

# TANDBERG® TCD 910/911

## Circuit Diagrams and Alignment Instructions

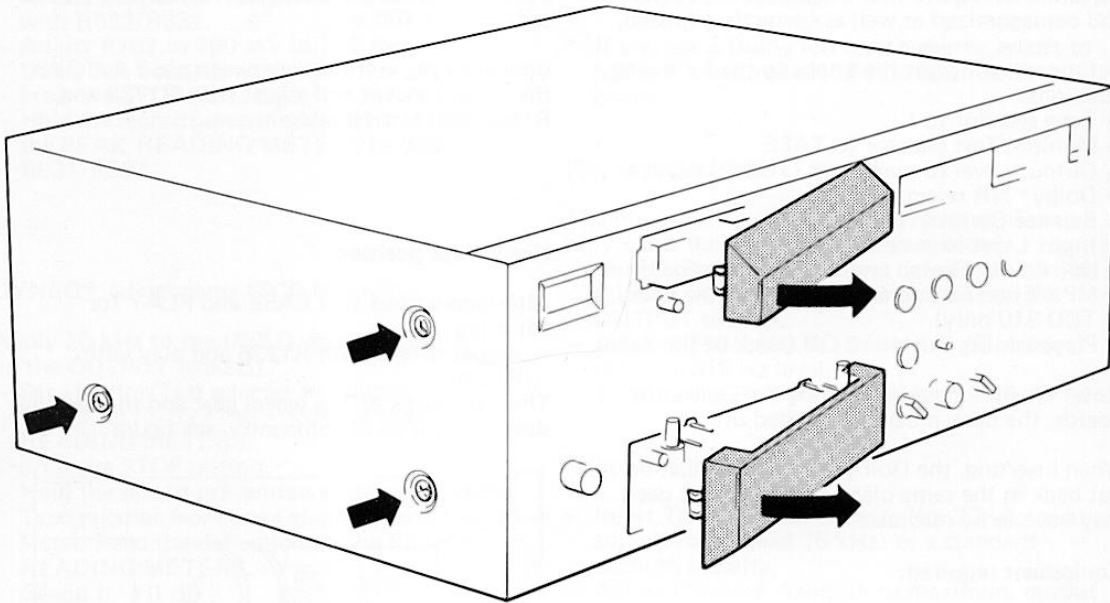


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### Removing the top/side cover

Remove the three screws (see figure) on both sides and lift off the top/side cover.



Pull off the head covers, see figure.

**NOTE!** Do not pull off the function knobs as RELEASE, PLAY, RECORD, etc. or the other push buttons.

## Electrical adjustments

### General

Before adjusting fold out page 7. The electrical adjustments require that the tape path is cleaned and demagnetized as well as correctly adjusted.

Before adjusting, set the knobs to the following positions:

- Tape selector to I.
- Monitor/Test selector to TAPE.
- Output Level to maximum (TCD 911 only).
- Dolby\* NR selector to Off.
- Balance Control to the middle.
- Input Level to maximum.
- Cue Points, Search and Cut selectors to Off.
- MPX Filter button to Off (back of the deck, TCD 910 only).
- Playback Eq. button to Off (back of the deck).

**Note!** When removing/inserting the Dolby NR boards, the deck must be switched off.

When inserting, the Dolby NR boards must be put back in the same place, otherwise the deck may have to be readjusted.

### Equipment required:

- 2 millivoltmeters
- Audio signal generator
- Frequency counter
- Distortion meter
- Wow and flutter meter
- Tandberg test cassettes:
  - No. 21 (speed check 1000 Hz)
  - No. 22 (wow and flutter check 3150 Hz)
  - No. 23 (azimuth adj. playback head 10 kHz)
  - No. 24 (playback level adj. 1000 Hz)
- Measuring cassettes:
  - Group I: Maxell XL I S
  - Group II: Maxell XL II S
  - Metal: Maxel MX Metaxial
  - Playback alignment tape (18 kHz) IEC, New Standard available from BASF or TEAC.

### Dc. offset adjustments

Connect a dc. voltmeter to P506 pin 1 and P506 pin 3 and adjust with R504 and R604 to 0 V dc.  $\pm 10$  mV.

Connect a dc. voltmeter to the center of R132/R133 on the left and R232/R233 on the right and adjust with R100 and R200 to 0 V dc.  $\pm 100$  mV.

Connect a dc. voltmeter to the hot side on P1704 and P1804 and adjust with R1716 and R1816 to 0 V dc.  $\pm 50$  mV (R1706 and R1806 are for coarse adjustment only).

Connect a dc. voltmeter to pin 2 or 3 on the output socket and adjust with R1739 and R1839 to 0 V dc.  $\pm 100$  mV.

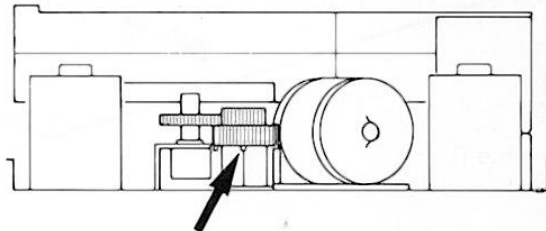
Connect a dc. voltmeter between pin 2 and 3 on the output socket and adjust with R1738 and R1838 to 0 V  $\pm 10$  mV.

### Headbridge position

Alternately press RELEASE and PLAY for adjusting.

- Adjust release with R1236 and play with R1235.

The two marks on the worm gear and the bearing sleeve should be in conformity, see figure.



### Bias oscillator (TCD 910 only)

The bias oscillator frequency is between 80 and 85 kHz. The voltage measured on the erase head should be approx. 7 V for all the Tape selector positions.

### Bias traps (TCD 910 only)

### Encoder

- Set the audio signal generator to read oscillator frequency and connect the signal to the INPUT sockets.
- Set Monitor/Test selector to TAPE position and turn down the Input Level.
- Adjust to minimum signal in TP2 on both Dolby NR boards with L581/L681.

### Decoder

- Set the Monitor/Test selector to TAPE position and turn down the Input Level.
- Set the deck to record.
- Adjust C356/C456 to minimum bias on the OUTPUT sockets.

\* "Dolby" and the double-D-symbol are trademarks of Dolby Laboratories Licensing Corporation.  
Noise reduction system manufactured under license from Dolby Laboratories Licensing Corporation.

### Sensitivity adjustment (TCD 910 only)

- Set Monitor/Test selector to Source.
- Apply 400 Hz to the INPUT sockets.
- Adjust Input Level and Balance to 700 mV on P506 pin 1 and 3.
- Adjust the PEAK READING METERS to 0 dB with R532/R632.
- Adjust R702 to 700 mV in TP2 (both Dolby NR boards).
- Press the STOP button.
- Hold the record prevention switch in and adjust the PEAK READING METERS to 0 dB with R531/R631.

### DYNEQ® adjustments (TCD 910 only)

Apply 20 kHz to the INPUT sockets (350 mV on the OUTPUT sockets).

- Set Monitor/Test selector to Source.
- Adjust R177/R277 to + 1 dB on the PEAK READING METERS.
- Press the STOP button.
- Hold the record prevention switch and set the Tape selector from pos I to pos. II and then to Metal. Read the deflection on the PEAK READING METERS.  
Group I: + 1 dB  
Group II: + 3 dB  
Metal: + 5 dB

### Antisaturation network

The antisaturation network is adjusted from the factory and should normally not be readjusted.

### Encoder (TCD 910 only)

- Set Monitor/Test selector to Source and the Dolby NR selector to C position.
- Apply 19.9 kHz to the INPUT sockets (use a frequency counter) and adjust L711 to minimum in TP2 on both Dolby NR boards.

### Decoder

- Set the deck to PLAY and the Dolby NR selector to C position.
- Set the Monitor/Test selector to TAPE (TCD 910 only).
- Apply 19.9 kHz 10 mV (use a frequency counter) to the free leg on C751 and adjust to maximum in TP4 on both Dolby NR boards.

### MPX Filter adjustment (TCD 910 only)

- Apply 19 kHz to the INPUT sockets.
- Set Monitor/Test selector to Source.
- Press in the button marked MPX Filter.
- Adjust L582/L682 to minimum reading on the millivoltmeters in TP2 (both Dolby NR boards).
- Set the MPX Filter button to Off.

### Playback level adjustment

- Note!** The Playback Eq. must be set to Automatic.
- Insert Tandberg test cassette\* No. 24 (Playback level adj. 1000 Hz).
  - Adjust R378/R478 to 750 mV measured on the OUTPUT sockets.

\* If you use a Dolby NR level cassette, adjust to 580 mV measured on TP4 on both Dolby NR boards.

### Playback Equalizer

The Playback Eq. adjustment is to be carried out only when the playback head is replaced.

- Insert a Playback alignment cassette and adjust azimuth at 18 kHz to maximum out on the OUTPUT sockets.
- Adjust L350/L450 at 18 kHz 1.5 dB higher than the 315 Hz level.
- Tolerance at 31.5 Hz - 18 kHz:  $\pm 2$  dB

### Azimuth adjustment

- Insert Tandberg test cassette No. 23 (Azimuth adj. playback head 10 kHz) or a standard azimuth cassette.
- Adjust Playback Azimuth to maximum output or best compromise on the OUTPUT sockets.

### Adjustments for metal tape (TCD 910 only)

- Set the Tape selector to Metal position.
- Apply 400 Hz to the INPUT sockets and adjust Input Level to 50 mV out in Source position.
- Set the Monitor/Test selector to TAPE position and adjust the Record Current (Metal) to 50 mV on the OUTPUT sockets.
- Set the audio generator to 12 kHz and adjust Azimuth for the record head to maximum out.
- Adjust the Bias Current (Metal) to 50 mV out and if necessary readjust the Record Current.

### Record Equalizer (TCD 910 only)

This adjustment affect the HF EQ for all groups of tape.

- Apply 20 kHz to the INPUT sockets and adjust the Input Level to 50 mV out in Source position.
- Set the Monitor/Test selector to TAPE position and adjust R169/R269 to 50 mV on the OUTPUT sockets.

### Calibration oscillator (TCD 910 only)

The test and the azimuth oscillator frequencies are 315 Hz and 15 kHz.

- Set the Monitor/Test selector to 315 Hz and adjust R138 to 0 dB on the PEAK READING METERS.
- Set Monitor/Test selector to 15 kHz, adjust the Azimuth control to obtain the highest and most stable deflection on the PEAK READING METERS. Then adjust R140 to 0 dB on the PEAK READING METERS.

### Adjustments for group II tape (TCD 910 only)

The HF EQ (R169/R269) must not be altered.

- Set the Tape selector to II position.
- Use the same procedure as for Metal tape.

### Adjustments for group I tape (TCD 910 only)

The HF EQ (R169/R269) must not be altered.

- Set the Tape selector to I position.
- Use the same procedure as for Metal tape.

### Frequency range

Metal IV	18 Hz – 23 kHz
(– 20 dB)	± 1.5 dB
With Dolby C NR	± 3.0 dB

Tape II	18 Hz – 20 kHz
(– 20 dB)	± 1.5 dB

Tape I	18 Hz – 20 kHz
(– 20 dB)	± 1.5 dB

### Distortion (TCD 910 only)

Record 1000 Hz at 0 dB deflection on the PEAK READING METERS.

Harmonic Distortion – 250 nW/m, Dolby B NR:	
Metal IV	< 1%
Tape II	< 2%
Tape I	< 1.5%

### Speed check

Play back Tandberg test cassette No. 21 (speed check 1000 Hz) and measure with a frequency counter on the OUTPUT sockets:

± 0.5% (995 Hz to 1005 Hz).

If necessary, adjust R60 on the motor control board to correct speed.

### Wow and flutter check

#### Playback

Play back Tandberg test cassette No. 22 (3150 Hz) and measure with a wow and flutter meter on the OUTPUT sockets.

Playback (Weighted RMS): < 0.06%.

#### Record/playback (TCD 910 only)

Use a Maxell C-90 XL I S cassette. Connect the wow and flutter meter to the INPUT/OUTPUT sockets. Set the deck to record and record for about a minute. Wind back the cassette and set the TCD 910 to play.

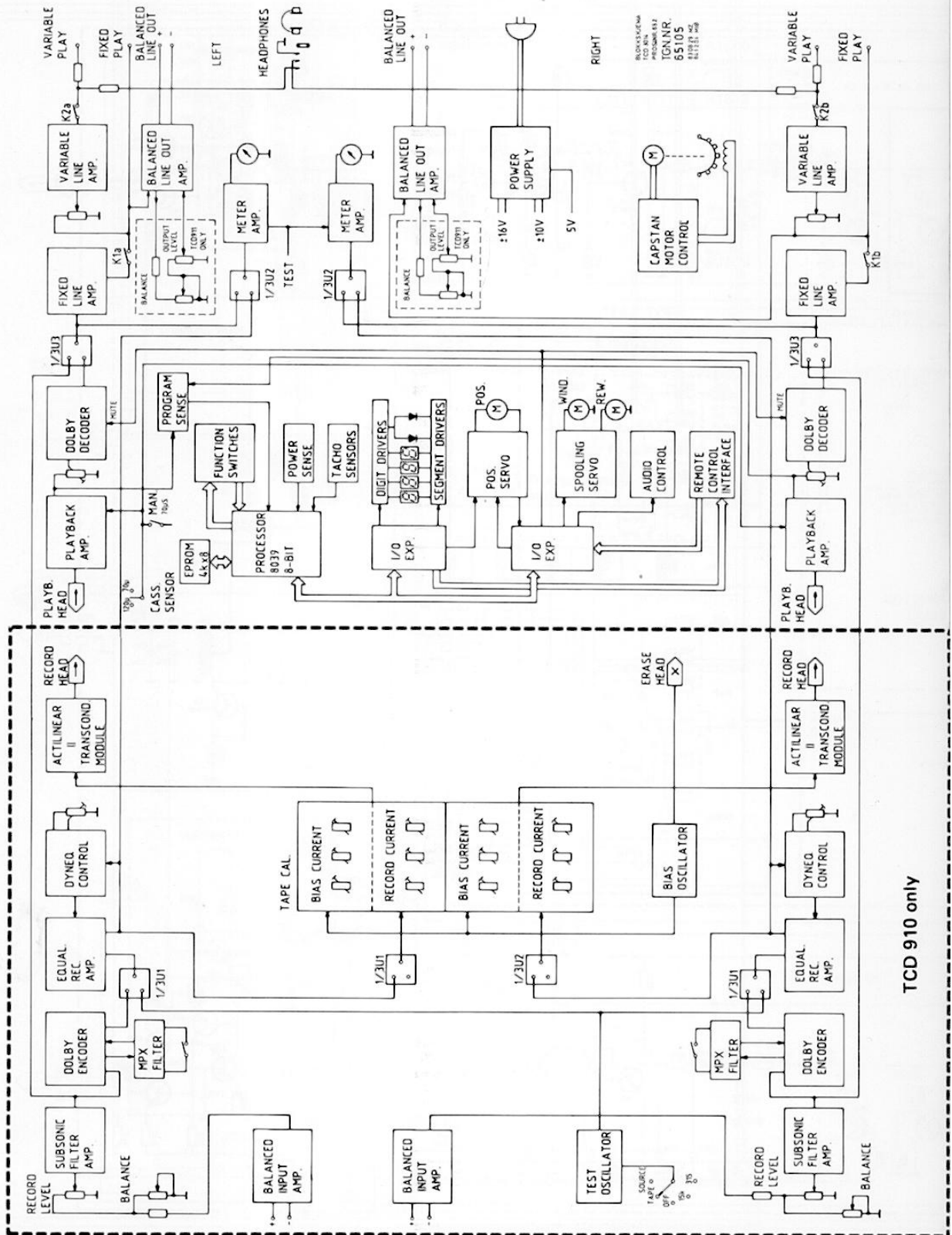
Record/playback (DIN - IEC): < 0.12%

Record/playback (Weighted RMS): < 0.09%

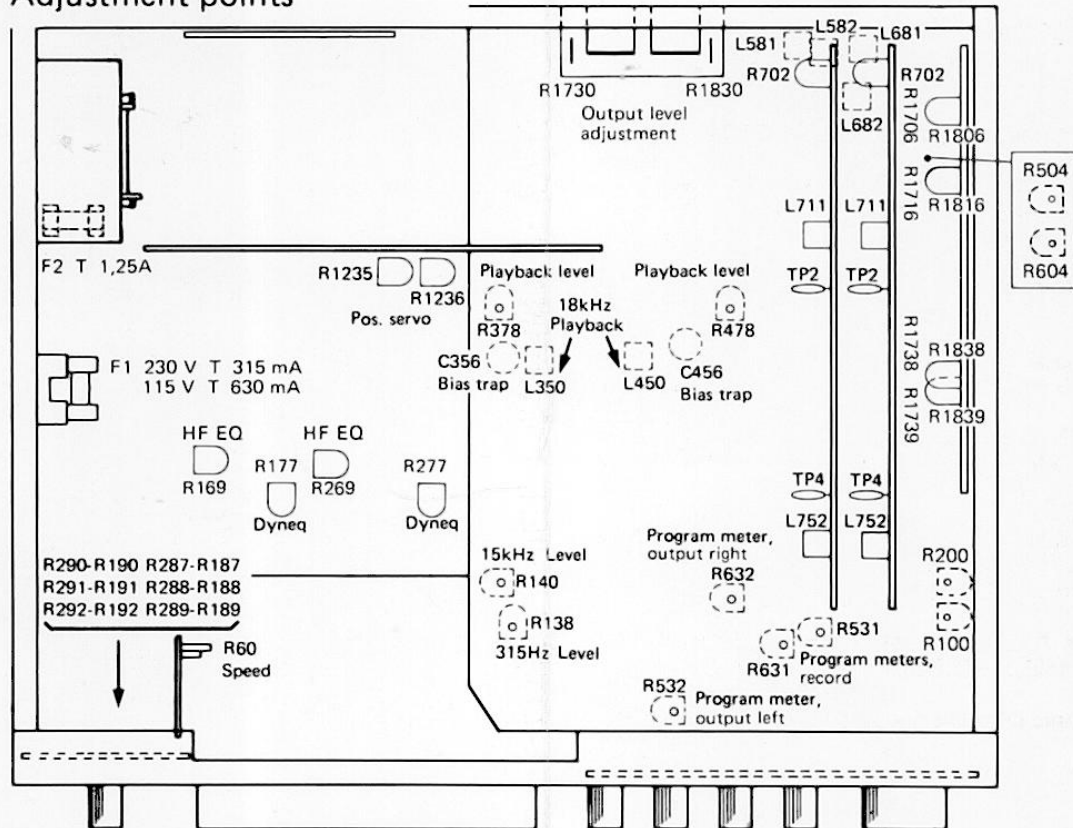
### Output level

From the factory the output level is adjusted to 1.55 V European version and to 2.05 V USA version. The adjustments are carried out with R1730 on the left and R1830 on the right channel available from the rear of the deck (Level adj.).

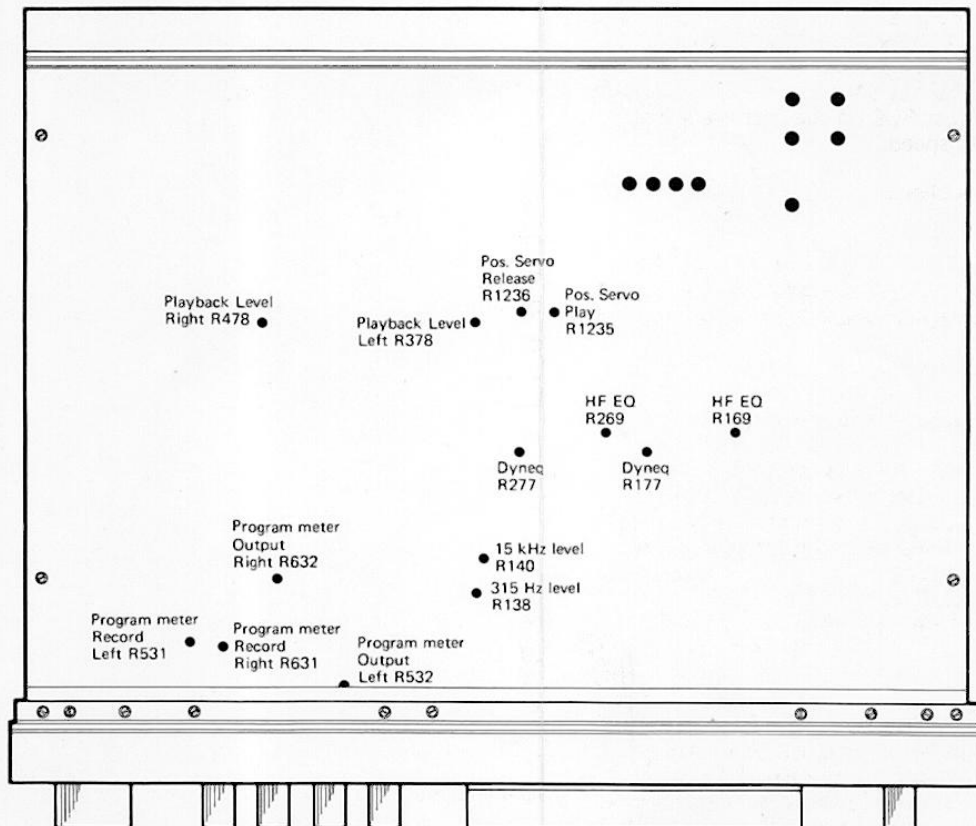
# Block diagram



## Adjustment points



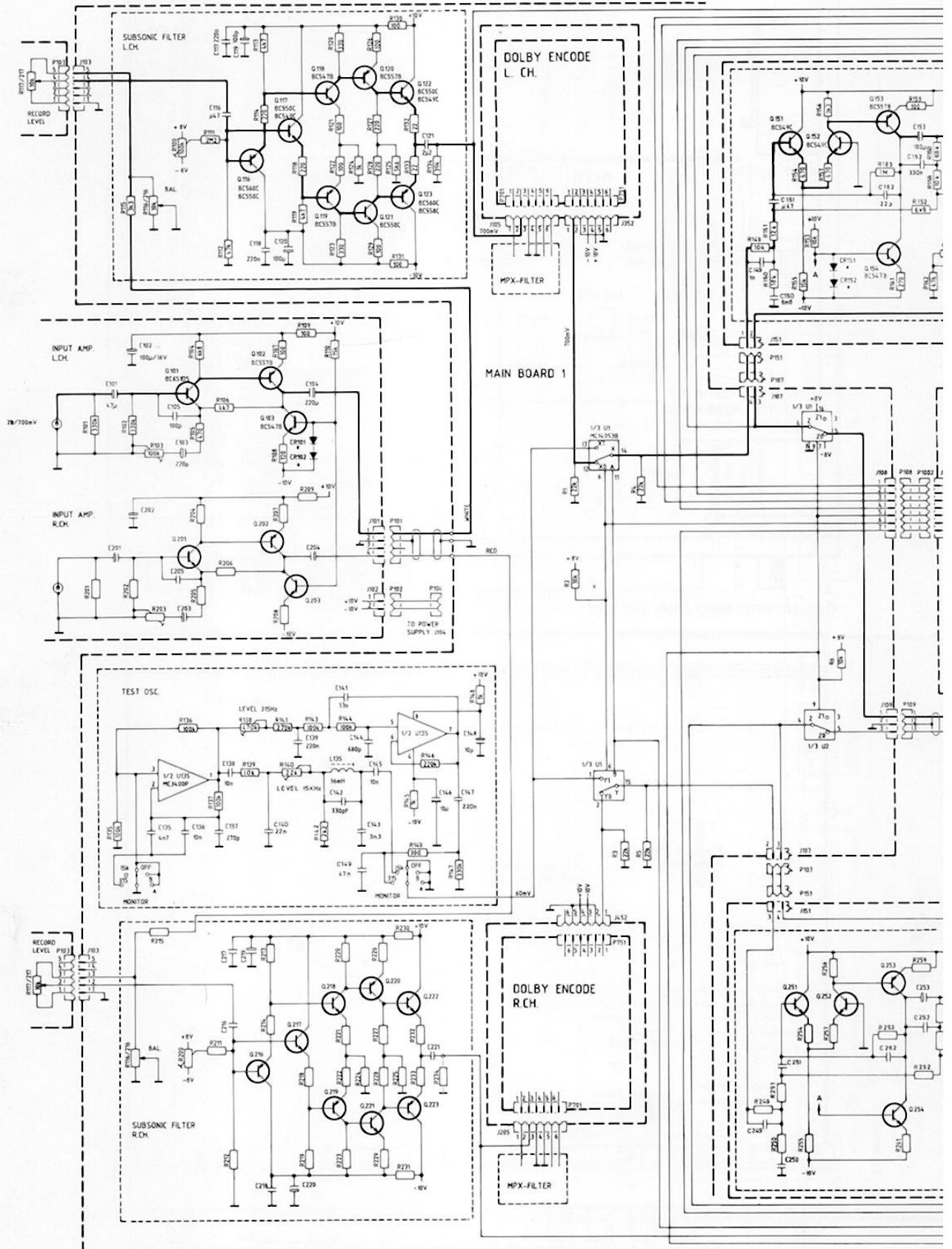
Adjustments seen from the top.

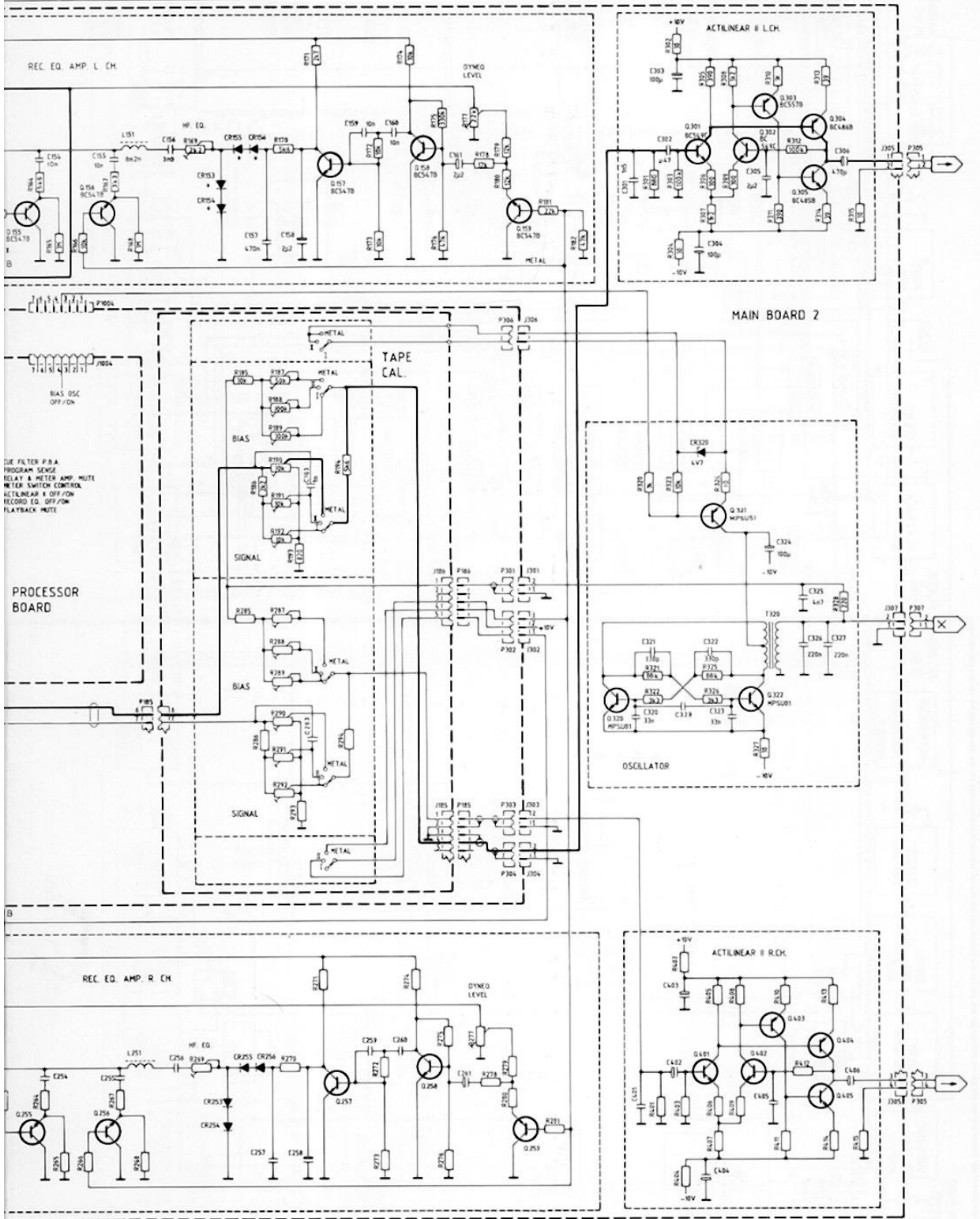


Adjustments seen from the bottom.  
Available through holes in the bottom plate.



# Circuit diagrams





USE FILTER P.B.A.  
PROGRAM SENSE  
RELAY & METER AMP. MUTE  
METER SWITCH CONTROL  
ACTILINEAR II OFF/ON  
RECORD EQ. OFF/ON  
PLAYBACK MUTE

PROCESSOR BOARD

REC EQ AMP L CH

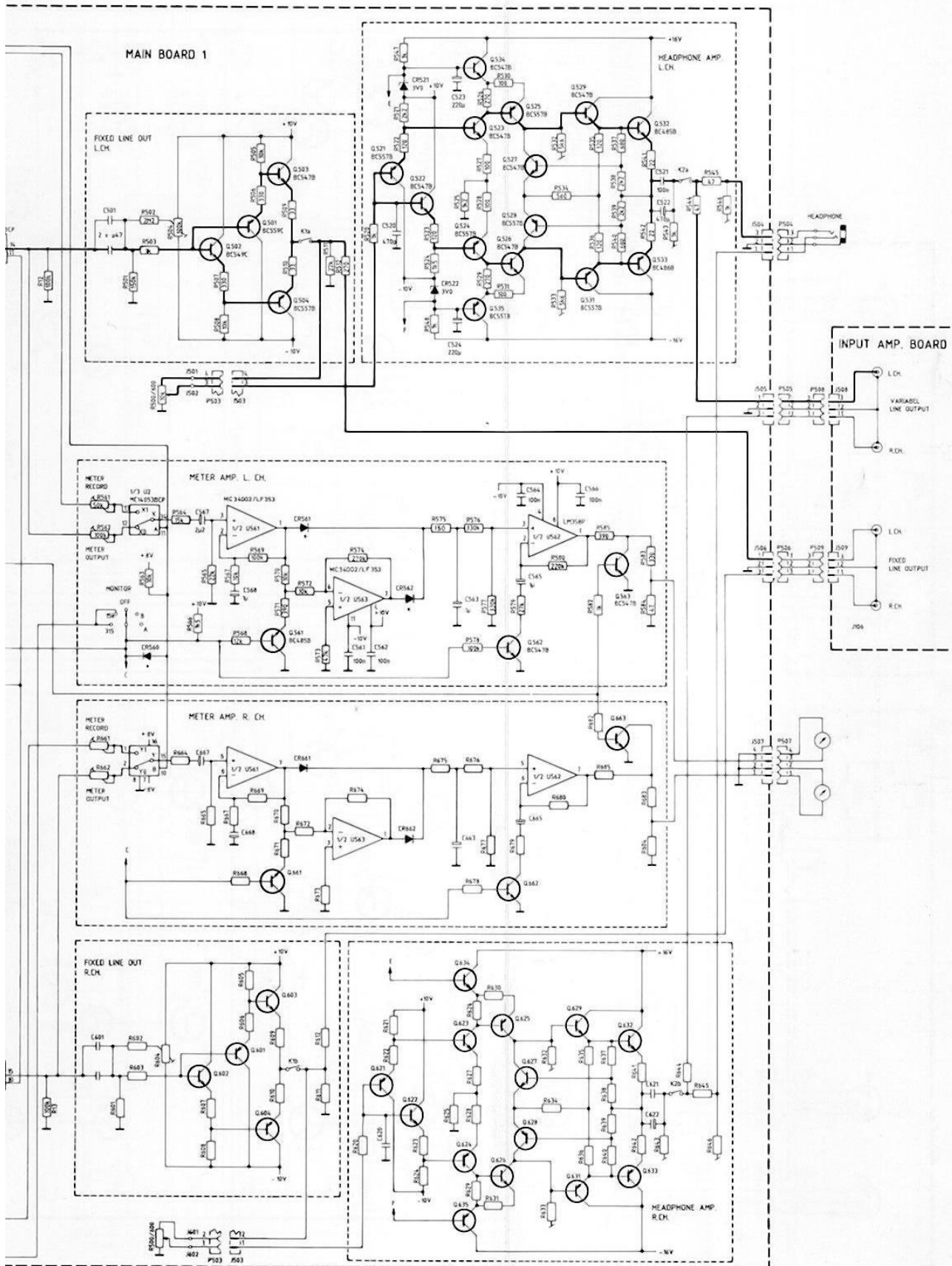
REC EQ AMP R CH

TAPE CAL

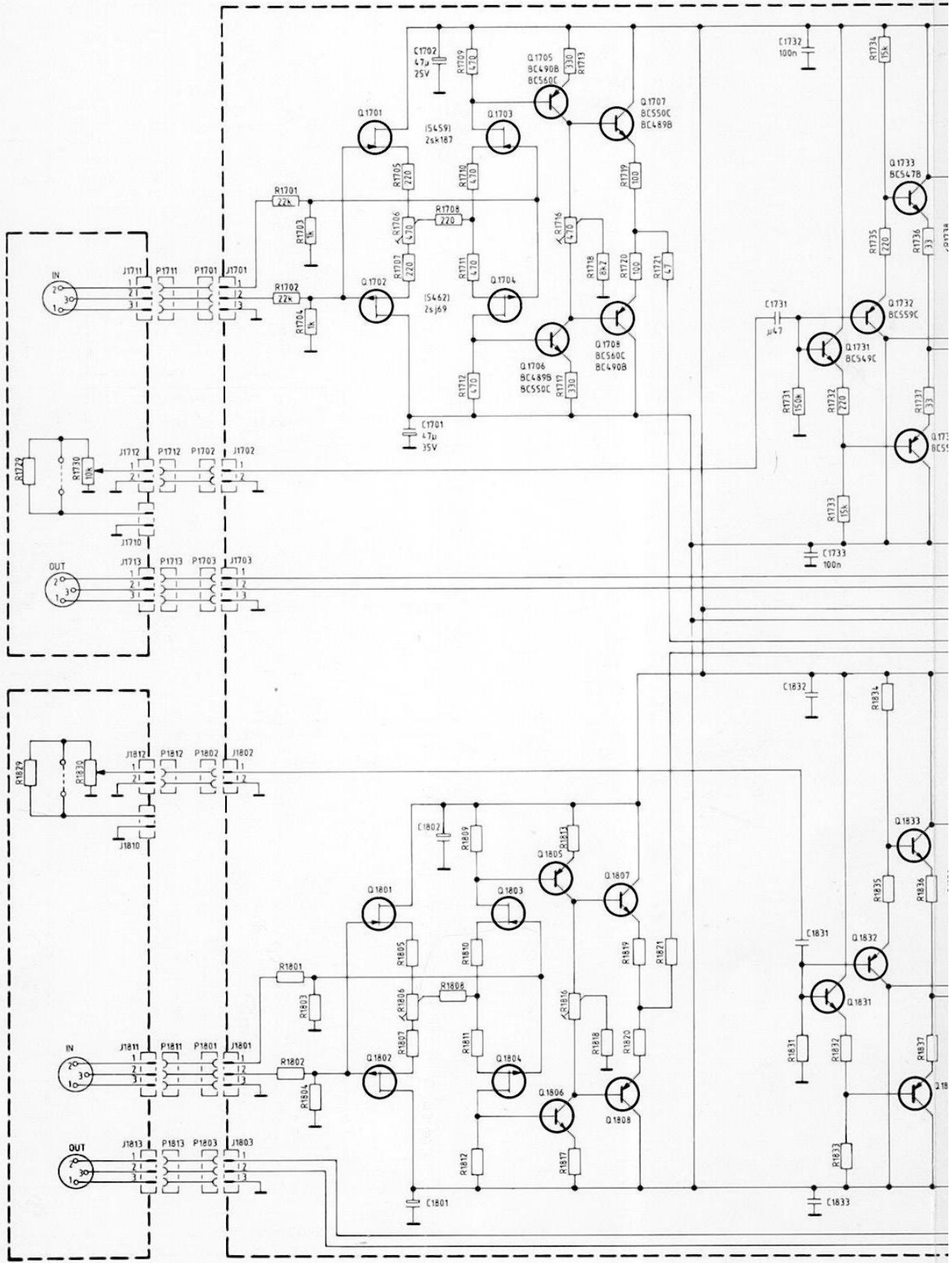
MAIN BOARD 2

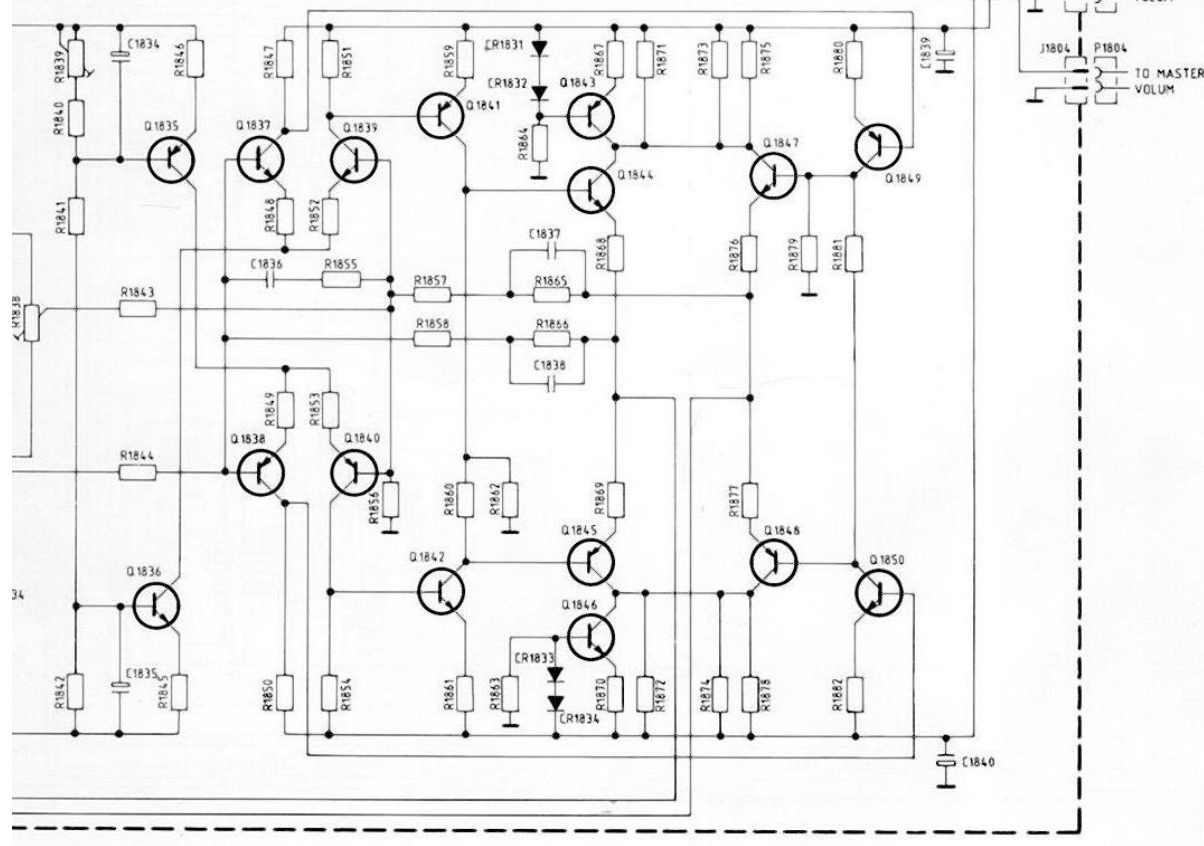
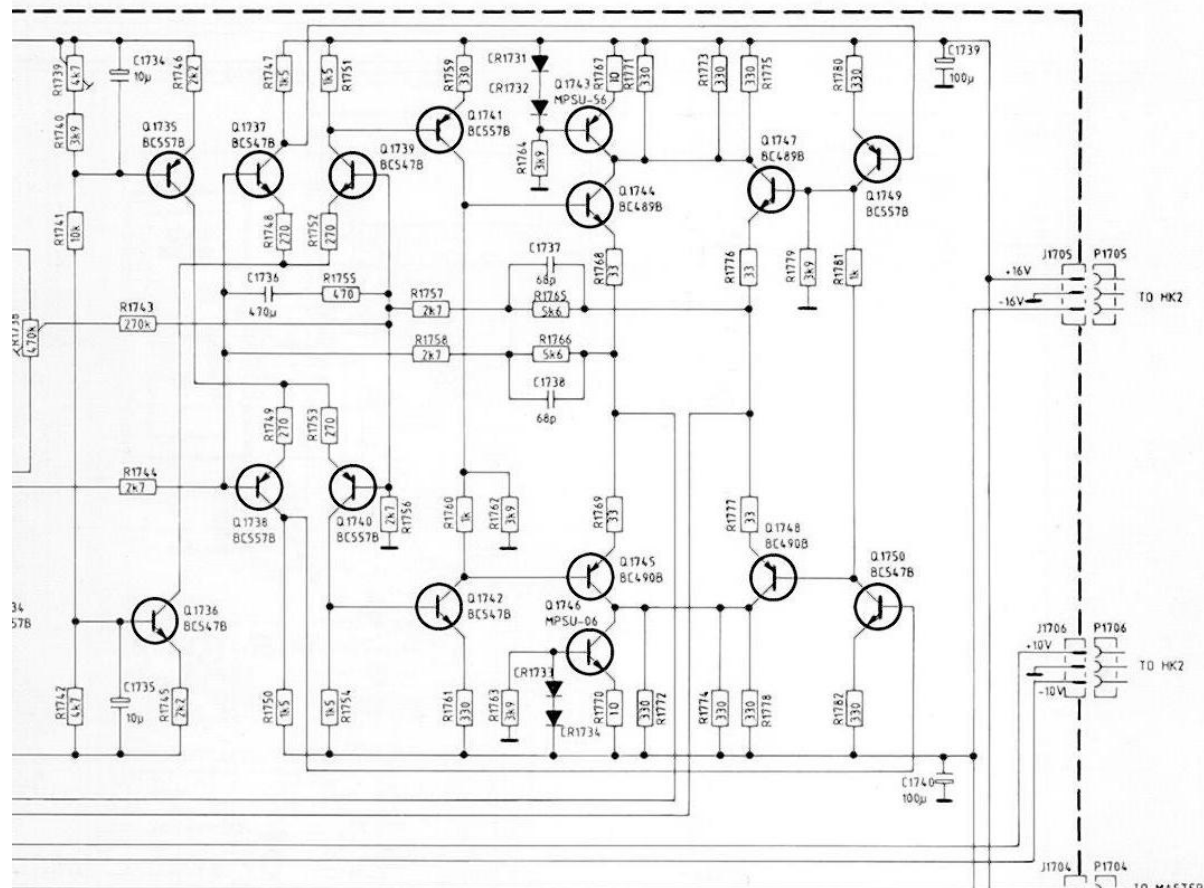
ACTILINEAR II L CH

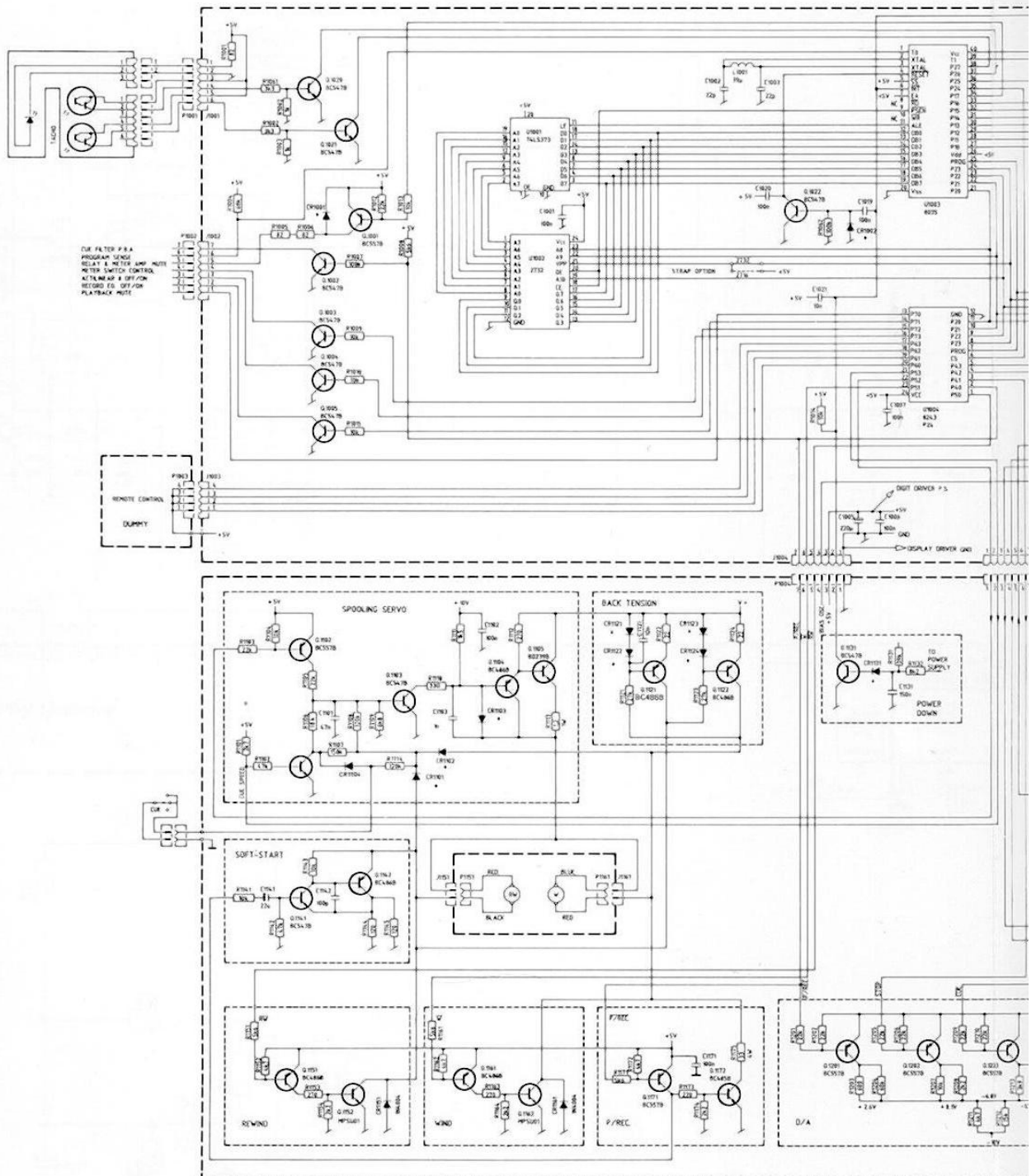
ACTILINEAR II R CH







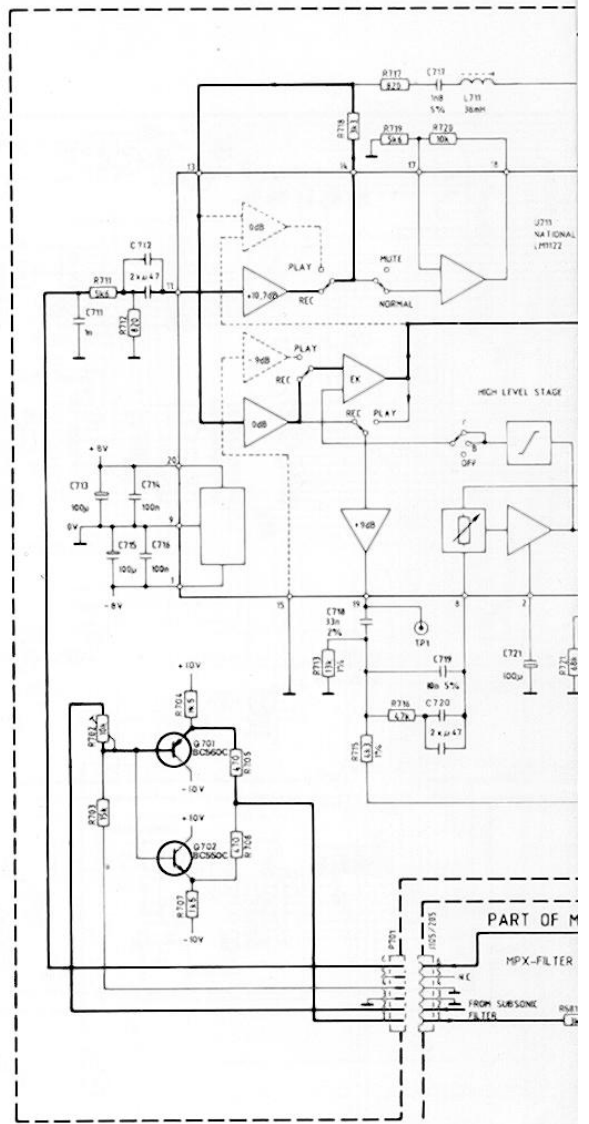




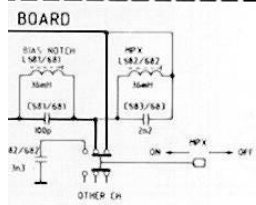
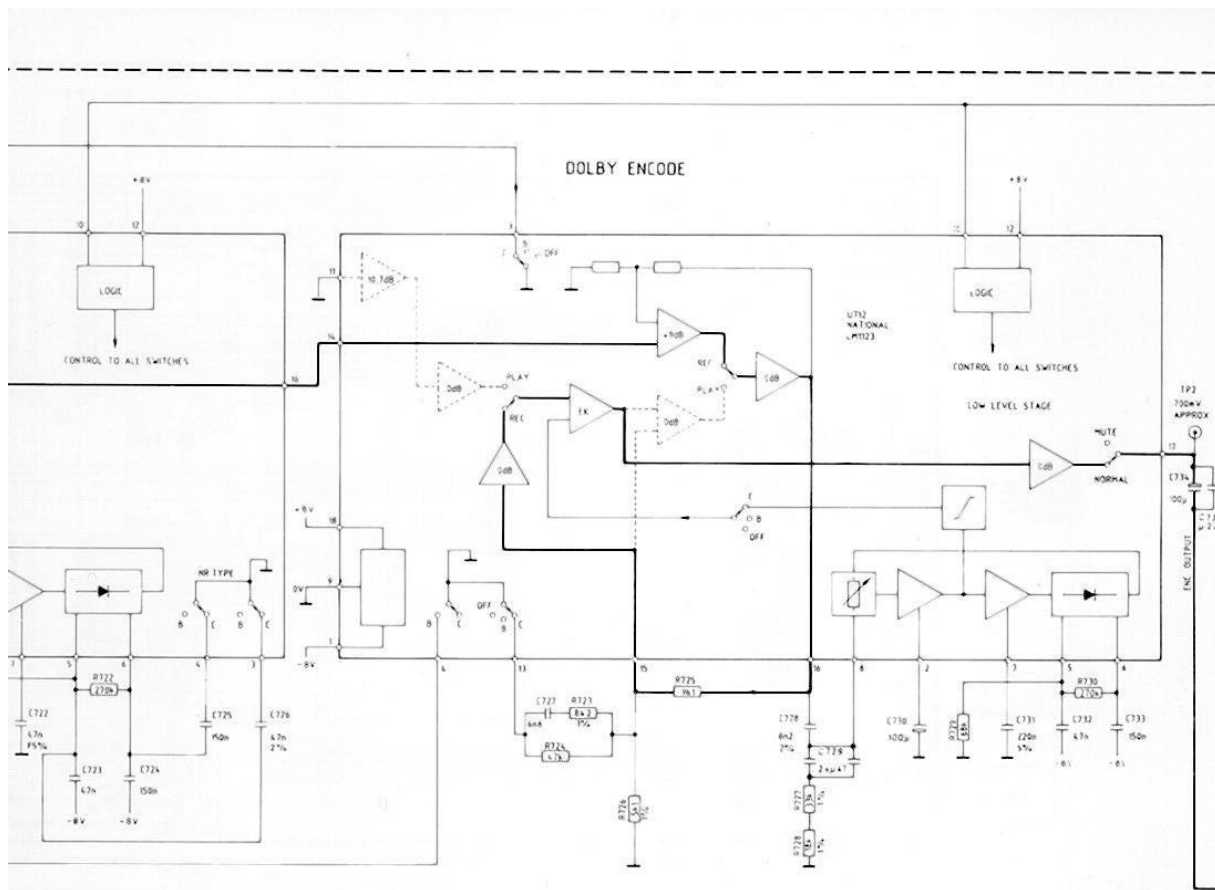
Processor and motor control

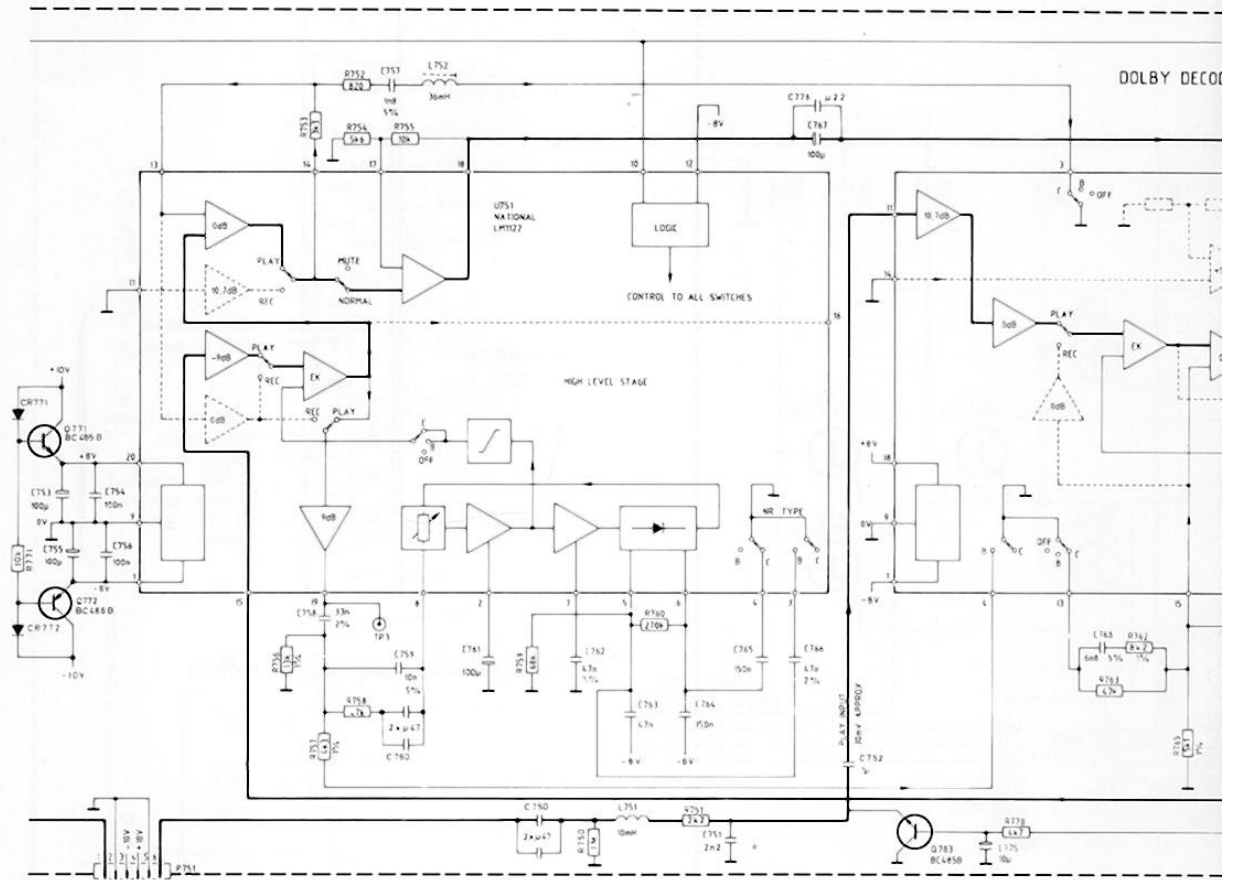




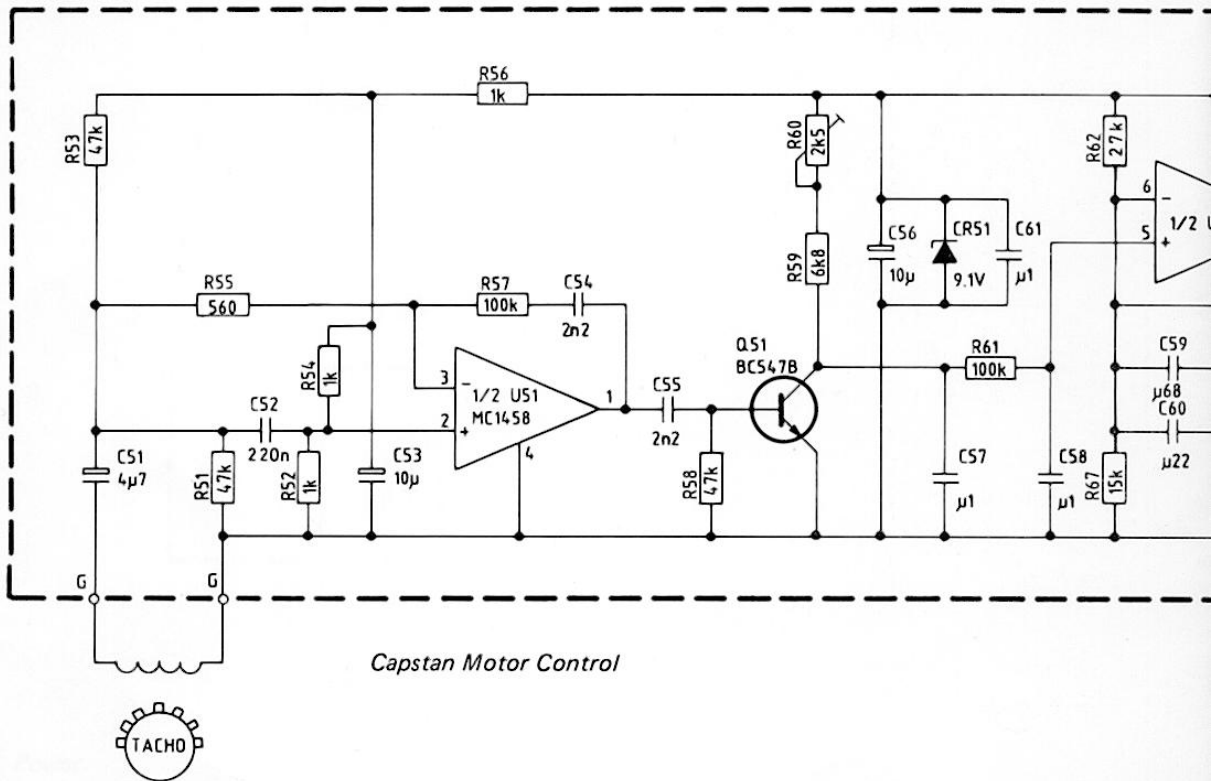


Dolby Encoder

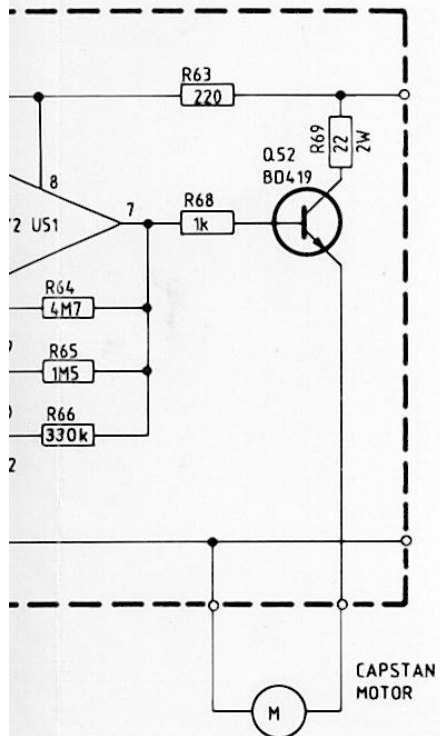
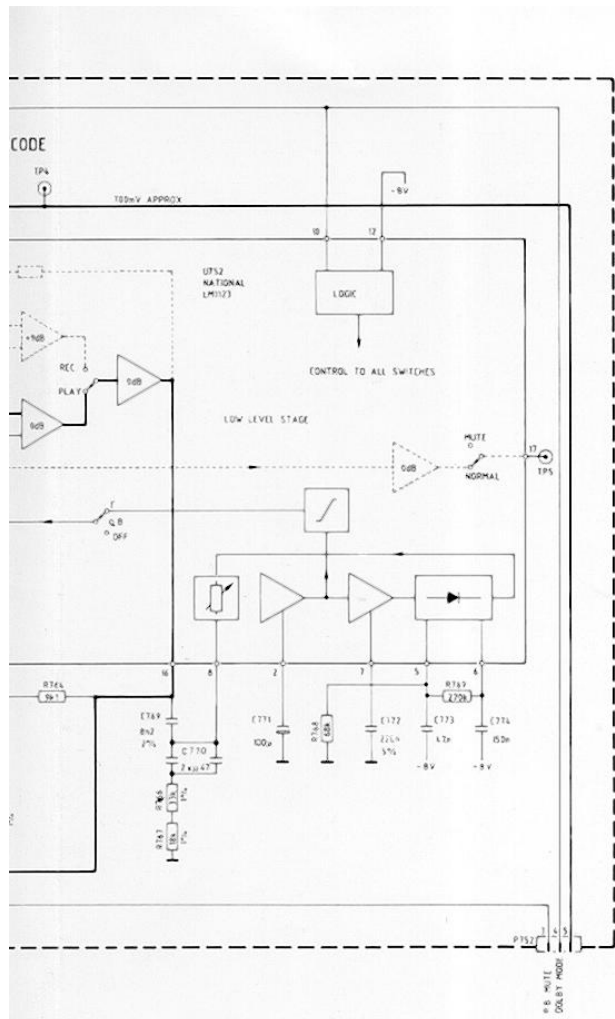


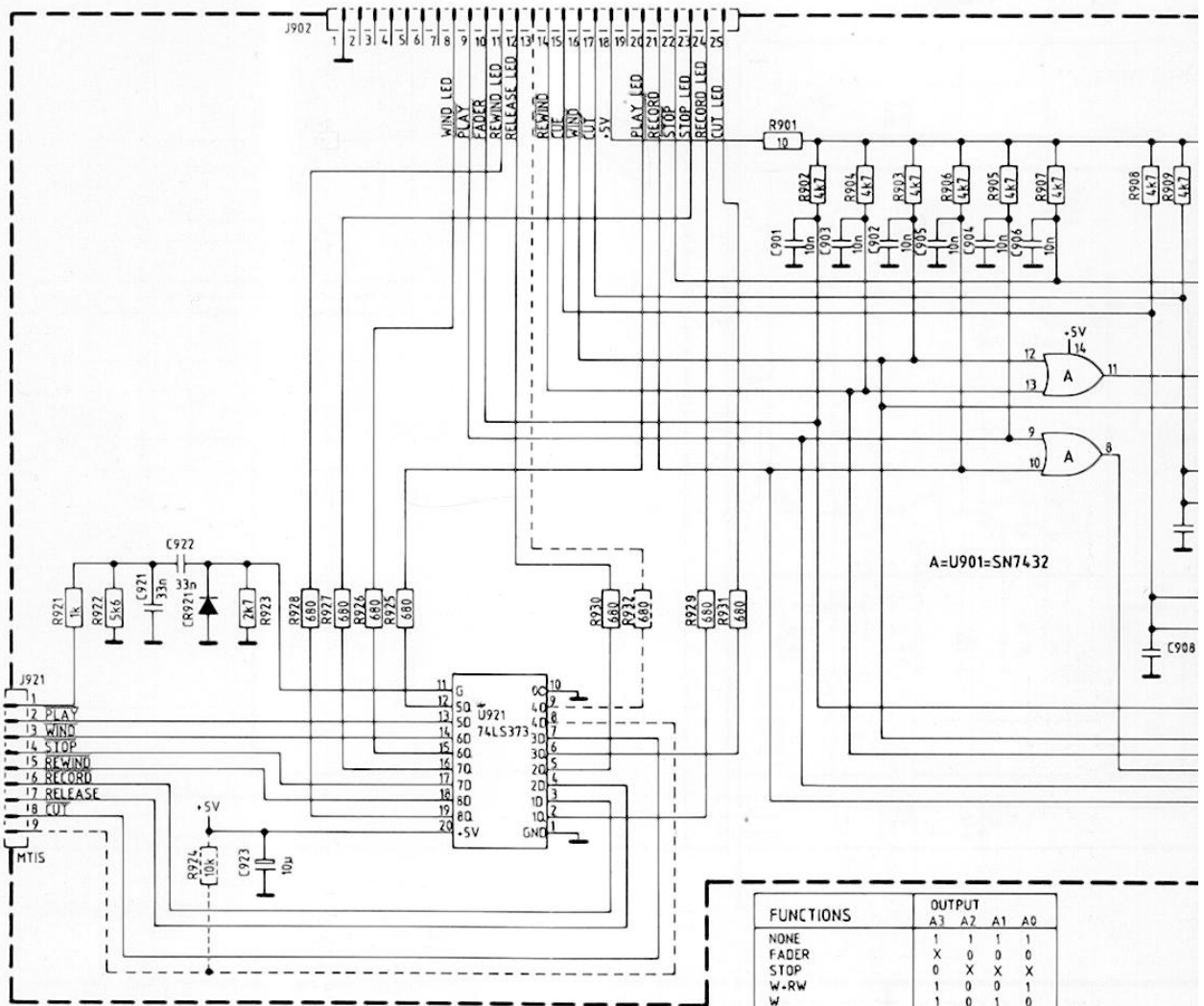


Dolby Decoder



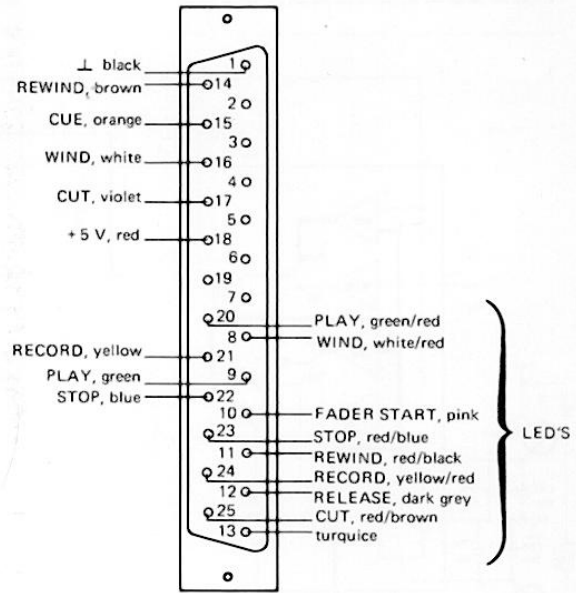
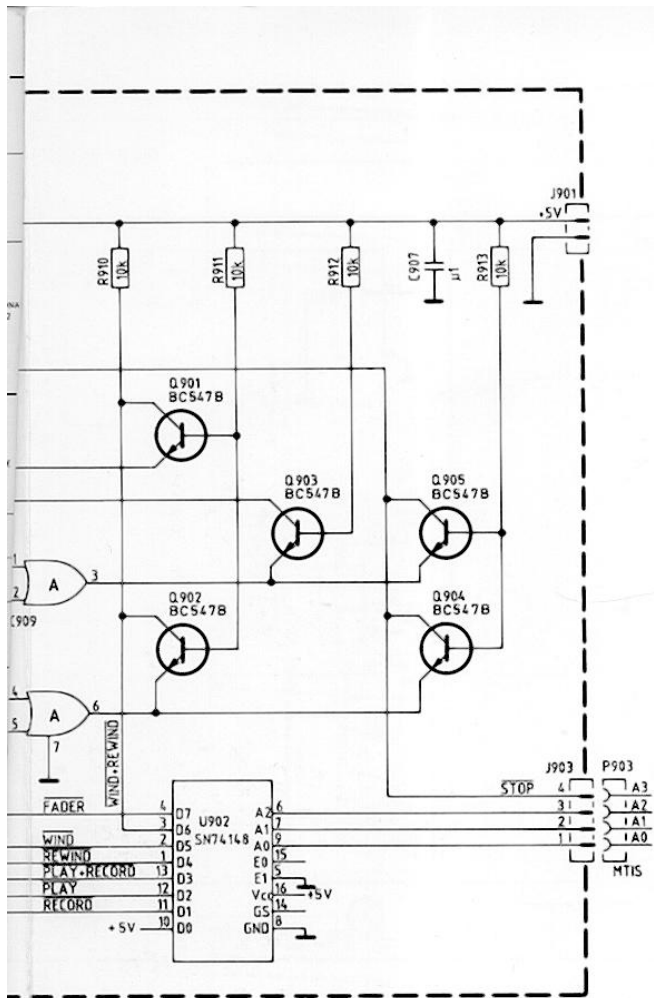
Capstan Motor Control



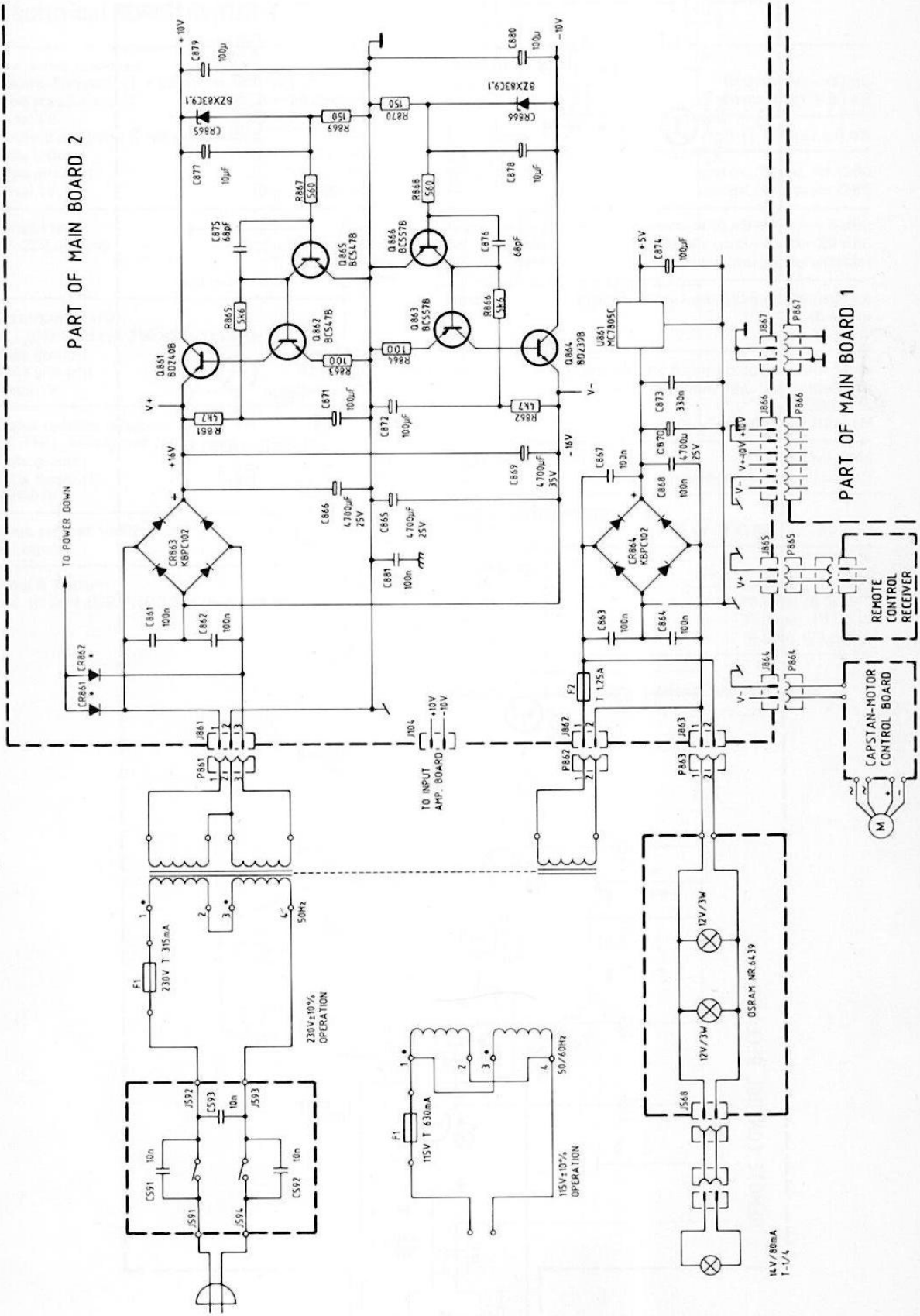


Remote I/O board

FUNCTIONS	OUTPUT			
	A3	A2	A1	A0
NONE	1	1	1	1
FADER	X	0	0	0
STOP	0	X	X	X
W-RW	1	0	0	1
W	1	0	1	0
RW	1	0	1	1
PLAY-RECORD	1	1	0	0
PLAY	1	1	0	1
RECORD	1	1	1	0
RECAP(STOP-PLAY)	0	1	0	1
SPACE(STOP-REC)	0	1	1	0
CUE(STOP-W-RW)	0	0	0	1
CUT	0	0	1	0
STOP-REWIND	0	0	1	1
STOP-PLAY-REC.	0	1	0	0



Cable Remote Control connections







## Technical specifications

### Frequency response:

Record/Playback at - 20 dB rel. 250 nWb/m	
Tape group I and II	20 - 20.000 Hz ± 2 dB
Metal IV	20 - 23.000 Hz ± 2 dB
Dolby B or Dolby C NR switched on	
Tape group I	20 - 16.000 Hz ± 3 dB
Tape group II	20 - 18.000 Hz ± 3 dB
Metal IV	20 - 20.000 Hz ± 3 dB

### Output level:

rel. 250 nWb/m	+ 6 dBu (European model)
	+ 8 dBu (USA model)
	adjustable from - 2 to + 12 dBu

### Distortion (THD):

at 1 kHz 0 dB rel. 250 nWb/m Dolby NR	
Tape group I	Better than 1.8%
Tape group II	Better than 2.8%
Metal IV	Better than 1.5%

### Signal-to-noise ratio:

3% THD, A-weighted (noise band with 20 Hz - 20 kHz)	
Tape group I	68 dB
Tape group II	71 dB
Metal IV	74 dB

### Erase ratio at 1 kHz:

All tapes	min. 78 dB
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### Wow & Flutter:

acc. to DIN 45507/IEC 386 peak, weighted	0.1%
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### Crosstalk (1 kHz):

Side A - B	Better than - 80 dB
Track 1 - 2	Better than - 50 dB

### Tape Speed:

4.76 cm/s (1 7/8 ips) ± 0.5%

### Winding times:

approx. 35 sec. for C-60  
approx. 55 sec. for C-90

### Input level:

Calibrated (0 dB level) = + 6 dBu  
for 0 dB level  
rel. 250 nWb/m  
Adjustable from - 6 to + 22 dBu  
(Calibrated position adjustable)

### Inputs:

Electronically balanced input impedance  
> 40 kohm  
up to 100 kHz

### Outputs:

Electronically balanced output impedance  
< 30 ohm min. load impedance  
> 300 ohm  
10 Hz to 100 kHz

### Level meter:

Symmetric PPM  
(showing true record current)

### Operating temperature range:

+ 15 to 32°C (59 . . . . 89.6°F)

### Dimensions:

Width	43.5 cm (17 1/8")
Height	16.6 cm (6 9/16")
Depth	35.0 cm (13 3/4")
Weight	9.9 kg (21.8 lbs)

Specifications are subject to change without notice.



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Tandberg A/S

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Fetveien 1, P.O. Box 53

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N-2007 Kjeller, Norway

