



GRAMOPHONE
MOTORS

type 228 b & d
incorporated in
models 254, 271,
274 and 290

Marconiphone Service Manual

PRIVATE AND CONFIDENTIAL
TO THE TRADE ONLY



GENERAL DESCRIPTION.

TYPE 228B—Standard Turntable Model.

Suitable for use on 200 to 250 volt (50-60 cycle) supplies only.

TYPE 228D.

Suitable for 100-125, 200-250 volt (50-60 cycle) supplies.

This motor, which is generally known as a "squirrel cage" type, is a high speed induction motor. The flux is maintained in the machine by the four stator coils, connected as shown in Figs. 1 and 2. Motion imparted to the rotor is due to the reaction between the induced currents in the rotor reacting with the field magnets on which the energising coils are mounted.

The conductors in the rotor are in the form of masses of metal buried beneath the surface of the stampings forming the bulk of the rotor.

The armature, which has a speed of approximately 1,070 r.p.m., operates the turntable through worm gearing which turns the table spindle at 78 r.p.m.

The field magnet assembly is composed of a number of laminations riveted together, the assembly being held in position by the cheese-head screws—see Figs. 1 and 2. Fitted on each pole of the field magnet assembly is a copper band which serves to provide the necessary starting field.

CURRENT CONSUMPTION.

The current will vary according to the voltage applied, and the speed at which the armature is running. If motor is allowed to run faster than 78 r.p.m., a slight decrease in current consumption will be noticed. The following figures show the current consumption at 78 r.p.m. :—

Volts.	Amps.	Watts.	Volt-amps.
100	.116	7.0	11.6
125	.150	12.0	18.75
200	.058	7.0	11.6
250	.075	12.0	18.75

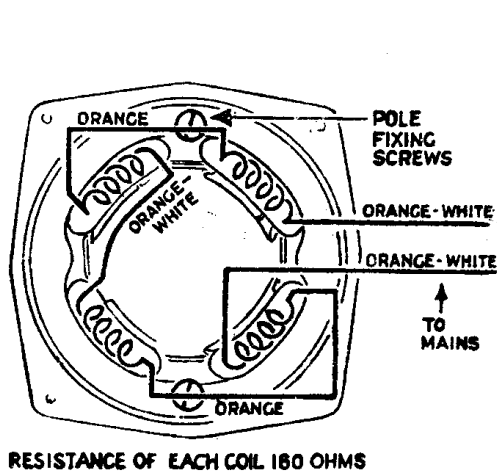
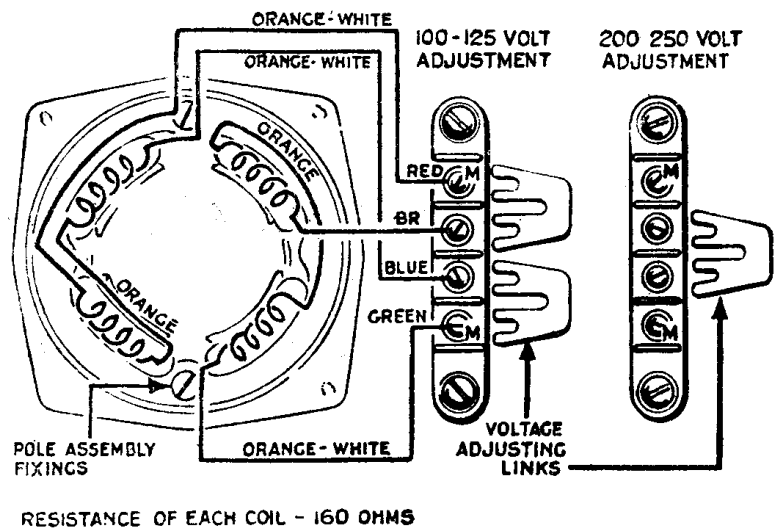


Fig. 1.
Wiring diagram for type 228B.



Connect mains to terminals marked M (Fig. 2).
Fig. 2.
Wiring diagram for type 228D.

DISMANTLING.

REMOVAL OF ROTOR ASSEMBLY.

1. Take out the four cheese-head screws holding the two halves of casing together.
2. Slack off the cheese-head screw (fixing collar) which engages with the stop pin—see Fig. 4.
3. Turn the motor so that the rotor spindle is vertical (turntable spindle horizontal) and carefully lift off the field assembly.

Be careful not to strain the end of shaft which runs in the bottom bearing, and do not lose the two steel balls located in the two bearings—see Fig. 3.

4. On moving the speed lever it will now be possible to withdraw the rotor assembly.

REMOVAL OF STATOR ASSEMBLY.

1. Remove rotor assembly.
 2. Take out the two cheese-head screws—see Figs. 1 and 2.
- Care should be taken to ensure that leads are not broken or disturbed.

REPLACEMENT OF STATOR WINDINGS—see Fig. 5.

1. Drive out the slot wedges at either side of the coil to be replaced, and remove the insulating strips between wedges and coil.

IMPORTANT.—It is essential that **both** the slot wedges be replaced in each slot. Although primarily used to hold coils in position, the presence of the wedges is essential if the best operating conditions are to be maintained.

When renewing a coil make sure that the start and finishing ends of coil are in accordance with colours shown in Figs. 1 and 2, and that the joints between the coils are all on the governor side of stator assembly. See that the joints are adequately covered with systoflex, and that the wiring is not likely to foul the governors.

Do not forget to replace the insulating strips between the body of laminations and coil, and between the coil and the slot wedges.

REMOVAL OF TURNTABLE SPINDLE.

1. Remove three screws fixing bottom bearing to casting.
- Do not lose the small steel ball and remember to replace the locking washers under screw heads.

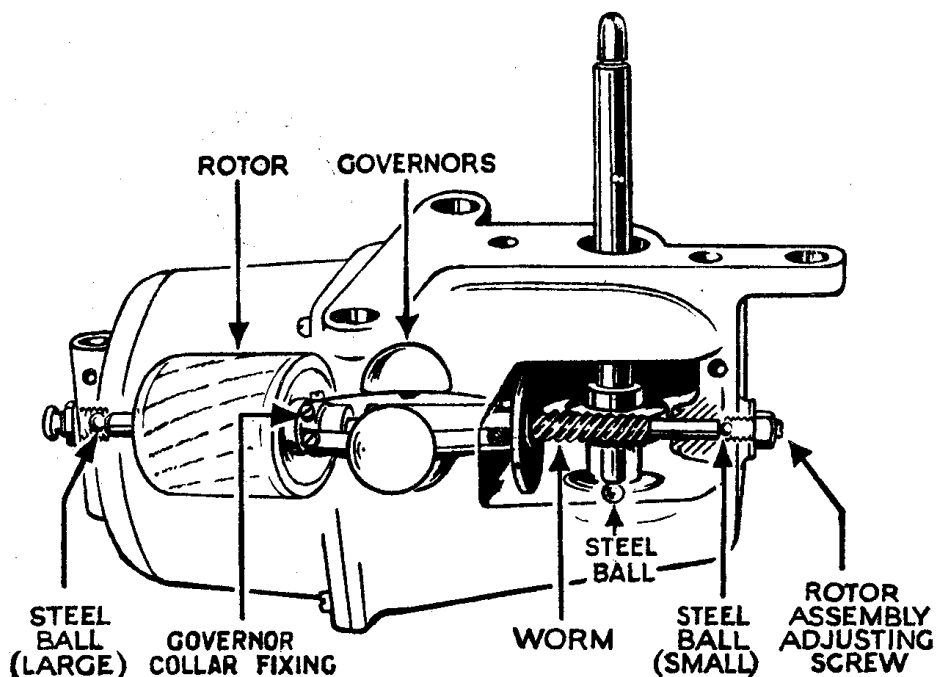


Fig. 3.

2. Knock out the turntable locating pin. (The plain end of pin is the smaller end.)
 3. Lower the turntable spindle through bottom bearing hole.
- Access to bottom bearing ball may be obtained by removing only the bottom bearing plate.

RENEWAL OF GOVERNOR FRICTION PAD.

The clip holding this pad is bifurcated. Open up the clip with a screwdriver to replace the leather and close the jaws firmly.

Apply oil to new friction pads and massage with a pair of pliers to soften.

FIXING OF GOVERNOR FRICTION PAD ASSEMBLY.

The friction pad assembly is fixed by the small cheese-head screw, the end of which should locate in the small dimple in speed lever.

ADJUSTMENT OF ROTOR IN BEARINGS—see Fig. 3.

When rotor is correctly adjusted there should only be very slight play between the ends of shaft and the steel balls.

To adjust the armature slack off the rotor assembly adjustment locknut. Do not interfere with the opposite bearing in which the large steel ball is located.

Adjust the screw until only a very slight movement of rotor is felt, and then lock the screw with nut.

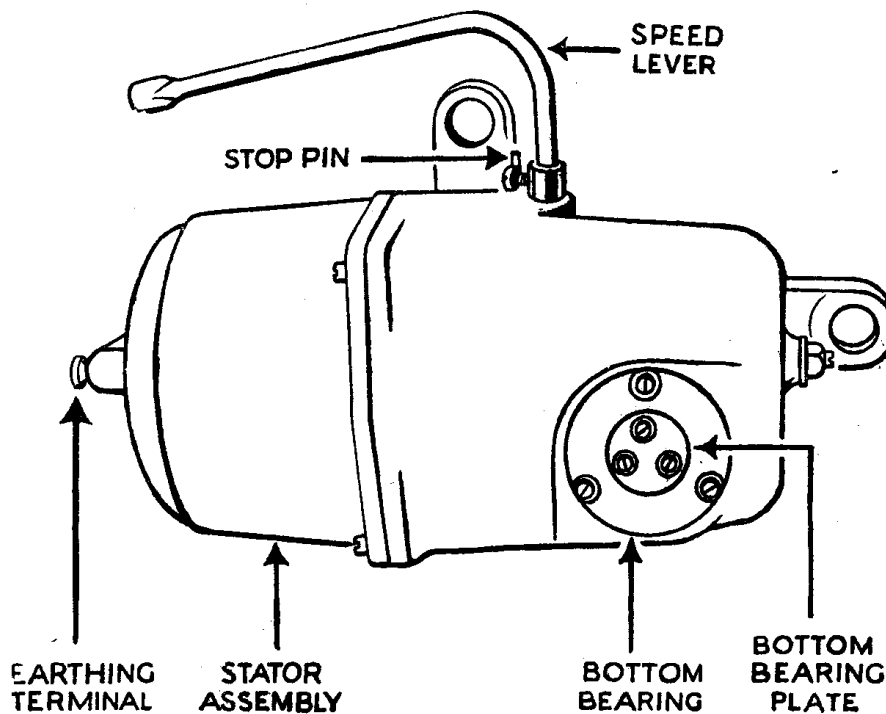


Fig. 4.

SEE THAT THE ROTOR MOVES FREELY BEFORE APPLYING VOLTAGE. The rotor should be free enough to revolve when turntable spindle is turned by hand.

IMPRESS UPON YOUR CUSTOMER THE IMPORTANCE OF NEVER TURNING THE MOTOR BY MEANS OF THE TURNTABLE. A SUDDEN JERK APPLIED TO THE TURNTABLE WILL SERIOUSLY DAMAGE THE WORM GEARING.

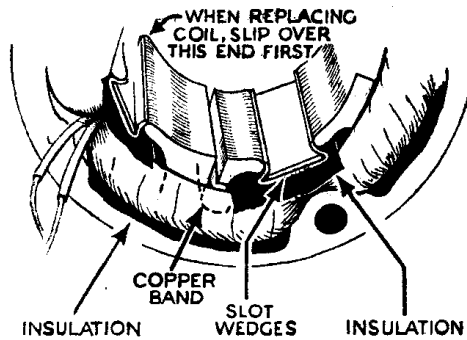


Fig. 5.

LUBRICATION.

Due to the comparatively high speed at which this motor runs, the points indicated on Fig. 6 should be attended to periodically.

Remove any dirty or gummy oil before applying fresh lubricants.

Use a good quality machine oil where specified, and apply grease only to the worm and worm wheel.

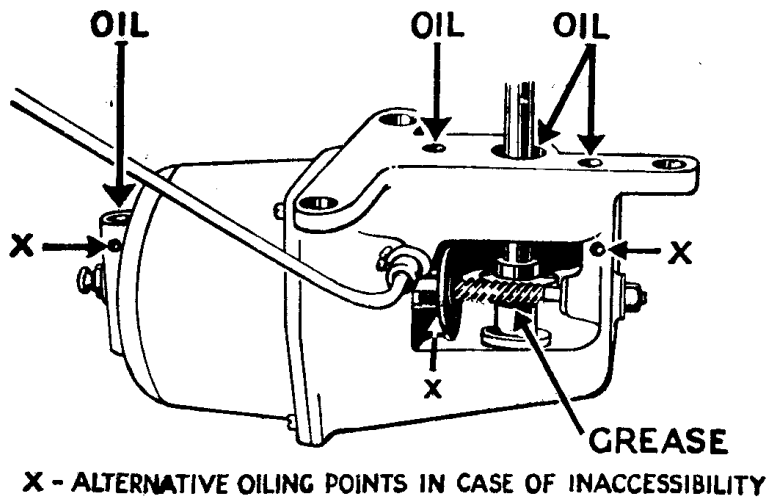


Fig. 6.

SERVICE TABLE.

Symptom.	Possible Cause.	Suggested Action.
Motor will not start ...	Undue friction at rotor bearings ... Mechanical interference ... Faulty field coil ...	Adjust as specified on page 4. See that the governor friction pad assembly is correctly located. Make sure that coil loops are clear of the rotor. Check coils for continuity—see Figs. 1 and 2.
Motor slows down when needle is lowered on record.	Voltage of supply incorrect ... Mechanical stiffness ... Short circuited turns in coil or leakage to frame. Balls in rotor bearings binding on ends of shaft.	— Oil all bearings. See that automatic brake (controlling the motor) is functioning correctly. Test and check resistance of coils with Figs. 1 and 2. Adjust according to instructions given on page 4.
Hum. Motor will probably become hot.	Short circuited turns or shorting of coil to frame.	See that insulators (Fig. 5) are in position. See that the coil loops are not fouling the rotor. Check coils by Figs. 1 and 2.
Fuse blows or motor becomes hot.	Short circuited turns on energising coils or winding shorting to earth.	Refer to Figs. 1, 2 and 5. The outside of stator should not rise above blood heat, even after a long continuous run.
Intermittent vibration ...	A loose screw ...	See that the screws fixing the speed lever collars are tight. Also make sure that the screw holding the governor friction pad assembly is firm. To ensure that the above collars and friction pad assembly are assembled correctly, there are dimples in the speed lever into which the ends of screws should locate.
Variation in speed ...	Friction leather too hard ...	Massage with pliers to encourage softness and apply oil.
Mechanical noise ...	Excessive play in armature spindle ... Loose governor springs ... Worn worm wheel ...	Adjust end bearing as described on page 4. Remove rotor and firmly secure all governor spring tightening screws. There should be a small washer under each screw head. Adjust the three governor weights to the same height to ensure smooth running. If the worm wheel is worn the motor will become noisy and jumpy. Replace entire turntable spindle assembly. It is unlikely that the worm cut in the rotor will cause any trouble.
Sluggishness ...	Congeaed or unsuitable oil or grease will bring about this condition. Foreign matter having lodged between rotor and stator, or between worm and worm wheel.	—
Governor weights do not revolve—speed of motor uncontrollable.	Governor collar fixing screw having become loose.	Remove rotor, and having located the dimple in shaft by sliding the governor to one side, retighten the screw so that end locates in the dimple.

SPARE PART LIST (BOTH TYPES).

Part No.	Description.	Parts per Inst.	Retail List Price.	Per
228B	Complete motor	1	£ 2 19 6	Each.
11849	Bottom bearing in 228B	1	0 0 11	"
11327	Screw } securing 11849 to 228B	3	0 0 3	Doz.
3165	Washer }	3	0 0 2	"
11318	Screw } securing two parts of 228B	4	0 0 2	"
3166	Washer }	4	0 0 2	"
11821	Bearing plate for turntable spindle (in 11849)	1	0 0 1	Each.
11335	Screw } securing 11821 to 11849	3	0 0 3	Doz.
3165	Washer }	3	0 0 2	"
3523	Ball-bearing in 11849 for bottom bearing of turntable spindle	1	0 0 1	"
11813	Thrust screw } for end bearing of rotor (coil-end)	1	0 0 2	Each.
3910	Washer }	1	0 0 2	Doz.
11814	Terminal nut for 11813 }	1	0 0 5	"
3528	Ball-bearing held by 11813	1	0 0 1	"
11815	Felt oiler } for above bearing	1	0 0 2	"
11816	Felt retainer }	1	0 0 2	"
4712	Insulating bush for leads	1	0 0 1	Each.
11841B	Complete coil unit, wound on laminations	1	1 2 4	"
11316	Fixing screw for 11841B	2	0 0 1	"
11845A	Coil (with one long and one short lead)	2	0 3 5	"
11845B	Coil (with two short leads)	2	0 3 4	"
13923	Insulation behind coils	4	0 0 4	Doz.
11846	Insulating strip in front of coil	4	0 0 3	"
11848	Spring clip, securing coils to laminations	4	0 0 2	"
11847	Packing strip, securing 11848	4	0 0 2	"
14799	Wooden wedge for coils	4	0 0 1	Each.
11817	Thrust screw for rotor bearing (worm end)	1	0 0 4	Doz.
11627	Nut } securing 11817 to main casting	1	0 0 6	"
14120	Nut }	2	0 0 2	"
3540	Ball-bearing in 11817	1	0 0 1	"
11815	Felt oiler } for above bearing	1	0 0 2	"
11816	Felt retainer }	1	0 0 1	"
11822	Felt oiler } for bottom bearing of turntable spindle	1	0 0 2	"
11823	Felt retainer }	1	0 0 1	"
11824	Felt oiler } for top bearing of turntable spindle	1	0 0 2	"
11825	Felt retainer }	1	0 0 2	"
11826A	Turntable spindle, complete with gear and one pin	1	0 2 1	Each.
2901	Pin locating turntable	1	0 0 6	Doz.
11828	Speed regulating lever	1	0 0 3	Each.
11830	Spring on 11828	1	0 1 3	Doz.
11831A	Regulator bracket, complete	1	0 0 3	Each.
11851	Screw securing 11831A to 11828	1	0 0 4	Doz.
9403	Leather pad on 11831A	1	0 0 2	"
11829	Collar } on Part No. 11828	2	0 0 1	Each.
11851	Screw }	2	0 0 4	Doz.
2917	Stop pin for 11829	1	0 0 2	"
11833B	Rotor, complete with governor	1	0 8 11	Each.
11833A	Spindle, with rotor only	1	0 5 8	"
11835A	Friction disc for governor	1	0 0 10	"
1174A	Governor ball and spring	3	0 0 2	"
11836	Collar for securing 1174A	1	0 0 4	"
11342	Screw } securing governors to 11836 and 11835A	6	0 0 2	Doz.
360	Washer }	6	0 0 1	"
13888	Screw securing 11836 to spindle	1	0 0 3	"
11852	Unit No. and voltage plate	1	0 0 2	Each
211	Screw securing 11852 to casting	2	0 0 6	Doz.

SPARE PARTS PECULIAR TO 228D MOTOR.

(100-160 volts, 200-250 volts, 50-60 cycles.)

Part No.	Description.	Parts per Inst.	Finish.	Retail List Price.	Per
11841C	Stator assembly	1	Std.	£ s. d. 1 2 5	Each.
11845A	Stator coil	4	Std.	0 3 5	"
13560	Fixing screw for stator	2	W.N.	0 0 9	Doz.
5876	Washer	2	W.N.	0 0 2	"
13561	Unit and voltage plate	1	Std.	0 0 3	Each.
13559	Terminal block	1	P.F.	0 0 7	"
13558	Spacing stud	2	W.N.	0 0 5	"
11310	Screw	2	W.N.	0 0 2	Doz.
969	Washer	4	W.N.	0 0 2	"
3924	Link	2	P.F.	0 0 6	"
2792	Screw	4	W.N.	0 0 6	"

In order to expedite delivery of spare part orders, please quote :—

1. Model number and unit type number.
2. Spare part number and description as given in the above list.
3. Quantity required.

Order spare parts from :—

THE SERVICE DEPARTMENT,
THE MARCONIPHONE CO., LTD.,
SHERATON WORKS,
HAYES, MIDDLESEX.

Telephone : Southall 2468.

Telegrams : SERVICE, Hayes, Middlesex.