

MARCONIPHONE

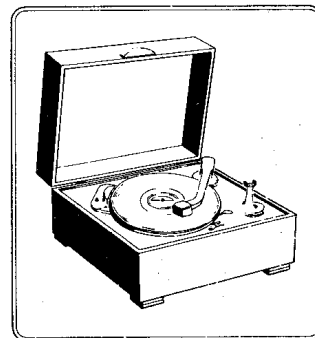
G. Marconi

THE GREATEST NAME IN RADIO

Record Player

Model 8903

SERVICE MANUAL



SPECIFICATION

Voltage Range.

100-130 volts, 200-250 volts, 50 cycles.

Consumption.

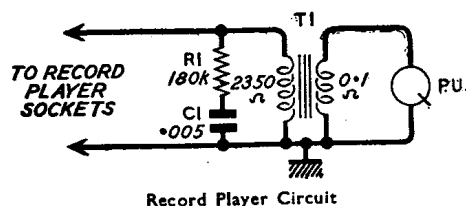
19 watts.

Overall Dimensions.

Height 6 $\frac{3}{4}$ inches.
Width 15 inches.
Depth 13 $\frac{1}{2}$ inches.

Weight.

11 $\frac{1}{2}$ lb. net.



Pick-Up.

The No. 13 (Part No. 36218B) is used.

D.C. resistance of coil, 1.3 ohms. Impedance at 1,000 cycles, 2 ohms. Output, 1.5 volts R.M.S. average. Impedance at 1,000 cycles across output leads of matching unit, 0.1 megohm.

Auto-Brake.

Part No. 230M. Friction feed type.

Motor.

Part No. 32370E, F, M or N.

On early production suffix E or F is used, and later suffix M or N. The main difference is that motors, suffixes E and F, have a metal pulley driving a rubber rimmed turntable and motors, suffixes M and N, a rubber tyred pulley driving a metal rimmed turntable.

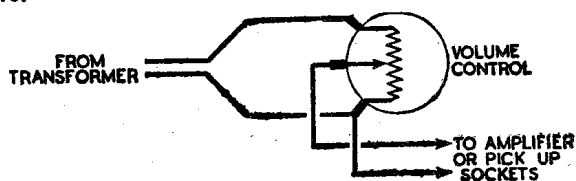


FIG. 1

CONNECTION TO RADIO RECEIVERS WITH PICK-UP SOCKETS

Most receivers, fitted with pick-up sockets, have either a "gram" position on the wave-change switch or a separate radio-gram switch. Where such switching is not fitted it may be found necessary to remove the pick-up plugs from the sockets in order to revert to radio reception.

If in either of the above cases it is found when playing a record, that the volume obtained is weak, this will normally be due to sockets on the receiver being matched for a high impedance pick-up. Circuits of this type have a resistance across the pick-up input leads. If this resistance is removed, the required volume will be obtained as no matching additional to that fitted in the record player should be necessary.

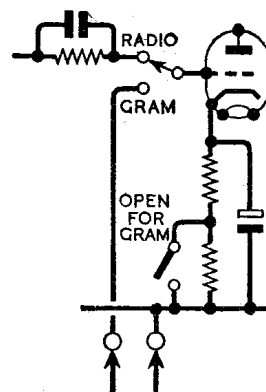


FIG. 2

For receivers in which the volume control is inoperative on "gram" a 0.5 megohm volume control should be inserted in the pick-up leads, as shown in Fig. 1.

CONNECTION TO RADIO RECEIVERS WITHOUT PICK-UP SOCKETS

Where a receiver has no pick-up sockets, the modifications necessary vary with the type of receiver concerned. If a leaky grid or anode bend detector is employed, the pick-up should be connected as shown in Fig. 2. The use of a radio-gram switch is optional and may be undesirable through the introduction of excessive hum. Where a switch is used all leads

from the switch should be well screened. If a switch is not fitted, the pick-up leads must be disconnected from the receiver before the receiver can be used for radio reception.

When the receiver uses a diode detector the pick-up connections should be as shown in Fig. 3. As before, the use of a switch is arbitrary. If a receiver has only one L.F. stage, i.e., a high efficiency output pentode is used without previous L.F. amplification, sufficient gain cannot be obtained to load fully the output stage and therefore the connection of a pick-up should not be attempted.

If the volume control of the receiver is inoperative when the record player is connected, a 0.5 megohm volume control should be inserted in the pick-up leads as shown in Fig. 1

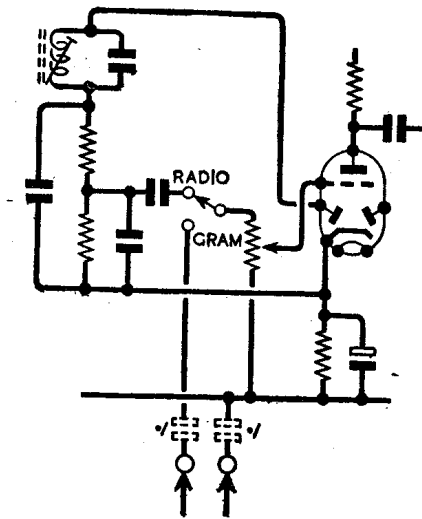


FIG. 3

WARNING

On A.C./D.C. receivers, where one side of the mains is connected to chassis the pick-up sockets should be

isolated by inserting a 0.1 mfd. condenser in each lead, as shown dotted in Fig. 3.

PICK-UP

IMPORTANT.—Dealers should appreciate, and advise owners when necessary that the new light weight pick-up is a component of precision which should be handled accordingly. No other needles but the Columbia 99 type must be used, and it is normal for these to feel loose when correctly inserted. Damage will result if force is used.

Normal Maintenance Adjustments.

To carry out normal maintenance adjustments it is not necessary to remove the pick-up from the motor board, although it may be found more convenient to do so.

1. Take out the needle. Remove the top which is stuck in position with cellulose cement. (Insert a knife blade under a corner of the top and gently prise it off.)

2. Unscrew the two nuts securing the reed plate. The reed plate may now be removed and the coil may be lifted clear of the pole-pieces. Note carefully the arrangement of paper washer(s).

3. Examine the armature and air gap for dust, grit and iron filings, but do not dismantle further unless absolutely necessary. A small piece of "plasticine" will be found very effective for clearing out iron filings.

4. Ascertain whether the damping pad has perished. Make sure that the armature is attached firmly to the reed plate and not bent or damaged in any way. If any of the above parts is faulty, reject and obtain and fit a complete new assembly.

5. Check continuity of the coil. (Resistance 1.3 ohms.)

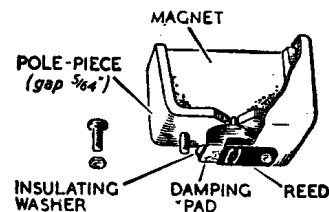
6. If it is necessary to remove the coil, the leads may be unsoldered from the tags just behind the pick-up head. (These tags are protected by an insulator.)

NOTE.

Do not remove the magnet and pole-pieces unless this is absolutely necessary.

To Replace the Coil.

1. Insert the coil and paper washer in the hole provided with the inner lead lying on the side of the coil nearest the pole-pieces; care should be taken to see that this lead does not lie in the air gap.



2. Cut the leads to the correct length and clean the ends. Solder to the connecting tags.

3. Replace the insulator over the tags, and fix with cellulose cement.

To Re-Assemble the Pick-Up Head.

1. Replace the coil as above.

2. Place the paper washer(s) on the coil and replace the reed plate. Care must be taken to ensure that the paint spot on the slot side of the reed plate is at the back of the pick-up head, i.e. towards the arm.

3. Place the fixing nuts on the reed plate and adjust the plate until the armature lies centrally in the air gap. Tighten the fixing nuts until the damping pad is compressed slightly.

4. Replace the top and secure with cellulose cement

To Remove the Pick-Up from the Motor-Board.

1. Unsolder the pick-up leads from tags on transformer. (Beneath motor-board.)

2. Remove the three screws beneath the motor-board securing the pick-up base.
3. The pick-up may now be removed and the leads drawn through the hole in the motor-board.

MOTOR

The four motors, suffixes E, F, M and N, are basically the same and differ mainly in the following details :—

- (a) "E" and "F" have a metal pulley driving a rubber rimmed turntable. "M" and "N" have a rubber tyred pulley driving a metal rimmed turntable.
- (b) "E" and "M" have 6 tags and "F" and "N" have 7, one of which is not used—see circuit diagrams.
- (c) The condensers on "E" and "M" are of different values from those on "F" and "N"—see circuit diagrams.

Principle of Operation.

The motor is a synchronous A.C. motor consisting of two pairs of coils—one pair being directly fed with between 100 and 125 v., according to the mains supply, the second pair being fed through a series condenser. The combined fields of these coils, being out of phase, produce a rotating field in the rotor causing it to turn at 3,000 r.p.m. The motion is transmitted to the turntable by means of a pulley fitted directly to the rotor spindle, the pulley driving the turntable at a constant speed of 78 r.p.m. The condenser in series and a resistance in parallel with the motor drop the voltage of the mains supply to that required by the motor, i.e., 100 to 125 v.

Bearings.

The two bearings are of phosphor-bronze surrounded by oil soaked felt washers. These washers contain sufficient oil for many years' service, it is advised therefore, that no further lubrication be added. If a fault develops in the bottom bearing it can easily be replaced—see "Dismantling"; if in the top bearing the complete motor should be returned to E.M.I. Sales & Service, Ltd., because special workshop facilities are needed to remove the pulley from the rotor spindle.

Coils.

The resistance of the coils may be checked by measuring between tags 1 and 2, and tags 2 and 3. The resistance in each case should be approximately 500 ohms; if a low reading or open circuit is obtained check each coil individually (250 ohms). The insulation resistance between the coils and laminations should be not less than 50 megohms when measured with 500 v. Tester. If any coil is found to be faulty proceed to "Dismantling".

Condensers.

If an electrical fault is suspected or a new coil has been fitted, the capacity and insulation of both condensers must be checked. Disconnect the three motor leads from their tags and measure insulation (50 megohms) and capacity between the appropriate terminals as shown on the circuit diagrams.

Dismantling.

To Remove Motor and Base Plate Assembly from Motor Board.

1. Screw down transit screw until motor assembly is held firmly.
2. Unsolder mains lead from motor tag panel.
3. Lift off turntable and remove screws fixing base plate to motor board.
4. Withdraw motor and base plate assembly.

To Replace Motor Bearings or Coils.

1. Remove 2 screws securing mounting bracket to base plate and withdraw motor assembly.
2. Remove 2 screws securing motor to this bracket and withdraw motor.
3. Remove 2 screws securing bearing brackets to laminations. The top bearing bracket complete with rotor, and the bottom bearing bracket can now be withdrawn. Care should be taken not to damage the rotor or its spindle.
4. The bottom bearing may now be stripped down for replacement.
5. To remove a coil press out the stator ring in the centre of the laminations, unsolder the leads from the coil tags and push the coil off the laminations, taking careful note of the disposition of the tags and leads to the remainder of the assembly.

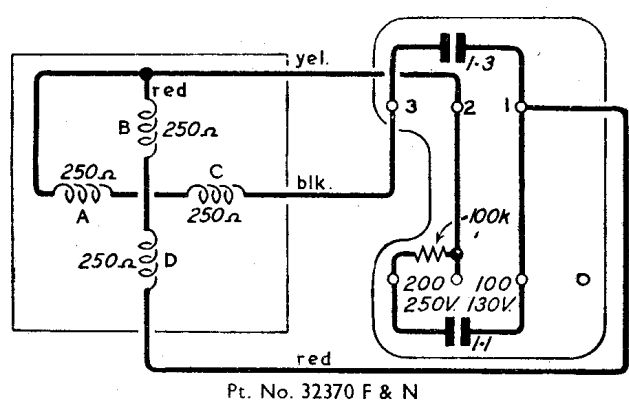
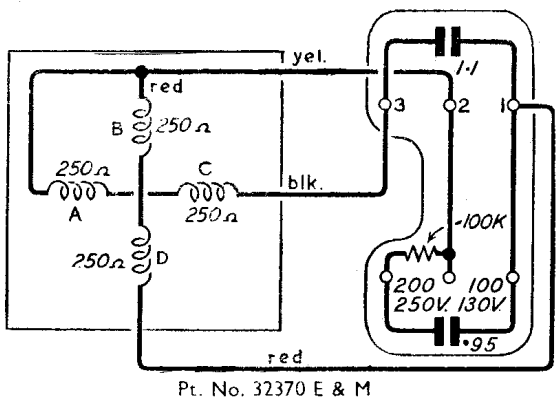
Re-Assembly.

For re-assembly reverse the procedure given above, paying particular attention to the following :—

- (a) *Air-gap between rotor and stator.* Insert four .014 inch feelers in the gap at equal distances round the rotor, tighten the two screws securing the bearing brackets and then withdraw the feelers. If the bearings feel tight on the rotor spindle, tap lightly the flat surfaces at each end of the bearing bracket and the bearings should free themselves.
- (b) *Position of turntable bearing.*—If a 12-inch record scrapes against the bakelite cover, slacken the lock-nut at the lower end of the turntable bearing and adjust until the necessary clearance is obtained.

(c) Position of driving pulley relative to turntable.—To obtain a correct turntable speed of 78 r.p.m. the pulley, when resting on the turntable, must be parallel to the face of the rim.

To adjust, slacken the 2 screws securing mounting bracket to base plate and slide the motor assembly as required.



THE AUTO-BRAKE

Principle of Operation.

To switch "On" the pick-up arm is swung away from the turntable until lever L1 pushes the right fork of L2 in the same direction. This movement of L2 moves L4 to the left and this lever in turn moves L5. At the end of its travel L5 switches on the motor switch (under the motor board) and releases the brake HB.

During playing, the pick-up arm travels across the record until L1 commences to push the left fork of L2. This slight movement is transmitted to the trip lever L3 by the friction bearing BR. So long as the needle progresses over the record at the normal rate (obtained only by the actual playing of a record) the movement of the pick-up arm is not enough to move L3 sufficiently for the upper, or semi-circular portion of the pawl CW to engage fully with the tooth D on the frictional collar round the turntable bush. The cam A engages the lower portion, circular rubber bush, of CW, thus pushing the pawl away at each revolution.

When, however, the end of the record is reached and the spiral quick "run-in" groove gives the pick-up arm a more rapid movement, the increase in speed of movement is sufficient to cause the pawl to move far enough towards the turntable spindle for the tooth D to strike the face B, thus actuating the brake and operating the motor switch.

For hand operation the "Auto-brake on/off" lever is moved to the "Off" position thereby holding lever L3 away from the frictional collar on the turntable bush. Hand brake lever HB is then used for stopping the turntable.

Switching "On" is the same for both "Hand" and "Auto" operation.

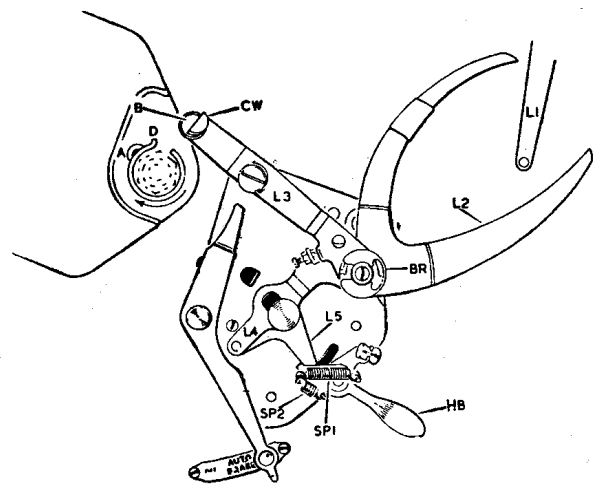
Adjustment of Brake.

If at any time the spring SPI in the hand brake is renewed or replaced, make sure that the axis of

the spring lies as far distant as possible from the centre of the pivot of the HB lever, otherwise the friction brake may fail to operate in conjunction with the automatic stop.

If the auto-brake does not function, increase the friction at BR by removing the Isle-o'-Man washer and bending the arms in order to increase the effective thickness. Too much friction at BR may cause a hollow knocking sound to be transmitted to the pick-up and may also cause undue record wear. If a knocking sound is heard, decrease slightly the friction of BR, but do not apply oil.

The only parts which may need lubrication are the pivots of all levers and a smearing of grease should be applied between the frictional collar and the turntable bush. Under no circumstances apply lubrication to the frictional bearing BR. As the pivot at the centre of L3 has to be loose for satisfactory operation, any noise from this pivot can be reduced by applying a smearing of grease.



MODIFICATIONS

RIM DRIVE MOTORS TYPES 32370, M, N, J.

Drive Roller Replacement

Incorrect alignment of the rubber drive roller to the turntable rim, will cause uneven wear of the rubber and eventually the drive becomes noisy.

In the initial setting up of a Model incorporating a rim drive motor, the motor drive must be inspected to ensure that there is flush contact to the turntable rim.

When there are long periods between use of the gramophone or unit, it is advisable to arrange for the contact between the drive roller and turntable to be disconnected by means of the red headed transit screw.

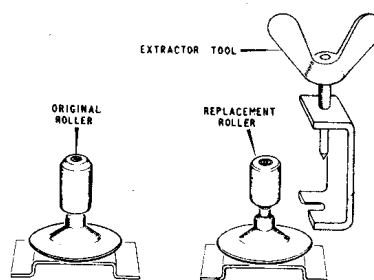
If wear of the rubber drive roller has taken place, it will be necessary to replace the roller. Replacement rubber drive rollers are now available, Part No. 46489B.

Later Models are fitted with this new drive roller and a special tool Part No. Q/D. 519, as illustrated, is available from the Spare Parts Division for removing the roller when necessary for replacement. The replacement roller differs from the original roller

insofar that there is a brass sleeve insert which fits on the motor spindle. The original roller had no sleeve and was cemented directly on the motor spindle.

When removing the original type roller it can be cut away with a sharp knife and the motor spindle cleaned to receive the replacement.

The replacement roller as illustrated has the rubber and sleeve flush at one end, whilst at the other end, the sleeve protrudes. It must be fitted on the motor spindle with the flush end, flush with the end of the motor spindle. A smear of fixing cement such as "Durofix" should be applied to the motor spindle before fitting the replacement drive roller.



REPLACEMENT CAPACITORS FOR RECORD PLAYER

RIM DRIVE MOTORS TYPES 32370F AND 32370N

Due to the difficulty experienced in obtaining the close tolerances required, the following motor capacitors will be discontinued when the existing stock held in Spare Parts Division becomes exhausted.

PART No.	VALUE	
37700 All Suffixes	1.3 mfd.	} Various Tolerances.
37486 Suffix A, B, C & E.	1.1 mfd.	

The 1.1 mfd. capacitor, Part No. 37486D remains available and will be issued in future as replacement for all these components.

A 2 mfd. capacitor, Part No. 38236B, must be added

in parallel with the 37486D in order to obtain the correct capacitance whenever the 1.3 mfd. type 37700 requires to be replaced.

WARNING:

These motors employ two phasing capacitors, 1 off each 1.3 mfd. and 1.1 mfd., and it is most essential that both components have identical tolerances. When one capacitor is to be replaced, the associated capacitor must be examined to ensure that this also bears the same suffix D, and should this not be the case, then this component must also be replaced with the 37486D.

SPARE PARTS LIST

All parts apply to both models unless otherwise stated.

Part No.	Description.	No. per Inst.	Finish.	Part No.	Description.	No. per Inst.	Finish.
INSTRUCTION CARDS AND TRANSFERS.				CABINET PARTS AND FITTINGS.			
49259	Instruction Card	1	—	404201	Cabinet, complete ..	1	Pol.
8936	Transfer "Close Lid Whilst Playing"	1	—	22110A	Lid Hinge	2	Bronzed
				8651	Screws securing Hinge	8	46
				30972	Rubber Feet	4	—
				403507	Bottom (mill board)..	1	—
				403523	Motor Board	1	—
				23202	Wood screw securing Motor Board	4	46

SPARE PARTS LIST continued

Part No.	Description.	No. per Inst.	Finish.	Part No.	Description.	No. per Inst.	Finish.
MOTOR BOARD FITTINGS.				RIM DRIVE MOTOR.			
13825A	Serial No. plate	1	—	32370F	MOTOR and base plate assembly, complete	1	—
3551	Brad securing plate	4	—	36373	BASE PLATE (less tags)	1	—
230M	Auto Switch brake	1	—	SPS7652	BASEPLATE (with tags)	1	—
230U	Base-plate assembly with rocking lever and hand brake	1	—	32385	Bush for turntable spindle	1	—
9040	Spring, large, for hand brake	1	—	33847	Nut } securing bush to base-plate	1	03
10920	Spring, small, for hand brake	1	—	33346	Washer }	1	03
40746	Trip fork	1	449/442 Loc.	32386	Screw } for adjusting turntable	1	—
3084	Rubber sleeve for trip fork	1	—	33481	Nut } spindle	1	03
32787A	Trip lever	1	—	32486	Bracket, housing motor	1	—
200060H	Adjusting screw	1	03	200048N	Screw } securing bracket to base-plate	2	03
200406	Locknut	1	03	201304	Washer }	2	03
245	Screw, securing lever to baseplate	1	03	201804	S.P. Washer	2	—
40744	Friction washer	2	—	200404	Nut	2	689
296	Spring washer } securing trip	1	03	32388	Screw, securing motor to bracket	2	03
40745	Spacer } lever to trip	1	03	32487	Rubber bush, for screw securing motor to bracket	2	—
297	Circlip	1	03	36051	Transit screw	1	256
8780C	Switch	1	—	36055	Locknut (special) } for adjusting	1	256
2753	Screw, securing switch	2	03	201304	Washer } transit screw	1	256
8602	Screw, securing auto-brake	3	03	17378	Eyelet tag	7	104
246	Auto-brake—on/off plate	1	256	37486D	Condenser 1.1 μ F	2	—
8644	Screw, securing plate	2	256	38236B	Condenser .2 μ F	1	—
9430	Needle bowl and cover	1	—				
3484	Needle bowl support	1	03				
3551	Brad, securing support	3	03				

NOTE.—See under Modifications Page 5.

PICK UP (NO. 13).							
35218B	P.U. complete with leads and pivot assembly	1	—	33373EA	Resistance, 100,000 ohms, 20 per cent., 1 watt	1	—
35218A	P.U. arm and head with leads	1	—	9524	Screw, securing baseplate to motor board	3	256
35218	P.U. arm, moulding only	1	—	32370D	MOTOR only	1	—
35215	Pole piece, R.H.	1	312	46489B	Drive Roller	1	—
35216	" " L.H.	1	312	32377B	Top bracket and rotor assembly	1	—
34778	Magnet	1	—	36637A	Bottom bracket assembly	1	—
35361	Insulation	1	—	32378	Disc	1	—
28811B	Coil	1	—	32371	Bush	1	—
35364	Washer	1	—	32372	Oil washer	1	—
28808	Damper (VINYLITE)	1	—	40463	Cover	1	688
35217B	Reed-plate assembly	1	—	200080D	Screw } securing cover to bottom	2	03
41109	Screw } securing pole-piece, coil and reed-plate	2	312	200408	Nut } bracket	2	03
123994	Washer }	2	—	32780B	Lamination and coil assembly	1	—
35356	Nut } assembly	2	256	35384B	Coil	4	—
35219	Cover moulding (plain)	1	—	39350	Packing (for coils) approx.	8	—
35358	Lead clamp	1	—	35301	Ring	1	312
200060F	Screw } securing clamp to arm	1	312	32382	Insulation (between lamination and bracket assemblies)	4	—
201306	Washer } moulding	1	312	3520	Ball, for bottom bearing	1	—
35214B	Lead and pin assembly	2	—	200045Q	Screw } securing top and bottom brackets to lamination assembly	2	03
4201 x 1301	Lead only	25	each	200404	Nut }	2	03
40841B	Pivot assembly with trip lever	1	—				
34781	Bearing	1	06				
37281	Shim washer	1	03				
120999	Stop pin	1	312				
35363	Pivot pin	1	—				
33873	Shim washer	2	03				
34771	P.U. base moulding	1	—				
200060G	Screw } securing pivot bearing to base	2	312				
201306	Washer }	2	312				
200040M	Screw } securing P.U. base to motor board	3	03				
201304	Washer }	6	03				
15969A	P.U. rest	1	—				
15970	Felt	1	—				
9545	Screw, securing rest	2	256				
34720E	P.U. transformer (TI)	1	—				
132799	Tag	2	104				
8694	Screw, securing transformer	2	03				
33368PX	Resistance, .18 megohms (RI)	1	—				
36355C	Condenser, .005 mfd. (CI)	1	—				

On later models, the following motors may be used.

32370M	MOTOR and base plate assembly, complete	1	—
33345	Base plate	1	—
32385	Bush, for turntable spindle	1	—
33847	Nut } securing bush to base-plate	1	03
33346	Washer }	1	03
32386	Screw } for adjusting turntable	1	03
33481	Nut } spindle	1	03
32486	Bracket, housing motor	1	—

SPARE PARTS LIST continued

Part No.	Description.	No. per Inst.	Finish.	Part No.	Description.	No. per Inst.	Finish.
RIM DRIVE MOTOR—continued.				RIM DRIVE MOTOR—continued.			
200048N	Screw	2	03/854	32388	Screw, securing motor to bracket ..	2	03
201304	Washer	2	03/854	32487	Rubber bush, for screw securing motor to bracket ..	2	—
201804	S.P. Washer	2	—	36051	Transit screw ..	1	256
200404	Nut	2	689	36055	Locknut (special) } for adjusting	1	256
32388	Screw, securing motor to bracket..	2	03	201300	Washer } transit screw	1	256
32487	Rubber bush, for screw securing motor to bracket ..	2	—	17378	Eyelet tag ..	7	104
36051	Transit screw ..	1	256	36758	Slipper, screwed to end of locking screw ..	1	03
36758	Slipper, screwed to end of transit screw ..	1	03	46489B	Drive Roller ..	1	—
36055	Locknut (special) }	1	256	37486D	Condenser 1.1 μ F ..	2	—
201300	Washer }	1	256	38236B	Condenser .2 μ F ..	1	—
36052	Bush }	1	256	NOTE.—See under Modifications Page 5.			
36053	Nut (special) }	1	03	33373EA	Resistance, 100,000 ohms, 20 per cent., 1 watt ..	1	—
200068T	Stop screw ..	1	03	9524	Screw, securing baseplate to motor board ..	3	256
200506	Locknut for stop screw ..	2	03	32370L	MOTOR only. As used on 32370M	—	—
36198C	Condenser case assembly with condensers ..	1	—	TURNTABLES.			
59119CE	Rivet securing condenser case assembly ..	4	—	Used with 32370F Motor.			
32370L	MOTOR only ..	1	—	30874F	Turntable complete ..	1	—
32370K	Top bracket and rotor assembly ..	1	—	3569	Felt ..	1	—
36637A	Bottom bracket assembly ..	1	—	39357	Friction band ..	1	—
32378	Disc ..	1	—	Used with 32370M and N Motor.			
32371	Bush ..	1	—	35390U	Turntable complete ..	1	—
32372	Oil washer ..	1	—	35398	Felt (top) ..	1	—
40463	Cover ..	1	688	36633	Felt (underside) ..	1	—
200080D	Screw } securing cover to bottom	2	03	39357	Friction band ..	1	—
200408	Nut } bracket	2	03	LEADS, ETC.			
32780B	Lamination and coil assembly ..	1	—	28991C	Mains lead and cleat ..	1	—
35384B	Coil ..	4	—	11892	Cleat ..	1	03
39350	Packing (for coils), approx. ..	8	—	8692	Woodscrow securing mains lead ..	1	—
35301	Ring ..	1	312	27071A	Pick-up lead with two plugs ..	1	—
32382	Insulation (between lamination and bracket assemblies) ..	4	—	3475G	Plug (Yellow) ..	1	—
3520	Ball, for bottom bearing ..	1	—	3475B	„ (Black) ..	1	—
200045Q	Screw } securing top and bottom	2	03	25297F	Earth lead and tag (4 inches long) ..	1	—
200404	Nut } brackets to lamination assembly	2	03	15140	Tag ..	1	104
Or the following complete motor may be used.				33530A	Earth leads (3 inches long) ..	2	—
32370N	MOTOR and base plate assembly complete ..	1	—	105194A	Tag and bracket ..	1	—
36373	BASE PLATE ..	1	—	8697	Screw, securing bracket ..	1	03
32385	Bush, for turntable spindle ..	1	—	4681	Cleat ..	2	03
33847	Nut } securing bush to base-	1	03	8697	Screws securing cleats ..	2	03
33346	Washer } plate ..	1	03				
32386	Screw } for adjusting turntable	1	03				
33481	Nut } spindle ..	1	03				
32486	Bracket, housing motor ..	1	—				
200048N	Screw	2	03				
201304	Washer	2	03				
201804	S.P. Washer	2	—				
200404	Nut	2	689				

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

1. Model and serial numbers
2. Spare part number and description.
3. Quantity required.

Unless full particulars are quoted, delay in execution of orders must inevitably result.

Order Spare Parts.

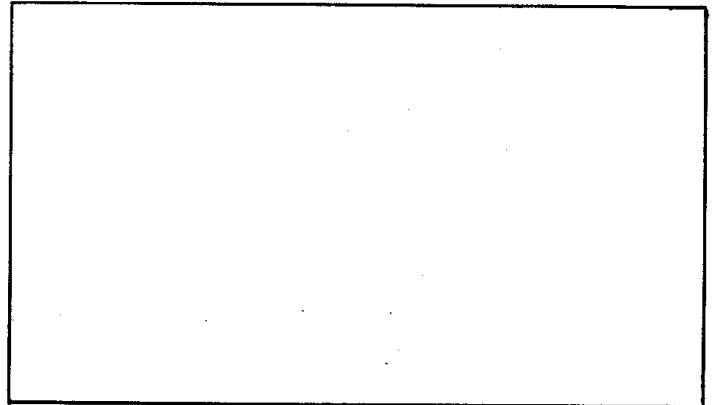
From:—

E.M.I. SALES & SERVICE LIMITED,
SPARE PARTS DIVISION,
SHERATON WORKS,
WADSWORTH ROAD,
GREENFORD, MIDDLESEX.

Telephone: PERivale 6666

Telegraphic Address: Emiservice, Greenford,
Middlesex.

Or:—



The Company reserves the right to make any modifications without notice.

ISSUED BY:— **E.M.I. SALES & SERVICE LTD., HAYES, MIDDLESEX.**