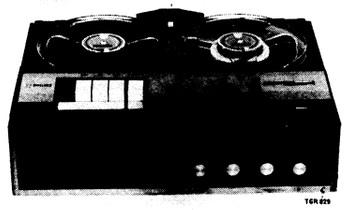
PHILIPS *Service*

RECORDERS

EL 3558/00/15/43



TECHNICAL DATA

Tape speed	: 4.75 and 9.5 cm/sec.	Output voltage line output	: 750 mV 20 kΩ
Mains voltages	: 110-127-220-240 V a.c.	stereo	: 250 µV 2 kΩ
Power consumption	: approx. 40 W	earphone	: 0-1.5 V 50 Ω
Loudspeaker output power	: 1.5 W	Transistors	: 2xAC172 pre-amplifier
Frequency range	: 4.75 cm/sec. 60- 9000 c/s		3xAC125 pre-amplifier
	9.5 cm/sec. 60-12000 c/s		1xAC126 control amplifier
Maximum reel diameter	: 18 cm		1xAC128 oscillator
Number of tracks	: 4		1x2-AC128 output amplifier
Weight	: approx. 6 kg		1xOA79 and 1xAC125 modulation indicator
Dimensions	: 40x29x13 cm		1x BCY34S regulating transistor
Sensitivities microphone	: 200 µV 2 kΩ	Microphone	: EL 3781-00
radio	: 2 mV 20 kΩ	Loudspeaker	: AD 3386RX
pick-up	: 70 mV 680 kΩ		

LIST OF CONTENTS

MAINTENANCE

It is recommended to clean the apparatus after about 500 hours of operation. If necessary, lubricate the apparatus at certain points and replace the pressure felt pad.

Clean with methylated spirits or alcohol

Tape guides
Erase head
Recording/play-back head
Capstan
Contact surface of pressure roller
Cords
Motor pulley
Cord grooves of pulleys
Cord groove of flywheel
Friction discs
Brake blocks
Brake surfaces of reels

Clean with brush

Inside of reels.

Lubricate with I7 (A9 881 29/F50)

Motor bearing.

Lubricate with Shell Tellus 33 (4822 077 00104)

Reel spindles
Pulley spindles
Pressure roller spindle
Flywheel spindle
Bearing of speed-selector mechanism

Also, when replacing the above parts, see to it that these are lubricated also.

Lubricate with lubricant 10 (A9 881 46/F10)

Contact surfaces of the various brackets with mounting plate and the contact surfaces between the brackets themselves.

Lubricate with Shell Alvania 2 (A9 881 22/P50)

Balls of brake bracket

REMOVING THE CABINET

. Remove the knob of the speed selector.
. Remove knobs item 207.
. Remove the 3 ornamental screws of the cover plate
. Remove the cover plate.
. Remove the wire spring of the level meter.
. Unscrew the four screws by means of which the tape deck is fitted in the cabinet.
. The tape deck can then be removed from the cabinet.

CONVERSION FROM 50 TO 60 c/s, Fig. 1

. Remove the cabinet.
. Position the drive cord in groove B of the motor pulley with aid of tweezers or a small pair of pliers.

CONVERSION FROM 60 TO 50 c/s, Fig. 1

. Remove the cabinet.
. Position the drive cord in groove A of the motor pulley with aid of tweezers or a small pair of pliers.

REPAIR HINTS

. Removing the print, Fig. 15
. Remove the spring, item 68.
. Remove the screws, item "A".
. Remove the signal lamp.
. Remove the wires from the screen plate.
. The print is then loose from the tape deck.

Note: When mounting, make sure that the bracket, item 254, engages the groove of bracket, item 304. Make sure especially, that transistor pair AC128 is tightened again.

For repairs to the print, it is recommended to place the apparatus on its right-hand side.

Replacing the right-side reel
. Loose print from tape deck.
. Remove the clamping ring, item 12.
. Remove the ring, item 118.
. After this, the reel can be removed.
. Mounting is effected in reverse order.

Note: The reel should have an axial play of 0.1 to 0.3 mm.

Replacing the left-side reel

. Remove the clamping ring, item 12.
. Remove the pulley, item 66.
. Remove the clamping ring, item 12.
. Remove the washers, item 53.
. The reel can then be removed.
. Mounting is effected in reverse order.

Replacing a push-button

. Remove the spring of the button to be replaced.
. Push the relevant control bracket backward.
. The button can then be removed.
. Mounting is effected in reverse order.

Replacing the stop push-button

. Snap brackets, item 79, out of bracket, item 73 (slightly enlarge the notches of brackets, item 79).
. Disconnect all push-button springs.
. Remove the two winding buttons and the stand-by button.
. Set the apparatus to recording position.
. Next, remove the recording and play-back buttons.
. Push bracket, item 78, backward as far as possible.
. Shorten the tag of bracket, item 78, to the edge of the tape deck.
. Remove the stand-by button.
. The stop button can then be removed by moving it about 5 mm to the right and pulling it forward.
. Mounting is effected in reverse order.

Replacing the erase head, Fig. 2

. The erase head can be replaced with aid of, for exemple a pointed pair of tweezers, or screw-driver.
. There is no need to adjust the erase head.

Replacing the protective cover of the recording/play-back head

. Loosen screw, item 21, a few turns.
. The protective cover can then be removed by sliding it backward.

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Replacing the recording/play-back head

. Remove the two screws, item 107A.
. Loosen screw, item 21, a few turns.
. The recording/play-back head can then be removed.

Replacing the head plate

. Remove clamping ring, item 9.
. Remove spring, item 126.
. Remove the pressure-felt pad.
. Remove both tape guides, item 113 and item 95.
. Remove both brackets, item 114.
. Remove both spring, item 115.
. Remove the screw, item 21.
. Remove the screws, item 107A and springs item 11.
. Remove the screw, item 22.
. Remove the base of the erase head by tilting it to the right.
. Remove the spring item 80.
. Remove the three screws, item 23.
. Remove the dust cap around the flywheel spindle.
. Remove the clamping ring, item 9.
. Remove the clamping ring, item 9.
. Remove the spring, item 103.
. Bend the tag of the head plate upward and remove the head wires.
. The head plate can then be removed.
. Mounting is effected in reverse order.

Replacing the brake bracket

. Remove the cord.
. Remove the clamping ring, item 9.
. Remove the bracket, item 87, and bracket, item 306.
. Remove the spring, item 76.
. The brake bracket can then be replaced.
. Mounting is effected in reverse order.

Replacing the flywheel

. Loosen the dust cap.
. Loosen screws, item 110.
. Disconnect the spring, item 10.
. Remove the bracket, item 305.
. The flywheel can then be removed.
. Mounting is effected in reverse order.

Replacing the speed-selector segment

. Disconnect the print.
. Remove the spring, item 105.
. Remove the three screws, item 10, item 18.
. Remove the bracket, item 309.
. The selector segment can then be removed.
. Mounting is effected in reverse order.

Replacing the cord around the flywheel

. Disconnect the print.
. Loosen screws, item 10.
. The cord can then be removed.

Adjusting the switch for automatic recording control SK5, Fig. 6

In position "AUT ⌀ ⏻" the switch should be set as indicated in fig. 6.
Adjust with cam, point C, before print bracket.
In position "MANUAL" and "AUT ⊂ " the switch should be set as indicated in fig. 6.
This can be adjusted for small corrections by moving flat spring E or bending tags A and B.

MECHANICAL ADJUSTMENTS

Adjusting the air gap of the recording/play-back head, Fig. 3

. Insert a test tape of 8000 c/s (WT 939 15).
. Set the apparatus to position "play-back".
. Connect a valve voltmeter to points 2 and 3 of BU1.
. Adjust to maximum output voltage by means of screw A.
. Seal screw A with lacquer after the adjustment.

Note: The erase head does not have to be adjusted.

Adjusting the speed-selector, item 82, Fig. 4

In both positions, the selector should at least be 0.5 mm from the cord.

Adjusting the track selector, item 253, Fig. 5
Adjusting the automatic switch item 266.
If the print has been disconnected, selector (item 253) should be adjusted so that in both extreme positions it is equally far from A and B.
This can be adjusted by bending the bracket in point D, Fig. 6.

Adjusting the recording switch, Fig. 7

In stop position, the tag of the slide bracket should be against the print-bracket.
In recording position, the hole in the slide bracket should become completely visible through the print bracket.
This can be adjusted by bending bracket, item 115, in point A.

Adjusting track-selector SK2, Fig. 6

In position "par", the selector should be as shown in Fig. 6.
Adjust with cam, point A, for print bracket.
In positions 4-1 and 2-3, the selector should be as shown in Fig. 6.
This can be adjusted by bending tags A and B, by moving flat spring E.
Adjusting the pressure-roller unit, Fig. 9

In positions "play-back" or "recording", the pressure-roller bracket, item 124, should be at least 1 mm away from stop A, at the top as well as at the bottom. This can be adjusted by bending the pressure-roller bracket in point B.

In position "play-back" or "recording", the pressure-roller bracket should be at least 0.5 mm away from bracket, item 310, point C.
This can be adjusted by bending the erect tag on bracket, item 78.

In position stand-by, the pressure roller should be 1-0.5 mm removed from the capstan; it also should be parallel to the captstan. This can be adjusted by bending the erect tag on bracket, item 78.

The pressure roller force should be 400 gr ± 40 gr at point E.
If necessary, replace spring, item 125.

The pressure force of the recording/play-back head pad should be 15 - 25 gr. If necessary replace spring, item 126, Fig. 10.

Adjusting the toggle lever, item 81, Fig. 8

In position "recording" or "play-back" when the toggle lever is pressed against its stop, there should be 1 mm of play between the toggle lever and the erect tag on bracket, item 72. This can be adjusted by bending the erect tag.
In stop position, the toggle-lever spring pos. 103, should still have a residual force of at least 20 gr., measured at point A. Replace the spring if less than 20 gr., Fig. 11.
Stand-by bracket apring, item 80, in stop position still should have a residual force of at least 100 gr., measured at point D. If less than 100 gr., replace the spring, Fig. 9

Adjusting the winding rollers, item 94

In winding position, the winding rollers should be 0.1 to 0.5 mm away from the lower rim of the reels. If necessary, fill up with washers, item 93, code number 4822 175 01169.

Winding, Fig. 13

The winding time for 360 m L.P. should be ≤ 180 sec.
The counter friction should be 15 to 25 gr. at the re-winding reel.
The winding friction should produce 15 to 25 gr. tape tension force.
If necessary, clean the friction discs and the brake blocks in the friction discs or replace the brake blocks in the friction discs.

Adjusting the brake bracket, Fig. 12

When the grommet, item 59, is against the right-side reel, the left-side brake bracket should be 0.2 - 0.5 mm away from the left-side reels. This can be adjusted by bending the left-side brake bracket tag in point A.

ADJUSTING TAPE TRANSPORT

Adjusting the tape guides

The left-side tape guide should be adjusted so that the upper track of the erase head is visible up to 0.2 mm above the tape.
The right-side tape guide should be adjusted so that the tape runs free from the reel in playing and winding positions and does not show a visible loop between capstan and tape guide.

Adjusting the height of the recording/play-back head

. Insert the tape.
. Set the apparatus to position "play-back".
. Adjust the head by means of the screws, item 107A, so that the tape no longer loops between the tape guides and the recording/play-back head.

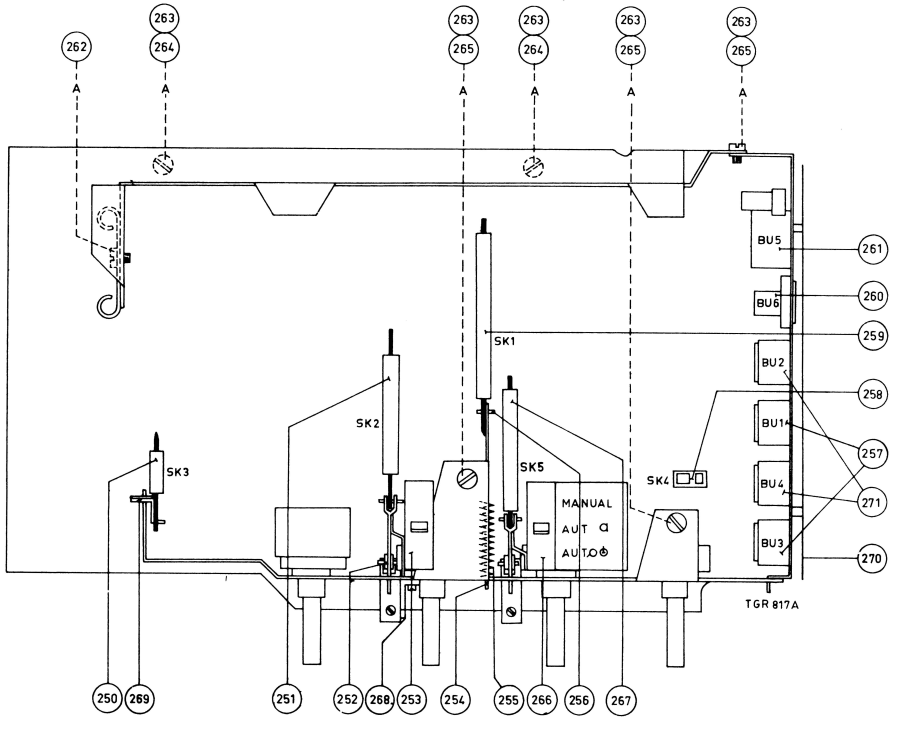


fig. 15

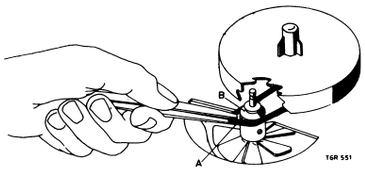


Fig. 1

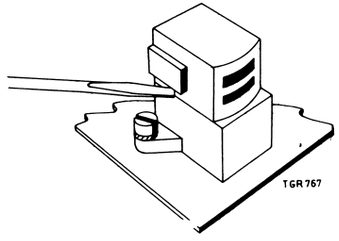


Fig. 2

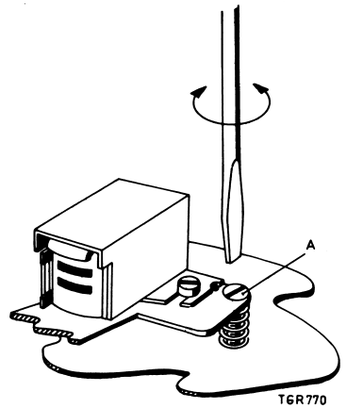


Fig. 3

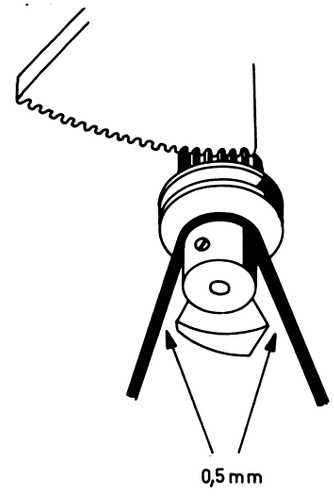


Fig. 4 TGR 778

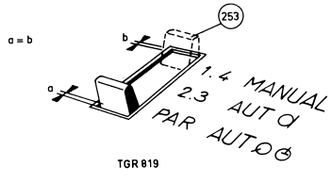


Fig. 5

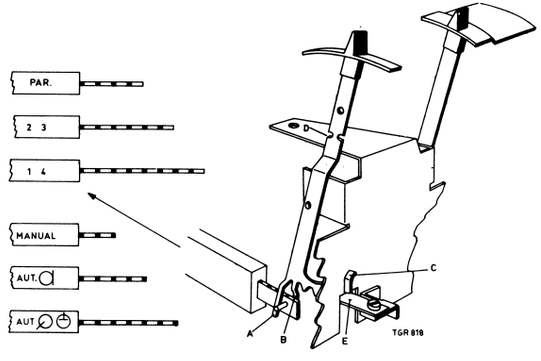


Fig. 6

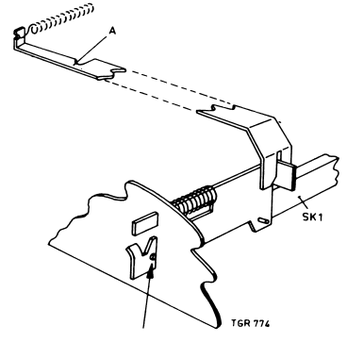


Fig. 7

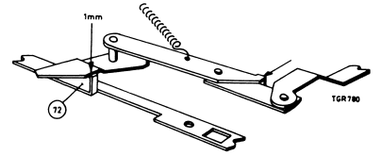


Fig. 8

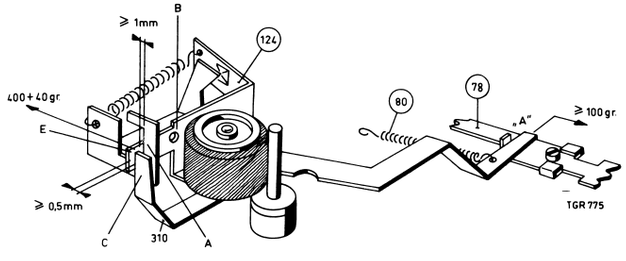


Fig. 9

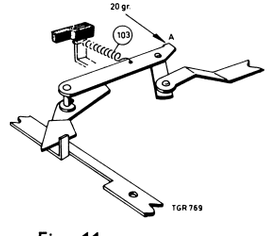


Fig. 11

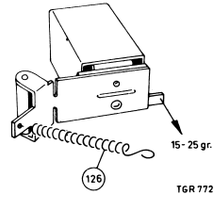
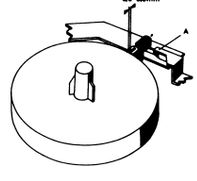


Fig. 10



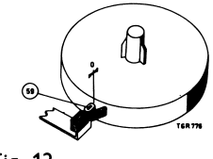
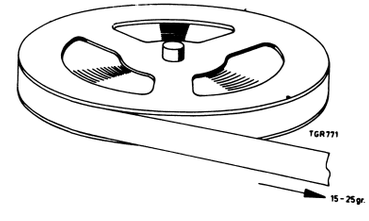


Fig. 12



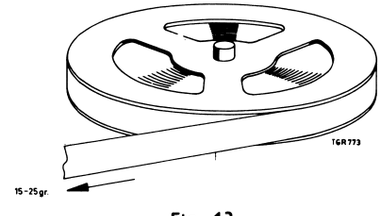


Fig. 13

PHILIPS MODEL EL3558

EXPLODED VIEW Fig. 14

Item	Code number	Description
1	985/4	Locking ring, 4 mm
2	986/5	Pressure spring-washer, 5 mm
3	987/3	Lock washer, external teeth,3 mm
4	999/3x5	Cheese-head screw, 3x5 mm
5	985/6	Locking ring, 6 mm
6	999/3x15	Cheese-head screw, 3x15 mm
7	989/3	Spring washer, 3 mm
8	990/3,5x35	Spacer (shorten to 4 mm)
9	985/3,2	Locking ring
10	999/4x6	Cheese-head screw, 4x6 mm
11	987/4	Lock washer, external teeth,4 mm
12	984/3	Locking ring, 3 mm
13	999/3x10	Cheese-head screw, 3x10 mm
14	988/3	Washer, 3 mm
15	993/M4	Hexagonal nut, 4 mm
16	988/4	Washer
17	990/4,5x50	Spacer
18	999/3x10	Cheese-head screw
19	997/3x10	Set screw
20	985/7	Locking ring
21	B 054 ED/2,6x6	Cheese-head screw
22	999/2,6x8	Cheese-head screw
23	998/4x30	Screw, 4x20
24	989/4	Spring washer
25	995/4x150	Screw, 4x65
50	4822 175 01282	Reel disc
51	4822 175 01281	Friction ring, felt
52	4822 175 01279	Friction disc, nylon
53	4822 175 01341	Ring, teflon
54	4822 175 01343	Brake block
55	4822 175 01283	Friction disc
56	4822 175 01331	Bracket
57	4822 175 01346	Spring
58	4822 175 01285	Brake block
59	4822 175 01347	Brake block
60	4822 163 01019	Key, white
60A	4822 175 01396	Bracket
61	4822 163 01022	Key, red
62	4822 175 01292	Spring
63	4822 163 01021	Knob, stop
64	4822 163 01023	Knob, interval stop
65	4822 175 01369	Leaf spring
66	4822 175 01297	Pulley
67	4822 175 01293	Flywheel with shaft
68	4822 175 01367	Spring
69	4822 175 01371	Knob, white
70	4822 175 01368	Spring
71	4822 175 01349	Ring
72	4822 175 01287	Bracket
73	4822 175 01117	Bracket
74	4822 175 01338	Bracket
75	4822 175 01337	Brake bracket
76	4822 185 01322	Spring
77	4822 175 01191	Brake block, interval stop
78	4822 175 01294	Bracket
79	4822 175 01114	Bracket
80	4822 175 01323	Spring
81	4822 175 01316	Pulley with shaft
81A	WHB 045 TU/2,5	Clamping ring
82	4822 175 01318	Shift piece
83	4822 175 01296	Pulley
84	4822 175 01317	Pulley
85	4822 175 01298	Belt, counter
86	4822 175 01344	Spring
87	4822 175 01324	Leaf spring
88	A3 311 15	Lamp holder
89	4822 175 01315	Belt, flywheel
90	4822 163 01024	Insulation plate
91	4822 175 01295	Counter
92	4822 175 01312	Erase head
93	4822 175 01169	Ring
94	4822 175 01109	Pulley
95	4822 175 01306	Tape guide, left-hand
96	89 205 01	Kogel
97	4822 175 01285	Brake block
98	AE 017 48	Ring
99	4822 175 01168	Ring
100	4822 163 01013	Grommet
101	4822 175 01301	Pressure felt
102	4822 175 01383	Bracket
103	4822 175 01302	Spring
104	4822 175 01335	Bracket
105	4822 175 01321	Spring
106	4822 175 01319	Speed switch
107	4822 163 01027	Drive belt
107A	4822 068 00668	Screw
108	4822 175 01311	Erase head holder
109	4822 175 01308	Recording/play-back head
110	4822 163 01026	Dust cap
111	WT 730 89	Compression spring
112	4822 175 01422	Nut
113	4822 175 01307	Tape guide, right-hand
114	4822 175 01305	Bracket
115	4822 175 01304	Spring
116	4822 175 01379	Plate with flywheel bearing
117	4822 175 01284	Reel-disc, right-hand
118	4822 175 01341	Ring
119	4822 163 01012	Belt below right-hand reel-disc
120	4822 175 01342	Friction disc
121	4822 175 01102	Ring
122	4822 175 01101	Pressure roller
123	4822 175 01171	Ring
124	4822 175 01336	Pressure-roller bracket
125	4822 175 01299	Spring
126	4822 175 01348	Spring
127	4822 068 00754	Set screw, motor
128	4822 175 01139	Motor pulley
129	4822 175 01286	Motor
130	WY 832 07	Brush

ELECTRICAL PARTS LIST

TS1,2	AC172
TS3,8a,b	AC128
TS4,5,7,9	AC125
TS6	AC126
TS10	BCY34S
GR1	SR30B/500/250
GR2	OA79
GR3,4	BA100 of OA202
R71,72,76	916/GL2CK
R73,74	E 097 AC/50K
R75	916/DL4K+16K
T1	4822 117 00422
T2	4822 108 00703
T3	4822 117 00411
T4	4822 117 00407
LA1	8097D/71
R78,77	4822 071 00639
R68,69	4822 071 00685
R88	E 097 AC/20K
C1,23,39,37,22	909/Z10
C2,7,9,11,15	909/C25
C3	4822 069 00666
C5,24,41,8	909/W125
C10,13	4822 069 00592
C14,40	909/C25
C21	4822 069 00669
C42	4822 069 00916
C16,43	909/W250
C32,44,50	4822 069 00995
C18	4822 069 00598
C34,49,25	C 280 AA/P100K
C27	4822 069 01001

PRINT Fig. 15

Item	Code number	Description
250	4822 175 01277	Switch SK3
251	4822 175 01275	Switch SK2
252	4822 175 01326	Roller
253	4822 175 01276	Track switch
254	4822 175 01339	Bracket
255	4822 175 01274	Spring
256	4822 175 01327	Lens
257	979/5x180	5-pole plug
258	4822 175 01278	Switch SK4
259	4822 175 01273	Switch SK1
260	979/S2x4	Plug
261	979/S5x270	5-pole plug
262	999/2x8	Cheese-head screw
263	999/3x5	Cheese-head screw
264	PW 052 52	Ring
265	987/3	Lock washer, external teeth
266	4822 175 01419	Knob (automatic)
267	4822 175 01412	Switch SK5
268	4822 175 01402	Bracket
269	4822 175 01418	Bracket of switch
270	4822 175 01404	Plate
271	4822 175 01386	6-pole plug

CABINET Fig. 16

Item	Code number	Description
200	999/3x30	Cheese-head screw
201	4822 175 01272	Ring
202	4822 175 01259	Compression spring
203	4822 175 01258	Handle
204	998/3x10	Ornamental screw
207	4822 175 01271	Knob
208	4822 220 00371	Ring
209	4822 175 01266	Indicator
211	4822 175 01345	Level meter
212	4822 175 01401	Wire spring
213	4822 175 01267	Knob
214	4822 175 01333	Leaf spring
215	4822 175 01255	Cover plate
216	4822 175 01415	Top cabinet
217	4822 175 01416	Bottom cabinet
218	4822 175 01417	Lid
219	WT 886 86	Voltage adapter
220	4822 175 01261	Wire spring
225	4822 175 01328	Lens
226	4822 175 01409	Lid
227	4822 175 01406	Screw
228	999/4x25	Screw
229	4822 175 01408	Lens
230	4822 175 01405	Ring
231	4822 175 01407	Cabinet (wood)
232	998/3x10	Ornamental screw
233	4822 175 01419	Knob, automatic
234	4822 175 01414	Front
	4822 403 30014	Bracket without knob (track selector)
	4822 403 30015	Bracket without knob (automatic selector)

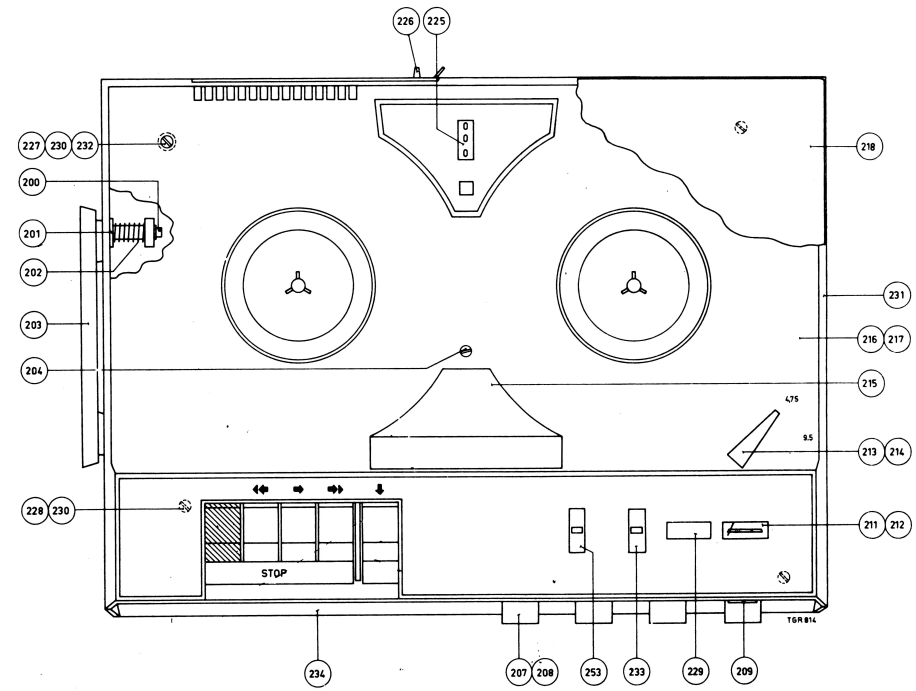


Fig. 16

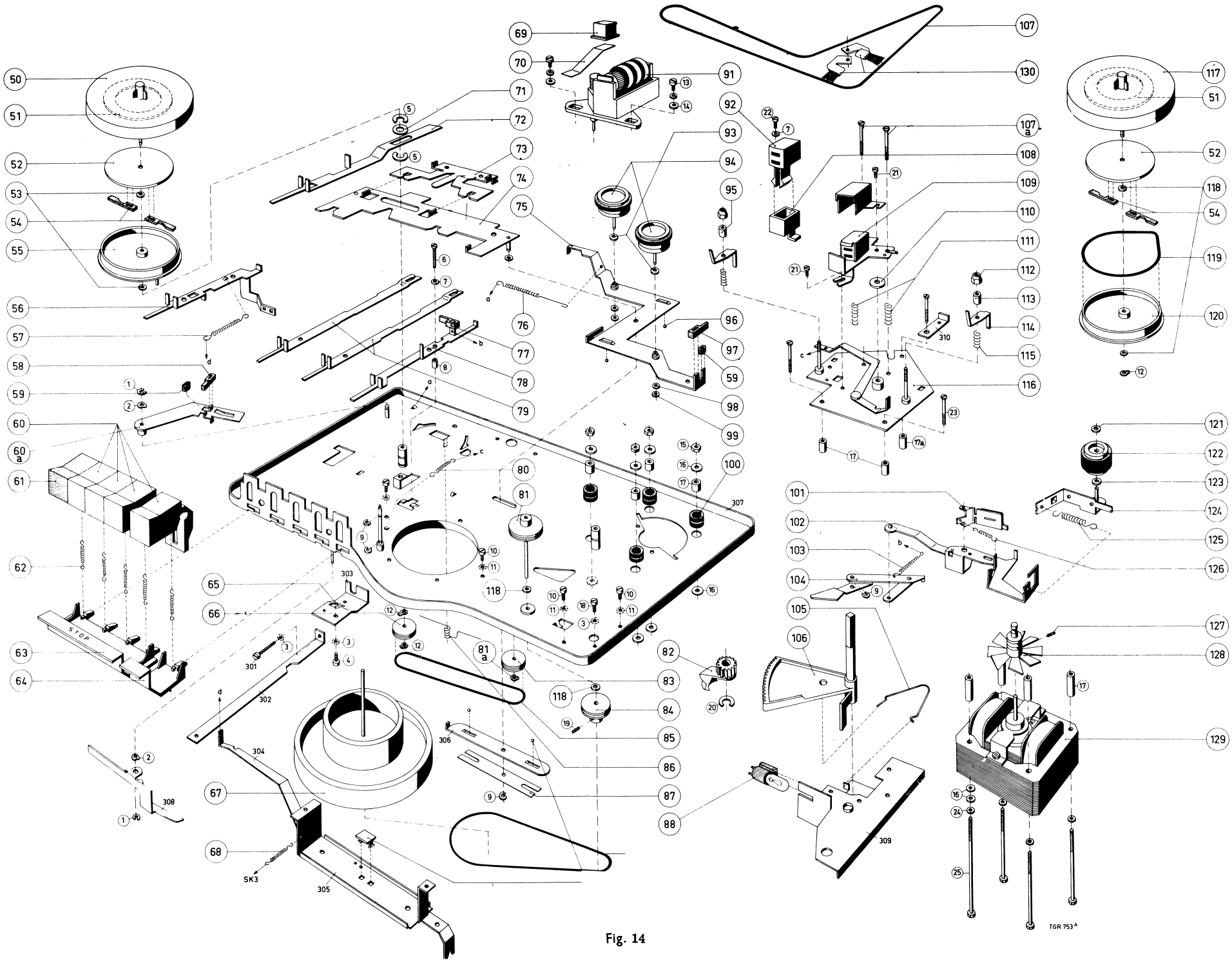


Fig. 14

PHILIPS MODEL EL3558

ELECTRICAL ADJUSTMENTS AND MEASUREMENTS

From AH01 44/65 onward the apparatuses were equipped with 6 pole DIN plugs for BU2 and BU4. Also the position of the print tracks was altered and these tracks were sprayed with a green point to prevent short-circuits when soldering.
The measuring points have been moved to the centre points of BU2 and BU4, see Figs. 20 and 21.

Play-back amplifier

- Replace the loudspeaker by a 4-Ω resistor.
- Set the apparatus to position "play-back".
- Turn volume and tone control to maximum.
- Apply a 1 kc/s - 28 mV signal to measuring point (MP) via a 22-kΩ resistor.
- The voltage across the 4-Ω resistor should then amount to 450 mV ± 2 dB.

Play-back line output

- Set the apparatus to position "play-back".
- Apply a 1 kc/s - 28 mV to the measuring point (MP) via a 22-kΩ resistor.
- The voltage on the line output should then be 75 mV ± 2 dB.

Play-back headphone

- Set the apparatus to position "play-back".
- Apply a 1 kc/s - 28 mV signal to the measuring point (MP) via a 22-kΩ resistor
- The voltage on the headphone output should then be 490 mV ± 2 dB.

Frequency response curve

- Set the apparatus to position "play-back".
- Turn the volume control to minimum.
- Apply a 1000 c/s signal so that the voltage on the line output is 77.5 mV.
- Keep the input signal constant.
- The following should be measured on the line output :

Frequency	dB
125	16
1000	0
6000	-2 5
10000	-2.5

Sensitivity of the pick-up amplifier, Fig. 17

- Only depress the recording button.
- Apply a 1 kc/s signal according to Fig. 17 to the different inputs of the amplifier.
- Microphone and radio volume controls at maximum.
- Play-back volume control off.
- Speed selector in position 9.5 cm/sec.
- The following voltages should be measured :

	Voltage on input	Voltage on measuring point	Tolerance
P.U.	55 mV	2.8 mV	± 2 dB
Radio	135 mV	2.8 mV	± 2 dB
Microphone	28 mV	2.8 mV	± 2 dB

Adjusting the pre-magnetising current

When adjusting the pre-magnetising, a compromise must be found between the frequency-response curve and the distortion. When the pre-magnetising current is too small, distortion arises. When it is too large, the high notes are attenuated.
The pre-magnetising current causes a voltage-drop across the measuring resistor (MP) of 10-25 mV (target value 18 mV) and is adjusted with R73 and R74 so that no distortion is audible yet.
The most favourable setting can be achieved experimentally, by alternately making a test recording and changing the setting of R73 and R74.

Indicator

- Only depress the recording button.
- Apply a signal of 1 kc/s to points 2 and 3 of BU1.
- Set the volume control to maximum.
- Next, adjust the voltage so that 2.8 mV is measured on the measuring point.
- The pointer of the meter should then be in a range limited by 2 mm left or right of the division.
- If the signal is removed from the output, the meter should show maximal 1 mm forward deflection under influence of the bias.

NOTE

Throughout the production, R49 may have been replaced by a resistor of 22 K, 33 K or 39 K. A resistor of 68 K may also have been soldered in parallel with R49 on the bottom side of the print. The above alterations depend on the amplification factor of TS9 (AC125).
When replacing TS9, the amplification factor can be checked by checking the indicator as has been described in the Service Notes.
Should the indicator deflect beyond 2 mm from the separation zone, then R49 should be replaced by resistor of a higher value, namely 22 K, 33 K or 39 K.
Should the indicator fail to deflect to 2 mm from the separation zone, then a resistor of a lower value should be applied and, if required, a 68 K resistor should be soldered in parallel with R49.

Frequency response curve

- Depress the recording button.
- While the radio volume control is at maximum, apply a 13.5 mV voltage to the radio input.
- Next, record several frequencies with constant input voltage between :

  60 c/s to 8 kc/s for 4.75 cm/sec.
  60 c/s to 15 kc/s for 9.5 cm/sec.

- When playing back, the output voltages with the different frequencies mutually should not differ more than 6 dB.

Biasing voltage and currents

- Connect the apparatus to 220 V ± 1 %, 50 c/s and measure with an universal meter of 20000 Ω/V.
- Set the apparatus to position "play-back", except for the oscillator (TS3) and the meter (TS9); in the latter two cases it should be in position "recording"
The following voltages and currents should then be measured with a tolerance of 20%.

TS	Collector	Emittor	Condensator
1	4 V	8 V	C44 22.7 V
2	1.5 V	8 V	C32 21 V
3	8.5 V	0.4 V	C16 15.5 V
4	10 V	4 V	C10 10 V
5	10 V	5 V	C8 10 V
6	12 V	4 V	I total, without signal
7	18 V	4 V	30 mA
8a	22 V	9.5 V	I total, max. output 1.8W
8b	10 V	-	200 mA
9	14.7 V	7.9 V	

Setting of R88.

. Apply a signal of 55 mV, 1 kc/s, to the pick-up input, according to Fig. 17 of the Service Notes.
. Automatic switch in pos. "Aut.".
. Short-circuit capacitor C52.
. Adjust R88 so that 2,8 mV is present at the measuring point.
. Remove the short-circuit.

Checking the automatic recording volume control

. Apply the signal as indicated above; however, 550 mV.
. Attenuate the input voltage in one step to 55 mV.
. The output voltage should rise to 1,4 mV within 1 - 4,5 min.
. In this position of the apparatus, the radio volume control may not influence the amplification.

Due to delivery problems and the amplification factor concerning TS10, the following circuits may occur :
1x BCY40, or 1x BCY34, or 1x BCY34S, or 1x BCY33
Also the following cases may occur :
2x BCY34, or 1x BCY33
In the latter two cases, a resistor of 2M7 has been connected in parallel to C52, see Fig. 18A.
The amplification factor of TS10 can be checked by measuring the automatic amplification.
When making repairs, however, replace TS10 by BCY34S.

TROUBLE SHOOTING

PHENOMENON	POSSIBLE CAUSE	REMEDY
1. Apparatus does not work at all.	1. a. Defective thermal fuse on mains transformer. b. Interrupted mains flex/plug.	1. a. Trace the fault, if any, and replace fuse. b. Check by means of an Ohmmeter.
2. Apparatus does not work mechanically.	2. a. Cord or cords have run off the pulley. b. Defective motor.	2. a. Refit the cord or cords or replace. b. Check the motor bearing or replace the motor.
3. Apparatus does not wind fast.	3. The winding idler wheel slipping on the right-side turntable.	3. Degrease with methylated spirits or alcohol.
4. Apparatus does not rewind fast.	4. Rewinding idler wheel slipping.	4. Degrease with methylated spirits or alcohol.
5. Apparatus brakes poorly or not at all.	5. Brake shoe is greasy, dirty or worn.	5. Degrease with methylated spirits or replace brake shoe.
6. Apparatus does not record.	6. a. Fault in amplifier. b. Recording/play-back head with short circuit winding. c. Too large a biasing current.	6. a. Locate the fault and repair. b. Replace the head. c. Readjust the biasing current.
7. Apparatus does not play-back.	7. Fault in amplifier.	7. Locate the fault and repair.
8. Apparatus whines.	8. a. Greasy driving cord. b. Winding friction of right-side turntable irregular. c. Pressure roller does not run smoothly. d. Capstan is bent. e. Counter operates too heavily. f. Speed selector mechanism operates too heavily.	8. a. Degrease with methylated spirits or replace cord. b. Clean the friction. c. Replace pressure roller. d. Replace the flywheel. e. Clean or replace counter. f. Clean or, if necessary, replace mechanism.
9. Loop forming after switching to "play-back".	9. Incorrect winding friction of the right-side turntable.	9. a. Clean the friction and adjust the spring pressure. b. Clean the cord or replace.
10. Noise during play-back.	10. a. Fault in amplifier. b. Magnetised recording/play-back head.	10. a. Locate the fault (transistor) and repair. b. Switch the apparatus a few times on and off in position "recording".
11. Distortion during recording.	11. a. Tape is not properly pressed against the recording/play-back head. b. Too small a biasing current. c. Fault in amplifier.	11. a. Check the pressure felt against recording/play-back head. b. Readjust the biasing current. c. Locate the fault and repair.
12. Tape is wound insufficiently taut during fast rewinding.	12. Friction of right-side turntable insufficient.	12. a. Check if cord is streched (replace if necessary). b. Clean friction disc and brake blocks.
13. Tape is wound insufficiently taut during fast winding.	13. Friction of left-side turntable insufficient.	13. a. Check whether the cord is streched (replace if necessary). b. Clean friction disc and brake blocks.
14. Distorted sound.	14. a. Worn pressure felt for recording/play-back head. b. Dirty tape. c. Groove in tape guide of recording/play-back head. d. Dirty recording/play-back head.	14. a. Replace the pressure felt pad and check the pressure. b. Replace or clean the tape. c. Replace the recording/play-back head and readjust. d. Clean the recording/play-back head with methylated spirits or alcohol.
15. Hum during play-back.	15. Mu-metal screening does not properly fit the recording/play-back head.	15. Slightly bend the bracket.
16. Tape is erased poorly or not at all.	16. a. Dirty erase head. b. Defective erase head.	16. a. Clean the erase head with methylated spirits or alcohol. b. Replace erase head.

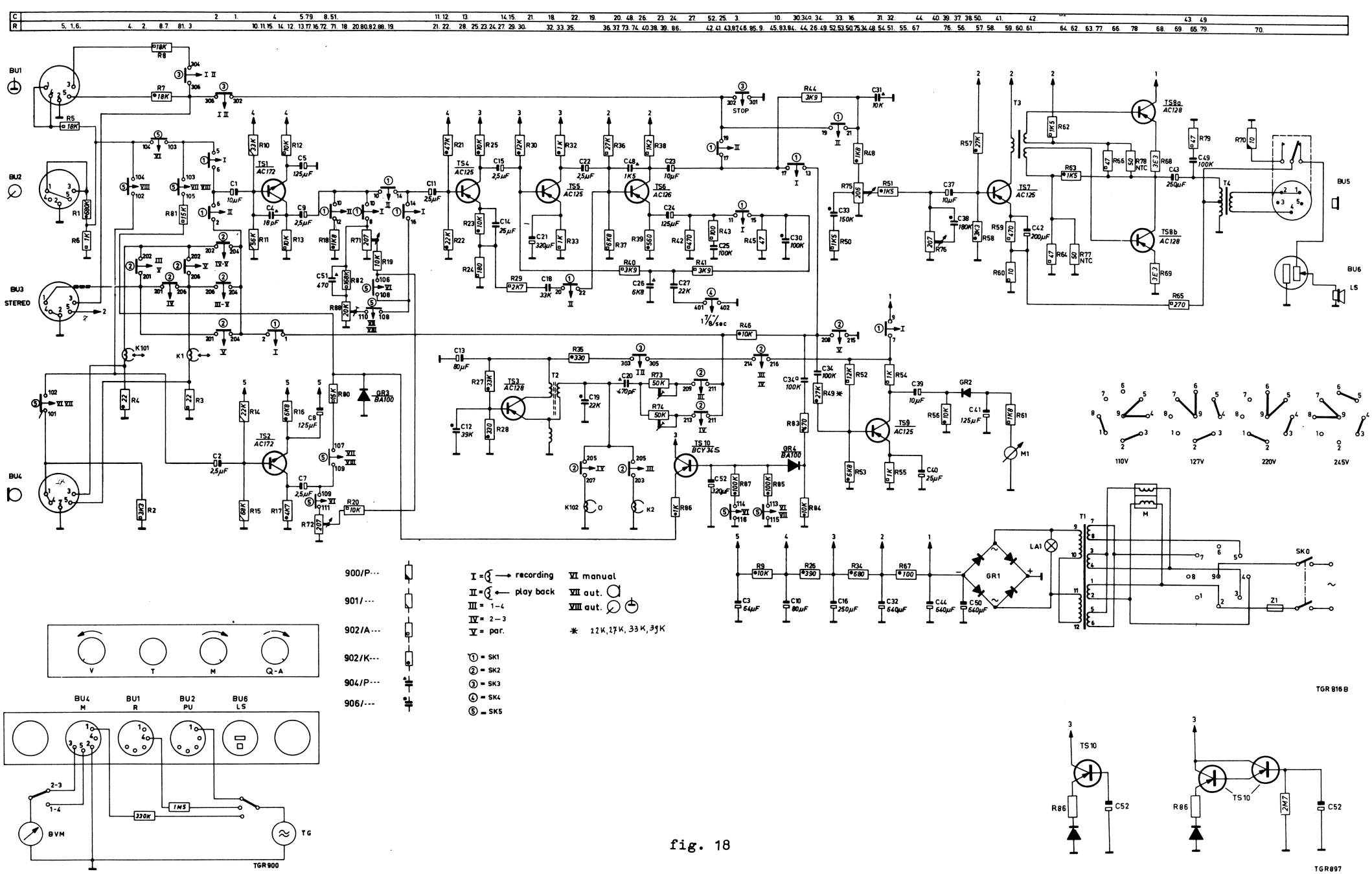

BU1
BU2
BU3
STEREO
BU4
BU5
BU6
LS
TS1 AC172
TS2 AC172
TS3 AC128
TS4 AC125
TS5 AC125
TS6 AC126
TS7 AC125
TS8a AC128
TS8b AC128
TS9 AC125
TS10 BCY34S
GR1
GR2
GR3 BA100
GR4 BA100
K101
K1
K102
K2
STOP
1 7/8 sec
LA1
M1
M
SK0
Z1
T1
T2
T3
T4
110V
127V
220V
245V
900/P···
901/···
902/A···
902/K···
904/P···
906/···
I = recording
II = play back
III = 1-4
IV = 2-3
V = par.
VI manual
VII aut.
VIII aut.
* 12K, 27K, 33K, 39K
① = SK1
② = SK2
③ = SK3
④ = SK4
⑤ = SK5
V
T
M
Q-A
BU4 M
BU1 R
BU2 PU
BU6 LS
2-3
1-4
330K
1M5
BVM
TG
TGR900
TGR816B
TGR897

fig. 18

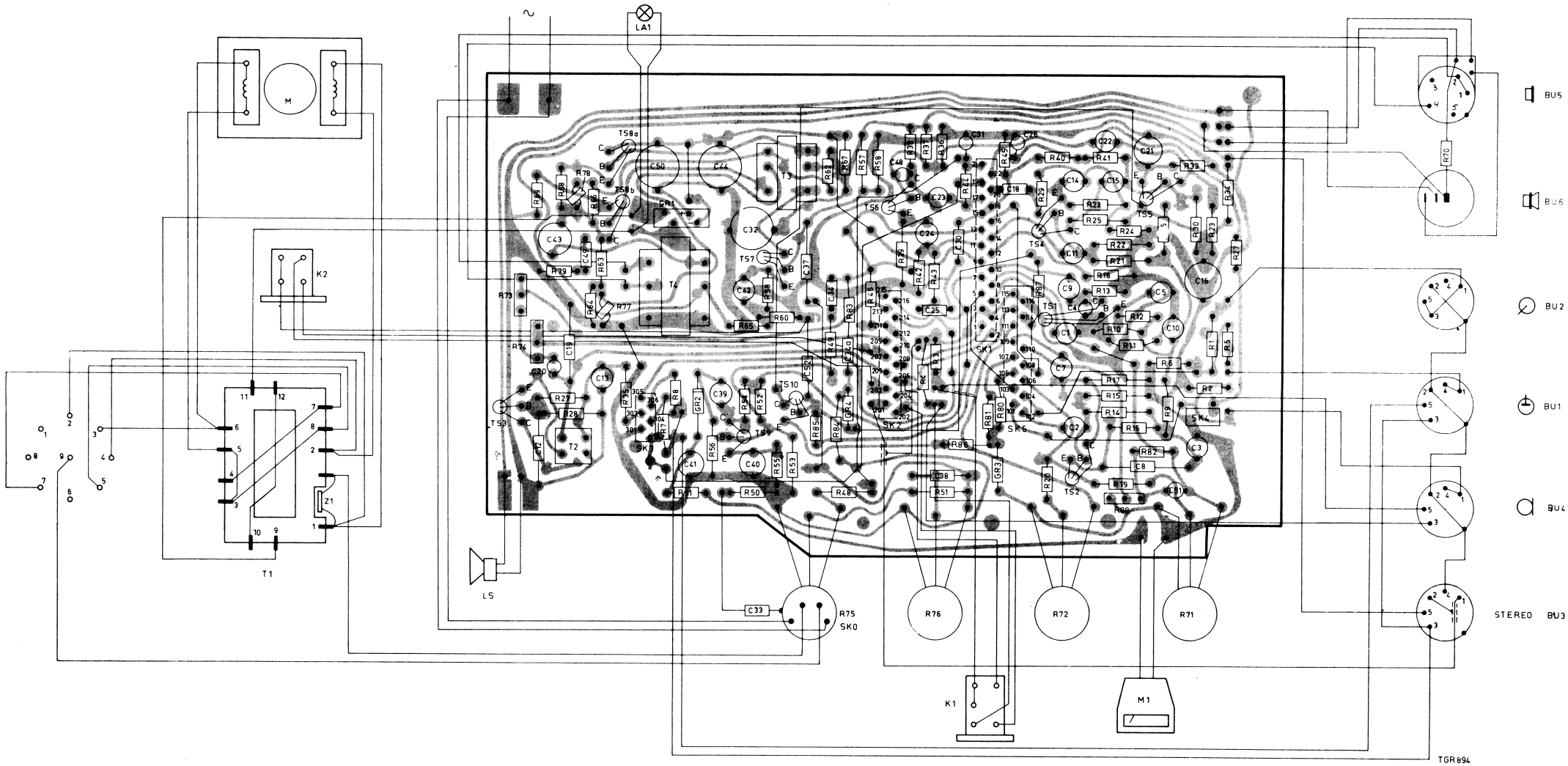

LA1
M
K2
T1
Z1
LS
K1
M1
BU5
BU6
BU2
BU1
BU4
STEREO BU3
R75 SK0
R76
R72
R71
TGR894

fig. 19

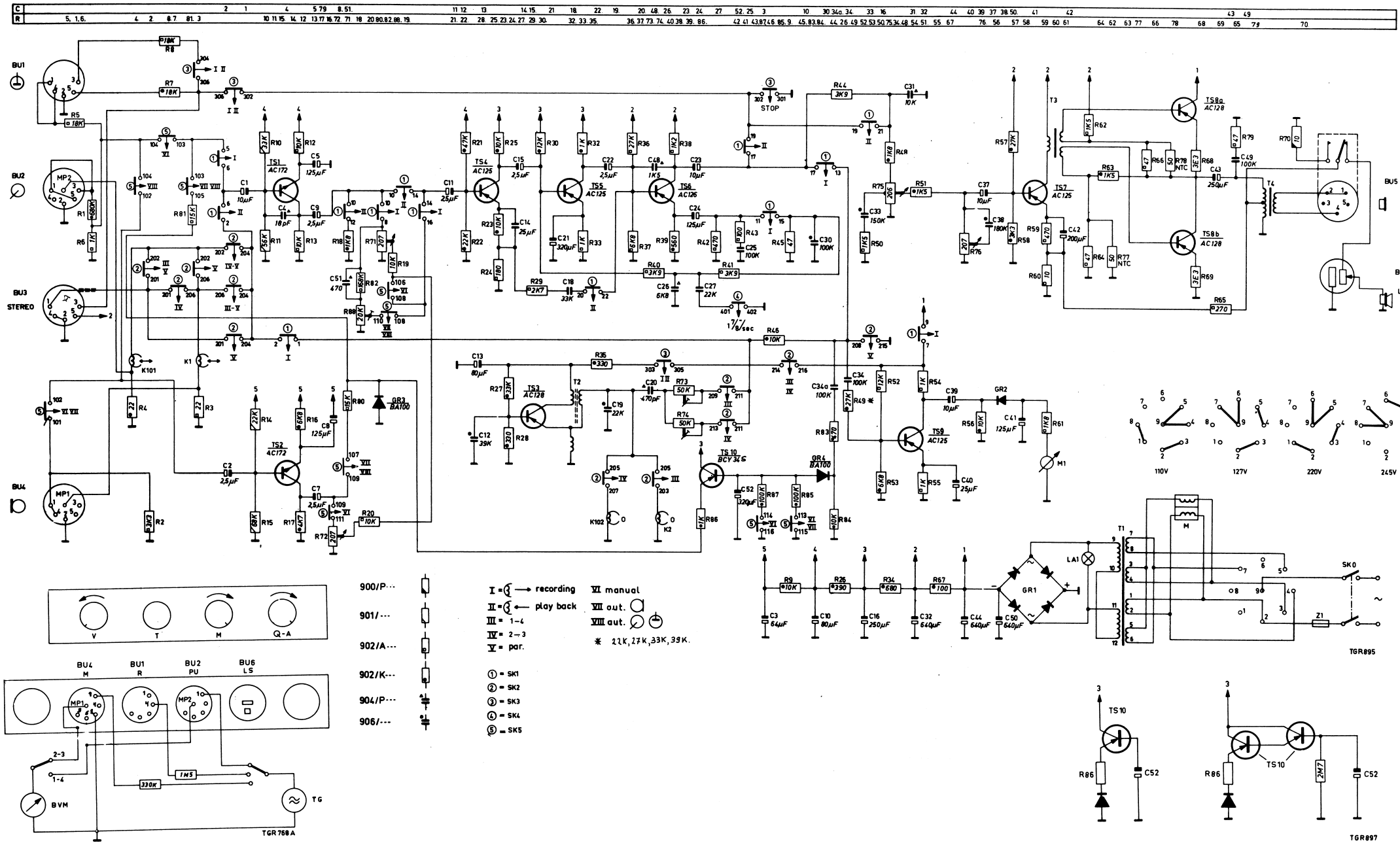


fig. 20

fig. 21

fig. 21a

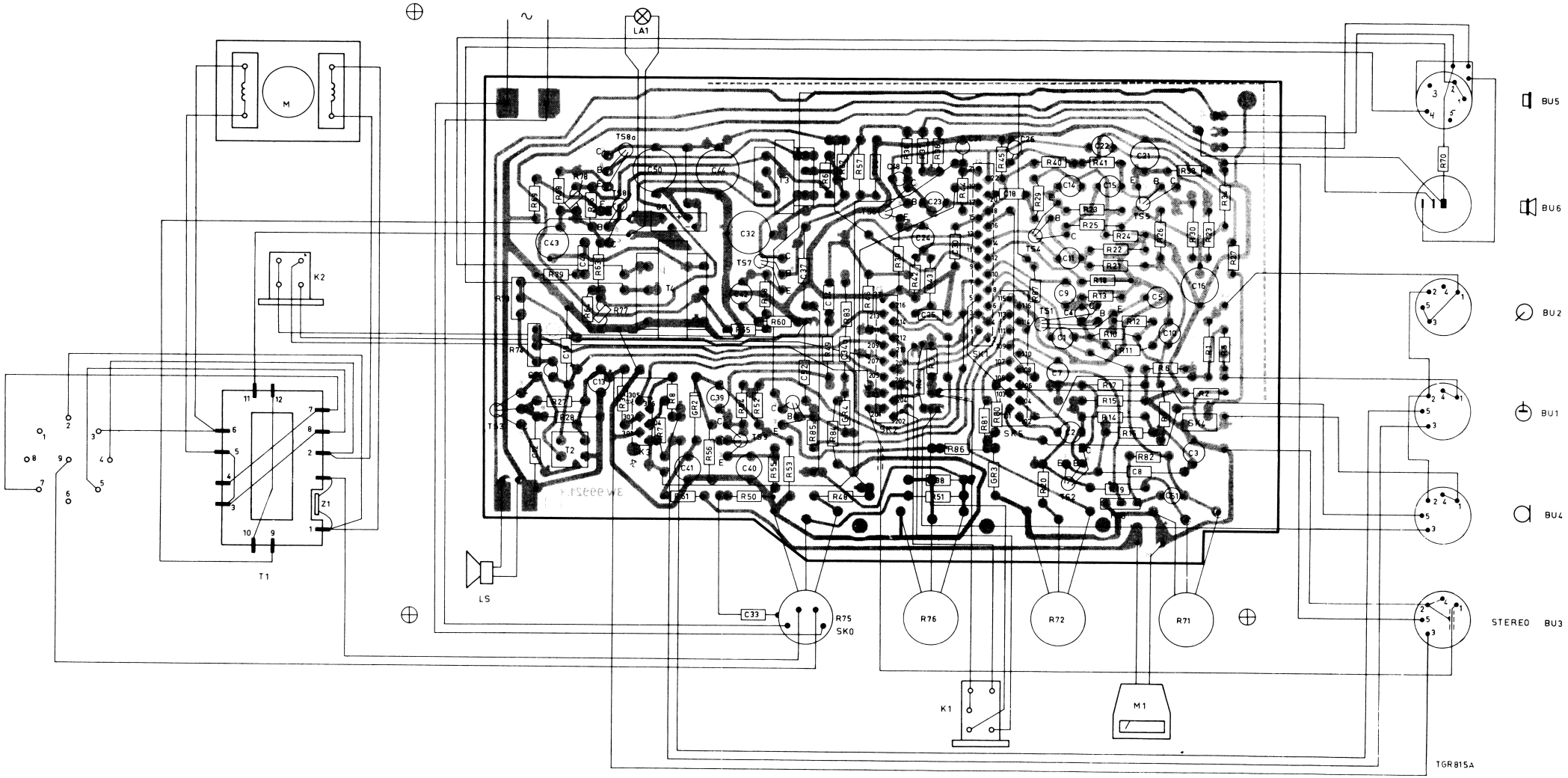

LA1
M
K2
T1
Z1
LS
K1
M1
BU5
BU6
BU2
BU1
BU4
STEREO BU3
R75
SK0
R76
R72
R71
TGR815A

fig. 22

PHILIPS Service

INFORMATION

RECORDERS

7-3-1965	EL 3558	Bc 615

DESCRIPTION OF THE AUTOMATIC RECORDING VOLUME CONTROL

GENERAL INFORMATION

In the above apparatus the variable resistance of a germanium or silicon diode is used for automatic volume control. This resistance depends on the direct current that is passed through the diode. This can be derived from the diode characteristic, drawn below, fig. 1.

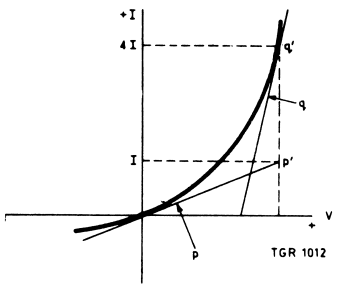


Fig 1

In point i the resistance is equal to the slope of the tangent P' and is V/I. In point q the resistance is equal to the slope of the tangent q' and is V/4I. This means that the resistance in point q is four times as small as the one in point P. If the diode with a resistance is placed in a potentiometer circuit, the value of Vũ will depend on the direct current present (Fig. 2).

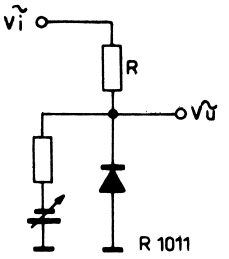


Fig. 2

Since the diode caracteristic is curved, the a.c. voltage signal will have to be very small, in order to prevent distortion.

Practical application (Fig. 3)

The signal coming from radio or gramophone is supplied to the base of TS2 via C2.

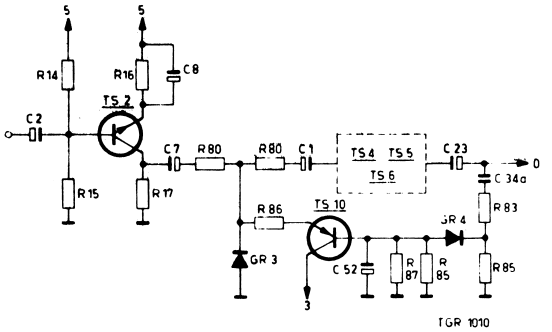


Fig. 3

Via C7 - R80/GR3/R81 - C1 is applied to the base of TS1.
Next, the signal is amplified by TS4...TS6. Via C23 - C34a the signal is supplied to R83/R84. From the junction of R83 - R84 onwards. GR4 rectifies the signal.
Consequently, C52 is negatively charged to a certain voltage dependent on the intensity of the signal to be recorded. This means that the base voltage and, therefore, the emitter voltage depend on the signal intensity. Via R86, this rectification is supplied to diode GR3.
The diode is in passing direction and, therefore, a current will pass through the diode. With a weak input signal the diode current will be small and, consequently, the resistance of the diode will be high.
With a strong input signal the diode current will increase and the diode resistance decrease. The signal between TS2 and TS1 will then be attenuated considerably. The output a.c. voltage on point 0 will then become independent of the input voltage.
To maintain the dynamics of music the balancing time has been made very long via capacitor C52 and the leakage current of TS10.
For speech this time is shorter, because R85 is connected in parallel with C52.