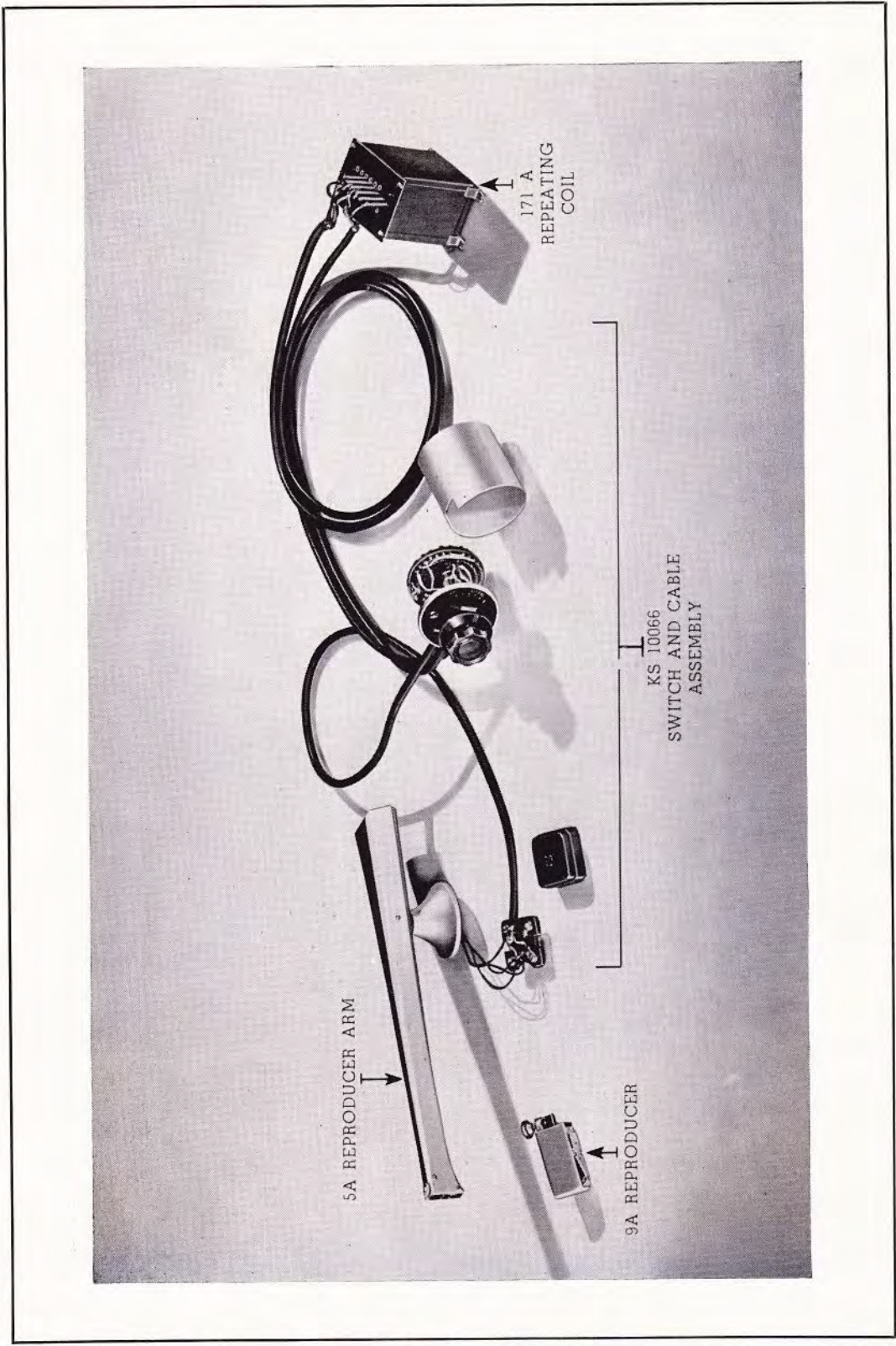


REPRODUCING GROUP



For Radio Broadcasting and
for Sound Distribution Systems

Western Electric



These Units, when combined, form the Western Electric 109A Reproducing Group.

Western Electric Company
INCORPORATED

109A REPRODUCING GROUP

A development of Bell Telephone Laboratories — the research laboratories of the American Telephone and Telegraph Company and the Western Electric Company

THE WESTERN ELECTRIC 109A REPRODUCING GROUP offers a high degree of stability and reproduction quality to operators of radio broadcasting transcription and sound distribution systems.

This Reproducing Group includes a Reproducer, a Reproducer Arm, Equalizing Equipment and Accessories. It possesses distinctive performance characteristics and advantages. Among them are:

1. Two vertical and five lateral reproducing characteristics.
2. Overall frequency response to better than 10,000 cycles per second on the wide range settings.
3. Combined equalizer and matching device designed to work into input impedances of 30, 250, 500 or 600 ohms.
4. Equalized output level of approximately—62VU (1 milliwatt reference level).
5. Diamond stylus point of long and uniform life.
6. Stylus pressure of approximately 35 grams, minimizing record wear.
7. Stylus construction that permits turning the record back for cuing purposes.

Description

The 109A Reproducing Group consists of a combination lateral-vertical 9A Reproducer, 5A Reproducer Arm and Equalizing Equipment, which incorporates the 171A Repeating Coil, KS10066 Switch and Cable Assembly—all conceived and constructed to provide sound reproduction without parallel and embody design advances to meet future technique. The 711A or 712A Brackets are accessories for use in supporting the arm.

A description of these units is as follows:

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9A Reproducer

The 9A Reproducer, one of the essential units of the Group, represents the latest improvements in reproducer design. It is dynamic (moving coil) in type with the generating assembly arranged to move vertically for reproducing from hill-and-dale records



The Reproducing Group is designed so that it can be accommodated to almost any type of turntable panel

and transversely for reproducing from lateral records. Selection of either method of reproduction is accomplished by a simple switching operation as described on page 6.

An entirely new concept of basic principles has resulted in the design of an instrument which is capable of discriminating between different types of groove modulation. As examples: vertical modulation—in which both signal and noise are always present in the bottom of lateral record grooves—is suppressed when the reproducer is connected for lateral reproduction. Lateral modulation—inherent in the side of vertical record grooves—is so far reduced as to provide a quality of reproduction heretofore attainable only under the most scientific laboratory conditions.

The fidelity of the 9A Reproducer is truly remarkable. The mechanical impedance of the generating element is in the order of milligrams. This permits accurate reproduction of the finer cuttings previously slurred over by even the best available reproducers. Good recordings of speech and music come to life, assuming presence and definition.

The 9A Reproducer and 5A Arm in combination have been designed so that their natural period lies below the audio frequencies usually reproduced in any system. This coupled with the low mechanical impedance of the 9A Reproducer minimizes vibratory pick-up.

The diamond stylus point of the 9A Reproducer is carefully ground to the correct shape and is highly polished. This accurate and practically permanent stylus, together with the approximate 35-gram effective weight of the generating element work together to assure long record-life. The type of aluminum finish used on the 9A Reproducer and on the 5A Arm is unusually durable. Roughening facilitates handling, particularly when fingers are moist with perspiration.

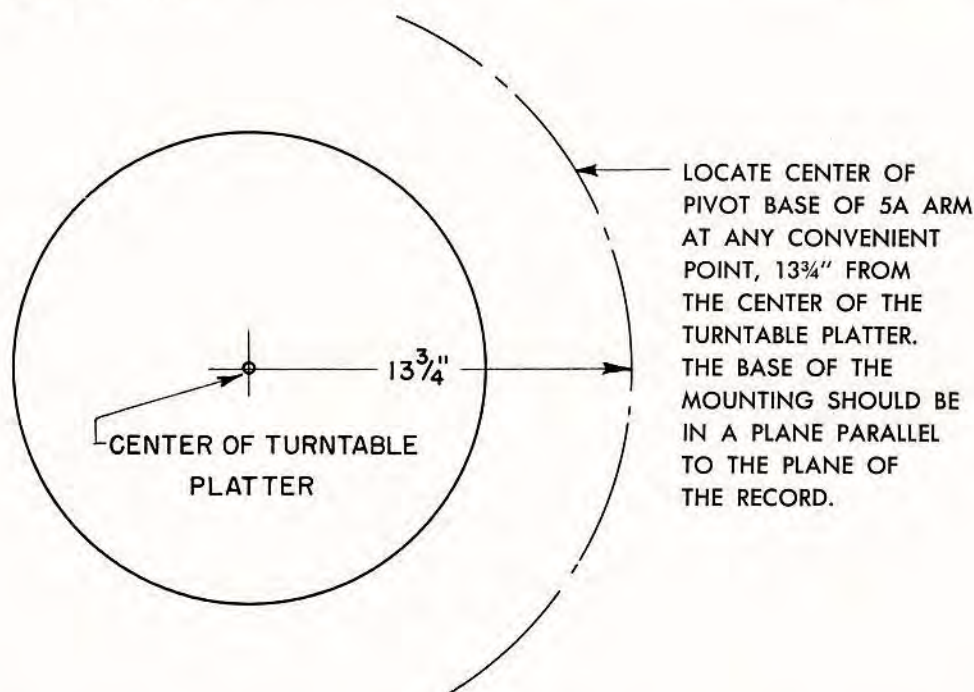
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Connection of the 9A Reproducer and 5A Arm is made by a plug and jack combination similar to that used on Western Electric Microphones. This connection is locked by means of a thumb-screw.

The 9A Reproducer (without the associated equalizing equipment) is designed to work into a 5 ohm impedance and has an output of about -37VU from the average lateral record and about -32VU from the average vertical record. Since it is a dynamic instrument its impedance remains practically constant over its useful frequency range. Its use without the associated equalizing equipment is not recommended. The reason for this is that the frequency response would be so nearly linear that a reproduction of the recording characteristic would result, rather than a true image of the original sound.

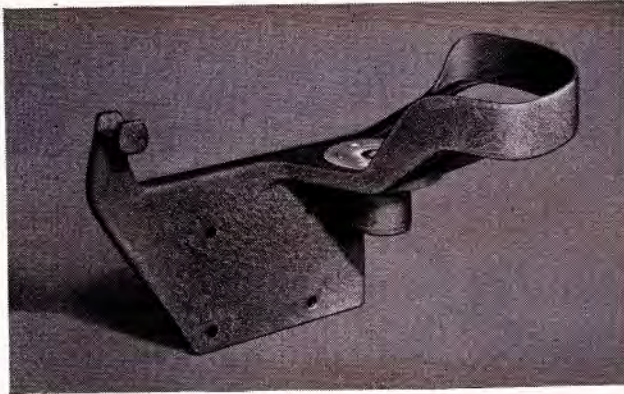
5A Reproducer Arm

The 5A Reproducer Arm which holds the 9A Reproducer is designed so that it can be accommodated on almost any type of turntable panel. The 5A Reproducer Arm should be located as shown by the drawing below. It is essential that the base of the arm be so located that the stylus is perpendicular to the record face to avoid undue pressure on the sides of the grooves.



The weight of the 5A Reproducer Arm is $3\frac{1}{2}$ pounds. Its sturdy construction and mass provide the inertia so necessary to good low frequency reproduction—yet its carefully adjusted bearings allow complete freedom of motion. The overall length of the Arm and Reproducer is $18\frac{1}{8}"$ and the distance between the stylus and pivot is $13\frac{1}{8}"$. The height of the Arm can be regulated by a set screw adjustment which provides a variation in height from $\frac{3}{4}"$ to $2"$.

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712A Bracket



711A Bracket

712A and 711A Supporting Brackets (Accessories)

By means of the 712A Bracket, the Reproducer and the Arm can be adapted to Cabinet types of transcription turntables which lack sufficient area on the table top to accommodate the base of the arm at the proper distance from the center of the turntable. (See page 5.) This bracket has a guard which protects the weighted end of the Reproducer Arm from an accidental blow.

The 711A Bracket is a simple arm rest and is recommended for all installations where the 712A Bracket is not used.

171A Repeating Coil—KS10066 Switch and Cable Assembly

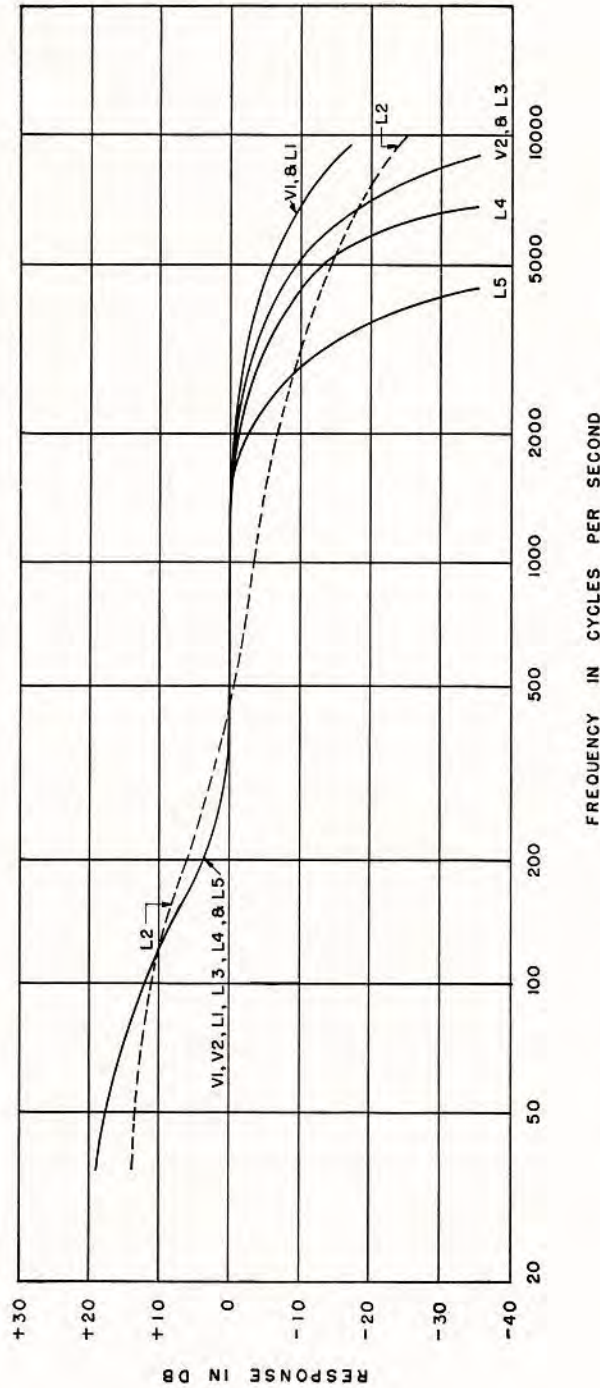
The 171A Repeating Coil and the KS10066 Switch and Cable Assembly form the equalizing portion of this Reproducing Group.

The 171A Repeating Coil is of unique design. It performs the dual role of providing equalization for the 9A Reproducer and of matching the low impedance output of the Reproducer with the various pre-amplifier input impedances commonly encountered, namely: 30, 250, 500 or 600 ohms. The overall size and dimensions of the coil are shown in the illustration, page 13.

The KS10066 Switch is used to transfer the 9A Reproducer from lateral to vertical operation or vice versa. It provides a method by which seven different reproducing characteristics are easily made available. These reproducing characteristics are shown in the graph, page 7. Basically, they are the reciprocals of recording characteristics in general use, so that, on the wide range settings, the sound output of the reproducing group will be a true image of the original sound input to the recording equalizer.

Two vertical response characteristics differing only by the amount of high frequency attenuation, can be secured by rotating the switch knob to positions V1 or V2. V1 is the conjugate of the standard recording characteristic usually used for vertical recording. V2 is the same except that scratch filtering is added to improve the reproduction of old or worn records.

FREQUENCY RESPONSE CHARACTERISTIC
 171A REPEATING COIL & KS10066 SWITCH (ISSUE 6)
 USED WITH 9A REPRODUCER



Note: The absolute level corresponding to 0 DB response depends on a number of factors, an important one being the level employed in recording. However, it is probable that a good average is about the same as that accepted for the dynamic microphone, on program pickup, namely, -62 VU (i.e. -62 DB below 1 mw. approx.).

V1 is the conjugate of the recording characteristic in general use for vertical recording. V2 is the same except that scratch filtering is added to improve reproduction of old or worn records.

L1, & L2 are the conjugates of current lateral recording characteristics.

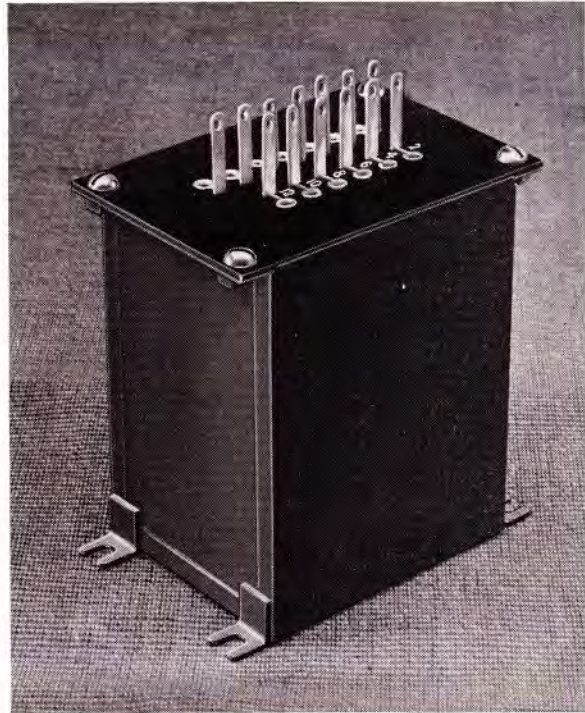
L3, L4, & L5 provide increasing amounts of scratch filtering for L1 (beginning with issue 5 of the switch, the L2 characteristic was changed to conform with a new lateral recording characteristic adopted by a group of makers of lateral recordings for broadcasting).

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Position L1 provides lateral reproduction, having the same equalization curve as position V1. Some lateral transcriptions and phonograph records require this equalization.

Position L2 offers the reproducing conjugate of the equalization characteristic standardized by the National Association of Broadcasters for lateral recordings.

Positions L3, L4 and L5 have the same bass response as V1, V2 and L1, but provide varying degrees of high frequency attenuation which can be selected to best reproduce the lateral recording at hand. Position L5 also has application in conjunction with sound effect records where greatly attenuated high frequency response is desired.



171A Repeating Coil



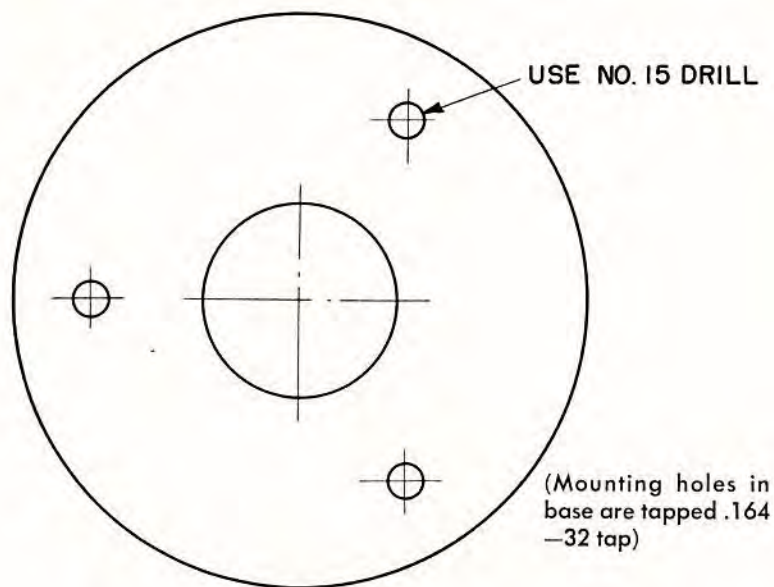
KS10066 Switch and Cable Assembly

Installation

5A Reproducer Arm Assembly

The pivot base of the 5A Reproducer Arm should be located as shown by drawing on page 5. The drawing below shows a templet to be used when drilling the panel.

The Arm height should be adjusted by means of the set screw located in the pivot base of the Arm. When this adjustment is made the stylus should be set at right angles to the record face. The arm, or base, should be connected electrically to the ground if the arm is not mounted in contact with a grounded metal panel.



DRILLING TEMPLET

KS10066 Switch and Cable Assembly

The KS10066 Switch should be located in the most convenient position on the panel. The length and type of the cables furnished should not be changed as the capacity between wires is included in the calculation of the filter assembly. The escutcheon plate of this Switch should be used as a templet when drilling the panel to mount it. Further information regarding the Switch and associated cables is given in wiring diagram on page 12.

171A Repeating Coil Assembly

The 171A Repeating Coil should be located in the most convenient place available within the length of the cables and as far as practicable from alternating current fields such as are produced by turntable drive motors. (See page 13 for dimensions.)

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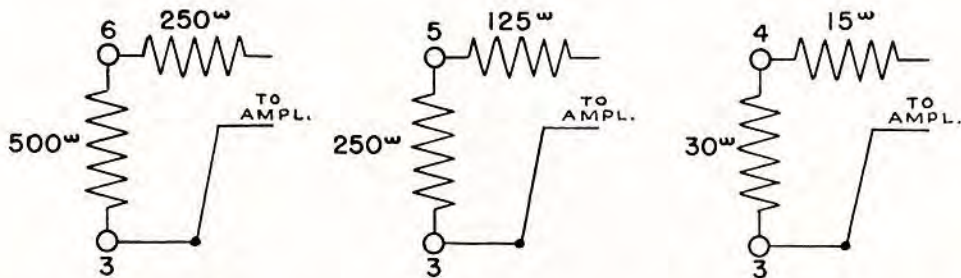
Wiring and Connections of Reproducing Group

Connections between Reproducer and Switch and Switch and Repeating Coil should be made as shown on page 13. *All equipment and wiring should be located as far as possible from the motor and the power wiring.*

The input of the amplifier with which this Reproducing Group will be used should be connected to the 171A Repeating Coil as follows:

For 500, 600 ohms—Use terminals 3 and 6
“ 250 “ “ “ 3 and 5
“ 30 “ “ “ 3 and 4

The coil is designed to work into a resistive load. If the amplifier input does not present an effective resistance load, as is the case where a constant impedance mixer control is connected to the input, the use of one of the following terminations between the coil and the amplifier input is recommended to stabilize impedance conditions.



If the amplifier is operated with one side of its input circuit grounded, for best results, the grounded side should be connected to terminal three of the Repeating Coil.

Ordering Information

For radio broadcasting and for sound distribution systems application the complete Reproducing Group and one accessory bracket will be desired and should be ordered as follows:

- 1—Complete 109A Western Electric Reproducing Group comprising:
 - 1—9A Reproducer
 - 1—5A Reproducer Arm
 - 1—KS10066 Switch and Cable Assembly
(includes Terminal Block)
 - 1—171A Repeating Coil

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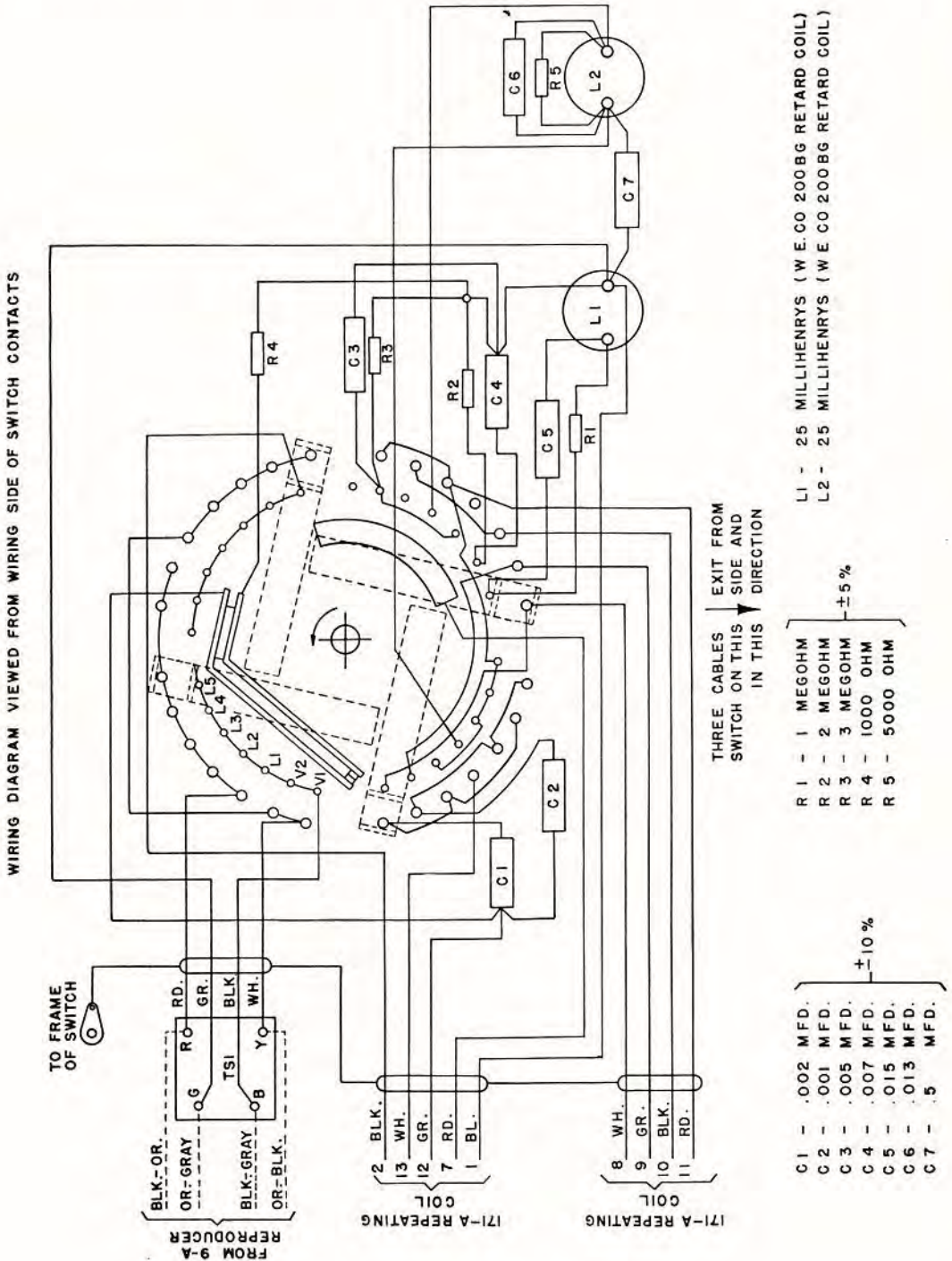
Accessory Brackets:

- 1-712A Supporting Bracket (desirable when turntable top does not have sufficient area for proper mounting of 5A Reproducer Arm)
- 1-711A Supporting Bracket (to be used as an arm rest when 712A Bracket is not employed)

Additional Information

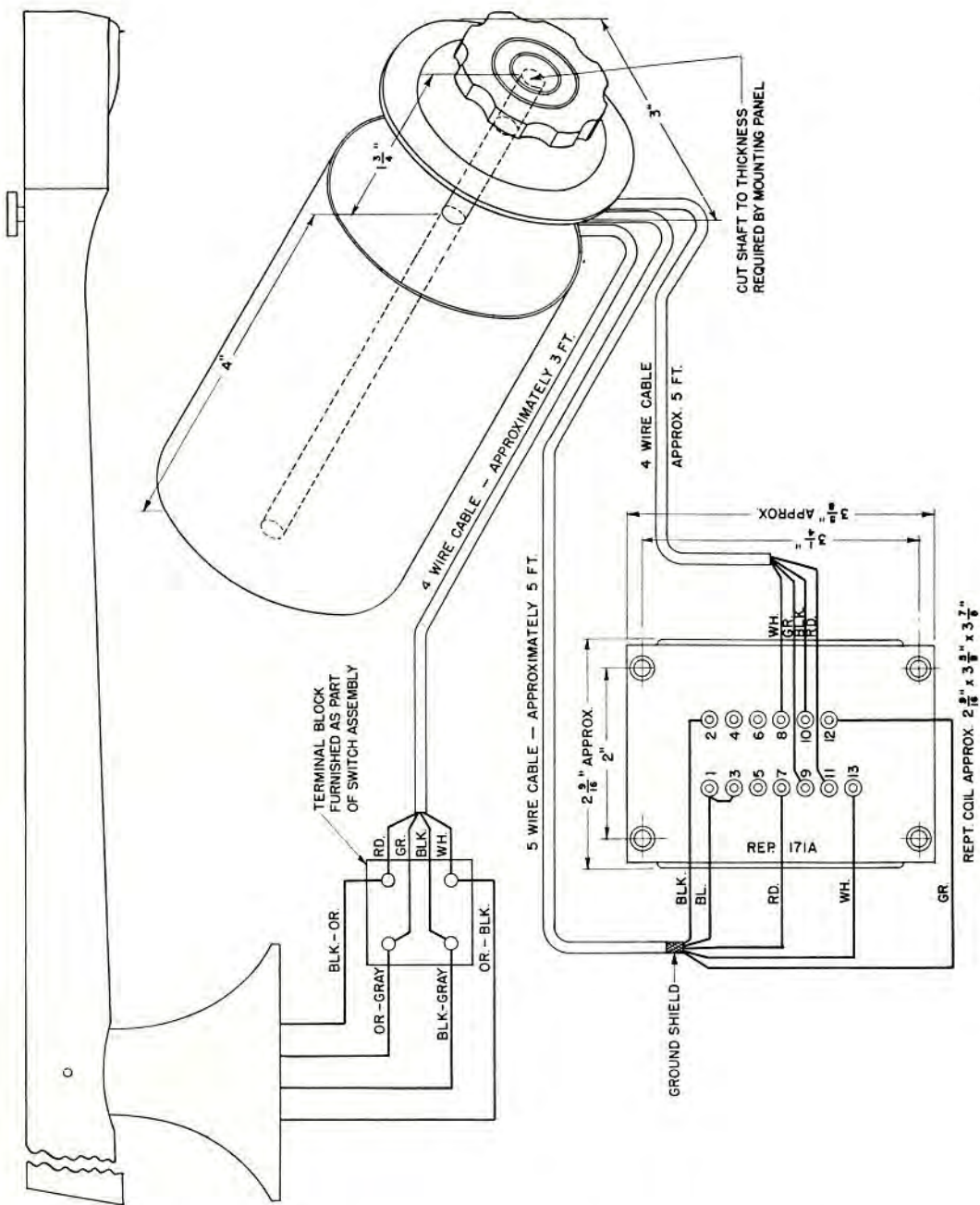
If additional information is required regarding this Western Electric Reproducing Group or other broadcasting or sound distribution equipment, inquiries should be directed to the nearest distributor listed on the back cover of this bulletin.

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Wiring Diagram KS10066 Switch—Issue 5

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Dimensions and Wiring Connections of the 109A Reproducing Group

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