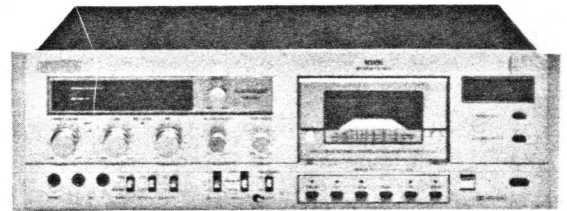


Service
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Service Manual

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Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified, be used.

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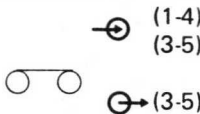

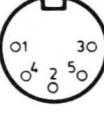


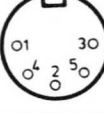



Subject to modification

4822 725 13619

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PHILIPS

INPUTS AND OUTPUTS

HEADPHONES BU1		0,2 mW	8-600 Ω	JACK	1 -  2 - left 3 - right
MICROPHONE L BU2		0,4 mV	47 k Ω	JACK	1 -  2 - left
MICROPHONE R BU3		0,4 mV	47 k Ω	JACK	1 -  2 - right
LINE INPUT L BU4		60 mV	300 k Ω	CINCH 	1 - left 2 - 
LINE INPUT R BU5		60 mV	300 k Ω	CINCH 	1 - right 2 - 
LINE OUTPUT L BU6		0...1 V	3 k Ω	CINCH 	1 - left 2 - 
LINE OUTPUT R BU7		0...1 V	3 k Ω	CINCH 	1 - right 2 - 
LINE INPUT/OUTPUT BU8	 (1-4) (3-5)  (3-5)	0,4 mV 200 mV 0...1 V	2 k Ω 1 M Ω 3 k Ω	5p, 180°, DIN 	1 - left 4 - right 2 -  5 - right 3 - left
MONITOR BU9	 (3-5)	0...1 V	3 k Ω	5p, 180°, DIN, 	1 - 4 - 2 -  5 - right 3 - left
REMOTE BU10				8p, DIN 	7 - STOP 1 - PAUZE 4 - WIND 2 - REC 5 - PLAY 3 - REWIND 8 - -12 V 6 - PLAY

401 4822 130 90035
402 4822 480 20049
403 4822 454 20408
404 4822 450 60174
405 4822 214 30436
406 4822 505 10571
407 4822 417 50132
408 4822 462 71126
409 4822 460 20192
410 4822 413 40863
411 4822 413 40864
412 4822 411 50474
413 4822 532 10284
414 4822 492 31498
415 4822 413 30868

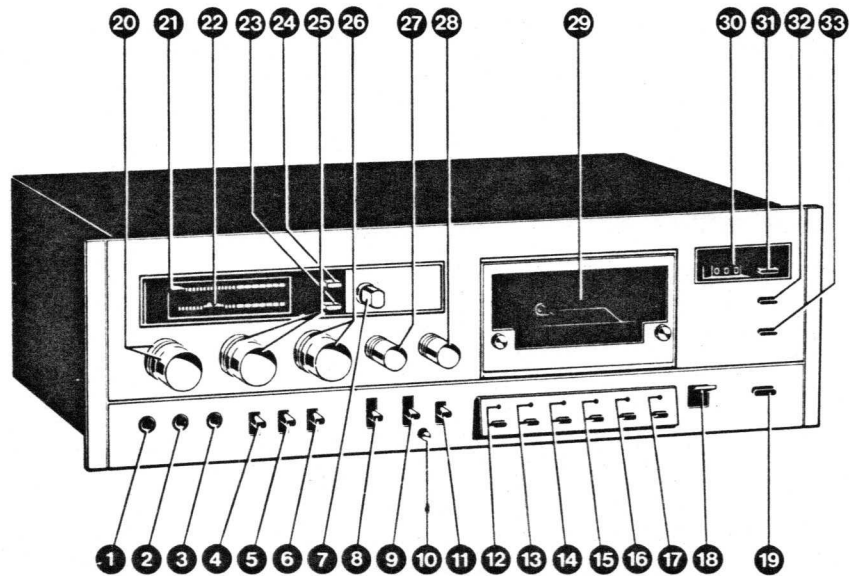
416 4822 403 51148
417 4822 403 51147
418 4822 214 30435
419 4822 459 80118
421 4822 443 50315
422 4822 276 20262
423 4822 410 40164
427 4822 403 51146
428 4822 462 40381
429 4822 532 10582
431 4822 267 54072
434 4822 413 30757
436 4822 349 50104
437 4822 410 22275
438 4822 276 10731

439 4822 410 22188
441 4822 267 20168
443 4822 459 80119
444 4822 492 60063
446 4822 146 20588
447 4822 272 10079
448 4822 462 71121
449 4822 462 71127
451 4822 276 10641
452 4822 492 30256
453 4822 411 50475
454 4822 410 40154
455 4822 413 30869

3

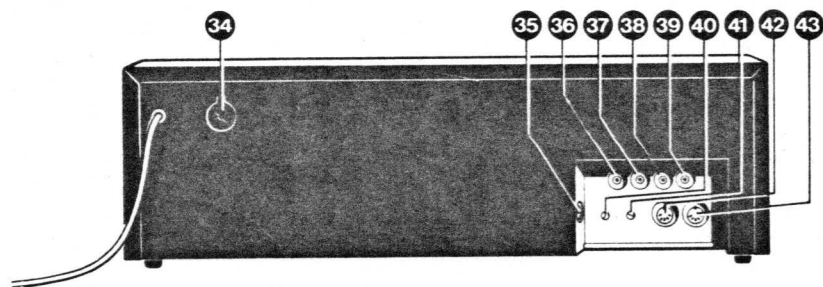
SPECIFICATIONS

Mains voltage	: 110-127-220-240 V	. Metal cassettes	: ≥ 57 dB (DIN 45405)
Mains frequency	: 50-60 Hz	. Chromium cassettes	: ≥ 56 dB (DIN 45405)
Power consumption	: 20 W	. Ferro cassettes	: ≥ 55 dB (DIN 45405)
Number of tracks	: 2x2	Improvement in signal/noise ratio (with A-filter) obtained with metal cassettes in comparison with the chromium reference tape C401R	
Tape speed	: 4.76 cm/sec. ± 1 % (DIN 45500)	. At 315 kHz	: + 1 dB
Wow and flutter	: ≤ 0.1 % (DIN 45500)	. At 10 kHz	: + 5 dB
Winding time C60 cassette	: ≤ 85 secs.	. At 16 kHz	: + 8 dB
Frequency range for		Improvement signal/noise ratio with	
. Metal cassettes	: 20...20,000 Hz (DIN 45500)	. Dolby	: ≥ 8.5 dB (CCIR)
. Chromium cassettes	: 20...20,000 Hz (DIN 45500)	. DNL	: ≥ 10 dB (with filter 5.6 kHz, 18 dB/octave)
. Ferro cassettes	: 20...20,000 Hz (DIN 45511)	Erase frequency	: 100 kHz ± 10 %
Improvement in dynamic range when metal cassettes are used in comparison with chromium reference tape C401R		Input and output sensitivities	: See Chapter "Inputs and outputs"
. Max. output level at 315 Hz	: + 3 dB	Dimensions	: 482 x 150 x 300 mm
. Saturation level at 10 kHz	: + 7 dB	Weight	: 8.2 kg
. Saturation level at 16 kHz	: +10 dB		
Signal/noise ratio (without DNL or Dolby)			



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Fig. 1



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Fig. 2

CONNECTIONS AND CONTROLS

Figs. 1 and 2

	Designation in diagram	Designation on recorder
1 Socket for stereo headphones	BU1	PHONES
2 Socket for microphone, left-hand channel	BU2	L-MIC
3 Socket for microphone, right-hand channel	BU3	MIC-R
4 Monitor switch	SK7	MONI
5 RIF and MPX filter switch	SK1	RIF-MPX
6 Dolby on/off switch	SK2	DOLBY NR
7 Dimmer for indicators 21 and 22	R422	DIMMER
8 Tape-sort equalisation switch	SK4	EQ
9 Tape sort bias switch	SK5	BIAS
10 Button for releasing the post-fading switch	—	LOCK
11 Post-fading switch	SK6	POST FADING
12 Pause button with indicator	SK11, D426	PAUSE
13 Recording button with "rec" indicator	SK12, D427	REC
14 Fast-rewind and review button with "rew" indicator	SK13, D428	REW
15 Start button with "play" indicator	SK14, D429	PLAY
16 Fast wind and cue button with "ff" indicator	SK15, D430	FF
17 Stop button with indicator	SK16, D431	STOP
18 Button for releasing the cassette holder	—	EJECT
19 Mains switch	SK0	ON
20 Volume controls for headphones	R436 a/b	PHONES VOLUME L.R.
21 Recording level indicator - left channel	U416	—
22 Recording level indicator - right channel	U416	—
23 Peak hold button	SK22	PEAK HOLD
24 Reset button for peak hold	SK23	RESET
25 Recording level controls for line in sockets	R437 a/b	LINE REC LEVEL L.R.
26 Recording level controls for microphone input sockets	R438 a/b	REC LEVEL MIC L.R.
27 Master control for the recording level	R426 a/b	RECORD MASTER
28 Speed control for post-fading-erasures	R423	POST FADING
29 Cassette holder	—	—
30 Counter	—	COUNTER
31 Counter reset button	SK8	RESET
32 Zero-stop on/off switch	SK9	MEMORY STOP
33 Automatic repeat on/off switch	SK10	AUTOMATIC REPEAT
34 Mains voltage adapter	SK20	—
35 Remote-control socket	BU10	REMOTE
36 Line output, left-hand channel	BU6	LINE OUT L
37 Line output, right-hand channel	BU7	LINE OUT R
38 Line input, left-hand channel	BU4	LINE IN L
39 Line input, right-hand channel	BU5	LINE IN R
40 Output level control, left-hand channel	R492	LINE OUT L
41 Output level control, right-hand channel	R493	LINE OUT R
42 Monitor output (DIN)	BU9	MONITOR
43 Line input/output (DIN)	BU8	LINE IN/OUT

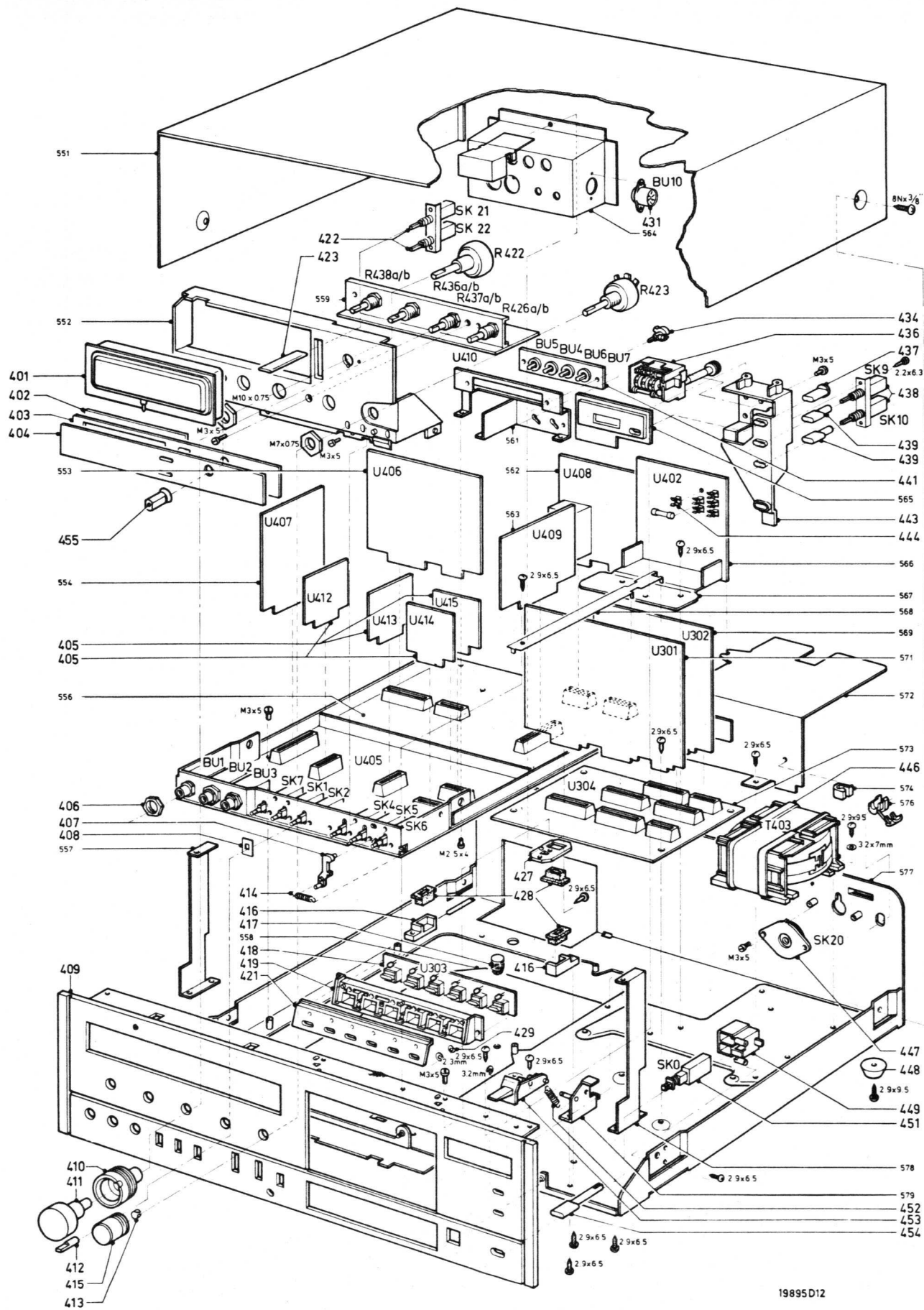


Fig. 3

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REPAIR INSTRUCTIONS

1. Top cover

- Remove the four screws in the side of the top cover. In the case of repairs or measurements with the top cover removed, exposure to strong direct lighting may give rise to incorrect operation of the automatic stop system.

2. Tape deck (Fig. 3 and 13)

- Remove the top cover.
- Unplug the following connectors:
 - a. Plugs 9, 10 and 11 (head wiring)
 - b. P.C. board connector 12
- Take the counter belt off the counter pulley.
- Remove motor control unit U302 and logic unit U301.
- Unscrew the two tape-deck holders 427.
- The tape deck can now be removed from the cabinet by sliding it to the rear.

3. Front panel 408 (Fig. 3)

- Remove the top cover.
- Remove the knobs 410, 411 and 415.
- Remove the eight screws at the top and the three screws at the bottom of the front panel.
- Press the two tabs at the top of item 552 downwards and pull the front panel forwards. The front panel is now detached from the cabinet.

Note:

The front panel must be removed for replacement of the following parts:
FTD indicator 401, switches SK1...SK7, SK22, SK23, sockets BU1...BU3, potentiometers R422, R423, U410 and the tape-deck control panel.

4. L.H. friction 174 (Fig. 9)

- Open the cassette holder.
- Remove left-hand carrier 107 and pulley 189.
- The L.H. friction may now be pulled out of the tape deck in a backward direction.

Note:

When the friction is mounted, the fork should engage with the centring pin, so that the friction is locked in position.

5. R.H. friction 181 (Fig. 9)

- Remove the tape deck.
- Remove cassette holder 124, cover plate 108, right-hand carrier 107, capstan motor 183 (three screws), pulley 189, pulsing disc 194.
- The R.H. friction may now be pulled backwards out of the tape deck.

6. Bearings 176 or 179 (Fig. 4 and 9)

- The bearings can be removed by driving a self-tapping screw into the bearing to be removed and pulling the bearing out of the bearing seat by means of pliers.
- When mounting the new bearings press them into the bearing seats with the fingers or a blunt object of a soft material (for example wood). Check that the bearing is placed so that the mark is visible.

MAINTENANCE AND LUBRICATING INSTRUCTIONS

It is recommended to clean the recorder and lubricate the principal points after approximately 500 hours of operation.

1. To be cleaned with alcohol or spirit

- The heads
- Belts
- Pulleys
- Brake discs and brake shoes

Attention !

- a. The capstan has been provided with a special protective coating. Therefore, the capstan and pressure roller should *not* be cleaned with alcohol or spirit. Clean the capstan and pressure roller with *dry* filter paper (as used in coffee filters).
- b. After the heads have been cleaned with alcohol or spirit wipe them with water and subsequently dry them.

2. Lubricating instructions (Fig. 9)

- All purpose oil (4822 390 10048) for the bearings of: pressure rollers 112, 138, 153, gear wheel shafts, wind selection friction. Pivots of head brackets 521, 523 and pressure roller bracket 512.
- Shell Alvania 2 (4822 389 10001): gear wheels and ball seats underneath head slide 114.
- Lubricant 10 (4822 390 10003) brackets 509 and 522.

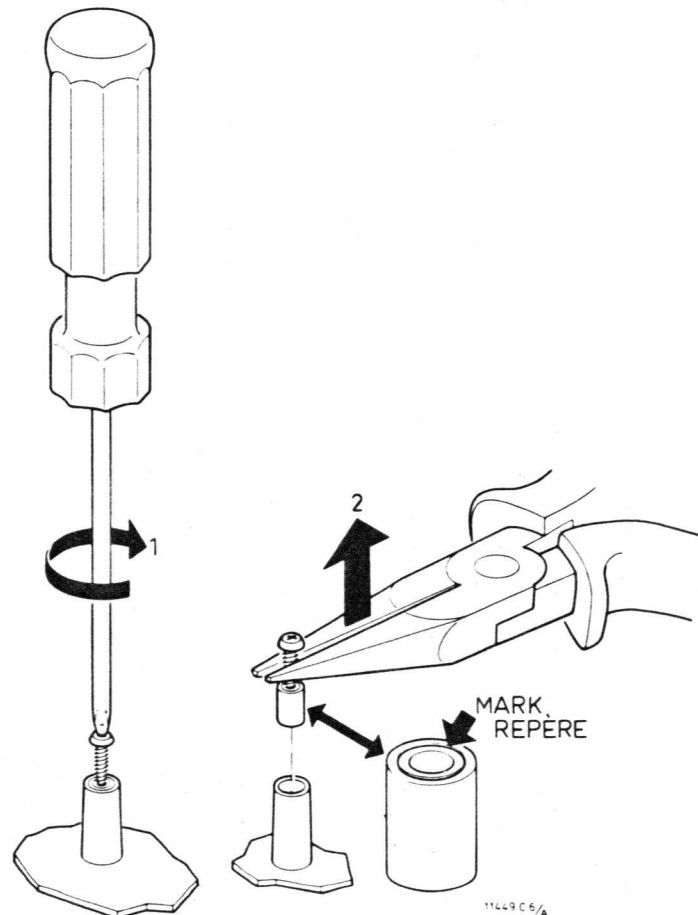


Fig. 4

MECHANICAL ADJUSTMENTS AND CHECKS

Required test equipment

- Head alignment jig 4822 395 80154
- Friction test cassette 4822 395 30054
- Spring pressure gauge 50...500 g 4822 395 80028
- Azimuth test cassette (e.g. Universal test cassette SBC 126 Cr) 4822 397 30038
- Millivoltmeter or oscilloscope

1. Adjusting the heads

Note:

First check the adjustment of the head-slide relay (see Chapter "Solenoid adjustments").

a1. Height recording/playback head (Fig. 5)

- Slide jig 4822 395 80154 over the capstan and hold it horizontally on the supporting points A.
- Press the head slide forwards and turn the two nuts B and C so that the tape guides of the recording/playback head slide over the jig and the underside of the jig just touches the top of the lower tape guide.

a2. Azimuth recording/playback head (Fig. 5)

- Connect the two outputs BU8 in parallel to a millivoltmeter or oscilloscope.
- Play back the 10 kHz signal on an azimuth test cassette.
- Adjust for maximum output voltage with nut C. The output voltage should not fluctuate more than 1.5 dB. If this is more, the lace-path must be checked.
- Again check the height of the recording/playback head (see Chapter a1).

a3. Penetration depth of recording/playback head (Fig. 5)

- Slide jig 4822 395 80154 over the capstan and hold it horizontally on points A.
- Loosen screw E and slide head plate F (item 115) slightly backwards.
- Position the head slide 114 against stop G by pushing the core of solenoid RE176 inwards.
- Slide head plate F forwards, in such a way that the head face of the recording/playback head just contacts the jig.
- Tighten screws E.

b1. Erase head height (Fig. 5)

- Slide jig 4822 395 80154 over the capstan and hold it horizontally on points A.
- Push the head slide forwards and adjust nut D until the tape guides of the erase head just slide over the jig.

b2. Penetration depth of the erase head (Fig. 5)

- Slide jig 4822 395 80154 over the capstan and hold it horizontally on points A.
- Loosen screw H and slide the head plate slightly backwards.
- Position head slide 114 against stop G by pressing the core of solenoid RE176 inwards.
- Slide the head plate forwards until the head face of the erase head just contacts the jig.
- Tighten screw H.

Note:

After the mechanical adjustment of the recording/playback head the following electrical measurements and adjustments should be carried out:

- a. Playback sensitivity and indicators
- b. Bias
- c. Recording sensitivity
- d. Frequency response

2. Solenoid adjustments

a. Head slide solenoid RE476 (Fig. 5)

- Set the recorder to "Play" with an arbitrary cassette.
- Loosen the fixing screws of the solenoid
- With attracted core pull back the relay until the head slide is positioned against stop G (L against G) and subsequently secure the relay.

b. Pressure roller solenoid RE475 (Fig. 6)

- Loosen the fixing screws of the relay.
- Set the recorder to "Play" with an arbitrary cassette.
- With attracted core pull back the solenoid until gear wheel bracket 521 is positioned against stop K. Subsequently secure the solenoid.

3. Brake brackets (Fig. 7)

- In the "off" position (none of the solenoids actuated) the brakes should have a clearance of 0.4 to 0.8 mm relative to the brake discs. This can be adjusted with tab A of brackets 501 and 508.
- In the "Play" mode (head-slide and pressure roller solenoids actuated) the brakes should be 0.8 to 1.5 mm clear of the brake discs. This can be adjusted with tab B of brackets 501 and 508.

4. Pressure roller (Fig. 8)

- The force exerted on the capstan by the pressure roller should be 370-450 g. This can be measured as follows:
- Set the recorder to "Play" without cassette (the cassette presence detection should be activated).
 - Check the clearance between the pressure roller nut and the pressure roller bracket. This clearance should be 0.3 to 0.6 mm and is adjustable with the pressure roller nut.
 - Pull back the pressure roller with the spring pressure gauge, as shown in Fig. 8, with the aid of a string.
 - Allow the pressure roller with the spring pressure gauge to return slowly to the capstan.
 - Take the gauge reading at the instant that the pressure roller comes into contact with the capstan.
 - The pressure roller force is not adjustable. If the pressure roller force is not correct, check the position of the pressure roller solenoid (see Chapter 2b). If no improvement is obtained, replace pressure roller spring 154.

5. RH and LH friction

Set the recorder to "Play" with the friction test cassette inserted.

- The RH friction should be 35 to 46 g.cm.
- The LH friction should be 4 to 8 g.cm.

6. Winding motor M2

The groove of the motor pulley should be at the same level as the groove of pulley 189 within 0.3 mm.

7. Eject bracket 522 (Fig. 9)

- Insert a cassette.
- Bend the adjusting tab of eject bracket 522 so that the top of the eject bracket is just clear of unlocking bracket 509.

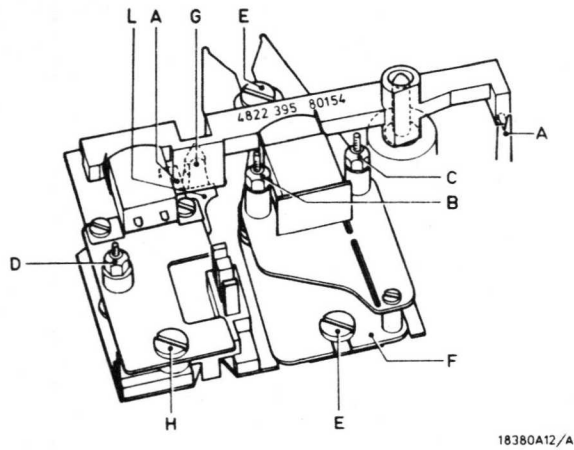


Fig. 5

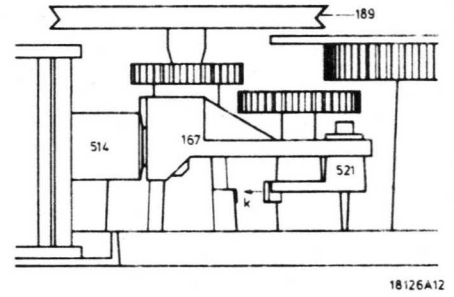


Fig. 6

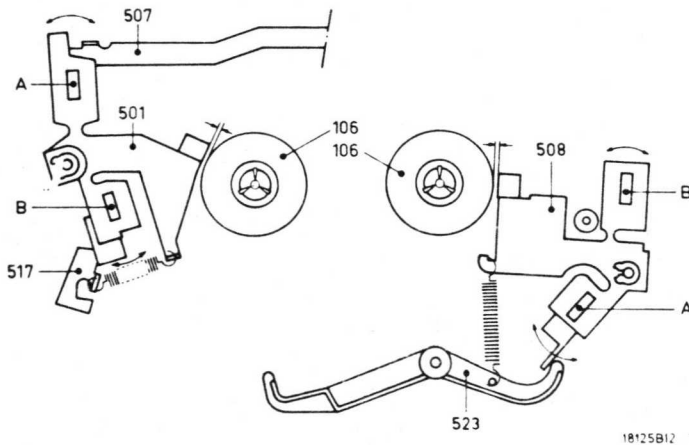


Fig. 7

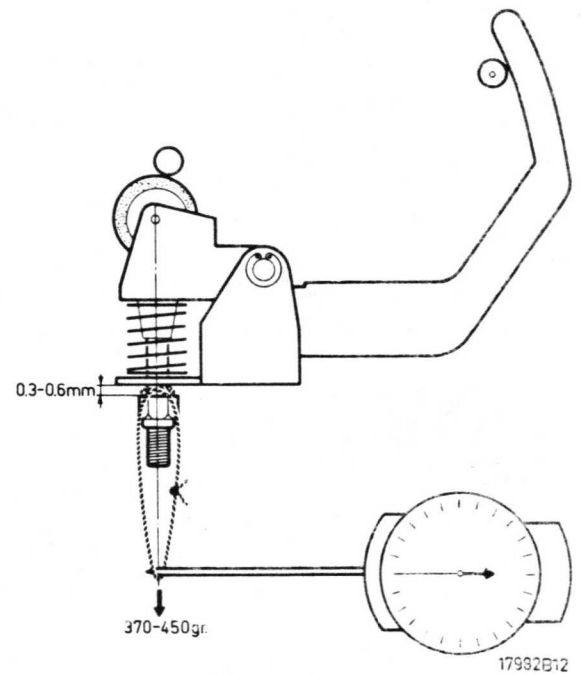


Fig. 8

101	4822 443 50334	122	4822 506 90024	146	4822 492 31503	171	4822 492 51259
102	4822 443 60656	123	4822 249 40094	147	4822 532 10666	172	4822 532 50692
103	4822 502 11408	124	4822 403 51118	148	4822 492 51261	173	4822 528 90304
104	4822 492 31499	126	4822 403 51119	149	4822 403 51124	174	4822 528 20248
106	4822 528 20249	127	4822 443 50333	151	4822 532 51102	176	4822 520 30353
107	4822 528 40207	128	4822 492 51269	152	4822 528 20251	177	4822 492 31504
108	4822 443 30374	129	4822 492 40809	153	4822 403 51117	178	4822 492 31502
109	4822 130 31194	131	4822 403 51115	154	4822 492 51199	179	4822 532 10766
110	4822 381 20038	132	4822 403 10145	156	4822 505 10612	181	4822 528 20247
111	4822 443 60665	133	4822 492 31498	157	4822 492 31499	182	4822 532 20709
112	4822 532 60699	134	4822 462 71122	158	4822 532 51101	183	4822 361 20157
113	4822 403 10154	136	4822 492 31501	159	4822 403 51125	184	4822 691 20113
114	4822 403 51116	137	4822 520 40044	161	4822 403 51123	186	4822 520 40044
115	4822 403 51166	138	4822 532 51101	162	4822 492 51261	187	4822 492 62138
116	4822 403 51114	139	4822 290 80353	163	4822 403 51122	188	4822 358 30263
117	4822 492 51169	141	4822 403 51165	164	4822 492 31492	189	4822 528 80731
118	4822 492 51275	142	4822 492 31498	166	4822 281 50056	191	4822 522 31276
119	4822 532 10785	143	4822 492 31497	167	4822 403 51121	192	4822 528 90305
120	4822 249 10108	144	4822 403 51164	168	4822 532 70078	193	4822 214 30415
121	4822 532 20708	145	4822 403 51163	169	4822 361 30108	194	4822 528 20246
						196	4822 358 30264

ELECTRICAL MEASUREMENTS AND ADJUSTMENTS

The following measurements and adjustments are described for the left-hand channel. The test points and adjusting elements for the right-hand channel are given in brackets.

Required test equipment and test cassettes

- LF generator
- AC millivoltmeter
- Wow-and-flutter meter
- Multimeter
- Oscilloscope
- Universal test cassette SBC 126 Cr 4822 397 30038
- Universal test cassette SBC 133 Fe 4822 397 30039
- Frequency counter
- Cassette service set 801/CSS 4822 395 30078

General conditions

The following general conditions apply to the electrical measurements and adjustments, unless explicitly stated otherwise.

- Mains voltage 220 V \pm 5 %, 50 Hz
- Ambient temperature 20 to 25 °C
- Monitor switch set to "Source"
- MPX-RIF, Dolby and post-fading switched off.
- Tape selectors, BIAS set to Chromium, EQ set to 70 μ secs.
- Volume controls line output, headphones and recording set to maximum.
- The heads must have been adjusted for optimum results (see "Mechanical adjustments and checks")

Note 1:

IC's MC14001BCP, MC14011BCP, MC14071BCP and MC14081BCP are MOS IC's which are generally very susceptible to overloading and excess voltages. Therefore proceed with the greatest care during the measurements.

For further instructions reference is made to the leaflet packed with the IC's.

Note 2:

Before each measurement or adjustment with running tape it is advised to degauss the heads and tape guides. Strong remanent magnetism may adversely affect the signal-noise ratio and the frequency range and may also damage the test cassettes beyond repair.

Moreover, it is recommended to clean the heads before each measurement or adjustment with running tape.

1. Adjusting the tape speed

Method a: With the wow-and-flutter meter

- Connect the recorder to a wow-and-flutter meter.
- Set the recorder to "play" with the 3150 Hz section of test cassette SBC 126 Cr.
- The speed is adjustable with R480 on motor control board U302. The maximum permissible deviation is 1 %.
- Moreover, the wow-and-flutter value can be read. This should not exceed 0.065 % (with filter).

Note:

When a recording is made and subsequently played back the wow and flutter should be \leq 0.1 %.

Method b: With the cassette service set

- Connect the recorder to the cassette service set via an amplifier.

- Set the recorder to "Play" with the 50 Hz cassette of the cassette service set.
- Adjust for minimum beat effect of the test indicator with R480.

2. Winding speed

- Connect a frequency counter to point 4 of U305 or point 6 of connector 12.
- Set the recorder to forward winding ("wind") without cassette.
- Adjust the winding speed with R481 on motor control board U302 until the frequency counter indicates 50 Hz.

3. Adjusting the playback sensitivity and indicators

Method a: With test cassette SBC 126 Cr (250 nWb/m)

- Play back the 315 Hz, 0 dB signal on test cassette SBC 126 Cr. (Set tape selector SK5 to Cr).
- Adjust R490 (R491) so that the voltage on test point A/4 (A/2) is 650 mV.
- Adjust R440 (R441) of U407 so, that the + 1 dB block of the FTD - U416 lights up.
- Decrease, with R490 (R491), the signal on A/4 (A/2) by 35 mV (= ½dB). Now the + 1 dB block of the FTD U416 must be out. (if necessary correction can be made with R440 (R441) of U407).
- Adjust R490 (R491) so again, that the voltage on measuring point A/4 (A/2) is 650 mV.

Method b: With LF generator

- Via a 22 k Ω resistor apply a 205 mV, 315 Hz signal to test point B/3 (B/4).
- Insert an arbitrary cassette.
- Adjust R490 (R491) so that the voltage on test point A/4 (A/2) is 580 mV. (set tape selector SK5 to Cr)
- Adjust R440 (R441) of U407 so, that the -1 dB block of the FTD - U416 lights up.
- Decrease, with R490 (R491), the signal on A/4 (A/2) by 32 mV (= ½dB). Now the -1 dB block of the FTD-U416 must be out. (If necessary, correction can be made with R440 (R441) of U407).
- Adjust R490 (R491) so again, that the voltage on measuring point A/4 (A/2) is 580 mV.

4. Playback frequency response

When test cassette SBC 126 Cr is played back the frequencies between 40 and 12,500 Hz should be in conformity with the graph of Fig. 11.

Note:

If necessary, check the azimuth.

5. Adjusting the recording sensitivity

a. For Cr tape

- Set the recorder to "Recording" with reference test cassette TC-QR (8945 600 12901) or the reference section of test cassette SBC 126 Cr. If less stringent accuracy requirements are imposed, it is also possible to employ a high-quality chromium cassette.
- Adjust the bias for both channels to 450 μ A (target value), which corresponds to a voltage of 9 mV on test point B/1 (B/2). This can be adjusted with R488 (R489). Also see Chapter 6.
- Apply such a 315 Hz signal to BU8, point 3/2 (5/2) that the voltage on test point A/9 (A/7) is 290 mV.
- Set the monitor switch to "TAPE".
- Adjust the recording sensitivity with R486 (R487)

so that 290 mV is measured on playback Dolby test point A/4 (A/2).

b. For Me tape

- Set the recorder to "Recording" with a metal test cassette or a high-quality metal cassette.
- Set the tape selector to "Me".
- Repeat the adjusting procedure for Cr tape, but now adjust the recording sensitivity with R484 (R485). Do not change the bias.

c. For Fe tape

- Set the recorder to "Recording" with an Fe test cassette (TC-R or SBC 133) or a high-quality Fe cassette.
- Set the tape selector to "Fe".
- Set the equalization switch to 120 μ secs.
- Repeat the adjusting procedure for Cr-tape, but now adjust the recording sensitivity with R482 (R483). Do not change the bias.

6. Adjusting the erase current and bias current

- Set the recorder to "Recording" with a high-quality Me cassette.
Set tape selector SK5 to "Me" and monitor switch SK7 to "TAPE".

a. Erase head current

- Adjust the erase current to 60 mA with R462 (on oscillator unit U408). This corresponds to a voltage of 60 mV across R604 (1 Ω resistor in series with the erase head).

b. Coarse adjustment of bias

- Apply a 315 Hz signal to 3/2 (5/2) of BU8 so that 580 mV is obtained on test point A/4 (A/2).
- Reduce the input voltage in such a way that 29 mV (which is -26 dB relative to 580 mV) is measured on test point A/4 (A/2).
- Set the LF generator to 14 kHz, the input voltage being the same.
- Adjust R488 (R489) until the voltage on test point A/4 (A/2) is 29 mV (output voltage equal to 315 Hz output voltage).

c. Fine adjustment bias Me-tape

The fine adjustment of the bias demands a compromise between frequency response and distortion. In the case of a correct adjustment the frequency response will be as shown in Fig. 12, curve b.

Curve a points towards an excessive bias current.

Curve c is an indication of too small a bias.

For a correct adjustment of the bias it is necessary to record a number of frequencies between 20 Hz and 20 kHz (level -26 dB).

Play back the recordings made and plot the values thus found in a graph. Figure 11 shows between which limits the curve should be situated.

Correct the bias with R488 (R489) until the correct frequency response is obtained and the distortion is within 3 %.

Attention: Measure the distortion at 100 % modulation, i.e. 580 mV on test point A/4 (A/2).

Note:

In theory it would be possible to read the output levels for the measurement of the frequency response directly by setting SK7 to "TAPE". However, in practice it is found that at higher frequencies the output level in the case of direct reading is adversely affected by the recording head. For this reason it is necessary to first

record various frequencies, to rewind the tape and then to measure the output levels in position "Play".

d. Fine adjustment bias Cr-tape

Note:

This adjustment is necessary only if the (overall) frequency response for Cr-tape is not within the limits of Fig. 11.

- Set the recorder to "Recording" with reference cassette SBC 126 Cr.
- The adjustment procedure is the same as for fine adjustment of the bias for Me-tape, but adjustment is effected with R463 (for both channels).

e. Fine adjustment bias Fe-tape

Note:

This adjustment is necessary only if the (overall) frequency response for Fe-tape is not within the limits of Fig. 11.

- Set the recorder to "Recording" with reference cassette SBC 133 Fe.
Set tape selector SK5 to "Fe"
Set equalization switch SK4 to 120 μ secs.
- Use the same adjusting procedure as in the case of fine adjustment of the bias for Me-tape, but adjust with R464 (for both channels).

7. Adjusting the erase frequency

- Set the recorder to "Recording" with an arbitrary cassette.
- Measure the erase frequency at resistor R604 by means of a frequency meter.
- Adjust the erase frequency to 100 kHz with T460 (on U408).

8. Measuring the frequency response

- Set the recorder to "Recording" with a Metal test cassette or a high-quality metal cassette.
- Set the recording level controls to maximum.
Set tape selector SK5 to "Me".
Set equalization switch SK4 to 70 μ secs.
- Apply a 315 Hz signal to point 3/2 (5/2) of BU8 so that 580 mV is obtained on test point A/4 (A/2).
Reduce the voltage on test point A/4 (A/2) to 29 mV (is -26 dB) with the recording level controls.
- Record some frequencies between 20 Hz and 20 kHz.
- Play back this recording and measure the output voltage on point 3/2 (5/2) of BU8.
- Plot the output levels thus found in a graph.
Figure 11 shows the limits within which the curve should lie.

For Cr and Fe tapes follow the same measuring procedure. For Cr use reference tape TC-QR or SBC 126 Cr and for Fe use reference tape TC-R or SBC 133 Fe. Set the tape selector switches SK4 and SK5 to Cr, 70 μ secs. and Fe, 120 μ secs. respectively.

9. Adjusting the 19/38 kHz MPX-filter

- Set the recorder to "Recording" with an arbitrary cassette.
- Switch on the MPX switch.
- Apply such a 315 Hz signal to 3/2 (5/2) of BU8 that 775 mV is measured on test point A/9 (A/7).
- Set the LF generator to 19 kHz at the same input voltage.
- Adjust the voltage on test point A/9 (A/7) to minimum

- with L464 (L465). The attenuation of the 19 kHz signal should be at least 30 dB (≤ 25 mV).
- Set the LF generator to 38 kHz at the same input voltage.
The attenuation of the 38 kHz signal should be at least 25 dB relative to 775 mV (≤ 43.5 mV).

10. Adjusting the recording correction filter

- Set the recorder to "Recording" with an arbitrary cassette.

- Disable the bias oscillator by connecting point 8 of oscillator unit U408 to earth.
- Apply a 315 Hz signal to point 3/2 (5/2) of BU8 so that 0.245 mV is obtained on test point B/1 (B/2).
- Set the LF generator to 20 kHz at the same input voltage.
- With L456 (L457) on recording unit U406 adjust the voltage on test point B/1 (B/2) to 1.55 mV (i.e. +16 dB relative to the 315 Hz signal).
- Disconnect the bias oscillator from earth.

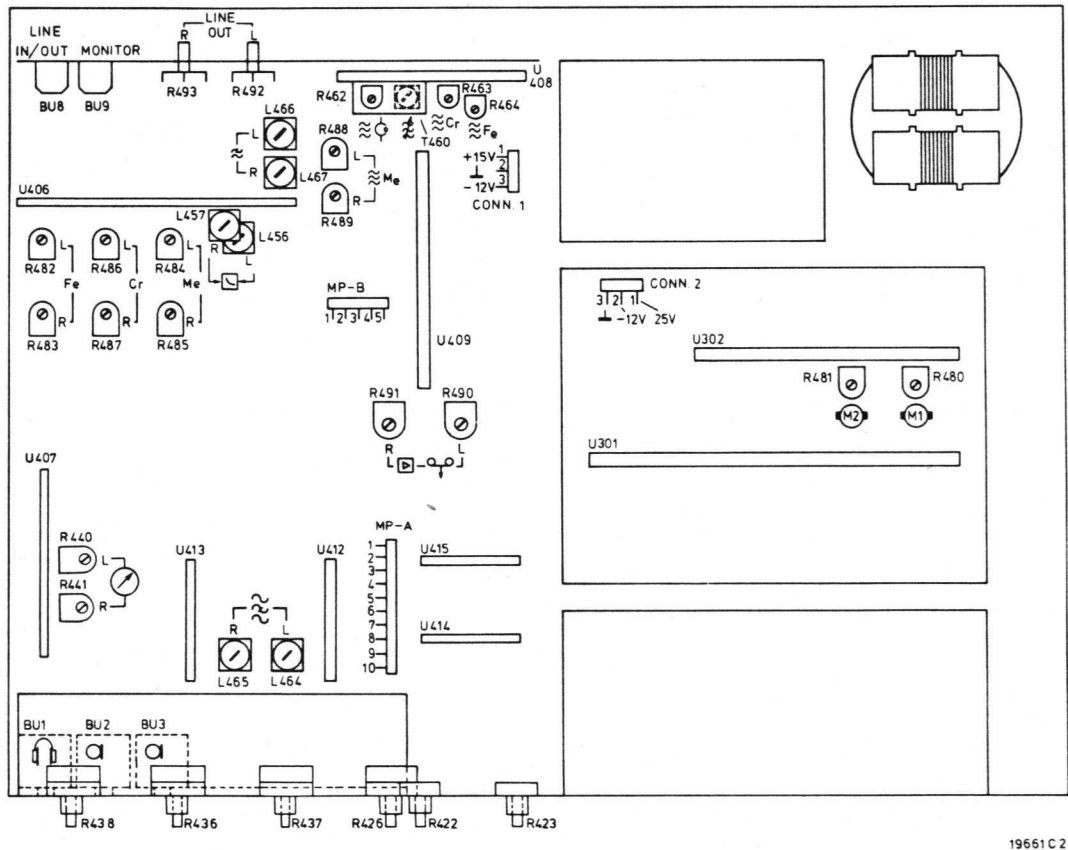


Fig. 10

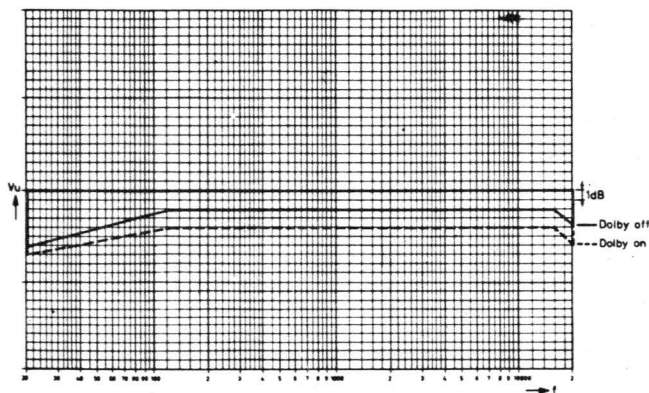


Fig. 11

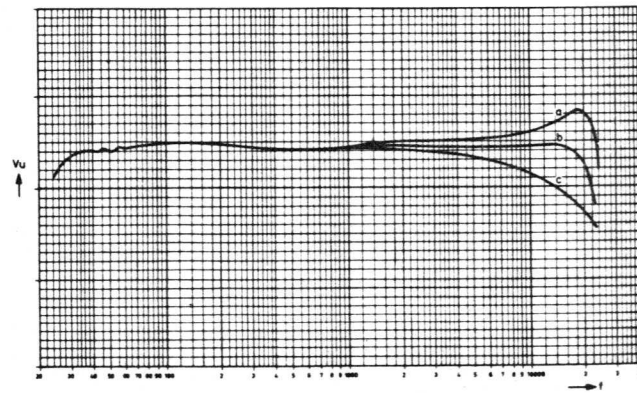
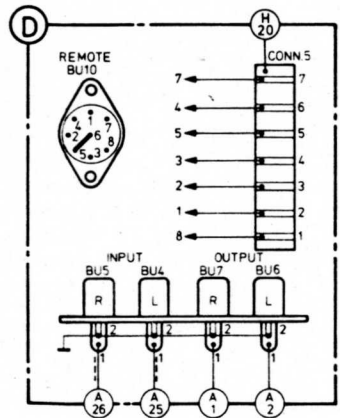
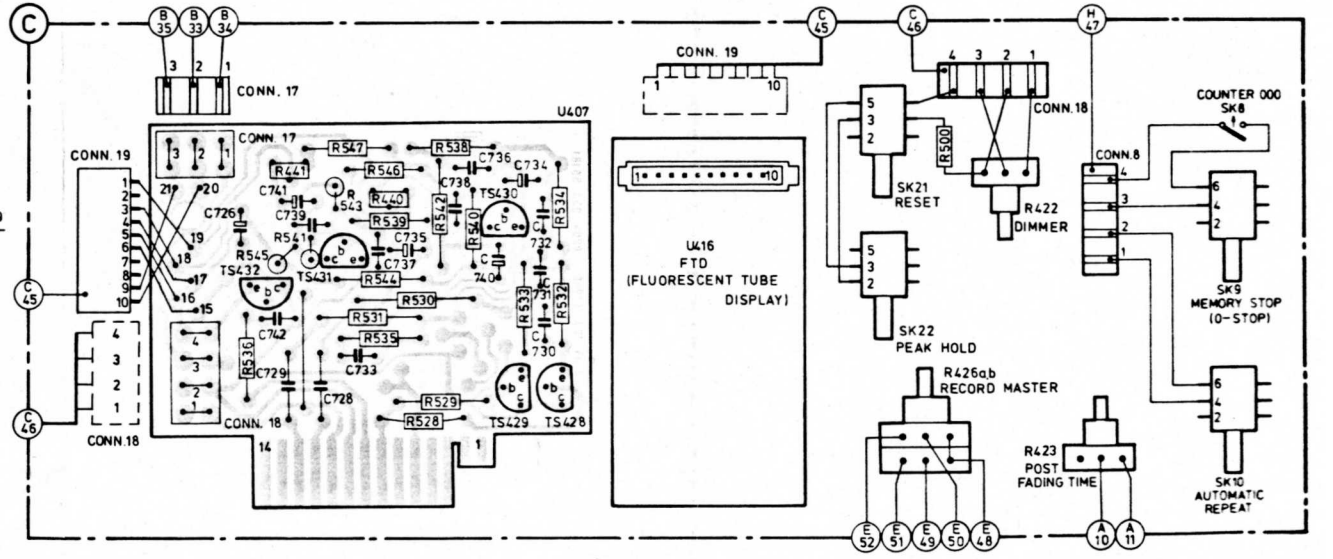
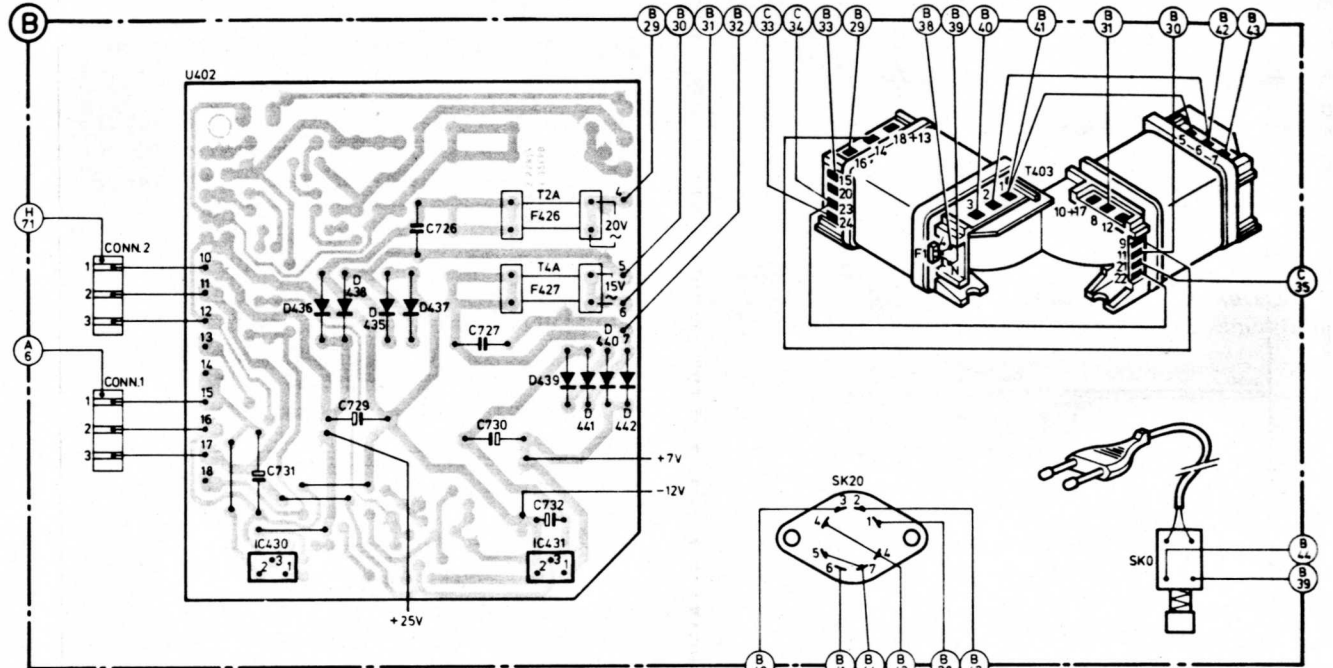
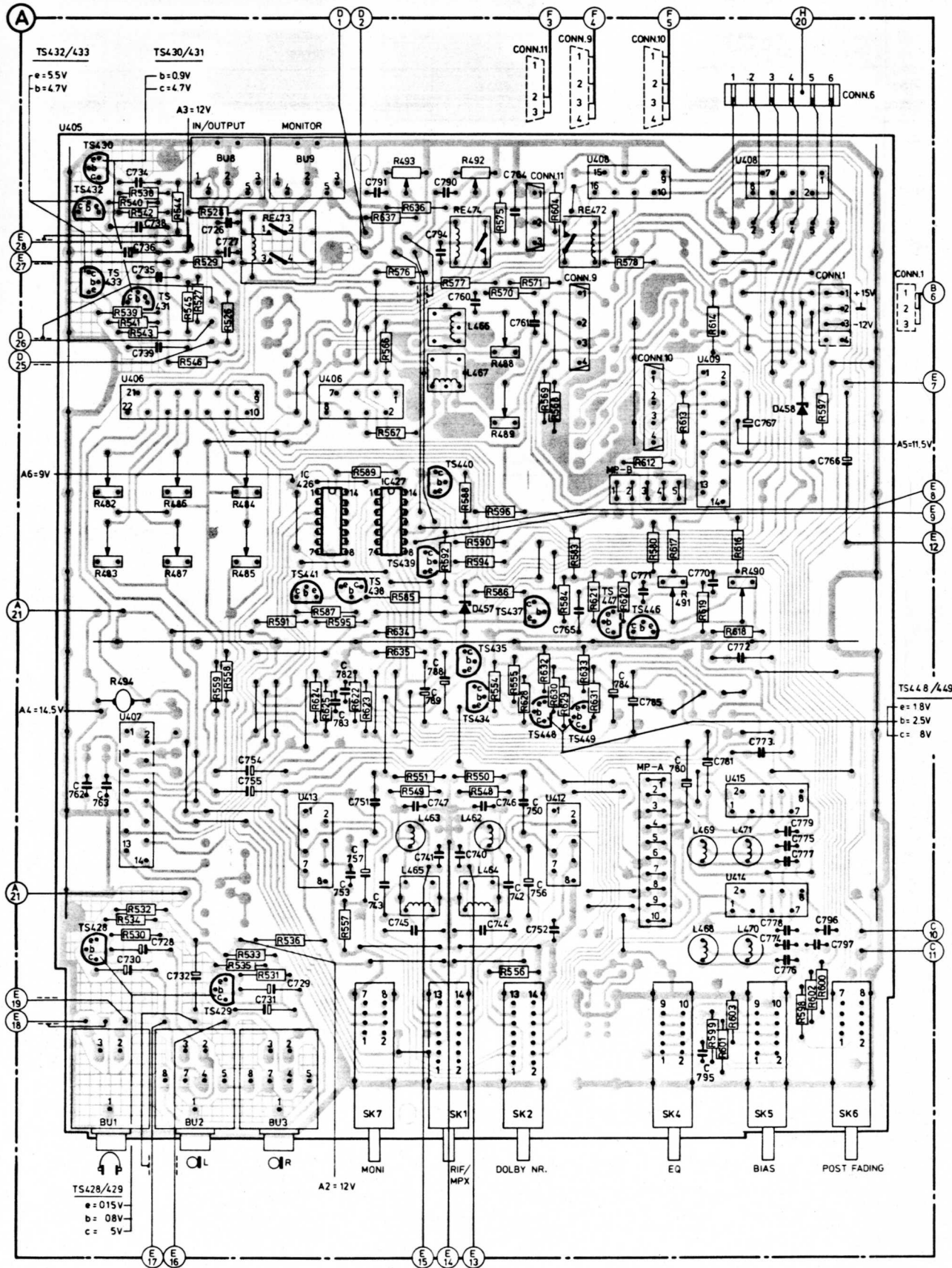


Fig. 12

SUMMARY OF THE ELETRICAL ADJUSTMENTS

Adjustment	Cassette	Recorder in position	Apply signal to	Measure on	Read on	Adjust with	Adjust to	
Playback speed	3150 Hz of SBC 126 Cr	PLAY	—	Line out	Wow and flutter meter	R480 (on U302)	—	
Winding speed	No cassette !!	WIND	—	Conn.12/6	Frequency counter	R481 (on U302)	50 Hz	
Method 1 Playback sensitivity + Indicators	315 Hz - 0 dB of SBC 126 Cr	PLAY	—	A/4 (A/2)	AC-millivoltmeter	R490 (R491)	650 mV	
		PLAY	—	—	FTD, U416	R440 (R441) on U407	+ 1 dB	
Method 2 Playback sensitivity + Indicators	Arbitrary cassette	STOP	315 Hz, 205 mV via 22 k to B/3 (B/4)	A/4 (A/2)	AC-millivoltmeter	R490 (R491)	580 mV	
				—	FTD, U416	R440 (R441) on U407	0 dB	
Target value BIAS	Arbitrary cassette	REC	—	B/1 (B/2)	AC-millivoltmeter	R488 (R489)	9 mV	
Recording sensitivity Cr-tape	Reference tape	REC+PLAY	315 Hz to BU8-3/2 (5/2)	A/9 (A/7)	AC-millivoltmeter	LF generator	290 mV	
	SBC 126 Cr	SK7-TAPE	—	A/4 (A/2)	AC-millivoltmeter	R486 (R487)	290 mV	
Recording sensitivity Me-tape	Metal-tape	SK5 - Me REC+PLAY	315 Hz to BU8-3/2 (5/2)	A/9 (A/7)	AC-millivoltmeter	LF generator	290 mV	
		SK7-TAPE	—	A/4 (A/2)	AC-millivoltmeter	R484 (R485)	290 mV	
Recording sensitivity Fe tape	Reference tape	SK5-Fe SK4-120 μ s REC+PLAY	315 Hz to BU8-3/2 (5/2)	A/9 (A/7)	AC-millivoltmeter	LF generator	290 mV	
		SK7-TAPE	—	A/4 (A/2)	AC-millivoltmeter	R482 (R483)	290 mV	
Erase current	Metal-tape	SK5-Me SK7-TAPE REC+PLAY	—	R604	AC-millivoltmeter	R462 on U408	60 mV	
BIAS (coarse adjustment)	Metal-tape	SK5-Me SK7-TAPE	315 Hz to BU8-3/2 (5/2)	A/4 (A/2)	AC-millivoltmeter	LF generator	29 mV	
		REC+PLAY	14 kHz to BU8-3/2 (5/2) (same input voltage)	A/4 (A/2)	AC-millivoltmeter	R488 (R489)	29 mV	
BIAS (Fine adjustment)	Metal tape	SK5-Me SK7-TAPE REC+PLAY	315 Hz to BU8-3/2 (5/2)	A/4 (A/2)	AC-millivoltmeter	LF generator	29 mV	
			40 Hz - 6.3 kHz 16 kHz-18 kHz 20 kHz BU8-3/2 (5/2) (same input voltage)	Record a number of frequencies				
			Rewind recording made	PLAY	—	A/4 (A/2)	AC-millivoltmeter	R488 (R489)
Erase frequency	Arbitrary cassette	REC	—	R604	Frequency counter	T460 on U408	100 kHz	
19/38 kHz Pilot tone suppression	Arbitrary cassette	REC	315 Hz to BU8-3/2 (5/2)	A/9 (A/7)	AC-millivoltmeter	LF generator	775 mV	
			19 kHz to BU8-3/2 (5/2)	A/9 (A/7)	AC-millivoltmeter	L464 (L465)	\leq 25 mV	
			38 kHz to BU8-3/2 (5/2)	A/9 (A/7)	AC-millivoltmeter	—	\leq 43,5 mV	

MISC	TS428+433.BU1	BU2	BU3.BU4.RE473	BU9	IC426.TS438-44	IC427.SK7.D457	TS434.435.437	RE474	TS446-448	RE472	SK1-2	MP-B	MP-A	SK4	SK5	D458	SK6	MISC	BU10	BU4-7	IC430	D435-438	IC431	F426	F427	D439+442	SK20	SK21	SK22	F.1	T403	SK0	SK0-10											
L					465.463.467.466.464.462	753.757.751	740-747.760.750.756.752.764.761.765	771	770	767.772-779	766								MISC	TS432	TS431	TS428	L29.430	IC426	IC427	TS429	TS428	TS430.431				TS433	432											
C726-779	762.763.	736.734+736.739	726+732.755.754																C726-732			731	729	726	727.730	732																		
C780-797				783.782		788+791.794		784	785	780.795	781								(C)	C725-745			726	729	741.742	739	728																	
R432-571	494	538+546	482+487	526+536	558.559	557	567.566	493	492	548+551	555	489.488	554	556	568+571	491	490		(E)	R422-550			536	541	441	543	+547	440	535	528	+531	538	-540	542	532	-534	500	426	422	423				
R575-603					591	587	595	589	585	592	572	+575	588	590	594	596	586	584	583				742	743	741	740	736	-739	750a	746	745b	744	731	726	727	730			728	729	735	734	733	732
R604-637					622-625	634-637				604	626	-633	621	620	612	-614	616	-619					553	552	549	548	438	550	542	-547	551	554	436	526	-533	535	437	534	541	536	-540			



MSC	K3	SK11,D426,K1,K101,D402,K2,K102	D427,SK12	D428,SK13	SK14,D429,TS426,D428,M1,D430,RE476,SK15	SK16,D431	SK17,RE475,M2	SK18
C	826				926			
R								

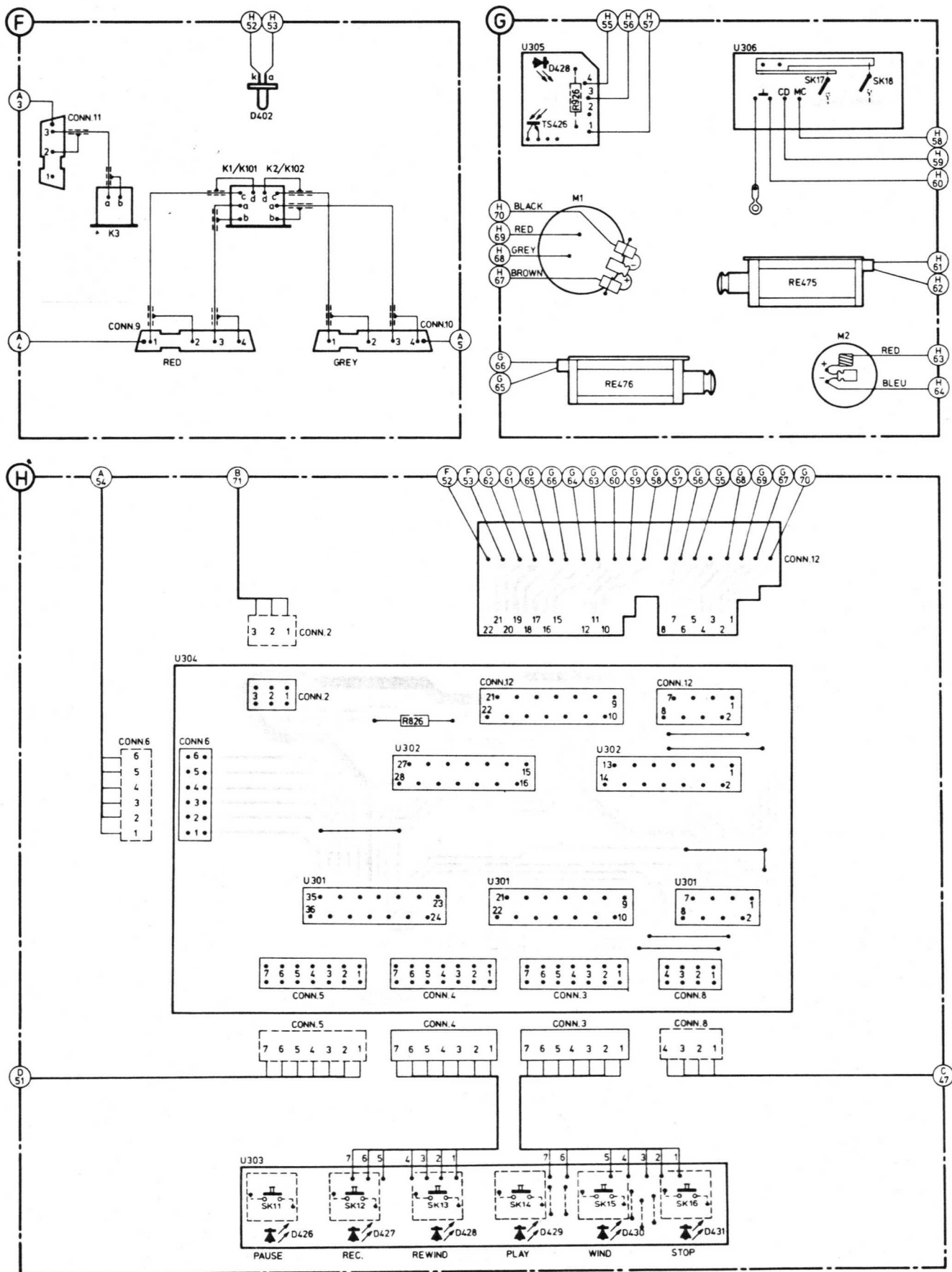


Fig. 14

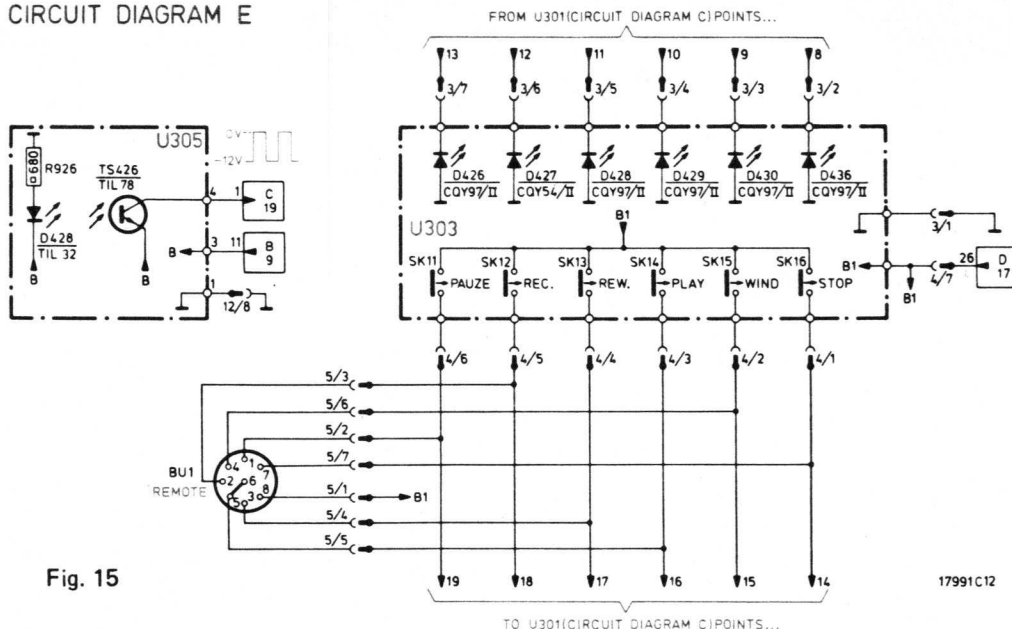


Fig. 15

CIRCUIT DIAGRAM B

MISC	SK0	SK20	F1	T403	F426 F427	D435-442	IC430, 431	SK10, D402	MISC
C					726 727	729 730	731 732		C

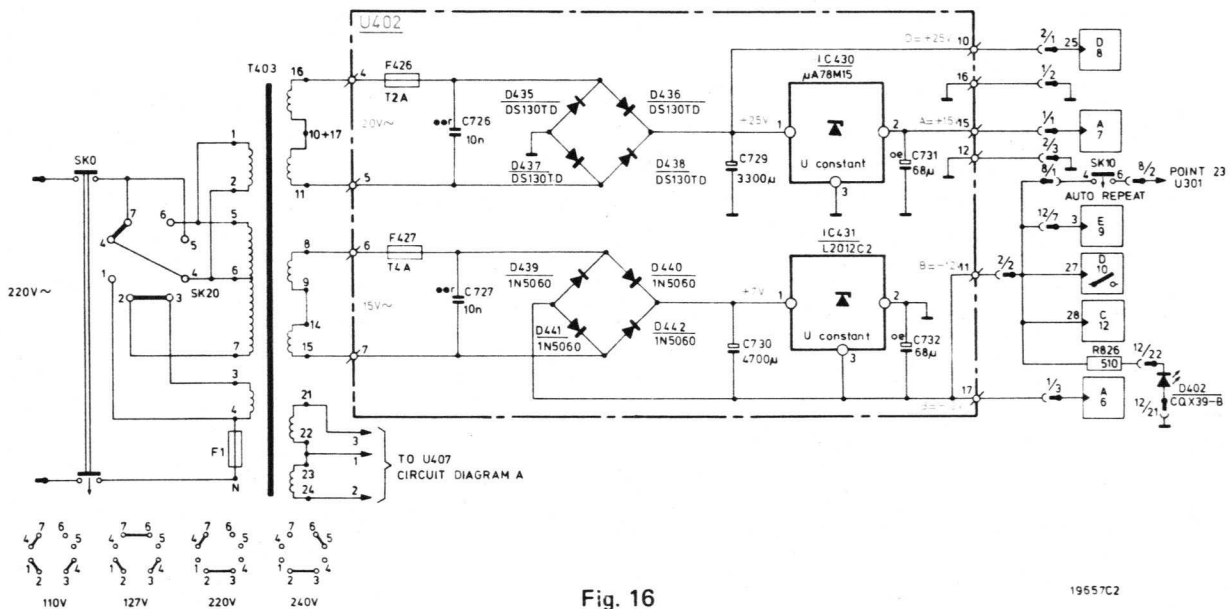


Fig. 16

MISC	D439-442, IC431, F426, F427	D435-438	IC430
C	732 730, 727	726 729	731

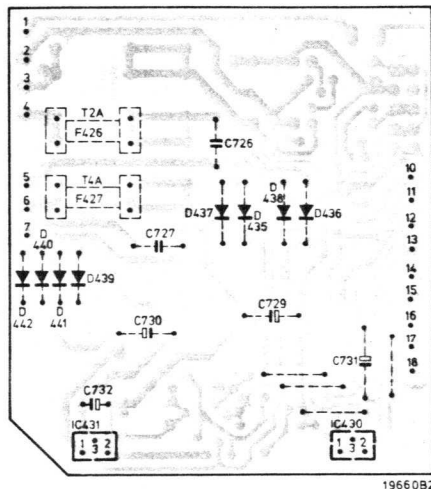
















Fig. 17

	μ A78M15 L2012C2	4822 209 80523 4822 209 80535
	DS130TD 1N5060	4822 130 31161 4822 130 31164
	C729 C730	3300 μ F - 35 V 4822 124 20798 4700 μ F - 25 V 4822 124 20791
	Spring clip Jig Mica	4822 492 40819 4822 403 51043 4822 255 40138

U405 MAINBOARD

		
MC14016BCP		5322 209 14119
		
BC337/16		4822 130 41095
BC548A		4822 130 40948
BC548B		4822 130 40937
BC549C		4822 130 44246
BC550C		4822 130 41096
BC558B		4822 130 44197
		
BZX79/C9V1		4822 130 30862
BZX79/C5V1		5322 130 34233
		
L462,463,468	36 mH	4822 156 20811
L469,470,471	36 mH	4822 156 20811
L464,465	23 mH	4822 156 20821
		
RE472,472		4822 280 20076
RE473		4822 280 20075
		
R484,485	10K	4822 100 10035
R486,487, 490,491	10K	4822 100 10035
R482,483	4K7	4822 100 10036
R488,489	47K	4822 101 14048
R492,493	4K7	4822 100 10186
		
C742,743	2n7 - 1 %	5322 121 54065
C744,745	4n7 - 1 %	4822 121 50539
C764	560p	4822 121 50576
		
SK1,2	2x4	4822 277 10485
SK7	2x2	4822 277 10483
SK4,5	3x2	4822 277 10484
SK6	1x2	4822 277 10486
		
BU1		4822 267 30287
BU2,3		4822 267 30277
BU4÷7		4822 267 20168
BU8,9		4822 267 40325
BU10		4822 267 54072
Conn. 8 f for U406,408, 412,413,414,415		4822 290 60213
Conn. 14 f for U406,407,409		4822 290 60211
Conn. 1, MP.A, MP.B		4822 267 40342
Conn. 9,10		4822 265 30119
Conn. 11		4822 265 30121
		
U412/414	DOLBY	4822 214 30436
U413/415	DOLBY	4822 214 30436

U402 POWER SUPPLY

		
μA78M15		4822 209 80523
L2012C2		4822 209 80535
		
DS130TD		4822 130 31161
1N5060		4822 130 31164
		
C729	3300 μF - 35 V	4822 124 20798
C730	4700 μF - 25 V	4822 124 20791
		
Spring clip		4822 492 40819
Jig		4822 403 51043
Mica		4822 255 40138







U407 INDICATOR AMPL.

For electrical parts see page 29

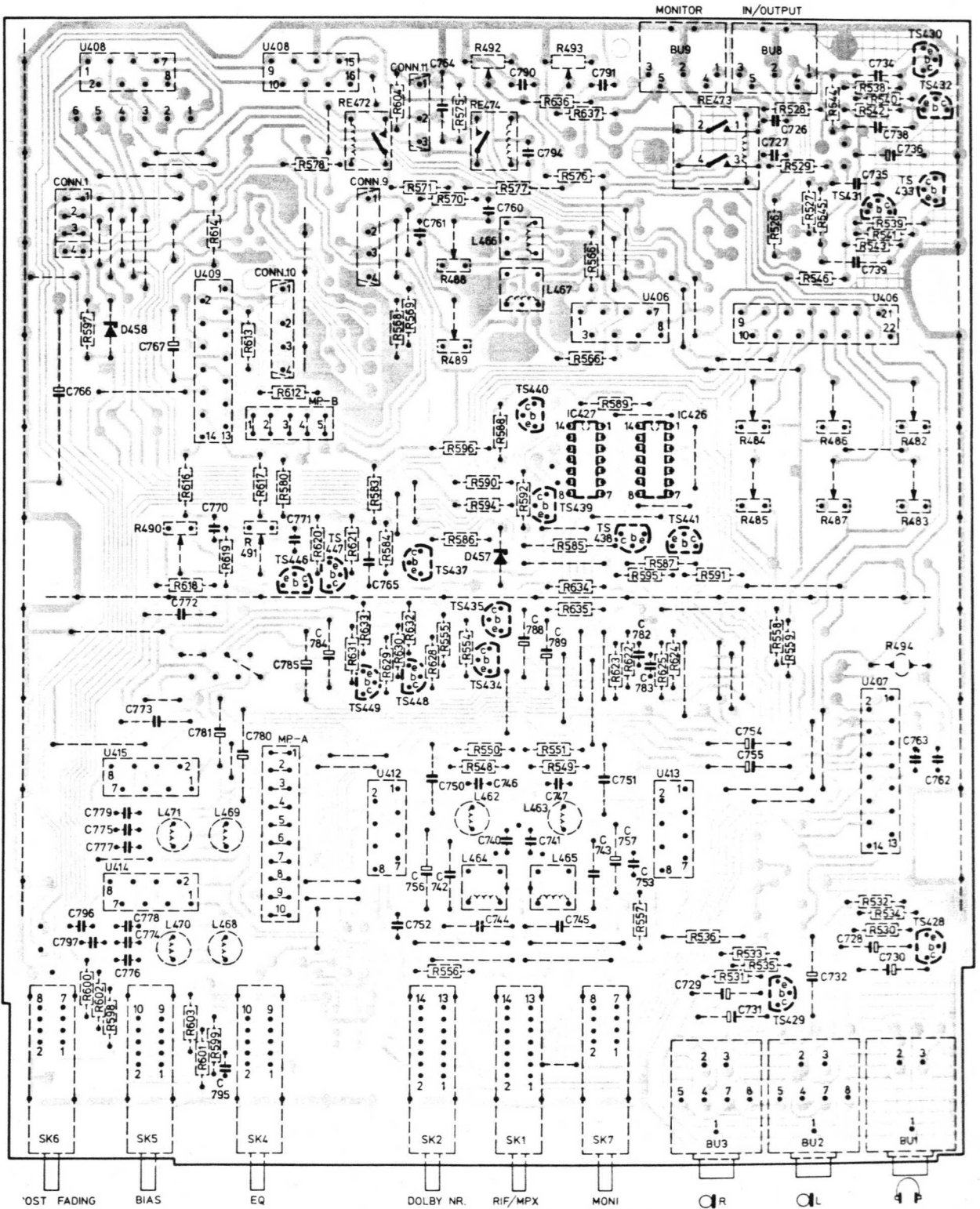
U410 MIXING/HEADPHONE AMPL.

For electrical parts see page 32

DIV.

		
SK0		4822 276 10641
SK9-10		4822 276 10731
SK11,12,13,14,15,16		4822 276 10717
Cap. for SK11÷16		4822 410 90047
SK20		4822 272 10079
SK21,22		4822 276 20262
		
U303		4822 214 30435
U305		4822 214 30415
U306		4822 290 80353
		
M1		4822 361 20157
M2		4822 361 30108
		
R422	4K7	4822 101 20565
R423	1M	4822 101 20564
R426 a/b	50K	4822 102 30323
		
D402	CQX39-B	4822 130 31194
D427	CQY54/II	4822 130 31128
D426,428,429	CQY97/II	4822 130 31146
D430,431	CQY97/II	4822 130 31146
		
FTD-U416		4822 130 90035
T403		4822 146 20588
F1	250 mA/125°	4822 252 20007
RE475,476		4822 281 50056
K1/101,K2/102		4822 249 10108
K3		4822 249 40094

MISC	SK6	D458.SK5	MP-A.MP-B.TS446-448.RE472KS1-4.RE474.TS437.435.434.D457SK7.IC427.TS438-441.IC426.BU9.RE473.BU8.3	BU2	TS428-433.BU1
L		470.471.468.469		462.464.466.467.463.465	
C726-779	766 772-779.767	770	771	765.761.764.752.756.750.760.740-747.	751.757.753
C780-797	797.796	781.795.780	784 785		794.788-791
R432-571		490	491	568-571.556.554.488.489.555.548-551.492	493.566.567
R575-603		597-603		580.578	583.584
R604-637		616-619.612-614		586.596.594.590.588.572-575.592	585
				634-637	622-625



CIRCUIT DIAGRAM A

MISC	BU2	BU4, BU8	TS428-TS433	TS446, TS447	TS434, TS435	TS448, TS449	TS437, TS438	TS440, TS441, BU6, BU1, BU7	TS439	D457, D458	MISC										
L	BU3	BU5	726-731	734, 735	738, 739	L468-L471	L462-L465	IC427a, b	IC426c, d	IC426a, b	SK6	RE472, RE473, RE474	L466, L467								
C	700-760	761-799	726-731	734, 735	738, 739	770, 771	772, 773	774-779	780, 781	500, 548-551, 422	482-487	790, 791	492, 493	R438a, b, 423	795-797	794	764, 765	494	536, 488, 489, 546	400-551	
R	552-650	612, 613	526-535	538-545	436a, b, 437a, b, 490, 491	426a, b	616-621	622, 623	554, 555	556, 557	624, 625	558, 559	628-635	636, 637	583-591	595	592, 594	598-603	576-578, 580, 566, 567, 575	596, 597, 614, 568-571, 604	552-650

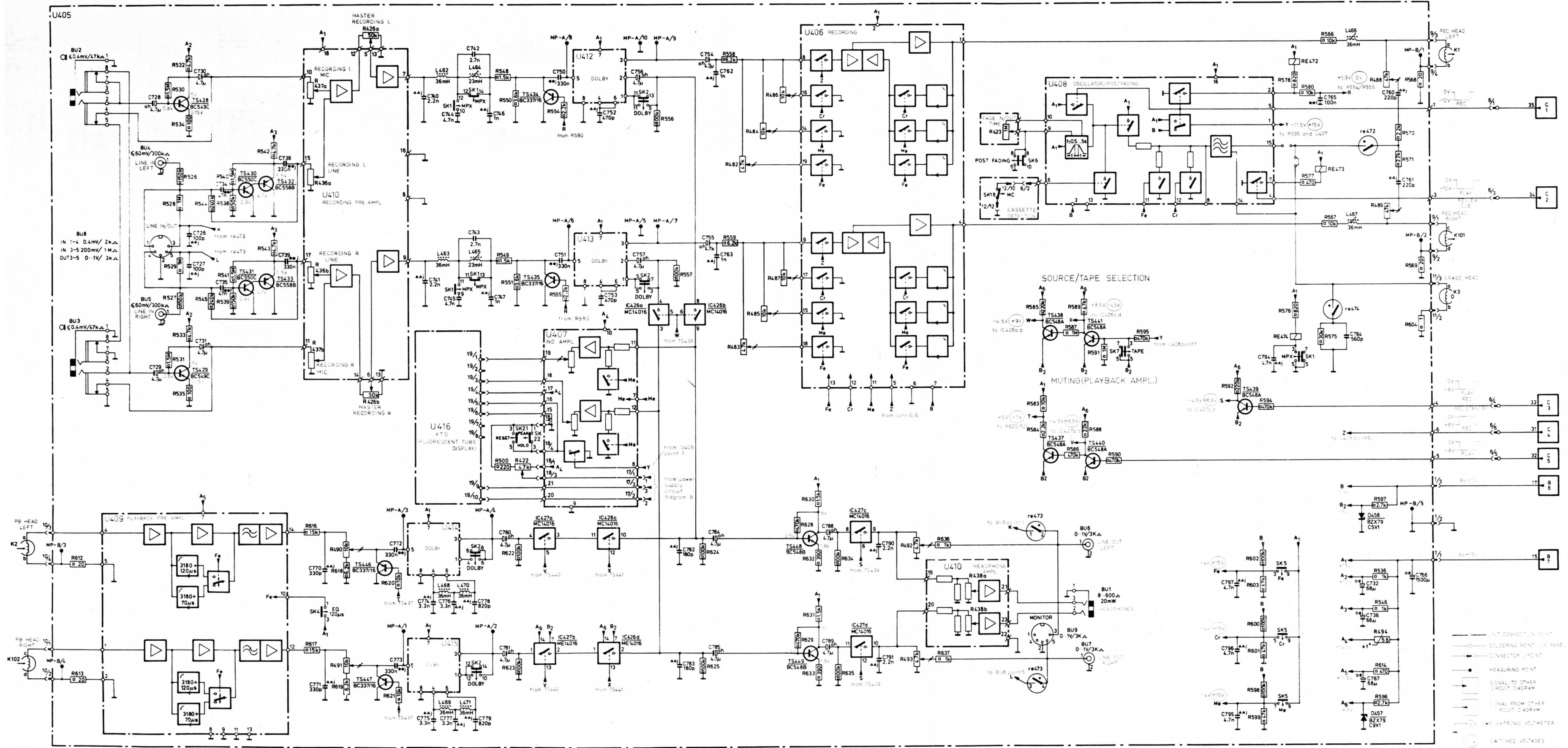


Fig 19

CIRCUIT DIAGRAM C

MISC.	D445	D446	D447	D460	D448	D449	D450, D452	D451	TS471, D453	D454	D455-457, TS467-470, D458, 459	D426-431	MISC.																
IC	426a	438a,b,c	439c	427a	440c	428b	440b	437b	428d	433a,b	429a	428c	IC																
IC	434a, 439d	436c,d	436b	426b,c	426d	428a	437c	439a,b	434b	437a	431b	431d	435a,d, 429b	434c,d	435b,c	429c, 429d	432b,c	433c,d	430b	432a	430a	437d	436a	430c	432d	431c	440a,d	431a	IC
R	526-540	582	541	581	543	542	544	545	571	576	547	546	574	549	550	548	551	552, 553	554	580	575, 579	555, 556-558	557, 578, 572, 573	566-570	559-565	R			
C	747	727-729, 726, 730	735	736	737	737	737	737	737	737	737	737	737	737	737	737	737	737	741	741	749	743	742	745	C				
C	746	748	732-734	731	731	731	731	731	731	731	731	731	731	731	731	731	731	731	741	741	749	743	742	745	C				

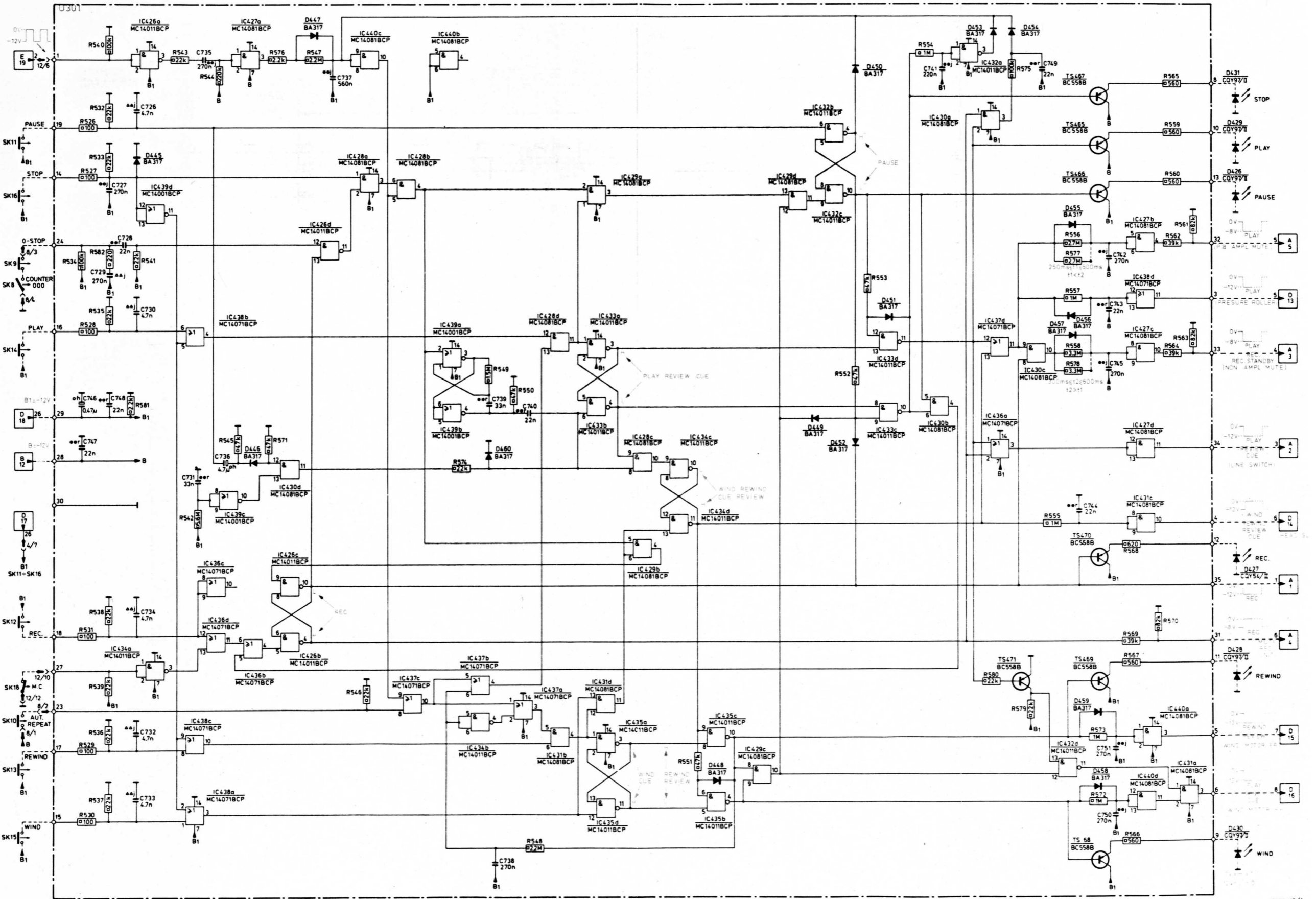


Fig. 20

MISC	D455,IC437	D459,456,448,IC436	D458	IC429	IC432	D450,453,454,TS471,IC428,D460	D457,IC426,430				
MISC	IC434,439	IC435	TS465-470,IC440,D445	IC431	IC438	D446,447,IC433,D449,452,454,IC427					
C	739,742,740	738	743	751	727,750	733	730	732,744,741,734,726,731,736	728,749,746,729,737	745,735	747,748
R526-560	539,556,540,546,548-551,559,557,560					526-533,535-538	555,554,542,541,545			552,553,534,547,544,543,558	
R561-581	577		573	565-568	572	581		579	571,575	570,580,561-564,574,576,569,578	

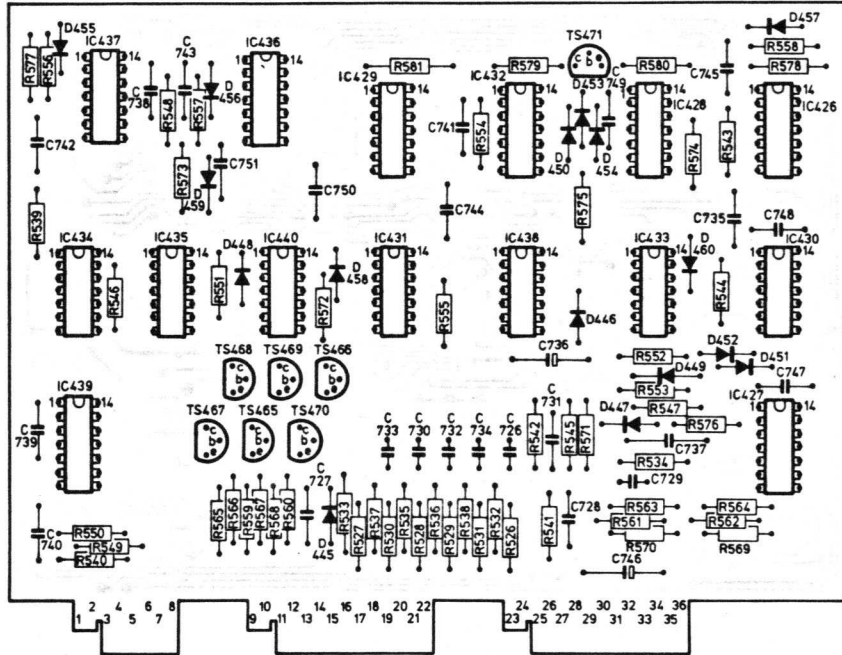


Fig. 21

17326C12

MISC	IC430,426,D457	D460,IC428,TS471,D454,453,450	IC432	IC429	D458	IC436,D448,456,459	IC437,D455			
MISC	IC427,D451,452,449,IC433,D447,446		IC438	IC431	D445,IC440,TS465-470	IC435	IC439,434			
C	748,747	735,745	737,729,746,749,728,736,731,726,734,741,744,732	730	733	750,727	751	743	738	740,742,739
R526-560	558,543,544,547,534,553,552		545,541,542,554,555,535-538,526-533				560,557,559,548-551,546,540,556,539			
R561-581	578,569,576,574,561-564,580,570		575,571	579	581	572	565-568	573		577

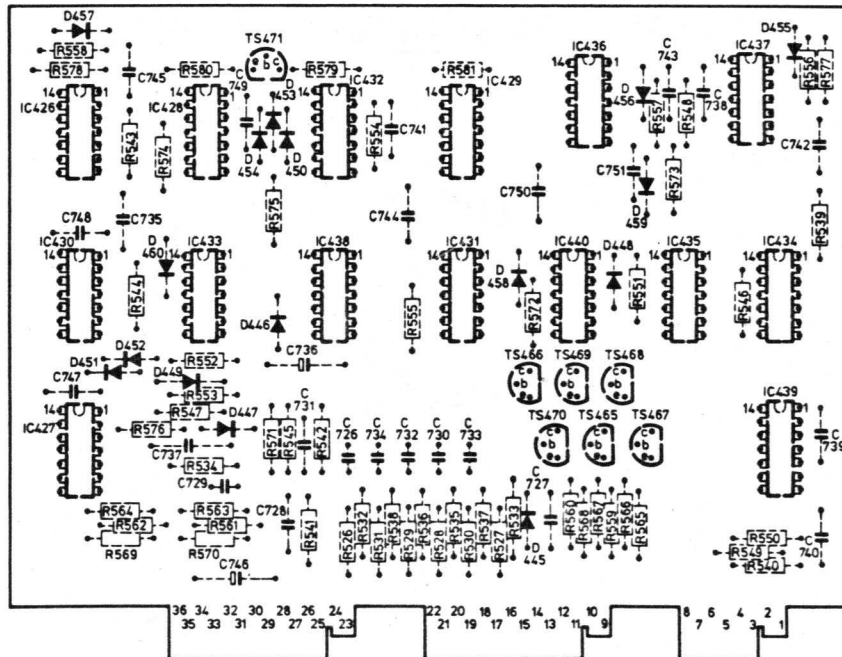




Fig. 22

17332C12

IC	
MC14001BCP	5322 209 14045
MC14011BCP	5322 209 14046
MC14071BCP	4822 209 10054
MC14081BCP	4822 209 10053

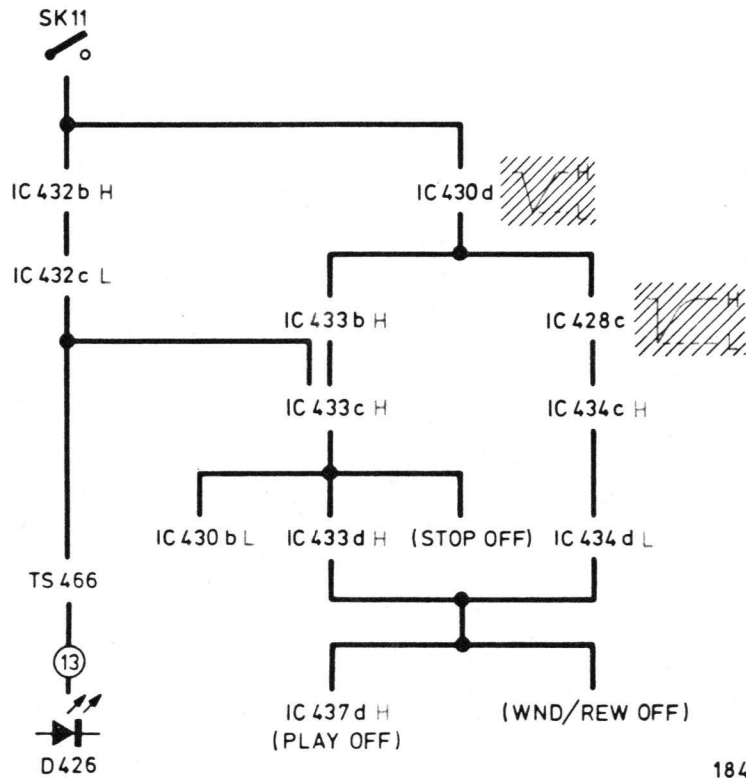
	BC558B	4822 130 44197
	BA317	4822 130 30847

FLOW CHARTS

- L = LOW STATE (-12V)
- H = HIGH STATE (0V)
-  = PRESSED IN SWITCH : LOW STATE RELEASED SWITCH : HIGH STATE
-  = WITH DELAY IN LOW STATE
- ⑤ UNIT CONNECTIONPOINT

IC4.. a = PIN 3 OF IC4..
 IC4.. b = PIN 4 OF IC4..
 IC4.. c = PIN10 OF IC4..
 IC4.. d = PIN11 OF IC4..

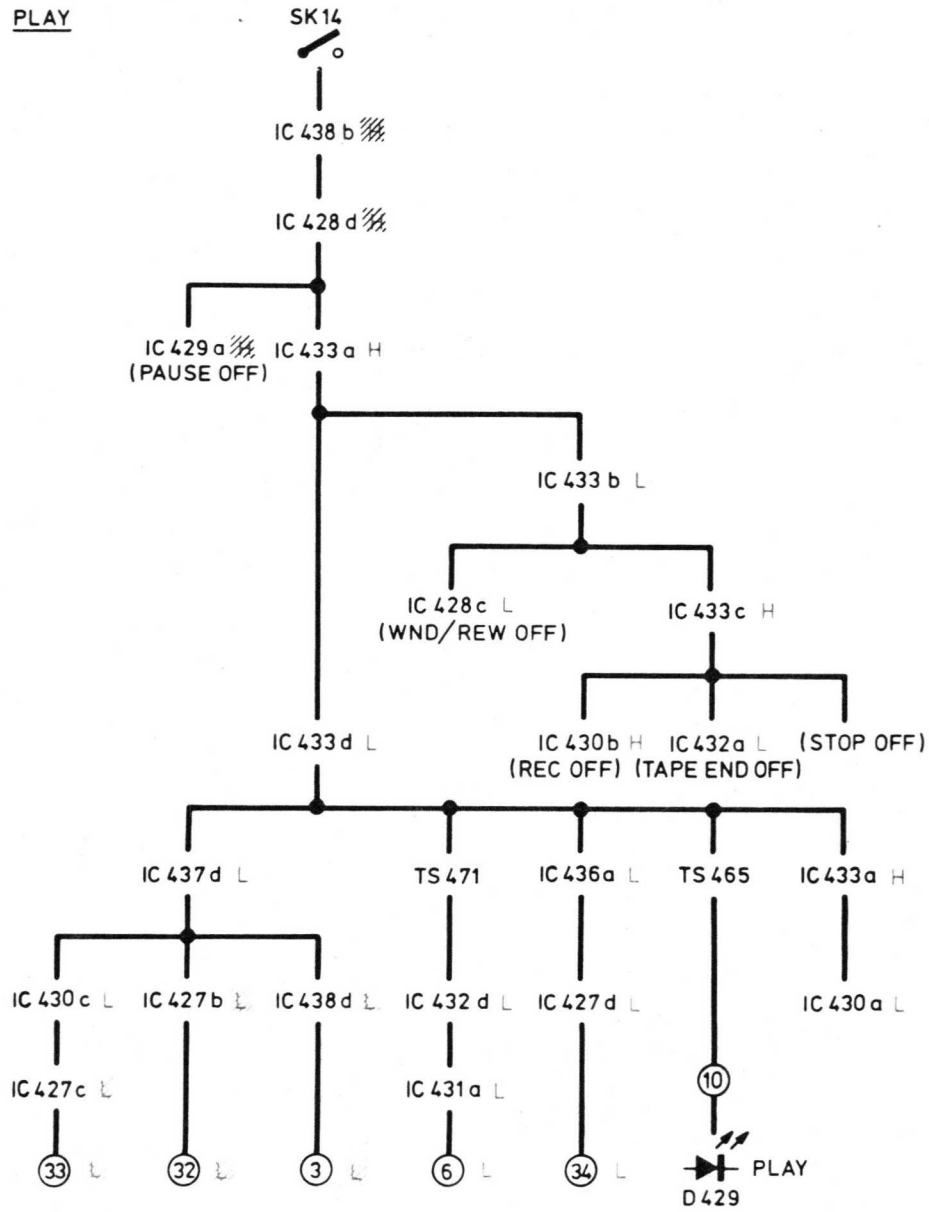
PAUSE



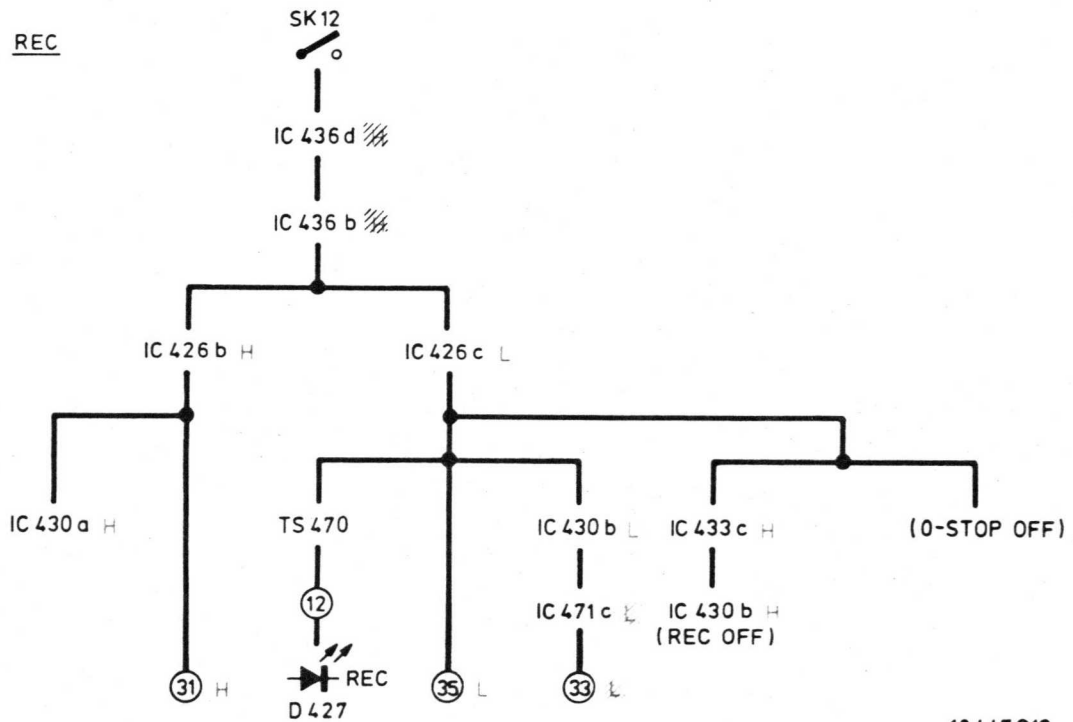
18446B12

Measuring instrument: $R_i \geq 10 \text{ M}\Omega$

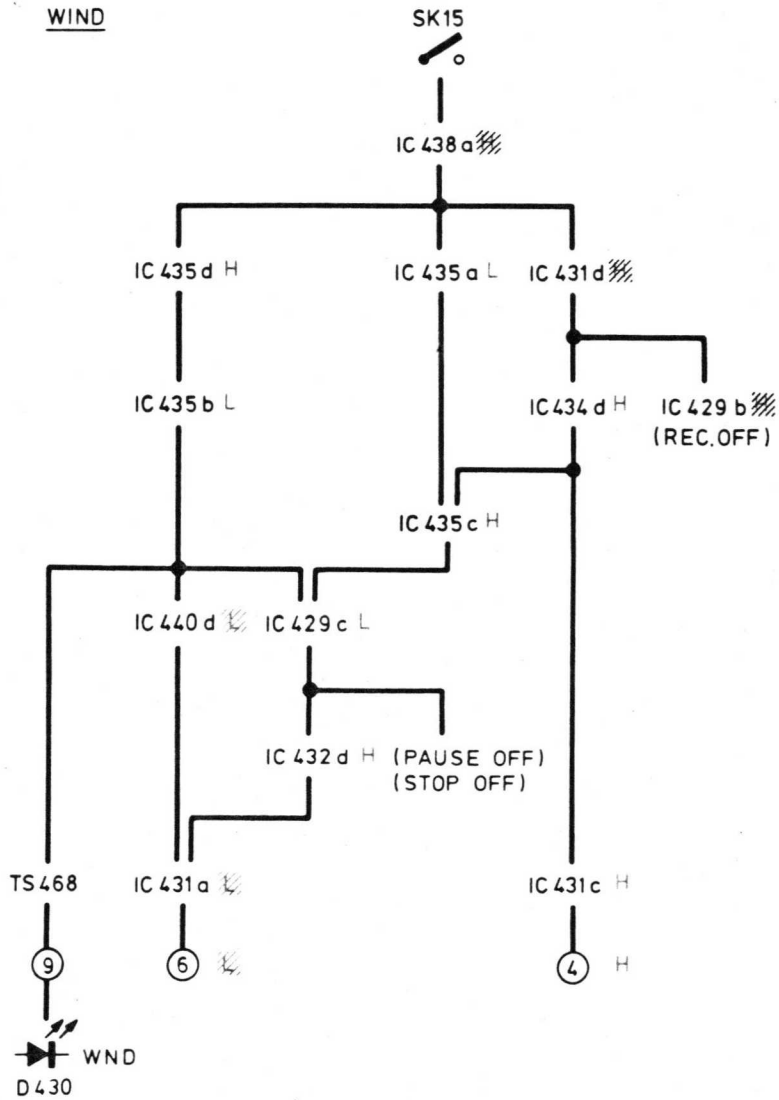
PLAY



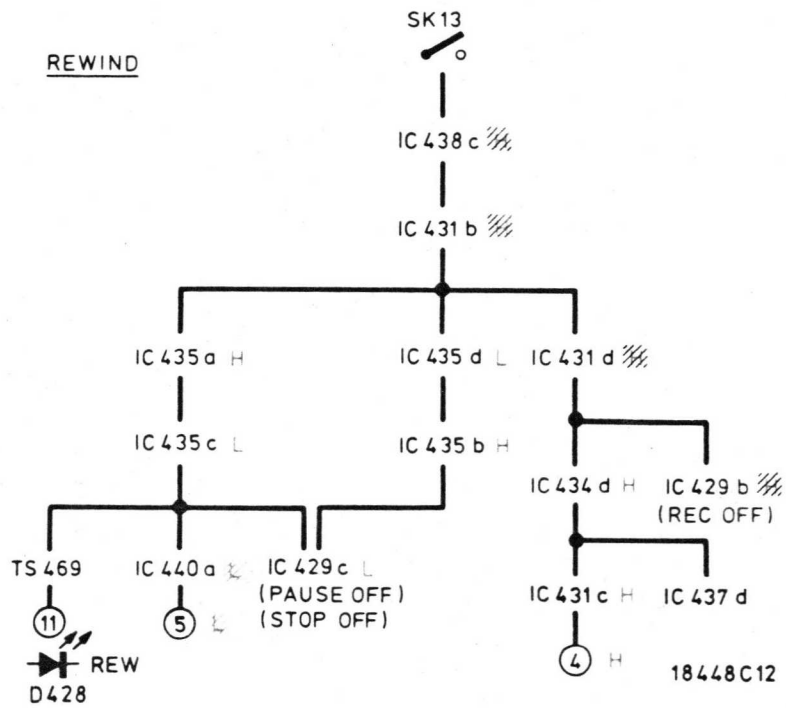
REC



WIND

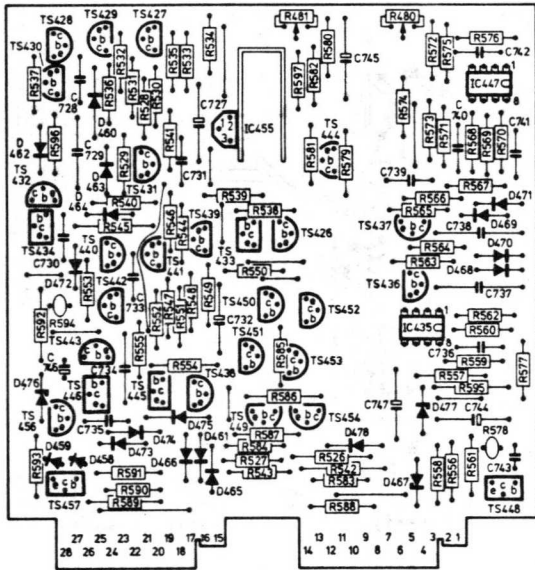


REWIND



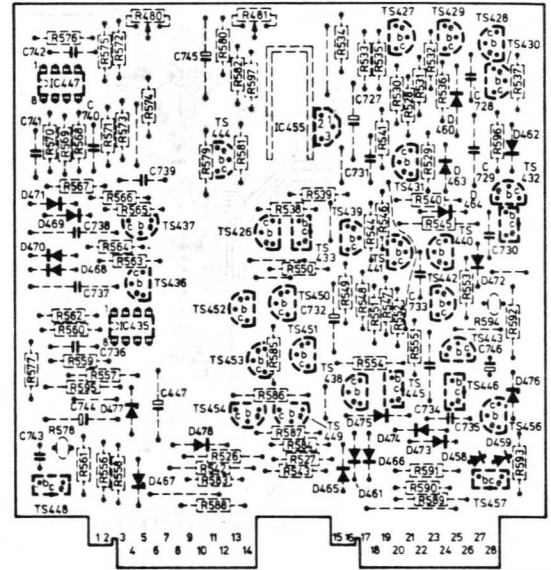
MISC	D462	TS427-432	D460	464	463	TS433	IC455	TS444	IC447	D468-471				
MISC	D476	TS434	D472	TS443	446	438-442	445	450-453	426	TS437	436	IC435		
MISC	TS456	D459	458	TS457	D473-475	D466	461	465	TS449	454	D478	D467	477	TS448
C	728-730	735	746	733	731	727	732	734	745	747	736-744			
R480-541	537	538	540	528-535	541	539	527	538	481	526	480			
R542-578		553	555	552	544-549	551	550	543	542	563-576	556-562			
R577-596	592-594	596	589-591		583-588	579-582	597		595	578	577			

MISC	D468-471	IC447	TS444	IC455	TS433	D463	464	460	TS427-432	D462				
MISC	IC435	TS436	437	426	450-453	445	438-442	446	443	D472	TS434	D476		
MISC	TS448	D467	477	478	TS454	449	D465	461	466	473-475	TS457	D458	459	TS456
C	736-744	747	745	526	481	538	527	539	541	528-535	540	536	537	
R480-541		480		542	543	550	551	544-549	552	553-555				
R542-578	556-562	563-576		542	543	550	551	544-549	552	553-555				
R577-596	577	578	595	597	579-582	583-588		589-591	596	592-594				



17328C12

Fig. 23



17334C12

Fig. 24

BC547B	4822 130 40959	R480	10K 4822 100 10024
BC548B	4822 130 40937	R481	100E 4822 100 10073
BC548C	4822 130 44196	R563,565	5.1K - 2% 5322 116 54595
BC557B	4822 130 44568	R569	22K - 2% 5322 116 54574
BC558B	4822 130 44197	R573	13K - 2% 5322 116 50522
BC635	5322 130 44349	R578	9.4E - PTC 4822 116 40031
BC636	4822 130 44283	R580	100E - 2% 5322 116 54469
BD135	4822 130 40645	R594	2.3E - PTC 4822 116 40032
LM358N	4822 209 80484	C737,738	22n - 1% 4822 121 50609
TDA1059B	4822 209 80361		
BA317	4822 130 30847	-Div.-	
BAX18A	4822 130 31025	Spring clip	4822 255 40128
BZX79/C4V7	4822 130 34174		
BZX79/C7V5	4822 130 30861		
BZX79/C9V1	4822 130 30862		

CIRCUIT DIAGRAM D

MISC	G	D467	TS426, IC435a, TS427, D460	TS428-430, IC435b, D462, TS431, D463-466, 461, TS436, 432-434, 437, RE476, D468-471	TS438	D472, TS439	TS440-442, IC447a	D473-475, TS443, 445, 446, D478, IC447b, RE475, TS444	TS448-451, R578, IC445	M1.2	TS452-454	D477, TS456, 457, D476, 458, 459, R594
C			727 736 728, 729 730 737, 731 738	739	732 740, 741, 733, 734	735	742	743-745				746, 747
R		556-558, 526, 527	559, 528-531 532-534, 560	561, 535 536, 537	562, 596, 538, 563, 539-541, 564	565	542, 543 566, 544-547, 567, 568, 548-550	569, 551 570, 552, 553 554, 480, 555, 571-575	576	579 577, 580, 583, 584, 581, 582, 585, 597, 481	586 587 588	592, 595 591, 593 589, 590

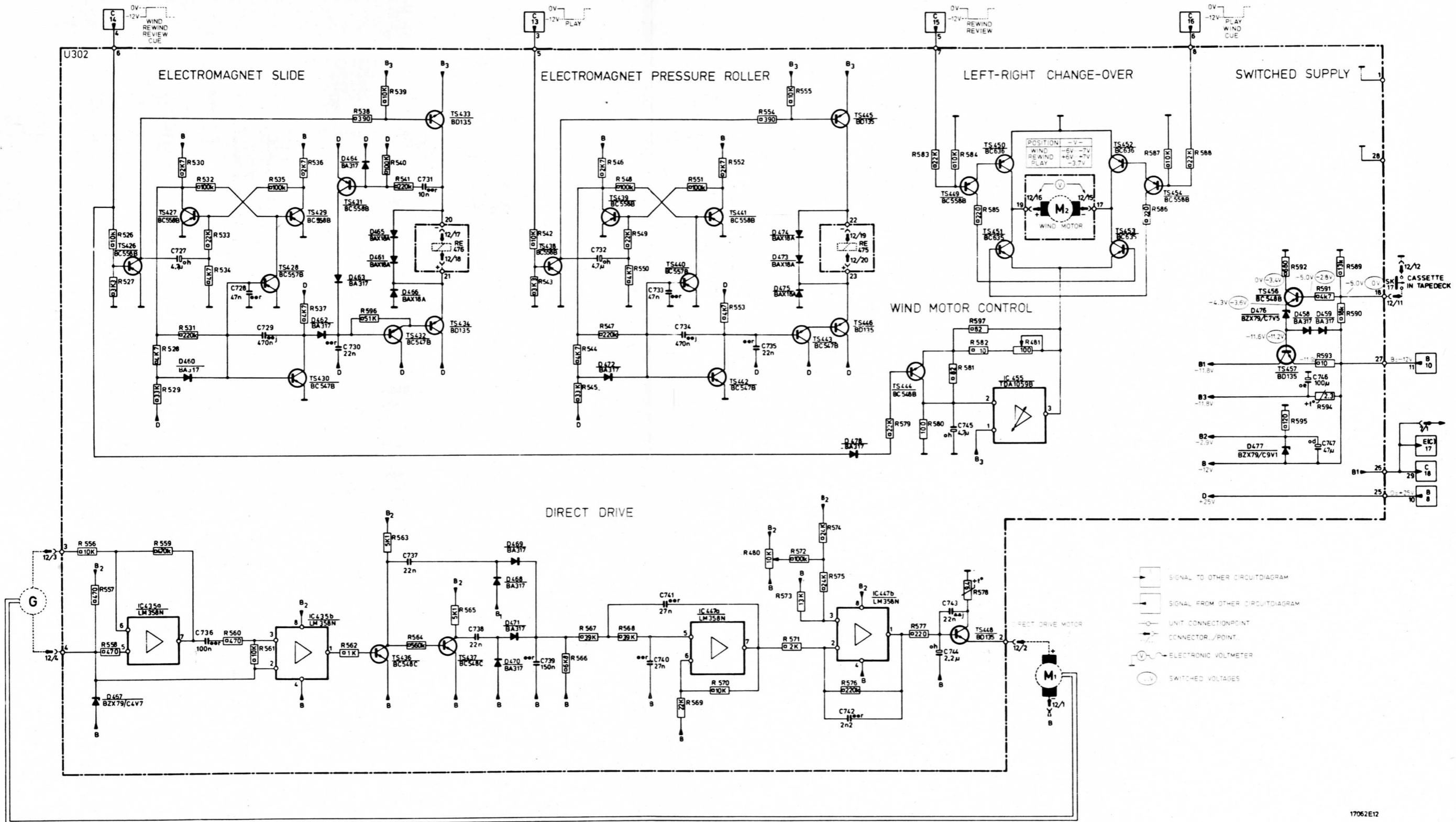


Fig. 25

17062E12

U406

RECORDING AMPLIFIER

MISC	IC426a b TS428+433	IC426c d	TS434 435	TS436+439	TS440 441	TS442 443	L456 457 TS444 445 448 449	TS450 451 446	TS447
C		746 747		726 727	728 729	730 731	732 733	738 739	740 741 743 734 735 736 737 742 744 745
R	526+531	532+539	544 545	540+543	546 547	550+553	554+557	558 559 560 561	562 563 564+567 568 569 586 587 570 571 588 589 572+575 576+579 581+584

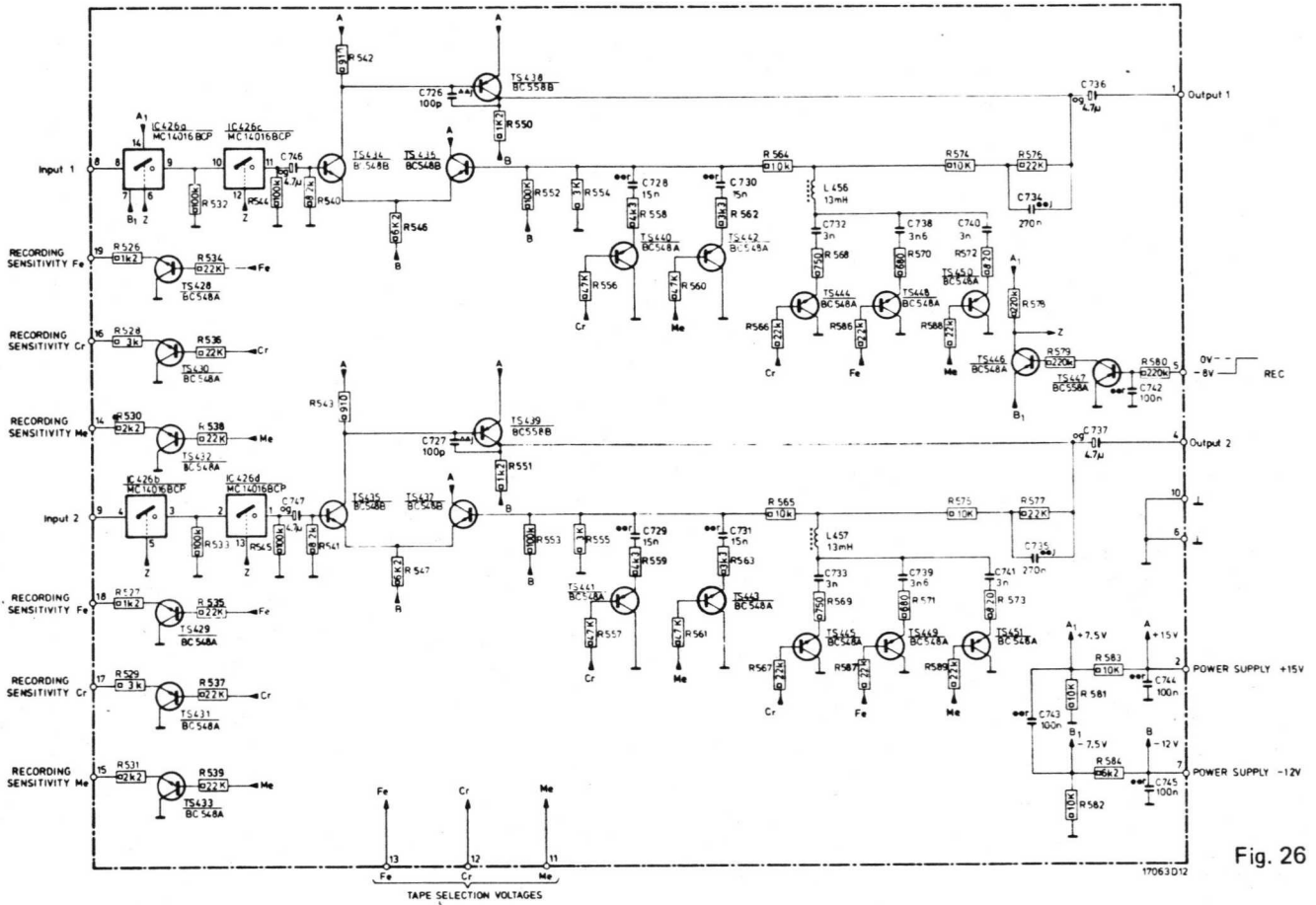


Fig. 26

MISC	TS440-445 448-451	L456 457	TS434-439
MISC	TS428-433	IC426	TS446 447
C		728-733 738-741 745	735 734 747 746 726 727 742-743 736 737
RS26-555	526-531 534-539	532 533 550-555 540-547	
RS56-589	556-563 566-573 586-589 564 565 574-577	578-584	

MISC	TS434-439	L456 457	TS440-445 448-451
MISC	TS446 447	IC426	TS428-433
C		737 736 742-744 727 726 746 747 734 735 745 738-741 728-733	
RS26-555		540-547 550-555 533 532	526-531 534-539
RS56-589		578-584	574-577 565 564 586-589 566-573 556-563

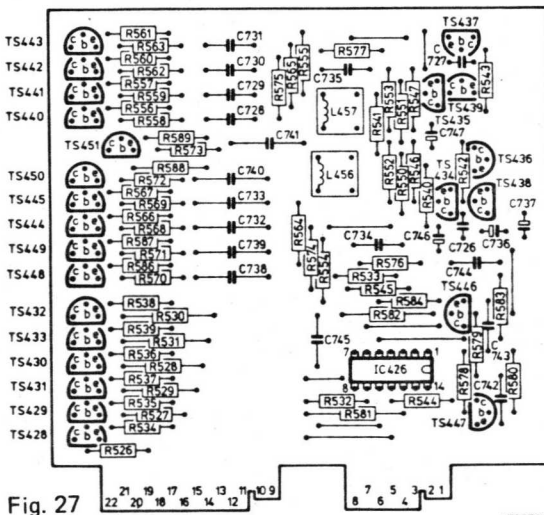


Fig. 27

17327C12

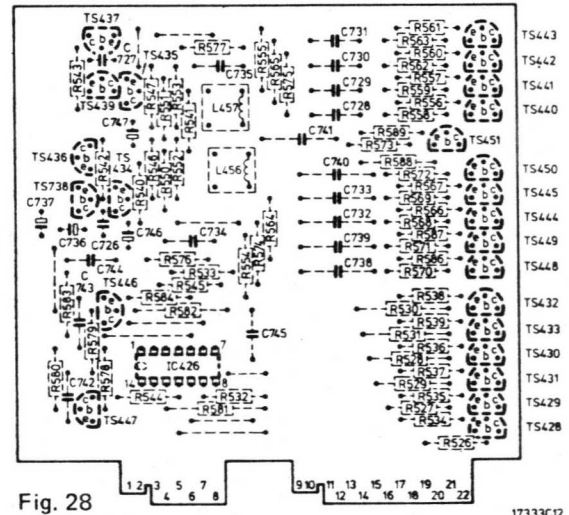


Fig. 28

17333C12

IC	MC14016BCP	5322 209 14119	
	BC548A	4822 130 40948	
	BC548B	4822 130 40937	
	BC558A	4822 130 40962	
	BC558B	4822 130 44197	

U407

INDICATOR

MISC	TS428 TS429				TS430				432			
C	729 728 726		730 733	742 734	739	740 741						
R	530 531	528 529	532 536	538	541	542 545	440 441	546 547				

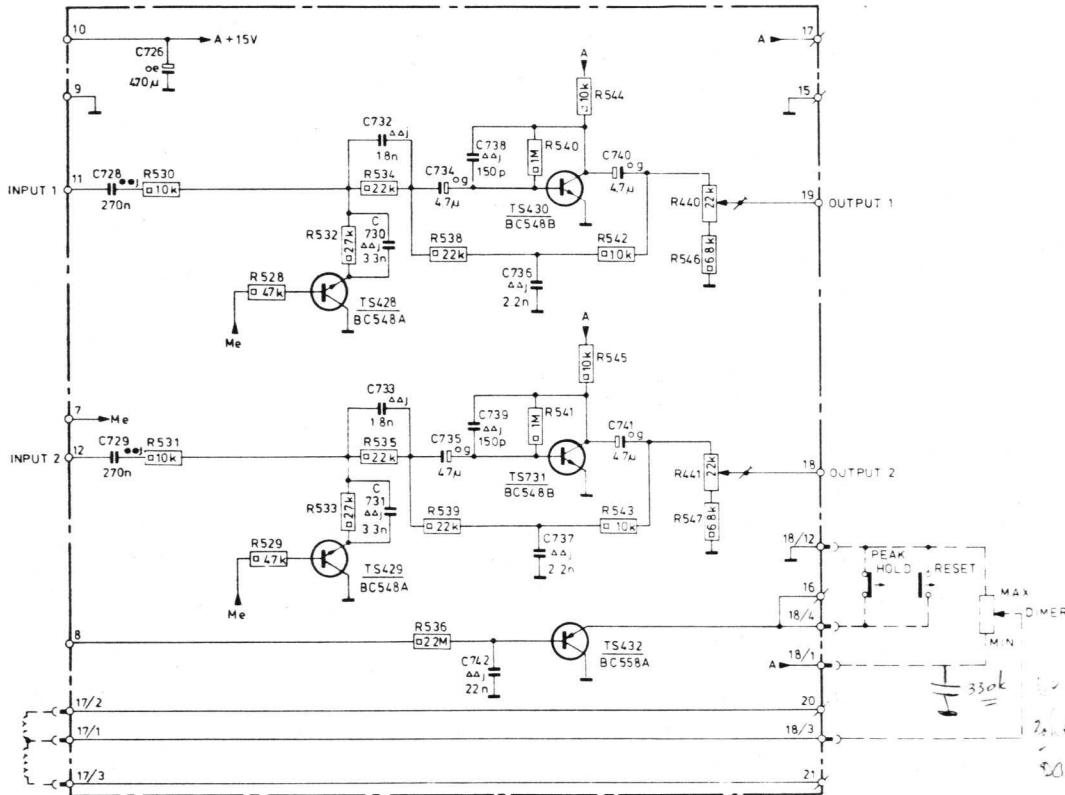


Fig. 29

MISC	TS428-430				TS431				TS432					
C	730-732	734	740	736	738	735	737	733	728	739	741	742	729	726
R	532-534	540	538	542	440	539	546	547	543	441				
R			528-531	544	535	541	545	538						

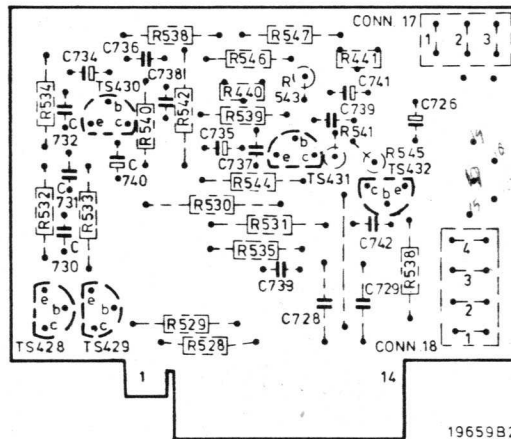


Fig. 30

U406		
— —		
C732,733	3 nF - 63 V	4822 121 50601
C738,739	3.6 nF - 63 V	4822 121 50088
C740,741	3 nF - 63 V	4822 121 50601
—w—		
L456,457	13 mH	4822 156 20822

U407		⊗
BC548A		4822 130 40948
BC548B		4822 130 40937
BC558A		4822 130 40962
— / —		
R440,441	22k	4822 100 10086

MISC	-TS426	TS427.431	D448,TS434	TS428	TS432,429,430,D449	D450,451,TS433,D452,453	TS439	TS435	TS437,436,R465,TS440	TS438	TS441,D454	T460	D455
C	734		727,726	728				735	731	729	730	732	733
R	526,544	529,527	560,530	528	532,540,543	533,531,534	539,535,541	542,536+538	545	546,561,463,547,548,550,562,464,549,551+554,465	555+558		466,462

U408 OSCILLATOR

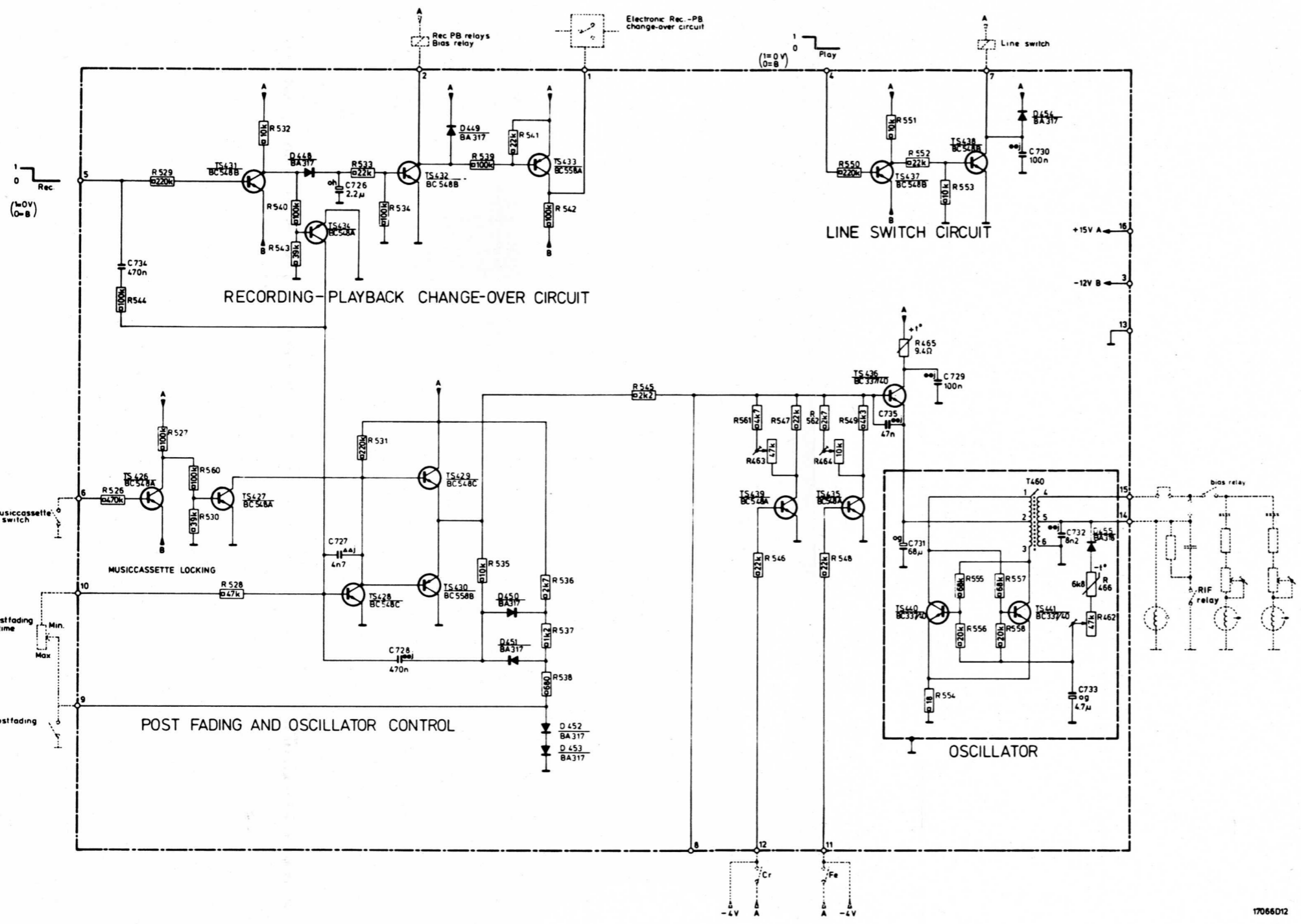


Fig. 31

BC337/40	4822 130 41344	T460	4822 146 20565
BC548A	4822 130 40948		
BC548B	4822 130 40937		
BC548C	4822 130 44196		
BC558A	4822 130 40962		
BC558B	4822 130 44197		
BA317	4822 130 30847		
BA318	4822 130 30852		
		R462,463	47K 4822 100 10076
		R464	10K 4822 100 10024
		R465	9.4E - PTC 4822 116 40031
		R466	6.8K - NTC 5322 116 34055

MISC	C	R
TS430		
TS429	727	
TS432		465
TS428		543
D450	728	530
D451		538
D448	729	545
TS427		527
TS431	726	560
D452		
TS436	735	540
TS434	730	
D453		529
TS426	734	463
TS439	733	462
TS438		561
D454	731	547
		562
		544
		551
TS440		553
TS441		546
D449		549
TS437		464
TS535		528
T460		554
D455	466	558
		539
		548
		541
		542
		550
TS433		526

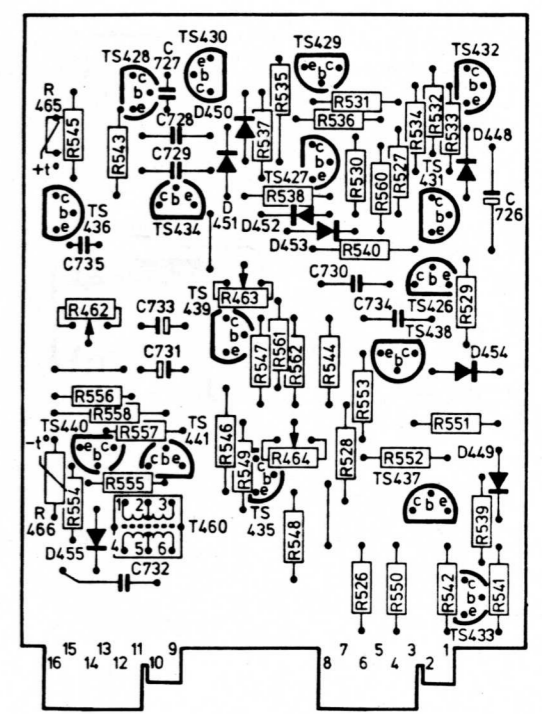


Fig. 32

17324B2/A

MISC	C	R
TS430		
TS429	727	
TS432		465
TS428		543
D450	728	530
D451		538
D448	729	545
TS427		527
TS431	726	560
D452		
TS436	735	540
TS434	730	
D453		529
TS426	734	463
TS439	733	462
TS438		561
D454	731	547
		562
		544
		551
TS440		553
TS441		546
D449		549
TS437		464
TS535		528
T460		554
D455	466	558
		539
		548
		541
		542
		550
TS433		526

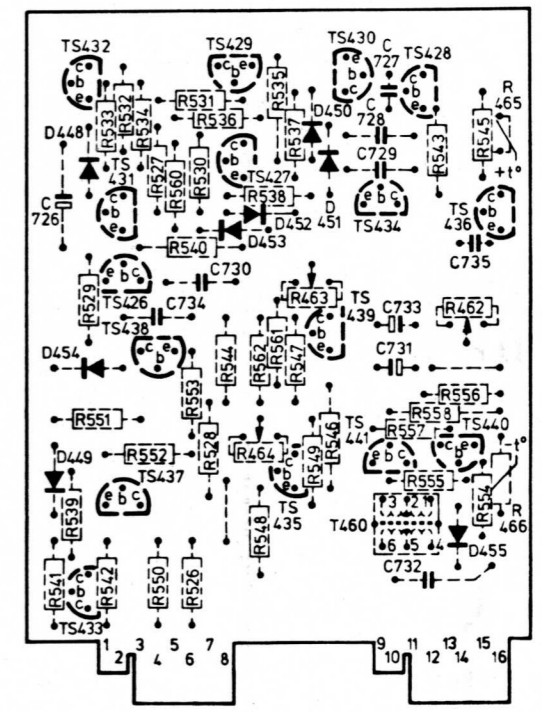


Fig. 33

18236B2/A

MISC	TS428.429	TS430.431	TS432.433	TS434.435	TS436.437
C	726 + 731	732 733	734 735	736 737	738 739
R	528 529 530 + 535	536 537 538 + 541	542 + 549	550 551	552 + 555
				556 + 559	560 + 563

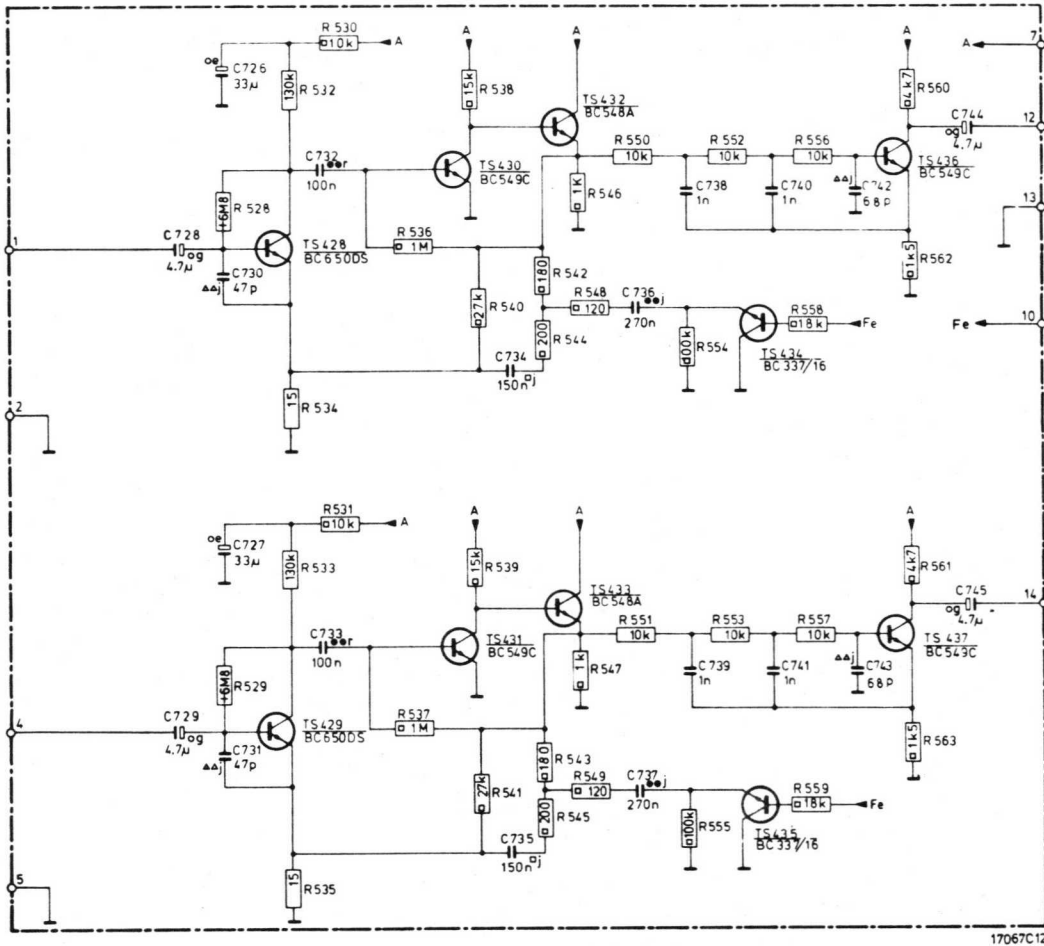


Fig. 34

MISC	TS437 433 432 436	TS435	TS434 428 - 431
C	743 745 738 - 742 744. 734 - 737		727 - 733
R526 - 545	539	538	540 - 545
R546 - 552	547 551	546	550 552 549
R553 - 564	557 553 560 - 563 556 559	558	554 555

MISC	TS428 - 431 434	TS435	TS436 432 433 437
C	726	727 - 732	734 - 737 744 738 - 742 745 743
R526 - 545	533 - 537	528 - 532	540 - 545
R546 - 552	548	549 552 550	546 551 547
R553 - 564	555 554	558	559 556 560 - 563 553 557

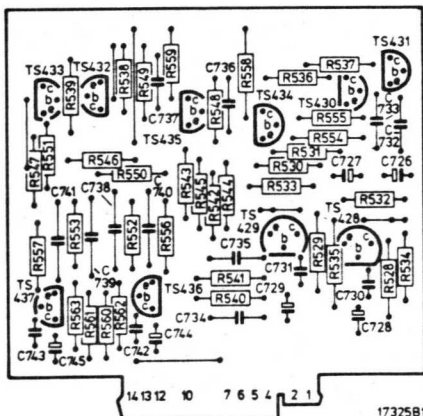


Fig. 35

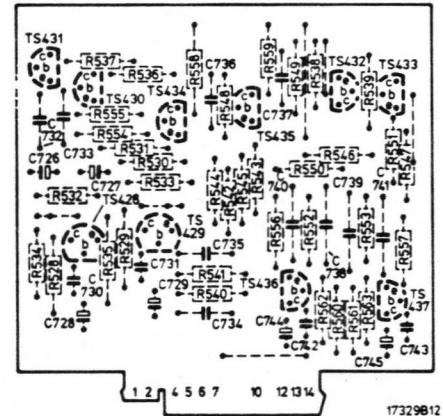


Fig. 36

BC337/16		4822 130 41095		R532,533
BC548A		4822 130 40948		R534,535
BC549C		4822 130 44246		R550,551
BC650DS		4822 130 41364		R552,553
				R556,557
C738,739	1 nF - 1 %	4822 121 50566		
C740,741	1 nF - 1 %	4822 121 50566		

U410

MIXER/HEADPHONE AMPL:

MISC	TS428 429	TS430 431	TS432 433	C426 427	736 737	738	741	742	746
C	726 729	730 731	732 735						
R	436a b 437a b	526 535	536 541	542 545	438a b 546 547		548 551	552 554	

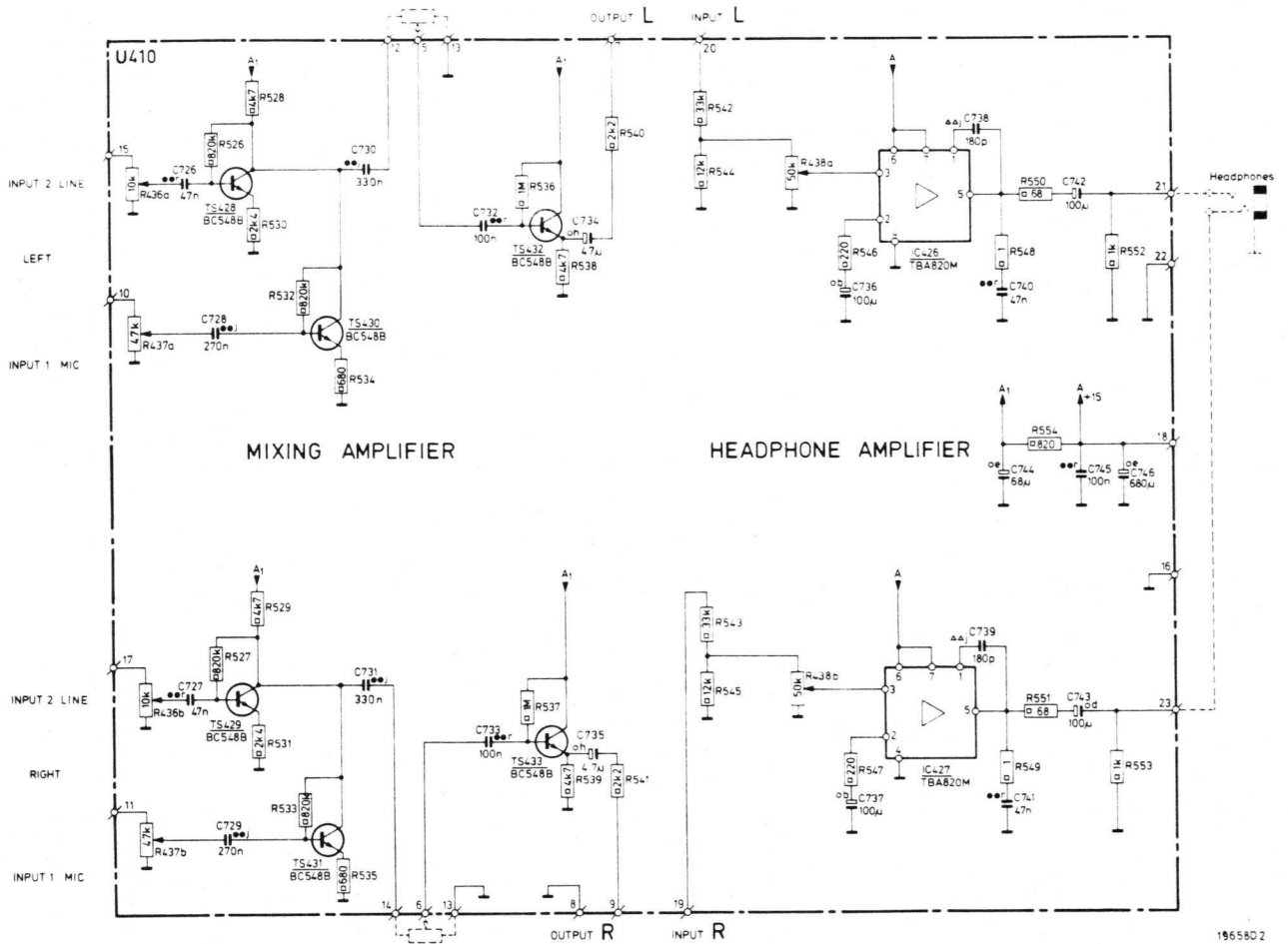


Fig. 37

MISC	IC426	IC427	TS429	TS428	TS430 431	TS433 432
C	742 743	741 740	745a 736+739 746	745b 744 726 727 731 730	728 729	735 734 733 732
R	533 522 438a b 549 548 542 + 546 550 551 547		554 436a b	531 530	526 + 529 532 533 535 437a b 534	536 + 541

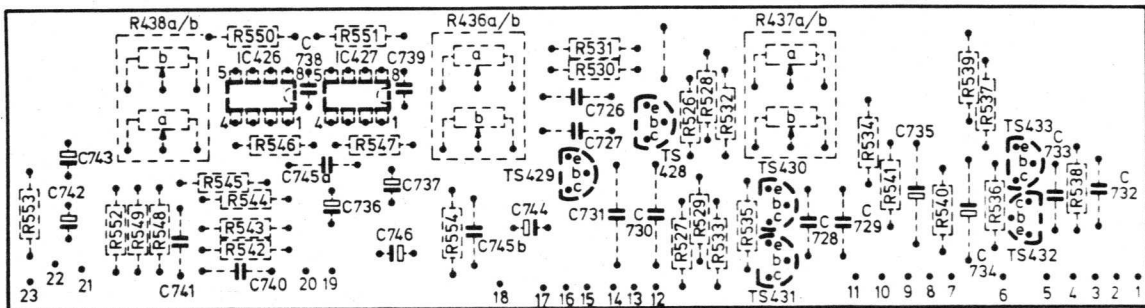
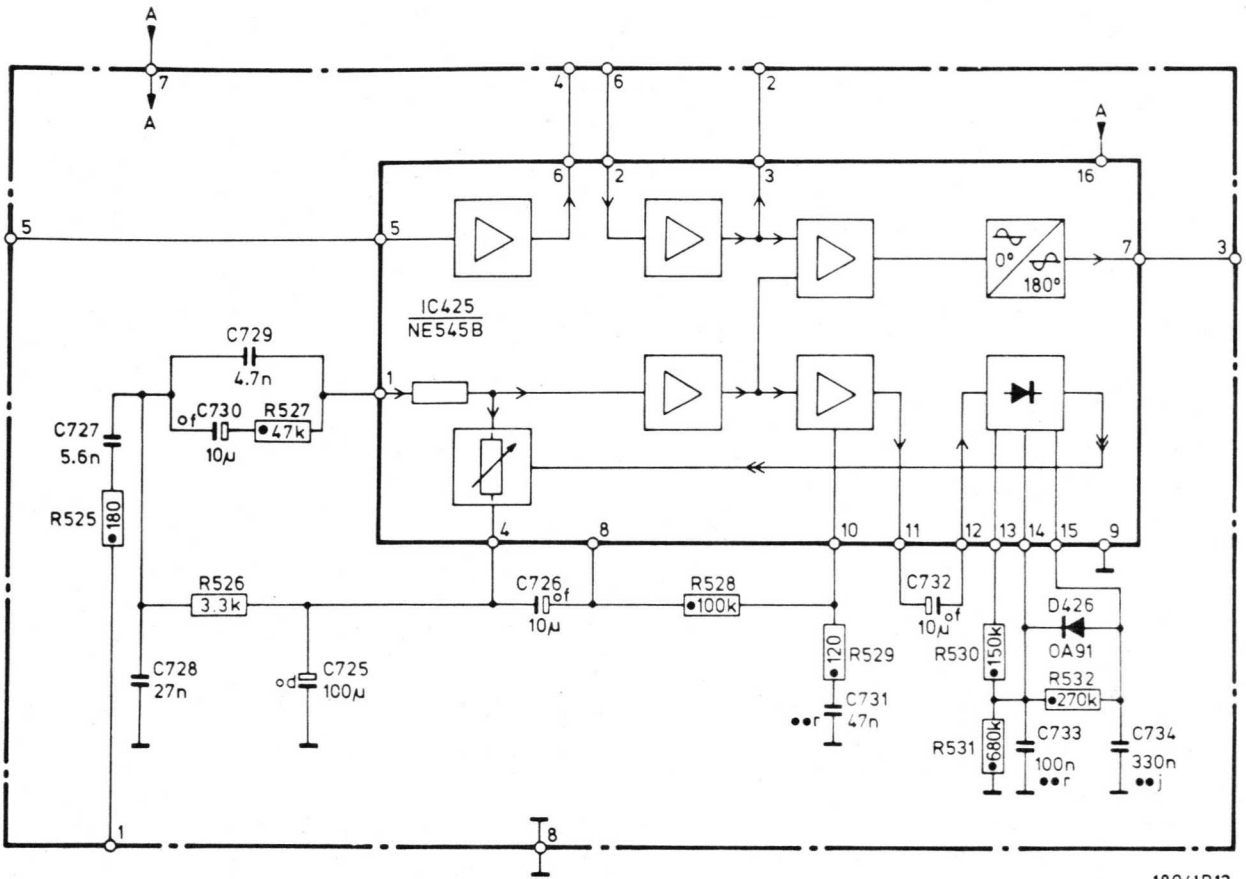


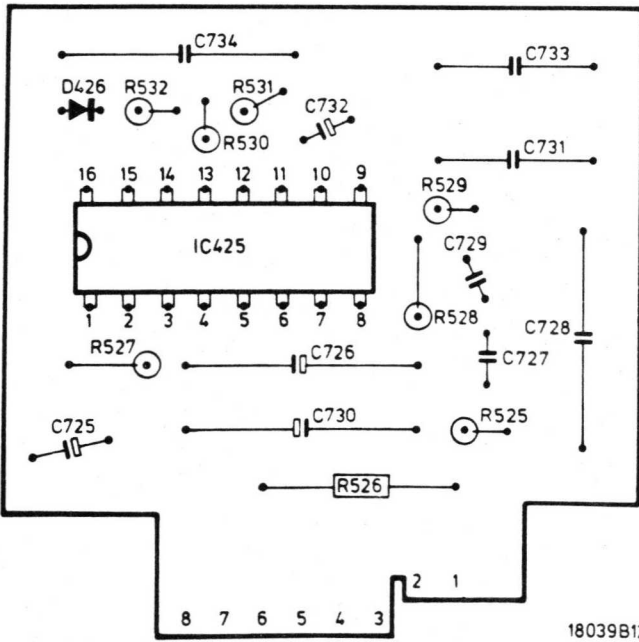
Fig. 38

TBA820M	4822 209 80348	R436 a/b	10K 4822 105 10375
	BC548B	R437 a/b	50K 4822 105 10376
		R439 a/b	50K 4822 105 10376
	4822 130 40937		



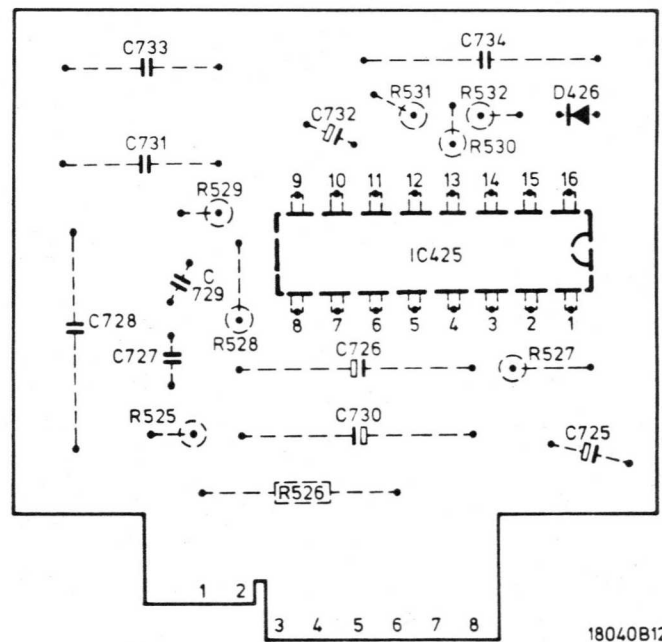
18041B12

Fig. 39



18039B12























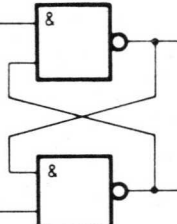









Fig. 40



18040B12

Fig. 41

NE645B	4822 209 80454	C727	5.6 n - 1 % 4822 121 50543
		C728	27 n - 1 % 4822 121 50607
		C729	4.7 n - 1 % 4822 121 50539
R526	3.32k - 1 % 5322 116 54005		

	Reed contact		Voltage-level switch		Resistor 0.33 W ≤ 1 MΩ - 5 % (CR25) > 1 MΩ-10%
	Electronic switch		Voltage-level switch with a specific time t		Resistor 0.5 W > 1 MΩ-5 % (VR37)
	Amplifier		Automatically controlled amplifier		Metallised polyester capacitors
	Operational amplifier		AND-gate Note: output is 1 only if all inputs are 1 1 zijn		Ceramic plate capacitors
	Low-pass filter		NAND-gate Note: output is 0 only if all inputs are 1		Miniature electrolytic capacitors * d = 10 V e = 16 V f = 25 V g = 40 V h = 63 V j = 100 V r = 250 V
	High-pass filter		OR-gate Note: output is 1 only if one or more inputs are 1		Unit connection point ...
	Rejection filter		NOR-gate Note: output is 0 only if one or more inputs are 1		Solder point ... on p.c. board
	Oscillator		Bistable multivibrator (flip-flop)		Connector-plug ... / point ...
	Detector				Test socket ... / point ...
	Voltage stabiliser U-const				Signal goes to point in other circuit diagram. In present example: to circuit diagram C, point 25
	Pre-emphasis				Signal comes from point in other circuit diagram In present example: from point 13, circuit diagram D
	De-emphasis				Switch is open if a cassette with erase protection (knock-out removed) is inserted