

Service
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Service Manual

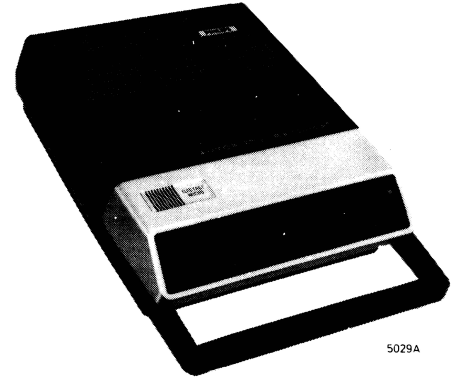
TECHNICAL DATA

Mains voltage	: 110/127 V, 220/240 V
Mains frequency	: 50 and 60 Hz
Power consumption from mains	: approx. 5 W
Battery voltage	: 7.5 V (5xR14TR)
Output power	: 900 mW \pm 1 dB ($d \leq 10\%$)
Frequency range	: 80-10,000 Hz within 6 dB
Tape speed	: 4.76 cm/s ($\pm 2\%$)
Wow and flutter	: $\leq 0.4\%$
Number of tracks	: 2 (compact cassette)
Erase frequency	: 54 kHz
Dimensions	: 243x195x64.5 mm
Weight (without batteries)	: 1.65 kg
Built-in loudspeaker	: 4 Ω - 1.25 W
Microphone	: built-in "electret" microphone

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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HINTS FOR REPAIR

Removing the cabinet (Fig. 7)

- Remove the battery cover 127 and the batteries.
- Remove the lower cabinet 144 by loosening the four screws A, one of which is situated in the battery compartment. The battery power supply remains connected to the recorder.
- Remove the chassis from the upper cabinet by removing the three screws B and the tension spring 142. The chassis remains connected to the upper cabinet via the wiring.

Swinging up the p.c. board (Figs. 7, 8)

- Remove the lower cabinet 144 (see "Removing the cabinet").
- The p.c. board can be swung up by removal of the three screws C. For swinging the p.c. board further upwards, remove the socket connector assy. BU1-BU2 from the upper cabinet.

Remark:

When refitting the p.c. board, ensure that the switch lever 62 engages in the pin of the switch SK1.

Replacing the drive belt 92 (Fig. 8)

- Remove the lower cabinet 144 (see "Removing the cabinet").
- Remove the flywheel bearing bracket 94 and the motor cover 510.
- The belt can then be replaced.

Remark:

After replacement of the belt, the flywheel bearing bracket should be readjusted, see "Mechanical adjustments and checks".

Replacing the flywheel 93 and the winding friction 89 (Fig. 8)

- Remove the lower cabinet 144 (see "Removing the cabinet").
- Remove the drive belt 92 and locking ring 90.
- The flywheel and the winding friction wheel should be simultaneously removed.

Remark:

After refitting, the flywheel bearing bracket should be readjusted. See "Mechanical adjustments and checks".

Replacing the microphone 120 (Fig. 7)

- Pull the grip 145 forwards.
- Bend the sides of ornamental cover 130 slightly outwards, so that this cover can be removed in the upwards direction.
- Remove the lower cabinet 144 (see "Removing the cabinet").
- Detach the plug-in connections of the microphone connection board.
- Pull the microphone connection board upwards; the guides should then be bent slightly outwards.
- Unsolder the connection wires of the microphone.
- Remove the microphone from the recorder from the top side.

Removing the knobs 143 and the pushbuttons 61 (Fig. 1,7,8)

- Remove the cabinet.
- Insert a small screwdriver into the slit between the knob and the button and twist the knob loose (Fig. 1).
- When refitting, slide the knob back onto the button so far that it clicks.
- Remove spring 60.
- The pushbutton can then be removed by an upward directed tilting movement.

Remark:

When replacing the playback button, straighten the twisted tag of bracket 513 (underneath pushbutton).

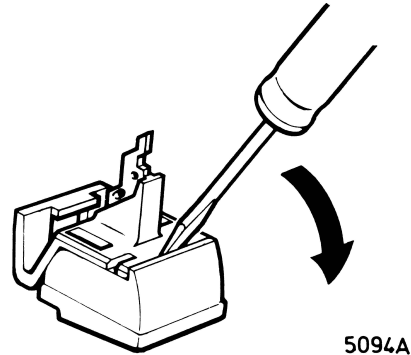


Fig. 1

LIST OF CABINET PARTS

7	Clamping ring 3 mm	4822 530 70115	130	Ornamental cap	4822 443 60457
12	Ring 3.2 mm	4822 532 10332	131	Cassette cover	4822 443 60434
15	Self-tapping screw 2.9x8	4822 502 37032	132	Leaf spring	4822 492 61996
16	Self-tapping screw 2.9x9.5	4822 502 30085	133	Mirror	4822 460 20102
17	Screw M2.5x6	4822 502 10909	134	Upper cabinet assembly	4822 443 30259
18	Clamping ring 2 mm	4822 530 70114	135	Locking bracket	4822 403 50791
19	Self-tapping screw 2.9x9.5	4822 502 30085	136	Pressure spring	4822 492 51049
20	Curved washer	4822 530 80158	137	Bracket	4822 403 30232
21	Screw M2x4	4822 502 11059	138	Cassette ejector	4822 403 50789
22	Self-tapping screw 2.2x6.3	4822 502 30081	139	Shaft	4822 535 90949
120	Electret microphone (409)	4822 242 30064	140	Ejecting button assembly	4822 410 21387
121	Ornamental plate	4822 454 20327	141	Fuse holder	4822 256 30128
122	Knob assembly	4822 411 60284	142	Tension spring	4822 492 31151
123	Guide plate	4822 403 30233	143	Knob	4822 410 21386
124	Potentiometer (R401)	4822 105 10098	144	Lower cabinet assembly	4822 443 50215
125	Voltage adapter (SK4)	4822 272 10109	145	Handle	4822 498 40352
126	Battery spring	4822 492 61311	146	Foot	4822 462 40323
127	Battery cover	4822 443 60436			
128	Battery spring	4822 492 61309			
129	Battery spring	4822 492 61308			

ADJUSTMENTS AND CHECKS OF MECHANICAL PARTS

Adjusting the record/playback head (Figs. 2 and 7)

To adjust the azimuth of the record/playback head, the chassis need not be removed.

- Connect a VTVM-meter between the points 2 and 3 of BU1.
- Open the cassette lid: hole D is then visible.
- Play back the 8-kHz side of the test cassette contained in the Cassette Service Set. (code number 4822 395 30052).

Attention: Do not close the cassette lid.

- The output voltage must be adjusted for a maximum value.
- Adjust with screw 9 (through hole D).
- Seal the set screw with cellulose lacquer 4822 389 20004.

Figure 2 shows the uncased chassis.

Note:

For this adjustment, the 6300-Hz testcassette 8945 600 13501 may also be used.

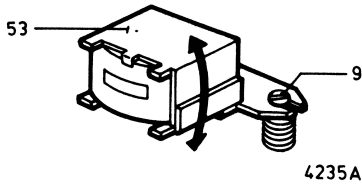


Fig. 2

Adjusting the pressure roller (Fig. 3)

- Remove the chassis.
- Set the recorder to position Playback.
- The force to release the pressure roller just from the capstan should be between 185 and 235 g.
- Adjust this by sliding the torsion spring 82 to its next hole.

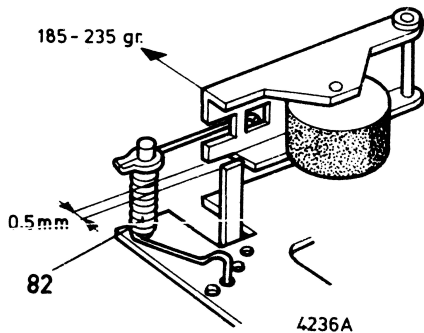


Fig. 3

Adjust the flywheel (Fig. 4)

- Remove the chassis.
- The axial play of the flywheel should be between 0.1 mm and 0.3 mm.
- Adjust this play by shifting bracket 94 with a screwdriver.

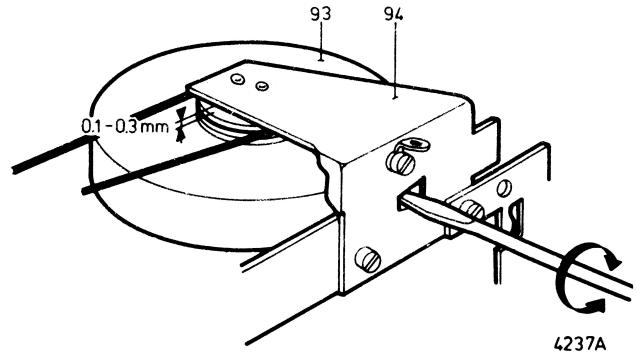


Fig. 4

Adjusting the winding mechanism (Fig. 5)

- Remove the chassis.
- a. Position "Playback"
 - The spacing between the flywheel 93 and the idler wheel 74 should be between 1 mm and 2 mm.
 - Adjust this spacing by bending lug E.
- b. Position "Rewind"
 - Spacing F should be at least 0.2 mm.
 - Adjust this spacing by bending lug G.
- c. Position "Wind"
 - Spacing H should be at least 0.2 mm.
 - Adjust this spacing by bending lug G.

Note:

In the positions "Playback" and "Fast Winding" the spacing between the reel discs and the brake bracket should be at least 0.3 mm.

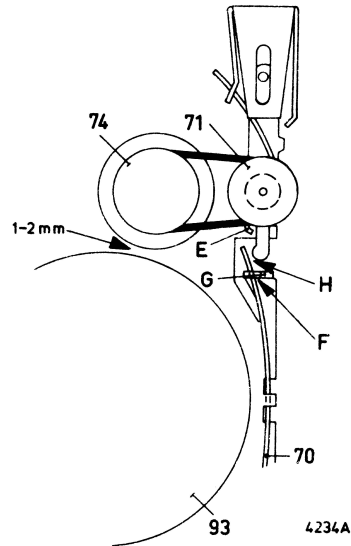


Fig. 5

Checking the winding friction wheel (Fig. 6)

For this check the Cassette Torque Meter 4822 395 30054 is used.

- Insert the cassette torque meter into the recorder. Set the recorder to position "Playback."
- The Cassette Torque Meter should give the following indications:
 - Right-hand reel disc 30-50 g-cm.
 - Left-hand reel disc 4-8 g-cm.
- The meter reading should be as constant as possible.
- If the aforementioned values are not measured, the chassis must be removed.
- Degrease the belts and running surfaces of the flywheel, the idler wheels, the friction wheel and the reel discs.
- If the aforementioned values are still not measured, the winding friction wheel must be replaced. (See "Repair hints")

Note:

The friction wheel may also be checked by a measurement of the current taken from the external power supply.

- Connect the recorder to an external power supply of 7.5 V via a current meter.
- Set the recorder to position "Playback" and read the amount of current taken from the power supply.
- Block the rotating reel disc and read the increase in current. This should be 10-12 mA.

Checking the tape speed

The tape speed is measured with the Cassette Service Set 4822 395 30052.

- Play back the 50-Hz side of the test cassette. Compare the 50-Hz frequency of the test cassette with the mains frequency.
- If the tape speed is too low, first check that the pressure roller, the winding friction wheel, the flywheel, etc. run smoothly.
- If necessary, readjust the speed with R450. To this end, the lower cabinet should be removed.

Note:

The tape speed may also be checked with a test cassette on which a 800-Hz signal has been

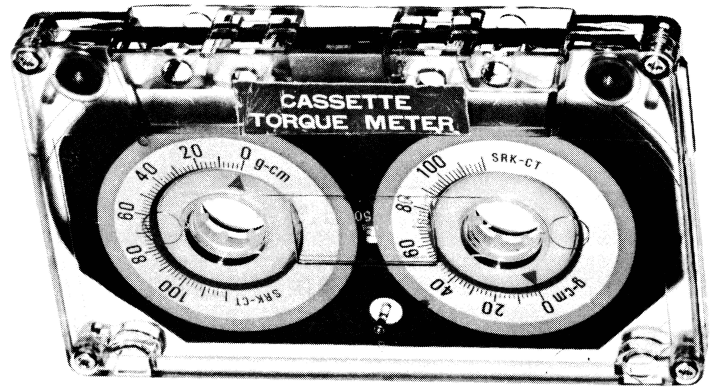


Fig. 6

modulated at intervals of 4.76 m.

Code number of cassette: 8945 600 11501.

- Play back the test cassette. Measure the time between two signals to be 98-102 seconds.

MAINTENANCE

It is suggested to clean the recorder and to lubricate its essential lubrication points after about 500 hours of operation.

To be cleaned with industrial alcohol or methylated spirit

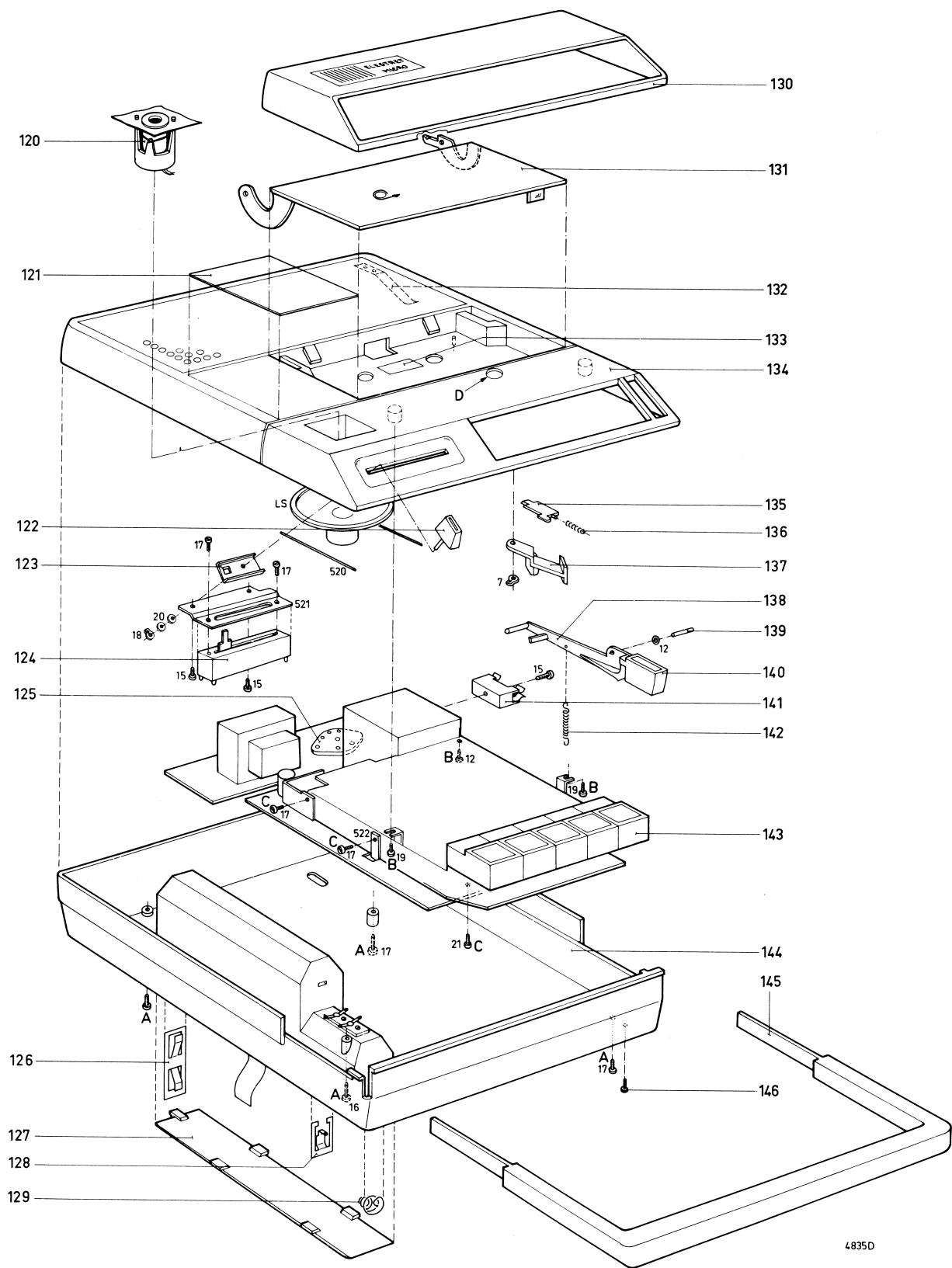
- Erase head
- Record/Playback head
- Belts
- Reel discs
- Idler wheels
- Capstan
- Pressure roller

Lubricating instruction

- Shell Alvania 2 - 4822 389 10001
Ball tracks: for example the ball tracks of the balls 59 and chassis 501
- Grease 10 - 4822 390 10003
Sliding surfaces: for example, the brackets 65,503 and 507
- Shell Clavis 17 - 4822 390 10048
Spindles and bearings: for example the spindle of the idler wheel 71, the spindles 87 of the reel discs and the spindle of the flywheel 93
Note: ensure that there is no oil on the part of the capstan producing the capstan bearing.
- Silicone paste - 4822 390 20023
Leaf spring 132

LIST OF MECHANICAL PARTS

1	Screw M2x6	4822 502 10745	71	Bracket with idler wheel	4822 403 20083
2	Screw M2x12	4822 502 10671	72	Ring	4822 532 50265
3	Clamping ring 1.9 mm	4822 530 70122	73	Ring	4822 532 50262
4	Screw M2.5x5	4822 502 10951	74	Pulley	4822 528 80147
5	Clamping ring 2.3 mm	4822 530 70043	75	Ring	4822 532 50262
6	Ring 2.8 mm	4822 532 10215	76	Belt	4822 358 30077
7	Clamping ring 3 mm	4822 530 70115	77	Locking bracket	4822 403 20085
8	Clamping ring 4 mm	4822 530 70047	78	Wire spring	4822 492 40438
9	Screw M2x8	4822 502 10134	79	Brake bracket	4822 403 10112
10	Clamping ring 1.5 mm	4822 530 70121	80	Ring	4822 532 50268
11	Ring 2.2 mm	4822 532 10331	81	Pressure roller assembly	4822 403 40041
12	Ring 3.2 mm	4822 532 10332	82	Torsion spring	4822 492 40117
51	Bracket	4822 403 50844	83	Leaf spring	4822 492 61314
52	Erase head (K2)	4822 249 40068	84	Ring	4822 532 50268
53	Recording/Playback head (K1)	4822 249 10032	85	Roller	4822 528 80409
54	Pressure spring	4822 492 51024	86	Leaf spring	4822 492 61534
55	Tension spring	4822 492 31104	87	Shaft for reel disc	4822 535 90062
56	Tension spring	4822 492 30836	88	Wire spring	4822 492 60345
57	Tension spring	4822 492 31102	89	Winding friction assembly	4822 528 20163
58	Slide assembly	4822 403 50601	90	Ring	4822 532 50265
59	Ball for slide	4822 520 40005	91	Ring	4822 532 50692
60	Pressure spring	4822 492 50676	92	Belt	4822 358 30152
61	Push-button	4822 411 50259	93	Flywheel	4822 528 10228
62	Switch lever	4822 403 30234	94	Bearing bracket	4822 520 10297
63	Spring	4822 492 60344	95	Cap for reel disc	4822 462 70867
64	Roller	4822 528 90081	96	Carrier	4822 528 10284
65	Bracket assembly	4822 403 50576	97	Ring	4822 532 50706
66	Pressure spring	4822 492 51051	98	Reel disc assembly	4822 528 10283
67	Tension spring	4822 492 30778	99	Control panel	4822 403 50703
68	Screw	4822 500 10137	100	Switch	4822 278 90223
69	Tension spring	4822 492 30777	101	Motor	4822 361 20035
70	Wire spring	4822 492 60912	102	Spacer	4822 532 60543



4835D

Fig. 7

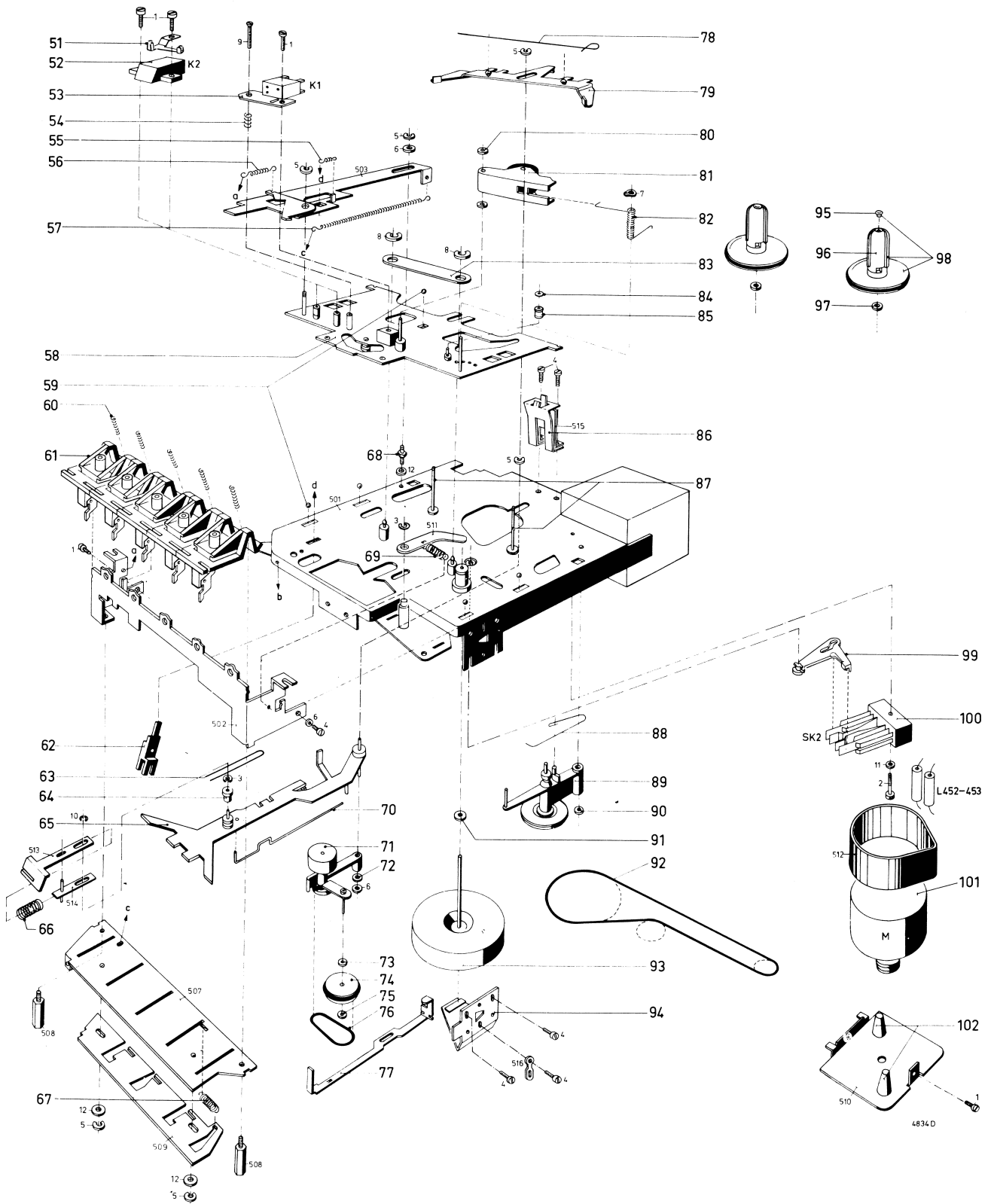
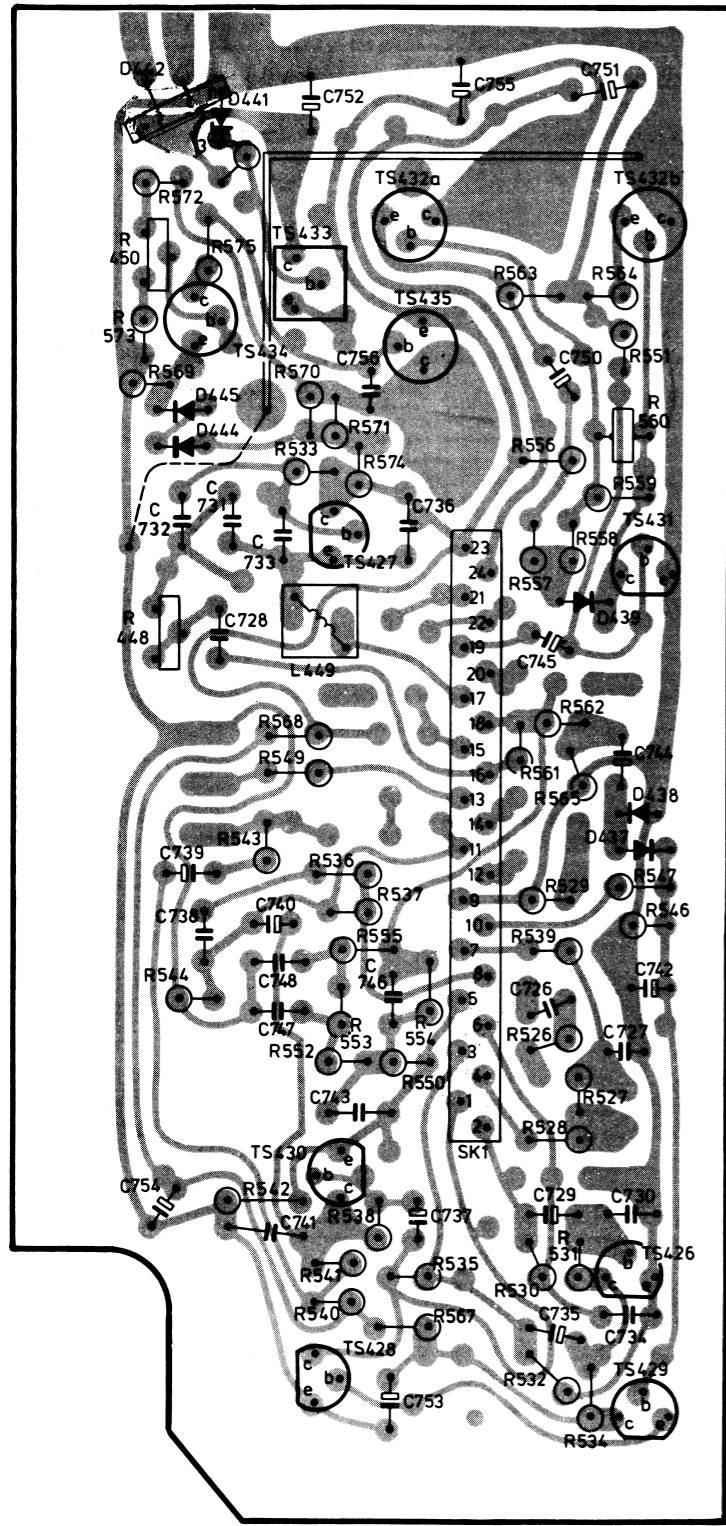


Fig. 8



MISC	R	C
SK3 SK5 BU3		
Z452*		751
BU2		752
D442		755
D441		
Z451		
SK6	566	
TS432a	575	
TS432b	450	
TS433	563	
SK4	564	
BU1		
TS435	573	
SK7	551	756
TS434	569	750
D445	570	
D444	571	
D444	560	
D444	556	
D444	533	
D444	574	
D444	559	
TS431		732
TS431		731
TS431		736
TS427	558	733
T450	557	
L452		
D439		448
L449		728
M		745
L453	562	
L453	568	
L453	561	744
L453	549	
L453	565	
D438	543	
D437	536	
D437	547	
D437	537	739
D437	529	
D437	534	
D437	546	740
D437	555	738
D437	548	748
D437	539	742
D437	544	746
SK2	554	726
SK2	526	747
SK2	553	727
SK2	552	
SK2	550	
SK2	527	
K1		
SK1	528	743
TS430		754
TS430		729
TS430		730
TS430		531
TS430		737
TS430		741
TS426		535
TS426		530
TS426		540
TS426		567
TS428		734
TS429	532	753
LS403	534	
	401	

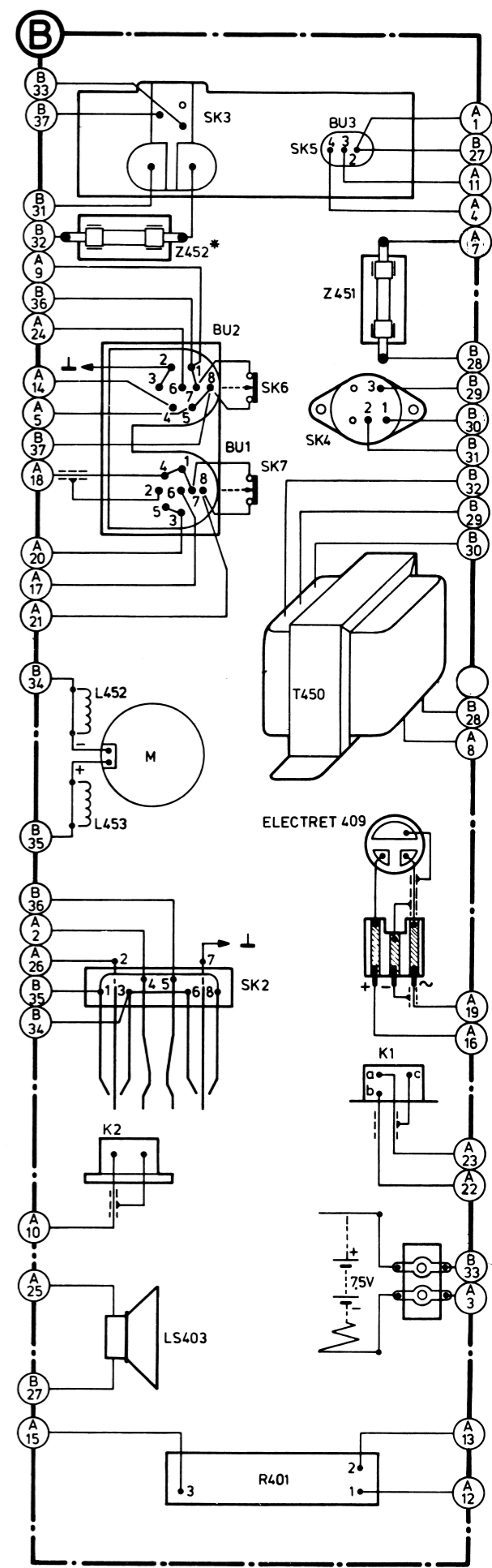
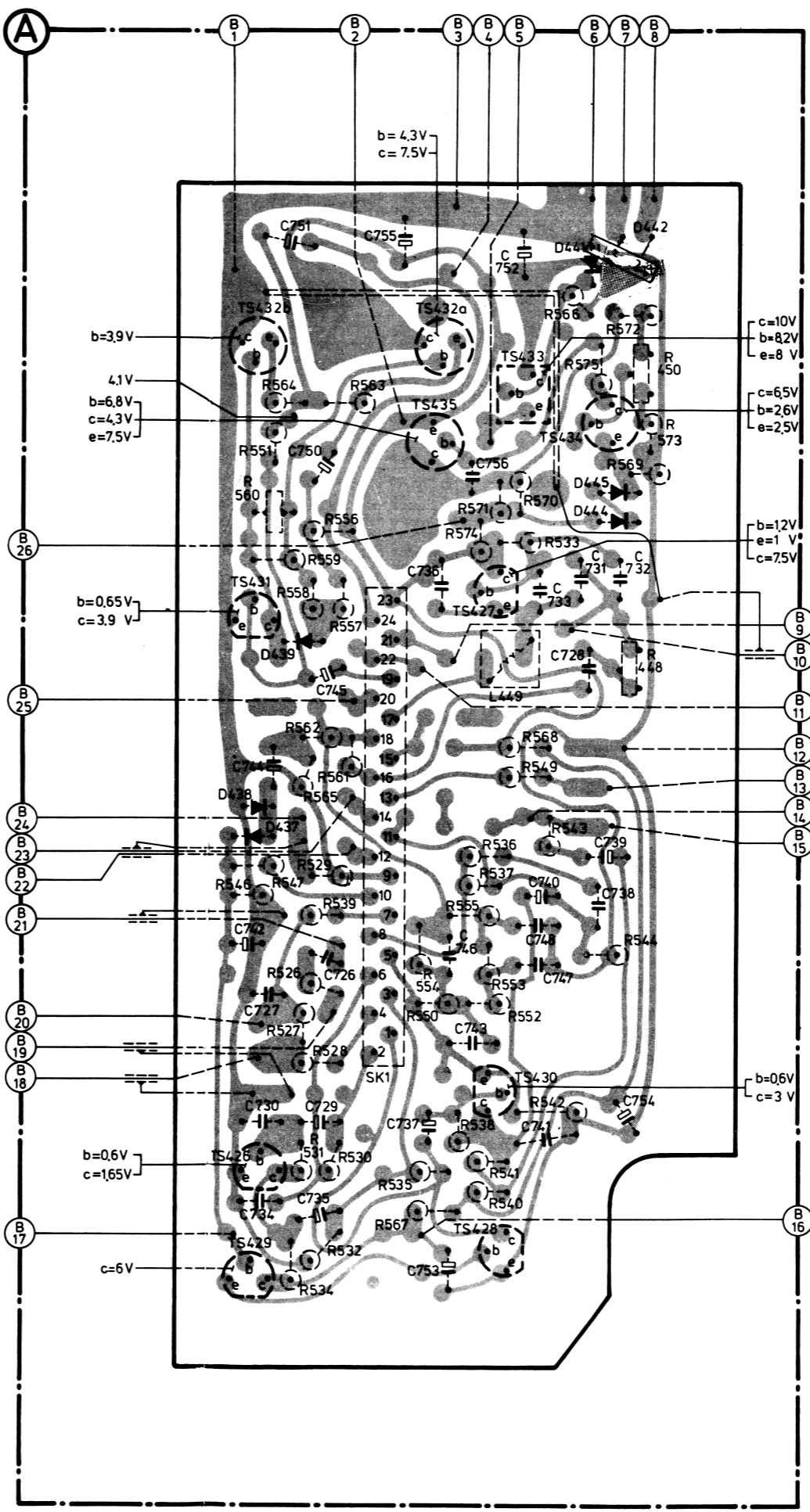


Fig. 9

*-/15 ONLY

ELECTRICAL MEASUREMENTS AND TESTS

The apparatus should receive its power supply from fresh batteries or from the mains.

Playback sensitivity

- For this measurement, connect a resistor of 4 Ω - 1 W to the loudspeaker socket.
- Apply a 1-kHz signal to point 6 of BU2 via a 12-k Ω resistor.
- Adjust the input voltage such that a voltage of 450 mV is measured across the 4- Ω resistor. The input voltage should then amount to 65-100 mV.
- The voltage on the line output (point 3 BU1) should then be 65-100 mV.

Record control

- Remove the lower cabinet.
- Make an interconnection between the base and the emitter of TS427. The erase oscillator is thus deactivated.
- Set the recorder to the position "record".
- Apply a 80 mV - 1 kHz signal to the microphone input (point 1 BU1) via a 1-M Ω resistor.
- A voltage of 3.2 - 4 mV should be present on point 6 of BU2.

- Increase the input voltage to 800 mV. The voltage on point 6 of BU2 should then be 4.3 mV.
- Readjust to 80 mV. After 15 seconds, a voltage of 1.8-2.8 mV should be present on point 6 of BU2. After these 15 seconds, this value continues to rise to about 3.2 - 4 mV.

Erase head

- Set the recorder to the position "record".
- The voltage across the erase head should be about 16 V, measured using a meter of ≥ 40 k Ω /V.
- The frequency of the oscillator is between 48 and 58 kHz.

Bias current

- Set the recorder to position "record".
- A voltage of 12-16 mV should be present on point 6 of BU2. This voltage can be adjusted by means of R448.

LIST OF ELECTRICAL PARTS

Transistors

TS426	BC239B	4822 130 40883
TS427,434	AC127	5322 130 40096
TS428,431	BC238E	5322 130 40838
TS429	BC238A	4822 130 40896
TS430	BC238C	4822 130 40901
TS432A-B	AC187/AC188	4822 130 40347
TS433	AC187/01	5322 130 40089
TS435	BC328	5322 130 44104

Diodes

D437,438	BA216	5322 130 30702
D439,444,445	BA220	4822 130 40879
D441	BZX79/C8V2	5322 130 34119
D442	1N4001	5322 130 30197
	or BY164	4822 130 30414

Resistors

R401	Potmeter 22 k Ω	4822 105 10098
R448	10 k Ω	4822 100 10024
R450	100 Ω	4822 100 10073
R560	NTC 130 Ω	4822 116 30016

Coils

L449	Coil	4822 156 20459
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Electrolytic capacitors

C729,735,740	1.5 μ F, 63 V	4822 124 20342
C737,744	0.64 μ F, 63 V	4822 124 20201
C739,745	2.2 μ F, 40 V	4822 124 20344
C742,753,754	100 μ F, 10 V	4822 124 20462
C750	47 μ F, 10 V	4822 124 20461
C751,755	470 μ F, 10 V	4822 124 40127
C752	1000 μ F, 16 V	4822 124 20529

Miscellaneous

BU1-BU2	Socket connector assy	4822 267 20158
BU3-AC	Socket connector assy	4822 267 20147
mains		
K1	Record/playback head	4822 249 10032
K2	Erase head	4822 249 40068
SK1	Switch	4822 277 30564
	Coupling pin for SK1	4822 535 90135
SK2	Motor switch	4822 278 90223
SK4	Voltage selector	4822 272 10109
LS403	Loudspeaker 4 Ω	4822 240 30101
T450	Transformer	4822 145 30132
Z451	Glass fuse 400 mA.T.	4822 253 30016
Z452 (only	Glass fuse 32 mA.T.	4822 253 30001
../15)		
L452-453	Ferrite head	4822 526 10098
409	Mains cord	4802 321 17024
	Electret microphone	4822 242 30064

