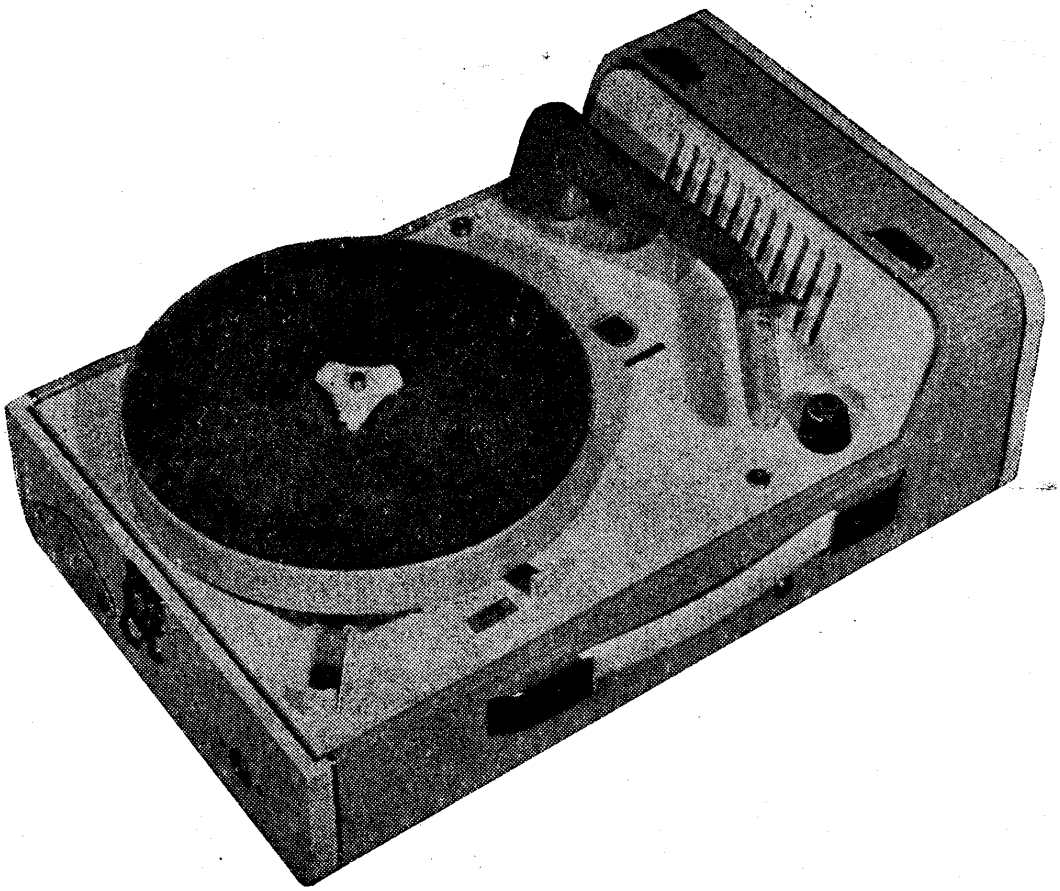
SERVICE MANUAL

PHILIPS



Record Player Type AG4049

CENTRAL SERVICE DEPARTMENT
WADDON FACTORY ESTATE
CROYDON SURREY

NOVEMBER 1960

Telephone . . . CROydon 7722
Grams . Philiserve Croydon

Price 2s 6d

CIRCULATION RESTRICTED TO THE RADIO TRADE

Vintage Service Data CD-Rom

SERVICE INFORMATION FOR THE

PHILIPS RECORD PLAYER

TYPE AG4049

GENERAL DESCRIPTION

The AG4049 consists of a four-speed record player unit, and a transistor amplifier mounted on a printed wiring panel. A socket is fitted at the side of the instrument so that an additional amplifier (or radio receiver) can be connected for the reproduction of stereophonic records.

An automatic stop is operated at the end of each record. This disconnects the 6 V. L.T. supply from both player and amplifier and returns the switch lever to the off position.

TECHNICAL DATA

Turntable Speeds	$16\frac{2}{3}$, $33\frac{1}{3}$, 45 and 78 r.p.m.
Motor	Low consumption D.C. commutator motor with governor speed stabilisation.
Pick-up Head	Type AG3016.
Transistors	Tr1. OC71/AG9147—Input Amplifier. Tr2. OC71/AG9147—Driver Amplifier. Tr3 and 4 OC74—Push-Pull Output.
Output Power	500 mW. (approx.).
Loudspeaker	High efficiency 4" dia. 3Ω Impedance.
Consumption	80 mA. (approx.).
Battery Types	4 x 1.5 V. batteries are fitted with the positive connection facing the outside of the cabinet. Any of the following types are suitable:— Ever Ready U2 — Oldham K532 Exide T20 — Siemens T1 G.E.C. BA6103 — Vidor V0002
Cabinet Dimensions	Width 10". Length 15". Depth 6".
Weight	9 lb.

REPRODUCTION OF STEREOPHONIC RECORDS

When setting up to play stereophonic records, the record player must be on the listener's left. The additional amplifier or radio receiver should be placed on the right at a distance between the loudspeakers of 6 to 9 feet. A suitable screened co-axial lead and cinch-type plug should be used to make the connection between the two instruments.

Ensure that a stereophonic pick-up head, AG3060, AG3063 or AG3301, is fitted and switch the player on. Adjust the volume controls on the record player and the amplifier or radio receiver to give the required balance between the two channels.

PRECAUTIONARY NOTES

Information concerning the use of transistors has been published in various technical journals and books. For engineers who are not yet familiar with the technique involved, the following notes may be of assistance. It will be evident that certain methods of fault-finding, measurements, etc., hitherto regarded as "normal," can cause damage to equipment using transistors.

1. Transistors are temperature conscious. The current which flows between base and collector (with emitter disconnected) is approximately doubled for every 7° C. temperature rise. This current is multiplied by the amplification factor when the emitter is grounded. There is a maximum working temperature above which the current will increase until the transistor is destroyed. Apart from working conditions, heat alone is detrimental and they should not be subjected to temperatures above 60° C. in storage, etc.

2. A temperature rise of about 1° C. is produced by a dissipation of about 2.5 mW. in a transistor. For this reason the output transistors are equipped with heat sinks which must always be fitted when the receiver is operative.

3. When a resistance meter is being used for fault-finding, care must be taken to ensure that the voltage applied from the meter battery does not exceed the normal circuit potential at the point being measured. Due to current flow through the transistors caused by the meter battery, false readings will be observed, when making resistance checks on some parts of the circuit. In these instances it will be necessary to disconnect the component under test.

4. Voltage surges can cause damage. Although low voltages are involved, it is essential to switch the apparatus off before replacing transistors and components. Soldering to the transistor leads must be done rapidly with the aid of a heat shunt (i.e., grip the leads with a pair of pliers).

5. Transistors are photo-electric. Glass cased units are painted black. This paint must not be scratched or chipped; whilst exposure to light does no harm, it will modulate the transistor current (e.g., such a transistor operating under a fluorescent light will produce hum).

6. Transistors are adversely affected by humidity. The glass cased units are fragile, and a crack may not be conspicuous. Ingress of moisture will cause the unit to deteriorate at a rate depending on the size of the flaw. Care must, therefore, be exercised in handling and storage.

7. The output transistors Tr.3 and Tr.4 are a matched pair. Should replacement of both transistors become necessary either a matched pair, or two medium spread characteristic transistors must be used. If only one transistor is replaced, sufficient closeness of tolerance should be achieved by fitting a medium spread transistor. It may in some cases, however, be necessary to replace both transistors to eliminate distortion.

Note.—The collector current must be adjusted after Tr.3 or Tr.4 has been replaced. (See Adjustment of Pre-set Controls.)

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ADJUSTMENT OF PRE-SET CONTROLS

1. If either or both output transistors are replaced, the collector current must be adjusted in the following manner: Connect a milliammeter between point A (junction of R14 and C7) and point B (centre tap of S6/S7). A link, which can be disconnected for this purpose, is provided on the top of the printed wiring panel adjacent to R15.

   Disconnect the motor and turn the volume control to minimum.

   Adjust R14 for a meter reading of 10 mA.

2. The pre-set control R7, in the emitter circuit of Tr.1, is provided to enable the amplifier to be adjusted for optimum gain with individual pick-up heads.

   When a replacement head is fitted, R7 should be adjusted to the point where distortion or microphony is just perceptible and then slightly retarded. The control is accessible through a hole in the front of the cabinet behind the handle.

REMOVING THE MOTOR BOARD AND AMPLIFIER

Remove the turntable.

Unscrew the three mounting board fixing nuts, remove the unit from the case and unsolder the battery and loudspeaker leads.

The amplifier plate can be separated from the mounting board after the four fixing screws and volume control knob have been removed and the motor connections unsoldered.

PICK UP HEADS AND ARM

1. Shorting links

The AG3016 pick-up head supplied with the instrument is fitted with a shorting link (49.956.54) as shown in Fig. 1.

If a replacement pick-up head is used it is necessary for a shorting link to be fitted.

When using stereophonic pick-up heads a shorting link (49.950.21) is required when playing monaural records only.

The shape and position of this is shown in Fig. 2.

2. Weight adjustment

Two pre-set adjustments and an owner adjustment enable the weight of the pick-up arm to be adjusted for monaural and stereophonic pick-ups.

When using the AG3016, AG3060, AG3063 pick-ups, the lever should be in the rear position " a " and the arm adjusted by altering the position of the stop plate 16 (Fig. 3) for the pick-up weight shown in Fig. 4.

When an AG3301 dual-purpose pick-up is being used, the lever at the side of the pick-up arm should be placed in the position " b " shown in Figs. 3 and 4, and the tension spring 2, Fig. 3, adjusted by altering its anchoring position, for a pick-up playing weight of between 4 to 6 grams.

3. Arm adjustment

The distance between the locking ring 11 of the pick-up arm spindle and the bottom of the moulding should be 0.5 mm. (see Fig. 5). Adjustment can be made by unscrewing fixing screw 3 and altering the position of bracket 4. The trip lever operating bracket 13 must be positioned so that the vertical section of the rod 20 moves centrally within the slot in the mounting board when the pick-up arm is moved over its full range of travel.

THE RECORD PLAYER

1. The Motor

The speed of the motor is controlled by switching the current to the motor coils on and off. This is achieved by means of the contact situated at the end of the motor shaft.

The contact opens when the motor has reached a certain speed and closes again when the speed of the motor has fallen to a pre-determined level. When the regulator contact is open, the voltage applied to the motor is dropped by the resistor connected across the switch contacts to 2.4v. By this means the speed is kep constant. Ajustment of this contact is made during manufacture and it should not be necessary to alter the setting. the motor is listed as a complete item in the spare parts list and is not repairable. A four-speed step spindle is fitted to the motor shaft.

2. Mechanical Checks and Adjustments

(a) The spring mounting of the motor should be adjusted so that the distance between the motor mounting plate 28 and the unit mounting plate 22 is 1.5 mm. (see Fig. 6). After adjustment the locking nut should be tightened and sealed with locking paint.

(b) The pressure of the idler wheel against the pulley should be 35-50 grams (see Fig. 10). If the pressure is above 50 grams, spring 45 should be carefully stretched, and if below 35 grams the spring should be shortened.

(c) The idler wheel should be 90° with respect to the turntable rim and motor pulley. In addition, the edges of the idler wheel should be at least 0.5 mm. from the adjacent speed steps of the spindle as shown in Fig. 7. Fig. 8 shows how the idler wheel bracket can be adjusted if the idler wheel is placed too low on the pulley. The bend must be made in the opposite direction if the position of the pulley is too high.

(d) In the 78 r.p.m. position with the switch lever in the " on " position, lip B of the idler wheel bracket 44 should be at least 0.3 mm. from the U bracket 33 (see Fig. 10). When making this check it is necessary for the idler wheel to be in the same position as when the turntable is fitted, and for this purpose a pair of vernier calipers will be required. Set the calipers to 101.5 mm. and place them over the turntable spindle and the idler wheel as shown. If necessary, adjustment can be made by bending lip B of the idler wheel bracket.

(e) In the 16 r.p.m. position with the switch lever in the " on " position, the distance between the idler wheel bracket 44 and lip A of the locating bracket 39 should be 0.5 mm. as shown in Fig. 11. Using the calipers as described in the previous paragraph, adjust if necessary by bending lip A of the locating bracket.

(f) When the switch lever is in the " on " position, the idler wheel bracket 44 should be at least 0.5 mm. from the stop bracket 23 on the mounting plate (see Fig. 9). Use vernier calipers as described above to ensure that the idler wheel is in its normal operating position while making this check.

(g) Spring 38 provides the tension between the locating bracket 39 and the speed selector lever 47 in the respective speed positions. The tension of spring 38 when measured as shown in Fig. 10 should not be more than 600 grams.

(h) The force required to switch the unit off, measured at the knob on the switch lever 37, should be a maximum of 200 grams. Adjustment is made by altering the pressure between the stop spring 48 and lever 37 (see Fig. 12).

(i) When the switch is in the " off " position the spring pressure against the lever 37 should be between 250 and 350 grams. This should be measured in the curve of the stop spring 48 as shown in Fig. 12. The switch lever must be held stationary while making this measurement.

(j) The distance between the turntable cam and the nylon block on lever 32 should be a minimum of 0.3 mm. with the switch lever in the " off " position (see Fig. 13).

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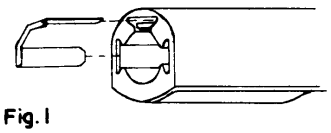

Fig. 1

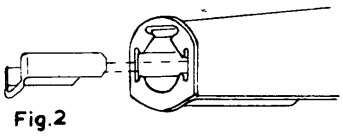

Fig. 2

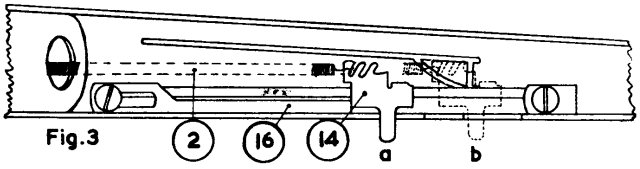

Fig. 3

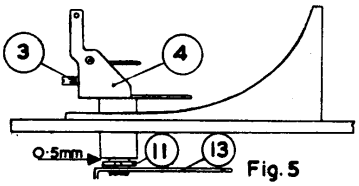

Fig. 5

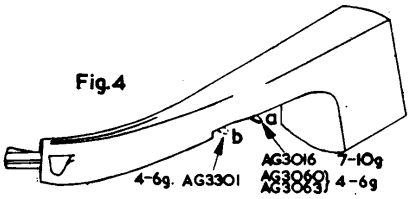

Fig. 4

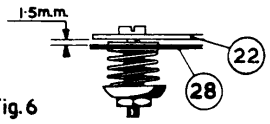

Fig. 6

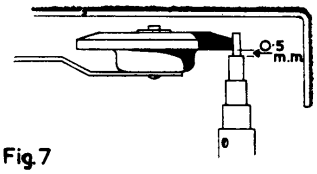

Fig. 7

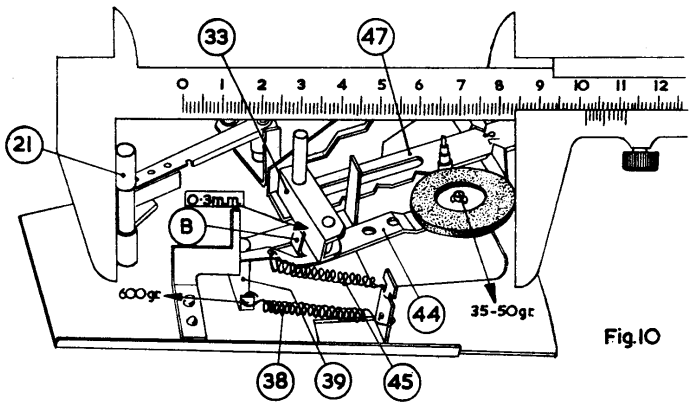

Fig. 10

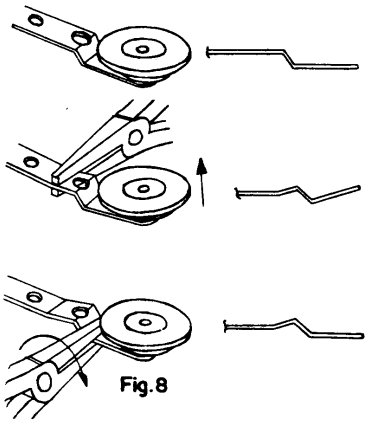

Fig. 8

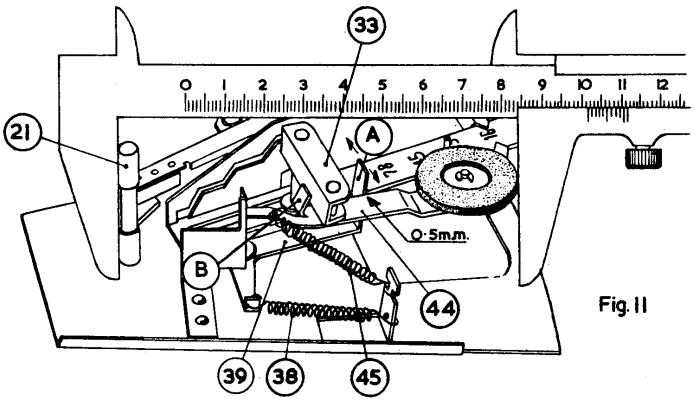

Fig. 11

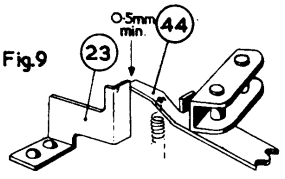

Fig. 9

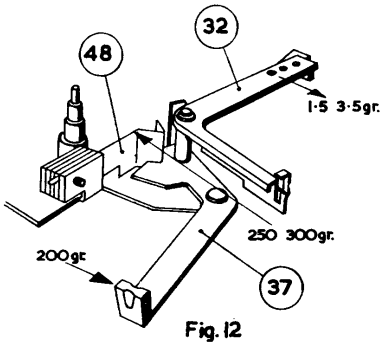

Fig. 12

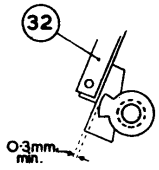

Fig. 13

SD 1656

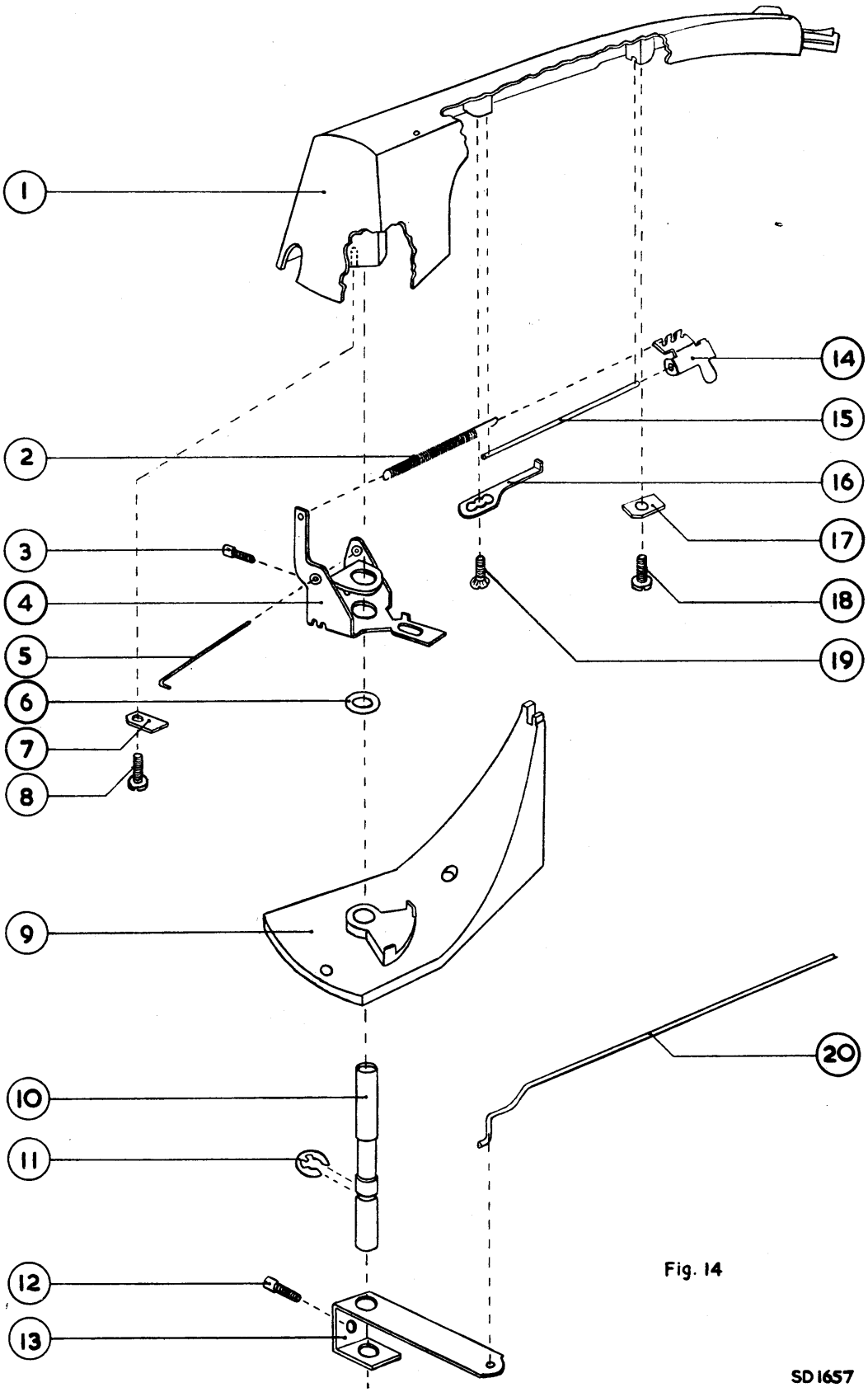

Fig. 14

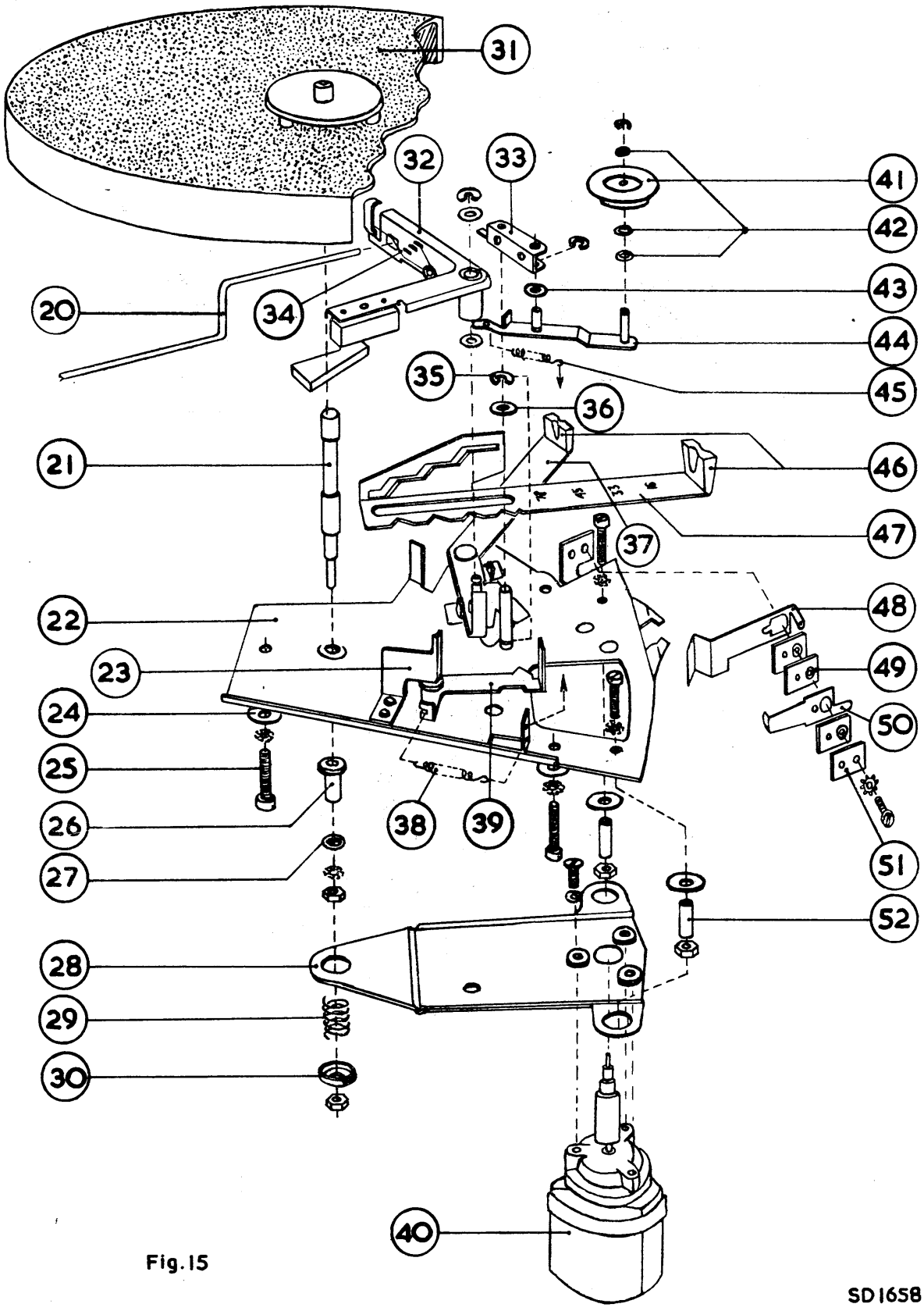

Fig. 15

SD1658

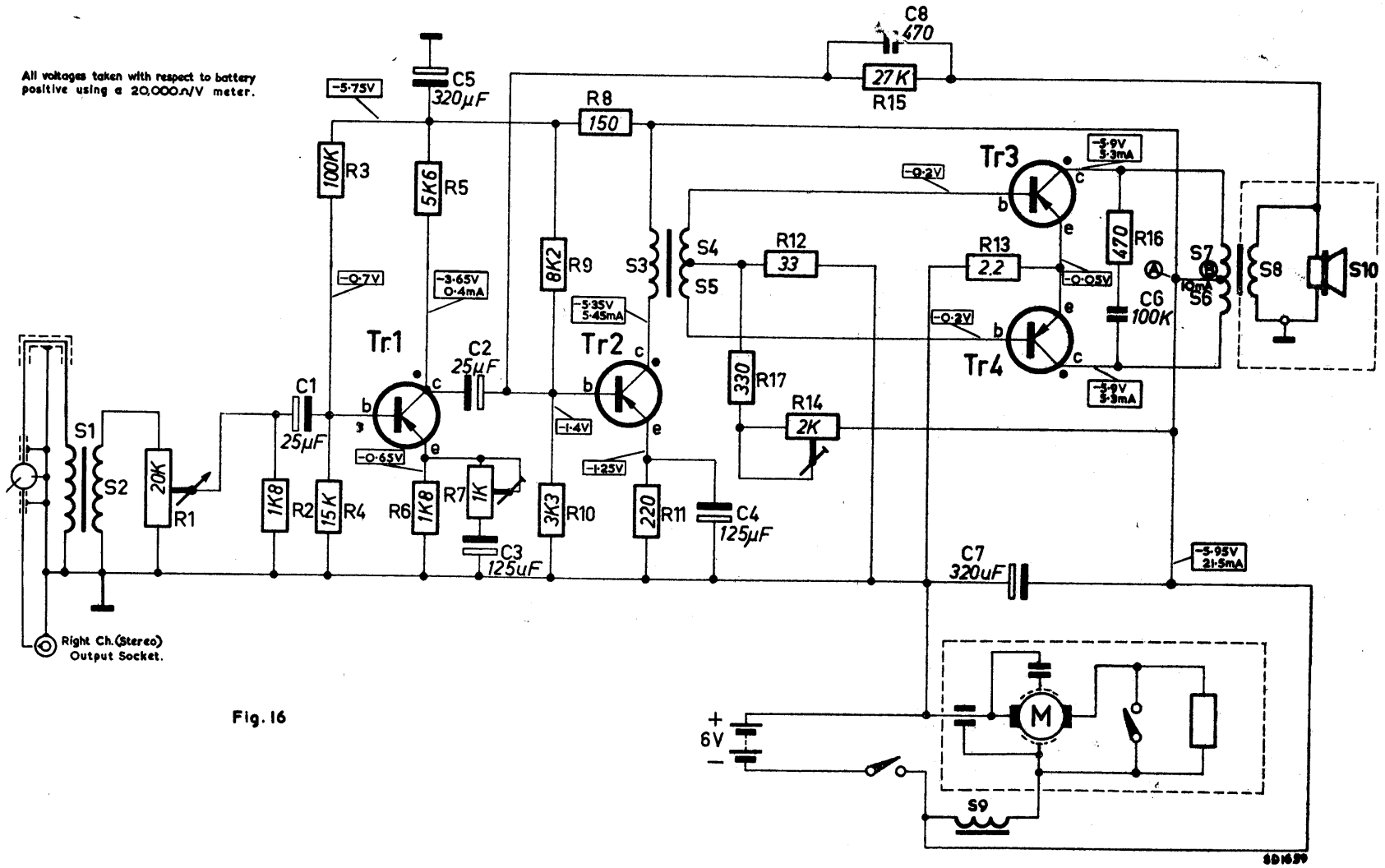
All voltages taken with respect to battery positive using a 20,000Ω/V meter.
C8 470
27K R15
C5 320μF
R8 150
-5·75V
100K R3
5K6 R5
-0·7V
-3·65V 0·4mA
8K2 R9
-5·35V 5·45mA
S3
S4
S5
R12 33
Tr3
-0·2V
-3·9V 3·3mA
R13 2.2
-0·05V
470 R16
S7
S8
S10
C6 100K
S6
Tr4
-0·2V
-3·9V 3·3mA
330 R17
R14 2K
Tr1
Tr2
C2 25μF
C1 25μF
-1·4V
-0·65V
-1·25V
S1
S2
20K R1
1K8 R2
15K R4
R6 1K8
R7 1K
C3 125uF
3K3 R10
220 R11
C4 125μF
C7 320uF
-3·95V 21·5mA
Right Ch.(Stereo) Output Socket.
6V
M
S9

Fig. 16

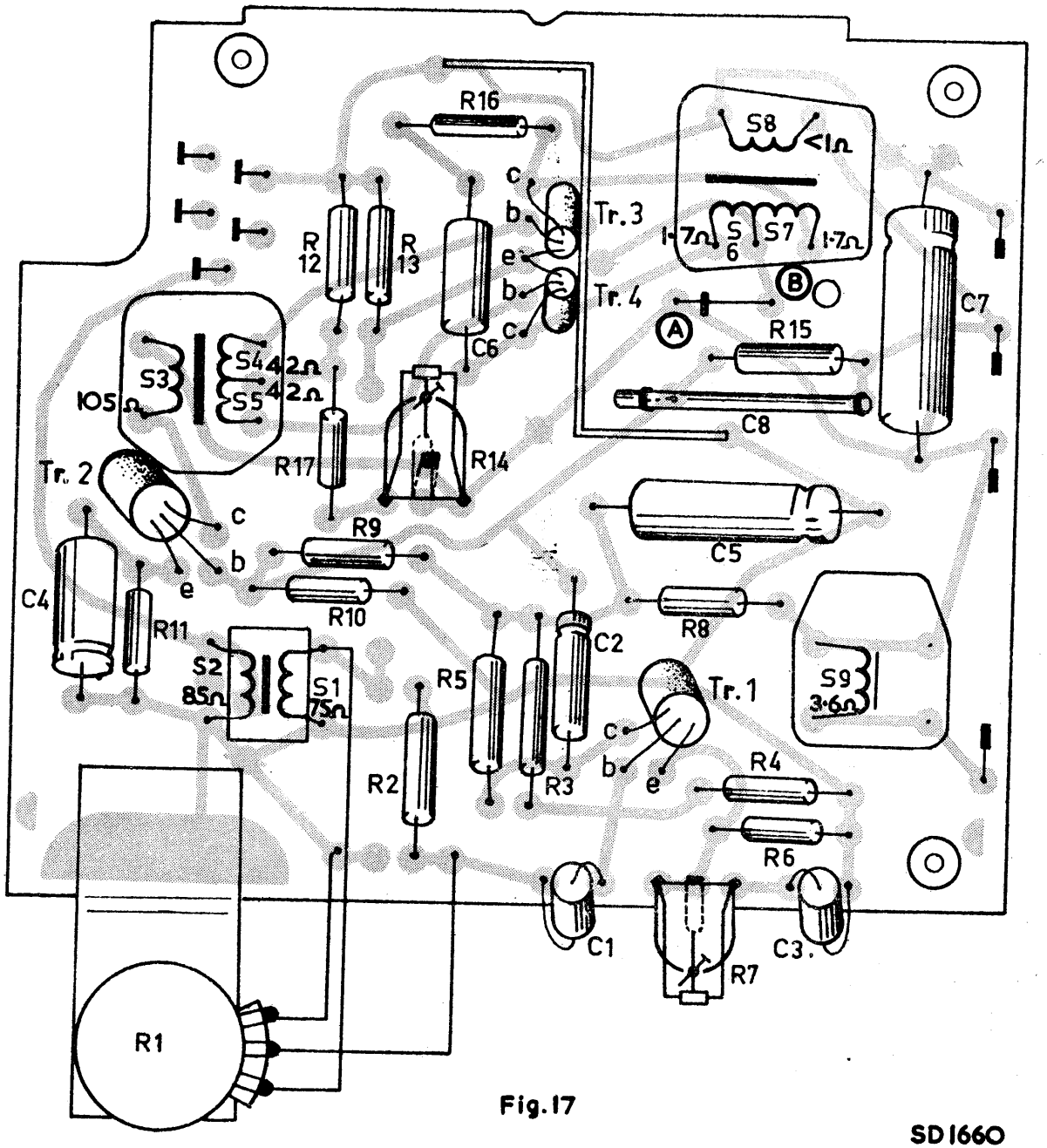

Fig. 17

SD1660

SPARE PARTS LIST

	CASE ASSEMBLY	AE.012.83
	Handle assembly	AE.010.43
	Stereo output socket	AE.605.15
	Plug for above	V3.737.15
	CONTROL KNOB—Volume	MK.856.16
	Grub screw	B.061.ED/3x10
46	Knobs for operating levers (2)	P5.510.66/159
1	PICK-UP ARM ASSEMBLY	AE.601.13.2
2	Tension spring	AE.010.34
9	Pick-up arm rest	P5.511.39/159KW
	Pick-up head—monaural	AG3016
	Pick-up head—stereo	AG3301
	Pick-up lead	AE.152.68
31	TURNTABLE ASSEMBLY	AE.153.71
41	DRIVE WHEEL	AE.151.44
45	Tension spring	AE.001.62
47	SPEED SELECTOR	AE.005.02
38	Tension spring	AE.001.81
32	TRIP LEVER ASSEMBLY	AE.009.18
34	Hair spring	AE.601.56
	SWITCH ASSEMBLY	
48	Contact—large	AE.009.07
50	Contact—small	A3.651.75
37	" Start " lever	AE.601.51
40	MOTOR ASSEMBLY	49.266.85
	Capacitor—3,300 pF	904/3K3
	Feed-through capacitor—1,200 pF	B1.664.25
	Resistor—150 ohm	48.426.10/150E
	MISCELLANEOUS	
	Battery container	AE.605.75
	Spindle for R1	916/01
	Screw for above	B.054.ED/3x5

TRANSISTORS

Tr. 1	... ...	OC71/AG9147
Tr. 2	... ...	OC71/AG9147
Tr. 3 & 4	... ...	2 x OC74

TRANSFORMERS & LOUDSPEAKER

S1/2	Pick-up matching transformer	... ...	A3.162.31
S3-5	Audio coupling transformer	... ...	A3.162.30
S6-8	Output transformer	... ...	A3.154.37
S9	Choke	... ...	A3.166.49
S10	Loudspeaker—3 ohm	... ...	940/AD2400Z

CAPACITORS

			Working Voltage	Permitted Tolerance %	
C1	Electrolytic	25 uF	25		909/C25
C2	Electrolytic	25 uF	25		909/C25
C3	Electrolytic	125 uF	2.5		C.426.AE/A125
C4	Electrolytic	125 uF	2.5		C.426.AE/A125
C5	Electrolytic	320 uF	10		909/U320
C6	Polyester	0.1 uF	125	10	906/L100K
C7	Electrolytic	320 uF	10		909/U320
C8	Ceramic	470 pF	500	10	904/470E

RESISTORS

		Ohms		
R1	Volume control	20,000	Linear Law	916/GE20K
R2		1,800		48.426.10/1K8
R3		0.1M		48.42610/100K
R4		15,000		48.426.10/15K
R5		5,600		48.426.10/5K6
R6		1,800		48.426.10/1K8
R7	Potentiometer	1,000		E.097.AC/1K
R8		150		48.426.10/150E
R9		8,200		48.426.10/8K2
R10		3,300		48.426.10/3K3
R11		220		48.426.10/220E
R12		33		48.426.10/33E
R13	Wirewound	2.2		48.760.05/2E2
R.14	Potentiometer	2,000		B1.514.54
R15		27,000		48.426.10/27K
R16		470		48.426.10/470E
R17		330		48.426.10/330E