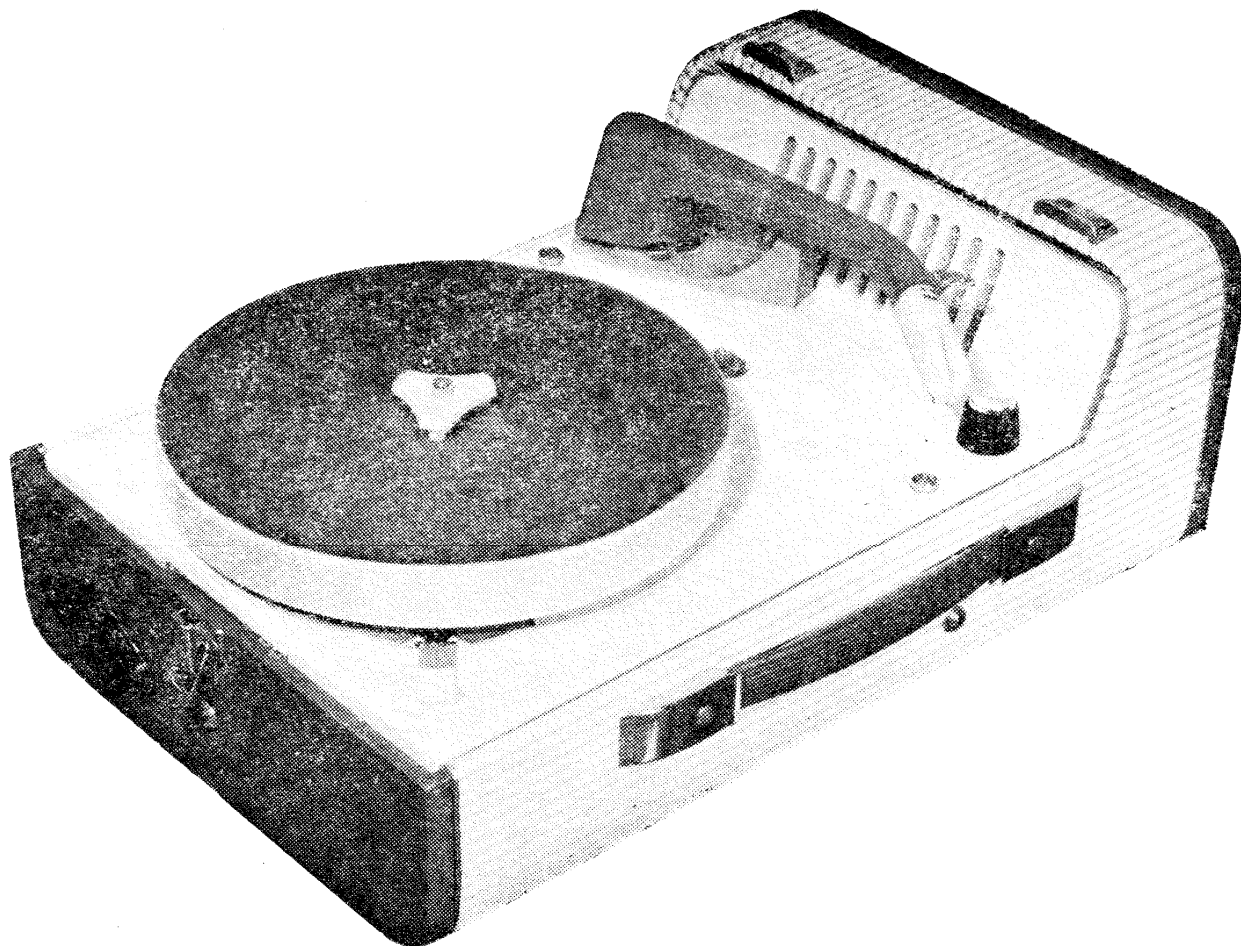


SERVICE INFORMATION

PHILIPS



Record Player
TYPE AG 9147



SERVICE DEPARTMENT
WADDON FACTORY ESTATE
CROYDON • SURREY
JUNE, 1959

Telephone . . . CROYdon 7722
'Grams . PHILISERVE CROYDON

Price 2s. 6d.
CIRCULATION RESTRICTED TO THE
RADIO TRADE

SERVICE MANUAL FOR

PHILIPS RECORD PLAYER

TYPE AG 9147

GENERAL DESCRIPTION

The unit consists of a four speed record player and a transistor amplifier with loudspeaker. A printed wiring panel is used for mounting the amplifier components. Four $1\frac{1}{2}$ -volt batteries provide the L.T. supply.

TRANSISTOR COMBINATION

Tr.1—OC71—Pre-amplifier
Tr.2—OC71—Driver
Tr.3, Tr.4—OC72—Output

OUTPUT POWER

220 mW (approximately).

TURNTABLE SPEEDS

$16\frac{2}{3}$, $33\frac{1}{3}$, 45 and 78 r.p.m.

PICK-UP HEAD

AG3016

NEEDLE PRESSURE

6—9 grams

BATTERY TYPES

The batteries are fitted with the positive connection facing the outside of the cabinet.

Any of the following $1\frac{1}{2}$ -volt battery types are required :

Ever Ready Four Type	U2
Exide	" " T20
G.E.C.	" " BA6103
Oldham	" " K532
Pertrix	" " 601
Siemens	" " T1
Vidor	" " V0002

BATTERY CONSUMPTION

With a battery voltage of 6V applied :
Without the motor : 8—12mA (No signal).
With the motor : 45—60mA

LOUDSPEAKER

Diameter 4in.
Impedance 3Ω .

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 2.5mW in a transistor. For this reason the output transistors are equipped with cooling fins 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.

OUTPUT TRANSISTORS

As the output transistors are connected in push-pull, the collector currents must be equal within certain limits. It is necessary, therefore, if one becomes defective, to fit a replacement pair.

After a new pair of OC72's have been fitted the collector current must be adjusted in the following manner:

Connect a milliammeter between the centre tap of S4/S5 and the L.T.—ve connection at the junction of S9/R15. (This can be conveniently done by disconnecting the link on the top of the printed plate adjacent to Tr.4.) Turn the volume control to minimum and disconnect the motor. Adjust R15 for a meter reading of 3mA.

REMOVING THE MOTOR BOARD & 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 now be separated from the mounting board, once the four fixing screws and volume control knob have been removed and the motor connections unsoldered.

THE RECORD PLAYER

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 drops through R18 to 2.4V. By this means the speed is kept constant. Adjustment 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.

Motor Suspension

The spring mounting of the motor should be adjusted so that the distance between the motor mounting plate and the unit mounting plate is 1.5mm. (see fig. 2). After adjustment the locking nut should be tightened and sealed with locking paint.

Adjustment of the Driving Mechanism

When making adjustments 1 and 3 below, it is essential that the idler wheel is in the same position as when the turntable is fitted. To determine this position a pair of vernier calipers will be required.

1. In the 78 r.p.m. position lip B of the idler wheel bracket should be at least 0.3mm. from the U bracket 14. (fig. 1). To check this adjustment set the vernier calipers to 101.5mm. and place them over the turntable spindle

and idler wheel as shown. Adjustment can be made if necessary by bending lip B of the idler wheel bracket.

2. When the speed indicator is set to the "O" position, the distance between the motor pulley and the idler wheel should be at least 1.5mm. Adjustment is made by bending lip A on the stop bracket (see fig. 4). When the lip on the stop bracket is correctly adjusted the turntable rim should just clear the edge of the idler wheel when the turntable is placed on the turntable spindle.

3. In the 16 r.p.m. position, the distance between the idler wheel bracket and lip A of the stop bracket should be 0.5mm., as shown in fig. 4. To check this adjustment set the vernier calipers to 101.5mm. and place them over the turntable spindle and idler wheel as shown. Adjustment is made by bending lip A of the stop bracket. Having made this adjustment, the adjustment referred to in item 2 should be re-checked.

4. In the 78 r.p.m. position, the pressure of the idler wheel against the pulley should be 45—55 grams (see fig. 1). If the pressure is above 55 grams, spring 42 should be carefully stretched, and if below 45 grams the spring should be shortened.

5. Spring 42 provides the tension between the switch bracket and the selector lever in the respective speed positions. The tension of spring 42 when measured as shown in fig. 1 should not be more than 600 grams.

6. The position of the idler wheel should be 90° with respect to the turntable and motor pulley. In addition in the 16, 33 and 45 r.p.m. positions, the bottom edge of the idler wheel should be at least 0.5mm. from the next highest speed step of the spindle as shown in fig. 3.

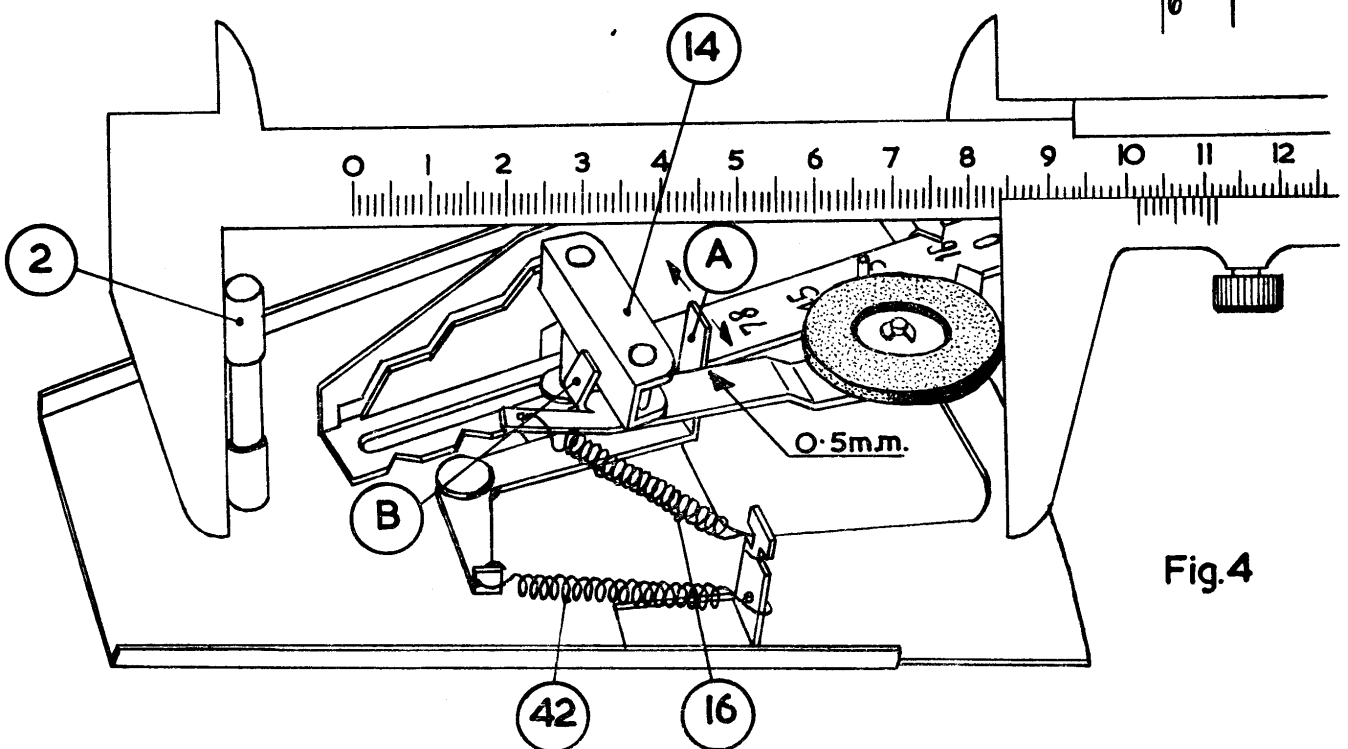
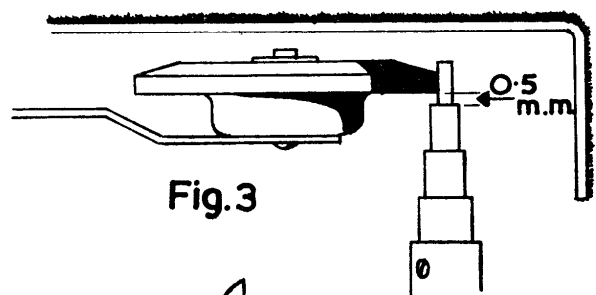
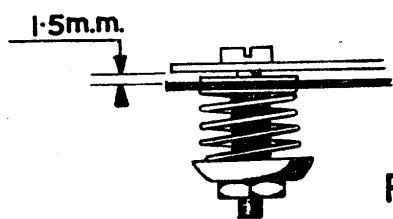
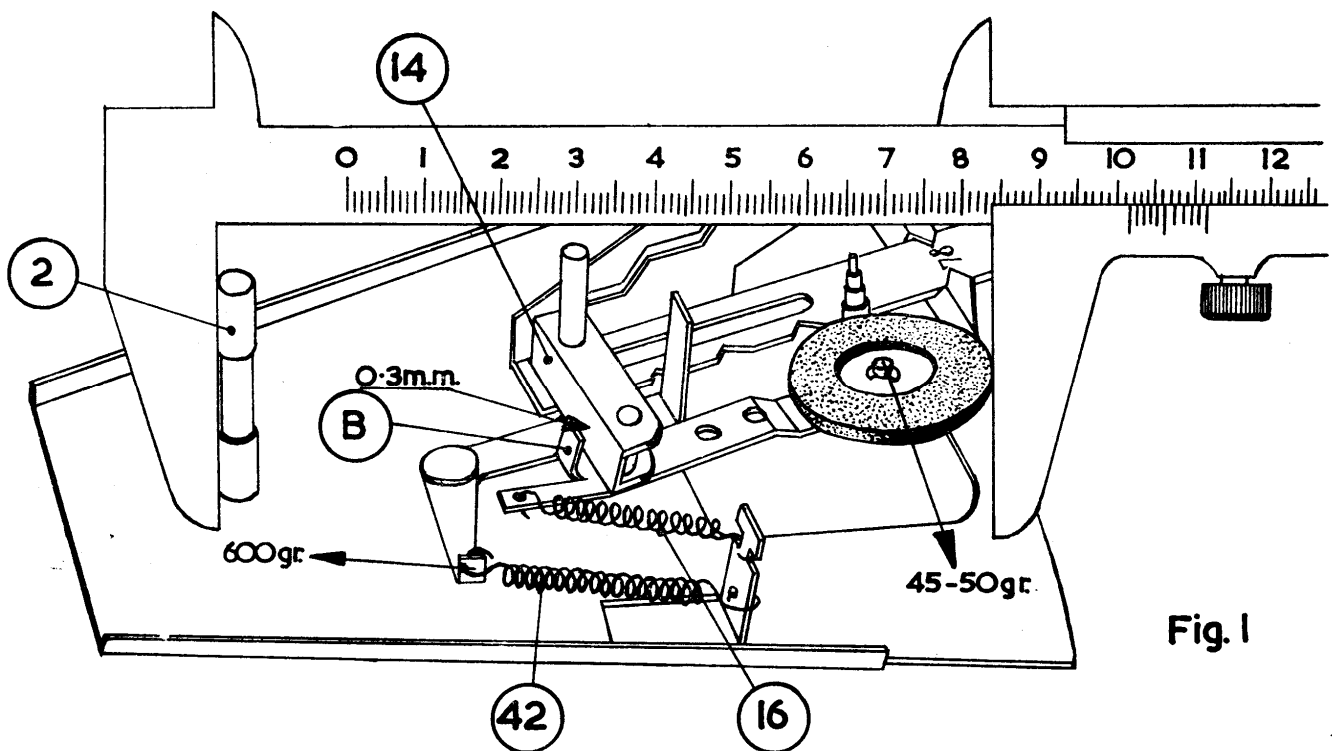
Fig. 5 shows how the idler wheel bracket can be adjusted if the idler wheel is placed too low on the pulley. The bend must be made in the opposite direction if the position of the pulley is too high.

Pick-Up Arm Adjustment

1. The distance between the locking ring of the pick-up arm spindle and the bottom of the moulding should be 0.5mm. (see fig. 8). Adjustment can be made by unscrewing fixing screw 33 and altering the position of bracket 34.

2. The needle pressure with an AG3016 pick-up head fitted to the pick-up arm should be 6—9 grams. The method of adjustment is shown in figs. 6 and 7. If the needle pressure is too light, the lip of the adjusting plate should be bent to the left by means of a screwdriver (fig. 7b). Should this adjustment not be sufficient the spring 32 can be slightly extended.

If the needle pressure is too heavy the lip can be bent to the right with a pair of pliers (fig. 7a). Should further adjustment be required, the adjusting plate can be turned round as shown in fig. 6b. Now the same adjustment as described above can be made. For too light a needle pressure the lip is bent to the left, and for too heavy a needle pressure the spring 32 must be shortened.



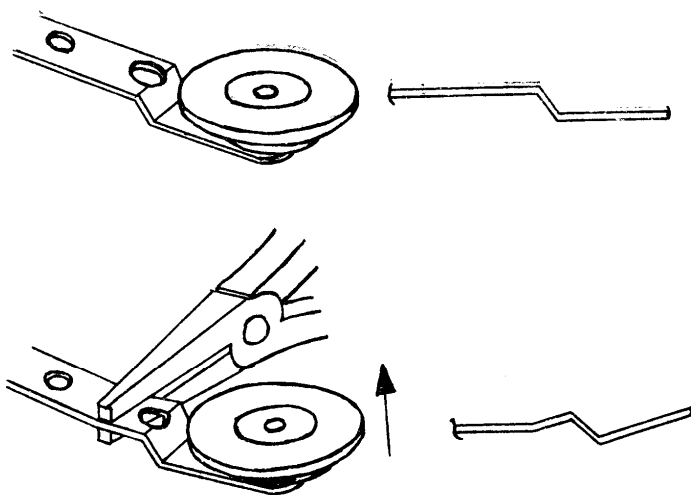


Fig.5

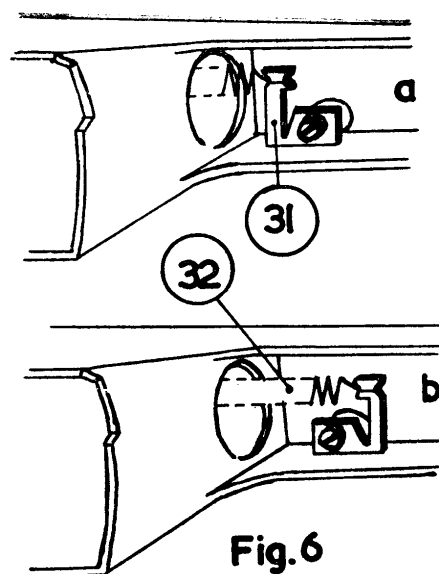


Fig.6

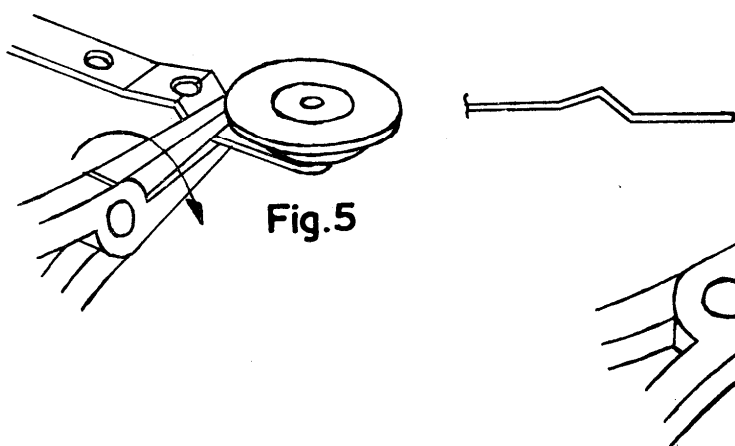


Fig.7

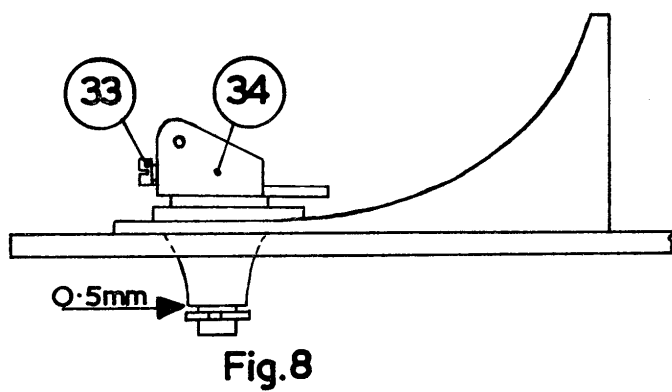


Fig.8

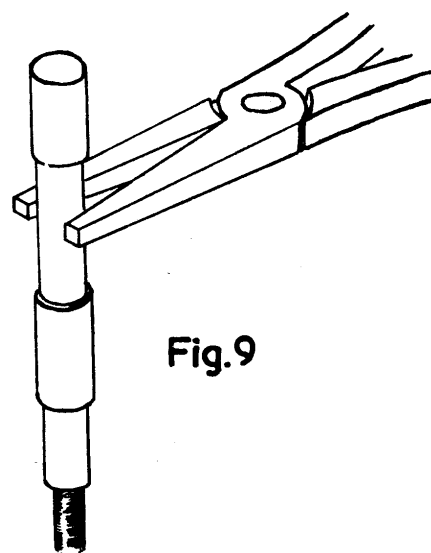


Fig.9

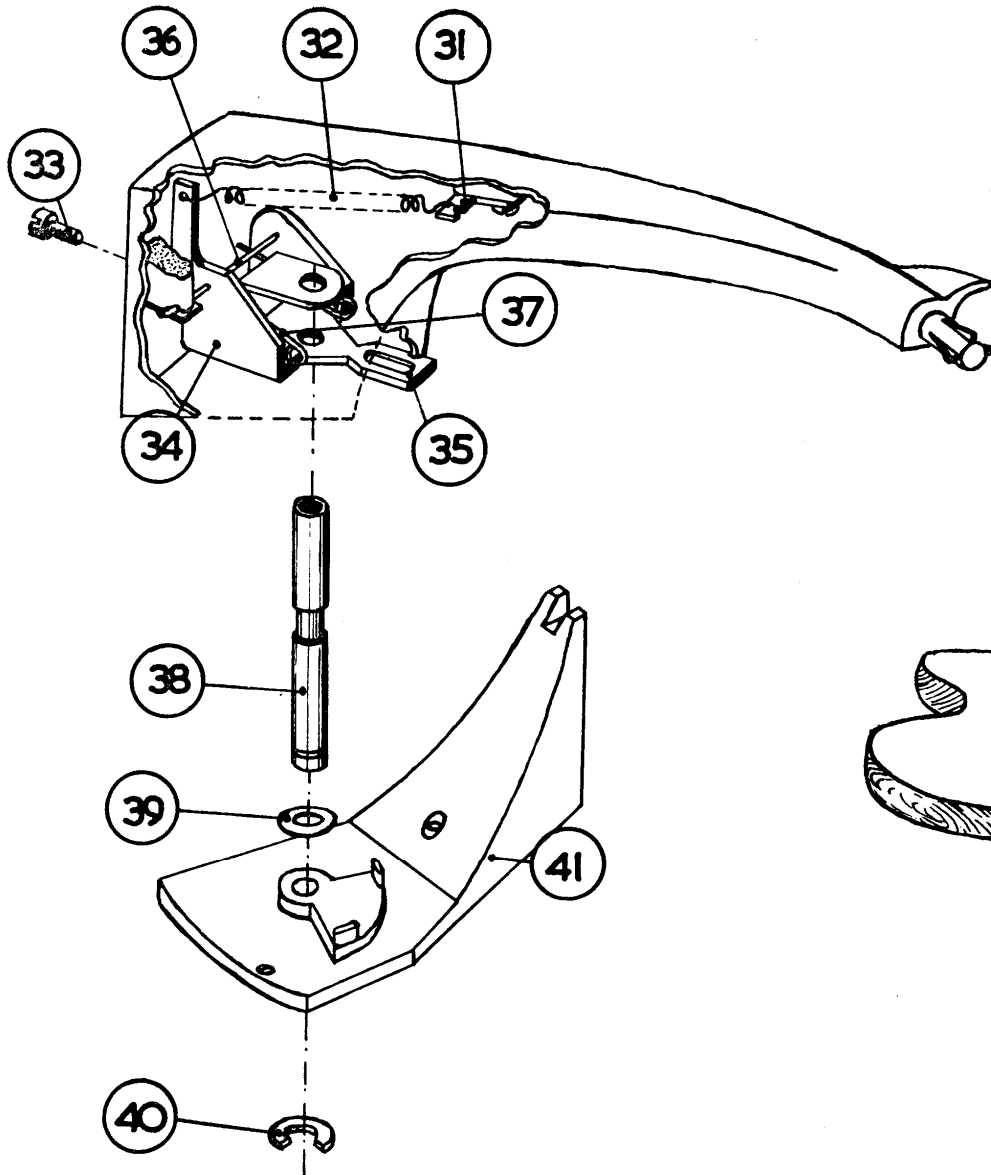


Fig. 10

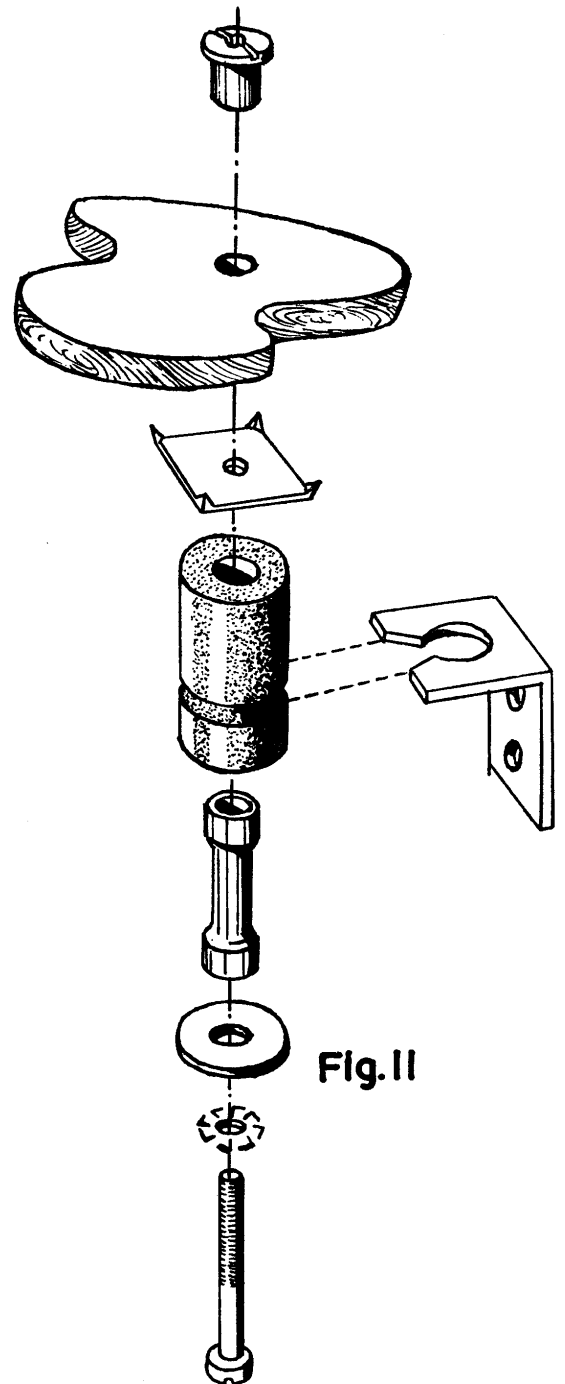
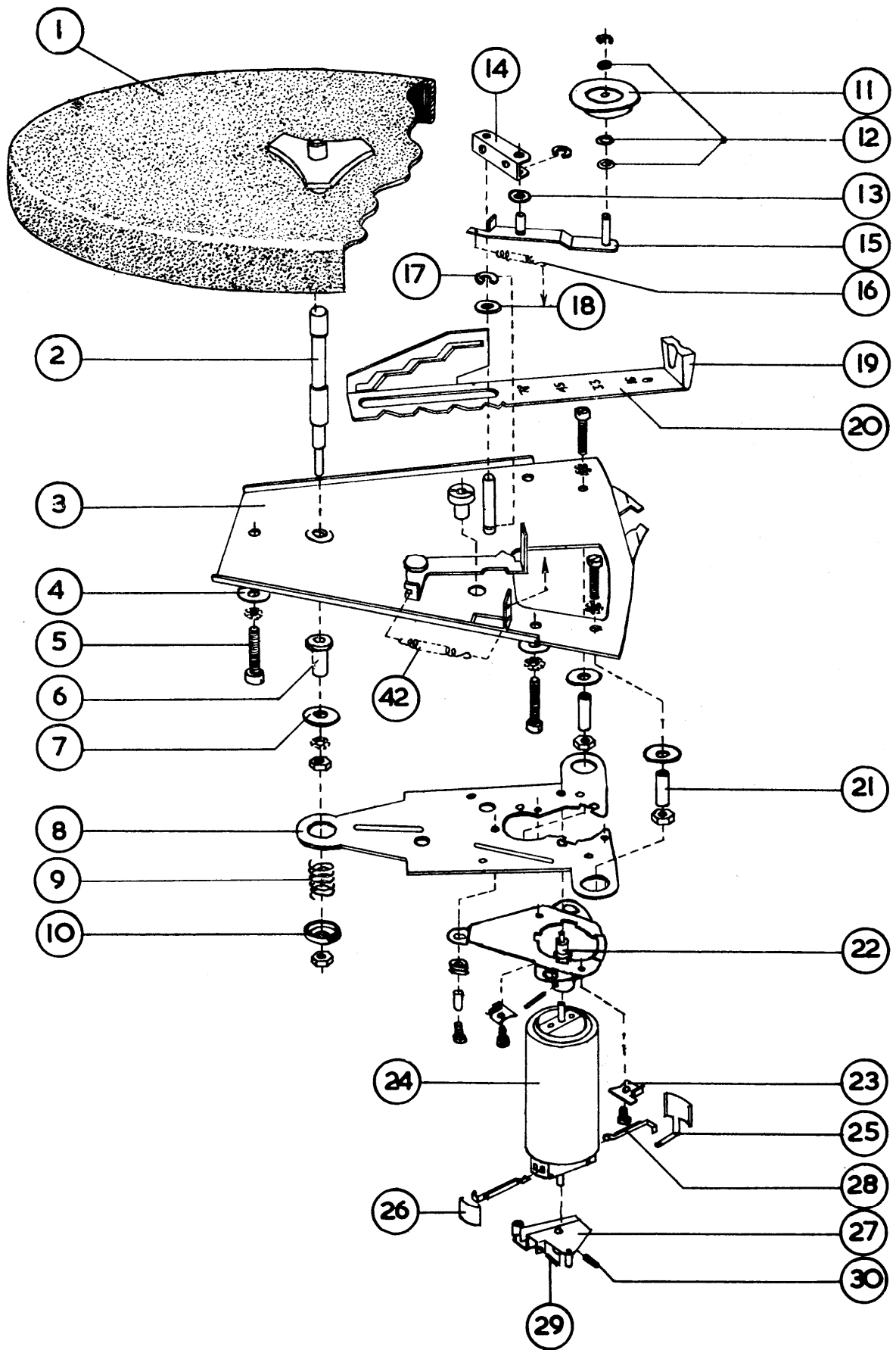
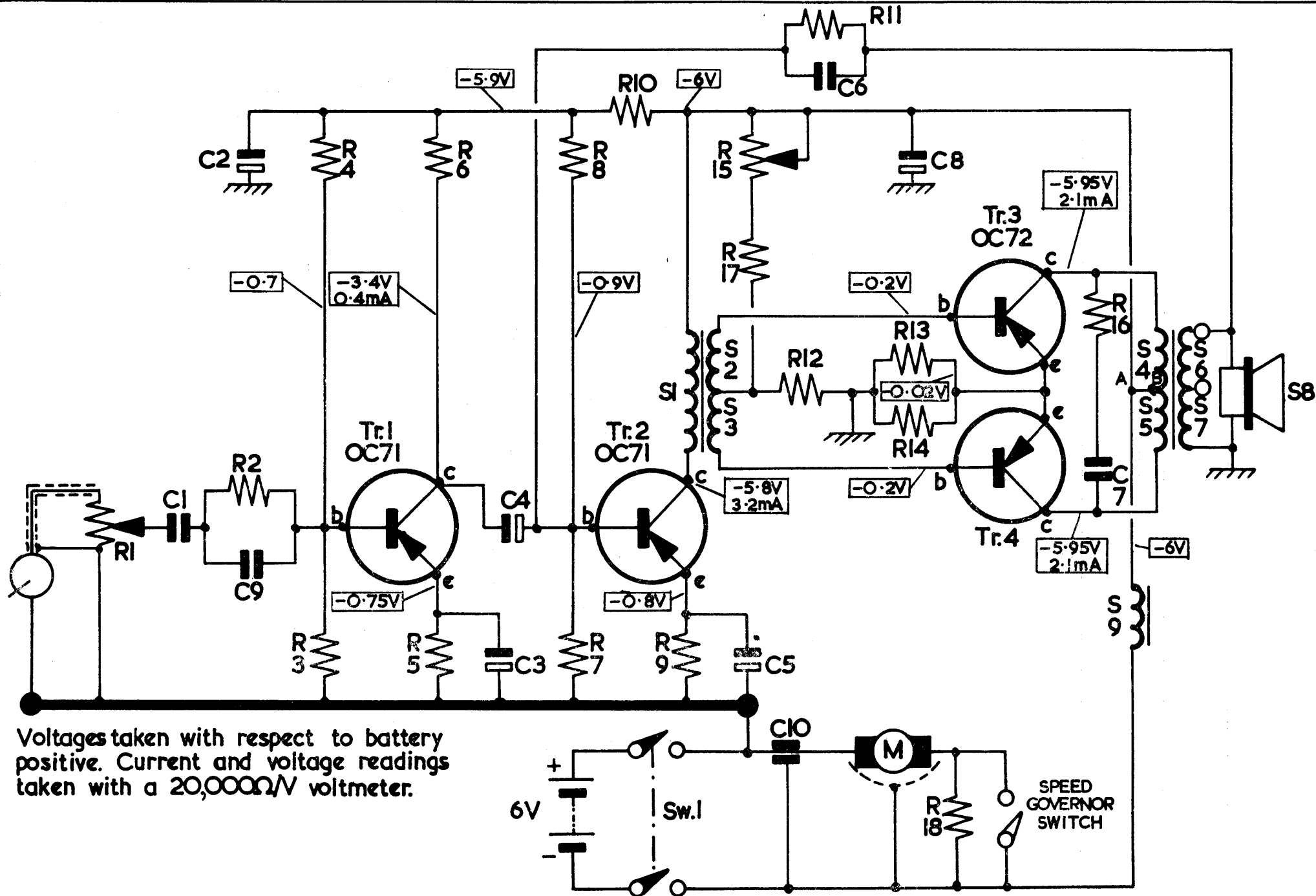


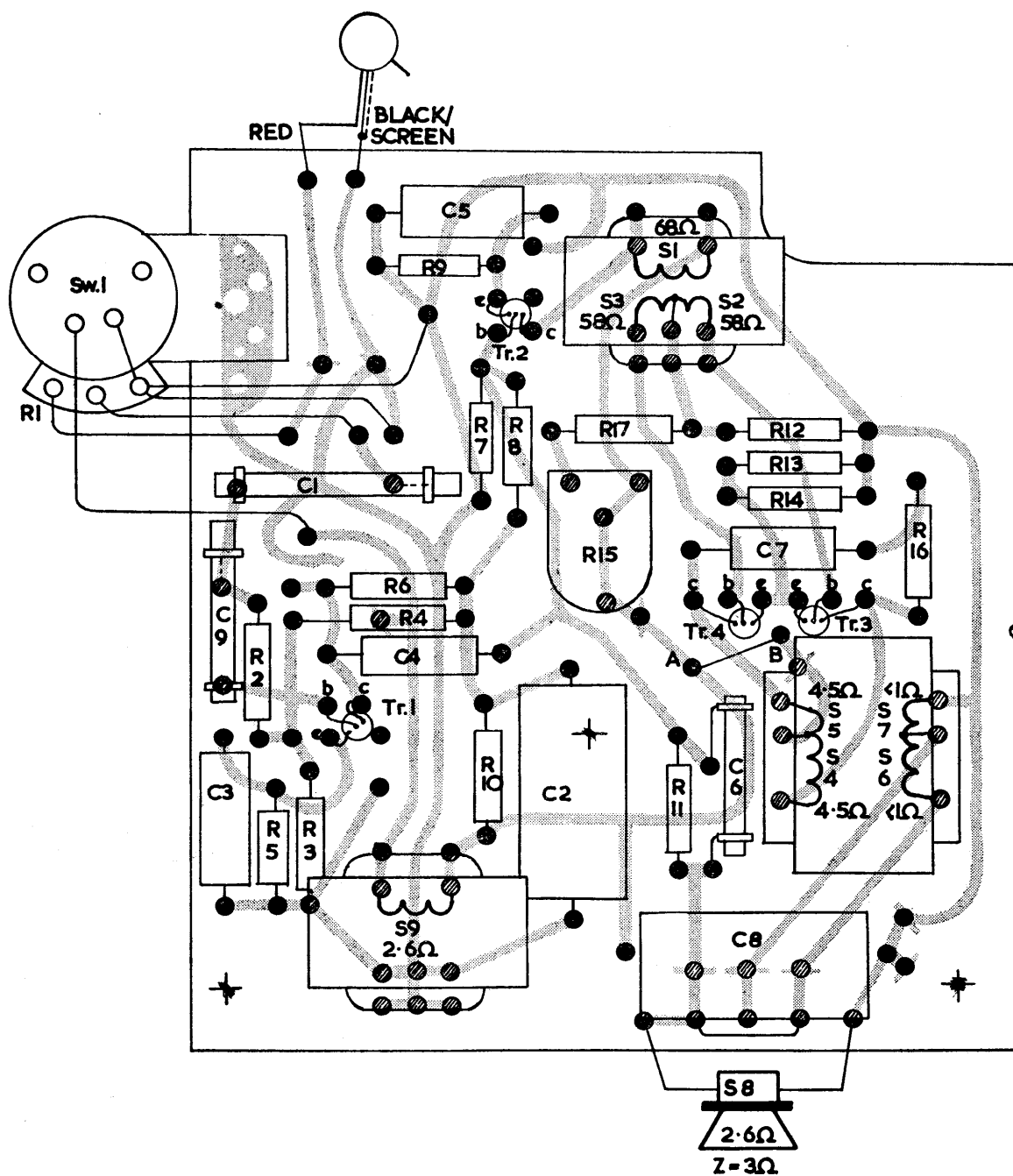
Fig. 11



S	I. 2.3.										9.4.5.6.7. 8.			
C	I.	2.9.	3.4.			5.	10.6.	8.	7.					
R	I.	2.	4. 3.	6.5.	8.7.	10.	9.	15.17.	12.11.	13.14. 18.	16.			



S	9			3. 1. 2. 8. 5. 4.			6. 7.
C	9. 3.	1	4. 5.	2	6. 8. 7.		
R	1.	2. 5. 3	6. 4. 9. 7. 10. 8.	15. 17.	11.	12. 13. 14.	16.



SPARE PARTS LIST — TYPE AG 9147

CABINET ASSEMBLY	AE.005.83	MOTOR ASSEMBLY	49.266.80
CONTROL KNOB	A3.769.61	TRANSISTORS	
Grubscrew	B.061.ED/3x10	Tr.1	OC71
PICK-UP ARM ASSEMBLY	AE.152.75	Tr.2	OC71
TURNTABLE ASSEMBLY	AE.152.65.2	Tr.3—4 Matched pair	A9.868.25
SPEED SELECTOR KNOB	P5.510.66/159	TRANSFORMERS AND LOUDSPEAKER	
IDLER WHEEL	AE.151.44	S1—3 Audio coupling transformer	A3.162.07
		S4—7 Output transformer	A3.154.03
		S9 Choke	A3.166.45
		S8 Loudspeaker	AD.2400Z

CAPACITORS

				<i>Working Voltage</i>	<i>Permitted Tolerance%</i>	
C1	Ceramic	10,000 pF	..	350	.. —20+50	C.301GB/H10K
C2	Electrolytic	250 uF	..	12.5	..	910/B250
C3	Electrolytic	100 uF	..	3	..	AC.5700/100
C4	Electrolytic	16 uF	..	12.5	..	AC.5703/16
C5	Electrolytic	100 uF	..	3	..	AC.5700/100
C6	Ceramic	390 pF	..	500	.. 10	C.304.AH/A390E
C7	Polyester	0.1 uF	..	125	.. 10	C.296.AA/A100K
C8	Electrolytic	250 uF	..	12.5	..	910/B250
C9	Ceramic	68 pF	..	500	.. 10	HT.303.10/68E

RESISTORS

		<i>Ohms</i>	<i>Wattage</i>	<i>Permitted Tolerance %</i>	
R1	Volume control with switch	0.1 M	..	..	916/DE1M
R2	.. .. .	15,000	.. $\frac{1}{2}$	.. 10	48.426.10/100K
R3	.. .. .	82,000	.. $\frac{1}{2}$	.. 10	48.426.10/15K
R4	.. .. .	1,800	.. $\frac{1}{2}$	.. 10	48.426.10/82K
R5	.. .. .	5,600	.. $\frac{1}{2}$	.. 10	48.426.10/1K8
R6	.. .. .	5,600	.. $\frac{1}{2}$	.. 10	48.426.10/5K6
R7	.. .. .	22,000	.. $\frac{1}{2}$	.. 10	48.426.10/5K6
R8	.. .. .	270	.. $\frac{1}{2}$	.. 10	48.426.10/22K
R9	.. .. .	150	.. $\frac{1}{2}$	.. 10	48.426.10/270E
R10	.. .. .	33,000	.. $\frac{1}{2}$	.. 10	48.426.10/150E
R11	.. .. .	56	.. $\frac{1}{2}$	.. 10	48.426.10/33K
R12	.. .. .	10	.. $\frac{1}{2}$	.. 10	48.426.10/56E
R13	.. .. .	10	.. $\frac{1}{2}$	.. 10	48.426.10/10E
R14	.. .. .	10	.. $\frac{1}{2}$	.. 10	48.426.10/10E
R15	Potentiometer	330	.. $\frac{1}{2}$	.. 10	B1.514.29
R16	.. .. .	1,000	.. $\frac{1}{2}$	.. 10	48.426.10/330E
R17	.. .. .		.. $\frac{1}{2}$	.. 10	48.426.10/1K

SERVICE INFORMATION FOR THE

PHILIPS

RECORD PLAYER

TYPE AG9149

The AG9149 is similar to the AG9147 for which a Service Manual has already been issued. Apart from the pick-up input connections the electrical circuit is identical to that used in the AG9147. The main mechanical differences are the inclusion of an On/Off switch providing an automatic stop, a different method of pick-up weight adjustment and the addition of a "stereo" socket. Details of these differences are given below:

PLAYING STEREOPHONIC RECORDS

A socket is fitted at the side of the instrument so that an additional amplifier or radio can be connected for the purposes of playing stereophonic records.

When setting up the apparatus, the record player must be on the left hand side. The additional amplifier or radio receiver should be placed on the right at a distance between the loudspeakers of between 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 amplifier or radio receiver to give the required balance for each channel.

PICK-UP SHORTING LINKS

The AG3016 pick-up head supplied with the instrument is fitted with a shorting link (49.956.54) as shown in fig. 4. If a replacement pick-up head is used it is essential that a shorting link is 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. 5.

PICK-UP 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 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 fig. 2, and the tension spring 32, fig. 3, adjusted by altering its anchoring position, for a pick-up playing weight of between 4 to 6 grams.

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 47 for the pick-up weight shown in fig. 2.

ON/OFF SWITCH ADJUSTMENT

The force required to switch the unit off measured at the knob on the switch lever (44) should be a maximum of 200 grams. Adjustment is made by altering the pressure between the stop spring 46 and lever 44.

When the switch is in the stop position the spring pressure against the lever 44 should be between 250 and 350 grams. This should be measured in the curve of the stop spring 46 as shown in fig. 1. The switch lever must be held stationary while making this measurement.

SPARE PARTS LIST — Type AG9149

Spares for this model are identical to those listed for the AG9147 with the following exceptions:

CABINET ASSEMBLY						AE.009.26
Stereo output socket	...	...	...	...	...	AE.605.15
Plug for socket	...	...	...	...	...	V3.737.15
CONTROL KNOBS						
Spindle R1	...	...	...	...	...	916/01
PICK-UP ARM ASSEMBLY						
Weight adjuster	...	...	...	...	...	AE.002.99
Pick-up head	...	...	...	...	...	AG.3016
Shorting link for AG3016 head	...	...	...	...	...	49.956.54
TURNTABLE ASSEMBLY	...	...	...	...	...	E.153.71
START LEVER ASSEMBLY	...	...	...	...	...	AE.605.11

CAPACITORS

			Working Voltage	Permitted Tolerance%	
C10	Feed through	1,200pF	...	...	B1.664.25
C11	Ceramic	3,300pF	...	...	904/3K3

RESISTORS

(N.B.—Wattage is based upon an ambient temperature of 70°C.)

			Wattage	Permitted Tolerance%	
R1	Volume control	1.0MΩ	Linear Law	...	916/GE1M
R18	...	150Ω	...	10	48.426.10/150E



Service Department
Telephone: CROYDON 7722

Waddon Factory Estate

Croydon Surrey
'Grams: Philiserve, Croydon

Form No. 3507/RS387

January, 1960

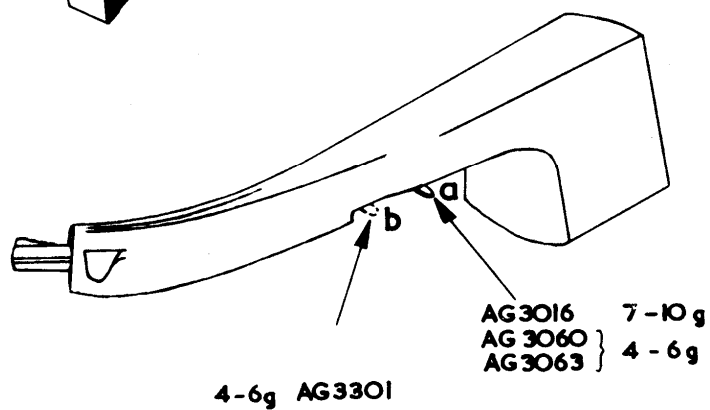
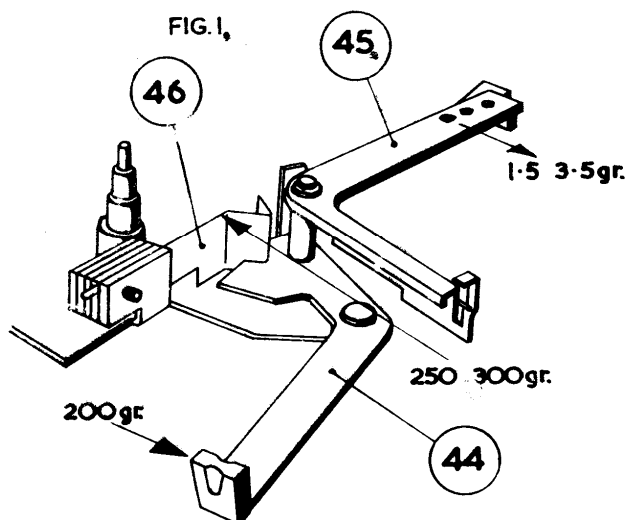


FIG. 2

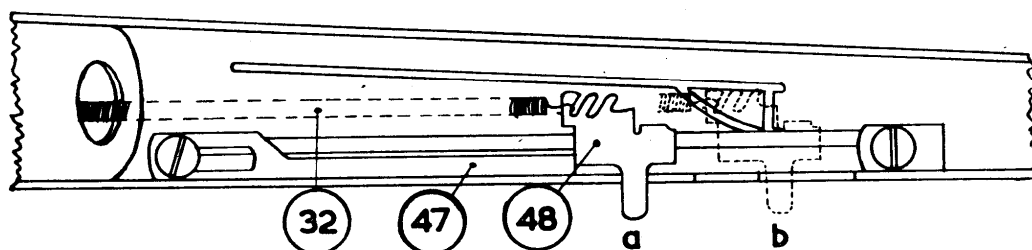


FIG. 3

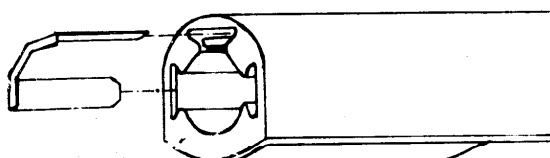


FIG. 4

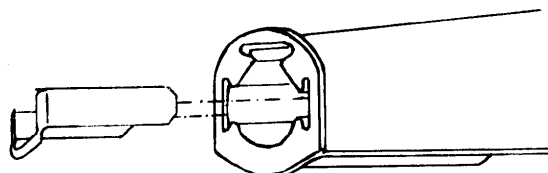


FIG. 5