AMI *Incorporated*

MODEL "C"

SERVICE MANUAL

FOREWORD

We earnestly believe the AMI model "C" to be the finest and most dependable coin operated phonograph ever offered to the operator. Give it reasonably good care and the modest amount of attention it requires and it will repay you by faithful service.

This manual explains how to put the machine into operation, and how to maintain it properly. It describes also how the various parts are related to each other and how they function together so that the source of any difficulty that may arise may be quickly found.

Before you attempt to service the machine in any way, please read this manual carefully. You will agree that it is unwise to attempt an adjustment without understanding clearly just why the adjustment needs to be made. Naturally, we or our agents cannot be held accountable for damage done to the machine through "tinkering" with its operation.

If you need any special information, contact your nearest AMI Distributor or write us direct, attention Service Department. And, note please -- when asking for information about a particular phonograph, be sure to furnish the serial number of cabinet, mechanism, and amplifier. Explain fully the difficulty you are experiencing and we will be able to answer quickly and intelligently.

Information concerning the ordering of replacement parts is contained in the latter part of the section on Servicing.

We wish you continued success with your new AMI.

AMI Incorporated
General Offices and Factory
1500 Union Avenue, S. E.
Grand Rapids 2, Michigan

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GENERAL

The Model "C" Phonograph consists of a cabinet shell with decorative lighting, a slug rejector, coin switches, selector switches, a credit unit, a record changer mechanism, an amplifier, a speaker and a junction box. The purpose and function of the various parts are described in detail in sections of the manual following.

The phonograph is designed for use on 100 to 125 volts, 60 cycle alternating current. Satisfactory performance will be obtained at 50 cycles, except that in order to obtain the correct turntable speed, the turntable motor drive wheel (on the motor armature) must be replaced with a wheel of different diameter.

The lights, turntable motor and amplifier operate from the 110 volt alternating current source. The mechanism motors and all selection and control circuits operate from a 26 volt direct current power supply located in the phonograph junction box.

To facilitate identification of parts, code numbers are placed in brackets following part names throughout this manual. Parts are designated by these numbers in the photographic illustrations at the end of the manual.

PUTTING THE MACHINE IN OPERATION

After the phonograph has been removed from its shook and unpacked in accordance with the sheet of instructions attached to the back of the cabinet, it is ready to be placed in operation.

Adjust the casters to the floor upon which the phonograph stands as follows:

> Turn all casters all the way in (upward) and then back out one or more casters only sufficiently to level the phonograph with all four feet on the floor. Keeping the extension of the casters to a minimum safeguards against bending the threaded shafts.

Before records are placed in the mechanism record rack, plug the machine into a power outlet, turn the AC switch marked "Phono" at the rear of the cabinet to "ON" and press the record cancel pushbutton, located below the AC switch. The transfer arm (277) will return to its rest position over the record rack. Records should be loaded or changed only when the transfer arm is over the record rack. Records are normally changed through the front door. Use the record rack pushbutton switch on top of the mechanism junction box (296) to run the rack back and forth as required for loading. The record rack will move as long as this pushbutton is held down, but only when the transfer arm is over the rack.

Loading the rack when the transfer arm is in playing position at the turntable invites accident. If a record is placed in the same slot to which the transfer arm will return, a jam will occur when the arm transfers with its jaws closed and strikes the record in the rack.

PUTTING THE MACHINE IN OPERATION (Continued)

The selection numbers of the records are indicated on the number strip located along the side of the rack nearest the turntable. There are two numbers for each record, corresponding to the two sides. The side of the record toward the front of the phonograph has the lowest number. Remove the title strip racks (118) from the front door and insert record title strips in the slots numbered the same as the corresponding record side numbers in the record rack. When replacing title strip racks, be sure that the selection numbers increase from left to right when facing the front of the phonograph door (1 thru 10 on the left, 31 thru 40 on the right).

The back door normally does not need to be opened unless the record condition switch on the amplifier (40) should be set in a different position or when the installation requires attachment of wall boxes, auxiliary loudspeakers or a remote volume control.

Set the record condition switch to the proper position corresponding to whether new, good records ("NEW"), average ("NORMAL") or badly worn ("BADLY WORN") records are used.

Establish credit using coins and press a selector switch pushbutton. Turn the volume control knob at the rear of the cabinet to give the proper musical loudness for the location. The slight delay in the starting of the turntable motor when a selection is made is to allow the amplifier time to be completely ready to play.

The switch marked "LIGHTS" at the rear of the cabinet may be used to turn off all lights, except the title light. During the daytime when some locations are brightly illuminated, the lighting may be preferred in this condition.

SERVICING

The following list of tools should suffice for all ordinary servicing of the phonograph:

Straight screwdrivers: 1/8" bit - 2" long, 9/32" bit - 3" long, 11/32" bit - 6" long
Phillips screwdrivers: #1 bit - 4" long, #2 bit - 3" long
Offset screwdriver: 1/4" wide bit
Open end wrenches: 3/16", 1/4", 5/16", 11/32" (1/8" thick), 3/8", 7/16" and 9/16"
Ball pein hammer: 8 oz.
Water pump pliers: 10"
Allen or Parker Kalon set screw hex. keys: 1/8" dia. for 1/4" set screw, 1/16" dia. for #5 and #6 set screw
Soldering iron
Needlenose pliers: 6"
Diagonal cutters: 5"
Feeler gauge: .002" to .035"
Gram gauge: 0 to 150 grams (blade type)
Wood block: 2" x 4" x 5" (to hold up back of mechanism for plugging in harness)

SERVICING (Continued)

The phonograph should require only periodic cleaning and lubrication as follows:

Monthly - Apply a drop or two of sewing machine oil to the following parts:

Sliding Cam surfaces on cam, shaft and gear assembly (285).
Trunnion bearing and pin assembly (278).
Each of the record rack guide rods (270).
Apply, if required to prevent squeaking, a small quantity of Aero Lubriplate on the plastic tubing on each end of the color lamps.

Yearly - Clean and lubricate the following with a drop or two of sewing machine oil:

Camshaft drive chains (291).
Record rack drive chain and pin (292).
Tone arm pivot bearing (314).
Toggle pin unit assembly (281), including toggle cam surfaces.
Between trunnion drive gear (283) and record release cam gear (282).
Clean trunnion bearing and pin assembly (278) and repack with about a level teaspoonful of Aero Lubriplate. If not otherwise available, Aero Lubriplate may be obtained from your distributor.

DO NOT OVER OIL.

The needle (309) in the pickup cartridge (308) will play several thousand records before replacement will be required. As necessary to insure good reproduction, change to a new needle as follows: Raise the pickup arm (307), grasp the needle at the point where it enters the plastic block which holds it and pull the needle out. Insert the new needle into the hole in the plastic block from which the old needle was removed and push the new needle into place, being sure that the forward end of the needle is centered in the "V" -shaped notch at the fore end of the pickup cartridge and is touching both sides of this notch.

The standard needle is tipped with an osmium alloy. It does not fracture and is self-polishing. Sapphire tipped needles are available and may be used interchangeably with the metal tipped needles.

There are four fuses in the phonograph. Three are in the phonograph junction box (38) and one is in the amplifier (40). If a fuse has blown something is wrong, or was wrong momentarily. If possible determine what caused the fuse to blow, and correct the fault, if it still exists, before replacing the fuse.

Each blown fuse should be replaced with one of the proper type and current rating. The current ratings are marked on the junction box and amplifier beside the fuse holders.

The fuses are:

In the Junction Box

8 ampere cartridge fuse (88), quick-blow type.

8/10 ampere fusetron (87), slow-blow type.
1/2 ampere fusetron (86), slow-blow type.

In the Amplifier

2 ampere cartridge fuse (192), quick-blow type.

Adjustments are clearly outlined in the sections concerning the various component units of the phonograph. Adjustments should be made only when necessary. Follow carefully the instructions given. We strongly recommend that before any adjustment is attempted the explanatory material concerning the functioning of the units be thoroughly studied and the reason for making the adjustment clearly understood.

Where the structure of the phonograph necessitates special procedures for replacement of parts which may become defective, refer to the section on the Cabinet.

If you need any special information, contact your nearest AMI Distributor. When asking for information concerning a phonograph, be sure to furnish the serial numbers of cabinet, mechanism and amplifier and explain fully the difficulty you are experiencing. With this information your Distributor should be able to give you a complete answer without delay.

Replacement parts can be obtained from your AMI Distributor. In the photographic illustrations at the end of the manual parts and assemblies are indicated by code numbers from 1 through 317. Merely find the code number of a desired part in the appropriate illustration and then refer to the parts list immediately preceding the photographic illustrations, to locate the AMI Part Number of Assembly Number, and a description. In case of doubt, filling of orders will be simplified if you will send the old parts along with the order.

OPERATION OF THE PHONOGRAPH

The operation of the phonograph, as dictated by the inserting of coins and pushing of selector buttons, depends upon the operation of the several units of which it is composed. In the following sections all of these are treated in turn beginning with the unit which distributes electrical power, the junction box.

JUNCTION BOX

The junction box (38) houses the phonograph control switches, the record cancel pushbutton switch, the DC power supply and all fuses except the fuse in the amplifier. It serves to distribute electrical power, both AC and DC, to the various functioning parts of the phonograph. It houses also the junction box relay (94), mentioned in the section concerning the record changer mechanism.

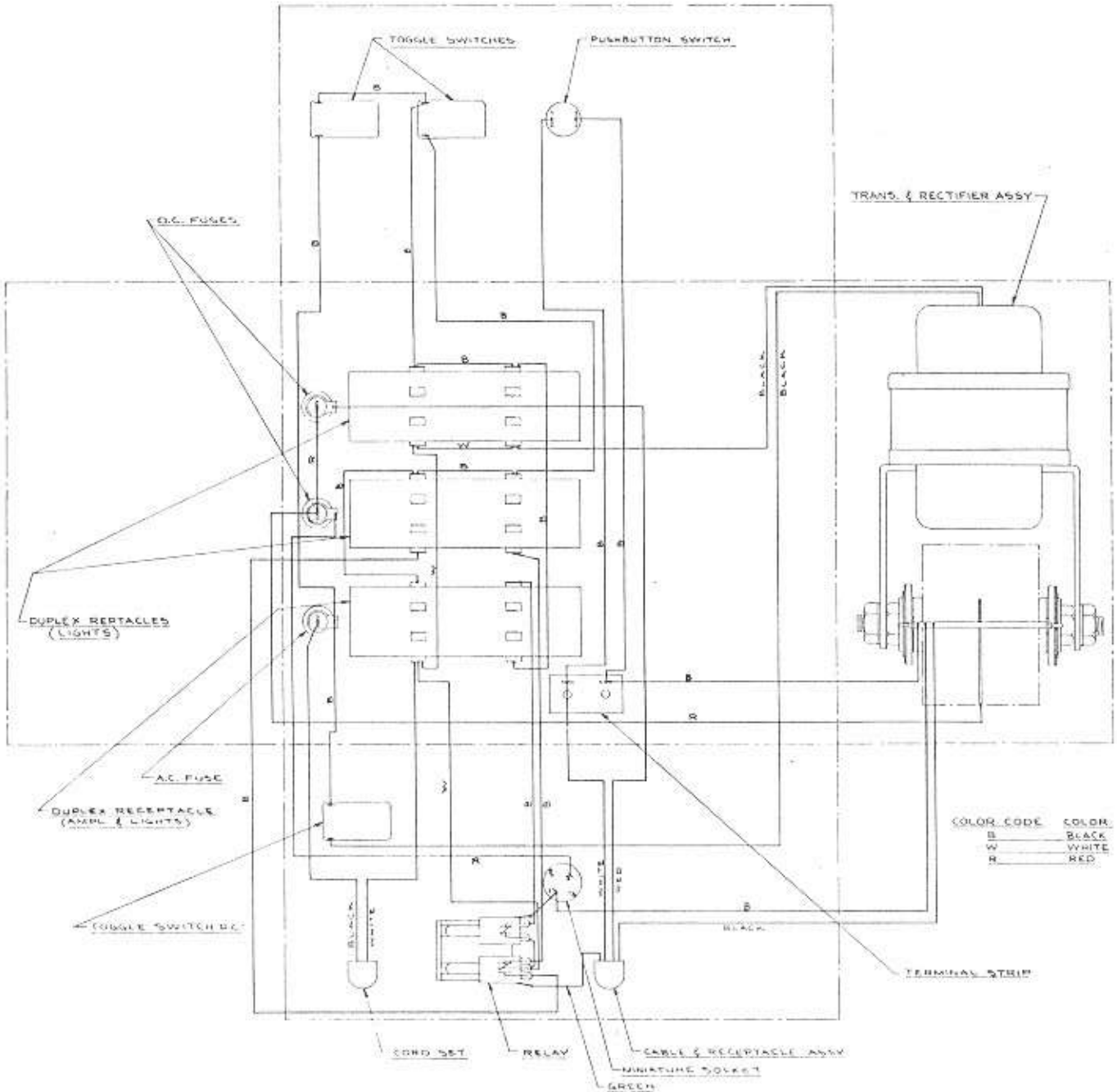


Fig. 1. Wiring Diagram - Phonograph Junction Box

JUNCTION BOX (Continued)

The 110 volt AC power to the phonograph is controlled by the AC "Phono" switch. The decorative lighting scheme is controlled by an additional switch located immediately below the AC switch. This "Light" switch may be used to turn off all of the phonograph lights except the title light. When the light switch is "on" all the decorative illumination will be lighted as determined by the condition of the junction box relay. When a record is being played by the record changer mechanism, the junction box relay is not energized. In this condition, the mechanism light (26) and the top lights (65) are on and the dome light assembly (55) is off. When no selection has been made and the mechanism is at rest, the junction box relay is energized. In this condition, the mechanism light and the top lights are off and the lights in the dome are on. The lower lights and color tube motors operate at all times when the light switch is on. The amplifier and the mechanism turntable are energized whenever a selection has been made and the mechanism is in playing position. The title light and an extra receptacle in the junction box for powering a remote control system are energized whenever the AC "Phono" switch is "on".

At the rear side of the junction box (toward the front of the phonograph) is located a DC switch intended to be used for servicing purposes only. This switch turns off the DC power. The DC is normally on at all times when the phonograph is plugged into a power outlet, even when the master switch is off. This insures proper registering of credits when coins are dropped into the phonograph when the AC switch is turned "off", and prevents stopping the mechanism in the operation of returning a record to the rack or placing it on the turntable.

Directly below the light switch is located a record cancel pushbutton for rejecting the record being played. This pushbutton switch parallels the starting switch (302) in the mechanism circuit.

The fuses in the junction box are:

8 ampere fuse (88) for AC power line.
8/10 ampere (slow-blow) fusetron (87) for the DC mechanism circuit.
1/2 ampere (slow-blow) fusetron (86) for DC selection and credit circuit.

The slow-blow fusetrons will carry higher currents than their rating for a few seconds. This is necessary to accomodate momentary high currents during starting and operation of reset solenoids on the mechanism, and during operation of the credit solenoid and the credit and selection circuit.

For tracing circuits in the junction box, see the Schematic Diagram of the Selection, Credit, Mechanism and Junction Box Circuits, Fig. 15.

SLUG REJECTOR, COIN SWITCH AND COUNTER ASSEMBLY

The slug rejector (121), coin switch (122) and counter (124) are assembled into one unit which swings on a hinge from the phonograph front door. This unit is fastened in place for operation by a wing nut which can be released by hand.

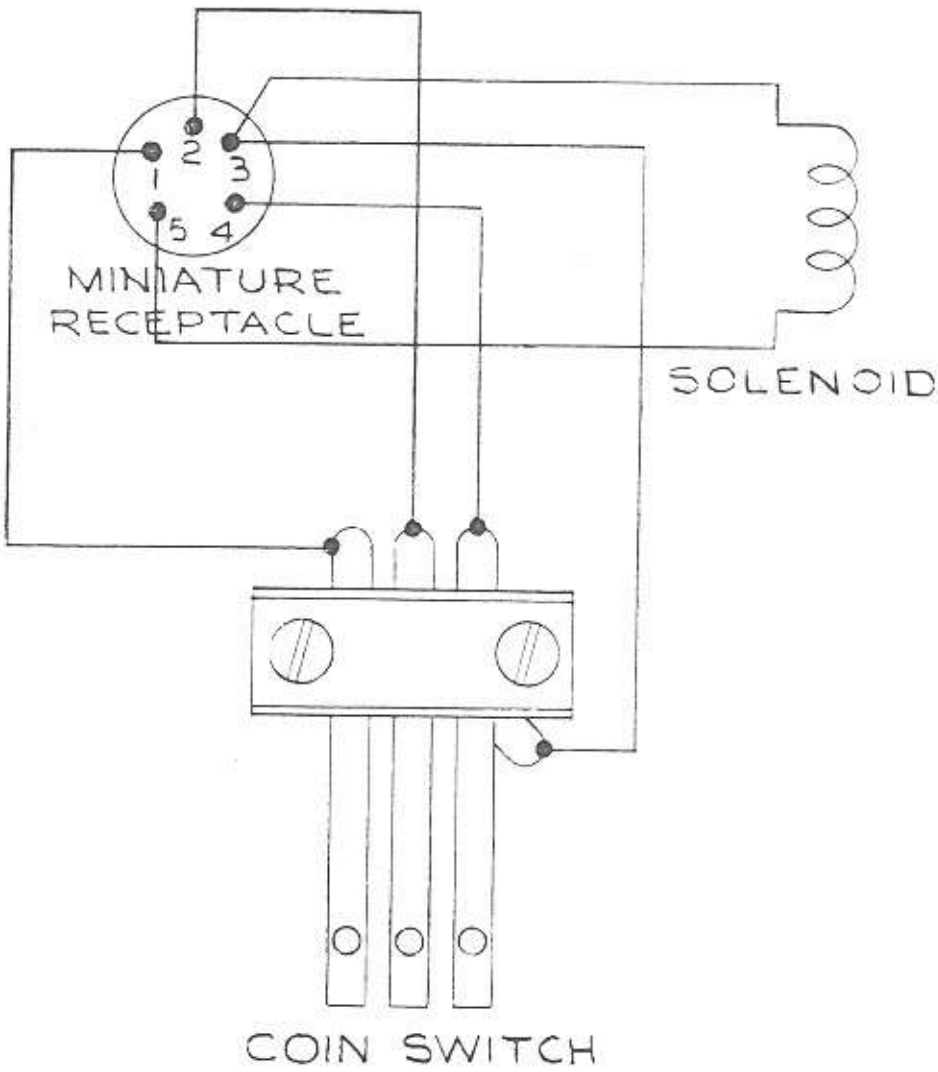


Fig. 2. Wiring Diagram - Coin Switch and Counter Solenoid

SLUG REJECTOR, COIN SWITCH AND COUNTER ASSEMBLY (Continued)

The slug rejector serves to reject improper coins or slugs and direct them into the slug cup (107) and to sort out nickels, dimes and quarters into separate exit slots, one for each of the three denominations. As a nickel, dime or quarter falls from the slug rejector it strikes the actuating arm of one of the three coin switches, passing thence into the coin chute and the cash box of the phonograph. The closures of the coin switches energize appropriate circuits in the phonograph Credit Unit (117) establishing the proper amount of credit as explained in the section on the Credit Unit following.

The counter, energized from the Credit Unit as explained also in the Credit Unit section, registers the total number of credits removed from the phonograph, which is always equal to the total number of credits established by the inserting of coins. This count, in the case when the phonograph is arranged to give five selections for a quarter, two for a dime and one for a nickel, equals the total of five cents worth of money deposited in the phonograph. When AMI Wall Boxes are used with the phonograph this same counter registers additionally the total of five cents worth of money deposited in all the Wall Boxes.

Adjustments

Slug Rejector

The Slug Rejector is a standard product of National Slug Rejectors, Inc., St. Louis 15, Missouri. It is their Model NDQ 274. Detailed instructions for adjustment of this slug rejector are furnished in a brochure published by National Slug Rejectors, and which may be obtained from them or from your AMI Distributor. Maintenance required is slight. Keep it clean, particularly the magnet faces to which metal particles may cling.

Coin Switches

The air gap between coin switch contacts should be 1/32 inch at the time that the actuating arms are against the slug rejector. The long contact blade must press against the actuating arm in each case sufficiently to hold the arm against the slug rejector. The long blade, however, must not be tensioned against the actuating arm so much as to prevent a coin from falling through the switch. Check this last as follows: hold up, by hand, the actuating arm of each switch in turn and drop the appropriate coin into the slug rejector. The coin will then be caught on the switch. Release the actuating arm of the switch by removing slowly the finger supporting it. The coin should push down the actuating arm by its own weight, closing the contacts and falling clear of the switch and slug rejector. In case this adjustment cannot be made by reducing the tension of the long blade without allowing the actuating arm to fall free of the slug rejector, reduce the tension of the short contact blade against the stiffener blade which positions it.

Counter

The actuating lever (130) which connects the counter shaft to the solenoid plunger (127) should be horizontal when the solenoid is not energized. When the actuating lever has been set in this position back out the adjusting screw on the solenoid bracket (126) and push the solenoid plunger upward as far as the counter stroke will permit. Turn in the adjusting screw until it just touches the solenoid plunger and then turn in the screw one quarter turn more so that the solenoid plunger is moved slightly downward. Hold the adjusting screw in this position and tighten the locking nut. Check the operation of the counter by inserting coins in the phonograph and pressing selector buttons. One count should be registered for each time that a selector button is pushed when there is credit on the machine.

SELECTOR SWITCH, TERMINAL BOX AND HARNESS ASSEMBLY

The selector switch, terminal box and harness assembly (131) provides the selector pushbutton switches (166) and connects them with the selector magnet bank (269) on the record changer mechanism (33) and with the credit unit (117). Additionally, connections to the selector magnet bank are carried to the two 24-connector receptacles (157) marked "C" and "D" in the terminal box (156) for connection to the remote control system.

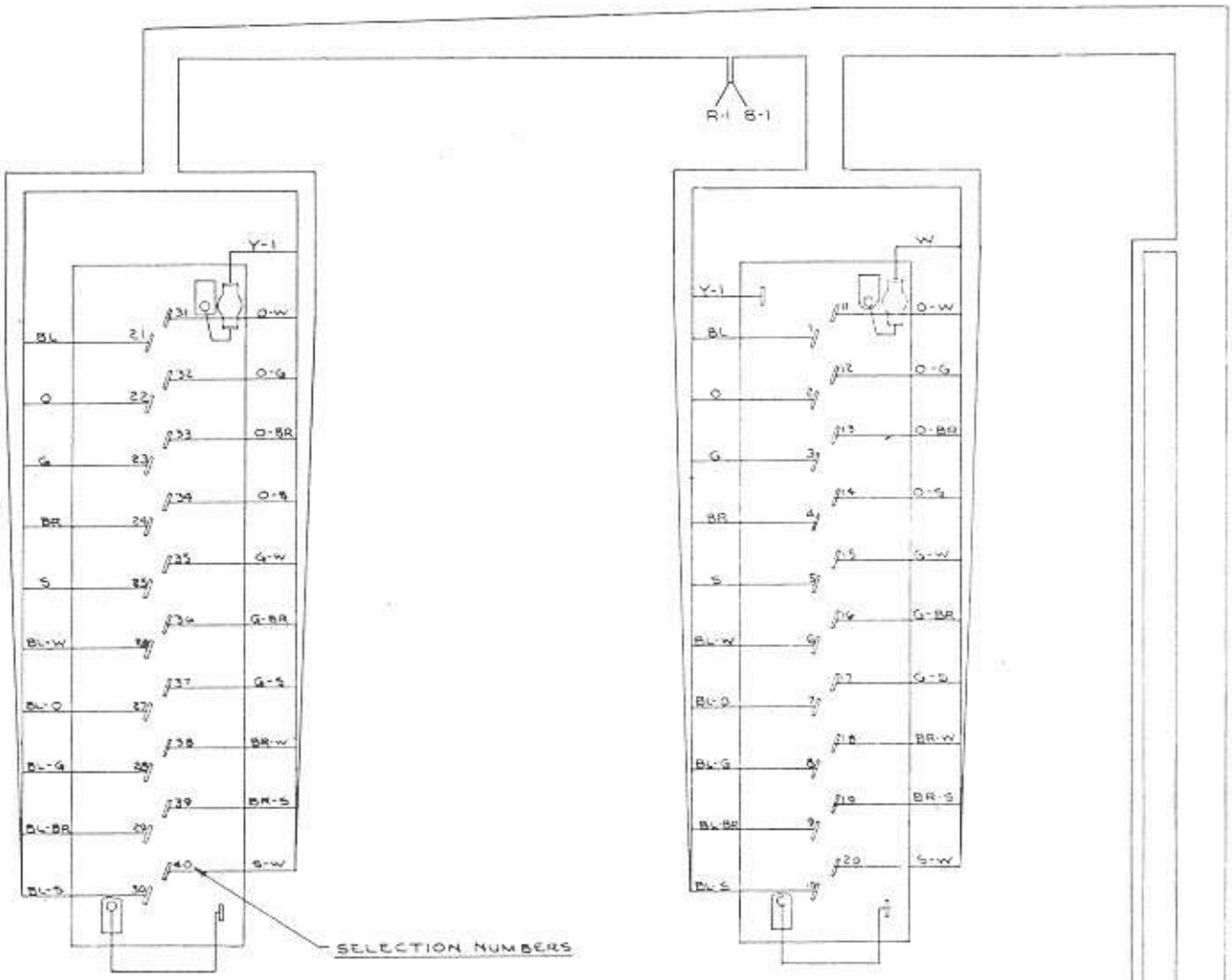
Terminal number 21 of the receptacle marked "C" is positive DC (+). When a circuit is closed between this terminal and any of the terminals on receptacles "C" or "D" numbered 1 through 20 the related selector magnet will be energized. Terminal number 24 of both receptacles is negative DC (-).

A separate terminal strip (92) in the terminal box is provided for the attachment of a lighting transformer of the proper voltage when required in the use of multiple-wire wall box systems. The screw type terminals on this strip are wired to terminals number 22 and 23 in both receptacles "C" and "D" for convenience in connecting to the cables from the wall boxes.

Terminal number 21 in the receptacle marked "D" goes to the counter (124) on the phonograph front door. When AMI wall boxes are used, this connection enables the counter to total all money deposited in wall boxes along with that deposited in the phonograph.

Included as part of this assembly is the ballast (159) for the title light, and wires to connect the title light assembly (132) to the phonograph junction box (38).

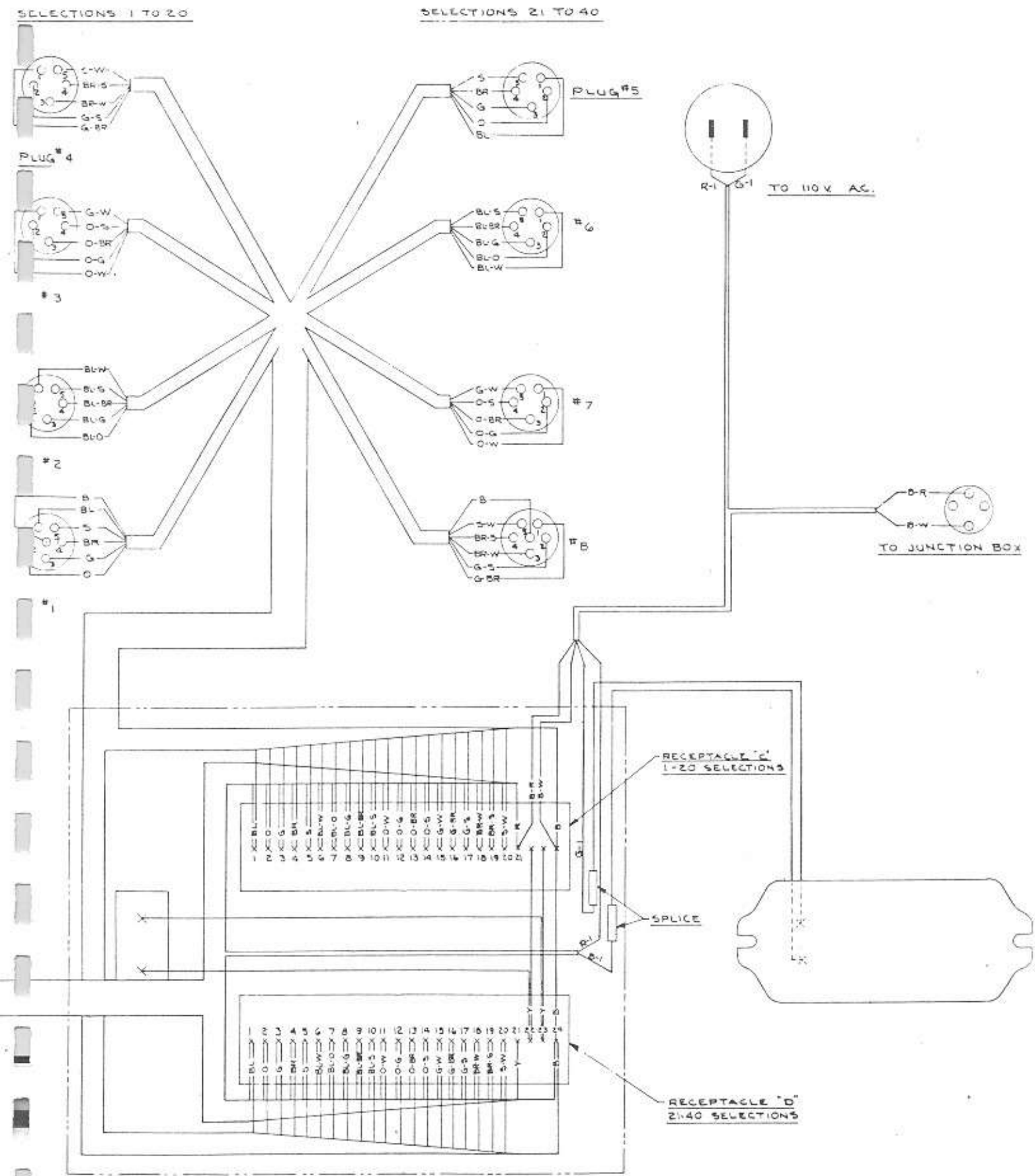
For tracing wires, use the Wiring Diagram for the Selector Switch, Terminal Box and Harness Assembly, Fig. 3, or the Schematic Diagram of the Selection, Credit, Mechanism and Junction Box Circuits, Fig. 15, whichever is appropriate.



COLOR CODE

R	RED
B	BLACK
W	WHITE
Y	YELLOW
BL	BLUE
O	ORANGE
G	GREEN
BR	BROWN
S	SLATE
BL-W	BLUE-WHITE
BL-O	BLUE-ORANGE
BL-G	BLUE-GREEN
BL-BR	BLUE-BROWN
BL-S	BLUE-SLATE
O-W	ORANGE-WHITE
O-G	ORANGE-GREEN
O-BR	ORANGE-BROWN
O-S	ORANGE-SLATE
G-W	GREEN-WHITE
G-BR	GREEN-BROWN
G-S	GREEN-SLATE
BR-W	BROWN-WHITE
BR-S	BROWN-SLATE
S-W	SLATE-WHITE
G-1	GREEN
B-1	BLACK
R-1	RED
Y-1	YELLOW
B-R	BLACK-RED
B-W	BLACK-WHITE

Fig. 3. Wiring Diagram - Selector Switc



Terminal Box and Harness Assembly

Adjustments

The parts of this assembly normally require no attention. Should selector push-button switches be put out of adjustment through accident, each switch may be re-adjusted as follows:

Bend the brass contact bracket against which the contact spring assembly (172) closes up and away from the contact spring to allow the contact spring to move freely when the pushbutton (170) actuating it is depressed.

Holding the pushbutton depressed, measure the gap between the silver contact at the end of the contact spring and the silver contact on the adjacent contact spring against which the contact spring being actuated is normally closed. This gap should be 1/16 to 3/32 inch. Bend the contact spring if necessary to obtain this gap.

Releasing the pushbutton, bend the contact bracket back to its normal position, setting the gap between the silver contact on the contact bracket and the silver contact on the contact spring at .025 to .035 inches.

CREDIT UNIT

The Credit Unit (117) performs two functions essential to the operation of the phonograph. First it provides a means of remembering the credit value of coins deposited in the coin slot. Second, for each credit thus established by coins, it furnishes a circuit closure of an appropriate time length to energize a selector magnet when a selector switch button is pushed.

A toothed credit wheel (139) in the unit serves as a mechanical memory for the number of credits established. It is continuously under spring tension which attempts to rotate it to a home (no credit) position. At this position a blade switch, called the main credit switch (144), is held open by a pin on the wheel.

When a coin passes through the slug rejector it causes a coin switch to close momentarily. This permits current to flow through a solenoid (142). A plunger (143) in this solenoid moves, actuating a pawl (153) which engages the credit wheel, rotating it away from its home position. This permits the main credit switch to close. The number of wheel tooth spaces by which the pawl moves the wheel is equal to the proper credit value of the coin. For the quarter (25¢) the movement of the pawl is limited by a fixed stop. For the nickel a movable stop (136) is caused to move into the

path of the pawl by the same current which energizes the solenoid. For the dime a second movable stop (136), actuated similarly to the nickel stop, limits the movement of the pawl. The credit wheel is held in the position to which it is moved by the pawl by an escapement (141). It cannot return toward its home position except when the escapement is moved. As additional coins are dropped into the coin slot of the phonograph the credit wheel is rotated further from its home position by the number of tooth spaces equivalent to the total credit value of the coins. Rectifiers (149), connected across the solenoid and stop coils (134), serve to prolong the action of the solenoid plunger and the stops after the coin switches reopen.

As sent from the factory the credit unit gives one play for a nickel, two plays for a dime and five plays for a quarter. Changes which cause the unit to give six plays for a quarter or one play for a dime and three plays for a quarter can be made easily and quickly (see section "Change of Crediting").

With credit established and the main credit switch closed, the unit is in the condition to make selections. When a selector switch button is pushed, a circuit is closed through the corresponding selector magnet on the phonograph mechanism. This circuit also includes the main credit switch, a set of relay (150) contacts and the reset magnet (146) which operates the escapement. Simultaneously, the selector magnet pulls down the selector finger, making the selection, and the reset magnet rotates the escapement, permitting the credit wheel to return one tooth space toward its home position. The movement of the escapement closes a pair of contacts of the reset switch (145) energizing the relay whose contacts are in the selection circuit just mentioned. The relay contacts open, interrupting the selection circuit. The circuit stays open until the selector switch button is released. This is accomplished by causing the relay to remain energized through a resistor (206) as long as the selector switch button is held down.

The length of the closure of the selection circuit is sufficiently long to trip one selector finger but is not long enough to trip two in succession. This remains true over the entire range of operating voltages which may be encountered in actual operation.

As more selector switches are operated, the selection cycle as described repeats. This continues until credit is exhausted and the movement of the wheel when the last selection is made causes the main credit switch to open. Further pressing of the selector switch buttons cannot close the selection circuit. The relay operates, however, energized through the resistor as described. This operating of the relay is incidental to the functioning of the unit, and occurs for purposes of circuit convenience.

A second pair of contacts on the reset switch are closed each time the escapement is pulled against the reset magnet. This pair of contacts actuates the counter (124) on the phonograph front door. One count is registered for each time a credit is removed from the credit wheel so that the total count is equivalent to the number of 5¢ worth of money deposited in the phonograph (five selections for quarter (25¢) play).

and the insulating tube on the pin in the credit wheel. A force of 25 to 30 grams at the point where the pin on the credit wheel strikes should be required to open the switch contacts. The stiff blade should not touch the center blade at the position of the credit wheel for no credit (contacts open). Adjust as explained for the reset switch.

Assembly of Stops (134) - The lower edge of the pawl (153) should rest along the leg of the bracket of the assembly of stops for its entire length. If it does not, the solenoid (142) must be lowered (See paragraph on Solenoid below). When the solenoid plunger is pushed upward, the point of the pawl should move directly to the bottom of a tooth space on the credit wheel. For this check the upper tooth of the escapement must be engaged normally. Adjust by loosening the screws holding the assembly of stops and by moving it in the mounting slots.

Solenoid (142) - The solenoid should be closer than .010 inch to the pawl lever (153) but not actually against it. It must not support the pawl lever so as to raise the lower edge of the pawl from the leg of the bracket of the assembly of stops at any point.

Change of Crediting

To alter the unit to give six plays for a quarter (25¢), remove entirely from the unit the stud (F-1179) on the assembly of stops (see sketch). Leave the coin switch connections standard.

To alter the unit to give three plays for a quarter (25¢) and one play for a dime, move the stud (F-1179) from its normal location near the upper leg of the bracket of the assembly of stops to the tapped hole near the center of the bracket (see sketch). Remove the white wire from prong #2 on the 5 connector plug and move the yellow wire from prong #1 to prong #2.

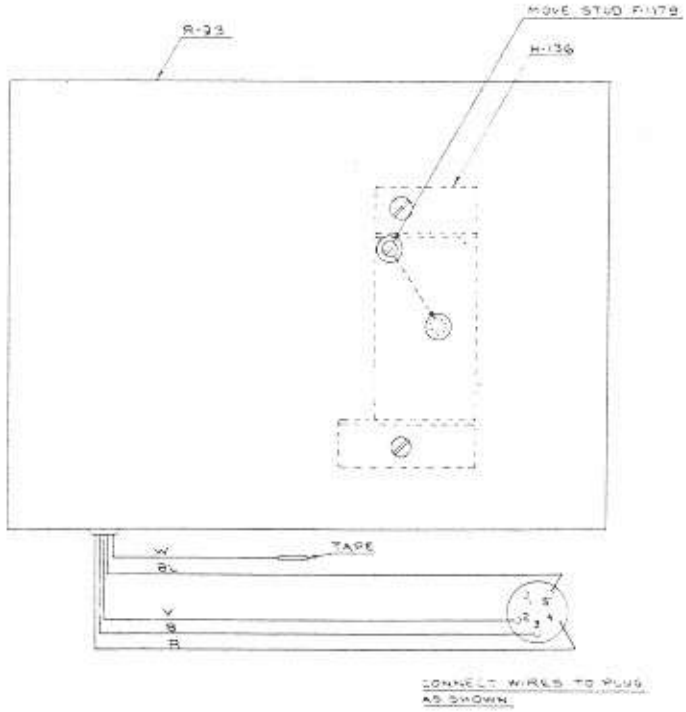
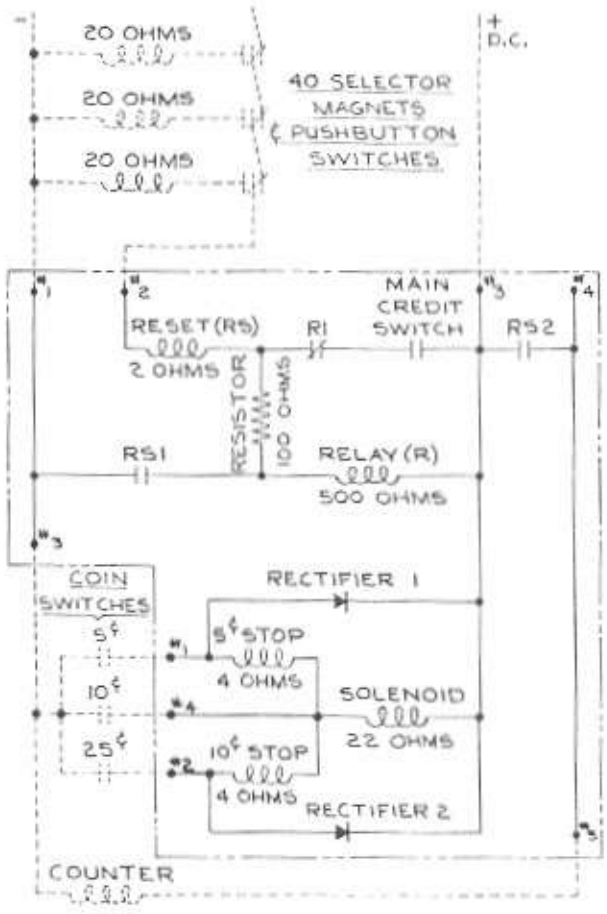


Fig. 4. One Play for Dime, Three Plays for Quarter

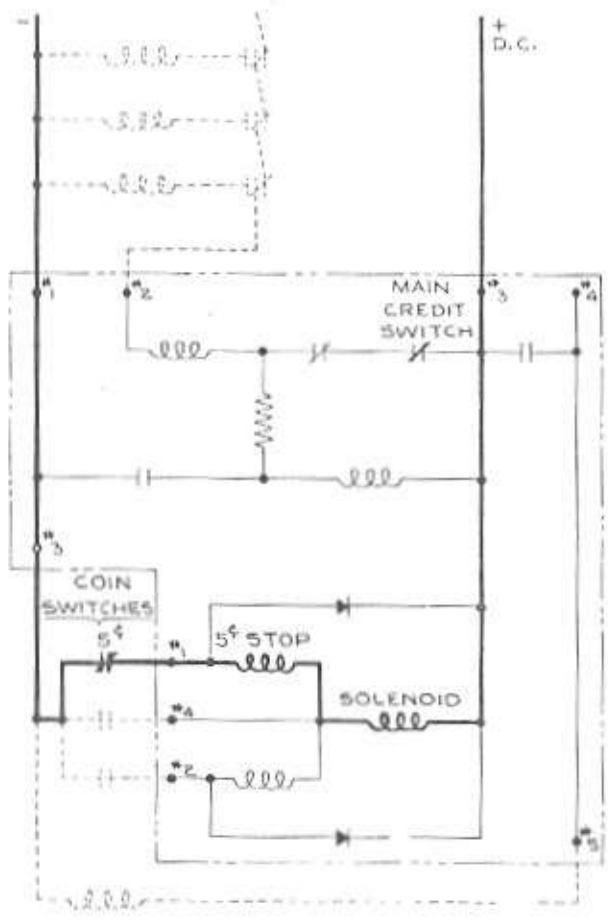
CREDIT UNIT CYCLE OF OPERATION

Heavy Lines Indicate Current Flow



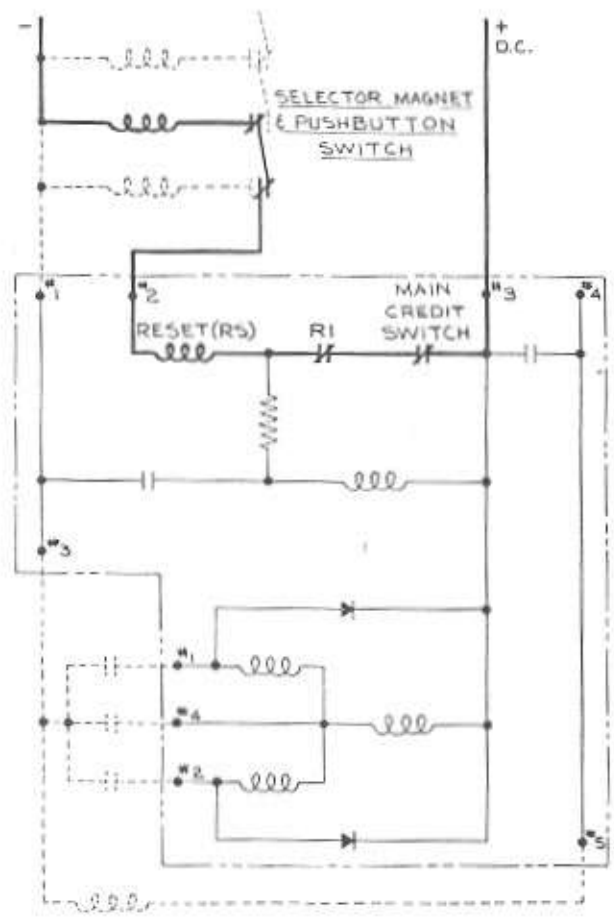
NO. 1. NORMAL CONDITION

Main credit switch is open. No current flows.



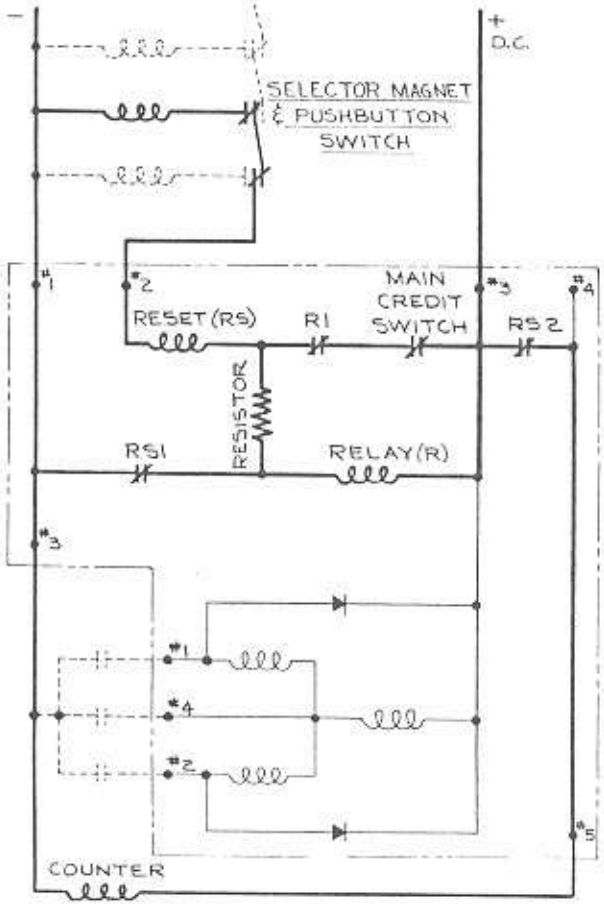
NO. 2. ESTABLISHING CREDIT

Nickel passing through slug rejector closes (5¢) coin switch. (5¢) stop coil is energized, moving (5¢) stop. Solenoid is energized, moving plunger which causes pawl to rotate credit wheel one tooth. Main credit switch closes.



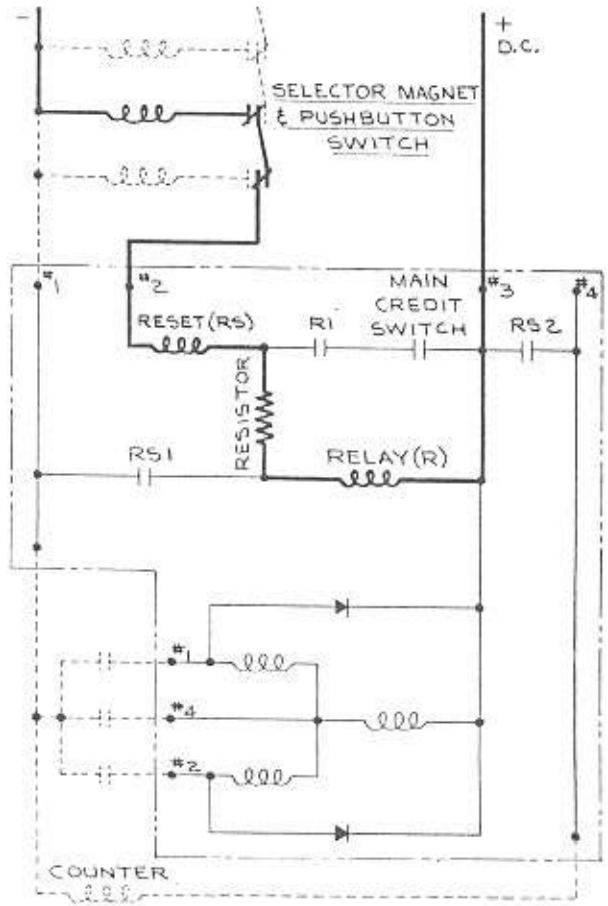
NO. 3. CHOOSING SELECTION

Operation of pushbutton switch energizes selector magnet and reset. Selector finger starts to trip and escapement starts to move.



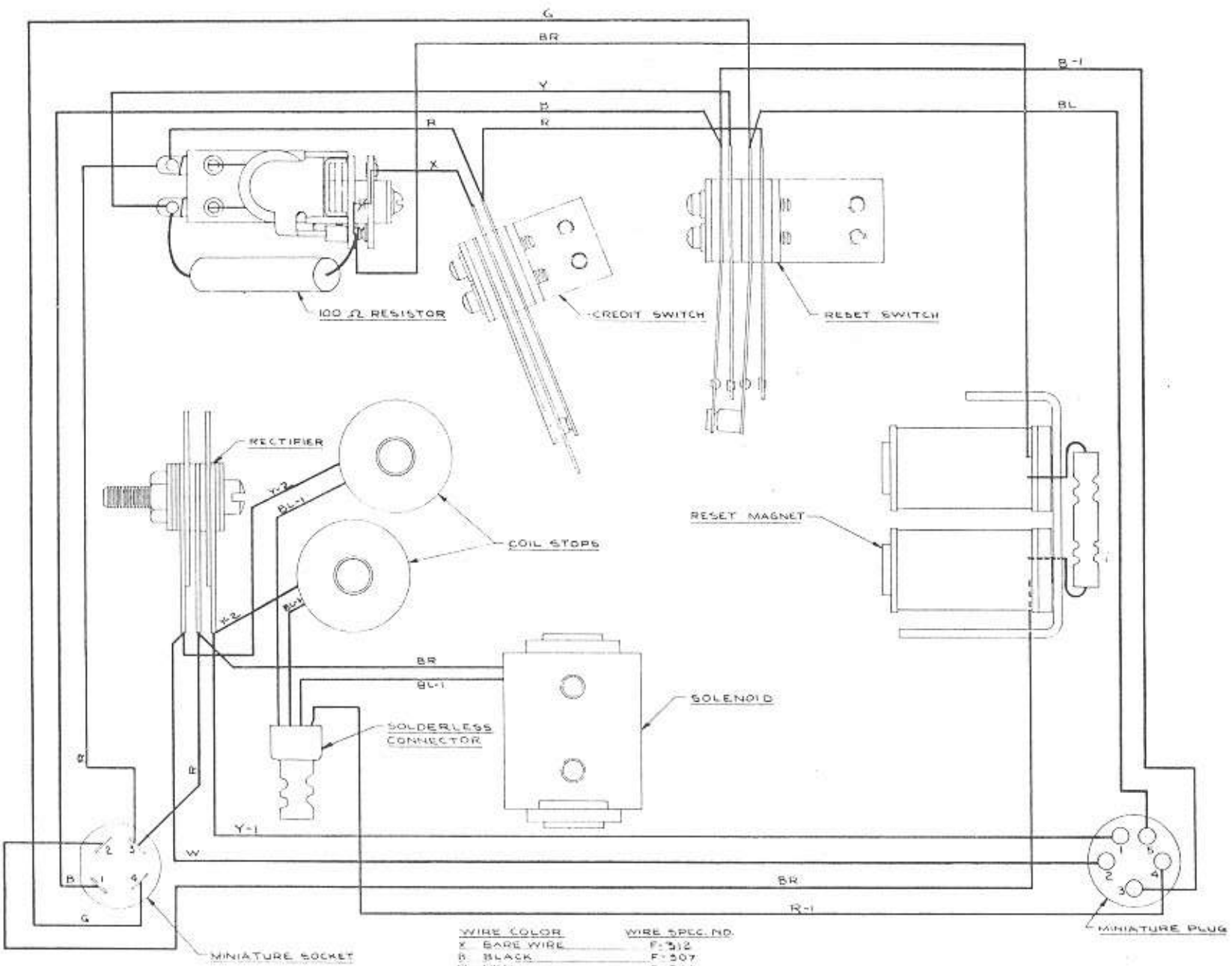
NO. 4. MAKING SELECTION

Escapement moves to reset magnet and closes contacts RS (1) and RS (2), energizing relay and counter. Current through selector magnet and reset continues. Selector finger trips.



NO. 5. REMOVING CREDIT

Opening of relay contacts R (1) breaks selection current through main credit switch. Current continuing through selector magnet, reset, resistor and relay is very small. Escapement moves away from reset magnet, opening contacts RS (2) and RS (1) and moving credit wheel one tooth, which opens main credit switch. Relay remains energized, holding relay contacts R (1) open, until pushbutton switch is released, when unit returns to normal as shown in diagram No. 1.



WIRE COLOR	WIRE SPEC. NO.
X BARE WIRE	F-312
B BLACK	F-307
W WHITE	F-307
Y YELLOW	F-307
G GREEN	F-307
BL BLACK	F-317
R-1 RED	F-317
Y-1 YELLOW	F-317
BL BLUE	F-317
W WHITE	F-317

BL-1 BLUE, BR BROWN, Y-2 YELLOW } COIL LEADS FURNISHED

Fig. 5. Wiring Diagram - Credit Unit

RECORD CHANGER MECHANISM

The Record Changer Mechanism (33) serves the functions of remembering the selections that have been made, and of selecting and playing the records in sequence.

Selections are made through the operation of the credit unit (117) as described in the previous section. The pressing of a selector switch button and the action of the credit unit energizes the related selector magnet coil of the selector assembly (267) drawing one end of the selector finger against the magnet. The finger is maintained in this position against the magnet by the action of a spring (268). As a finger is pivoted, the end opposite the magnet raises a bail which closes the starting switch (302). This removes the voltage applied to the junction box relay (94) in the phonograph junction box. The junction box relay falls out, closing the circuit to the turntable motor and amplifier and changing the decorative illumination of the shell (see section - JUNCTION BOX). The closing of the starting switch also completes the DC circuit through the record rack motor (290).

The record rack motor moves the record rack by means of a drive arm (264) coupled to the record rack drive chain (292) which runs on a drive sprocket (288) and an idler sprocket (287). The record rack is moved along on the guide rods (270) until the trip lever (250) of one of the record rack switches (257) encounters the raised end of a selector finger. This actuates the record rack switch, stopping the record rack motor and closing a circuit through the reversing control relay (299) contacts to start the transfer motor (290).

The transfer motor turns a driven sprocket (284) by means of a chain (291) from the drive sprocket (289) on the motor. The driven sprocket turns the cam, shaft and gear assembly (285), which includes the pickup arm cam and the transfer gear.

The transfer gear performs two functions. First, it turns the record release cam gear (282) allowing the inner shoe (275) and the transfer arm and outer shoe (277) to move toward each other, thus clamping the record. Second, after clamping a record it lifts it and places it on the turntable. As the record moves toward the turntable a slot in the transfer cam (286) engages the toggle pin assembly (281) which has been positioned by contact with number strip assembly on the record rack. This action turns the record to a horizontal position before placing it on the turntable. The side of the record that is turned up is determined by the toggle pin that engages the transfer cam.

After the record reaches the turntable, the record release cam turns to force the inner shoe and the transfer arm and outer shoe assembly outward, compressing the cam spring and releasing the record from the shoes. Further rotation of the cam shaft lifts the pickup arm (307), swings it over the record and places it in the starting groove. At this time the cam shaft switch lever arm (305) rides up on the high lobe of the pickup arm cam, closing the cam shaft switch (304) contacts. This energizes the proper reset solenoid (258) to restore the selector finger and release the trip lever of the record rack switch. This action breaks the circuit through the reset solenoid and stops the transfer motor. If only one selector finger was tripped, the bail which operated the starting switch falls as the selector finger is restored,

opening the starting switch. If another selector finger has been tripped, the starting switch remains closed but cannot start the record rack motor until the record on the turntable has been returned to the rack.

While the record plays, the pickup arm moves toward the cut-off grooves of the record. When this point is reached, an arm on the pickup arm pivot bearing (314) closes the reversing switch (306). This operates the reversing control relay in the mechanism junction box (296), reversing the transfer motor, causing the pickup arm cam to turn, raising the pickup arm and swinging it to clear the record. The record is then gripped, deposited in the record rack and released. The cam shaft switch lever arm enters the depression in the pickup arm cam, actuating the cam shaft switch. This stops the transfer motor and energizes the junction box relay to shut off the turntable motor and amplifier, and change the decorative lighting.

The record cancel pushbutton switch in the phonograph junction box (38) parallels the reversing switch. It is normally used to cancel records which are playing when this is desired. If the supply current is broken while a record is being returned to the rack, movement of the transfer arm will stop and remain stopped after the current is restored. Press the cancel button to energize the reversing control relay and operation will continue.

The starting switch is paralleled by the record rack button switch on the mechanism junction box. Closing of this switch moves the record rack for changing records.

The cycle of operation of the mechanism and the function of all its parts are understood most clearly by following through the associated electrical cycle in the mechanism control circuit as presented in diagrams and explanation under "Control Cycle-Record Changer Mechanism".

Maintenance

The lubrication required by the mechanism is listed in the section on "Servicing". If adjustments or repairs need to be made, the DC switch on the phonograph junction box will be useful for shutting off power to the mechanism and for "inching" motors. Periodic checking of adjustments, even when the mechanism is functioning satisfactorily, will help to assure that proper operation will continue.

Adjustments

Camshaft Switch (303)

The camshaft switch, in conjunction with the record rack switches, operates to stop the transfer motor. The lever arm (305) should operate the switch at two points equidistant from the regular surface of the cam. To check this, proceed as follows:

Adjustments (Continued)

Camshaft Switch (303) (Continued)

With the mechanism in rest position, remove the pickup arm assembly (307) by lifting it from the mounting post. Rotate the armature of the transfer motor clockwise until the point of the cam shaft switch lever rides on the regular surface of the cam. Move the point of the lever arm away from the regular surface of the cam. At approximately 1/16 inch to 3/32 inch distance from the surface, the switch should operate to change the circuit (turntable will start rotating if power is on). Rotate the armature of the transfer motor counterclockwise until the point of the lever drops below the regular surface into the recess in the cam and operates switch (turntable should stop rotating if power is on). This action should occur at 1/16 inch to 3/32 inch below the regular surface of cam.

If the switch does not operate properly, adjust the set screw in the lever arm and repeat the test. Note: There must be at least 1/32 inch clearance between the point of the lever and the bottom of the recess when the switch operates to stop the turntable.

Make a selection and allow the mechanism to place a record on the turntable and the transfer motor to stop. (Shut off power to prevent cancelling accidentally). Rotate the armature of the transfer motor by hand clockwise. The armature should turn at least one complete revolution before the gears bind. Turn on the power and cancel the selection, allowing mechanism to return the transfer arm to its position over the record rack and the transfer motor to stop. Rotate the armature of the transfer motor by hand counterclockwise. The armature should turn at least one complete revolution before gears bind. If either of these conditions does not hold, recheck the adjustment of the camshaft switch.

Turntable - (300)

When the record is held over the turntable in its normal position between the inner shoe (275) and the outer shoe of the transfer arm (277) with the transfer arm at rest on the transfer arm support (293) the top surface of the turntable should just clear the underside of the record. At the same time the hole in the record should center over the center post on the turntable. The posts which support the turntable and motor (300) are adjustable for height. Use these to raise or lower the turntable. If the hole in the record does not center properly, remove the turntable by raising it from the center post, loosen the mounting screws holding the turntable motor assembly to the supporting posts, and shift the motor laterally as required.

Pickup Arm Mounting Height

A clearance of approximately .005'' to .015'' should be maintained between the pivot bearing (314) plate and the highest point of the cam (285) while the pickup arm (307) is in playing position. Height adjustment is made with the headless set screw at the top of the pivot bearing.

Adjustments (Continued)

Needle Height

Make a selection and allow the needle (309) to be set on a record. Turn off the DC switch in the junction box to prevent cancelling. Lift the record from the turntable. By means of the headless set screw on the hinge clip and mounting bracket (313) below the pickup arm, adjust the pickup arm height so that the needle will just touch the flock on the turntable.

Needle Starting Position

Allow the mechanism to operate until the pickup arm is ready to be placed on the record. Turn off the DC and AC switches in the junction box and rotate the transfer motor armature by hand until the needle is placed on the record. The needle should come to rest about 1/32 inch from the outer record groove (in the lead in groove). To adjust, loosen the screw nearest the pivot bearing which clamps the hinge clip and mounting bracket (313) to the pivot bearing plate and set the needle in the desired position, then tighten the screw.

Reversing Switch

The reversing (cut-off) switch (306) should operate when the needle is 1-7/8 to 2 inches from the center of the turntable spindle. Use the set screw in the weight (319) on the arm of the switch to adjust the point of operation. The arm on the pickup pivot bearing (314), which pushes against the end of the set screw in the weight, should not strike the set screw until the needle is just past the last playing groove of a record. Move the lever stop on the reversing switch to one side, if necessary, to prevent the arm on the pivot bearing from riding against the set screw too soon.

Record Rack Switches

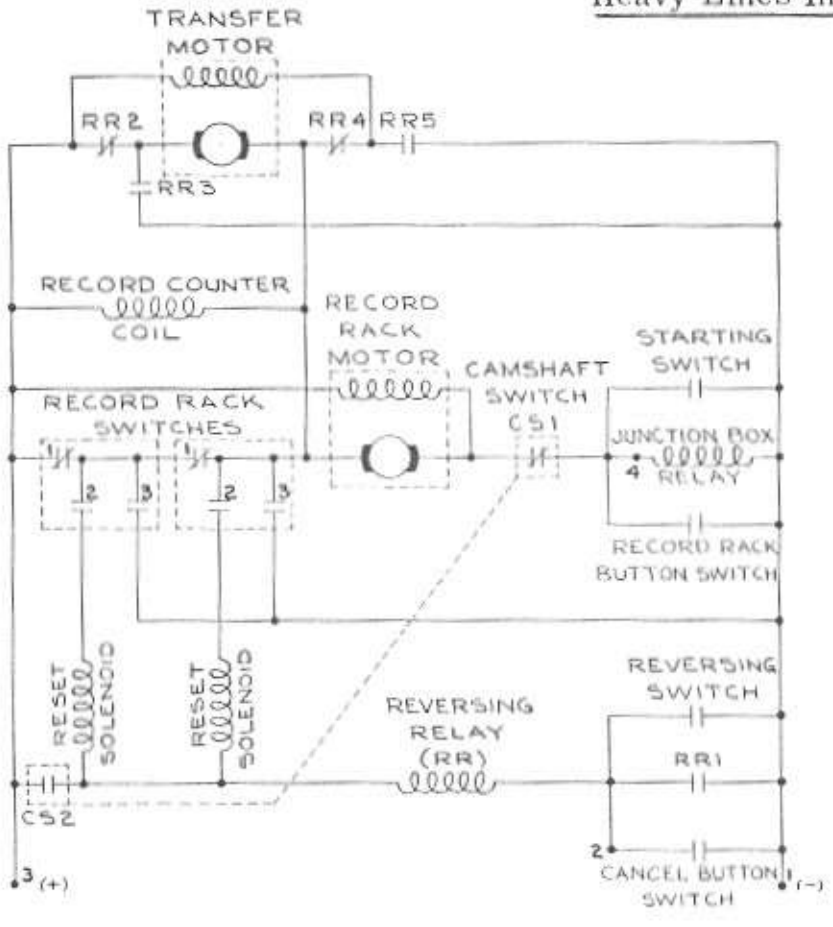
The record rack should stop with a record positioned so as to center in the grooves of the inner shoe (275) and the outer shoe (277). If the rack stops too soon in either forward or reverse motion, turn the set screw of the record rack switch operated counterclockwise. Turn the screw clockwise if the record rack moves too far.

To adjust the right hand switch, it will be necessary to remove the records from the rack to obtain access to the switch adjusting screw.

Check the trip levers (250) to see that no bind occurs and that the switches will operate in both compressed and released positions. Unless the switches operate at the released position the transfer motor will not shut off.

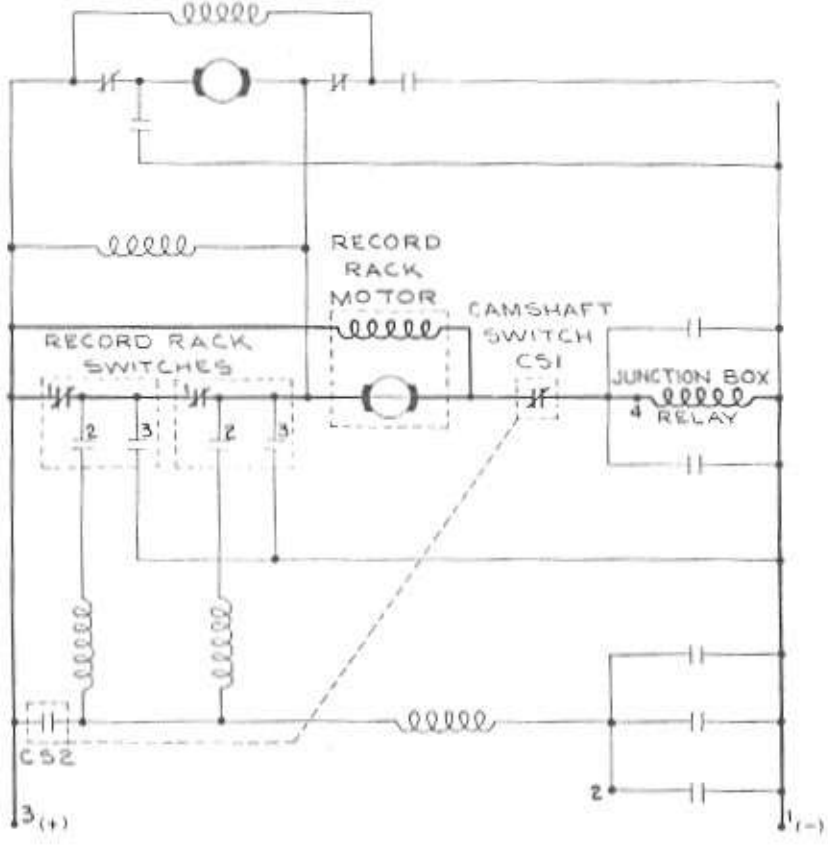
CONTROL CYCLE - RECORD CHANGER MECHANISM

Heavy Lines Indicate Current Flow



NO. 1. POWER OFF

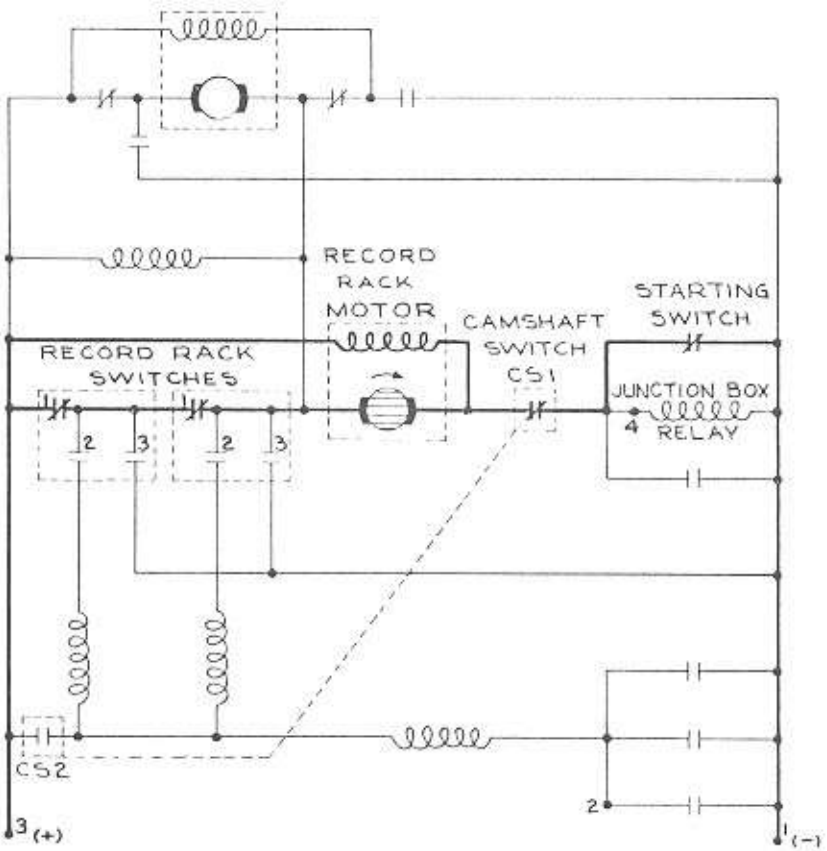
DC servicing switch off. All circuit elements in normal condition. All records in rack.



NO. 2. POWER ON

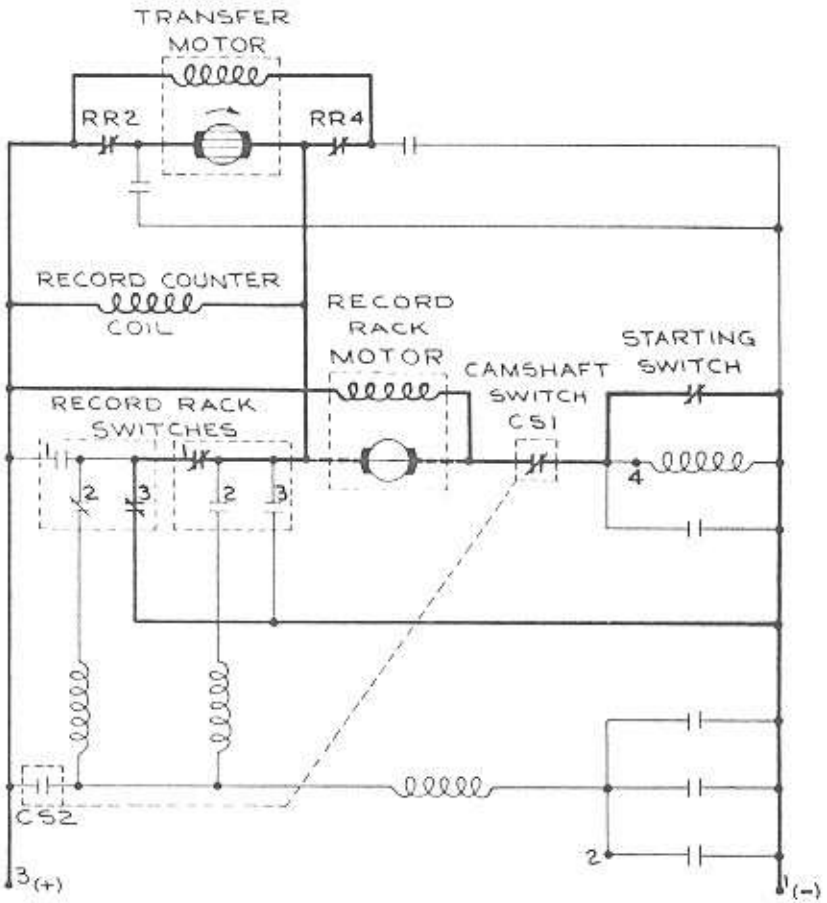
Phonograph junction box relay is energized through record rack switches and record rack motor. Motor does not run because relay current is small.

CONTROL CYCLE - RECORD CHANGER MECHANISM (Con't)



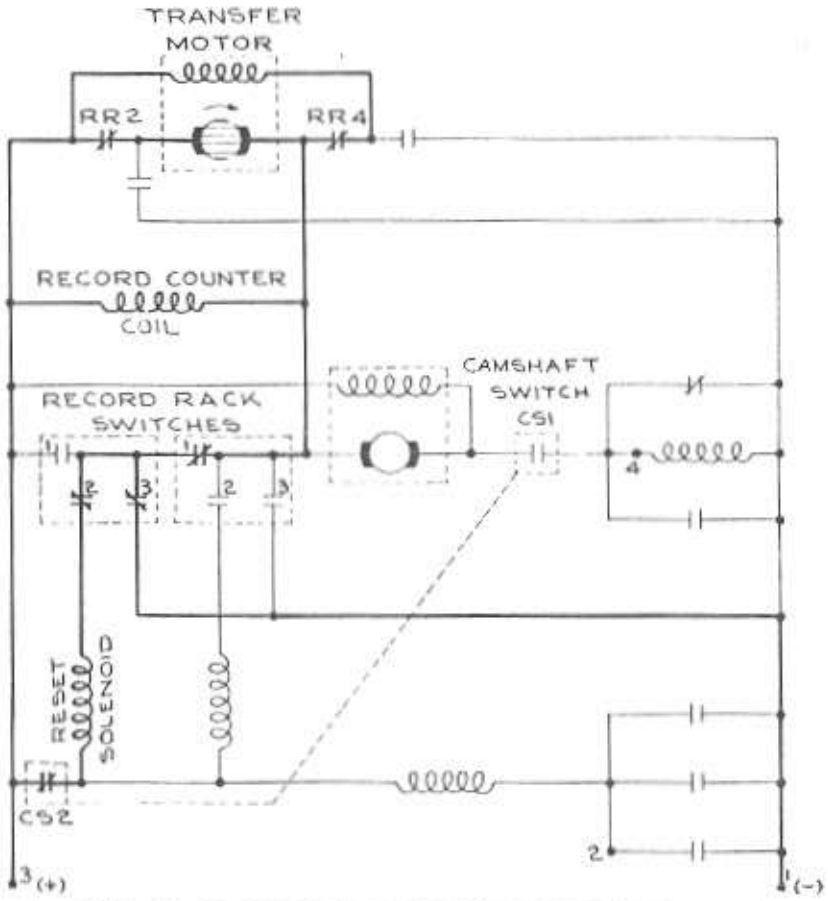
NO. 3. SELECTION MADE

Tripping of selector finger closes starting switch. Junction box relay falls out (Starting amplifier and turntable motor and changing lights). Record rack motor is energized and record rack starts to move.



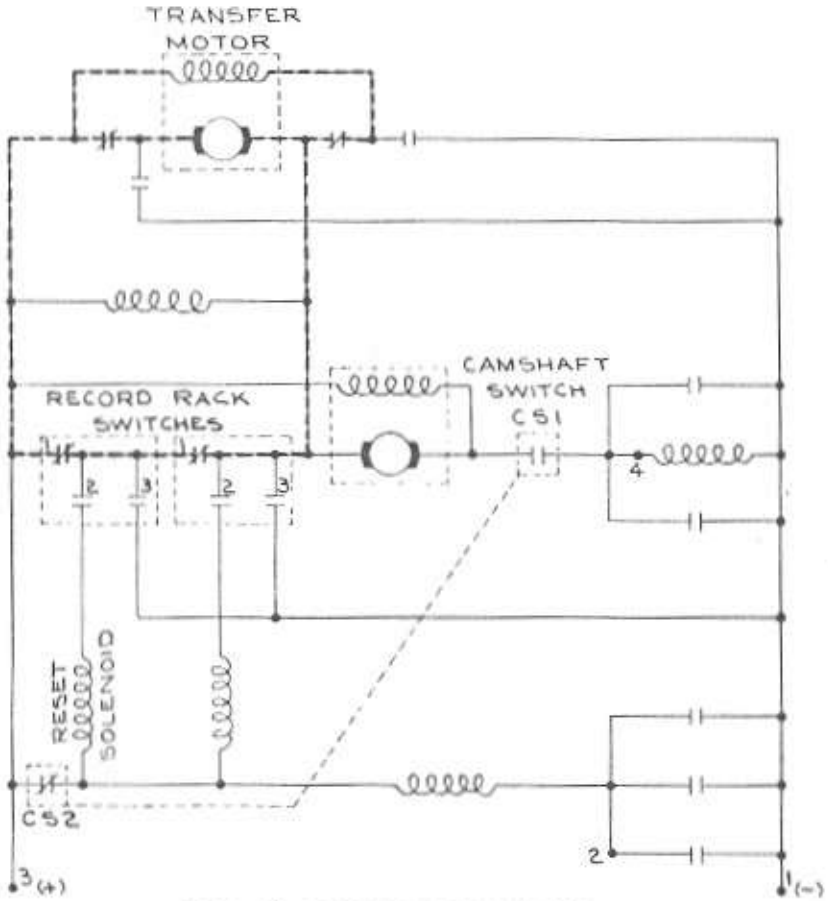
NO. 4. RECORD SELECTED

Trip lever of record rack switch, moving with record rack, strikes tripped selector finger. Contact pair #1 of record rack switch opens. Contact pairs #2 and #3 close. Armature of record rack motor is shorted, dynamically braking motor and stopping record rack with selected record between inner and outer shoes of transfer assembly. Record counter coil is energized, moving proper counter wheel one step. Transfer motor is energized causing record to be gripped and moved to turntable.



NO. 5. SELECTOR FINGER RESET

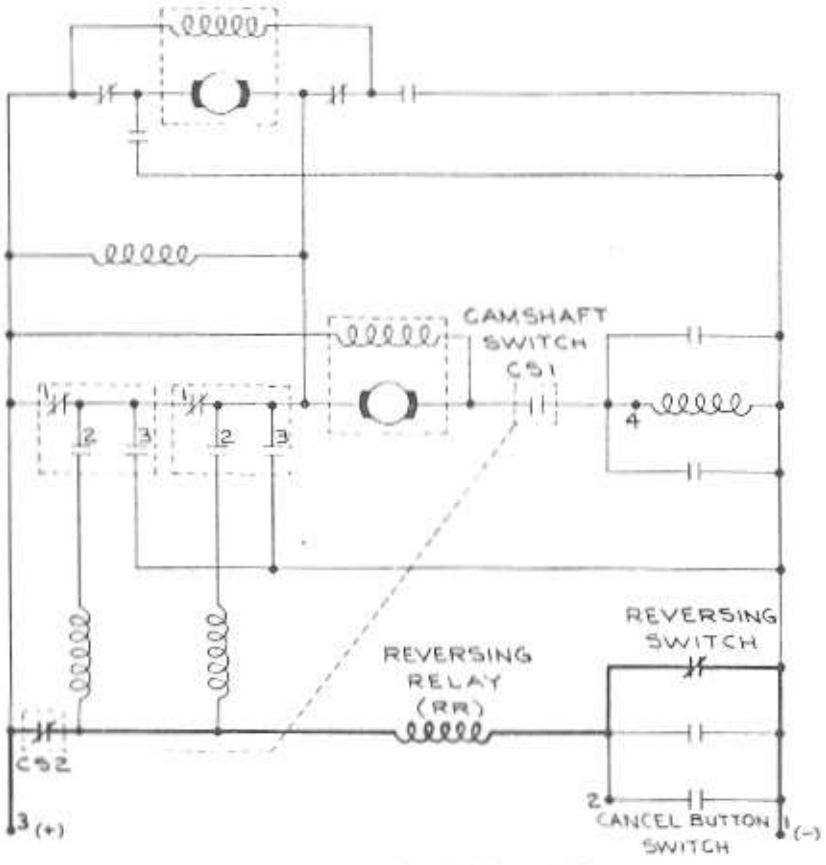
Rotation of camshaft after record is placed on turntable and released operates camshaft switch opening contact pair CS1 and closing contact pair CS2. Reset solenoid is energized and moves its plunger to restore the tripped selector finger to the normal position.



NO. 6. RECORD PLAYS

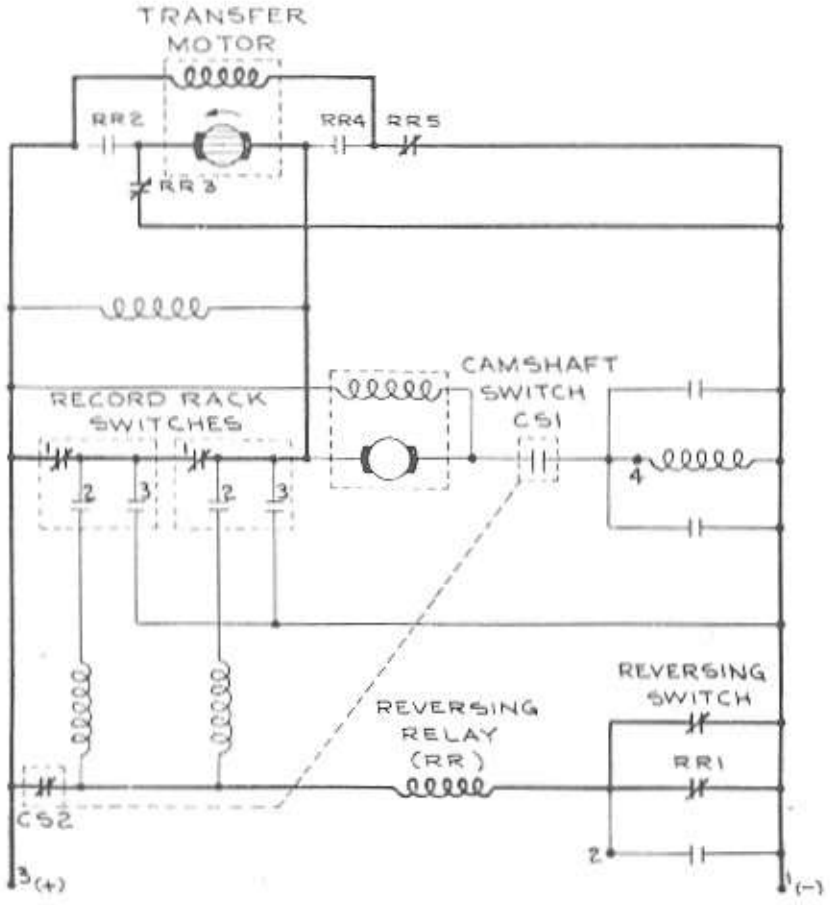
Restoring of tripped selector finger allows starting switch to reopen and releases trip lever of record rack switch. Contact pairs #2 and #3 of record rack switch open. Contact pair #1 closes. Energizing of reset solenoid, record counter coil and transfer motor ceases. Armature and field of transfer motor are shorted, dynamically braking transfer motor and stopping movement of inner and outer shoes after record is released onto turntable and pickup arm moves onto record. Turntable turns and record plays.

CONTROL CYCLE - RECORD CHANGER MECHANISM (Con't)



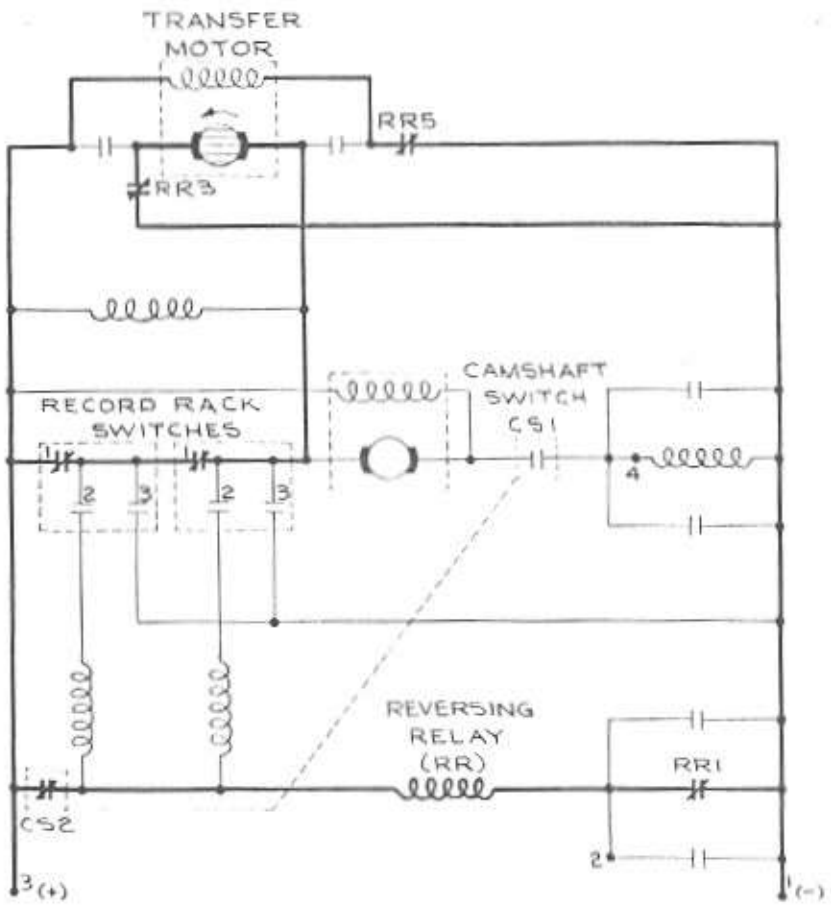
NO. 7. RECORD PLAY COMPLETED

Movement of pickup arm as needle moves into playoff grooves of record trips reversing switch closing its contacts and energizing reversing relay.



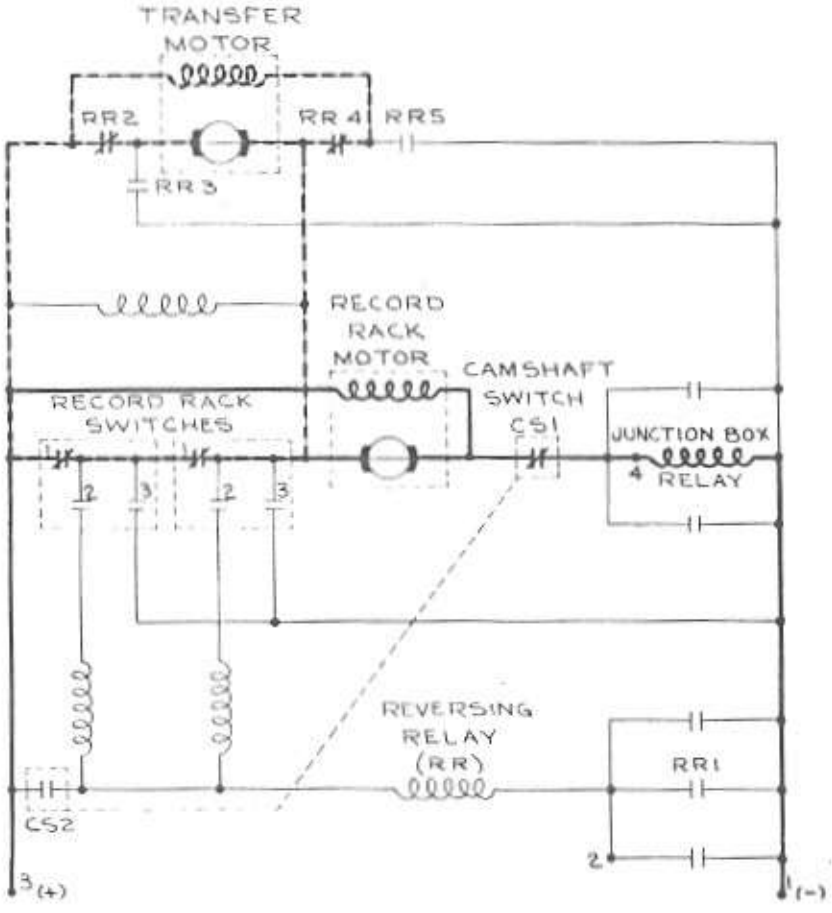
NO. 8. RECORD STARTS TOWARD RACK

Reversing relay, energized through reversing switch, closes its contact pairs RR1, RR3 and RR5 and opens RR2 and RR4. Transfer motor is energized, rotating in opposite direction (from direction in No. 4). Record is gripped and pick-up arm is moved off record.



NO. 9. RECORD RESTORED TO RACK

Moving of pickup arm off record allows reversing switch to open. Reversing relay remains energized through its own contact pair RR1. Transfer motor continues to run, raising record from turntable and moving it to record rack.



NO. 10. CYCLE COMPLETED

Record is released after placement in record rack by running of transfer motor which continues to rotate camshaft until camshaft switch operates. Contact pair CS2 opens and contact pair CS1 closes. Reversing relay drops out opening contact pairs RR1, RR3 and RR5, and closing contact pairs RR2 and RR4. Transfer motor armature and field are shorted, dynamically braking motor and stopping action of mechanism. Junction box relay is re-energized (turning off amplifier and turntable and changing lights) and mechanism returns to normal condition as in diagram No. 2

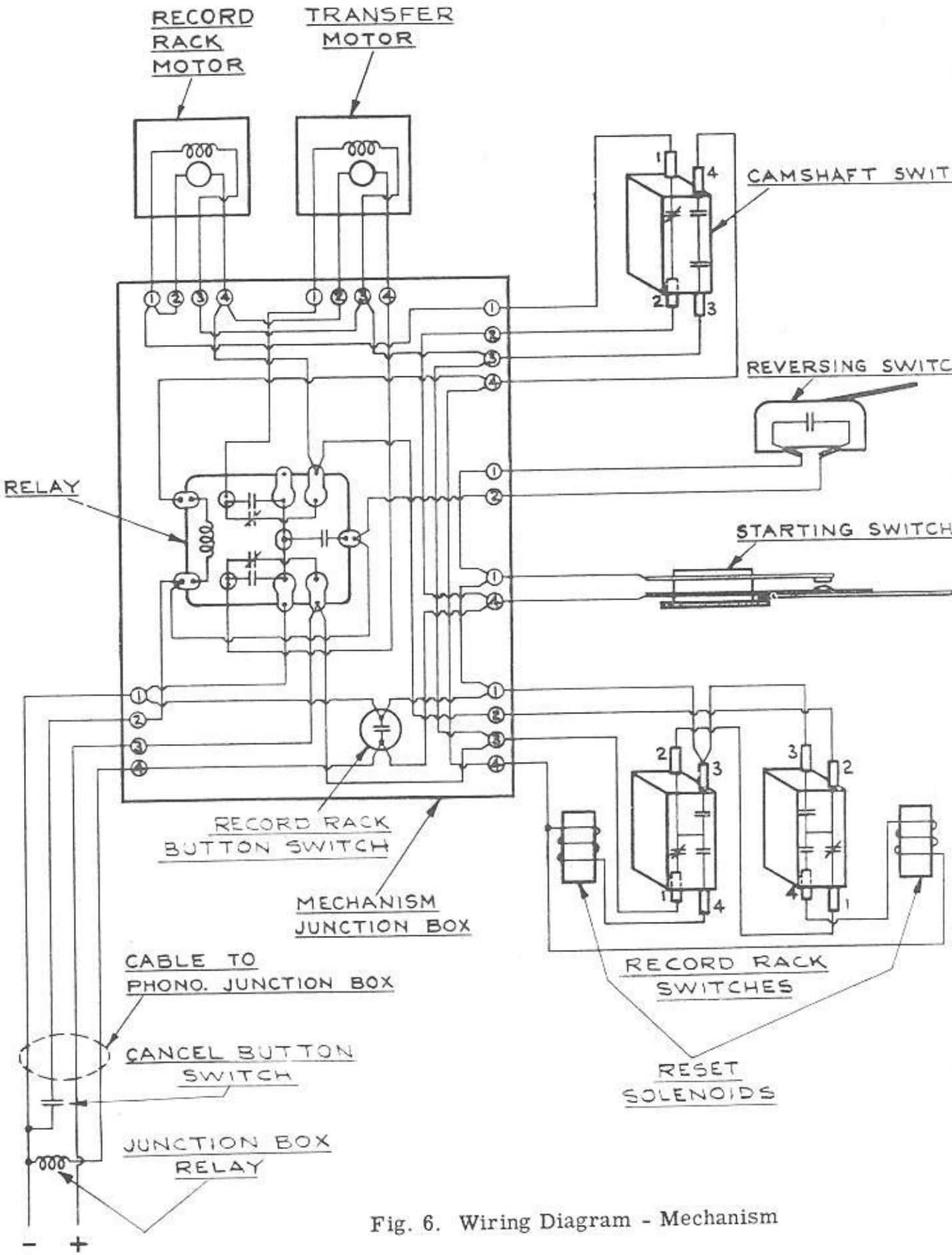


Fig. 6. Wiring Diagram - Mechanism

THE SOUND SYSTEM

The AMI sound system consists of three major units: the crystal pickup, the amplifier and the loudspeaker and/or loudspeakers. These three units have been carefully designed and selected to provide a matched sound system incorporating features most wanted in the field.

The Amplifier

The heart of the sound system is the amplifier (40). This unit can be used as:

1. A straightforward amplifier.
2. A master amplifier driving similar amplifiers used as auxiliary amplifiers.
3. An auxiliary amplifier being driven by a similar amplifier used as the master amplifier.

In each of the above applications, up to six speakers may be connected to each amplifier -- either six remote speakers or the cabinet speaker plus five remote speakers.

The Volume Control

The volume control (39) regulates the gain and therefore the power output of the amplifier. It may be placed and used at any distance from the amplifier without affecting the quality of reproduction by simply adding the necessary length of ordinary two-conductor lamp cord. The two terminals on the amplifier to which the volume control is connected are clearly labeled on the amplifier.

Sudden rotation of the volume control to the maximum volume position will cause the amplifier to momentarily lose volume and then to surge to maximum volume - similar in action to a dead spot in the volume control. This behavior is entirely normal and does not occur when the control is slowly rotated.

The Record Condition Control

One of the most severe problems in phonograph reproduction is that of record noise. Although record noise exists throughout the musical spectrum, it is most noticeable at treble frequencies. The noise at bass and middle frequencies is masked by the music because the energy of music is concentrated at these frequencies. By cutting the response of the amplifier at treble frequencies, noise at these frequencies is reduced. Of course, the quality of reproduction suffers because of the reduction of music in the treble range.

In order to preserve the greatest amount of musical content for a given amount of noise, a sharp cut-off filter circuit is used. Effective reproduction is maintained up to the cut-off frequency; above that frequency the output is sharply attenuated. The treble cut-off control, labeled "Record Condition", has three positions corresponding to the three conditions of record wear and noise. The three conditions are "New Records", "Normal" (moderately worn) and "Badly Worn".

The Amplifier (Continued)

The Record Condition Control (Continued)

It is realized that the records in a phonograph will be mixed as to condition. The control should be set to the position which corresponds to the condition of the majority of the records in the phonograph. Conditions in the field indicate that the "Normal" position would be the one most frequently used.

The Automatic Bass Tone Control

Because bass frequencies seem proportionally less loud than do treble frequencies to the human ear at the lower volume levels, "bass boost" is incorporated in the amplifier to maintain tonal balance. Bass frequencies would overload the amplifier before the treble frequencies as high volume levels were reached unless means were taken to reduce the amount of bass boost at the higher volume levels. The bass boost tone circuit in this amplifier is completely automatic in operation. As full power output of the amplifier is approached, the bass boost is electronically reduced just sufficiently to prevent overloading and consequent distortion. Thus, both bass and treble frequencies can be reproduced at the maximum power output of the amplifier.

Master-Auxiliary Amplifier Use

Large and complex installations may be beyond the scope of one amplifier. In cases where more power is needed, an amplifier is used as the master amplifier which drives one or more similar amplifiers used as auxiliary amplifiers. Each amplifier, whether it is used as master or auxiliary, has its own volume control and treble cut-off tone control. Thus it follows that the power output and tonal quality of each amplifier is controlled independently of the others.

This independent control of volume and tone is especially valuable when the installation problem is one of frequent change in volume levels in two separate rooms rather than one of adequate power.

The volume controls of the master and auxiliary amplifiers can be grouped at one place or can be individually located, whichever the installation demands.

The number of auxiliary amplifiers which a master amplifier can handle is limited only by the type and amount of wire used to carry the signal between the master amplifiers and auxiliary amplifiers. In most cases, connections for the signal between a master amplifier and an auxiliary amplifier can be made with ordinary two-conductor lamp cord. The length of lamp cord between a master amplifier and any given auxiliary amplifier should not be over 500 feet provided this wiring is kept away from AC power wiring; otherwise excessive hum will result.

The signal wiring should be connected from the two terminals marked "Output to

The Amplifier (Continued)

Master-Auxiliary Amplifier Use (Continued)

Aux. Ampl." on the master amplifier to the two terminals marked "Input from Master Ampl." on the auxiliary amplifier. The "Ground" terminal of each pair of above terminals should be connected to the same wire in the lampcord, otherwise severe hum will result. In other words, the ground wiring must be common to all amplifiers. Thus all of the auxiliary amplifiers connected to the master amplifier are wired in parallel through the signal wiring.

In cases where the signal wiring must be run next to power wiring for distances of 100 feet or more, single conductor shielded microphone cable should be used. The shield becomes the second conductor and is used for the ground side of the signal wiring.

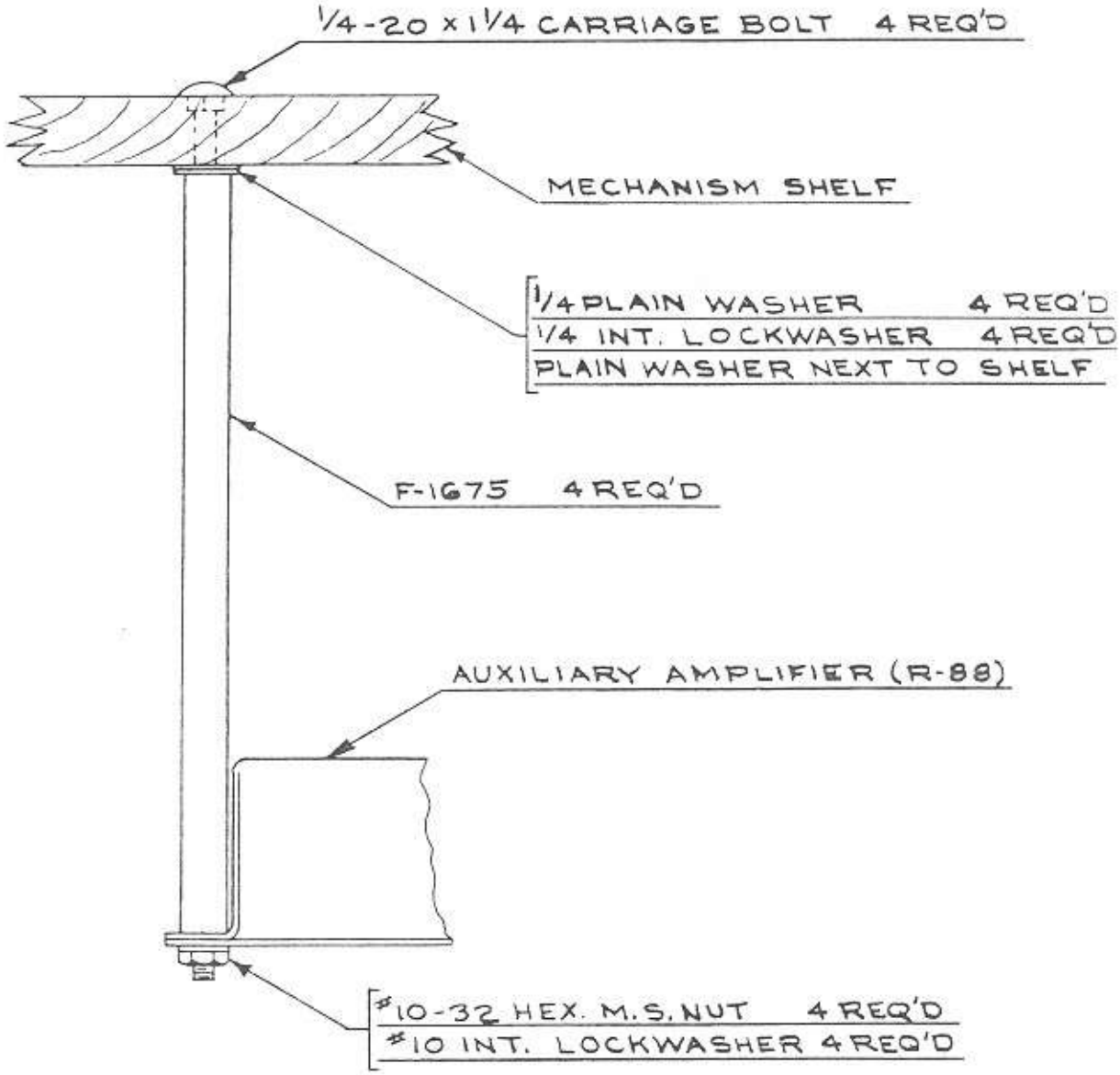
The signal wiring between amplifiers has an electrical property: capacity, which, if excessive, results in losses at treble frequencies. Thus the total length (and capacity) connected to the master amplifier must not exceed certain limits. The total length of lamp cord and/or capacity (25 micro-microfarads/foot) shielded microphone cable should not exceed 1000 feet. If shielded cable is used having two times the capacity per foot as the above, the maximum length would be one-half the above or 500 feet. In no case should the total capacity exceed 30,000 micro-micro-farads.

The amplifiers do not require direct grounding because they are effectively grounded to one side of the AC power wiring by means of a small capacitor. To determine the ground side of the AC power wiring, turn up the volume control (no record playing) and reverse the amplifier AC line cord plug in its receptacle and leave in the position of least hum. This procedure is necessary insofar as master-auxiliary application is concerned but is usually not necessary for ordinary single amplifier use.

To mount an auxiliary amplifier within the phonograph, refer to "Auxiliary Amplifier Mounting Instructions", Fig. 7.

The Crystal Pickup

The crystal pickup used with the amplifier is of the ceramic element type. This type of crystal is unequalled in its ability to withstand excessive heat and humidity. The crystal, normally furnished with a replaceable self-polishing osmium needle, provides unusually good record life. A replaceable sapphire needle is also available. Instructions for replacing the needle are given in the section "Putting the Machine in Operation". Caution: The amplifier has been designed for the output response of this crystal. Use of crystals having different responses will result in unsatisfactory performance.



INSTRUCTIONS FOR MOUNTING AUXILIARY AMPLIFIER

1. REMOVE MECHANISM MOUNTING SCREWS
2. RAISE MECHANISM AND INSERT 4 CARRIAGE BOLTS IN PRE-DRILLED HOLES IN SHELF (PIERCE THRU SHELF COVERING IF NECESSARY)
3. ATTACH 1/2 D. ROD TO EACH CARRIAGE BOLT WITH PLIERS INSERTING PLAIN WASHER & LOCKWASHER AS SHOWN.
4. ATTACH AUXILIARY AMPLIFIER TO PROTRUDING STUDS ON 1/2 D. ROD WITH LOCKWASHER & NUTS AS SHOWN.
5. REPLACE MECHANISM MOUNTING SCREWS.

Fig. 7. Auxiliary Amplifier Mounting Instructions

SPEAKER CONNECTION CHART

Numbers indicate terminals on speaker terminal strip.

Cabinet Speaker		Remote Speakers Connected in Parallel			Jumper Number 1		Jumper Number 2	
Leads to Terminals		Number & Impedance	Leads to Terminals		Connect Terminals		Connect Terminals	
Cabinet speaker louder than each remote speaker.								
2	4	1-8 Ohm	2	6	5	6		
2	4	2-8 Ohm	2	6	5	6		
2	4	1-500 Ohm	2	7	5	6	1	4
2	4	2-500 Ohm	1	3	5	6	5	7
4	6	3-500 Ohm	5	7	2	3	1	3
4	6	4-500 Ohm	1	6	2	3	5	7
4	6	5-500 Ohm	1	6	2	3	5	7
Each remote speaker louder than cabinet speaker.								
3	4	1-8 Ohm	4	5				
2	5	2-8 Ohm	3	4	4	6		
3	4	1-500 Ohm	6	7	1	5	2	3
2	5	2-500 Ohm	1	4	3	7	4	6
2	5	3-500 Ohm	2	7	4	6	1	6
2	6	4-500 Ohm	4	7	1	3		
2	6	5-500 Ohm	4	7	2	3	1	6

Fig. 8. Connection Chart - Unequal Power to Speakers

Loudspeakers

The Phonograph Speaker

The loudspeaker furnished with the phonograph is a heavy duty 15 inch permanent magnet type, and has a voice coil impedance of 16 ohms. It is capable of handling the full output of the amplifier without overloading.

Remote Speaker Application

The amplifier is designed to handle those installations which require remote speakers for adequate sound coverage. This covers installations where the phonograph speaker is used with remote speakers and Hideaway installations where only remote speakers are used. Either 8 ohm or 500 ohm remote speakers can be used in installations which require one or two remote speakers. It is not practical to connect more than two 8 ohm remote speakers to the amplifier because of excessive power loss in the speaker lines. Therefore, provision has been made for only one and two 8 ohm remote speakers (with or without the phonograph speaker).

Because 500 ohm remote speakers have negligible line loss, provision has been made to connect up to five 500 ohm remote speakers in addition to the phonograph speaker or up to six 500 ohm remote speakers without the phonograph speaker. Connection of the speaker leads and the necessary jumper wires are shown on the "Speaker Connection Chart" located on the amplifier. This chart is for equal power into each speaker.

For those installations which require greater volume from the phonograph speaker than the remote speakers (or vice-versa), refer to the connection chart, Fig. 8.

For individual control of speaker volume in a multiple speaker installation, L pads can be connected to each speaker. The L pad should match the impedance of the speaker with which it is used.

Amplifier Service Information

Efficient service of any piece of equipment requires an understanding of the basic operation of the equipment. Although conventional in most respects, the amplifier contains several simple but special circuit features. This section contains information on these special circuit features as well as general service information. It is strongly recommended that the serviceman understand the operation of the special circuits and become familiar with the general service information before servicing the amplifier.

Conventional Circuits:

Inspection of the amplifier schematic diagram, Fig. 9, shows that the DC power sup-

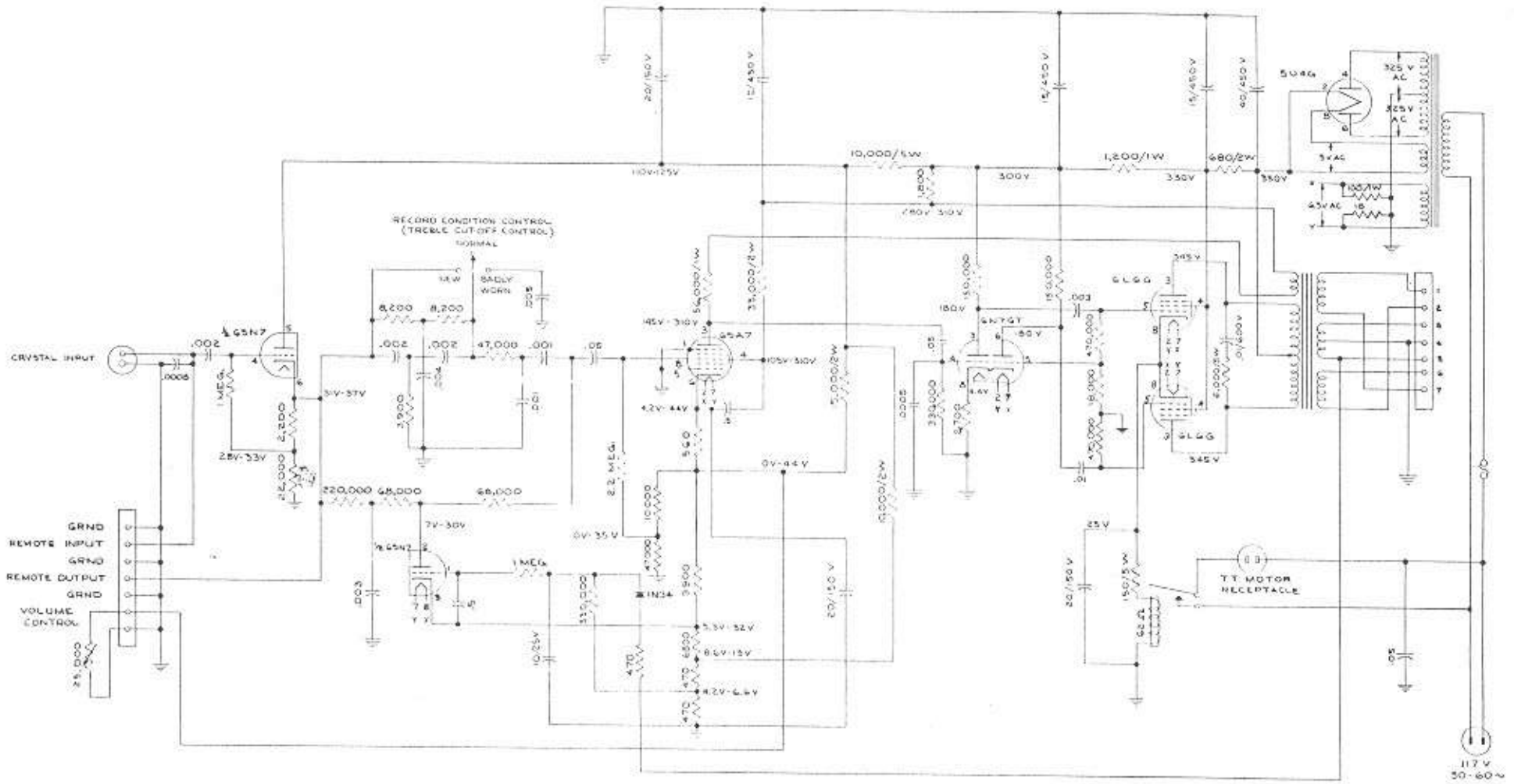


Fig. 9. Schematic Diagram - Amplifier

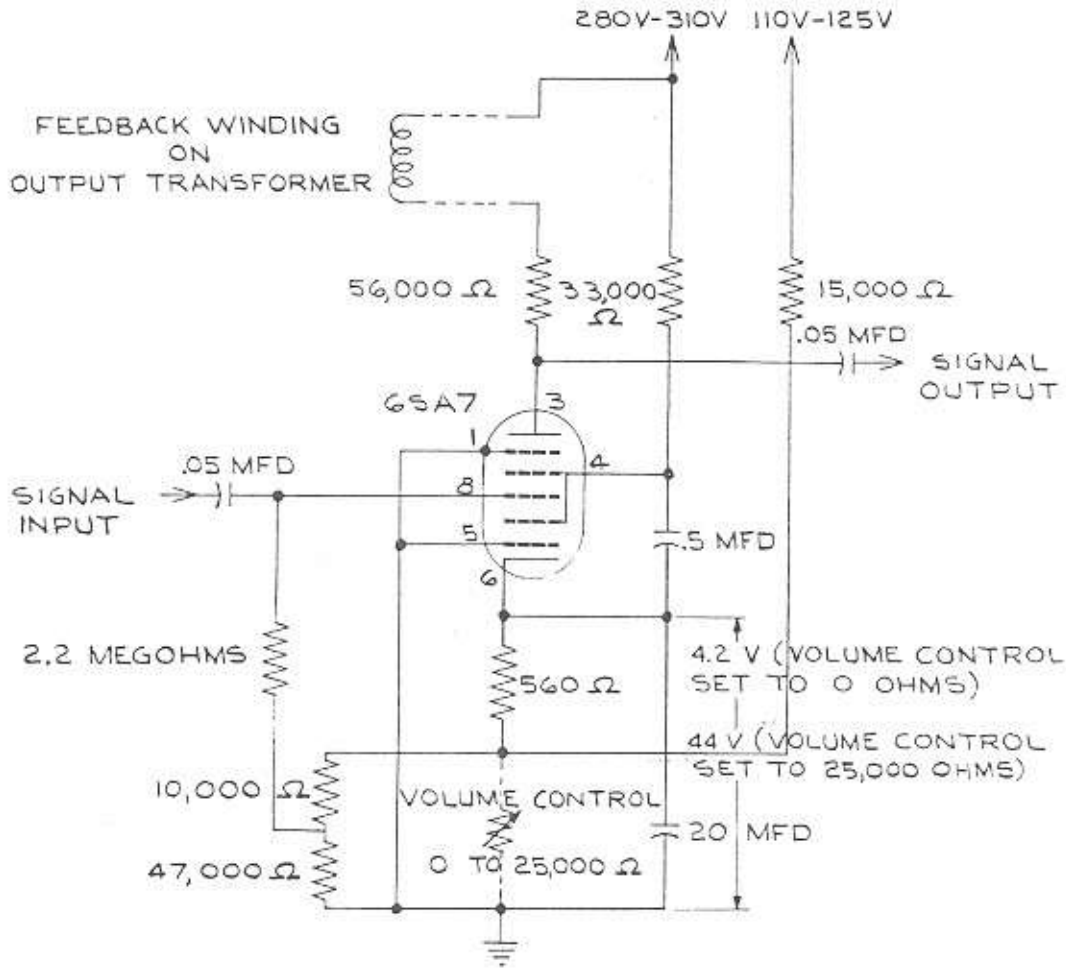


Fig. 10. Schematic Diagram - Volume Control Circuit

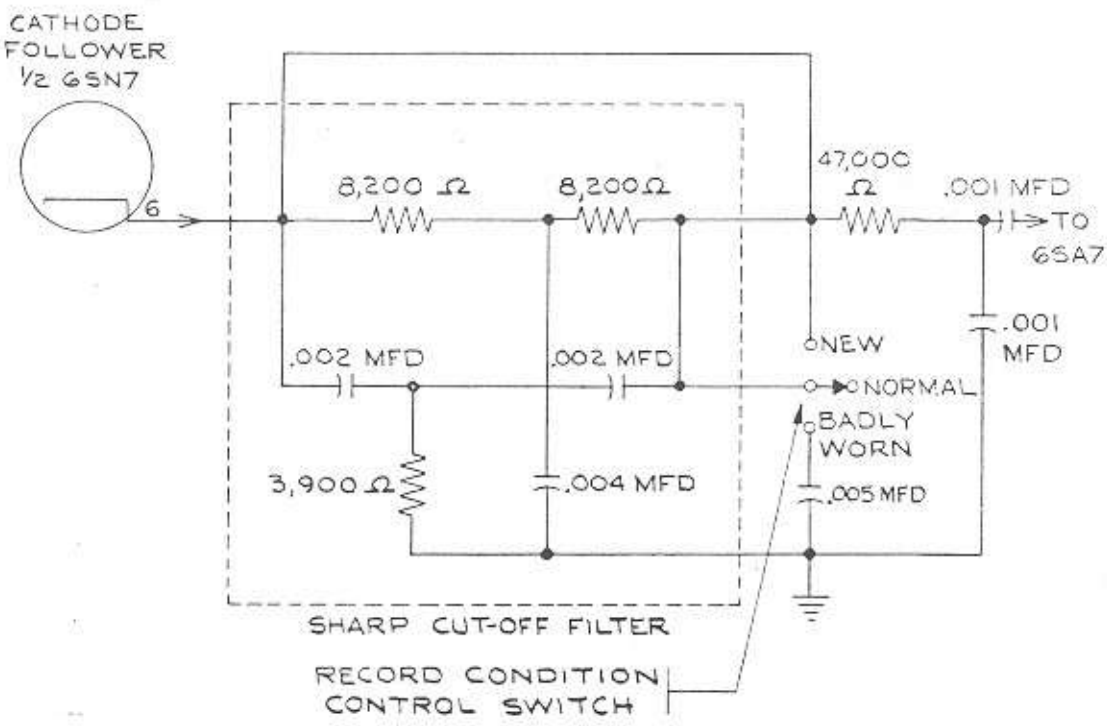


Fig. 11. Schematic Diagram - Record Condition Control Circuit

Amplifier Service Information (Continued)

Conventional Circuits (Continued):

ply, audio power output and phase inverter circuits are conventional.

The 60 cycle AC voltage, stepped up by the power transformer, is rectified into DC voltage by a 5U4G tube. Hum ripple voltage at the output of the rectifier tube is smoothed out by resistance-capacitance filters.

Push-pull 6L6G tubes, operated class AB_1, deliver up to 22 watts into the output transformer. Inverse feedback, fed into the plate circuit of the 6SA7 tube from a separate winding on the output transformer, is used to reduce distortion, stabilize gain and improve frequency response. The secondary windings of the output transformer are connected to a terminal strip marked "Speakers". The secondary windings can be connected together by means of jumper wires so as to either aid or oppose each other. Thus, many different values of impedances can be matched to the power output tubes.

A 6N7GT twin-triode tube is used as an amplifier and phase inverter. One triode section of the 6N7GT tube is used as a voltage amplifier between the output of the 6SA7 tube and the input of one of the 6L6G power output tubes. A fraction of the input voltage to the forementioned 6L6G tube is amplified and inverted in phase by the remaining triode section of the 6N7GT tube and applied to the input of the other 6L6G power output tube. Thus, the remaining triode section of the 6N7GT tube is used as a phase inverter. The input voltage to each 6L6G tube is equal and opposite in phase -- a condition necessary for push-pull operation.

A relay is connected in the cathode circuit of the 6L6G tubes to insure starting of the turntable motor only when the amplifier is sufficiently warmed up to deliver power. When energized by sufficient cathode current, the relay closes and applies power to the turntable motor.

The Volume Control Circuit:

The power output of the amplifier is controlled by varying the gain (or amplification) of the amplifier. This is done in the 6SA7 penta-grid tube by changing the DC voltage on one of the grids. Referring to the basic volume control circuit, Fig. 10, it is seen that the signal is applied to the #3 grid of the 6SA7 and the gain of the tube is controlled by varying the DC bias voltage on the #1 and #5 grids. The maximum gain condition is with the volume control set for zero resistance. The negative bias (grid to cathode) voltage on #1, #3, #5 grids would be the 4.2 volts developed across the 560 ohm cathode resistor. As the volume control is rotated from its zero resistance position, its resistance is increased and the voltage drop across it increases. This increases the negative bias on the #1 and #5 grids since they are at chassis potential and the cathode voltage is now increased by the voltage drop across the volume control. The negative bias on the #3 (signal) grid is not effectively changed through

Amplifier Service Information (Continued)

The Volume Control Circuit (Continued):

most of the volume control range because the voltage across it follows the rise in voltage across the volume control. With the volume control set at the maximum resistance position of 25,000 ohms (minimum gain position) the cathode voltage, and hence the #1 and #5 negative bias voltage, becomes 44 volts -- more than enough to reduce the tube plate current to zero and the amplification to zero. A 20 mfd. capacitor by-passes any signal voltage developed across the cathode.

Because only DC voltage appears across the volume control, it may be extended any distance from the amplifier by adding the necessary length of unshielded two-conductor wire such as lampcord.

Two precautions have been taken because of the possibility of microphonics from the 6SA7 tube. One, the 6SA7 tube socket has been "floated" on rubber grommets; two, a weight in the form of a spring has been fastened to the tube itself. To fasten the spring to the tube, rotate the spring in the direction that "opens" it and "screw" it on the tube. To remove the spring, rotate it in the same direction used to install it and pull it from the tube. If the spring is rotated in the wrong direction, it will tighten on the tube making removal difficult.

The Record Condition (Treble Cut-off) Control Circuit:

Referring to the amplifier schematic diagram, Fig. 9, it is seen that this circuit immediately precedes the 6SA7 volume control circuit. The basic circuit is shown on Fig. 11.

As discussed previously, use of a sharp cut-off filter circuit for the treble frequencies results in the least damage to the natural reproduction of treble frequencies for a given reduction of record noise. The sharp cut-off filter consists of a parallel T circuit.

With the Record Condition control switch in the "New" position, the sharp cut-off filter circuit is shorted out. Thus, the full response of the crystal pickup and record is possible except for a small amount of treble attenuation due to the 47,000 ohm series resistor and the .001 mfd. by-pass capacitor.

With the Record Condition control switch in the "Normal" position, the sharp cut-off filter becomes effective. Good treble response is retained to the cut-off point of the filter; beyond the cut-off point, severe attenuation takes place with the consequent effective reduction of record noise.

With the Record Condition control switch in the "Badly Worn" position, treble attenuation and record noise reduction over and above that of the "Normal" position is accomplished by the addition of a .005 mfd. capacitor to the filter circuit.

Amplifier Service Information (Continued)

The Automatic Bass Tone Control Circuit:

Because of the "bass boost" incorporated in the amplifier, bass frequencies are the first to cause overloading of the power output stage as higher volume levels are reached. Therefore, the "bass boost" must be eliminated to permit both bass and treble frequencies to be reproduced at the maximum power output of the amplifier.

Referring to the simplified schematic of this circuit, Fig. 12, it is seen that this circuit, between the output of the cathode follower and the input of the 6SA7 tube, is in parallel with the Treble Cut-off circuit and controls the bass frequencies.

Treble frequencies are by-passed to ground through the .003 mfd. capacitor; thus only bass frequencies reach the input of the 6SA7 tube through this circuit, whereas, treble frequencies reach the input of the 6SA7 tube through the Treble Cut-off circuit. This is the condition when the bass control tube is disconnected (unenergized) as shown in the equivalent circuit. The frequency characteristic of the treble and bass circuits, in conjunction with the frequency characteristic of the crystal pickup is designed to produce a preponderance of bass frequencies (bass boost) when the bass control tube is unenergized.

The bass control tube circuit can be replaced for discussion purposes by an equivalent circuit consisting of a variable resistance and a switch. As previously mentioned, the switch is open and the resistance disconnected when the tube is unenergized.

At the threshold of energization, the switch closes thus connecting the resistance into the circuit. The resistance is very high under this condition and produces little effect in the bass circuit. As the energization of the bass control tube is increased, the variable resistance decreases. As the variable resistance decreases, its shorting effect in the bass circuit increases, thus decreasing the amount of bass frequency signal reaching the input of the 6SA7.

The degree of energization of the bass control tube varies with and is controlled by the power output of the amplifier. Therefore, as the power output of the amplifier is increased, the bass boost is decreased thus preventing overload of the amplifier at bass frequencies. At maximum power output of the amplifier, the overall frequency response of the amplifier and crystal pickup is relatively "flat".

The actual bass control tube circuit is shown on Fig. 13. All DC voltages under discussion are positive with respect to the chassis. A triode section of the 6SN7 tube acts as the switch and variable resistance in the equivalent circuit. The variable resistance is the plate resistance of the tube which varies with the plate current which in turn is controlled by the grid bias on the tube.

At low signal levels the negative bias on the grid of the tube is sufficient to cut-off the plate current in the tube, thus making the tube an open circuit as far as the bass

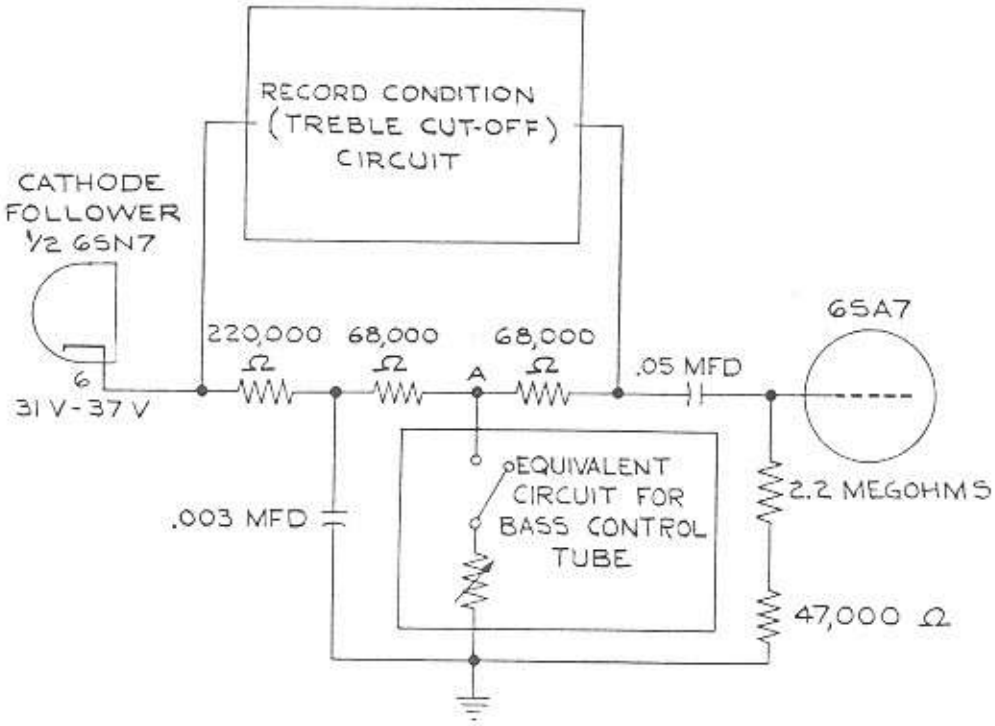


Fig. 12. Schematic Diagram - Simplified Automatic Bass Tone Control Circuit

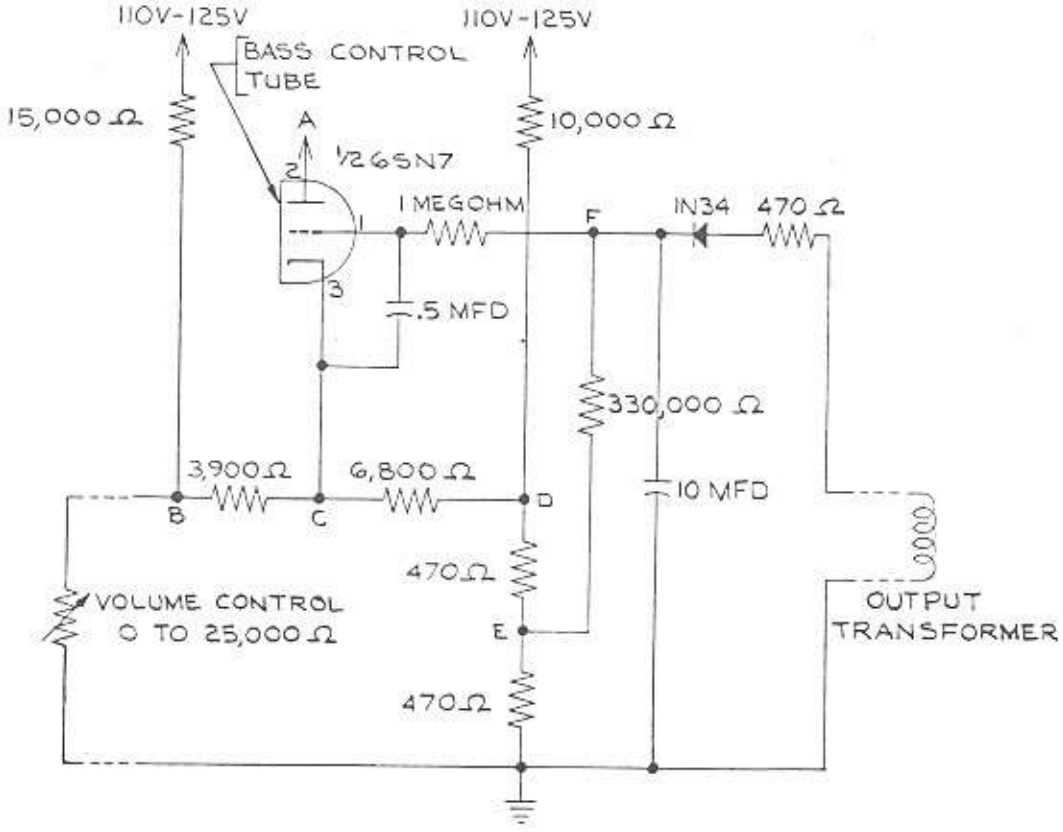


Fig. 13. Schematic Diagram - Bass Control Tube Circuit

Amplifier Service Information (Continued)

The Automatic Bass Tone Control Circuit (Continued):

control circuit is concerned. The plate of the tube has approximately 30 volts DC applied to it and connects to point "A" on the simplified circuit schematic.

A study of the voltages in the bass control circuit at the threshold point of operation of the circuit not only would give an understanding of the circuit for that condition of operation but also would provide analysis of the operation of the circuit for conditions on either side of the threshold condition. At the threshold point, the power output of the amplifier at bass frequencies is at the verge of overloading and the bass control tube is at the verge of operation. A typical volume control setting for this threshold point would produce about 12 volts across the volume control (or between chassis and point "B"). Point "D" is anchored at 9 volts by means of the 10,000 ohm bleeder. Point "C" will then have a voltage above chassis of approximately 11 volts. Assume for the moment, that there is no signal input to the amplifier. Then the grid voltage of the bass control tube would be that at point "E" or 4.5 volts. The negative grid bias on the tube would then be the voltage at point "E" subtracted from the voltage at point "C" or 11 - 4.5 = 6.5 volts. This value is more than sufficient to cause plate current cut-off in the tube. Now apply a signal to the input of the amplifier. The AC signal voltage developed across the output transformer winding will be rectified by the 1N34 germanium diode rectifier and a positive DC voltage will appear across the 10 mfd. capacitor at point "F". Now the grid voltage is that at point "F". A typical value would be 8 volts. The negative grid bias is now 11 - 8 or 3 volts, a value which just causes plate current cut-off. If the voltage across the output transformer winding is increased, the rectified DC voltage at point "F" is increased, which causes a decrease of negative grid bias. Plate current then flows in the bass control tube and the bass boost is reduced.

The net grid bias on the bass control tube is determined both by the rectified voltage at point "F" and by the voltage at point "C" which partially depends upon the position of the volume control for its value. In the threshold area of operation, the effect upon the voltage at point "C" due to position of the volume control is small so that the bias is determined essentially by the rectified voltage at point "F".

In the maximum volume region of the volume control, the control operates the bass control circuit independently of the power output of the amplifier and reduces the bass gain. If this were not done, acoustic feedback would develop in the sound system during the record changing period because of no signal input (no rectified bass control voltage) and resultant very high bass gain. With the volume control set at zero ohms (maximum volume), the voltage at point "B" become zero. The voltage at point "D" remains at about 9 volts, thus the voltage at point "C" is in the order of 3 volts. The grid voltage at no signal is that at point "E" or 4.5 volts. The grid bias then becomes 4.5 - 3 or a positive 1.5 volts which, of course, causes the bass control tube to operate.

Operation of the amplifier at power levels below the threshold region does not affect

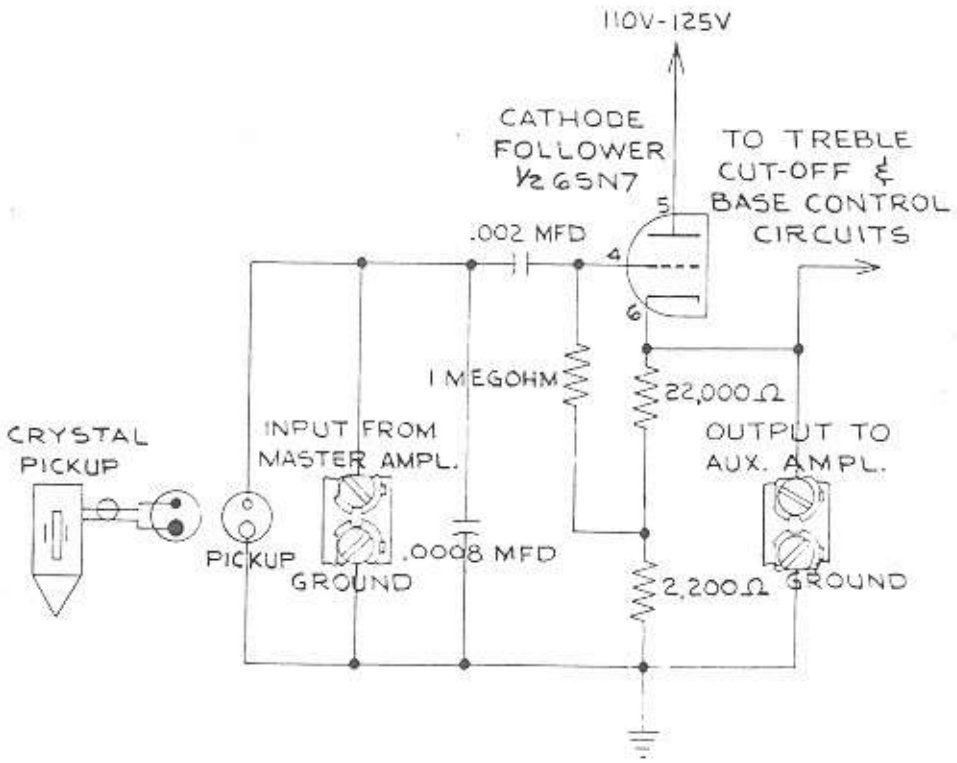


Fig. 14. Schematic Diagram - Master-Auxiliary Amplifier Circuit

Amplifier Service Information (Continued)

The Automatic Bass Tone Control Circuit (Continued):

the bass boost because the rectified control voltage at "F" is small and the voltage at point "C" is relatively high. This adds up to a high negative bias on the bass control tube.

By virtue of the R-C time constants involved, the control voltage rectifier circuit has been designed to develop DC control voltage (at point "F") rapidly upon application of signal voltage from the output transformer and to lose control voltage slowly upon removal of the signal voltage. This means that the bass boost is cut quickly to prevent distortion and returns gradually so that the listener is hardly aware of the change. The charging R-C time constant of the control voltage rectifier circuit is basically determined by the 10 mfd. capacitor, the forward resistance (under 500 ohms) of the rectifier and the 470 ohm current limiting resistor. The discharging R-C time constant is basically determined by the 10 mfd. capacitor and the parallel resistance of the 330,000 ohm resistor and the back resistance (over 200,000 ohms) of the rectifier. Thus the characteristics of the 1N34 rectifier play a vital part in th proper operation of the circuit.

The 1 megohm resistor and .5 mfd. capacitor in the grid circuit of the bass control tube reduces the ripple content of the DC rectified voltage and thus functions as a smoothing and decoupling filter.

Master-Auxiliary Amplifier Circuit

Because the crystal is a high impedance device, the signal developed by it can not be transmitted more than several feet away without excessive loss and hum pickup. A low impedance signal source is necessary for transmission of the signal over considerable distances. As shown on Fig. 14, a cathode follower circuit provides this. It has a relatively low output impedance of 1000 ohms and an amplification of slightly less than unity. The output voltage of the cathode follower in the amplifier used as the master amplifier is applied to the input of the cathode follower on the amplifiers used as auxiliary amplifiers. Thus the voltage applied to the input of all the amplifiers is substanitally the same value. Because the cathode follower preceeds the volume control, treble cut-off control and automatic bass control circuits, these circuits remain effective for each amplifier regardless of its use in a master-auxiliary amplifier set-up.

The .0008 mfd. capacitor across the input of the cathode follower in addition to the capacity of the shielded crystal pickup cable, reduces the output voltage of the crystal pickup to an average value of .35 volts at 1000 cycles.

CABINET

The construction and features of the cabinet are, for the most part, obvious. The paragraphs following explain methods of replacement, disassembly or assembly where the procedure might not be self-evident.

Plugging Harness into Selector Magnet Banks

Insertion of plugs into selector magnet banks is facilitated by propping up mechanism (the right end when looking forward) with a 5'' length of 2 x 4 or equivalent. The plugs on the harness which connect to the selector magnet banks (269) on the record changer mechanism, are numbered from 1 through 8. Plugs numbered 1, 2, 3 and 4 go into the selector magnet bank nearest the center of the record changer mechanism (the left bank when looking forward from the rear of the phonograph). Plug numbers advance from number 1 at the rear of the phonograph to number 4 at the front. Plugs numbered 5, 6, 7 and 8 go into the selector magnet bank nearest the end of the mechanism (the right bank when looking forward) starting with plug numbered 5 at the front and advancing to plug numbered 8 at the rear.

Changing Title Light

The title lamp may be removed upward from its holders after the starter immediately above the lamp is removed from its socket.

Changing Lamps in Dome

Lamps in the dome light assembly (55) and the top light assemblies (65) may be changed by removing the 4 screws holding the rectangular panel at the rear of the phonograph above the door. The panel may then be removed from the phonograph permitting replacement of lamps.

Replacing Grille Louvres

Should damage occur to one of the grille louvres, it may be replaced without any disassembly of the cabinet. Break the damaged louvre or pull it downward at the center and out from under the ear on the center vertical grille stiffener which holds it and continue pulling outward at the center of the louvre so that it comes out of the sockets retaining it at each end. Before installing a new louvre, bend the ears on the center vertical grille stiffener and the ears which will retain the ends of the louvre slightly so that the new part may be easily slid beneath them. Insert one end of new louvre under ears in side channel, bow center outward and insert other end into other side channel. Next, grasp louvre on both sides of center stiffener and twist one side clockwise and other side counter-clockwise, at same time forcing down and then up under ear on center stiffener. Lastly, bend all ears so they bear against new louvre.

Above method does not apply to bottom louvre or top grill panel. These parts require removal of grille assembly for replacement.

Replacing Domes

For easy replacement of domes, the front vertical top trim extrusion (29) should be removed. Before this extrusion can be removed, the top trim casting (32) must be removed, as also the screws holding this extrusion to the center trim casting (34) and the plastic retaining clips. The clips may be removed by lifting the rear (bent) end of the clip up and away from the extrusion retaining them. An offset screwdriver is ideal for this purpose. The new dome may be inserted through the front or rear door. Drive the plastic clips into position using a hammer and a wood block against the rear of the clips.

Mounting Auxiliary Amplifier

The method for mounting an auxiliary amplifier in the cabinet is shown in Fig. 7. The necessary holes are provided in the mechanism support shelf but the plastic shelf covering must be cut away from the holes.

Replacing Harness Assembly

Should removal of the harness assembly be necessary, the terminal box, turned on edge, will pass through the hole in the baffle on which it is mounted and the harness may be taken out of the front of the phonograph.

Replacing Color Tube Lamps

Each color tube lamp has near each of its ends a length of plastic tubing used to prevent the color tube end caps from rattling against the glass. These plastic tubes should be removed when the old lamp is replaced and placed on the new lamp If desired, new plastic tubes may be obtained from your AMI distributor, part number S-2131 F. For placing on the lamps, these tubes may be stretched mechanically. Alternately, they may be expanded by soaking for a few minutes in methyl-ethyl-ketone, until they may be slipped over the lamp ends and then allowed to dry in place. Lubricate, so that the color tubes will not squeak, by applying a small quantity of Aero Lubriplate on top of the plastic under the ears of the color tube end caps.

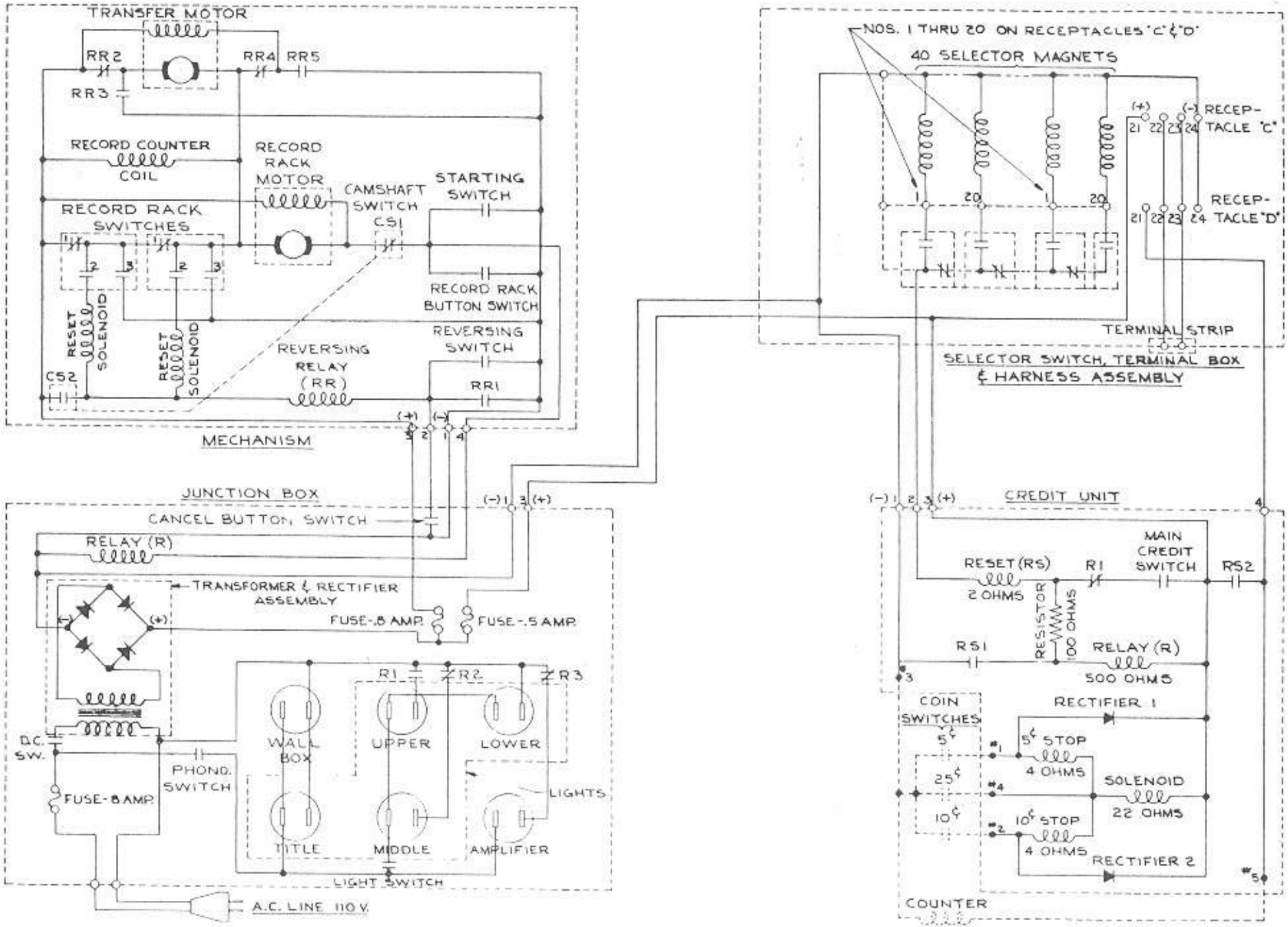


Fig. 15. Schematic Diagram - Selection, Credit, Junction Box and Mechanism Circuits

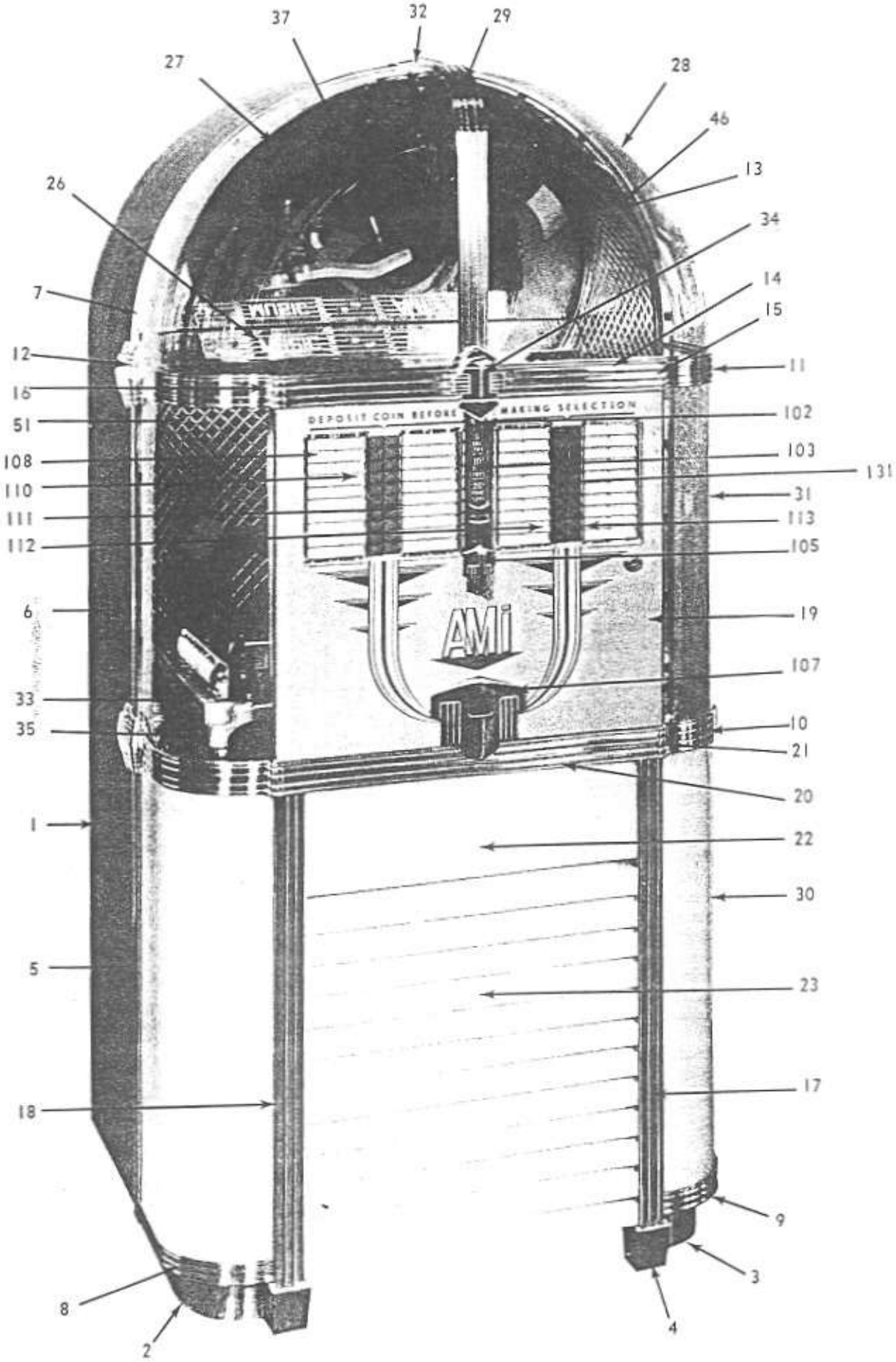
MODEL "C" SERVICE PARTS

Code No.	Part No.	Description
1	R-170	Shell - Model "C"
2	L-172	Base - Left Hand
3	L-173	Base - Right Hand
4	H-193	Trim - Base
5	H-172	Trim - Lower - Side
6	H-173	Trim - Center - Side
7	L-179	Trim - Top - Side Corner
8	H-177	Trim - L. H. Lower Corner
9	H-178	Trim - R. H. Lower Corner
10	H-174	Trim - Center - Horizontal
11	L-174	Trim - Top - Horizontal
12	L-176	Trim - Side Casting
13	F-1752	Extrusion - Trim Angle
14	H-183	Trim - Above Door
15	H-187	Hinge - Front Door - Upper R. H.
16	H-188	Hinge - Front Door Upper L. H.
17	H-184	Trim - Vertical Grille - R. H.
18	H-190	Trim - Vertical Grille - L. H.
19	L-202	Front Door Assembly (Includes No's 101 thru 132)
20	H-185	Trim - Below Door
21	H-189	Cap - Below Door Trim - Lower R.H.
22	L-188	Louvre - Grille - Top
23	H-206	Extrusion - Grille - Louvre
24	H-203	Covering - Interior Left Side
25	H-204	Covering - Interior Right Side
26	L-200	Mechanism Light Assembly
27	L-189	Dome L. H.
28	L-190	Dome R. H.
29	L-178	Trim - Top - Front - Vertical
30	H-208	Panel - Lower Plastic
31	H-202	Vision Panel - Plastic
32	F-1778	Trim - Top - Casting
33	R-200	Mechanism Assembly With Counter (Includes No's 248 thru 317)
34	H-171	Casting - Center Trim
35	H-200	Cover - Shelf
36	L-201	Baffle Board Assembly
37	L-192	Mirror
38	R-178	Junction Box Assy. (Incl. No's 84 thru 96)
39	H-168	Volume Control Box Assembly (Includes No's 97 thru 100)
40	R-88	Amplifier (Includes No's 178 thru 247)
41	H-207	Blind - Side
42	H-217	Cash Box Assembly
43	S-2131B	Insulating Tubing
44	L-187	Baffle Extension
45	F-1754	Clip - Plastic Retaining
46	F-1716	Spring Clip
47	F-1722	Hinge Assembly - Front Door
48	F-161	Spring
49	S-600N	Fluorescent Lamp
50	S-800A	Fluorescent Starter
51	F-1779	Covering - Interior - Back Door
52	H-170	Door - Color Light
53	F-1788	Bumper - Phono.
54	F-1631	Caster
55	L-199	Dome Light Assembly (Includes 58 thru 65)
56	F-1759	Bracket - Lampholder
57	S-604C	Lamp - Global
58	H-211	Shield - Dome Light
59	F-1759	Bracket - Lampholder
60	F-1758	Bracket - Spacer
61	F-1780	Bracket - Mounting
62	H-213	Color Screen - Dome
63	F-763	Socket - Showcase Lamp
64	S-604B	Lamp - Global
65	H-225	Top Light Assembly (Includes No's 56 and 63)
66	H-222	Light Reflector & Decal
67	F-1733	Bracket - Lamp Socket
68	F-790	Lamp Holder - Fluorescent Lamp
69	F-295	Starter Socket
70	F-291	Ballast
71	L-171	Baffle Board
72	F-1711	Bracket - Lampholder
73	F-292	Lampholder - Fluorescent
74	S-600H	Fluorescent Lamp
75	F-1240	Ballast
76	R-181	Permanent Magnet Speaker & Cable Assembly
77	S-600L	Fluorescent Lamp
78	L-1508	End Cap & Color Tube Assembly
79	F-1712	Bracket - Color Light Motor
80	H-224	Motor - Clockwise
81	F-1802	Pinion - Lower
82	F-1803	Sleeve - Pinion
83	H-223	Motor - Counter Clockwise
84	L-196	Junction Box With Lettering
85	F-861	Thermal Fuse Holder
86	S-721A	Fusetron (1/2 Amp.)
87	S-721B	Fusetron (8/10 Amp.)
88	S-720B	Cartridge Fuse (8 Amps.)
89	F-112	Miniature Socket (4 Contact)
90	F-235	Toggle Switch S.P.S.T.
91	F-116	Pushbutton Switch
92	F-541	Terminal Strip
93	H-80	Duplex Receptacle
94	F-1767	Relay
95	L-13	Transformer & Rectifier Assembly
96	F-117	Shielded Plug (4 Contact)
97	F-1670	Potentiometer
98	F-1799	Knob - Volume Control
99	H-717	Box - Volume Control
100	F-719	Bracket - Volume Control
101	L-209	Door - Decorative
102	L-175	Coin Inlet
103	H-198	Panel - Program
104	F-1739	Cover - Coin Inlet Chute
105	H-176	Knob - Actuating - Slug Rejector
106	F-1710	Lever - Actuating
107	L-177	Slug Cup
108	H-205	Window - Title Rack
109	F-1771	Spring - Title Rack
110	F-1772	Strip - Title Numbers 1 to 10
111	F-1773	Strip - Title Numbers 11 to 20
112	F-1774	Strip - Title Numbers 21 to 30
113	F-1775	Strip - Title Numbers 31 to 40
114	S-1610F	Cylinder Lock - Common Keying
115	F-1726	Coin Chute Assembly
116	F-1782	Clip - Curtain
117	R-93	Credit Unit (Includes No's 133 thru 155 and No's 89 &206)

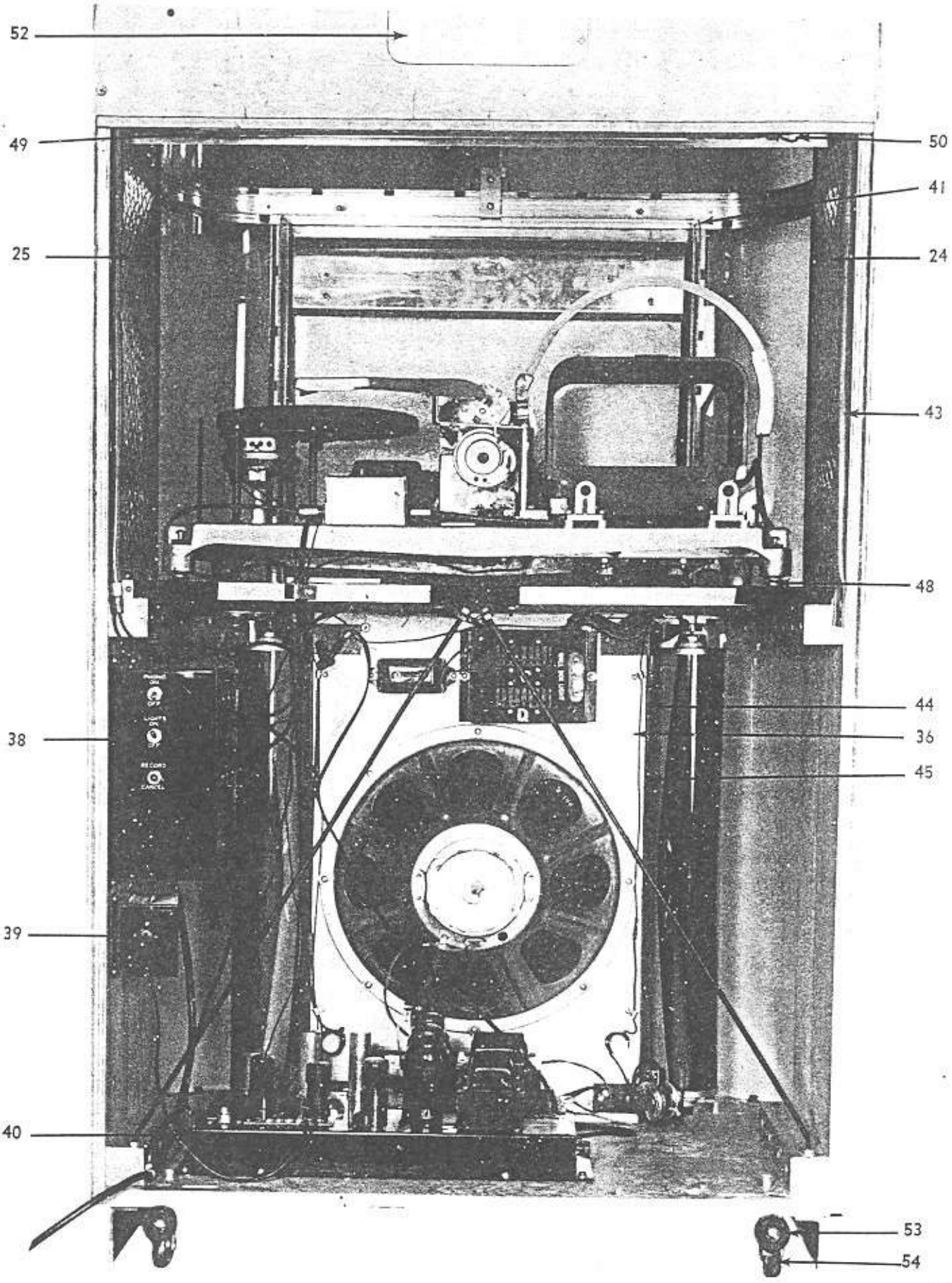
Code No.	Part No.	Description
118	L-194	Rack - Title Strip
119	H-175	Hinge - Slug Rejector
120	F-1755	Wing Nut
121	H-40	Slug Rejector
122	H-119	Coin Switch
123	F-120	Miniature Socket (5 Contact)
124	F-1744	Counter - Total Selections
125	F-1618	Solenoid Assembly
126	F-1743	Bracket - Solenoid (Counter)
127	F-1439	Plunger - Solenoid
128	F-1609	Pin - Clevis
129	F-1257	Hairpin - Clip
130	F-1742	Lever - Actuating (Counter)
131	R-175	Selector Switch, Terminal Box and Harness Assembly (Includes No's 92, 156 & 157 and No's 159 thru 166)
132	H-215	Title Light Shield Assembly (Includes No's 174 thru 177 and No's 67, 68 & 69)
133	L-103	Frame (Credit Unit)
134	F-1430	Assembly of 5¢, 10¢ & 25¢ Stops
135	F-1404	Tension Spring
136	F-1427	5¢ & 10¢ Plunger
137	F-1429	Return Spring - 5¢ & 10¢ Plungers
138	S-1430A	Retainer Ring
139	F-1402	Credit Wheel
140	F-1403	Shaft - Ratchet Wheel
141	F-1446	Escapement & Shaft Assembly
142	F-1618	Solenoid Assembly
143	F-1412	Pawl Operating Plunger
144	F-1434	Main Credit Switch Assembly
145	F-1435	Reset Switch Assembly
146	F-1691	Reset Magnet
147	F-1419	Escapement Adjustment
148	F-1431	Spring Holder & Frame Stiffener
149	F-1219	Rectifier
150	F-1619	Relay
151	F-1638	Spacer - Mounting
152	F-1633	Rubber Mount
153	F-1642	Pawl & Pawl Lever Assembly
154	F-251	Grommet
155	F-287	Miniature Plug (5 Contact)
156	H-65	Terminal Box
157	F-228	Receptacle (24 Contact)
158	F-1503	Receptacle - 2 Pole
159	F-708	Ballast
160	R-179	Harness Assembly
161	F-826	Grommet
162	F-287	Plug (5 Contact)
163	F-119	Plug (6 Contact)
164	F-118	Plug (4 Contact)
165	F-115	Plug Cap (2 Contact)
166	L-191	Pushbutton Switch Bank Assembly (Includes No's 168 thru 173)
167	L-181	Frame
168	L-197	Plate Assembly
169	H-221	Clamping Strip Assembly
170	F-1728	Pushbutton Assembly
171	F-1729	Compression Spring
172	F-1770	Contact Spring Assembly
173	F-1760	Solder Lug
174	H-194	Reflector - Light
175	F-1732	Bracket - Reflector
176	H-228	Curtain Assembly - Front Door
177	F-1776	Bar - Curtain Support
178	L-135	Amplifier Chassis With Lettering
179	L-36	Bottom Cover
180	F-262	Terminal Strip
181	F-266	Terminal Strip
182	F-267	Octal Socket
183	F-1292	Capacitor (40 Mfd) (450 Volts) (15 Mfd) (450 Volts)
184	F-1685	Capacitor (15 Mfd) (450 Volts) (10 Mfd) (450 Volts) (20 Mfd) (150 Volts)
185	F-1686	Capacitor (20 Mfd) (150 Volts) (20 Mfd) (150 Volts)
186	F-1667	Octal Socket
187	F-1668	Grommet
188	F-255	Relay
189	F-1692	Tube Slug
190	F-1671	Switch
191	F-1249	Knob
192	S-720A	Cartridge Fuse (2 Amps)
193	L-136	Transformer - Output
194	L-137	Transformer - Power
195	F-1689	Speaker Connection Chart
196	F-273	6SN7-GT Tube
197	F-1687	6SA7 Tube
198	F-1688	6N7-GT Tube
199	F-1072	6L6-G Tube
200	F-195	5U4-G Tube
201	S-102U	Resistor (18 ohms) (1/2 watt)
202	S-102F	Resistor (1 Meg ohms) (1/2 watt)
203	S-102H	Resistor (1800 ohms) (1/2 watt)
204	S-102K	Resistor (470,000 ohms) (1/2 watt)
205	S-104P	Resistor (2,700 ohms) (1/2 watt)
206	S-103D	Resistor (100 ohms) (1 watt)
207	S-103A	Resistor (1,200 ohms) (1 watt)
208	S-105A	Resistor (680 ohms) (2 watt)
209	S-110C	Resistor (150 ohms) (5 watt)
210	S-110D	Resistor (10,000 ohms) (5 watt)
211	S-210B	Capacitor (.002 mfd) (400 volts)
212	S-210E	Capacitor (.005 mfd) (400 volts)
213	S-210P	Capacitor (.05 mfd) (400 volts)
214	S-210L	Capacitor (.01 mfd) (400 volts)
215	S-210J	Capacitor (.003 mfd) (400 volts)
216	S-210R	Capacitor (.5 mfd) (200 volts)
217	S-200D	Capacitor (.0008 mfd) (500 volts)
218	H-72	Terminal Panel
219	S-104B	Resistor (470 ohms) (1/2 watt)
220	S-104C	Resistor (560 ohms) (1/2 watt)
221	S-104F	Resistor (1,800 ohms) (1/2 watt)
222	S-102J	Resistor (2,200 ohms) (1/2 watt)
223	S-104G	Resistor (3,900 ohms) (1/2 watt)
224	S-104J	Resistor (8,200 ohms) (1/2 watt)
225	S-104K	Resistor (22,000 ohms) (1/2 watt)
226	S-102A	Resistor (47,000 ohms) (1/2 watt)
227	S-104L	Resistor (68,000 ohms) (1/2 watt)
228	S-102G	Resistor (220,000 ohms) (1/2 watt)
229	S-102L	Resistor (330,000 ohms) (1/2 watt)
230	S-102D	Resistor (2.2 Meg ohms) (1/2 watt)
231	S-102M	Resistor (10,000 ohms) (1/2 watt)

Code No.	Part No.	Description
232	S-104R	Resistor (6,800 ohms) (1/2 watt)
233	S-102B	Resistor (150,000 ohms) (1/2 watt)
234	S-103E	Resistor (56,000 ohms) (1 watt)
235	S-110B	Resistor (6,000 ohms) (5 watt)
236	S-105B	Resistor (10,000 ohms) (2 watt)
237	S-105C	Resistor (15,000 ohms) (2 watt)
238	S-105D	Resistor (33,000 ohms) (2 watt)
239	S-210F	Capacitor (.001 mfd) (400 volts)
240	S-210K	Capacitor (.004 mfd) (400 volts)
241	S-210S	Capacitor (.5 mfd) (400 volts)
242	S-200C	Capacitor (.0005 mfd) (400 volts)
243	S-210N	Capacitor (.01 mfd) (600 volts)
244	F-1693	Capacitor (10 mfd) (25 volts)
245	F-1683	Diode (Germanium) Type IN34
246	F-1285	Adaptor Plate
247	F-1684	Terminal Strip
248	H-45	Base & Locating Pins Assembly
249	H-147	Record Rack End Plate Assembly for Counter (Includes No's 250 thru 263)
250	F-198	Trip Lever Assembly
251	F-1257	Hairpin Clip
252	H-15	Reset Lever - R. H.
253	H-16	Reset Lever - L. H.
254	F-1609	Pin Clevis
255	F-31	Switch & Lever Mounting Plate
256	F-30	Switch Mounting Bracket
257	F-103	Switch (Record Rack)
258	F-1618	Solenoid Assembly
259	F-1439	Plunger (Reset Solenoid)
260	H-87	End Plate & Studs Assembly
261	F-1565	Cover Mounting Bracket
262	F-447	Cable & Plug Assembly
263	F-224	Coil & Bracket Assembly
264	H-63	Drive Arm (Record Rack)
265	H-57	Counter Lever (Record Counter)
266	F-225	Tension Spring (Counter Lever)
267	L-61	Selector Assembly (Includes No's 268 & 269)
268	F-264	Spring
269	L-47	Selector Magnet Bank
270	F-16	Guide Rod
271	H-13	Guide Rod Bracket
272	H-14	Guide Rod Bracket (Slotted)
273	L-9	Transfer Assembly (Includes No's 274 thru 287)
274	L-7	Transfer Housing With Pins & Bushing Assembly
275	F-18	Inner Shoe
276	F-20	Spring (Inner Shoe)
277	L-29	Transfer Arm & Outer Shoe Assembly
278	F-69	Trunnion Bearing With Pin Assembly
279	F-85	Record Release Cam & Plug Assembly
280	F-21	Retaining Pin (Inner Shoe)
281	H-34	Toggle Pin Unit Assembly
282	H-18	Gear (Record Release Cam)
283	H-19	Drive Gear (Trunnion)
284	F-52	Driven Sprocket
285	H-25	Cam, Shaft & Gear Assembly
286	F-249	Transfer Cam & Sleeve
287	F-47	Record Rack Idler Sprocket & Bushing Assembly
288	F-48	Record Rack Drive Sprocket
289	F-53	Drive Sprocket (Camshaft)
290	L-48	Gear Motor
291	F-54	Drive Chain (Camshaft)
292	F-43	Drive Chain & Pin (Record Rack Assembly)
293	F-149	Transfer Arm Support Assembly
294	F-42	Transfer Arm Stop
295	H-50	Cover (End Plate)
296	L-25	Mechanism Junction Box Assembly (Includes No's 297 thru 299 & 89)
297	F-116	Pushbutton Switch
298	F-113	Miniature Plug (4 Contact)
299	F-107	Relay (Reversing Control)
300	L-23	Turntable & Motor (Includes No.301)
301	L-27	Turntable
302	F-181	Starting Switch, Cable & Plug Assy.
303	H-44	Camshaft Switch, Cable, Plug & Bracket Assembly (Includes No's 304 and 305)
304	F-104	Switch (Camshaft)
305	F-80	Lever Assembly
306	F-179	Reversing Switch, Cable & Plug Assembly (Includes No. 318)
307	H-169	Pickup Arm Assembly (Includes No's 308 thru 311)
308	F-1673	Cartridge - Crystal Pickup (Includes No. 309 or No. 310)
309	F-1694	Needle - Precious Metal Tip
310	F-1695	Needle - Sapphire Tip (Optional)
311	F-1696	Pickup Arm Cable Assembly
312	H-61	Pickup Arm Mounting Assembly (Includes No's 313 & 314)
313	F-172	Hinge Clip & Mounting Bracket Assy.
314	H-22	Pivot Bearing
315	L-30	Counter Assembly
316	H-59	Counter Wheel Identifying Strip
317	F-213	Tension Spring
318	F-105	Reversing Switch
319	F-66	Reversing Switch Lever Weight

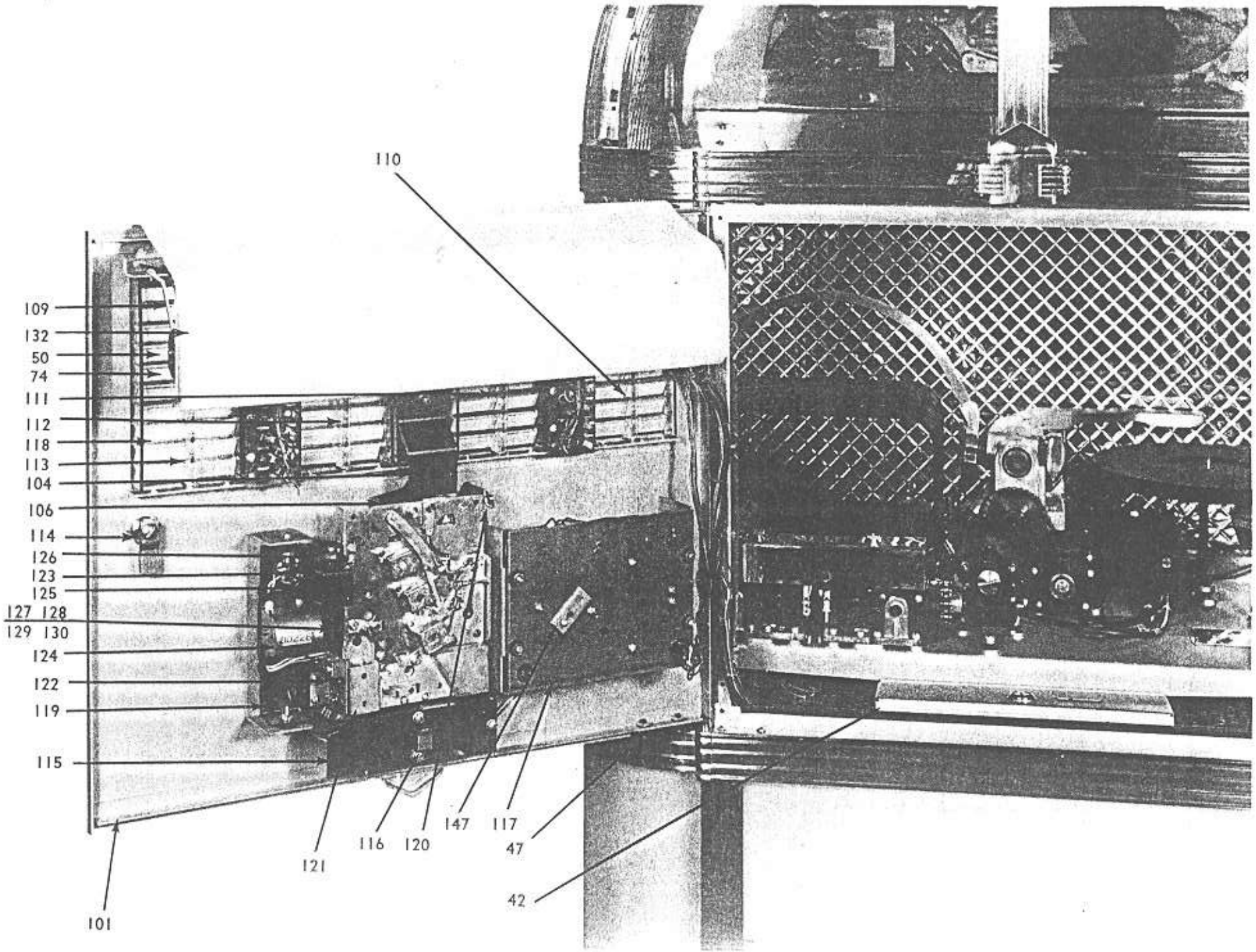
Model "C" Phonograph - Front View



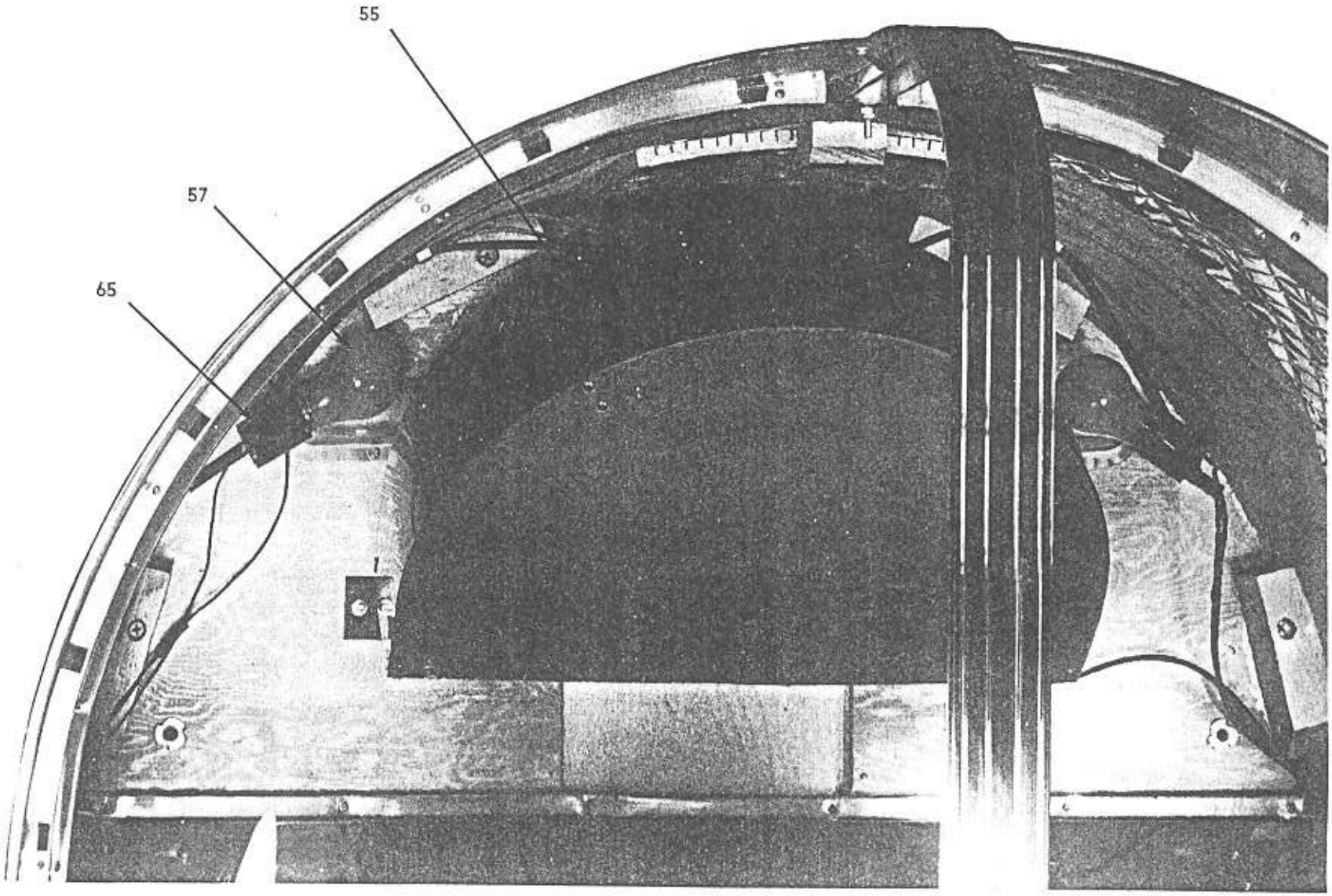
Model "C" Phonograph - Rear View



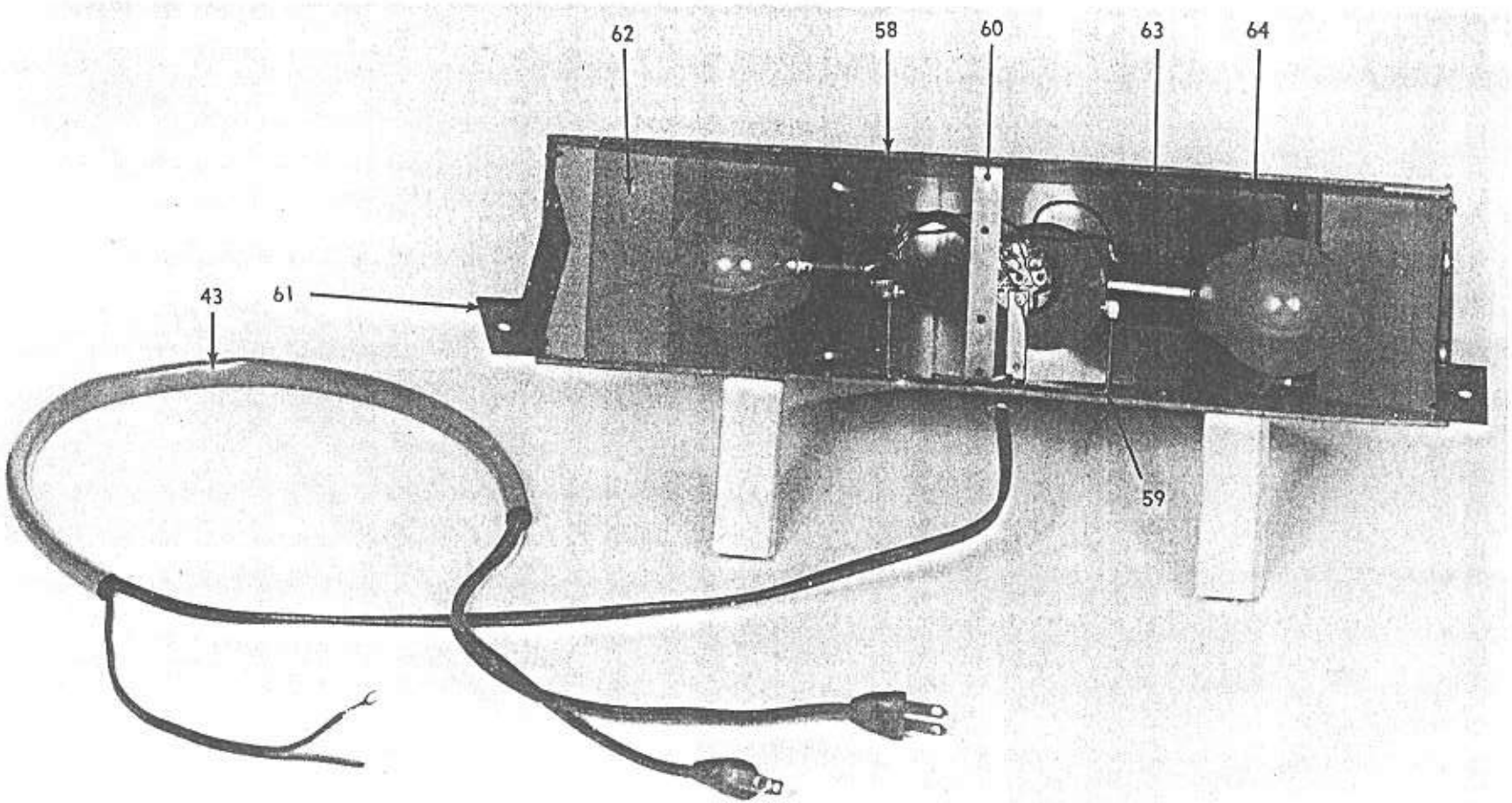
Model "C" Phonograph - Front Door Open



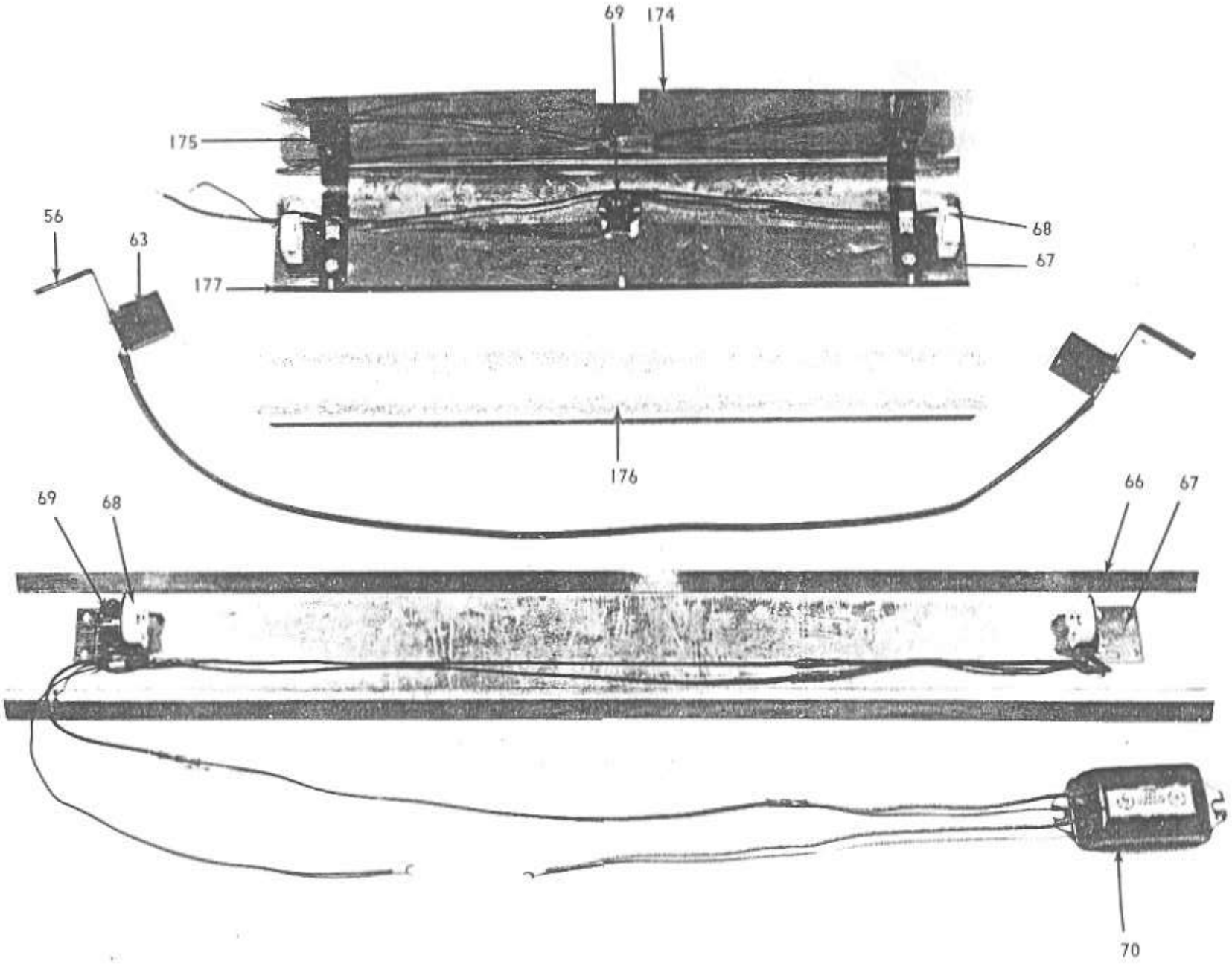
Model "C" Phonograph - Mirror Removed



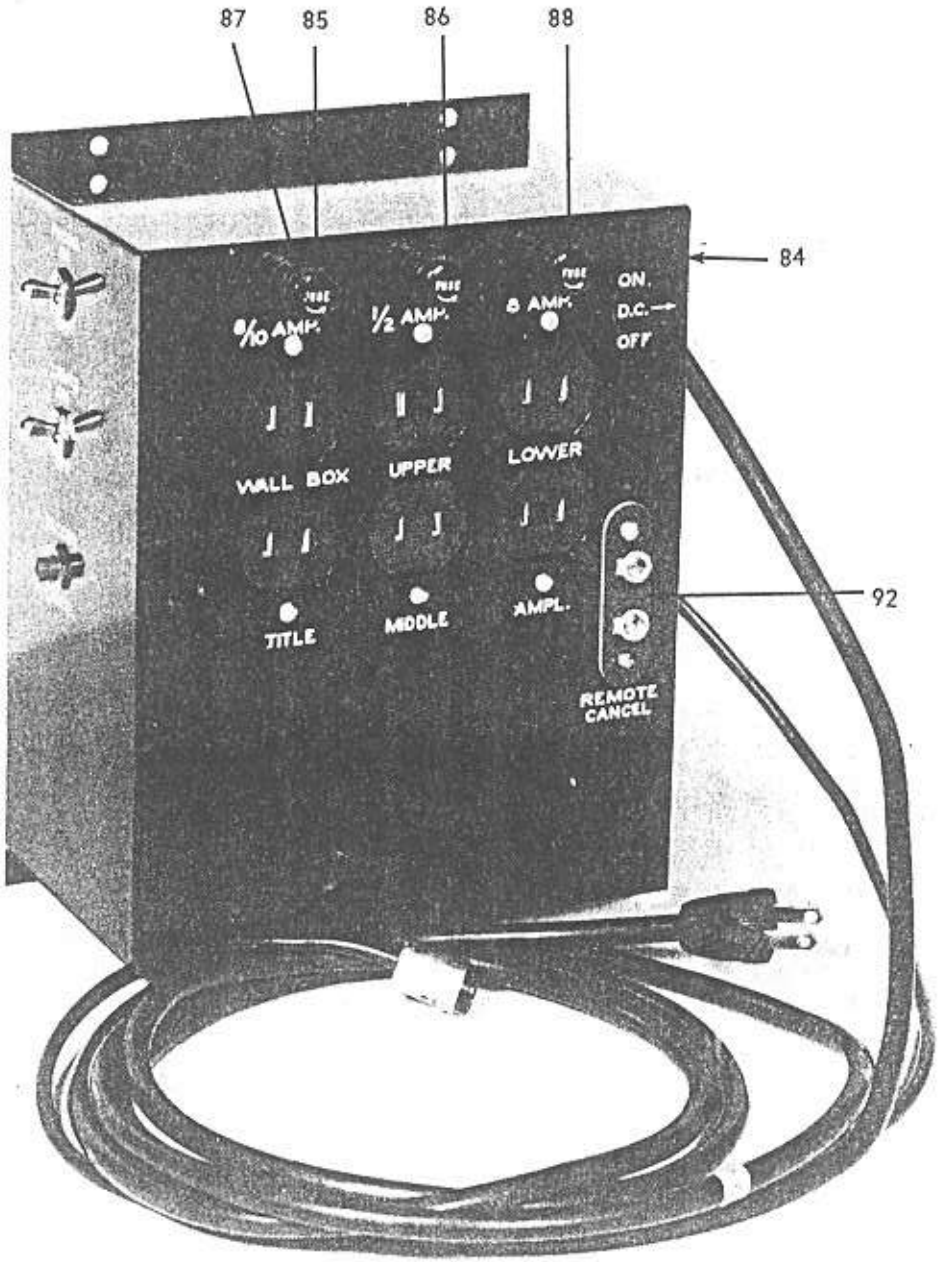
Dome Light Assembly



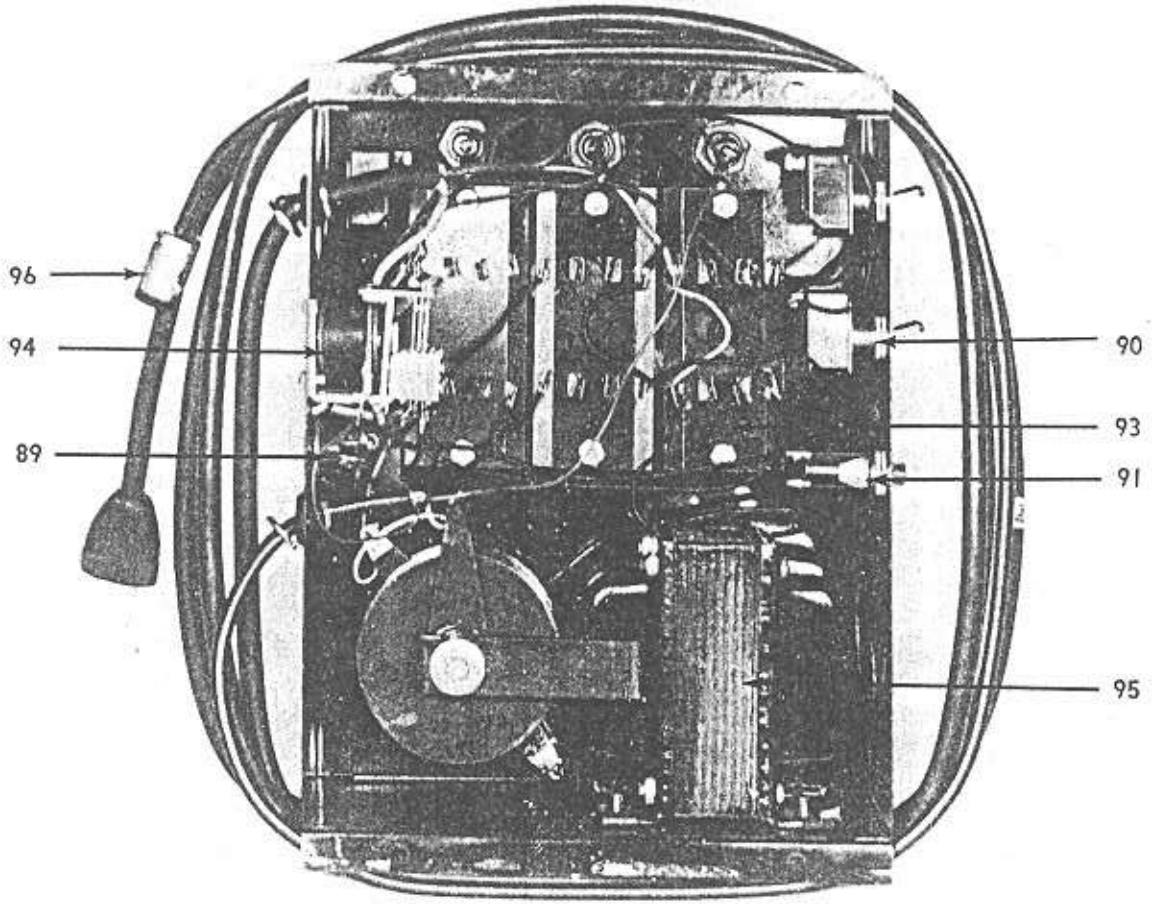
Title & Mechanism Light Assemblies



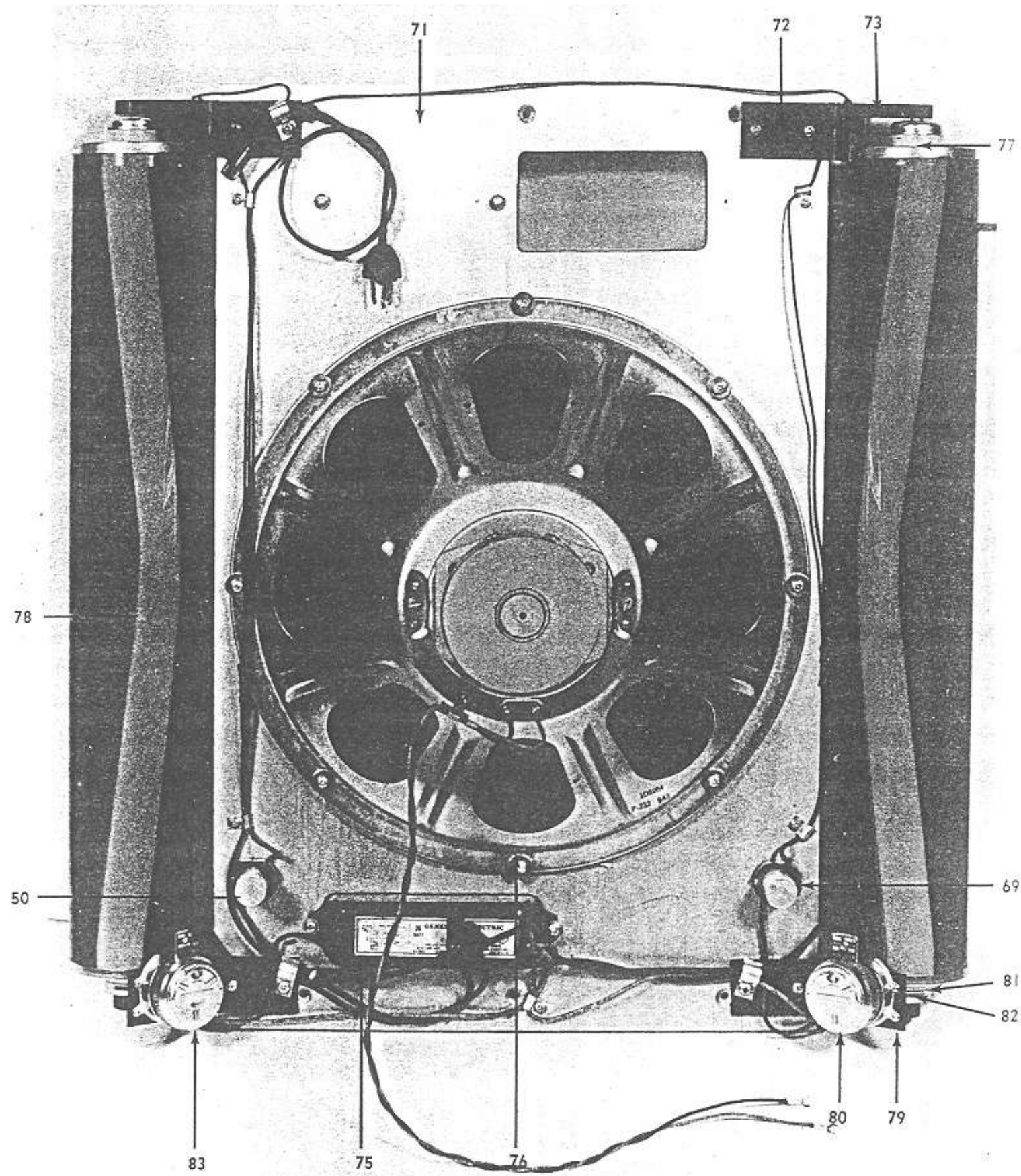
Junction Box - Front View



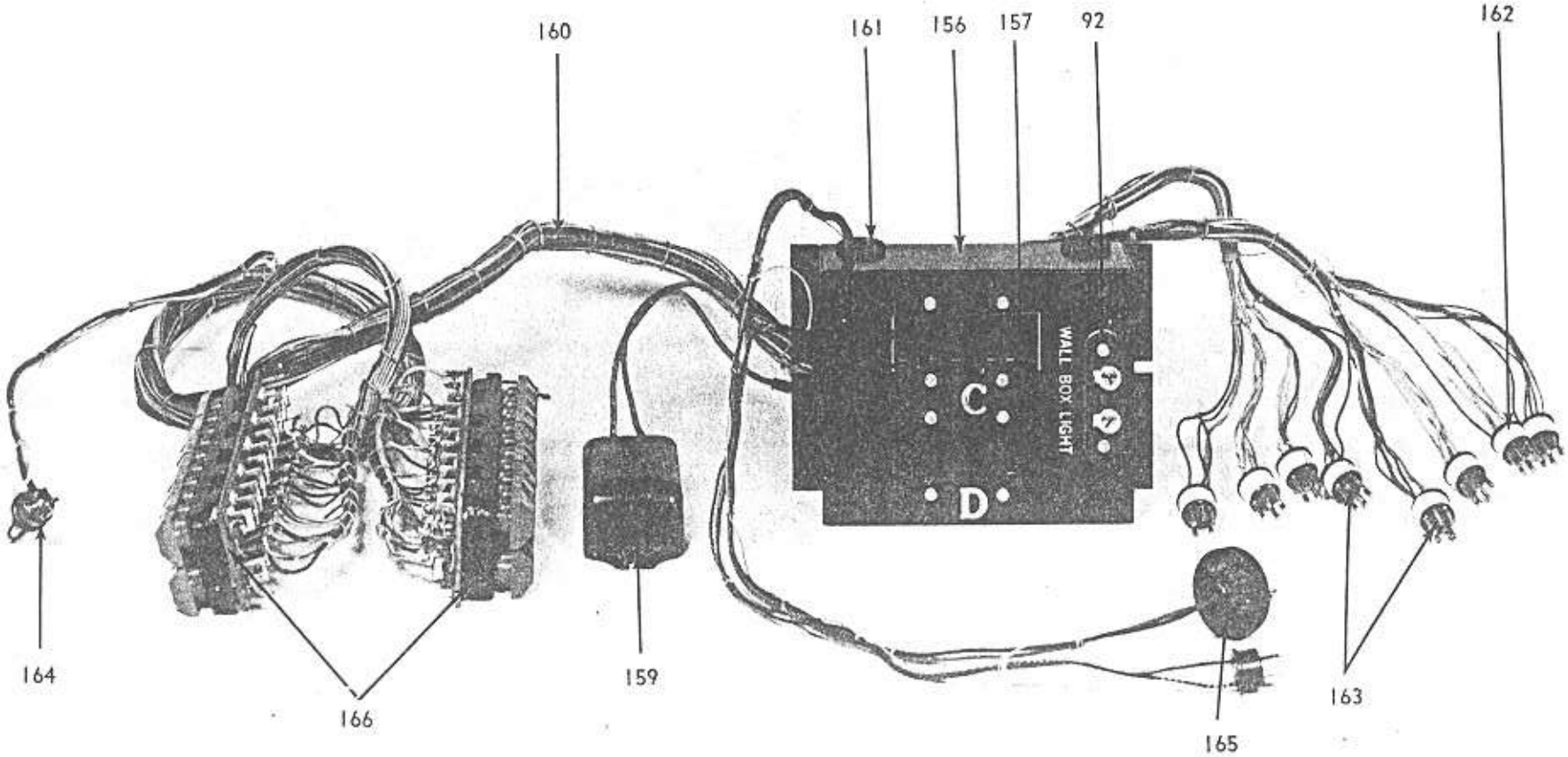
Junction Box - Rear View



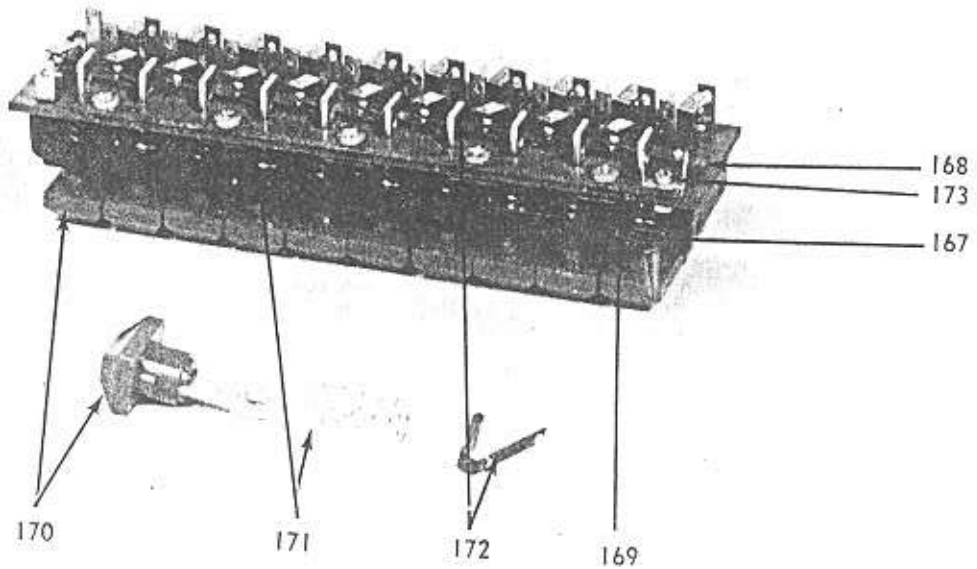
Baffle Board Assembly



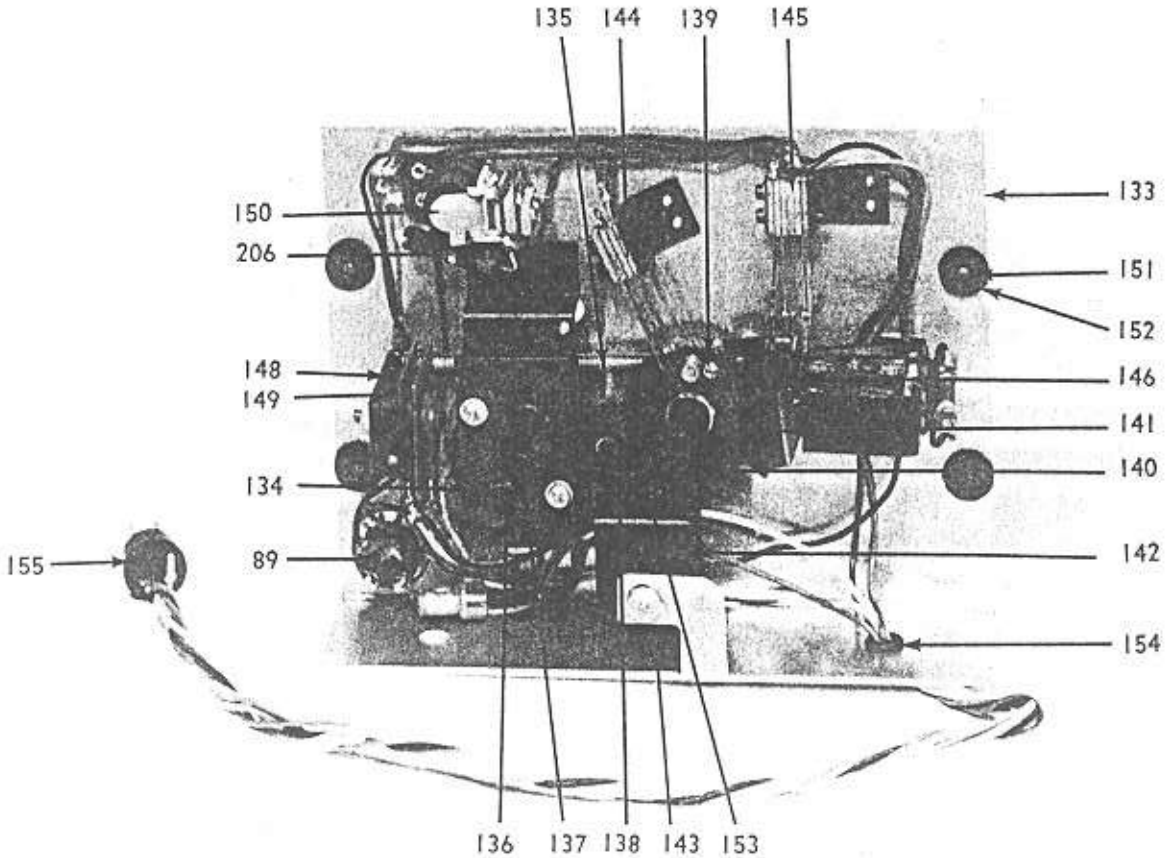
Selector Switch, Terminal Box and Harness Assembly



Pushbutton Switch Bank Assembly



Credit Unit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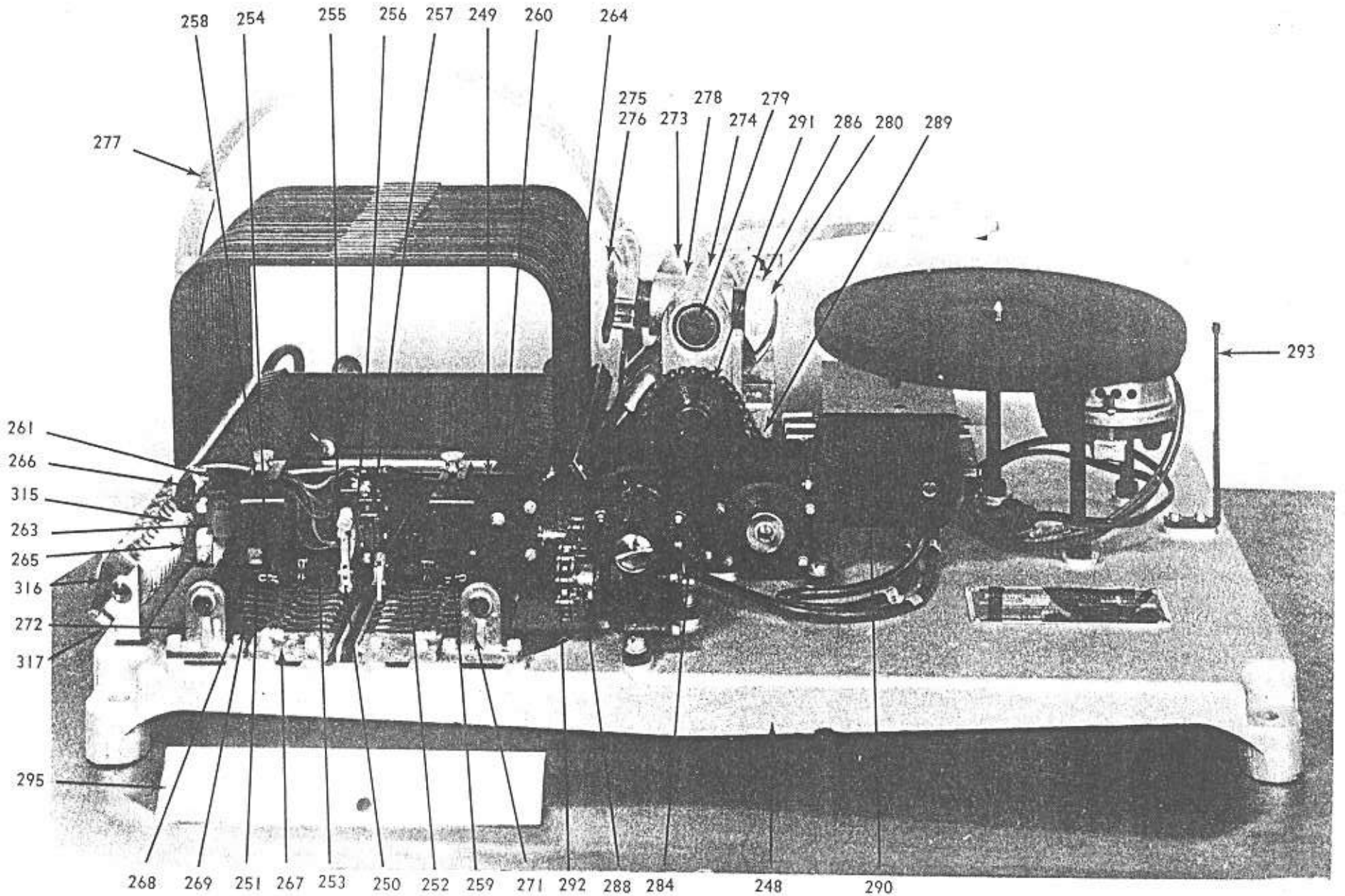
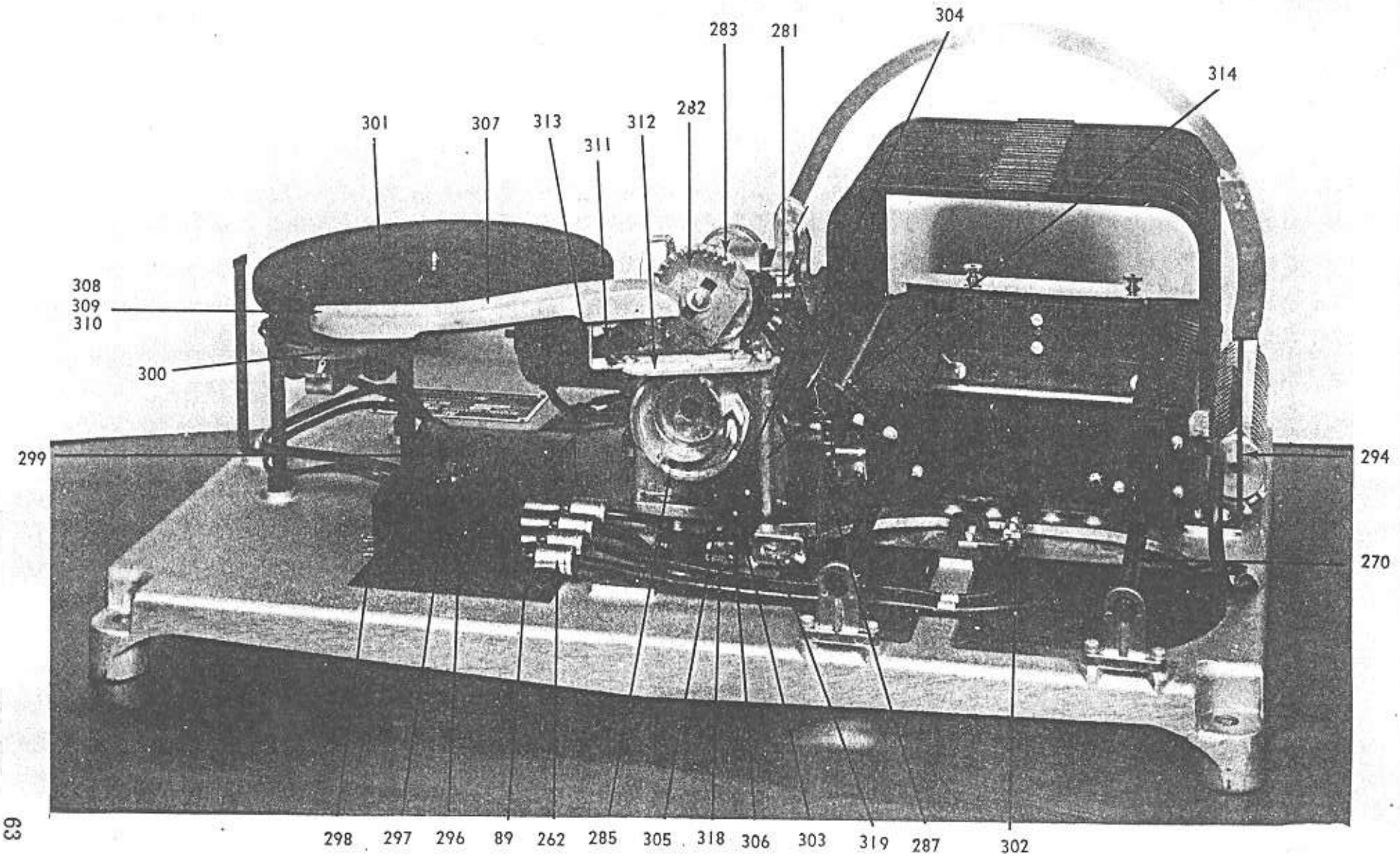
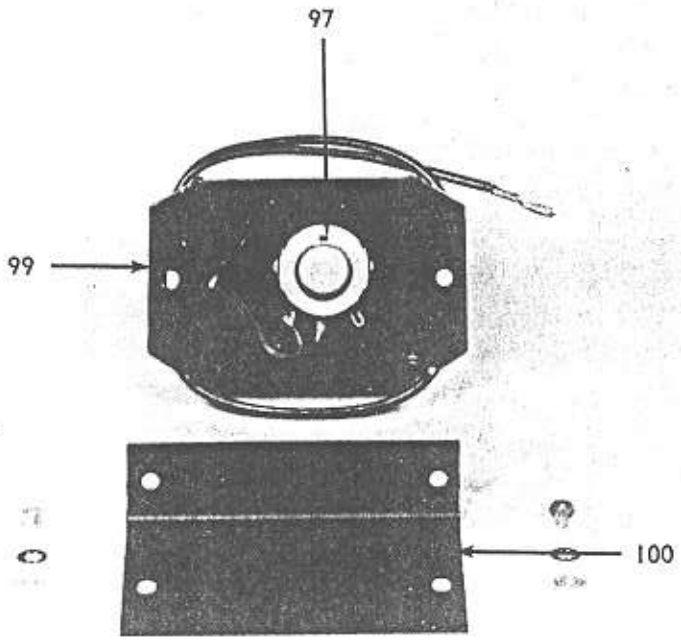
Record Changer Mechanism - Front View

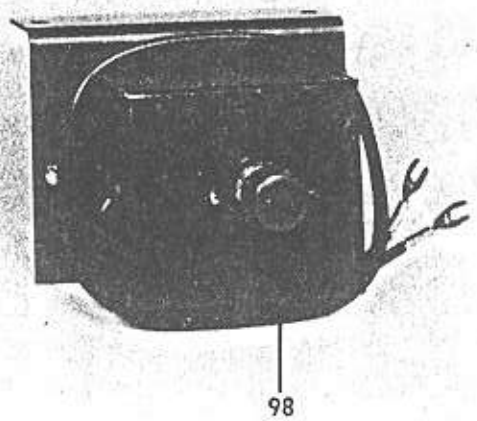


Record Changer Mechanism - Rear View

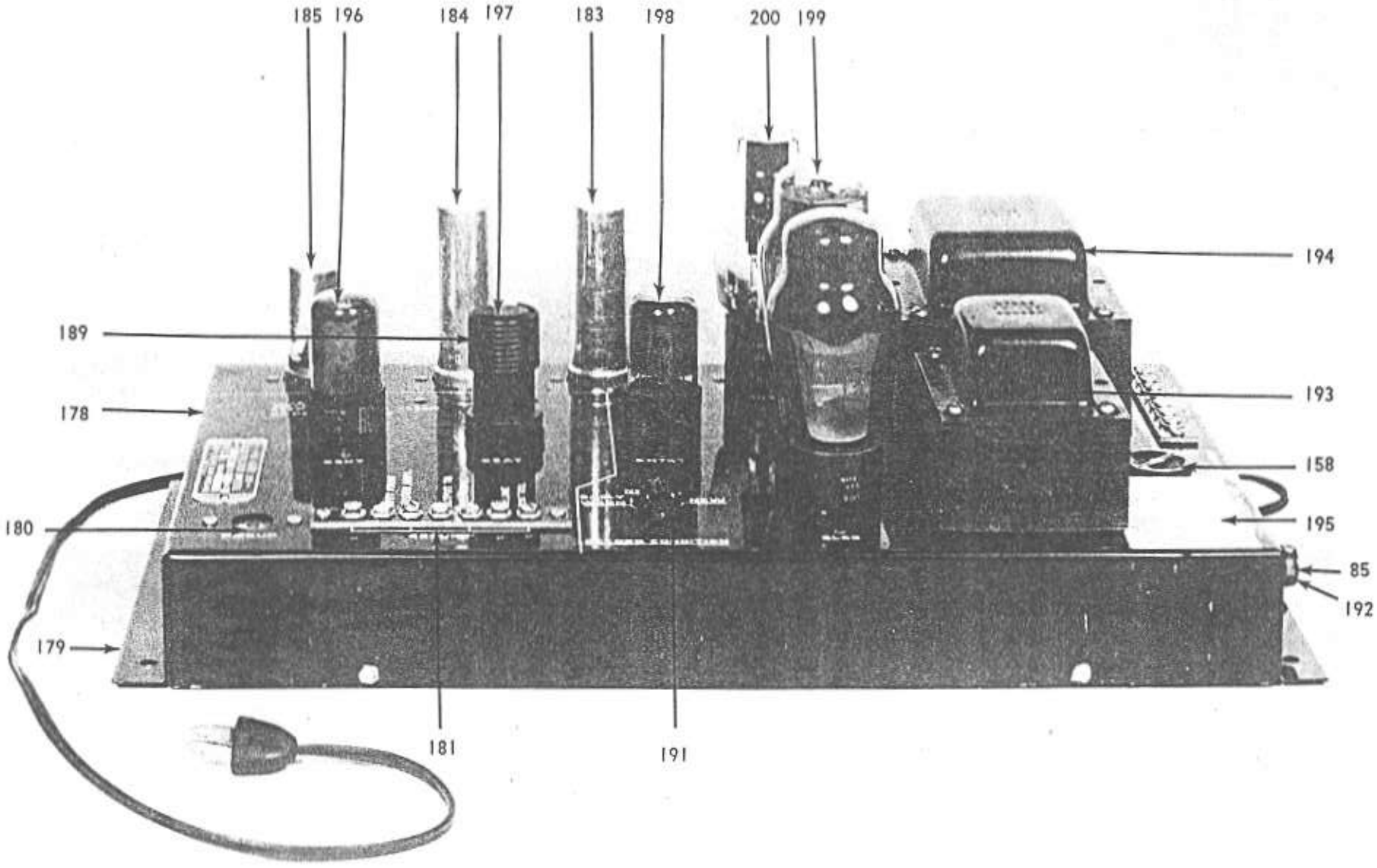


Volume Control Box Assembly





Amplifier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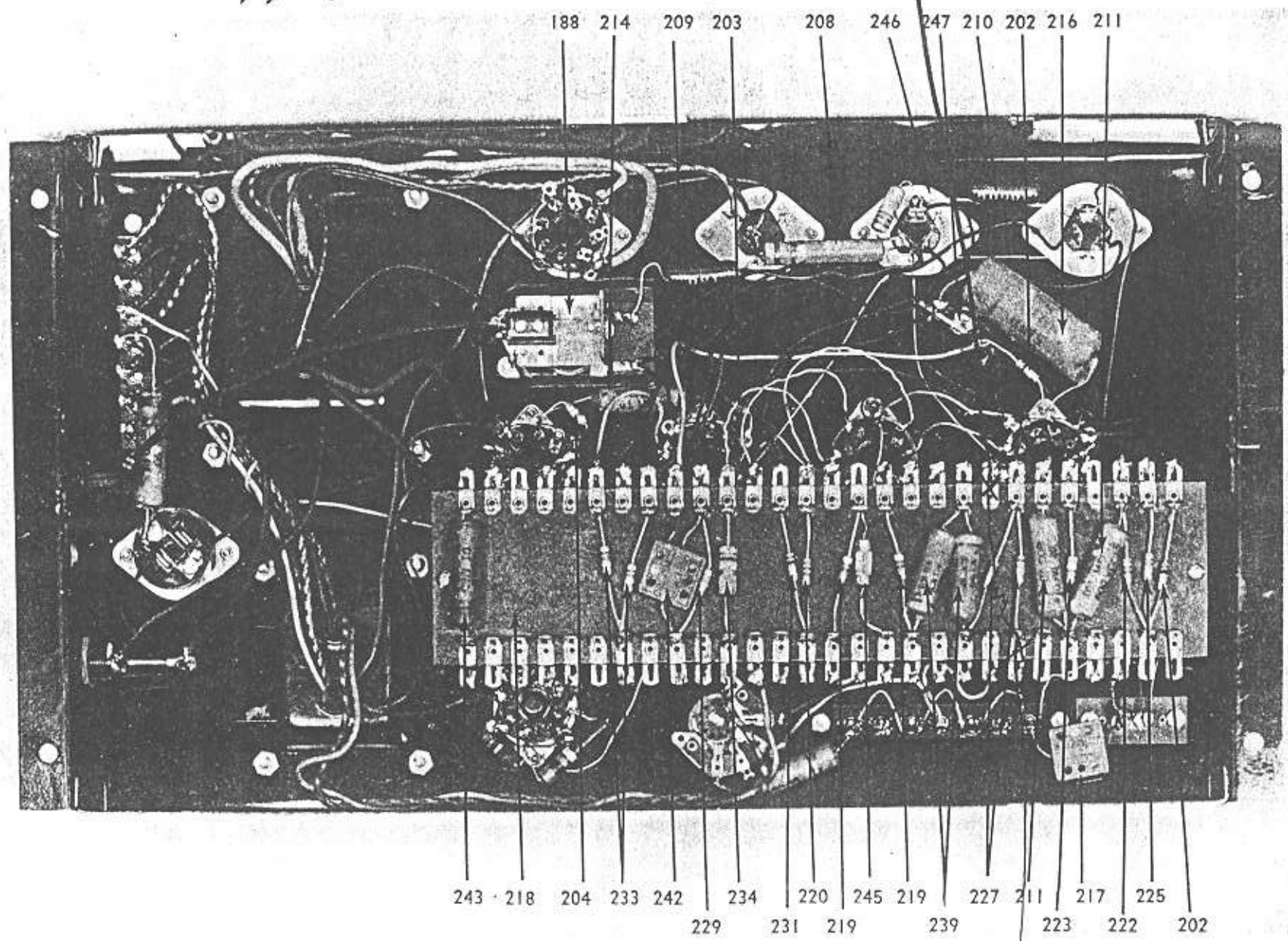
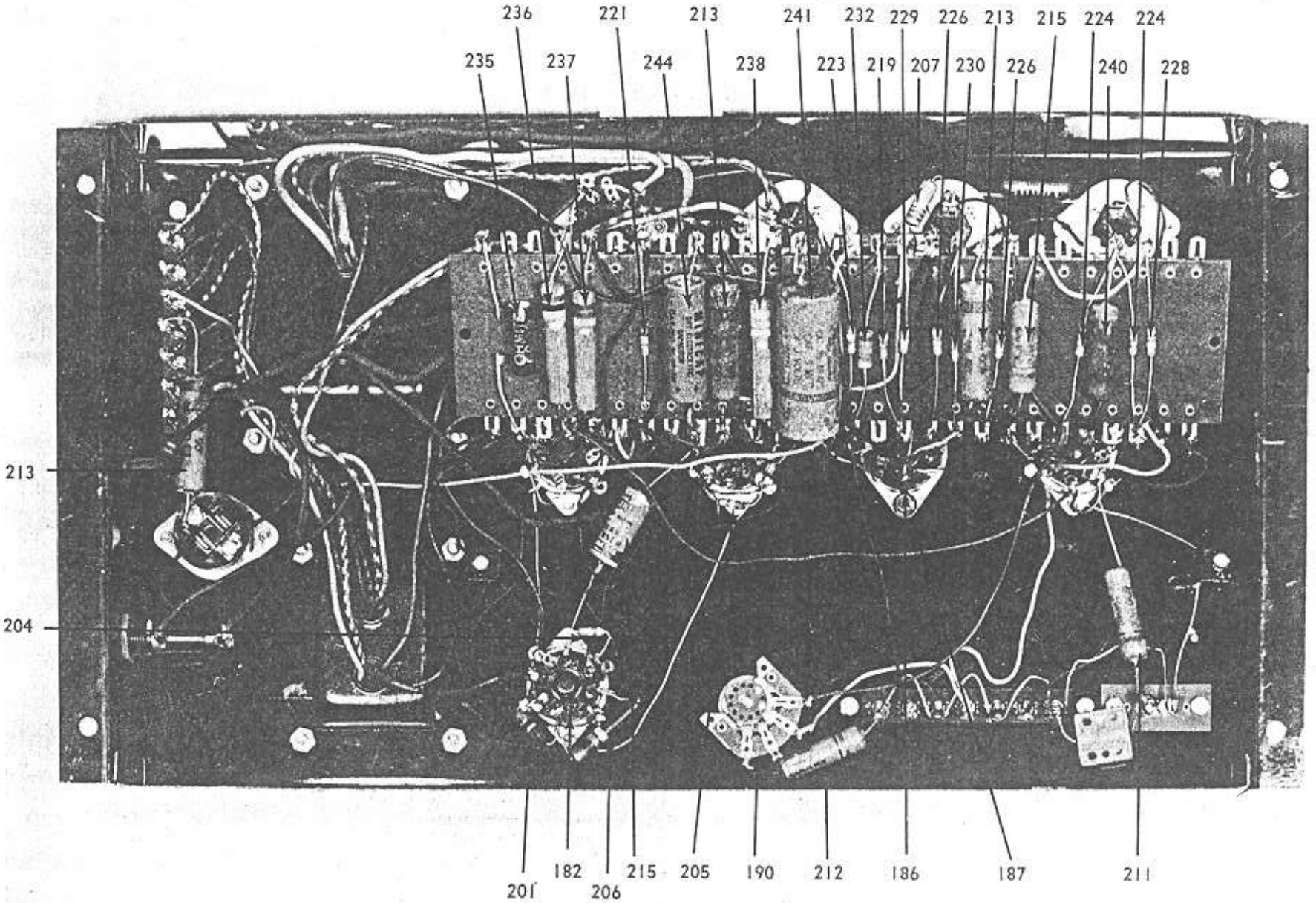
Amplifier - With Cover Removed



Amplifier - With Cover Removed and Terminal Panel Turned Over



TROUBLE SHOOTING CHART

Complaint	Symptom	Cause	Remedy
Instrument will not operate or light up.	Instrument inoperative.	8 amp. fuse blown.	Replace fuse.
		Broken line connection.	Trace wiring from power supply to Junction Box. Make sure instrument receives the 110 AC supply.
8/10 Amp fusetron blown.	Mechanism inoperative, turntable, amplifier and Rainbow Unit Motors operate.	Cam shaft Switch out of adjustment	See Section on cam shaft switch adjustment.
		End of transfer arm caught behind the transfer arm rest.	Bend transfer arm rest slightly outward.
		Shorted record rack motor.	Replace motor.
		Short in transfer motor or mechanism circuit.	Replace motor or remove short from mechanism circuit.
		Open in transfer motor or its circuit.	Replace motor or repair open in circuit.
8/10 Amp. fusetron blown, mechanism in playing position.	Mechanism inoperative, turntable, amplifier and Rainbow Unit Motors operate.	Cam shaft switch out of adjustment.	See section - cam shaft switch adjustment.
		Record rack switches not operating correctly.	See section - record rack switch adjustment.
		Short in D. C. Motor or mechanism circuit.	Replace motors or remove short from mechanism circuit
1/2 Amp. fusetron blown.	No credits can be registered or selections made.	Trip lever on one of the coin trip switches remains in operated position.	Remove coin from trip lever. See that lever operates freely. Line up slots in coin switch with coin selector slots.
		Credit and selection circuit shorted or grounded.	Check circuit with an ohmmeter.
No plays for coin.	Credit unit does not register any coin.	1/2 Amp. fusetron blown.	See complaint - 1/2 Amp. fusetron blown.
		Credit wheel does not revolve.	Check credit wheel for binding or a defective spring.
		Credit solenoid does not operate.	Check common line to coin trip switches and credit solenoid. See if plug is in socket at credit unit and junction box.
	Credit unit registers coin but no selection can be made.	Main credit switch does not complete circuit.	Adjust main credit switch to make contact as soon as the post on back of credit wheel moves away from switch.
		Credit unit relay contacts not closed.	Adjust relay contacts.
	Credits lost but no selection made.	Selector fingers do not trip.	Check input voltage. Check selector assembly springs.

TROUBLE SHOOTING CHART (Continued)

Complaint	Sympton	Cause	Remedy
No plays for coin.	Selector fingers trip but mechanism does not start.	Starting switch does not make contact.	Adjust starting switch.
		8/10 Amp. fusetron blown.	See section 8/10 Amp. fusetron blown.
		Record rack motor won't run.	Check Mechanism Junction Box for a short or open circuit and check contacts of the Reversing Control Relay therein.
	More than one credit removed and only one selection made.	Escapement in credit unit not operating.	Adjust escapement.
	All or some of the selector buttons dead.	Series circuit through selector switches open.	Check for selector switch sticking in operated position. Check for loose connection or an open circuit, in series circuit through selector switches back to rectifier.
Selections can be made without coins being inserted.	Selection made and no credits removed.	Credit wheel does not reset.	Check reset magnet to see if operative. Check escapement adjustment.
	All credits removed and selections can still be made.	Main credit switch remains closed.	Adjust main credit switch so that the post on credit wheel will open switch when all credits are removed.
Transfer arm does not pick up records from the rack.	Mechanism in playing position - no record on turntable.	Inner shoe stuck in hub of transfer arm.	Clean bearing surfaces.
Transfer arm does not pick up records from turntable.	Two records on turntable or records not placed back on rack.	Transfer arm bent.	Correct arm.
		Lubricant stiff or gummy.	Place 4 or 5 drops of sewing machine oil on bearing surfaces of Transfer Unit.
		Inner shoe sticks in hub of Transfer arm.	Clean bearing surfaces.
		Outer shoe sticking on rubber bumper of transfer arm support.	Eliminate stickiness.
Transfer arm does not grip records properly.	Record not gripped properly when removed from rack.	Record rack does not stop in correct position.	Adjust record rack switches. See section record rack switch adjustment.
		Transfer arm bent.	Correct arm.

TROUBLE SHOOTING CHART (Continued)

Complaint	Symptom	Cause	Remedy
Transfer arm does not grip records properly.	Record not gripped properly when removed from turntable.	Transfer arm bent.	Correct arm.
		Turntable assembly out of alignment.	Adjust height and position of turntable assembly.
Transfer motor does not stop after placing record on turntable.	8/10 Amp. fusetron blown. Mechanism remains in playing position.	Cam shaft switch out of adjustment.	Adjust cam shaft switch. See section on cam shaft adjustment.
		Record rack switches not restoring to normal position.	Bend the stop bracket on the switch lever mounting plate to allow the trip levers to make and break circuits in both operated and non-operated positions. Make sure the trip lever operates freely.
Transfer motor does not stop after placing record in rack.	8/10 Amp. fusetron blown. Mechanism remains at rest in restored position.	Cam shaft switch out of adjustment.	Adjust cam shaft switch. See section on cam shaft adjustment. Check nut on cam switch lever for looseness.
Transfer assembly does not operate smoothly.	Transfer arm moves in an unsteady manner.	One or both of the Allen set screws in the cam shaft drive sprocket and the cam shaft driven sprocket loose.	Tighten both set screws with an Allen wrench.
Turntable, amplifier and Rainbow unit motors operate continuously.	Mechanism wont operate.	8/10 Amp. fusetron blown.	See section on 8/10 Amp. fusetron blown.
	Circuits to all three not broken.	Contacts of junction box relay do not break.	Check armature of relay for binding. Check contacts of relay for correct gap. Check winding of relay (330 ohm). Check circuit to relay.
Instrument does not operate after placing record on turntable.	Turntable, amplifier and Rainbow unit motors do not operate.	Open circuit through the contacts of the junction box relay.	Check contact points and circuit for continuity.
Mechanism jams.	Transfer cam jams against toggle pin unit.	Binding in toggle pin unit.	Free toggle pin unit. Clean bearing surfaces.
	Sluggish action of mechanism.	Operating mechanism in extremely cold location.	Place a few drops of fine machine oil on bearing surfaces of trunnion bearing and between inner shoe shaft and hub of outer shoe.
		Binding in transfer assembly.	Clean all bearing surfaces and lubricate. See section - Lubrication.
	Gears lock just as record shoes grip record on turntable.	Incorrect height of transfer arm on support and rubber bumper.	Straighten support and replace rubber bumper if necessary. Over all height of support and bumper from top of boss must be 5-1/16" ± 1/64".
		Transfer arm bent to one side.	Straighten transfer arm.
Needle does not contact record.	Misses record entirely.	Pickup arm assembly out of adjustment.	See section on pickup arm assembly adjustment.
		Pickup cable on top of adjusting screw.	Straighten cable
		Pickup arm assembly hangs up on post.	Clean post and inside of tube. Apply light film of machine oil.
Needle misses first part of record.	Needle is not placed on starting margin of record.	Cam spring bent or out of adjustment.	Straighten cam spring and adjust so that needle is placed on record just before pin on bottom of pickup arm hinge clip releases from cam spring.

TROUBLE SHOOTING CHART (Continued)

Complaint	Symptom	Cause	Remedy
Must cancel by hand.	Record does not cancel automatically.	Faulty cut-off grooves in record.	Replace record.
		Improper adjustment of reversing switch.	See section - reversing switch.
		Cut-off circuit open through reversing switch.	Check for faulty switch. Check for open circuit, especially plug connection.
Record will not cancel.	Mechanism will not begin reverse cycle.	8/10 Amp. fusetron blown.	See section on 8/10 Amp. fusetron.
Mechanism does not complete reverse cycle.	Mechanism stalled in reverse cycle.	Power cut off while mechanism was in reverse cycle, de-energizing the reversing control relay located in mechanism junction box.	Push cancel button or operate reversing switch. Either one will re-energize the reversing control relay and put mechanism back in operation.
		Cam Shaft Switch out of adjustment.	Adjust Cam Shaft Switch.
No Music.	Reproduction can not be heard.	Volume Control.	See that volume control is turned up. Check connections. Check for open circuit or burned out Volume control. See section on volume control.
		Amplifier.	Check plug and terminal connections. Replace tubes. Be sure they make good contact in their sockets. Check amplifier. See section on Amplifier.
		Speaker.	Check speaker circuits for open or loose connections.
		Crystal pickup.	Check pickup leads for open or loose connections. Replace crystal pickup cartridge.
Music distorted.	Reproduction fuzzy.	Mechanism bolted down tightly to chassis.	Loosen the four bolts and let the mechanism float on the springs.
		Amplifier gain set too high.	Lower volume control setting.
		Crystal pickup defective.	Replace crystal pickup cartridge.
Music fades.	Volume varies.	Tubes or crystal pickup cartridge.	Check tubes. Replace crystal pickup cartridge.
Imperfect reproduction.	Scratching or high surface noise.	Worn needle or record.	Replace.
		Record condition control set improperly.	Adjust control.
	Music slow.	Turntable slow.	Check input voltage. Replace turntable motor.
	Hum.	Tube.	Check tubes by replacing.
		Filter condenser.	Check condenser for an open circuit.