

RCA Victor DUO JUNIOR R-93

SERVICE NOTES



SERVICE DIVISION

RCA Victor Company, Inc.

Camden, N. J., U. S. A.

A RADIO CORPORATION OF AMERICA SUBSIDIARY

REPRESENTATIVES IN PRINCIPAL CITIES

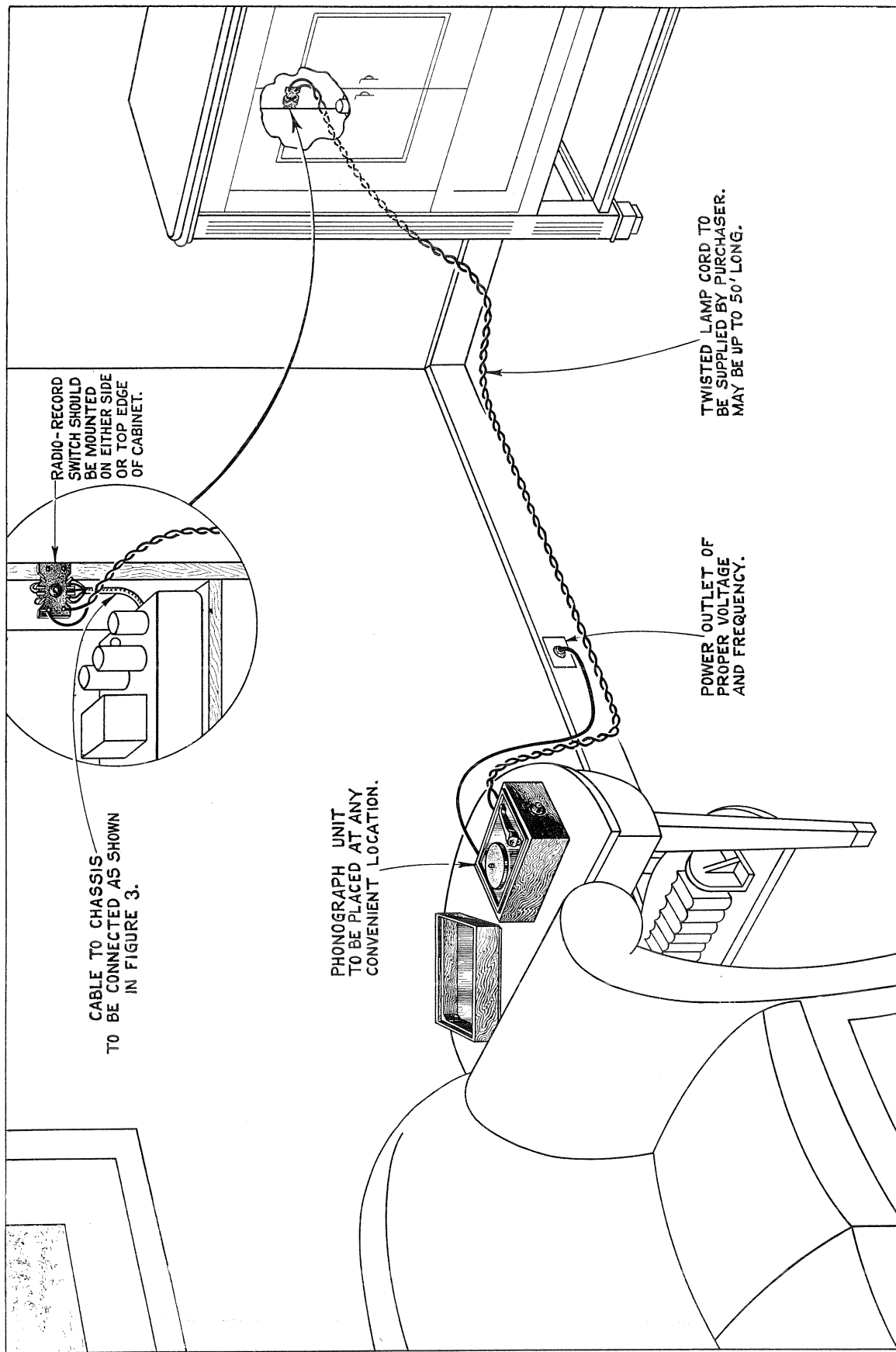


Figure 1—Typical Layout and Connections for Model R-93

RCA VICTOR DUO JUNIOR MODEL R-93

SERVICE NOTES

Electrical Specifications

Voltage Rating.....	105-125 Volts	Turntable Speed.....	78 R.P.M.
Frequency Rating.....	25, 50 and 60 Cycles	Pickup Impedance at 1000 Cycles.....	2450 Ohms
Power Consumption.....	4 Watts	Pickup Output Voltage.....	0.4 Volt at 400 Cycles
Type of Motor.....	Synchronous Reaction	Volume Control Resistance.....	20,000 Ohms

Physical Specifications

Turntable Diameter.....	7 Inches	Width.....	11 Inches
Height.....	5 Inches	Depth.....	8 Inches

This phonograph turntable and pickup assembly is designed to provide record reproduction to the owner of a modern radio receiver. Use of the audio amplifying system and loudspeaker of the radio receiver provides a quality of reproduction equal to or better than that obtained from radio stations. A switch is provided for changing from radio to record reproduction, or vice-versa. Simplicity, compact size and ease of connections are outstanding features of this instrument.

Electrically, the instrument consists of a magnetic pickup—for transforming the mechanical variations

of the record grooves to voltage variations—a volume control for adjusting the output voltage to any desired level and a radio-record switch for shifting the connections to the receiver so that either radio or record reproduction may be obtained as desired by the user.

Figure 1 shows a typical layout for an ideal installation. Figure 2 shows the proper connections to be made between the pickup unit and the switch assembly. Figure 3 shows the schematic diagram, while Figures 4 and 5 show the chassis and cable wiring diagrams respectively.

Connecting Phonograph to the Radio Receiver

When connecting a phonograph unit to a radio receiver, there are a few fundamental facts to be considered. First, the output of the pickup must be connected to the receiver at a point where sufficient audio gain between it and the speaker is available to give normal sound output. Second, when doing this some attention should be given to the possibilities of introducing hum and other undesired noise, both in the audio and in the radio circuits.

In general, it will be found that the grid or cathode circuits of the second detector of a super-heterodyne circuit are suitable for phonograph input. On tuned R. F. receivers, either the detector cathode or the first audio transformer primary circuit may be employed, depending upon the amount of audio gain and the type of detector used.

It is fairly common to find radio receivers employing a volume control located in the audio circuit. In these cases, it is advisable to run the phonograph volume control at maximum and use the radio receiver volume control for adjusting the phonograph output. In circuits using aurally compensated volume controls, advantage of this feature is not taken unless the radio receiver volume control is used.

Investigation of a large number of receivers has shown that four general types of connections, all of which may be made without removing the chassis from the cabinet, cover practically every type of receiver. These connections are as follows:

- (1) Receivers having phonograph input jacks and Radio-Record Switches. With these receivers the cable and switch supplied with the R-93 is not used. The phonograph output is connected direct to the phonograph input jack

and the Radio-Record Switch on the Receiver is used for changing from Record to Radio reproduction. The 1929 Victor Receiver and numerous Stromberg-Carlson Receivers are typical examples of this type of connection.

- (2) Receivers having phonograph terminal board connections. Such connections are made in accordance with the instructions pertaining to that particular instrument.
- (3) Receivers using the 2B7 or 6B7 Second Detectors. With receivers of this type, the yellow and green leads are connected in series with the grid cap connection of this tube.
- (4) Receivers not having any of the foregoing features. On receivers of this type, an adaptor having a split cathode connection is necessary. Stock No. 4611, five-prong adaptor, or Stock No. 4612, six-prong adaptor, may be used. In such cases, the yellow and green leads are connected in series with the cathode, which is placed under the tube used in the second detector socket of the receiver.

It will be noted that red and blue leads are brought out from the switch for "killing" the radio during record reproduction. With most receivers, these may be connected in series with the antenna lead. However, in event this does not work satisfactorily, then one of the split cathode adaptors must be used in the oscillator socket and the leads connected in series with the cathode. This will effectually "kill" the radio on any super-heterodyne receiver. On the following page, a list of numerous receivers and their proper connections are given.

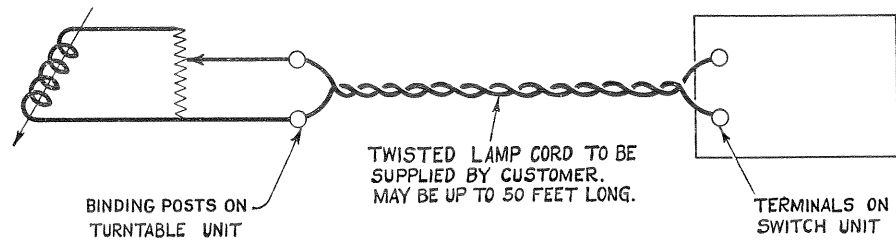


Figure 2—Connections from Pickup to Switch Unit

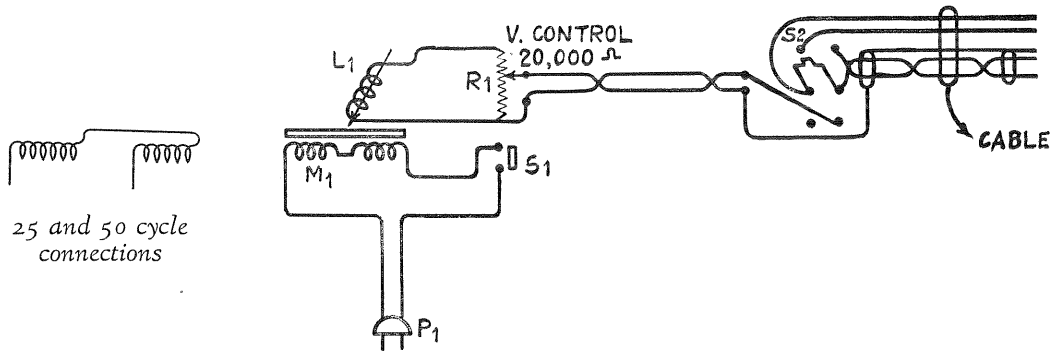


Figure 3—Schematic Diagram

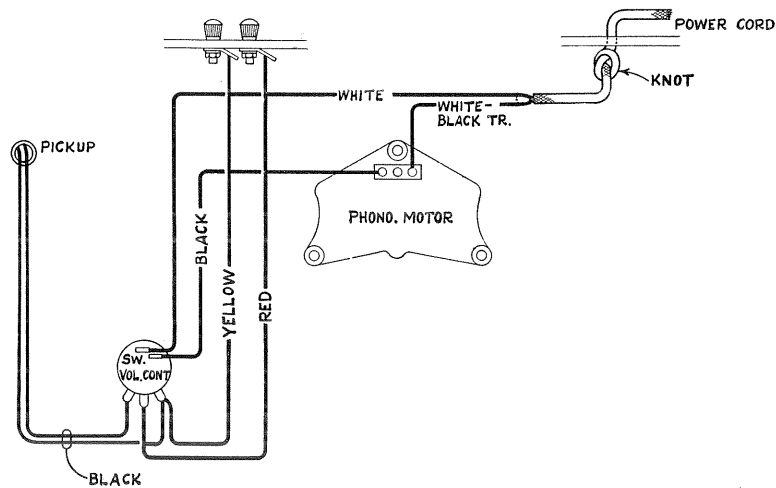


Figure 4—Wiring Diagram

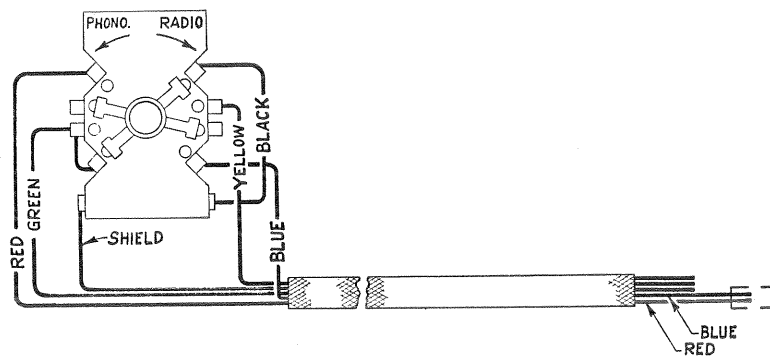
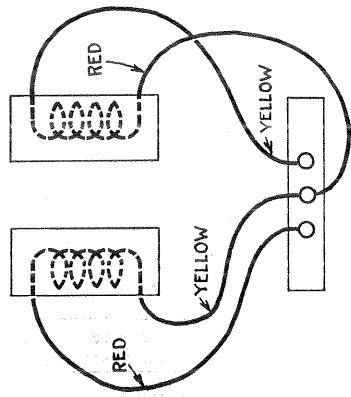


Figure 5—Cable Connections

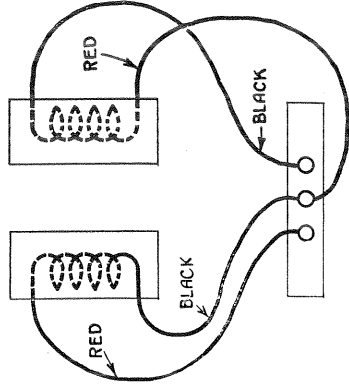
RCA VICTOR RECEIVERS — DETAILS OF LEAD CONNECTIONS

<i>Model</i>	<i>Method of Connection</i>	<i>Green</i>	<i>Yellow</i>	<i>Red</i>	<i>Blue</i>	<i>Shield</i>
R-4, 6	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Chassis
R-5	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Det. Cathode (Yellow)
R-7	2. Term. Board	Term. 2 (Open Link)	Term. 1	Ant.	Ant. Lead	Term. 4
R-7A	2. Term. Board	Term. 2 (Open Link)	Term. 1	Ant.	Ant. Lead	Term. 4
R-8, 10, 12	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Chassis
R-11	2. Term. Board	Term. 2 (Open Link)	Term. 3	Term. 4	Term. 5	Term. 6
R-17M	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Det. Cathode (Yellow)
R-18W	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Det. Cathode (Yellow)
R-21	2. Term. Board	Term. 2 (Open Link)	Term. 3	Term. 4	Term. 5	Term. 6
R-22	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Det. Cathode (Yellow)
RO-23	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Chassis
R-27	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Det. Cathode (Yellow)
R-28	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Chassis
R-37, 38	3. Grid Clip	Grid Cap of Tube	Grid Clip Contact	Ant.	Ant. Lead	Chassis
Rad. 48	2. Term. Board	Term. 4 (Open Link)	Term. 5	Term. 2	Term. 3	Term. 5
R-50, 55	2. Term. Board	Term. 3 (Open Link)	Term. 4	Term. 1 (Open Link)	Term. 2	Term. 6
R-70	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Chassis
R-71, 72	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Chassis
R-73, 75	3. Grid Clip	Grid Cap of Tube	Grid Clip	Ant.	Ant. Lead	Chassis
R-73A, 75A	3. Grid Clip	Grid Cap of Tube	Grid Clip	Ant.	Ant. Lead	Chassis
R-74, 76, 77	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Chassis
R-78	2. Term. Board	Term. 7 (Open Link)	Term. 8	Term. 1	Term. 2	Chassis
Rad. 80	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Bind. Post	Chassis
Rad. 82	2. Term. Board	Term. 2 (Open Link)	Term. 3 (Tie-in Term. 1 to Term. 3)	Term. 1	Term. 3	Term. 3
R-90, 260, 261	4. Adaptor	Det. Cathode	Cathode Socket Contact	Osc. Cathode*	Osc. Cathode Socket Contact	Chassis
110, 111, 115, 210	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead or Bind. Post	Cathode Socket Contact
114	4. Adaptor	Det. Cathode	Cathode Socket Contact	Ant.	Ant. Lead	Det. Cathode (Yellow)
120, 124, 220	3. Grid Clip	Grid Cap of Tube	Grid Clip	Ant.	Ant. Lead on Bind. Post	Chassis
121, 122, 221	3. Grid Clip	Grid Cap of Tube	Grid Clip	Ant.	Ant. Lead on Bind. Post	Chassis
140, 141, 240	2. Term. Board	Term. 3	Tape	Term. 1	Term. 2	Term. 1
280	4. Adaptor	Det. Cathode	Cathode Socket Contact	Osc. Cathode*	Osc. Cathode Socket Cont.	Chassis

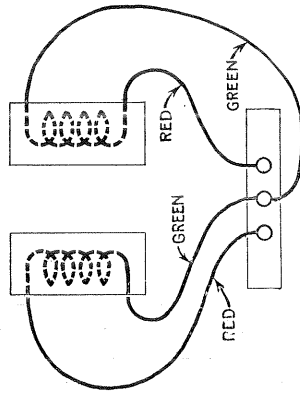
*Use a second adaptor.



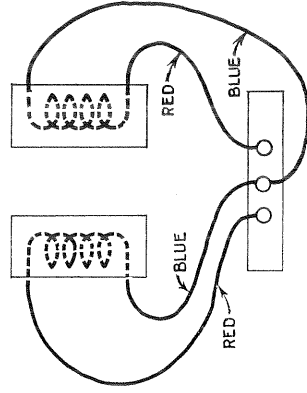
110 Volt—60 Cycle



220 Volt—50 Cycle



110 Volt—50 Cycle



110 Volt—25 Cycle

Figure 6—Motor Wiring Connections

PHONOGRAPH MOTOR SERVICE DATA

The synchronous motor used in this instrument is of simple design and fool-proof construction. Among its many features are low power consumption, single moving part, ease of starting, oilless main bearing, resilient bumper, and long life with freedom from service repairs.

Figure 7 shows the main parts of the motor and the points that may require attention.

Operation:

The two stator coils are connected as shown in Figure 2 and the motor is started by giving it a clockwise spin with the hand. If it is found to be difficult of starting, or if it runs at a sub-synchronous speed such as at 70 R.P.M., such action may result from one of the following causes:

Difficult to Start—This may be due to the stator failing to rotate on the outer bearing. This can be caused by the lug being bent and rubbing in the slot, or sticking to the resilient bumper. The outer bearing not being properly lubricated may also cause this condition. It is important that the ball bearing be at the bottom of the main bearing assembly.

Slow Speed—If the turntable is jarred or slowed down, the motor may run at a sub-synchronous speed, such as 70 R.P.M. This is remedied by merely lifting the tone arm from the turntable, thereby removing the load. The turntable speed will then immediately increase to normal.

Excessive Vibration and Hum:

A small amount of hum when starting, decreasing to a negligible amount while running, is normal. If excessive vibration occurs either at starting or running, it may be due to one of the following:

- (1) Insufficient lubricant in outer bearing or any other failure that will cause the stator to bind.
- (2) Metal washer not above the leather washer at the bottom of the main bearing.
- (3) Motor not properly supported from motor board. Unless the motor is properly supported from the motor board, normal vibration will be excessive.

Removing Rotor from Stator:

The rotor which includes the turntable may be removed by loosening the screw shown in Figure 7 until it clears the rotor and then lifting the turntable. Be careful not to lose the ball end-bearing when this is removed. After replacing the rotor, tighten the retaining screw securely to eliminate the possibility of rattle in operation.

Power Consumption:

The motor consumes 4 watts. It should never be turned on when the rotor is removed, as in this condition excessive current will be drawn with consequent increase in temperature.

NOTE—The above values of power consumption are average for a 60-cycle motor at 125 volts. At lower voltages the power consumption will be less.

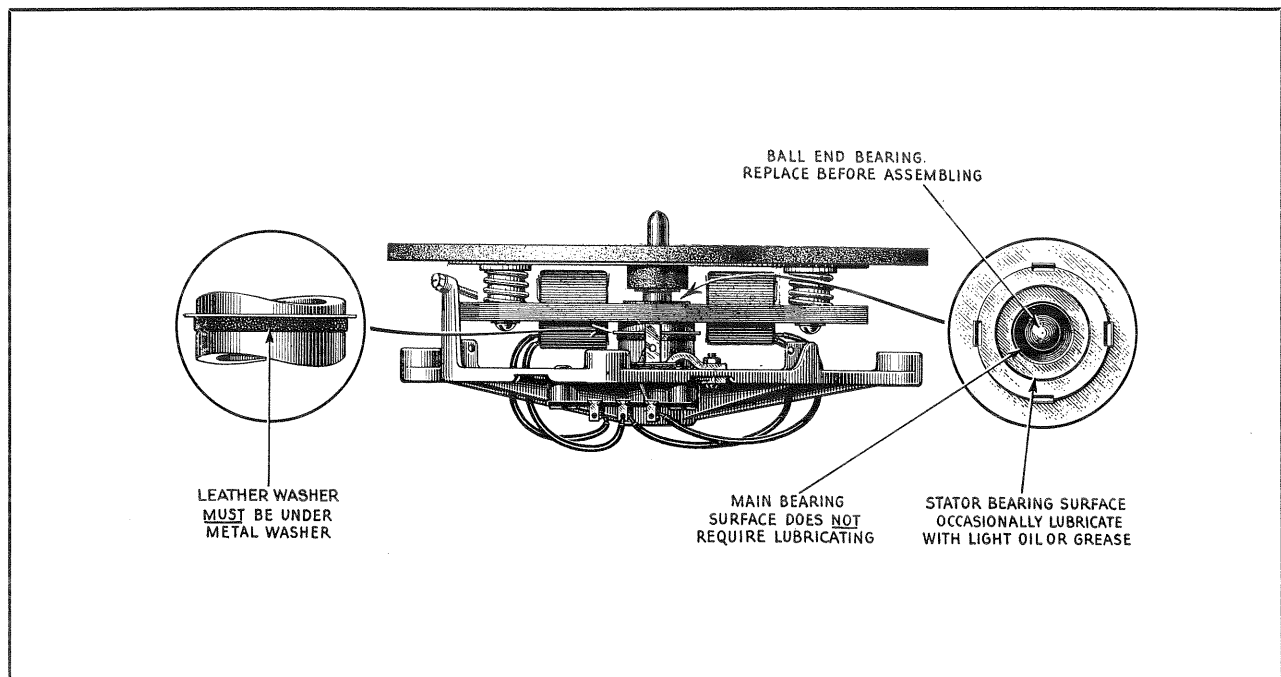


Figure 7—Details of Motor

PICKUP UNIT SERVICE DATA

The magnetic pickup and tone arm assembly of this instrument is of new design and unique construction. Service work will consist of centering the armature and replacing the rubber pivots, damping block and replacing the magnet coil.

Disassembling the Pickup:

The pickup may be disassembled in the following manner:

- (a) Unsolder the two cable connections to the terminal strip.
- (b) Remove the needle screw and screws "A" and "B."
- (c) Remove the pickup assembly from the arm and housing.
- (d) Unsolder the two magnet coil leads attached to the terminals and then remove screw E. This will allow the removal of the terminal board.
- (e) If centering the pickup armature is the only adjustment required, such centering can be done without removing the terminal board indicated in (d). The armature is centered by loosening screw F, accessible through the hole shown, and holding the armature with the finger in proper position while screw F is tightened. "Feeling" the armature while deflecting it between its two extremes is the best manner of ascertaining proper centering. When centering, after work has been done or the magnet removed, it is important that the magnet be remagnetized while in place.

- (f) If the coil or pivot rubbers are to be replaced, the pickup must be further disassembled. This is done by removing the magnet and then removing screws C and D. The pole piece may now be removed and the old coil and sleeve disassembled. Acetone will be found helpful for dissolving the old cement that holds the coil in place. The new coil, with its sleeve, may now be replaced and cemented in a similar position to that occupied by the old coil. Duco household or Ambroid cement may be used to hold the coil in place. Be careful to center the coil with its paper sleeve before cementing. Only rosin core solder should be used for soldering the coil leads in the pickup.
- (g) The pivot rubbers are replaced by loosening the armature adjusting screw F and removing screw G, clamp H and washer I and removing the armature from its bracket. Damping block J must be removed from the armature. After putting the new pivot rubbers in place, a new damping block should be fastened to the armature as outlined in instructions on replacing the damping block. The rubbers can then be removed by slipping them from each end of the pivot shaft.

Replacing the Damping Block

If it is desired to replace the damping block, it may be done in the following manner:

- (a) Disassemble the pickup as described under the preceding section.

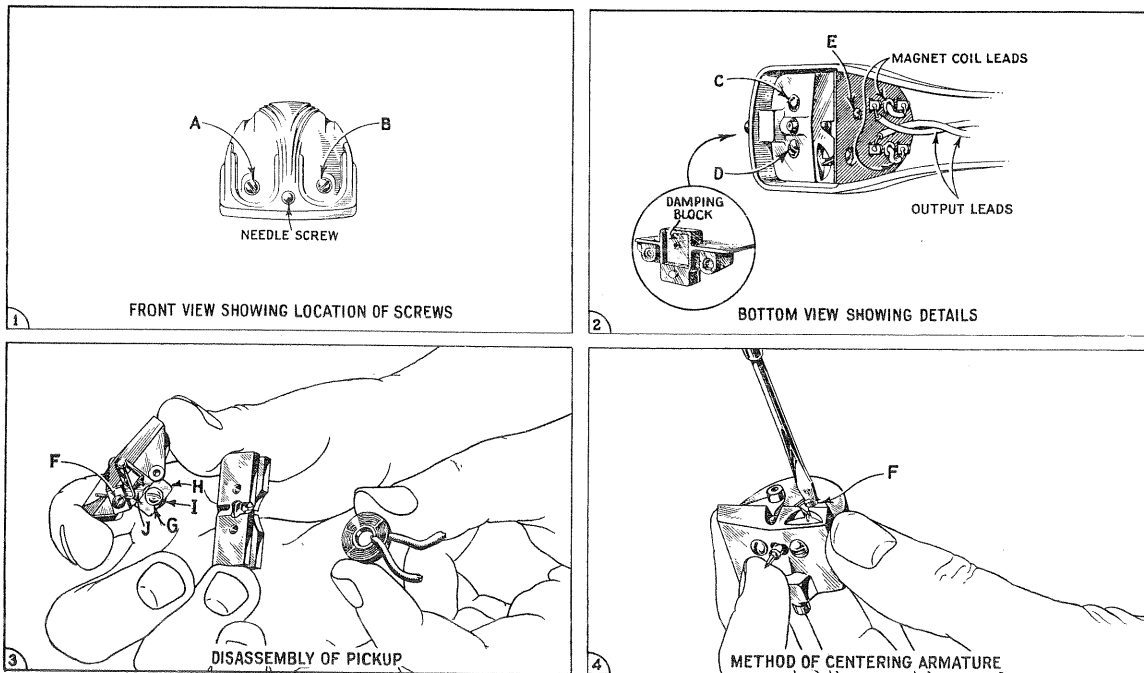


Figure 8—Details of Pickup Assembly

- (b) Remove the damping block from the armature and clean the armature shaft with emery paper.
- (c) Insert the armature through the new block so that it occupies the same position as that of the old. Also ascertain that the block is in correct vertical alignment with the armature. It will be noted that the hole in the damping block is somewhat smaller than the shaft diameter. This is done so that a snug fit will be obtained.
- (d) After properly locating the damping block, a soldering iron should be applied to the armature so that the block will melt slightly at its point of contact with the armature. A special tip, constructed as shown in Figure 9, will prove desirable for fusing the block in place. The iron should be applied only long enough to melt the block sufficiently to cause a small bulge

on each side, and must be removed before any bubbling occurs. The pickup should then be reassembled.

It is important to remember that in all operations after reassembling but before placing in the tone arm,

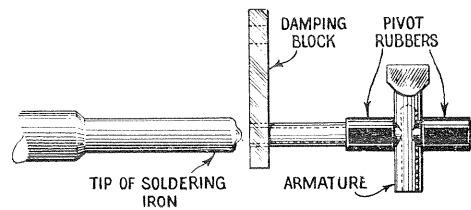


Figure 9—Replacing Damping Block

the pickup should be magnetized and the armature centered after remagnetizing. Magnetizing should be done by placing the pickup magnet on the magnetizer and sliding it onto the pole pieces, after magnetizing being careful not to break the magnetic circuit.

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	DESCRIPTION	List Price	Stock No.	DESCRIPTION	List Price
MOTOR ASSEMBLIES					
10194	Ball—Steel ball bearing—Package of 20	\$0.25	9522	Turntable — Turntable assembly complete with rotor laminations—105-125/200-250 volt—50 cycle operation	\$4.25
7657	Base—Motor base and bearing assembly—50-60 cycle—105-125/200-250 volt operation	1.20	4083	Washer—Leather washer—Package of 10 . . . . .	.20
9523	Base—Motor base and bearing assembly—25 cycle operation	1.20	4084	Washer—Metal washer—Package of 10 . . . . .	.26
9519	Coil—Stator assembly—Comprising coil and laminations—105-125 volt, 60 cycle operation	2.50	PICKUP AND ARM ASSEMBLIES		
9521	Coil—Stator assembly—Comprising coil and laminations—105-125 volt, 50 cycle operation	2.35	3812	Armature—Pickup armature . . . . .	.32
9524	Coil—Stator assembly—Comprising coil and laminations—105-125 volt, 25 cycle operation	2.25	4462	Cable—Pickup cable . . . . .	.20
9529	Coil—Stator coil assembly—Comprising coil and laminations—50 cycle, 200-250 volt operation	2.50	3810	Coil—Pickup coil . . . . .	.32
9515	Motor—105-125 volts—60 cycle motor	8.80	4543	Damper — Damper block complete with damper clamp, washer . . . . .	.10
9516	Motor—105-125 volts—50 cycle motor	8.42	4503	Pickup and arm assembly complete	4.95
9517	Motor—105-125 volts—25 cycle motor	9.00	3811	Screw—Needle holding screw—Package of 10 . . . . .	.46
9528	Motor—200-250 volts—50 cycle motor	9.60	CABINET ASSEMBLIES		
4456	Motor accessories—Comprising 3 nuts, 1 shield and 1 screw . . . . .	.10	X-249	Bottom—Lower section of wood cabinet	2.95
3813	Motor suspension assembly—Comprising one screw, one metal bushing, two rubber bushings, one flat washer, one lockwasher and one nut—Package of 3 . . . . .	.56	X-248	Cover—Top half of wood cabinet	3.00
4457	Spring, screw and washer assembly—Used to mount rotor laminations to turntable—Comprising 3 springs, 3 screws and 9 washers . . . . .	.15	MISCELLANEOUS ASSEMBLIES		
9520	Turntable — Turntable assembly complete with rotor laminations—60 cycle operation	4.45	4611	Adaptor—Five-prong split cathode adaptor	1.00
9525	Turntable — Turntable assembly complete with rotor laminations—25 cycle operation	4.85	4612	Adaptor—Six-prong split cathode adaptor	1.00
			4461	Cable — 5-conductor—Radio-Record switch cable . . . . .	.28
			4459	Bracket—Volume control mounting bracket . . . . .	.10
			4463	Foot—Felt foot for bottom cover—Package of 10 . . . . .	.20
			3829	Knob—Radio-Record switch knob—Package of 5	1.10
			3961	Knob—Volume control knob—Package of 5 . . . . .	.60
			4458	Post—Binding post—Package of 10	2.50
			4507	Rest—Pickup rest—Package of 5 . . . . .	.60
			4119	Screw—No. 8-32-1/4-inch headless set screw for knob—Package of 20 . . . . .	.38
			4460	Switch—Radio-Record switch . . . . .	.40
			4502	Volume control (R1)	1.16