmeter. Adjust both instrument systems with
the variable resistors R 405 and R 406 on the
pc board "instrument amplifier 400" to a 0 dB
reading.

4.2 R 402 and R 404 Adjustment of the limiter

Increase output voltage of the audio oscillator
with the limiter turned on to get 60 mV being
applied to socket RADIO. Do not change position
of the level controls in relation to 4.1. Adjust
the limiters in both channels with the variable
resistors R 402 and R 404 on the pc board
"instrument amplifier 400" to get 0,85 V at the
measurement output.

instrument amplifier 400



4.3 R 331 and R 333 Adjustment of the limiter indication

Measurement setup as described under 4.2. Re-
duce output voltage of the audio oscillator until
at the measurement output there is a reading
of 0.775 V. Adjust the variable resistors R 331
and R 333 on the pc board until the LED in-

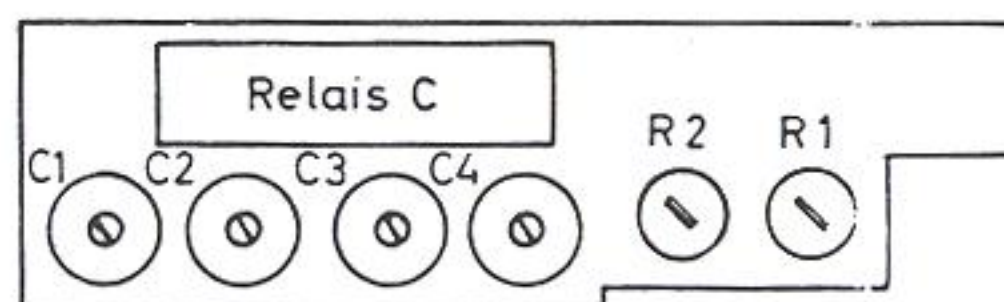
Measurement setup as described under 4.1.
Reduce output voltage at the audio oscillator
by 30 dB = 0.65 mV. Set tape selector switch
to position Fe and tape speed to 9.5 cm/s. Adjust
variable RF capacitors C 1 and C 2 on the printed
circuit board "head assembly Z 402 or Z 412
respectively" to get a frequency response of -3
until -5 dB at 20 kHz at the socket MONITOR,
related to 333 Hz.

After this, adjust variable RF capacitors C 3 and
C 4 at a tape speed of 19 cm/s to get a frequency
response from +1 to -1 at 20 kHz, related to
333 Hz. If necessary, adjust tape speed 19 cm/s
exactly by means of the adjust control (I.) (see
figure 1).

4.5 R 1 and R 2 Adjustment of the playback level

Record 333 Hz at a recording level of 0 dB and
at a tape speed of 9.5 cm/s. Rewind recording
and set unit to playback. With pushbutton MONI-
TOR not being pressed adjust 0.775 V at the
socket MONITOR with the variable resistors R 1
and R 2 on the printed circuit board "Head as-
sembly Z 402 or Z 412 respectively.

tape head assembly Z 402 (2 track) or Z 412 (4 track)



5. Alignment of the RF generator and of the rejector circuits

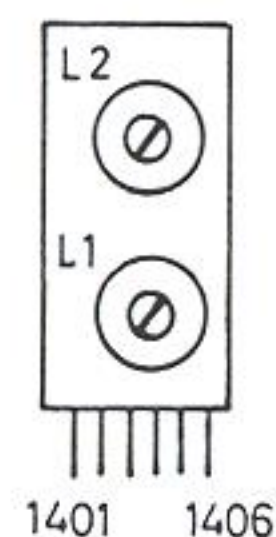
The adjustment of the nominal frequency be-
comes only necessary after the exchange of the
printed circuit board "RF generator 1000" of any
other components influencing the frequency on
this modul. The alignment of the rejector circuits
in the playback amplifier has to be performed
after the exchange of the printed circuit board
"playback amplifier 900".

5.1 L 1002 Alignment of the nominal frequency

Connect frequency indicator to contact 1004 of
the printed circuit board "RF generator 1000".
Set unit to recording and stereo. By turning the
core of the generator coil L 1002 the nominal
frequency is adjusted to 100 kHz \pm 2 kHz.

equivalent load

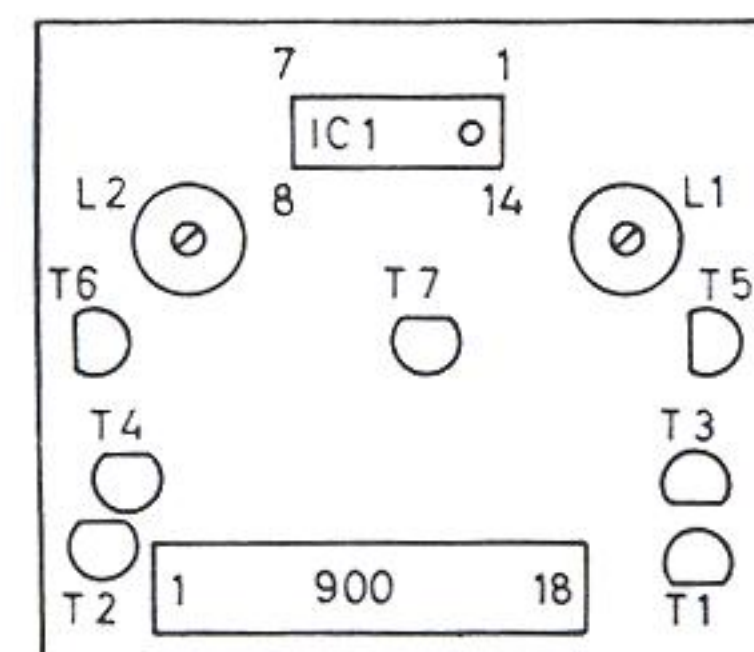
1400



5.3 L 1 and L 2 RF rejector circuits in the recording amplifier

Set unit to RECORDING and STEREO. Connect
LF voltmeter to the measure points MP 1 and
MP 2 on the printed circuit board "basic wiring
1-99".

playback amplifier 900



5.4 L 901 and L 902 RF rejector circuits in the playback amplifier

Set unit to RECORDING. Do not press the MONI-
TOR button (S 1). Connect LF voltmeter to socket
MONITOR.

Adjust RF minimum by turning the cores of the
RF rejector coils L 901 and L 902 on the printed
circuit board "playback amplifier 900".

6. Adjustment of the tape brakes (see figure 2)

The braking levers (A) must have a bending re-
sulting in position STOP in a distance of 2 mm
on the left side and 1 mm on the right side to
the brake release pot (B).
Between the right hand braking lever and the
brake release lever (F) there must be a distance
of 0.1 to 0.2 mm with the right hand braking

The adjustment is done by shifting the clevis
hooks (D) or by changing the position of the
springs (E). The right hand spring must be hooked
in such a way that there is no danger of its
hooking to the brake release lever (F). Finally
press the braking lever (A) to the brake release
pot (B).

Nominal value of the braking strength 600-700 p.

The adjustment is done after loosening the
screws (G) by shifting the adjustment plates (H).

7. Exchange of the gear wheels of the servo-gear (see figure 3)

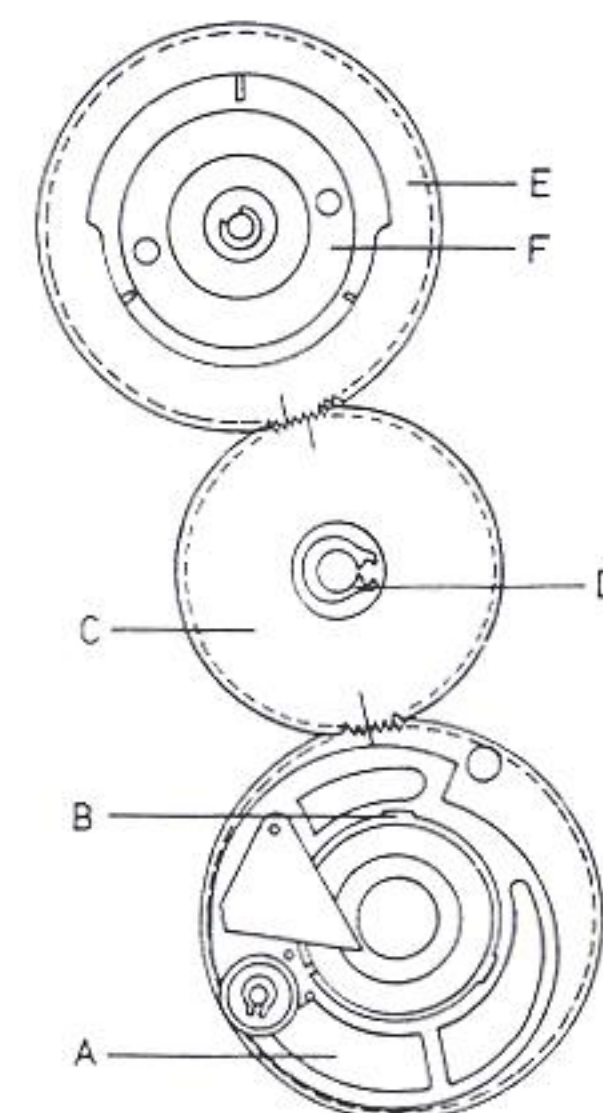


Fig. 3

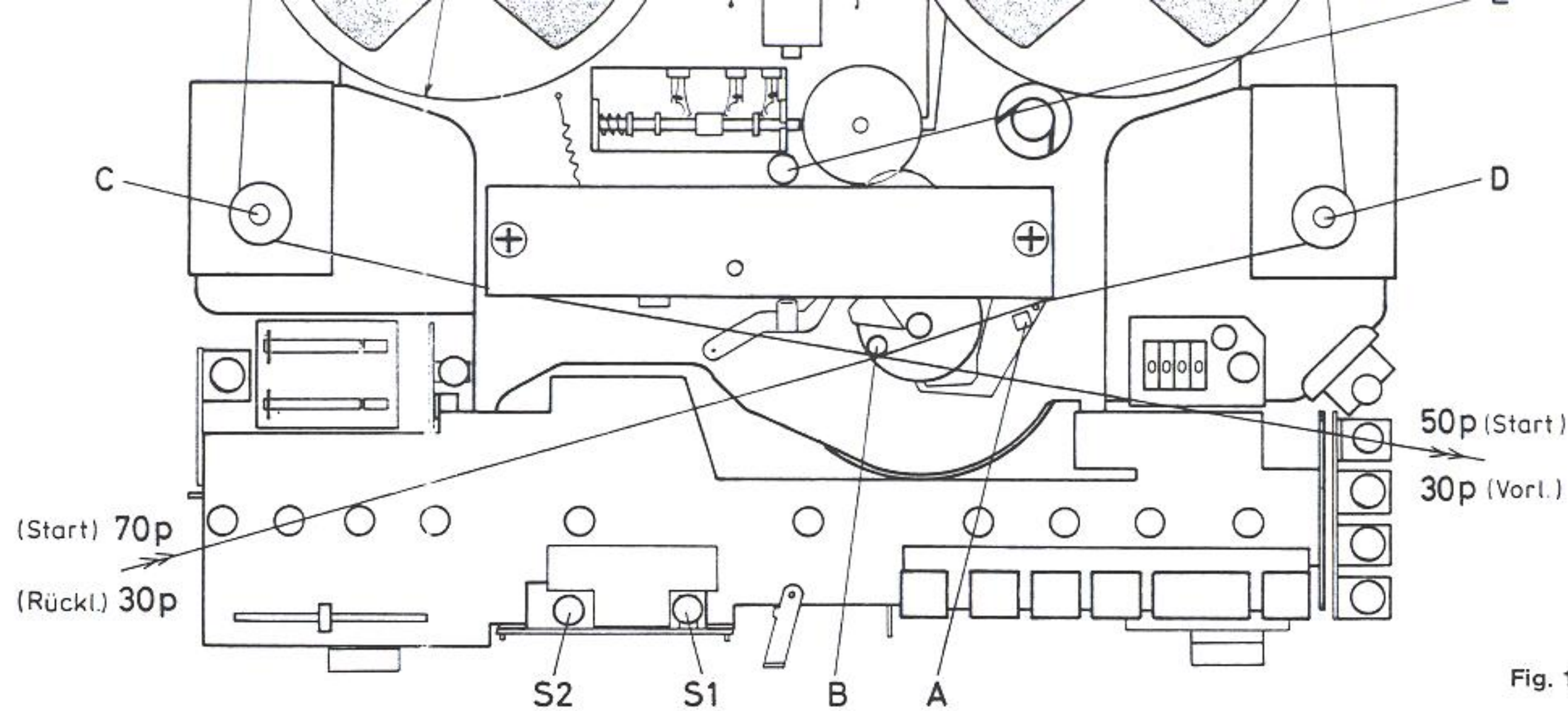
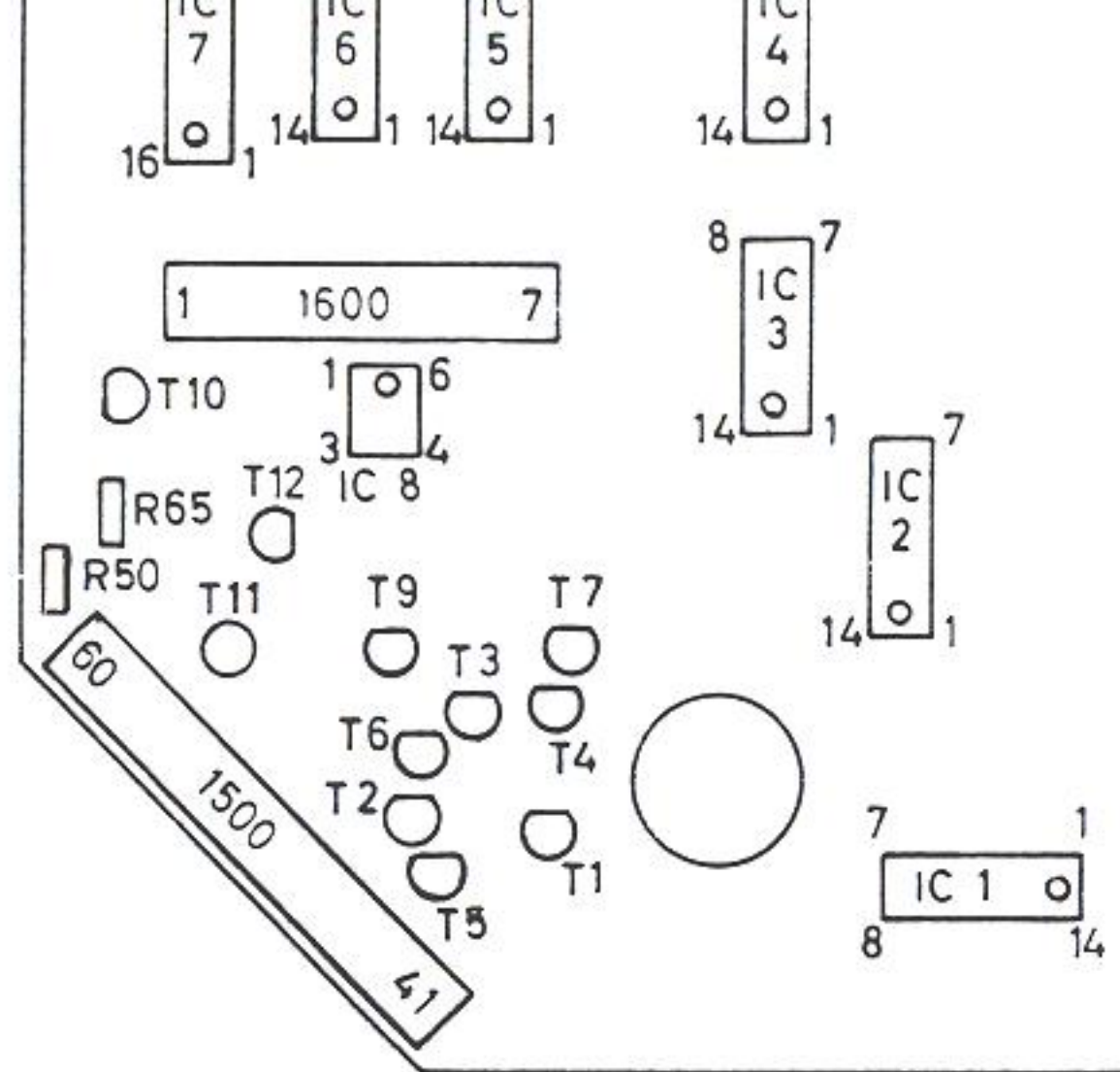
7.1 Removal of the gear wheels

To remove the gear wheel (A) with the cam plate
the locking ring has to be destroyed (B). The idler
gear can be removed after removal of the Seeger
ring (D) and of the gear wheel (E) with the release
clutch and after removal of the plastic nut (F).

7.2 Installment and adjustment of the gear wheels

The installment has to be performed in position
START. The markings at the gear wheel (A) and
at the idler gear (C) have to face each other;
the marking at the gear wheel (E) has to be
shifted to the right by three teeth related to the
idler gear (C).

The gear wheel (A) and the gear wheel (C) have
to be secured by a new locking ring (B) and
a Seeger ring (D) respectively.

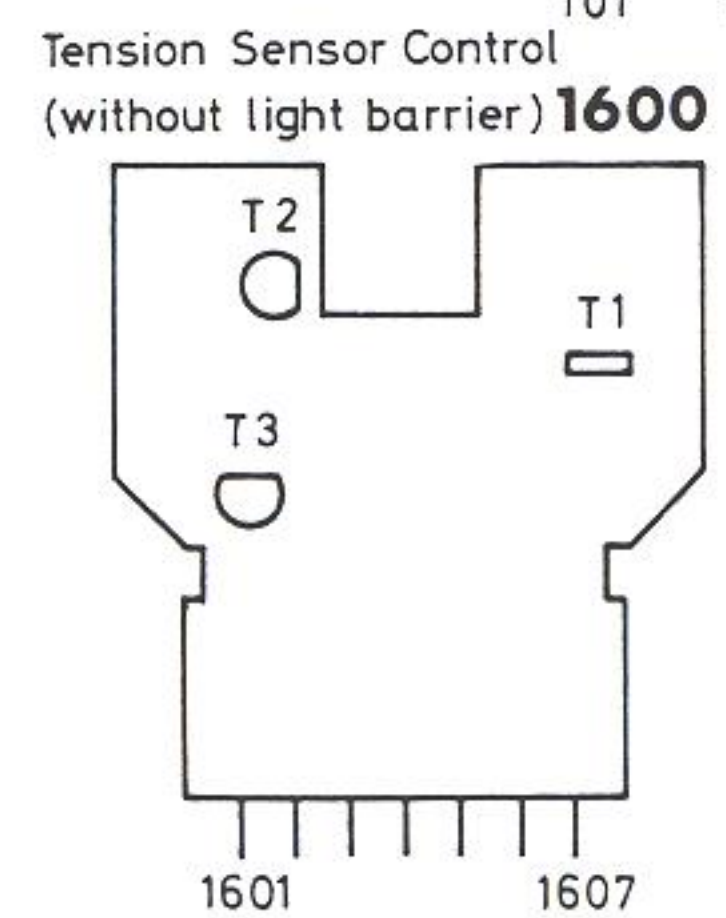
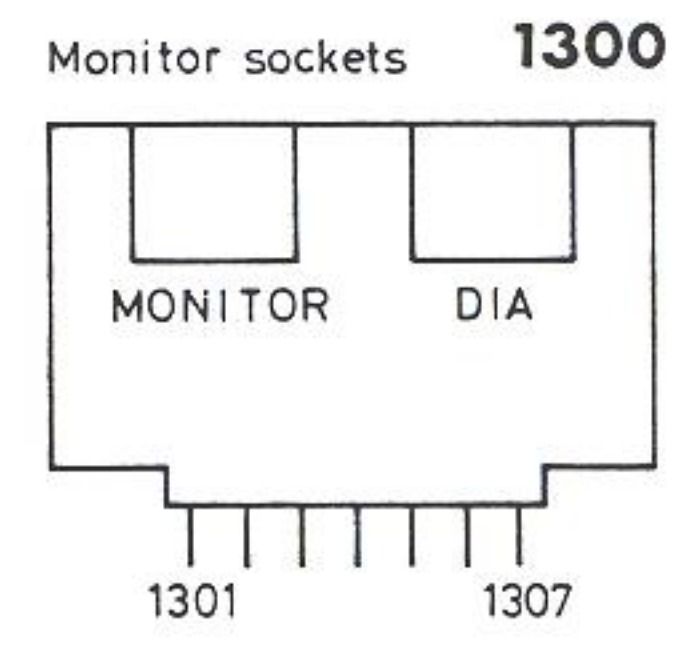
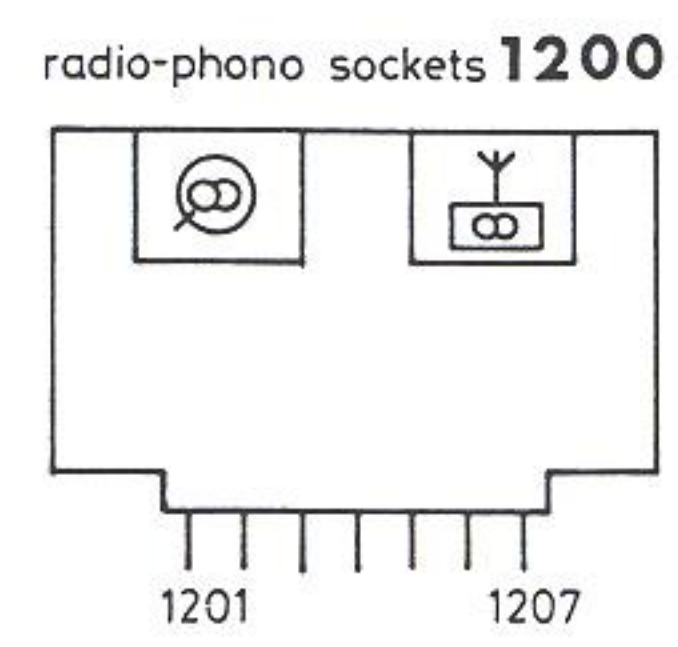
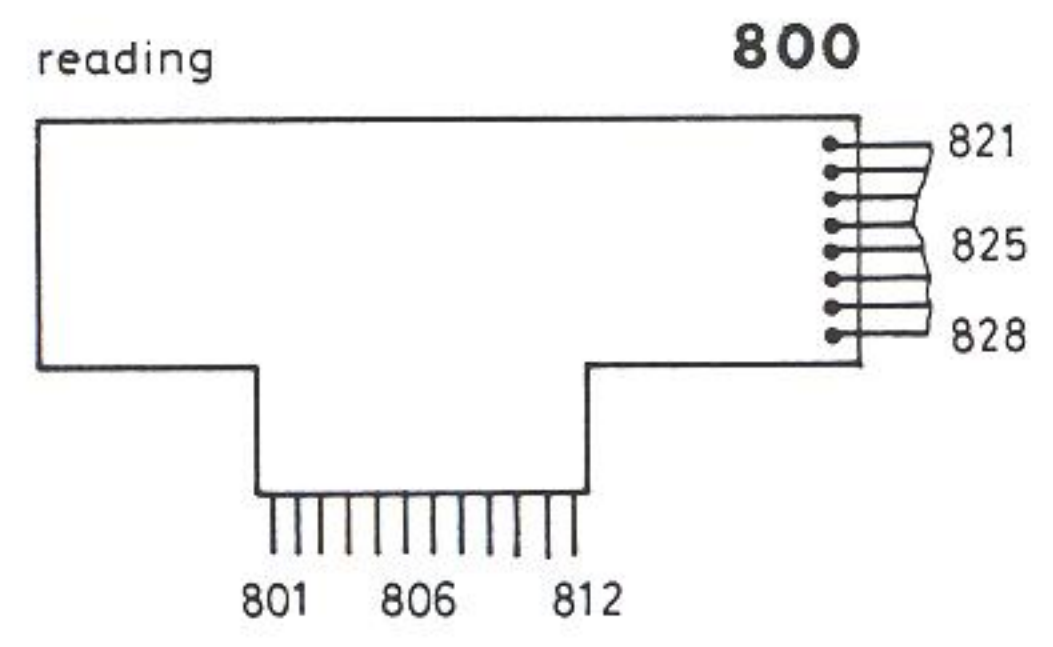
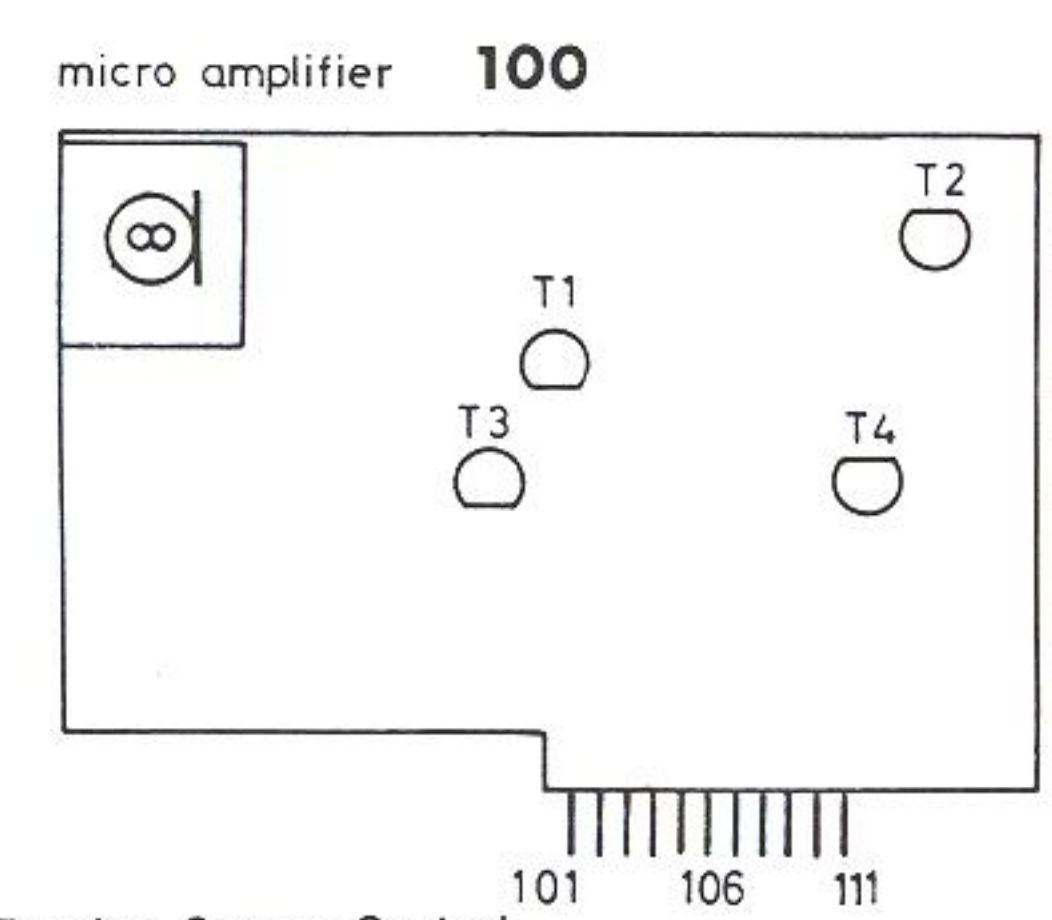
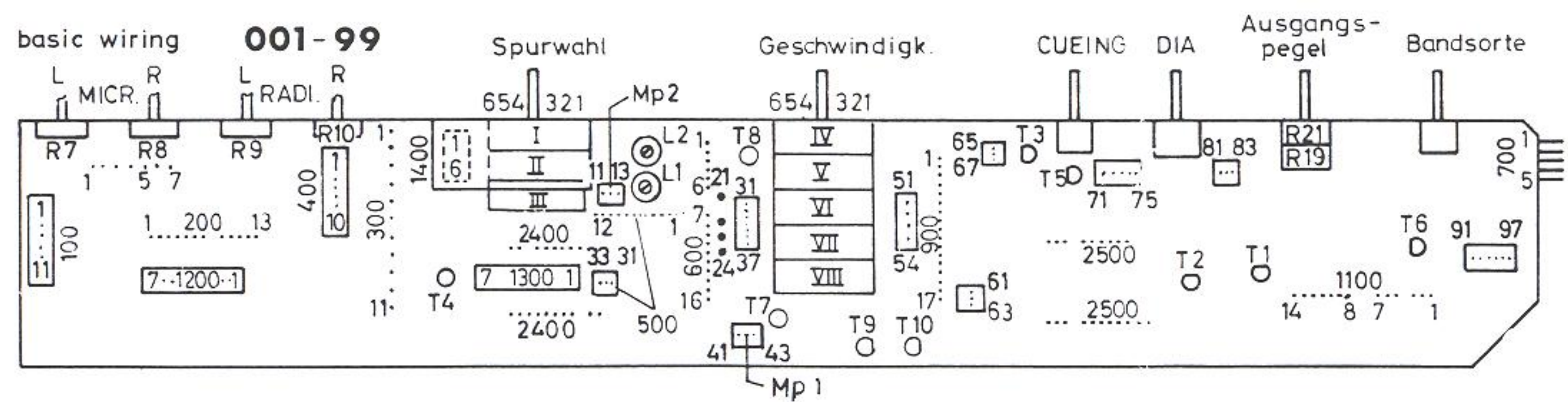


As measurement
a LF voltmeter (R
lator use socket M
nel), contact 5 (r
(chassis). All mea
have to be perform
(= unrecorded sec

4.1 R 405 and R 406 level control

Use tape speed S
inserted of with the
tape end switch o
and press MONITO
voltage of the audic
being applied to soc
trol to the right ha
trol RADIO L and

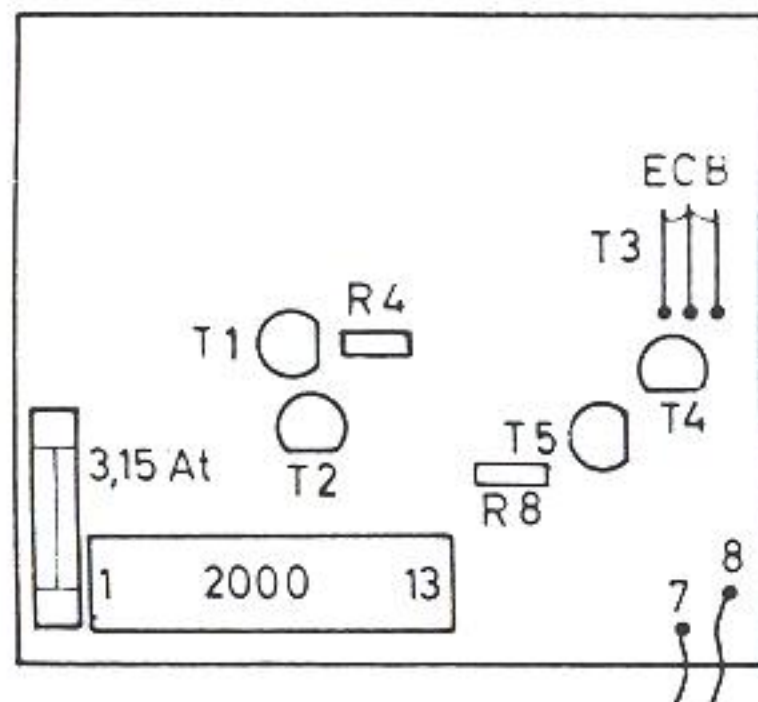
Fig. 1



a voltage reading of +12 to +13 V.

2000

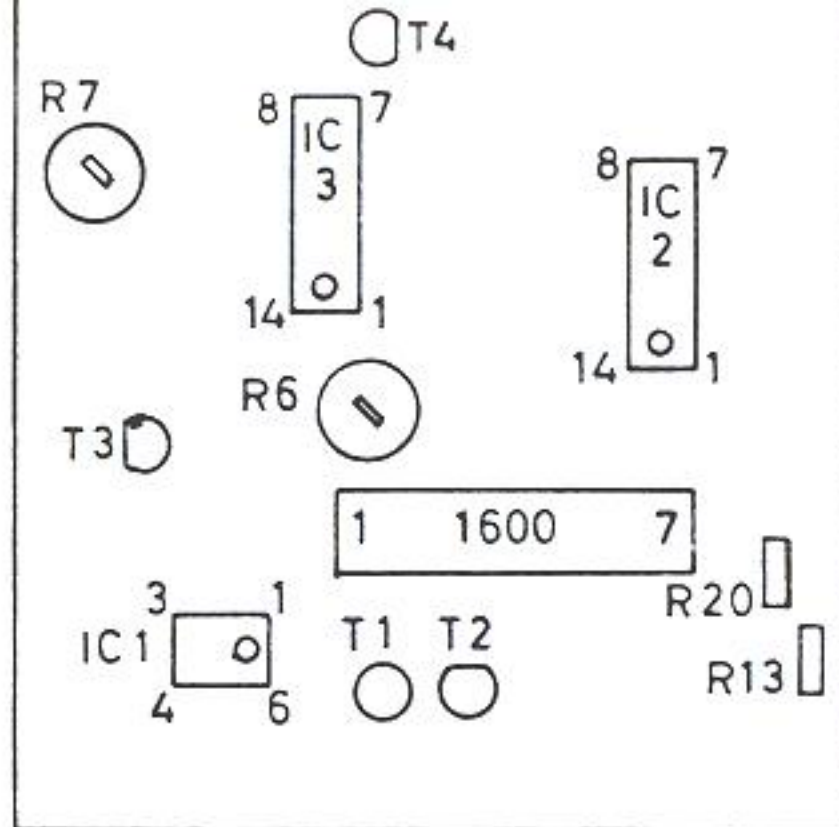
power supply winding motors



1.3 Measurement of the tape tensions

(see figure 1)

The measurement of the tape tensions is performed in vertical operating position with a full tape reel of 18 cm diameter. Hook a spring



1.3.2 R 1565 and R 1550/1554 Adjustment of the winding tensions

(see figure 1)

Place on the right turntable a full reel with a diameter of 18 cm (7 inch). Set unit to START. Guide tape over the right hand tape tension sensor (D) and between the two pins on the support of the light barrier. Follow the tape ten-

chapter 1.3.2). If there is a tape tension of less than 0.3 N (30 p) the intensity of the winding impulses is too small or lacking at all. This winding impulses is needed for the tension of the tape while the omega loop of the capstan is formed.

roller seeming to stand still at once. To check the correct adjustment of the start-up time a checking has to be performed with an almost empty unwinding reel.

2. R 2226, R 2227 and R 2228 Adjustment of the tape speed

(see figure 1)

For the adjustment of the tape speed in the individual speed steps the UHER speed measurement tape is being used (requisition number 029650). The adjustment has to be performed according to the manual enclosed to the measurement tape by means of the variable resistors R 2226 (4.75 cm/s), R 2227 (9.5 cm/s) and R 2228 (19 cm/s). When aligning the tape speed 19 cm/s it is necessary to take care for the adjusting resistor R 2230 (E) being in the middle position. The variable resistors R 2226, R 2227 and R 2228 become accessible on the printed circuit board "control capstan motor 2200" by an opening in the unit bottom, closed by a stopper.

impuls store with unwinding control right

1500

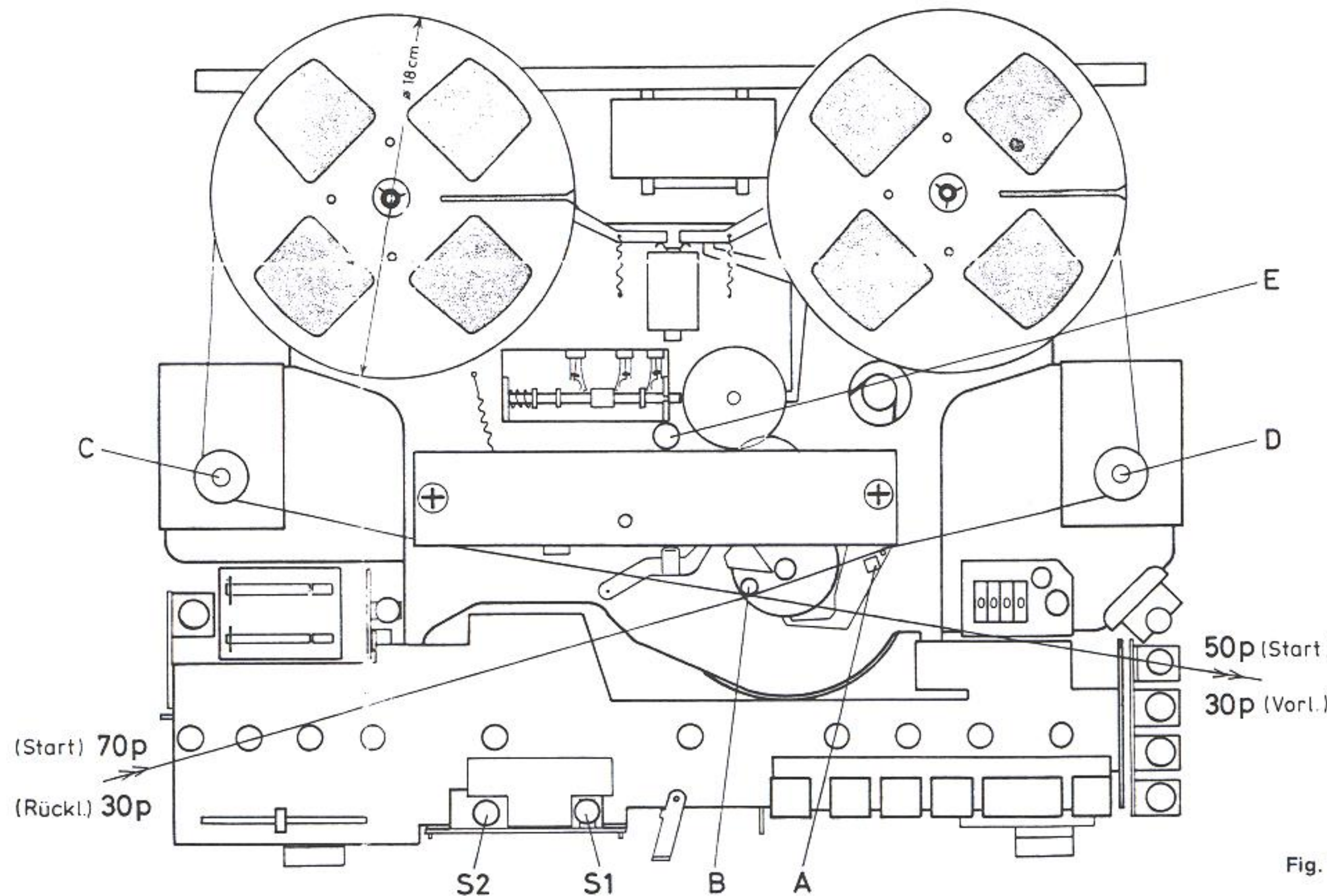
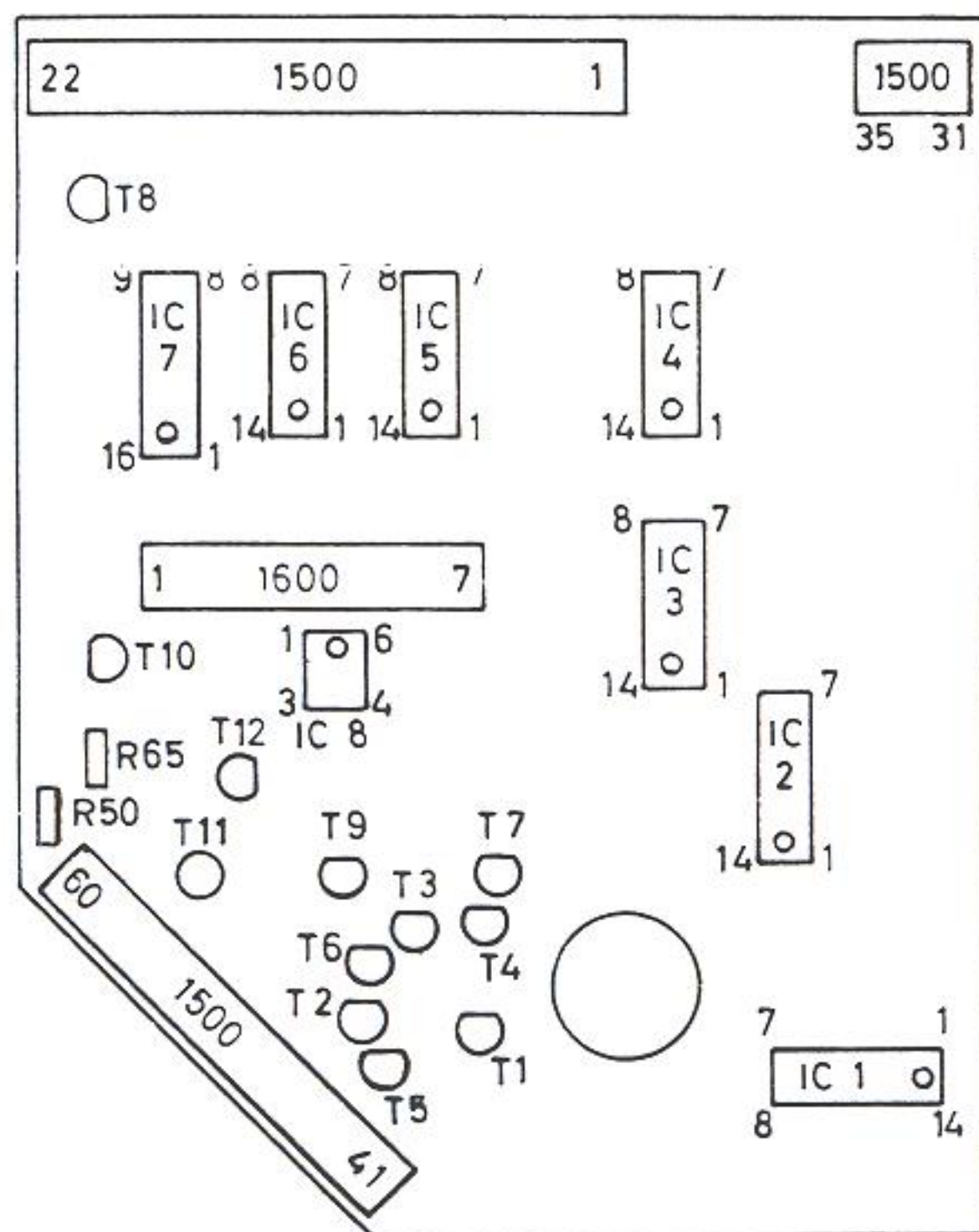


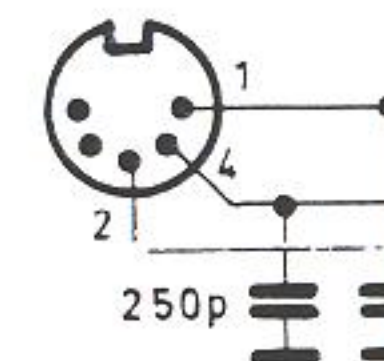
Fig. 1

DIA control



4. Alignment of the the LF section

During all measurements connected with socket 1, the equivalent circuit shown in the diagram has to be in



As measurement on a LF voltmeter (Ri...), use socket MC... (chassis). All measurements have to be performed (= unrecorded section).

4.1 R 405 and R 406 level control

Use tape speed 9... inserted of with the... tape end switch off... and press MONITOR... voltage of the audio... being applied to sock... control to the right hand... control RADIO L and R...

basic wiring

001-99

Spurwahl

Geschwindigkeit

CUEING

DIA

Ausgangs-
pegel

Bandsorte

micro amplifier 100

T2

Adjustment of the variable resistors

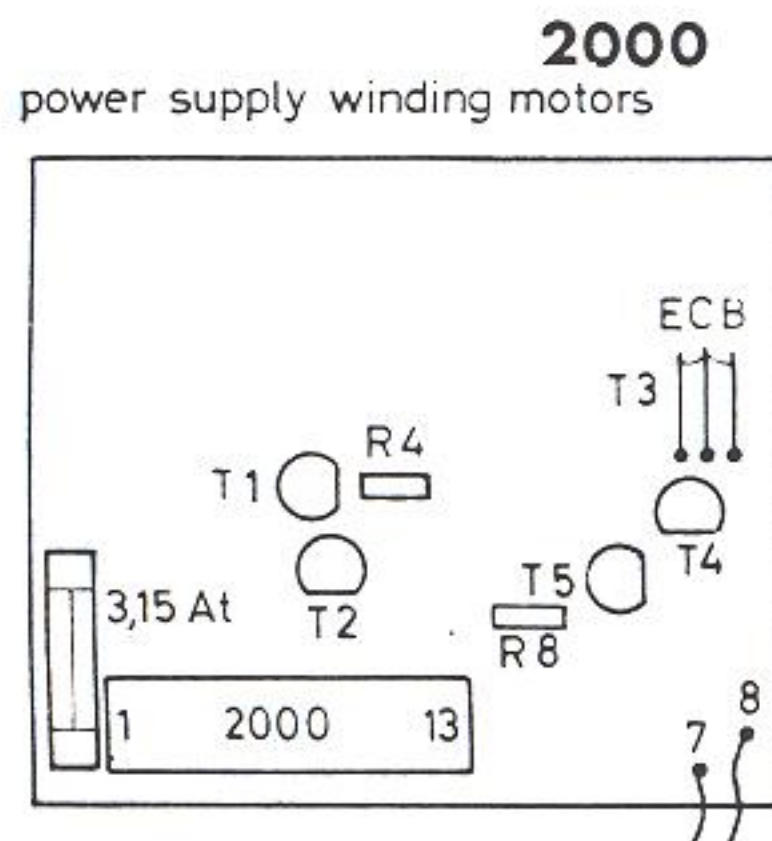
1. Alignment of the variable resistors in the driving mechanism

1.1 R 2008 Adjustment of the operating voltage

For measurement of the operating voltage connect the digital voltmeter to the contacts 2011 to 2013 (+20 V) and 2001 to 2005 (chassis) of the printed circuit board "power supply winding motors 2000". Exactly adjust a voltage of 20 V by means of the adjustable resistor R 2008.

1.2 Adjustment of the working point of the light barrier of the automatic tape end switch off

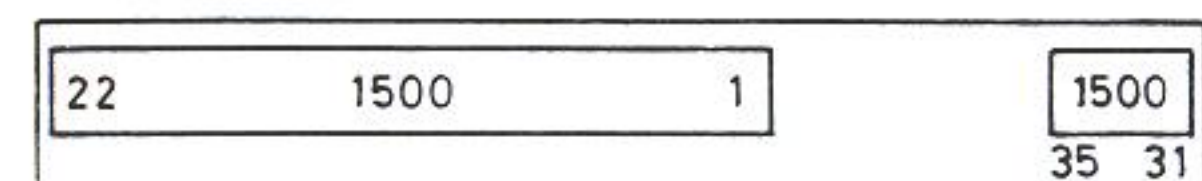
For the adjustment the head assembly and the front head shield have to be put on to prevent external light leak. The adjustment is performed with the UHER test tape inserted in position STOP. At the DC-voltmeter ($R_i = 1 \text{ MOhm}$), connected to the contacts 2006 and 2001 (chassis) a voltage of 1.5 V is adjusted by means of the variable resistor R 2014. After this the inserted tape is removed. The DC-voltmeter now must give a voltage reading of +12 to +13 V.



1.3 Measurement of the tape tensions (see figure 1)

The measurement of the tape tensions is performed in vertical operating position with a full tape reel of 18 cm diameter. Hook a spring

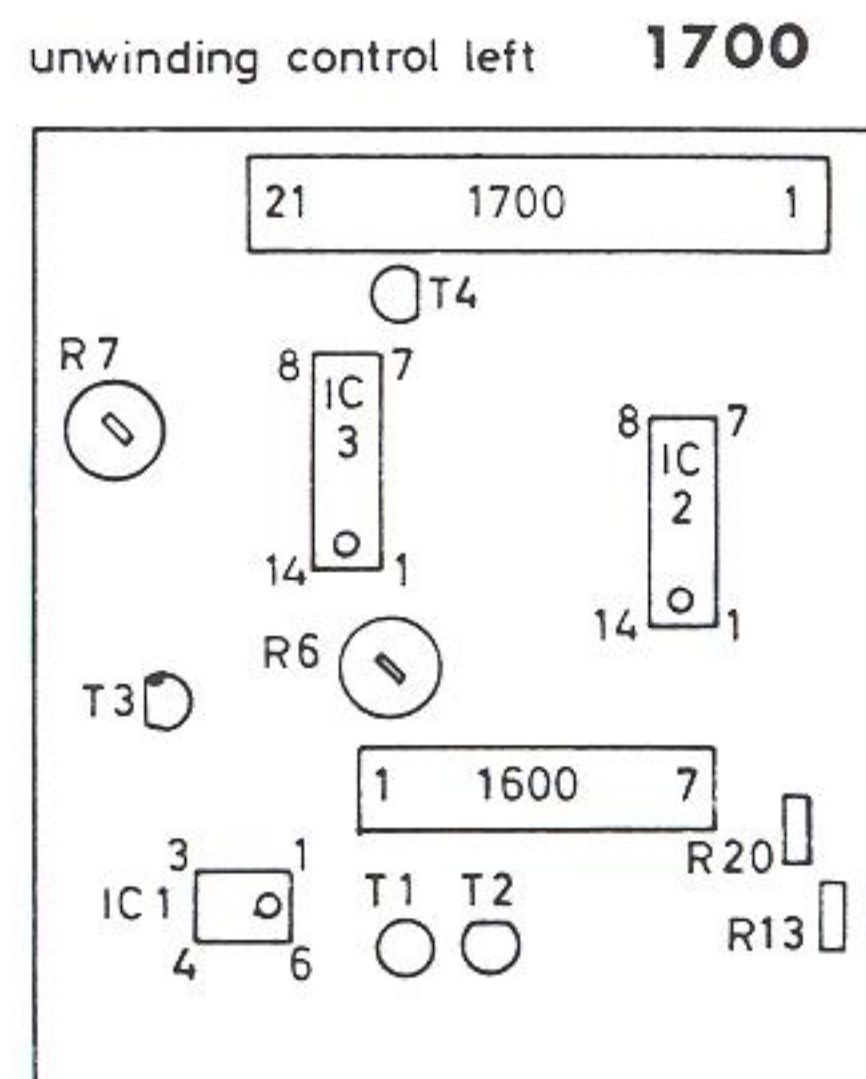
impuls store with unwinding control right



balance (measurement range about 150 p) to the free end of the tape. The light barrier (A) of the automatic tape end switch off is covered by a lighttight adhesive tape during the measurement.

1.3.1 R 1720 and R 1713 Adjustment of the unwinding tensions (see fig. 1)

Place on the left turntable a full reel with a diameter of 18 cm (7 inch). Set unit to START. Guide tape over the left tape tension sensor and the guide roller at the capstan (B). Hook spring balance to the tape end of the measuring tape and unwind. Adjust a tape tension of 50 p by means of the variable resistor R 1720 on the printed circuit board "unwinding control left 1700". Set the unit to FAST Forward with the same measurement setup and pull spring balance. Adjust an unwinding tension of 30 p by means of the variable resistor R 1713 on the printed circuit board "unwinding control left 1700".



1.3.2 R 1565 and R 1550/1554 Adjustment of the winding tensions (see figure 1)

Place on the right turntable a full reel with a diameter of 18 cm (7 inch). Set unit to START. Guide tape over the right hand tape tension sensor (D) and between the two pins on the support of the light barrier. Follow the tape ten-

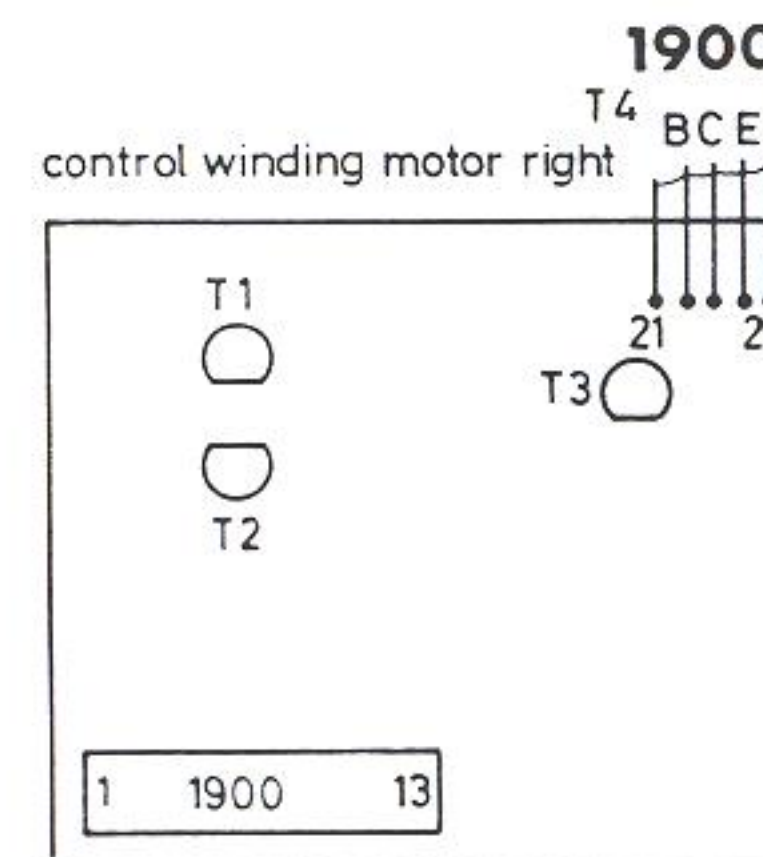
sion with the spring balance and adjust a tape tension of 70 p by means of the variable resistor R 1565 on the printed circuit board "impuls store with unwinding control right 1500". Set unit to REWIND with the same measurement setup and pull spring balance. Adjust a tape tension of 30 p during this acting by means of the coarse variable resistor R 1554 and the precision variable resistor R 1550.

1.4 Checking of the winding time

With the tape tensions exactly adjusted the winding time has to range between 120 and 150 seconds using a tape (double) with 1200 m.

1.5 Checking of the intensity of the winding impuls for the right hand winding motor

The checking is performed using two reels with 26.5 cm diameter each. First, with the full tape on the right hand reel the unit is set to START and PAUSE. Actuating the key STOP the tape section of the omega loop must be wound to the right hand reel without any loop. In case of too high intensity of the winding impuls there is a tape tension of more than 0.3 N (30 p) (see chapter 1.3.2). If there is a tape tension of less than 0.3 N (30 p) the intensity of the winding impuls is too small or lacking at all. This winding impuls is needed for the tension of the tape while the omega loop of the capstan is formed.



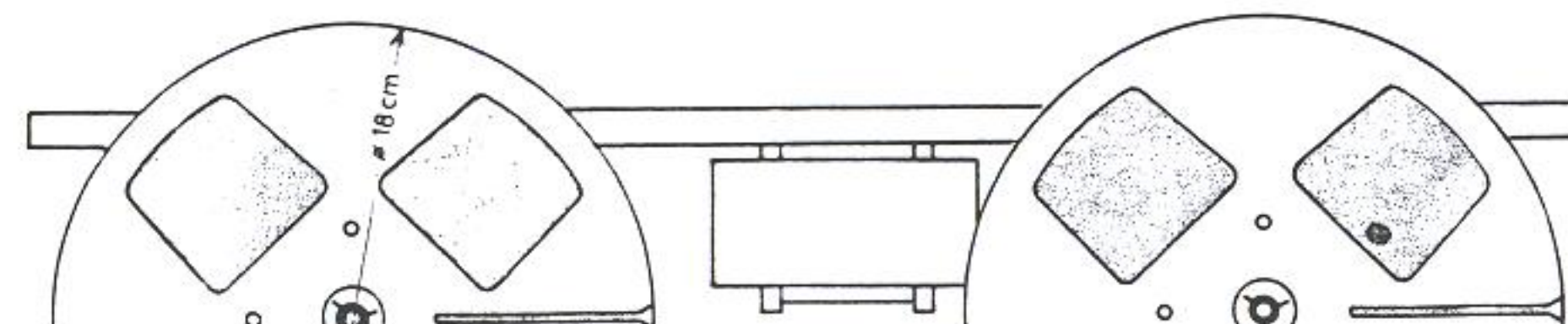
1.6 R 1706 and R 1707 Adjustment of the start-up time when switching from PAUSE to START (see figure 1)

This adjustment has to be performed in a horizontal operating position. The preadjustment is done at the contact 1602 of the printed circuit board "unwinding control left 1700" by measuring an adjusting the voltage. Set unit to START and PAUSE and set switch S2 to position "tape reel diameter 27 cm". Adjust a voltage of 4.5 V by means of the variable resistor R 1706. Set switch S2 to position "tape reel diameter 13-18 cm" and adjust a voltage of 5.5 V by means of the variable resistor R 1707.

The final precision adjustment is performed likewise with reels of a diameter of 26.5 cm by means of resistor R 1706 and with reels of a diameter of 18 cm by means of resistor 1707, in both cases with the almost full reel on the left unwinding reel and while watching the 50 Hz stroboscope roller (C) or the 60 Hz stroboscope roller (D) in corresponding artificial lighting. Switching from position START and PAUSE to position START the tape must reach its nominal speed without any noticeable delay. That is the case with the graduation on the corresponding stroboscope roller seeming to stand still at once. To check the correct adjustment of the start-up time a checking has to be performed with an almost empty unwinding reel.

2. R 2226, R 2227 and R 2228 Adjustment of the tape speed (see figure 1)

For the adjustment of the tape speed in the individual speed steps the UHER speed measurement tape is being used (requisition number 029650). The adjustment has to be performed according to the manual enclosed to the measurement tape by means of the variable resistors R 2226 (4.75 cm/s), R 2227 (9.5 cm/s) and R 2228 (19 cm/s). When aligning the tape speed 19 cm/s it is necessary to take care for the adjusting resistor R 2230 (E) being in the middle position. The variable resistors R 2226, R 2227 and R 2228 become accessible on the printed circuit board "control capstan motor 2200" by an opening in the unit bottom, closed by a stopper.



contro

R 30

T9

3. R 1125 Adjustment of the response of the

Set tape recorder to... Turn the variable res... "DIA control 1100" t... responds. Now turn... until the DIA relay c... for 10 to the right. After this a test rec... at the tape speed of

DIA control

1

4. Alignment of the LF section

During all measure... connected with so... valent circuit show... control has to be in

