Specialized AUTO RADIO MANUAL

JOHN F. RIDER

Volume I

Specialized

AUTO RADIO MANUAL

VOLUME I

by

John F. Rider

JOHN F. RIDER

1440 Broadway New York City

Other manuals by John F. Rider

Perpetual Trouble Shooter's Manual Volume I

About 1180 pages. Price $7.50

Perpetual Trouble Shooter's Manual Volume II

About 780 pages. Price $6.50

Perpetual Trouble Shooter's Manual Volume III

About 1185 pages. Price $7.50

Specialized Auto Radio Manual Volume I

About 350 pages. Price $3.50

The Perpetual Trouble Shooter's Manuals listed above are the "standard" of the radio service industry.

Their absolute supremacy as sources of accurate—complete and detailed radio service data is established by their use by the world-famous tube manufacturing organizations, such as E. T. Cunningham, Inc., National Union Radio Corp., RCA Radiotron, Inc.—the most famous service instrument manufacturers, like Weston, Hickok, Readrite and Supreme and their use and recommendation by the world's leading radio receiver manufacturers.

AUTHOR'S NOTE

It is with a great deal of pleasure that we present the *Specialized* Auto Radio Manual, Volume I.

The tremendous growth of the auto radio industry and the rapidly expanding market requires that such a manual be available.

There are in this country a large number of auto service stations, who have affiliated themselves with one or more auto radio manufacturers. These service stations are specializing in auto radio receivers exclusively. Consequently, they are interested solely in auto radio receivers.

It would be an injustice to expect such organizations to purchase copies of the Perpetual Trouble Shooter's Manual, which now totals about 3000 pages, to secure the comparatively small amount of auto radio data, when they can find no use for the remaining thousands of pages covering home radio receivers. Hence we have made this, the *Specialized* Auto Radio Manual, complete in itself and limited exclusively to auto radio receivers.

In order to make the *Specialized* Manual complete it was necessary to include about 116 pages of service information which have already appeared in Volumes I, II or III of the Perpetual Trouble Shooter's Manual. This amount of duplication is just a small portion of the total contents of the manual and we feel that it is entirely justified.

By having all of the information under one cover, only one manual need be referred to when working on an auto radio job. We have tried to make the *Specialized* Auto Radio Manual as complete as possible and to include every one of the auto radio receivers ever manufactured by the organizations represented. We have paid particular attention to peak frequencies, electrical values, voltage data, socket layouts, installation notes, etc. Everything in the form of information available for publication has been included.

We wish to focus your attention upon the eleven pages headed "Symposium". In these eleven pages we have gathered special ignition-interference elimination data, shop equipment data, antenna data and general installation data from the manufacturers whose names appear in the text. We sincerely hope that this information will prove of value and that you will appreciate the different view points expressed in these pages.

We wish to take this opportunity to express our thanks to every one of the manufacturers, their chief engineers, the engineering departments, service managers and service departments and sales departments for their courteous co-operation.

JOHN F. RIDER

INDEX OF *SPECIALIZED* AUTO RADIO MANUAL

SUBJECT--AUTO RADIO SERVICE EQUIPMENT, TOOLS AND SERVICE PARTS STOCK

In order to provide each Authorized Auto Radio Service Station with complete facilities for the effective and efficient handling of auto radio installation and service work, United Motors has developed a most comprehensive program. The entire arrangement has been worked out so as to fit in with the needs and requirements of any station--from the one starting from "scratch" to the station already in the business and having a fairly complete layout.

No station can hope to do a satisfactory job of auto radio work unless the proper tools, equipment and facilities are available Those facilities which can be considered as indispensable are as follows:

A. PERSONNEL

It goes without saying that the radio service station cannot render proper service without at least one competent and capable radio man. United Motors will assist Authorized Stations to the fullest possible extent, where desired, in the selection and training of their auto radio service personnel.

B. TOOLS AND EQUIPMENT

To properly handle auto radio service and installation work, the station will require:

1. Electric portable drill--3/4" chuck
2. Drills--7/16", 3/8", 5/16", 1/4", 3/16", 7/64", 9/64"
3. Hammer
4. Center punch
5. 6" Crescent wrench, or equivalent
6. Screw drivers--1/8", 1/4", 3/8" blades
7. 5" diagonal side cutters
8. 5" square jawed pliers
9. 200 watt electric soldering iron
10. 5" long nose pliers
11. Socket wrench set
12. Cold chisel
13. 10" Rat-tail file
14. 10" Mill Bastard file
15. Steel rule
16. Small bench vise
17. 10" Tin snips
18. Roll of 1/2" high voltage adhesive tape
19. Hack saw with 12" blades
20. Roll of Rosin core solder. (Do not use acid solder or soldering flux.)
21. Test and work bench, with convenient outlets for "A" battery current, necessary "B" voltages, antenna connection, and handy location for tools and miscellaneous parts.
22. Testing equipment--
    - (a) Test meter or "Set Analyzer."
    - (b) Test oscillator
    - (c) Tube checker
23. Test cables (for testing sets and speakers on or off the car) adapters, test speaker and service kit.

The first twenty items can of course be obtained locally if the service station does not already have them available. It is in connection with the balance of the list, however, that the average station is apt to run into trouble unless someone with a knowledge of their problem is in a position to advise and help them. For this reason, United Motors has gone to considerable expense and trouble to develop and work out an auto radio set-up for its service stations with the following in mind.

(a) Lowest possible first cost

(b) Will not be obsolete as soon as new models come out

(c) Will lend itself to servicing all makes and models of auto radio sets

C. SERVICE PARTS STOCK

Unless someone is in a position to make intelligent recommendations with respect to a service parts stock, one of two things is bound to occur--

1. The station will not have necessary service parts when they are needed.
2. The station will put in a complete stock in order to anticipate its needs, and will end up with a lot of obsolete and "dead" stock.

INSTRUCTIONS FOR SUPPRESSION OF IGNITION INTERFERENCE AND ANTENNA INSTALLATION

The following sections give standard instructions for suppression of ignition interference in an automobile when a Stromberg-Carlson Radio Receiver is installed. Instructions are also given for the installation of an antenna in cars not already equipped with a built-in antenna.

While the instructions given for the suppression of motor interference are those generally used in practice, it must be remembered that many cars present individual problems in suppression and may require special treatment. The procedure of such special treatment will be learned after several installations are made.

SECTION I—SUPPRESSION OF IGNITION INTERFERENCE

Standard equipment for suppression of ignition interference consists of eight P-23618 Spark Plug Suppressors, one P-23619 Distributor Suppressor and two P-23163 Capacitors (one-microfarad). These are to be used to prevent ignition interference from being picked up by the radio receiver while the motor is running. They should be installed as follows:

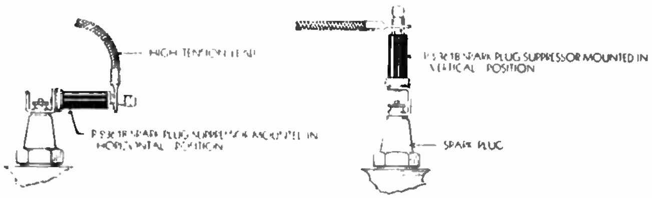


Fig. 1. Mounting of Spark Plug Suppressors.

1—*Spark Plug Suppressors*—Remove the high tension leads, one at a time, from the top of each spark plug. Mount the spark plug suppressors on the plugs and connect the high tension leads to the terminals provided on the end of the suppressors as shown in Fig. 1. The suppressors should be mounted in a horizontal position when possible. In some cars it will be necessary to obtain the "Splice-In" type Suppressors, P-23620, shown in Fig. 2. These are installed by cutting the high tension lead a short distance from the plugs. Then screw the two cut ends into the two ends of the suppressor. This type of suppressor should be mounted as close to the plugs as possible. Care should be taken that a good contact is made between the wires and the screws and the wires should be taped to each end of the suppressor to prevent any tendency to become loose. When dual ignition is used, each spark plug must be equipped with a suppressor.

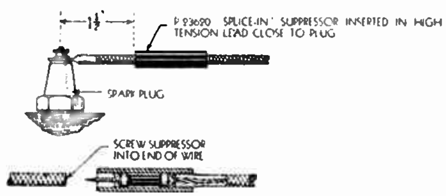


Fig. 2. Method of Attaching "Splice-In" Suppressors.

2—*Distributor Suppressor*—If the distributor is of the plug-in type, disconnect the center high tension wire from the head. Plug the split end of the distributor suppressor into the socket from which the wire was removed and insert the wire in the free end of the suppressor as shown in Fig. 3. For cap type distributors use the P-23620 "Splice-In" type suppressor connecting it into the high tension lead from the rotor arm of the distributor as close to the distributor as possible. If the car has two ignition coils a suppressor is necessary in each high tension lead to the distributor.

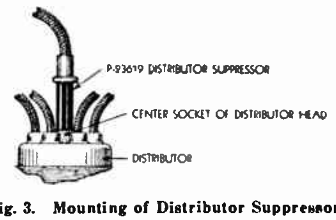


Fig. 3. Mounting of Distributor Suppressor.

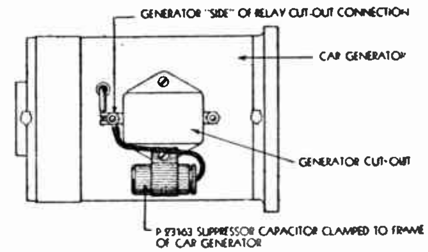


Fig. 4. Mounting of Suppressor Capacitor on Generator.

3—*Generator Capacitor*—Clamp one of the P-23163 Capacitors to the frame of the car generator as shown in Fig. 4. The screw holding the cut-out relay ordinarily may be used for this purpose. Connect the capacitor lead to the terminal on the generator side of the cut-out. In some cases interference will be reduced by connecting the capacitor lead to the other side of the cut-out, therefore the most suitable position must be determined by trial.

4—*Ammeter Capacitor*—The other P-23163 Capacitor should be fastened securely to the instrument panel (if it is metal) as shown in Fig. 5, or to some metal part where a good ground connection will be insured. Connect the lead from this capacitor to the battery side of the ammeter. In some cases this capacitor will be more effective when its lead is connected to the dome light, stop light, or horn wires. The proper connection for the best suppression should be determined with the motor running by noting the effect of connecting the capacitor to the several places in succession.

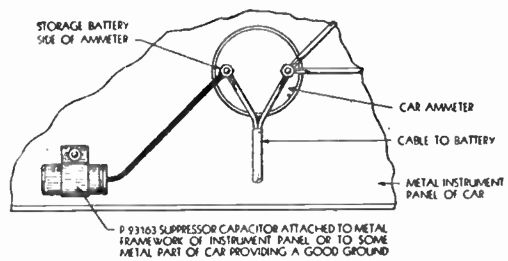


Fig. 5. Connection of Suppressor Capacitor to Ammeter.

In extreme cases it may be necessary to connect a capacitor to more than one of these points at the same time to obtain reception free from interference. Also, in some cases interference will be further reduced by connecting a P-23163 Capacitor between the battery side of the ignition coils and the car frame.

The above procedure should effectively suppress interference from the electrical system of the car. However, if in certain cases sufficient suppression is not obtained, it may be necessary to apply one or more of the following methods:

5—Determine if the interference is radiation picked up by the antenna or by the receiver itself. This can be done by grounding the antenna lead where it leaves the receiver. If the motor interference stops, it is quite certain that it is being picked up on the antenna. If the interference continues, the indication is that part of the noise is being picked up by the receiver itself.

6—If the latter indication is observed, that the interference is being picked up by the receiver, make sure that all ground connections are clean and tight. If the instructions for installing the receiver have been carefully followed and all the receiver wires have been kept out of the motor compartment, there should be no receiver pickup.

7—In the case of antenna pickup of motor interference, first be sure that the antenna lead is properly shielded from the receiver to the antenna and that this shield is properly grounded. If this precaution has been taken, the rotor arm of the distributor should be peened to reduced the gap between it and the contacts in the distributor head. Extreme caution should be used in doing this to prevent harming the distributor. The gap between the arm and the contacts should be held to about .001 inch maximum, but care must be taken that the rotor does not brush any of the contacts. Building up the rotor arm with solder is not recommended as the solder is soon burned away. Peen the rotor arm by placing it on a flat steel block and hammer the end of the rotor carefully with a small machinist's hammer. Repeat this operation until there is just sufficient clearance (about .001 inch). Dress the end of the rotor with a file, to its original shape. The judging of the correct amount of lengthening of the rotor arm may be done by putting a heavy chalk mark on each of the contacts. After the arm is lengthened, the distributor is assembled and the motor turned over so that the arm makes a complete revolution. The cap is then removed and the end of the arm examined for traces of chalk. If a mark is found, the contacts are examined to determine which one has close spacing and the arm filed to clear it (or them). If the distributor head is considerably "off center", it may be necessary to replace it. If there is evidence of the rotor touching the contacts, file off about .001 inch and recheck. If the rotor is double ended, both ends should be treated in the same manner. The operation should be complete on one end before doing the other.

8—If the motor interference still continues, remove the high tension lead between the coil and distributor, turn on the ignition switch and crank the car by hand. If "clicking" is heard in the loud speaker, the indication is that part of the interference at least is from the low tension circuit or breaker points in the distributor. If this is the case, remove the primary lead running from the ignition coil to the breaker points on the distributor and replace it with a piece of No. 14 shielded low tension cable. The shield of this cable should be grounded in two places with connections as short as possible. If necessary, replace the lead from the switch to the ignition coil with No. 14 shielded low tension cable, making good ground connections to the shielding. Care must be taken with the shielded leads so that the connections to the coil switch or distributor are not grounded. Never use a bypass capacitor on the distributor side of the primary of the coil as the operation of the motor will be affected.

9—After making test given in (4) and no clicking was heard, it may be assumed that the interference is coming from the high tension secondary circuit of the ignition system. All low tension wires which run parallel to or in the field of the high tension circuits act as carriers and they should be moved whenever possible, or the high tension wires re-routed. In cases where the high tension manifold is used to house low tension wires, the removal of the low tension wires from the manifold will be sufficient. In cars where the ignition coil is mounted on the instrument panel or elsewhere under the cowl, one of two procedures should be followed. First, shield the high-tension lead from the coil to the distributor. This may be done by covering the lead with flexible loom and running the shield of hollow copper braid over the loom. The shield should be grounded to the frame of the coil at one end and to the motor block or high tension manifold at the other. This lead should be run as directly as possible from the coil to the motor compartment, even if it necessitated drilling a new hole in the dash. Second, it may be necessary as a last resort to move the ignition coil (or coils) into the motor compartment on account of coupling of the electro-magnetic field of the coil with the receiver apparatus. Mount the coil on the motor block as near as possible to the distributor, making sure that a good ground contact is maintained. If it is necessary to mount the coil above the motor, make sure that a location is selected where the coil will stay sufficiently cool. The new primary wires required should be of No. 14 shielded low tension cable. These wires should not be run close to the high tension leads and the shields should be well grounded.

10—In many cases a good electrical contact between the motor block, dash, and frame of the car will eliminate much of the interference. These electrical connections may be made by connecting together the parts with short pieces of one inch copper braid. Such bonding may be particularly necessary on those cars having the motor mounted on rubber, in such cases the bonds from the motor block must be long enough to allow for vibration. A good connection between the instrument panel and the body and frame of the car may aid materially.

11—Every wire, rod, or pipe that runs from the motor compartment through the dash may radiate interference and they should be grounded to the dash. Use heavy flexible copper conductor or braid to ground, then to the dash, allowing for any movement necessary of the rods. If they are rusty, scrape them clean so that the copper conductor may be securely soldered to them. The wire conduit that runs to the base of the distributor in some cars should also be grounded in the same manner. In many cases the steering column must be bonded to the dash.

12—In some cases the interference being heard will be caused by loose wires in the electrical system of the car. Connections to all lights, horn button and horn, cigar lighters, etc., should be checked to see that the contacts are clean and the wire connections are tight. The connection of a P-23163 Capacitor on the battery lead feeding one or more of these items will sometimes have a decided effect on the interference. This is especially true of the dome light wires when a roof antenna is used.

13—Any metal parts of the car making imperfect or intermittent contact with the metal case of the receiver or associated equipment will cause noises in the loud speaker. To prevent such interference, choke wires or rods, speedometer cables, copper tubes, etc., should not be allowed to rub on the receiver. The battery, or other cables, should be secured so that they will not make poor or intermittent contact with the metal parts of the car.

14—Cars which have the high tension wiring near the bottom of the engine compartment will have a great amount of interference introduced through the wooden toe boards. The passenger will transfer this interference to the antenna through his body. A grounded screen over the toe boards on the passenger side will eliminate this interference.

15—The ignition system of the car must be kept in good condition. Plugs that are fouled or have improperly adjusted gaps will affect the operation of the receiver as well as that of the car. The same is true of burned or improperly adjusted breaker points.

16—Electrical disturbances from nearby power lines or other electrical equipment should not be confused with ignition interference. Such disturbances will be heard whether or not the motor is running, but the ignition interference should be checked in a location that is free from other disturbances.

SECTION 2—ANTENNA INSTALLATION

Roof Antennas:

A roof antenna should be used for efficiency and best results for distance reception. There are four types of top construction (besides the open and convertible cars) commonly used by the automobile manufacturers. These types with their particular antenna installation are as follows:

1—*Tops With Slat Construction*—In these cars the headlining should be lowered, working from the front to rear. This can be accomplished by removing the moulding between the windshield and the top of the car. This moulding is usually held in place by two or three screws. Next remove the moulding on both sides of the car, running from the front of the car to the back of the rear door. Now drop the headlining from the top of the car.

For the antenna use a good iron screen, galvanized or tinned after weaving, or a copper screen tinned after weaving. The mesh should be No. 8 or smaller. The thirty-six inch width of screen is satisfactory in practically all installations.

Three inches should be maintained as clearance between the screen and all metal work of the top of the car body. A section should be cut out of the screen to leave this clearance around the dome light.

The wiring in the top to the dome light and switch must be run along the side of the top frame and then along the top edge of the side of a bow to the dome light fixture. In some cases it will be necessary to shield this dome light lead on account of ignition interference.

Tack the screen to the bow which is farthest in the rear but which will still give the required three inches clearance from the rear metal apron. With the end of the screen lined up with the bottom front edge of the bow, the screen is tacked against the face of the bow, close to the top, as shown in Fig. 6. It is necessary to tack the screen in this manner so that the listing strip used to support the headlining can also be tacked to the face of the bow.

On bows on which the listing strip is not tacked, the screen may be tacked along the bottom of the bow as shown in Fig. 6. The screen should be tacked to each bow from the back to the front. Do not allow the screen to come closer than three inches to the metal aprons along the sides and the metal frame above the windshield.

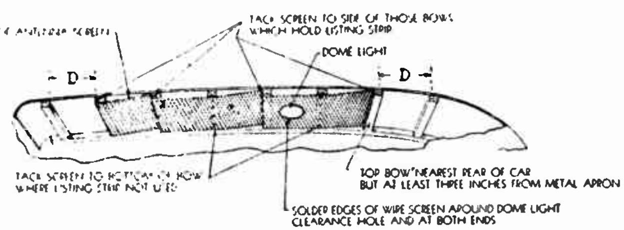


Fig. 6. Method of Installing Screen Antenna.

If the receiver is to be located at the right-hand side of the car, the shielded lead-in should be connected to that side of the antenna. If the receiver is to be on the left-hand side of the car, the lead-in should be connected to the left-hand front corner of the antenna. (See paragraph 6 on "Connection of Shielded Lead-In"). If the types of screen recommended (tinned or galvanized) are used, it will only be necessary to make the lead-in connection to one corner of the antenna. If an untinned or ungalvanized screen is used it is desirable to solder a bond across the entire front edge of the screen antenna and solder around the edges of the hole provided for the dome light as shown in Fig. 7.

After the antenna and lead-in have been installed, they should be tested for grounds. A high resistance voltmeter and a forty-five volt battery should be used, testing between the antenna lead and the body of the car. The test connections should not be held with the fingers as the leakage, due to the body, will cause a meter reading.

If the system is free from grounds, the headlining and trim may be replaced. After this is done, check the antenna again for grounds.

2—*Tops With Poultry Wire Reinforcement*—When cleared of grounds, the poultry wire netting used in some automobile tops may be used as an antenna. This may be done in one of two ways. The top deck may be removed and the netting cut away from where the edges ground on the car body, but the more practical method is to drop the headlining for the entire length of the car. The netting can then be cleared of grounds from underneath.

The netting is cleared of grounds by cutting a strip three inches wide around the four sides of it. The portion of the poultry screen used for the antenna is then laced securely to the portions remaining attached to the car by a strong waxed cord. The cords used should be pulled tight enough to hold up the center portion of the screen and thus prevent the top from sagging. Be sure to bend the sharp ends of the wire so that they will not puncture the top or headlining. The lead-in is attached in the same manner as described above. The dome light wires may have to be rearranged so that there is a minimum of coupling between them and the antenna.

3—*Tops With Fabric Construction*—In a few cases this top construction will be encountered; it is similar to the slat type except that the wood slats are replaced with strips of muslin stretched over the wooden bows. If these strips are not tacked to the bows, the antenna screen may be slipped in between the strips and the bows. In such case, the screen need only be tacked to the front and back bows used to support the antenna. In case the strips are tacked to the bows, the antenna should be installed and the lead connected in the same manner as with the slat type construction. The edges of the antenna screen should be kept three inches away from the metal parts of the top.

4—*Tops With Metal Braces*—In case there are diagonal metal braces in the top, these braces must be freed of grounds so that the efficiency of the antenna will not be impaired. Usually the rear ends of the braces are fastened to the wood top frame while the front ends are fastened by brackets to the front corner posts. The headlining should be lowered and the work done from the inside of the car. First, release the front ends of the braces. Next, ream out the holes in the brackets and use fibre washers and sleeve bushings to insulate the cross brace bolts from the brackets. The dome light is usually connected to one of the braces. Disconnect it from the brace and run a new lead to the car body for the dome light ground. When both braces have been insulated the antenna should be installed as detailed above.

5—*Other Types of Tops*—Metal bows may be encountered in a few cars. In this type of top a wire antenna is used. The headlining should be lowered and screw eyes or staples securely fastened around the wood top frame of the car. These staples should be separated from the metal bows by about three inches but are so spaced that wire threaded through them will be parallel to the bows and the loops will be about two inches apart. A No. 18 gauge stranded rubber covered and braided wire ("lamp cord") should be used. The end of the wire after the lacing is completed is brought over to one of the corner posts (depending on the location of the receiver) for connection to the shielded lead. This antenna system should be carefully tested for grounds before replacing the headlining.

Open and convertible models constitute a different type of antenna problems. There are two types in general use; the wire antenna and the under-car antenna. The wire antenna is the more efficient when the top is kept up but its operation is impaired when the top is down. In cars where the top is folded into a metal compartment, the wire antenna is useless when this is done. While the under-car antenna is not as efficient as the wire antenna in the top, it will be preferred if the top is kept folded a considerable portion of the time.

As the tops of open and convertible models are made to fold back, the wire antenna cannot in any way interfere with the operation. Such an antenna is installed as follows: Remove the top material and lay it back, leaving the side flaps in place. Secure a piece of top fabric matching that just removed and fasten it properly in place over the cross ribs and over the side flaps. Next cut a piece of drill cloth or muslin approximately three inches smaller than the width of the top and about the length of it. Holes should be punched in the drill cloth in rows three inches apart, parallel to the cross ribs. Space the holes about ten inches apart in each row. Now weave a No. 18 stranded rubber covered and braided wire ("lamp cord") back and forth through the holes in the cloth. When this is completed the cloth is fastened to the front and rear bows only. The antenna lead should be brought down in the rear so the top may be lowered easily. The shielded lead may be attached at the point where the top joins the body. The top material and all trim must then be carefully replaced. Check the antenna with a battery and voltmeter to make sure it is not grounded.

Where it is desired to use an under-car antenna, the P-23617 Antenna Outfit should be obtained. Complete instructions for installation are supplied with this outfit.

CONNECTION OF SHIELDED LEAD-IN:

When the antenna is installed in the roof of the car and it is not possible to bring the lead down inside the front post, the shielded lead should be installed as shown in Fig. 8-A. In cars with built-in antennas or cases where the lead is brought down inside the post, the shielded lead should be connected as shown in Fig. 8-B. Be sure to securely ground the shielding at the point where it is attached to the antenna or the lead. In the latter case, leave a very minimum of wire unshielded. In any installation do not use a longer length of shielded lead than absolutely necessary. In the case of a built-in antenna provided with a shielded lead, this lead should be replaced with that furnished with the Stromberg-Carlson Receiver.

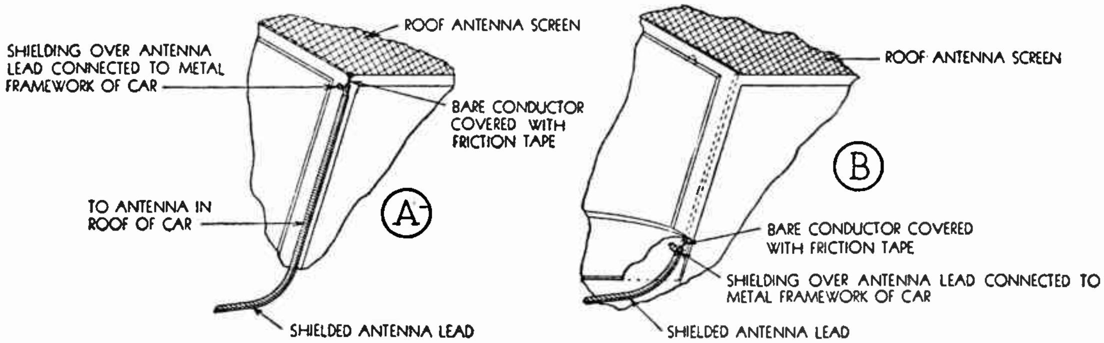
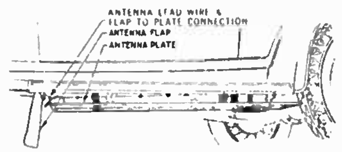


Fig. 7. Method of Connecting Shielded Antenna Lead.



Mounting of Running Board Antenna

Fig. 3

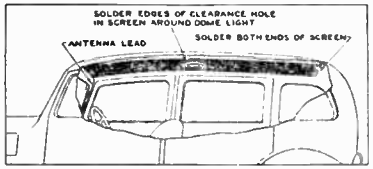


Fig. 4

Roof Antenna - For efficiency and best results for distance reception, a Roof Antenna should be used. There are four types of top construction commonly used by the automobile manufacturer. First, tops with slat construction: In these cars the headlining should be lowered, working from the front to rear. This can be done by removing the moulding between the windshield and the top of the car which is usually held in place by two or three screws. Then removing the moulding on both sides that runs from the front of the car to the back of the rear door. When this is removed you will notice the headlining is tacked to the trim rail. Remove the tacks from this, and the headlining will drop down. When replacing this headlining if care is taken to put the tacks back in their original holes, and moulding put back in place, it will be hard to tell that it has been taken down. After the headlining is down, if the top is of slat construction, #18 rubber covered stranded wire may be strung back and forth between the slats, tacking it to the front of the top and to the last bow used. About 60 to 75 feet of wire is sufficient. Be sure to keep the wire at least four inches from the metal sides of the top which is called the quarter deck. A lead-in should be fastened to one end of this wire and brought down through the corner post most convenient to the location of the receiver. It is also possible to use, instead of this stranded wire, copper screening. When this latter is used, care should be taken that the screen is kept at least three inches from any metal part of the car and the dome light. See Figure 4 which shows how this type of antenna should be installed. A stranded copper, rubber and cotton covered lead-in wire should then be soldered to the front corner nearest the receiver and then run down through the corner post. Be sure that the screen is tacked securely to the bows, being careful not to tack the screen to those bows to which the headlining strip is fastened.

Tops With Wire Construction - The headlining is removed by following the same procedure as above. The wire mesh may be used as an antenna by cutting out a three inch strip around the four sides. The center portion of the mesh is then laced securely to the part still remaining attached to the car by use of a strong cord. This should be pulled tight enough to hold the center portion of the mesh up and to prevent the top from sagging. A lead-in should be soldered to the corner of this mesh nearest the receiver and run down the corner post. The dome light wires may have to be re-arranged so that there is a minimum of coupling between them and the antenna.

Fabric Top Construction - The same procedure can be followed as in the slat top construction with the exception that if you use a copper screen, it should be placed on top of the bows and tacked at both ends.

Cars with Metal Braces - Some cars have metal diagonal braces to strengthen the top and usually these braces are fastened in wood at the rear and in a metal frame at the front. It will be necessary that these braces be freed of grounds or the efficiency of the antenna will be greatly reduced. This can be done by removing the braces at the front and reaming the holes to allow the use of a fibre washer or sleeve bushing to insulate the cross brace bolts from the brackets. Usually one of the dome light wires is connected to one of the braces and this lead will have to be disconnected from the brace and a new lead run to the body of the car.

Running Board Plate Antenna - For ease of installation and minimum requirement of time the Majestic #6586 Running Board Antenna is recommended and may be purchased from the Majestic Distributor in your territory. The Majestic Running Board Antenna comes complete with instructions for mounting and is shown completely installed in Figure 3.

Peen the rotor. It may be necessary to reduce the gap between the rotor arm and contacts of the distributor head. Extreme care should be used in this operation to prevent harming the distributor. Peen the rotor by placing it on a flat steel block and hammering the end with a small machinist's hammer. Repeat this operation until there is just sufficient clearance - about .004". The rotor must not be allowed to touch the contacts. If there is evidence of the rotor touching the contacts, file off about .001" and recheck. Building up the rotor arm with solder is not recommended as the solder is very soon burned away. In some cases, where the rotor is badly worn, it may be best to substitute a new one.

If the motor interference still continues, it may be well to determine the source. This can be done by removing the high tension lead from the coil to the distributor, turning on the ignition switch and cranking the car by hand. If a clicking is heard in the speaker, you may be sure that part of the trouble comes from the breaker points in the distributor or low tension circuit. It will then be necessary to remove the primary lead which runs from the coil to breaker points on the distributor, and replace it with a No. 14 shielded low tension cable, being sure not to run close to the high tension leads. The shielding must be grounded in at least two places. All ground connections must be as short as possible. It may be necessary to remove the lead from the switch to the coil and replace with a No. 14 shielded low tension cable being sure to ground the shielding. Care must be used when shielding so as not to short the coil or switch. Never use a by-pass condenser on this part of the circuit because it will effect the operation of the motor.

When you have tested to determine the source of motor interference and no clicking was heard in the speaker, we may assume that the interference is coming from the high tension or secondary circuit which is possibly the worst source of motor interference. All wires which run parallel to or within the field of this part of the circuit act as carriers and should be moved whenever possible, or the high tension wire re-routed. Sometimes the car manufacturer utilizes the high tension manifold to hold various wires and just removing them from the manifold will be sufficient. Be careful to keep the high tension lead as far as possible from the receiver. If after moving the wires, the interference continues, the high tension lead should be shielded. Care should be used when shielding the high tension lead to prevent the current from leaking through to ground. To prevent this first cover the high tension lead with loom, then run this shielding over the loom. The shielding must be grounded in at least two places (to the coil and motor block or high tension manifold). When the coil is under the cowl or bulkhead, the high tension lead should run as direct as possible to the motor compartment. This will sometimes necessitate drilling a new hole about one-half inch in diameter in the firewall or dash.

Due to the electro-magnetic field surrounding the ignition coil, it may be necessary, when the coil is under the cowl or bulkhead, to move it into the motor compartment. Mount it on the motor block as close to the distributor as possible and be sure that a good ground connection is maintained. If it is found necessary to mount the coil over the motor, care should be taken that it is so mounted as to stay sufficiently cool. New primary wires will be required and shielded No. 14 low tension ignition cable should be used. Caution. Do not run these wires close to the high tension lead, but ground them well. ONLY MOVE THIS COIL AS A LAST RESORT.

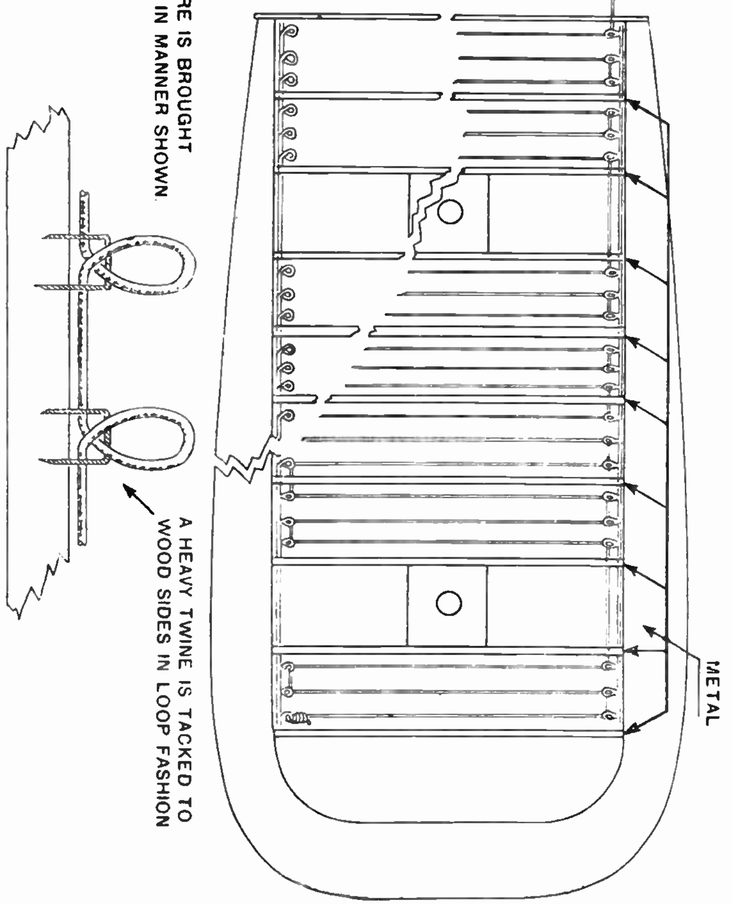
In a number of cases, the establishing of a good electrical contact between the motor block, firewall and frame of the car will eliminate much of the interference. In assembling automobiles, oftentimes paint or other substances will prevent a good ground connection from being made between the various metal parts of the car which form the ground circuit. These poor connections will have no apparent effect on the operation of the car. However, when a radio receiver is installed, it is especially desirable to maintain all the metal parts of the car at the same ground potential. This is accomplished by connecting together with short pieces of shielding the motor block, frame, and firewall and sometimes the body of the car. Bonding may be particularly necessary on those cars having the motor mounted on rubber blocks. When bonding the motor to the firewall, use one inch shielding and make the bond long enough to allow for vibration of the motor.

Installation of Antenna. The type of antenna installation to be used in connection with the Majestic Automobile Receiver consists of two types of optional choice to the purchaser.

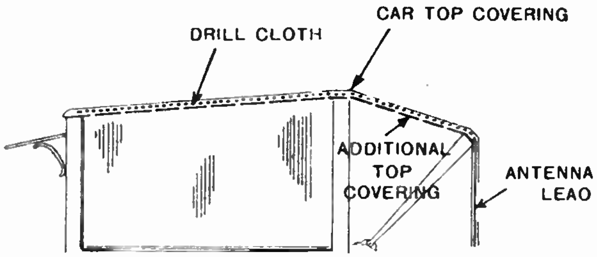
In cases where the automobile is to be used at extensive distances from broadcasting stations, rather than in the metropolitan areas of large cities where broadcasting stations are numerous, the top antenna is recommended.

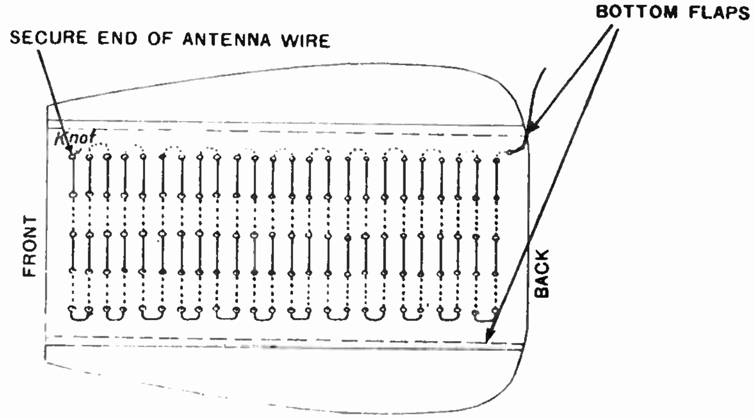
Several types of top antenna installation are illustrated in this Manual. A three to four inch clearance must be maintained from the roof's metal shell as well as about the dome light wiring.

In cases where the automobile will be driven in the city principally, or in localities not in excess of 150 miles from large broadcasting stations, the Under Carriage Antenna may be used.



ANTENNA INSTALLATION FOR METAL BOW ROOFS





INSTALLATION OF ANTENNA FOR OPEN CAR

It is absolutely necessary to have the radio chassis grounded to the frame of the car as well as the control cable and all shielded leads. When a ground connection is made, it must be soldered tight and on a clean surface. Grounding the Remote Control Drive Housing is not necessary.

It will be found that the above standard filter system will eliminate motor noise in practically all makes of cars. In those cases where motor noise is not sufficiently reduced by the standard filter system, a small amount of investigation will indicate which leads are causing the trouble and require shielding or an additional filter condenser.

To install the distributer suppressor pull out wire from coil to the distributer, insert stud end of suppressor into distributer. Then insert end of wire from coil into the other end of the suppressor. The distributer suppressor at the other end of this wire is placed over the coil in the same manner. If ignition noise is still experienced after the suppressors have been installed, it will be necessary to put a condenser of 0.5 Mfd. capacity across the low voltage leads of the distributer.

The generator is not very often a source of noise in automobile installations. If there is any noise from the generator, this manifests itself as a hum, the pitch depending on the speed of the car. In case noise of this kind is experienced a condenser of 0.5 Mfd. capacity should be connected from the battery connection of generator to the ground or frame of the machine at the most convenient point.

If noisy operation continues while the engine is running after the above procedure has been followed, first determine if this is due to radio frequency or audio frequency pick-up (after tubes have been inserted and receiver operated as explained in next two articles.) To do this reduce the volume by means of the volume control. If the noise is eliminated, it is due to radio frequency pick-up. If the noise continues, it is due to audio frequency pick-up. If the noise is diminished in volume but can still be heard, this is due to audio frequency pick-up and perhaps radio frequency pick-up.

As a further check remove the cover of the chassis and short circuit the third condenser section (nearest the 226 tube) taking care not to bend the condenser plates. Any residual noise is then due to audio frequency pick-up.

If the above tests reveal the pick-up to be audio frequency, move the ignition coil of the automobile away from the chassis and see if the noise disappears.

If the pick-up is radio frequency, replace the high tension lead from the coil to the distributor with No. 14 airplane ignition cable and ground the shield of this cable at the nearest convenient point using a short heavy lead for the ground connection. Replace the low tension lead from the coil to the distributor with No. 14 armored cable and ground the armor of this cable in the same way. If the coil is mounted in back of the dash (under the cowl) it will be necessary to place a copper can over the coil and ground the can. It will also be necessary to ground the shields of the above mentioned high and low tension cables on both sides of the dash.

In general it will not be possible to entirely eliminate the noise in an auto receiver. However, it can be reduced to such an extent by the above methods that it can scarcely be heard over the mechanical vibration when the car is running.

Antenna Installation

After a series of tests U. S. Radio and Television engineers have found a very satisfactory antenna or energy collecting system. This is a tinfoil covered tape which is laid lengthwise on the roof of the car.

This tape comes in ¼" wide rolls and is furnished as part of the antenna equipment that may be puchased with a Model 30 automobile receiver. A roll of 1" wide adhesive tape and a can of top dressing is also furnished with the antenna equipment.

The installation of this antenna takes but a few minutes. It is permanent, water proof and does not injure or in any way mar the appearance of the car. To make the installation first clean the top, removing all moisture and particles of dirt.

Then drill a hole through the roof of the car large enough for the lead-in wire (which comes with the receiver) to come through. If the chassis is mounted on the right side of the car, it will be most convenient to drill this hole so that the lead-in wire will come in at the right front corner post as shown in Fig. 10. The hole should be drilled preferably through one of the roof bows.

Now take the roll of antenna tape and starting at the hole for the lead-in unroll the tape and lay it on top of the roof in a pattern as shown in Fig. 10. The tape should be kept away from the metal part of the roof at least three inches, as shown in diagram, to avoid shielding effect. The antenna tape is supplied with a solder lug on the outside end of the roll. Bring one end of the lead-in wire up through the hole in the car roof and solder the wire to the lug on the antenna tape. Make the soldered connection as flat as possible to avoid a lump on the car roof.

Next take the roll of adhesive tape and cover over the antenna tape with it as shown in Fig. 10. Place two small lengths lengthwise and two crosswise over the soldered connection and the hole in the roof. Now go over the adhesive tape with the top dressing that is supplied in a two ounce can with the antenna equipment. Use at least two coats of this weatherproofing dressing.

The lead-in wire is brought down to the receiver in the most convenient manner. Usually it is secured to the corner post with the upholstery tacks. In some instances it may be placed under the window moulding. The lead-in should be soldered to the antenna lead from the receiver and the soldered connection taped.

In some cars there is a metal mesh in the roof grounded to the steel body supports. In a case of this kind the tape will not have a satisfactory pick-up. It will be necessary to get inside the roof and unground the metal mesh. It should also be cut off around the edges so that it is at least three inches away from the metal part of the roof. The metal mesh may then be used as an antenna or the tape antenna may be used.

In many makes of cars on the market, there is an antenna already built in the roof. In a case of this kind the built-in antenna can be used and will be found to be very satisfactory.

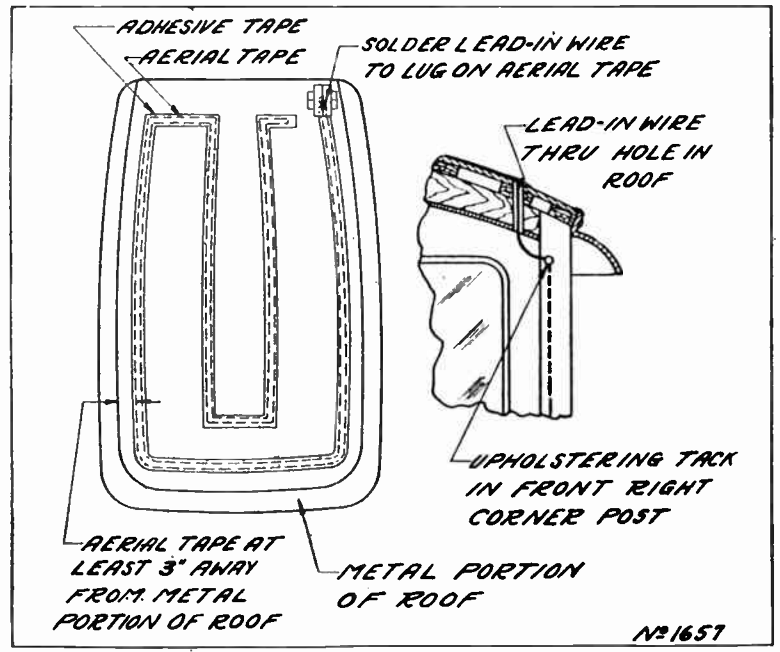


Fig. 10. Method of Making Antenna Installation.

Suppression of Ignition and Generator Noise

In order to operate the receiver while the motor is running it will be necessary to use suppressors in the ignition system. Ignition noise manifests itself as a buzzing or clicking of the same frequency as the spark discharges in the spark plugs. Two types, distributor suppressors and spark plug suppressors, are furnished as shown in list of accessories page 15.

One spark plug suppressor is required on each spark plug. Two distributer suppressors are used, one being placed over the distributer in the lead from the coil as shown and the other at the coil in the same lead from the distributer to the coil.

These suppressors are carbon resistors of 25,000 ohms each and have the effect of reducing the surge of the high voltage impulse. They do not in any way interfere with the running of the engine.

To install the spark plug suppressor remove lead from the distributer to the top of the spark plug. Remove nut of spark plug and place bracket end of suppressor over the stud on the spark plug. Then screw down nut of plug over suppressor bracket. Next place terminal on end of wire from distributer over stud at the other end of the suppressor.

Electrical Interference in Auto-Radios

Interference in auto-radio receivers has been a problem for the Service Technician ever since this type of set was first introduced. Lately, due to the increased sensitivity of auto-radio sets, the electrical interference set up by ignition systems and other electrical circuits has become even more of a problem.

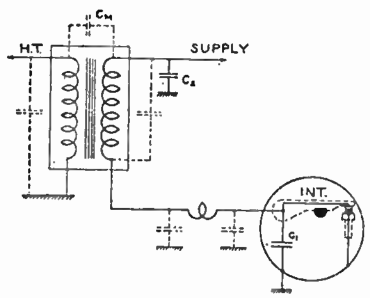


Fig. 1. The condensers C-1 and C-2 are usually sufficient to eliminate interference from the low-tension circuit.

A great deal of research has been carried on in order to determine first, all sources of interference in an automobile which have an effect on the auto-radio set, and second, the best possible means of eliminating these intereference effects without affecting the normal performance of the automobile.

Practically all troublesome forms of interference originate in the ignition system, and are due to spark discharges. The origin of the interference may be

(1) at the spark plugs,
(2) at the high tension distributor or at poorly connected leads in its circuits,
(3) at the low tension interrupter, or
(4) at the generator brushes.

These various forms of discharges produce oscillations at an audio rate, and are of sufficient intensity to be picked up by the car antenna even though the supply leads to the radio are filtered or shielded. These oscillations may also be picked up by the receiver by conduction along the car wiring and other insulated conductors.

Shielding

Such interference may be reduced by completely shielding the entire electrical system of the car. However, this is rather a difficult proposition in most cars, and a better way to go about the elimination of the interferences is to attack them at their sources just as most Service Technicians go about the elimination of electrical disturbances from household appliances.

You can begin by taking it for granted that most, if not all, the interference occurs in the engine compartment, right under the hood. The principal source of disturbance is the high-tension ignition wiring. Next in line is any wiring from the engine compartment to the radio set or space near the set. Also, any long leads that would tend to couple the aerial with the high tension source. Two bad actors are the primary breaker or interrupter and the lighting generator. And, believe it or not, the steering column and gear shift lever are not above suspicion, and it may be necessary to ground one or both to the frame of the car if interference persists.

Means of Reducing Interference

There is no need to say much about ignition suppressors as they are a part of the original installation. However, it is required that these suppressors, which are usually connected directly to the top of the spark plugs, carry high instantaneous currents, and sometimes they deteriorate. One or more may have to be replaced.

Interference in the low tension circuit may be reduced or eliminated by the use of fixed condensers. As shown in Fig. 1, one condenser (C-1) should be connected from the movable arm of the interrupter to ground. This reduces sparking at the contacts. Another condenser (C-2) should be connected from the supply lead of the primary winding of the ignition coil to ground. This condenser effectively grounds the high-frequency impulses at this point and prevents their conduction along the supply lead. In some cases it is necessary to place shielding on this supply lead and ground it at the interrupter and coil housings.

Figure 2 shows a typical circuit of a third brush lighting generator. A fixed condenser C connected across the contacts of the cut-out is usually sufficient to eliminate any surges produced by sparking at the commutator of the generator. The condenser C should be grounded to the frame of the generator.

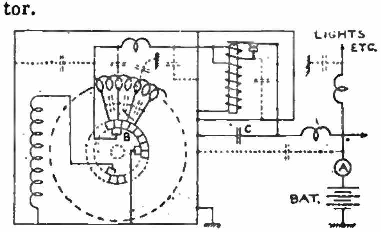


Fig. 2. Typical circuit of third brush lighting generator. Condenser C eliminates the possibility of voltage surges.

Procedure in Installation

In making an auto-radio installation it is well to proceed in the following manner:

(a) Install the receiver chassis, speaker, and accessories. Use a shielded antenna lead and make sure that both the chassis and shielding braid are carefully grounded.

(b) Check the ignition system for the condition of the spark plugs and the interrupter contacts. Make sure that all high-tension cables actually contact with the terminals at the distributor, plugs, or coil. Replace all leaky high-tensou cables.

(c) Connect the rotor and spark plug suppressors, the generator condenser, and the condenser on the supply side of the coil. Make sure that resistors, when used, are close to the proper terminals, and keep the condenser leads short.

(d) If the coil supply lead passes through the same conduit with the high-tension cables move it to a position where it will be coupled to them as little as possible.

(e) Make sure that the interrupter mechanism is actually grounded —if necessary shunt it to the engine frame.

If interference still exists proceed in the following order:-

(f) If the coil is far from the distributor, move it if it is allowed.

(g) If the coil must remain remote from the distributor, shield the lead from the coil to the interrupter and ground the metal braid to the coil and distributor housings.

(h) Be sure that the coil housing is well grounded to the engine block. If it is still mounted on the bulkhead, ground it through flexible braided lead.

(i) Clamp all the low- voltage wiring as close to the car frame as possible.

(j) Shield the 6-volt supply leads to the receiver and carry them back to the battery terminals.

(k) Check the interference with the dome light leads disconnected as near the source of interference as possible. If this reduces the interference insert a filter in these leads.

(l) Check the grounding of the steering column. If necessary add a flexible copper braid between the tube or column, and the car frame.

(m) If the common high-tension lead is long, shield it with copper braid, grounding the braid as often as possible along its length.

(n) Try other logical expedients suggested by the particular installation.

If you are working on a receiver already installed, it is a good idea to check the whole installation against the installation notes above, before taking any steps to eliminate interference, which might afterwards prove to be so much waste effort.

(L. F. Curtis, Proceedings, I. R. E., April, 1932)

◆

Philco Transitone Aerial Installation Data

Within certain limits, a large antenna will deliver greater signal strength than a small one. The signal impressed on the antenna is directly proportional to its length and its effective height, and inversely proportional to its resistance. The effective height does not necessarily mean the distance between earth and the flat top portion of the antenna, for in the automobile no earth connection is used. The body and chassis of the car are used as a counterpoise and function in much the same manner. The effective height can be considered as the distance between the antenna and the metallic body of the car.

This means that best reception is secured when the largest possible antenna is installed in the top of the car, when it is farthest separated from the ground used and when the antenna and lead-in wires are soldered and offer the least resistance.

Experiments conducted over a period of years have established the fact that the antenna should be separated from the nearest metal of the car body by at least three inches.

Car Top Construction

Before considering the installation of antenna, it is well to consider the top construction of the cars of today. They may be divided roughly into the following groups:

1. Slat Top.
2. Poultry Wire.
3. Fabric.
4. Metal Bow and Cross Braces.
5. Open and Convertible.

The slat type top consists of the conventional wood bow across the top with the slats running lengthwise and fastened to the bows. The top padding is supported by the slats. In the second group, the slats are replaced with poultry wire which is stretched tightly over the bows and fastened to the roof rails. The padding in this case is laid over the poultry wire. The third group uses muslin or some other fabric stretched over the bows for supporting the top padding.

Metal bows may be encountered in a few cars, or there may be metal reenforcement brackets on some of the bows. In a few cases, metal diagonal cross braces are used. Open and convertible model car tops have practically all the same construction, the top material is fastened over the bows.

By maintaining clearance between the poultry wire and the metal quarters of the body during the construction of the car, the car manufacturers have been able to build in a good car antenna. A few of the car factories install a wire antenna in the roof.

Cars With Slat Top Construction

The headlining should be lowered from front to back so that a copper screen antenna can be installed in the roof.

1. Use a good grade of copper screen. No. 14 or No. 16 mesh, 36-inches wide is satisfactory and can be used in practically all installations.

2. Maintain three inches clearance between the screen and the car body and all metal work in the top. Cut out a section of the screen to get this clearance around the dome light.

3. The wiring in the top to the dome light and switch must be run along the side of the top frame, then along the top edge of the side of a bow to the dome light fixture.

4. An 18-gauge stranded copper, rubber and cotton covered antenna lead-in should be soldered to a front corner of the antenna screen. If the receiver is to be located on the right side of the car, solder the lead-in to the right front corner of the antenna; if the receiver is to be located on the left side the antenna lead-in should be soldered to the left front corner. It is a good plan to solder or bond the whole front edge of the antenna screen.

5. The copper screen must be tacked securely so that it cannot come loose.

6. The headlining and all trim must be carefully replaced.

Tack the screen to the farthest bow in the rear that will give three inches clearance from the rear metal apron. With the edge of the screen lined up with the bottom front edge of the bow, the screen is tacked against the face of the bow, close to the top. It is necessary to tack the screen in this manner, so that the listing strip used to support the headlining can be tacked to the face of the bow. On bows on which the listing strip is not tacked, it will be quite all right to tack the screen along the bottom of the bow. Tack the screen to each bow from the back to the front of the screen. Do not come closer than three inches to the metal aprons along the sides and the metal frame above the windshield.

The lead-in should be concealed behind the windshield moulding, or if the front corner post is hollow, it can be run down the inside of the post. In a few cases, it may be necessary to bring the lead-in down through the wind hose along the side of the corner post.

After the antenna and lead-in have been installed, test the antenna for grounds.

Use a high resistance volt-meter and a 45-volt battery, testing between the antenna lead-in and the body of the car. Do not hold the test connections to the antenna and the car body with your fingers,—as the leakage across your body will cause a high reading on the meter.

Having made certain that the antenna system is clear of grounds and leaks, proceed with replacing the headlining and trim.

Cars With Poultry Wire Reenforcement

The poultry wire when cleared of grounds may be used as an antenna. This may be done in either of two ways. The top deck may be removed and the netting cleared where the edges ground on the car body. The more practical way is to drop the headlining the entire length of the car and clear from beneath.

A strip three inches wide is cut from the poultry wire reenforcement around the four sides. The poultry screen is then laced securely in place using double strands of number six waxed linen cord. Use short lengths of cord and fasten securely. The poultry wire must be held taut so the top will not sag. Care must be taken to keep the sharp ends of the screen bent back so they will not puncture the padding and the top deck material and will not extend through the headlining. On standard installations, the antenna lead-in must be soldered across the front end of the screen and brought down the front right corner post. In cases where the post is solid, the lead-in may sometimes be brought down inside the windshield moulding or down the hollow rubber wind hose which is used in many cars.

Rearrange the dome light wiring so that there is a minimum coupling between the wires and the poultry wire antenna. Test the installation for grounds, using a 45-volt "B" battery and a high resistance voltmeter. Replace the headlining and trim carefully

Fabric Top Construction

In a few cars, the top padding is supported by muslin strips stretched over wood bows. An antenna can be easily installed in these cars in much the same manner used in cars with the slat top construction. Instead of tacking the screen under the bows however, the screen can be placed over the bows and tacked only at the rear and the front. Otherwise the procedure is the same.

Cars With Metal Braces

In case there are metal diagonal braces in the top, the braces must be freed of grounds or the efficiency of the antenna will be greatly impaired.

Usually the rear ends of the braces are fastened to the wood top frame while the front ends are fastened by means of brackets to the front corner posts.

Drop the headlining and work from the inside of the car. Release the front end of the braces. Ream out the hole in the bracket and use fibre washers and sleeve bushing to insulate the cross brace bolts from the brackets.

Usually the dome light is connected to one of the braces. Disconnect the lead from the brace and run a new ground to the car body.

When both braces have been insulated, the antenna can be installed in the standard manner.

Cars With Metal Bows

In a few cars in which metal bows are encountered, a different kind of antenna is used.

After the headlining has been lowered, provisions are made to install a wire antenna. Screw eyes or staples should be securely fastened around the wood top frame of the car and separated from the bows by at least three inches. They should be so spaced that the wire will be parallel to the bows and the loops two to three inches apart. Using 18 gauge stranded rubber covered wire, lace the wire through the screw-eyes or staples. The antenna lead must be brought down one of the front corner posts, depending on the location of the receiver.

Test the antenna and lead-in for any possible grounds and then carefully replace the headlining and trim.

Open and Convertible Models

The tops of the open and convertible models are designed to fold back. Since the antenna cannot in any manner interfere with this, a wire antenna is the only practical one.

Remove the top material and lay it back, leaving the side flaps in place. Secure a piece of top fabric, matching that removed, and fasten it properly in place over the cross ribs and over the side flaps.

Cut a piece of drill cloth or muslin approximately three inches smaller than the width of the top and about the length of it. Punch holes in the drill cloth through which the antenna wire is to be woven. The holes should be in rows, three inches apart, parallel to the cross ribs. Space the holes about ten inches apart in each row.

Use 18-gauge stranded rubber covered wire and weave it back and forth through the holes in the cloth. When completed, the cloth is fastened to the front and rear bows only.

The antenna lead-in must be brought down in the rear so the top may be lowered easily.

The top material and all trim must be carefully replaced. While it is hardly probable that the antenna is grounded, check it with a voltmeter to make sure.

Shielding

In the past, a great number of service men were prone to shield the high tension leads indiscriminately. This gave rise to numerous complaints on the car performance. There is never any need for shielding the high tension leads. The only possible exception to this is when the coil is mounted on the instrument panel and practically touches the receiver. The high tension coil lead should be shielded in such cases in the following manner:

First cover the lead with a piece of loom similar to that used on the "B" cables. Then cover this with hollow copper braid. The shielding on the cable should start one inch from the coil terminal and be carried on through the engine compartment. Ground the shielding with a pigtail at the dash.

Shielded Antenna Lead

If a stubborn case of interference is encountered, shielding the antenna lead between the receiver housing and the point where the lead-in leaves the front corner post will usually be very effective. The shield must extend from the corner post to the receiver housing and be bonded to it.

Do not use the so called shielded antenna lead-in wire as the losses are too great. The best lead suitable for this is 7 m/m Beldenlace shielded secondary cable made by Belden.

Additional Supression

The intense high frequency field present under the hood is sometimes carried beyond the dash by pipe lines, rods and wires. To prevent this, some precautions are necessary.

Isolate the high tension leads from the rest of the car wiring. Never run low tension wires from the coil, horn wires or other cables in the high tension manifold or close to the high tension cables and parallel to them.

Additional interference condensers may sometimes be needed on fuse blocks, on the ammeter, or possibly on the dome light lead where it enters the front corner post. Always connect the "A" lead to the car battery. Unnecessary interference will most likely be encountered if the "A" lead is connected elsewhere.

Occasionally it will be necessary to bond the dash to engine block. Use heavy copper braid for this, bolting the braid to both the dash and the engine block. Use a smaller copper braid for bonding rods and pipe lines, fastening the braid to the dash with self-tapping screws, and soldering the other end to the parts to be bonded. Keep all bonds as short as possible, but allow sufficient slack so as not to interfere with the operation of choke rods, etc.

◆

Output tubes used as Class B amplifiers in auto-radio receivers must be of identical characteristics. For that matter, all such systems irrespective of their use, in automobiles or otherwise must use tubes with operating characteristics which differ as little as possible.

◆

"B" batteries should not be located near the exhaust pipe. Too much heat will greatly reduce the operating life of the plate voltage source. Make certain that the "B" battery box completely houses the batteries, otherwise there is danger of ruining the batteries during spraying of the springs of the car or when passing through puddles.

◆

Measured voltage: One peculiar condition noted in connection with automobile radio receivers is that relating to the measured voltage across the filaments of the tubes in the receivers. Assuming 6.3 volt tubes, tests have shown that tubes in receivers operated when the generator was charging at a rate of about 10 amperes, were being subjected to a potential of from 8.5 to about 9 volts. Normally the open circuit voltage of the average generator used to charge car batteries is about 30 to 35 volts. However, when this generator is connected across a 6 volt battery, one would expect that the voltage output of the battery would not be greater than that to be obtained right after full charge, or about 6.8 volts. Tests have shown that the battery voltage during gassing will rise as high or slightly above 7 volts, but the reason for a 9 volt output is mystifying. A possible reason for such a condition lies in undue agitation of the electrolyte, caused by the vibration conveyed to the battery when the car is in motion, or even when standing idle when the motor is accelerated up to a speed equivalent to about 25 miles per hour.

Plymouth and Desoto Radio Installations

Many Service Men have sweated and fretted and perhaps lost religion when making radio installations in the above mentioned cars. One of the leading Service Men in New Orleans recently lost what little religion he had working on such installations and finally in despair made up his mind that he was going to discover just what the trouble was, in order to spare others in the profession such exasperating work.

Mr. J. Henry Blache, Jr., finally discovered the trouble. It so happens that in the new models the motor firing spark is still heard in the loudspeaker regardless of all precautions suggested by the manufacturer. Mr. Blache discovered that this trouble was caused by the "hot" wire running from the ammeter on the dash board to the dome light. This unshielded lead comes near the overhead antenna and feeds the noise to it.

Mr. Blache found that by connecting an 0.5-mfd. condenser from the lead (red) where it makes contact with the ammeter to the ground (frame of car) this trouble was entirely eliminated.

E. T. Jones.

Auto-Radio Antenna

When making an auto-radio antenna installation it is generally well recognized that the greater the clearance above or below the car the better will be the antenna pick-up. Working along these lines, one soon arrives at a very definite practical limit, depending on the body style of the car, beyond which no further improvement is possible. Increasing the antenna pick-up is unquestionably one of the most important items in the betterment of auto-radio installations. A practical system, which has apparently been overlooked, capable of giving a 25 to 50 per cent increase in signal strength is here described. It involves the use of a regular roof antenna, an under-the-car antenna (counterpoise) and a floating antenna coil (ungrounded).

To understand the operation of the system, consider the action of the two types of antennae when encountered by an advancing positive wave-front. The roof antenna will acquire a positive charge with respect to the chassis. The counterpoise will become negative with respect to both chassis and the roof antenna. The potential difference between the roof antenna and the counterpoise, will be greater than the potential of either to the chassis.

By connecting the two antenna systems to opposite sides of the antenna input coil of the receiver, a stronger input is obtained. One further requirement is necessary in that the antenna coil must be "floating," or, in other words, disconnected on the ground side from the chassis. This is necessary to avoid shorting out the counterpoise to ground.

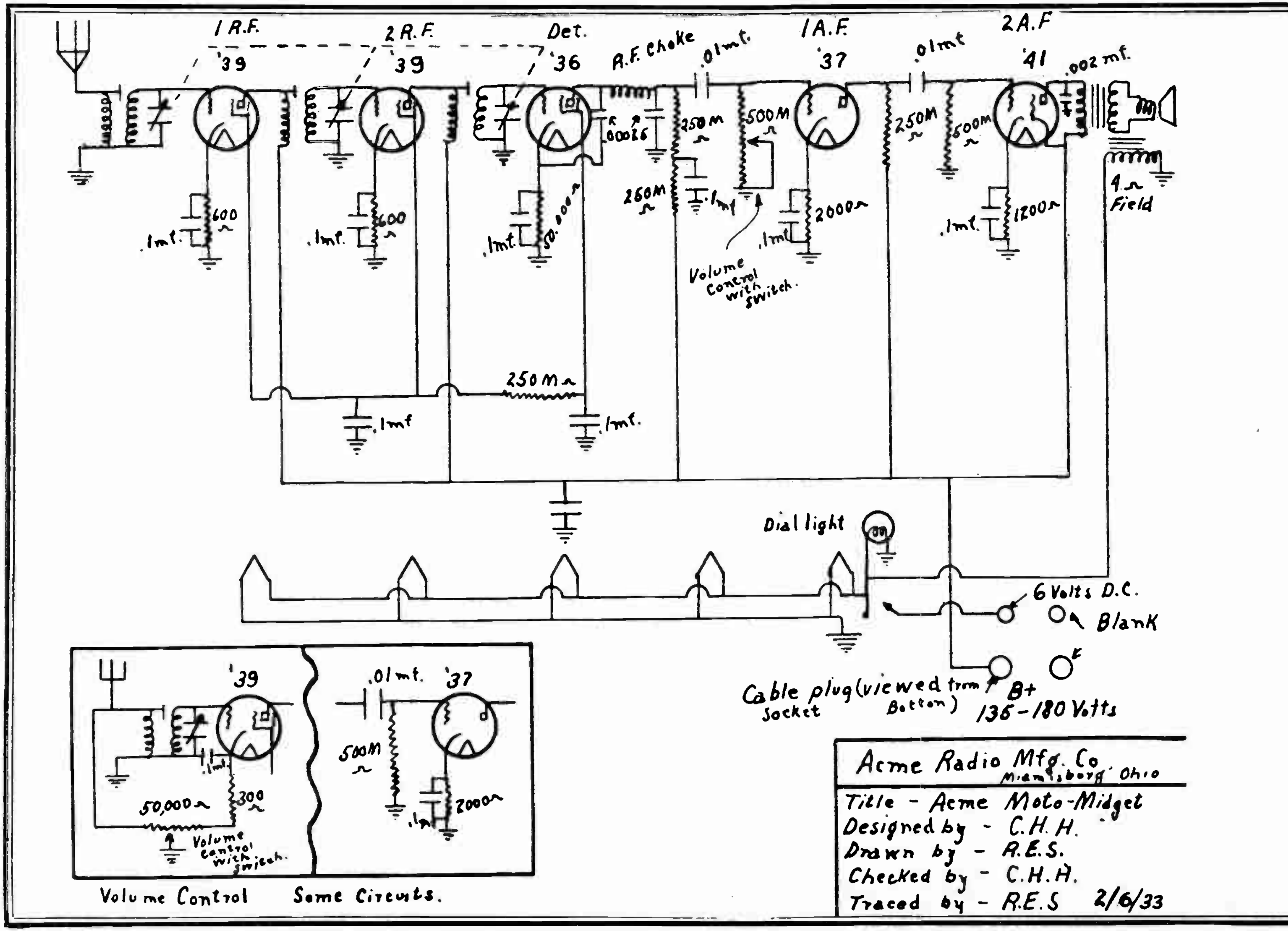
The antenna and counterpoise should meet in a twisted pair of wires at some point remote from the engine and conveyed in this manner up to the receiver.

The twisted pair will largely cancel out any disturbance which it picks up. While shielding may be used, it will generally result in but little improvement. The antenna and counterpoise should be installed with the same care as though they were to be used alone.

Alfred E. Teachman.

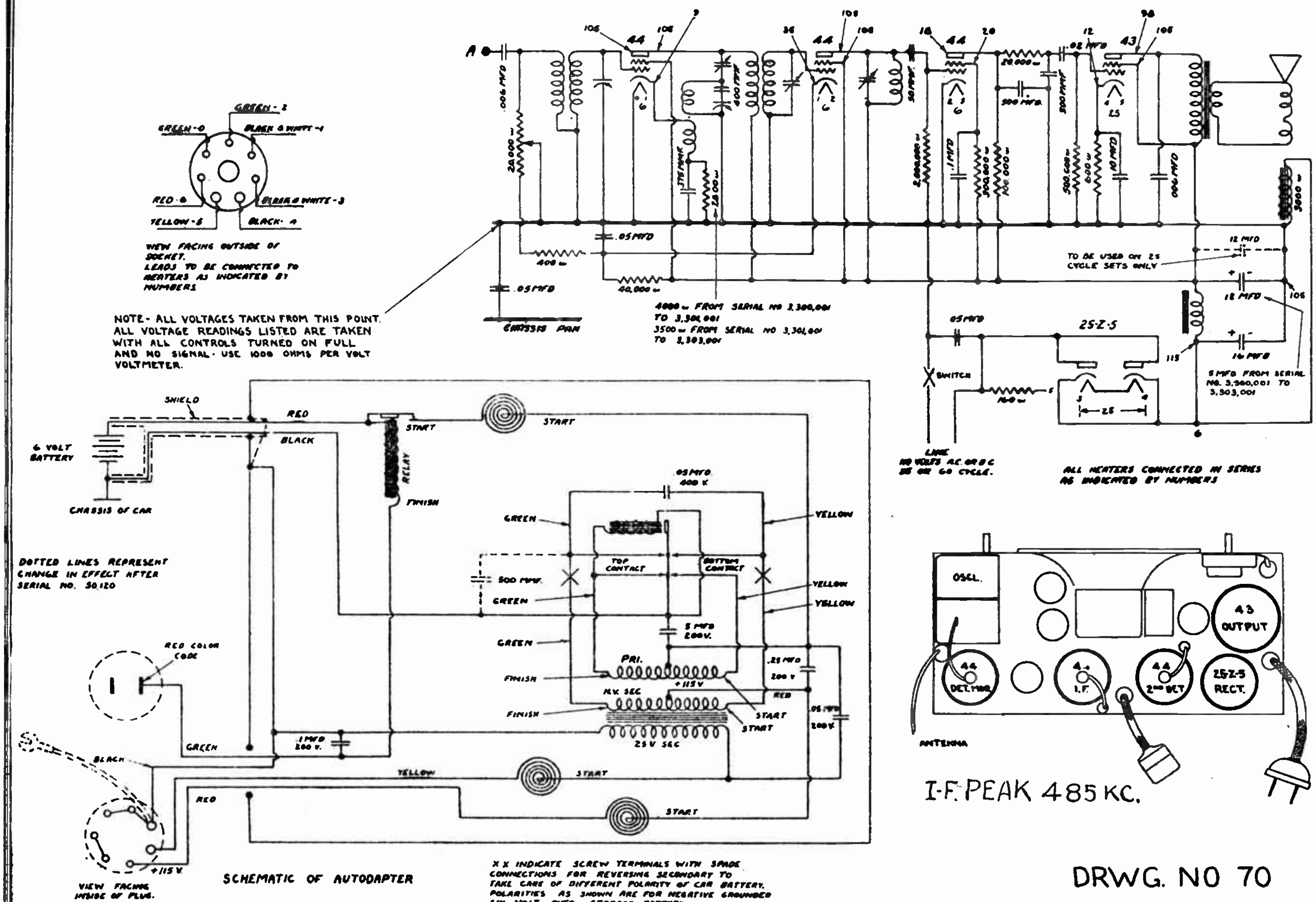
MODEL Moto-Midget

ACME RADIO MFG. CO.



MODEL U-50
Schematic
Socket, Voltage

ALL-AMERICAN MOHAWK CORP.

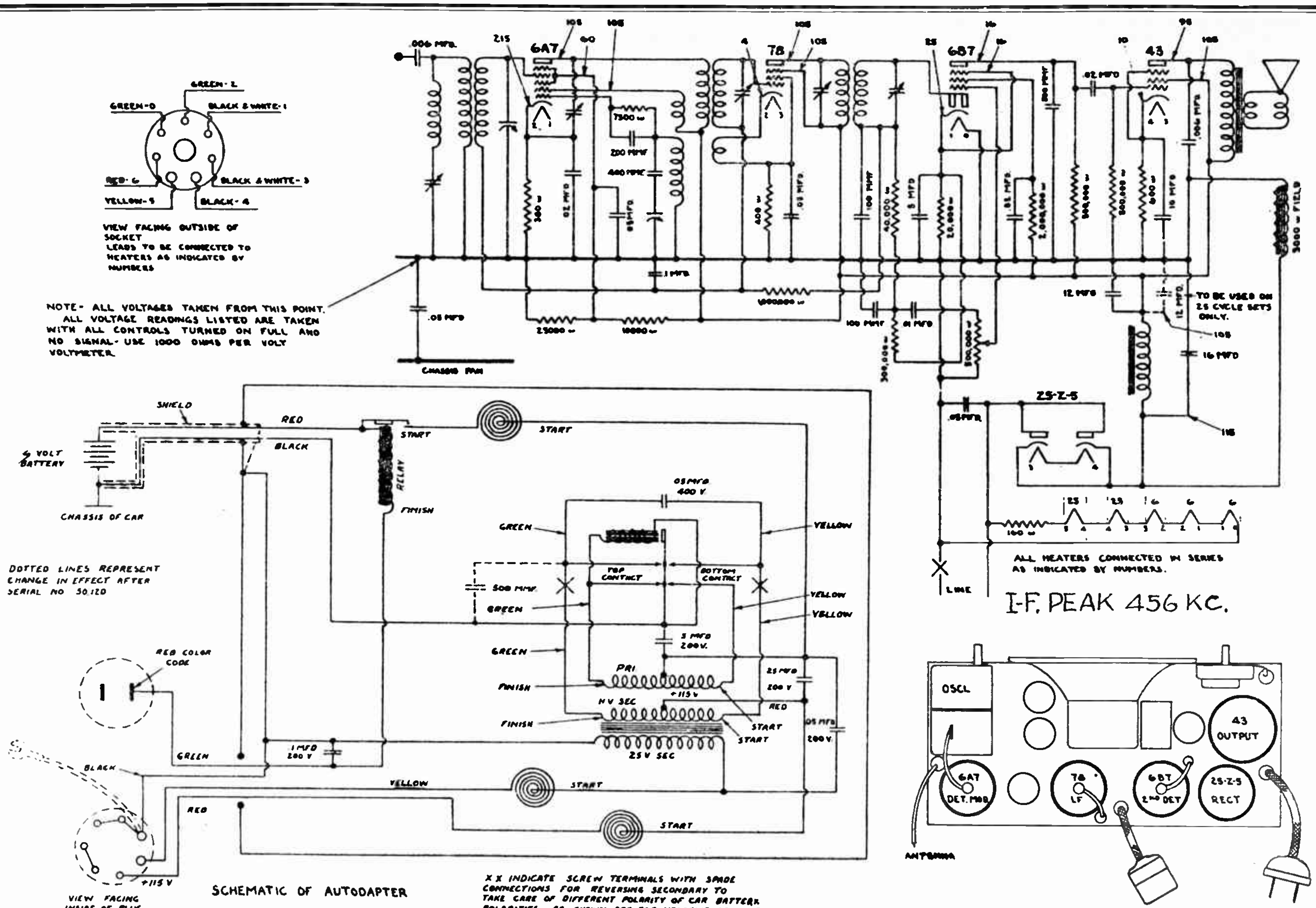


DRWG. NO 70

SERVICE SCHEMATIC MODEL U-50

MODEL U-500
Schematic
Socket, Voltage

ALL-AMERICAN MOHAWK CORP.



SCHEMATIC OF AUTODAPTER

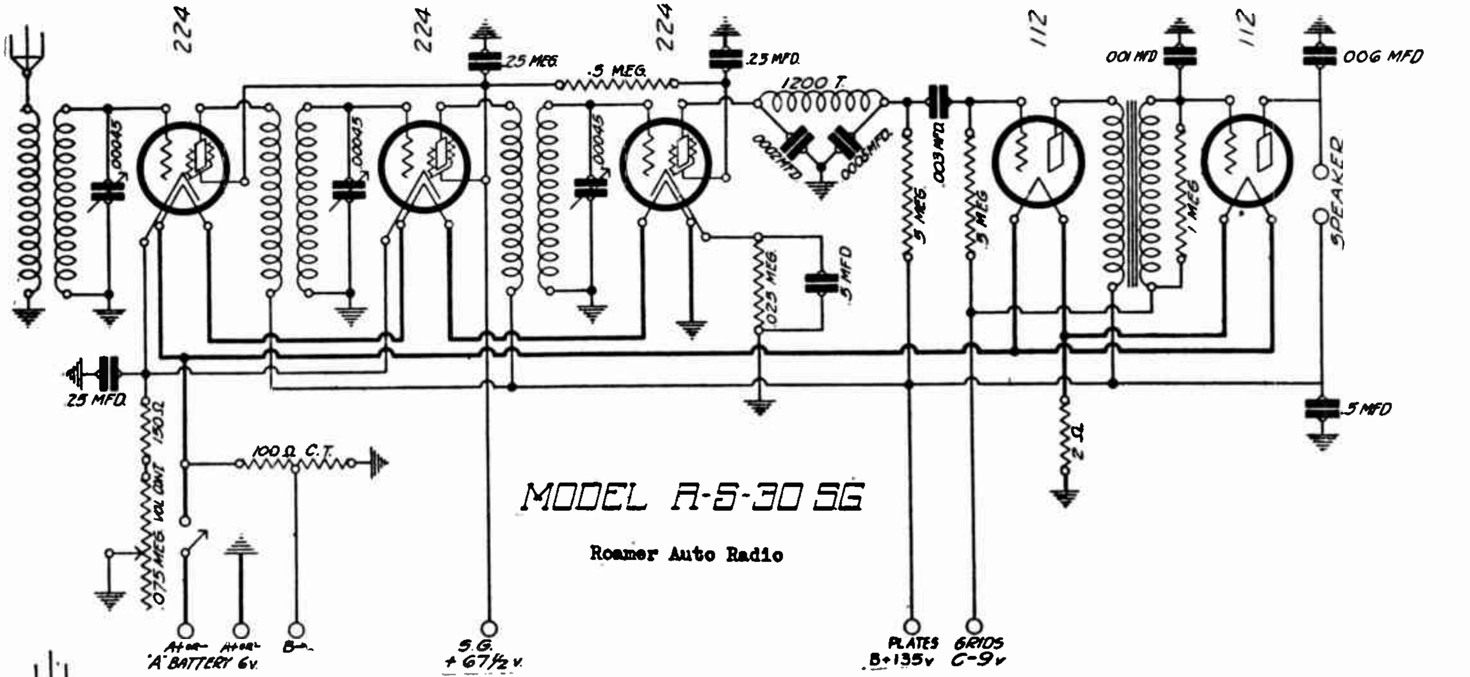
XX INDICATE SCREW TERMINALS WITH SPADE CONNECTIONS FOR REVERSING SECONDARY TO TAKE CARE OF DIFFERENT POLARITY OF CAR BATTERY. POLARITIES AS SHOWN ARE FOR NEGATIVE GROUNDED SIX VOLT AUTO STORAGE BATTERY.

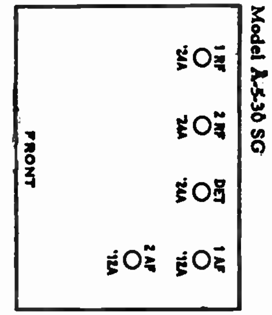
DRWG. NO. 72

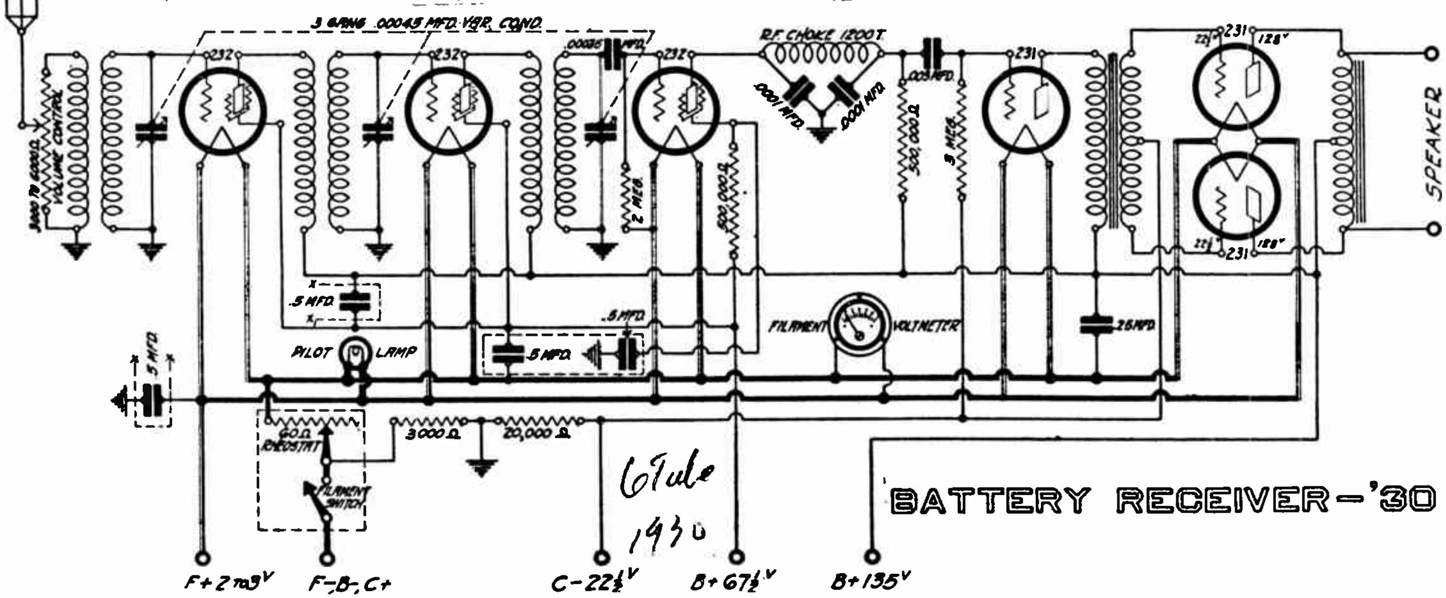
SERVICE SCHEMATIC MODEL U-500

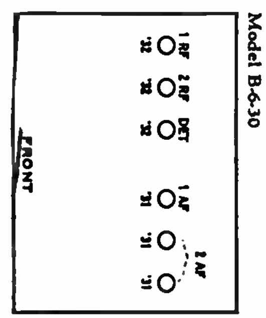
ALLIED RADIO CORP.

MODEL Roamer Auto Set 6 Tube "B" '30

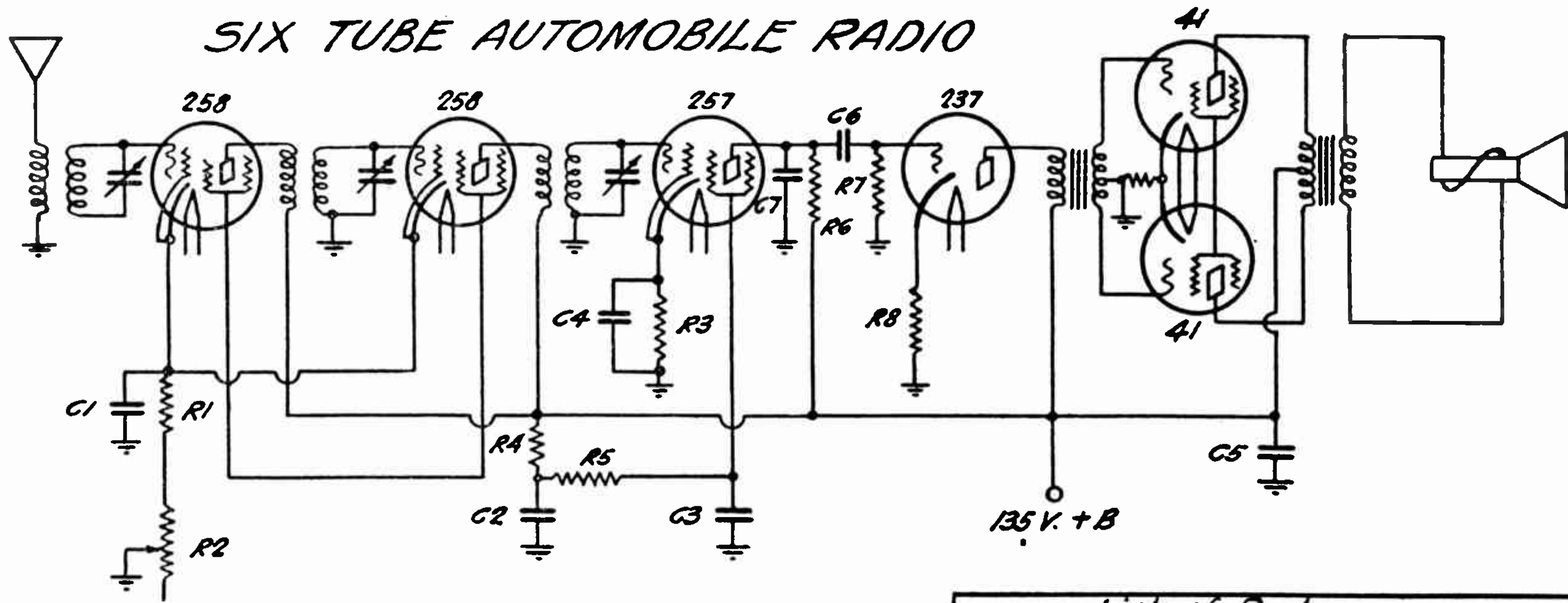








SIX TUBE AUTOMOBILE RADIO



List of Parts	
3 R.F. Coils	R3, 50,000 ohms
1 3 Gang Condenser	R4, 50,000 ohms
1 Input Push-pull Trans	R5, 2 meg.
C1, C2, C3, C4, C5. 1/10	Mfd. Conds.
C6, .01 Cond.	R6, 250,000
C7, .001 Cond.	R7, 250,000
R1, 200 ohms	R8, 2,000 ohms
R2, 10,000 ohms	R9, 500 ohms.

The 5 Tube Model identical to above print except less 1-41 tube.

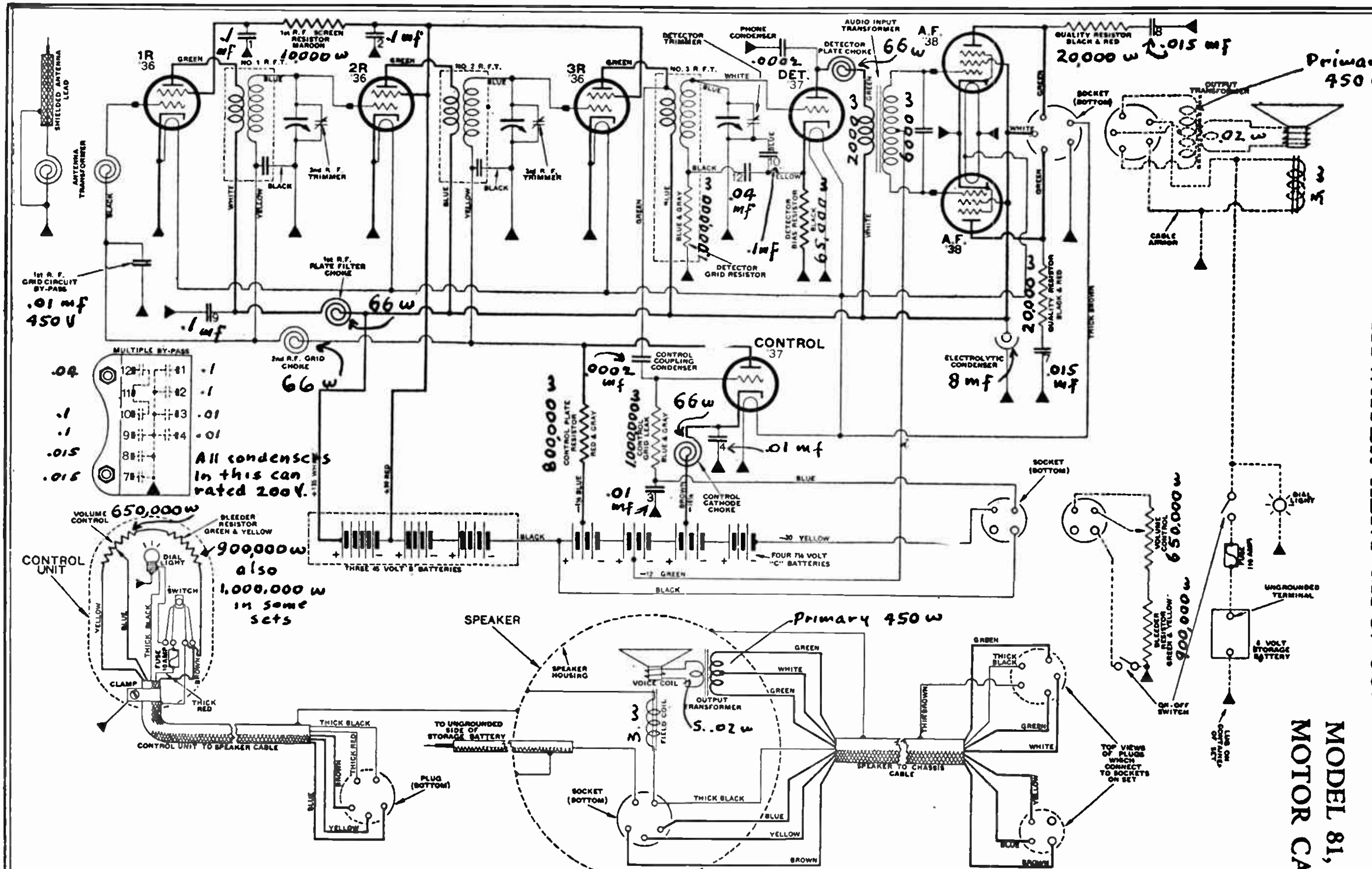
KNIGHT AUTO
1933

ALLIED RADIO CORP.

ATWATER KENT MFG. CO.

MODEL 81, 81-B, 81-C MOTOR CAR RADIO

MODEL 81
81-B
81-C

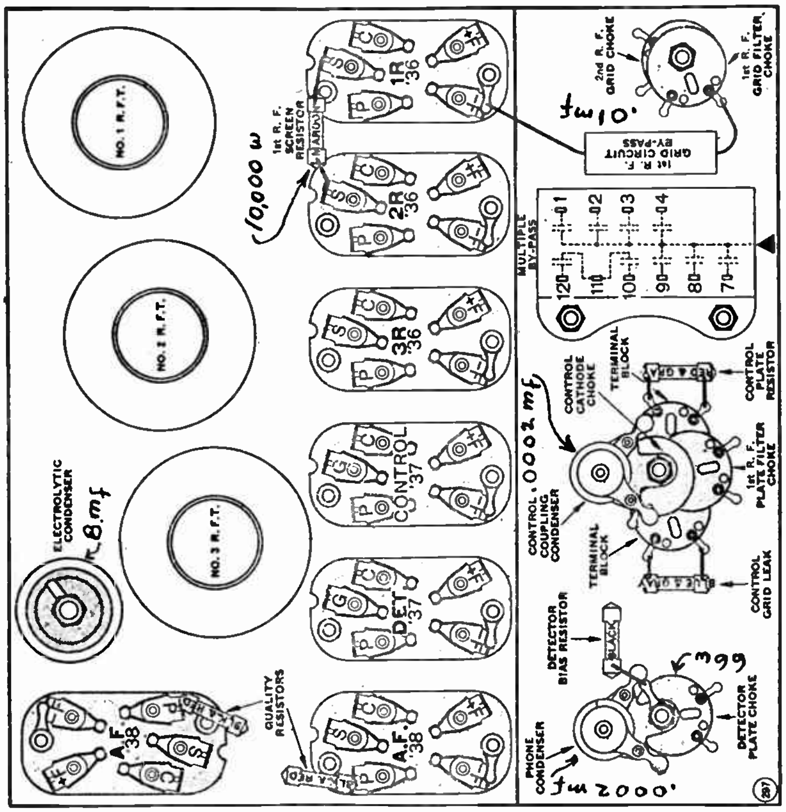


The small numerals adjacent to the bypass condensers correspond with the numerals marked upon the multiple bypass condenser unit. See next page.

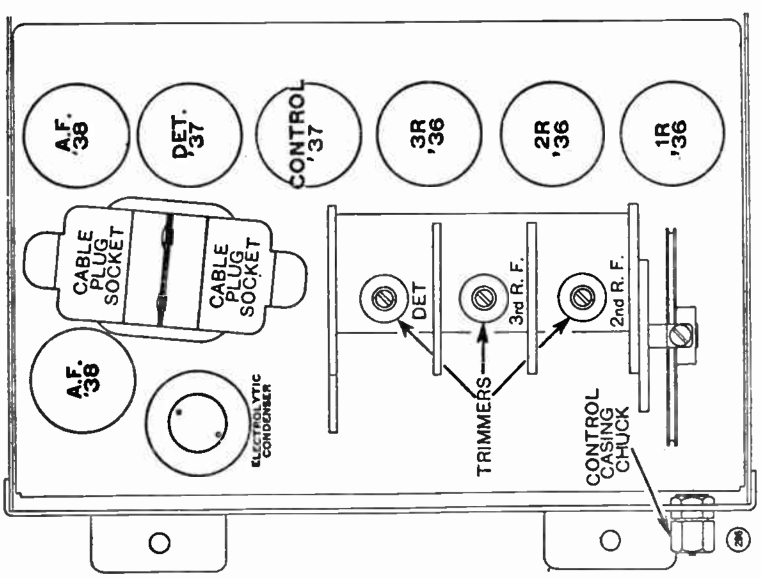
Voltage data on page 212

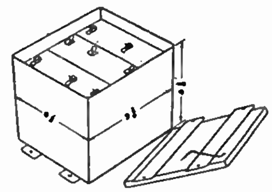
MODEL 81
81-B
81-C

ATWATER KENT MFG. CO.

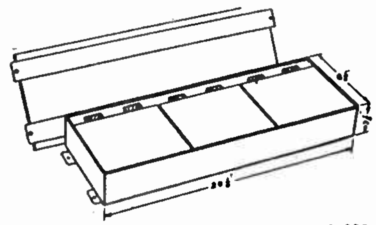


BOTTOM CHART.

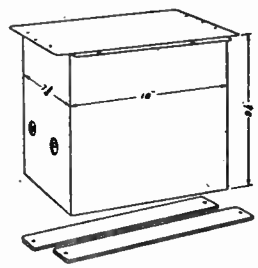




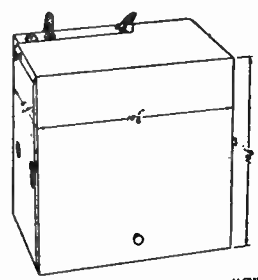
SQUARE "B" BATTERY CONTAINER No. 21933 FOR USE WITH MODEL 81-B OR 81-C.



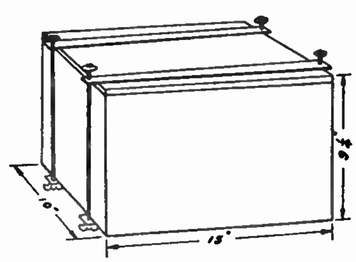
LONG "B" BATTERY CONTAINER No. 21932 FOR USE WITH MODEL 81-B OR 81-C.



MODEL 81-C CHASSIS AND "C" BATTERY CONTAINER No. 21931.
(Mounted under floor or through hole cut in floor.)



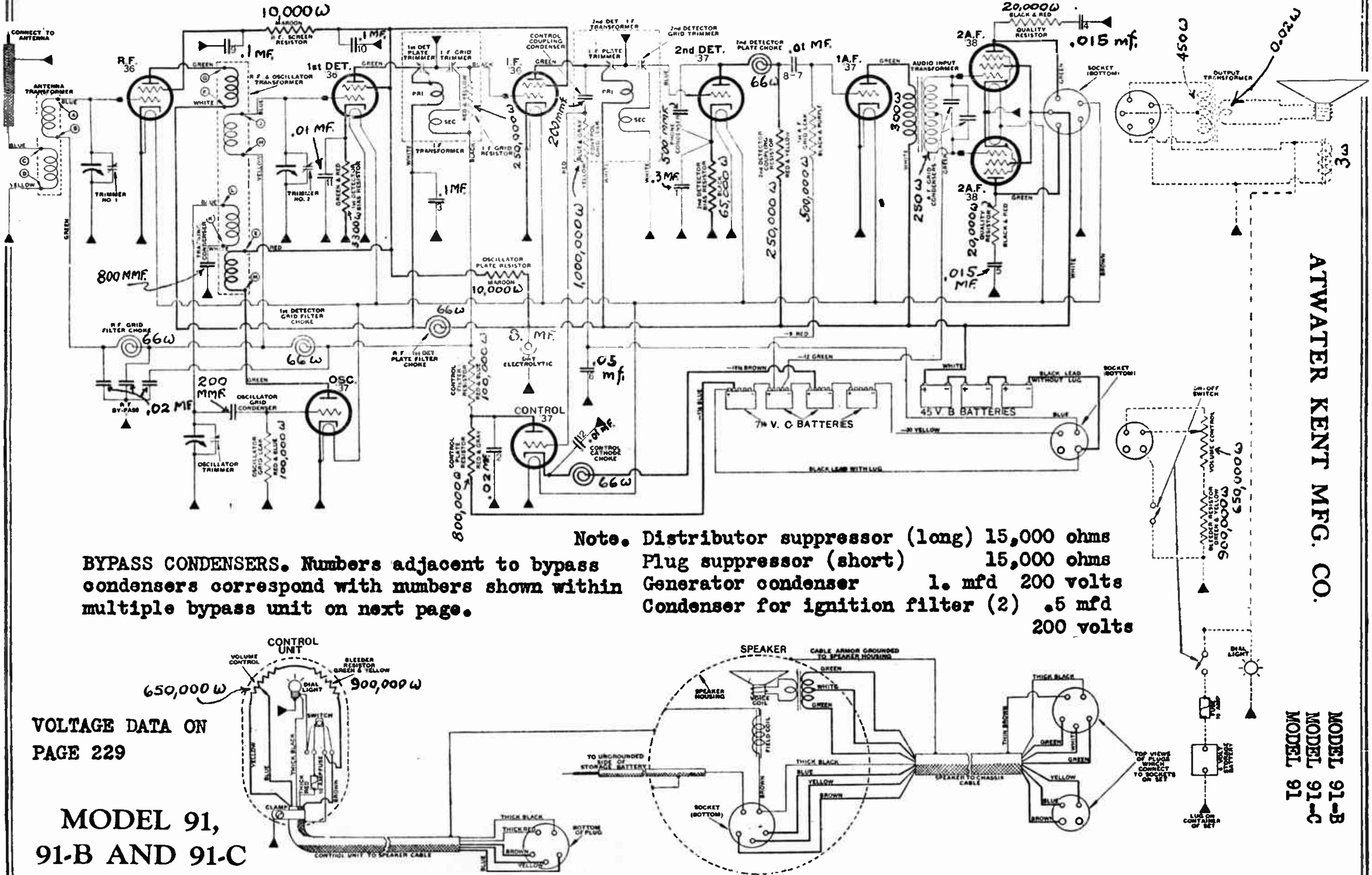
MODEL 81-B CHASSIS AND "C" BATTERY CONTAINER No. 21929.
(For dash mounting.)



MODEL 81 CHASSIS AND BATTERY CONTAINER.
(For under-floor mounting.)

Wiring diagram is shown on reverse side of this page.

(Intermediate Frequency, 260 Kilocycles)



Note. Distributor suppressor (long) 15,000 ohms
Plug suppressor (short) 15,000 ohms
Generator condenser 1. mfd 200 volts
Condenser for ignition filter (2) .5 mfd 200 volts

BYPASS CONDENSERS. Numbers adjacent to bypass condensers correspond with numbers shown within multiple bypass unit on next page.

VOLTAGE DATA ON PAGE 229

MODEL 91, 91-B AND 91-C

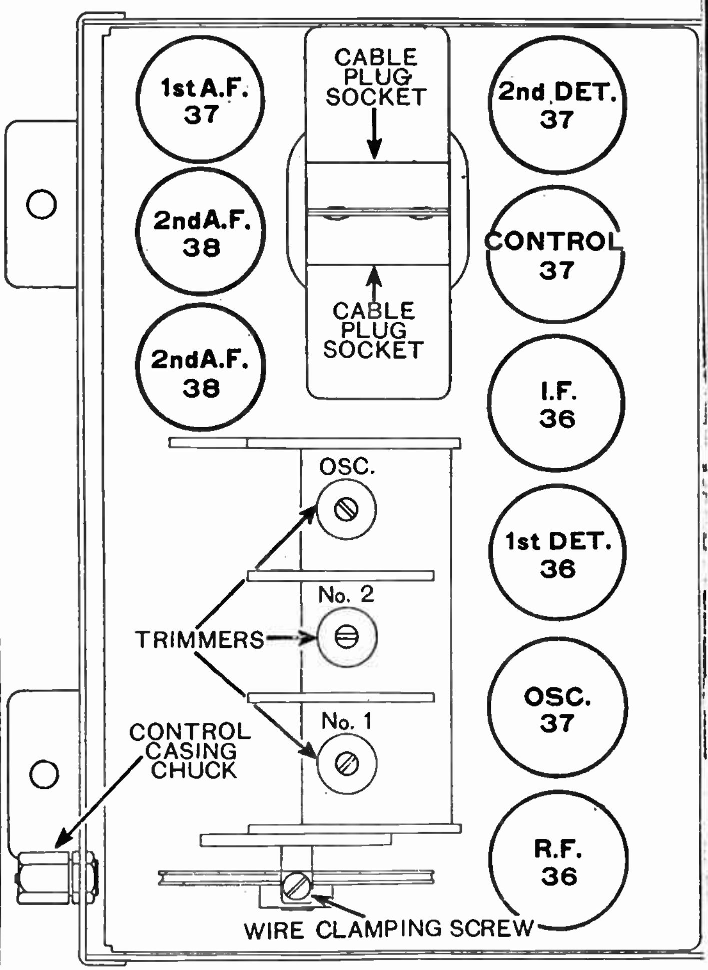
ATWATER KENT MFG. CO.

MODEL 91-B
MODEL 91-C
MODEL 91

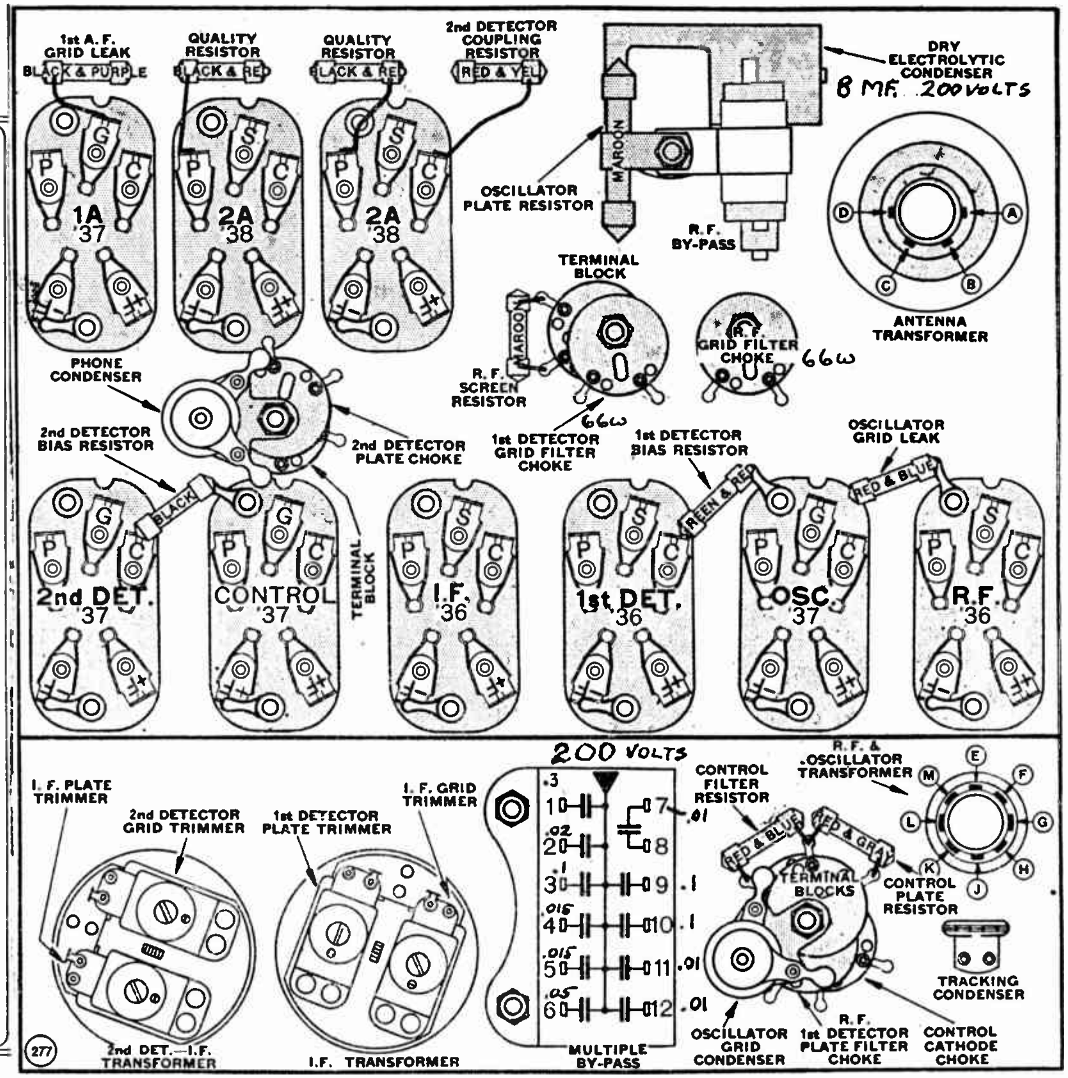
MODEL 91, 91-B, 91-C

(Intermediate Frequency, 260 Kilocycles)

ATWATER KENT MFG. CO.



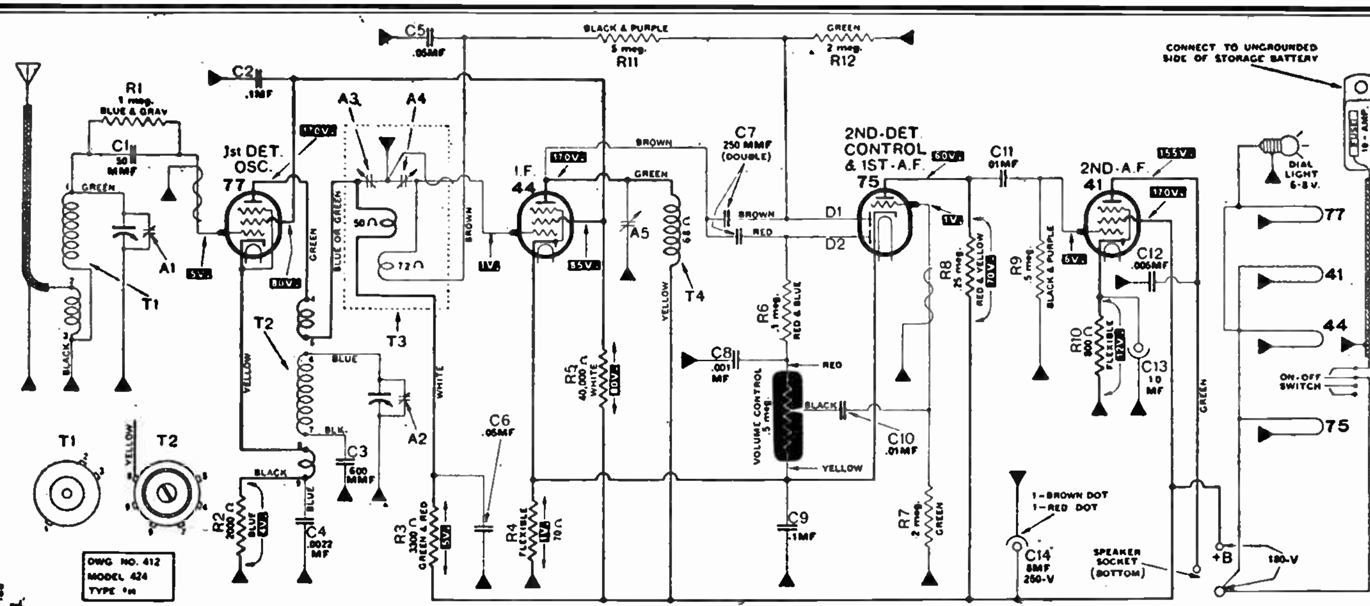
Top View of Model 91, 91-B and 91-C Chassis Showing Location of Tubes.



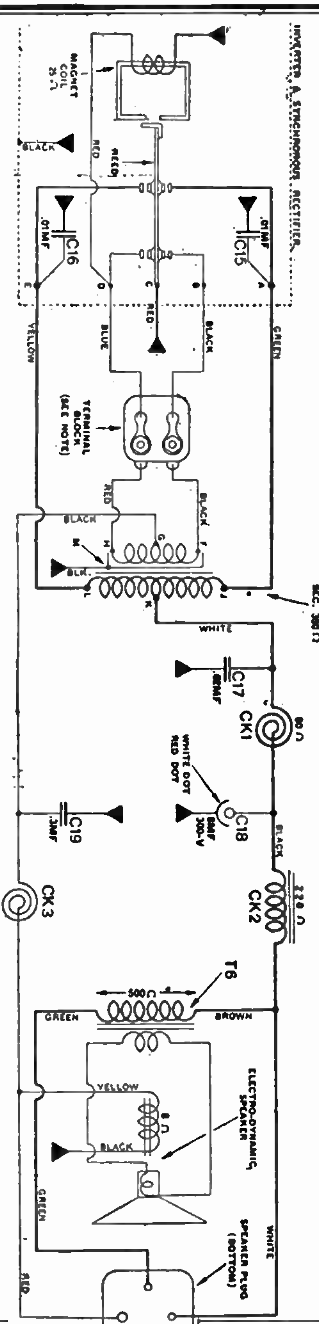
Bottom Chart of Model 91, 91-B and 91-C.

ATWATER KENT MFG. CO.

MODEL 424,534 Schematic Voltage



In late sets, T 1 is shielded, and there is no shield on the grid lead of the 77 tube.



Condensers C15 and C16 are .05MF in late sets.

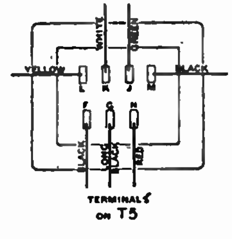
A fixed condenser (not shown above) is connected across the primary of T5. This condenser is listed as C20, .01MF, 200 volts.

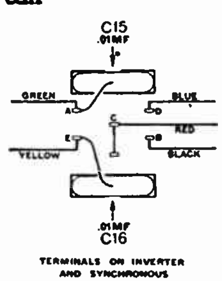
IF PEAK Model 424 264 KC

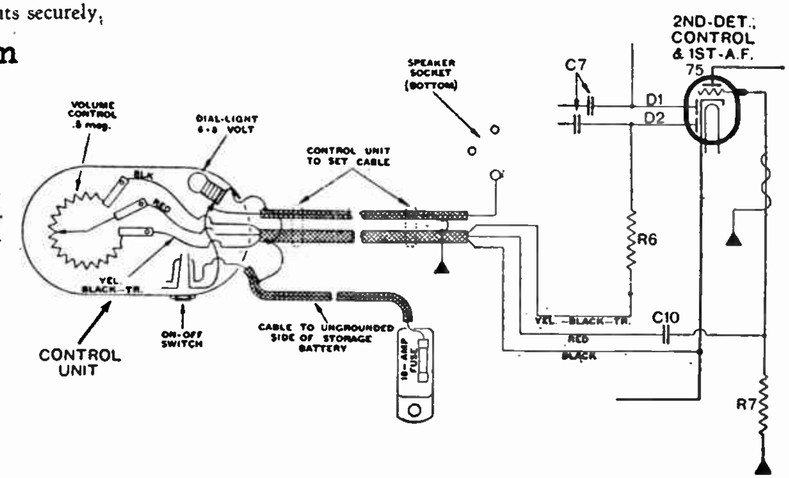
IF PEAK Model 534 450 KC

NOTE:—Model 424 and 534 are arranged for use, without change, in any car in which the positive of storage battery is grounded. If negative of battery is grounded, it is necessary, before installing set, to open the radio set container, remove the two nuts on the terminal block shown above, turn the block up-side-down, and replace the nuts securely.

Voltage data is shown on wiring diagram





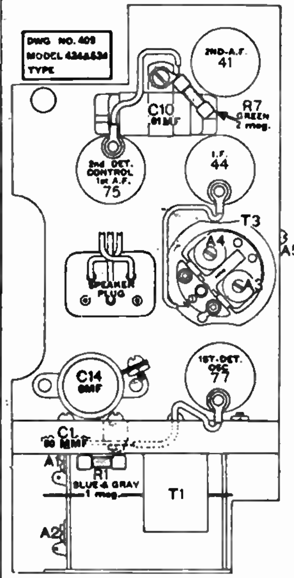


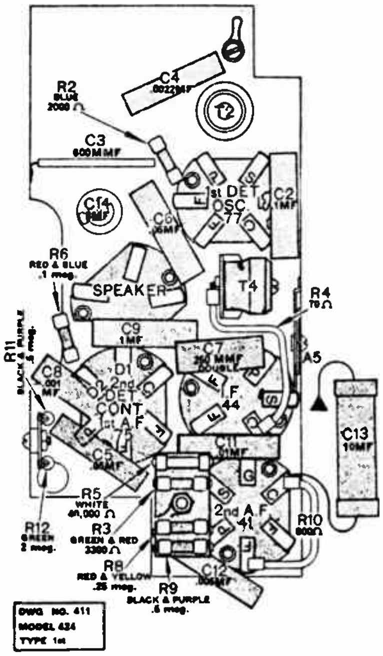
Control Unit in Model 534.

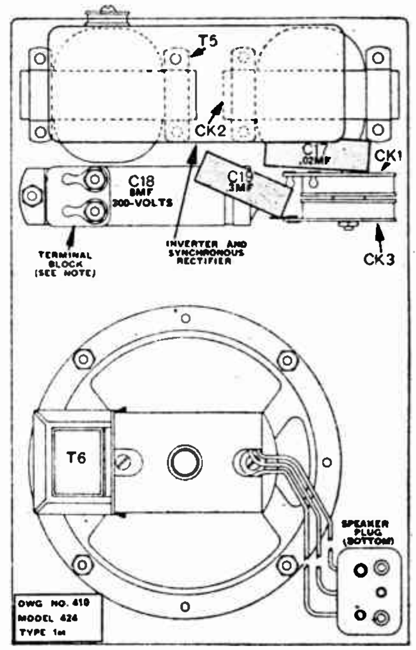
Parts list and layout on page following.

MODEL 424,534
Socket, Chassis
Parts List

ATWATER KENT MFG. CO.







Top View. Charts of receiver and power unit sections.

PARTS AND PRICE LIST FOR MODEL 424, No. 35000

Part No.	Name of Part	List Price
23482A	Volume control, complete less leads, .5 meg	$ .55
25287	Variable condenser rotor, stator, and frame	1.25
25279	On-off lockswitch	.40
25595	Inverter and synchronous rectifier complete	5.95

TRANSFORMERS

Dia. Code No.	Part No.	Description	List Price
*T1	33140	No. 1 R. F. T	$ .50
T2	33150	No. 2 R. F. T and oscillator trans	.60
T3	25505	No. 1 I. F. T. less trimmers	.55
T4	33360	No. 2 I. F. T.	.35
T5	25371	Power transformer	2.60
T6	25608	Output transformer	.85

*In late sets, T1 is shielded, and the part number is 33750, $.50.

RESISTORS

R1	30360	Blue-gray ...... 1,000,000 ohms, 1/3 watt	$ .10
R2	33250	Blue ...... 2,000 ohms, 1/3 watt	.10
R3	30380	Red-green ...... 3,300 ohms, 1/3 watt	.10
R4	18520	Flexible ...... 70 ohms,	.18
R5	26160	White ...... 40,000 ohms, ½ watt	.10
R6	30340	Red-blue ...... 100,000 ohms, 1/3 watt	.10
R7	30370	Green ...... 2,000,000 ohms, 1/3 watt	.10
R8	31970	Red-yellow ...... 250,000 ohms, 1/3 watt	.10
R9	30350	Black-purple ...... 500,000 ohms, 1/3 watt	.10
R10	20120	Flexible ...... 800 ohms,	.15
R11	30350	Black-purple ...... 500,000 ohms, 1/3 watt	.10
R12	30370	Green ...... 2,000,000 ohms, 1/3 watt	.10

CONDENSERS

C1	30260	50MMF Letter E stamped on washer	$ .15
C2	31530	.1MF, 100 volts, N. I.	.22
C3	33280	600MMF, 100 volts, mica	.30
C4	33660	.0022MF, 450 volts, inductive	.22
C5	31160	.05MF, 100 volts, N. I.	.25
C6	26820	.05MF, 200 volts, N. I.	.20
C7	33630	250MMF (double) 450 volts, inductive	.25
C8	33640	.01MF, 450 volts, N. I.	.22
C9	31530	.1MF, 100 volts, N. I.	.22
C10	23250	.01MF (metal case) 450 volts	.31
C11	27630	.01MF, 200 volts, inductive	.20
C12	28040	.005MF, 200 volts, inductive	.20
C13	24379	10MF, 25 volt, dry electrolytic	.40
C14	25385	8MF, 250 volts, dry electrolytic	.65
C15	33070	.05MF, 450 volts	.35
C16	33070	.05MF, 450 volts	.35
C17	29030	.02MF, 450 volts, N. I.	.20
C18	25384	8MF, 300 volts, dry electrolytic	.75
C19	31150	.3MF, 100 volts, N. I.	.25
C20	27630	.01MF, 200 volts, inductive	.20

CHOKES

CK1	17015	R. F. "B" filter choke	.25
CK2	33450	A. F. "B" filter choke	1.20
CK3	23530	R. F. "A" filter choke	.40

TRIMMERS

A3, A4	32880	Double I. F. trimmer	.30
A5	24495	Single I. F. trimmer	.25

SUPPRESSOR PARTS

Part No.	Name of Parts	List Price
21143	Plug suppressor	$ .30
21144	Distributor suppressor	.30
23260	Generator condenser, 1MF, 200 volts	1.05
23520	Ignition filter	2.00

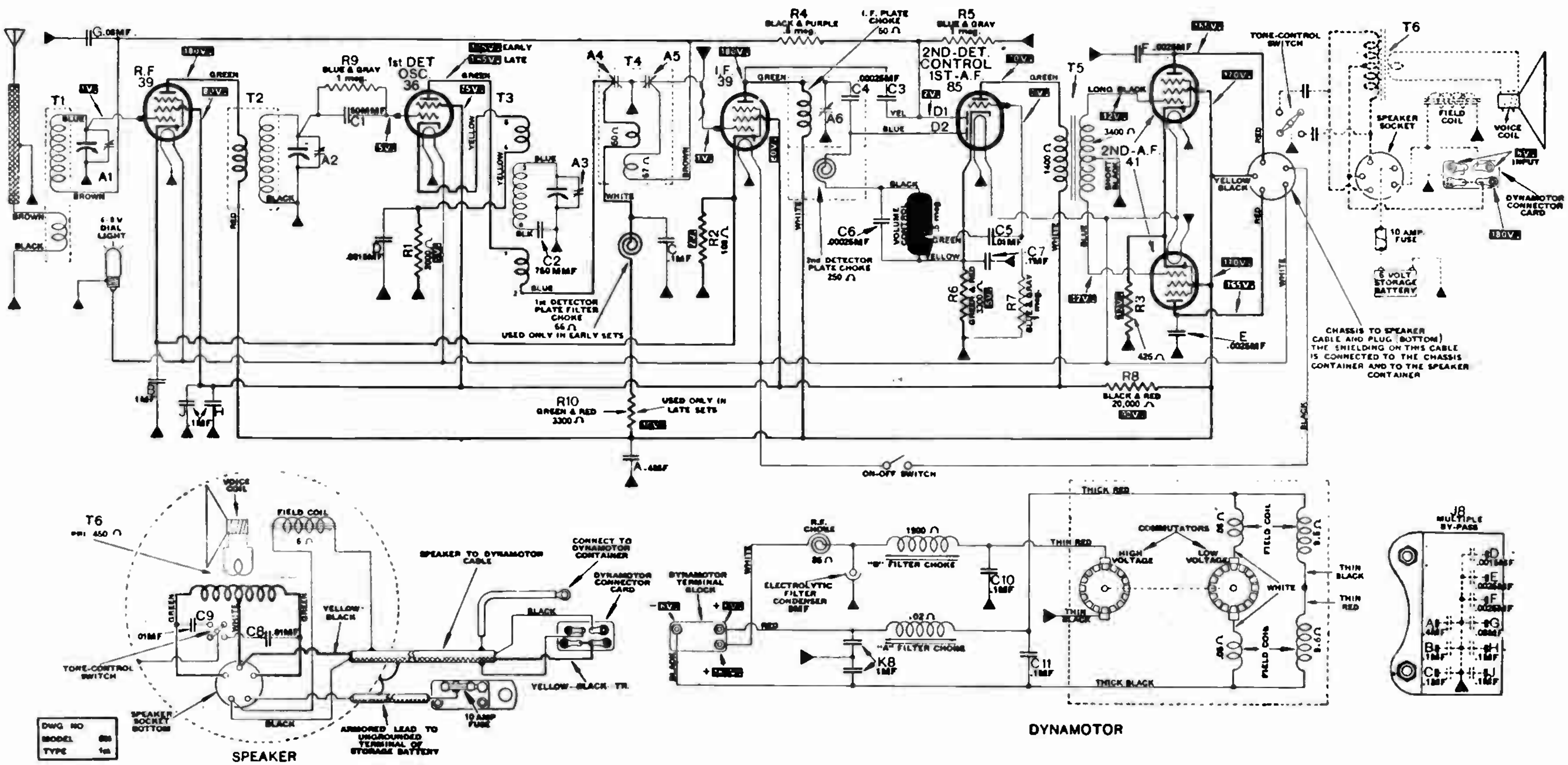
SPEAKER

25386	Speaker complete	3.25
25604	Cone assembly	1.65
25607	Field coil (8 ohms approximately)	.85
25608	Output transformer (T6)	.85

MISCELLANEOUS PARTS

24169	Dial or volume control knob	.20
21407	Dial lamp 6-8 volts	.20
21406	Fuse (10 amps.)	.05
20976	Lockswitch key	.05
25378	Instruction sheet (F-1071) ....net	.02

(Intermediate frequency, 262½ kilocycles)



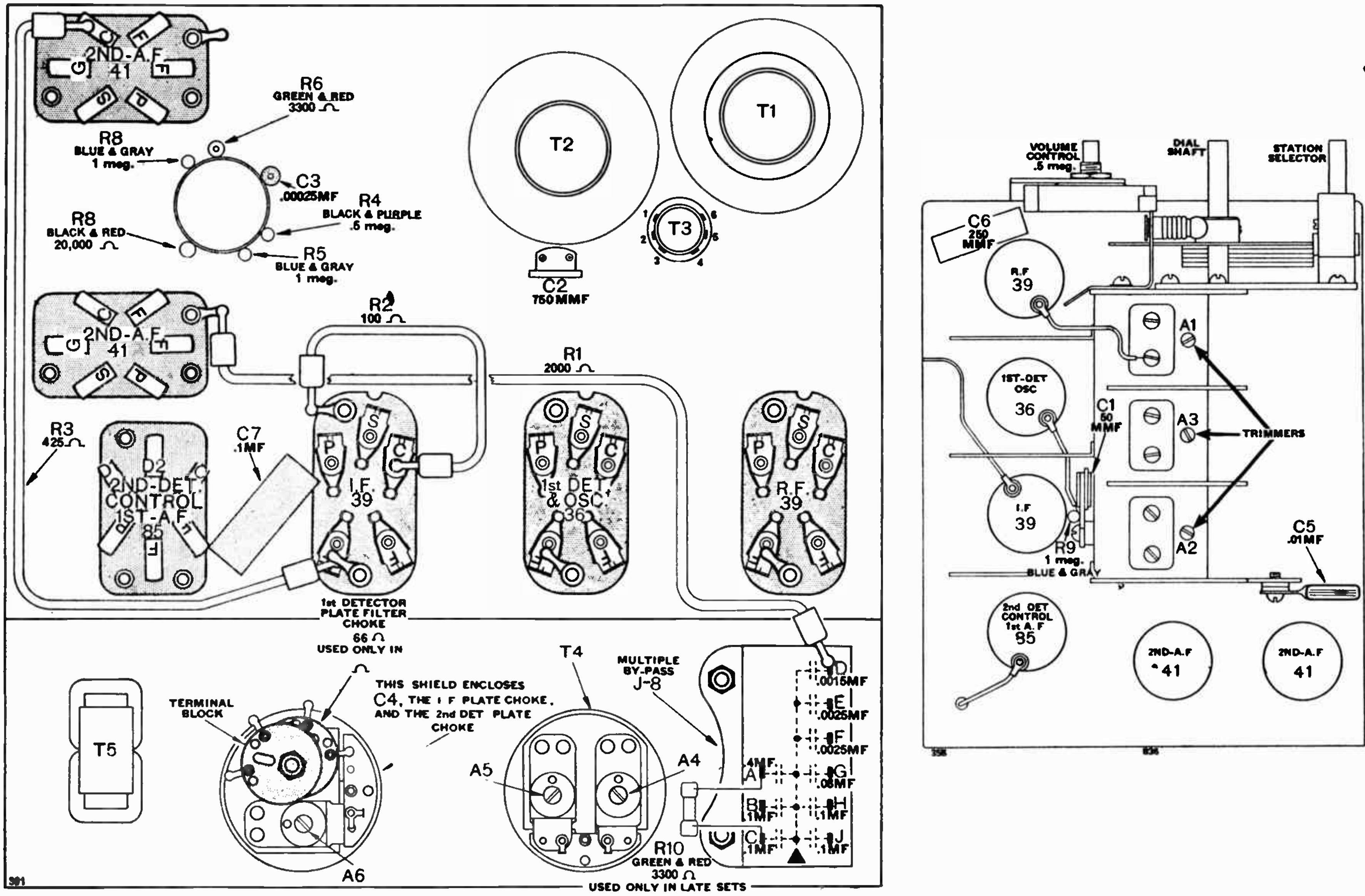
ATWATER KENT MFG. CO.

A.-K. PAGE 1-7

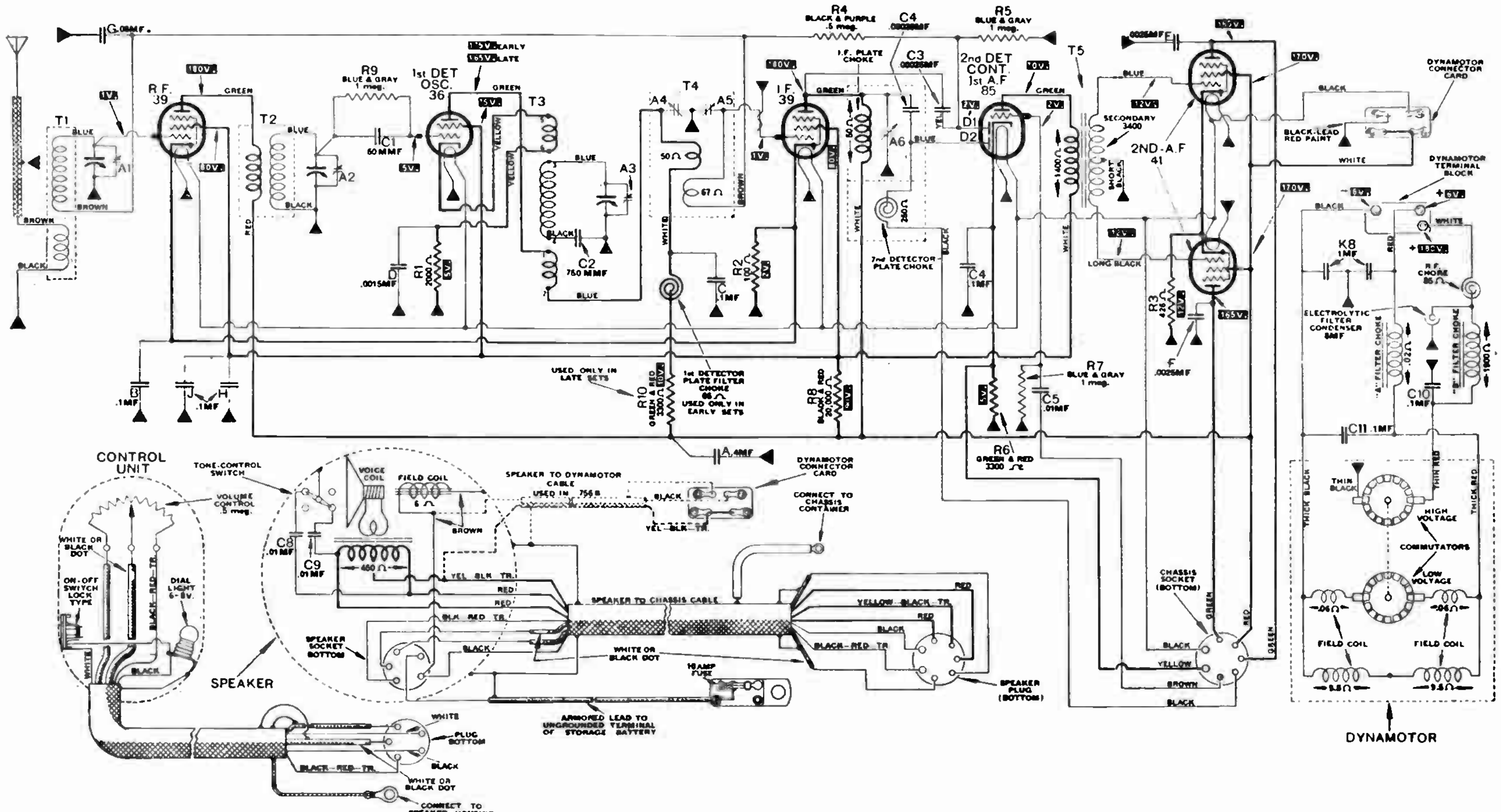
MODEL 636 Schematic

MODEL 636
Trimmers
Chassis Layout

ATWATER KENT MFG. CO.



(Intermediate frequency, 262½ kilocycles)

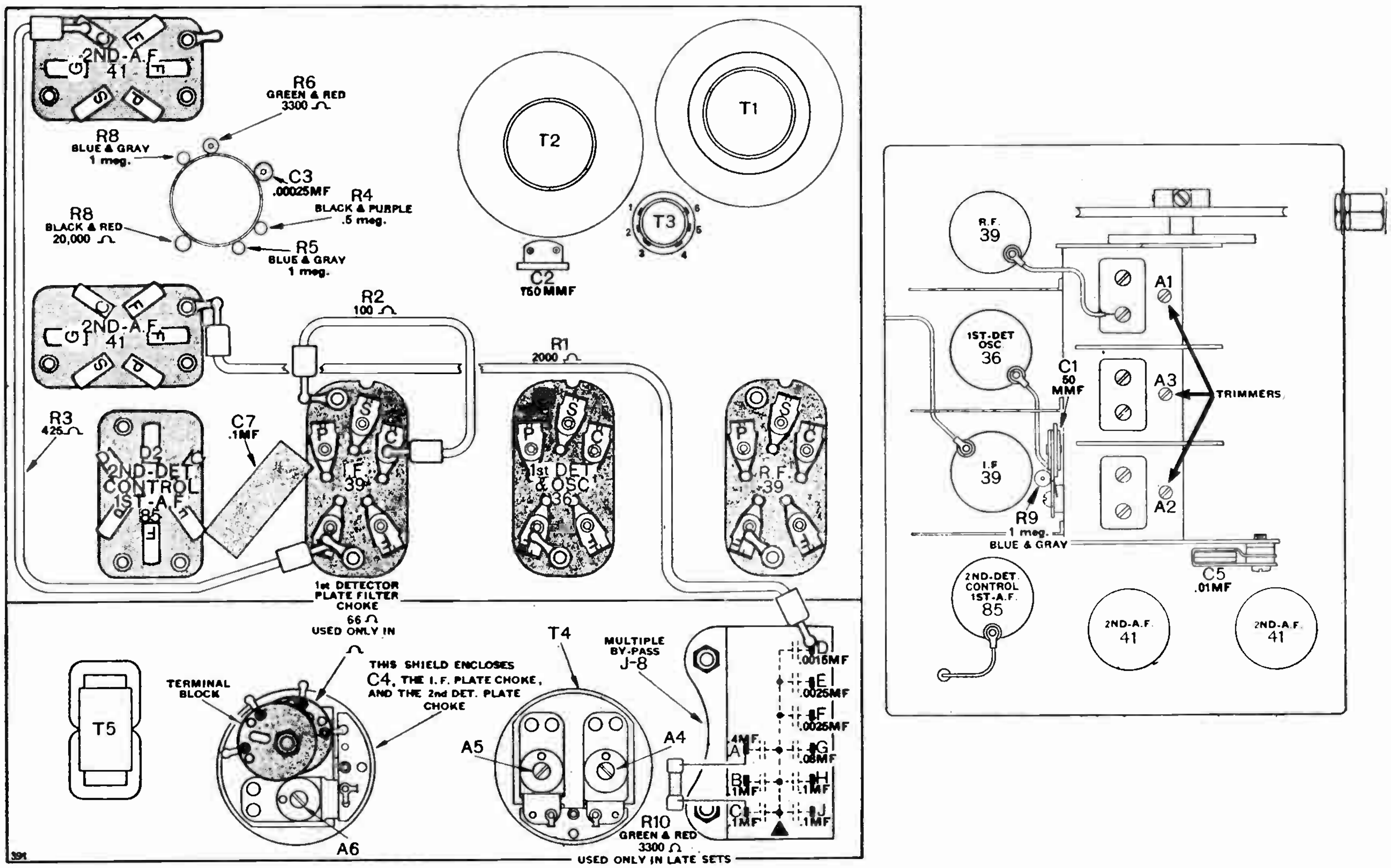


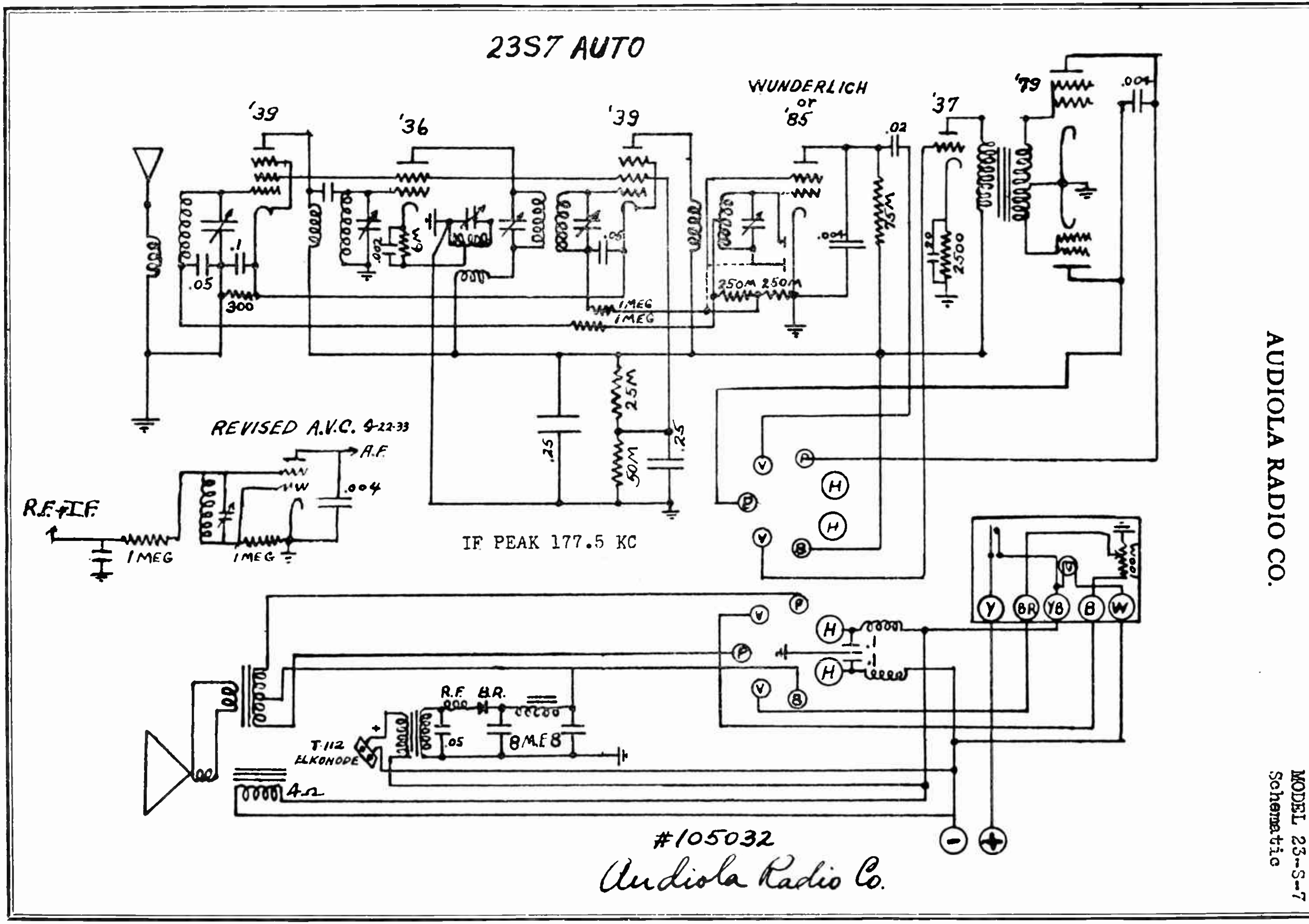
ATWATER KENT MFG. CO.

MODEL 756, 756-B
Schematic

MODEL 756, 756-B
Chassis Layout
Trimmers

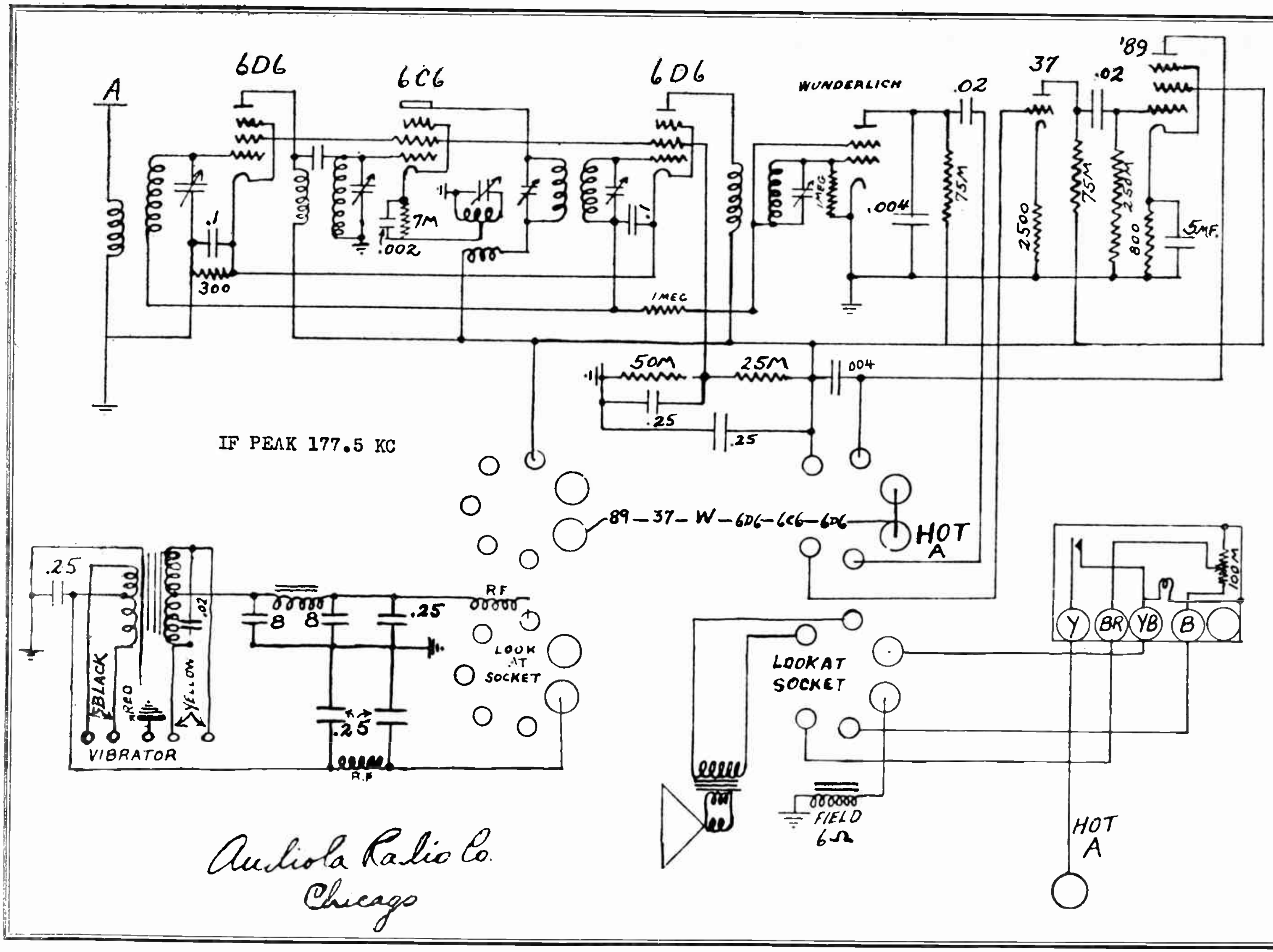
ATWATER KENT MFG. CO.

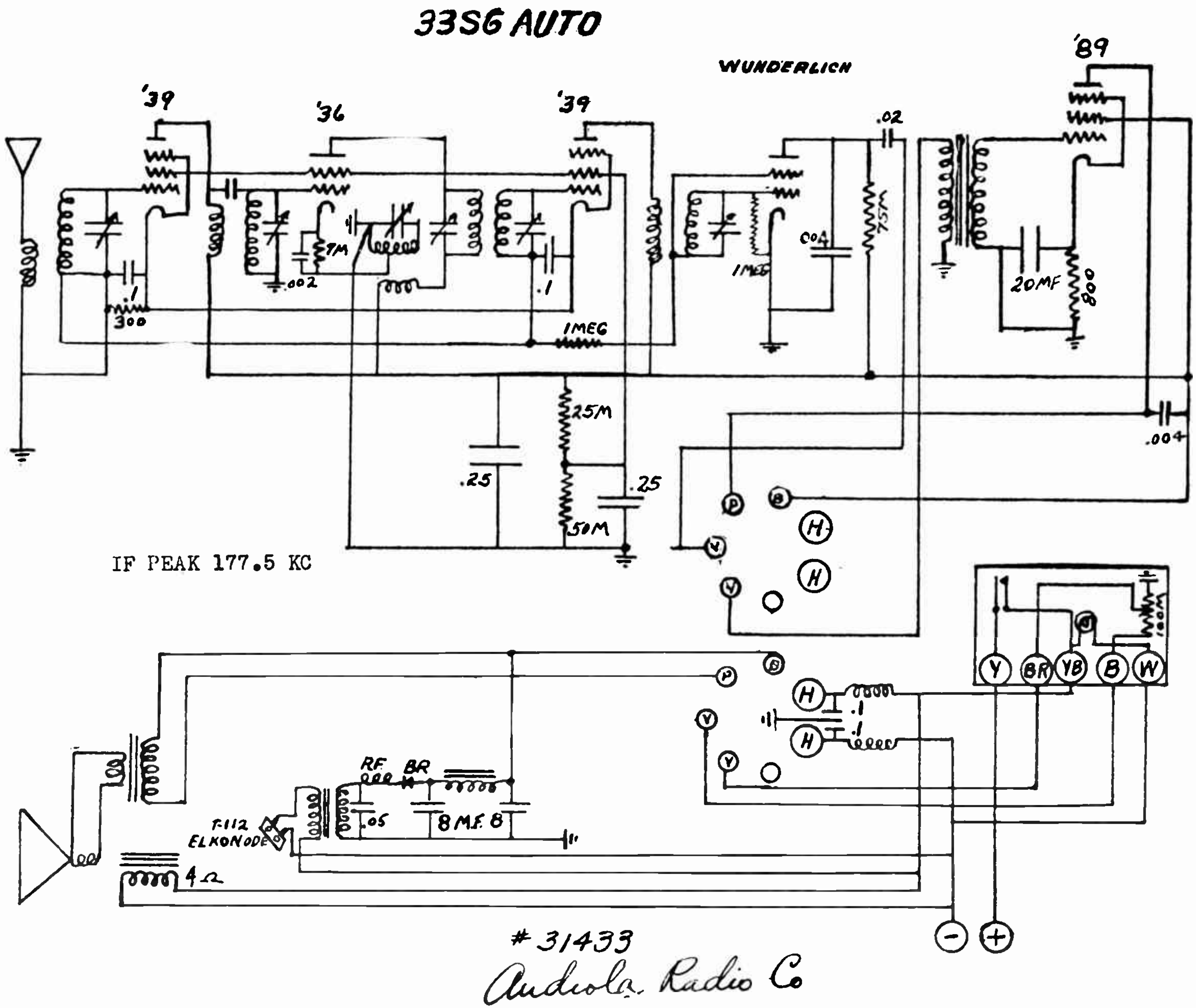



23S7 AUTO
'39
'36
'39
WUNDERLICH or '85
'37
'79
.05
.1
300
.002
6M
.05
1MEG
1MEG
250M 250M
.004
.02
15M
.004
120
2500
25M
50M
.25
.25
REVISED A.V.C. 4-22-33
A.F.
.004
R.F.+I.F.
1MEG
1MEG
IF PEAK 177.5 KC
AUDIOLA RADIO CO.
Y
BR
YB
B
W
100M
R.F.
B.R.
.05
8M.F.8
T-112
ELKONODE
4Ω
#105032
Audiola Radio Co.

MODEL 33-A-6
Schematic

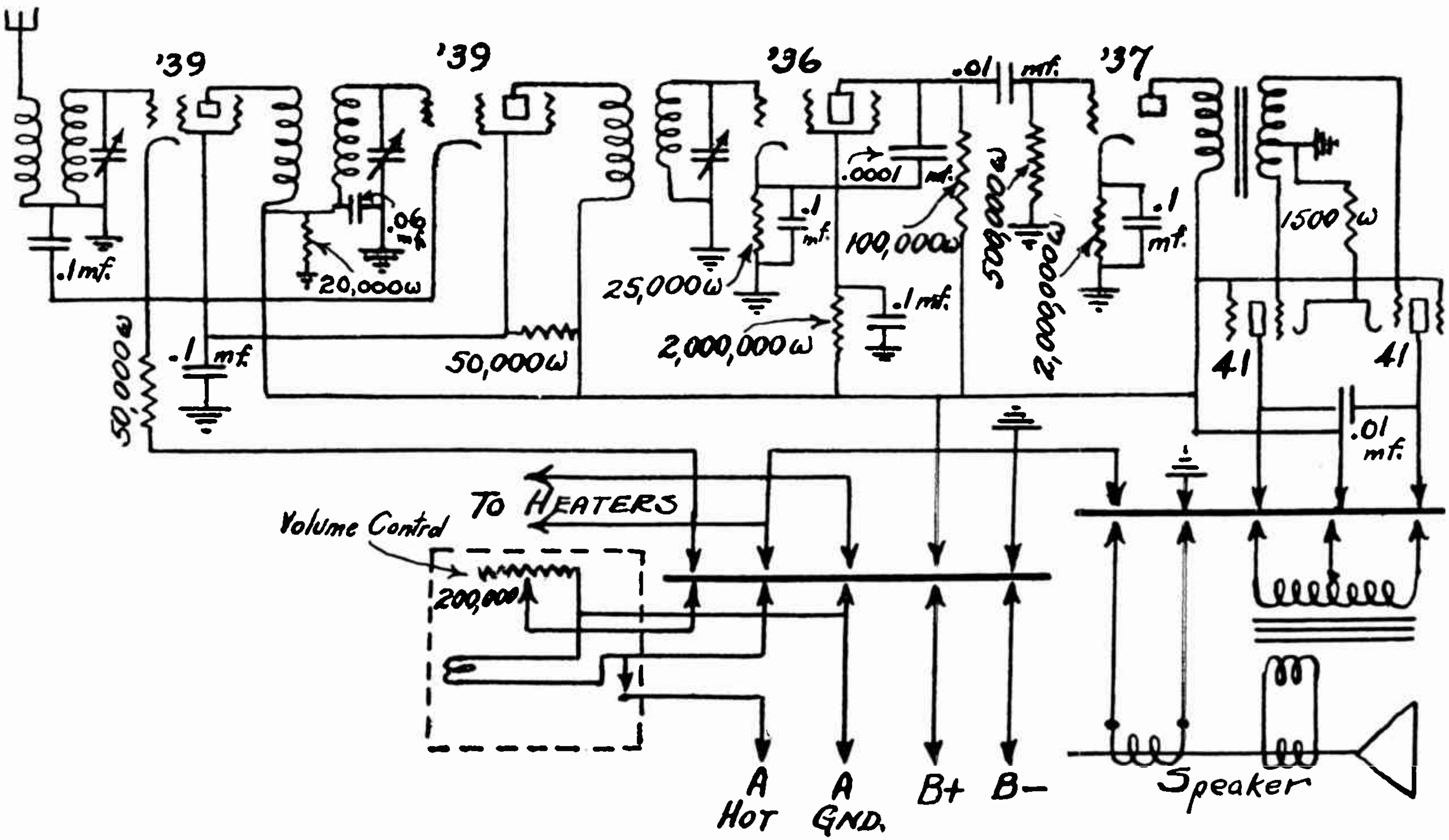
AUDIOLA RADIO CO.

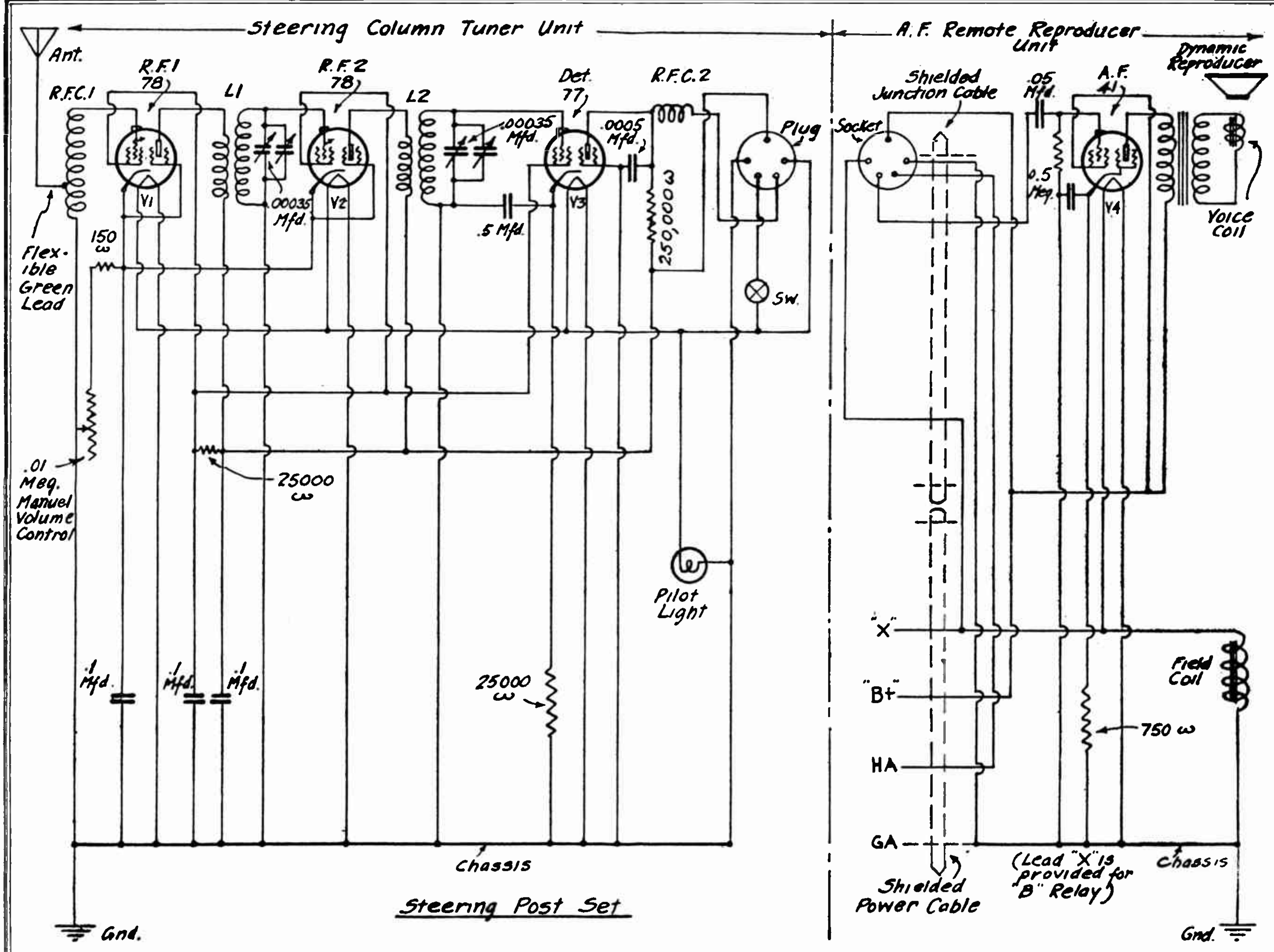




AUDIOLA RADIO CO.

MODEL 33-S-6
Schematic


'39
'39
'36
.01 mf.
'37
.1mf.
20,000ω
.06 mf
25,000ω
.1 mf.
.0001 mf.
100,000ω
500,000ω
2,000,000ω
.1 mf.
1500 ω
41
41
50,000ω
.1 mf.
50,000ω
2,000,000ω
.1mf.
.01 mf.
To HEATERS
Volume Control
200,000
A HOT
A GND.
B+
B−
Speaker



AUTOMATIC RADIO MFG. CO.

MODEL Tom Thumb Steering Post Schematic

MODEL Tom Thumb
Steering Post
Notes

AUTOMATIC RADIO MFG. CO.

INSTRUCTIONS FOR INSTALLING

This TOM THUMB AUTO RADIO is designed for operation in motor cars and while due to its small size, it may be installed in any convenient part of the automobile, it is recommended for STEERING POST mounting.

Uses the latest type tubes 77's, 78's, 41's; the 41 power tube being mounted in speaker case.

Battery Model

1. Place set in proper position on steering post, either on left side, right side, or on top, and secure with the four screws furnished.

2. Mount speaker in position desired—either under the cowl—to the roof of the car—behind the front seat—or in any other convenient place.

Connect shield cable with plug on end—this coming from the speaker to the five prong socket on radio set. The other cable leading from speaker has two wires, the yellow lead is A ungrounded, the black lead coming from the shield near this yellow lead is grounded.

The brown is B plus, 135 or 180, and the pigtail lead leading from the shield near the brown wire is B minus.

Where B batteries are used, connect as follows:

1. Yellow wire to ungrounded side of storage battery, and Black lead to chassis or grounded side of storage battery, preferably the latter.

2. Connect all of the individual batteries in series, and attach the brown wire to B plus, 135 or 180, preferably 180. Connect the pigtail lead to B minus.

All-Electric Model

1. Place set in proper position on steering post, either on left side, right side, or on top, and secure with the four screws furnished.

2. Mount speaker unit in position under cowl, connect shielded cable with socket attached on end, this coming from speaker, to the five pin plug in side of radio set.

IMPORTANT! CAUTION. CHECK POLARITY OF AUTOMOBILE STORAGE BATTERY. If positive side of battery is grounded to chassis DO NOT DISTURB connections on terminal strip inside of speaker unit. In the event that negative (—) side of battery is grounded to the chassis. Remove screws holding cover on speaker unit. Pull cover slightly forward exposing terminal strip on side of speaker opposite from tube. (See Figure 3.) Reverse connection No 1 and 2, i.e. Place yellow wire on terminal No. 2 and green wire on terminal No. 1.

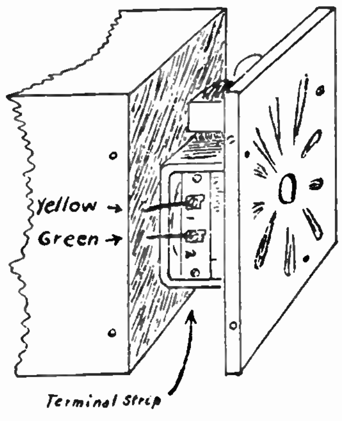
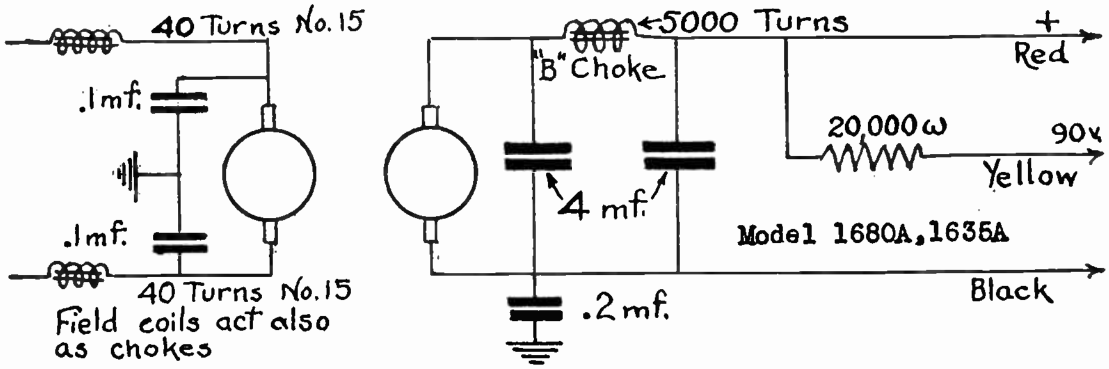


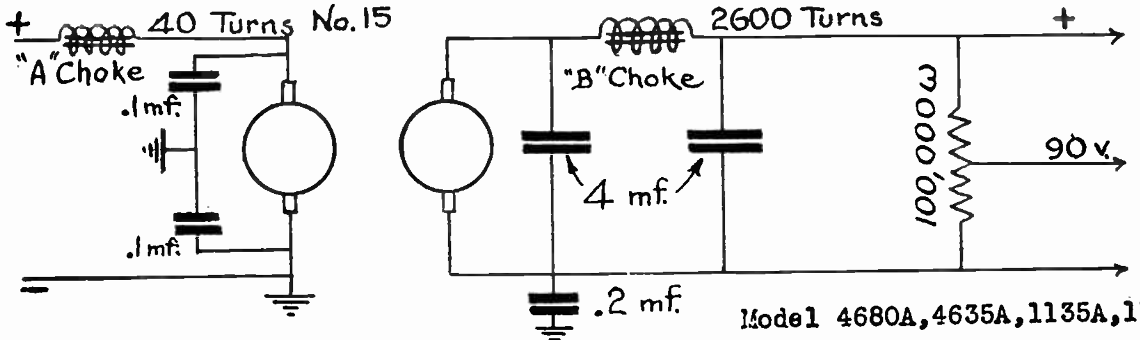
Fig. 3

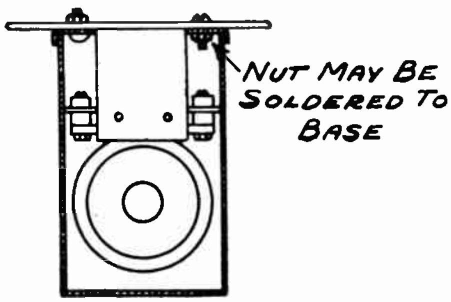
3. Connect YELLOW wire of shielded cable coming from speaker to UNGROUNDED side of storage battery and BLACK lead to GROUNDED side—making sure battery connections are clean and secure. It is also advisable to apply vaseline to battery lugs to prevent corrosion.

CARTER GENEMOTOR CORP.

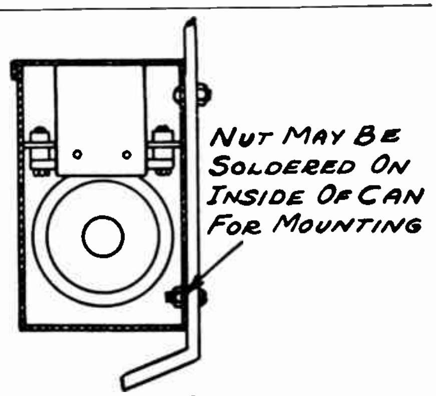
MODEL 1680-A
MODEL 1635-A
MODEL 4680-A
MODEL 4635-A
MODEL 1135-A
MODEL 1180-A



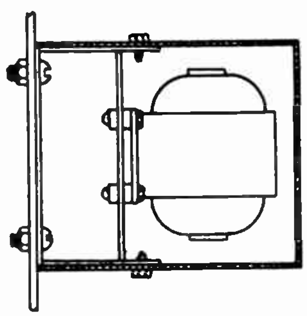




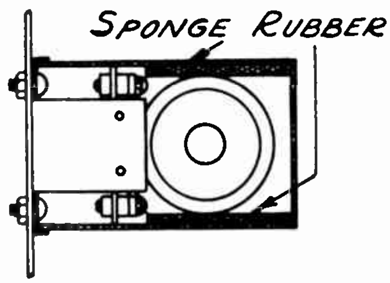
Showing Under Car Mounting



Under The Cowl Mounting

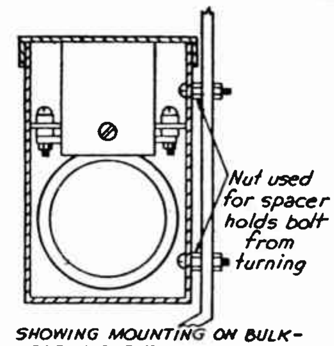


Do Not Mount In This Position

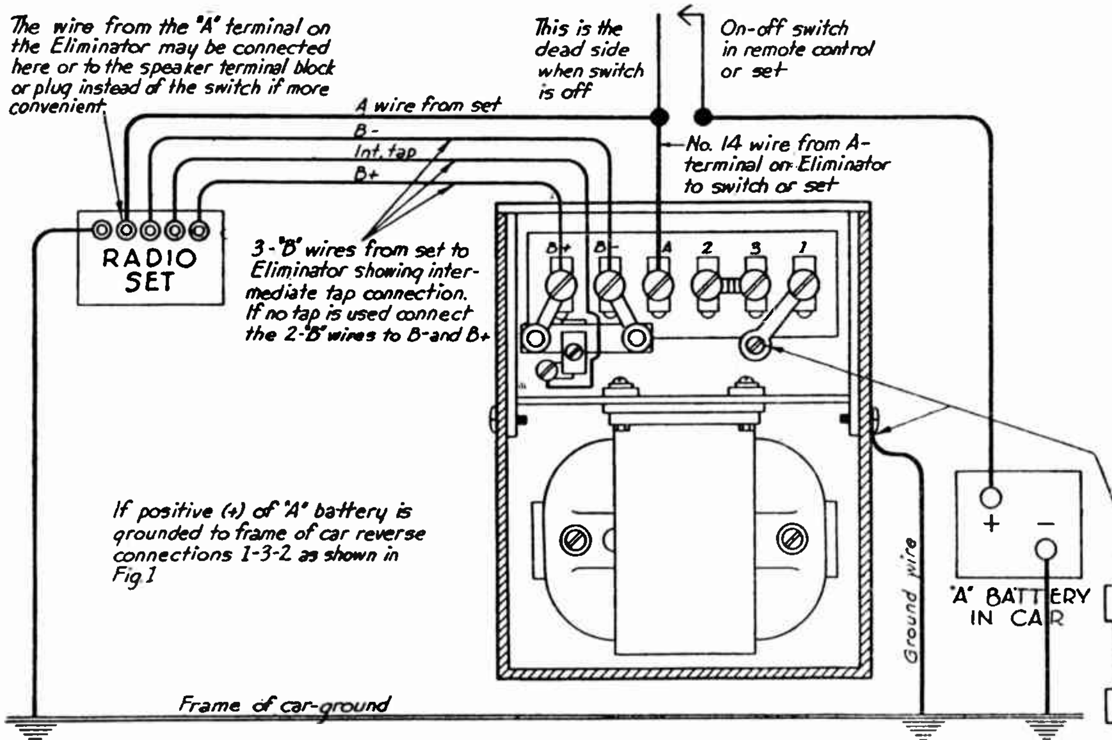


We Do Not Reccomend This Type Mounting. If Mounted In This Position Use Sponge Rubber As Shown Above.

Radio sets having only two B. wires do not require an intermediate tap at the Eliminator as the necessary resistors are in the set. Sets having three B wires require an intermediate tap. This tap is set at the factory at 90 volts on 180 volt output and 67½ volts on 135 volt output. Usually this is the proper setting for the average set, and should not be varied unless the set fails to operate properly. To change the intermediate tap voltage, loosen the screw that holds the contact on the resistance unit. The tap may be moved to a position where best results are obtained. Then tighten screw. When Eliminators with intermediate tap are used with set having 2 B wires disregard the intermediate tap, connect the 2 B wires from the set to B- and B+ on the Eliminator. Some sets work better if the B- terminal on the Eliminator is grounded to frame. Others require a small by pass condenser from B to ground.



SHOWING MOUNTING ON BULKHEAD UNDER THE COWL. CAN BE MOUNTED ON MOTOR SIDE OF BULKHEAD IF DESIRED



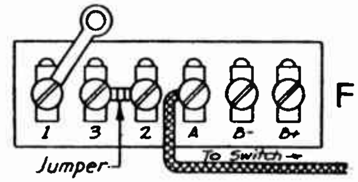


FIG. 2

CONNECT THIS WAY WHEN NEGATIVE OF "A" BATTERY IS GROUNDED

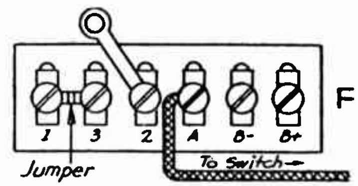


FIG. 1

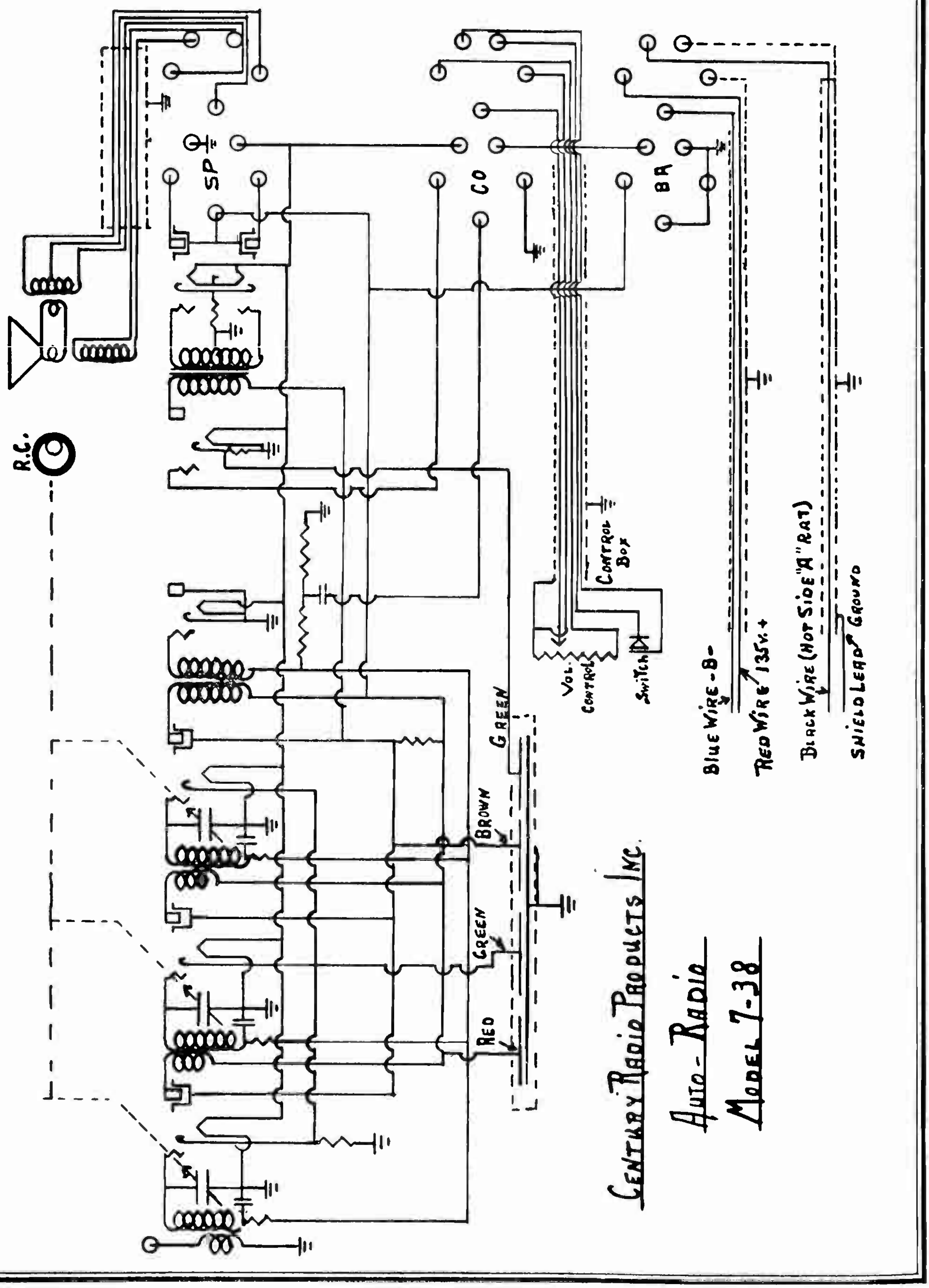
CONNECT THIS WAY WHEN POSITIVE OF "A" BATTERY IS GROUNDED

Carter Genemotor Corp.
361-365 WEST SUPERIOR STREET
CHICAGO, ILL.

JULY 1, 1933

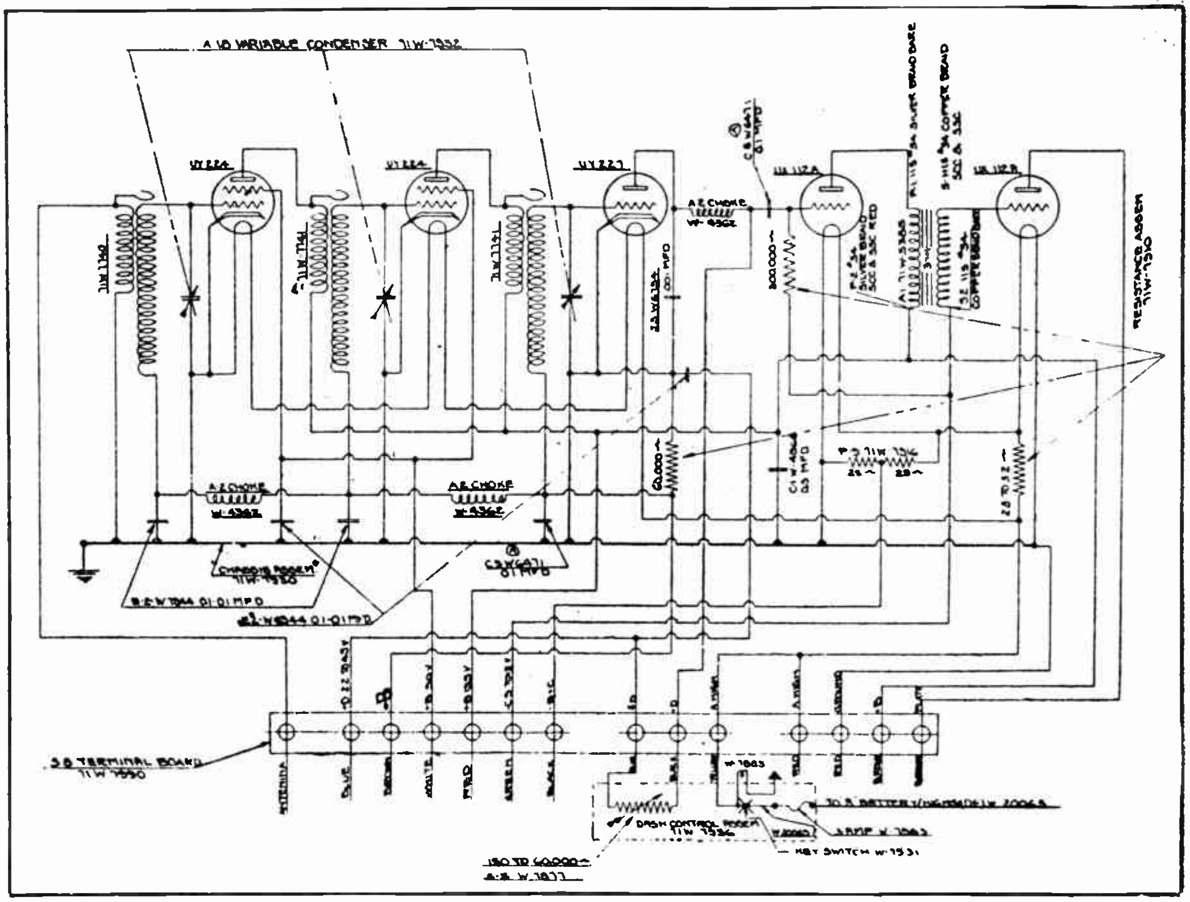
MODEL 7-38
Auto Radio

CENTURY RADIO PRODUCTS CO.



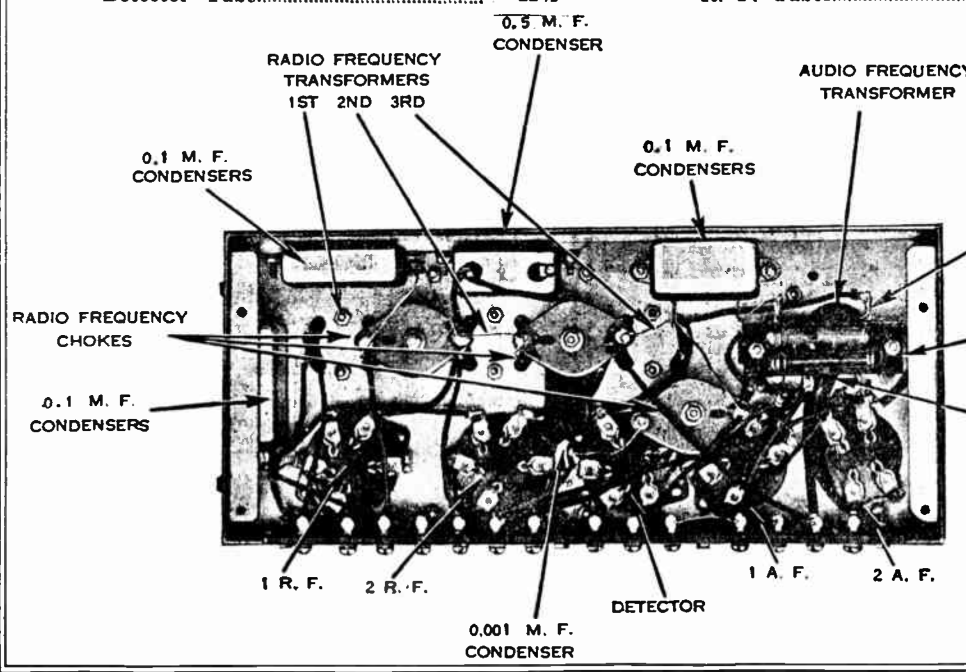
CROSLEY RADIO CORP.

MODEL 90 AUTO
Schematic, Voltage

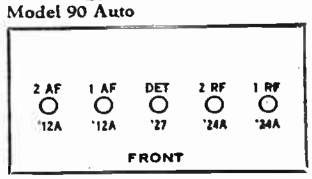


Filament Voltages	
R. F. and Detector Tubes	2.0
A. F. Tubes	4.7
Plate Voltages	
All Tubes but Detector	135
Detector Tube	22½

Control Grid Voltages	
R. F. Tubes	2.5
Detector Tube	3.0
A. F. Tubes	12.0
Screen Grid Voltages	
R. F. Tubes	90

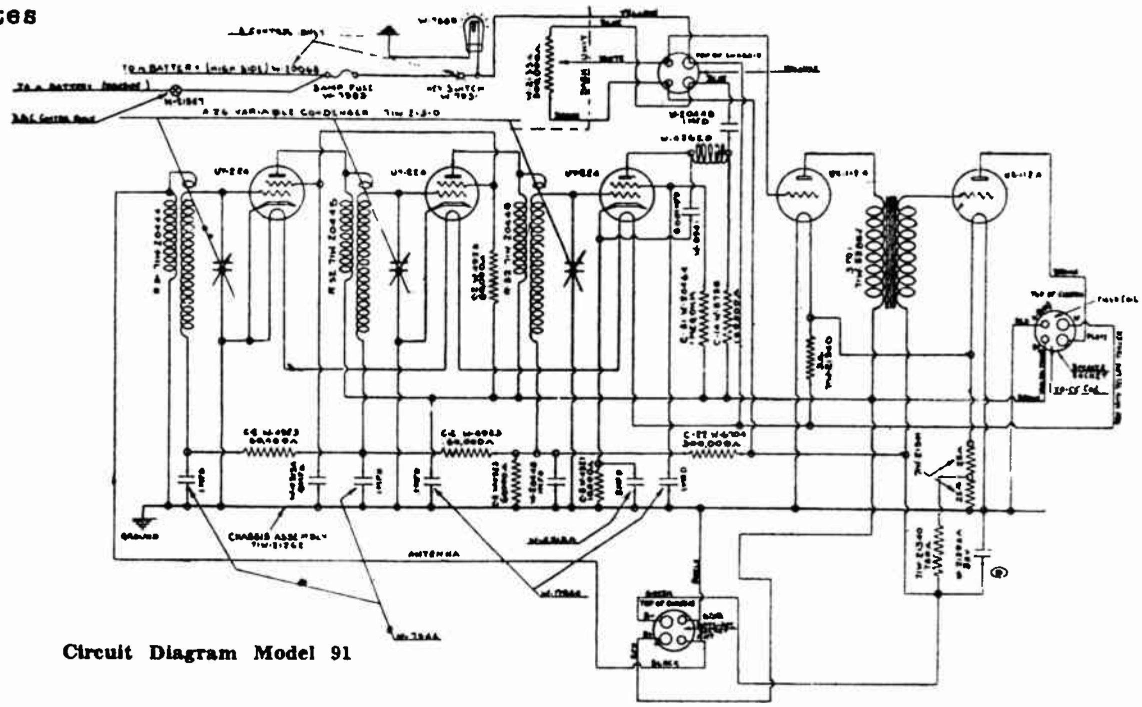


Model 90 Auto

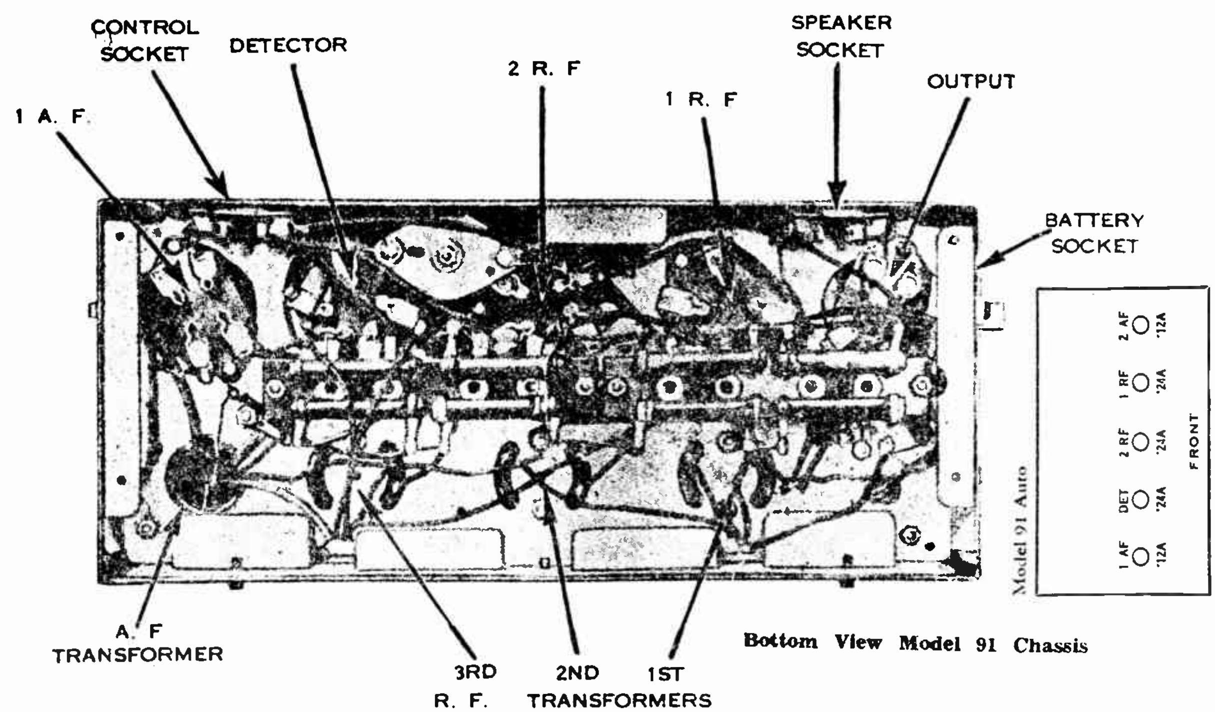


MODEL 91 AUTO
Schematic
Bottom View
Notes

CROSLEY RADIO CORP.



Circuit Diagram Model 91



Bottom View Model 91 Chassis

Filament Voltages	
R. F. and Detector Tubes	2.0
A. F. Tubes	4.7
Plate Voltages	
R. F. Tubes	160-180
Detector Tube	40-50
A. F. Tubes	160-180
Control Grid Voltages	
R. F. Tubes	1.0-2.0
Detector Tube	2.0-3.0
A. F. Tubes	9.0-11.0

Screen Grid Voltages	
R. F. Tubes	90-110
Detector Tube	5-10

The above voltages are to be measured with the speaker connected and the tubes in place. For plate and grid voltages use a high-resistance (800 ohms or more per volt) D. C. voltmeter. Measure plate and grid voltages from plate or grid socket contact to negative filament contact.

Note: Correct measurement of 1st A F bias can only be obtained with volume control "off".

CROSLEY RADIO CORP.

MODEL 91 AUTO
Parts List

Parts List

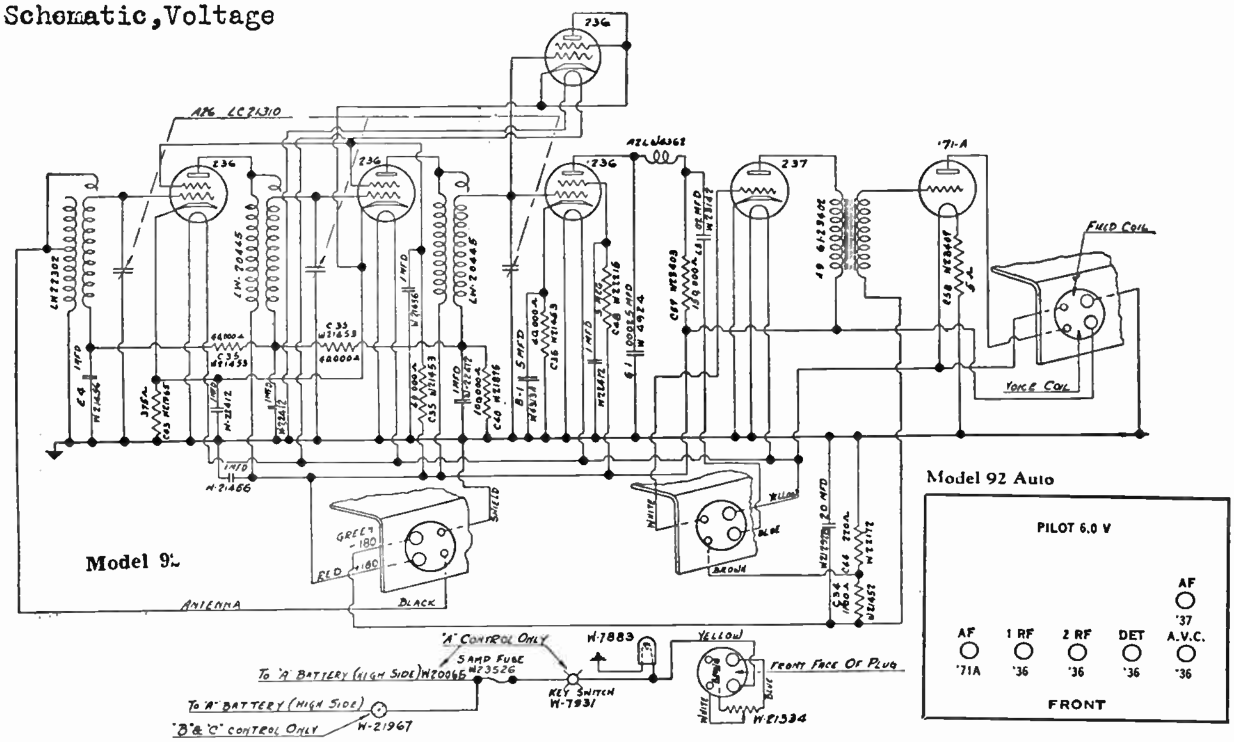
INSTRUCTIONS FOR ORDERING—Give part number, description of part, and serial number of receiver on which part is to be used. If article wanted is not listed separately, then that part of complete assembly containing this article should be ordered. Goods shipped on open account to Crosley Wholesale Distributors only. Cash must accompany Dealer and Consumer orders. Prices are subject to the usual trade discounts.

Qty.	Part No.	Description	List Price Each
		CABINET	
1	W-21888A	Housing	2.00
1	W-21887	Front Cover	.50
1	W-21553A	Drive Bracket Hole Cover	.10
1	W-21554A	Drive Bracket Cover	.15
1	B-21555A	Chassis Bottom	.25
1	W-21714	Battery Plug Bracket	.10
		CHASSIS	
1	C-21528	Chassis	.75
5	W-7871	Socket (4 Prong)	.25
3	W-7873	Socket (5 Prong)	.30
2	W-7872	Socket Guide	.10
3	W-7874	Socket Guide	.10
1	W-21622	Socket Guide (Speaker)	.10
1	W-21623	Socket Guide (Volume Control)	.10
1	W-21624	Socket Guide (Battery-Antenna)	.10
2	W-20445	R. F. Transformer	2.50
1	W-20444	R. F. Transformer (Antenna)	2.50
3	W-22208	Grid Connection	.25
3	W-20092C	R. F. Coil Shields	.50
1	W-21292A	Electrolytic Condenser	2.00
1	W-5385	A. F. Transformer	3.25
1	W-21310	Variable Condenser Assembly	12.00
2	B-21325	Tube Shield	.20
		DRIVE	
1	W-21300	Condenser Drive Assembly	3.25
	W-21547	Spindle Stop	.10
2	K-1	Cotter Pin	.05
2	W-20157	Set Screw	.05
	W-21548	Stop Nut	.10
	W-21549	Drive Spindle	1.00
	B-21550	Condenser Drive Pulley	1.25
	W-20634	Condenser Drive Cord (2 used)	.25
	W-21968	Tension Spring	.25
	W-21551	Spindle Stop Spring	.15
1	W-21575	Condenser Drive Bracket Assembly	.75
		PARTS UNDER CHASSIS	
2	W-4313	.5 Mfd. Fixed Condenser	1.20
2	W-7944	.1-.1 Mfd. Fixed Condenser	1.10
2	W-20448	.1 Mfd. Fixed Condenser	1.00
1	W-4362	Plate Choke	.50
1	W-6941	.001 Fixed Condenser	.40
1	W-21341	Mounted Resistor Assembly	3.30
	W-21574	25 -25 Ohm Resistance	.60
3	W-4923	60,000 Ohm Resistor	.60
	W-5735	150,000 Ohm Resistor	.60
1	W-21340	Mounted Resistor Assembly	3.30
	W-21573	3 -750 Ohm Resistance	.60
	W-4921	10,000 Ohm Resistor	.60
	W-4923	60,000 Ohm Resistor	.60
	W-6704	300,000 Ohm Resistor	.60
	W-20464	1 Meg. Resistor	.60
		MISCELLANEOUS	
1	W-21362	Battery Box (Standard type)	2.00
1	W-21363	Battery Box Lid (Standard type)	.75
1	W-21365	Cable Clip	.05
	W-22337	Battery Box (Oblong type)	2.00
	W-22336	Battery Box Lid (Oblong type)	.75
1	W-21572	"B" Battery Fuse Unit Assembly	.50
	W-20109	Fuse (¼ amp.)	.10
2	W-21370	"B" Battery Connector Cable	.10
2	W-20284	Universal Joint	1.00
1	W-7941	Drive Shaft (12" long)	.10
1	B-21367B	Battery Cable (8' 6" long)	4.00
3	W-4751A	Cable Clamp	.05
	W-20068	Eliminator	.80
	W-20070	Spark Plug Suppressor	.60
	W-20071	Distributor Head Suppressor	.70

Qty.	Part No.	Description	List Price Each
	W-21315	TYPE "A" DASH CONTROL COMPLETE	7.00
2	W-7919	Knob	.20
2	W-7947	Spring	.05
1	W-7946	Fuse Panel	.35
1	W-7959C	Mounting Plate & Dial Light Clip Assembly	.80
1	W-21316	Dial & Gear	.50
1	W-7928A	Escutcheon	.80
1	W-7931A	Key Switch	1.25
1	W-7907A	Pinion	.20
1	W-7958A	Pinion Shaft	.15
1	W-21334	Volume Control	1.75
2	W-7880	Mounting Clamp	.05
1	W-7882A	Dial Light Receptacle	.15
1	W-4907	Tension Spring	.05
1	W-4751A	Cable Clamp	.05
1	W-7912A	Dial Bushing	.10
1	W-7983A	Fuse (3 amp.)	.10
1	W-20057	Key Switch Insulator Sleeve	.05
1	W-20069	Switch to Fuse Lead	.10
1	B-21368A	Dash Control Cable (Standard 20" long)	1.25
	B-21386A	Dash Control Cable (Special 32" long)	2.50
1	W-7998	Adapter Shaft	.10
	W-21308	TYPE "B" DASH CONTROL COMPLETE	7.00
	W-21935	TYPE "C" DASH CONTROL COMPLETE	7.00
1	W-21556	Dial & Gear	.50
1	W-21557	Pinion	.20
1	W-21558	Pinion Shaft	.15
1	W-21559	Pinion Shaft Spacer	.05
2	W-4907	Tension Spring	.05
1	W-21560	Drive Support Bracket	.10
1	W-7946	Fuse Panel	.35
1	W-21561	Sub-Panel	.80
1	W-21365	Cable Clip	.05
1	W-21334	Volume Control	1.75
1	W-7983A	Fuse (3 amp.)	.10
1	W-21562	Dial Light Socket	.25
1	W-21563	Dial Stud	.05
1	W-21564	Dial Light Housing	.10
1	W-2282C	Fibre Washer	.05
1	W-7931A	Key Switch	1.25
2	W-20068	Switch Leads (18" long)	.05
1	W-21565	Escutcheon (large, for type B)	.80
1	W-21600	Escutcheon (small, for type C)	.50
2	W-5311	Screw (for type B)	.05
2	W-21936	Mounting Clamp (for type C)	.10
2	W-21937	Mounting Screw (for type C)	.05
2	W-7919	Knob	.20
2	W-7947	Spring	.05
1	W-21368A	Dash Control Cable (Standard 20" long)	1.25
	W-21386A	Dash Control Cable (Special 32" long)	2.50
		279 SPEAKER	
1	C-21617A	Speaker Frame	1.75
1	W-21655	Type C Dynacone Motor Assembly	8.00
1	W-21619	Name Plate	.50
1	W-21659A	Cone	1.00
1	W-1629G	Outer Cone Nut	.05
1	W-1495J	Outer Cone Clamp	.05
1	W-1490K	Inner Cone Clamp	.05
1	W-5874	Inner Cone Nut	.05
1	B-21369A	Speaker Cable (Standard 10 1-2" long)	.75
1	B-21649A	Speaker Cable (Special 30" long)	2.00

MODEL 92 AUTO
Schematic
MODEL 95
Schematic, Voltage

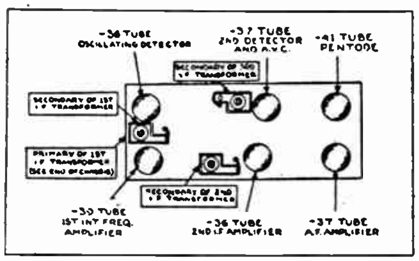
CROSLEY RADIO CORP.



CROSLEY MODEL 95 (ROAMIO) VOLTAGE DATA

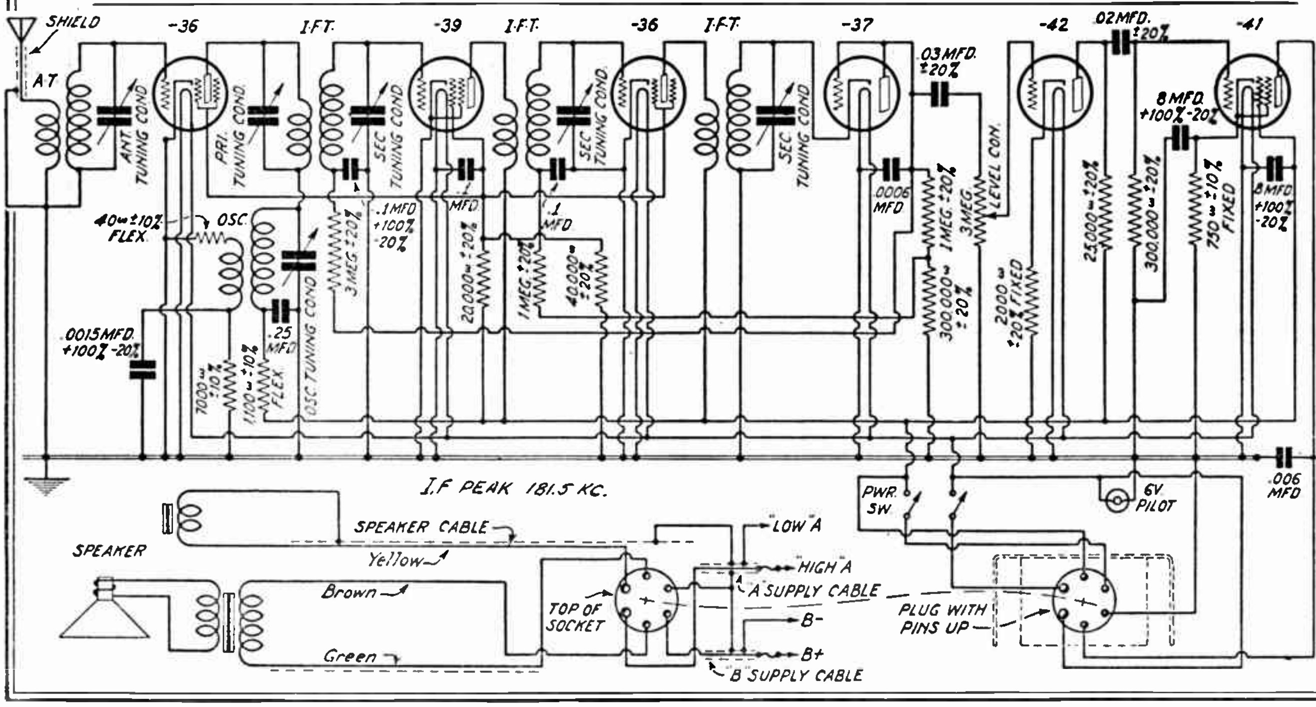
Tube	Plate	Screen	Grid
1st Det.	160—180	70—80	—7 to —9
I-F.	160—180	70—80	AVC only
2nd Det.	0	......	0
1st A-F.	80—90	......	—5 to —6
Output	150—170	160—180	—16 to —18

Plate and screen voltages measured from element to chassis.



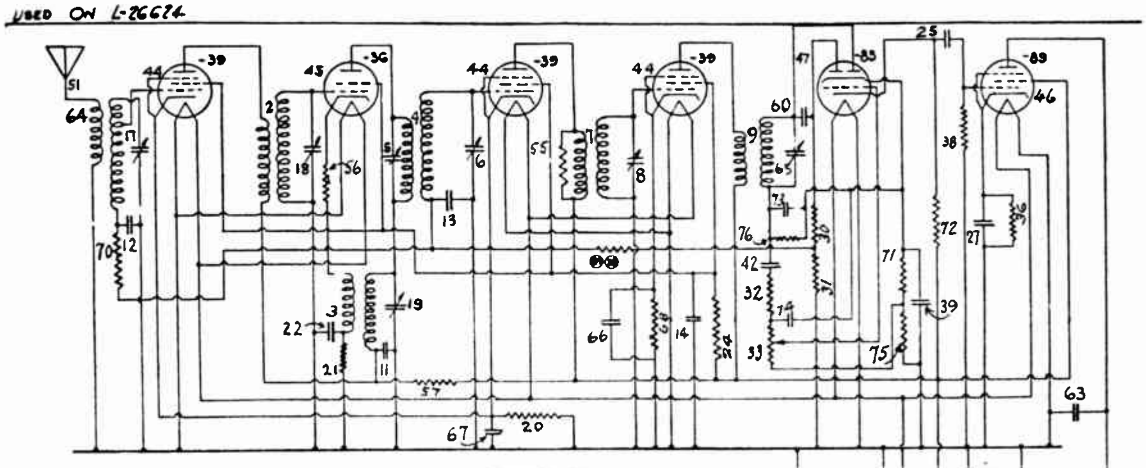
Model 95

Schematic diagram of the Crosley Model 95 (Roamio), with combination oscillator-detector

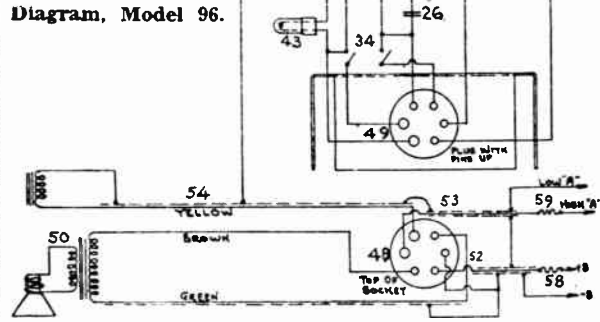


CROSLEY RADIO CORP

MODEL 96
Schematic
Voltage



Circuit Diagram, Model 96.



1	[illegible]	[illegible] Coil	37	W-21897	60,000 Ohms ± 20%	73	W-26152	0.0001 Condenser
2	W-24965	R.F. Transformer	38	W-21455	300,000 Ohms ± 20%	74		0.0001 Condenser
3	W-24996	Osc. Coil	39	W-26870	6 Mfd. Condenser	75	W-21453	40,000 Ohms ± 20%
4	W-25444	I.F. Transformer	40	W-25372	.0005 Mfd. Cond.	76	W-21654	1 Meg Ohm ± 20%
5	W-24563	Pri. Tuning Cond.	41		.0005 Mfd. Cond.			
6	W-22405A	Sec. Tuning Cond.	42	W-22425	0.006 Mfd. Cond.			
7	W-25445	I.F. Transformer	43	W-4099A	Dial Lamp 6V			
8	W-25608A	Sec. Tuning Condenser	44	617-26614	-39 Socket			
9	W-25445	I.F. Transformer	45	611-26614	-36 Socket			
10	[illegible]	Sec. Tuning Cond.	46	618-26614	-89 Socket			
11	W-25436	.01 Mfd. Cond.	47	627-26614	-85 Socket			
12		.01 Mfd. Cond.	48	W-25926P	Six Prong Male Plug			
13	W-26438	.01 Mfd. Cond.	49	W-25926A	Six Prong Female			
14		.01 Mfd. Cond.	50	L-26871	B22 Speaker			
15	W-25438	.01 Mfd. Cond.	51	W-6700	Ant. Lead 16" Long			
16		.01 Mfd. Cond.	52	W-22998	"B" Cable			
17	C-26640	Var. Cond. R.F. Sec.	53	W-26440	"A" Cable			
18		Var. Cond. R.F. Sec.	54	B-26062C	Speaker Cable			
19		Var. Cond. Osc. Sec.	55	W-21227	60,000 Ohms ± 20%			
20	W-24037	350 Ohms ± 10%	56	W-23012	40 Ohms ± 10%			
21	W-21876	10,000 Ohms ± 20%	57	W-21652	1100 Ohms ± 10%			
22	W-25487	.0015 Mfd. Cond.	58	W-22109	1/4 Amp. Fuse			
23	W-22172A	220 Ohms ± 10%	59	W-25791	10 Amp. Fuse			
24	W-22196	50,000 Ohms ± 20%	60	W-26571	.0005 Mfd. Cond.			
25	W-22142	0.02 Mfd. Cond.	61	W-5363	.002 Mfd. Cond.			
26	W-26857	8 Mfd. Cond.	62	W-29765	500,000 Ohms ± 20%			
27		8 Mfd. Cond.	63	W-25435	.008 Mfd. Cond.			
28	[illegible]	3 Megohms ± 20%	64	[illegible]	Antenna Coil			
29	W-22116	3 Megohms ± 20%	65	W-24986	Sec. Tuning Cond.			
30	W-21454	1 Megohm ± 20%	66	W-25516	0.250 Mfd. Cond.			
31	W-21454	1 Megohms ± 20%	67		0.250 Mfd. Cond.			
32	W-21655	250,000 Ohms ± 20%	68	W-21892	450 Ohms ± 10%			
33	W-26781A	Volume Control	69	W-21454	1 Megohm ± 20%			
34		Switch	70	W-21454	1 Megohm ± 20%			
35	[illegible]	1500 Ohms ± 10%	71	W-21876	10,000 Ohms ± 20%			
36	W-22214	750 Ohms ± 10%	72	W-22403	150,000 Ohms ± 20%			

I-F.PEAK 181.5 KC.

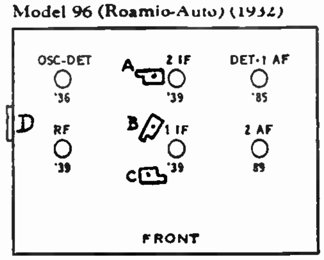
96 CHASSIS ASSEMBLY WIRING DIAGRAM

Aligning Intermediate Frequency Stages

1. A local oscillator tuned accurately to 181.5 kilocycles is required.
2. Set the dial of the station selector to 550 kilocycles.
3. Connect the high side of the test oscillator output through a condenser of approximately 0.1 mf. capacity to the grid of the first detector tube, and the low side of the test oscillator to chassis. Do not remove the clip wire from the grid of the first detector tube.
4. Adjust the two padding condensers at either side of the first intermediate frequency transformer for maximum reading on the output meter.
5. Adjust the secondary padding condensers on the second and third intermediate frequency transformers for maximum reading on the output meter.

Filament Voltages	
All tubes	5.8 to 6.2
Plate Voltages	
R.F., First Det., and I.F. tubes	160 to 200
Second Detector tube	70 to 90
Output tube	150 to 190
Screen Grid Voltages	
R.F., First Det., and I.F. tubes	85 to 105
Output tube	160 to 200
Operating Grid Voltages	
R.F and First I.F. tubes	-3.6 to -4.4
First Detector tube	-6.3 to -7.7
Second I.F. tube	-1.8 to -2.2
Second Detector tube	-5.4 to -6.6
Output tube	-13 to -15

Model 96 (Roamio-Auto) (1932)



A-Secondary of 1st i-f trans.
B-Secondary of 3rd i-f trans.
C-Secondary of 2nd i-f trans.
D-Primary of 1st i-f trans. mounted on side of chassis.

MODEL 98
Schematic
Voltage

CROSLEY RADIO CORP.

Model 98

Specifications

Model 98 is a five tube superheterodyne designed for automobile operation. The intermediate frequency is 181.5 KC. The "A" supply is furnished by the automobile storage battery and the "B" supply by the automobile storage battery used in connection with a Crosley Syncronode. Service information on the Syncronode is furnished in a separate bulletin.

Tubes and Voltage Limits

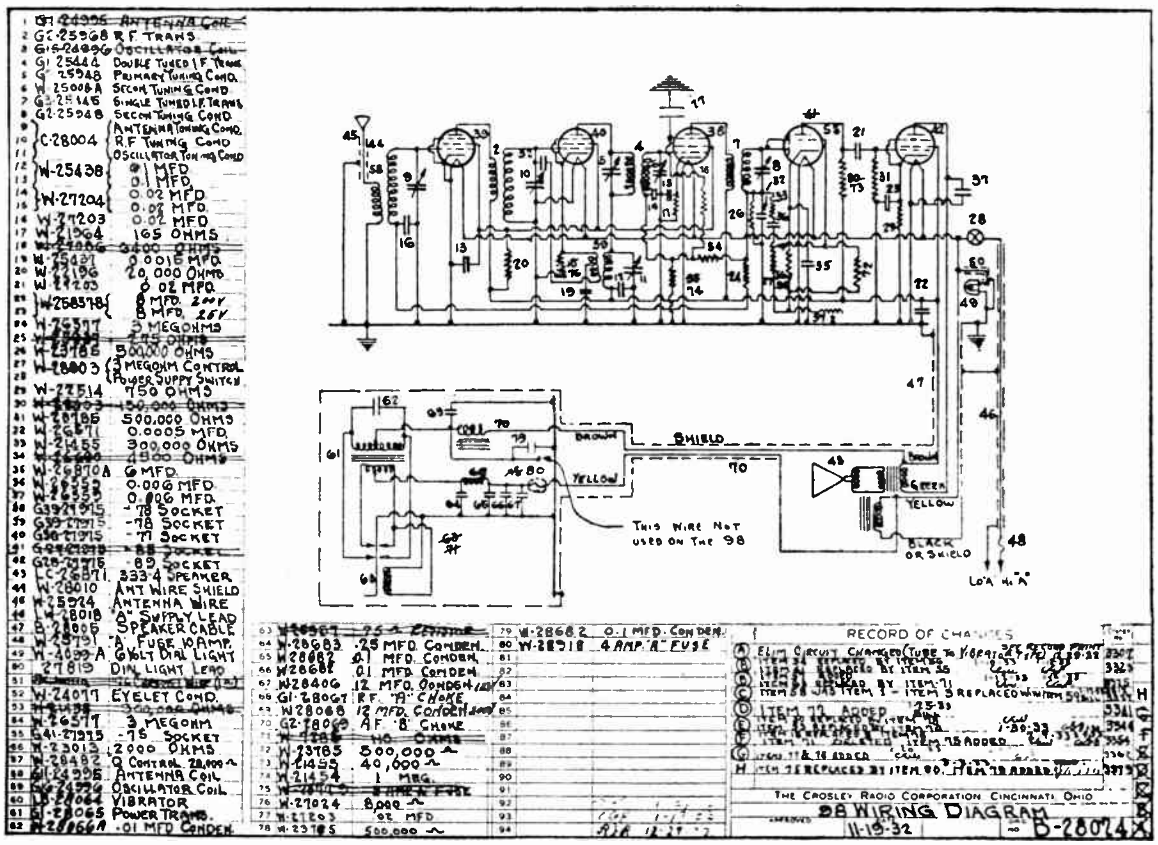
The following chart gives the tubes, their functions, and voltages, measured with the receiver in operating condition but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt or more) for all measurements. The voltage limits are + or — 10% of the values given.

All voltages are measured from tube contact to chassis with 6.3 volts at the battery and 180 volts from the Syncronode.

The "Q" control should be entirely off.

Tube	Position	Voltages Plate	Screen Grid	Cathode	Supp. Grid	Fil.
-78	R. F. Amplifier	180	85	0	0	6.0
-77	Oscillating detector	180	85	4.5	4.5	6.0
-78	I. F. Amplifier	180	85	2.0	0	6.0
-75	Diode—A. F. Amplifier	130		1.5		6.0
-89	Output (Class A Pentode)	180	180	17.0	17.0	6.0

"A" battery drain—4.6 amp. at 6.3 volts.



CROSLEY RADIO CORP.

MODEL 99
Schematic
Voltage

Model 99

Specifications

Model 99 is a six tube superheterodyne designed for automobile operation. The intermediate frequency is 181.5 KC. The "A" supply is furnished by the automobile storage battery and the "B" supply by the automobile storage battery used in connection with a Crosley Syncronode. Service information on the Syncronode is furnished in a separate bulletin.

Tubes and Voltage Limits

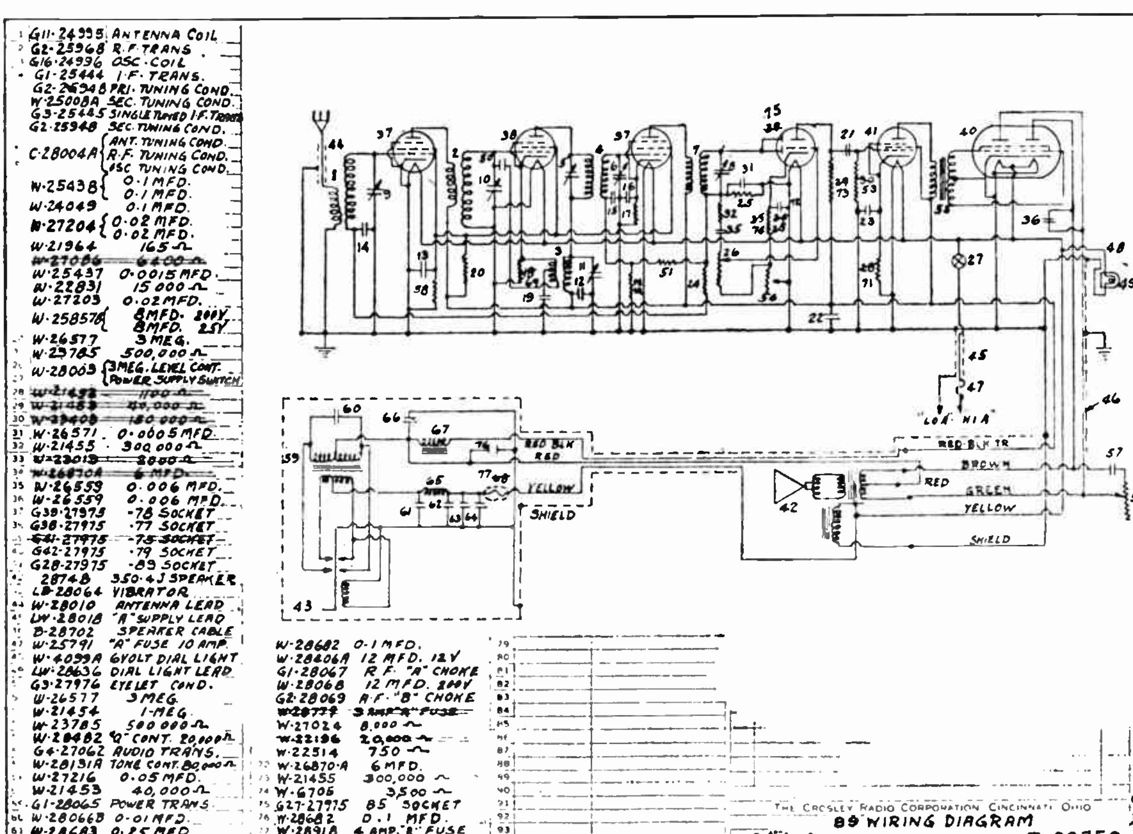
The following chart gives the tubes, their functions, and voltages measured with the receiver in operating condition but with no signal to the antenna circuit. Use a high resistance D. C. voltmeter (1000 ohms per volt or more) for all measurements. The voltage limits are + or — 10% of the values given.

All voltages are measured from tube contact to chassis with 6.3 volts at the battery and 170 volts from the Syncronode.

The "Q" control should be entirely off.

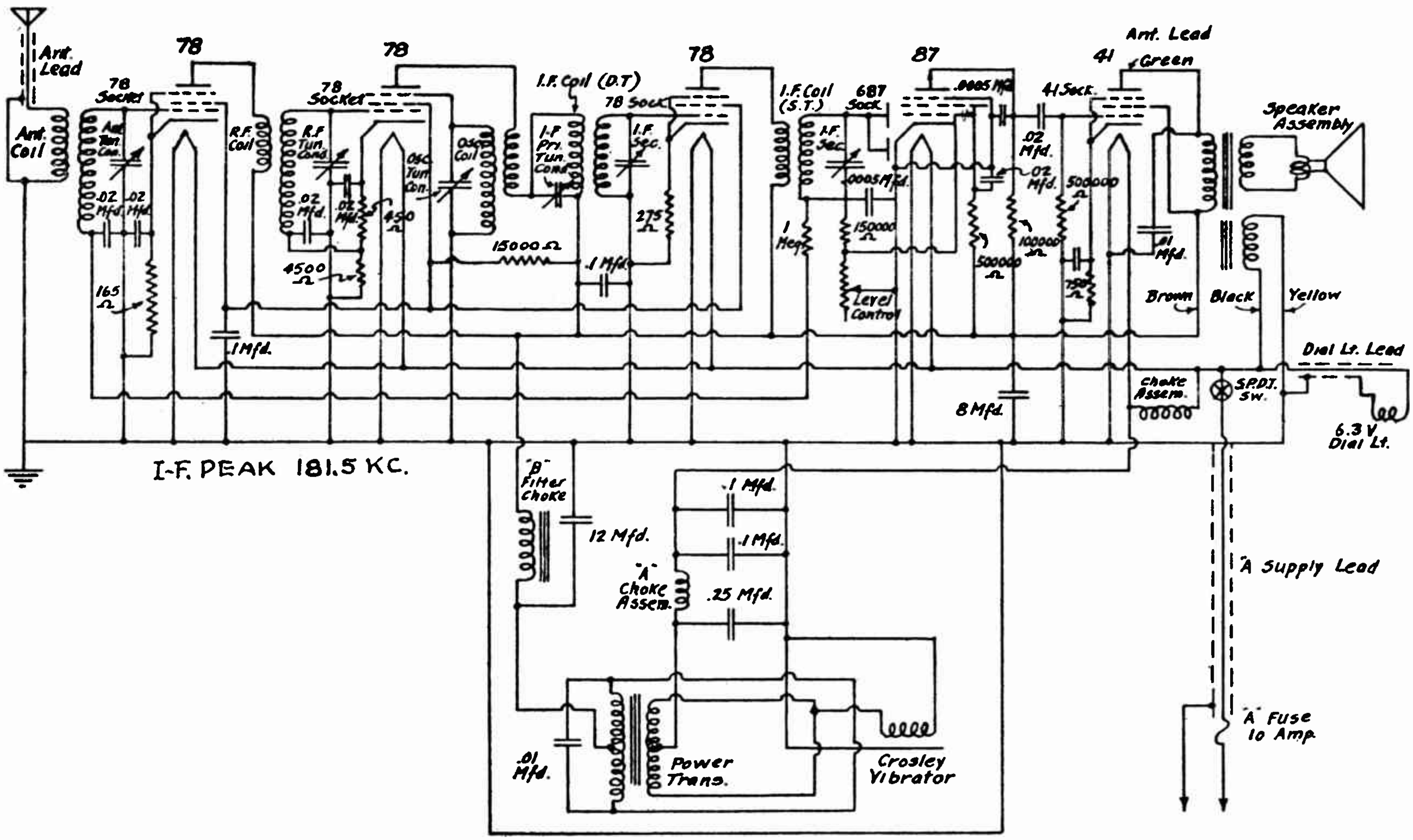
Tube	Position	Voltages: Plate	Screen Grid	Cathode	Supp. Grid	Fil.
-78	R. F. Amplifier	170	80	0	0	6.0
-77	Oscillating detector	170	80	4.0	4.0	6.0
-78	I. F. Amplifier	170	80	1.5	1.5	6.0
-85	Diode—A. F. Amplifier	25		2.0		6.0
-89	A. F. Amplifier	170	170	17	17	6.0
-79	Output (Class B)	170		0		6.0

"A" battery drain—5.3 amp. at 6.3 volts.

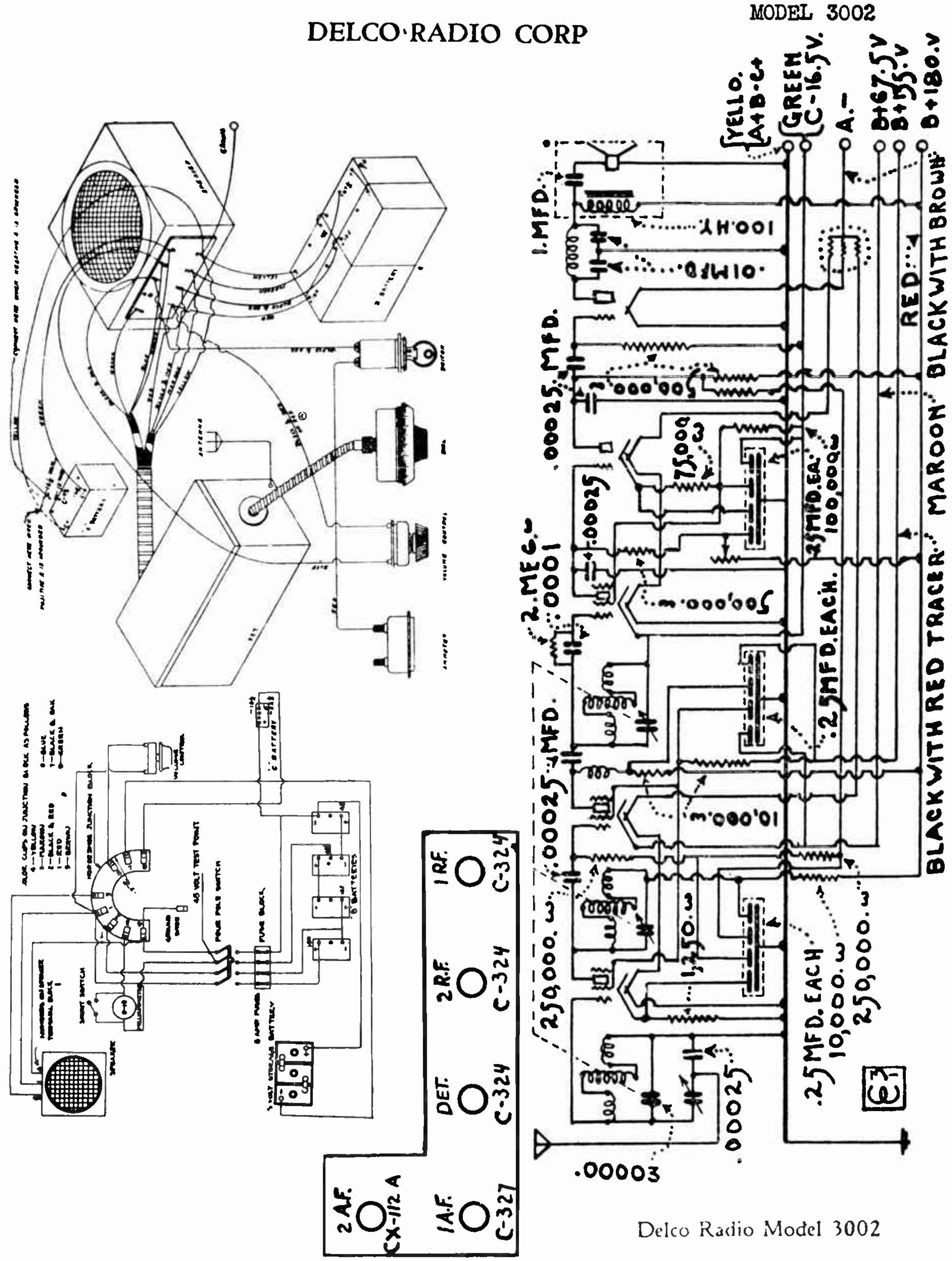


MODEL 102
Schematic

CROSLEY RADIO CORP.



I-F. PEAK 181.5 KC.



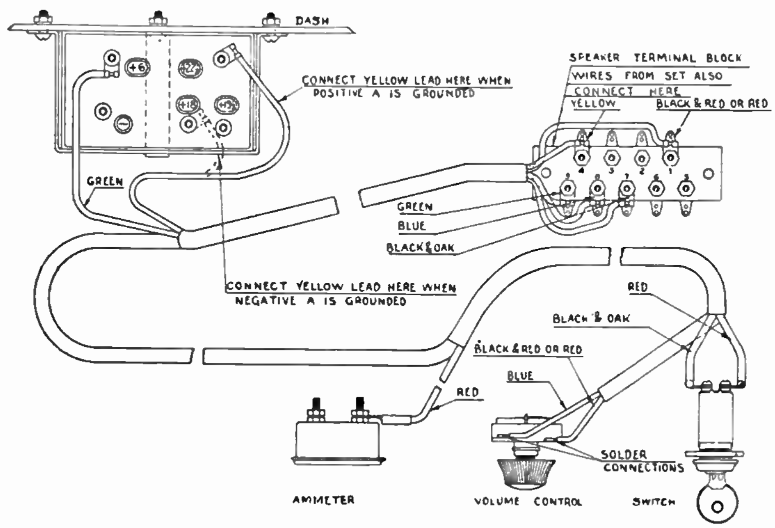
Delco Radio Model 3002

Type of Tube	Position of Tube	Tube in Test Kit					
		Filament Volts	Plate Volts	Control Grid Volts	Screen Volts	Plate M.A. Current	Plate M.A. Grid Test
224	1—R. F.	1.9	125	4.8	100	3.2	5.4
224	2—R. F.	1.9	72	0	42	2.2	2
224	Detector	1.9	15	0	10	.13	0
227	1—A. F.	1.9	45	1	-	.19	.27
212-A	2—A. F.	3.9	137	.2	-	5.5	10.5

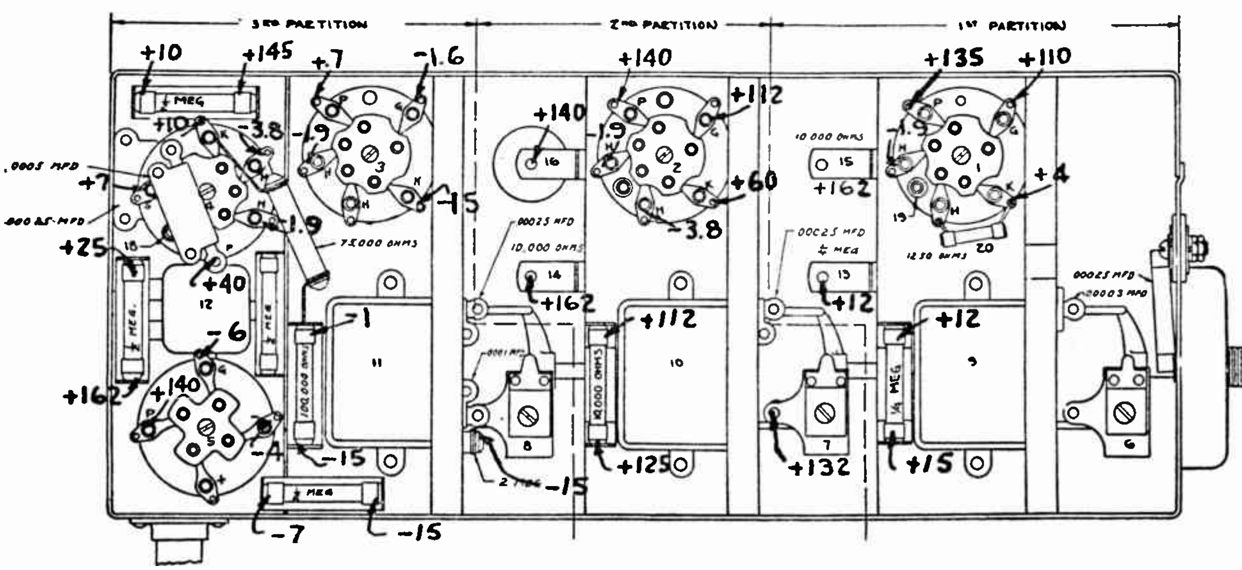
MODEL 3002
Notes
Parts Layout

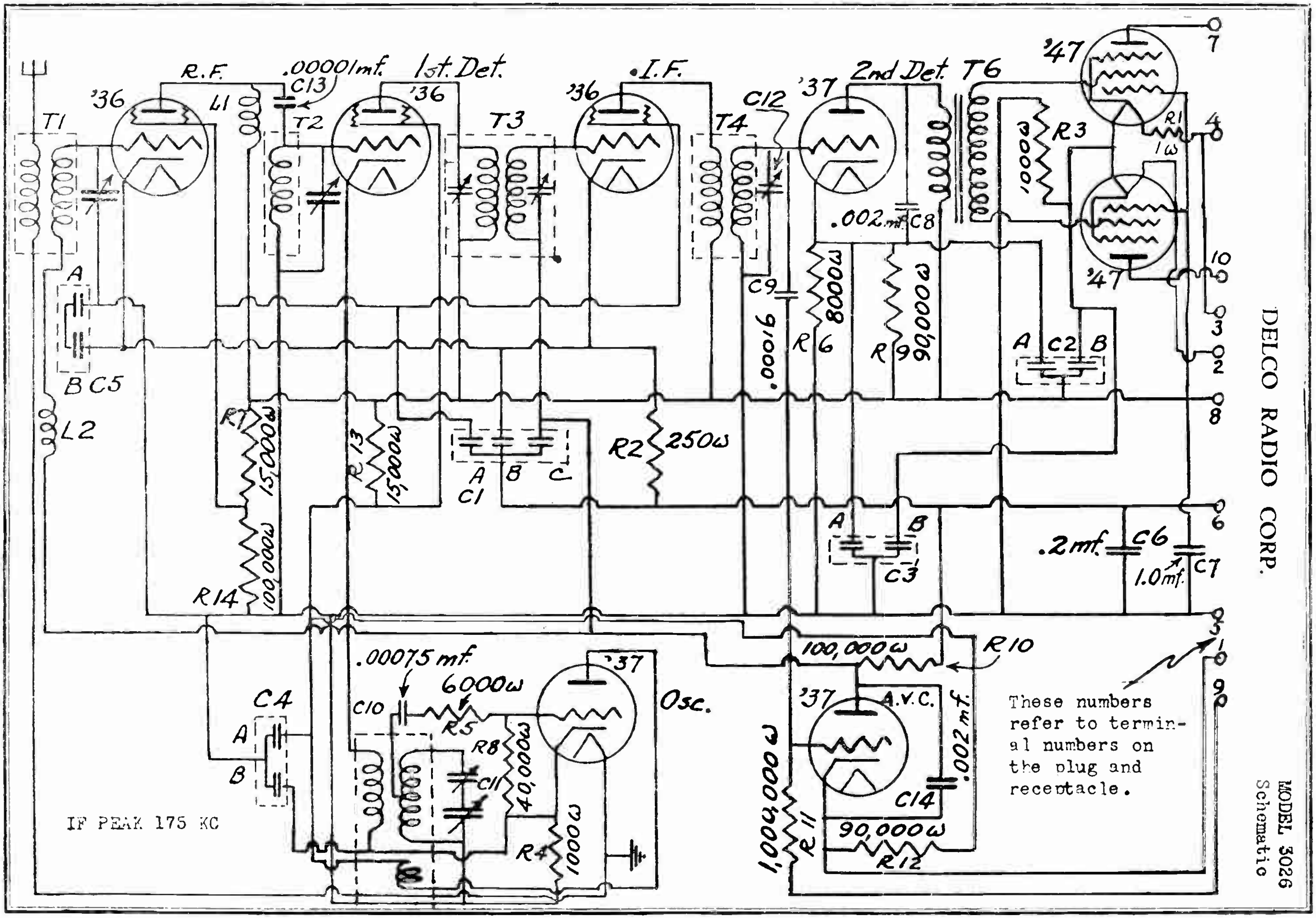
DELCO RADIO CORP

After the set is in operation on a powerful signal, it will be necessary to tune the antenna circuit so that weaker signals will be received with the maximum volume. The best way to do this is to connect a milliammeter, with a zero to ten milliampere scale, in series with the B Plus 67.5 volt maroon lead. (Connect positive side of meter to set.) Insert a small screw driver in the hole in the bottom of the receiver located nearest the antenna terminal and adjust the large screw on the first balancing condenser. This is located about two inches above the hole. Adjustments should be made by turning the screw until the minimum reading on the meter is obtained. While this adjustment is being made, the station selector should be turned slightly in either way to determine whether or not the reading can be further decreased. This adjustment is a very delicate operation and requires only a slight movement in either direction, not to exceed one full turn. If a meter is not available, a weaker signal should be selected and the set adjusted to maximum volume by varying the position of the screw. Care should be taken not to apply excessive pressure in making this adjustment. While it will do no damage to ground the screw driver to the set while adjusting the screw, the signals will be cut out whenever the screw driver touches the case. A little tape wound around the screw driver will prevent this. It is impossible to receive a shock while making this adjustment. Make above adjustment only through the hole located nearest the aerial connection. After installation is complete, check all connections for correct locations and tightness.



Control Wiring Harness Connections.

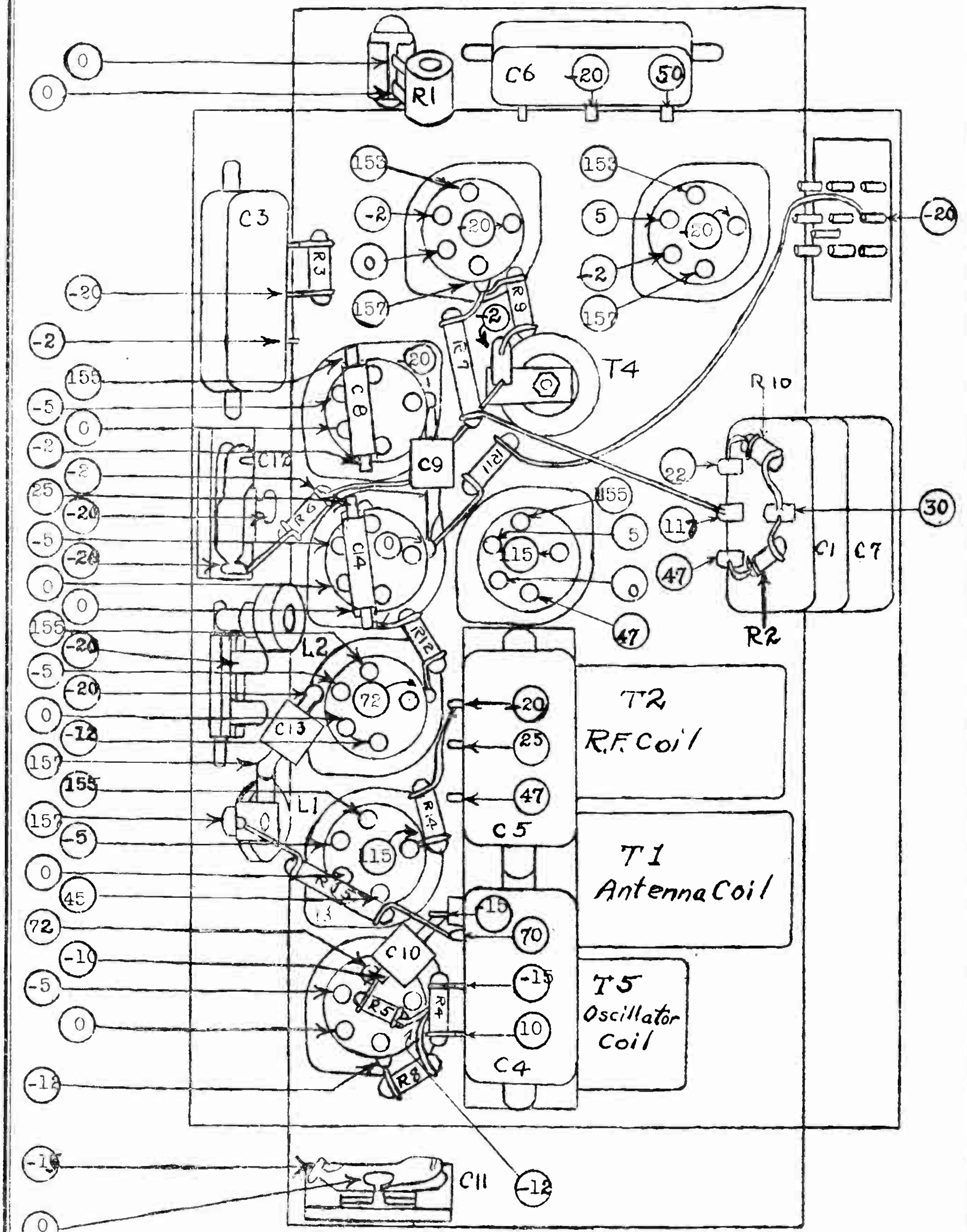




MODEL 3026
Schematic

MODEL 3026
Chassis Layout
Below Serial 1400

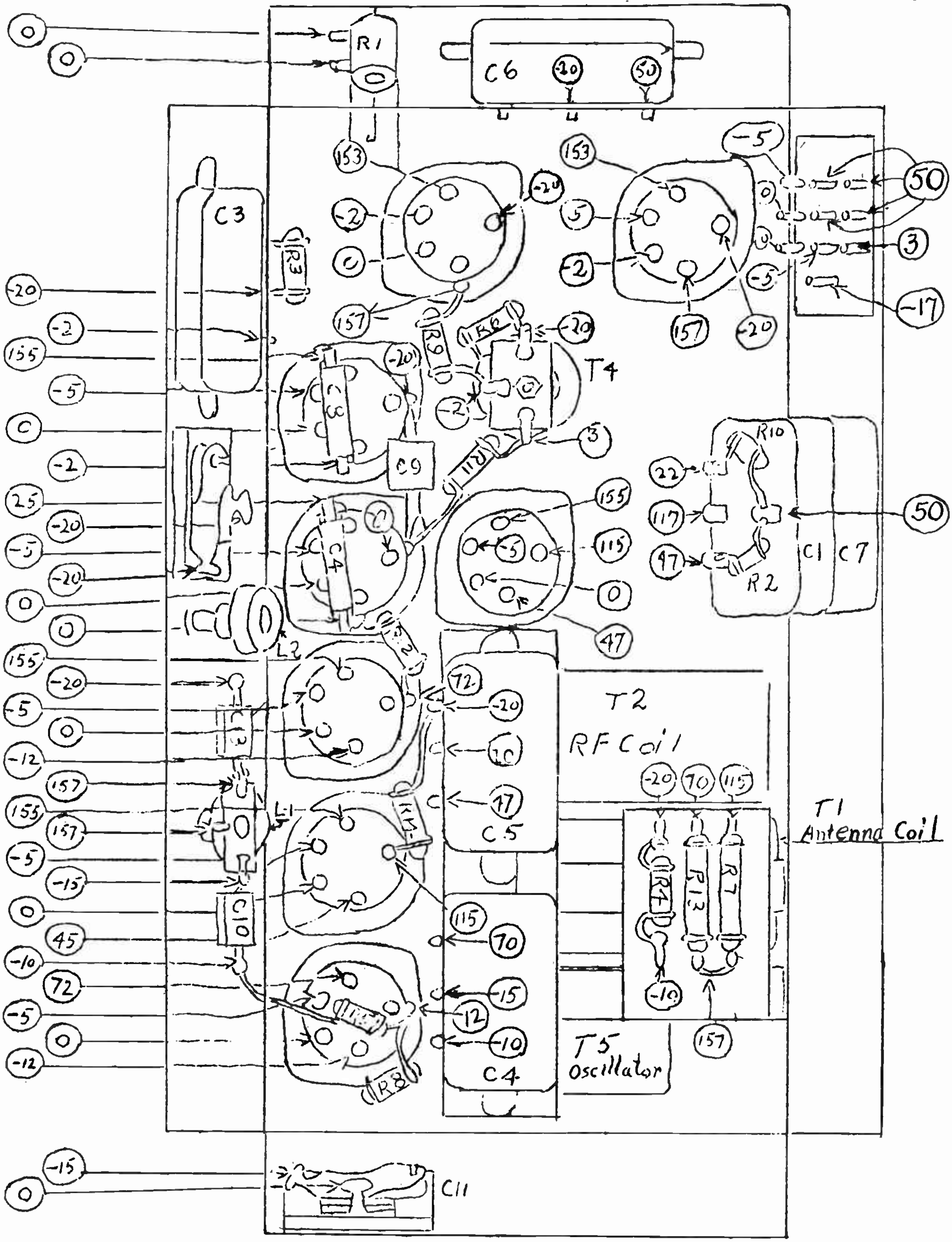
DELCO RADIO CORP.



BOTTOM OF CHASSIS
For sets with serial numbers below 1400

DELCO RADIO CORP.

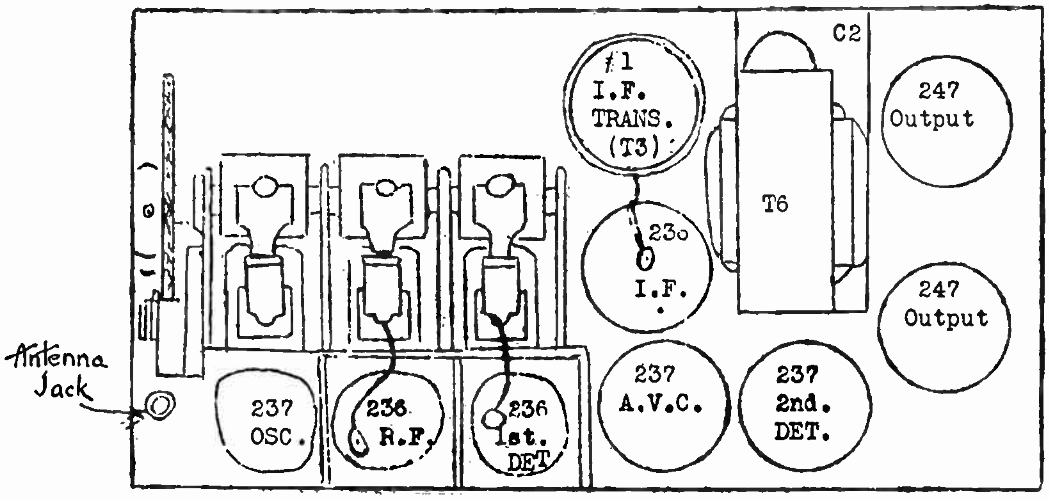
MODEL 3026
Chassis Layout
Above Serial 1400



Bottom of Chassis
For Sets with Serial Numbers above 1400

MODEL 3026
Socket Layout
Cable Data

DELCO RADIO CORP.



CABLE COLOR CODE:

BATTERY CABLE

Color	Battery end	Terminal No. (Plug on Receiver Case)
Red	B + 180V.	8
Maroon	B + 67½ V.	6
Yellow	B-	12
Black-Yellow	A (hot side)	11
Black	A (ground side)	2

CONTROL UNIT CABLE

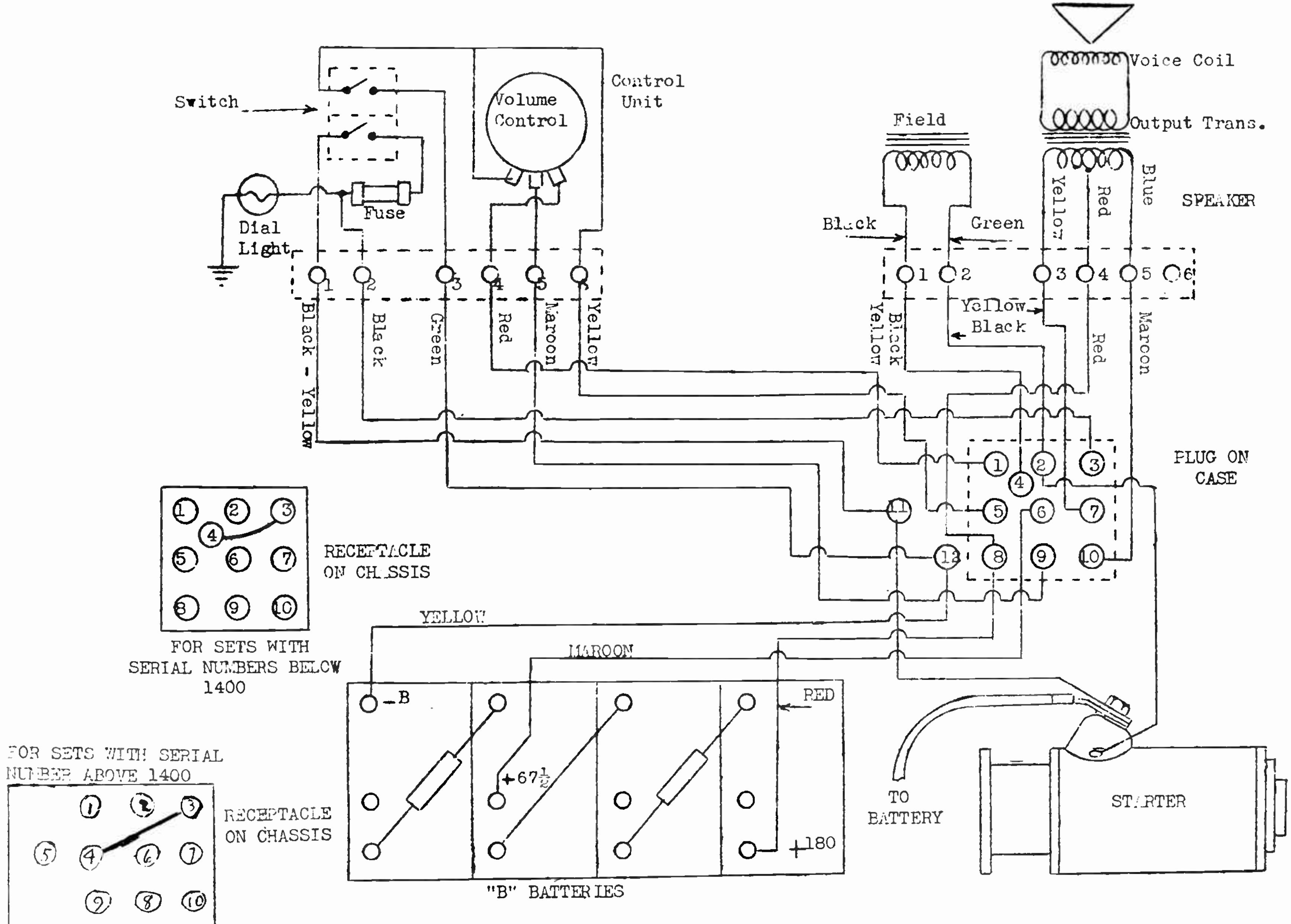
COLOR	FROM TERMINAL NO. (Control Unit Term. Strip)	TO TERMINAL NO. (Plug on Rec. Case)	CONNECTS
Black-Yellow	1	11	A (hot side) to switch
Black	2	3	Switch to filament
Green	3	12	B- from Battery
Red	4	1	A.V.C. cathode to high resistance side of Vol. Control.
Maroon	5	9	Grid resistor of A.V.C. tube to center tap of Vol. Control.
Yellow	6	5	B- to low resistance side of Vol. Control and to the switch

SPEAKER CABLE

COLOR	FROM TERMINAL NO. (Spkr. Term. Strip)	TO TERMINAL NO. (Plug on Rec. Case)	CONNECTS
Black-Yellow	1	4	One side of speaker field thru fuse to hot side of "A" Battery
Black	2	2	Other side of speaker field to ground side of "A" Battery
Yellow	3	7	Yellow lead of output trans. to plate of one 247 tube.
Red	4	8	Red lead of output trans. (center tap) to + 180 "B" Battery.
Maroon	5	10	Blue lead of output trans to plate of the other 247 tube.

DELCO RADIO CORP.

MODEL 3026
Terminal Data



DELCO RADIO CORP.

Remove the control drive cable from the rear of control unit.

Remove the control unit from the dash. Remove the top of the control unit. and the escutcheon plate.

Remove the stop pin from the selector drive shaft and loosen the two set screws in the cable windlass and the set screws in the selector shaft collar. Then push the selector drive shaft to the rear far enough to remove the windlass and cable assembly.

Hold the new windlass and cable, with the end containing the set screws in the left hand, and wind one complete turn of the short end of the cable around the windlass, in a clockwise direction, winding the cable in the groove away from the set screws.

Then wind three and one half turns of the long end of the cable around the windlass in a counter-clockwise direction, winding the cable in the groove toward the set screws.

Slip the cable clamp, Tool No. 1001, over the windlass to hold the cable in place

Place the windlass and cable in position with the set screws to the rear and push the selector drive shaft forward into position through the windlass. The long end of the cable should lead away from the windlass at the bottom. The short end of the cable should lead away from the windlass at the top.

Pull the long end of the cable under the small idler pulley near the windlass and around the larger idler pulley from bottom to top. Hook the spring on the loop at the end of the long section of the cable then lead the cable through the slot in the face of the selector dial drum and hook the free end of the spring over the ear in the drum, nearest the 50 mark.

Lead the short end of the cable once around the outside of the selector drum in a counter-clockwise direction and through the slot in the face of the drum. Hook the loop at the end of the cable over the ear in the drum nearest the 150 mark.

NOTE:

On a number of sets of early production, the two ends of the cable are connected by the cable spring. The selector drum in this case has two notches and the cable is wound around the drum with the spring in the position shown in Figure 8

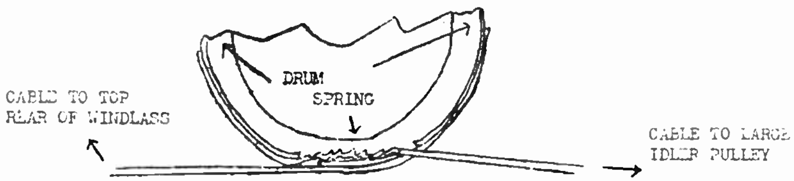


Figure 8

If it should be necessary to replace either the windlass and cable assembly or the dial and drum assembly described above, both parts should be replaced by the later type as listed in the part section of this manual.

Be sure that four selector shaft stop washers and four plain washers are in position on the shaft. These washers should be arranged alternately with one plain washer against the rear bearing.

Replace the selector shaft stop pin, and with the windlass loose on the shaft, turn the shaft as far as it will go in a clockwise direction.

Hold the escutcheon plate in place on the front of the control unit and turn the selector dial until the last line beyond the 150 mark is lined up with the indicating pointers.

Place the windlass close enough to the front bearing to allow approximately 1/64" end play and tighten the two set screws in this position.

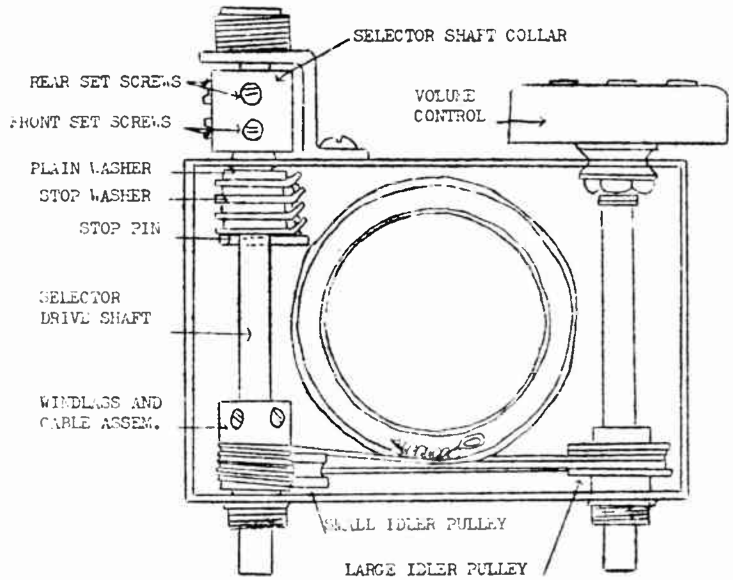


Figure 7

DELCO RADIO CORP.

MODEL 3026
Voltage
Resistance
Plug Data

Type of Tube	Position of Tube	Fil. Volts	Plate Volts	Control Grid Volts	Screen Grid Volts	Cathode Volts	Pentode Screen Volts	Normal Plate Current	Grid Test
37	Oscillator	5.5	65	-----	----	5.0	----	6.0	7.5
36	R. F.	5.5	105	.15	65	55.0	----	2.5	3.5
36	1st Detector	5.5	165	5.50	80	5.0	----	1.3	2.5
36	I. F.	5.5	110	2.50	75	52.0	----	.5	3.0
37	A.V.C.	5.5	15	-----	----	7.5	----	---	---
37	2nd Detector	5.5	150	10.00	----	5.0	----	---	---
47*	A.F.	2.5	150	18.00	----	----	160	7.0	25.0
47*	A.F.	2.5	150	18.00	----	----	160	7.0	25.0
GA#	A.F.	5.0	150	18.00	----	----	160	7.0	25.0

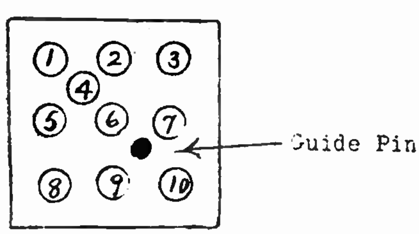
Volume Control on Max. "B" Battery Voltage 180

*Do not attempt to take readings on the type 47 (Pentode) tube unless your set analyzer is equipped to test sets using this type of tube. Otherwise, readings taken at the 47 sockets will be misleading.

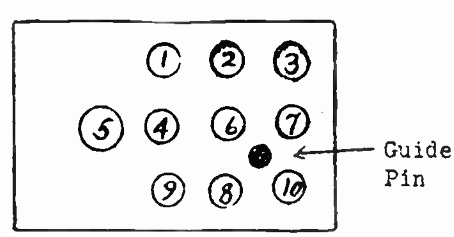
#GA pentode used in Models 2027-A and 2029-A in place of '47 pentode output tubes.

NOTE: It should be noted that readings obtained with different set analyzers will vary with battery voltage and with different tubes. The readings shown, therefore, are only average readings. For this reason, each service man should compile a chart similar to the one illustrated, using his own set analyzer with a set, and batteries that are known to be operating properly.

Test from contact No.	to contact No.	Correct Voltage Readings Min.	Max.	Probable cause of trouble if voltage is below Min. Limit
5	8	120	180	Low "B" Batteries
5	6	45	67½	Low "B" Batteries
1	8	120	180	Open volume control
9	8	120	180	Defective volume control
5	7	120	180	Open speaker transformer
5	10	120	180	Open speaker transformer
2	3	6.0	6.8	Low storage battery
3	4	6.0	6.8	Open speaker field
8	2	No Reading		(If reading is obtained "B" Batteries may be grounded or "B" Battery wires may be grounded due to moisture between the Batteries and "B" Battery box.)
6	2	No Reading		



Sets with serial numbers
Below 1400



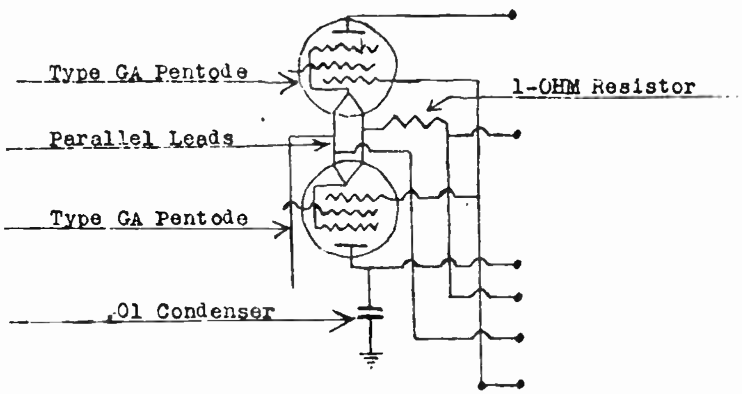
Sets with serial numbers
Above 1400

View of plug in case with chassis removed.

MODELS 2027-A AND 2029-A

WIRING CHANGE FROM TYPE 247 PENTODE TO TYPE GA PENTODE

In order to re-operate the 2027 or 2029 chassis to the new 2027-A or 2029-A, there are three distinct operations which are as follows:



1. Change Filament leads which are connected in series, for use with the 247 tube, to parallel connections.

2. Insert the Black tubular 1-OHM Resistor in the positive lead. This does not necessitate moving the resistor.

3. Connect a .01 Mfd. condenser from the plate terminal on one pentode socket to ground.

The choke coils, which were mounted on the 2027-A and 2029-A sets received from the factory, are not necessary in making this change.

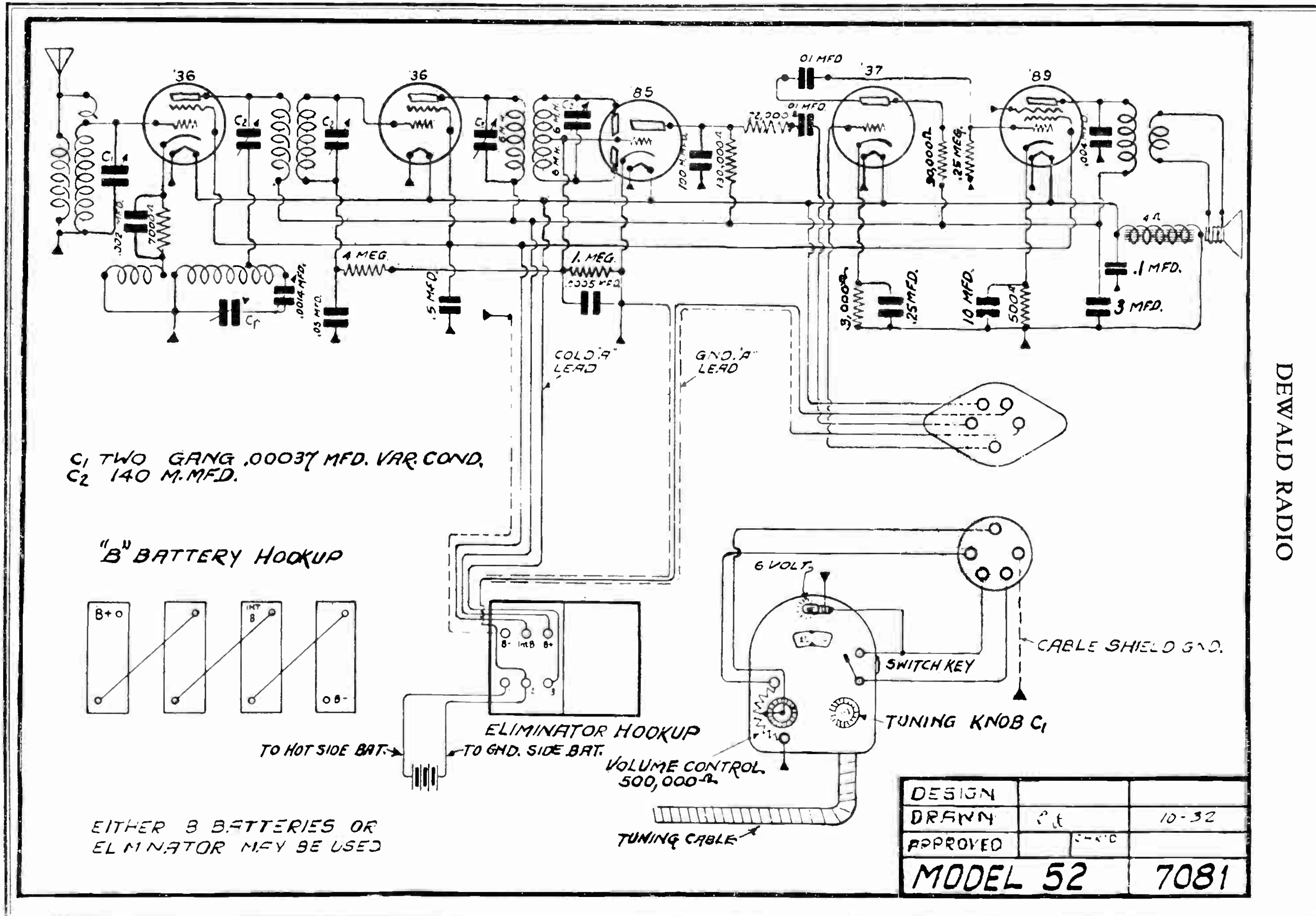
TABLE OF CONDENSERS AND RESISTORS:

CONDENSERS

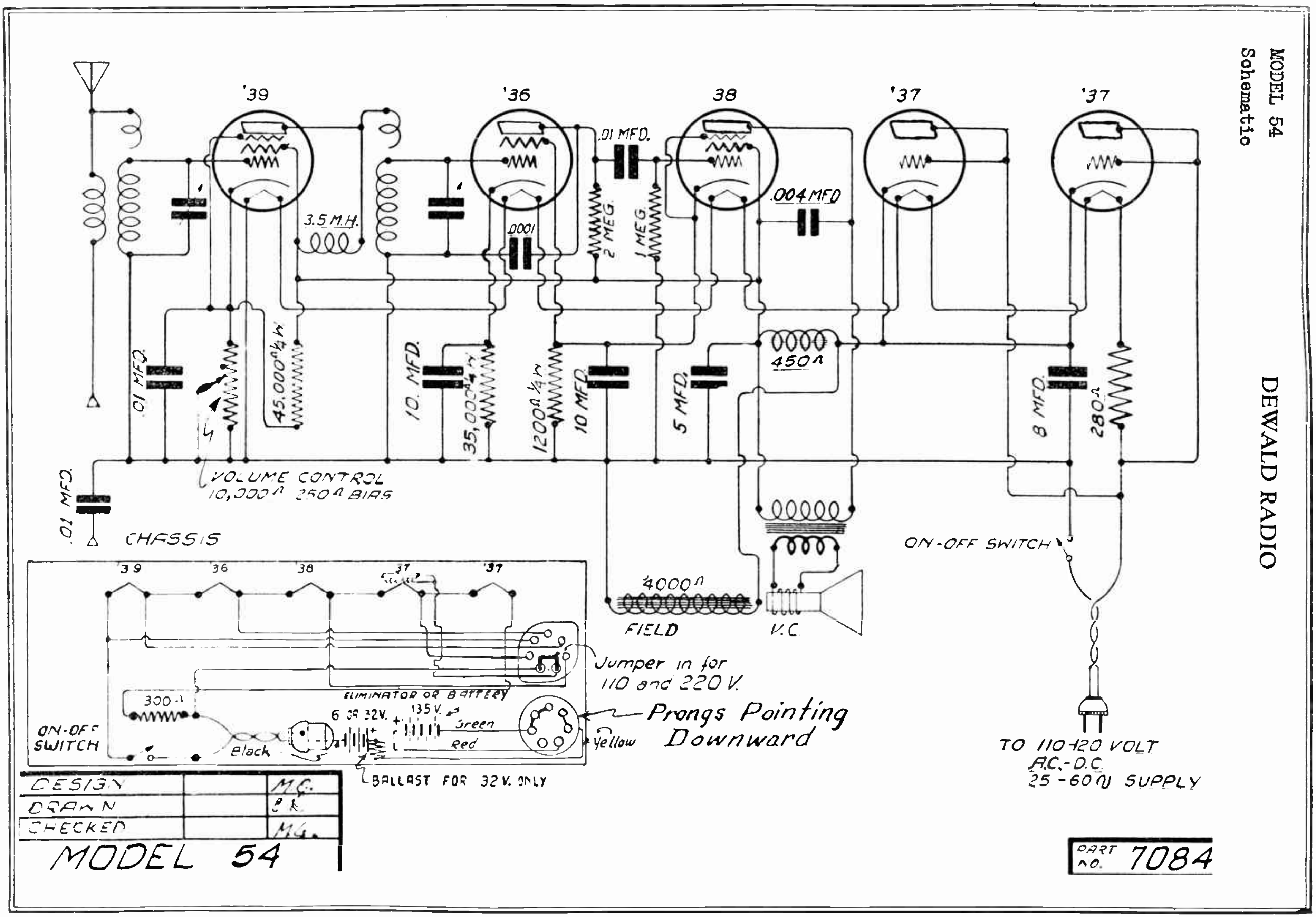
Wiring Diagram Code	Section of Condenser	Capacity	Part No.
C-1	A	.1 Mfd.	1206834
C-1	B	.1 Mfd.	1206834
C-1	C	.5 Mfd.	1206834
C-2	A	1.0 Mfd.	1206156
C-2	B	3.0 Mfd.	1206156
C-3	A	.1 Mfd.	1206397
C-3	B	.1 Mfd.	1206397
C-4	A	.1 Mfd.	1206397
C-4	B	.1 Mfd.	1206397
C-5	A	.1 Mfd.	1206397
C-5	B	.1 Mfd.	1206397
C-6		.2 Mfd.	1206397
C-7		1.0 Mfd.	1207239
C-8		.002 Mfd.	1203894
C-9		.00016 Mfd.	1203387
C-10		.00075 Mfd.	
		Below Serial No. 1400	1200422
		Above Serial No. 1400	1200423
C-11		Oscillator Series Trimmer.	1204265
C-12		No. 2 I.F. Trimmer	1206749
C-13		.00001 Mfd.	
		Below Serial No. 1400	1203388
		Above Serial No. 1400	1203386
C-14		.002 Mfd.	1203894

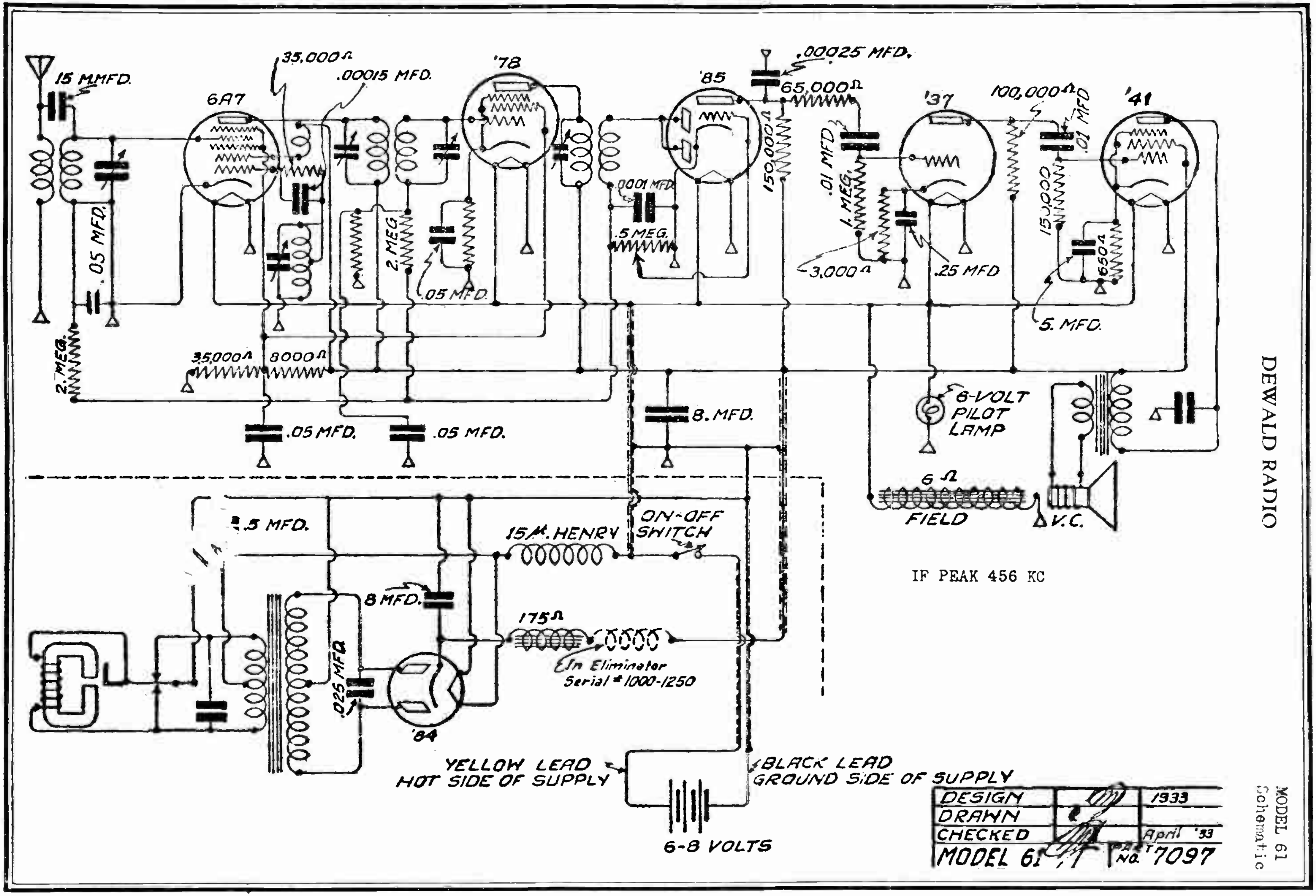
RESISTORS

CODE	OHMS	WATTS	BODY	END	SPOT	PART NO.
R1	1	5	Tubular Enameled Resistor			1206977
R2	250	1/2	Red	Green	Brown	1204109
R3	1,000	1/2	Brown	Black	Red	1201630
R4	1,000	1	Brown	Black	Red	1201615
R5	6,000	1/2	Blue	Black	Red	1204106
R6	8,000	1/2	Gray	Black	Red	1204132
R7	15,000	1	Brown	Green	Orange	1204111
R8	40,000	1/2	Yellow	Black	Orange	1201636
R9	90,000	1/2	White	Black	Orange	1204133
R10	100,000	1/2	Brown	Black	Yellow	1201635
R11	1,000,000	1/2	Brown	Black	Green	1201618
R12	90,000	1/2	White	Black	Orange	1204133
R13	15,000	1/2	Brown	Green	Orange	1204111
R14	100,000	1/2	Brown	Black	Yellow	1201635



DEWALD RADIO
'36
'36
85
'37
'89
C1
C2
.01 MFD
.01 MFD.
22,000
.002 MFD.
7000
4 MEG.
1. MEG.
.0005 MFD.
.0014 MFD.
.03 MFD.
.5 MFD.
100 M.MFD.
130,000
90,000
.25 MEG.
.004
4
.1 MFD.
3 MFD.
9,000
.25 MFD.
10 MFD.
500
COLD "A" LEAD
GND. "A" LEAD
C1 TWO GANG .00037 MFD. VAR. COND.
C2 140 M.MFD.
"B" BATTERY HOOKUP
B+
INT B
B-
B- IntB B+
ELIMINATOR HOOKUP
TO HOT SIDE BAT.
TO GND. SIDE BAT.
6 VOLT
CABLE SHIELD GND.
SWITCH KEY
TUNING KNOB C1
VOLUME CONTROL 500,000
TUNING CABLE
EITHER B BATTERIES OR ELIMINATOR MAY BE USED
DESIGN
DRAWN
10-32
APPROVED
MODEL 52
7081


DEWALD RADIO
'39
'36
38
'37
'37
.01 MFD.
.004 MFD
3.5 M.H.
.0001
2 MEG.
1 MEG.
.01 MFD.
45,000 Ω ¼ W
10. MFD.
35,000 Ω ¼ W
1200 Ω ¼ W
10 MFD.
5 MFD.
450 Ω
8 MFD.
280 Ω
VOLUME CONTROL
10,000 Ω 250 Ω BIAS
.01 MFD.
CHASSIS
4000 Ω
FIELD
V.C.
ON-OFF SWITCH
39
36
38
37
'37
Jumper in for
110 and 220 V.
ELIMINATOR OR BATTERY
300 Ω
6 OR 32 V.
135 V.
Green
Red
Black
Yellow
ON-OFF SWITCH
Prongs Pointing
Downward
BALLAST FOR 32 V. ONLY
TO 110-120 VOLT
A.C.-D.C.
25-60 ~ SUPPLY
DESIGN M.G.
DRAWN
CHECKED M.G.
MODEL 54
PART NO. 7084


15 MMFD.
6A7
35,000Ω
.00015 MFD.
'78
'85
.00025 MFD.
65,000Ω
'37
100,000Ω
'41
.05 MFD.
2 MEG.
.05 MFD.
.0001 MFD.
.5 MEG.
150,000Ω
.01 MFD.
1. MEG.
3,000Ω
.25 MFD
.01 MFD
15000Ω
650Ω
5. MFD.
2 MEG.
35,000Ω
8000Ω
.05 MFD.
.05 MFD.
8. MFD.
6-VOLT PILOT LAMP
6Ω
FIELD
V.C.
.5 MFD.
15 M. HENRY
ON-OFF SWITCH
8 MFD.
175Ω
In Eliminator Serial # 1000-1250
.025 MFD.
'84
YELLOW LEAD HOT SIDE OF SUPPLY
BLACK LEAD GROUND SIDE OF SUPPLY
6-8 VOLTS
IF PEAK 456 KC
DESIGN
DRAWN
CHECKED
1933
April '33
MODEL 61
NO. 7097
DEWALD RADIO
MODEL 61 Schematic

MODEL 61·
Socket Layout
Alignment

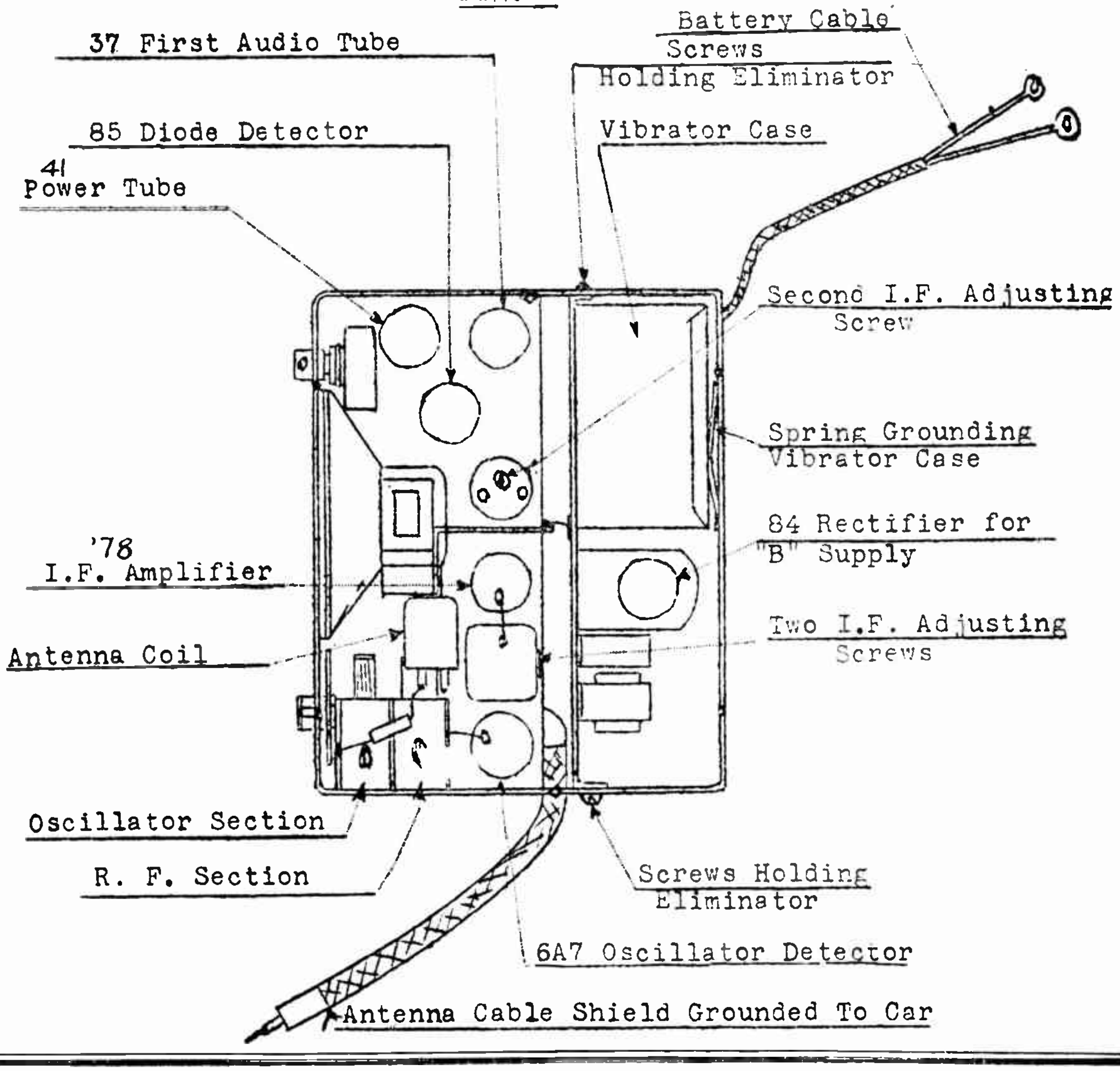
DEWALD RADIO

RECEIVER ALIGNMENT — To align the I.F. circuit, an oscillator supplying 456 K.C. should be connected to the control grid of the 6A7 and the variable condenser frame. The grid cap normally on the 6A7 should be removed. The oscillator section of the variable condenser should be short circuited. This may be done by putting a small clip on the terminal of the oscillator condenser trimmer and running a wire to ground. It is preferable to use an output meter for accurate work, which may be connected into circuit of the 41 by means of an adapter having leads brought out from plate and screen through a .5 mfd stopping condenser. See Fig. #4.

The volume control on the receiver should be turned to maximum and the three I.F. adjusting screws shown in Fig. #2 set to give maximum on the output meter. This operation may be performed with the receiver in the can if a pair of long nose pliers or offset screw driver is used.

For R.F. alignment, remove oscillator condenser short circuit, replace grid cap on 6A7 and connect oscillator covering broadcast range to antenna wire and its shield.

Fig. 2



DEWALD RADIO

MODEL 61
Vibrator Data

VIBRATOR ADJUSTMENT To examine vibrator, remove "B" supply unit from can by unsoldering 3 leads. (see Fig.3) removing 6 screws at ends of unit Take cover off vibrator case and vibrator may be removed without unsoldering its lead wires. It will be seen that there are a top and a bottom set of contacts. The normal clearance on these contacts is .003" to .004" and this may be adjusted with screws provided.

Any dirt on contacts should be removed with pipe cleaner before adjustment. If top clearance is too great vibrator may operate but not close this circuit (operate half wave) and the voltage will be low. If bottom clearance is too great, vibrator will pull down but not vibrate. Too small a bottom clearance may short bottom contacts and cause inoperative vibrator and heavy current drain.

If both contact clearances are small, the vibrator will operate at a higher pitch and voltage, but sparking will occur.

Check of vibrator operation may be made by running three temporary jumpers from "B" supply unit outside can to the receiver, (See Fig.3) and operating the vibrator outside its case so it is visible. The tone should be low pitched, even and regular, and no appreciable sparking should occur. To remove vibrator for replacement purposes, unsolder the three vibrator wires at the terminals of the step up transformer and at the ground terminal near the tube. Leads should be left attached to vibrator.

If set is not available or is in doubtful condition a 4000 ohm load resistance of 5 watts or larger may be used from plus "B" to ground of eliminator in place of set. The 6-volt supply is applied to the two terminals at the vibrator end of "B" unit.

If gaps are okay, and sparking persists, check for dirty contacts or open condenser across primary of step-up transformer.

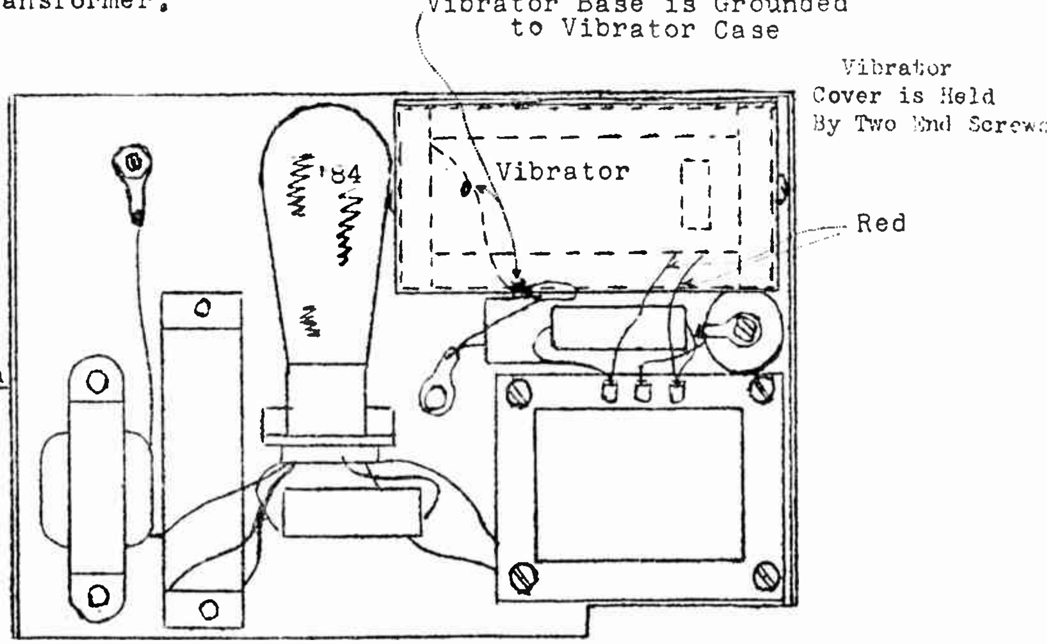


Fig 3a

MODEL 61
Notes

DEWALD RADIO

Be sure shield of battery cable is soldered to can at left side of receiver.

When cover is placed on can, a heavy spring on the inside grounds the top of "B" supply unit. Be sure contacts is good and pressure heavy.

Condenser from antenna transformer should run to front of variable condenser. If further difficulty is experienced check ground of chassis and "B" supply unit to can at various points with heavy screw driver.

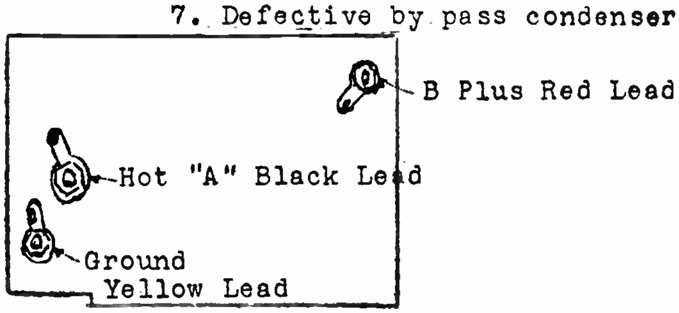
The wire on vibrator which runs from its coil to the frame, should be securely soldered on frame and on inside of vibrator case.

POSSIBLE SET TROUBLES

A. Low volume or weak signals
1. Defective tubes.
2. Poor antenna (small size shielded wire must not be used to extend present antenna, as capacity between shield and inside is too great.
3. Open circuit in radio frequency or audio stage.
4. Defective resistors.
5. Defective by pass condensers.
6. Defective volume control
7. Low "B" voltage.

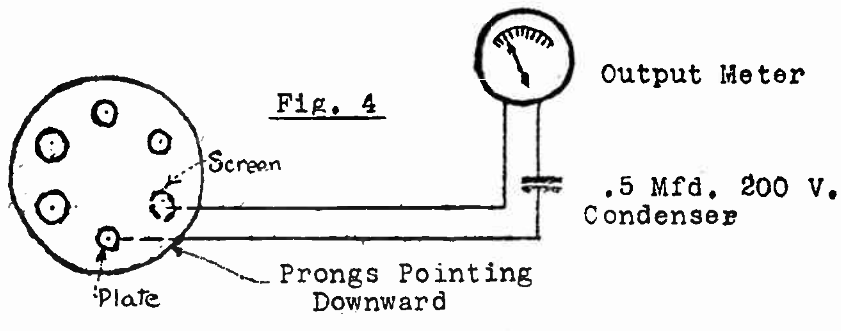
B. Intermittent reception.
1. Antenna shorting (use high resistance continuity to check car antenna-set disconnected)
2. Defective tubes.
3. Loose connection.
4. Film breaking down in electrolytic condenser
5. Defective speaker
6. Defective volume control
7. Defective by pass condenser

Fig.3b



View Showing Eliminator Three Terminals & Color Code of Connections

Fig. 4



Adapter for 41 Showing Wires to Screen Grid & Plate Plus Circuit

DEWALD RADIO

MODEL 61
Parts List
Alignment

Set test oscillator at 1500 K.C. and receiver variable condenser at minimum capacity. Adjust to maximum output with trimmers on top of variable condenser.

Apply 600 K.C. from test oscillator, tune in on receiver and check variable condenser alignment by bending one R.F. condenser rotor plate in or out slightly to give maximum output. Repeat procedure at 800, 1000, and 1200 kilocycles.

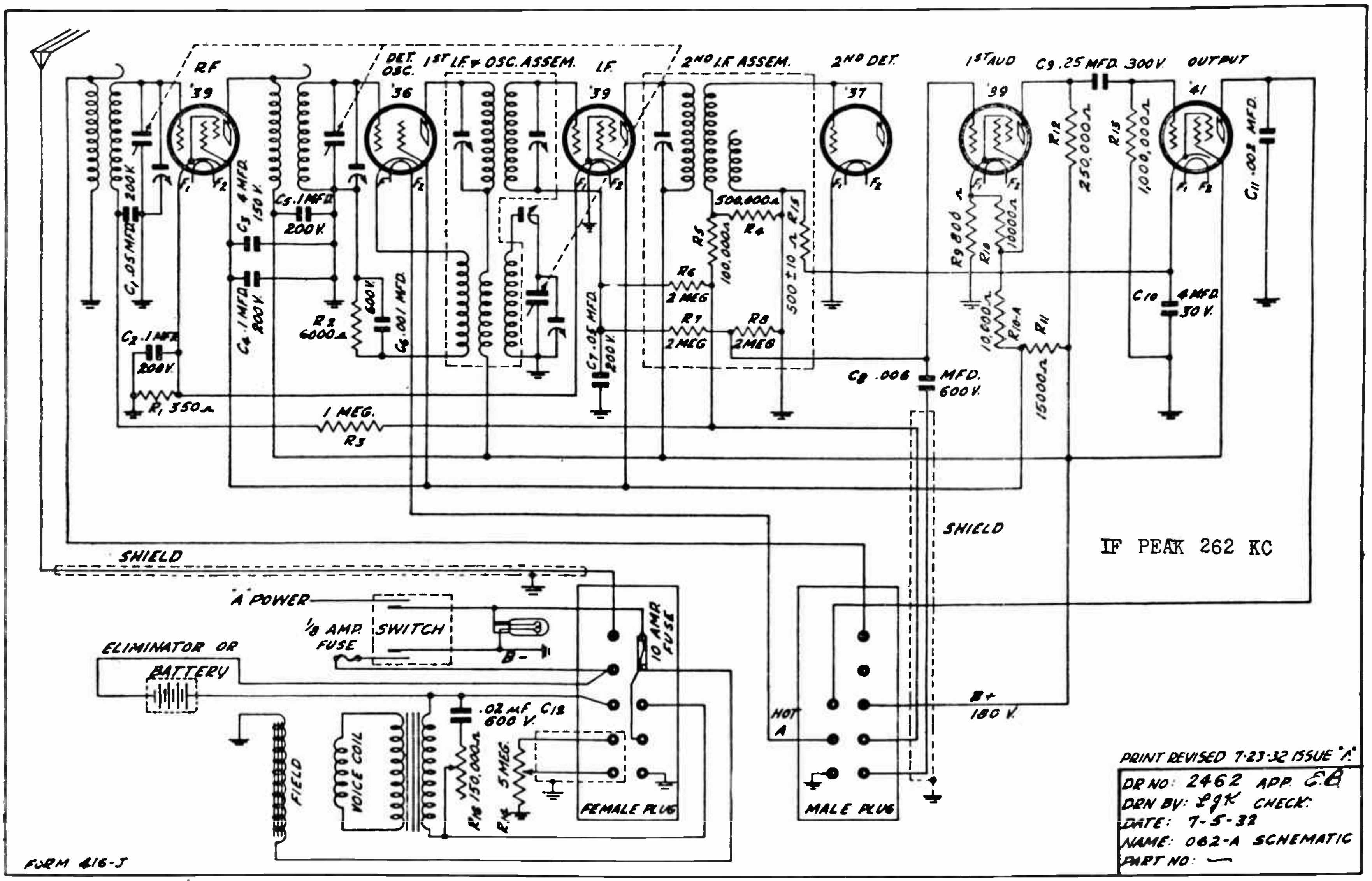
MODEL #61 RECEIVER

NUMBERS AND LIST PRICES OF REPLACEMENT PARTS

1165	Second Detector Transformer	$ 1.40
1166	Dual I.F. Tuned Transformer	1.70
1168	Oscillator Coil	.70
1169	Antenna Coil	.85
2033	.25 Cub Condenser	.35
2046	.05 Cub Condenser	.35
2047	.00025 Mica Condenser	.35
2056	.01 Cub Condenser	.35
2081	.00015 Mica Condenser	.35
2123	.0001 Mica Condenser	.35
2133	5 Mfd Elect. Condenser	.75
2135	2 X .05 Cub Condenser	.45
2147	8 Mfd Elec. Condenser	1.00
2152	.25 Gen. Condenser	.50
3192	Spark Plug Suppressor	.50
3193	Distributor Suppressor	.50
5064	Antenna Cable	.50
5069	Battery Cable	.90
7095	Speaker	5.20
8308	Combination Controls (Vol Cont. & Switch)	1.15
9257	Drive Cover	.50
9270	Baffle Board	.15

MODEL #61 ELIMINATOR

1163	Choke R.F	.60
1162	Transformer	2.60
2070	.5 Mfd Cub Condenser	.35
2033	.25 Cub Condenser	.35
2145	.025 Mfd Cub Condenser	.35
2147	8 Mfd Elect. Condenser	1.00
8304	Vibrator	5.00
9289	T. & B. Cushion 3/8 X 2-1/16 X 4-3/8	.25
9290	Side Cushion 3/8 X 1-3/16 X 3-5/8	.20
9291	End Cushion 3/8 X 1-3/16 X 2-1/16	.20
1161	Filter Choke	.75
9202-9203	Drive Cable Ably	1.75
8317	Driven Gear Ably	1.00

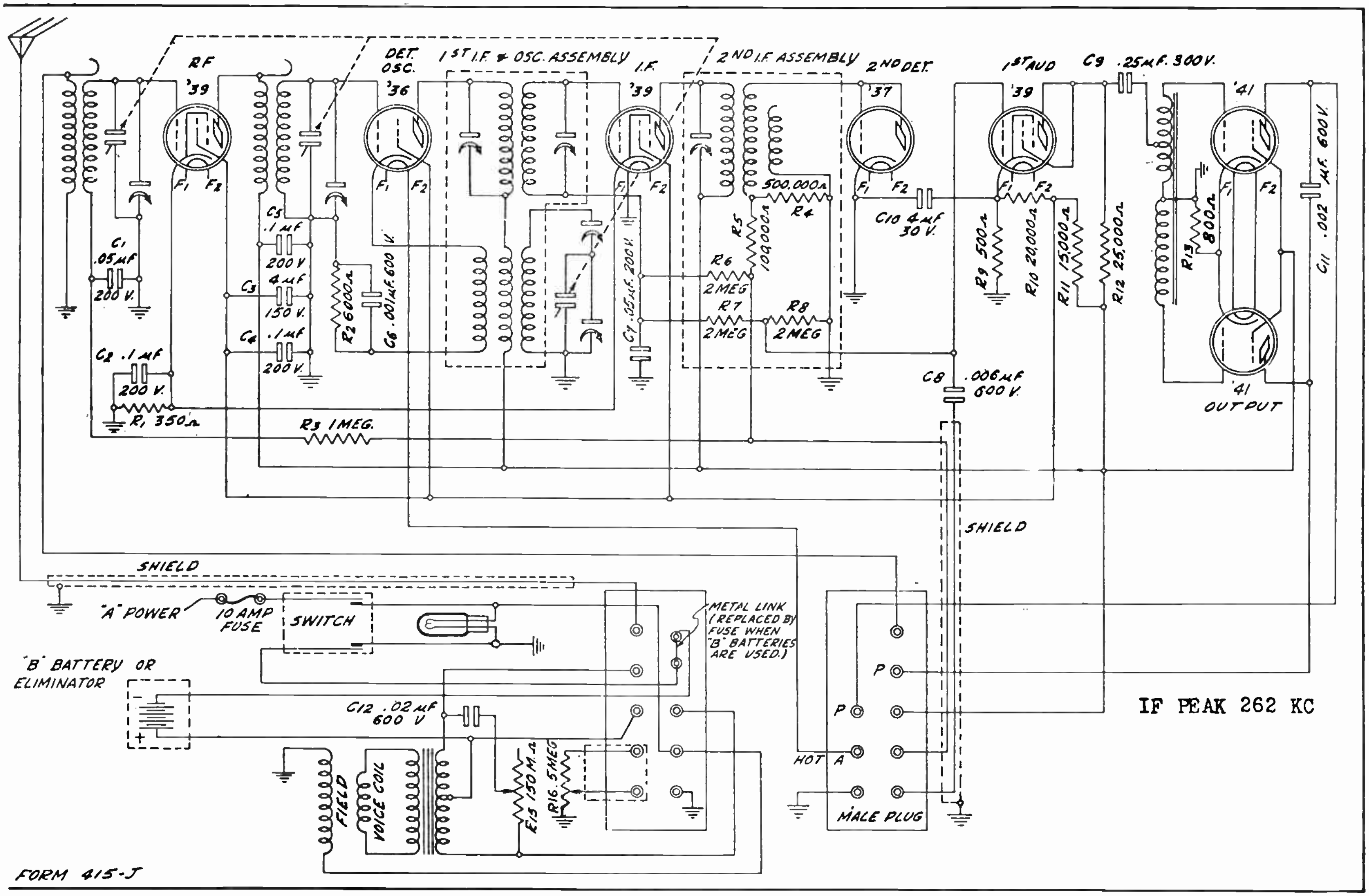


ELECTRIC AUTO LITE CO.

MODEL 062-A
Schematic

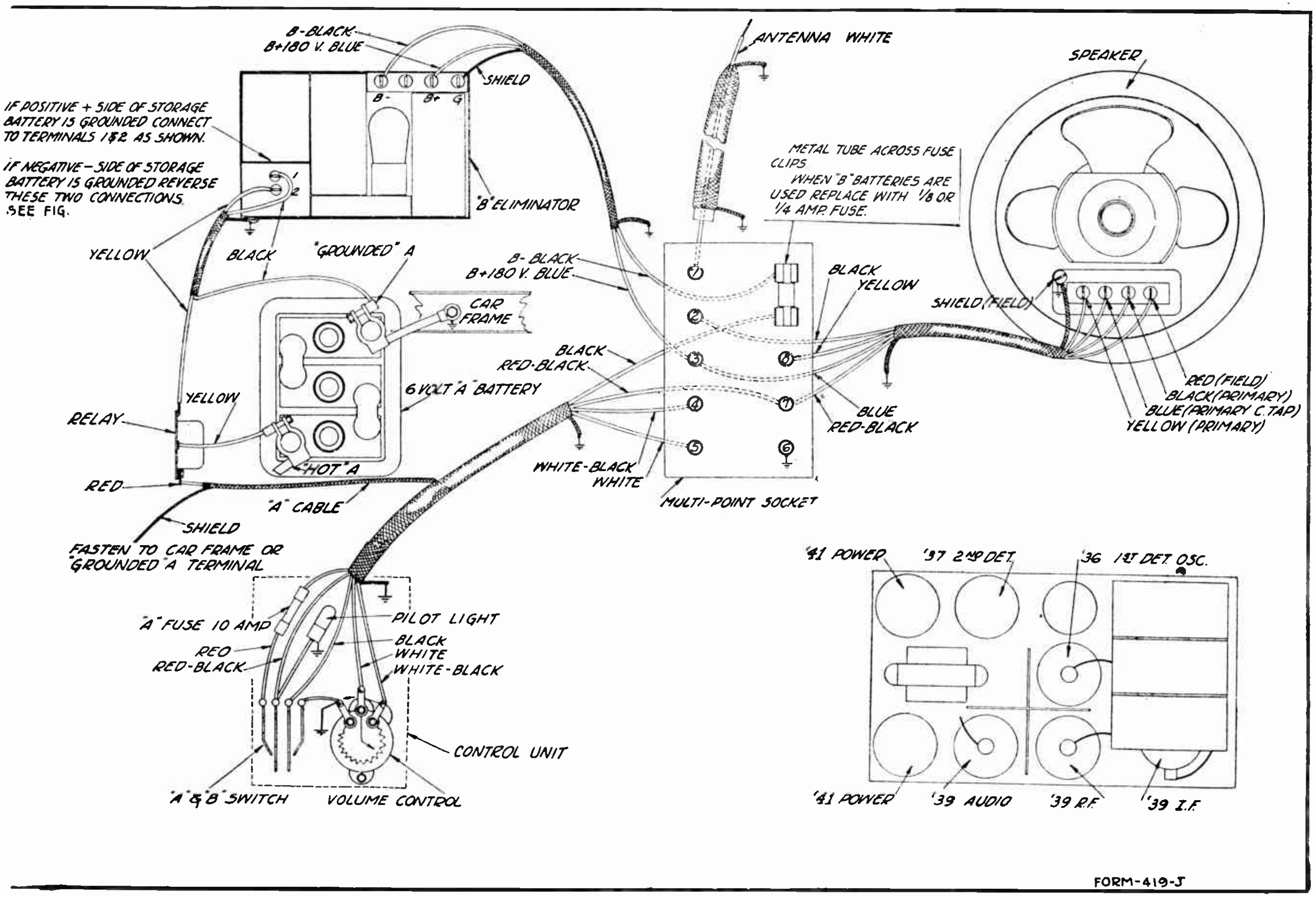
MODEL 072-A
Schematic

ELECTRIC AUTO LITE CO.



MODEL 072-A
Assembly Wiring

ELECTRIC AUTO LITE CO.



MODEL 072-A
Installation Notes

ELECTRIC AUTO LITE CO.

The chassis is received with the condenser pulley, spring and centering ring mounted in the proper position on the tuning condenser and the cable chuck through which the drive cable passes mounted on the chassis box.

All that it is necessary to do is to mount the control unit on the steering column, cut the cable and housing to length if necessary, attach the cable to the drive pulley, and secure the housing in the chuck.

MOUNTING THE CONTROL UNIT

The control unit is mounted on the steering column with the knobs extending toward the right hand side. The proper distance below the steering wheel can be determined by trial.

Two clamps are provided to secure the control unit to the steering column. Use the lockwashers supplied under the heads of the clamp screws to secure the clamps on the control unit.

If the steering column is 1½" in diameter, use the leather spacers supplied. If 1-5/8", split the spacers or wrap the column with about 1/16" of friction tape under the brackets. If the column is 1-3/4", no spacers are required.

ATTACHING THE CABLE

The drive cable should be run in as straight a line as possible. Avoid any sharp bends.

After the control unit has been mounted and before securing the drive cable and housing at the chassis, cut it to length if necessary. Be sure that enough cable is allowed to avoid any sharp bends. Do not coil the excess length in short loops.

To cut the cable proceed as follows: With a sharp three-corner file, file across one of the turns of the tubular housing until it is practically severed. Then bend it only slightly back and forth until it breaks off. Do not bend sharply as in so doing permanent injury to the inner element of the cable might result.

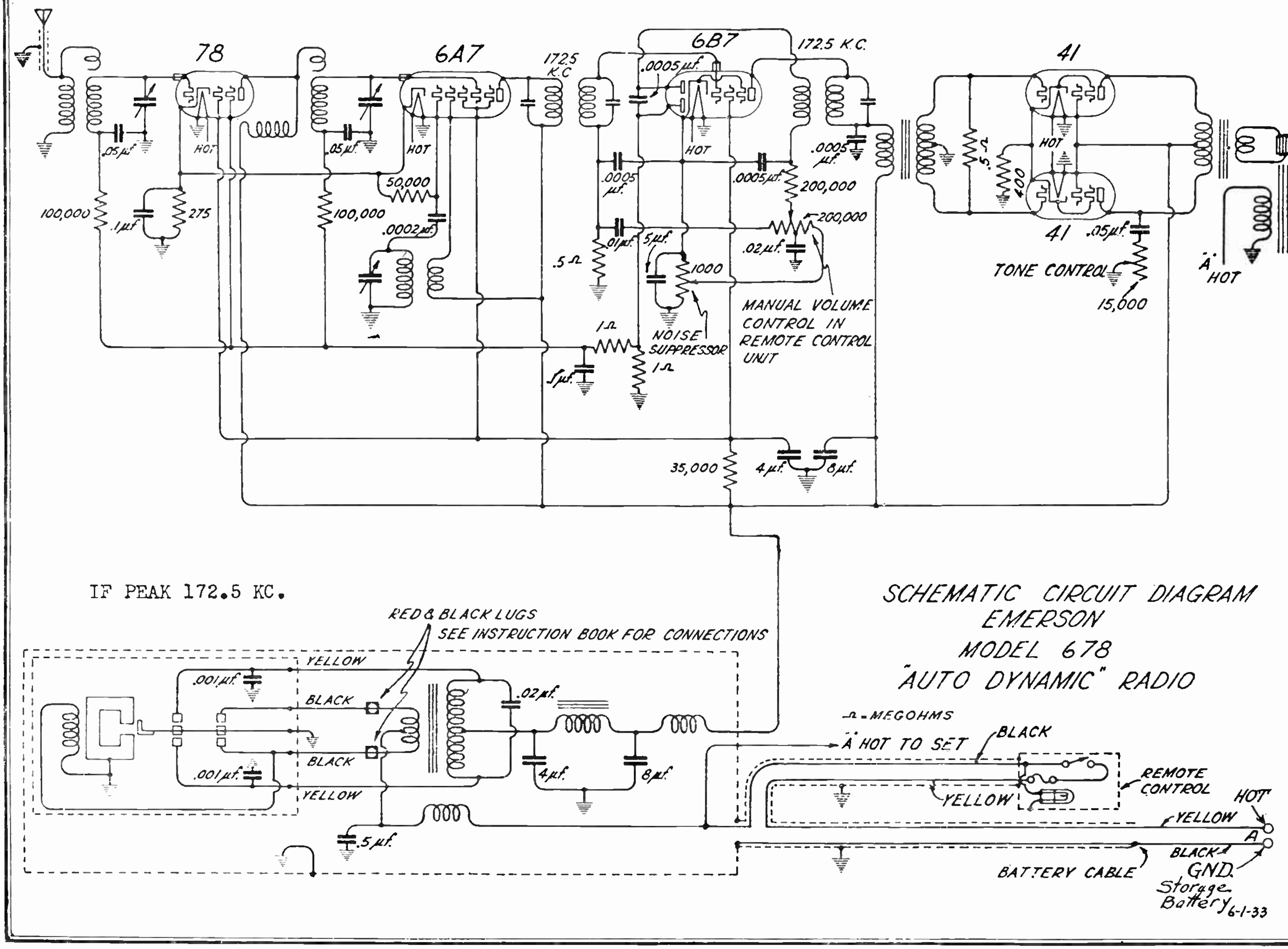
Turn the station selector knob on the control unit as far as it will go in a counter-clockwise direction. The cable will then extend out of the housing the greatest distance.

Loosen the large jam nut on the cable chuck. Insert the free end of the cable and its tubular housing. Be sure that the housing with its weatherproof covering is inside the chuck. Then tighten the jam nut. This will secure the housing and weatherproof braid in place. As explained above, the station selector knob should be turned to the extreme counter-clockwise position. The rotor of the tuning condenser is held at the extreme clockwise position by the action of the spring. Bring the free end of the cable around the pulley, loosen the cable clamp screw at the top of the pulley, insert the cable under the clamp washer and then tighten in place. Cut off any excess cable to prevent tangling with other parts of the receiver. Care should be taken not to put a sharp bend in the exposed portion of the drive cable, as the latter may be permanently injured.

After the cable head is in place on the chassis and after the drive cable is attached to the pulley, check the centering of the cable chuck with the pulley. If necessary to re-center, loosen the nut which secures the chuck to the chassis box. Then move the chuck until the cable is centered relative to the groove in the pulley and re-tighten the nut.

DIAL LAMP

The dial lamp may be replaced by removing the station selector knob and the two screws on the sides of the control housing. Use a standard 6-8 V. screw base lamp which may be procured from the factory. As a temporary measure, a 6 volt pilot light bulb may be procured from any radio store.



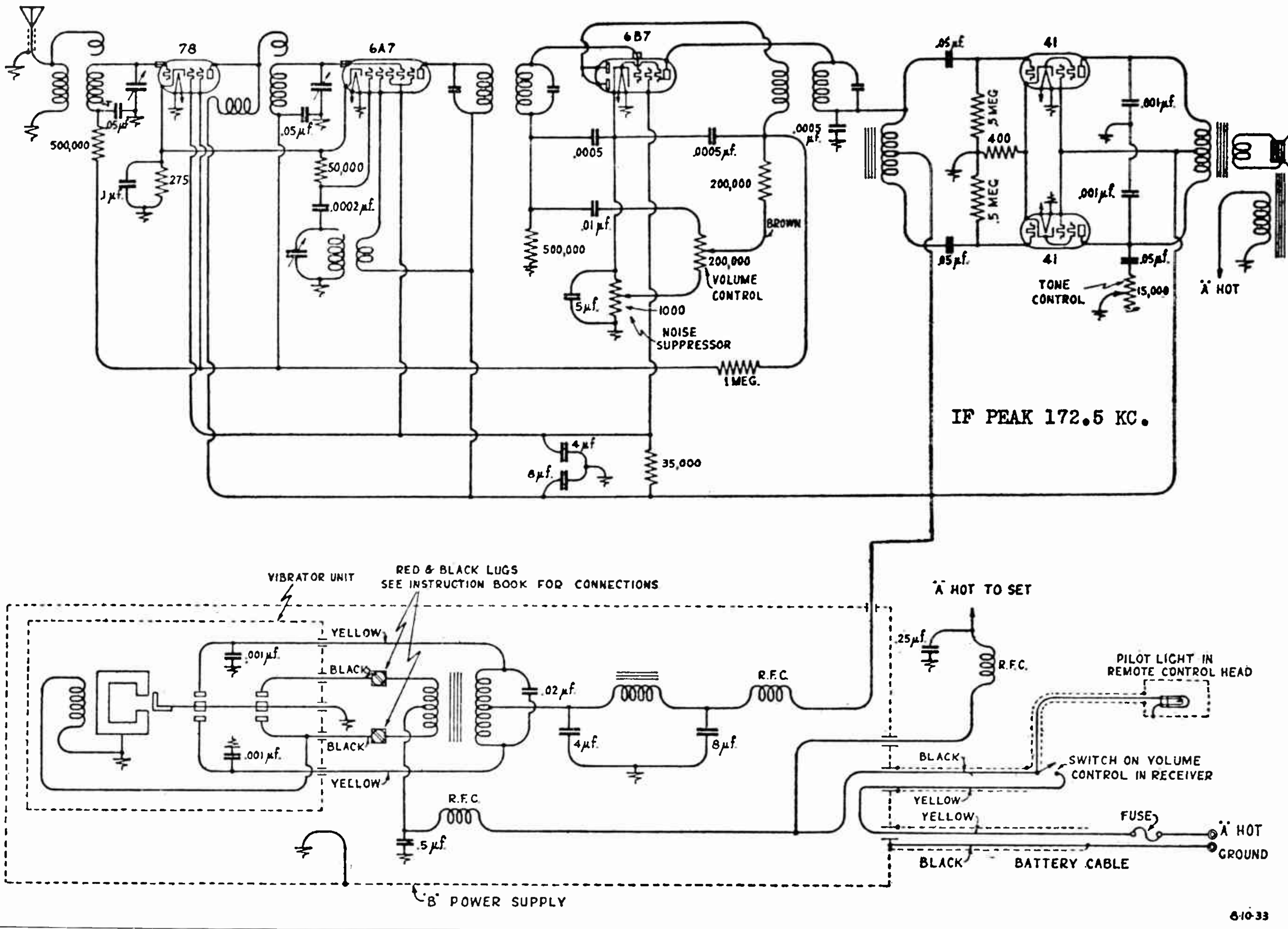
SCHEMATIC CIRCUIT DIAGRAM
EMERSON
MODEL 678
"AUTO DYNAMIC" RADIO

EMERSON RADIO AND PHONOGRAPH CORPORATION

MODEL 678
Schematic Type 1

MODEL 678
Schematic Type 2

EMERSON RADIO AND PHONOGRAPH CORPORATION



EMERSON RADIO AND PHONOGRAPH CORPORATION

MODEL 678
Installation Notes

INSTALLATION PROCEDURE

(Follow closely for easy installation)

1. Open carton, unpack set and check equipment furnished.

2. Remove the two thumb-screws holding the mounting plate to the radio cabinet proper. Tip the mounting plate back and unhook it.

3. Remove the top cover and check visually conditions in general, i.e., tubes, grid caps, remote tuning drive, etc.

4. Using the mounting plate (Figure I) for exploring, determine the most satisfactory position for mounting in the car. As the mounting plate has the same area as the frontal area of the radio cabinet, any space which will accommodate the mounting plate will be satisfactory, (allowing clearance for the set to tilt forward for inspection after being installed).

5. Using the mounting plate as a template, locate the holes for the three mounting bolts. Check under engine hood to see if bolts will be clear. Optional mountings may utilize 2, 3, 4 or 5 mounting bolts.

6. Drill these three holes. Suggest using ⅛" drill as a pilot hole then finish with ⅜" drill.) Put one lock washer on each 5/16" bolt and insert thru the plate. Put a nut on each bolt and fasten securely against plate. Put a spacer nut and lock-washer on each bolt and mount the plate on auto bulk-head. Allow ½" to 1" clearance between back of mounting plate and bulk-head for ventilation and good tone quality. Now tighten the bolts from the engine side of the bulk-head using a lock-washer and nut for each bolt.

7. Before proceeding further, at this time, check the polarity of the car battery; that is, determine which side of the battery is grounded. This may be done most conveniently with a low reading D.C. volt-meter. However, experienced mechanics may recognize the positive terminal of the battery by the fact that it is usually larger and blacker than the negative terminal. If there is any corrosion present, GREEN corrosion will be found at the POSITIVE terminal. ***Do not take chances or guess at the polarity but use every means to determine it correctly, as the wrong connections may cause serious damage to the receiver and car battery!***

8. If the POSITIVE terminal of the battery is grounded, no changes are necessary and the installation may proceed.

If the NEGATIVE terminal of the battery is GROUNDED, it is required to make a slight change in the receiver. This is done quite conveniently by removing the top screw and loosening the bottom screw holding the serial number plate to the right side of the receiver cabinet. Tip the plate down and reverse the red and black-marked spade lugs. When this is done, the black-marked lug will be on top and the red-marked lug will be the lower one. (See Figure II and red tag on battery cable.)

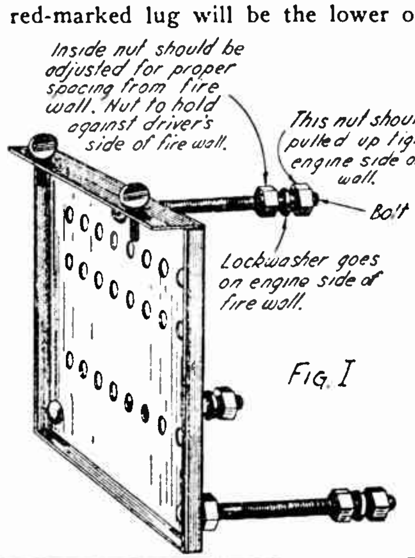


FIG. I

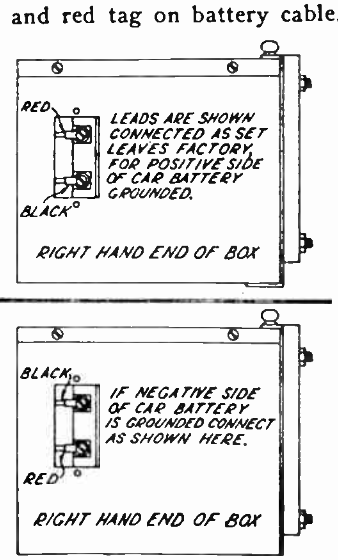


FIG. 2

MODEL 678
Installation Notes

EMERSON RADIO AND PHONOGRAPH CORPORATION

9. Replace the top cover on the receiver cabinet, using the screws to fasten it and attach the radio cabinet to the mounting plate; first, by hooking the two hooks on rear of the cabinet into the slots of the mounting plate; second, by inserting the two thumb-screws into the holes on the top of the mounting plate and screwing them into the holes of the cabinet. This completes the mounting of the radio cabinet.

10. Attach Remote-Control Unit to a convenient position on the steering wheel column, allowing the cables to take a smooth path to the set. Leather strips are furnished to accommodate unusual size steering wheel columns and also to prevent marring finish. *Screw down the set screws in the center of the clamps in order to ground the remote-control unit to the steering post.* Fasten the cable to the steering column and other points in order to prevent vibration and interference with the operation of the car.

11. Connect the two-conductor shielded cable to the battery, the BLACK wire always connects to the GROUNDED terminal of battery and the YELLOW wire always connects to the HOT terminal of battery regardless of polarity. (Re-read and check paragraph 7.) It is advisable to run this cable as directly as possible to the battery, keeping away from the engine compartment and other high tension wires. Grounding the cable as often as possible along its entire length reduces motor noise and is recommended. Poor connections at the battery terminals cause noise; therefore, clean the terminals and make good connections. (Connections to the ammeter are not recommended, in general.)

12. Before connecting the antenna, check it for a possible ground. If ungrounded, connect to the antenna lead of the radio by splicing a good connection, taping the joint and sliding the section of insulated tubing over the connection. In the event that the antenna lead-in is shielded, do not neglect to connect the shielding to the shielding on the antenna lead from the set. A word of caution here: *Do not run the antenna lead-in thru the engine compartment and keep it away from all high-tension parts and leads.* Ground the shielding of the antenna lead-in along its entire length, if possible.

13. Turn switch-key halfway in remote control unit. The dial should light up immediately if everything is correct. Turn volume control (small knob) clockwise to a position for loud volume and when the tubes are warmed up, turning the station dial (large knob) will tune in stations. Adjust volume by the volume control knob, never by detuning the station, as this ruins quality. The separate, delayed automatic volume control will counteract fading and blasting and requires little or no adjustment by the manual control.

14. If the installation thus far has been carefully followed, starting and running the motor causes very little interference generally. However, the amount of motor noise WITHOUT SUPPRESSION may be noted as a check on a good installation.

15. Fasten the condenser supplied for generator-noise-suppression by slipping the grounded lug of the condenser under a screw in the generator frame. Connect the live lead of the condenser to the generator side of the cut-out relay mounted on the generator (connecting the live lead to the battery side of the cut-out relay is more effective in some cases. This may be determined by test.)

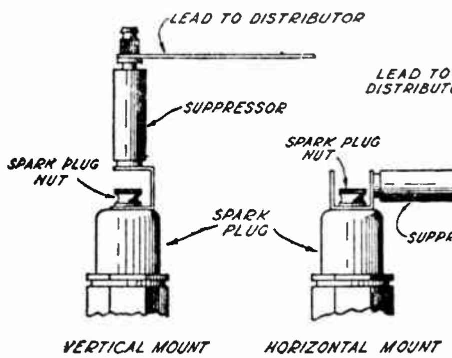


Fig. 111

16. Fasten a spark plug suppressor to each spark plug (see Figure III) and the distributor suppressor in the head of the distributor. Fasten the suppressors firmly to the plugs and to the leads so that the connections will not shake loose and ground. If special types of suppressors are required for certain cars, these may be obtained.

17. In general, this should suppress motor noise effectively. However, an auxiliary suppressor condenser connected from ground to battery side of ammeter may sometimes prove effective. (See further details under "Notes on Ignition Suppression.")

EMERSON RADIO AND PHONOGRAPH CORPORATION

MODEL 678
Voltage
Socket Layout
Adjustments

Tubes: 1—78, 1—6A7, 1—6B7, 2—41 (5 tubes).
Total Battery Drain: 4.8 amperes.
Max. output: 4 watts.
Electro-Dynamic Speaker Field Resistance: 6 ohms.
Vibrator: Full wave synchronous rectifier.

Tube-Functions and circuit analysis:

78
- 1 Radio-frequency amplifier
- 2 Automatic fidelity control
- 3 Automatic selectivity control

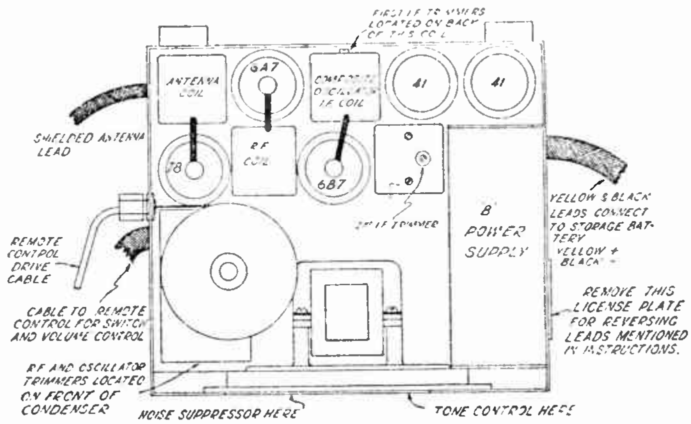
6A7
- 4 High gain modulator
- 5 Electron coupled oscillator

6B7
- 6 High gain I. F. Amplifier
- 7 Neutralized space-charge diode detector
- 8 Separate delayed automatic volume control
- 9 Automatic noise suppression
- 10 Reflexed audio-frequency amplifier

41 — 11 Push-pull output tube Class A"

41 — 12 Push-pull output tube Class A"

13 Full wave synchronous vibrator rectifier



- TOP VIEW OF RECEIVER WITHOUT COVER -

Fig. IV

VOLTAGE ANALYSIS

Use a high resistance voltmeter. Storage battery should be fully charged. Readings taken with no signals received.

Tube	Cathode to Ground	Screen Grid to Ground	Plate to Ground	Heater to Ground
78	3- 3.5V.	75-85V.	200-210V.	6V.
6A7	3- 3.5	75-85	200-210	6
6B7	3.5-4.5	75-85	200-210	6
41	14-18	200-210	190-200	6
41	14-18	200-210	190-200	6

Voltage across speaker field—6 volts.

ADJUSTMENTS

The receiver was carefully adjusted and aligned when it left the factory. Under no conditions should these adjustments be disturbed unless there is no question that it is absolutely necessary.

Intermediate-Frequency

To line up the Intermediate Frequency Amplifier, use a good modulated oscillator giving 172½ K.C. and a rectifier type output meter. Connect the oscillator output to the grid cap of the 6A7 and ground. Connect the output meter across the voice coil of the speaker or across primary of speaker transformer.

Ground the antenna lead and turn the tuning dial so that no signal is received (other than the test oscillator), with the volume control set at maximum volume.

Using the smallest output from the test oscillator to get an output reading, adjust the double-tuned input transformer and the single tuned output transformer for maximum output. It is preferable to use a non-metallic screw driver for this purpose. (See Figure IV.)

Radio-Frequency

To line up the R. F. section, due to the extreme sensitivity of the receiver, use only a high-grade oscillator. Couple the oscillator through a standard dummy antenna to the antenna lead and ground of the receiver. Attach the output meter to the voice coil of the speaker and align the trimmers on the variable condenser for a weak high frequency signal (between 1350—1450 K.C.). Readjust the trimmers to get accurate settings. (See Figure IV.)

If a high grade oscillator and output meter is not available, it is suggested that the alignments be made on broadcast. Tune in a weak station between 1350—1450 K.C. and align the trimmers carefully. Readjust the trimmers as above.

MODEL 678
Notes, Changes

EMERSON RADIO AND PHONOGRAPH CORPORATION

The following changes and additions are the effects of improvements in mechanical and electrical construction made on the "Auto Dynamic"—Model 678—since the release of the "Service Manual."

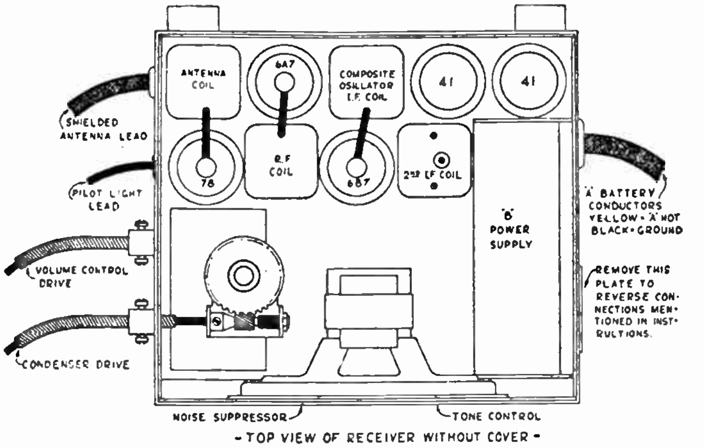


FIG. IV (Substitute for Fig. IV. now appearing in "Service Manual".)

Paragraph 10 of the section "Installation Procedure" should read:

10. By means of the adjustable strap supplied, fasten the remote-control-unit in a convenient position on the steering column, allowing the cables to take a smooth path to the set. The procedure to follow being to place the end of the strap with a single hole under one of the holes in either flange on the control head. Place a bolt through the holes, slipping a lockwasher and nut on the other end. Do not fasten the bolt; leave it loose temporarily. Twist the strap through a radius around the steering column so that with a snug fit one of the three remaining holes in the strap lines up with the hole in the other flange of the control head. Insert a bolt through the two holes that line up under these conditions and slip a lockwasher and nut on this bolt. Finally fasten both bolts securely so that the control head will not turn. Bond the cables at numerous points along the steering column to eliminate vibration and prevent interference with the operation of the car.

* * * * *

Paragraph 13 of the same section should read:

13. Place the switch-key in the slot provided for it and turn clockwise until a snap is felt and the dial illuminated. The light will indicate that the receiver is properly wired and ready to operate or ready for advance in installation procedure. Turn the volume control completely clockwise by means of the switch key to the maximum volume level. When the receiver is warmed up (this will be indicated by noise) tune a station carefully to resonance by means of the right-hand knob. Re-adjust the volume to a satisfactory level. Never attempt volume attenuation by de-tuning the station, as this will distort the quality of tone translation. The separate, delayed-automatic-volume control incorporated internally will tend to counteract fading and blasting, retaining the volume at the level determined by the manual volume control.

The illuminated dial and the tuning control mechanism are mutually self-aligning. If the calibration of the dial does not check reasonably well with the frequencies of the stations received, it is only necessary to turn the tuning control knob slowly clockwise until it stops. If the dial pointer is at the extreme counter-clockwise position they are aligned. If not, turn the knob slowly, counter-clockwise, until it stops and the dial is completely clockwise. If either or both these instructions are carried out the calibration should check.

* * * *

THE FOLLOWING NOTES APPLY TO THE SERVICE SECTION

If it becomes necessary to disconnect the remote control unit; progress by loosening the two set screws which clamp the volume control cable to the lower stud on the receiver case, and by pulling the cable totally out of the recess provided for it. To detach the turning control cable, remove the cover of the receiver box and loosen the set screws which hold the cable to the worm gear drive. Unbind the two set screws which hold the cable to the receiver box and pull the cable out. Lastly, remove the bottom of the set and unsolder the two connections for the pilot light, pull it out of the grommet and the operations are complete.

To replace the control unit, it is only necessary to reverse the above process, being sure that the "tongue" of the volume control cable slips into the slot provided for it. This may be accomplished by rotating the volume control knob slowly, and pushing the cable in simultaneously until the tongue engages the slot.

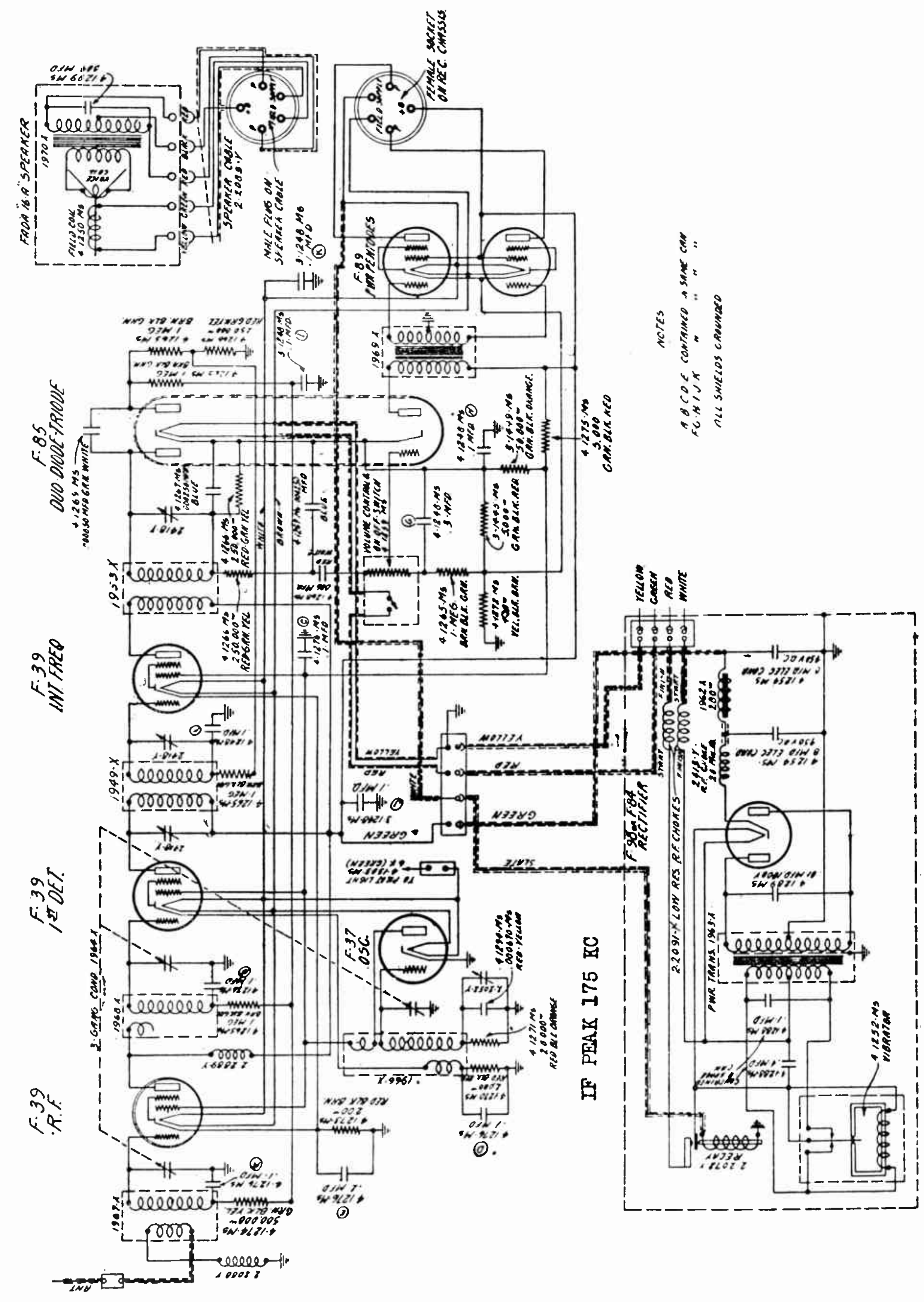
Replacement of the fuse in the event of a burn-out requires a removal of the floor board of the car. Remove both cables from the battery and unlock the fuse receptacle in the yellow lead, the fuse should drop out easily. A fuse of 10 ampere capacity, as indicated on the defective fuse, should replace it. The cause for the burn-out of the fuse should be determined before a new one is put in.

TONE CONTROL ADJUSTMENT

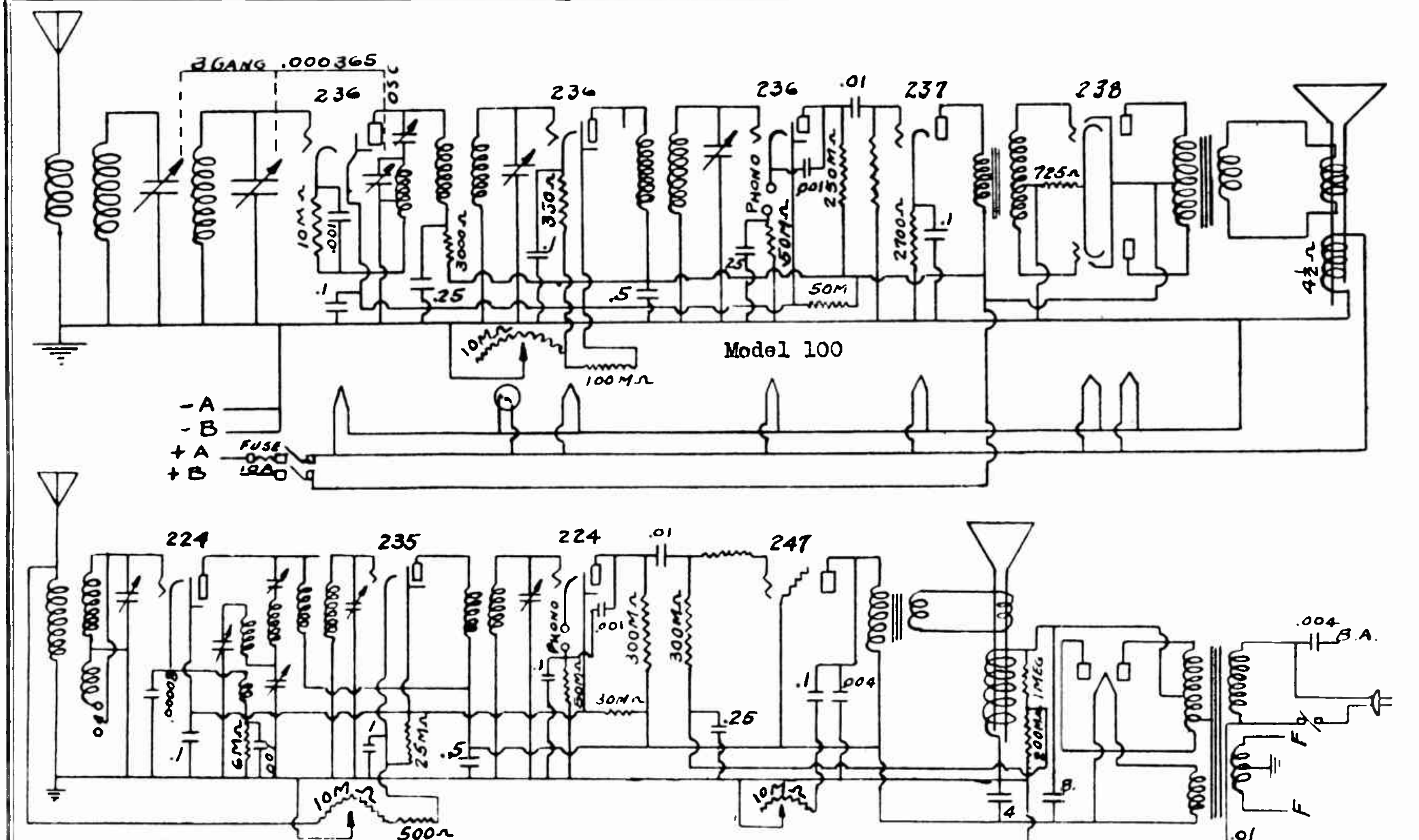
The adjustment as the receiver leaves the factory is set for full register reproduction. This is recommended for closed cars and for vocal programs. Turning the control clockwise brings up the low tones and is recommended for open cars and musical programs. Incidentally in this position, static and other noises are decreased greatly. Do not turn clockwise more than necessary as definition of speech may be lost due to the attenuation of higher tones by the car interior.

MODEL 101 (RK)
Motoset

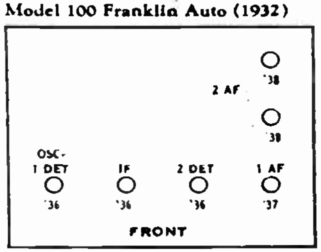
FADA RADIO & ELECTRIC CORP.



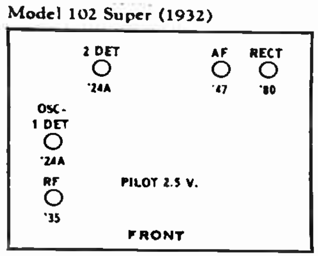
IF PEAK 175 KC



Model 100 Franklin Auto (1932)



Model 102 Super (1932)



FRANKLIN RADIO CORP.

MODEL 100
MODEL 102
Schematics

MODEL 100
Service Notes

FRANKLIN RADIO CORP.

CONNECTING "A" BATTERY

The "A" battery connections of the Franklin Auto Radio have no polarity. By this is meant, neither negative or positive, but the heavy green wire with tracer must always be connected to the "hot" side of the battery,(the ungrounded side of the storage battery). The sheath may be attached to any convenient ground connection such as any bolt passing into the frame of the car or direct to the grounded terminal of the storage battery.

We recommend that the heavy green wire with tracer be attached either directly to the "hot" side of the storage battery or to the heavy cable running to the starter switch. Never, under any circumstances, attach the heavy green wire with tracer to any of the ignition wires or light wires. Special warning is given against connecting this wire to the generator wire anywhere along its length.

CONNECTING MODEL 100

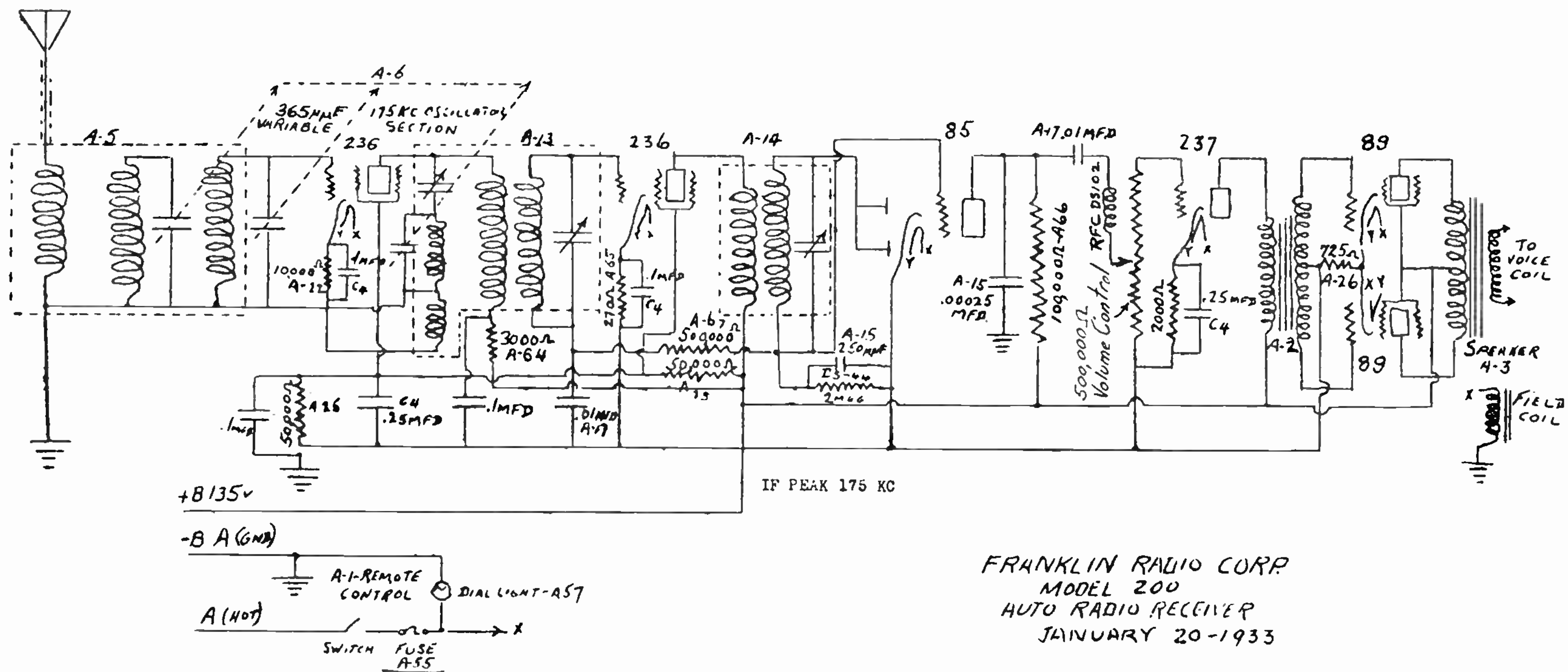
Remove radio chassis from housing and fasten steering column mounting bracket to bottom of housing with machine screws that are furnished, or if steering column cannot be used, use the bolts that are furnished to fasten housing to bulkhead of car; drawing the three bolts through the three mounting holes in back of housing. In this case be sure to allow housing to extend about 3/4" to 1" away from bulkhead, by adjusting the series of nuts also furnished for this purpose. This will relieve any warping of housing and chassis, so as not to throw the radio set out of balance.

Now pass driving control cable through grommeted hole in front cover of housing. With radio chassis still removed from housing, set dial scale on remote control to 0, Now, using a small wrench or pair of pliers unscrew bushing headnut on variable condenser back plate about three fourths of the way, and pass control wire through hole in bushing until control cable sheath enters into hole of the bushing. Then tighten up the bushing headnut with dial scale at 0. Then grasp the condenser pulley in one hand and revolve same until condenser plates are all the way open and will not turn further in that direction. Holding condenser in this position, loosen clamp screw at top of the pulley and run comtrol wire under clamp until all the slack is taken out of the wire. Then tighten clamp screw down on wire rather tight. Procede to put chassis back into housing and bolt down as it was before removal from housing.

DETERMINING PICKUP

The first thing to do in the elimination of ignition noise is to determine whether it is being picked up by the antenna and antenna leadin, or by the set itself. To determine this, turn on the set and start the motor. Then disconnect the leadin at a point where it is connected with the shielded lead going to the receiver. If the noise stops, it naturally shows that the noise is being picked up somewhere in the antenna system. If the noise is still in evidence after disconnectin g the leadin, the noise is presumably chassis pickup. Sometimes there is a combination of the two, and in this case, it is necessary to first eliminate the chassis noise and then the remaining noise can be removed using methods normally discussed in connection with ignition noise elimination.

FRANKLIN RADIO CORP.

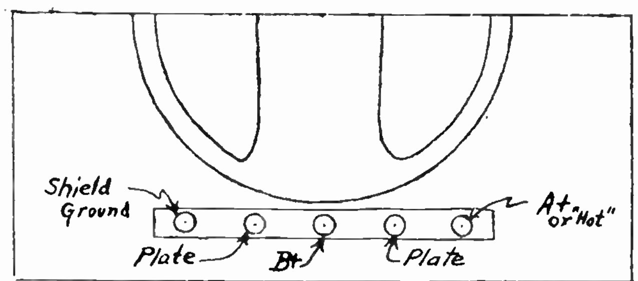


INSTALLATION OF SET CHASSIS AND CONNECTION OF REMOTE CONTROL

Remove radio chassis from housing and fasten steering column mounting bracket to bottom of housing with machine screws that are furnished, or if steering column can not be used, use the bolts that are furnished, to fasten housing to bulkhead of car, drawing the three bolts through the three mounting holes in back of housing. In this case, be sure to allow housing to extend about 3/4" to 1" away from bulkhead, by adjustment of a series of nuts furnished for this purpose. This will relieve any warping of housing and chassis, so as not to throw radio set out of balance.

Now pass driving control cable through grommeted hole in front cover of housing. With radio chassis still removed from housing, set dial scale on remote control at 0. Using a small wrench or pair of pliers, unscrew bushing headnut on variable condenser back plate about three-fourths of the way, and pass control wire through hole in bushing headnut, and with dial scale still at 0, grasp the condenser pulley in one hand and revolve same until condenser plates are all the way open and will not turn further in that direction. Holding condenser in this position, loosen clamp screw at top of the pulley and run control wire under clamp until all the slack is taken out of the wire. Then tighten clamp screw down tight on wire. Put chassis back in housing and bolt down as before removing it from housing.

The following diagram shows the connections for speaker cable, and is supplied for service purposes only, as the speaker is already connected to the plug of the chassis.



Bottom of Magnavox Speaker

MOUNTING THE RADIO SET AND SPEAKER

WARNING--

When locating a position for the receiver, always bear in mind that you must allow sufficient room for mounting the speaker.

The Franklin Auto Radio has been designed to be mounted on the steering column or dash board. You may mount the set either in the driver's compartment of the car, or in the motor compartment. When locating the three mounting holes for radio, be sure that you locate them accurately. The reason for this is that if the holes are not perfectly in line with the bolts on chassis, you will badly warp the receiver can on mounting it to the dash board.

After mounting the radio receiver, the next operation is to mount the speaker. We recommend that you mount the speaker as high as possible behind the instrument panel, the reason for this being that when mounted in this position, the speaker receives full advantage of the resonance effect of this space behind the instrument panel. You can easily prove this for yourself, by turning on the radio receiver and placing the speaker in various positions in the car.

You will then note the advantage of placing the speaker according to our instructions. After mounting the radio receiver, drill a 3/8" hole directly below the receiver in buck board. This hole is to be used for allowing A and B battery wires to pass through into the motor compartment. Directions for connecting these wires will be found in the following sheets.

The tuning control should be clamped on to the steering column at a height equal to that of the top of shift lever, as this makes tuning a natural motion. In cases where the steering column is of a smaller diameter than that of the clamp, use the leather shims furnished with the tuning control.

When running the wires and tuning control cable from radio to control, be sure that you do not kink them excessively, as this will make the tuning control work hard. Always be sure to securely tape the tuning control at about every six inches along its length to some solid part of the car. If you do not do this and the control is left free to swing, it will de-tune the radio.

CONNECTING "A" BATTERY

The "A" battery connections of the Franklin Auto Radio have no polarity. By this we mean, neither negative or positive, but the heavy green wire with tracer must always be attached to the "hot" side of storage battery (the un-grounded side of storage battery) The sheath may be attached to any convenient ground connection, such as any bolt passing into the frame of the car or direct to the grounded terminal of the storage battery.

The heavy green wire with tracer may be attached either directly at the "hot" side of the storage battery or to the heavy cable running to the starter switch. Never, under any circumstances, attach this heavy green wire with yellow tracer to any of the ignition wires or light wires. Special warning is given against connecting this wire to the generator wire anywhere along its length. It is also convenient and advantageous to connect this wire to one side of the car ammeter, so that when the receiver is turned on, the battery load is indicated on the ammeter.

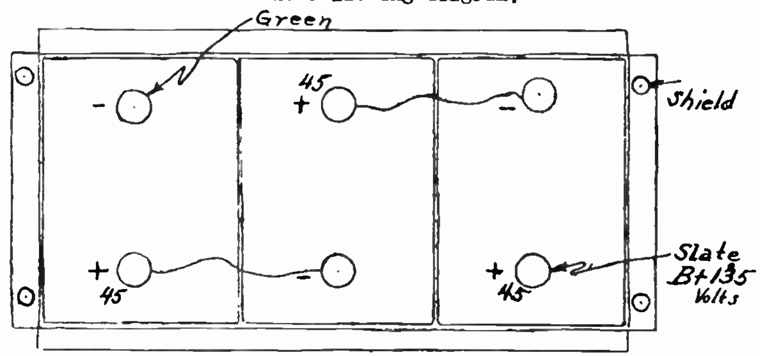
MOUNTING "B" BATTERY CONTAINER

Included with each radio is a special container for the "B" batteries. This container is to be mounted through the floor boards of the car, wherever possible. In mounting this "B" battery box, be sure that you check underneath the floor boards to see that there are no brake rods, mufflers, storage batteries or other parts of the car located directly below the space in the floor boards. The proper method for locating the place for the "B" battery container is to hold it against the floor boards from underneath car, drilling four small holes up through the floor board at the four corners of the box. After doing this, you can cut the hole from above and feel assured that you will not run into obstructions underneath the floor boards.

If it is a wooden floor board, you can very easily cut this with a key-hole saw. If, however, the floor boards are metal, we recommend cutting the hole with a cold chisel and a hammer, using a shearing action by holding the cold chisel as nearly parallel to the floor boards as possible. By using this method, you will find it very easy to cut these metal floors.

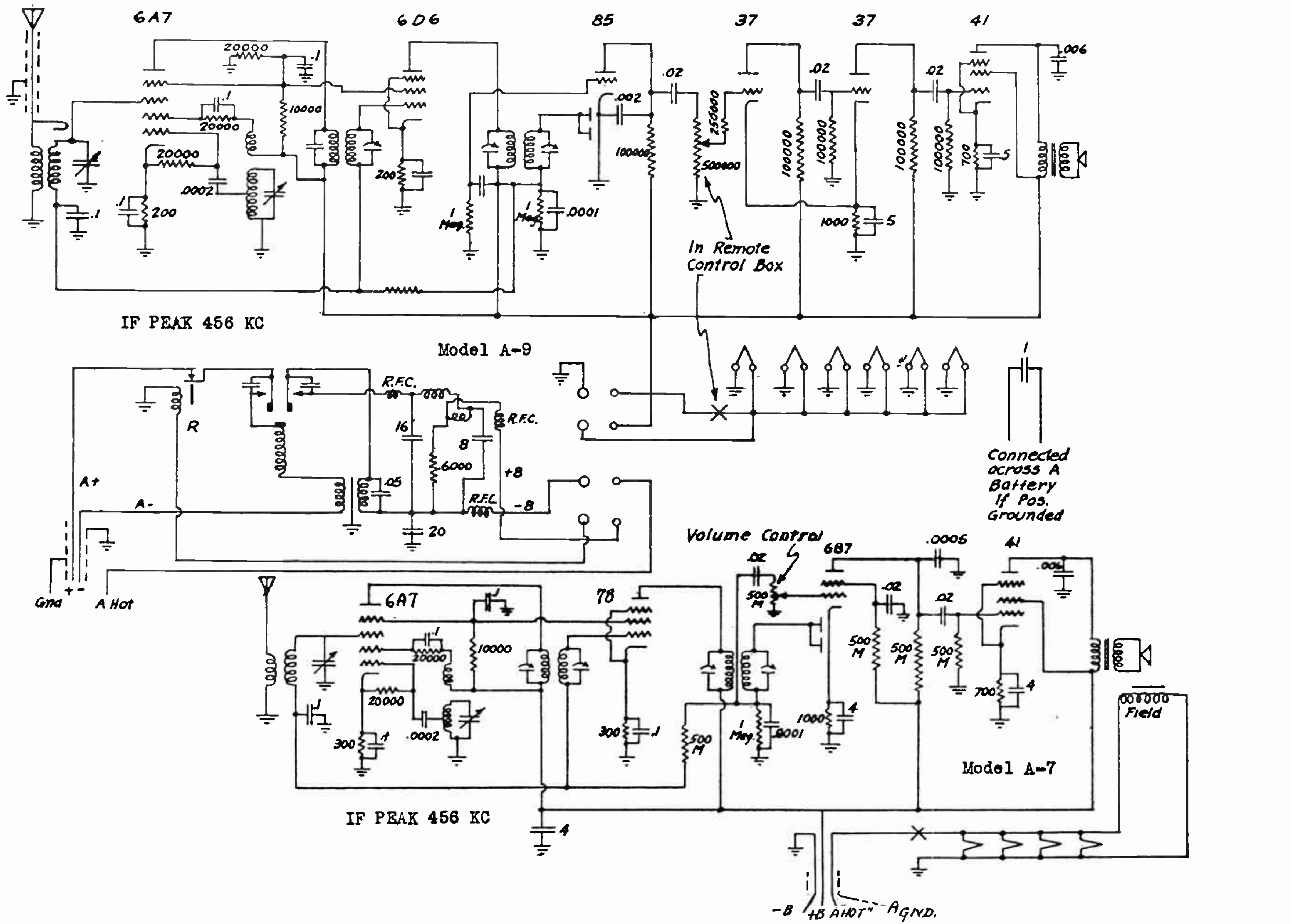
Whenever cutting through floor boards, be sure to do it in such a manner so as not to weaken floor boards of the car. In some cases, you will have to fasten braces underneath the floor boards at the edge of "B" battery can to strengthen the floor of car, due to the fact that sometimes the only location for the "B" battery can necessitates cutting through the whole width of one floor board.

When placing "B" batteries in "B" battery container, wedge cardboard or wooden shims beside the batteries to hold them securely from rattling. The proper method of connecting these batteries together is illustrated in the following diagram:



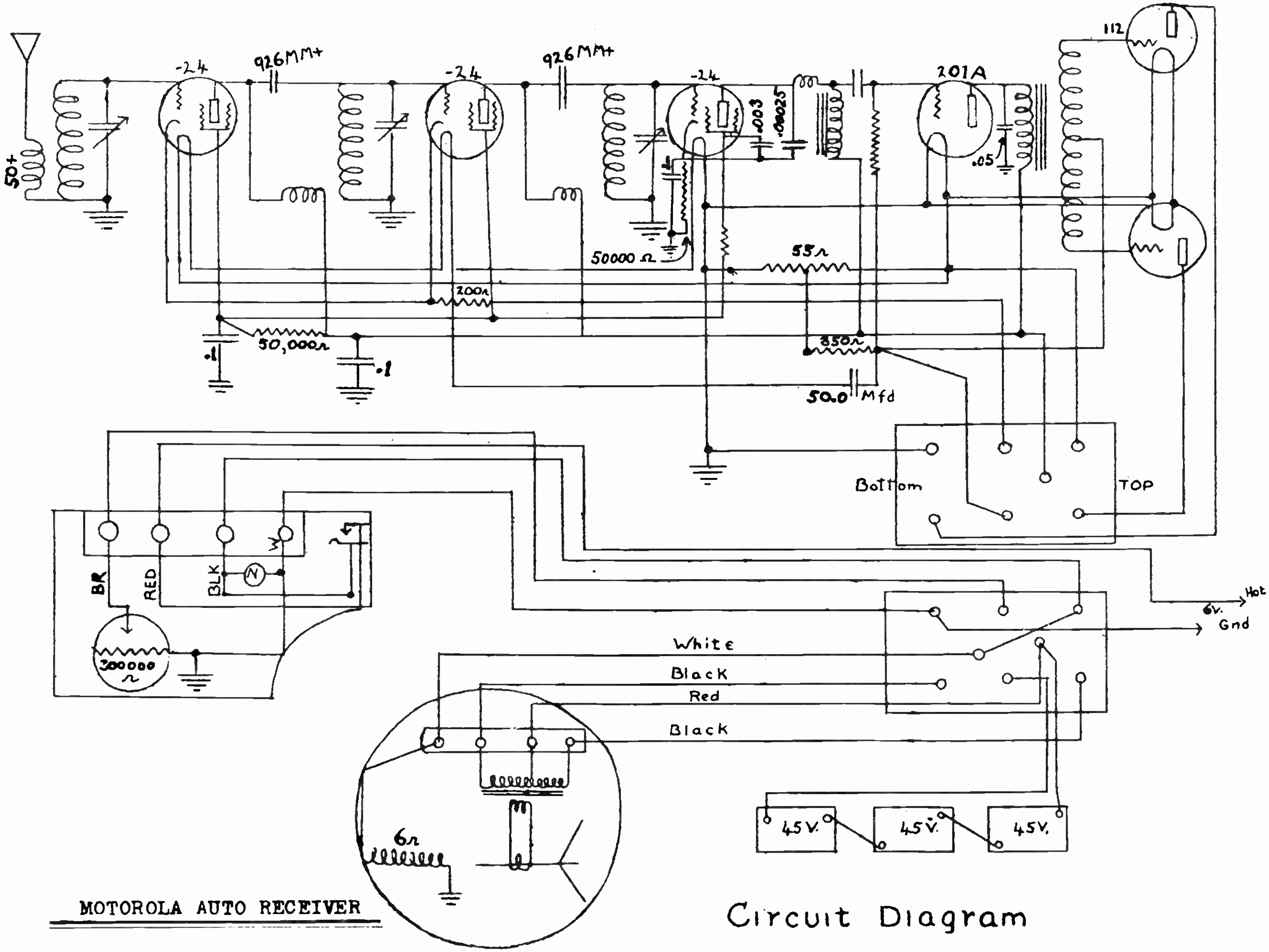
FREED RADIO AND TELEVISION CORP.

MODEL A-7
MODEL A-9



GALVIN MFG. CO.

MODEL Motorola
Auto Receiver

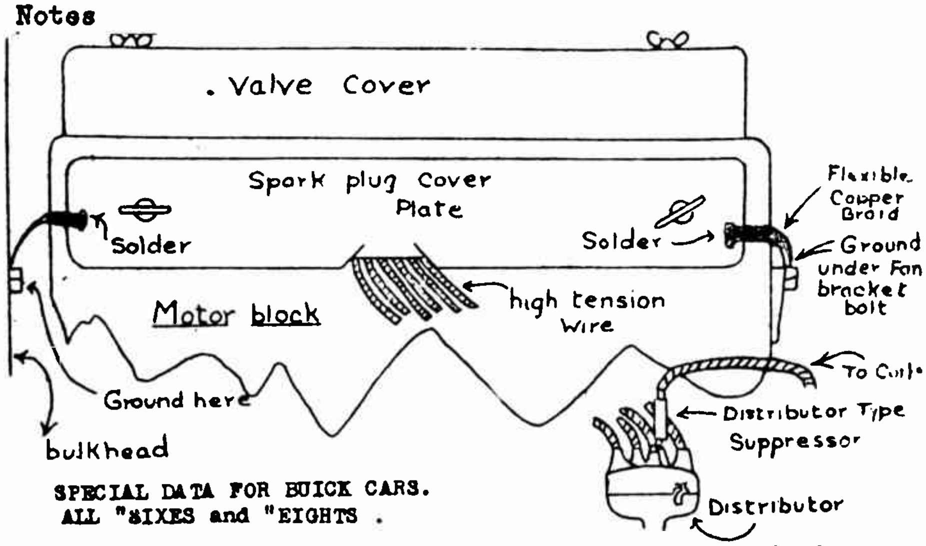


MOTOROLA AUTO RECEIVER

Circuit Diagram

MODEL Motorola
Auto Receiver
Notes

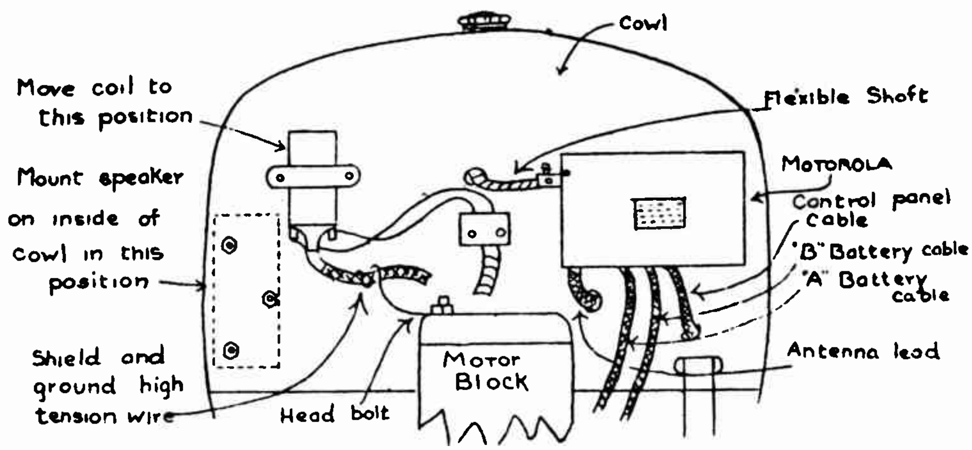
GALVIN MFG. CO.



**SPECIAL DATA FOR BUICK CARS.
ALL "SIXES and "EIGHTS .**

(a) The above illustrates a method of grounding the spark plug cover plate found on all Buick cars. Do not be misled by the fact that this plate is apparently grounded by the two aluminum wing nuts holding it to side of motor, <u>for this is in no way</u> a ground for the type of current radiating from spark plugs which cause radio interference." Soldering flexible jumpers to this cover plate and grounding same under motor or chassis bolts will in every case help eliminate motor noise in radio reception.

(b) As a further help on the new model Buick Eights, it will be found advisable to solder copper bonds to all the control shafts passing through bulkhead and grounding these to bulkhead. By "control shafts" we mean choke rods, carburetor heat control, motor temperature indicator, etc.



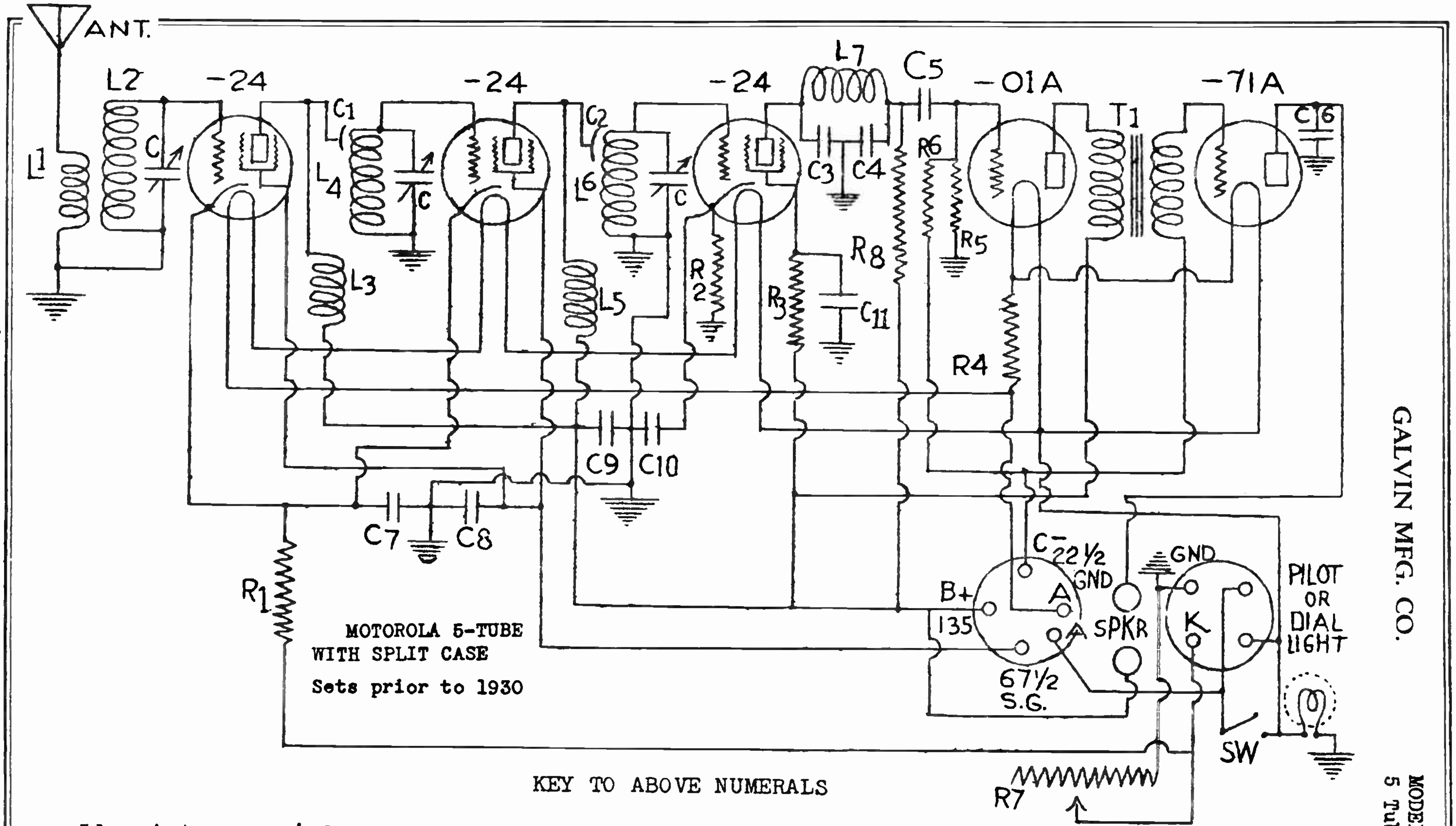
SPECIAL DATA FOR MODEL "A" FORD CARS

The above illustrates the proper mounting of a Motorola receiver on a Model "A" Ford car. On inspection you will note that it is necessary to move the ignition coil over to side of cowl. This is done for two reasons, one to make room for the flexible shaft to pass through cowl and the other to help in elimination of motor noise.

It is advisable to shield the high tension lead from coil to distributor and ground this shielding to motor block as per diagram.

The speaker will be found to mount best on the inside of cowl to the right side of car above foot board.

Different cars will have different types of antennae a their capacities with respect to the frame of the car will be different, therefore it will be necessary to phase the antenna with the set. Remove the four screws holding the set lid in place, turning the set on and tuning to a very weak station. Adjust with a screw driver the small trimming condenser, to th maximum signal obtainable. If operation is satisfactory to this point, the volume should be turned all the way on, the station selector knob turned to a point where no signal is received, the motor of car started and there should be no motor noise noticeable.



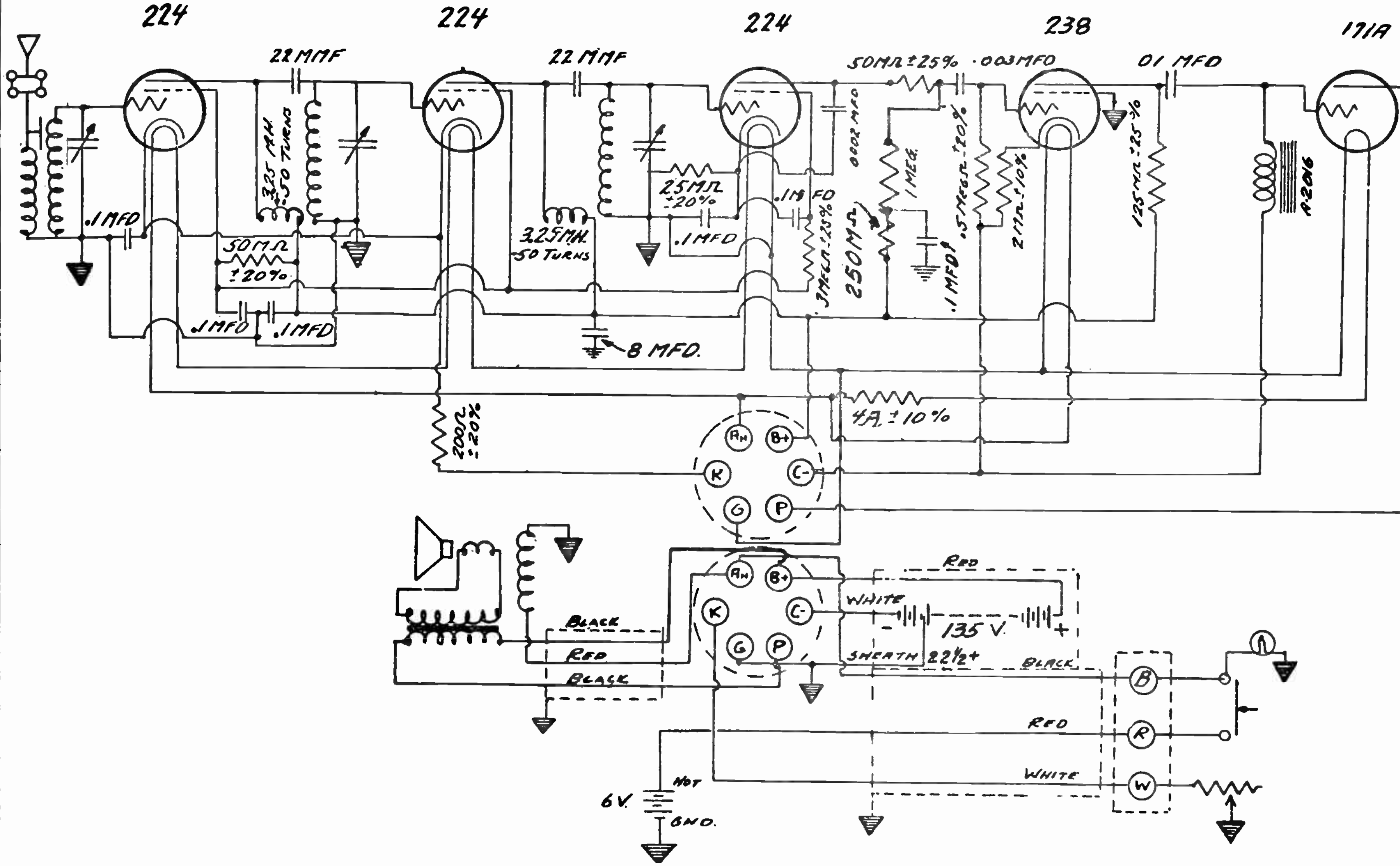
KEY TO ABOVE NUMERALS

L1 - Antenna primary
L2, L4, L6 - R.F. secondarys
L3, L5 - R.F. plate chokes
L7 - Detector plate choke
C, C1, C2 - Main tuning condensers
C1, C2 - R.F.coupling condenser. Cap. 9.6 microfarads
C3, C4 - 0001 mfd. condensers
C5, C6, C11 - .003 mfd.condensers
C7, C8, C9, C10 - .25 mfd.by pass condensers
R1 - 200 (Gray resistor
R2 - 25,000 (Black) resistor
R3, R6 - 3 meg (Blue or Pink) resistor
R4 - 2 wire wound resistor
R5, R8 - 1 meg (Lavender) resistor
R7 - 300.000 Volume control

MODEL Motorola
5 Tube, Split Case

MODEL Motorola 5T-71

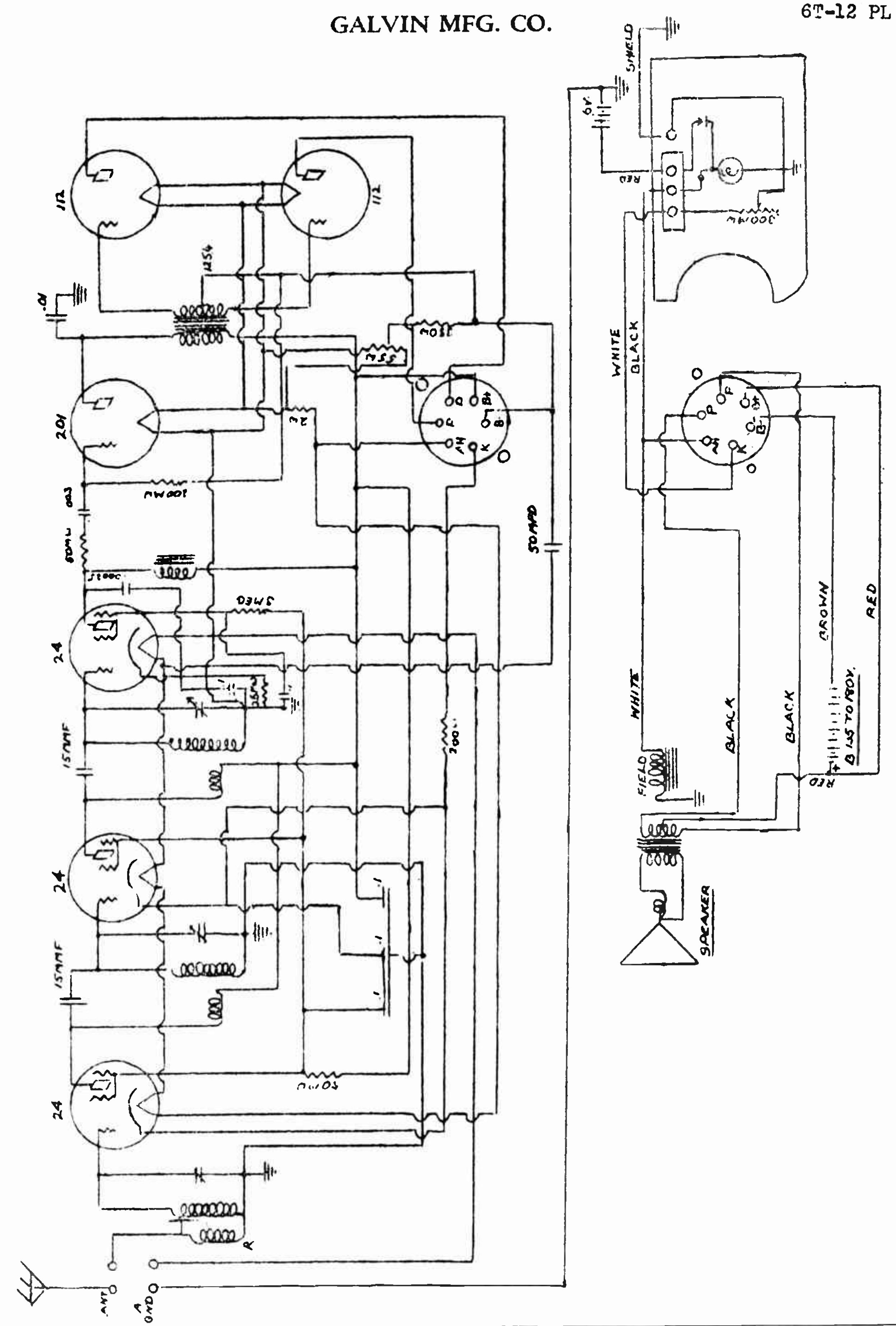
OCT. 1, 1931



GALVIN MFG. CO.

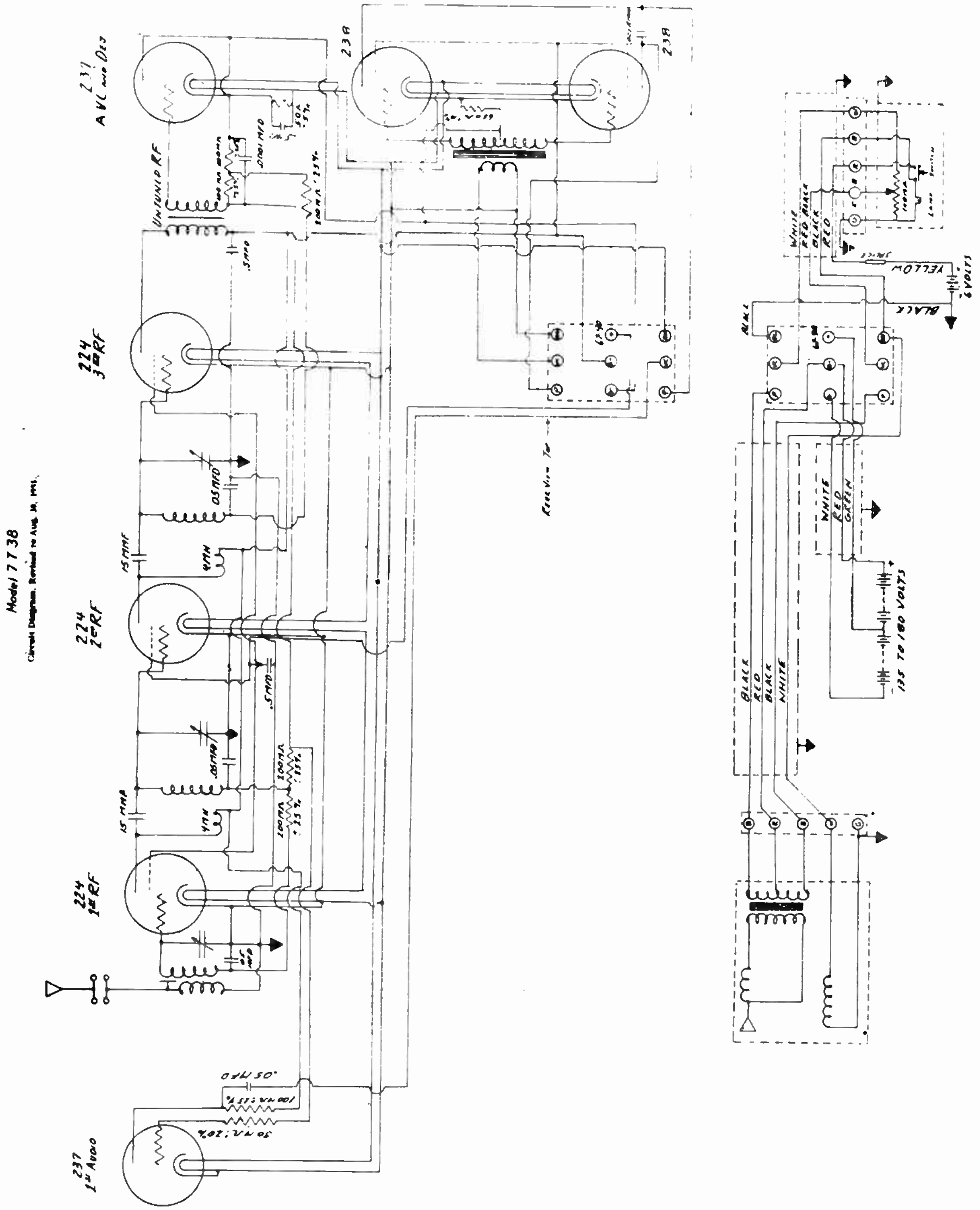
MODEL Motorola
6T-12 PL

GALVIN MFG. CO.



MODEL Motorola
7T-38
Schematic

GALVIN MFG. CO.



Socket layout and point-to-point data on next page. Variation of this receiver is sknown as 7T-38-A.

SOCKET #1
1 to 13 50,000
2 to 5 100,000
3 to X 0
2 to H OPEN
Y to I 0

SOCKET #2
4 to 7 200,000
6 to X 0
5 to E 60
SR to F 0
Y to Z 0

SOCKET #3
7 to 13 200,000
9 to X 0
8 to E 60
SR to F 0
W to K 0

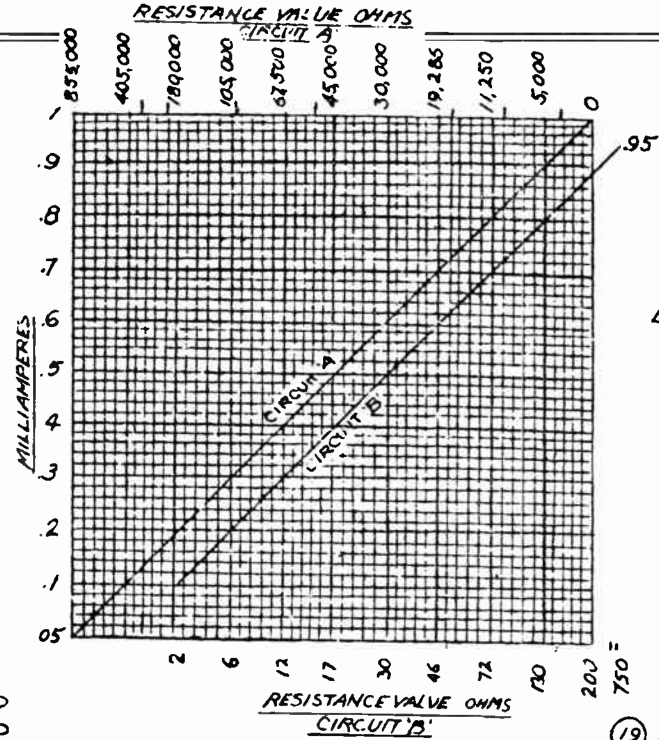
SOCKET #4
11 to E 100
12 to X 0
Y to I 0
SR to F 0
10 to 13 300,000

SOCKET #5
13 to 15 200,000
15 to X 50
14 to 15 0
14 to D 0
Y to I 0

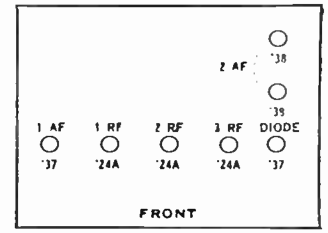
SOCKET #6
16 to D 9,000
16 to 19 18,000
18 to D 650 to 750
17 to G C
5 to E 0

SOCKET #7
19 to D 9000
21 to D 650 to 750
20 to A 0
5 to E 0

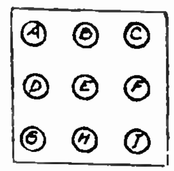
FEMALE PLUG
C to B 3,000
E to I OPEN
B to H OPEN
A to G OPEN
D to E OPEN CONDENSER
D to F OPEN CONDENSER
E to C OPEN
E to F OPEN
A to C OPEN
G to C OPEN
I to D OPEN

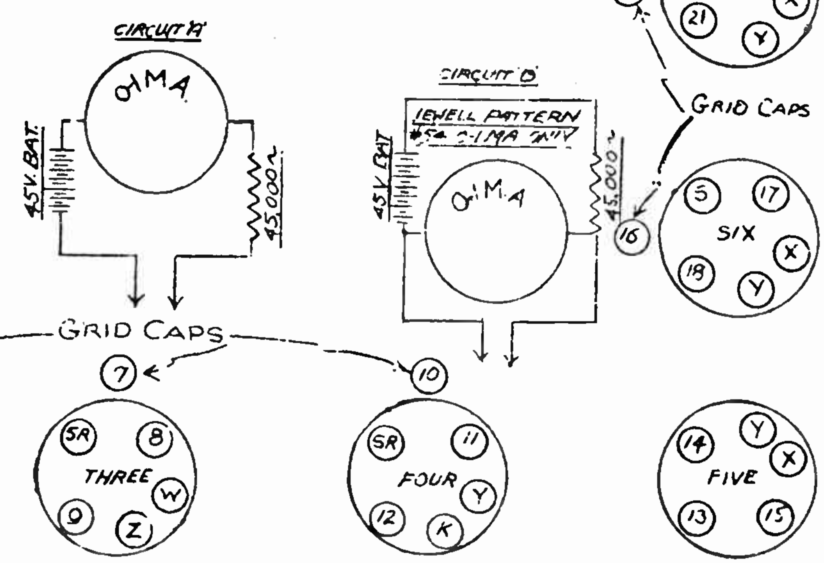


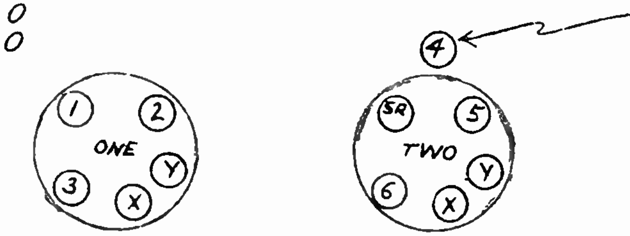
Model 7T38 (1931)



BACK TOP SET PLUG





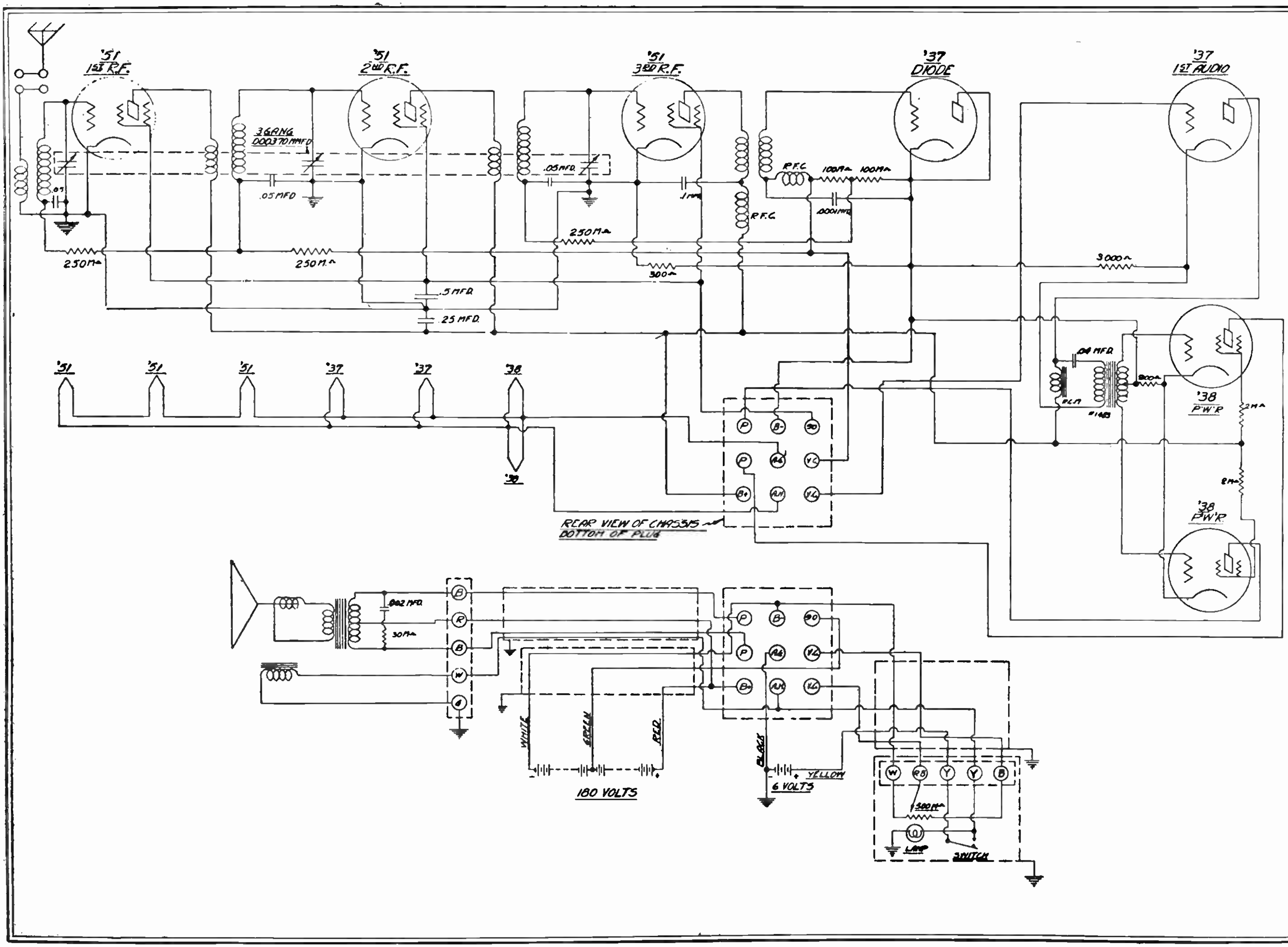


TOP VIEW OF CHASSIS

GALVIN MFG. CO.

MODEL Motorola
7T-38
Test Data

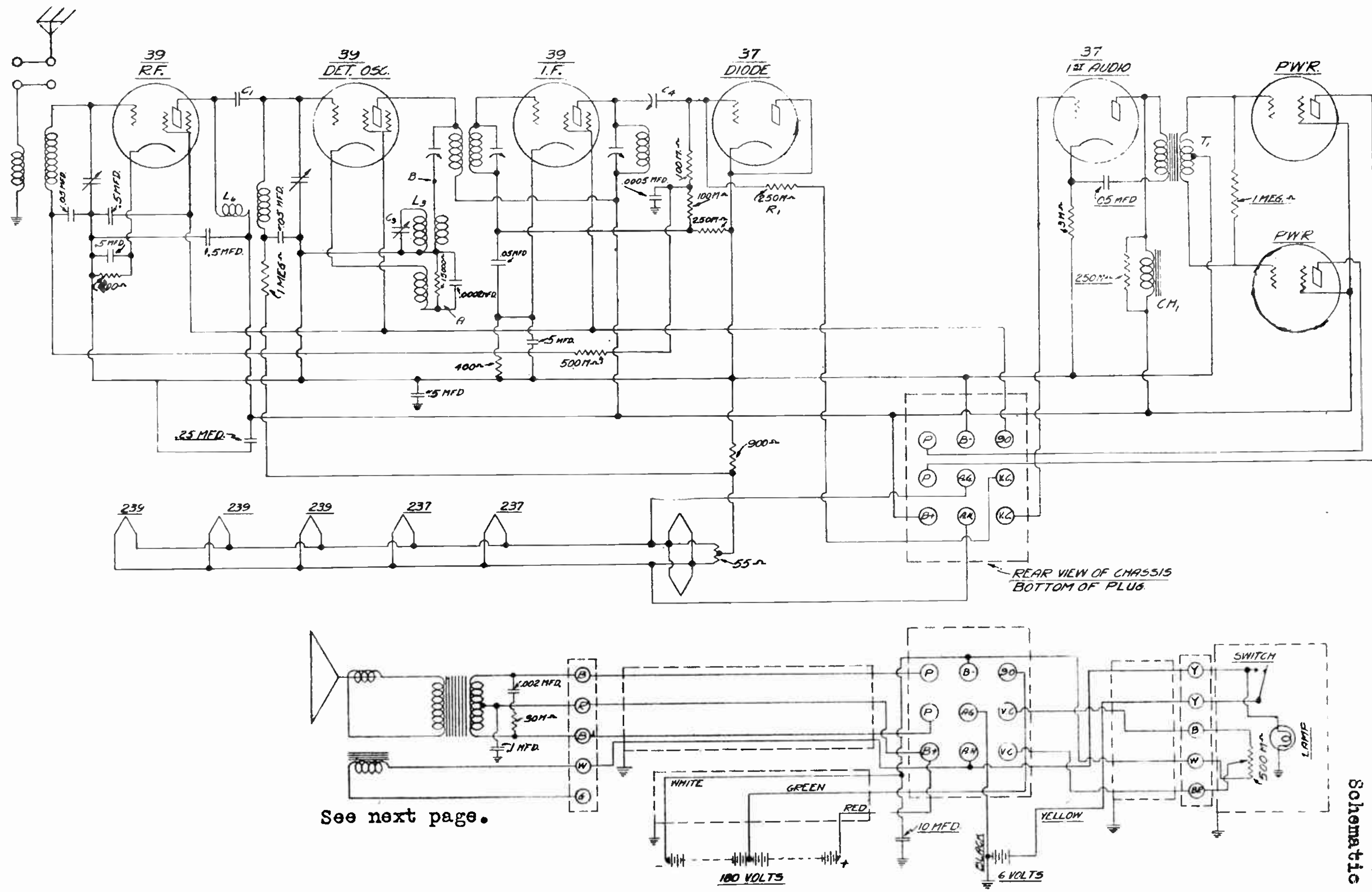
MODEL Motorola 7T-38-A



GALVIN MFG. CO.

MODEL Motorola 7T-47-A Schematic

GALVIN MFG. CO.

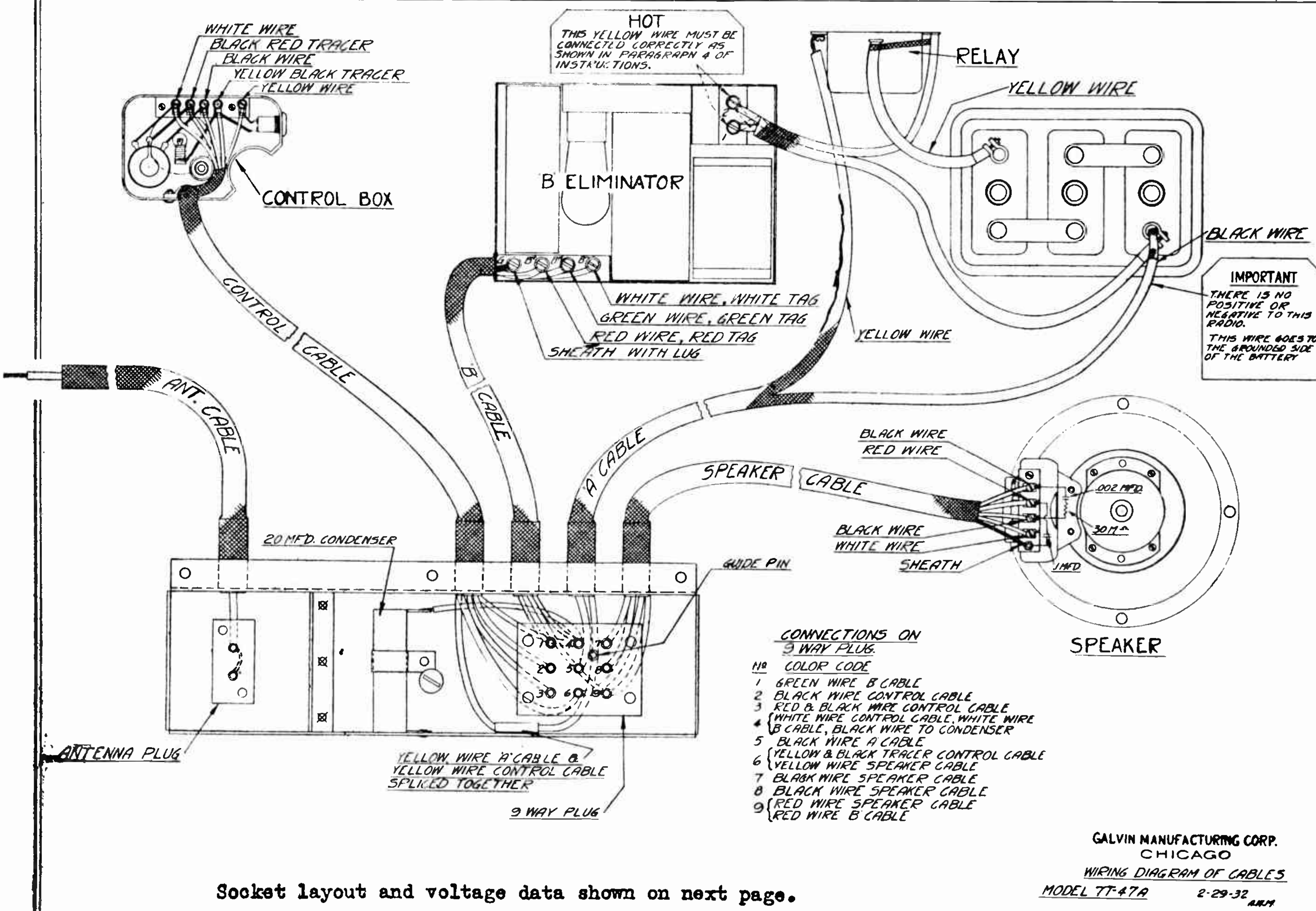


See next page.

Assembly wiring will be found in page following.

MODEL Motorola
7T-47-A
Connection Data

GALVIN MFG. CO.



Socket layout and voltage data shown on next page.

MODEL Motorola
7T-47-A
Voltage - Notes

GALVIN MFG. CO.

CONTINUITY TEST

INSTRUCTION
USE THE TEST CIRCUIT NOTED BY THE FOLLOWING MARKERS: + LOW RESISTANCE
* HIGH RESISTANCE
• MEGOHM TEST
TEST CIRCUITS GIVEN ON THE RIGHT HAND SIDE OF THIS SHEET.

DATA
SOCKET NO. 1:

	TEST FROM	TO	READ
+	S-1	C(B+90)	0
+	P-1	G(B+180)	30ω
•	G-1	G-3	600Mω
•	G-1	B(B-)	850Mω
*	K-1	B(B-)	300ω
+	FG-1	E(AG)	0
+	FH-1	E(AH)	0

SOCKET NO. 2.

	TEST FROM	TO	READ
+	P-2	G(B+180)	43ω
•	G-2	B(B-)	1 MEG.
*	K-2	B(B-)	15Mω
+	F.G-2	E(A.G.)	0
+	F.G-2	H(A.H.)	0
+	S-2	C(B+90)	0

DATA
SOCKET NO. 3

	TEST FROM	TO	READ
+	P-3	K-3	0
+	K-3	B(B-)	0
•	G-3	F(VC)	250Mω
•	G-3	B(B-)	450Mω
•	G-3	G-4	200Mω
+	FG-3	E(AG)	0
+	FH-3	H(AH)	0

SOCKET NO. 4

	TEST FROM	TO	READ
+	S-4	C(B+90)	0
+	P-4	G(B+180)	60ω
*	K-4	B(B-)	300ω
•	G-4	B(B-)	250Mω
+	FG-4	E(AG)	0
+	FH-4	H(AH)	0

SOCKET NO. 5.

	TEST FROM	TO	READ
*	P-5	G(B+180)	2Mω
+	G-5	I(VC)	0
*	K-5	B(B-)	3Mω
+	FG-5	E(AG)	0
+	FH-5	H(A.H)	0

DATA
SOCKET NO. 6

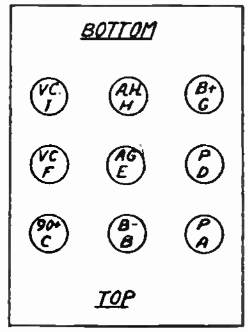
	TEST FROM	TO	READ
+	S-6	G(B+)	0
+	P-6	A(P)	0
*	G-6	B(B-)	6Mω
*	G-6	G-7	12Mω
+	F.G-6	E(AG)	0
+	FH-6	H(AH)	0

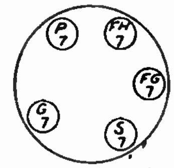
SOCKET NO. 7

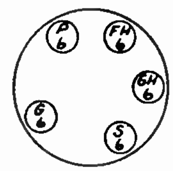
	TEST FROM	TO	READ
+	S-7	G(B+)	0
+	P-7	D(P)	0
*	G-7	B(B-)	6Mω
+	F.G-7	E(AG)	0
+	F.H-7	H(AH)	0

BACK PLUG

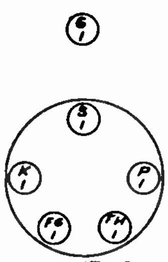
	TEST FROM	TO	READ
•	A(P)	GND	OPEN
•	B(B-)	GND	OPEN
	B(B-)	C(B+90)	OPEN
•	C(B+90)	GND.	OPEN
•	D(P)	GND	OPEN
*	E(AG)	B(B-)	900ω
•	E(AG)	GND	OPEN
+	E(AG)	H(AH)	55ω
•	F(VC)	GND	OPEN
•	G(B+180)	B(B-)	OPEN
•	G(B+180)	GND	OPEN
•	H(AH)	GND	OPEN
•	I(V.C)	GND	OPEN

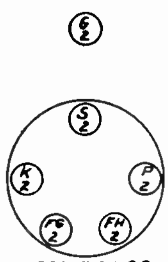


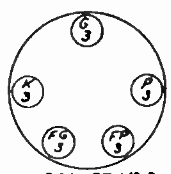

SOCKET NO. 7

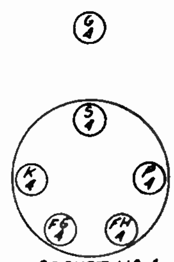

SOCKET NO 6

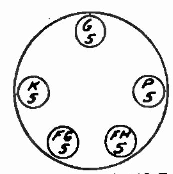
MOTOROLA CONTINUITY CHART
MODEL 7T-47-A.
GALVIN MFG CORP CHICAGO
M.A.K. 6/17/32.


SOCKET NO 1


SOCKET NO. 2


SOCKET NO. 3


SOCKET NO 4


SOCKET NO. 5

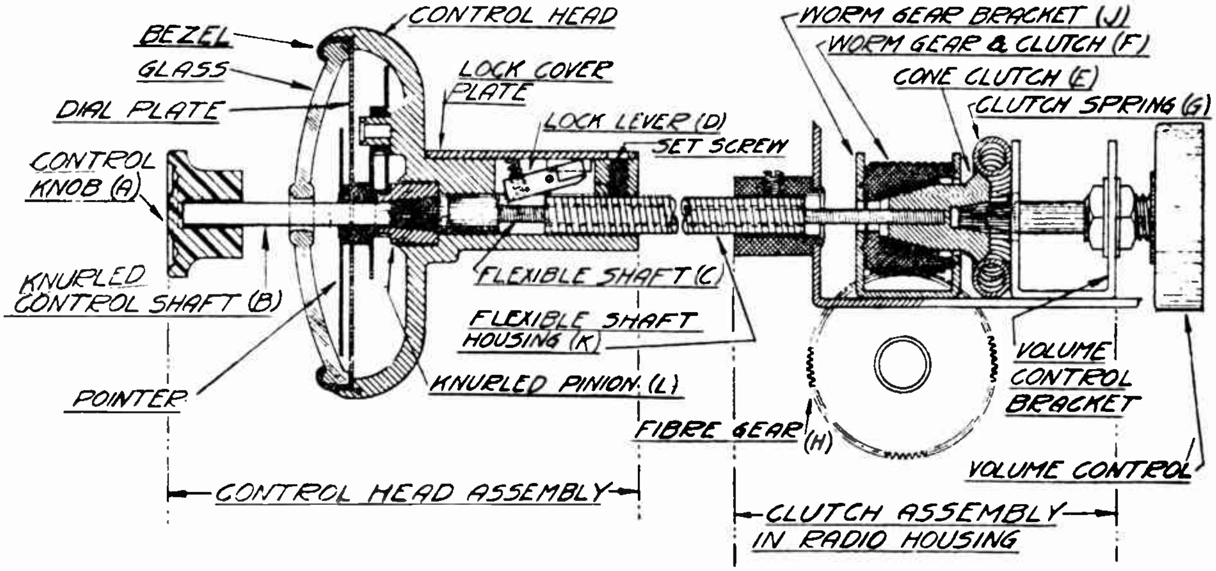
	1ST R.F.	DET. OSC.	DIODE	I.F.	1ST AUDIO	L.A.'s
E_p	176 V.	176 V.	0	176 V.	164 V.	176 V.
I_p	4.7 MILS.	1.3 MILS.	0	1 MIL.	4.1 MILS.	7.7 MILS.
E_g	2 V.	8 V.	0	2 V.	12 V.	18 V.
E_s	80 V.	80 V.	–	80 V.	–	176 V.
I_s	1.1 MILS.	.3 MILS.	–	1.2 MILS.	–	1.6 MILS. NO SIGNAL
NO SIGNAL I-CATHODE	5.8 MILS.	1.7 MILS.	.00001	5.5 MILS.	4.1 MILS.	
100-MMV. I CATHODE	.9 MILS.	2.2 MILS.	.0004	1.5 MILS.	2 MILS.	
E_f	6.2 V.	6.2 V.	6.2 V.	6.2 V.	6.2 V.	6.2 V

A-BATTERY VOLTAGE AT TERMINALS 6.25 VOLTS

Volts cathode oscillating 8 V
Volts cathode not oscillating 4 V
(Measured with 10 V 1000~/volt meter)

GALVIN MFG. CO.

Motorola Airplane Type Control
Notes



CROSS-SECTION OF AIRPLANE TYPE CONTROL ASSEMBLY.
PATENT APPL'D. FOR.

Adjusting Instructions for Motorola Airplane Type Control

The above cross section view of the Motorola Airplane Type Control identifies the principal parts of the Control Head and Clutch Assembly.

The simplicity of the Assembly and Operation is quickly apparent. A few minutes careful observation of the above cross section view will give you a clear picture of the full Assembly, which can be divided in two main assemblies. (1) The Control Head Assembly which installs on the steering post. (2) The Clutch Assembly which is in the radio set housing.

Two positions operate the control. (1) "Tuning Position." (2) "Volume Control Position." When the knob is pulled toward you it is in the Tuning or "OUT" Position. When pressed toward the control head it is in the Volume Control or "IN" Position which turns set on and off and controls the volume.

Smooth, positive operation in either position is but a matter of simple installation. Therefore, it is important that you spend a few minutes familiarizing yourself with principal parts of the control in relation to the functioning of the Control Head and Clutch Assemblies.

The above cross section view is illustrated as being in the "OUT" Position. The Control Knob (A) is fastened to a Knurled Control Shaft (B) connecting and engaging the Flexible Shaft (C) which runs through the Flexible Housing (K) from the Control Head to the Clutch Assembly.

In the "OUT" Position the Flexible Shaft causes the Cone Clutch (E) to engage inside of the Worm Gear and Clutch (F) operating the Fibre Gear. Note particularly that the Fibre Gear (H) is meshed with the Worm Gear. This Fibre Gear is attached to the shaft of the variable condenser.

The Clutch Spring (G) in the "OUT" Position is in back of the high point on the Cone Clutch (E) bearing pressure on the Cone Clutch into the Worm Gear.

When in the "OUT" Position you will observe that the pointer is engaged with the Knurled Pinion (L). In this position, upon rotation of the knob, the Knurled Control Shaft operates the pointer at the same time the Worm Gear engages the Fibre Gear and rotates the variable condenser.

When the knob is pressed toward the head or "IN" Position, the Knurled Control Shaft and the Worm Gear and Clutch are disengaged, permitting the Flexible Shaft to throw the Cone Clutch into the "ON", "OFF" and Volume Control Positions.

ADJUSTMENT OF THE AIRPLANE TYPE CONTROL

Visualizing the positiveness and simplicity of the action of this Control Assembly, you can readily see there are only two things which can cause the rotation of the Condensers in the Clutch Assembly and the Arrow Pointer in the Control Head to get out of step.

(1) There is a possibility of the Cone Clutch (E) slipping in the Worm Gear (F). The remedy is simple. Merely remove Clutch Spring (G) and cut out a few coils of the spring in order to tighten it ,and replace in position. Occasionally the Fibre Gear may press the Worm Gear too snug. This friction creates a binding which may cause the Clutch to slip. To correct this, slightly relieve the tension of the small spring which you will observe on the chassis that holds the Condenser in place.

(2) The other point to get out of adjustment is where the tapered knurled portion of the Knurled Control Shaft (B) engages the Knurled Pinion (L) in the Control Head Assembly. This can be out of adjustment when the Knurled Control Shaft (B) which is attached to the Flexible Shaft (C) and which is inside the shaft housing, is adjusted too FAR BACK in the Control Head. In this position it WILL NOT ENGAGE the knurled portion of the Knurled Pinion (L). This can also occur when the set screw holding the Flexible Shaft in place in the Control Head becomes loose allowing the entire Flexible Shaft to work back out of position.

It is a very easy matter to determine if adjustment is correct at the Control Head. If you can lock the set it is in proper adjustment. If you cannot lock the set adjust as follows: Put key into position. Pull the knob to the "OUT" Position. Then remove the knob and loosen the set screws. Pull the Flexible Shaft out of the Control Head about an inch and a half. Then REMOVE THE KEY. Re-insert Flexible Shaft into the Control Head, moving it slowly into position, until you hear the lock tumbler "click", which indicates that the Knurled Control Shaft has passed the end of the lock lever. Now pull shaft back slightly. Then tighten the set screws and the whole assembly will be held in proper position. Replace the tuning knob and key.

NOTE: When re-inserting the Flexible Shaft and when the Knurled Control Shaft passes the lock lever, a slight "click" will be heard when the raised portion on the Knurled Control Shaft passes the lock lever, but when you notice a pronounced "click" and at the same time when the knob end of Knurled Control Shaft extends out of the front of the control about three-quarters of an inch, you can then be sure it is in proper position.

The operation of the airplane type control is positive in its action and whenever slippage of the pointer or slippage of the clutch is encountered, one or the other of the above adjustments will correct this condition, and when correctly adjusted after the installation is made it will remain in adjustment thereafter.

GALVIN MFG. CO.

MODEL 44
Data

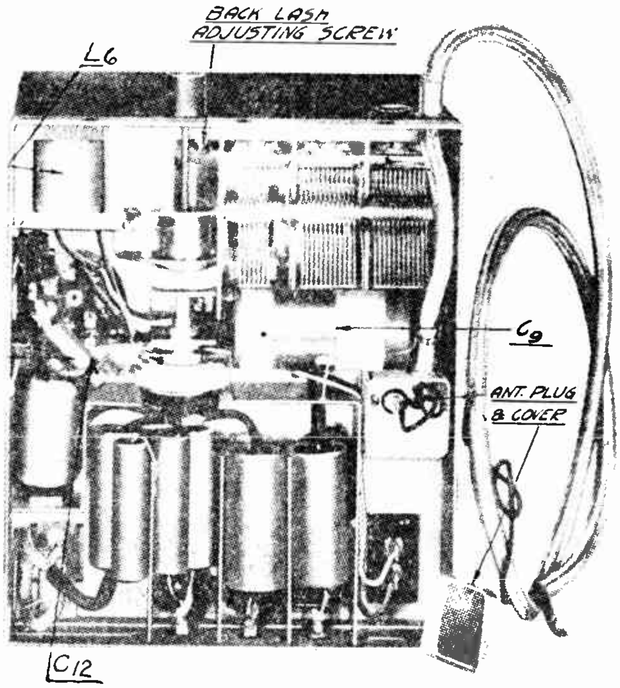


FIGURE 5

The backlash adjusting screw on Model "77" and Model "44".

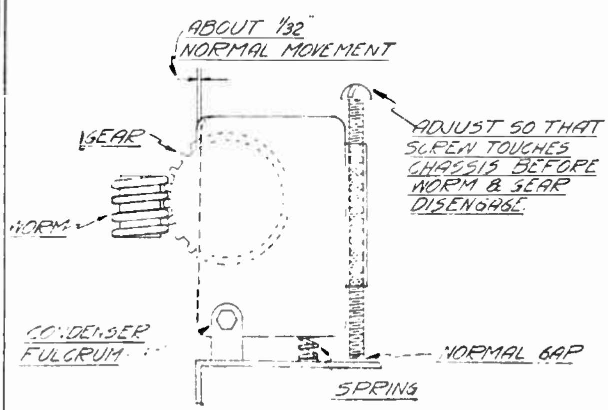


FIGURE 6

MODEL "44"

The Motorola Model "44" is a 5-tube superheterodyne different from the previous Motorola circuits in that it does not have a radio frequency stage. The antenna is fed into a specially designed antenna coil to give the full gain in the antenna coil throughout the broadcast band, which antenna coil feeds into the grid of the type 77 autodyne tube, whose function as an autodyne has been previously described.

From the plate circuit of the "77" it feeds into the first I.F. tube with the grounded end of the secondary left open for the insertion of negative A.V.C. voltages. The plate of this first I.F. feeds into the grid circuit of a second I.F. tube with the grounded end of this secondary left open for the insertion of negative A.V.C. voltages. From the plate of the second I.F. tube it feeds into the diode circuit, with the voltages of the secondary of this transformer being rectified with the diode section of the 75 tube. From the plate of this 75 tube it is resistance coupled into the 12-A-5 power tube.

The 12-A-5 power tube is a low impedance Pentode output tube, it having 2 cathodes plus heaters hooked in parallel. The plate impedance of this tube is low in comparison with all other types of Pentodes. Each and every tube of the set is self-biased and by so doing it allows extreme flexibility in the use of power packs. It will be observed in Figure 9 a view is shown of 3 different packs. Any one of the three will work in the Model "44".

The Motorola eliminode circuit is included in the "44" as shown in Figure all wires being filtered, including the dial light wire.

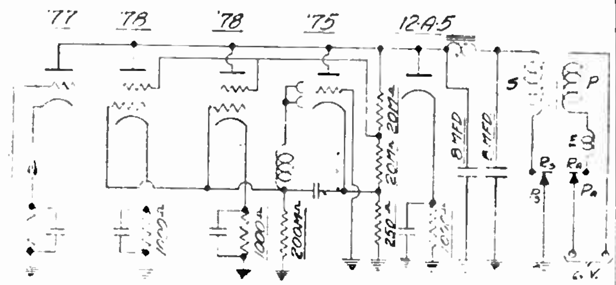


FIGURE 7

Figure 7 shows in simplified form, the method of obtaining bias, principally the 75 tube. You will also observe a simplified "B" supply wiring with all point condensers, etc., left off. This is so the service man can more clearly understand the action of tubeless type power supply.

A little description of the operation of tubeless type "B" supply will install in the serviceman's mind a better feeling of confidence with easier isolation of trouble.

The reed or pendulums marked R_s for secondary side and R_a for primary side are as shown in normal position, that is closed. Upon applying a 6 volt D.C. source at the two terminals marked 6V. the circuit is completed through contact point P_a, through reed R_a, through exciting coil E, then primary of transformer P.

By virtue of the surge of D.C. a flux is immediately set up in the transformer, the flux then producing a voltage much more in the secondary S than in P due to the turn ratio of the two windings. This voltage then, of course, charges up the system.

Due to the current flowing in coil E the reeds are pulled away from their contacts P_s and P_a, but they, being of considerable mass do not move instantly; their motion must be made at their natural period. They are so made mechanically that when the point of saturation of the transformer is reached reed R_s and contact P_s open before contact P_m and reed R_a do. This is accomplished by the amplitude of the secondary being less than the primary (although they are exact in frequency). That allowed the secondary points to open without sparking. Following then the primary points R_a and P_a open, allowing the flux to collapse, this reverse flux discharged through the buffer condenser on secondary and point condenser on primary side.

Since the primary points opened R_a and P_a their exciting coil E could not longer pull on the reed. Due to their natural period they will complete the cycle and return to the original position.

The action of full wave tubeless is identical in principle except the collapse of flux is utilized and aided by use of duplicate windings of P and S on transformer, plus an extra set of points to make reverse contact to reeds.

MODEL 44
Voltage
Pesistance Data
Adjustment

GALVIN MFG. CO.

TESTING MODEL "44"

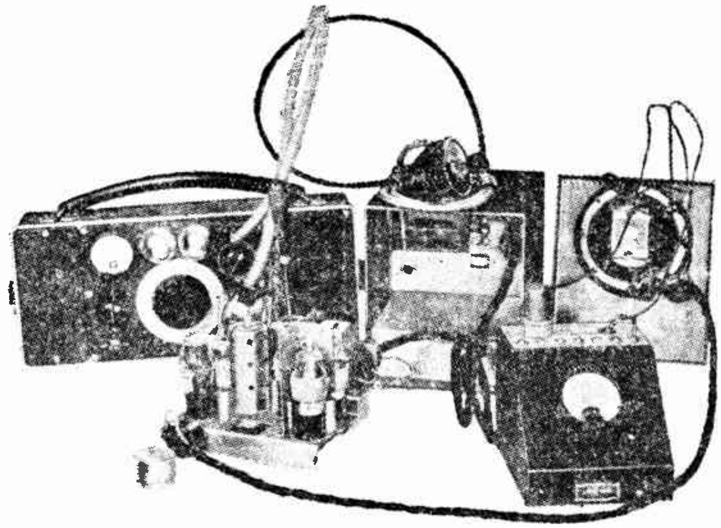


FIGURE 8

The extreme advantage and flexibility of plug-in units is clearly illustrated in Figure 8. Set-up of this nature can be made in the car as well as bench. You will observe in the Figure a Weston Service Oscillator, although any good oscillator should be satisfactory if it attenuates to zero, does not change in frequency when going so, and at least 30% or better modulation. The Motorola Utility Meter is here shown set for output measurement in its most sensitive position, which is very satisfactory for output measurements across the voice coil where the testing voltage is generally not over 1 volt, maximum of 2.5 volts. The voice coil resistance of the Model "44" speaker is 2.7 ohms.

The oscillator is shown in proper position for I.F. alignment with screw driver in position, for aligning the plate coil of first intermediate transformer. A socket wrench is necessary to align the secondary.

In case it is desired to examine the power pack under operation, two speaker extension cables can be used. This may introduce a little hash but will not interfere in any way with the voltage or an investigation of a bad connection.

With the radio set out as shown in Figure 8 and by referring to Figure 9, the data given in Table 1 was all taken with a Motorola Utility Meter; or any 1000 per volt voltmeter will be satisfactory.

Figure 9 gives the location of all special positions referred to in the Table. As an additional help we have given a table giving the resistance and inductance of all the coils used in Model "44".

Secondary output transformer (Utah)	.4 ohms	
Primary output transformer	100 ohms	
Primary antenna coil	24 ohms	480 microhenrys
Secondary antenna coil	5 ohms	330 microhenrys
Secondary oscillator coil	4 ohms	137 microhenrys
Primary first I.F.	10 ohms	154 millihenrys
Secondary first I.F.	10 ohms	154 millihenrys
Primary second I.F.	10 ohms	154 millihenrys
Secondary second I.F.	10 ohms	154 millihenrys
Primary diode feeder	15 ohms	2 millihenrys
Secondary diode feeder	15 ohms	2 millihenrys
Speaker voice coil resistance (Utah)	2.7 ohms	

By using the Motorola Utility Meter as a 0 to 1 mill D.C. meter only, the automatic volume control characteristics can be very accurately determined. By placing the 0 to 1 meter across the 200,000 ohm A.V.C. grounding resistor and connecting the antenna onto the radio set:

1. Noise level should produce 1 mill.
2. Strong local stations should produce a 95 mill reading on the meter. The intensity of this reading of course will vary with the field strength of your local station.

By connecting this meter at the .05 condenser in the A.V.C. of the first I.F., as the position shown in Figure 9, the meter should read 1 mill on a station and 0 off station. By connecting the meter between the .05 condenser in the A.V.C. of the second I.F. and ground, the meter should read 15 mills on strong local stations and then go to 0 off stations.

A continued overall audio gain check can be made by applying 110 volts 60 cycle, connecting the grounded end of the 60 cycle to the chassis and working the hot end through a .001 condenser, then completing the circuit through the grid of the 75 tube. With the Motorola Utility Meter connected as shown in Figure 8, a .2 mill reading should be obtained. A slight variation of this might be obtained, but if there is any trouble in the audio circuit it will show up as practically no reading or very slight on the Utility Meter. However, a rough check can be made by just tipping your soldering iron while it is connected to the 110 line onto the grid of the "75". There is enough stray capacity in the soldering iron to produce a 60 cycle hum in the speaker or approximately .2 mill reading on the Utility Meter.

VOLTAGE TEST OF MODEL "44"

A Battery = 6.5 Volts
Power Supply = 200 Volts

AUTODYNE OR 77 TUBE

	Voltage drop across Cathode Resistor 1500 K.C.	1000 K.C.	600 K.C.	S.G. Volts	Drop Across 2000 Ohm Isolating Resistor In Voltage Divider
No Signal	4.0 Volts	5.2 Volts	10.5 Volts	112 Volts	.75 Volts
Local Signal	5.5 Volts	7.2 Volts	12.5 Volts	104 Volts	.82 Volts

1ST AND 2ND I.F. OR 78 TUBE

	Voltage Drop Across Cathode Resistor	S.G. Volts
No Signal	4.0 Volts	112 Volts
Local Signal	1.4 Volts	104 Volts

A.V.C. AND 1ST AUDIO OR 75 TUBE

Voltage Drop Across Cathode Resistor. Measurement Made Across 250 ohms at Grounded End of Voltage Divider.	Drop Across 500,000 Ohm Plate Resistor. Use 200 Volt Scale of 1000 Ohm Per Voltmeter
	No Signal = 80 Volts
1.1 to not more than 1.5 Volts.	Local Signal Volume Full On = Peaks Vary 50 to 80 Volts

OUTPUT TUBE OR 12-A-5

Two Heaters. Both Should be Lighted.	Voltage Drop Across Cathode Resistor.	D.C. Voltage Drop Across Output Transformer Due to Plate Current.
	28 Volts	18 Volts

MODEL 44
Chassis Views

GALVIN MFG. CO.

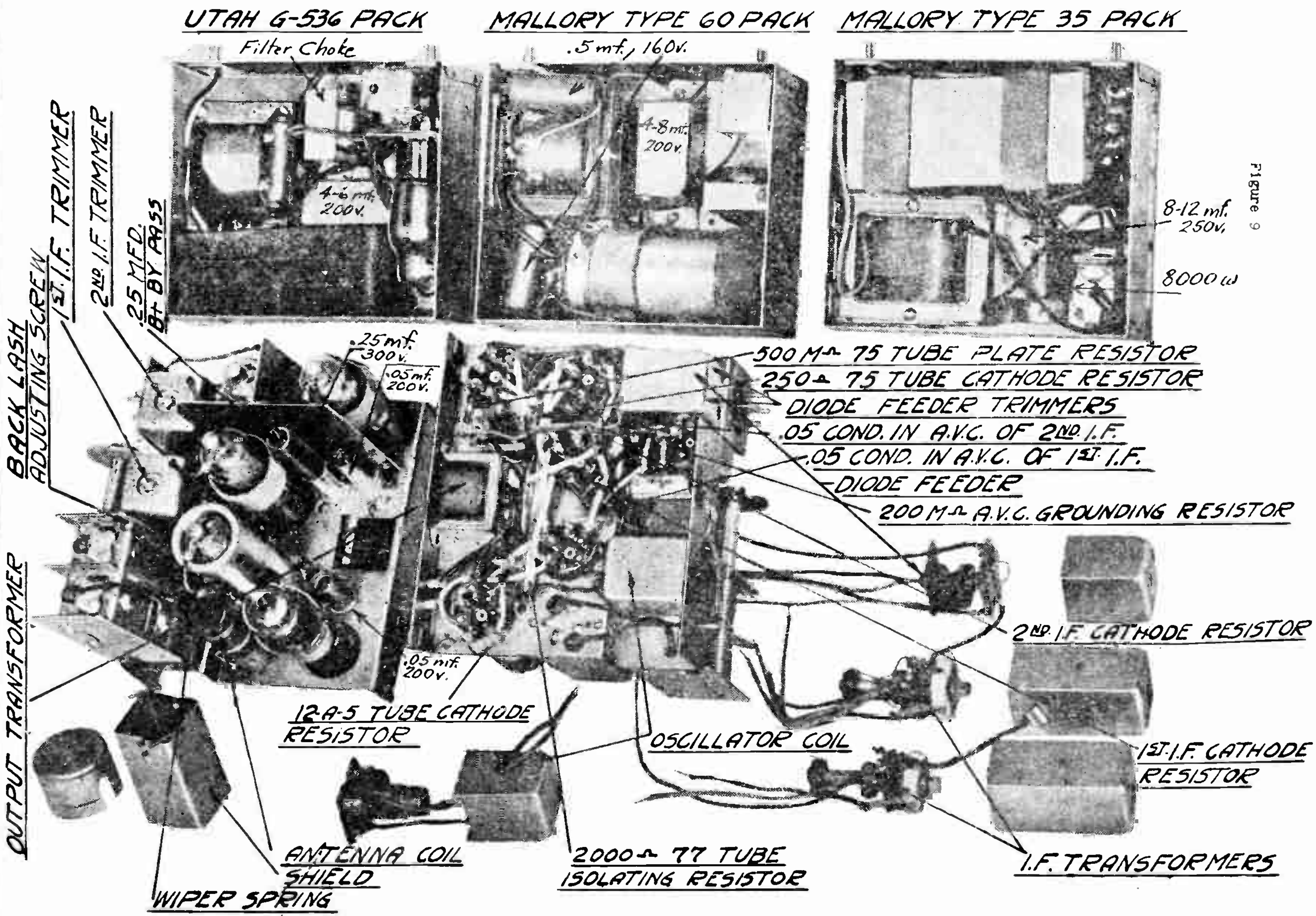


Figure 9

MODEL 44
Schematic

GALVIN MFG. CO.

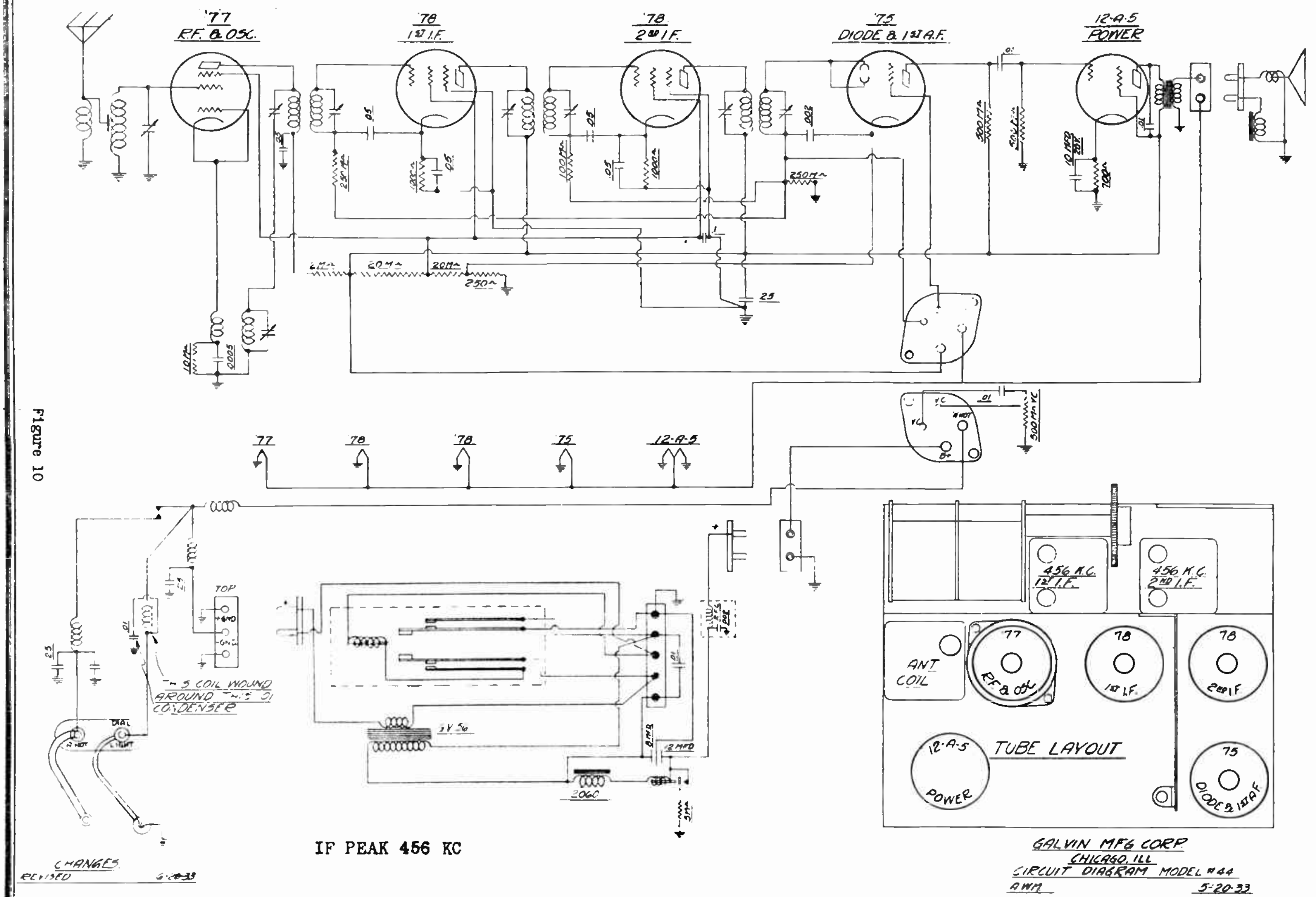


Figure 10

IF PEAK 456 KC

GALVIN MFG CORP.
CHICAGO, ILL
CIRCUIT DIAGRAM MODEL #44
AWM 5-20-33

GALVIN MFG. CO.

MODEL 55
Schematic
Alignment

Motorola Model "55" is a 5-tube superheterodyne. The chassis, "B" power supply and dynamic speaker are assembled in one unit. The "55" is so designed that all component parts are assembled on the speaker plate. By removing all screws except the six hexagon head screws and four round head screws located at the edge of the speaker drill, the entire set may be dropped out of the outer housing for servicing or tube replacement.

SERVICING MODEL "55"

After removing the outer housing, the chassis can be inverted and the six hexagon head screws removed. After removing these screws, the speaker plate and speaker may be lifted off and placed at the side of the chassis without disconnecting the speaker wires. After this has been done, all wiring will be exposed and easily accessible for service.

Care should be used in reassembling so the speaker wires do not get pinched under the speaker "pot".

Reference to the circuit diagrams will show that resistance values from the various parts are given so the set may be completely analyzed by resistance method.

ALIGNMENT OF I.F. TRANSFORMERS AND TUNING CONDENSERS

The method of aligning the I.F. transformers at 456 kilocycles and the alignment of the gang tuning condensers is the same as used in Model "77".

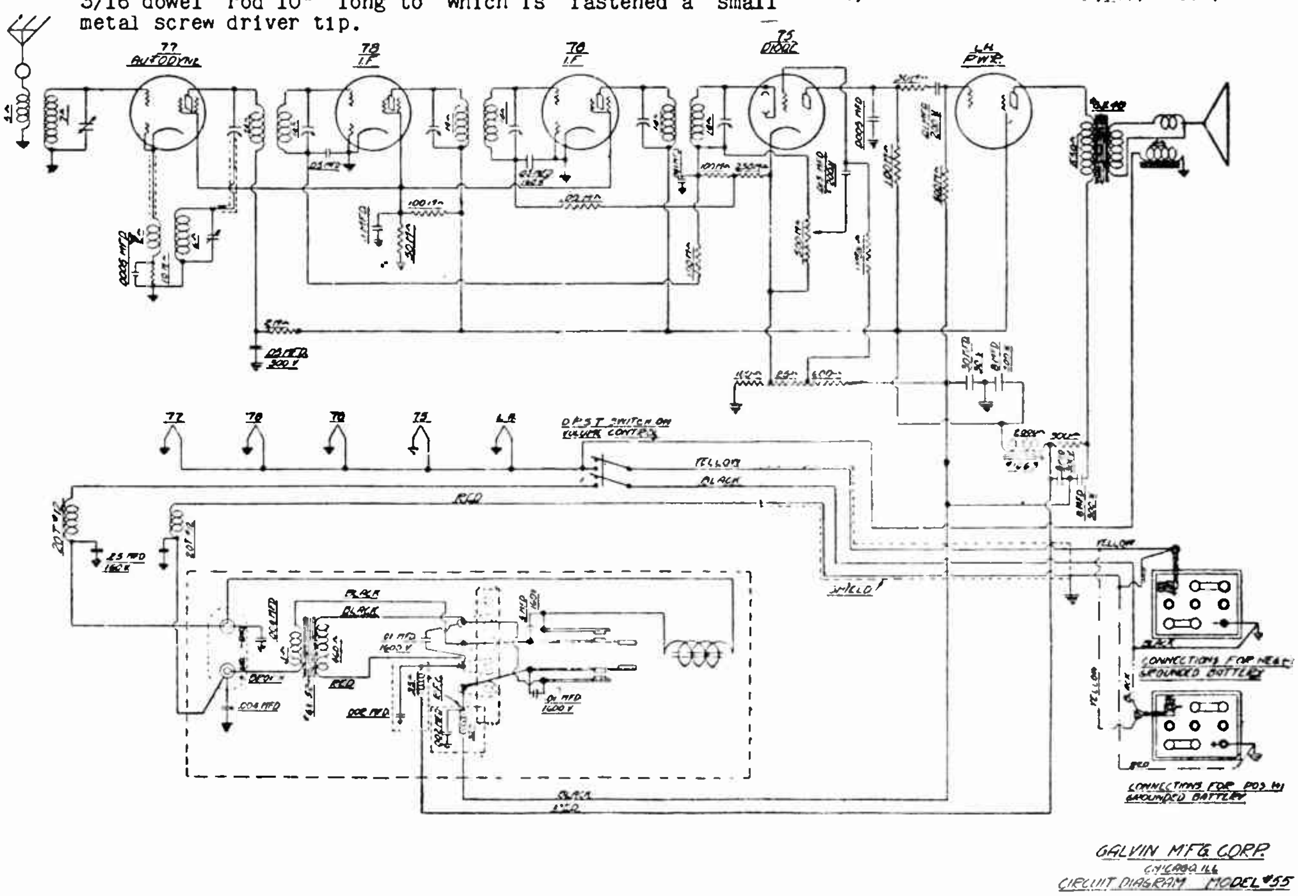
In the alignment of I.F. transformers it will be noted that the third I.F. transformer or diode feeder may be reached with a non-metallic screw driver inserted in the hole provided in the upper part of the chassis located between the first I.F. transformer and the "B" power supply housing. This screw driver may be a piece of 3/16 dowel rod 10" long to which is fastened a small metal screw driver tip.

Any of the various units of the Model "55" may be removed individually for repairing or replacement without disturbing other units.

"B" POWER SUPPLY

The self-rectifying Elkonode is also used in the Model "55". This along with the power transformer are housed in a single unit in the upper right corner of the chassis. The complete power unit may be removed by disconnecting the two "A" supply leads at the power unit terminal strip and disconnecting the B- (minus and B plus) leads at their respective terminals located on the set chassis. Should the Elkonode require replacement it may be removed by disconnecting the four wires extending from its sponge rubber housing and connecting the new unit as shown in Figure CH-55-B

CAUTION: Do not attempt to make any adjustments to Elkonode.



CAR INSTALLATION NOTES

AUBURN:

The majority of Auburns will be found to operate very satisfactorily on one suppressor, that being applied in the line between the ignition coil and the distributor.

The aluminum plate which houses the distributor must be thoroughly grounded, both top and bottom, and is most easily accomplished by riveting a piece of shielding braid on to the cover under the aluminum cover and carrying this shield down, fastening it under one of the head bolts.

Then remove the black and yellow wire on the ignition coil .. the other end of this wire is at the electrolux switch ... and replace this wire with a shielded wire, grounding this shielded wire where it passes through the bulkhead.

This should take care of the 1930 and 1931 Auburns.

BUICKS: (1929-30-31)

Due to the spark wires all being thoroughly shielded, the application of one suppressor is all that is necessary on a Buick. This suppressor should be applied as close to the distributor as it is possible to make it as the antenna pick-up is very severe. Grounding the wind shield, as well as the small metal pieces on both sides of the wind shield, will be found very effective, when a roof aerial is used as there are a number of Buick models that do not have these parts grounded.

CHEVROLET:

If the car is not a new model contact points should be examined thoroughly and if any of them have been pitted new contact points should be installed.

Apply an extra condenser at the ammeter, dome light filter in the dome light circuit if connected, and with a short piece of shielding bond the rain spouting which is the small angular material running close around the edge of the car roof. This has been discovered not to be grounded in the majority of Chevrolets and it will be necessary, after bonding it together, to then ground it to a corner post, checking thoroughly to see that the corner post used is likewise grounded.

Then abide with the same type of interference elimination used in the Buick which will effectively take care of this car.

It has also been found in some cases in this car that the person sitting on passenger side will radiate interference carried from his feet which are close to coil on other side of bulkhead, up to the antenna. A piece of screening placed under the floor mat will eliminate this type of interference. This screen must be grounded.

DODGE:

It is necessary that there be thorough shielding of the cable leading from the ignition coil to the bulkhead, grounding the shield to the outside of the bulkhead. An additional heavy bond must be made from the motor to the bulkhead, in some cars, or from the motor to the channel frame in others.

ESSEX:

It is very important in the Essex that the "A" Battery connections be made to the storage battery. It will also be necessary in all installations to install a by-pass condenser at the ignition switch. This condenser should be at least 1 mfd.

FORD: Model "A"

It will always be necessary in Fords to bond the spark control rod to the motor by means of a piece of shielding, soldering one end of the shielding to the rod and the other end under a cylinder head bolt.

It has occasionally been necessary to place an additional bond to the other end of the spark control rod to the bulkhead.

In a few instances it has been necessary to bond the electrolux cable to the bulkhead at the point where it enters the small rubber terminal block.

The distributor spacing must be checked up thoroughly to see that is is not too large, as this varies considerably in Fords. If it is found to be over five thousandths of an inch it should be built up with solder or piened. Figure #6 indicates what is meant by building up the distributor.

GRAHAM-PAIGE:

The shielding of the wire from the ignition coil to the switch located on the steering column, grounding this shield to the bulkhead, is necessary in the Graham-Paige. It is also necessary to place an additional by-pass condenser at the fuse block, located on the bulkhead, together with the standard suppressors. This will take care of the majority of this type car.

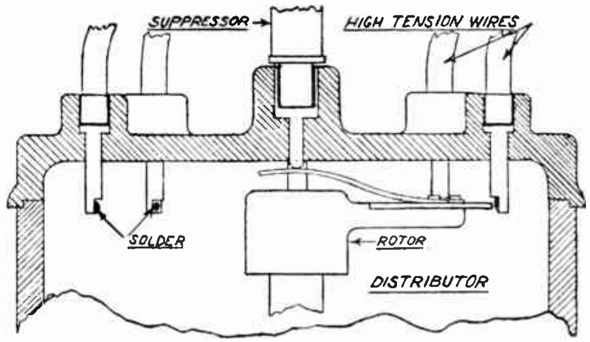


Figure 6

LINCOLN:

In the earlier model Lincoln that have the distributor coils mounted on the driver's side of the bulkhead, if it is impossible to eliminate antenna pick-up by any of the ordinary methods, it will be necessary to remove the coils and place them in the motor compartment. The same mounting holes may be used for the coils only they will be placed in the motor compartment instead of the driver's compartment.

The T junction of the flexible conduit should be loosened from the conduit and the flexible conduit placed up on the bakelite taper of the ignition coil. You will find enough slack in the flexible conduit to allow you to place the ignition cable proper in place before the flexible conduit is pushed up on the bakelite of the distributor. This will make a very neat appearing job and yet will accomplish the purpose desired.

On new Lincoln a dome light filter should be used - also it may be necessary to by-pass dome light feeder at the terminal board located back of the rear seat cushion with a .5 mfd. or larger capacity condenser.

LASALLE:

Remove the primary wire leading from the distributor to the ignition coil from the high tension conduit, keeping it outside this conduit. Shield the short length of wire leading from the distributor coil to the bulkhead, grounding this shield where it passes through the bulkhead. It will not be necessary to shield any wire other than this one.

In a few of the later custom models the application of two dome light filters will be necessary. They will have to be applied underneath the car at the junction boxes to their respective circuits.

On the 1932 model the coil is located on the bulkhead, on driver's side above the clutch pedals. To keep interference from being radiated by person driving car it is sometimes necessary to move coil to some other location.

OAKLAND:

For the reason of the No.8 spark plug being located so close to the storage battery, the Oakland "8" presents a rather difficult installation problem. A shielding of the spark plug wire leading to the No.8 spark plug will be of great assistance. It is extremely important that the "A" Battery connections of the radio be run directly to the post of the storage battery. The "A" Battery wires must be shielded clear up to the terminal posts, the shield covering the wire as close as it is practical to shield it.

It may often be necessary to place a double length of shielding over the "A" Battery wires as they come very close to the No.8 spark plug.

Dome light filters need to be installed in all sedans and an additional generator condenser must be applied either at the starter connection to the bulkhead or at the ammeter to the instrument board.

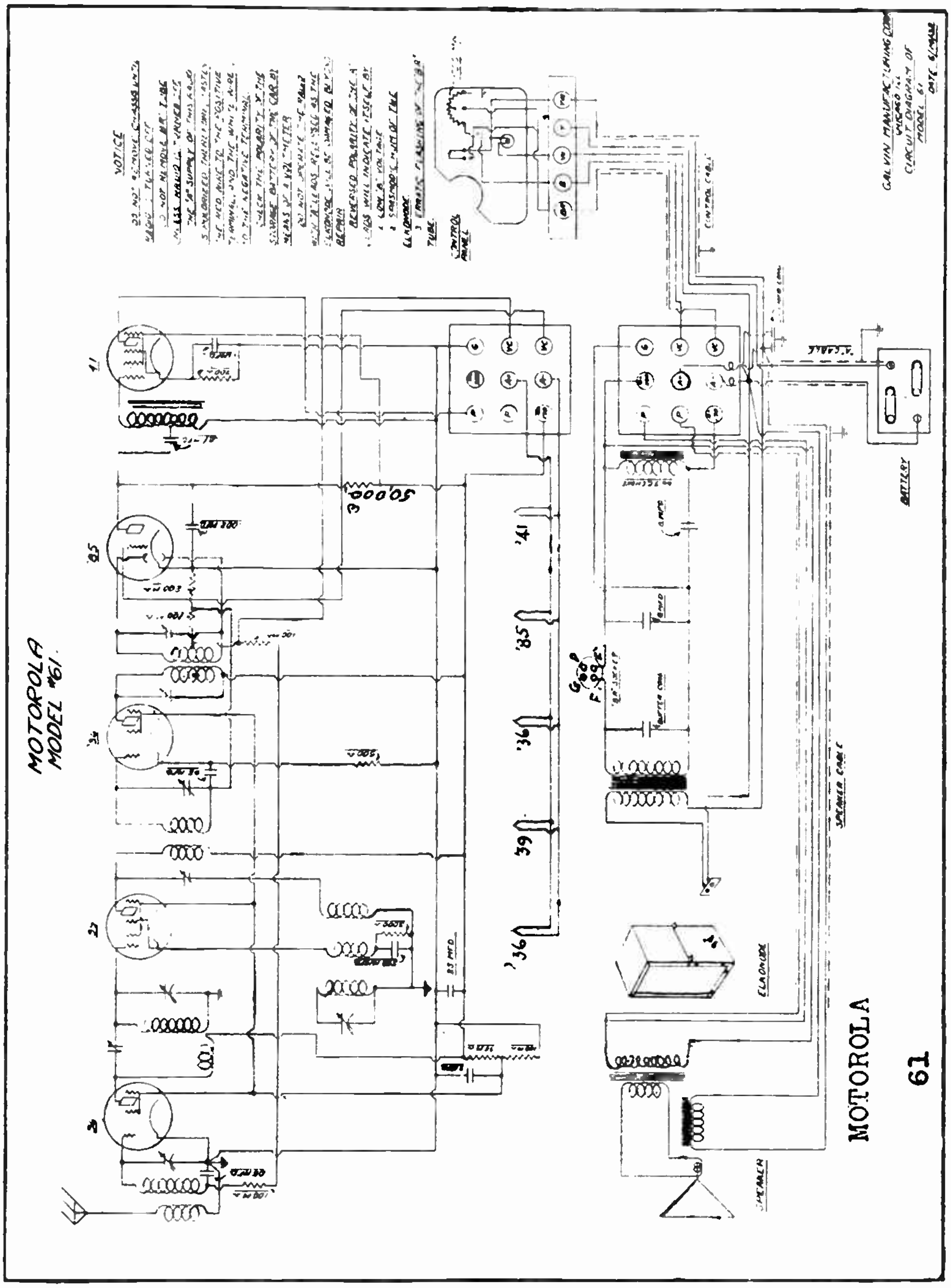
Shielding must be placed over the lead from the distributor coil to the bulkhead, grounding this shield at the bulkhead.

PLYMOUTH:

The Plymouth, due to the motor floating in rubber, will need the motor bonded to the chassis frame in several places ... principally to the channel frame, again at the bulkhead, and again at the radiator. Braided shielding is recommended for this bond and enough slack should be left so that motor is free to float.

MODEL Motorola
61

GALVIN MFG. CO.



For continuity test data, see information related to Motorola 88.

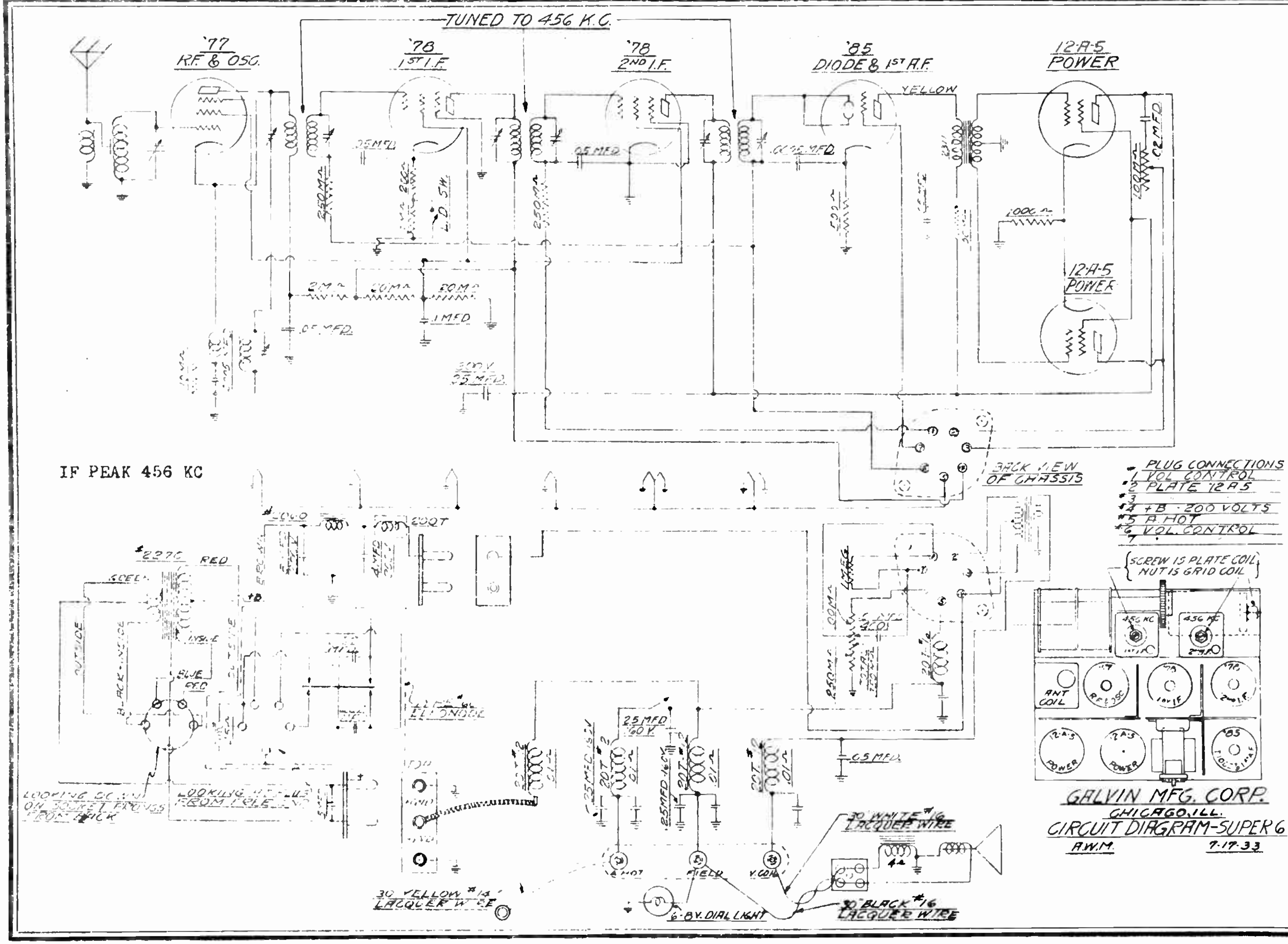
The Motorola Model 61 is very similar to the Model 88, the difference being in the design of the audio frequency end.

The Radio Frequency of Model 61 is interchangeable, serviced and wired in exactly the same manner as Model 88

The interchangeability of tubes as used in the radio frequency end can be done as described in Chapter III with all tubes, EXCEPTING THE 85 AND 41, which tubes must be interchanged only with tubes of corresponding numbers. The method of controlling volume in the Model 61 limits the adaptability of other types of detector tubes.

MODEL 66
Schematic
Socket

GALVIN MFG. CO.



MODEL 77
Schematic

GALVIN MFG. CO.

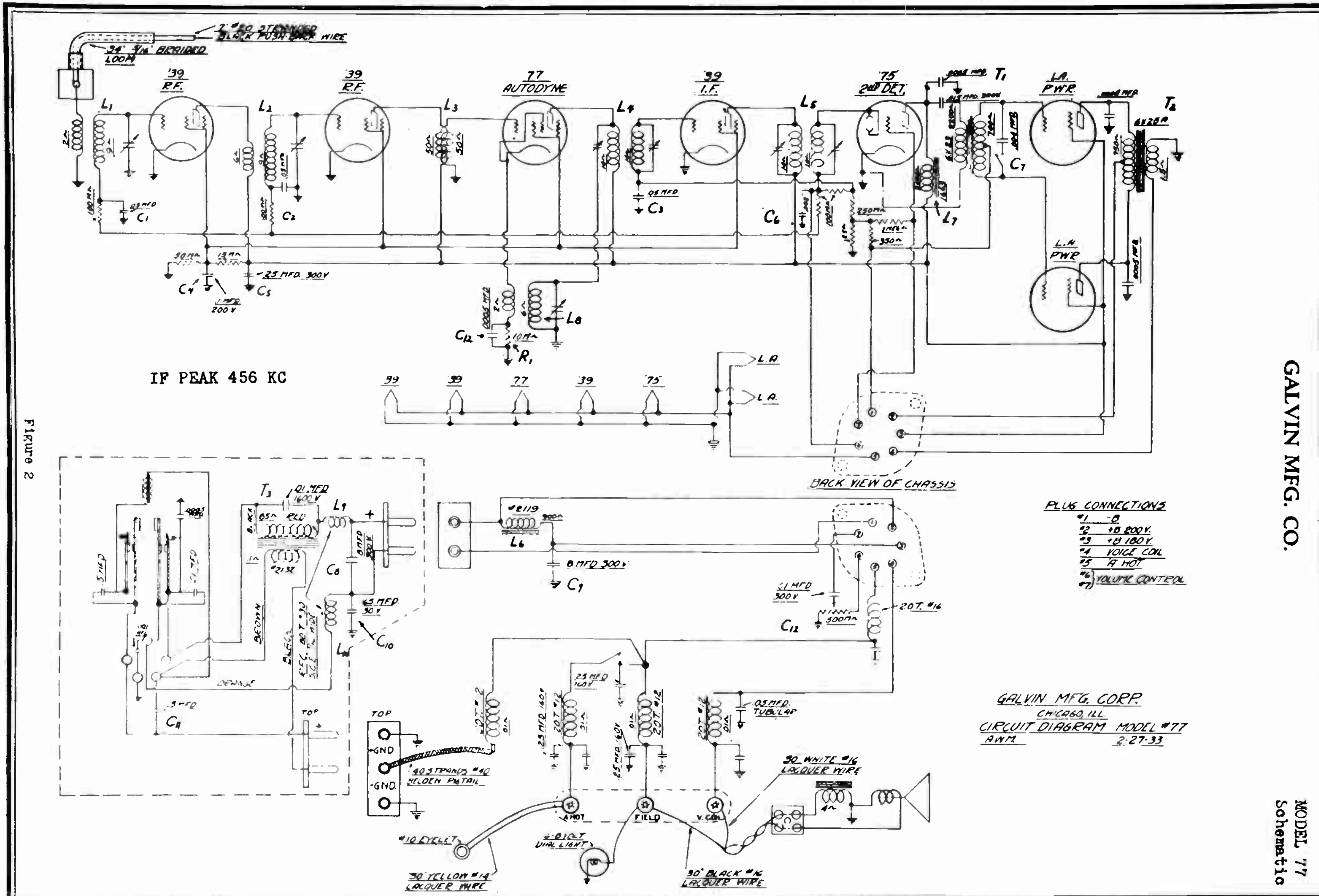
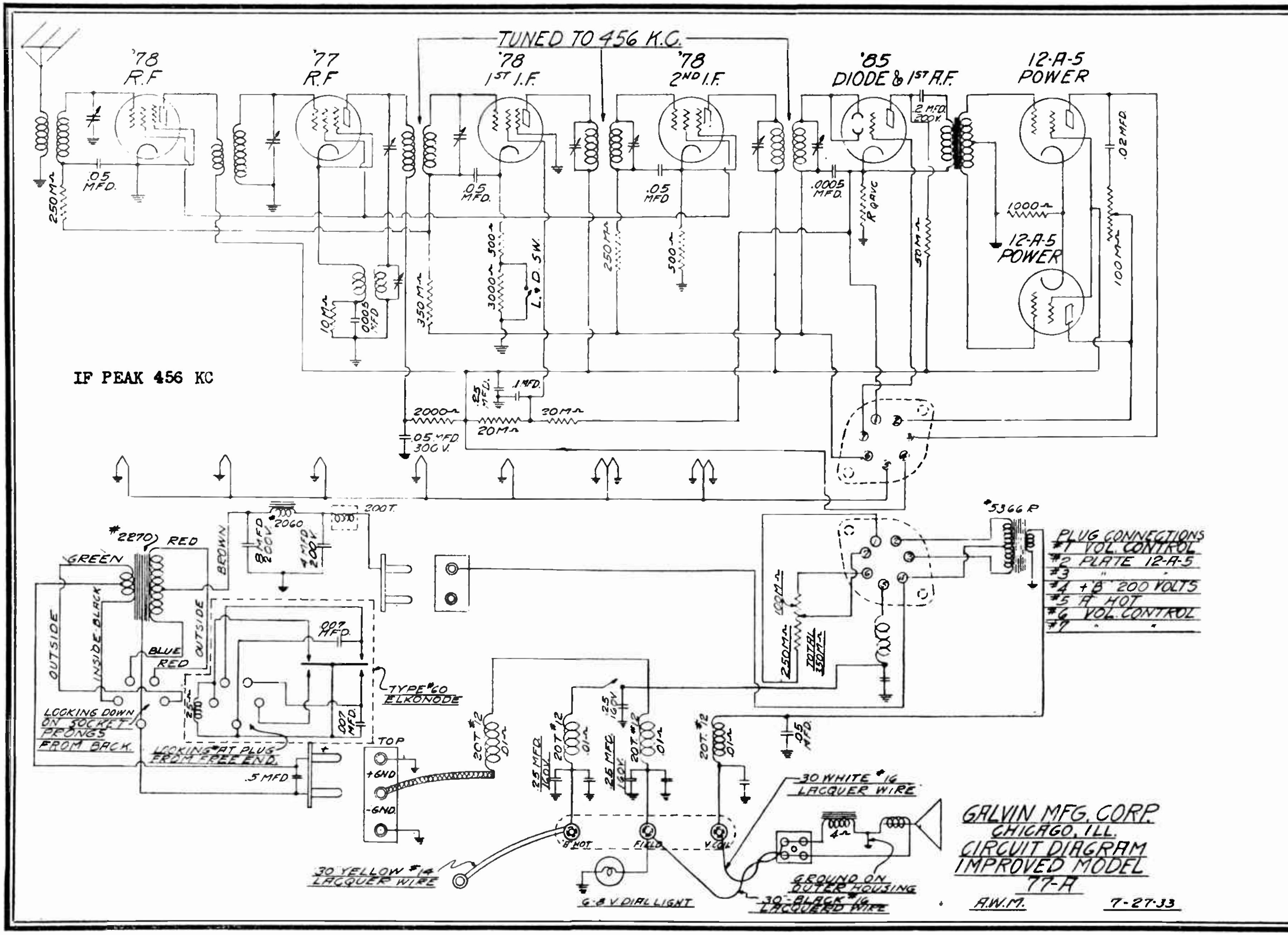


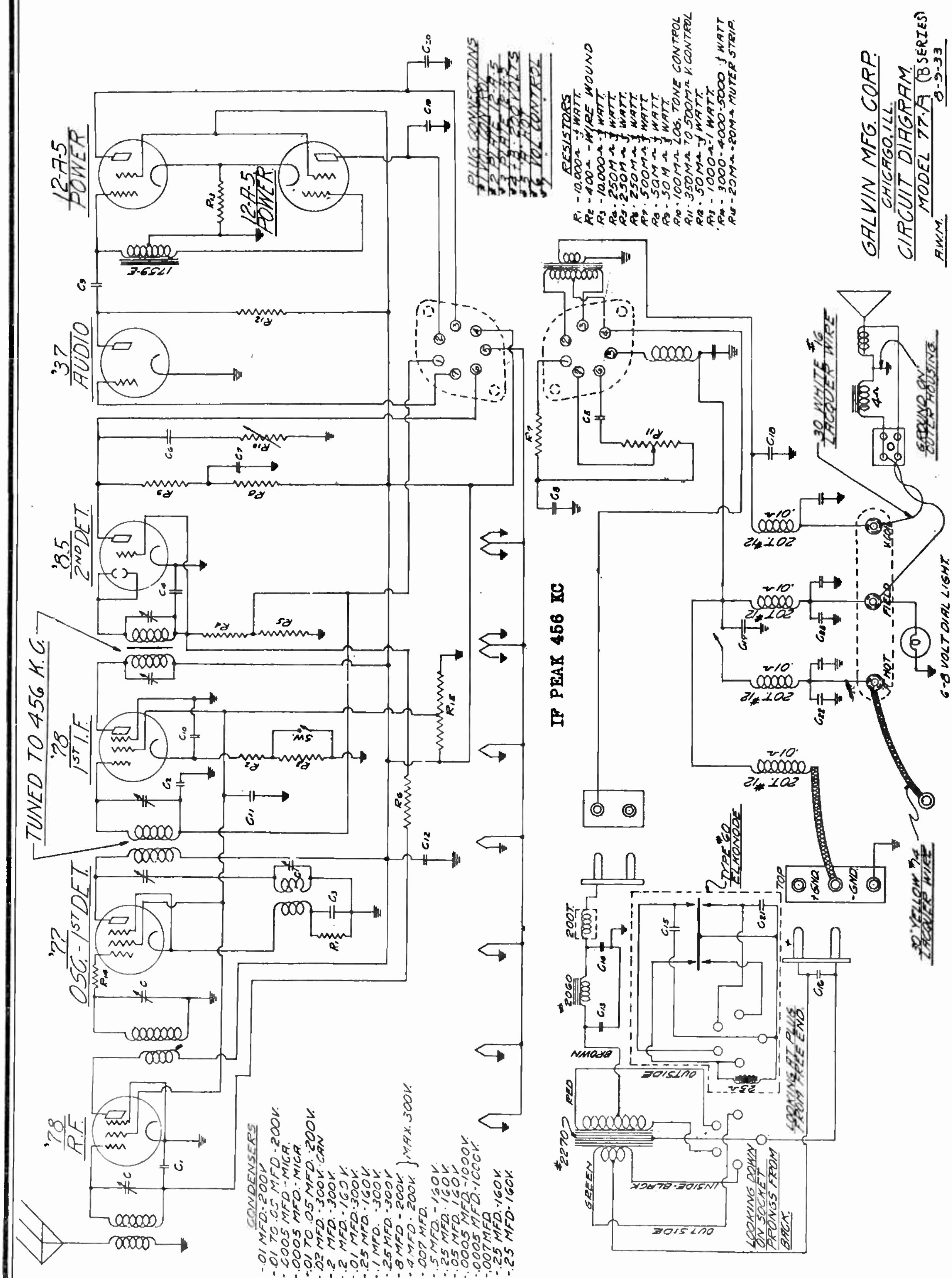
Figure 2

GALVIN MFG. CO.



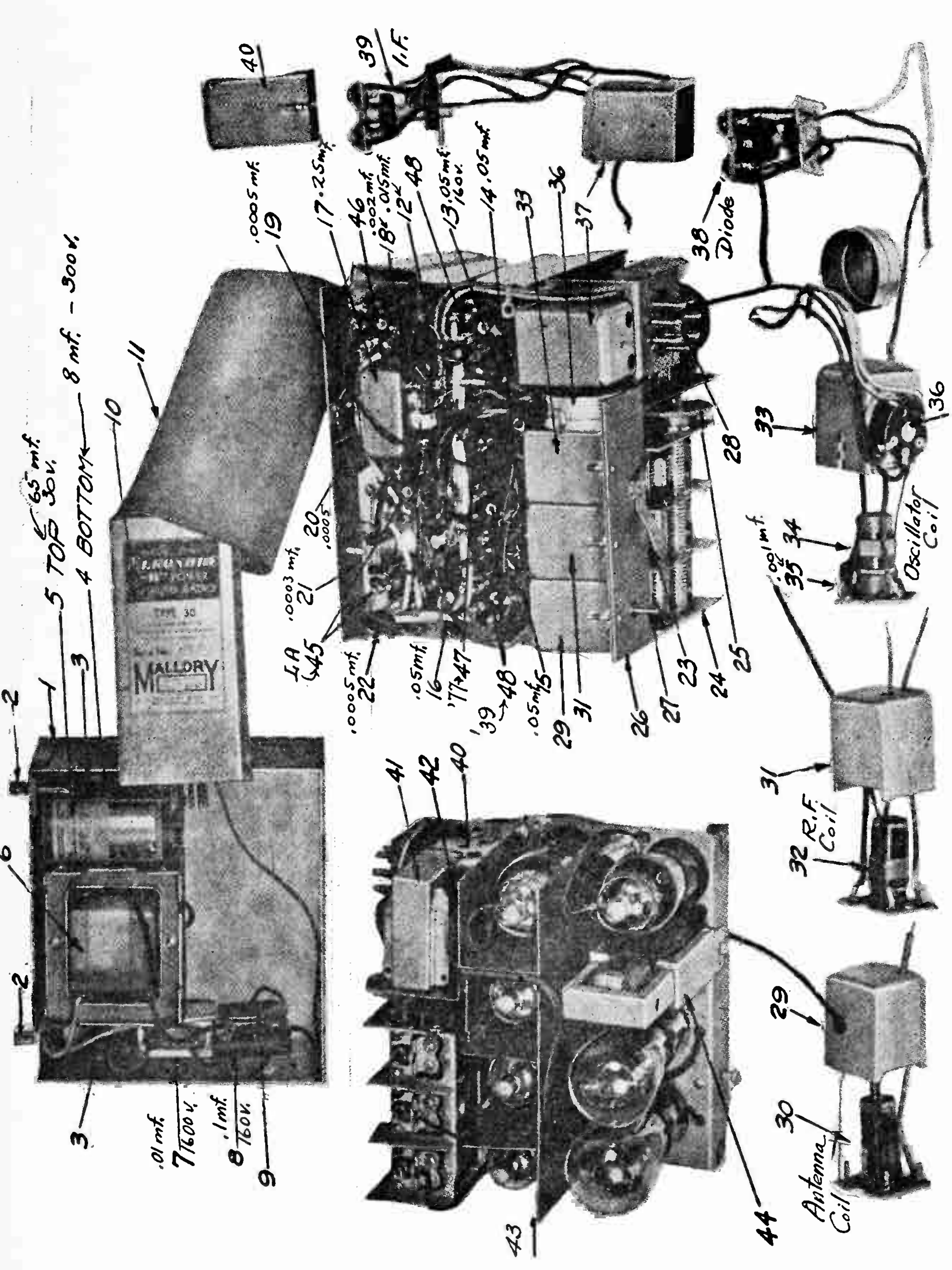
GALVIN MFG. CO.

MODEL 77A
Schematic
Series B



MODEL 77
Chassis Views

GALVIN MFG. CO.



GALVIN MFG. CO.

MODEL 77
Notes

SERVICING "77"

In servicing the Model 77 use of the service extension cable is highly recommended and its convenience either in the car or on a bench is clearly illustrated in Photograph Extension Cable Test, Figure 8, Page 17.

(While photograph shows the Model "44" the same method and instrument apply to the "77") you will note the extension cable plugged into the housing and a test oscillator applied to the grid of the "77" autodyne. The output meter has been connected across the voice coil, one connection at the voice coil, the other connection at the output meter to ground and the output meter set on the one volt scale. This method should be satisfactory in the Model "77" if the percentage of modulation of your local test oscillator is at least 30%, but in case in trying to align the I.F.'s in accordance with information given on Page 9, you find that you are not able to reach satisfactory resonance point with the I.F.'s, then a sensitive D.C. instrument such as a microammeter or not greater than a 0 to 1 milliammeter will have to be placed from terminal No.6 on the chassis plug to ground. This places the meter across the diode network, reading the actual R.F. component in the diode circuit. Then with that combination pronounced peaks can be very easily noticed, provided the I.F. transformers are in proper condition. After the I.F.'s have been properly aligned the procedure, as outlined on Page 9, should be carried out to conclusion. For those servicemen equipped with standard signal generators, the A.V.C. curve of this radio should begin flattening out at 10 microvolts and be on a complete flat portion of the curve at 30 to 40 microvolts and should remain absolutely flat from thereon out to 1 volt.

"77" "B" POWER SUPPLY

Model "77" uses a self-rectifying Elkonode which eliminates the rectifier tube used in former Motorola all-electric models. The yellow "A" lead of the "77" may be connected to any point on the electrical system of the car....ammeter, starter button or battery.

It is necessary to maintain a definite polarity at the Elkonode. For this purpose a polarity changing switch has been provided at the rear of the set housing. The polarity is indicated through a small hold at the lower right rear corner of the set housing. If a red disc appears in the window which reads plus (+) ground, it means that the "B" supply unit is set to be used in cars having the positive side of the battery grounded. If a black disc appears which reads minus (-) ground, it means that the "B" supply unit is set to be used in cars having the negative side of battery grounded. Be sure to determine exactly which side of the car battery is grounded. Then be sure that the marking on the indicator corresponds with it. To change the polarity proceed as follows:

(1) Remove "B" supply unit by prying with screw driver in the slots provided on either side of the "B" power unit.

(2) After removal of the "B" power unit you will observe two receptacles on the rear partition - one on the left and one on the right. The one on the left side requires no adjustments but the one on the right side may be moved up or down in its slot.

(3) Insert a small shank screw driver or ice pick in one of the jacks of this receptacle and adjust up or down for desired indication in window.

(4) Replace "B" power supply.

MAKES OF CARS HAVING "POSITIVE" GROUND - Marmon - De Soto - Cadillac - Pierce-Arrow - Dodge - Packard - Graham - Plymouth - Studebaker - Auburn - Hupp. - Franklin - Rockne - Ford - Chrysler - Nash Twin Ignition.

MAKES OF CARS HAVING "NEGATIVE" GROUND - Reo - Chevrolet - Stutz - Willys-Overland - James Cunningham - Lincoln - Continental - Buick - Oldsmobile - Pontiac - Hudson - Essex - Nash Single Ignition.

For any cars not listed phone earest car distributor or dealer.

Access may be gained to the interior of power supply for service by removing the round head screws which hold the bottom cover plate and remove this plate.

It will be noted that the connections to the Elkonode are made by means of a floating socket and to replace, it is only necessary to pull the Elkonode out of the socket.

CAUTION: When replacing Elkonode make sure that it lies with the label either down or up, but not on the sides. This is extremely important for if placed on the side the vibrating reeds will pull against gravity and their life will be shortened.

REMOVAL OF "77" PARTS FOR REPLACEMENT

Almost all the parts of the chassis assembly, "B" power assembly and outer housing assembly may be removed for replacement without disturbing any other units. There are several, however, which cannot be removed individually. Therefore, to remove the antenna coil, the second R.F. coil or the oscillator coil, it will be necessary to remove the tubes from the chassis and remove the tube shield which is held in place by two sheet metal screws. The screws holding the coil cans may now be reached and removed.

To remove the I.F. transformer it will be necessary to remove the transformer mounting bracket to which the I.F. unit is attached.

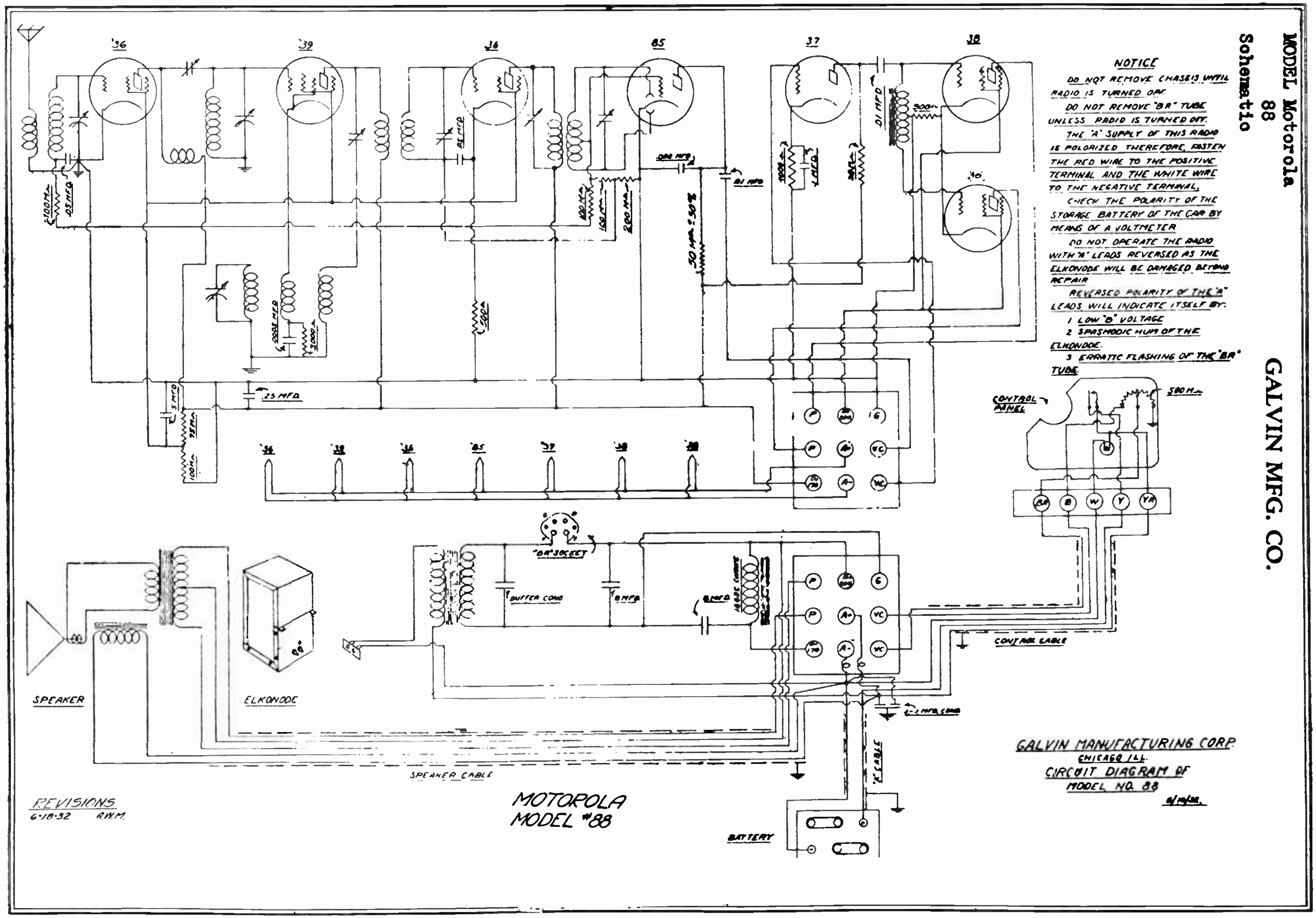
To remove the diode feeder, loosen the transformer mounting bracket and it can be moved sufficiently to get at the screws holding the diode feeder unit. To remove volume control unit (located in the rear of the set housing) remove screws holding worm gear bracket and volume control bracket. Disconnect all leads to the switch and volume control. The volume control assembly may now be removed and replaced with a new unit, care being taken in reassembling.

All by-pass condensers except the R.F. plate by-pass are of the tubular type and are set in thimbles in the chassis. Should any one prove defective it may be pushed out and replaced.

On Models "44" and "77" if complaints are made of noisy reception over bumpy road and tapping each tube does not disclose a bad tube, pounding chassis does not show a defective solder joint, tapping roof antenna does not show a vibrating ground, plugs are clean and making good contact, check the condition of ground of variable condenser to chassis. On Model "77" there should be a wire grounding variable condenser to chassis wiper Figure 5. On Model "44" clean off wiper spring to insure its making good ground. Then by placing a screw driver through the antenna trimmer hole check the back-lash in worm gear, driving variable condenser. It frequently occurs when chassis has been exchanged in housing, that the new chassis has not had proper backlash adjustment. This allows the variable to jump off station on bumpy roads and chatter.

MODEL Motorola 88 Schematic

GALVIN MFG. CO.



GALVIN MFG. CO.

MOTOROLA 88

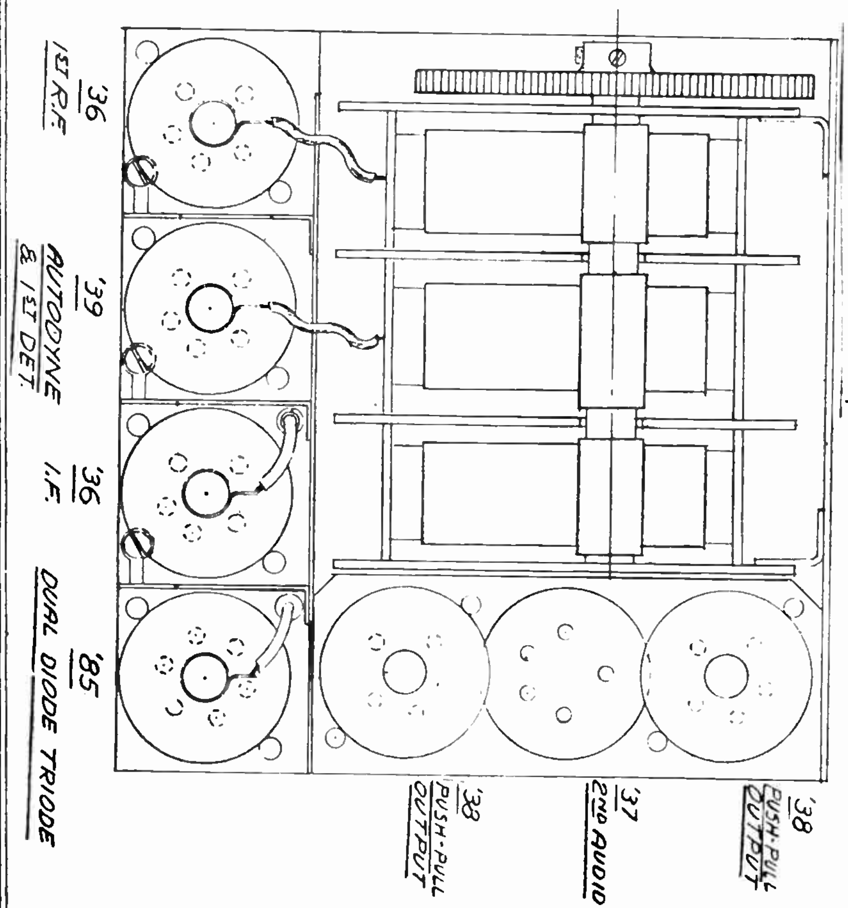


TABLE No 2

	1st R.F.	MIXER	I.F.	DET.	2nd AUDIO	'38
I_P	2.5 MILS.	2 MILS.	2.5 MILS.	1.8 MILS.	.7 MILS.	8.5 MILS.
E_P	*180 V.	*180 V.	*180 V	*30 V.	*38 V.	*200 V.
E_G	0	6 V	1 V.	0	2 V.	20 V.
E_S	*60 V.	*60 V	*60 V			*200 V.
I_S	.7 MILS.	.3 MILS.	.3 MILS.			2 MILS
NO SIGNAL I CATHODE	3.4 MILS.	1.8 MILS.	2.8 MILS.			10.5 MILS
100 M. M.V. I CATHODE	0	2.3 MILS	.6 MILS			11.4 MILS.
E_F	5.8 V	5.8 V	5.8 V	5.8 V.	5.8 V.	5.8 V

TOTAL CURRENT OF SET 31.8 MILS. AT 185 V. 'B' MAX.

'A' BATTERY VOLTAGE - 6.5 VOLTS AT BATTERY TERMINALS
'A' " " 5.8 " " 1st R.F. TUBE.

* APPROX. VOLTAGES

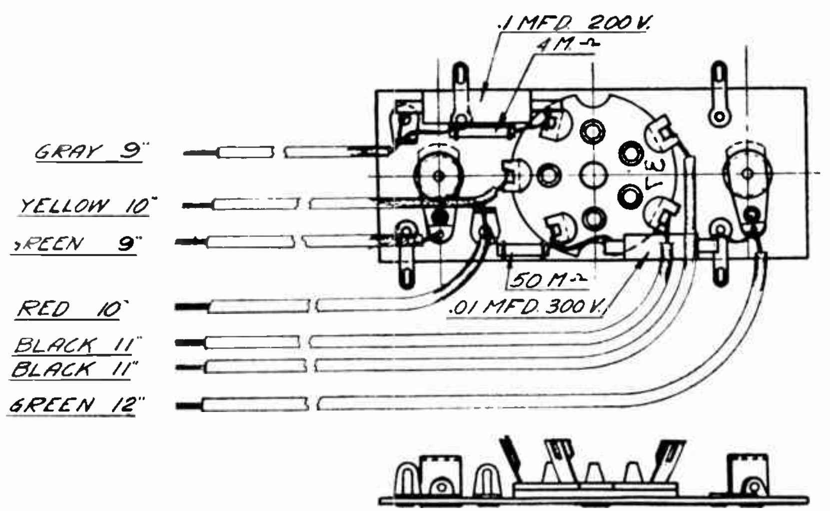


FIGURE 19

Figure (19) - shows the resistance audio coupling device that is used in the inverted socket which is a coupling medium that occurs between the 2nd audio and the push-pull stage.

MODEL Motorola
38
Service Notes

GALVIN MFG. CO.

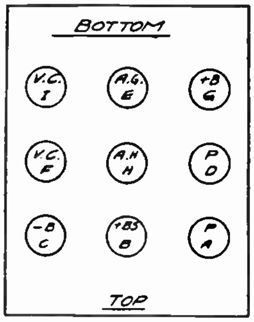
INSTRUCTIONS
USE THE TEST CIRCUIT NOTED BY THE FOLLOWING MARKERS: + LOW RESISTANCE
* HIGH RESISTANCE
• MEGOHM TEST
TEST CIRCUITS GIVEN ON RIGHT HAND SIDE OF THIS SHEET

SOCKET #3

TEST	FROM	TO	READ
•	S3	G(+B)	75MΩ
+	P3	G(+B)	40Ω
•	G3	G4	100MΩ
*	K3	C(-B)	500Ω
+	AG-3	E(AG)	0
+	AH-3	H(AH)	0

SOCKET #6

TEST	FROM	TO	READ
•	P6	G(+B)	50MΩ
+	G6	I(VC)	0
*	K6	C(-B)	4MΩ
+	AG-6	E(AG)	0
+	AH-6	H(AH)	0



SOCKET #1

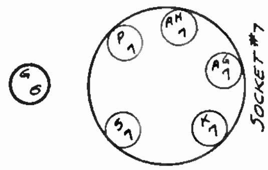
TEST	FROM	TO	READ
•	S1	G(+B)	75MΩ
+	P1	G(+B)	30Ω
•	G1	G4	200MΩ
+	K1	C(-B)	0
+	AG-1	E(AG)	0
+	AH-1	H(AH)	0

SOCKET #4

TEST	FROM	TO	READ
•	P4	G(+B)	100MΩ
•	G4	C(-B)	300MΩ
+	K4	C(-B)	0
+	AG4	E(AG)	0
+	AH4	H(AH)	0
+	C4a	G4	20Ω
+	C4b	G4	20Ω

SOCKET #7

TEST	FROM	TO	READ
+	S7	B(+BS)	0
+	P7	D(P)	0
*	G7	C(-B)	3MΩ
*	K7	C(-B)	900Ω
+	AG-7	E(AG)	0
+	AH-7	H(AH)	0



SOCKET #2

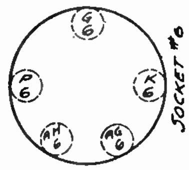
TEST	FROM	TO	READ
•	S2	G(+B)	75MΩ
+	P2	G(+B)	40Ω
+	G2	C(-B)	5Ω
*	K2	C(-B)	5MΩ
+	AG-2	E(AG)	0
+	AH-2	H(AH)	0

SOCKET #5

TEST	FROM	TO	READ
+	S5	B(+BS)	0
+	P5	D(P)	0
*	G5	C(-B)	3MΩ
*	K5	C(-B)	900Ω
+	AG5	E(AG)	0
+	AH5	H(AH)	0

ANT

TEST	FROM	TO	READ
+	ANT	C(-B)	5Ω

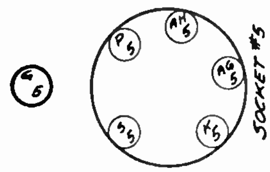


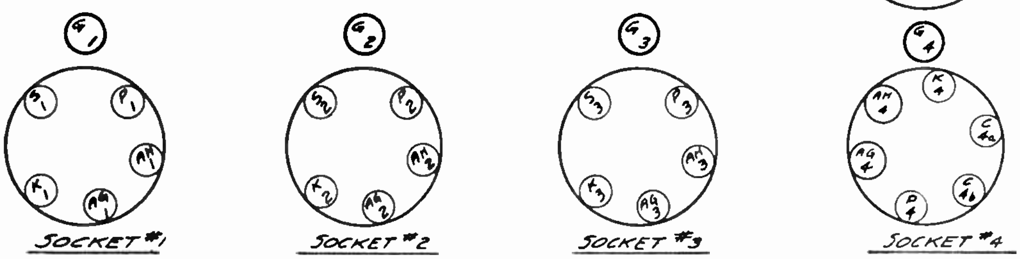
BACK PLUG

TEST	FROM	TO	READ
+	A (P)	C(-B)	OPEN
+	B (+BS)	C(-B)	"
+	C (-B)	G(+B)	"
+	D (P)	C(-B)	"
+	H (AH)	C(-B)	"
+	F (VC)	C(-B)	"
•	G (+B)	C(-B)	175MΩ
+	E (AG)	C(-B)	OPEN
+	I (VC)	C(-B)	"

MOTOROLA

88



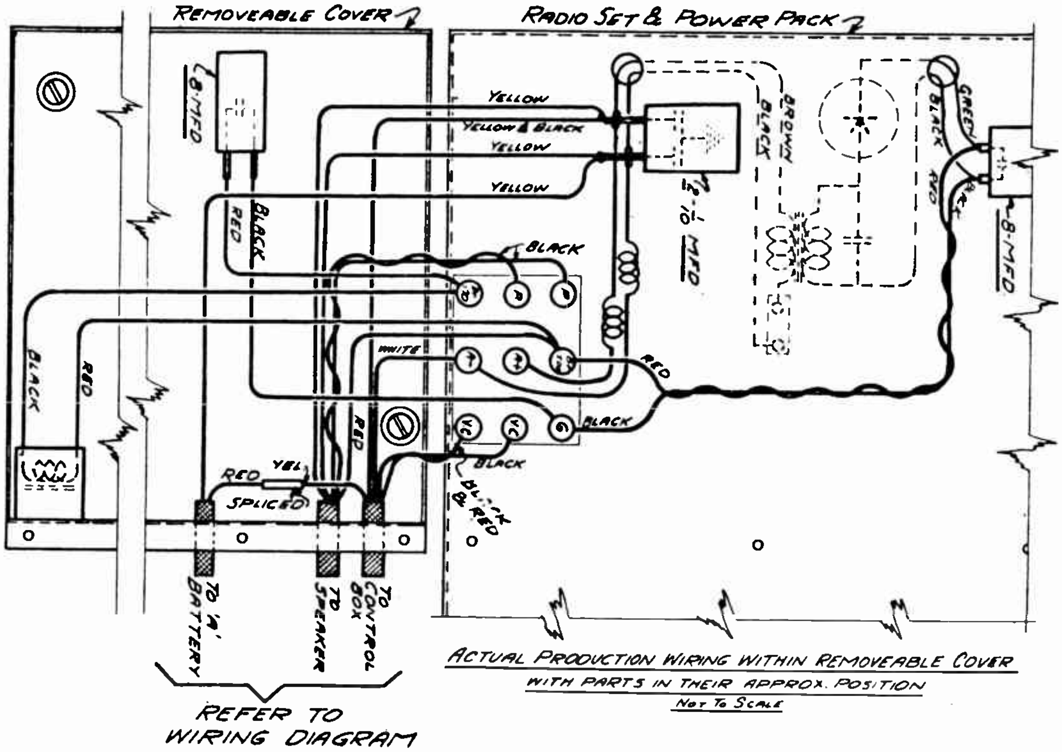


Ordinary AVC sets with normal tube hiss or noise level deliver sufficient bias to the tubes to prevent excessive plate current drain. The fourth tube, being second detector, is interchangeable with the 6 prong automotive type Wunderlich tube, Sylvania's 69 or 85 tube, or any other make of Dual Diode Triode. When the Wunderlich tube is interchanged with the 85 the grid clip which is normally connected on the top of the 85 tube can be ignored by merely taping it up and tucking it behind the tube, so that it will not become grounded. There is no substitution for the 5th tube, it being 37 second audio tube. The 6th and 7th tubes, or the 38 output tubes will be found to work best if the oval plate type of ER 38 is used, although any other type of 38 tube may be substituted.

* "Static bias is defined as self-biasing of the tube when there is no signal being imposed into the radio set, the radio being in a static condition."

MODEL Motorola 88 Service Notes

GALVIN MFG. CO.



ACTUAL PRODUCTION WIRING WITHIN REMOVEABLE COVER
WITH PARTS IN THEIR APPROX. POSITION
NOT TO SCALE

Inverted Tube Socket - - - If the inverted tube socket and its associated wiring becomes defective, and it is required to replace it, it is only necessary to remove the set from the housing and unsolder the two green wires from the dummy lugs located in the tube laying on the right hand side of the chassis - also remove the two volume control wires whose position under the terminal post is shown in Figure (15) the "B" plus wire, heater and ground, leading in the cable assembly, and when all of these wires are disconnected the entire cabling may be removed, or it may be replaced by a new one, or the old one repaired, which is wired as shown in Figure (19).

Removal of Diode Unit - - - If after thoroughly checking continuity of the diode unit it is found defective, it is only necessary to disconnect the four wires on each terminal, and the 5th wire coming out of the hole in the center of the unit. After the removal of these wires, the two nuts that hold the terminal strip should be removed, and the entire unit can be pulled out.

If the I.F. unit is found defective, the four wires should be removed from the terminals of the unit and the 5th wire coming out of the center should be removed from the by-pass condenser terminal. The two screws holding the terminal strip in place should be removed. The unit is then ready to be pulled out after the oscillator section has been removed as described below.

Removal of Oscillator Coil - - - The oscillator coil as shown in Figure (18) is located in the lower left hand corner of the chassis, and to remove it the tube shield should be removed by removing the three sheet metal screws holding the bottom of the tube shield in place and the two 6/32 nuts holding the back of the tube shield. It may then be lifted out of place, which allows the stator connection of the third variable condenser to be unsoldered. Also remove the black #20 wire that is soldered to the wiper of this same section. After removal of these two wires solder an additional 8" or 10" of wire on to each of these wires. This will act as a pull wire. Then remove the two hex-head screws located in the lower left hand face of the chassis which will release the coil and it may be removed and pulled out. After it has been removed, unsolder the two pull wires that were originally soldered on to the leads, removed from the variable condenser. These will be very important when you attempt to replace this unit, as it will put the wires back to the condenser in the same place they were removed. This pull wire will be very essential, because if the oscillator section is removed without placing this pull wire in place, you will find it necessary to remove all of the other coils in the radio in order to reassemble the oscillator grid and stator connections.

MODEL Motorola 88
Service Notes

GALVIN MFG. CO.

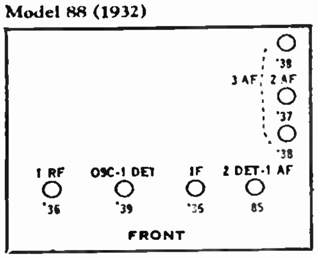
Removal of Antenna and Radio Frequency Coils - - - First remove the tube shield as previously described and unsolder all these stator connections on to the variable condenser. Remove the 160-tooth drive gear and remove the four hex-head sheet metal screws holding the variable condenser on to the brackets - then unhook the wipers from their position on the condenser and pull the condenser out, leaving the wipers soldered to the wires. This will allow complete access to the radio frequency and antenna coils.

Removal of Power Pack - - - Should the power pack become defective, it can be removed as a unit. It will be necessary to remove the housing from the car, or remove it from the bulkhead. Unscrew all of the screws holding the back cover plate in place tipping this back cover aside being careful not to pull any leads loose while working about it It will be found very convenient to use the middle mounting screw on the bottom which will align with the middle mounting screw of the back cover and by fastening those two points together the lid will be held in an out of the way position. All leads are amply long to allow it to rest in that position. Unsolder the brown and black #14 wires connecting the transformer to by-pass condenser, also unsolder the red (or green) and black wire leading to the 8 mfd. filter condenser. There will be no further wires necessary to unsolder. Remove the two screws holding the top of the transformer case located near these two red (or green) and black wires mentioned. Remove one screw holding the second side of the transformer case located on the right side of the outer housing, also the four screws, two holding the Elkonode and two holding the transformer located on the bottom of the outer housing. This will allow the Elkonode and the BR tube and transformer all to be pulled from the chassis as a unit. After it is removed, it can be tested by applying 6 volts to the large terminals with positive polarity to the brown wire and applying a 5000-ohm resistor across the red (or green) and black wires, an 8 mfd. electrolytic condenser and a voltmeter. With this setup the Elkonode unit should consume not more than 2.25 amperes and the voltage drop across the 5000-ohm load should be between 160 to 170 volts, provided the battery voltage is on exactly 6.3 volts.

It is not recommended by us that any repairs to the Elkonode be attempted by the service stations. All defective Elkonodes should be returned to the factory or the manufacturers of the Elkonode as indicated by the label on same.

Open Buffer Condenser - - - This condenser shown as being applied directly across the secondary of the power transformer will be indicated by the failure of the BR tube to stay ionized. Ionization is the bluish-red glow always characteristic of Raytheon Rectifier tubes, while a shorted .05 condenser will be indicated by a spasmodic operation of the Elkonode, as well as failure of the BR tube to glow. As a general rule in all power packs when spasmodic operation of the Elkonode is observed, it is always an indication that the Elkonode is not feeding into the proper load. It is either unloaded or overloaded, and it is very hazardous if the Elkonode is allowed to operate in either one of the two conditions for any period of time.

Model 88 (1932)



shows the tube layout and the sequence of tubes, reading from left to right as follows: 1st - 36 type used as 1st radio frequency, 2nd - 39 type used as an autodyne and 1st detector, 3rd - 36 type used as an I.F. stage, 4th - 85 type used as a Dual Diode Triode, meaning it is serving two purposes - that of the Dual Diode and a Triode, or three element 1st audio tube, 5th - 38 tube used as one of the output tubes operating as class "A" amplifier, 6th - 37 2nd audio tube, 38 - as the second of the push-pull output tube. The 36 and 39 tubes may be interchanged with each other, or all 36, or all 39 tubes can be used with the following expectations, when different type numbers are exchanged. It is recommended that a 36 be left in the 1st R.F. where it does not have a *static bias, and if left disconnected from antenna over a very long period of time very short life can be expected of the 39 when used in that position and no increase in sensitivity will be noticed. Substitution of the 36 in the autodyne socket will result in a 5% decrease in sensitivity and a corresponding decrease in oscillator hiss. Substitution of the 39 in the I.F. stage is suggested when an increase in sensitivity is desired. It is perfectly safe to use a 39 in the I.F. stage as it is statically biased.

GALVIN MFG. CO.

Antenna Data

ANTENNAS

There are various ways to obtain energy or antenna signals. Different makes and types of cars have various conditions and each must be coped with individually. Experience has shown that the roof antenna, if properly installed, is the most satisfactory.

The most satisfactory roof antenna is a piece of copper or galvanized screen, approximately 3 feet square installed between the head-lining and roof of the car. This is done by dropping the headlining back for a distance of one yard or more and tacking the screen to the ribs. The screen should not come closer than 8 inches to the metal on top at the front of the car and to within 4 inches of the metal on the sides of the top.

If after dropping the headlining it is discovered that chicken wire is used in the construction of the top, it will not be satisfactory to install the screen as described in the above paragraph. Instead check the chicken wire with a continuity meter to see if it is grounded. If it is not, a lead may be attached and the chicken wire used as an aerial. If it proves to be grounded it must be freed in the manner described in a later paragraph on "Roof Antenna in Model A Fords".

The following automobile manufacturers announce roof antenna in various 1932 models:

TYPE AUTOMOBILE	YEAR MODEL	REMARKS
Chrysler	1932	Roof antenna with lead-in and provisions for "B" Battery Box.
Dodge	1932	Roof antenna with lead-in and provisions for "B" Battery Box.
DeSoto	1932	Roof antenna with lead-in and provisions for "B" Battery Box.
Plymouth	1932	Roof antenna with lead-in and provisions for "B" Battery Box.
Reo	1932	Equipped with roof antenna and lead-in.
Rockne	1932	Equipped with roof antenna and lead-in.
Studebaker	1932	Equipped with roof antenna and lead-in.
Buick	All Models	$6.00 additional for antenna installation.
Franklin	1932	Roof antenna, no lead-in.
Cunningham	All Models	Additional charge for antenna installation.
Ford	1932	Roof antenna,but no lead-in.

1933 Cars Equipped With

Overhead Aerials

Buick.	33-50	Cadillac	V-12
Buick.	33-60	Cadillac	V-16
Buick.	33-80		
Buick.	33-90	Chevrolet. . . .	....
Cadillac	V-8	Chrysler	6
Chrysler	Royal 8	Oldsmobile . . .	8
Chrysler	Imp. 8		
Chrysler	Imp. Cust. 8	Pierce Arrow . .	836
		Pierce Arrow . .	1236
DeSoto	6	Pierce Arrow . .	1242
		Pierce Arrow . .	1246
Dodge.	6		
Dodge.	8	Plymouth	6
Hupmobile. . . .	321	Pontiac.	8
Hupmobile. . . .	322		
Hupmobile. . . .	326	Reo, Royal . . .	....
LaSalle.	....	Rockne	6
Lincoln.	V-8	Studebaker . . .	6
Lincoln.	V-12	Studebaker . . .	Comm. 8
		Studebaker . . .	Pres. 8
Nash	6		
Nash	Std. 8	Studebaker . . .	Spd.Pres. 8
Nash	Spec. 8		
Nash	Adv. 8		
Nash	Amb. 8	Willys	99

CHECK THE ANTENNA

The antennas that are installed by the manufacturers will need to be checked very thoroughly. It can be easily checked by simply trying to peak the antenna stage. If you are unable to reach a peak on the antenna assembly you have either a bad, leaky antenna, or one with too great capacity.

After the set is installed ready for operation, it may be necessary to balance the set with the antenna. This is done by adjustment of the first antenna trimmer. Openings for this adjustment are provided for in the various models.

In making this adjustment be absolutely sure you have properly tuned in a very weak station around 20 or 30 on the dial, adjust the trimmer in and out with a screw driver until the point of maximum volume is reached.

Check for grounded antenna by means of a very sensitive voltmeter, such as 200 volt, 1000 ohm per volt voltmeter placed in series with 200 volts of "B" battery, touching one end of the meter to the antenna and the other end of the batteries to the chassis of the car. With this sensitive meter and this high voltage, you should not get over a 2-volt deflection on the meter, even on a damp day. If you do get over a 2-volt deflection it indicates the antenna is either fully or partially grounded, depending on reading. If a reading is obtained it will be necessary to remove the headlining and cut a strip three or four inches wide out of the screen wire or around its edge, thereby insulating and isolating it from the frame of the car. If a dome light is installed in the car, a circle should be cut out of the screen so it will not be near the dome light.

An effective area of this screen need not be greater than 9 square feet. Bearing this in mind, you will find it necessary to take the headlining down all the way back. Generally to the second rib is sufficient. If, after freeing the screen from the end supports, it is detected that there is a chance of the screen shifting, tacking the screen to one of the ribs will hold it in place.

The lead-in for any of the above type of installations, must be given consideration and it should be brought down on the same side of the car where the Radio is mounted and down the front corner post, either right or left, depending of course on the position of the Radio. On many cars, you will find the windlass is composed of a hollow rubber tube and makes a very nice housing for the lead-in wire and having a distinct electrical advantage insofar as it keeps the wire away from the metal of the car, maintaining the capacity of the lead-in very low.

PLATE ANTENNA

If it is desired, a plate antenna may be used. The plate consists of a piece of metal, approximately 2½ square feet in area, rigidly held to the car and the closer to the ground this is placed, the greater efficiency within of course practical limits. It may be placed under the running boards or fastened to the channel frame. These plates may be obtained from Galvin Manufacturing Corporation on special order, and are fastened by means of clamps to the frame of the car, no drilling being necessary.

In the use of a plate or under-car aerial, some additional shielding may be needed on the antenna lead. If the unshielded portion of the antenna lead is over one foot in length a piece of loom, similar to that used on the shielded part of the lead, should be used to keep the shielding from coming too close to the antenna lead wire. Enough of this loom should be slipped over the wire to reach within about four inches of where the lead attaches to the aerial proper. Braided sheathing is then slipped over this loom, and joined to the shielding of the shielded lead from the set so as to make a continuous shielded lead from the set to within about four inches of aerial proper. The end of shield nearest the aerial should then be grounded to frame of car.

UNDER-CAR ANTENNA

The under-Car antenna consists of a wire fastened from the lower point on the right hand side of the rear axle to the lowest point under the motor, then back to the lowest point on the left hand side of the rear axle, thus forming a "V". At the vertex of the "V" a heavy coil spring should be attached to keep up slack, the spring being insulated from the motor, as well as the other two ends of the wire. The lead-in, of course, is fastened at the vertex.

ROOF ANTENNA ON MODEL "A" FORDS

In the application of the roof antenna on the Model "A" 1930 Fords, when the top is dropped you will notice that No. 2 rib is a steel rib, and it will be necessary in order to get full effect from the antenna. that the screen be cut clear of this steel rib

Motorola
Alignment
General Data

GALVIN MFG. CO.

TESTING PRACTICE

The success of a Superheterodyne rests, to a large extent, on the proper choice and use of an intermediate frequency unit. The frequency to which they are aligned, of course, is determined by the mechanical design of the variable condenser. The plates of the variable condenser used in our design are laid out mechanically to produce a frequency differential of 175 kilocycles, or 456 kilocycles, depending upon model, and if the setting of the oscillator trimmer with respect to the radio frequency trimmer has been disturbed it will be necessary to realign. The realignment is accomplished by the use of an oscillator. The circuit diagram of the oscillator is shown on the left hand side of Figure F with its proper application to a Motorola.

In case an oscillator set-up similar to Figure F, is used, some means of reading the output of this oscillator must be provided. The oscillator may be modulated by inserting a bell ringing transformer at point "X" or the "B"

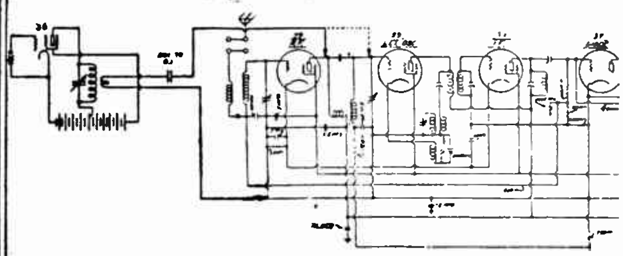


FIGURE F

supply may be taken from the 110 A.C. lines. Since most oscillators furnished with service kits are modulated, the only problem is that of reading the output.

While the ear can be used for some purposes, it is not dependable and when there are so many output meters on the market it is folly to use the ear for any kind of service work except harmonic analysis. It is not recommended that intermediate frequency units be adjusted by the ear or by air test. The only safe and sure way is by means of the modulated oscillator fitted into either one of the two points shown in Figure F, depending, of course, upon the strength of the local oscillator and by reading the output with an output meter across the plate terminal of the speaker or voice coil

ALIGNMENT OF CUT PLATE VARIABLE CONDENSERS

The alignment of cut plate variable condensers, the type used in Motorola, differs from the alignment of the variable condenser with a padder, in that the cut plate condenser has a fixed mechanical ratio between the capacities of its sections. In the past it has been possible with padders to align the condenser with an accuracy of ten degrees of rotation of the condenser plates - that is, it could be set at the high frequency end with all trimmers in alignment and then could be re-aligned at the low frequency end by rocking the condenser while adjusting the padder, thereby finding the point of proper alignment. This procedure cannot be used with a cut plate condenser.

The simplest and easiest way to align a cut plate condenser is as follows: Use a standard test service oscillator and output meter. Connect a 200 mfd. condenser in series with the antenna lead of the oscillator and connect to the antenna of the radio set. CAUTION: Before proceeding be sure that the I. F. transformers have been tuned to exactly I. F. frequency. This is absolutely necessary otherwise the proper alignment of the variable condensers can never be attained. After assurance that the I. F.'s are in correct alignment, set the test oscillator to approximately 1400 kilocycles and apply this energy to the antenna post of the radio set. If this frequency is accurately known you can get approximately the correct starting position by setting the pointer on Model "77" to the indicated frequency. However, if it is not known it is not essential.

Align all three trimmers to 1400 kilocycles. Then move the variable condenser to approximately the 600 kilocycle position and check the alignment of the second radio frequency trimmer. If it is found that the trimmer must be moved either in or out to return to resonance it is an indication that the variable condenser is not at correct starting position for the initial setting of the test oscillator. If, for example, it is found that the trimmer must be screwed down, it is an indication that the radio frequency tuning condenser requires more capacity at the low frequency end. Therefore, return to the initial high frequency setting of the condenser. Change your test oscillator to correspond with this setting of the condenser. It is not necessary to return to the exact setting you originally had. Readjust the second radio frequency trimmer which was moved when it was in the low frequency position. This will restore it to its initial setting of the oscillator trimmer.

Remember the second radio frequency condenser needs more capacity at the low frequency end so it is necessary to move the condenser a few degrees inward, which gives more capacity to this condenser, leaving the test oscillator in the same position. Screw the oscillator trimmer until the signal is brought back, then go over all three trimmers to assure yourself that they are in perfect alignment. Move the variable condensers back to approximately 600 kilocycles and re-check the second radio frequency trimmer the second time, and if the condenser had been moved sufficiently while you were at the high frequency and the R.F. trimmer will show resonance. If it was moved too far it will be indicated by having to move the radio frequency trimmer out instead of having to tighten it, as was necessary in the first trial.

After having found the proper starting point so that the second R.F. and oscillator trimmers are in alignment, the antenna stage should fall in exact alignment with the second radio frequency condenser. If it does not it may be necessary to bend the end plate sections slightly in order to align it with the second R. F. tuning condenser.

In the above set-up caution should be taken to see that the points chosen in which to align the radio set are in channels that are not occupied by a local broadcast station. This often upsets the measurements and you find you are tuning to the heterodyne beat occurring between your local test oscillator and the local broadcast station. This, of course, will tend to give a double peak.

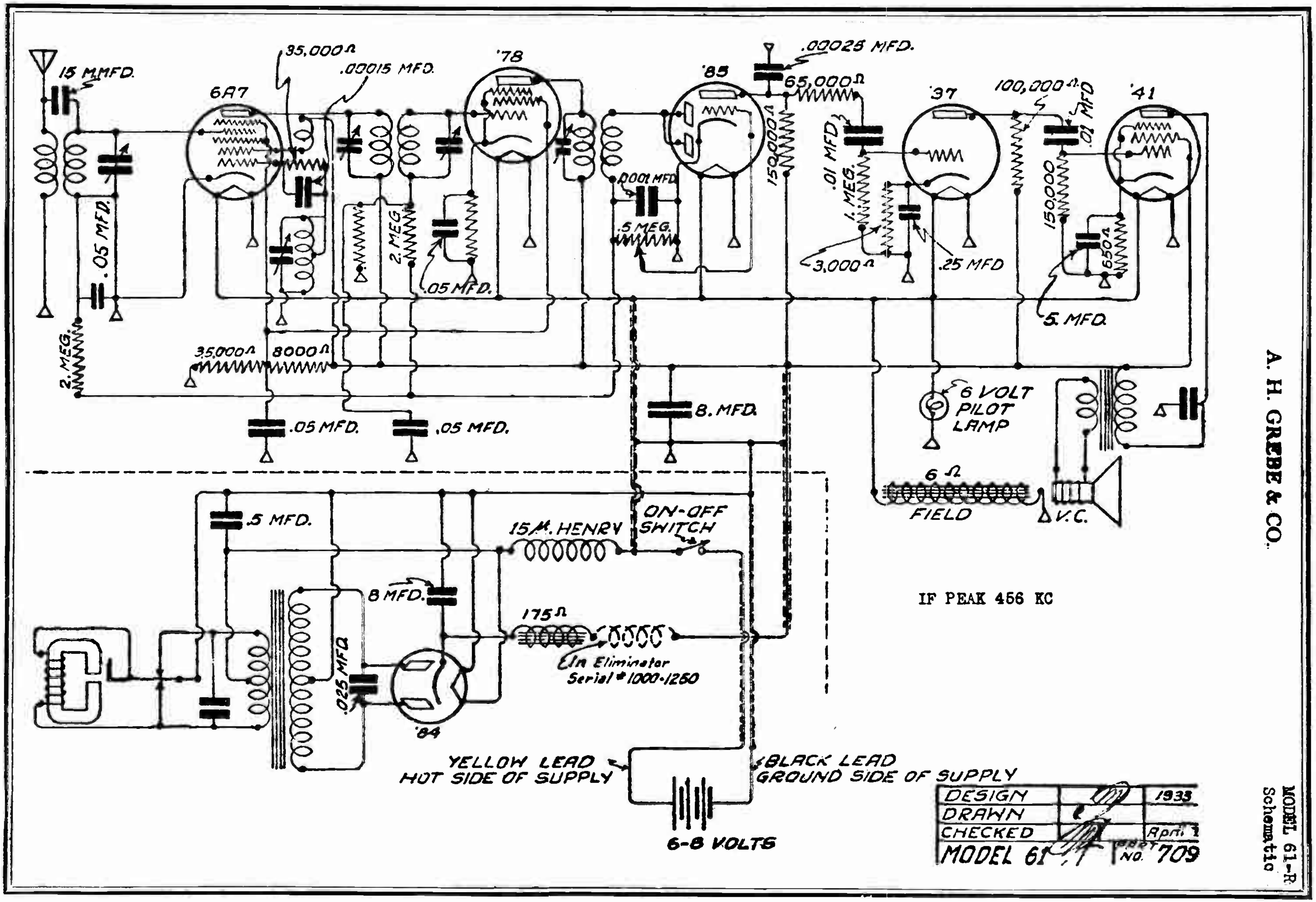
You realize the value of isolating the trouble in a radio before starting to repair it. If the tone quality is bad, the first thing to do is check the output tubes and read their plate currents so as to get a suitable match. If that checks O. K. the following suggestion might be helpful.

Examine the speaker for rubbing voice coil, this being a quite common occurrence in all automobile installations as the speaker in auto radios is exposed to a great deal more direct dust and mechanical vibrations than home set speakers and as a result speaker failures are a little more frequent in auto sets than in home sets. The examination for rubbing a voice coil requires a little practice and we suggest that you get the feel of the cone movement of a speaker known to be good and listen while moving to see if the voice coil is rubbing. Observe while testing this speaker known to be good how easily a voice coil can be made to rub by unequal pressure on the side of the cone. Therefore, while checking the speaker suspected to be bad, profit by the experience gained from the good speaker.

A rubbing voice coil sounds similar to two pieces of sand paper being very lightly rubbed together. If you are still in doubt the application of 50 volts 60 cycle across the two outside terminals of the output transformer, the two "B" terminals, will cause the speaker to pump sufficiently, and if the voice coil is rubbing, noise will emit from the speaker instead of a perfectly free hum.

If the speaker sounds satisfactory see if the hum is equal on both halves of the output transformer, and if the speaker passes the above test it is evidently not the cause of the trouble. A customary set analysis as to the bias readings, etc., should indicate the trouble.

All of the above tests can be simplified if the service man has a spare chassis known to be good or a spare speaker which can be substituted to quickly isolate the trouble.



15 MMFD.
6A7
35,000Ω
.00015 MFD.
'78
'85
.00025 MFD.
65,000Ω
'37
100,000Ω
'41
.01 MFD
.05 MFD.
2. MEG.
.05 MFD.
.001 MFD
.5 MEG.
150,000Ω
.01 MFD
1. MEG.
3,000Ω
.25 MFD
150,000
650Ω
5. MFD.
2. MEG.
35,000Ω
8000Ω
.05 MFD.
.05 MFD.
8. MFD.
6 VOLT
PILOT
LAMP
6 Ω
FIELD
V.C.
.5 MFD.
15 M. HENRY
ON-OFF
SWITCH
8 MFD.
175Ω
In Eliminator
Serial # 1000-1250
.025 MFD
'84
YELLOW LEAD
HOT SIDE OF SUPPLY
BLACK LEAD
GROUND SIDE OF SUPPLY
6-8 VOLTS
IF PEAK 456 KC
A. H. GREBE & CO.
DESIGN
DRAWN
CHECKED
1933
April
MODEL 61
NO. 709
MODEL 61-R
Schematic

MODEL 61-R
Socket Layout
Alignment Data
Vibrator Data

A. H. GREBE & CO.

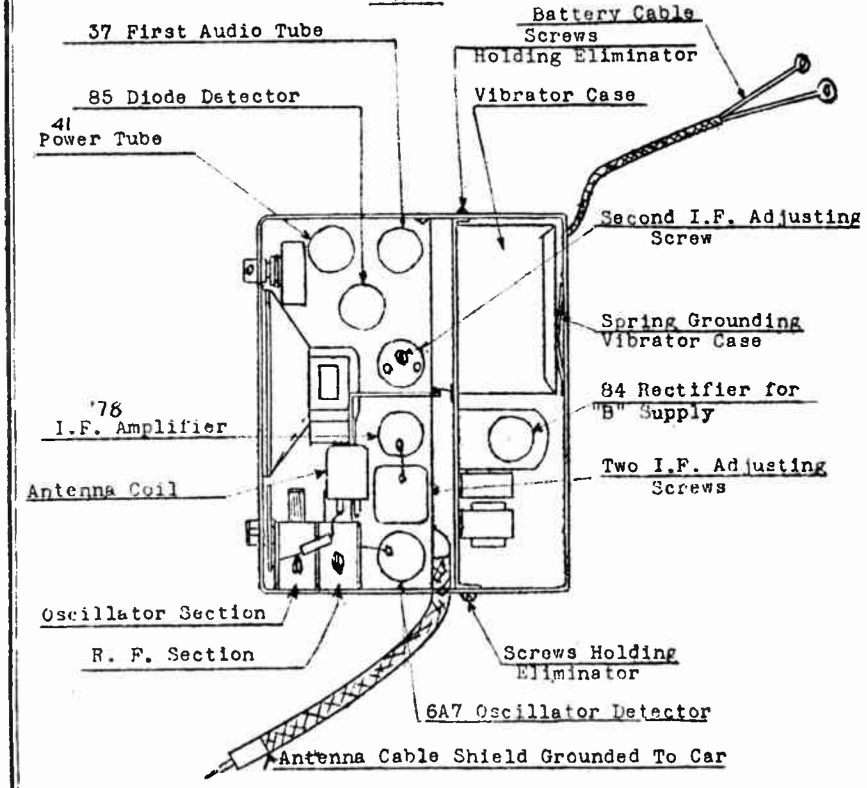
Next Page

RECEIVER ALIGNMENT To align the I.F. circuit, an oscillator supplying 456 K.C. should be connected to the control grid of the 6A7 and the variable condenser frame. The grid cap normally on the 6A7 should be removed. The oscillator section of the variable condenser should be short circuited. This may be done by putting a small clip on the terminal of the oscillator condenser trimmer and running a wire to ground. It is preferable to use an output meter for accurate work, which may be connected into circuit of the 41 by means of an adapter having leads brought out from plate and screen through a 5 mfd stopping condenser. See Fig. #4.

The volume control on the receiver should be turned to maximum and the three I.F. adjusting screws shown in Fig. #2 set to give maximum on the output meter. This operation may be performed with the receiver in the can if a pair of long nose pliers or offset screw driver is used.

For R.F. alignment, remove oscillator condenser short circuit, replace grid cap on 6A7 and connect oscillator covering broadcast range to antenna wire and its shield.

Fig. 2



VIBRATOR ADJUSTMENT To examine vibrator, remove "B" supply unit from can by unsoldering 3 leads. (see Fig.3) removing 6 screws at ends of unit Take cover off vibrator case and vibrator may be removed without unsoldering its lead wires. It will be seen that there are a top and a bottom set of contacts. The normal clearance on these contacts is .003" to .004" and this may be adjusted with screws provided.

Any dirt on contacts should be removed with pipe cleaner before adjustment. If top clearance is too great vibrator may operate but not close this circuit (operate half wave) and the voltage will be low. If bottom clearance is too great, vibrator will pull down but not vibrate. Too small a bottom clearance may short bottom contacts and cause inoperative vibrator and heavy current drain.

If both contact clearances are small, the vibrator will operate at a higher pitch and voltage, but sparking will occur.

Check of vibrator operation may be made by running three temporary jumpers from "B" supply unit outside can to the receiver, (See Fig.3) and operating the vibrator outside its case so it is visible. The tone should be low pitched, even and regular, and no appreciable sparking should occur. To remove vibrator for replacement purposes, unsolder the three vibrator wires at the terminals of the step up transformer and at the ground terminal near the tube. Leads should be left attached to vibrator.

If set is not available or is in doubtful condition a 4000 ohm load resistance of 5 watts or larger may be used from plus "B" to ground of eliminator in place of set. The 6-volt supply is applied to the two terminals at the vibrator end of "B" unit.

If gaps are okay, and sparking persists, check for dirty contacts or open condenser across primary of step-up transformer.

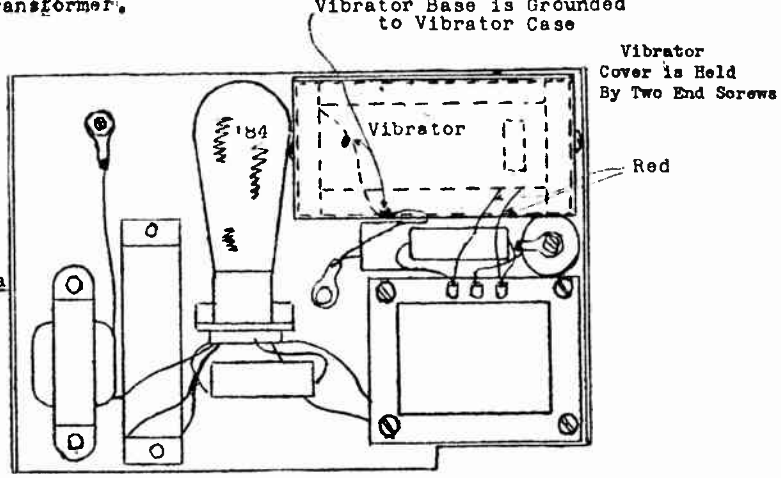
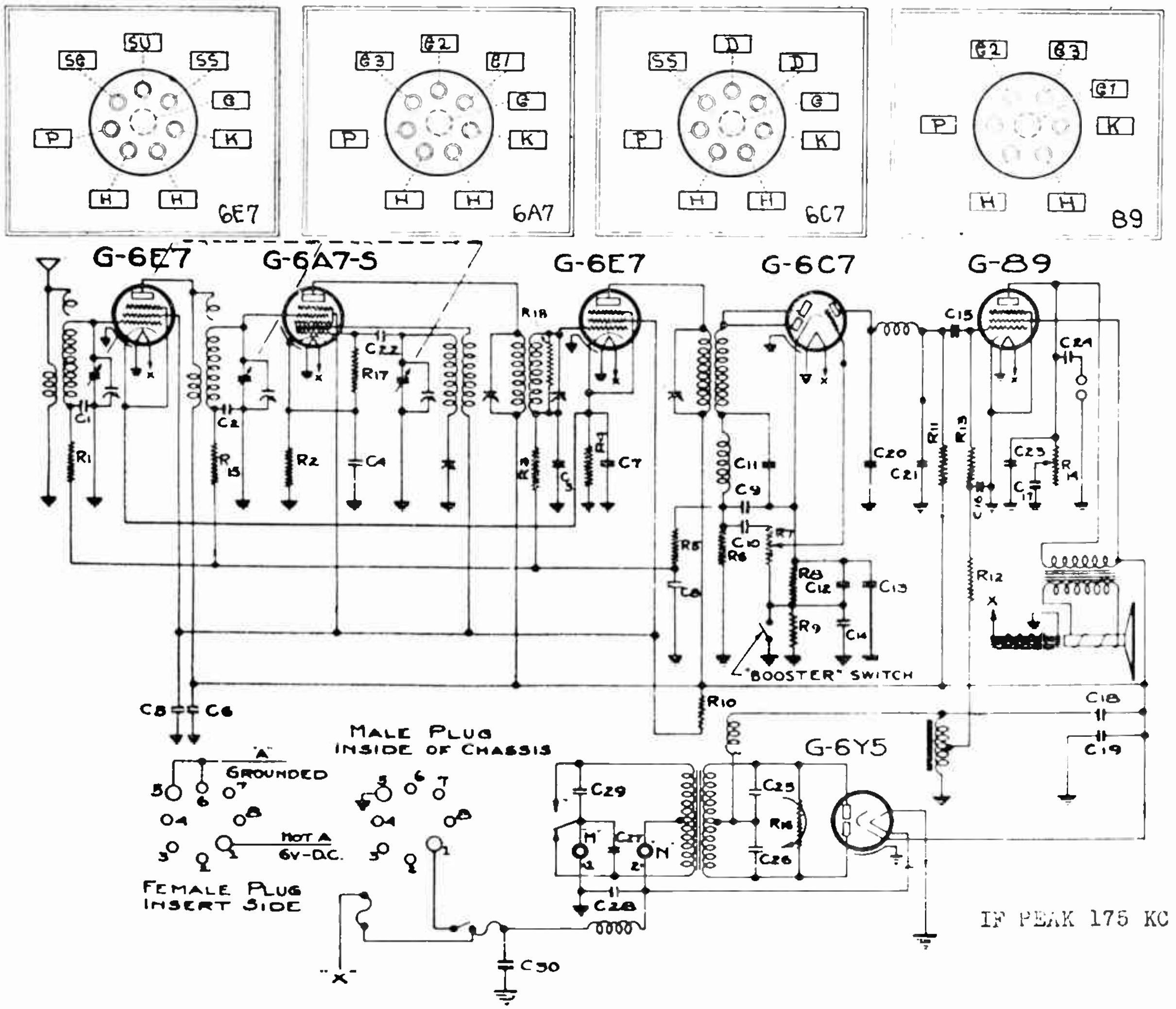


Fig 3a

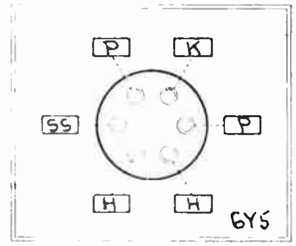


RESISTORS

R1	300,000	R10	10,000
R2	250	R11	200,000
R3	300,000	R12	250,000
R4	400	R13	250,000
R5	300,000	R14	50,000
R6	100,000	R15	300,000
R7	200,000	R16	500,000 GLOBAR
R8	2,500	R17	50,000
R9	10,000	R18	1,000,000

CONDENSERS

C1	.03	C16	.25
C2	.03	C17	.02
C3	.01	C18	8.0
C4	.1	C19	8.0
C5	.25	C20	.0005
C6	.25	C21	.0005
C7	.25	C22	.00025
C8	.03	C23	.005
C9	.0005	C24	.1
C10	.03	C25	.008
C11	.0005	C26	.008
C12	10.	C27	.1
C13	.25	C28	.5
C14	.25	C29	.1
C15	.03	C30	.5

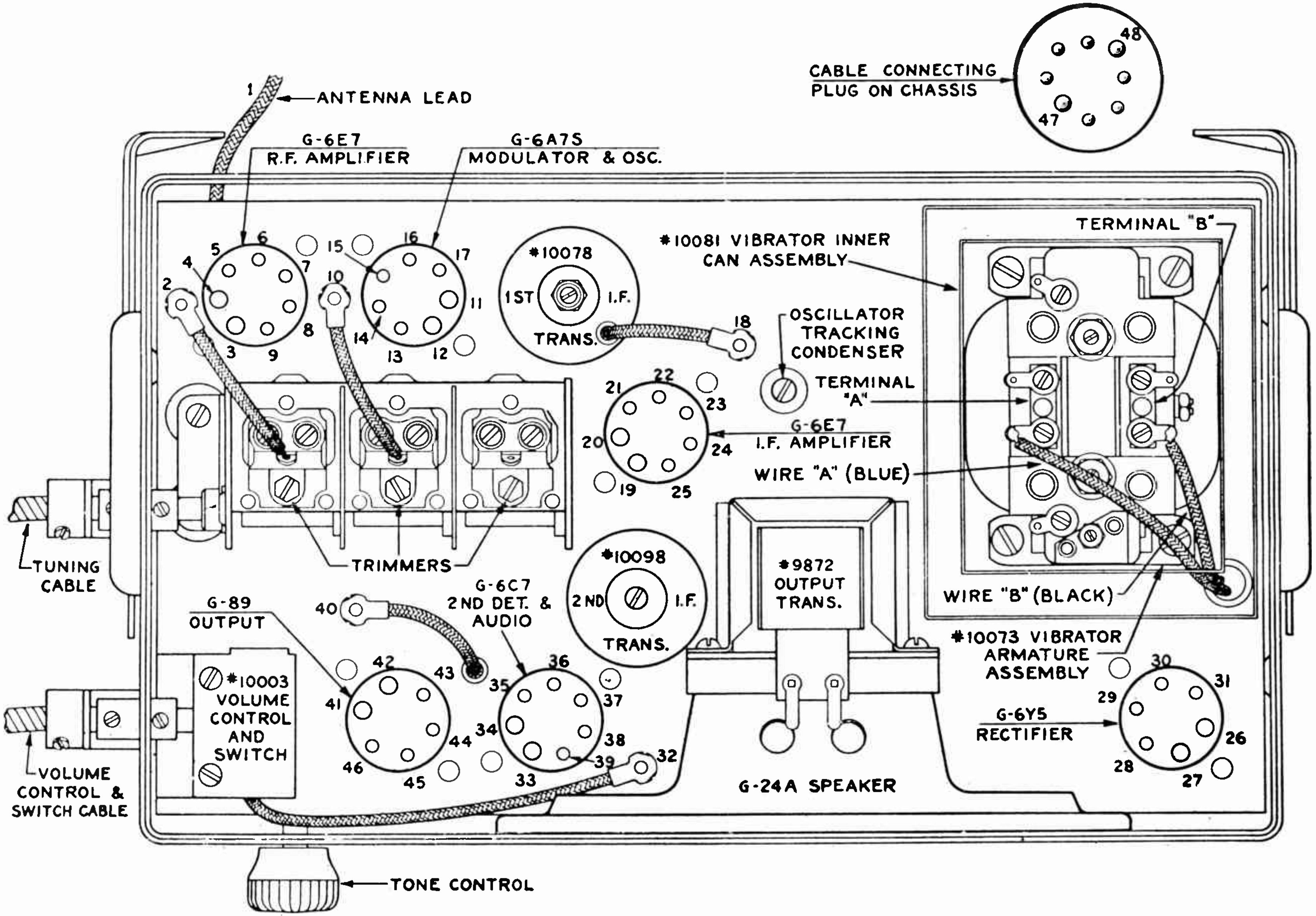


GRIGSBY - GRUNOW CO.

Deadwood Diag 6

MODEL 6C
Schematic

GRIGSBY-GRUNOW CO.



GRIGSBY - GRUNOW CO.

MODEL 66
Test Data

MODEL 66 RESISTANCE CHART

All readings are taken from designated points to ground except those marked with an asterisk (*) which are taken to terminal No. 29, with all tubes removed from their sockets, volume control turned to maximum clockwise position, and the speaker connected in the circuit

TERMINAL NUMBER	RESISTANCE IN OHMS	IF RESISTANCE DIFFERS GREATLY FROM VALUE SHOWN, CHECK THE FOLLOWING:
1	21	Primary of antenna coil
2	700,000	Secondary of antenna coil, R-1, C-1, R-5, C-8 and R-6
3	0	Ground connection
4	.135	Primary of vibrator trans., Field Coil, C-30, C-28, C-27 and C-29
5	400	R-4 and C-7
6	0	Ground connection
7	Same as #5	
* 8	10,000	R-10
9	112	Primary of R.F. transformer
10	700,000	Secondary of R.F. transformer, C-2 and R-15
11	Same as #4	
12	0	Ground connection
13	250	R-2 and C-4
14	50,250	R-17
*15	10,000	Secondary of oscillator coil and R-10
16	Same as #8	
*17	88	Primary of 1st I.F. transformer
18	700,000	Secondary of 1st I.F. transformer, C-3, and R-3
19	Same as #4	
20	0	Ground connection
21	Same as #5	
22	0	Ground connection
23	Same as #5	
24	Same as #8	
*25	165	Primary of 2nd I.F. transformer
26	Same as #4	
27	0	Ground connection
28	1250	Secondary of vibrator trans., C-26, C-25, R.F. buzzer choke, and "B" filter choke
29	0	C-18, C-19, C-5 and C-6
30	Same as #28	
31	0	Ground connection
32	210,000	C-10, R-7, R-9, C-14 and C-13
33	Same as #4	
34	0	Ground connection
35	12,500	R-8, R-9, C-12, C-13, C-14 and C-10
36	100,284	Secondary of 2nd I.F. trans., R.F.C., R-6, C-11, C-9 and C-10
37	Same as #36	
38	0	Ground connection
*39	200,035	C-20, C-21, R.F.C., C-15 and R-11
40	500,450	R-13, R-12, C-16 and "B" filter choke
41	Same as #4	
42	0	Ground connection
43	0	Ground connection
44	Same as #43	
*45	0	Connections
46	430	Primary of output transformer
47	0	Ground connection
48	Same as #4	

Due to manufacturing tolerances on carbon resistors, the values given above may be expected to differ plus or minus 15 per cent.

INSTRUCTIONS FOR INSTALLATION

MOUNTING OF RECEIVER

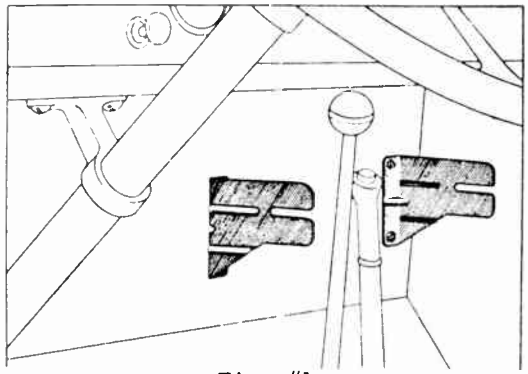


Fig. #1

The receiver is designed to be installed on the inside of the fire-wall behind the instrument panel, preferably in a horizontal position and close enough to the steering column for the control cables to reach the receiver. Only in cases where it is impossible to install in a horizontal position should it be mounted vertically. Mount the two adjustable brackets, one on each end of the receiver, then determine the best location for the receiver by holding it against the fire-wall, being careful to avoid interference with mechanical controls of the car. It may be necessary to reverse the brackets to accomplish this. After the best location has been determined, drill four holes using the template furnished with receiver for marking their location. Figure #1 shows how the brackets should look after being bolted to the fire-wall. Before permanently bolting the receiver to the brackets, the plug of the battery cable should be inserted into the rear of the receiver.

CAUTION - All mounting nuts and bolts must be drawn tight.

CONNECTING CONTROL

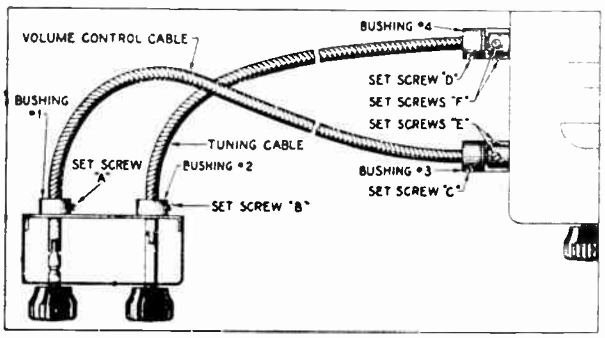


Fig. #2

Two flexible drive shafts are furnished with the Model 66 receiver. The volume control shaft has a slotted fitting on one end while the tuning shaft is similarly provided with a key fitting. To assemble the control unit the end of the volume control shaft with the slotted fitting should be inserted into bushing No. 1 on the control unit. (See Fig. #2). Make sure the outside casing of the shaft goes about five-sixteenths of an inch into the bushing. Then tighten the set screw "A" so that the outer casing of the cable will be securely held. Now connect in the same manner, the key end of the tuning cable to bushing No. 2, securing it with set screw "B". After the two cables are so connected, to sure that the knobs on the control head turn smoothly and without binding. Binding might be caused by the cables being pushed too tightly into the control unit.

The left hand or volume control cable should now be connected to bushing No. 3 on the end of the receiver. Pass the cable through the bushing so that the fitting on the end of the cable fits into the coupling on the volume control and the outer casing of the cable comes flush with the inside edge of bushing No. 3. Tighten set screw "C" so that it will securely hold the outer casing.

Next, connect in the same manner, the tuning cable to bushing No. 4, securing it with set screw "D". If the cables are properly connected they will cross. Set screws "E" and "F" should not be tightened until the control unit and cables are permanently mounted.

Now mount the control unit on the steering column in the most convenient place. Fasten drive cables securely wherever convenient so that they will not interfere with operation of the car, and then tighten the set screws "E" and "F"

MODEL 66
Installation Notes
Voltage

GRIGSBY-GRUNOW CO.

Battery Terminal Volts	5.5	6.3	7.5	* Measured with 300,000 ohm meter.
B+ to B- (Volts)	216	261	322	All voltages measured with no input signal.
B+ to Ground (Volts)	184	218	257	All voltages to ground from socket unless otherwise stated.
Total Battery Drain (Amps)	6.15	7.25	8.50	

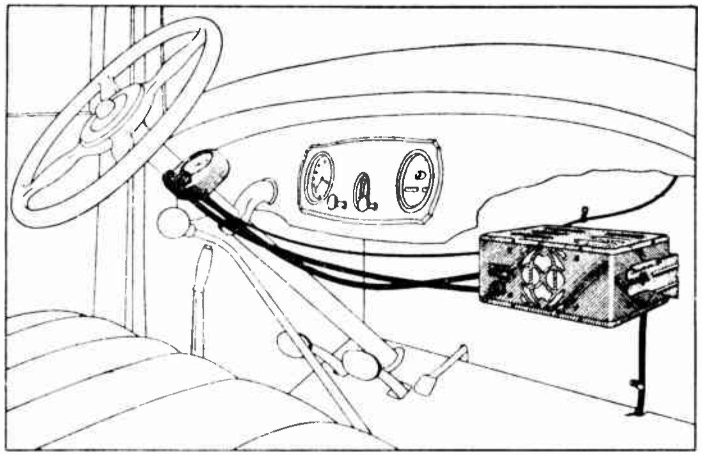


Fig. #3

in the couplings. If these are tightened before the control unit has been mounted, binding of the controls might result. Binding might also be caused by the bushings on the end of the receiver not being directly in front of the couplings. By loosening the screws that hold the bushings and then re-adjusting the bushings, this condition should be remedied. After control unit and receiver are mounted, they should appear as in Figure #3.

After the control unit and cables have been connected, the dial pointer should be adjusted. This is accomplished by slowly rotating the tuning control knob to the right until a definite stop is reached. Do not force the knob after the stop has been encountered as this may seriously damage the mechanism. Then rotate the knob slowly to the left until another definite stop is reached. In most cases it will be natural for either the pointer to come to the end of the dial strip before the stop is reached, or for the stop to be reached before the pointer comes to the end of the dial strip. In this manner the dial pointer is automatically adjusted to indicate correct frequency readings.

VOLTAGE TABLE FOR MODEL 66 AUTO RECEIVER

	PLATE VOLTS			SCREEN VOLTS			CATHODE VOLTS			GRID VOLTS		
Battery Terminal Volts	5.5	6.3	7.5	5.5	6.3	7.5	5.5	6.3	7.5	5.5	6.3	7.5
R. F. (G-6E7)	182	217	256	88	99	109	8.0	9.3	12.5	8.0	9.3	12.5
G-6A7S Det.	182	217	256	88	99	109	2.7	3.4	4.2	2.7	3.4	4.2
G-6A7S Osc.	88	99	109	-	-	-	-	-	-	7.0*	8.0*	8.0*
I. F. (G-6E7)	182	217	256	88	99	109	8.0	9.3	12.5	8.0	9.3	12.5
Audio (G-6C7)	51	60	61	-	-	-	7.5	9.2	9.5	1.8	2.2	2.3
Output (G-89)	177	209	248	184	218	257	-	-	-	23.0	27.0	35.0

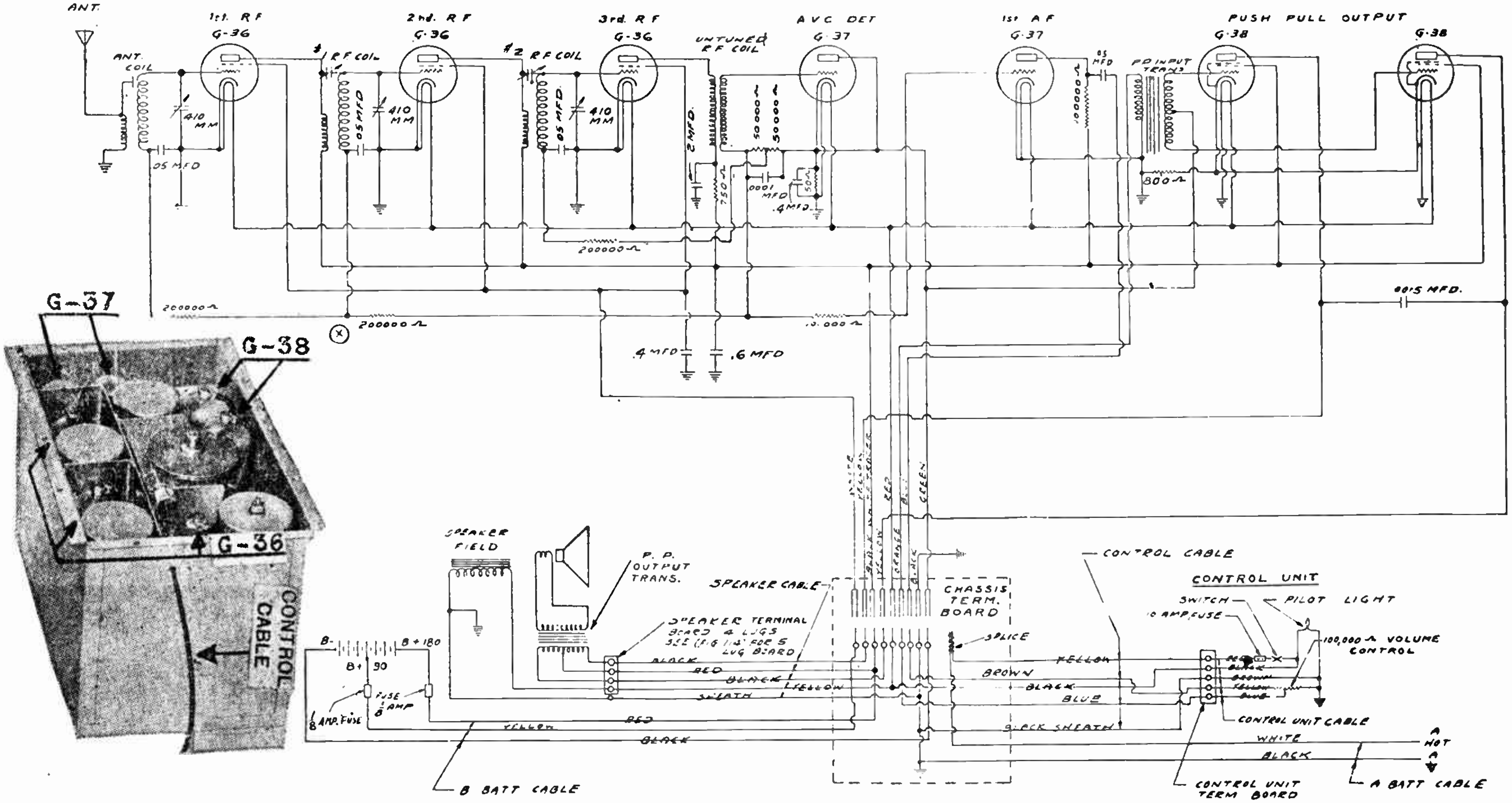
MODEL 66
Parts List

GRIGSBY - GRUNOW CO.

RECEIVER PARTS

PART NO.	DESCRIPTION	LIST PRICE
10065	"A" Battery Cable Assembly with Plug	1.60
9977	"B" Choke Assembly	1.65
8857	Detector Plate R. F. Choke Coil	.60
10057	Choke Coil "A" Supply	.55
10135	R. F. Buzzer Choke Coil	.30
10017	Antenna Coil Assembly Complete	1.60
10018	Antenna Coil Assembly less Can	.95
10020	Oscillator Coil Assembly Complete	.80
10021	Oscillator Coil Assembly less Can	.60
10013	R. F. Coil Assembly Complete	1.75
10014	R. F. Coil Assembly less Can	1.10
10074	Adjustable Condenser for I. F. (Double)	.50
10075	Adjustable Condenser for I. F. (Single)	.35
9984	By-pass Condenser Assembly, C-4 to C-7	1.20
9981	By-pass Condenser Assembly, C-10, C-13, C-14, C-16 and C-17	1.40
9410	Condenser Assembly, .005 Mfd. C-23	.30
8279	Condenser Assembly, .01 Mfd. C-3	.35
9437	Condenser Assembly, .03 Mfd. C-1, C-2, C-8, C-10	.30
10189	Condenser Assembly, .1 Mfd. C-24	.45
10184	Condenser Assembly, .5 Mfd. C-28, C-30	.40
9979	Electrolytic Condensers Dual 8 Mfd. C-18, C-19	2.50
10067	Electrolytic Condenser, 10 Mfd. C-12	.70
6242	Mica Condenser, .0005 Mfd. C-9, C-11, C-20, C-21	.20
6641	Mica Condenser .00025 Mfd. C-22	.25
7253	Resistor 300,000 ohms, R-1, R-3, R-5, R-15	.20
9691	Resistor 250 ohms, R-2	.25
10285	Resistor 400 ohms, R-4	.20
5059	Resistor 100,000 ohms, R-6	.25
9944	Resistor 2,500 ohms, R-8	.20
5219	Resistor 10,000 ohms, R-9	.25
10252	Resistor 10,000 ohms, R-10	.45
5060	Resistor 200,000 ohms, R-11	.30
7259	Resistor 250,000 ohms, R-12, R-13	.25
9887	Resistor - Globar, R-16	.45
7498	Resistor 50,000 ohms, R-17	.20
9223	Resistor 1,000,000 ohms, R-18	.20
9863	Model G-24-A Speaker	6.15
9884	Field Coil (5.4 ohms)	1.20
9876	Cone Assembly	1.30
9872	Output Transformer	1.70
10078	1st I. F. Transformer Assembly Complete	2.30
10079	1st I. F. Transformer Assembly less Can	2.10
10098	2nd I. F. Transformer Assembly Complete	2.70
10099	2nd I. F. Transformer Assembly less Can	2.50
10081	Vibrator Inner Can Assembly	13.00
10073	Vibrator Armature Assembly	6.25
10004	Tone Control	.85
10003	Volume Control & Switch	1.25
9211	Sockets (6 prong)	.15
10107	Sockets (7 prong)	.10
9986	Female Connector Plug - 8 contact	.35
9985	Male Plug (8 prong)	.15
9970	Twin Tip Jack Assembly	.15
9969	Fuse Board Assembly	.30
10101	Fuse 15 Amp.	.05
9999	Gang Condenser	4.15

All leads marked "A" plus signify the ungrounded side of the car battery, and not necessarily the positive side.



GRIGSBY - GRUNOW CO.

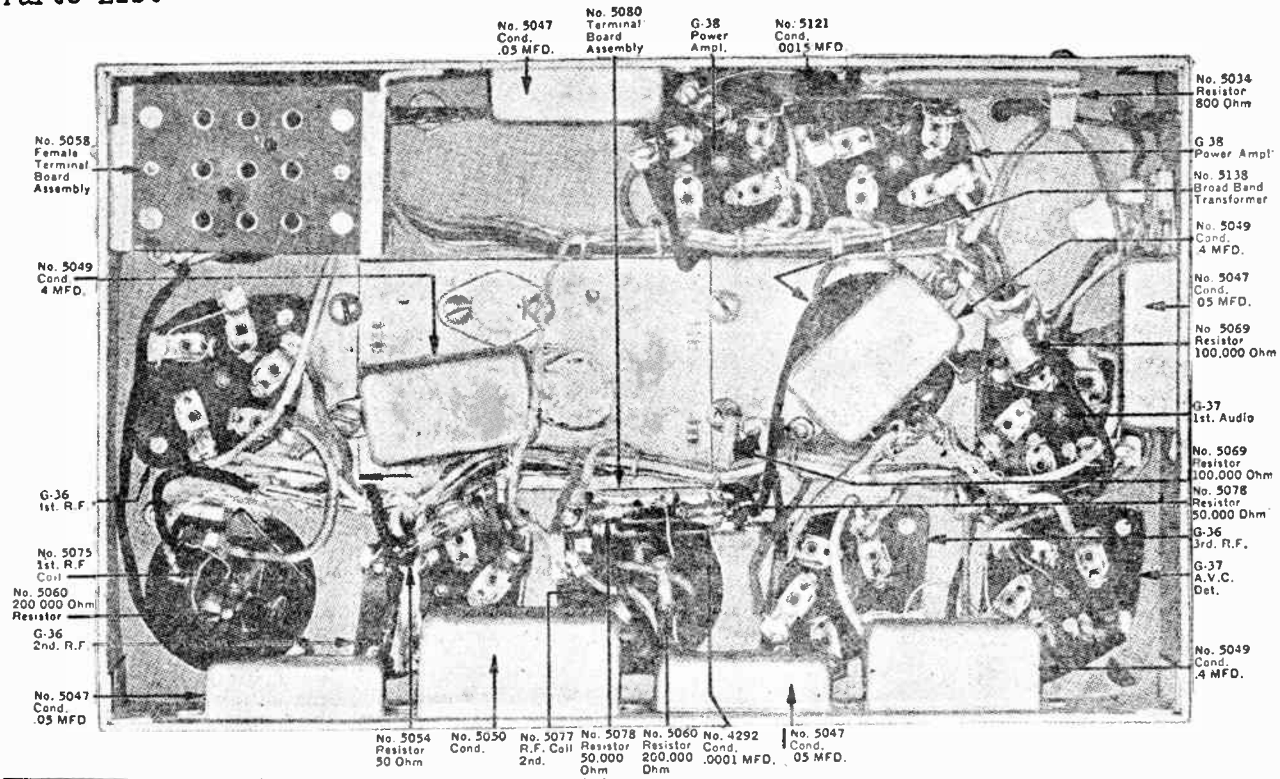
Note on Alignment of Gang Condenser: Should a receiver need realignment in the field, a station should be tuned in at approximately 1300 kilocycles and the alignment made in the usual manner. In case one alignment condenser will not indicate a peak of sensitivity, slightly advance or retard the tuning control and proceed to readjust the alignment condenser as before.

Note on Automatic Volume Control System: The Model 110 chassis utilizes an automatic volume control system in combination with a diode detector, the G-37 detector serving both functions.

Majestic Model 110
Auto Radio

MODEL 110
Chassis, Voltage
Parts List

GRIGSBY - GRUNOW CO.



CHASSIS PARTS

PART No.	DESCRIPTION	DEALER'S NET PRICE
5083	Antenna Coil	$1.08
5025	Battery Can, without cover	.72
5026	Cover for Battery Can	.45
4641	By-Pass Condenser, Generator	.32
	Cables	
5020	Control Cable	1.38
5022	"A" Battery Cable	.37
5023	"B" Battery Cable	.49
5151	Drive Cable, 8 ft.	.95
5177	Drive Cable, 10 ft.	1.67
5178	Drive Cable, 12 ft.	1.89
5179	Drive Cable, 14 ft.	3.14
5100	Chassis Container Cover	.11
5033	Chassis Container Mounting Strap	.08
5149	Clamp, for Steering Column	.11
5150	Clock Spring, Flat	.22
5145	Collet Assembly	.22
	Condensers	
4292	.0001 MFD.	.16
5121	.0015 MFD.	.15
5047	.05 MFD.	.25
5140	.25 MFD.	.33
5049	.4 MFD.	.30
5050	.6 MFD.	.49
5064	Condenser, Gang	2.95
5146	Condenser Pulley	.27
5102	Control Unit, Complete	7.42
5185	Control Terminal Board	.54
5147	Dial Lamp, 6 Volt. See Page 95.	
5196	Dial Drive Shaft	.29
5182	Dial Strip	.16
5183	Dial Strip and Gear Assembly	.51
5118	Fuse, 1/8 Amp.	.10
4663	Fuse, 10 Amp. for Control Unit	.08
5119	Fuse Clip	.03
5170	Gasket for Lid, Rubber	.06
5088	Input Transformer, Grid Clip Assembly	2.29
5148	Key	.06
5144	Knob for Selector	.22
5143	Knob for Volume Control	.16
5153	Output Transformer	.90
	Resistors	
5054	50 Ohm	.13
4621	750 Ohm	.13
5034	800 Ohm	.12

CHASSIS PARTS

PART No.	DESCRIPTION	DEALER'S NET PRICE
5078	50,000 Ohm	$0.13
5059	100,000 Ohm	.13
5060	200,000 Ohm	.12
5075	R. F. 1st Coil, Comp.	1.08
5077	R. F. Coil, 2nd Comp.	.99
	Screws and Nuts	
2285	Screw for Control Clamp. Per 10	.02
2269	Screw 8/32x1⅛" Per 10	.03
2331	Nut for Above Per 10	.02
2462	Screw R. H. I. M. 12/24x2⅜"	.01
2603	Nut for Above	
2339	Nut 10/32 Per 10	.04
2460	Washer for Nut No. 2339 Per 10	.04
5152	Switch Assembly Comp.	.54
4640	Suppressor for Spark Plug	.21½
5199	Suppressor, Screw Type	.21½
5122	Suppressor for Distributor	.21½
5010	Terminal Board, Male	.08
5008	Terminal Board, Female	.09
5138	Transformer, Broad Band	.89
5069	Tube Socket, G-36	.12
5070	Tube Socket, G-37	.12
5071	Tube Socket, G-38	.12
5072	Volume Control	.60

SPEAKER

PART No.	DESCRIPTION	DEALER'S NET PRICE
5135	Speaker Complete with Output Transformer, Magnavox	$4.17
61619	Speaker Cabinet, Less Back	1.57
61618	Speaker Back, Complete	.18
5116	Speaker Bracket	.05
5021	Speaker Cable	1.31
5116	Speaker Mounting Brackets	.05
5194	Cone for Magnavox	1.25
5195	Cone for Utah	1.30
5188	Field Coil (Magnavox)	.95
5189	Field Coil (Utah)	.90

TABLE OF VOLTAGES

Tube Purpose	Type	Fil. D.C.	Plate D.C.	Screen D.C.	Cathode D.C.
1st R. F.	G-36	6.3	175	90	0
2nd R. F.	G-36	6.3	175	90	0
3rd R. F.	G-36	6.3	175	90	0
Diode Det. & A.V.C	G-37	6.3	7.5	...	7.5
1st Audio	G-37	6.3	50	...	0
P. P. Power	G-38	6.3	150	180	12
P. P. Power	G-38	6.3	150	180	12

GRIGSBY - GRUNOW CO.

MODEL 114
Schematic
Service Notes
Parts List

"B" SUPPLY PARTS

PART. No.	DESCRIPTION	DEALER'S NET PRICE
7735	By-Pass Condenser Assembly, C-14, 15	$0.81
7724	Condenser, Electrolytic 8. MFD. C-16	.89
7676	Lid for Container	.18
7654	Motor, Emerson	13.50
7664	Rubber Gasket	.09
7725	Tube Socket, 4 Prong Oval	.06

CONTROL UNIT PARTS

8564	Control Unit Complete	$6.98
8688	Cable, Shielded 3 Wire	.99
5147	Dial Lamp, 6 Volt, See page 95	
8689	Dial Strip	.22
8690	Dial Strip and Gear Assembly	.61
5151	Drive Cable, 8 Ft.	.98
5177	Drive Cable, 10 Ft.	1.67
5178	Drive Cable, 12 Ft.	1.89
5179	Drive Cable, 14 Ft.	3.14
8691	Drive Shaft	.49
5148	Key	.06
8693	Knob,-Small for Volume Control	.24
8694	Knob, Large for Tuning	.27
8696	Switch Assembly	.24
9479	Tension Spring for Drive Shaft	.08
8695	Volume Control	.92

SPEAKER ASSEMBLY

8565	Speaker and Complete Assembly	$6.22
8262	Speaker (Field Coil Resistance 6 Ohm). Less Cabinet	2.95
66001	Speaker Cabinet	1.75
8560	"A" Battery Cable	.35
7725	Socket, 4 Contact, oval	.06
7705	Socket, 5 Contact	.06
8627	Speaker Mounting Bracket Assembly	.16

MISCELLANEOUS PARTS

8278	By-Pass Condenser for Generator	$0.54
7675	Cable Clips, Small	.03
7677	Cable Clips, Large	.06
8562	Eliminator and Chassis Cable 12 Ft.	2.90
8561	Eliminator and Chassis Cable 16 Ft.	3.15

SUPPRESSORS

4640	Spark Plug	$0.21½
5122	Distributor	.21½
5199	Spark Plug for Buick, etc., Screw Type	.21½

RUNNING BOARD ANTENNA

8585	Running Board Antenna, Complete	$1.89
8630	Antenna Plate Assembly	.97
8334	Countersunk Washer	.02
8331	Extension Spring	.03
8332	Extension Spring Support Nut	.03
8328	Mounting Spring Assembly	.11
8333	Rubber Spacer	.04
8335	Splash Guard Assembly	.75

All Above Prices Subject to 2% Federal Tax

INTER-STATION NOISE SUPPRESSION

Noise suppression is obtained by the use of the resistor R-5 in the G-85 cathode circuit. There is a voltage across this resistor due to the space current of the triode portion of G-85, hence the ground end of R-5 is more negative than the cathode end, and R-3 is more positive than ground. A certain signal voltage must, therefore, reach the diode plates before the diode plate end of R-3 attains a voltage below ground potential. This is similar to the usual delayed A.V.C. while the condition of no signal exits, the grids of the G-39's tend to be positive, and are prevented from being actually more positive than their cathodes by the fact that they draw grid current through the resistors R-6 and R-1. The fact that these tubes are drawing grid current prevents them from giving the full amplification of which they are capable under proper voltage conditions. When, however, sufficient signal reaches the diode plates to produce a bias of three volts across the resistor R-3, the G-39 tubes attain their full mutual conductance and the entire system works as a normal A.V.C. circuit.

CONNECTION FOR NEGATIVE GROUND ON BATTERY

The "B" eliminator on the Model 114 as supplied from the factory is connected for operation in automobiles which have the positive terminal of the battery grounded. When an installation is to be made in a car having the negative terminal of the battery grounded, it is necessary to reverse the two leads that come out of the generator near the choke and connecting assembly.

In some of the first sets made, it may be necessary to splice the wire that is now grounded so that it will reach to the terminal on the ½ mfd. condenser. Be sure to use wire that is large enough to carry the current required to run the motor.

ELECTRICAL SPECIFICATIONS

Field coil resistance—6 ohms
Voice coil resistance—1.7 ohms
Field coil current drain—1 ampere
"B" supply current drain—3 amperes
Tubes heater current drain—2 amperes
Plate current from "B" supply—40 mills
Plate voltage from "B" supply—180 volts

NOISE SUPPRESSION

FIRST follow up all test steps as explained on following page for chassis 116 regarding antenna, suppressor and chassis connection. If these steps are not sufficient to eliminate noise interference, the following suggestions are made. PEEN THE ROTOR. It may be necessary to reduce the gap between the rotor arm and contacts of the distributor head. Extreme care should be used in this operation to prevent harming the distributor. Peen the rotor by placing it on a flat steel block and hammering the end with a small machinist's hammer. Repeat this operation until there is just sufficient clearance—about .004". The rotor must not be allowed to touch the contacts. If there is evidence of the rotor touching the contacts, file off about .001" and recheck. Building up the rotor arm with solder is not recommended as the solder is very soon burned away. In some cases, where the rotor is badly worn, it may be best to substitute a new one.

If the motor interference still continues, it may be well to determine the source. This can be done by removing the high tension lead from the coil to the distributor, turning on the ignition switch and cranking the car by hand. If a clicking is heard in the speaker, you may be sure that part of the trouble comes from the breaker points in the distributor or low tension circuit.

It will then be necessary to remove the primary lead which runs from the coil to breaker points on the distributor, and replace it with a No. 14 shielded low tension cable being sure to ground the shielding. Care must be used when shielding so as not to short the coil or switch. Never use a by-pass condenser on this part of the circuit because it will effect the operation of the motor.

When you have tested to determine the source of motor interference and no clicking was heard in the speaker, we may assume that the interference is coming from the high tension or secondary circuit which is possibly the worst source of motor interference. All wires which run parallel to or within the field of this part of the circuit act as carriers and should be moved whenever possible, or the high tension wire re-routed. Sometimes the car manufacturer utilizes the high tension manifold to hold various wires and just removing them from the manifold will be sufficient. Be careful to keep the high tension lead as far as possible from the receiver.

ALIGNMENT

It will be necessary to use a special chassis container can that has had holes drilled in it to permit reaching the aligning condenser with the aligning tool. The bale should be removed before inserting the chassis in the special container can as it covers the two 1st I.F. aligning screws.

1. Completely connect the receiver as for operation with the volume control in maximum position. *It will be necessary to connect the cathode of the G-85 tube to ground to stop the inter-station noise suppression action while aligning the receiver.*

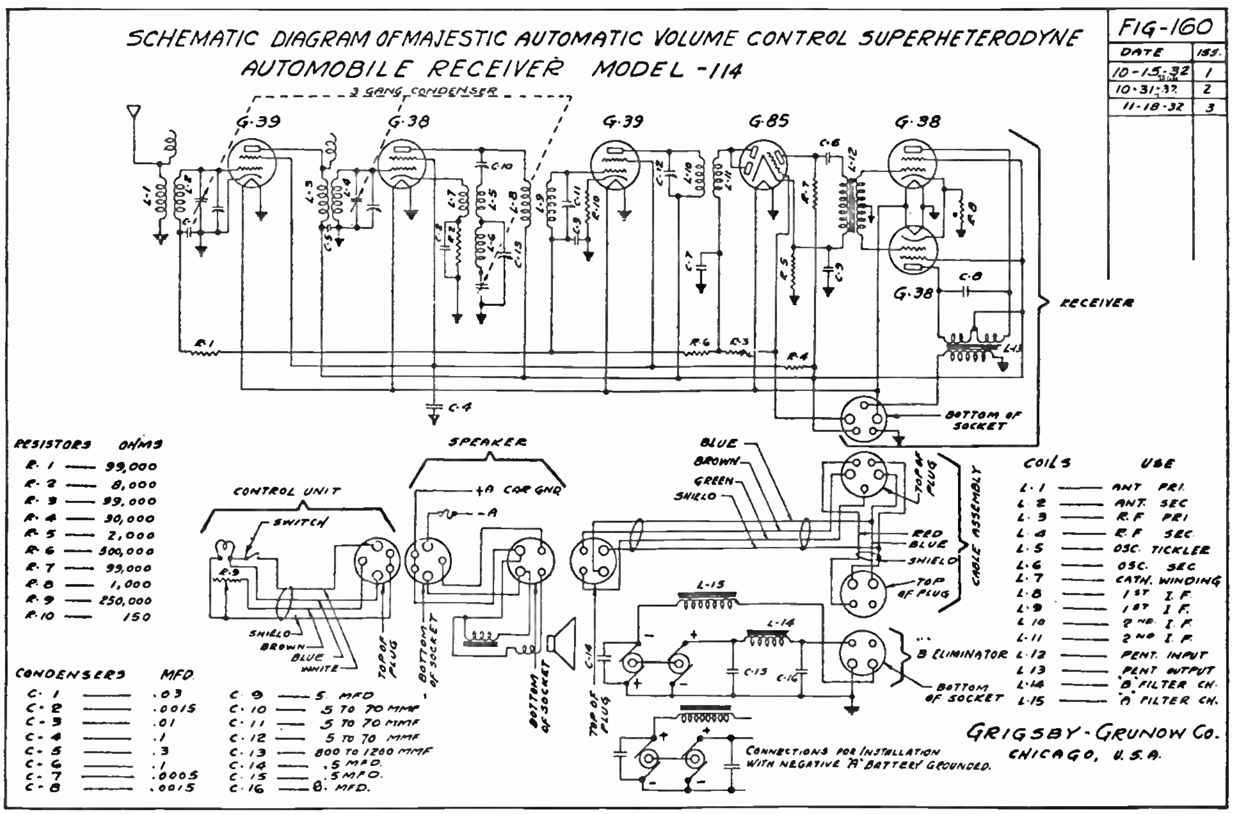
2. Supply a 175 K.C. signal to the grid of the G-38 first detector tube and align the three I.F. aligning condensers for maximum output. (Two are located on the 1st I.F. transformer, and one just below the G-85 tube.)

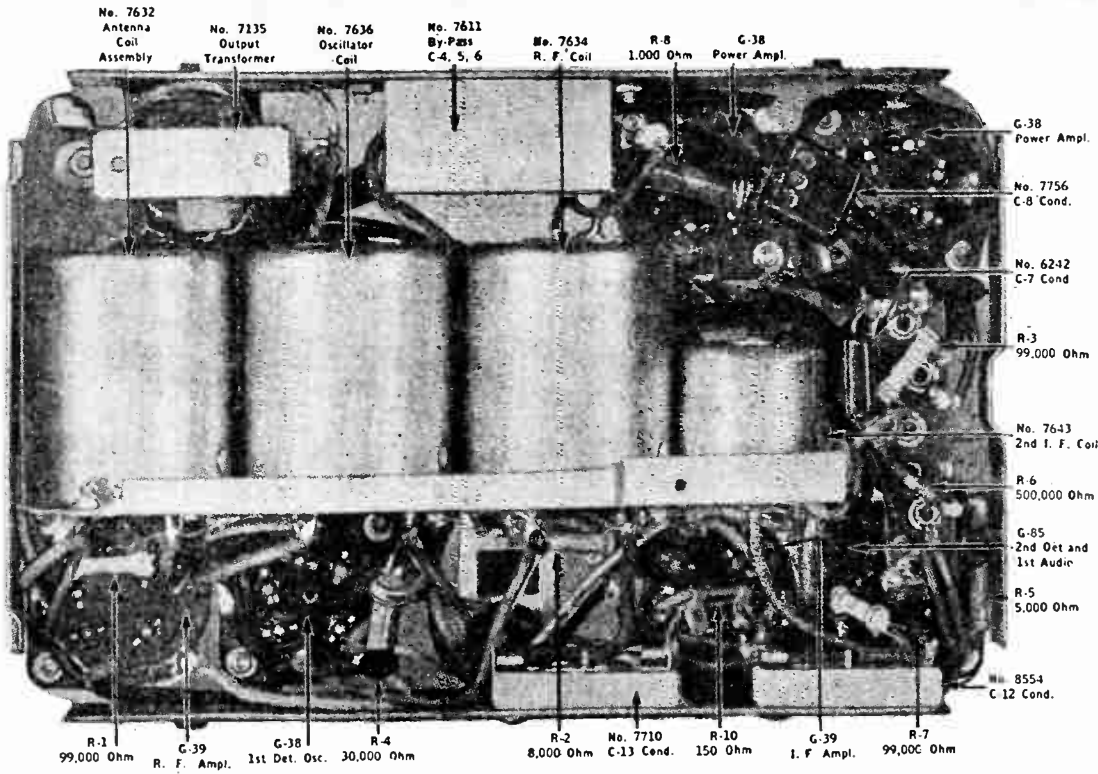
3. Supply a 1500 K.C. signal to the grid of the first detector tube and adjust the gang condenser for maximum output.

4. Supply a 1500 K.C. signal to the antenna post and align the two trimmers on the gang condenser for maximum output.

5. Turn the gang condenser to approximately maximum capacity position (completely meshed) and supply a 550 K.C. signal to the antenna post. Adjust the series aligning condenser, which is located just below the 1st I.F. transformer for maximum output. For each adjustment of the series aligning condenser there will be a different gang condenser setting which gives maximum output. The combination of gang setting and series condenser adjustment which give maximum output, disregarding setting, is the correct adjustment. Be sure to remove the ground from the G-85 cathode after completing alignment.

Chassis layout and voltage data are shown on separate page. Also operation of automatic volume control.





CHASSIS PARTS

PART No.	DESCRIPTION	DEALER'S NET PRICE
7632	Antenna Coil Assembly, Less Can	$0.81
7746	Antenna Spring and Bracket Assembly	.05
7611	By-Pass Condenser C-4, C-5, C-6	.67
8575	Chassis Container	1.16
	Condensers	
6242	.0005 MFD., C-7	.12
7756	.0015 MFD.	.11
	Condenser Assembly	
8279	.01 MFD.	.19
7693	.03 MFD.	.16
8554	Adjustable, C-12	.12
7710	Adjustable, C-13	.32
7210	Adjustable for I. F. Transformer, C-11	.14
8286	Condenser, Electrolytic 5. MFD., C-9	.39
7784	Condenser, Electrolytic 20 MFD.	.32
7619	Condenser, Three Gang	2.95
8563	Condenser Pully	.49
7664	Lid Gasket	.09
7676	Lid for Container	.18
8323	I. F. Transformer Assembly, 1st	1.23
7643	I. F. Transformer Assembly, 2nd	.54
7636	Oscillator Coil Assembly, Less Can	.54
7135	Output Transformer Assembly	1.08
	Resistors	
7751	150 Ohm, R-10	.11
7606	1,000 Ohm, R-8	.11
7125	2,000 Ohm, R-5	.11
7672	8,000 Ohm, R-2	.11
7755	30,000 Ohm, R-4	.11
7671	99,000 Ohm, R-1, 3 7	.11
7482	500,000 Ohm, R-6	.11
7634	R. F. Coil Assembly, Less Can	.67
7615	Transformer Assembly, Push-Pull Input	1.67
	Tube Sockets	
7705	5-Contact plain	.06
7762	5-Contact for G-38	.06
7763	5-Contact for G-39	.06
7608	6-Contact for G-85	.06

"B"—SUPPLY PARTS

8254	"A" Supply Choke Assembly	$0.49
7674	"B" Supply Container	.89
7739	"B" Filter Choke Assembly	.62

All Above Prices Subject to 2% Federal Tax

TABLE OF VOLTAGES

Tube	Purpose in Circuit	Plate Voltage	Screen Voltage	Cathode Voltage
G-39	R.F. Amplifier	180	85	0
G-38	1st Detector Oscillator	180	85	15.
G-39	I.F. Amplifier	180	85	1.1
G-85	2nd Detector and 1st Audio Amplifier	A.F. Plate 50	...	2
G-38	Power Amplifier	170	180	17
G-38	Power Amplifier	170	180	17

NOTE: Measurements made with a 1000 ohm per volt, 300 volt range, D.C. voltmeter, all tubes in their sockets and receiver connected to a storage battery supply delivering 6 volts at the cable terminals, under load

Tubes should be previously tested to assure that they are in good condition

Readings to be taken from designated points to ground, with the condenser gang fully meshed and with no signal supplied to the receiver

THE CIRCUIT

Superheterodyne with "B" Supply of the motor type.

AUTOMATIC VOLUME CONTROL

Referring to the schematic diagram it will be seen that the signal voltage across the 2nd I.F. coil (L-11) is rectified by the diode plates of the G-85 second detector tube, causing space current to flow around the circuit composed of the diode plates, cathode, resistor R-5, volume control R-7; and resistor R-3. This in turn establishes a direct current voltage across R-3 in which the end toward the plates is negative with respect to the end toward the cathode. As the grids of the G-39 tubes are connected to the negative potential end of R-3, these grids become negative with respect to ground and hence negative with respect to their own cathodes.

This negative bias reduces the mutual conductance and hence the amplification of the G-39 tubes. The signal at the coil L-11 is, therefore, reduced until a balanced condition is reached. It will be evident that the effect is to maintain practically constant the signal at the diode plates independently of the received strength, within the limits of the A.V.C. system. This does away with blasting and fading.

By connecting the two diode plates together it is possible to obtain almost twice as much A.V.C. voltage as could be obtained with the full wave connection, and it is possible to obtain good A.V.C. at the small signals encountered in automotive receivers.

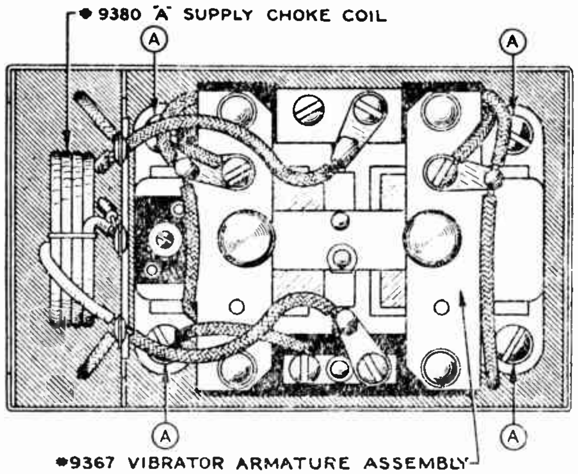


Fig. 11

DURO-MUTE POWER UNIT

The Duro-Mute Power Unit of the MAJESTIC Model 116 Auto Receiver is completely housed in the large metal container located at the extreme right of the receiver (see Figure 12).

Do not tamper with this unit unless it has proven defective by causing a gradual decrease in plate voltages and power output.

Should it, at any time, become necessary to inspect or replace the vibrator armature assembly of this unit, the procedure outlined below should be followed:

If the receiver is installed in the automobile, remove it from the firewall by loosening the clamping screws and sliding it off the supporting brackets.

Take off the top and bottom covers of the chassis container.

Unsolder the red, yellow, blue and black leads from the speaker output transformer

Remove the flexible drive cable from the gang condenser drive pulley, being careful not to cause any sharp bends or kinks in the cable.

After removing the five screws from the ends of the receiver, lift the container and speaker from the chassis, being careful not to place undue strain on the antenna lead wire.

Unscrew the four screws which hold the cover of the Duro-Mute Power Unit in place. The cover is easily removed by rocking slightly and lifting upward.

The entire vibrator armature assembly is now accessible for inspection or replacement.

WARNING!
Do not file the contacts or tamper with any of the adjustments on the vibrator armature assembly. This unit has been carefully adjusted at the factory for utmost efficiency and any changes will seriously affect its operation.

The guarantee on the receiver will become void if the above warning is not followed.

If the vibrator armature assembly is known to be defective, remove it by disconnecting the necessary wires and unscrewing the four large screws marked "A" in Figure 11.

Replace with a new part #9367 vibrator armature assembly.

If there was a spacing washer under each of the screws at "A", they should not be used when the vibrator armature assembly is replaced with a new one.

Replace the Duro-Mute Power Unit cover, being certain that is fits snugly and properly supports the filter choke clamp.

Reassemble the outer container and speaker to the chassis and replace the bottom cover. Solder the speaker leads.

Assemble the flexible drive cables to the drive pulley so that with the tuning dial rotated to zero, the condenser gang will be completely unmeshed.

Turn on the receiver and test for proper operation over the entire tuning range,also noting that the drive cable operates smoothly and correctly.

Replace cover and assemble receiver to firewall.

CAUTION! Be sure to tighten all nuts and screws securely.

VOLTAGE CHART FOR MODEL 116 AUTO RECEIVER

TYPE	PURPOSE IN CIRCUIT	PLATE VOLTAGE	SCREEN VOLTAGE	CATHODE VOLTAGE	SUPPRESSOR VOLTAGE	GRID VOLTS
G57A-S	1st Detector Oscillator	110	110	15	0	1.4
G58A-S	1st I.F. Amplifier	180	90	3.5	3.5	...
G58A-S	2nd I.F. Amplifier	180	90	3.5	3.5	...
G75	2nd Detector and 1st Audio Amplifier	135	...	2.25	...	...
G89	Power Amplifier	170	180	0	0	...
G6-Z5	Rectifier	...	...	180	...	...

NOTE: All measurements made from designated points to ground with a 1000 ohm per volt; 300 volt range, D.C. voltmeter, the receiver connected storage battery delivering 6.0 volts at the battery terminals under load, the condenser gang fully meshed, and no signal supplied to the input of the receiver.

The tubes should be previously tested to assure that they are in good condition.

MODEL 116
Data

GRIGSBY - GRUNOW CO.

TECHNICAL DATA, SCHEMATIC DIAGRAMS AND COMPLETE PARTS LISTS PERTAINING TO MAJESTIC MODEL NO. 116 AUTO RECEIVERS

There are four types of the Model No.116 series auto receivers. The first three types are all known as Model 116's and are covered by serial numbers 10,001 to 16,036. The last type is known as Model 116-A and is covered by serial numbers 16,037 and up.

Model 116—Type 1

This receiver is wired according to the circuit diagram, figure No.175-A, and is the type that first left the factory.

Model 116—Type 2

This receiver is wired as shown in figure No.175-B, and is practically the same as type No.1. The main changes being that Resistor R-3 was shorted out, Resistor R-5 was replaced by one of 3,000 ohms, Resistor R-8 was replaced by one of 50,000 ohms, and instead of returning R-8 to ground, it was connected to the cathode of the G-75 tube.

Model 116—Type 3

The receivers of this type are wired according to figure No.175-C, and differ from type No.1 in that they have a G-85A tube for a second detector, a G-6Y5 tube for a rectifier, two 4,000 ohm resistors, R-17 and R-18 added, Resistor R-5 and Condenser C-22 omitted, and a different type of bias circuit. Also the filament of the rectifier tube is separated from the other filaments and connected to the white wire with a red tracer that comes from the control unit.

Model 116A—Type 4

This type receiver is wired according to figure No.175, issue #5, and is known as the Model 116-A. The difference between this type and the preceding type is only in the connection and value of some of the resistors and condensers as will be noted on the diagram. The second detector and rectifier tubes are also of the G-85A and G-6Y5 types respectively.

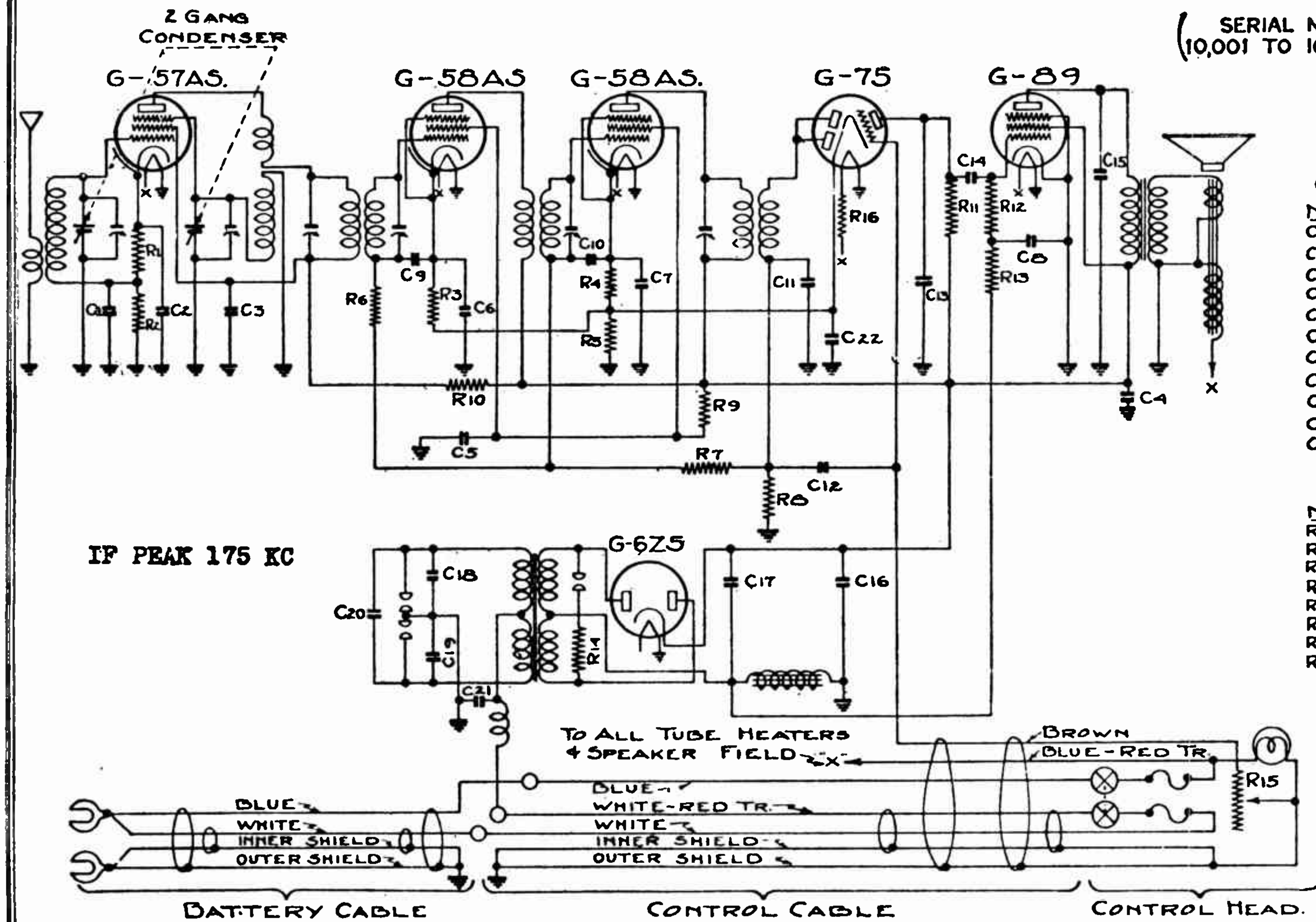
A special Globar Resistor (R-14), is connected across the plates of the rectifier tube in place of the spark gap and resistor which was used on the Model 116, This resistor has a value of 500,000 ohms at 750 volts D.C., and a value of 1500 ohms at 2000 volts D.C.

TUBES

The G-6Y5 rectifier is of the full wave mercury vapor type having a heater rating of 6.3 volts. The tube voltage drop is approximately 15 volts. This tube is spray shielded and the tube shielding is connected to one of the heater prongs which in the circuit is grounded.

The G-85A-S tube is a duodiode-triode similar to the type G-85. The only difference being that the triode part of the G-85A-S is of the multi-mu design and has a lower mutual conductance.

(SERIAL NOS. 10,001 TO 16,036)



CONDENSER VALUES

NO.	MFD	NO.	MFD.
C1	.1	C12	.01
C2	.03	C13	.005
C3	.03	C14	.01
C4	.25	C15	.005
C5	.5	C16	8.0
C6	.1	C17	8.0
C7	.1	C18	.1
C8	.1	C19	.1
C9	.03	C20	.5
C10	.01	C21	1.0
C11	.0005	C22	.01

RESISTOR VALUES

NO.	OHMS	NO.	OHMS
R1	300	R9	30,000
R2	3000	R10	15000
R3	200	R11	99,000
R4	200	R12	250,000
R5	150	R13	250,000
R6	99000	R14	40,000
R7	500,000	R15	250,000 VOLUME CONTROL
R8	99,000		

R16 — 1.5 OHMS

FIG. 175-A

REVISIONS	ISSUE	MEMO
1-25-33	1	7685
2-10-33	2	7736

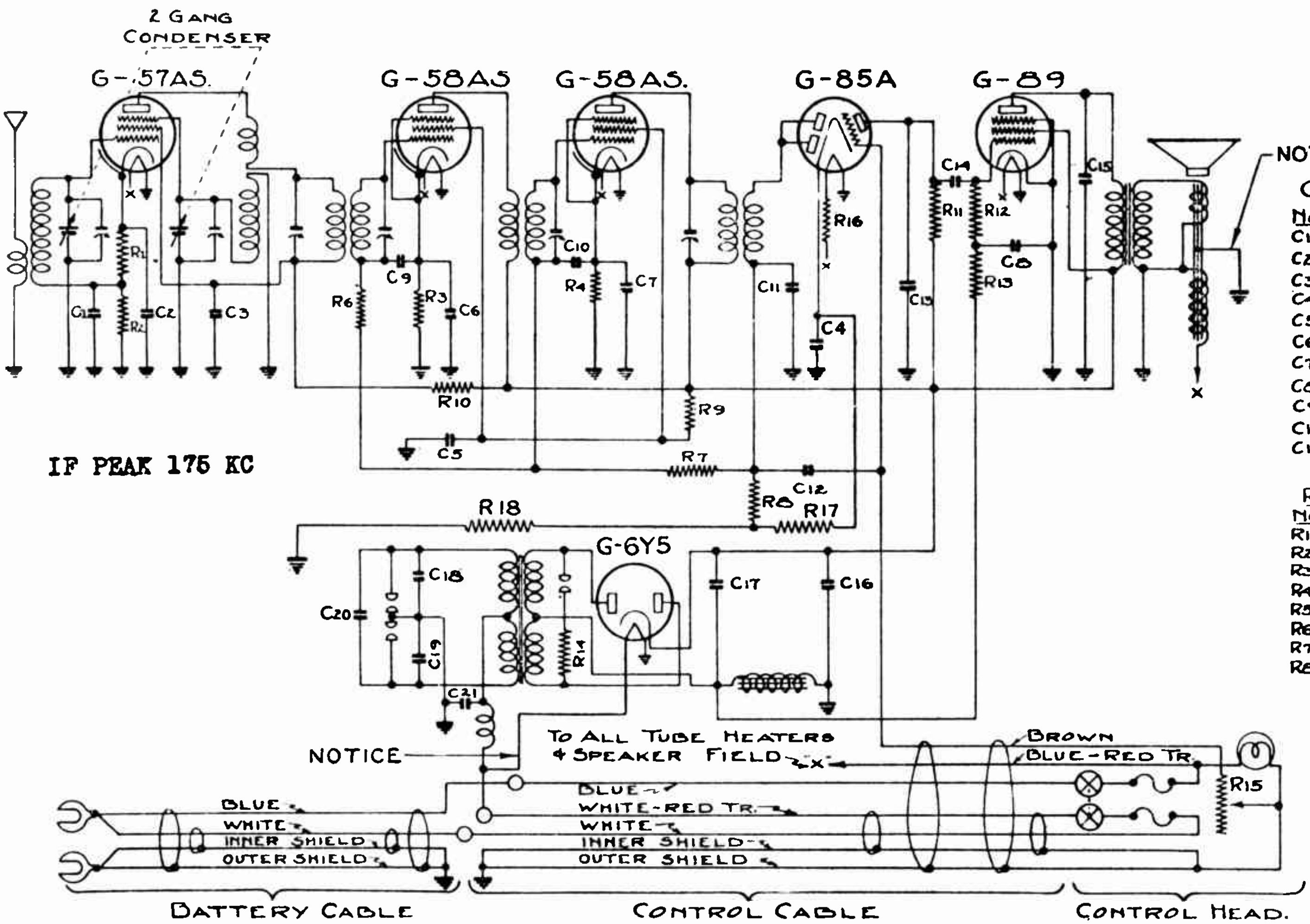
GRIGSBY-GRUNOW CO.

MODEL 116
Schematic
Type 1

MODEL 116
Schematic
Type 8

Fig. 175-C

REVISIONS	ISSUE	MEMO
1-25-33	1	7685
2-10-33	2	7736



CONDENSER VALUES

No.	MFD.	No.	MFD
C1	.1	C12	.01
C2	.03	C13	.005
C3	.03	C14	.01
C4	.25	C15	.005
C5	.5	C16	8.0
C6	.1	C17	8.0
C7	.1	C18	.1
C8	.1	C19	.1
C9	.03	C20	.5
C10	.01	C21	1.0
C11	.0005	C22	

RESISTOR VALUES

No.	OHMS	No.	OHMS
R1	300	R9	30,000
R2	3000	R10	15,000
R3	200	R11	99,000
R4	200	R12	250,000
R5		R13	250,000
R6	99,000	R14	40,000
R7	500,000	R15	250,000 VOLUME CONTROL
R8	99,000		

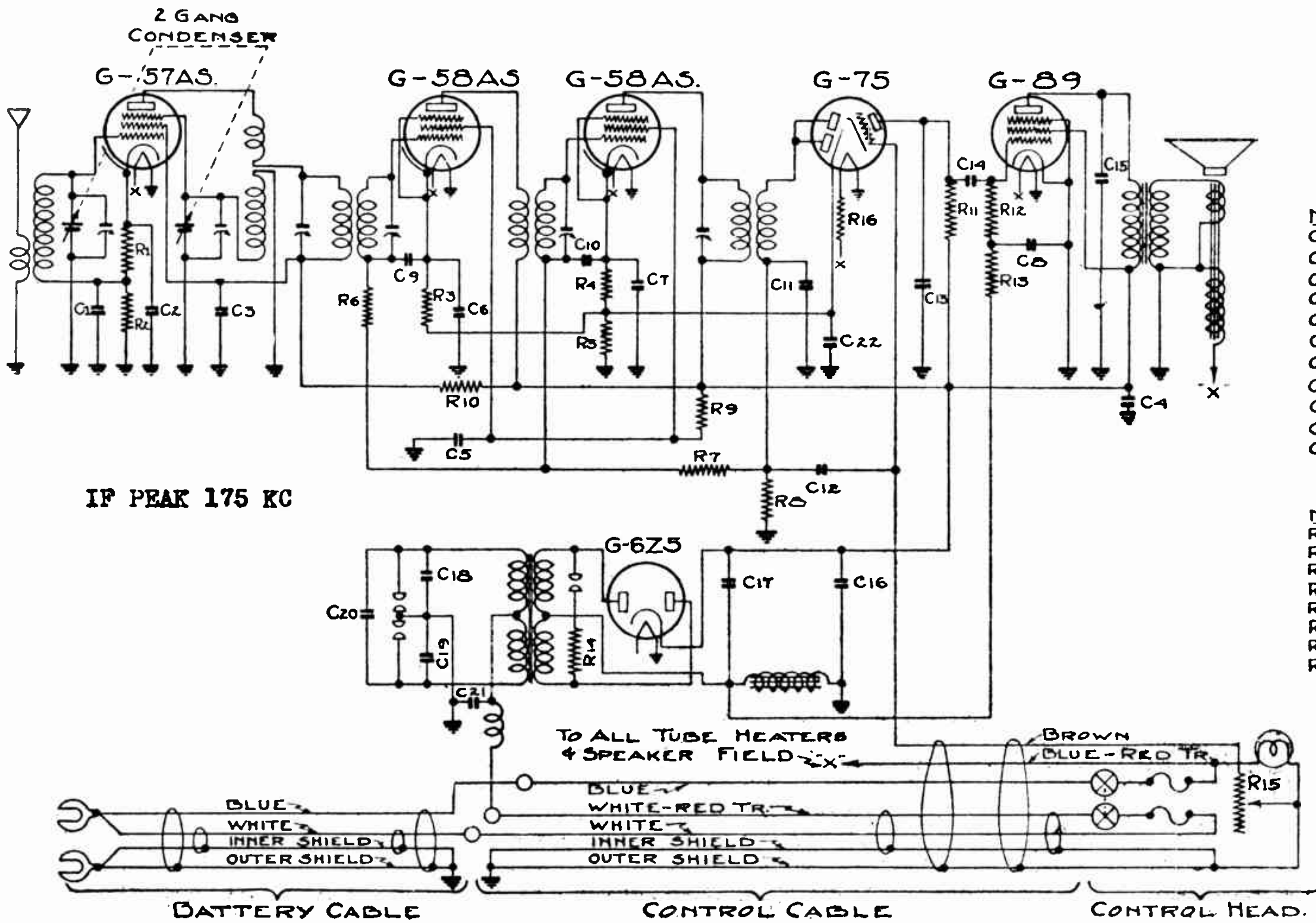
R16 — 1.5 OHMS
R17 — 4000 "
R18 — 4000 "

(SERIAL NOS. 10,001 TO 16,036)

GRIGSBY - GRUNOW CO.

MODEL 116
Schematic
Type 4

GRIGSBY-GRUNOW CO.



CONDENSER VALUES

NO.	MFD.	NO.	MFD.
C1	.1	C12	.01
C2	.03	C13	.005
C3	.03	C14	.01
C4	.25	C15	.005
C5	.5	C16	8.0
C6	.1	C17	8.0
C7	.1	C18	.1
C8	.1	C19	.1
C9	.03	C20	.5
C10	.01	C21	1.0
C11	.0005	C22	.01

RESISTOR VALUES

NO.	OHMS	NO.	OHMS
R1	300	R9	30,000
R2	3000	R10	15,000
R3	200	R11	99,000
R4	200	R12	250,000
R5	150	R13	250,000
R6	99000	R14	40,000
R7	500,000	R15	250,000 VOLUME CONTROL
R8	99,000		

R16 — 1.5 OHMS.

FIG. 175

REVISIONS	ISSUE	MEMO
1-25-33	1	7685
2-10-33	2	7736

MODEL 116
Chassis
Alignment Data

GRIGSBY - GRUNOW CO.

ALIGNMENT

If, for any reason it becomes necessary to align the Model No. 116 Auto Radio, the following procedure should be carefully followed.

It will be necessary to remove the chassis container and cover to align the receiver.

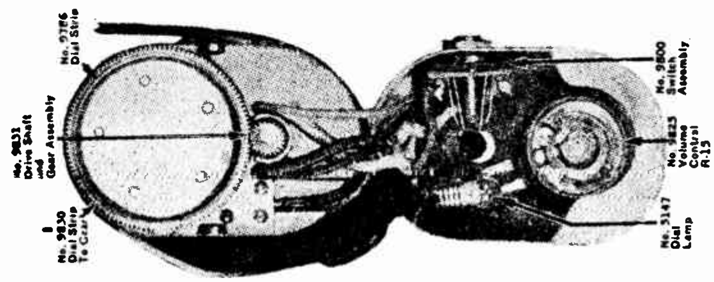
1. Set the volume control at maximum, insert all tubes in their proper sockets and connect the battery cable to a six (6) volt storage battery.

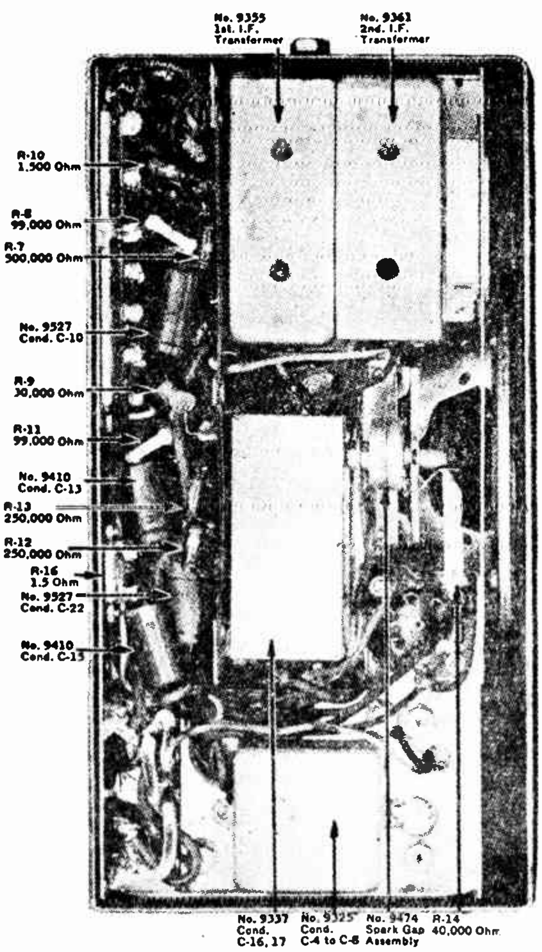
2. Supply a 456 Kilocycle signal to the grid of the first detector tube and align for maximum output the three (3) I.F. aligning condensers that are located on the bottom right hand side of the chassis and the one (1) I.F. aligning condenser located on the upper part of the chassis behind the speaker.

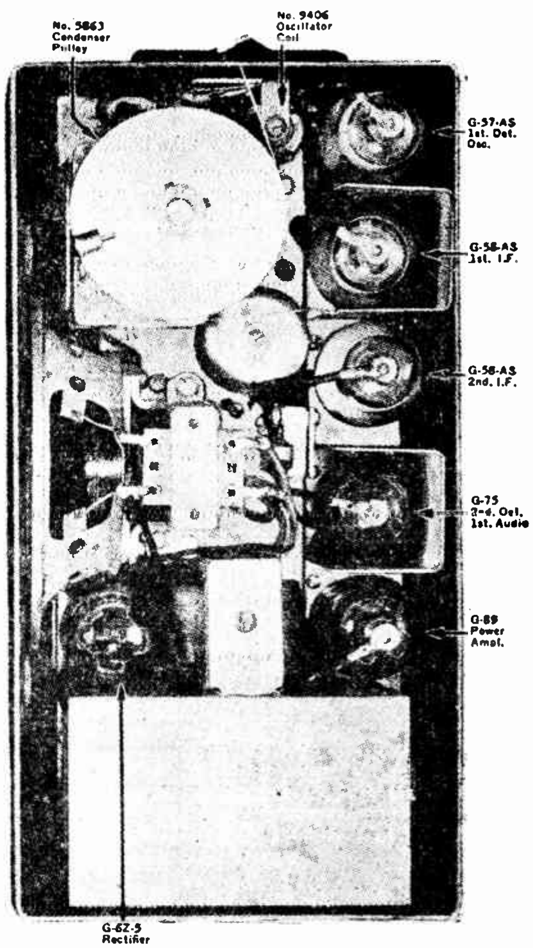
The shielding is to be connected to the grounded side of the battery and the two wires emerging from the shielding are both connected to the hot side. The polarity of the battery need not be considered when making these connections. When making the ground connections, scrape away any corrosion, paint or rust so as to make a good electrical contact.

TO OBTAIN BEST RESULTS FROM THIS RECEIVER, ADVANCE THE CAR GENERATOR TO KEEP THE STORAGE BATTERY FULLY CHARGED.

The cable must be securely clamped and must not come in contact with the battery in order to avoid the possibility of corrosion and shorting the battery.

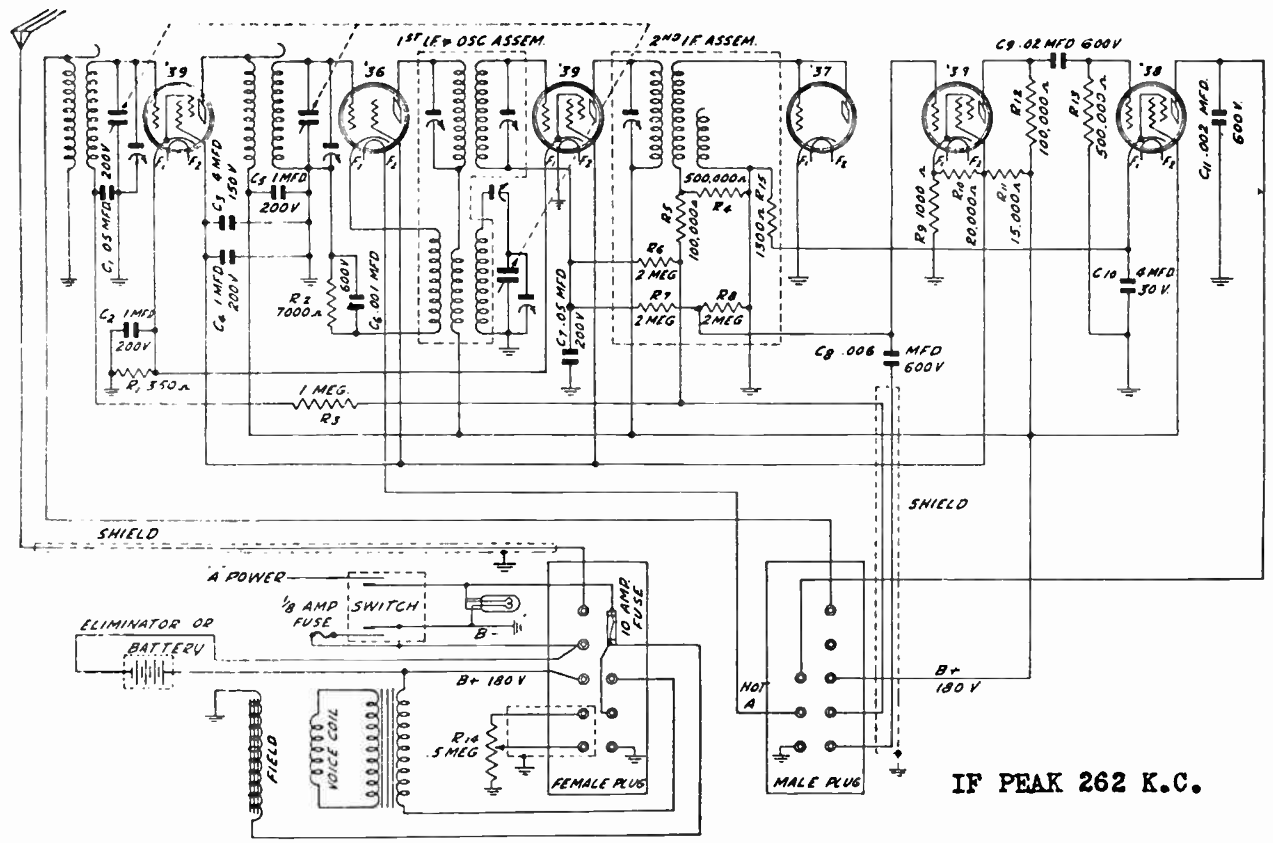




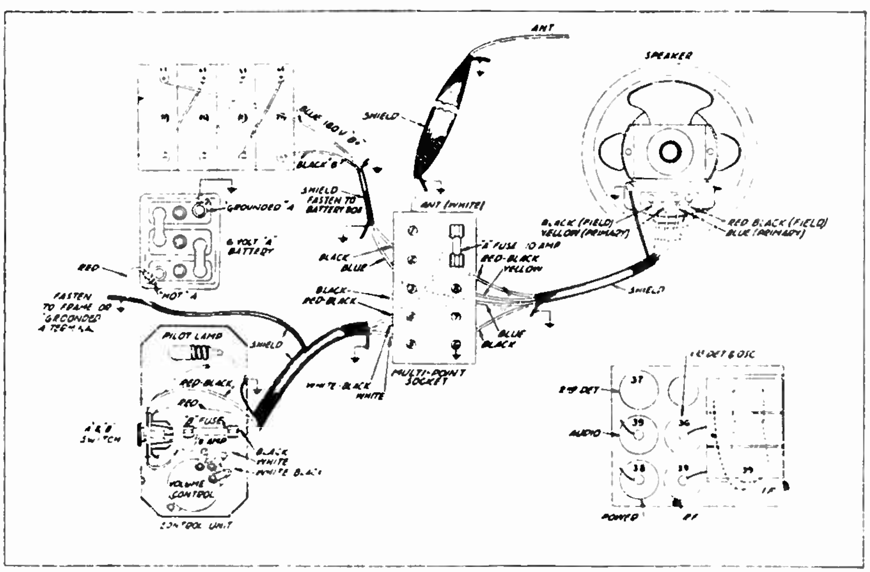


MODEL 362

GULBRANSEN CO.



IF PEAK 262 K.C.



VOLTAGE DATA

Tube	Plate	Screen	Grid	Plate MA.
R-F.	177	80	3	3.6
1st Det.	173	76	7*	.9*
I-F.	177	80	3	3.6
2nd Det.	0	0	0	0
1st A-F.	54	77	6	1.2
Output	159	165	15.5	10.0

* Will vary with dial setting.

MODEL 362 Auto Radio
Installation Data

GULBRANSEN CO.

Suppression of Ignition and Generator Noise

After the receiver is in satisfactory working order, start the motor and note the amount of noise. As a general rule, spark plug suppressors, a distributor suppressor and a ½ mfd. condenser on the generator are all that is required for the reduction of ignition and generator noise. If these items do not reduce the noise sufficiently, other measures as described below are required.

One spark plug suppressor is required for each plug. The method of mounting is shown in Fig. 12. Remove the wire from the top of the plug, put the suppressor on, and attach the wire to the top of the suppressor.

A distributor suppressor is put in the high tension lead, between the coil and the distributor head. Position "C," Fig. 12, on the distributor head is the most satisfactory and most commonly used point of mounting. If this is not practical, the high tension line may be cut *close to the distributor head* and the distributor suppressor with wood screw ends inserted in the line as shown in position "B."

The ½ mfd. generator condenser is installed as shown in Fig. 12. The lead from the condenser goes to one side of the cut-out connection on the generator. The mounting clamp grounds the other side of the condenser.

After the above procedure has been followed, again start the motor. If noisy operation persists, a number of steps can be taken and the various suggestions as given can be tried until the noise is satisfactorily reduced.

Try two suppressors in the high tension line, one at the coil end in addition to one at the distributor end, position "C," Fig. 12.

Ground all cables and tubing which pass through the dash, such as oil lines, gas lines, etc. Ground to the dash or at the nearest convenient point on the frame with a good short ground connection. Use the left-over shield from the "B" battery lead for this purpose.

If the chassis and coil are both in back of the dash (under the cowl), take off the coil and mount it on the front of the dash (in the engine compartment). If the coil cannot be moved, place a copper can over it and ground the can at the coil mounting.

Clean and respace spark plugs—clean and check distributor points—check distributor condenser.

In some cases, the high and low tension leads between the coil and distributor are run close together. In some cases they are in the same conduit. If this is the case, remove the low tension lead from this conduit.

Mounting "B" Eliminator and Relay

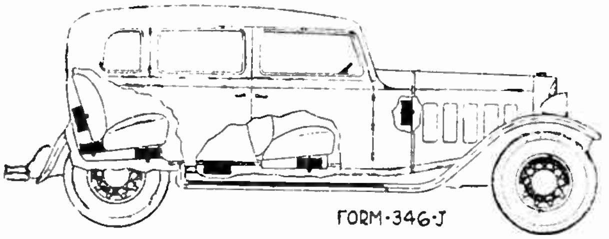


Fig. 7—"B" Eliminator Locations

In addition to the following instructions, a complete installing bulletin for the "B" eliminator is furnished by the manufacturer with each unit. The "B" eliminator can be conveniently mounted in a number of locations in the car as shown in Fig. 7. Under the front seat or in the motor compartment under the hood is a convenient place. The eliminator should be at least 12" away from any ignition or lighting wires of the automobile. Never install the eliminator on end, that is, with the mounting brackets at the top and bottom. Short out the "B" fuse when a "B" Eliminator is used.

In Fig. 1 the "B" eliminator is shown under the front seat, at the right hand side, for illustrative purposes. If, as shown in the illustration, the antenna lead comes down the right front corner post and the "B" eliminator is under the front seat, it should be moved to the left as far as possible. In general, mount it on the opposite side of the car that the antenna lead is installed.

The relay should be mounted near the car storage battery so that the two leads will reach. It is mounted on the frame of the car. Before making any connections to the battery, determine which side is grounded and which side is ungrounded. Then find out if the ungrounded or hot side is positive or negative. This will vary with the make of car.

In Fig. 8 is shown how the connections are made in either case. Unscrew the clamp bolts on the battery and connect lug of yellow lead to the "hot" side of the battery and the lug of the black lead to the grounded side. The bolt goes through the hole in the lug and the lug is bent over. Connect the shielded two-lead cable from the "A" battery and relay to the "B" eliminator. Note that the proper connections will depend on which side the battery is grounded. The "B" cable connections from the chassis may then be completed to the "B" eliminator. It is important that the "B" cable to the eliminator be located as far away from the "A" supply cable as possible. Run them to the "B" eliminator at opposite sides of the car as shown in Fig. 1.

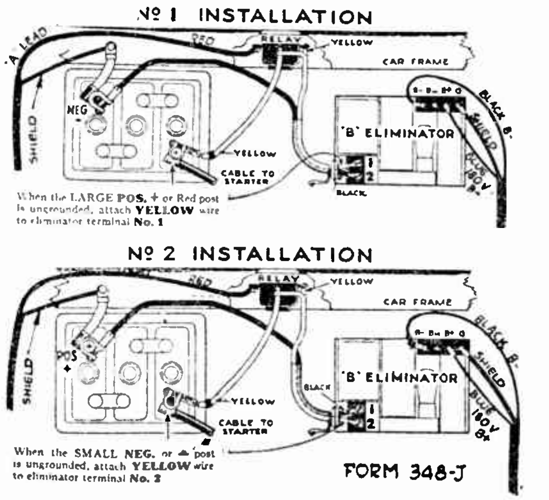


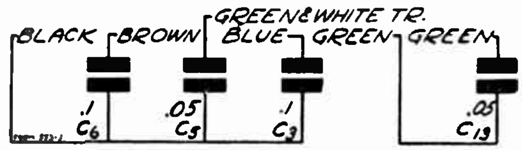
Fig 8—"B" Eliminator Connections

GULBRANSEN CO.

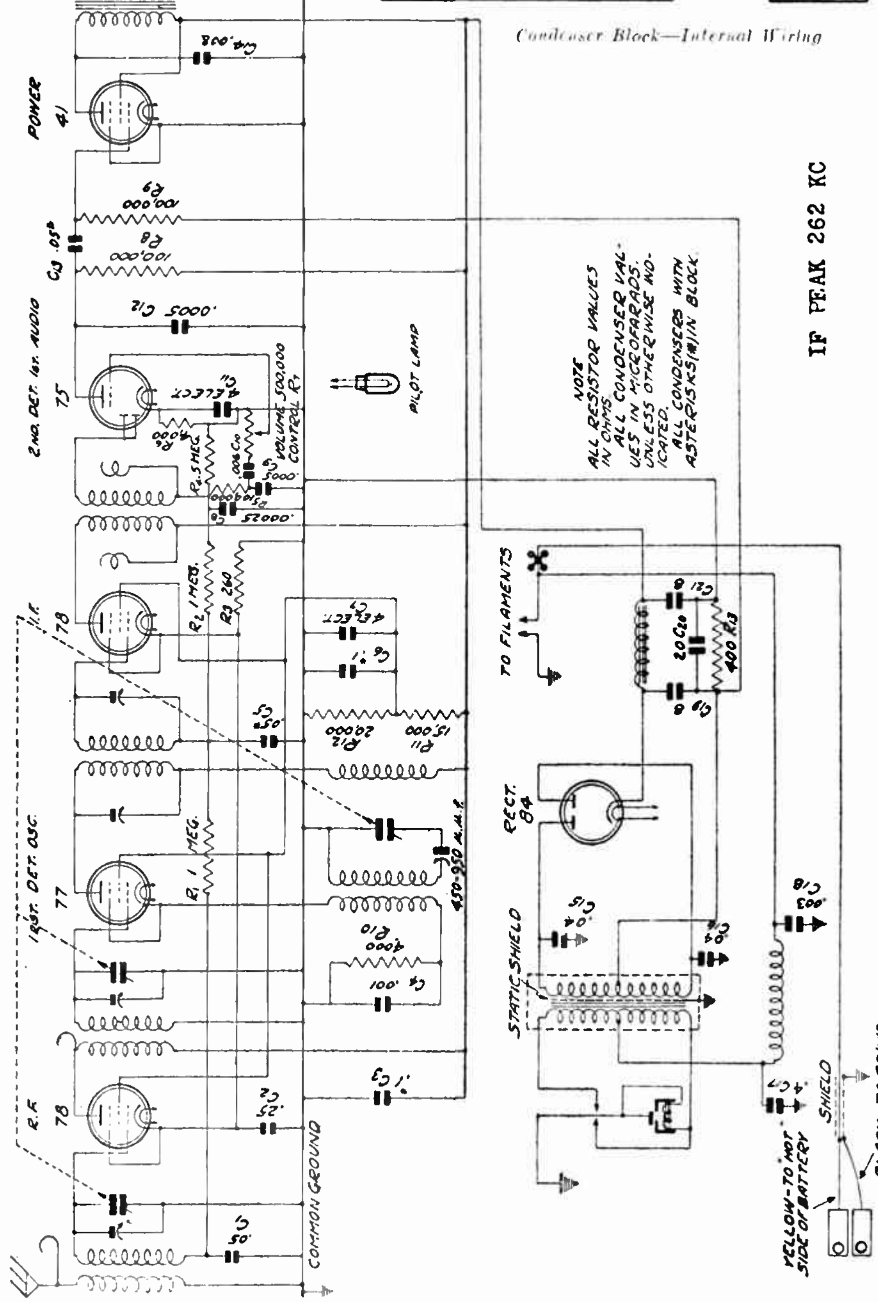
MODEL V622
Schematic
Voltage

	Across Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate MA
78 R.F.	6.1	182	80	3*	7.0
77 1st Det. & Osc.	6.1	178	77	5**	1.3**
78 I.F.	6.1	182	80	3.*	7.0
75 2nd Det. 1st Audio	6.1	70x		1.4*	.35
41 Output	6.1	172.5	176.5	12.5xx	16.0
84 Rect.	6.1	205			17.5 per plate

*-Cathode to Ground. **-Subject to Variation. x-Triode Plate to Cathode
xx-Read Across 400-Ohm Resistor, R13



Condenser Block—Internal Wiring



IF PEAK 262 KC

Trying Out the Set and Adjusting

After the wiring has all been completed and before the chassis is permanently installed, try out the set and adjust the antenna trimmer. The location of the tubes is shown in Fig. 7. To adjust the antenna trimmer, tune in a weak signal between 1200 and 1400 K.C. with the volume control about three-fourths on. On one end of the chassis box is a small metal plate. Remove this plate. Directly under the hole in the chassis box is the antenna trimmer condenser screw. Turn this adjusting screw up or down until maximum output is obtained.

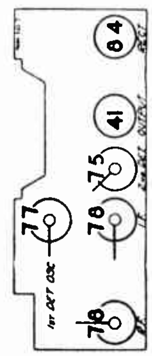


Fig. 7—Location of Tubes

MODEL V6Z2
Alignment
Antenna Notes

GULBRANSEN CO.

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself in broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide accurately calibrated signals over the broadcast band and accurately calibrated signals at and around 262 K.C., the intermediate frequency and an output indicating meter are desirable.

First set the signal generator at approximately 262 K.C. Connect the antenna lead from the generator to the control grid of the I.F. 78 tube, through a .05 mfd. condenser. The ground lead of the generator goes to the ground of the receiver. Turn the rotor plates of the tuning condenser completely out and keep the signal weak enough to prevent A.V.C. action. Note from Fig. 9 that the second I.F. transformer is self tuned and cannot be adjusted. Adjust the frequency of the signal generator until the output meter shows maximum output. The intermediate frequency setting of the generator is then correct, although it may be a very small percentage higher or lower than 262 K.C.

Next connect the signal lead from the signal generator to the grid of the 1st detector tube through a .05 mfd. condenser. Then adjust the two intermediate frequency condensers for maximum output. One of the I.F. condenser screws is reached through the hole on the top of the 1st I.F. assembly can. The other I.F. condenser screw is reached from the bottom of the sub-panel through a hole at the bottom of this assembly.

Now set the signal generator for a signal of exactly 1400 K.C. The antenna lead from the generator is, in this instance, connected to the antenna lead of the receiver. Connect the flexible drive shaft to the chassis if it has been disconnected. As explained previously, the dial scale should be at the low frequency end stop when the rotor is completely in mesh. Then turn the station selector knob until the dial scale is at 1400 K.C.

Then adjust the three trimmer condensers on the gang tuning condenser for maximum output, adjusting the oscillator section first.

Next, set the signal generator for a signal of 600 K.C. and adjust the oscillator 600 K.C. trimmer. The adjusting screw for this condenser is reached through a hole in the back wall of the sub-panel.

A non-metallic screwdriver is necessary for this adjustment. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting, at the same time adjusting the 600 K.C. trimmer screw until the highest output is obtained.

Then set the signal generator again for a signal of 1400 K.C. and check the adjustment of the tuning condenser trimmers at this frequency for maximum output.

Antenna

A roof antenna is recommended, as by far the best results will be obtained. A large percentage of cars at the present time come equipped by the factory with built-in roof antennas. In those cars which do not have an antenna, one will have to be put in.

First determine if the top has a grounded chicken wire mesh. To do this, use a continuity meter. By means of a wire, attach a darning needle to one of the prods. Poke the darning needle into the roof material and turn it around until it comes in contact with the chicken wire. Then ground the other prod and if the continuity meter shows a complete circuit, the chicken wire mesh is grounded. In a case of this kind, it will be necessary to get inside of the roof and it is advisable to employ the services of an auto "top man" or an upholsterer.

It will be necessary to remove the top material and cut away the chicken wire from the side supports until it is at least 3″ away from ground at any point. It should also be at least 3″ away from the dome light and the dome light wiring. The chicken wire may then be laced to the points from which it was cut with a heavy, waxed cord. The chicken wire will then make a satisfactory antenna, or a copper screen may be used.

If the chicken wire is not grounded, it may be used as the antenna by taking down the roof material at one corner and soldering the lead-in wire to it. If it is not desired to take down the roof material a piece of copper screening can be tacked to the roof on the inside of the car. At least six square feet should be used. Keep it at least 3″ away from any grounded metal parts on all sides. After the screen is in place, it can be covered over with cloth which matches the roof material. Solder the lead-in wire to the screen and bring it down the front corner post nearest to the set.

Another, and a very simple way in which an antenna can be secured to the inside of the car roof is to use one of the car-roof antennas which are now being made up especially for this purpose. There is one type of antenna which consists of copper strips laid back and forth between two pieces of cardboard. The cardboard is then covered over with material which matches the roof material. This antenna can be had in several colors and is tacked in place on the inside of the car roof in a few minutes.

GULBRANSEN CO.

MODEL V622
Service Notes

If the Receiver Fails to Operate

"A" Fuse— Check the "A" line fuse in the chassis box.

"A" Line Open—See if power is being supplied to the speaker, tube heaters, and "B" eliminator.

"B" Eliminator Not Working—See if the "B" eliminator is in proper working order by checking the high voltage points at the tube plate terminals (see Fig. 9).

Antenna and Lead—See if antenna is properly connected to lead-in wire and antenna lead from set. Be sure antenna system is not grounded at any point.

All Tubes Not Inserted—See if all tubes are inserted as per Fig. 7.

Defective Tubes—Try out a new set of tested tubes.

Grid Caps Not Connected—See if all grid caps are properly connected to top of top grid connection tubes.

Variable Condenser Plates Shorted—Check condenser sections in chassis carefully for foreign particles or rotor stator rubbing.

Weak Reception

Defective Tubes—Try out a new set of tested tubes and note any difference in performance.

Poor Antenna—To try out the effectiveness of the antenna used, check the volume against the volume when using a straight length of wire about 15′ long, run out of the car through one of the windows. If, upon test, the external wire is found to be much superior as far as volume is concerned, the antenna is not satisfactory and will have to be re-vamped or a new one installed. The antenna or lead-in may be too near grounded metal portions of the car frame or body resulting in a high capacity to ground. There may be grounded metal mesh in the car roof. There may be a poor soldered connection between the antenna, lead-in, or antenna lead from the set. The antenna system may be partially grounded at some point.

Antenna Trimmer Not Adjusted—See article "Trying Out the Set and Adjusting."

Car in Shielded Location—If the car is within or near a steel structure, the signals may be weakened by absorption.

Storage Battery Run Down—Check the condition of the battery.

Defective "B" Eliminator—Check "B" voltage at sockets (see voltage chart and Fig. 9).

Misalignment of Variable Tuning Condensers—Instructions for realigning are contained in this manual. Do not, however, attempt realignment unless other causes of low volume have first been investigated.

Wrong Voltages—Check voltages at the sockets (see voltage chart).

Other Causes of Low Volume—Defective speaker, poor battery, antenna, grid cap or other connections, defective A.V.C. system in the receiver, and various opens, grounds and shorts in the receiver assembly.

Distorted Reproduction

Receiver Oscillating—See article on oscillation.

Defective Tubes—Try out a new set of tubes.

Incorrect Voltages—Check the voltages at the sockets (see voltage chart).

Incorrect Tuning—The signal must be carefully tuned in to the clearest and loudest point. It must not be tuned "off resonance."

Defective Speaker—Try out a new one if it is available.

Defective Audio System in the Receiver—Make continuity resistance tests using as a guide Fig. 9.

Signal Transmission—Quality fading in the signal transmission can cause poor tone quality.

Oscillation

Cover of Box—May not be on or if on, may not be sufficiently tightened down.

Off Characteristic Tubes—Tubes whose characteristics vary considerably from the standard may cause oscillation. Try out some new ones.

Open Bypass Condensers—Check the bypass condensers and leads to them for open circuit.

Poor Ground Connections—Check the ground connections in the chassis for poor contact.

Grid Caps and Leads—The grid caps may not be making good contact to the tops of the tubes or the wires of the grid caps may be too close together.

MODEL V6Z2
Service Notes

GULBRANSEN CO.

Care and Maintenance

Advancing Generator Charging Rate

The installation of the automobile radio imposes an additional drain on the car storage battery. This can be compensated for by advancing the charging rate of the car generator. Check the state of charge of the storage battery about a week after the installation of the automobile radio is made and adjust the charging rate accordingly.

Tubes

The type of tubes used and location of these tubes in the chassis are shown in Fig. 7. These tubes are of a sturdy, rugged construction designed especially for an auto receiver. Most of them, under normal usage, will last for many months and in some cases, years. Some of them, however, may become faulty after a few months of operation.

For that reason, it is advisable to secure a new set of tested tubes at intervals of three to six months and have these inserted in the receiver one at a time, noting any difference in performance.

Pilot Lamp

The pilot lamp is located in the control unit. A 6-8 volt miniature base lamp is used. To replace the lamp, first turn the receiver off. Remove the two control knobs and the key entry nut. Then take out the screw holding the control box cover in place after which the cover can be taken off. The pilot lamp socket is secured to a spring clip which is on a bracket in the control unit. Push this clip and socket over far enough to get at the lamp, after which the bulb can be replaced and the control unit reassembled.

Fuse

A 10 amp. automobile fuse is used for the "A" line. This fuse is mounted on a block on the power transformer in the chassis. To change the fuse, it will be necessary to remove the cover of the chassis box.

Electrical Condition of Car

Dirty spark plugs, incorrect spacing of distributor points, faulty distributor condenser, and various other items in the car electrical system can cause noisy operation. If the customer complains of noise in the receiver after it has been in use for some time, check the items mentioned as well as other parts of the car electrical system for poor connections, grounds, and other faults which may be responsible for the noise.

Circuit

The circuit consists of an antenna stage, a 78 R.F. stage, a 77 1st detector-oscillator stage, a 78 I.F. stage, a 75 dual diode-triode tube, which functions as a diode 2nd-detector and triode 1st audio stage, and a single 41 output stage. An 84 full wave rectifier is used in the power unit. The intermediate frequency is 262 K.C. The diode current establishes a drop across a resistor which is used as additional bias voltage for the R.F. and I.F. tubes giving automatic volume control action. Noise suppression between stations is obtained by the resistor in the cathode circuit of the 75 tube, the drop across which must be overcome before rectification in this tube begins. The manual volume control varies the audio voltage applied to the grid of the 75 tube.

A vibrator interrupts the current through the primary of the power transformer in the power unit. This, together with the turns ratio in this transformer, results in the high voltage AC being present in the secondary of the transformer. The full wave rectifier tube, filter choke, and filter condensers convert this high voltage AC into high voltage DC for the plate and screen circuits.

Current for the receiver is obtained from the car storage battery.

Rattle

If rattle is experienced when a signal is being received, it is, in practically all cases, due to mechanical vibration at some point in the chassis. Inspect the chassis and look for a loose tube shield or a loose part at some point which can rattle against another part. When the vibrating part is found, secure it in place in some manner. This can generally be done with a wedge made of a piece of paper, cardboard or wood. Rattle may, in some instances, be due to a loose cover. If this is the case, remove the cover and bend the edge of the chassis box outward between the screw holes so that the cover will fit tightly when it is put on.

GULBRANSEN CO.

MODEL V6Z2
Parts List

Replacement Parts for Series V6Z2 Receivers

CHASSIS PARTS

Part No.	Description	List Price
P-1780	No. 75 Tube Socket	$0.10
P-1761	No. 77 Tube Socket	.10
P-1762	No. 78 Tube Socket	.10
P-1665	No. 41 Tube Socket	.10
P-1803	No. 84 Tube Socket	.10
P-1805	Single Pin Jack	.10
P-1799	Tube Shield Assembly	.25
P-20681	Chassis Box	4.00
P-20657	Chassis Box Cover	1.10
P-20680	Angle Plate	.25
P-70740	Shielded Antenna Lead	.40
P-70744	Shielded "A" Battery Lead	1.15
P-1824	Anchor Bushing, complete with nuts and washers	.35
P-1804	Vibrator Unit (in cast metal case)	6.00
P-10266	Vibrator Unit Rubber Cushion, pair	.10
P-20660	Vibrator Unit Box	.70
P-20661	Vibrator Unit Box Cover	.20
P-1572	Fuse Clip Assembly	.10
P-10260	Cardboard Baffle	.20
P-1624	10 Amp. Fuse	.10
P-1774	Electrodynamic Speaker	3.75
P-20675	Volume Control and Pinion Gear Bracket	.15
P-20545	Pinion Bearing	.10
P-20546	Pinion Compression Spring	.10
P-20544	Pinion Bracket	.10
P-20586	Drive Pinion	.10
P-20585	Cond. Drive Gear	.25
P-30417	Volume Control Coupling	.10
P-10263	Rubber Tube Bumper—Square	.10
P-10210	Rubber Tube Bumper—Round	.10
P-10213	Rubber Band for Tube	.10
P-50569	Filter Choke Assembly	1.60
P-50585	Power Trans. Assembly—Less condensers and brackets	3.25
P-5099	Antenna R. F. Transformer—Less Can	1.20
P-5065	Interstage R. F. Transformer—Less Can	1.00
P-5105	Second I. F. Transformer and Can Assembly	.95
P-5096	First I. F. and Oscillator Transformer and Can Assembly	2.70
P-5097	Single Solenoid "A" Choke	.25
P-40431	Antenna R. F. Can	.15
P-1826	Interstage R. F. Can	.10

Resistors

Part No.	Code No.	Resistance	Type	List Price
P-A95105	R-1	1 Megohm	Carbon	$0.25
P-A95105	R-2	1 Megohm	Carbon	.25
P-B94261	R-3	260 ohm	Carbon	.35
P-A95504	R-4	.5 Megohm	Carbon	.35
P-A95104	R-5	100,000 ohm	Carbon	.25
P-A94402	R-6	4,000 ohm	Carbon	.20
P-A91061	R-7	0-500,000 ohm	Volume Control and Switch	$1.15
P-A95104	R-8	100,000 ohm	Carbon	.25
P-A95104	R-9	100,000 ohm	Carbon	.25
P-A94402	R-10	4,000 ohm	Carbon	.20
P-B94153	R-11	15,000 ohm	Carbon	.25
P-B94203	R-12	20,000 ohm	Carbon	.25
P-C94401	R-13	400 ohm	Carbon	.20

Condensers

Part No.	Code No.	Capacity	Voltage	Type	List Price
P-80862	C-1	.05 mfd.	200 V.	Tubular	$0.30
P-80888	C-2	.25 mfd.	200 V.	Tubular	.35
P-80821-B	C-4	.001 mfd.	600 V.	Molded	.25
P-80937	C-7 C-11	4.0 mfd. 4.0 mfd.		Electrolytic Block in can	1.25
P-80919	C-8	.00025 mfd.	600 V.	Molded	.20
P-80945	C-9	.0005 mfd.	600 V.	Molded	15
P-80898	C-10	.006 mfd.	600 V.	Tubular	15
P-80945	C-12	.0005 mfd.	600 V.	Molded	.15
P-80960	C-14	.008 mfd.	600 V.	Tubular	20
P-80963	C-15 C-16	.04 mfd. .04 mfd.	400 V. 400 V.	Dual Tubular	30
P-80960	C-17	.4 mfd.	15 V.	In Metal Can	.50
P-80959	C-18	.003 mfd.	600 V.	Molded	.35
P-80956	C-19 C-20 C-21	8.0 mfd. 20.0 mfd. 8.0 mfd.	225 V. 25 V. 225 V.	Electrolytic Block in Can	2.25
P-80953	C-3 C-5 C-6 C-13	.1 mfd. .05 mfd. .1 mfd. .05 mfd.	300 V. 200 V. 200 V. 300 V.	Bypass Block in Can	1.35
P-1539	600 K. C. Trimmer Condenser				.45
P-80957	Three-Gang Variable Condenser				3.00

CONTROL UNIT PARTS

Part No.	Description	List Price
P-1816	Celluloid Dial Strip Only	$0.15
P-1825	Dial Gear and Strip Assembly	.40
P-20509B	Control Unit Swivel	.15
P-20510A	Steering Post Apron	.30
P-20511	Steering Post Clamp	.15
P-20689	Control Unit Cover	.35
P-70746	Pilot Lamp Cable Only	.40
P-1415A	Pilot Lamp Socket and Clip	.15
P-1563A	6-8 Volt Pilot Lamp	.25
P-20692	Volume Control Drive Shaft	.10
P-20703	Drive Shaft Pinion	.15
P-20691	Dial Gear Pinion (Hollow Center)	.15
P-30413	Entry Plate Assembly for Key	.30
P-30414	Key	.15
P-1813	Small Knob	.15
P-1814	Large Knob	.20

ADDITIONAL ITEMS

1—1550	14" Flexible Drive Shaft	.90 ea.
1—1553	20" Flexible Drive Shaft	1.25 ea.
1—1551	34" Flexible Drive Shaft	1.65 ea.
1—1552	45" Flexible Drive Shaft	2.00 ea.
1—91011	Spark Plug Suppressor	.50 ea.
1—91012	Distributor Suppressor, Wood Screw Ends	.50 ea.

MODEL V6Z2
Mounting Notes

GULBRANSEN CO.

Mounting the Chassis

The chassis is mounted on the dash by means of two brackets as shown in Fig. 2. Two mounting screws are used to secure each bracket to the end of

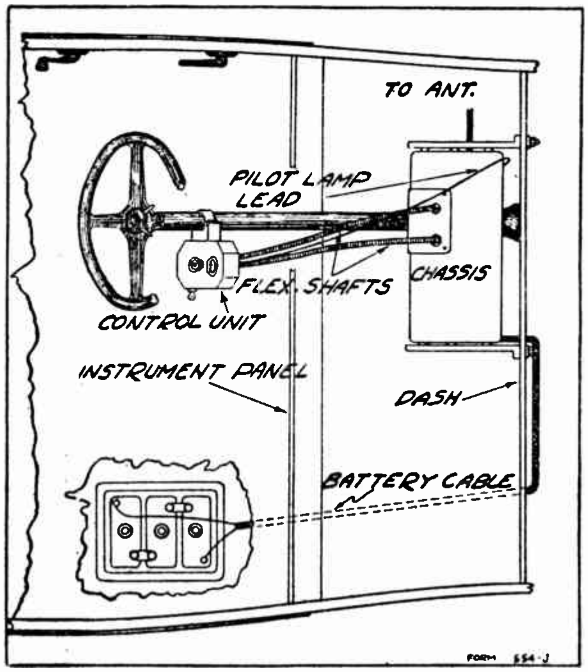


Fig. 2—General Installation—Top View

the chassis box. Six embossings with inset nuts are provided on each end of the chassis box. Any two of these may be used for the bracket screws, thus providing great flexibility in mounting.

Each nut has a mounting screw in it and if any of these are in the way of the mounting bracket, they can be taken out.

The chassis should be mounted with the speaker grill facing toward the driver. In this position, the anchor bushings in which the flexible drive shafts are placed will come out of the top.

The location of the chassis will very often depend on the space available. To the left of the center, as shown in Fig. 2, is a good location. The chassis should be mounted in such a way that the flexible drive shafts to the control unit will be in as straight a line as possible or with large radius bends. *In general, it will be advisable to consider the possibility of a car heater installation at the right side of the dash (facing forward)*. In practically every case no difficulty will be experienced in mounting the heater and chassis on the dash.

The possibility of interference with the legs of the driver or passenger in the front seat and the possibility of interference with the controls of the car should also be considered before the location of the chassis is definitely decided on.

Before mounting the chassis read the section on "Attaching the Flexible Drive Shafts."

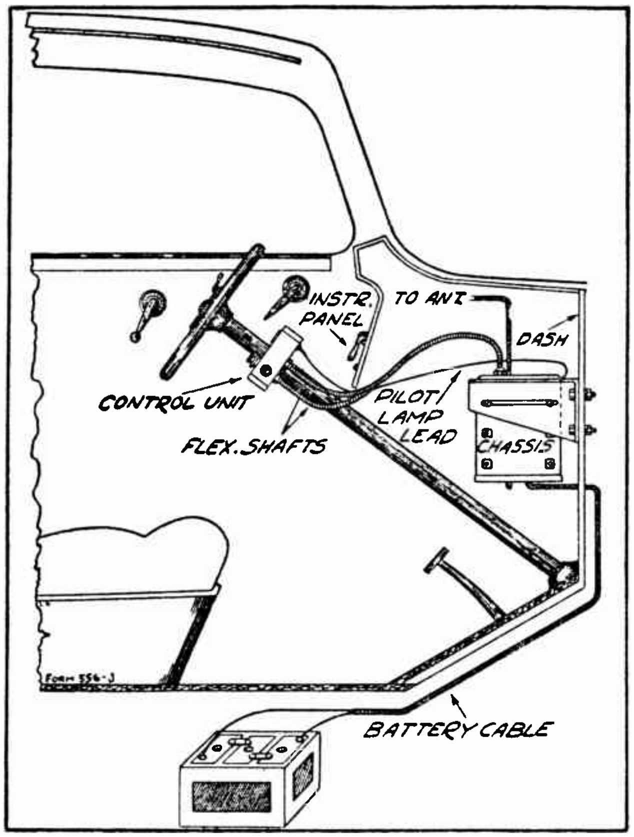


Fig. 3—General Installation—Side View

When the location is decided on, drill the four mounting holes required. The location and size of these holes is shown in Fig. 4. A template for drilling these holes is supplied with the receiver. Four ¼" mounting bolts, four washers, four lockwashers, and four nuts are provided. The mounting bolt is put through the bracket and dash with the shank

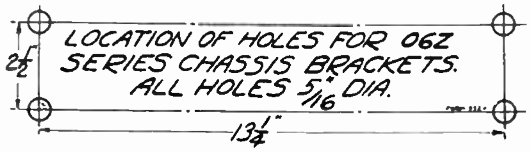


Fig. 4—Mounting Hole Location

extending into the engine compartment. A washer the lockwasher and nut, are then put on. Mount the brackets permanently, but do not mount the chassis permanently until all connections are completed, the tubes are all inserted, the receiver tried out, and the antenna trimmer adjusted (explained later).

GULBRANSEN CO.

MODEL V6Z2
Flexible Drive

Attaching the Flexible Drive Shafts

After the control unit and chassis are in position, the flexible drive shafts may be attached. Two 34" shafts are supplied, unless otherwise specified. These shafts may also be had in 14", 20", and 45" lengths.

The flexible drive shafts should always be installed with a minimum amount of bending. Always keep the radius of the bend as large as possible.

The 34" shafts supplied with the receiver may be cut to a shorter length if necessary. The shaft (inside portion) should first be brazed at the point to be cut. It should then be cut with a three-corner file or edge of a grinding wheel. *Do not use a hack saw.* After the shaft is cut, file it down in one place a slight amount to provide a flat surface for the set screw. The casing which is 1½" shorter must be cut to correspond. This should be tinned or brazed first at the point to be cut and may then be cut with a hack saw.

After the length and position of the shafts is decided on they may be secured to the chassis. The shafts are already secured at the control unit. It is advisable to attach the flexible shafts with the chassis on the mounting brackets, but if the chassis is accessible, it may be removed from the brackets. Keep it as close to its regular position as possible so that the flexible shaft will not turn after the chassis is replaced on the brackets. In general, it may be moved up or down, but should not be moved sideways or be turned. Just over the speaker grill on the chassis box will be seen an angle plate. Remove this plate. Before proceeding further with attachment of the shafts see if the receiver is in working order by operating it with the cover off and necessary connections completed, as explained further in this manual.

In Fig. 5 is shown a cross sectional view of the flexible drive shaft connections at the chassis end. First put the angle plate on the chassis box temporarily with two screws. Then center the volume control anchor bushing on this plate. To do this, loosen the nut which holds this bushing in place (see Fig. 5). Center the bushing by eye so that the center of it is in a line with the center of the volume control coupling. Then tighten the nut down.

Next, take the angle plate off. Extend the volume control flexible shaft and casing several inches through the hole in the anchor bushing of the angle plate so that the plate will be on the casing and out of the way. Turn the volume control coupling counter-clockwise until the switch is snapped to the off position. Lock the receiver on the control unit and turn the volume control knob counter-clockwise until it is in the locked position. Then loosen both set screws in the volume control coupling and insert the flexible shaft in the coupling (see Fig. 5). Tighten the outer set screw first on one of the *four flat faces* of the flexible shaft and then tighten the inner set screw. For purposes of illustration, the set screws in Fig. 5 are shown extending sideways in the coupling, but should actually extend towards the box opening in order to get at them. Then temporarily place the chassis on the mounting brackets if it has been taken off and check the operation of the switch, volume control, and lock. The switch should be off when the volume control knob is in the locked position. It may be necessary to loosen the inner set screw and do a slight amount of adjusting until the proper setting is obtained.

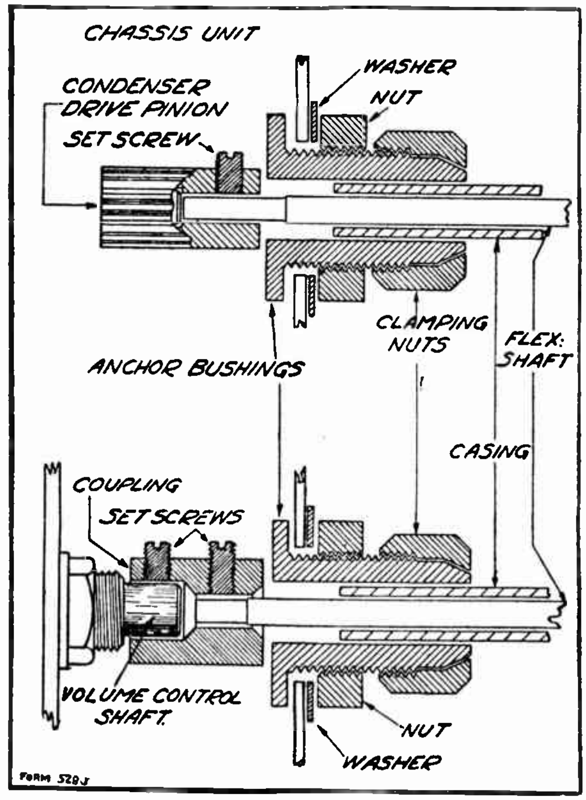


Fig. 5—Details of Flexible Drive Shaft Connections

To attach the tuning condenser flexible shaft, first center the anchor bushing by eye as was explained above. Then extend the tuning condenser flexible shaft into the hole at the center of the tuning condenser drive pinion. Turn the large gear on the tuning condenser rotor shaft until the rotor plates are completely in mesh. Then turn the station selector knob on the control unit until the dial gear is at the low frequency end stop. The set screw in the drive pinion should then be tightened down on one of the four flat faces of the shaft.

The operation of this control should also be tried out after the shaft is in place. In order to get accurate calibration it may be necessary in some instances to loosen the set screw of the large gear on the tuning condenser rotor shaft and adjust the setting of this gear.

Next, slide the angle plate into position and fasten it in place by means of the four screws. Then tighten down the clamping nuts on the two flexible shaft casings, *but do not tighten these nuts excessively.*

MODEL V6Z2
Control Unit
Wiring Data

GULBRANSEN CO.

Mounting the Control Unit

The control unit is mounted on the steering column under the steering wheel as shown in Figs. 2 and 3. A clamp is used to hold it in position.

The outer portion of the clamp is screwed to the inner portion by means of the four 8-32x3/8" fillister head screws supplied with the receiver. See Fig. 1.

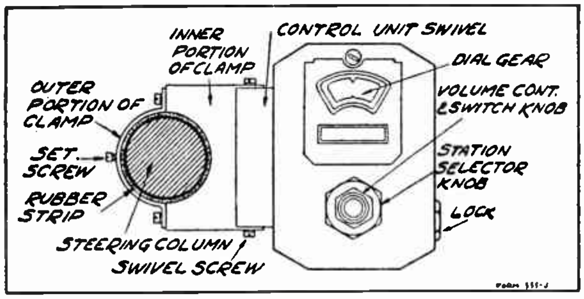


Fig. 1—Method of Mounting Control Unit

Two rubber strips are provided, one 1/8" thick and the other 1/16" thick. These are wrapped around the steering column under the clamp. Either or both of these strips may be used, depending on the thickness of the column. Wrap the rubber strips around the column in such a way as to allow the set screws which hold the clamp in position to pass through. When the clamp is in place, take the two 8-32 headless cup point set screws and screw them down on the steering column through the tapped holes in the clamp.

The control unit is generally about 4" below the wheel, but this will vary with individual cases. The length of the drive shaft and interference with driver's legs will also govern the location of the control unit.

There are two screws which hold the inside portion of the clamp to the control unit swivel. By loosening these two screws, the box can be swung around if such a position is handier from the standpoint of the person operating the set. Instructions for attaching the pilot lamp lead are contained in the article "Completing the Wiring Connections."

Completing the Wiring Connections

Pilot Lamp

The pilot lamp lead is in a shielded cable which extends out from the control unit box. On the rear wall of the chassis, near one of the ends, will be seen a tip jack. Insert the tip on the end of the pilot lamp lead into this jack. There is also a pigtail or shield extension at the end of this lead. Ground this pigtail with one of the angle plate screws (see Fig. 6). Double up the pilot lamp lead if it is too long—*Do not cut this lead.*

Antenna Cable

Bring the antenna cable of the receiver in the most direct manner possible to the lead-in from the antenna and connect it to the latter. Keep it as high as possible and as far away from any car wiring as possible. Care should be taken not to have the antenna wire come in contact with the shield wires. Ground the pigtail of the antenna cable shield at the antenna end. The pigtail of this shield at the chassis end is grounded under one of the chassis mounting screws.

In some cases the shielded antenna lead from the receiver is not long enough to reach to the column at which the antenna lead-in comes down. In a case of this kind, cover the exposed portion of the lead-in wire with braided shield from the point where it leaves the column to the point of connection to the antenna lead of the receiver. Connect the two wires together and connect the two shields together, care being taken that no strand of the shield touches the antenna wire.

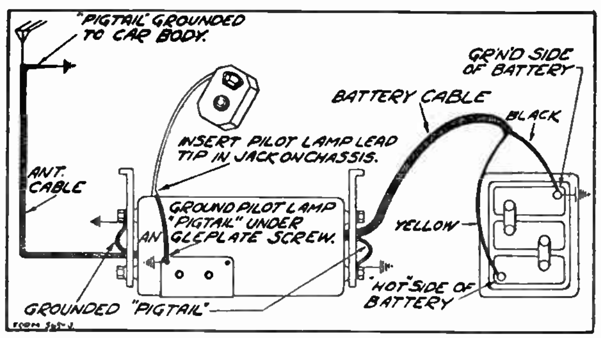
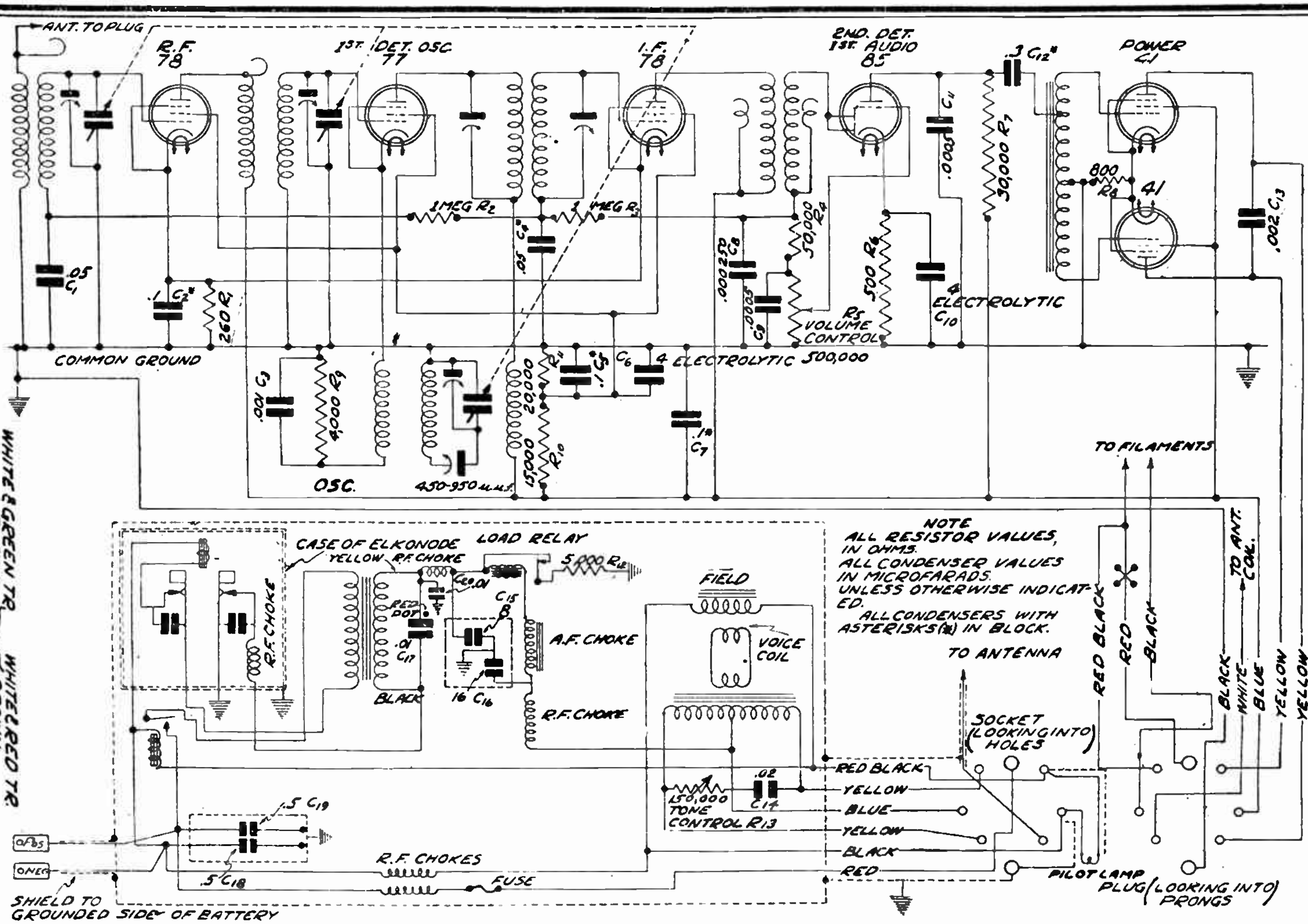


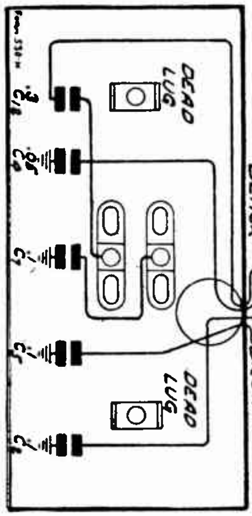
Fig. 6—External Wiring Connections

Battery Cable

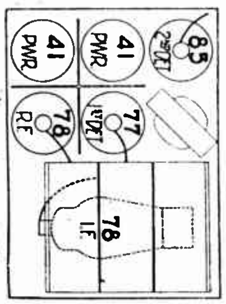
The battery cable should be brought over to the storage battery in the most convenient manner possible. In Figs. 2 and 3 it is shown passing through a hole in the dash, thence down and under the floor board to the battery. In other installations, it may be more convenient to bring this cable down in back of one of the side pads and thence to the battery. The lug on the yellow lead of this cable is connected to the "Hot" or ungrounded side of the battery (the "Hot" or ungrounded side may be positive or negative, depending on the make of car). The lug on the black lead is connected to the grounded side of the battery. The pigtail of the shield of this cable at the chassis end should be grounded under one of the chassis mounting screws.

IF PEAK 262 KC





Condenser Block—Internal Wiring



Location of Tubes

	Across Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate MA
78 R.F.	6.1	182	80	3**	7.0
77 1st Det.& Osc.	6.1	178	77	5 x	1.3 x
78 I.F.	6.1	182	80	3**	7.0
85 2nd Det.& 1st A.F.	6.1	70*		1.8**	3.5
41 Output	6.1	162	168.5	17	11.0

*-Triode Plate to Cathode. **-Cathode to Ground x-Subject to variation

NOTE:- All voltages are at 185 volts input from "B" Eliminator

GULBRANSEN CO.

MODEL 06-W
Schematic
Voltage
Socket

MODEL 06-W
Alignment

GULBRANSEN CO.

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself in broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide accurately calibrated signals over the broadcast band and accurately calibrated signals at and around 262 K.C., the intermediate frequency and an output indicating meter are desirable.

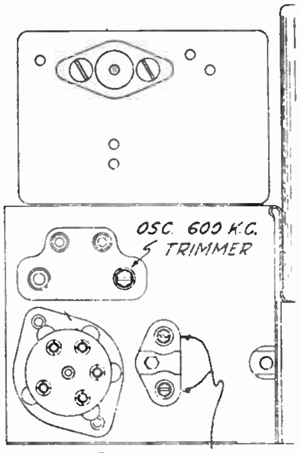


Fig. 12—Location of Trimmers

First set the signal generator at approximately 262 K.C. Connect the antenna lead from the generator to the control grid of the I.F. 78 tube, through a .05 mfd. condenser. The ground lead of the generator goes to the ground of the receiver. Turn the rotor plates of the tuning condenser completely out and keep the signal weak enough to prevent A.V.C. action. Note from Fig. 10 that the second I.F. transformer is self tuned and cannot be adjusted. Adjust the frequency of the signal generator until the output meter shows maximum output. The intermediate frequency setting of the generator is then correct, although it may be a very small percentage higher or lower than 262 K.C.

Next connect the signal lead from the signal generator to the grid of the 1st detector tube through a .05 mfd. condenser. Then adjust the two intermediate frequency condensers for maximum output. The location of the adjusting screws for these condensers is shown in Fig. 12.

Now set the signal generator for a signal of exactly 1400 K.C. The antenna lead from the generator is, in this instance, connected to the antenna lead of the receiver. Connect the flexible drive shaft to the chassis if it has been disconnected. As explained previously, the dial scale should be at the low frequency end stop when the rotor is completely in mesh. Then turn the station selector knob until the dial scale is at 1400 K.C.

Then adjust the three trimmer condensers on the gang tuning condenser for maximum output, adjusting the oscillator section first (section farthest from drive gear).

Next set the signal generator for a signal of 600 K.C. and adjust the oscillator 600 K.C. trimmer. The location of this condenser is shown in Fig. 12.

A non-metallic screwdriver is necessary for this adjustment. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting, at the same time adjusting the 600 K.C. trimmer screw until the highest output is obtained.

Then set the signal generator again for a signal of 1400 K.C. and check the adjustment of the tuning condenser trimmers at this frequency for maximum output.

Circuit

The circuit consists of an antenna stage, a 78 R.F. stage, a 77 1st detector-oscillator stage, a 78 I.F. stage, an 85 duo-diode-triode tube which functions as a diode 2nd detector and triode 1st audio stage, and two 41 tubes in a semi-Class "B" output stage. The intermediate frequency is 262 K.C. The diode current establishes a drop across a resistor which is used as additional bias voltage for the R.F. and I.F. tubes giving automatic volume control action. Noise suppression between stations is obtained by the resistor in the cathode circuit of the 85 tube, the drop across which must be overcome before rectification on this tube begins. The manual volume control varies the audio voltage applied to the grid of the 85 tube.

The "B" eliminator and speaker are in one box. A vibrator interrupts the current through the primary of the transformer in the "B" eliminator. Another vibrator in the secondary circuit operating at the same frequency acts as a rectifier. The on-off relay in the "B" eliminator closes the primary circuit when the set switch is turned on. The load relay provides a load current for the secondary circuit if the "B" line is drawing less than normal current.

Trying Out the Set and Adjusting

After the wiring has all been completed and before the chassis is permanently installed, try out the set and adjust the antenna trimmer condenser. The location of the tubes is shown in Fig. 8. Do not start the engine of the car yet.

To adjust the antenna trimmer, tune in a weak signal between 1200 and 1400 KC with the volume control about three-quarters on. On one end of the chassis box is a small metal plate. Remove the two screws which hold this plate in place. Directly under the hole in the chassis box is the antenna trimmer condenser screw. Turn this adjusting screw up or down until maximum output is obtained.

If the receiver fails to operate, check the items as given under the article by that name.

GULBRANSEN CO.

MODEL 06-W
Mounting Data

Mounting the Control Unit

The control unit is mounted on the steering column under the steering wheel as shown in Figs. 1 and 2. A clamp is used to hold it in position.

The outer portion of the clamp is screwed to the inner portion by means of the four 8-32x3/8" fillister head screws supplied with the receiver.

Two rubber strips are provided, one 1/8" thick and the other 1/16" thick. These are wrapped around the steering column under the clamp. Either or both of these strips may be used, depending on the thickness of the column. Wrap the rubber strips around the column in such a way as to allow the set screws which hold the clamp in position to pass through. When the clamp is in place, take the two 8-32 headless cup point set screws and screw them down on the steering column through the holes in the clamp.

The control unit is generally about 4" below the wheel. but this will vary with individual cases. The length of the drive shaft and interference with driver's legs will also govern the location of the control unit.

There are two screws which hold the inside portion of the clamp to the bracket on the box. By loosening these two screws, the box can be swung around if such a position is handier from the standpoint of the person operating the set. Instructions for attaching the pilot lamp are contained in the article "Completing the Wiring Connections."

Mounting the Chassis

The chassis is mounted in back of the dash as shown in Figs. 1 and 2. It should be mounted in such a way that the flexible drive shafts to the control unit will be in as straight a line as possible. The chassis is mounted with the anchor bushing into which the flexible drive shafts go, facing the control unit. In the illustrations mentioned above, the chassis is on the right side of the dash which is a good location from the standpoint of flexible drive shaft arrangement. *Before mounting the chassis read the section on "Attaching the Flexible Drive Shafts."*

The chassis is secured to the dash by means of the dash mounting plate (see Fig. 3). First drill the three mounting holes required for the dash mounting plate. The location and size of these holes is shown in Fig. 3. A template for drilling these holes is supplied with the set. Three 4" square head mounting bolts are supplied. Take two of these,

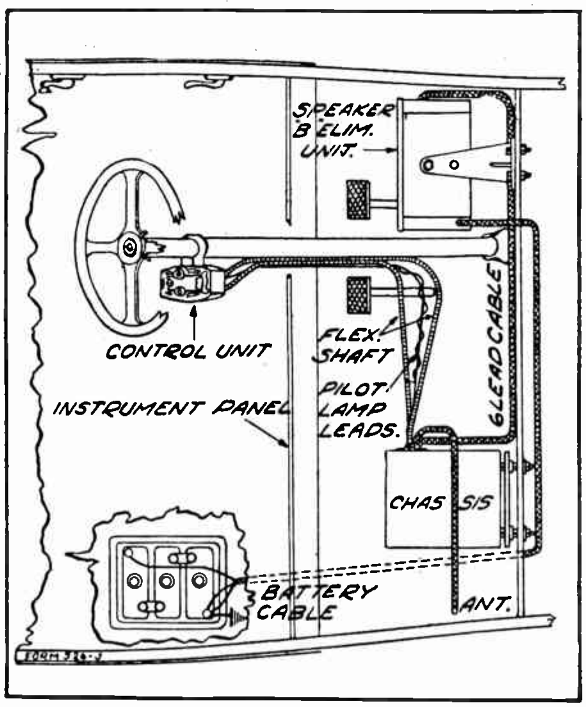


Fig. 1—General Installation—Top View

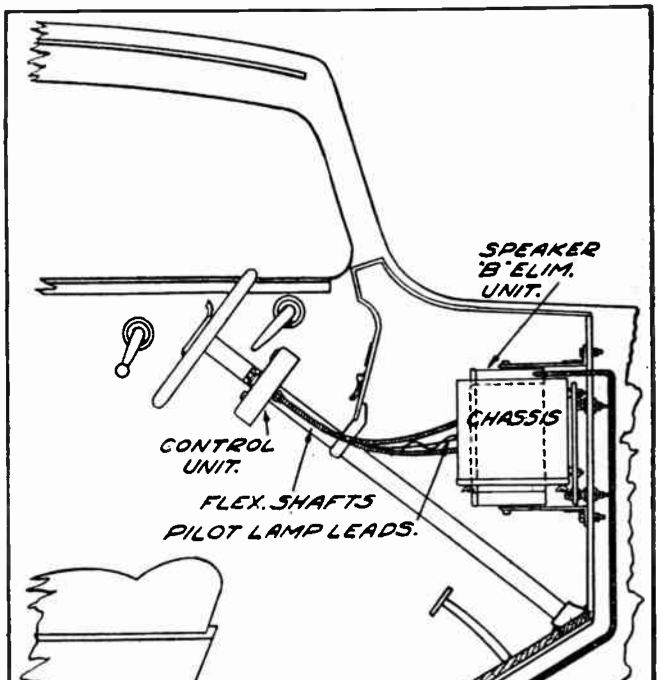


Fig. 2—General Installation—Side View

MODEL 06-W
Mounting Data

GULBRANSEN CO.

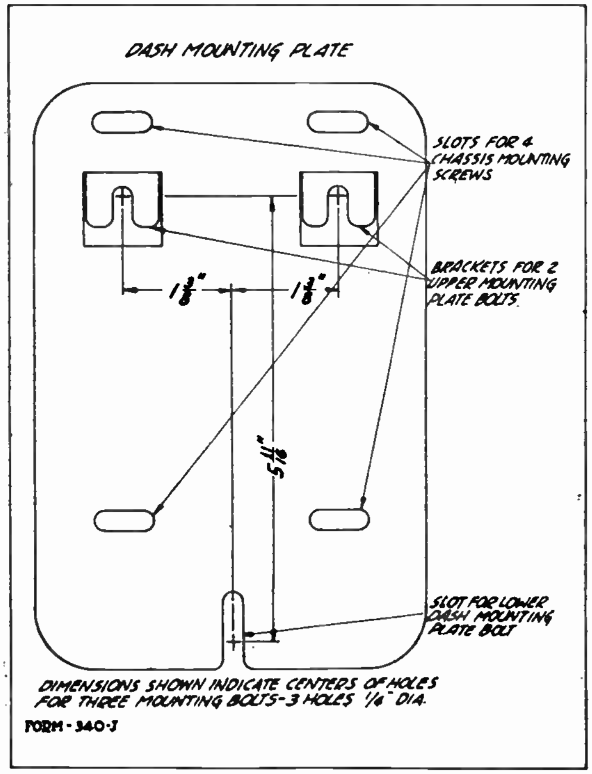


Fig. 3—Dash Mounting Plate

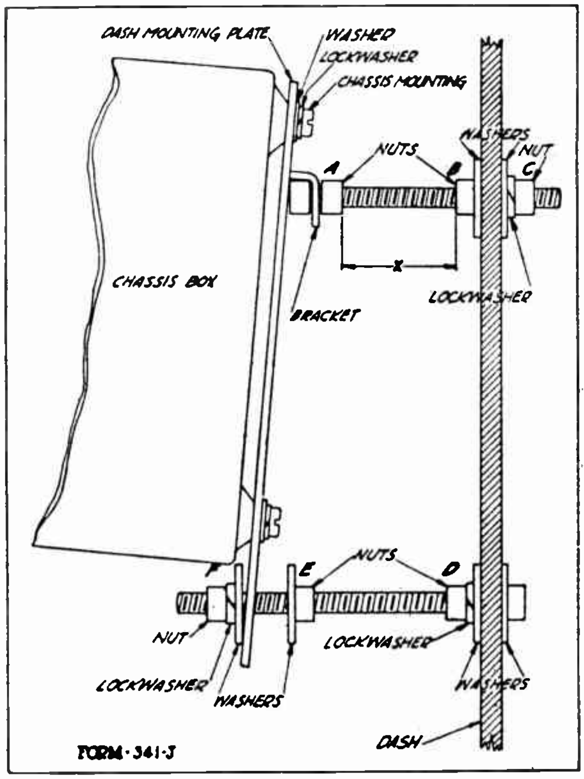


Fig. 4—Details of Chassis Mounting on Dash.

which will be used for the upper part of the mounting plate and screw on nut "A" (see Fig. 4). The nut should be just far enough away from the head of the bolt to permit the bracket of the mounting plate to slip down as shown in the illustration. Then put on nut "B" and the washer, after which the two bolts can be put through the dash, with the shanks extending into the engine compartment, as shown in Fig. 4. A washer, lockwasher, and nut are then put on these bolts from the front of the dash to hold them in place.

The distance "X" between nuts "A" and "B" determines how far out the chassis is mounted from the dash. When there is a lot of apparatus in back of the dash, such as wires, tubing, etc., the chassis will have to set out far enough to clear it. However, in most cars, there is no interfering apparatus and therefore the distance "X" will be zero.

Then put a washer on the third mounting bolt and put this bolt through the lower mounting hole with the head on the engine side of the dash, as shown in the illustration. Put on a washer, lockwasher, and nut "D" and tighten it up. Then put on nut "E" with a washer as shown. Nut "E" should be screwed down until it is about ¼" from nut "D," when distance "X," as explained above, is zero.

Next, secure the dash mounting plate to the chassis box by means of the four chassis mounting screws. Note that the broad or narrow face of the chassis box can be secured to the dash mounting plate. Use whichever side will be best from the standpoint of attachment of the flexible drive shafts.

All the tubes should be in the sockets, the antenna trimmer adjusted (as explained later) and the flexible drive shafts connected before the chassis is permanently installed. Complete information on the latter procedure is contained in the article on attaching the flexible drive shafts.

The four mounting screws pass through the four slots in the mounting plate (Fig. 3). After they are in place and tight, the dash mounting plate with chassis attached is slipped over the three mounting bolts. The two upper brackets on the plate slip down in back of nut "A" as shown in Fig. 4 and the slot at the bottom of the plate slips over the shank of the lower mounting bolt in back of nut "E." The plate will then hang with the bottom farther away from the dash than the top. A washer, lockwasher, and nut "F" are then put on the lower mounting bolt. Nut "F" is screwed on until the mounting plate is tight up against the washer in back of nut "E." In this position, the bracket at the top of the mounting plate should butt up against nut "A" and be tight. Also the mounting plate will be approximately parallel with the dash.

GULBRANSEN CO.

MODEL 06-N
Flexible Drive

Attaching the Flexible Drive Shafts

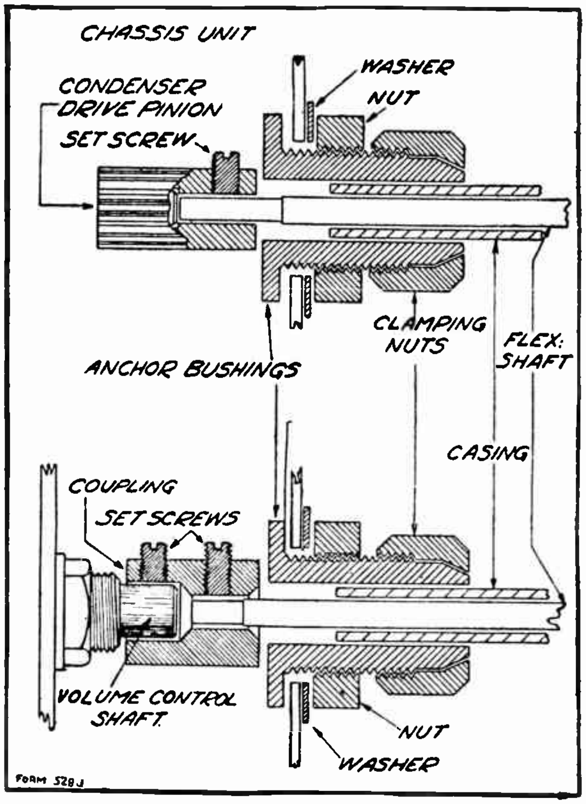


Fig. 6—Details of Flexible Drive Shaft Connections

After the control unit and chassis are in position, the flexible drive shafts may be attached. Two 34" shafts are supplied, unless otherwise specified. These shafts may also be had in 14", 20", and 45" lengths.

The flexible drive shafts should be put on with a minimum amount of bending. In general, one large radius 90° bend is all that is necessary.

The 34" shafts supplied with the receiver may be cut to a shorter length if necessary. The shaft (inside portion) should first be brazed at the point to be cut It should then be cut with a three-corner file or edge of a grinding wheel.* *Do not use a hack saw.* The casing which is 1½" shorter must be cut to correspond This should be tinned or brazed first at the point to be cut and may then be cut with a hack saw.

After the length and position of the shafts is decided on, remove the chassis and mounting plate from the mounting bolts. As the shafts are already secured at the control unit, it is necessary only to secure them at the chassis end. Before attaching the shafts, see if the set is in working order. Put the 8-prong socket in place on the chassis and operate the set with the cover off.

In Fig. 6 is shown a cross-sectional view of the flexible drive shaft connections at the chassis end. First put the tube cover plate on the chassis box temporarily with two screws. This is the large plate held in position ordinarily by means of five screws. Then center the volume control anchor bushing on this plate. To do this, loosen the nut which holds this bushing in place (see Fig. 6). Center the bushing by eye so that the center of it is in a line with the center of the volume control coupling. Then tighten the nut down.

Next, take the tube cover plate off. Extend the volume control flexible shaft and casing several inches through the hole in the anchor bushing of the tube cover plate so that the plate will be on the casing and out of the way. Turn the volume control coupling counter-clockwise until the switch is snapped to the off position. Lock the receiver on the control unit and turn the volume control knob counter-clockwise until it is in the locked position. Then loosen both set screws in the volume control coupling and insert the flexible shaft in the coupling (see Fig. 6). Tighten the outer set screw first on one of the four flat faces of the flexible shaft and then tighten the inner set screw. Then again temporarily hang the chassis on the mounting bolts. Next, check the operation of the switch, volume control and lock. The switch should be off when the volume control knob is in the locked position. It may be necessary to loosen the inner set screw and do a slight amount of adjusting until the proper setting is obtained.

Next, slide the tube cover plate into position and fasten it in place by means of the five screws. Then tighten down the clamping nut on the volume control shaft casing but *do not tighten this nut excessively.*

To attach the tuning condenser flexible shaft, first center the anchor bushing by eye as was explained above. Then extend the tuning condenser flexible shaft into the hole at the center of the tuning condenser drive pinion. With the rotor plates completely in mesh, turn the dial gear in the control unit until it is at the low frequency end stop. The set screw may then be tightened and the clamping nut secured on the casing as was explained above. In some instances, it may be necessary to loosen the set screw of the large gear on the tuning condenser rotor shaft and adjust the setting of this gear in order to get an accurate calibration.

*If the flexible shaft is cut as mentioned above, file it down in one place a slight amount to provide a flat surface for the set-screw.

MODEL 06-W
Speaker Data

GULBRANSEN CO.

Mounting the Speaker-"B" Eliminator

The speaker-"B" eliminator is mounted on the back of the dash by means of two brackets, as shown in Fig. 5. Usually the space available will govern the location of the speaker and position of it on the mounting brackets. However, the matter of acoustics should be given careful consideration. One of the most desirable positions from the standpoint of acoustics is that shown by the solid lines in Fig. 5 (A). In this position the sound waves travel in the most direct lines toward the listener. After the speaker is mounted and regardless of the position of the brackets, loosen the bracket bolts and turn it to several positions in order to get the best one from the standpoint of tone quality.

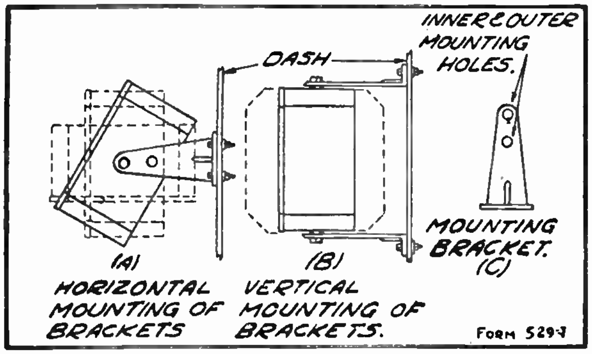


Fig 5—Method of Mounting Speaker

Other considerations governing the location of the speaker are the cables and the tone control. The speaker should be so mounted that the two shielded cables, one to the storage battery and one to the chassis, will be long enough and can be most conveniently brought over. The tone control knob on the speaker box should be preferably on the bottom, so that it can be reached easily.

After the position of the speaker is decided on, drill the four $\frac{5}{16}''$ holes required for the bracket mounting bolts. A template for these holes is supplied with the receiver. The holes are arranged in a rectangle. The centers of the holes, the small dimension are $2\frac{3}{8}''$ apart and the long dimension $10''$ apart. In Fig. 5 is shown how the brackets can be mounted horizontally (A) or vertically (B), and the different positions in which the speaker itself can be placed. There are two holes in each bracket as shown in Fig. 5 (C) which determine the distance of the speaker box from the dash. The grilled portion of the box at the front should face the listener.

Antenna

A roof antenna is recommended, as by far the best results will be obtained. A large percentage of cars at the present time come equipped by the factory with built-in roof antennas. In those cars which do not have an antenna, one will have to be put in.

First determine if the top has a grounded chicken wire mesh. To do this, use a continuity meter. By means of a wire, attach a darning needle to one of the prods. Poke the darning needle into the roof material and turn it around until it comes in contact with the chicken wire. Then ground the other prod and if the continuity meter shows a complete circuit, the chicken wire mesh is grounded. In a case of this kind, it will be necessary to get inside of the roof and it is advisable to employ the services of an auto "top man" or an upholsterer.

It will be necessary to remove the top material and cut away the chicken wire from the side supports until it is at least $3''$ away from the ground at any point. It should also be at least $3''$ away from the dome light and the dome light wiring. The chicken wire may then be laced to the points from which it was cut with a heavy, waxed cord. The chicken wire will then make a satisfactory antenna, or a copper screen may be used.

If the chicken wire is not grounded, it may be used as the antenna by taking down the roof material at one corner and soldering the lead-in wire to it. If it is not desired to take down the roof material a piece of copper screening can be tacked to the roof on the inside of the car. At least six square feet should be used. Keep it at least $3''$ away from any grounded metal parts on all sides. After the screen is in place, it can be covered over with cloth which matches the roof material. Solder the lead-in wire to the screen and bring it down the front corner post nearest to the set.

Another, and a very simple way in which an antenna can be secured to the inside of the car roof is to use a car-roof antenna which is made up especially for this purpose. This antenna consists of copper strips laid back and forth between two pieces of cardboard and the center being covered over with material which matches the roof material. It can be had in several colors and is tacked in place on the inside of the car roof in a few minutes.

GULBRANSEN CO.

MODEL 06-W
Wiring Connections

Completing the Wiring Connections

Pilot Lamp

The pilot lamp cable is 4 feet long and is attached to the 8-prong socket. At the end of the cable is the pilot lamp socket and spring clip. After the control unit and chassis are mounted, remove the cover of the control unit by taking off the two knobs, the key entry nut and the cover screw. Bring the pilot lamp

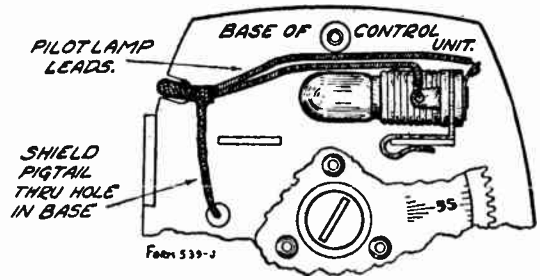


Fig. 7—Pilot Lamp Attachment

cable through the notch at the side of the back of the unit. Then, clip the pilot lamp socket clip over the right hand bracket as shown in Fig. 7, with the two leads going over the top of the lamp as illustrated. It is not necessary to remove the dial gear. There is a "pigtail" on the end of the shield of the pilot lamp cable. Pull this "pigtail" through the hole beneath the slot, as shown in the illustration. Then insert the round head ⅜" 8-32 screw through this hole with the head on the outside of the box and secure it in place with the lockwasher and nut provided. This holds the "pigtail" in position and grounds it. Cut off the excess length of "pigtail" Double up the pilot lamp leads if too long—do not cut them.

Antenna Cable

Bring the antenna cable of the receiver in the most direct manner possible to the lead-in from the antenna and connect it to the latter. Keep it as high as possible and as far away from any car wiring as possible. Care should be taken not to have the antenna wire come in contact with the shield wires. Ground the shield of the antenna cable at the antenna end.

Battery Cable and Six Lead Cable

The battery cable should be brought over to the storage battery in the most convenient manner possible. In Figs. 1 and 2 it is shown passing through a hole in the dash, thence down and under the floor board to the battery. In other installations, it may be more convenient to bring this cable down in back of one of the side pads and thence to the battery. The lug on the lead marked "positive" is connected to the positive side of the battery and the lug on the negatively marked lead is connected to the negative side of the battery. Ground the pigtail of the shield by screwing the No. 6 Parker Kalon screw through the end of the pigtail and through the hole in the lug which is grounded.

The six-lead cable between the chassis and the speaker—"B" eliminator is usually brought over along the dash in the most convenient manner possible.

Care and Maintenance

Advancing Generator Charging Rate

The installation of the automobile radio imposes an additional drain on the car storage battery. This can be compensated for by advancing the charging rate of the car generator. Check the state of charge of the storage battery about a week after the installation of the automobile radio is made and adjust the charging rate accordingly.

Tubes

The type of tubes used and location of these tubes in the chassis are shown in Fig. 8. These tubes are of a sturdy, rugged construction designed especially for an auto-receiver. Most of them, under normal usage, will last for many months and in some cases, years. Some of them, however, may become faulty after a few months of operation.

For that reason, it is advisable to secure a new set of tested tubes at intervals of three to six months and have these inserted in the receiver one at a time, noting any difference in performance.

Pilot Lamp

The pilot lamp is located in the control unit. A 6-8 volt miniature base lamp is used. To replace the lamp, first turn the receiver off. Remove the two control knobs and the key entry nut. Then take out the screw holding the control box cover in place after which the cover can be taken off. The pilot lamp socket is secured to a spring clip which is on a bracket in the control unit. Push this clip and socket over far enough to get at the lamp, after which the bulb can be replaced and the control unit reassembled.

Fuse

A 10 amp. automobile fuse is used for the "A" line. This fuse is mounted in the speaker—"B" eliminator box and is on one of the walls near the back. To change the fuse, it will be necessary to loosen the bracket bolts so that the box can be swung around to get at the back.

Electrical Condition of Car

Dirty spark plugs, incorrect spacing of distributor points, faulty distributor condenser, and various other items in the car electrical system can cause noisy operation. If the customer complains of noise in the receiver after it has been in use for some time, check the items mentioned as well as other parts of the car electrical system for poor connections, grounds, and other faults which may be responsible for the noise.

MODEL 06-W
Service Notes

GULBRANSEN CO.

If the Receiver Fails to Operate

"A" Fuse—Check the "A" line fuse in the speaker box.

"A" Line Open—See if power is being supplied to the speaker, tube heaters, and "B" eliminator.

"B" Eliminator Not Working—See if the "B" eliminator is in proper working order by checking the high voltage points at the speaker-terminal strip and at the tube plate terminals (see Fig. 10).

Antenna and Lead—See if antenna is properly connected to lead-in wire and antenna lead from set. Be sure antenna system is not grounded at any point.

All Tubes Not Inserted—See if all tubes are inserted as per Fig. 8.

Grid Caps Not Connected—See if all grid caps are properly connected to top of top grid connection tubes.

Variable Condenser Plates Shorted—Check condenser sections in chassis carefully for foreign particles or rotor stator rubbing.

Reversed Storage Battery Connections—Check storage battery connections for correctness.

Weak Reception

Defective Tubes—Try out a new set of tested tubes and note any difference in performance.

Poor Antenna—To try out the effectiveness of the antenna used, check the volume against the volume when using a straight length of wire about 15′ long, run out of the car through one of the windows. If, upon test, the external wire is found to be much superior as far as volume is concerned, the antenna is not satisfactory and will have to be re-vamped or a new one installed. The antenna or lead-in may be too near grounded metal portions of the car frame or body resulting in a high capacity to ground. There may be grounded metal mesh in the car roof. There may be a poor soldered connection between the antenna, lead-in, or antenna lead from the set. The antenna system may be partially grounded at some point.

Antenna Trimmer Not Adjusted—See article "Trying Out the Set and Adjusting."

Car in Shielded Location—If the car is within or near a steel structure, the signals may be weakened by absorption.

Storage Battery Run Down—Check the condition of the battery

Defective "B" Eliminator—Check "B" voltage at sockets and speaker terminal strip (see voltage chart and Fig. 10).

Misalignment of Variable Tuning Condensers—Instructions for realigning are contained in this manual. Do not, however, attempt realignment unless other causes of low volume have first been investigated.

Wrong Voltages—Check voltages at the sockets (see voltage chart).

Other Causes of Low Volume—Defective speaker, poor battery, antenna, grid cap or other connections, defective A.V.C. system in the receiver, and various opens, grounds and shorts in the receiver assembly.

Distorted Reproduction

Receiver Oscillating—See article on oscillation.

Defective Tubes—Try out a new set of tubes.

Incorrect Voltages—Check the voltages at the socket (see voltage chart).

Incorrect Tuning—The signal must be carefully tuned in to the clearest and loudest point. It must not be tuned "off resonance."

Defective Speaker—Try out a new one if it is available.

Defective Audio System in the Receiver—Make continuity resistance tests using as a guide Fig. 10.

Signal Transmission—Quality fading in the signal transmission can cause poor tone quality.

Oscillation

Cover of Box—May not be on or if on, may not be sufficiently tightened down.

Off Characteristic Tubes—Tubes whose characteristics vary considerably from the standard may cause oscillation. Try out some new ones.

Open Bypass Condensers—Check the bypass condensers and leads to them for open circuit.

Poor Ground Connections—Check the ground connections in the chassis and speaker—"B" eliminator box for poor contact.

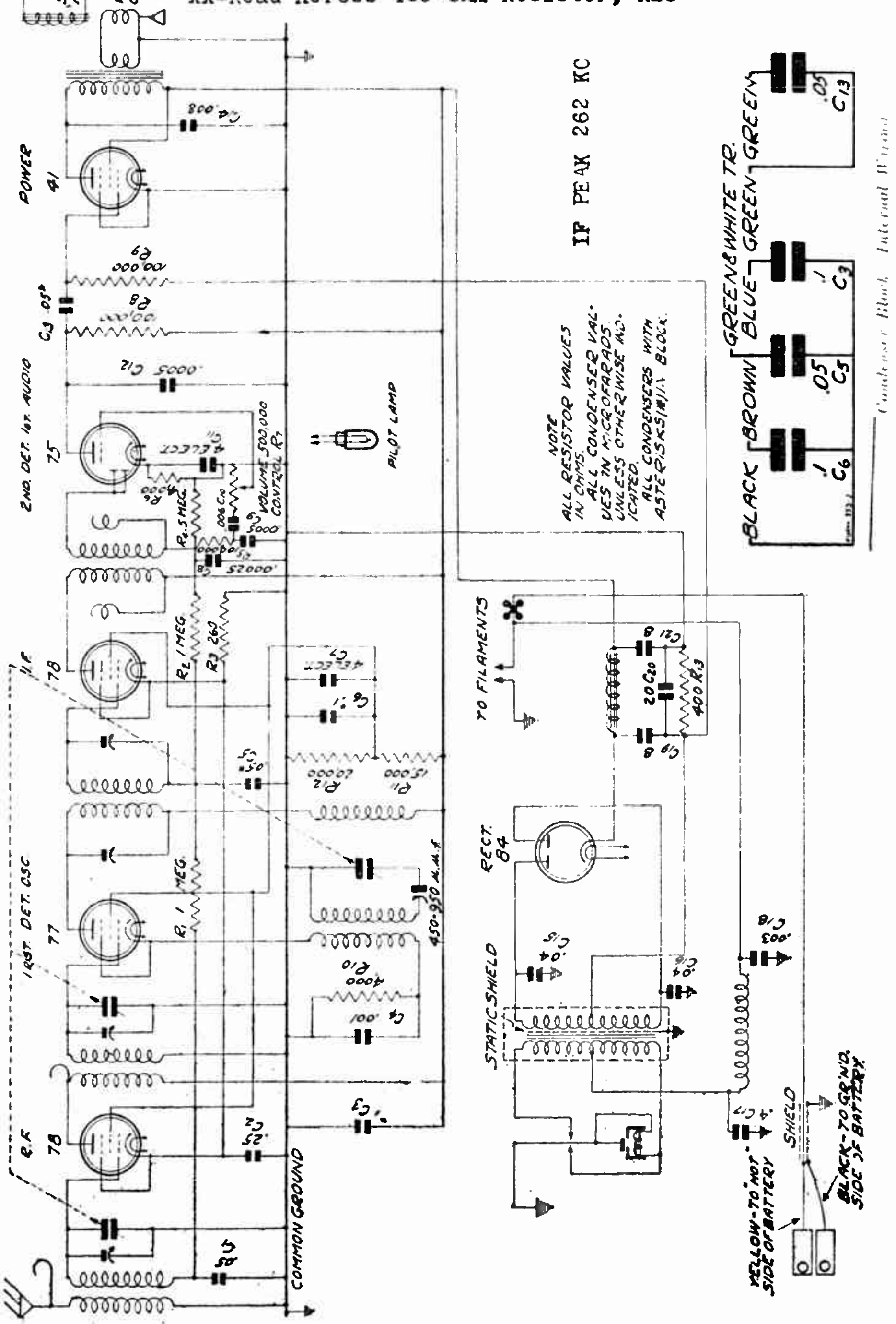
Grid Caps and Leads—The grid caps may not be making good contact to the tops of the tubes or the wires of the grid caps may be too close together.

GULBRANSEN CO.

MODEL 2621
Schematic
Voltage
Socket

	Across Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate MA
78 R.F.	6.1	182	80	3*	7.0
77 1st Det. & Osc.	6.1	178	77	5**	1.3**
78 I.F.	6.1	182	80	3.*	7.0
75 2nd Det. 1st Audio	6.1	70x		1.4*	.35
41 Output	6.1	172.5	176.5	12.5	16.0
84 Rect.	6.1	205			17.5per plate

*-Cathode to Ground. **-Subject to Variation. x-Triode Plate to Cathode
xx-Read Across 400-Ohm Resistor, R13



Condenser Block Internal Wiring

Trying Out the Set and Adjusting

After the wiring has all been completed and before the chassis is permanently installed, try out the set and adjust the antenna trimmer. The location of the tubes is shown in Fig. 8. To adjust the antenna trimmer, tune in a weak signal between 1200 and 1400 K.C. with the volume control about three-fourths on. On one end of the chassis box are two small metal plates. Remove the smaller of these two plates. Directly under the hole in the chassis box is the antenna trimmer condenser screw. Turn this adjusting screw up or down until maximum output is obtained.

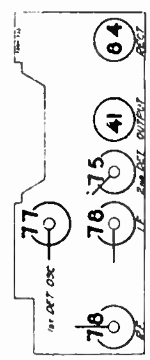


Fig. 8—Location of Tubes

MODEL Z6Z1
Alignment
Wiring

GULBRANSEN CO.

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself in broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide accurately calibrated signals over the broadcast band and accurately calibrated signals at and around 262 K.C., the intermediate frequency and an output indicating meter are desirable.

First set the signal generator at approximately 262 K.C. Connect the antenna lead from the generator to the control grid of the I.F. 78 tube, through a .05 mfd. condenser. The ground lead of the generator goes to the ground of the receiver. Turn the rotor plates of the tuning condenser completely out and keep the signal weak enough to prevent A.V.C. action. Note from Fig. 10 that the second I.F. transformer is self tuned and cannot be adjusted. Adjust the frequency of the signal generator until the output meter shows maximum output. The intermediate frequency setting of the generator is then correct, although it may be a very small percentage higher or lower than 262 K.C.

Next connect the signal lead from the signal generator to the grid of the 1st detector tube through a .05 mfd. condenser. Then adjust the two intermediate frequency condensers for maximum output. One of the I.F. condenser screws is reached through the hole on the top of the 1st I.F. assembly can. The other I.F. condenser screw is reached from the bottom of the sub-panel through a hole at the bottom of this assembly.

Now set the signal generator for a signal of exactly 1400 K.C. The antenna lead from the generator is, in this instance, connected to the antenna lead of the receiver. Connect the flexible drive shaft to the chassis if it has been disconnected. As explained previously, the dial scale should be at the low frequency end stop when the rotor is completely in mesh. Then turn the station selector knob until the dial scale is at 1400 K.C.

Then adjust the three trimmer condensers on the gang tuning condenser for maximum output, adjusting the oscillator section first.

Next, set the signal generator for a signal of 600 K.C. and adjust the oscillator 600 K.C. trimmer. The adjusting screw for this condenser is reached through a hole in the back wall of the sub-panel.

A non-metallic screwdriver is necessary for this adjustment. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting, at the same time adjusting the 600 K.C. trimmer screw until the highest output is obtained.

Then set the signal generator again for a signal of 1400 K.C. and check the adjustment of the tuning condenser trimmers at this frequency for maximum output.

Completing the Wiring Connections

Antenna Cable

Bring the antenna cable of the receiver in the most direct manner possible to the lead-in from the antenna and connect it to the latter. Keep it as high as possible and as far away from any car wiring as possible. Care should be taken not to have the antenna wire come in contact with the shield wires. Ground the pigtail of the antenna cable shield at the antenna end. The pigtail of this shield at the chassis end is grounded under one of the chassis mounting screws.

In some cases the shielded antenna lead from the receiver is not long enough to reach to the column at which the antenna lead-in comes down. In a case of this kind, cover the exposed portion of the lead-in wire with loom and braided shield from the point where it leaves the column to the point of connection to the antenna lead of the receiver. Connect the two wires together and connect the two shields together, care being taken that no strand of the shield touches the antenna wire.

Battery Cable

The battery cable should be brought over to the storage battery in the most convenient manner possible. In Figs. 4 and 5 it is shown passing through a hole in the dash, thence down and under the floor board to the battery. In other installations, it may be more convenient to bring this cable down in back of one of the side pads and thence to the battery. The lug on the yellow lead of this cable is connected to the "Hot" or ungrounded side of the battery (the "Hot" or ungrounded side may be positive or negative, depending on the make of car). The lug on the black lead is connected to the grounded side of the battery. The pigtail of the shield of this cable at the chassis end should be grounded under one of the chassis mounting screws.

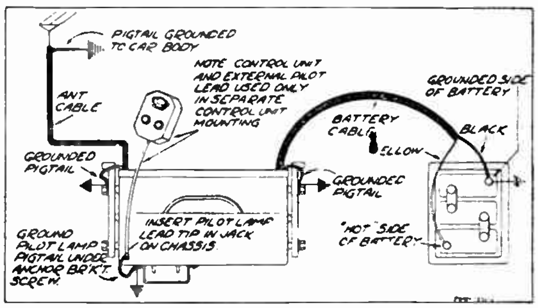


Fig. 7—External Wiring Connections

Pilot Lamp (For Separate Control Unit Only)

When a separate control unit is used connect the pilot lamp as follows:

The pilot lamp lead is in a shielded cable which extends out from the control unit box. On the rear wall of the chassis, near one of the ends, will be seen a tip jack. Insert the tip on the end of the pilot lamp lead into this jack. There is also a pigtail or shield extension at the end of this lead. Ground this pigtail with one of the anchor bracket screws (see Fig. 7). Double up the pilot lamp lead if it is too long—*Do not cut this lead.*

GULBRANSEN CO.

MODEL Z621
Antenna
Mounting Notes

Antenna

A roof antenna is recommended, as by far the best results will be obtained. A large percentage of cars at the present time come equipped by the factory with built-in roof antennas. In those cars which do not have an antenna, one will have to be put in.

First determine if the top has a grounded chicken wire mesh. To do this, use a continuity meter. By means of a wire, attach a darning needle to one of the prods. Poke the darning needle into the roof material and turn it around until it comes in contact with the chicken wire. Then ground the other prod and if the continuity meter shows a complete circuit, the chicken wire mesh is grounded. In a case of this kind, it will be necessary to get inside of the roof and it is advisable to employ the services of an auto "top man" or an upholsterer.

It will be necessary to remove the top material and cut away the chicken wire from the side supports until it is at least 3″ away from ground at any point. It should also be at least 3″ away from the dome light and the dome light wiring. The chicken wire may then be laced to the points from which it was cut with a heavy, waxed cord. The chicken wire will then make a satisfactory antenna, or a copper screen may be used.

If the chicken wire is not grounded, it may be used as the antenna by taking down the roof material at one corner and soldering the lead-in wire to it. If it is not desired to take down the roof material a piece of copper screening can be tacked to the roof on the inside of the car. At least six square feet should be used. Keep it at least 3″ away from any grounded metal parts on all sides. After the screen is in place, it can be covered over with cloth which matches the roof material. Solder the lead-in wire to the screen and bring it down the front corner post nearest to the set.

Another, and a very simple way in which an antenna can be secured to the inside of the car roof is to use one of the car-roof antennas which are now being made up especially for this purpose. There is one type of antenna which consists of copper strips laid back and forth between two pieces of cardboard. The cardboard is then covered over with material which matches the roof material. This antenna can be had in several colors and is tacked in place on the inside of the car roof in a few minutes.

Integral Mounting of Chassis

By integral or all-in-one mounting of the chassis is meant operating the receiver by means of the controls on the chassis box (and not with a separate control unit). This method is the simplest, as no changes are required on the receiver. It can be installed in several ways, as explained below and as illustrated in Fig. 1. Still other methods of mounting and locations for the chassis will suggest themselves, depending on the space available and variations in the construction of different cars.

Floor or Shelf Mounting

In Fig. 1(A) is shown how the chassis can be placed on the floor in front of the front seat. There are four rubber mounting feet on the bottom of the box, on which it stands. It may also be placed in back of the front seat (B) so as to be in the rear compartment of the car. In some cars, there is room enough between the two front seats for the chassis box to be placed. In coupes, the chassis may be placed on the shelf in back of the seat. Still other locations, as mentioned above, can be used, depending on the space available in different cars.

After the position is decided on, the chassis is permanently mounted in place by means of the two case mounting feet supplied for this method of mounting. These mounting feet are shown in Fig. 1. One side of the foot, which is a small angle bracket, is secured to the end of the chassis box by means of one of the chassis mounting screws. The other side of the foot is screwed to the floor board or surface on which the chassis is resting, with a wood screw. The two feet are placed diagonally, that is on one end of the chassis box it is at the front, while on the other end it is at the rear.

Flush Mounting of Chassis

In Fig. 1(C) is also shown how the chassis can be mounted on the dash by means of brackets, in such a way that the front portion of the box with the controls, is flush, or nearly so, with the instrument panel. This is a very desirable method of installation, as the receiver is rigidly in place, out of the way, and the controls are very accessible.

When mounted this way, two side case brackets (long type) are used, one on each end of the box, as shown in Fig. 1. Two mounting screws are generally used to secure each bracket to the end of the chassis box. Three may be used in cases where the distance between the instrument panel and dash is small. Six embossings with inset nuts are provided on each end of the chassis box. Any two of these or

MODEL Z621
Mounting Notes

GULBRANSEN CO.

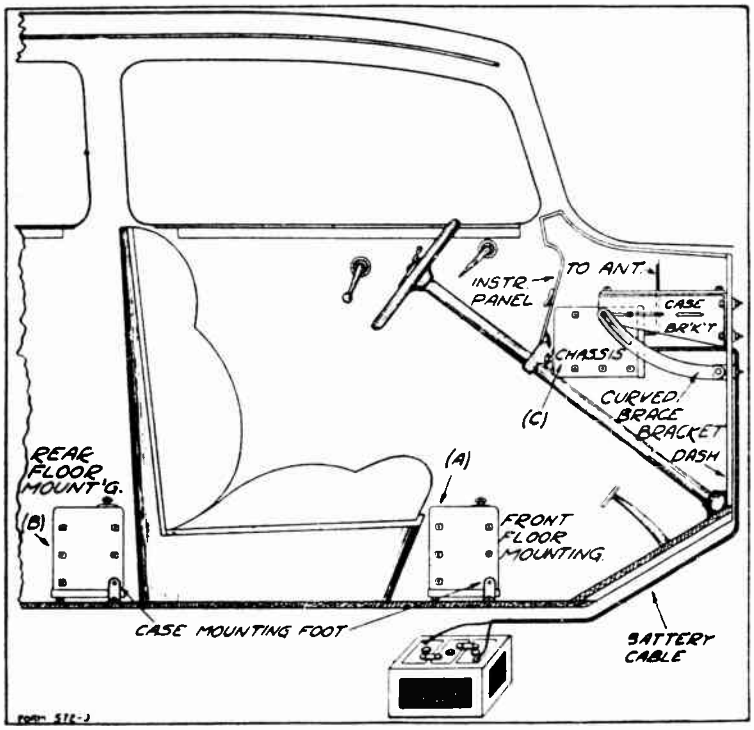


Fig. 1—Integral Mounting—Side View

three, as mentioned above, may be used for the bracket screws, which, together with the slots in the brackets, provides great flexibility in mounting. In addition to the side case brackets, two curved brace brackets and one cross strap brace as shown in Figs. 1 and 2 are used.

The chassis should be mounted as close to the center of the instrument panel as possible. This makes the controls accessible to people in either front seat. As stated above, it should be mounted so that the front side of the box with the controls, is flush or nearly so with the instrument panel of the automobile. If car apparatus or space available prevent the mounting of the chassis at the center,

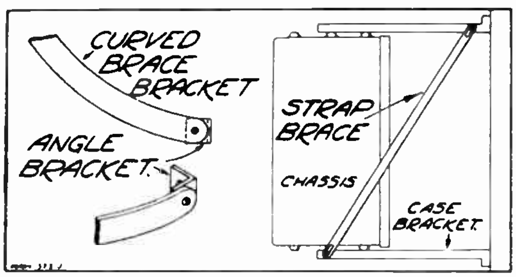


Fig. 2—Angle Brackets and Strap Brace

it may have to be moved to either side. In some instances, it can be mounted at the center of the instrument panel, but may have to be moved down and nearer to the dash than as shown in Fig. 1. Consideration should be given to the possibility of interference with the legs of the driver or passenger in the front seat and also to the possibility of interference with the controls of the car, such as pedals, gear shift lever, and hand brake lever, before the location is definitely decided on. The possibility of a car heater installation may also be considered. After the location is decided on, drill the four mounting holes required. The location and size of these holes is shown in Fig. 3. A template for drilling these holes is supplied with the receiver. Six 1/4" mounting bolts, six washers, six lockwashers and six nuts are provided. The mounting bolt is put through the bracket and dash with the shank extending into the engine compartment. A washer, the lockwasher and nut, are then put on. Mount the brackets permanently, but do not mount the chassis permanently until the wiring connections are completed, the tubes are all inserted, the receiver tried out, and the antenna trimmer adjusted (explained later).

When the case brackets are in place, the curved brace brackets can be installed. These can be put on in a number of different ways. The front or back case bracket screw can be used and the brace bracket itself can be mounted upward or downward. As a general rule it is mounted on the bracket screw farthest away from the dash and downward as shown in Fig. 1. The small angle brackets supplied with the receiver are secured at the base of the curved brace brackets as shown in Figs. 1 and 2, by means of the No. 10-32 3/8" Round Head Screw, nut and washer supplied. After the position of the brace brackets is decided on, put them in place and start the holes for them with a center punch. These brackets are bolted to the dash in the same manner as explained above for the case brackets.

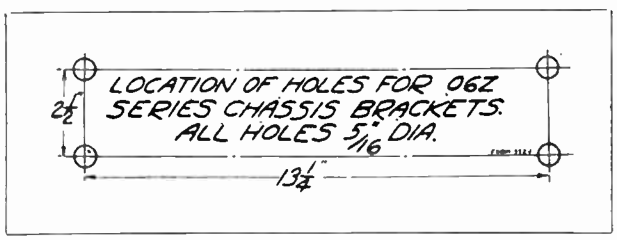


Fig. 3—Mounting Hole Location

Next, put the strap brace in place. This is mounted diagonally across the two brace brackets as shown in Fig. 2. There is a tapped hole at either end of the top flange of the case brackets which are used for this purpose. Two 10-32 1/4" long bolts are provided for the strap brace.

GULBRANSEN CO.

MODEL ZGZ1
Control Unit

Separate Control Unit Mounting of Chassis

In this method of mounting, the chassis is mounted on the dash and is operated from a separate remote control unit which is on the steering column. Two flexible shafts mechanically connect

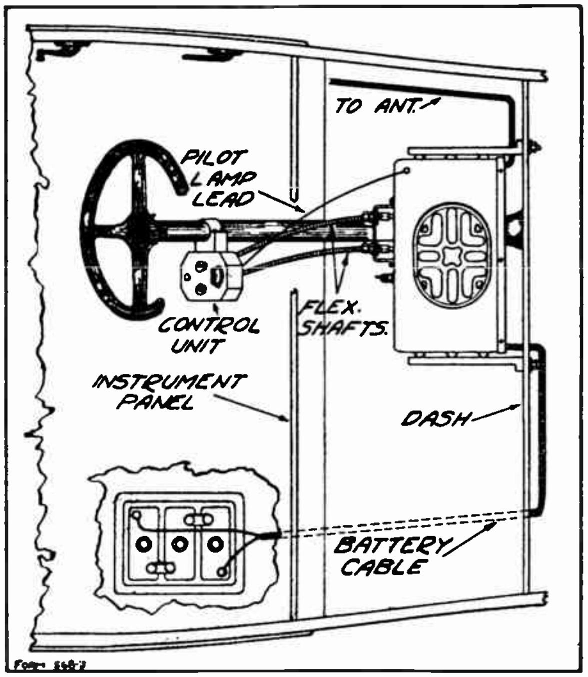


Fig. 4—Chassis with Control Unit—Top View

the control unit and the chassis. This method of mounting is very desirable as the controls are most accessible to the driver. The items required for this method of mounting are shown in the installation list at the back of the manual. The procedure for this method of installation is as follows:

Mounting the Control Unit

The control unit is mounted on the steering column under the steering wheel as shown in Figs. 4 and 5. A clamp is used to hold it in position.

The outer portion of the clamp is screwed to the inner portion by means of the four 8-32x⅜″ fillister head screws supplied with the receiver.

Two rubber strips are provided, one ⅛″ thick and the other $\frac{1}{16}$″ thick. These are wrapped around the steering column under the clamp. Either or both of these strips may be used, depending on the thickness of the column. Wrap the rubber strips around the column in such a way as to allow the set screws which hold the clamp in position to pass through. When the clamp is in place, take the two 8-32 headless cup point set screws and screw them down on the steering column through the tapped holes in the clamp.

The control unit is generally about 4″ below the wheel, but this will vary with individual cases. The length of the drive shaft and interference with driver's legs will also govern the location of the control unit.

There are two screws which hold the inside portion of the clamp to the control unit swivel. By

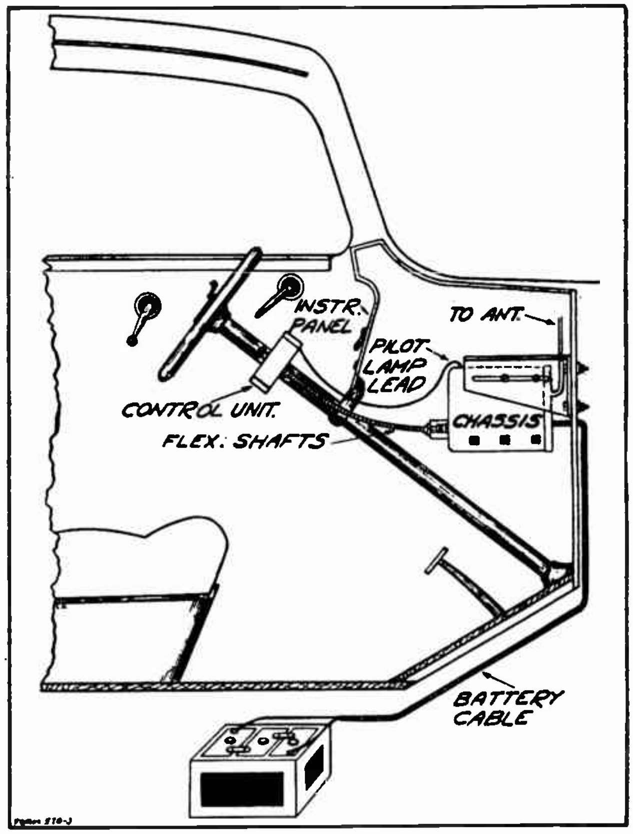


Fig. 5—Chassis with Control Unit—Side View

loosening these two screws, the box can be swung around if such a position is handier from the standpoint of the person operating the set. Instructions for attaching the pilot lamp lead are contained in the article "Completing the Wiring Connections."

Mounting the Chassis

The chassis is mounted on the dash by means of two short brackets, as shown in Figs. 4 and 5. Two or three mounting screws are used to secure each bracket to the end of the chassis box. Three are used if the chassis is close to the dash and two if it is set out some distance. In general, keep the chassis as close to the dash as possible. The procedure for attaching the brackets to the chassis box and to the dash is the same as explained above for mounting the side case brackets under the article, "Flush Mounting of Chassis." No curved brace brackets or strap braces are used in this method of mounting.

The chassis should be mounted with the speaker grill facing down and the side with lock and controls facing the listener, as shown in Fig. 4. Before mounting the chassis, the flexible drive shaft connections as explained in the next article must be made.

The location of the chassis will very often depend on the space available. To the left of the center, as shown in Fig. 4, is a good location. The chassis should be mounted in such a way that the flexible drive shafts to the control unit will be in as straight a line as possible or with large radius bends. *In general, it will be advisable to consider the possibility of a car heater installation at the right side of the dash (facing forward).* In practically every case no difficulty will be experienced in mounting the heater and chassis on the dash. The chassis should be mounted in such a way that the lock *which remains on the chassis box will be accessible.*

The possibility of interference with people in the front seats and with car controls, as mentioned previously, should also be considered.

When the location is decided on, drill the four mounting holes required as shown in Fig. 3 and proceed as explained above. Mount the brackets permanently, but do not mount the chassis permanently until the wiring connections are completed, all tubes are in the sockets, the flexible drive shafts connected, and the antenna trimmer adjusted (explained later).

Attaching the Flexible Drive Shafts

After the control unit is mounted and the chassis is temporarily mounted, the flexible drive shafts may be attached. Two 34" shafts are supplied unless otherwise specified. These shafts may also be had in 14", 20" and 45" lengths.

The flexible drive shafts should always be installed with a minimum amount of bending. Always keep the radius of the bend as large as possible. The larger the radius of the bend, the easier the shaft will turn.

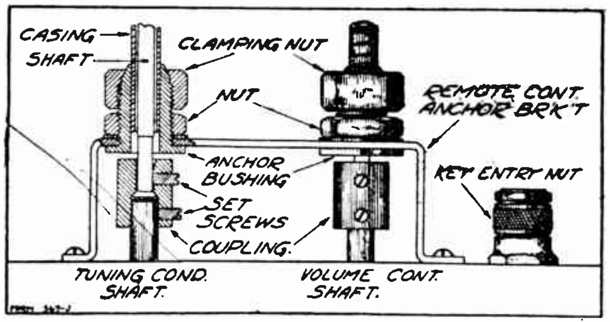


Fig. 6—Details of Flexible Drive Shaft Connections

The 34" shafts supplied with the receiver may be cut to a shorter length if necessary. The shaft (inside portion) should first be brazed at the point to be cut. It should then be cut with a three-corner file or edge of a grinding wheel. *Do not use a hack saw.* After the shaft is cut, file it down in one place a slight amount to provide a flat surface for the set screw. The casing which is 1½" shorter must be cut to correspond. This should be tinned or brazed first at the point to be cut and may then be cut with a hack saw.

It is advisable to attach the flexible shafts with the chassis on the mounting brackets, but if the chassis is inaccessible, it may be removed from the brackets. Keep it as close to its regular position as possible so that the flexible shaft will not turn after the chassis is replaced on the brackets. In general, it may be moved up or down, but should not be moved sideways or be turned.

To attach the flexible shafts to the chassis, first turn the on-off switch knob to the off position and the station selector knob to the low frequency end stop. Then remove the two knobs. These two knobs are then put on the control unit. Loosen the set screws on the two couplings and slip them over the two shafts as shown in Fig. 6. Then secure the remote control anchor bracket in place on the chassis box by means of the four 6-32-¼" screws. The dial gear and pilot lamp remain in the chassis box.

Next, center the two anchor bushings on the anchor bracket. To do this, first loosen the nut which holds the bushing in place. Center the bushing so that the center of it is in line with the center of the shaft below. Then tighten the nut. Turn the on-off switch and volume control knob on the control unit to the extréme counter-clockwise position. Then extend the volume control flexible shaft into the coupling and tighten the two set screws in this coupling. The outside set screw should be tightened down *on one of the four flat faces* of the shaft. Then tighten down the clamping nut on the volume control shaft casing, *but do not tighten this nut excessively.*

To attach the tuning condenser flexible shaft, proceed in the same manner as above, except that the dial gear in the control unit should first be turned to the low frequency end stop. After the two shafts are connected, mount the chassis in place temporarily if it has been taken off and check the operation of both tuning condenser and volume control. The switch should be off when the volume control knob is in the locked position. It may be necessary to loosen the inner set screw and do a slight amount of adjusting until the proper setting is obtained. In case the dial gear in the control unit is not correctly calibrated or does not coincide with the dial gear calibration in the chassis box, further adjustment of this control can be brought about in the same manner, that is, by first loosening the inner set screw of the coupling. The clamping nut of the tuning condenser shaft anchor bushing is tightened down as explained above.

GULBRANSEN CO.

MODEL Z6Z1
Service Notes

If the Receiver Fails to Operate

"A" Fuse—Check the "A" line fuse in the chassis box.

"A" Line Open—See if power is being supplied to the speaker, tube heaters, and "B" eliminator.

"B" Eliminator Not Working—See if the "B" eliminator is in proper working order by checking the high voltage points at the tube plate terminals (see Fig. 10).

Antenna and Lead—See if antenna is properly connected to lead-in wire and antenna lead from set. Be sure antenna system is not grounded at any point.

All Tubes Not Inserted—See if all tubes are inserted as per Fig. 8.

Defective Tubes—Try out a new set of tested tubes.

Grid Caps Not Connected—See if all grid caps are properly connected to top of top grid connection tubes.

Variable Condenser Plates Shorted—Check condenser sections in chassis carefully for foreign particles or rotor stator rubbing.

Weak Reception

Defective Tubes—Try out a new set of tested tubes and note any difference in performance.

Poor Antenna—To try out the effectiveness of the antenna used, check the volume against the volume when using a straight length of wire about 15′ long, run out of the car through one of the windows. If, upon test, the external wire is found to be much superior as far as volume is concerned, the antenna is not satisfactory and will have to be re-vamped or a new one installed. The antenna or lead-in may be too near grounded metal portions of the car frame or body resulting in a high capacity to ground. There may be grounded metal mesh in the car roof. There may be a poor soldered connection between the antenna, lead-in, or antenna lead from the set. The antenna system may be partially grounded at some point.

Antenna Trimmer Not Adjusted—See article "Trying Out the Set and Adjusting."

Car in Shielded Location—If the car is within or near a steel structure, the signals may be weakened by absorption.

Storage Battery Run Down—Check the condition of the battery.

Defective "B" Eliminator—Check "B" voltage at sockets (see voltage chart and Fig. 10).

Misalignment of Variable Tuning Condensers—Instructions for realigning are contained in this manual. Do not, however, attempt realignment unless other causes of low volume have first been investigated.

Wrong Voltages—Check voltages at the sockets (see voltage chart).

Other Causes of Low Volume—Defective speaker, poor battery, antenna, grid cap or other connections, defective A.V.C. system in the receiver, and various opens, grounds and shorts in the receiver assembly

Distorted Reproduction

Receiver Oscillating—See article on oscillation.

Defective Tubes—Try out a new set of tubes.

Incorrect Voltages—Check the voltages at the sockets (see voltage chart).

Incorrect Tuning—The signal must be carefully tuned in to the clearest and loudest point. It must not be tuned "off resonance."

Defective Speaker—Try out a new one if it is available.

Defective Audio System in the Receiver—Make continuity resistance tests using as a guide Fig. 10.

Signal Transmission—Quality fading in the signal transmission can cause poor tone quality.

Oscillation

Cover of Box—May not be on or if on, may not be sufficiently tightened down.

Off Characteristic Tubes—Tubes whose characteristics vary considerably from the standard may cause oscillation. Try out some new ones.

Open Bypass Condensers—Check the bypass condensers and leads to them for open circuit.

Poor Ground Connections—Check the ground connections in the chassis for poor contact.

Grid Caps and Leads—The grid caps may not be making good contact to the tops of the tubes or the wires of the grid caps may be too close together.

MODEL Z6Z1
Parts List

GULBRANSEN CO.

Replacement Parts for Series Z6Z1 Receivers

CHASSIS PARTS

Part No.	Description	List Price
P-1780	No. 75 Tube Socket	$0.10
P-1761	No. 77 Tube Socket	.10
P-1762	No. 78 Tube Socket	.10
P-1665	No. 41 Tube Socket	.10
P-1803	No. 84 Tube Socket	.10
P-1805	Single Pin Jack	.10
P-1799	Tube Shield Assembly	.25
P-20656	Chassis Box	4.00
P-20657	Chassis Box Cover	1.10
P-70740	Shielded Antenna Lead	.40
P-70744	Shielded "A" Battery Lead	1.15
P-1804	Vibrator Unit (in cast metal case)	6.00
P-10266	Vibrator Unit Rubber Cushion, pair	.10
P-20660	Vibrator Unit Box	.70
P-20661	Vibrator Unit Box Cover	.20
P-1572	Fuse Clip Assembly	.10
P-10260	Cardboard Baffle	.20
P-1624	10 Amp. Fuse	.10
P-1774	Electrodynamic Speaker	3.75
P-20585	Cond. Drive Gear	.25
P-1801	Volume Control and Drive Bracket	.30
P-20635	Cond. Drive Pinion	.15
P-20677	Pinion Adjustment Plate	.10
P-20614	Lock Lever	.10
P-20658	Tension Spring	.10
P-30419	Entry Plate Assembly	.10
P-1830	Dial Gear and Strip Assembly	.40
P-1816	Celluloid Dial Strip only	.15
P-1810	Pilot Lamp Socket and Spring Clip	.10
P-1563	6-8 Volt Pilot Lamp	.25
P-10263	Rubber Tube Bumper—Square	.10
P-10210	Rubber Tube Bumper—Round	.10
P-10213	Rubber Band for Tube	.10
P-50569	Filter Choke Assembly	1.60
P-50585	Power Trans. Assembly—Less condensers and brackets	3.25
P-5099	Antenna R. F. Transformer—Less Can	1.20
P-5065	Interstage R. F. Transformer—Less Can	1.00
P-5105	Second I. F. Transformer and Can Assembly	.95
P-5096	First I. F. and Oscillator Transformer and Can Assembly	2.70
P-5097	Single Solenoid "A" Choke	.25
P-40431	Antenna R. F. Can	.15
P-1826	Interstage R. F. Can	.10

Resistors

Part No.	Code No.	Resistance	Type	List Price
P-A95105	R-1	1 Megohm	Carbon	$0.25
P-A95105	R-2	1 Megohm	Carbon	.25
P-B94261	R-3	260 ohm	Carbon	.35
P-A95504	R-4	.5 Megohm	Carbon	.25
P-A95104	R-5	100,000 ohm	Carbon	.25
P-A94402	R-6	4,000 ohm	Carbon	.20
P-91066	R-7	0-500,00 ohm	Volume Control and Switch	$1.15
P-A95104	R-8	100,000 ohm	Carbon	.25
P-A95104	R-9	100,000 ohm	Carbon	.25
P-A94402	R-10	4,000 ohm	Carbon	.20
P-B94153	R-11	15,000 ohm	Carbon	.25
P-B94203	R-12	20,000 ohm	Carbon	.25
P-C94401	R-13	400 ohm	Carbon	.20

Condensers

Part No.	Code No.	Capacity	Voltage	Type	List Price
P-80862	C-1	.05 mfd.	200 V.	Tubular	$0.30
P-80888	C-2	.25 mfd.	200 V.	Tubular	.35
P-80821-B	C-4	.001 mfd.	600 V.	Molded	.25
P-80937	C-7 C-11	4.0 mfd. 4.0 mfd.		Electrolytic Block in can	1.25
P-80919	C-8	.00025 mfd.	600 V.	Molded	20
P-80945	C-9	.0005 mfd.	600 V.	Molded	.15
P-80898	C-10	.006 mfd.	600 V.	Tubular	15
P-80945	C-12	.0005 mfd.	600 V.	Molded	15
P-80966	C-14	.008 mfd.	600 V.	Tubular	20
P-80963	C-15 C-16	.01 mfd. .01 mfd.	400 V. 400 V.	Dual Tubular	.30
P-80960	C-17	.4 mfd.	15 V.	In Metal Can	50
P-80959	C-18	.003 mfd.	600 V.	Molded	.35
P-80956	C-19 C-20 C-21	8.0 mfd. 20.0 mfd. 8.0 mfd.	225 V. 25 V. 225 V.	Electrolytic Block in Can	2.25
P-80955	C-3 C-5 C-6 C-13	.1 mfd. .05 mfd. .1 mfd. .05 mfd.	300 V. 200 V. 200 V. 300 V.	Bypass Block in Can	1.35
P-1539	600 K. C. Trimmer Condenser				.45
P-80957	Three-Gang Variable Condenser				3.00

CONTROL UNIT PARTS

(When Separate Control Unit Is Used)

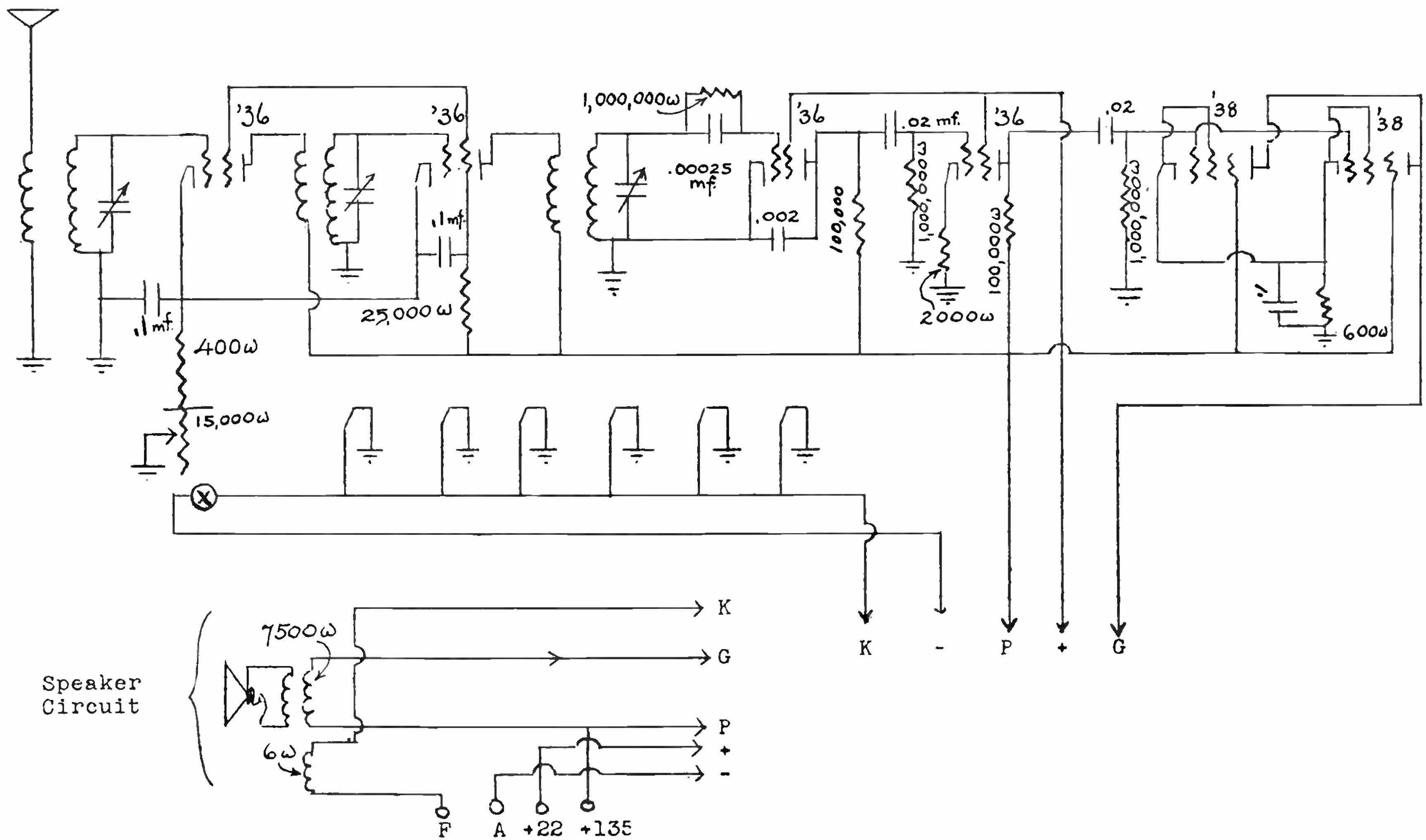
Part No.	Description	List Price
P-1816	Celluloid Dial Strip	$0.15
P-1825	Dial Gear and Strip Assembly	.40
P-20509B	Control Unit Swivel	.15
P-20510A	Steering Post Apron	.30
P-20511	Steering Post Clamp	.15
P-20693	Control Box Cover	.35
P-20635	Cond. Drive Pinion	.15
P-70746	Pilot Lamp Cable only	.40
P-1415A	Pilot Lamp Socket and Clip	.15
P-1563A	6-8 Volt Pilot Lamp	.25
P-30426	Ornamental Plug	.10
P-30414	Key	.15

ITEMS WHICH MAY BE REQUIRED IN SOME CASES

1—	1550	14" Flexible Drive Shaft—For Control Unit Mounting	$ .90 ea.
1—	1553	20" Flexible Drive Shaft—For Control Unit Mounting	1.25 ea.
1—	1551	34" Flexible Drive Shaft—For Control Unit Mounting	1.65 ea.
1—	1552	45" Flexible Drive Shaft—For Control Unit Mounting	2.00 ea.
1—	91011	Spark Plug Suppressor—All methods of mounting	.50 ea.
1—	91012	Distributor Suppressor, Wood Screw Ends—All methods of mounting	.50 ea.

AERO PENTODE AUTO RADIO MODEL A 1932

BEFORE NOVEMBER 10,1931

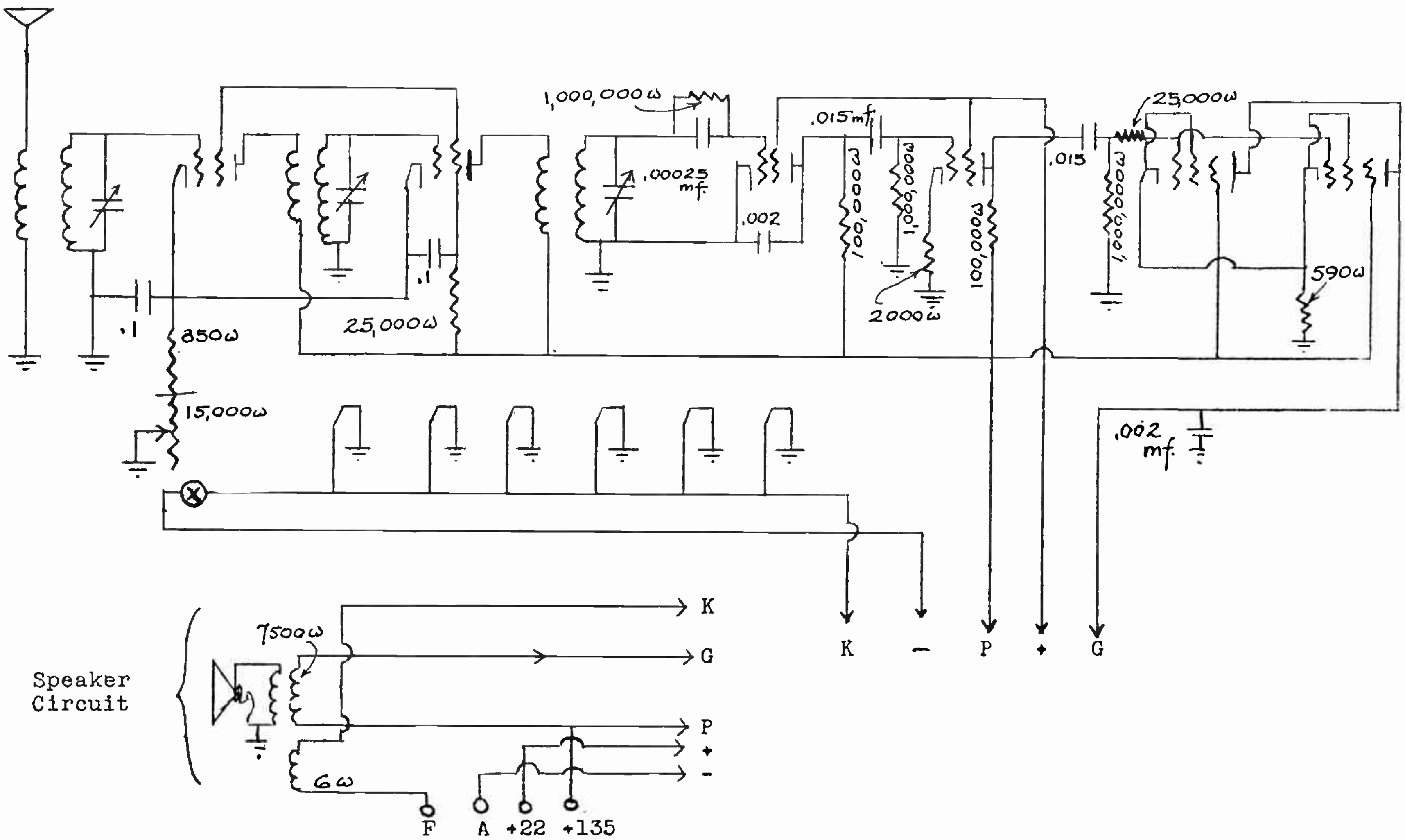


CHARLES HOODWIN CO.

MODEL A Aero Pentode Auto

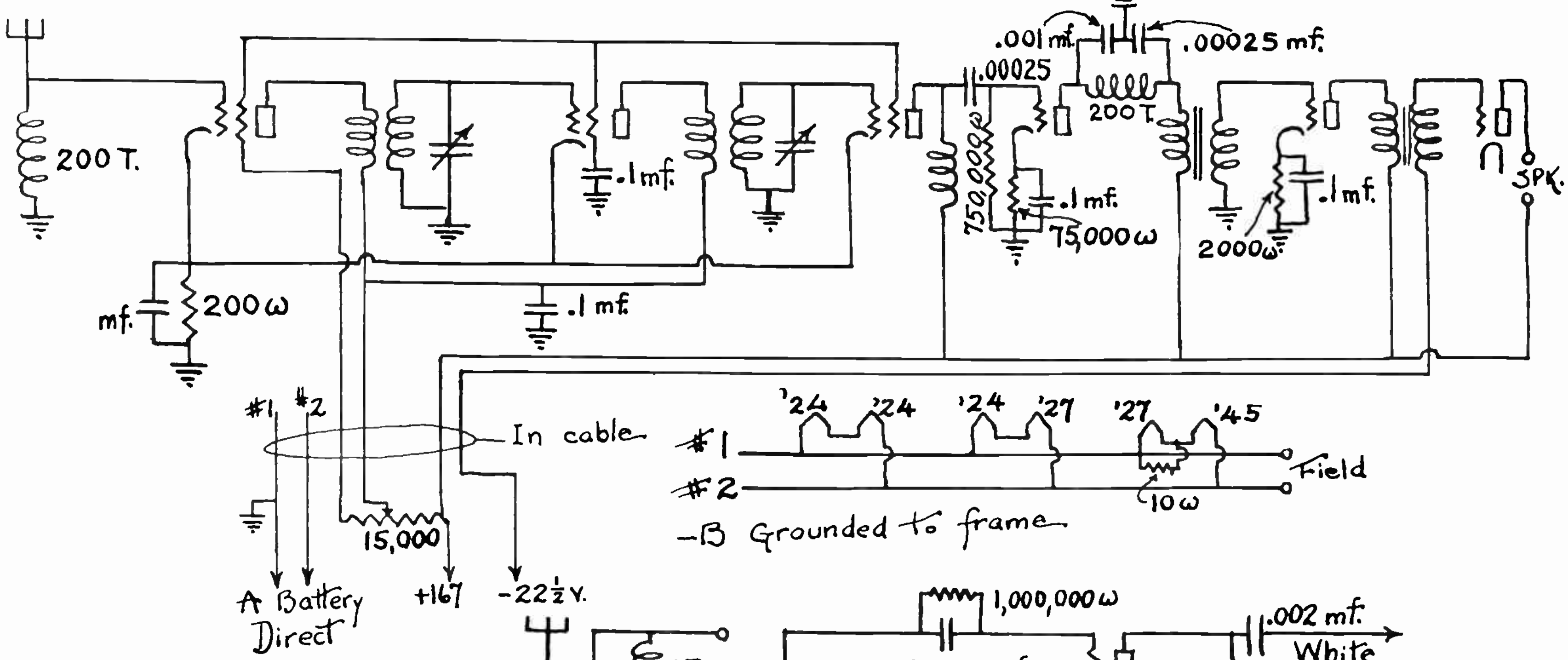
AERO PENTODE AUTO RADIO MODEL B 1932

AFTER NOVEMBER 10,1931

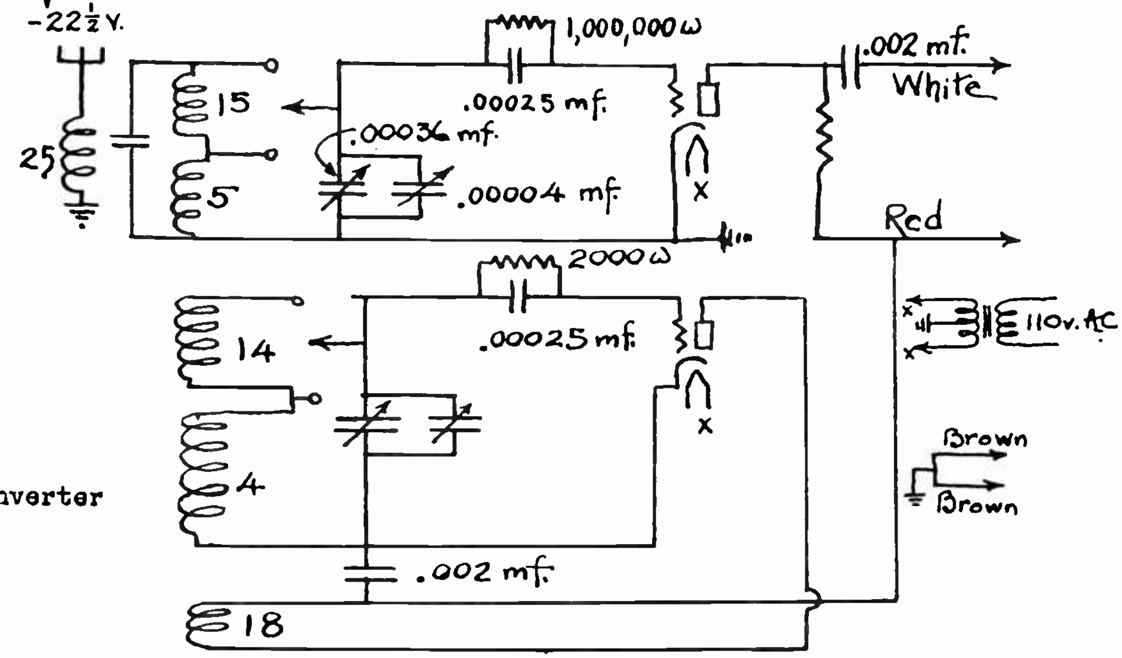


CHARLES HOODWIN CO.

CHARLES HOODWIN CO. MODEL Aero Auto Radio
MODEL Aero 1932 Converter



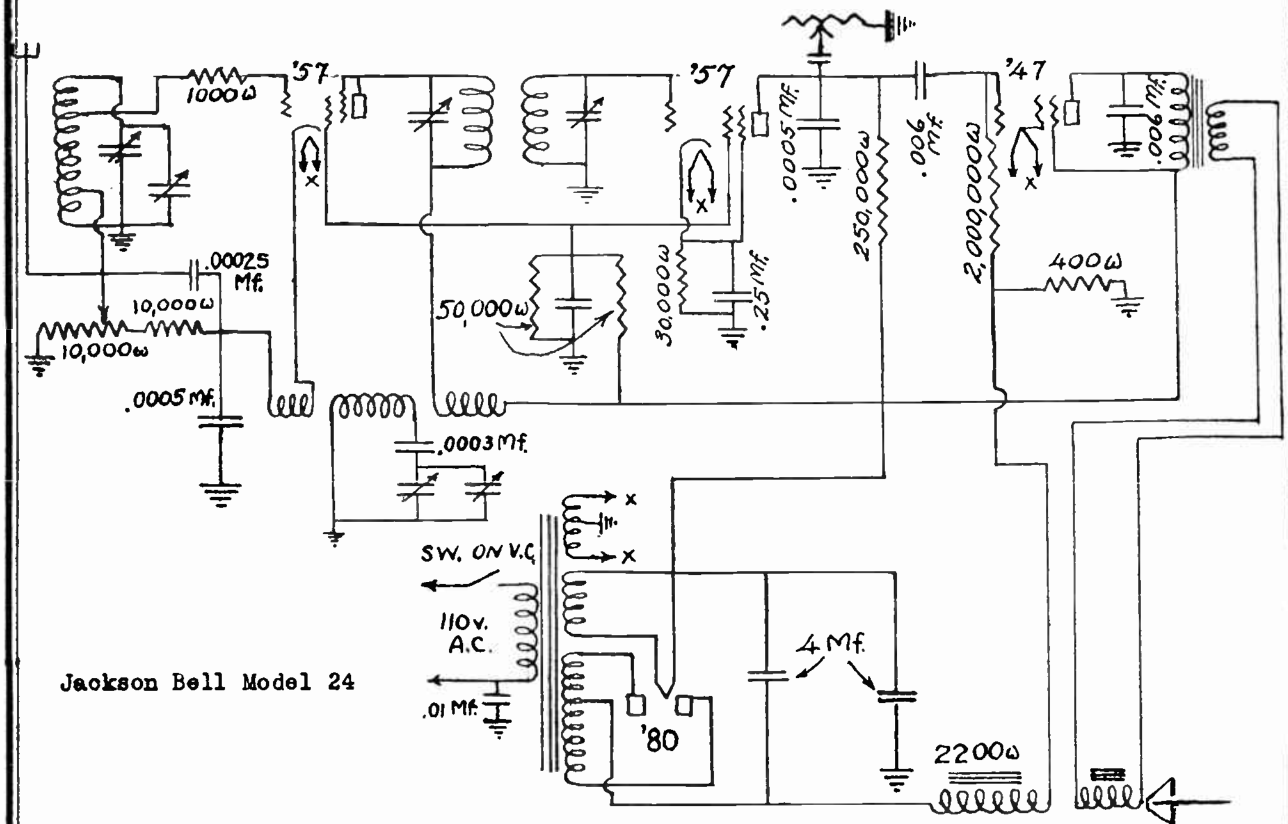
(Above)
MODEL Aero Auto Radio



(At Right)
MODEL Aero 1932 Converter

JACKSON-BELL CO., LTD.

MODEL 24
MODEL 205
(Auto)



Jackson Bell Model 24

Model 205 Data

The tuning range of the receiver is 550 to 1,750 kc., and reception of the 2,480-kc. police signals as an image frequency. The intermediate frequency used is 465 kc.

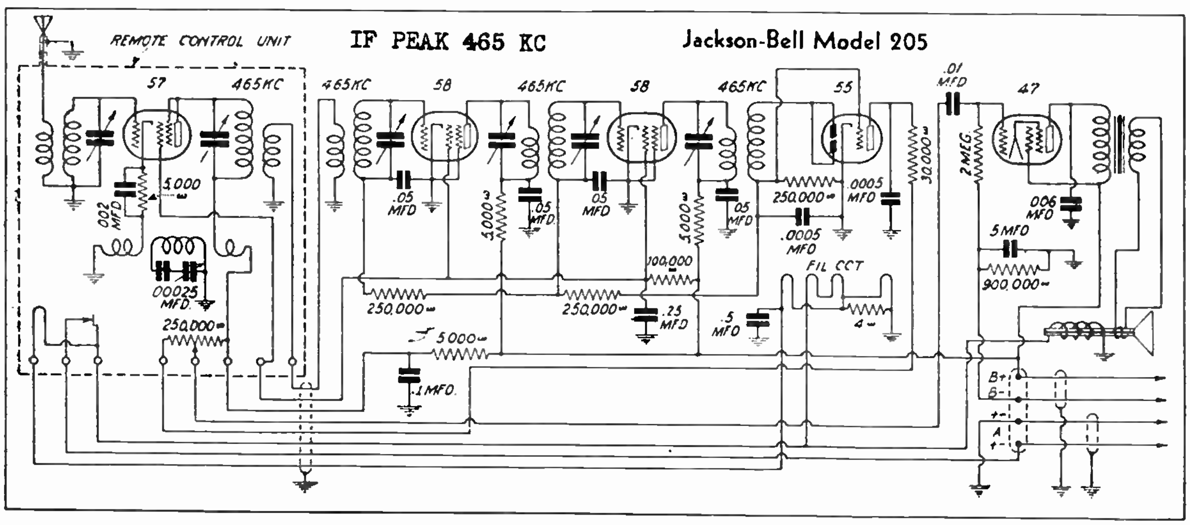
The most interesting feature of this receiver is the control unit which, instead of merely consisting of the usual remote tuning dial and volume control, actually contains the type '57 combination first detector and oscillator tube together with the associated units. This unit is then coupled to the intermediate-frequency amplifier by an i-f. transmission line contained in a shield along with the "A" and "B" feed wires, etc. The intermediate frequency and audio units are in a case with an eight-inch Lansing speaker, making the whole a two-unit job with remote control and no flexible shafts.

The i-f. feed line has at each end a coil composed of three turns of wire around a standard i-f bobbin, and the line may be 15 feet long without causing appreciable loss . . . the loss with a 15-foot run being about 5 db.

The two type '58 tubes in the intermediate-frequency stages are used as standard r-f pentodes. AVC is provided by the type '55 second detector tube which feeds the type '47 output pentode. Total plate current is 18 ma. at 180 volts.

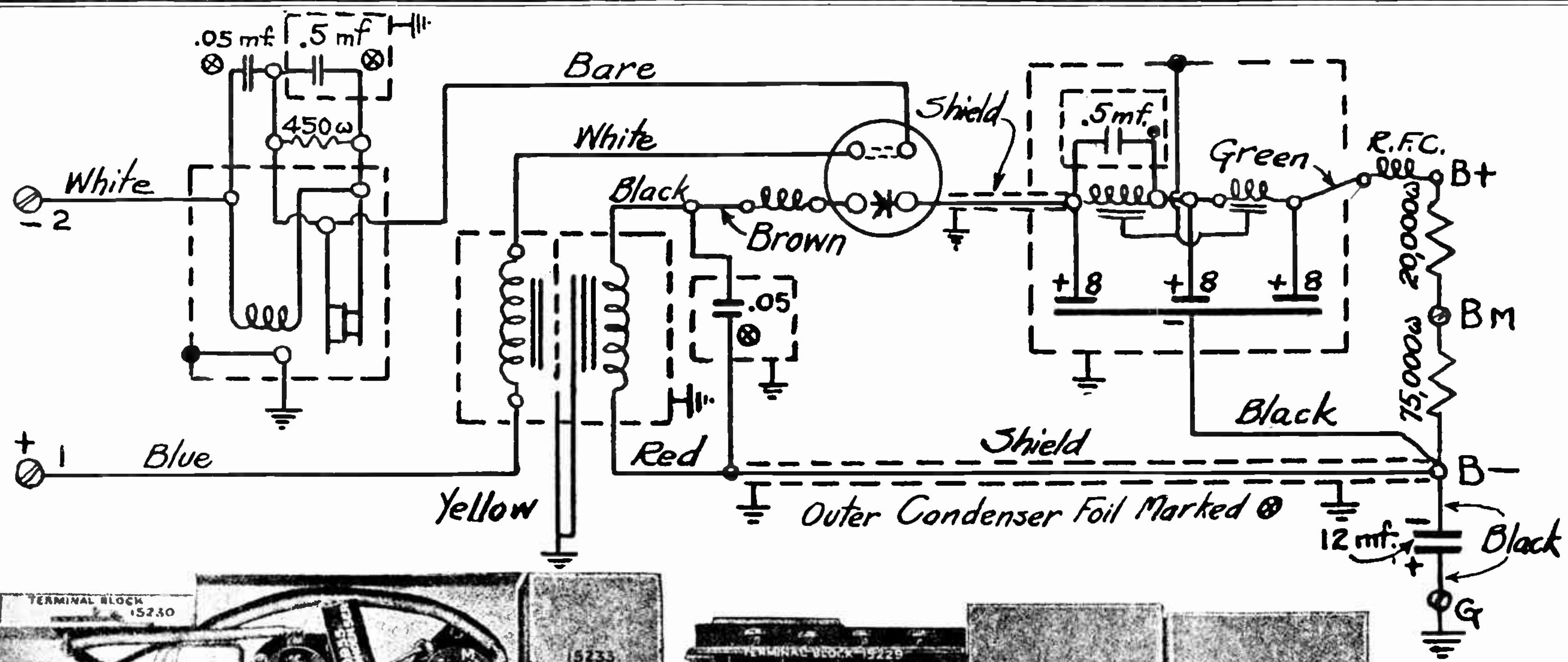
Care should be taken with the B + terminal as it is inclined to short to the chassis, in which case the 900-ohm bias resistor for the '47 tube will blow, as well as the electrolytic condenser shunting it.

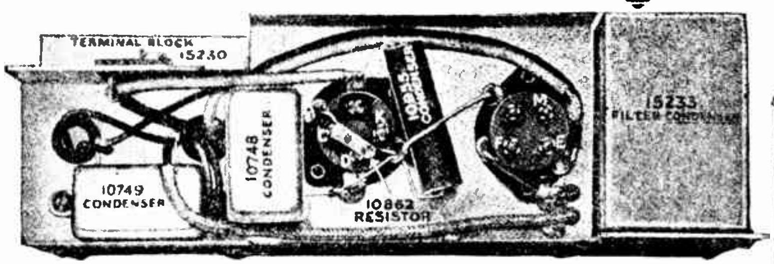
The plate winding on the oscillator coil in the control unit suffers seriously from electrolysis.

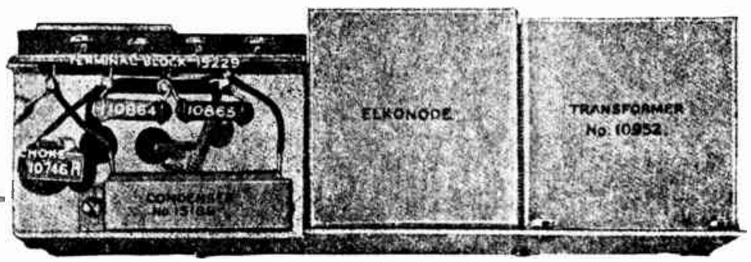


MODEL Elkon
Standard Type
Auto "B" Elim.
Schematic

P. R. MALLORY & CO.



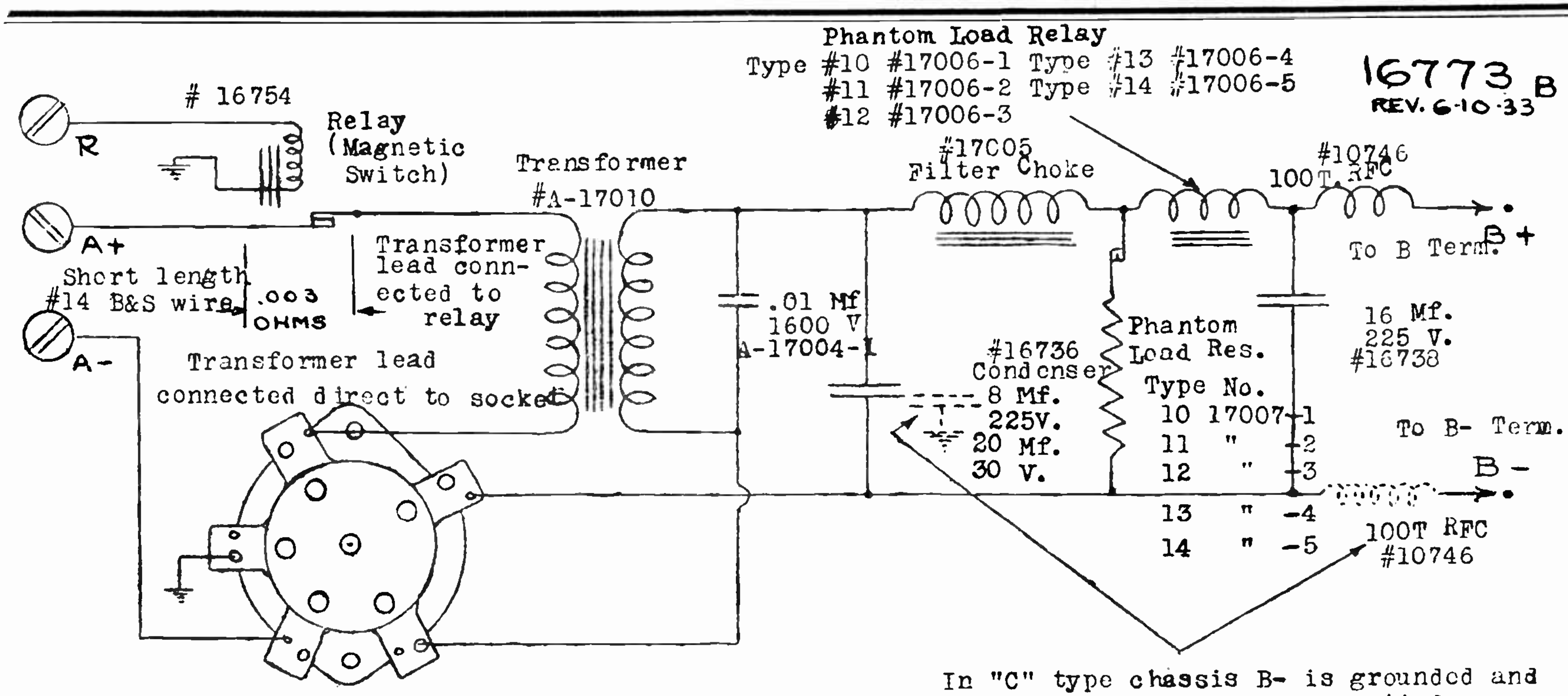




Mallory B-Eliminators: The following are the specifications for the new Mallory Auto-Radio B eliminators.

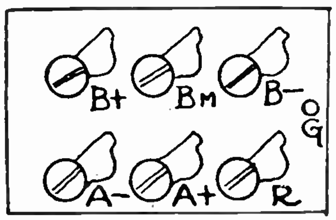
When checking these elminators for servicing, never connect the eliminator to a storage battery until there is a load resistor connected across the B minus to B plus terminals of the eliminator. If the storage battery is ungrounded, that is, is not in the car, then connect the A plus terminal to eliminator terminal 1, and the A minus terminal to the eliminator terminal 2, using not smaller than No. 14 B and S wire. When testing the eliminator the load resistor should be rated at 6000 ohms and 25 watts. While it is true that a 10-watt resistor is within the actual current rating, the 25-watt resistor is preferred. Resistances rated at less than 10 watts, will overheat very badly. The 6000 ohm load resistance is the equivalent of the average radio receiver.

Type	Amperes Input	Current At 180 V	Current at 135 V.
6	2.45	35 ma.	46 ma.
5	2.1	30 ma.	40 ma.
4	1.8	25 ma.	33 ma.
3	1.5	20 ma.	27 ma.
2	1.2	15 ma.	20 ma.
1	1.1	12 ma.	16 ma.



In "C" type chassis B- is grounded and condenser and choke are omitted.

It is imperative that the total resistance of the cable connecting the eliminator "A" and "A"- terminals to the battery terminals be .042 ohms or less

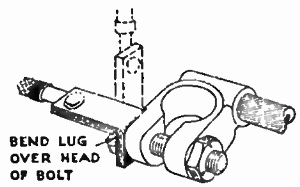


THE APPROVED MALLORY-ELKON "B" ELIMINATOR FOR LEADING AUTO RADIO RECEIVERS

Make	Model No.	Type	Make	Model No.	Type
Ajax		11 C	Motorola	7 T 38	10
Auto Lite	82	12	Motorola	7 T 47 A	10
Autotone	(Republic)	10	Ohio	6 Tube	11 C
Bosch	80	14	Philco	3	12*
Bosch	84	14	Philco	6	11 C
Bosch	9:20	11 PC	Philco	7 (using '38 Output Tube)	12 P
Cadillac	7 Tube	11 C	Philco	7 (using '41 Output Tube)	11 P
Colonial	53	11	Philco	8	10 C
Colonial	54	13	R.C.A Victor	M 32	11 C
Crescent	1931	11	Sparton	AR 19	12 PC
Crosley	95 (using '38 Output Tube)	12 C	Sparton	31	10 ST
Crosley	95 (using '41 Output Tube)	11 C	Sparton	40	13 S
Crosley	96	11 C	Roamio	91	13*
Erla	261	12 PC	Roamio	92	11
Gulbransen	6 Tube	11 C	Truetone	6 Tube	11 C
Gulbransen	7 Tube	11 C	Universal	57	11
Majestic	110	11	Universal	70	11
Majestic	114	11 C	Universal	77	11
Motometer		12 C	Wells Gardner*	6 Tube	11 C
Motorola	5 Tube	11 M	Wells Gardner	7 Tube	11 C
Motorola	6 Tube	10			
Motorola	5 T 71	11 M			

* Mallory "A" Choke Required.

THE CABLE for the new Mallory-Elkon "B" Eliminator consists of two wires within a braided metal covering. The **red** wire of this cable is positive "A," and the **green** wire is negative "A." Positive and negative "A" battery lugs are provided on the battery end of this cable (see illustration at right for method of connecting to battery). The braided metal strap at battery end should be screwed into the harness lug which is connected to the *grounded* post of storage battery. The other end of the cable should be attached to the "A" terminal screws on the terminal board of the eliminator, and proper polarity of these terminals must be observed, **red** to A+ and **green** to A—. Connect braided metal strap to one of Eliminator lid screws.



> **CAUTION: Never use anything except the Standard Mallory-Elkon Cable Assembly and never connect it to any point except directly to both the storage battery terminals.**
>
> **REASON: Any deviation from this use of cable will affect time constant of vibrator and seriously shorten life of vibrator points.**

THE TERMINAL MARKED "R" on the terminal board is for the operation of the relay which is contained in the eliminator housing, and this connection is made as follows:

1. Ascertain the "hot A" terminal on the terminal board of your loud speaker by turning set switch on and connecting an ordinary automobile dash lamp in series between the frame of the car or any grounded point and the "hot A" terminal of the speaker. There are four or more terminals on the terminal board of your speaker and the one which permits this test lamp to light will be the "hot A" terminal. (Permanent magnet type speakers having no terminals, require that relay wire be connected to load side of set switch, either in control-head or in set.) Turn set switch off while test-lamp is still connected, making sure lamp turns off with switch.

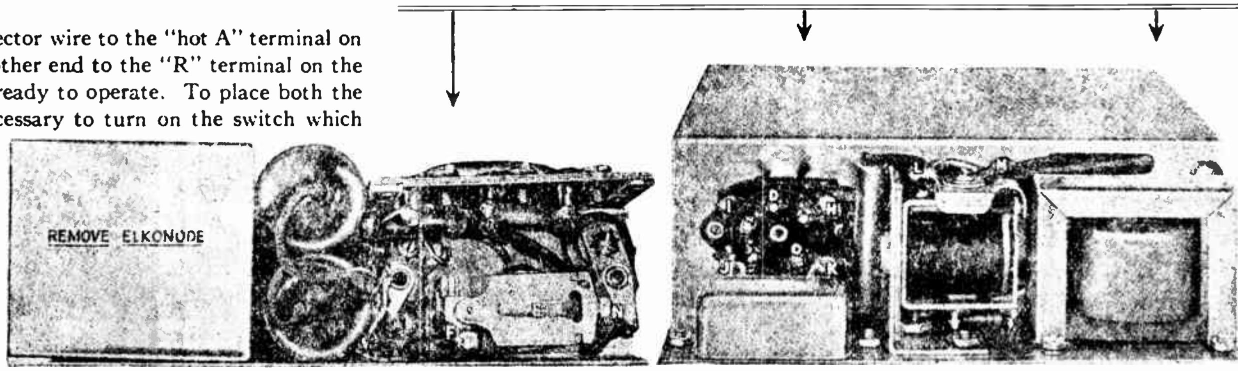
2. Attach one end of the special relay connector wire to the "hot A" terminal on the loud speaker terminal board and connect the other end to the "R" terminal on the eliminator terminal board. Your receiver is now ready to operate. To place both the receiver and the eliminator in operation, it is necessary to turn on the switch which operates the receiver. An automatic switch device is incorporated in the eliminator which turns the eliminator on when the receiver is turned on and turns it off when the receiver is turned off. From 30 to 60 seconds may be required before a signal is heard from the loud speaker, this being the time required by various types of tubes to reach proper operating heat.

5. CONTINUITY AND SERVICE TEST.

This test is to be made with the Elkonode removed from the eliminator.

It is assumed that before these tests are made the eliminator will be examined for poorly soldered or broken connections.

Continuity Between	Correct Continuity	Incorrect Continuity	Defect	Correction
R to GND	220 Ohms	Open	Open relay coil	Replace relay
"A+" to E	Closed	Open	Broken connection	Resolder
F to H	Closed	Open	Open transformer primary	Replace transformer
I to "A—"	Closed	Open	Broken connection	Resolder
H to GND	Open	Closed	Grounded transformer primary	Replace transformer
D to GND	Closed	Open	Broken connection	Resolder
J to K	90 Ohms	Open	Open transformer secondary	Replace transformer
J to K	90 Ohms	Closed	Shorted buffer condenser	Replace buffer condenser
J to GND	Open	Closed	Grounded transformer secondary or defective filter condenser	Replace transformer Replace 8 mfd. filter condenser
K to L	230 Ohms	Open	Open filter choke	Replace filter choke
K to GND	Open or 5000 to 12,000 Ohms	Closed	Grounded filter choke or shorted filter condenser	Replace filter choke or 8 mfd. filter condenser
L to M	40 to 80 Ohms	Open	Open relay coil	Replace relay
L to O	5,000 Ohms to 12,000 Ohms	Open	Open phantom load resistor	Replace load resistor
M to N	Closed	Open	Broken connection	Resolder
O to "B—"	Closed	Open	Broken connection or defective R. F. C.	Resolder or replace R. F. C.
N to "B+"	Closed	Open	Defective R. F. C.	Replace R. F. C.
"B—" to "B+"	5,000 to 12,000 Ohms	Short 270 to 310 Ohms	Shorted 16 MF Shorted 8 MF	Replace Replace



MODEL Elkon
Auto "B" Elim.
Power Connections

P. R. MALLORY & CO.

Auto-Lite Model 82 — **Eliminator** Type 5

Remove Resistors

Green Red Shield

Connect "A" Hot of Radio Set to Relay

Atwater Kent Model 81 — **Eliminator** Type 4

75,000 20,000

Black Red White

Connect "A" Hot of Radio Set to Relay
Use Regular "C" Batteries

Atwater Kent Model 91 — **Eliminator** Type 6

Remove Resistors

Black White Shield

Connect "A" Hot (from Speaker) to Relay
Use Regular "C" Batteries

Bosch Model 9:20 — **Eliminator** Type 5P

50,000 40,000

Black White Red

Connect Black Wire from Radio Set to Relay

Majestic Model 110 — **Eliminator** Type 6

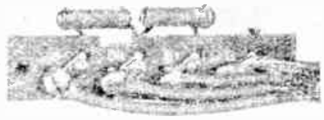
75,000 20,000

Black Yellow Red

Connect White Wire to Relay.—Black to Grounded Battery Post

Philco Model 7, Model 7, Chassis Code 121 — **Eliminator** Type 3P for 135V, 5P for 180V

50,000 40,000



Black White Green White Blue White Shield

Connect No. 14 Wire from "B—" to Relay, Preferably Shielded

Crosley Model 90 — **Eliminator** Type 3

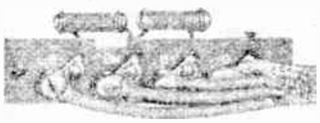
75,000 20,000

Black White Red

Connect "A" Hot of Radio Set to "A" Choke. "A" Choke to Relay
Use Regular "C" and "D" Batteries

Motorola Model 7-T-38, Model 7-T-47-A — **Eliminator** Type 6, Type 6

75,000 20,000

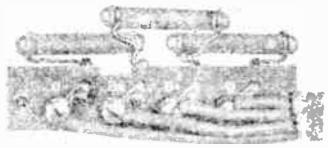


White Green Red Shield

Connect Yellow Wire to Relay. Black Wire to Grounded Battery Post

Sparton Model 40 — **Eliminator** Type 6 Spcl.*

5,000 20,000 20,000



Yellow Ground Brown Red

Connect Black and Red Wire to Relay

Crosley Model 91, Model 92 — **Eliminator** Type 4, Type 6

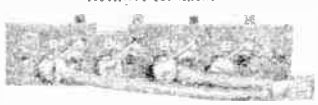
Remove Resistors

Green Red

Connect "A" Hot of Radio Set to "A" Choke. "A" Choke to Relay

Motorola Model 6 Tube — **Eliminator** Type 6

Remove Resistors



White Red

Connect Red Wire to Relay. Black Wire to Grounded Battery Post

Universal Models 60 and 70 — **Eliminator** Type 6

Remove Resistors

Red Shield

Connect White Wire to Relay. Black Wire to Grounded Battery Post

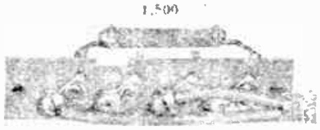
Crosley Model 95 — **Eliminator** Type 4

Remove Resistors

Connect "A" Hot of Radio Set to Relay

Motorola Model 5-T-71 — **Eliminator** Type 4 Spcl.

1,500

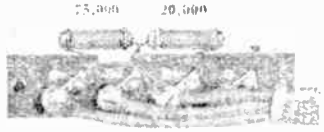


White Red Shield

*Connect Two 8 MFD. 275 Volt Elkon Condensers Across the Output B – to B +. Connect Red Wire to Relay

Colonial Model 33, Model 34 — **Eliminator** Type 5, Type 4

75,000 20,000

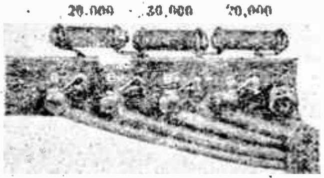


Black Yellow Red

Connect White Wire to Relay. Black Wire to Grounded Battery Post

Delco Model 3010 — **Eliminator** Type 3 Spcl.* †

20,000 30,000 20,000



Yellow Maroon Black Red Red Tr.

Connect Black and Yellow Wire from Radio Set to "A" Choke. "A" Choke to Relay

Philco Model 3 — **Eliminator** Type 6

Remove Resistors

Green-White Blue-White

Connect Black-White Wire to "A" Choke. "A" Choke to Relay

*Remove wire leading to "G" terminal. Move wire fastened to "B+" terminal to "G" terminal, making the "G" terminal, B+. Install resistors as shown.

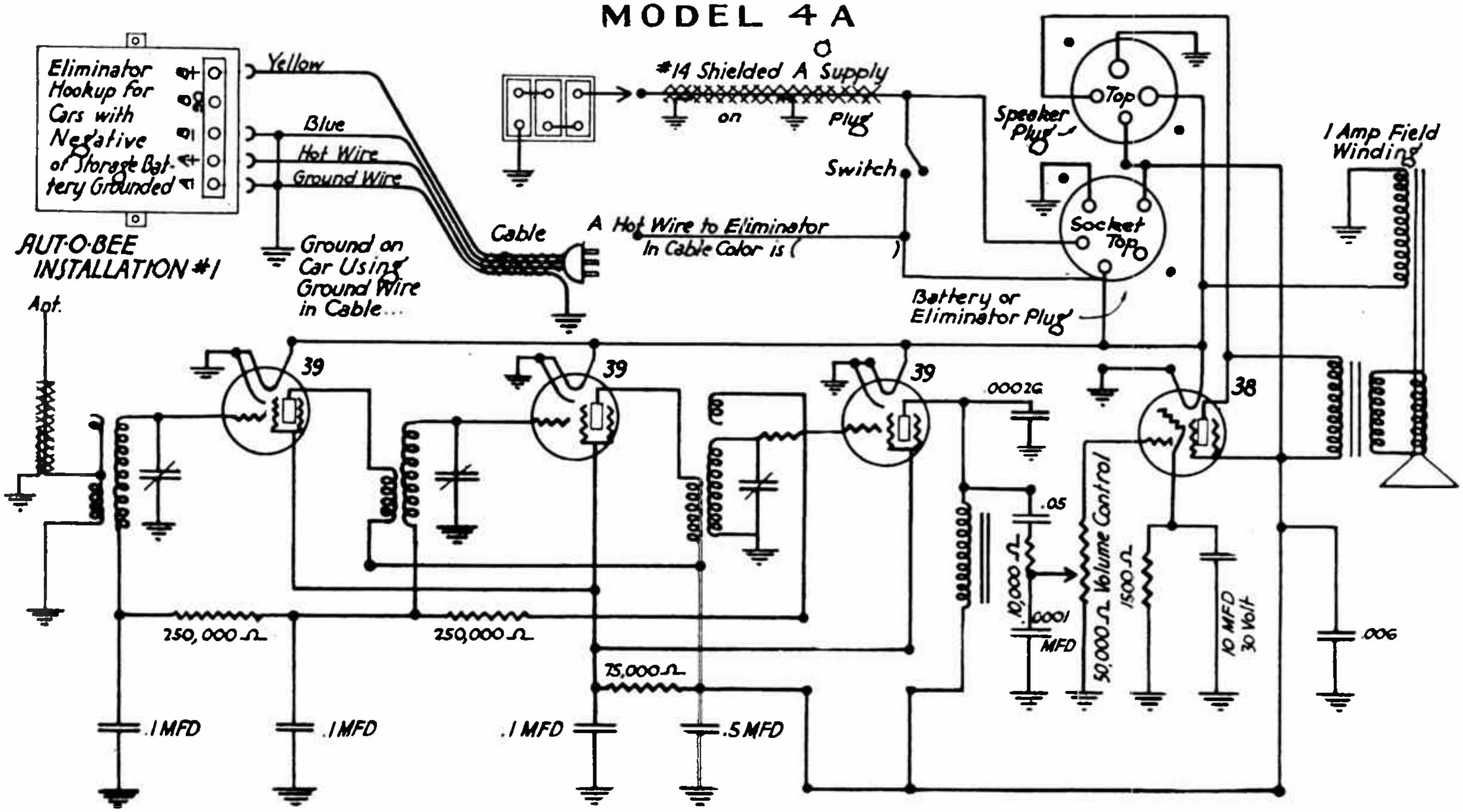
†If shielded "B" cable is used remove the rivet from the right end of the terminal strip and replace with screw and nuts.

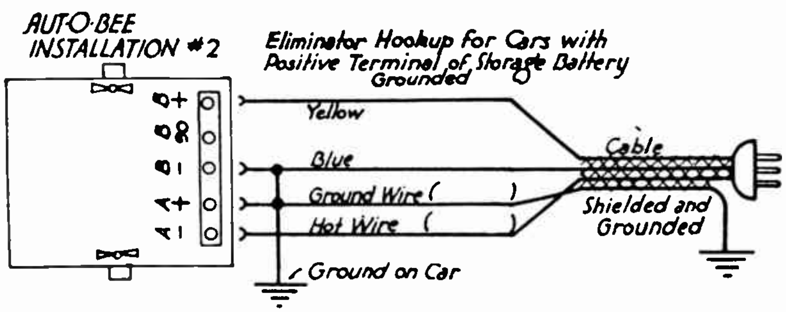
Fasten shield to bolt.

MODEL 4-A

MISSION BELL RADIO MFG. CO., INC.

MODEL 4 A





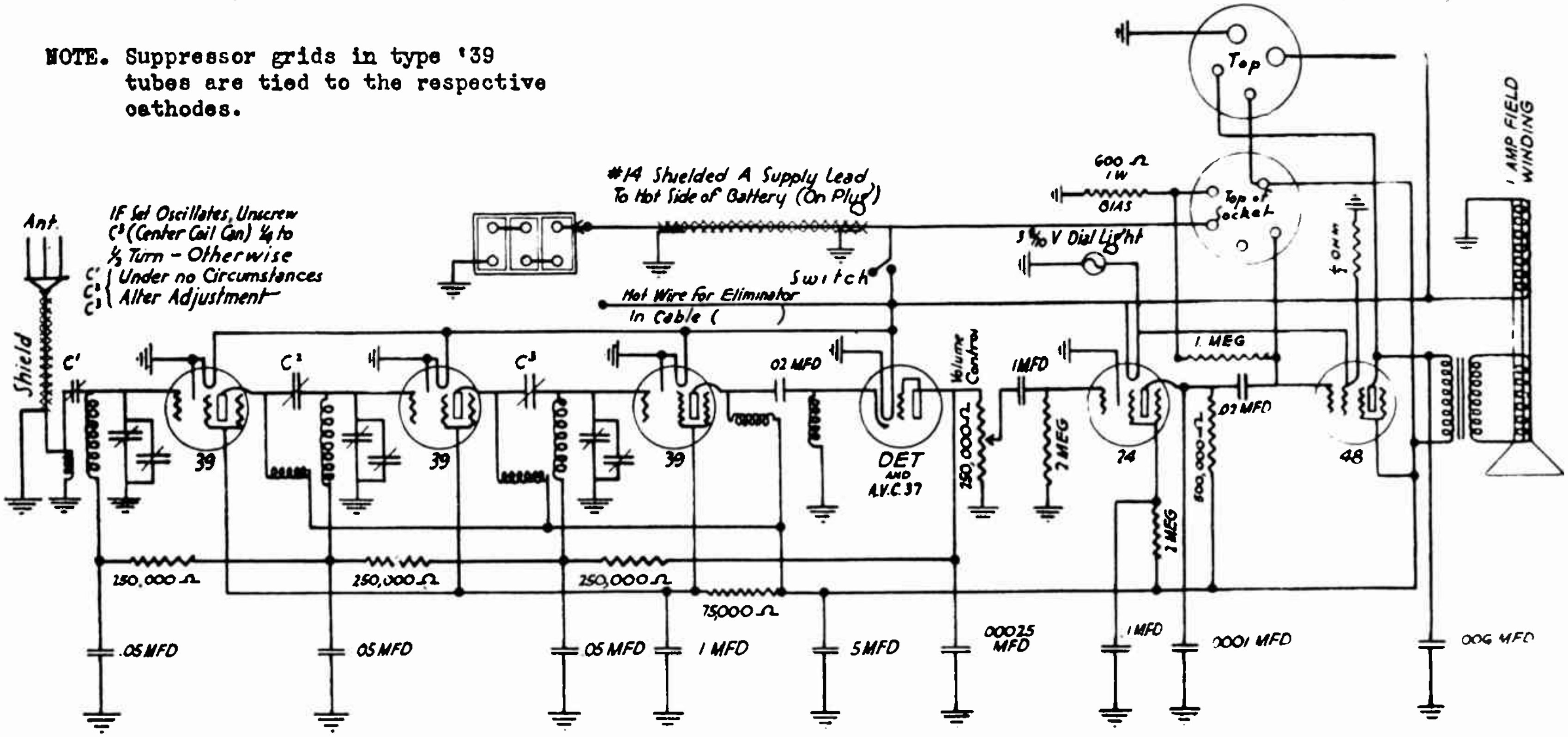
Ground Wire Can be Grounded Under Thumb Nut on Eliminator Cover
Color of Ground Wire is ( )

RF and DET Screen Voltage at No Signal	50
RF Plate Voltage at No Signal	175
DET Plate No Signal	165
38 Plate 38 Bias	170 16
Set Consumption at 175 Volts	20-21 MA

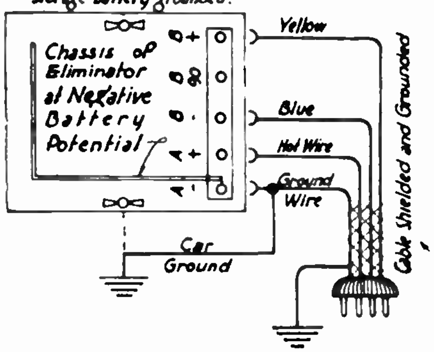
NOTE. Suppressor grids in type '39 tubes are tied to cathodes.

MISSION BELL RADIO MFG. CO., INC.

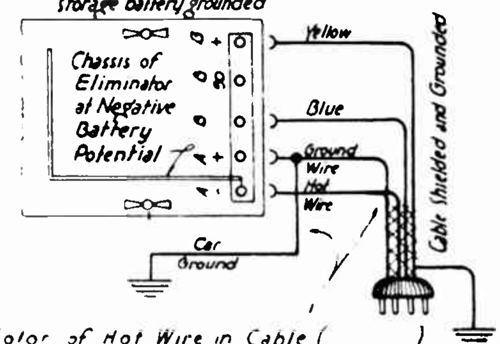
NOTE. Suppressor grids in type '39 tubes are tied to the respective cathodes.



AUT-O-BEE INSTALLATION #1
For cars with negative terminal of storage battery grounded.



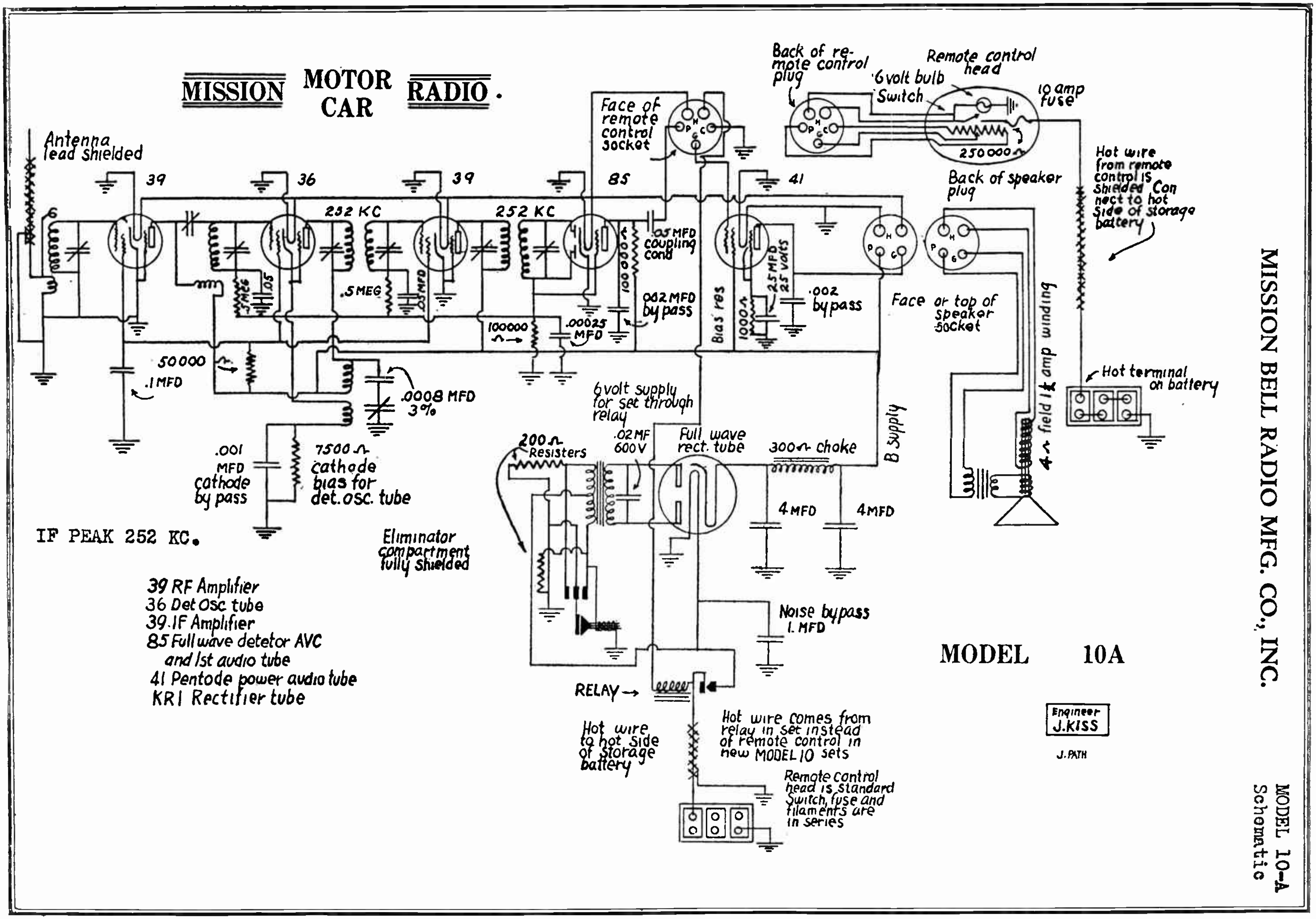
AUT-O-BEE INSTALLATION #2
For cars with positive terminal of storage battery grounded



Color of Hot Wire in Cable ( )
for AUT-O BEE
Color of Ground Wire in Cable(

AVERAGE VOLTAGE READINGS AS TAKEN WITH 1000 Ω PER VOLT METER

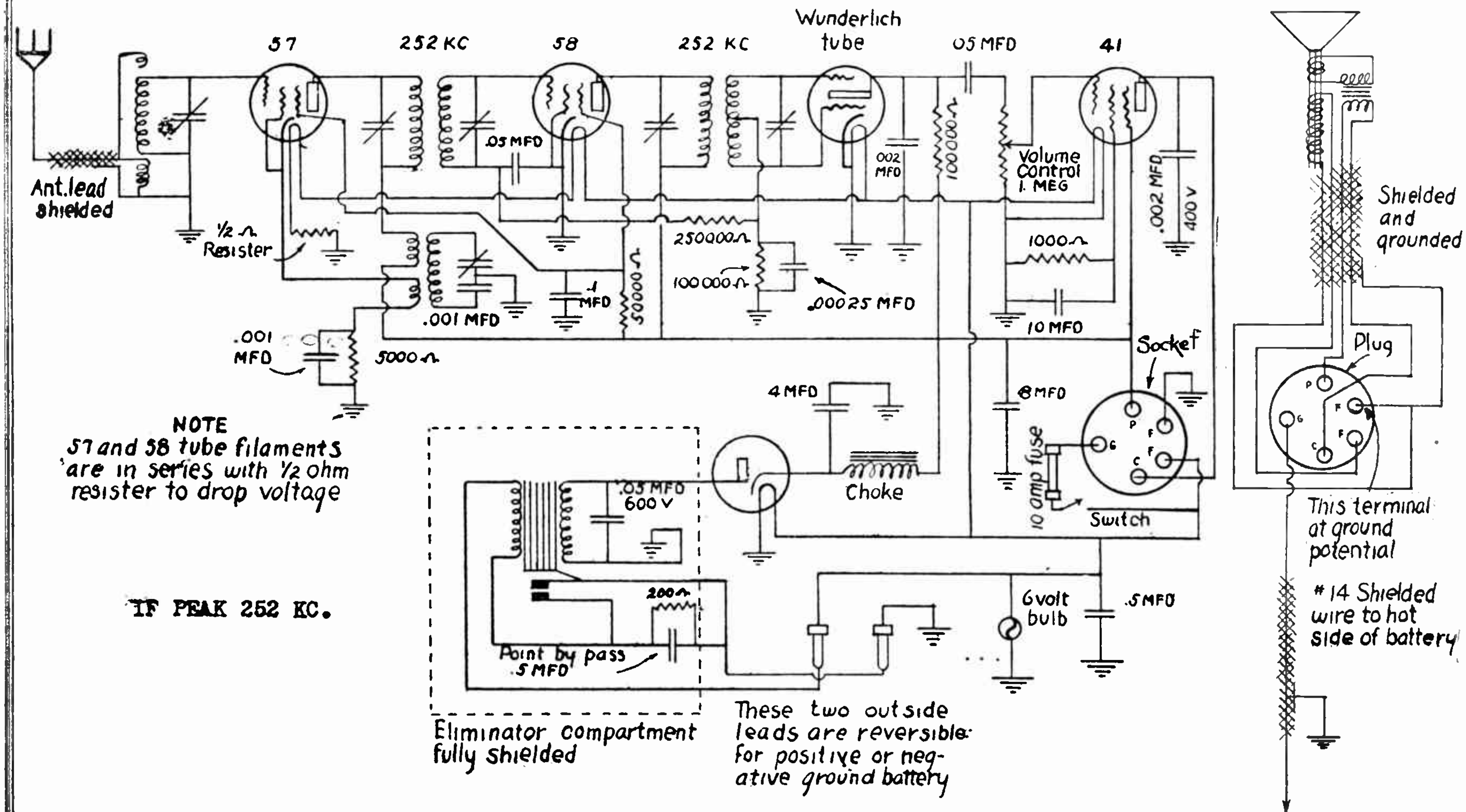
R F Screen Voltage at No Signal	55
R F Plate Voltage at No Signal	70
1st Audio Plate	30
1st Audio Screen	10
48 Plate to Ground	165
48 Bias B- to Ground	11 13
Set Consumption at 180 Volt Output	19-20 MA
AUT O Bee Output B+ to B	185 190



MODEL 10-A Schematic

MISSION MOTOR CAR RADIO

MODEL 19 AND 19A



NOTE
57 and 58 tube filaments are in series with ½ ohm resister to drop voltage

IF PEAK 252 KC.

Eliminator compartment fully shielded

These two outside leads are reversible for positive or negative ground battery

MISSION BELL RADIO MFG. CO., INC.

Mission Bell Radio Mfg. Inc.
1455 Venice Blvd., Los Angeles

SERVICE DATA ON FULL-WAVE INTERRUPTOR

****

An 0 to 5 Ammeter is absolutely necessary in servicing.
The Model 10A and 19-A and Model 5 should draw approximately 5½ to 5¾ amps. There is no voltage regulator, Your reading of output voltage can be secured most conveniently from the adjusting screws on top of intermediate frequency coil.
If the set draws 5½ to 5¾ amps. with no resulting output voltage, then check AC volts from transformer. Test rectifier tube - a shorted filter condenser will increase the drain approximately 2 amps. A shorted buffer condenser will increase drain 5 amps. Either of which cause the points to labor and heat up. Visually, this is indicated by excessive arc-ing and small movement of armature (weight on end of center spring). Shorted rectifier tube will show 8 amps short.
If transformer primary is shorted, due to contact points failing to move apart, you will receive a reading of from 18 to 26 amps - which will blow the fuse inside the set on Model 10A, 19A and 5, or in remote control on Model 19B. Usually, tightening the 2 6/32 nuts on the assembly, or giving the inside point next to the starting coil a gap of ten thousandths (.010), either by bending metal stop to push the points apart, or bending spring stock away from center point is all that is necessary.

If above conditions are normal and the vibrator fails to start, the points are spaced too far apart, or the armature is too far from the magnet or core - providing you have battery voltage to the points.

Bench Adjustment:- Weight on center spring (call Armature) should not be closer than 1/8" to magnet or core. The copper rivet fastening weight to spring should keep the weight from touching the core. The outside point should have a tension of not more than five thousandths (.005). The inside point should be open about eight to twelve thousandths (.008 to .012). The main consideration is to secure as wide a spacing as possible on the inside point, and yet not so wide that when set is turned off and on continuously there would be failure to start (or point make contact). It is also satisfactory to adjust so that the outside point has a small gap - but a closed contact on the outside point will assist in starting.

Adjustment of Interruptor of Open Frame Type: -(This frame is not a closed or complete rectangle). If the points work vigorously, or if the weight is pulled all the way to the core when switch is turned on, it is advisable to bend the frame to bring the weight farther away from the magnet. This can be accomplished with a large pair of pliars. If the weight is too far away and magnet will not pull weight down enough to contact lower point, bend opposite way. In either operation make the bend at the top end of frame. Other spacing and adjustments same as above directed.

ADJUSTMENT HALF-WAVE POINTS MODEL 10

****

Battery voltage should be not less than 5½ volts at terminals on the outside of Junction Block. (This is the small fiber strip attached to the side of Eliminator Box).
Put an 0 to 5 Ammeter in series with the hot or ungrounded wire on the Junction Block.

Second: - The lower spring should rest close to the transformer, 1/32 of an inch, no more, above the transformer. The lamentations at the groove should be level, and can be made so by tapping with a hammer. When installing a new assembly, see that adjusting screw does not touch the transformer until the point assembly is securely fastened down. On new assemblies as received from the factory, note carefully the tension and movement of the points, in case it should be necessary to bend the lower spring to secure right distance from transformer - you can then bend the upper spring enough to get this same tension again.

Third:-It is absolutely necessary to have an ammeter hooked in series with the hot wire on junction block, as the input voltage reading should never exceed a maximum of more than 2 amps. This voltage and also the output voltage can be regulated to some extent with the adjusting screw. If the points should be drawing more than two amps, they will get hot and pit and burn.
Fourth:- The tension on the top point is very important. These should be adjusted for maximum swing or up and down movement of both points when in operation.

Fifth:-With lower point adjusted to 1/32" from transformer, the upper spring should have enough tension to follow nor move down approximately 30/1000ths as the lower spring is pulled down to the core or lamentations. There should be a 30/1000ths gap between the points when the lower point reaches its maximum downward movement. Either decreasing or increasing the tension of the springs regulates the INPUT and OUTPUT VOLTAGE. The output voltage can be secured most conveniently from the upright intermediate frequency coil. One of the brass screws is B positive - B negative being the ground.

NOTE:-In case the negative of the car storage battery is grounded, then you must make the same polarity hook-up on the bench. Should the set be changed from a negative grounded car to a positive grounded car, then the two wires on the outside, and the same side of the junction block, must be reversed.
Should the points have been run backwards from hooking up wrong polarity, a few strokes of a thin file between the points will remove excess metal on surface of points, and then can be re-adjusted - unless they have been so hot that the temper is out of the metal.
To bend the springs use long nose pliars at the back end of spring, twisting either down or up, depending on desired effect.

Discussion of R. F. DISTURBANCE IN RELATION TO GROUNDS.

With reference to R. F. noise or disturbance created by the interruptor or eliminator, as applied to demonstrating boards and bench installation for testing and demonstrating.

Inasmuch as all transmitting stations use a good ground or counterpoise ground to properly dissipate R.F. energy - and the best of the receiving systems employ good ground or counter-poise for proper reception - it is quite evident that when a set of this nature is hooked up on a display board or on the bench, that the chassis or set connected to the battery or to the shielded cable forms a very poor ground - especially when the source of the interference is located inside of the set. Therefore, if proper dissipation of the R.F. disturbanse is not provided in the form of a ground, the antenna will pick up considerable interference from the set, battery and battery leads.

For installation on boards and bench testing, it has been found, after exhaustive tests, that a ground must be provided in the form of an outside type, or one of counter-poise effect constructed sufficient to offset the antenna pickup of this interference. An antenna of from three feet not to exceed ten feet is recommended, as it is generally possible to secure an outside ground sufficient to counteract this pickup of R.F. interference.

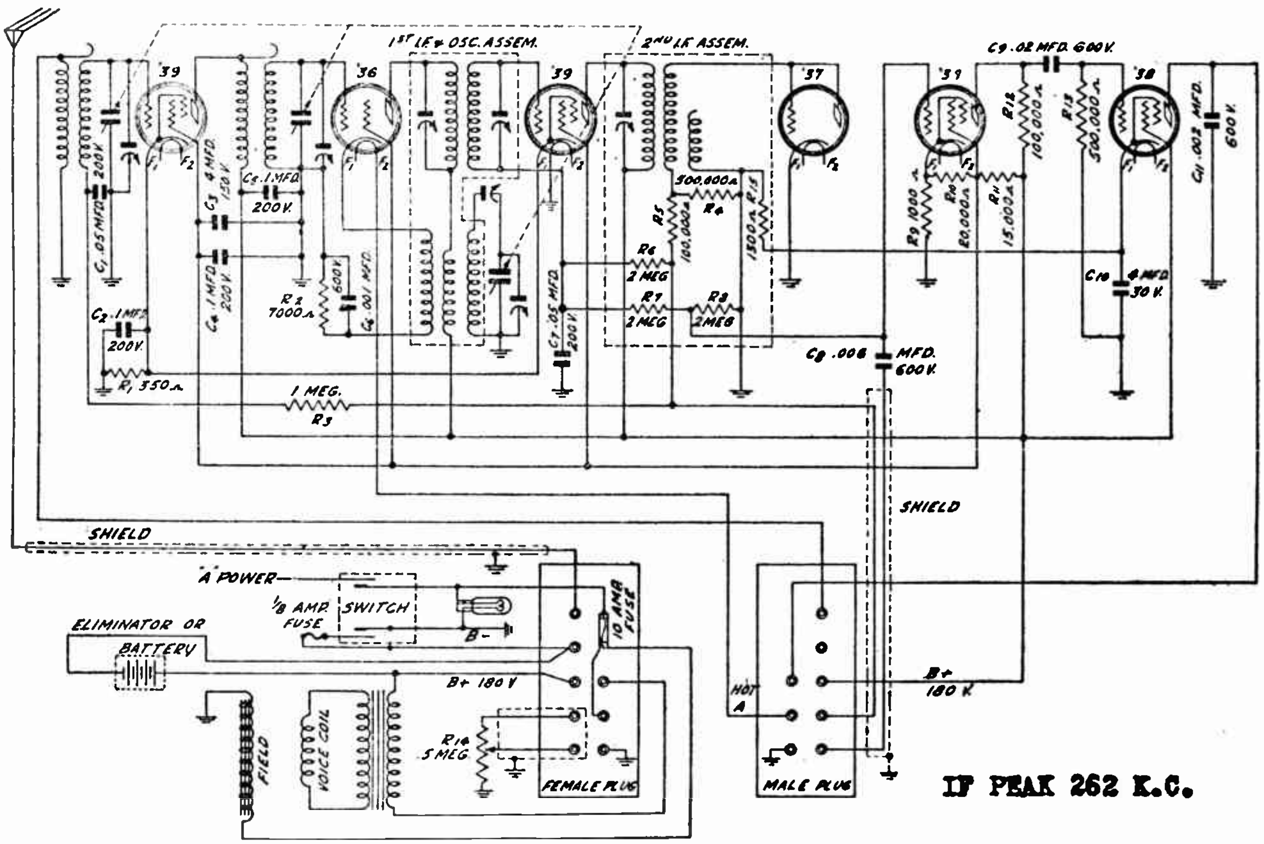
An automobile has proven to be one of the best counter-poise ground systems obtainable, and Mission Automobile Receivers have been designed for this type of ground system. The outside ground corresponds to the ground system in the car. The bolting of the receiver to the dash with the three studs gives considerably more ground effect than fastening an outside ground to one stud of the case when operating on the bench. Do not confuse the car battery as your ground system; it is merely your six-volt source of supply. The car-frame, motor and body become a very large and efficient counter-poise ground - and being situated right under the antenna input, becomes the dissipating agency for the R.F. noise that is created by the interruptor. That is the reason that the antenna in the car does not pick up the R.F. interference when the set is properly mounted in the car - but the same set would, no doubt, appear to be producing considerable amount of R.F. on the bench.

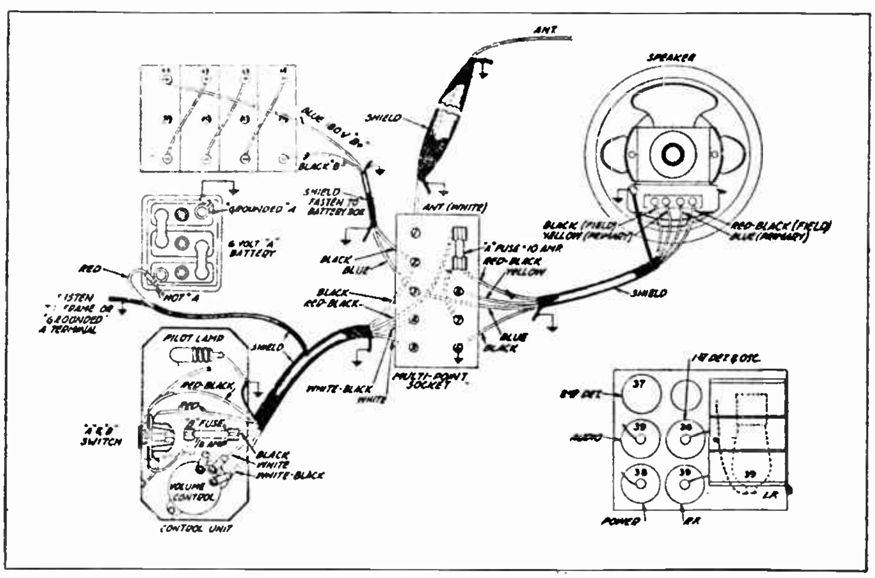
MISSION BELL RADIO MFG. CO., INC.

MODEL 10-A, 19, 19-A Vibrator Data

MONTGOMERY-WARD & CO.

MODEL Auto Radio





VOLTAGE DATA

Tube	Plate	Screen	Grid	Plate MA.
R-F.	177	80	3	3.6
1st Det.	173	76	7*	.9*
I-F.	177	80	3	3.6
2nd Det.	0	0	0	0
1st A-F.	54	77	6	1.2
Output	159	165	15.5	10.0

* Will vary with dial setting.

MODEL Auto Radio MONTGOMERY-WARD & CO.

Mounting "B" Eliminator and Relay

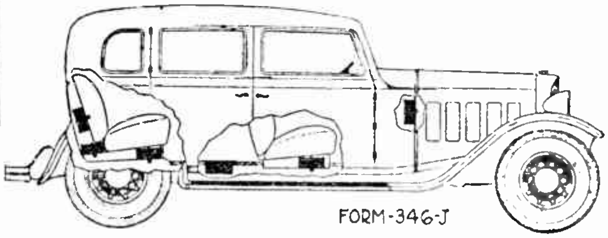


Fig. 7—"B" Eliminator Locations

In addition to the following instructions, a complete installing bulletin for the "B" eliminator is furnished by the manufacturer with each unit. The "B" eliminator can be conveniently mounted in a number of locations in the car as shown in Fig. 7. Under the front seat or in the motor compartment under the hood is a convenient place. The eliminator should be at least 12″ away from any ignition or lighting wires of the automobile. Never install the eliminator on end, that is, with the mounting brackets at the top and bottom. Short out the "B" fuse when a "B" Eliminator is used.

In Fig. 1 the "B" eliminator is shown under the front seat, at the right hand side, for illustrative purposes. If, as shown in the illustration, the antenna lead comes down the right front corner post and the "B" eliminator is under the front seat, it should be moved to the left as far as possible. In general, mount it on the opposite side of the car that the antenna lead is installed.

The relay should be mounted near the car storage battery so that the two leads will reach. It is mounted on the frame of the car. Before making any connections to the battery, determine which side is grounded and which side is ungrounded. Then find out if the ungrounded or hot side is positive or negative. This will vary with the make of car.

In Fig. 8 is shown how the connections are made in either case. Unscrew the clamp bolts on the battery and connect lug of yellow lead to the "hot" side of the battery and the lug of the black lead to the grounded side. The bolt goes through the hole in the lug and the lug is bent over. Connect the shielded two-lead cable from the "A" battery and relay to the "B" eliminator. Note that the proper connections will depend on which side the battery is grounded. The "B" cable connections from the chassis may then be completed to the "B" eliminator. It is important that the "B" cable to the eliminator be located as far away from the "A" supply cable as possible. Run them to the "B" eliminator at opposite sides of the car as shown in Fig. 1.

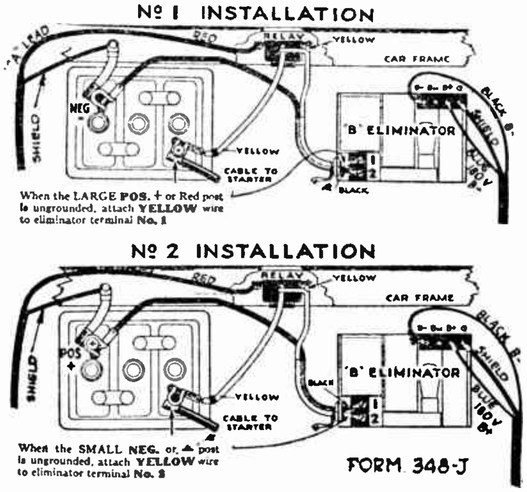


Fig. 8—"B" Eliminator Connections

Suppression of Ignition and Generator Noise

After the receiver is in satisfactory working order, start the motor and note the amount of noise. As a general rule, spark plug suppressors, a distributor suppressor and a ½ mfd. condenser on the generator are all that is required for the reduction of ignition and generator noise. If these items do not reduce the noise sufficiently, other measures as described below are required.

One spark plug suppressor is required for each plug. The method of mounting is shown in Fig. 12. Remove the wire from the top of the plug, put the suppressor on, and attach the wire to the top of the suppressor.

A distributor suppressor is put in the high tension lead, between the coil and the distributor head. Position "C," Fig. 12, on the distributor head is the most satisfactory and most commonly used point of mounting. If this is not practical, the high tension line may be cut *close to the distributor head* and the distributor suppressor with wood screw ends inserted in the line as shown in position "B."

The ½ mfd. generator condenser is installed as shown in Fig. 12. The lead from the condenser goes to one side of the cut-out connection on the generator. The mounting clamp grounds the other side of the condenser.

After the above procedure has been followed, again start the motor. If noisy operation persists, a number of steps can be taken and the various suggestions as given can be tried until the noise is satisfactorily reduced.

Try two suppressors in the high tension line, one at the coil end in addition to one at the distributor end, position "C," Fig. 12.

Ground all cables and tubing which pass through the dash, such as oil lines, gas lines, etc. Ground to the dash or at the nearest convenient point on the frame with a good short ground connection. Use the left-over shield from the "B" battery lead for this purpose.

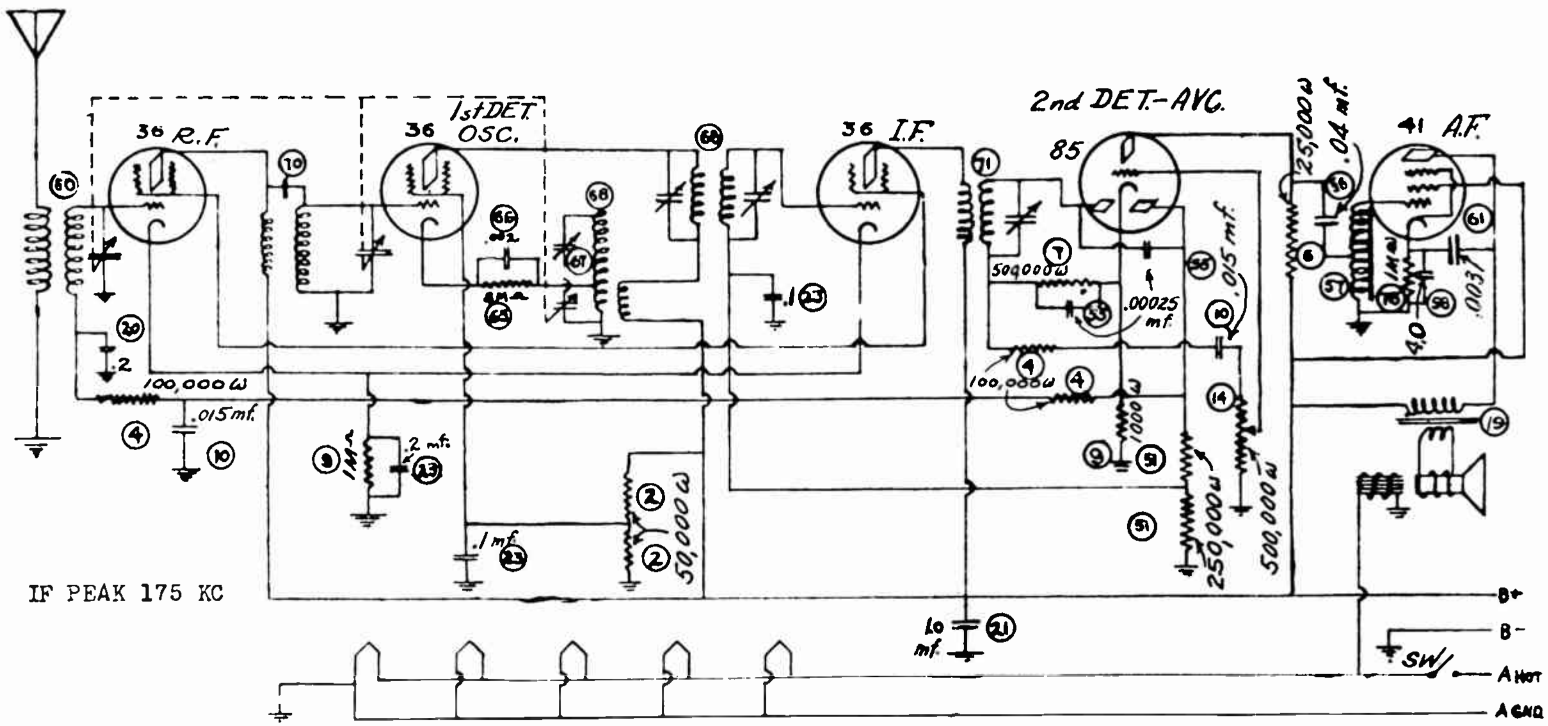
If the chassis and coil are both in back of the dash (under the cowl), take off the coil and mount it on the front of the dash (in the engine compartment). If the coil cannot be moved, place a copper can over it and ground the can at the coil mounting.

Clean and respace spark plugs—clean and check distributor points—check distributor condenser.

In some cases, the high and low tension leads between the coil and distributor are run close together. In some cases they are in the same conduit. If this is the case, remove the low tension lead from this conduit.

MOTO-METER GAUGE & EQUIPMENT CO.

MODEL 10-A
Moto-Vox
Schematic
Above Serial 500



IF PEAK 175 KC

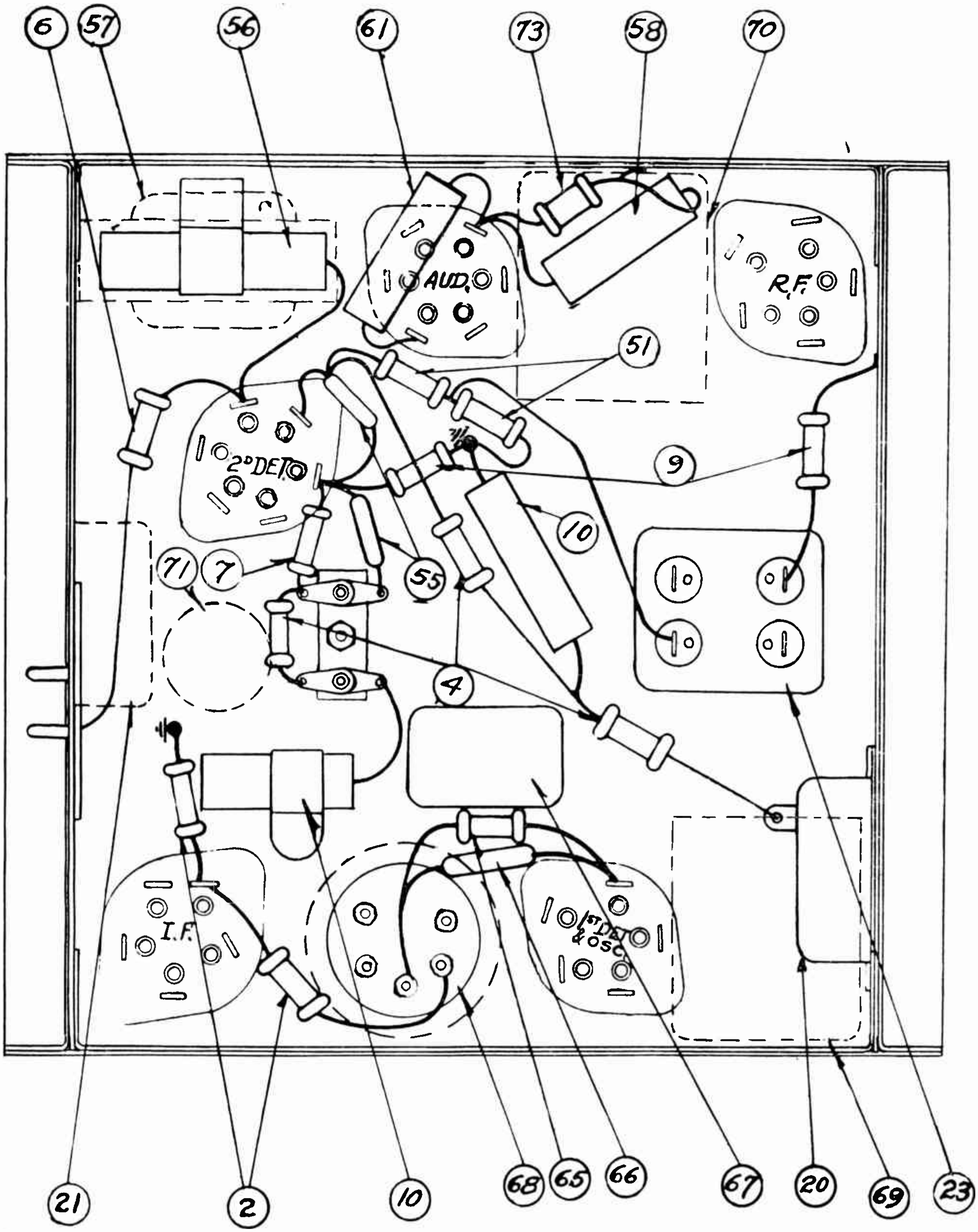
TUBE			CATHODE TO GROUND	CATHODE TO SCREEN	CATHODE TO PLATE
TYPE	PURPOSE	FILAMENT			
36	R.F.	5.6	3.5	82.0	196.0
36	1st Det. & Osc.	5.6	7.0	79.0	193.0
36	I.F.	5.6	3.5	82.0	196.0
85	2nd Det. & A.V.C.	5.6	4.2	——	82.0
41	A.F.	5.6	16.3	182.0	172.0

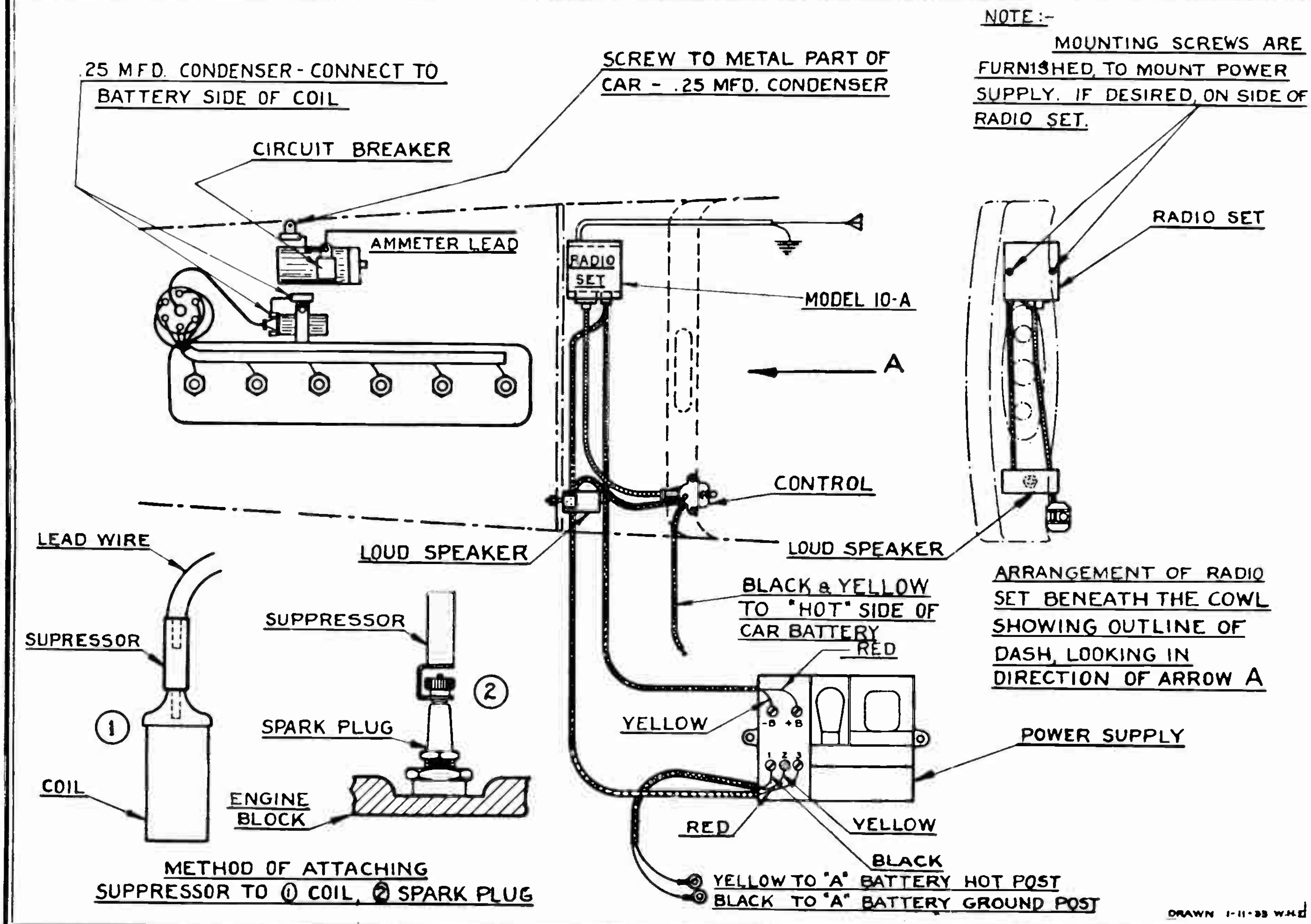
Take readings at tube sockets, when receiver is tuned off signal.

Total drain with input of 5.7 volts. 28 mils at 200 volts.

MODEL 10-A
Moto-Vox
Chassis Wiring
Above Serial 500

MOTO-METER GAUGE & EQUIPMENT CO.





MOTO-METER GAUGE & EQUIPMENT CO.

MODEL 10-A
Moto-Vox
Assembly Wiring

MODEL 10-A,10-E
Moto-Vox
Notes

MOTO-METER GAUGE & EQUIPMENT CO.

SPECIAL INSTRUCTIONS - MODEL "10 A" ALL ELECTRIC ONLY

POWER SUPPLY

Provision has been made for mounting the power supply on the bottom of the receiver by means of two self-tapping 1/4" screws, which are assembled in the bottom.

The power supply may also be mounted beneath or behind either front or rear seat.

Mount the power supply. Run the separately shielded Red lead, assembled in the speaker, to the terminal #3.

Assemble the Red lead in the radio cable to the B-plus terminal in the supply and the Yellow lead to the B-minus terminal, making certain that the shield of the cable is anchored by the mounting clamp provided in the power supply. If the cable is too long, do not cut it off, but double it up neatly and place out of sight. Make certain that the shielding on the cable is grounded to the metal part of the car in several places.

Now connect the Black with Yellow tracer lead of the tuning control along with the Yellow lead from the power supply terminal #2 to the Ungrounded post of the battery. Assemble the Black lead from terminal #1 of power supply to the grounded battery post.

IMPORTANT: MAKE CERTAIN THAT THESE CONNECTIONS TO THE BATTERY ARE CORRECT.

The receiver is now ready to be connected up. Plug the cable assembly into the receiver. MAKE SURE THAT THE PLUG IS NOT FORCED ONTO THE RECEPTACLE ON THE RECEIVER BUT THAT IT IS ASSEMBLED PROPERLY. Then remove one of the screws in the end of the chassis and fasten the clip at the end of the shield to the chassis holding it in place by means of this screw.

Pull the switch underneath the tuning control forward. Never turn this switch on unless the receiver is plugged into the harness assembly, thus making sure that the power supply is operating under load.

FINAL ADJUSTMENT - MODEL "10 A" ALL ELECTRIC AND MODEL "10 E" BATTERY TYPE

The installation is now complete with the exception of the elimination of certain noises known as interference, caused by the ignition system. You will find in the MotoVox package a complete set of suppressors for both coil and spark plugs for a six cylinder automobile. Assemble a spark plug resistor on each plug, (Diagrams #1 and #2) making sure that all connections are tight, as a loose connection at this particular point will render the resistor useless as well as interfere with the operation of the motor. Install the single coil suppressor provided in the top of the distributor.

In most cases the standard suppressors are very easily mounted. However, in the case of certain valve-in head motors, such as the Buick, it is necessary to use the MotoVox screw-in type suppressor which can be screwed into the ignition cable and then snapped over the plug. Be certain at all times that in the case of a two coil system, that there is one coil suppressor in each high tension lead going to each coil at the distributor. the screw-in type suppressor can be purchased from Moto Meter at a nominal charge.

In addition to the suppressors, there are two by-pass condensers provided. One of these by-pass condensers should be placed on the live side of the generator, mounting the condenser bracket under the relay mounting screw and connecting the lead to the relay battery terminal. The other condenser should be mounted on the battery side of the coil. The can of condenser must be grounded.

MOTO-METER GAUGE & EQUIPMENT CO. MODEL 10-A,10-E Moto-Vox Notes

ALIGNING RECEIVER WHEN REPLACING COILS

Since all of the adjustable condensers in this receiver have been accurately aligned in the process of manufacturing, it will only be necessary to adjust them when replacing one or more coils. This operation may be divided into two parts namely, First, Aligning intermediate frequency transformer trimmers and Second, Aligning gang condenser and series condenser trimmers.

ALIGNING INTERMEDIATE FREQUENCY TRANSFORMER TRIMMERS WHEN REPLACING INTERMEDIATE FREQUENCY TRANSFORMER "71" PART #76502 OR COMPOSITE UNIT "68" PART #76499.

Remove any external antenna from chassis and ground antenna on chassis during test. Connect one of the output leads of a 175 K.C. test oscillator to the control grid (top) cap of first detector tube (leaving grid cap terminal of lead in place on tube) and the other to the base of chassis. Connect an output meter in parallel with the primary of speaker output transformer at the terminal strip in the speaker housing. Turn the rotor plates entirely out of stator plates and adjust the adjustable trimmer in the top of coil "71" to the maximum meter reading. Then adjust the trimmers in the top of composite "68" to maximum reading in the same manner. When this is accomplished the intermediate frequency of the receiver has been aligned to 175 K.C.

ALIGNING GANG CONDENSER TRIMMER AND SERIES TRIMMERS

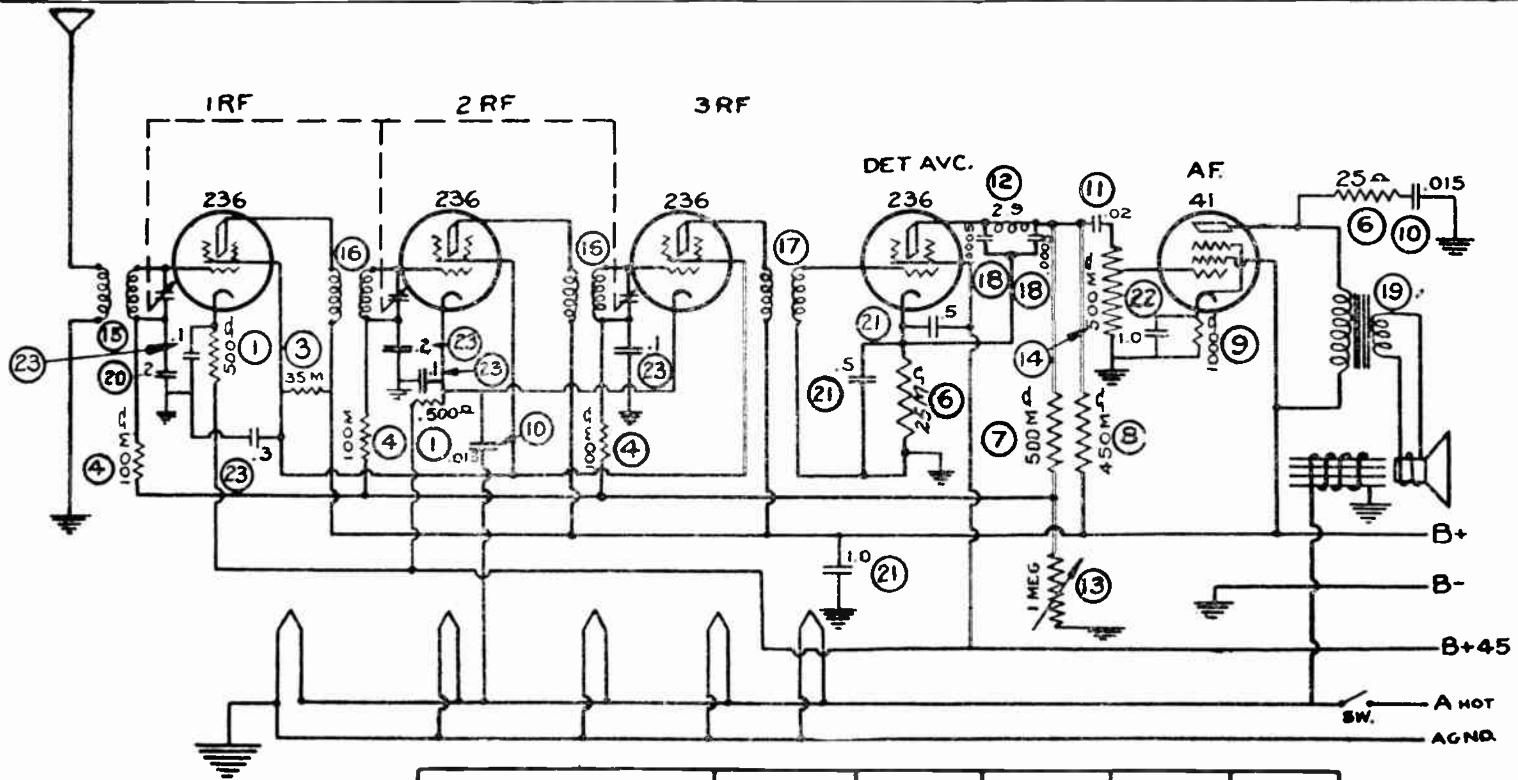
When replacing a gang condenser, series trimmers, composite, antenna, or R.F. coil it is necessary to realign the series trimmer and gang condenser trimmers. To do this fasten the tuning control to the chassis, turning the rotor blades all the way into the stator and setting the dial on 540 K.C. Now adjust a test oscillator to 600 K.C. and place one terminal on the base of the chassis and the other on the antenna post of the receiver. (Remove the ground from this post). Connect the output meter as described above. Now rotate the tuning mechanism slowly back and forth at approximately 600 K.C. on the dial and adjust the series trimmer so that maximum reading is shown on the meter. During these measurements reduce the signal from the oscillator to approximately one half scale reading.

Now adjust the test oscillator to 1400 K.C., tune the receiver to 1400 K.C. on the dial and adjust the three trimmer condensers on the gang condenser to the maximum meter reading.

If the proper coil is used and the tuning condenser is calibrated properly, the maximum output will be obtained at each of the other frequencies. In some cases, however, after aligning at 1400, it may be necessary to bend the outside blades at the other frequencies to track properly. This should only be done by an experienced radio service man and the receiver should always be aligned last at 1400 K.C.

MODEL 10-E
Moto-Vox
Schematic
Voltage

MOTO-METER GAUGE & EQUIPMENT CO.



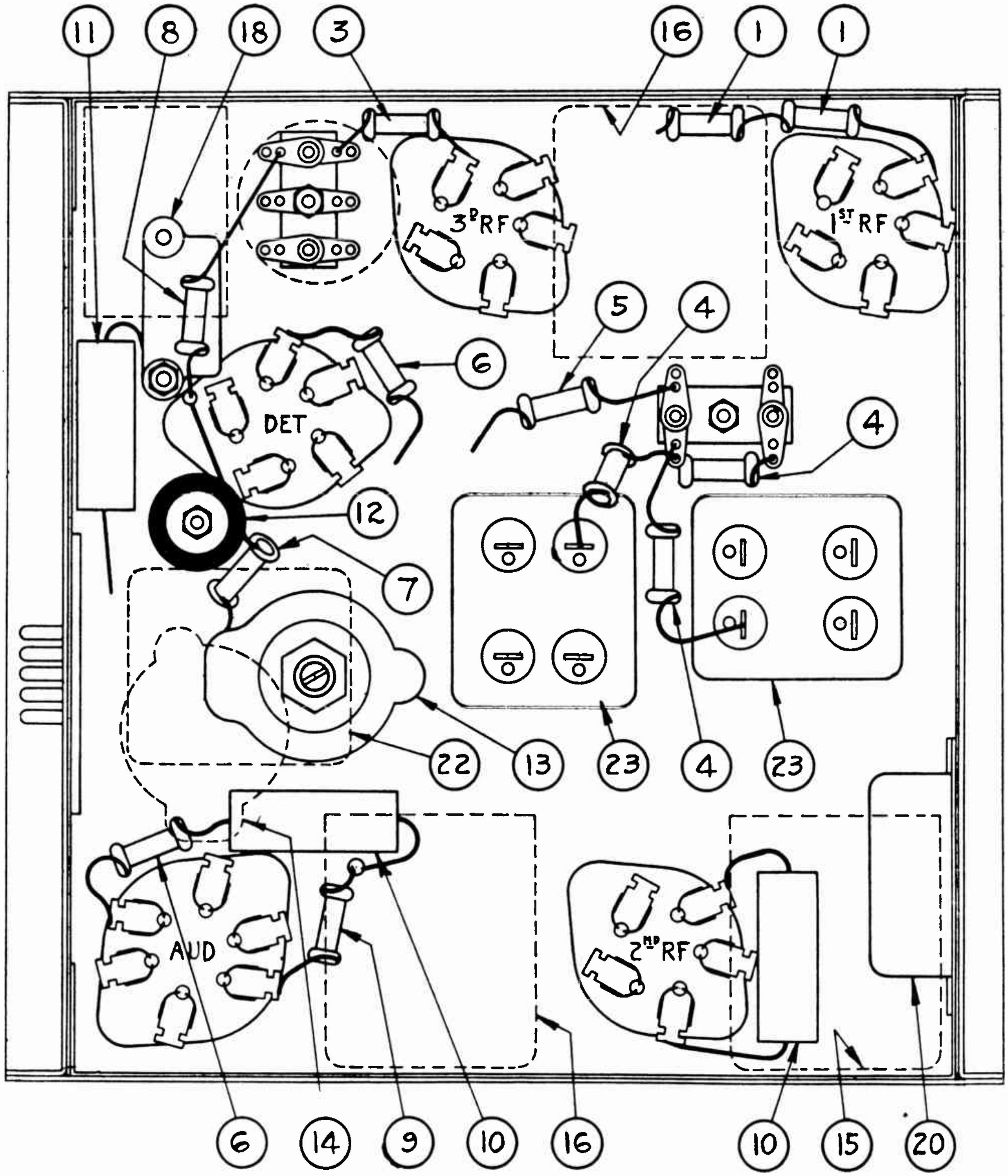
TUBE						
TYPE	PURPOSE	FILAMENT	CATHODE to GROUND	CATHODE to SCREEN	CATHODE to PLATE	Plus 45 to CATHODE
36	1st. R.F.	5.6	-	60	135	1.9
36	2nd. R.F.	5.6	-	59	134	3.0
36	3rd. R.F.	5.6	-	59	134	3.0
36	Detector	5.6	3 to 4	40	60 to 70	-
41	Audio	5.6	16.0	165	155	-

Take readings at tube socket contacts when receiver is tuned off signal.

Total Drain 19 milliamperes.

MOTO-METER GAUGE & EQUIPMENT CO.

MODEL 10-E
Moto-Vox
Chassis
Socket



MODEL 10-E BATTERY OPERATED

MODEL 10-E
Moto-Vox
Notes

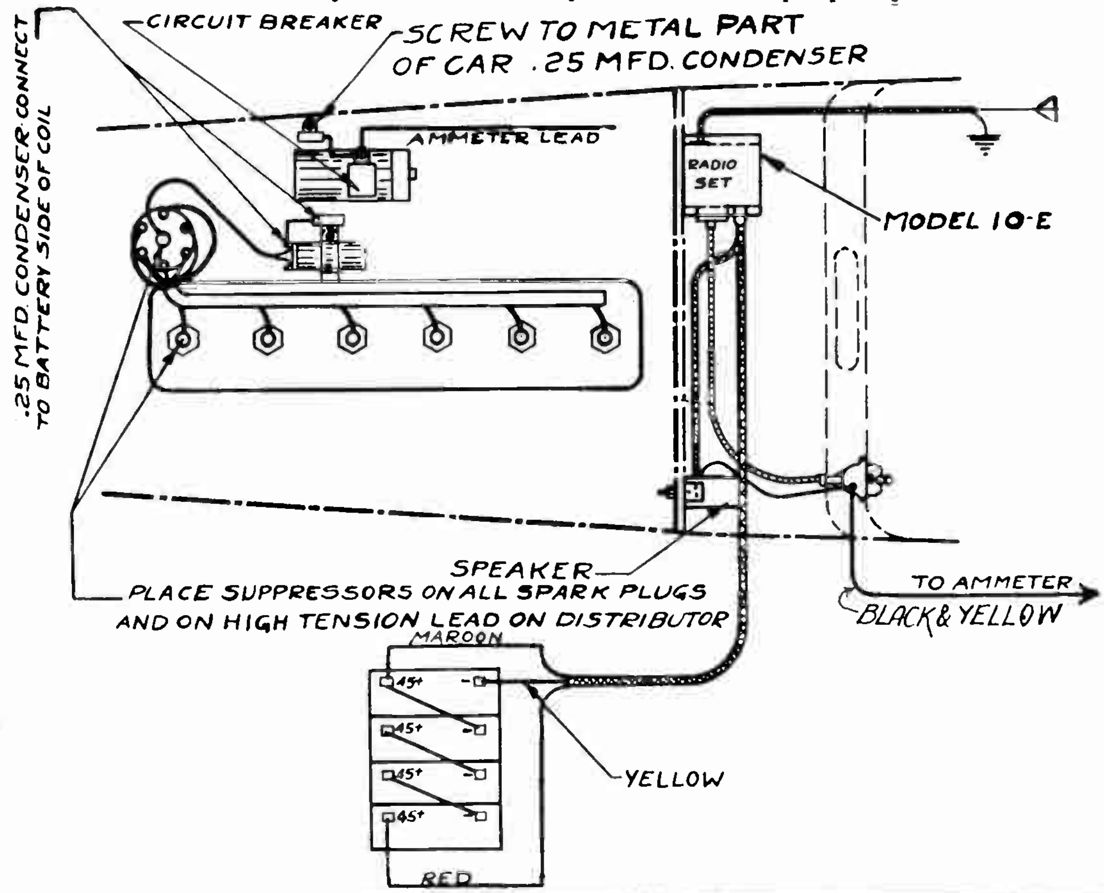
MOTO-METER GAUGE & EQUIPMENT CO.

SPECIAL INSTRUCTIONS FOR MODEL "10 E" BATTERY RECEIVER

In the case of Model "10 E", it is only necessary to assemble the Yellow lead in the "B" harness to the minus tap of 180 volts of battery. (Schematic Diagram #2) Four Type 2308 Burgess Batteries are recommended for this purpose. Then the Maroon lead is assembled onto plus 45 and the Red lead is assembled to plus 180. A 1/4 amp. 250 mil. fuse is provided in the plus 180 line to avoid possible damage due to short circuits to different parts of the radio circuit.

In most cases it is possible to mount the batteries underneath the seat, or in rear of either front or back seat. In case this is not possible a battery box can be obtained at a very nominal cost from the factory. It must be remembered that Model "10 A" and "10 E" are not interchangeable as far as hook-up is concerned. Model "10 A" is an All Electric Set and Model "10E" is Battery Operated and these circuits are wired accordingly. Therefore, it is not possible to operate the Model "10 A" as a battery receiver and the Model "10 E" as an all electric.

After the installation is completed, the receiver is now ready for sensitivity adjustment. Turn the receiver switch on and turn the dial off of a broadcast station between 1300 and 1500 kilocycles. The noise level at this point should be fairly high. Now turn the sensitivity control, **AN EXCLUSIVE MOTOVOX FEATURE**, located in the bottom of the receiver, entirely to the right or clockwise to the "Stop", then turn back counter-clockwise or to the left, until the point is reached at which the static level becomes very high. This is the point of maximum sensitivity. Any point beyond this in a counter-clockwise direction or to the left, will result in a lower sensitivity level and in a clockwise or right direction will result in a lack of sensitivity and automatic volume control. It is suggested that the control be set at a point just below the maximum sensitivity to reduce engine interference. Therefore, be certain at all times that the sensitivity control is adjusted at the proper point.



MOTO-METER GAUGE & EQUIPMENT CO.

MODEL 10-A, 10-E
Special Notes

INSTALLATION PROCEDURE

The model installation which is strongly recommended is to place the chassis on the right hand side of the dash as far up in the corner as it is possible and to place the tuning control unit on the left hand side of the instrument panel putting the speaker directly back of tuning control on the left hand side of dash.

The chassis may be mounted in any desired position. It is necessary to drill four clearance holes for 1/4" bolts and it is recommended that the four mounting bolts provided be secured to the case with the nuts provided, and then the complete chassis can be held against the dash marking the location of the four holes.

If it is desired, MotoVox has an accessory mounting bracket #76495, which can be obtained at all MotoVox distributors at a very nominal cost. This bracket permits the receiver to be mounted by drilling only one hole in the dash. In removing the receiver it is unnecessary to remove the bracket, but merely two mounting screws which secure the receiver to the bracket. For further instructions see directions accompanying the bracket.

The tuning control and speaker cable assembly are all completely attached and assembled together at the factory and it is only necessary to drill a clearance hole for a 3/8" bolt to mount the speaker on the dash. In case the bracket mounting which is provided for the speaker is not adaptable to the particular installation at hand, it is necessary to remove the cover, unfasten the mounting bolt and screw the mounting bolt in place in the tapped stud in the rear of the speaker. If this mounting is used be sure to space the speaker away from the dash at least 1½". In using the conventional mounting the speaker should be placed in such a manner that the face of the speaker, that is, the side on which screw heads show, should be mounted toward the center of the car, thus, giving a clear tone. The tuning control is fastened to the edge of instrument panel with two 1/4" screws provided.

MOUNTING CHASSIS AND TUNING CONTROL

In mounting the chassis to the dash, make sure that the tuning control bracket on the case is mounted in such a manner that it faces towards the tuning control, then assemble the tuning control to the chassis proper. Pull the short shaft and coupling extending through the side of the chassis entirely out and turn as far clockwise as possible. Then turn the tuning control knob in the same position and insert the driver on the end of the flexible shaft in the coupling. Then tighten the two screws in the coupling. Now insert the metal conduit on the outside of the flexible shaft in the tuning control bracket on the end of the case and tighten the two set screws in this bracket.

Run the drive shaft and the tuning control to the chassis in as direct a manner as possible, thus eliminating all kinks and bends which would tend to make the drive bind. REMEMBER THAT THE SUCCESS OF THIS PARTICULAR TYPE OF CONTROL DEPENDS UPON SMOOTH OPERATION AND THIS CAN ONLY BE ACCOMPLISHED BY PROPERLY LINING UP THE PARTS. Care has been taken in the manufacture of these parts in the factory and only by properly assembled jobs in the field can good results be obtained.

The final adjustment on the dial calibrations can be obtained after the power supply and the receiver are completely hooked up by tuning in on broadcasting stations. It is then a comparatively simple operation to loosen the coupling on the flexible cable by means of the two set screws, rotate the dial to the proper position and re-tighten these screws. Be sure that the screw which holds the tuning control conduit in the tuning control housing does not bind too tightly as this may cause an excessive bind on the flexible cable. It is recommended that the Receiver be tuned on a Broadcasting Station approximately 700 Kilocycles in making the above adjustment.

MODEL 10-A, 10-E
Parts List

MOTO-METER GAUGE & EQUIPMENT CO.

SERVICE PARTS

DESCRIPTION	NAME	MOTO METER PART NO.
1	Resistor 500 ohms	76303
2	Resistor 50,000 ohms	76309
3	Resistor 35,000 ohms	76302
4	Resistor 100,000 ohms	76300
5	Resistor 1,000,000 ohms	76308
6	Resistor 25,000 ohms	76301
7	Resistor 500,000 ohms	76304
8	Resistor 450,000 ohms	76305
9	Resistor 1000 ohms	76306
10	Condenser .015 mfd.	76350
11	Condenser .02 mfd.	76351
12	Choke Coil	76071
13	Sensitivity Control	76069
14	Volume Control	76460
15	Antenna Coil Assembly	76058
16	R.F. Coil Assembly	76060
17	Untuned Transformer Assembly	76039
18	Condenser .0005 mfd.	76251
19	Output Transformer	76450
20	Condenser 0.2 mfd.	76063
21	Condenser .5, .5 and 1.0 mfd.	76050
22	Condenser 1.0 mfd.	76045
23	Condenser .1, .1.1 and .1 mfd.	76064
24	Case Assembly Drive Screws	76002
25	Terminal Plug (Male)	76015
26	R.F. Tube (Type 36)	76020
27	Output Tube (Type 41)	76021
28	Tuning Condenser	76080
29	Volume Control Pinion	76051
30	Tube Socket (Type 36)	76065
31	Tube Socket (Type 41)	76067
32	Terminal Strip	76072
33	Antenna Lead-in Assembly	76407
34	Tuning Control Bottom Cover Assembly	76081
35	Switch & Nut	76083
36	Dial Light Bulb	76086
37	Control Housing	76091
38	Control Knob	76095
39	Dial Assembly	76094
40	Flexible Conduit	76402
41	Control Cable Assembly	76098
42	Control Harness Assembly	76412
43	Cable Plug (Female)	76414
44	Spark Suppressor (Standard)	76415
45	Coil Suppressor (Standard)	76416
46	Screw-In Suppressor	76449
47	1/4 amp. Fuse	76418
48	Interference Eliminator Condenser	76421
49	Speaker Assembly less Case	76431
50	Speaker Cone Assembly	76496
51	Resistor (250,000 ohms)	76307
52	Condenser (2.0 mfd.)	76451
53	Choke (Low Frequency)	76459
54	Choke (High Frequency)	76462
55	Condenser (.00025 mfd.) Bakelite	76456
56	Condenser (.04 mfd.) 200 volt	76457
57	Autoformer	76463
58	Condenser (4.0 mfd.) 25 Volt Electrolytic	76458
59	Condenser (.001 mfd.) Bakelite	76253
60	Resistor (10,000 ohms)	76310
61	Condenser (.003 mfd.) 200 volts	76353
62	Resistor (250 ohms)	76312
63	Tube Socket (Type 85)	76454
64	Output Tube (Type 85)	76455

SERVICE PARTS

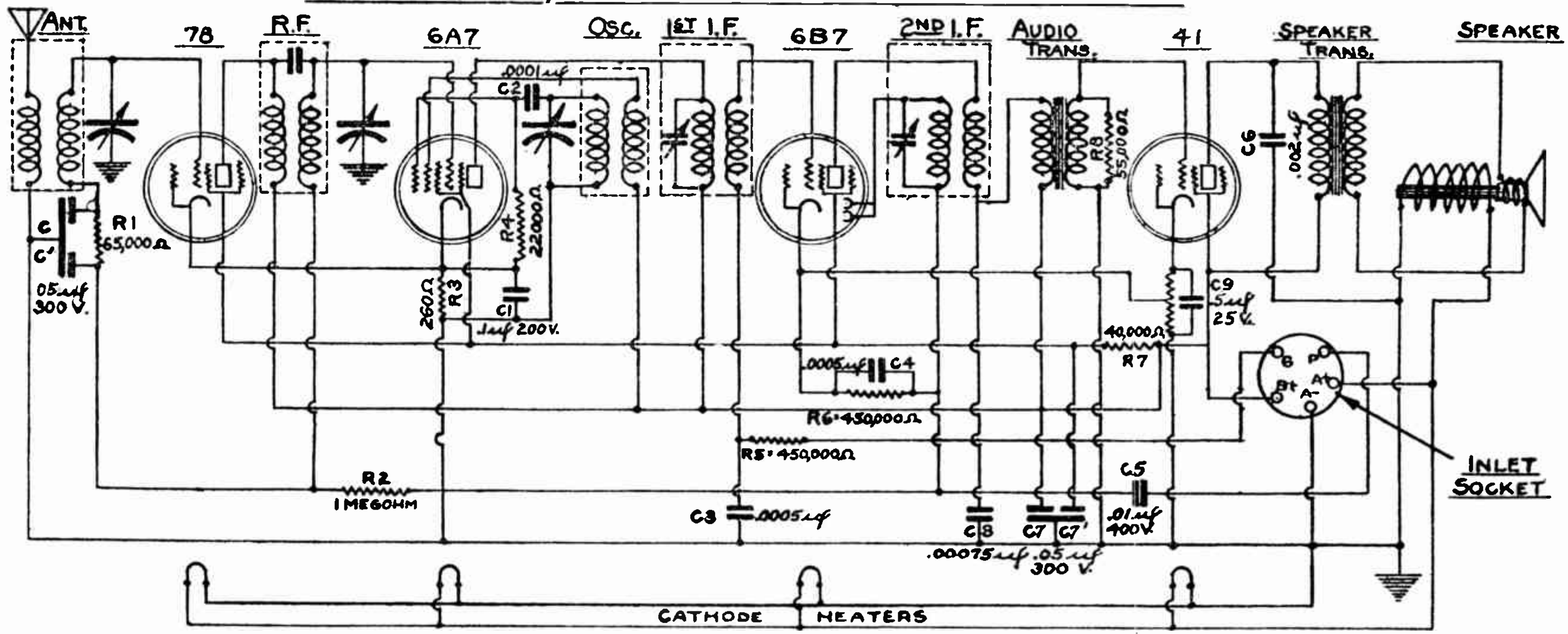
MODEL 10A ALL ELECTRIC

SERIAL NOS. ABOVE 500.

DESCRIPTION	NAME	MOTO METER PART NO.
65	Resistor (8000 ohms.)	76313
66	Condenser (.002 Mfd.)	76254
67	Series Trimmer	76498
68	Composite Unit	76499
69	Antenna Coil	76500
70	R F Coil	76501
71	Intermediate Freq. Transformer	76502
72	Type 36 Socket (1-1/8" Mtg. Center	76503
73	Resistor (1000 ohms) ½ Watt.	76311

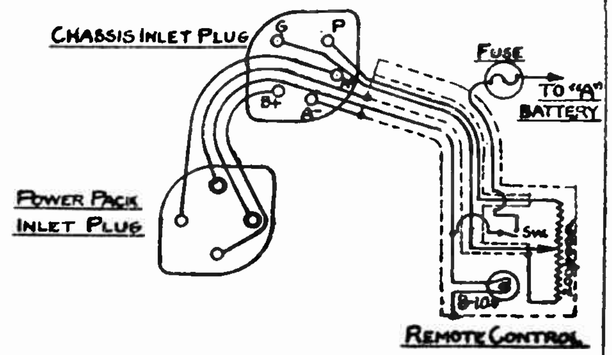
ARVIN CAR RADIO MODEL 10A

RADIO FREQUENCY, SPEAKER & REMOTE CONTROL CIRCUIT DIAGRAM



WIRING COLOR CODE			CAPACITY VALUES				RESISTANCE VALUES		
R.F. CHASSIS	CATHODES	YELLOW	SIGN	μf		P.V.D.C.	SIGN	Ω	WATTS
R.F. CHASSIS	NEG."A", NEG. HEATER & GROUND	BLACK	C	.5	TWIN	300	R1	65,000	
R.F. CHASSIS	POS."A" & POS. HEATER	YELLOW	C'	.5		300	R2	1,000,000	
R.F. CHASSIS	CONTROL GRIDS	GREEN	C1	.1		200	R3	260	
R.F. CHASSIS	PLATES	BLUE	C2	.0001			R4	22,000	
R.F. CHASSIS	"B" POS. & SCREEN GRIDS	RED	C3	.0005			R5	450,000	
SPEAKER	"A" POS. TO SPEAKER	YELLOW	C4	.0005			R6	450,000	
SPEAKER	"A" NEG. TO SPEAKER	BLACK	C5	.01		400	R7	40,000	
SPEAKER	SPEAKER TRANS. LEAD	RED	C6	.002		600	R8	55,000	
SPEAKER	SPEAKER TRANS. RETURN LEAD	BROWN	C7	.5	TWIN	300			
REMOTE CONTROL	"A" POS. BATTERY TO SWITCH	BLACK	C7'	.5		300			
REMOTE CONTROL	SWITCH TO POWER PACK	YELLOW	C8	.00075					
REMOTE CONTROL	"G" TO ROTATING CONTACT	GREEN	C9	.5		.25			
REMOTE CONTROL	"P" TO VOLUME CONTROL	BLUE							
REMOTE CONTROL	SWITCH TO LAMP BULB	RED							

IF PEAK 175 KC



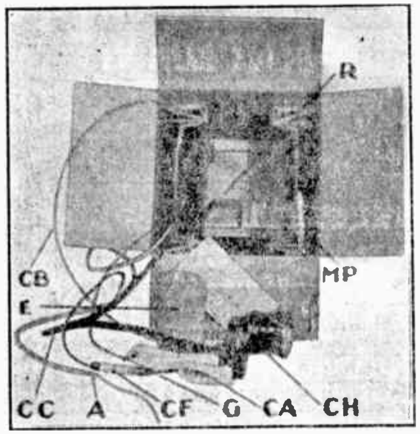


FIGURE 15

You can play the radio before taking it from the carton. To do so attach antenna lead A to any convenient aerial. Connect the wires CA and G to a six-volt storage battery. Obtain the key from sack E and turn on the switch in the center of the control head. Now tune the radio by rotating the large bakelite control knob.

Here's how it looks when first taken from the carton and spread out for examination. Please examine these parts carefully and identify them by the following key:

A —Shielded antenna lead
CA —Ammeter lead
CB —Bowden wire
CC —Control cable
CF —Fuse
CH —Remote control
EA —Steering column strap
EB —Strap screws
EC —Felt pad
EE —Suppressors
EF —Generator condenser
EG —Bonding ribbon
EH —Cable tie down strap
EK —Key
MB —Mounting bolts
MP —Mounting plate
SB —Stabilizing bracket
SBB —Stabilizing bracket bolt

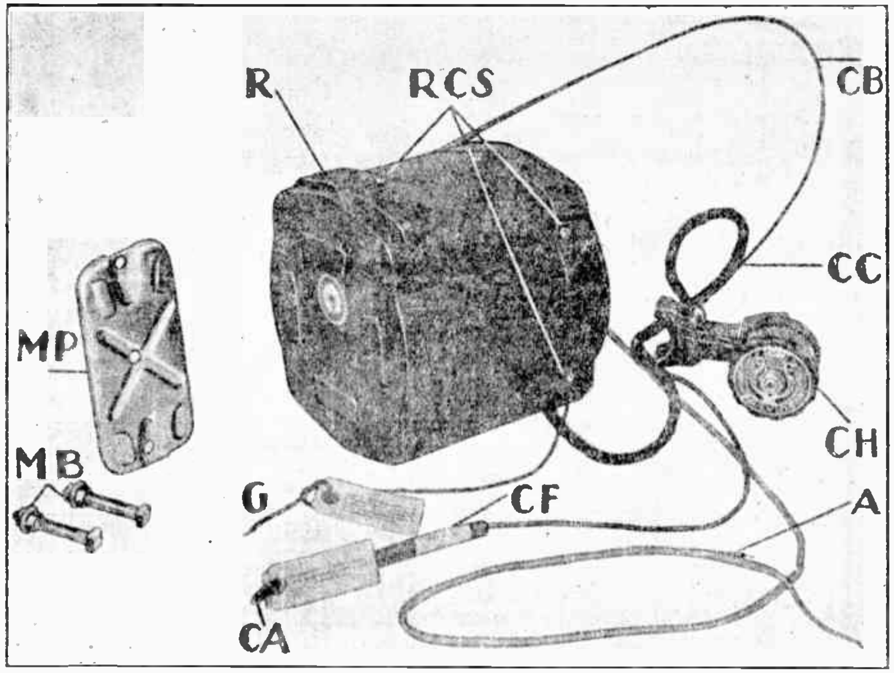


FIGURE 17

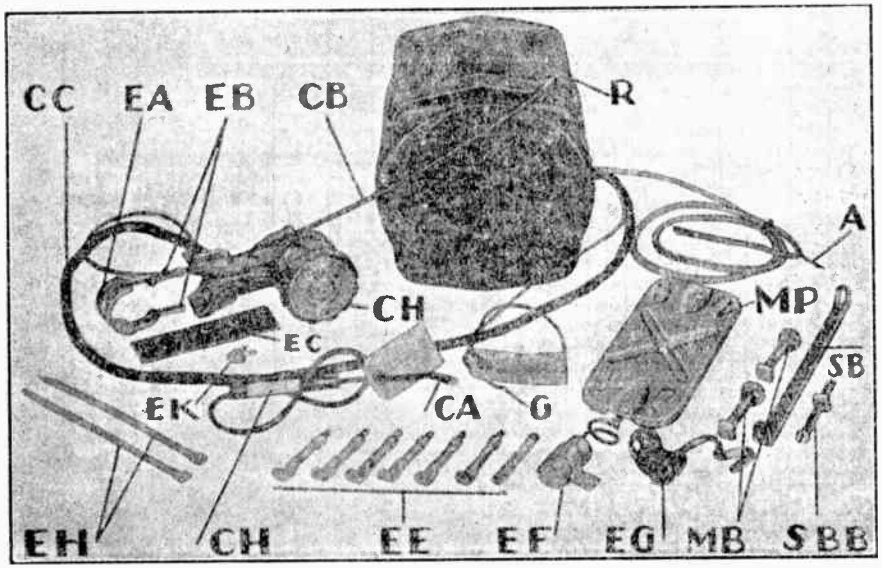


FIGURE 16

TO INSTALL: The model 10A has been designed to permit easy installation. By careful attention to the following instructions any one should be able to properly install an Arvin Model 10A with satisfactory results. The entire radio mounts under the dash of the car on mounting plate MP. Using this plate as a template mark the holes for mounting on the bulkhead. In selecting this position on the bulkhead care should be taken to see that the relationship between the remote control on the steering column and the radio on the bulkhead is such that the Bowden control cable will be as short and straight as possible. This will tend to make the control turn smoothly and be more uniformly accurate. Drill the holes in the bulkhead as marked using a 17/32 diameter drill.

Due to the unique Arvin design the radio may be mounted either horizontally or vertically and by one, two or three bolts. Two bolts MB are supplied as this type of mounting has been found most tisfactory. Next slide MP with bolt MB in place on to the tapered wedges on the back of radio case R, making sure that the sides of these wedges take hold in the channels of the mounting plate MP, as shown in figure 18. Using a light hammer tap this plate in place to make sure of a solid mounting. Next put the bolts in the bulkhead and secure them with the washers and nuts furnished. Pull these nuts up as tight as possible to make the bulkhead insulation pack down solid.

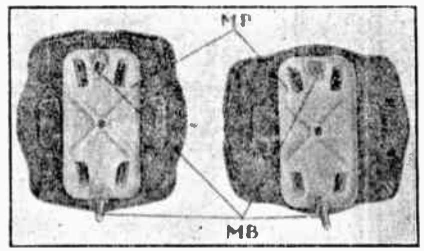


FIGURE 18

To Change Remote Control or Shorten Bowden Wire Cable

First, remove screw RT from the radio chassis (figure 22) and raise strap TS up out of the way pivoting it at the rivet on the front end of the chassis. This will give you ample room to work on the condenser pulley wheel and on the Bowden wire cable. To remove this cable it is merely necessary to remove or loose screw CPS on the pulley wheel to allow the tiller wire to be taken loose and then to loosen screw CBS on Bracket CBC to allow the Bowden wire to be pulled out of the clamp. Now measure the Bowden wire to obtain the proper length which will give the most efficient control. Set the remote control dial at zero and cut off the Bowden cable by proceeding as follows. To cut the cable armor score slightly with a file on opposite sides and break by bending. This avoids danger of cutting into a cable strand causing it to tangle. Next, cut the tiller wire approximately four inches from the end of the Bowden cable. This will allow you sufficient slack to be sure you do not have the tiller wire short. Now replace the Bowden wire in the cable clamp on the condenser frame and tighten down screw CBS. Then turn the remote control dial to 100 and wrap the tiller wire around the pulley screw and under the washer on screw CPS. Tighten this screw down tight. Then cut off any excess strands of tiller wire to prevent this wire from tangling or scraping on any of the surrounding metal parts of the chassis.

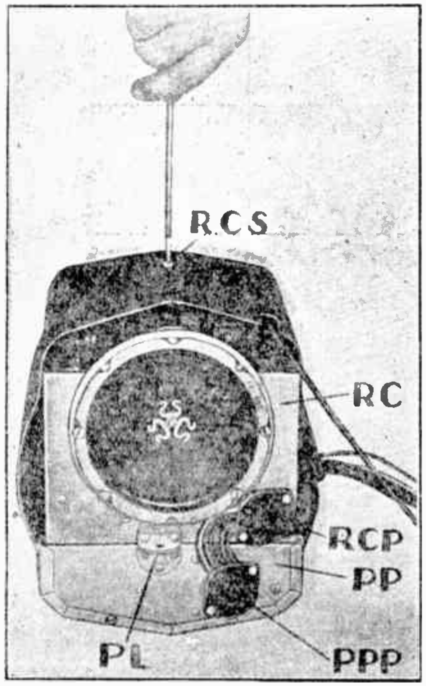


FIGURE 20

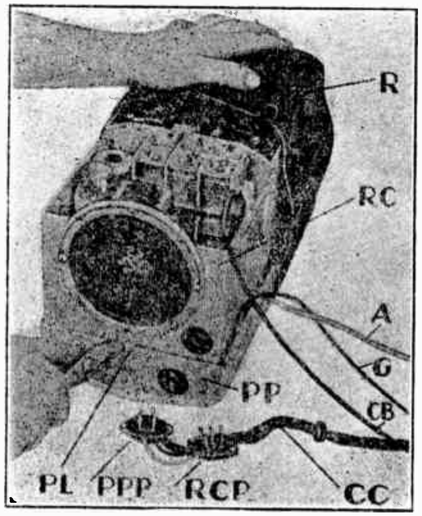


FIGURE 21

To Replace Tubes

No special instructions are necessary for replacing tubes in the model 10A chassis as every tube is very accessible. However, a word of caution—tubes with six and seven prongs such as 78, 6A7 and 6B7 have a very considerable socket contact friction and therefore it is wise to be sure you have pressed the tubes down firmly in place. Be sure that the tubes are seated all the way home, otherwise the grid cap may touch the mounting case of the radio and short out. A little precaution in this matter may save considerable trouble from a service standpoint after the radio has been installed. Also make sure that the grid clips on the tops of the tubes make good contact by pinching these clips slightly before placing them on the tube caps.

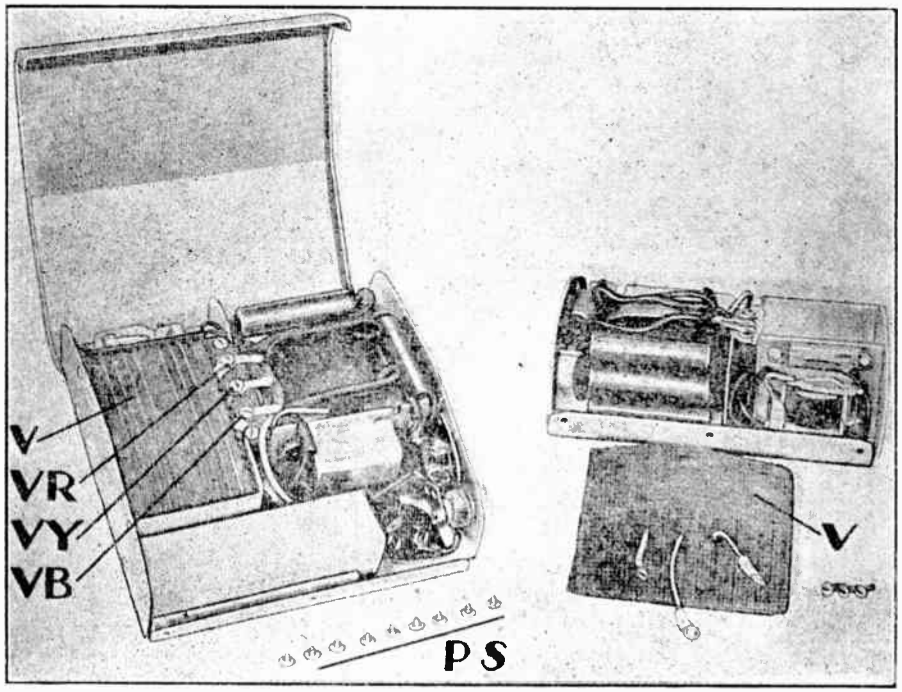


FIGURE 23

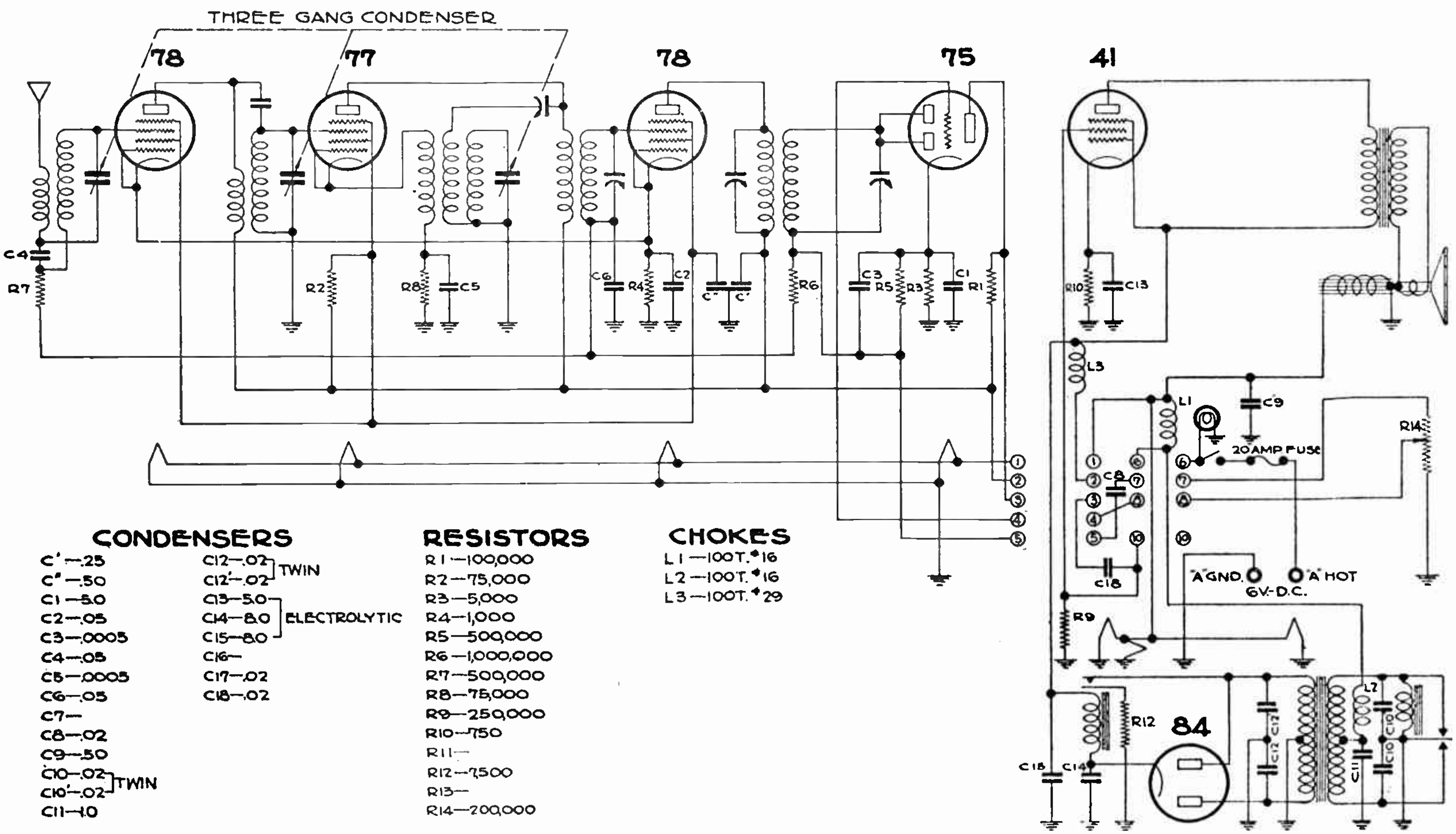
To Replace Vibrator

Remove power pack cover screws PS (figure 23) and lift off the cover. The entire power pack assembly and parts will then be exposed to view. To remove the vibrator remove screws VR, VY and VB and lift the rubber case in which the vibrator is packed out of the vibrator well. When replacing the vibrator make sure that the red lead is fastened under screw VR, the yellow lead under screw VY and the blue lead under screw VB. Then replace the cover in reverse order as it was taken off, making sure that the screws are pulled up tight to hold the cover on. This is very important and has a very definite bearing in relation to the amount of RF interference which the power pack will radiate.

DIAGRAM	ISSUE NO.	DATE
C	1	6-27-33
C	2	7-15-33

IF PEAK 181.5 KC

SCHEMATIC CIRCUIT DIAGRAM
ARVIN CAR RADIO MODEL 20A



CONDENSERS

C'—.25
C"—.50
C1—5.0
C2—.05
C3—.0005
C4—.05
C5—.0005
C6—.05
C7—
C8—.02
C9—.50
C10—.02 ⎤ TWIN
C10'—.02 ⎦
C11—1.0
C12—.02 ⎤ TWIN
C12'—.02 ⎦
C13—5.0 ⎤
C14—8.0 ⎥ ELECTROLYTIC
C15—8.0 ⎦
C16—
C17—.02
C18—.02

RESISTORS

R1—100,000
R2—75,000
R3—5,000
R4—1,000
R5—500,000
R6—1,000,000
R7—500,000
R8—75,000
R9—250,000
R10—750
R11—
R12—7,500
R13—
R14—200,000

CHOKES

L1—100T. #16
L2—100T. #16
L3—100T. #29

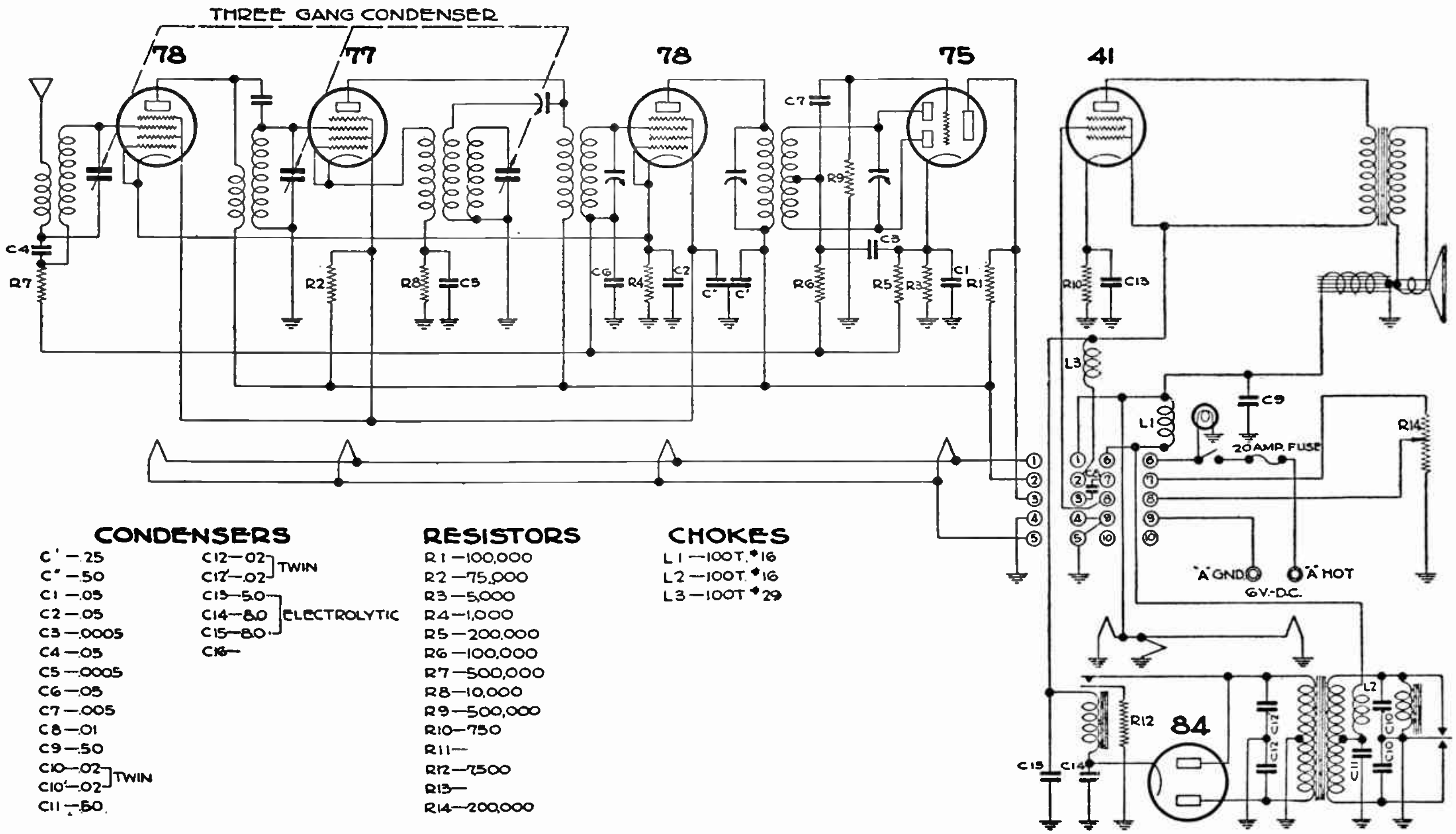
NOBLITT-SPARKS INDUSTRIES INC.
COLUMBUS INDIANA.

NOBLITT SPARKS INDUSTRIES

IF PEAK 181.5 KC

SCHEMATIC CIRCUIT DIAGRAM
ARVIN CAR RADIO MODEL 20A

DIAGRAM	ISSUE NO.	DATE
B	1	4-26-33
B	2	7-9-33



CONDENSERS

C' — .25
C" — .50
C1 — .05
C2 — .05
C3 — .0005
C4 — .05
C5 — .0005
C6 — .05
C7 — .005
C8 — .01
C9 — .50
C10 — .02 ⎤ TWIN
C10' — .02 ⎦
C11 — .50
C12 — .02 ⎤ TWIN
C12' — .02 ⎦
C13 — 5.0 ⎤
C14 — 8.0 ⎥ ELECTROLYTIC
C15 — 8.0 ⎦
C16 —

RESISTORS

R1 — 100,000
R2 — 75,000
R3 — 5,000
R4 — 1,000
R5 — 200,000
R6 — 100,000
R7 — 500,000
R8 — 10,000
R9 — 500,000
R10 — 750
R11 —
R12 — 7500
R13 —
R14 — 200,000

CHOKES

L1 — 100T. #16
L2 — 100T. #16
L3 — 100T. #29

NOBLITT-SPARKS INDUSTRIES INC.
COLUMBUS INDIANA.

NOBLITT SPARKS INDUSTRIES

MODEL Arvin 20-A
Schematic
Type 1

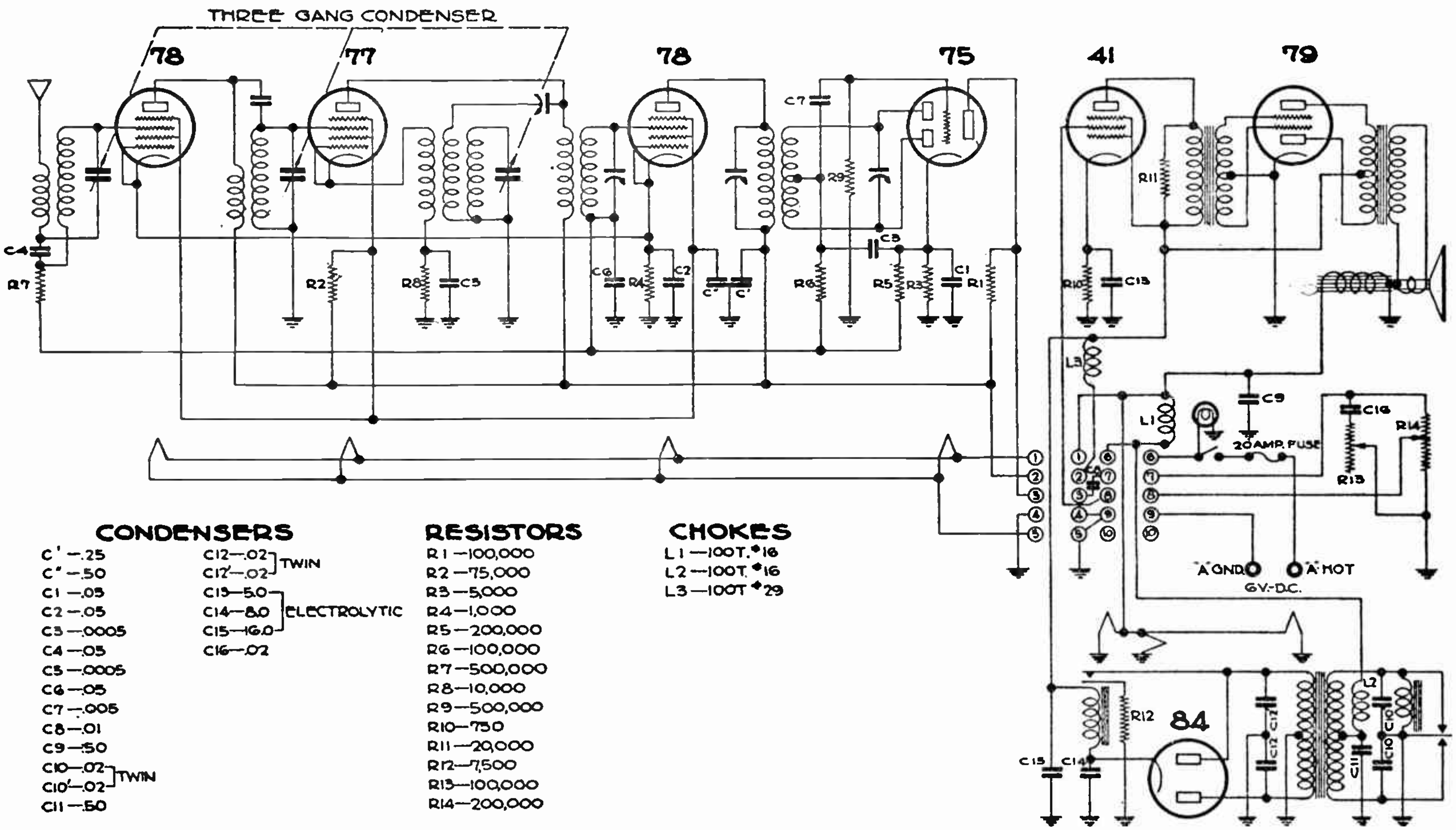
MODEL Arvin 30-A
Schematic
Type 1

NOBLITT SPARKS INDUSTRIES

DIAGRAM	ISSUE NO.	DATE
B	1	4-26-33
B	2	7-9-33

IF PEAK 181.5 KC

SCHEMATIC CIRCUIT DIAGRAM
ARVIN CAR RADIO MODEL 30A



CONDENSERS

C' —.25
C' —.50
C1 —.05
C2 —.05
C3 —.0005
C4 —.05
C5 —.0005
C6 —.05
C7 —.005
C8 —.01
C9 —.50
C10—.02 ⎤ TWIN
C10'—.02 ⎦
C11 —.50
C12—.02 ⎤ TWIN
C12'—.02 ⎦
C13—5.0 ⎤
C14—8.0 ⎥ ELECTROLYTIC
C15—16.0 ⎦
C16—.02

RESISTORS

R1 —100,000
R2 —75,000
R3 —5,000
R4—1,000
R5—200,000
R6—100,000
R7—500,000
R8—10,000
R9—500,000
R10—750
R11—20,000
R12—7,500
R13—100,000
R14—200,000

CHOKES

L1 —100T. #16
L2 —100T. #16
L3 —100T #29

NOBLITT-SPARKS INDUSTRIES INC.
COLUMBUS INDIANA.

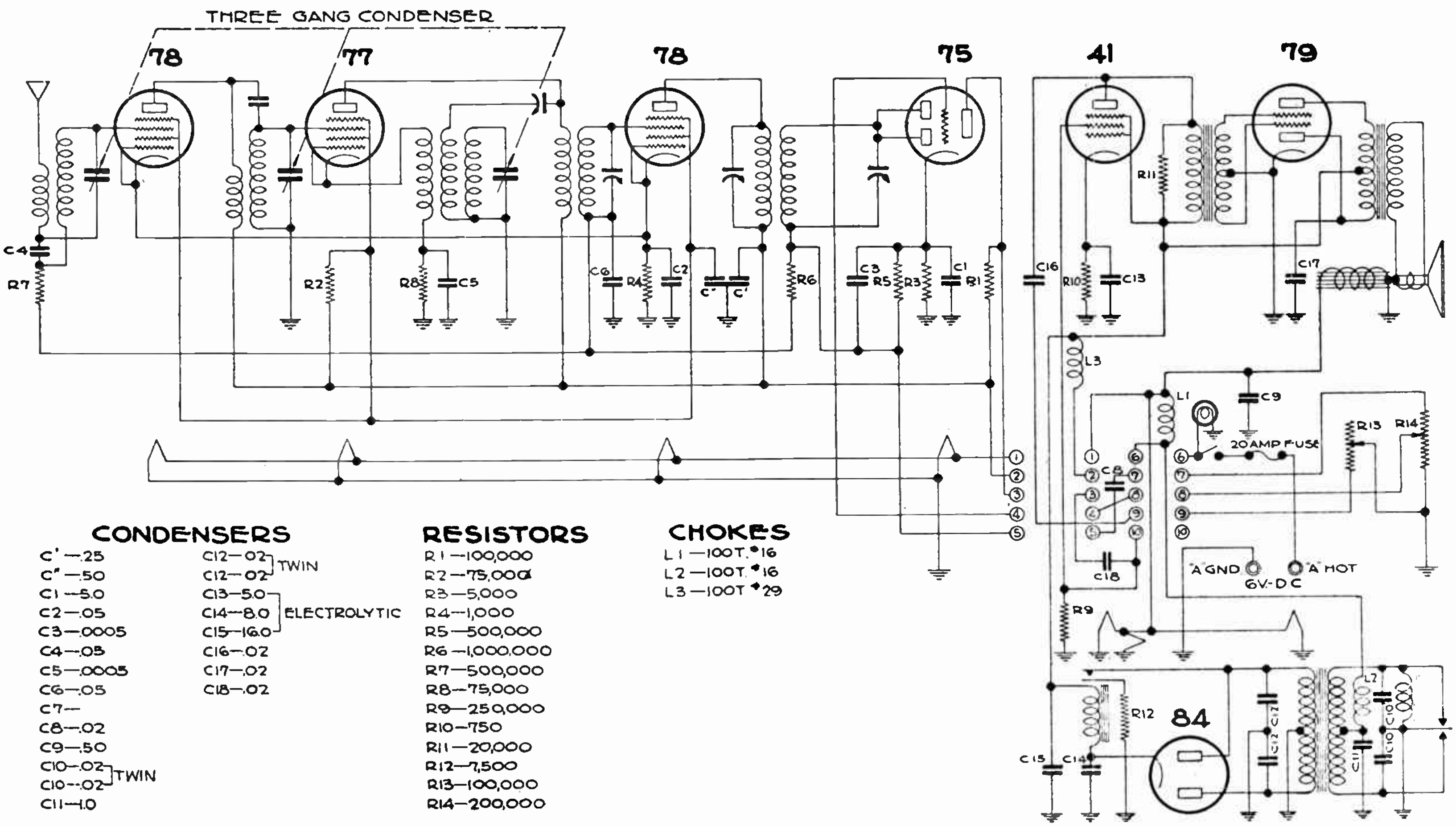
MODEL Arvin 30-A
Schematic
Type 2

NOBLITT SPARKS INDUSTRIES

DIAGRAM	ISSUE NO.	DATE
C	1	6-27-33
C	2	7-15-33

IF PEAK 181.5 KC

SCHEMATIC CIRCUIT DIAGRAM
ARVIN CAR RADIO MODEL 30A



CONDENSERS

C'—.25
C''—.50
C1—5.0
C2—.05
C3—.0005
C4—.05
C5—.0005
C6—.05
C7—
C8—.02
C9—.50
C10—.02 } TWIN
C10—.02 }
C11—1.0
C12—.02 } TWIN
C12—.02 }
C13—5.0 }
C14—8.0 } ELECTROLYTIC
C15—16.0 }
C16—.02
C17—.02
C18—.02

RESISTORS

R1—100,000
R2—75,000
R3—5,000
R4—1,000
R5—500,000
R6—1,000,000
R7—500,000
R8—75,000
R9—250,000
R10—750
R11—20,000
R12—7,500
R13—100,000
R14—200,000

CHOKES

L1—100T. #16
L2—100T. #16
L3—100T #29

NOBLITT-SPARKS INDUSTRIES INC.
COLUMBUS INDIANA

MODEL Arvin 30-A
Resistance Data
Voltage Data

NOBLITT SPARKS INDUSTRIES

RESISTANCE CHART

(A plus, A minus and B minus must be connected together on terminal strip while making resistance check.)

1ST STAGE—78 TUBE

	MAXIMUM	MINIMUM
Control grid to ground	705,000 ohms	600,000
Control grid to common between R4 and R6	500,000 ohms	400,000
Antenna Post on Coil to ground	4 ohms	2.5 ohms
Screen Grid to Plate No. 75 Tube	190,000	150,000
Plate to Plate No. 75 Tube	100,000	80,000
Suppressor Grid to Cathode	0	0
Suppressor Grid and Cathode to Ground	1,000	850
Plate to Screen Grid	75,000	60,000
Plate to B plus	45	45
Filaments	0	0

2ND STAGE—77 TUBE

	MAXIMUM	MINIMUM
Control Grid to Ground	7.5	6.5
Screen Grid to Plate No. 75 Tube	120,000	150,000
Plate to Plate No. 75 Tube	100,000	80,000
Screen Grid to Plate	75,000	60,000
Suppressor Grid to Cathode	0	0
Suppressor Grid and Cathode to Ground	10,000	8,500
Plate to B plus	30	30
Filaments	0	0
No. 2 Terminal first I. F. to Ground	5 ohms	3.5 ohms
Stator Oscillator Variable Condenser to Ground	4 ohms	3 ohms

3RD STAGE—78 TUBE

	MAXIMUM	MINIMUM
Control Grid to Ground	210,000	190,000
Control Grid to common between R5 and R6	50 ohms	50 ohms
Screen Grid to Plate No. 75 Tube	190,000	150,000
Plate to Screen Grid	75,000	60,000
Plate to Plate of No. 75 Tube	100,000	80,000
Plate to B plus	50 ohms	50 ohms
Suppressor Grid to Cathode	0	0
Suppressor Grid and Cathode to Ground	1,000	850
Filaments	0	0

4TH STAGE—75 TUBE

	MAXIMUM	MINIMUM
Centrol Grid to Ground	500,000	400,000
Cathode to Ground	5,500	4,500
Diode Plate to Ground	325,000	275,000
Diode Plate to Ground	325,000	275,000
Diode Plate to Diode Plate	50	45
Diode Plate to common between R6 and C3	25	22
Diode Plates to Cathode	300,000	275,000
Plate to B plus	100,000	80,000
Plate to all other Plates	100,000	80,000
Filaments	0	0

VOLTAGE CHART

(Test with Radio in operation 1000 ohms per volt meter)

B plus on terminal strip to B minus or ground on strip, 175V to 195V.

Chassis to Plate of No. 75 Tube, 125V to 140V.

Chassis to all other Plates, 175V to 195V.

Chassis to Cathode of No. 75 Tube, 1.7V to 2V.

Chassis to Cathodes of No. 78 Tubes, 5V to 6.5V.

Chassis to Cathode of No. 77 Tubes, 5V Min. 6.5V Max.

NOTE: If voltage runs as high as 7 to 9 volts there are shorted turns on cathode coil of oscillator.

Excessive voltage from 30 to 35V. indicates open circuit between Cathode of 77 Tube through Cathode coil, resistor R8 to No. 2 terminal on first I. F. Coil.

Chassis to all screen Grids, 60V to 75V.

NOBLITT SPARKS INDUSTRIES

MODEL Arvin 30-A
Condenser Data
Control Data

CAPACITY CHART

C4—To check this condenser a continuity test across the antenna section of the variable condenser should show no reading if both the variable condenser and the C4 are O. K. If one or the other is shorted the meter will show full scale deflection. If apparently shorted, check variable condenser by turning the plates in and out of mesh. If the variable condenser is at fault the meter will tend to flicker as the plates are rotated in and out of mesh.

C5—No check.

C6—Continuity check from common between R5 and R6 to ground should show no deflection on meter.

C7—Continuity check from control grid of No. 15 Tube to diode plate should show no deflection on meter.

C′—Using a capacity reading AC Voltmeter Millameter.

Check should show .25mfd.

C′—Using a capacity reading AC Voltmeter Milliameter Check should show .5 mfd.

C1—Coninuity check from cathode No. 75 Tube to ground should never show full scale deflection.

C2—Continuity check from cathode No. 78 Tube to ground should never show full scale deflection.

C3—Continuity check across this condenser should never show full scale deflection.

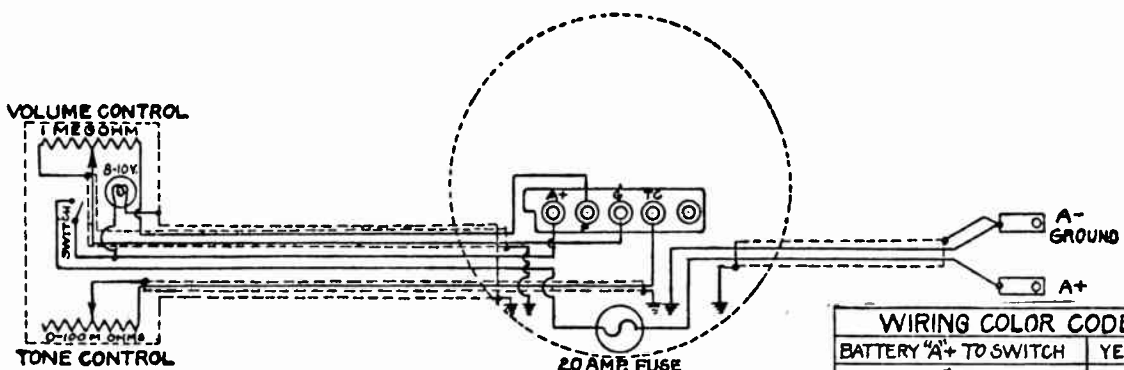
GENERAL CHART

(ANTENNA COIL.)

To check a bad antenna coil, remove the control grid clip from the top of the first No. 78 Tube and touch the grid cap on the tube with the antenna wire lead. If the radio plays after this is done—and did not before—it indicates an open circuit in the antenna coil.

(POWER PACK.)

To check quickly the power pack and remote control remove the grid clip from the control grid of the No. 75 Tube and touch the cap with your finger, if the volume and tone control are turned full on, a distinct roar will be heard in the speaker. A voltage check on the power pack should test 175V to 190V from BX to ground.



ARVIN CAR RADIO MODEL 30A
REMOTE CONTROL CIRCUIT DIAGRAM

WIRING COLOR CODE	
BATTERY "A"+ TO SWITCH	YELLOW
BATTERY "A"- TO TERMINAL	BLACK
"A"+ TERMINAL TO SWITCH	BLACK
"G" TO ROTATING CONTACT	GREEN
"P" TO VOLUME CONTROL	BLUE
SWITCH TO DIAL LAMP	RED
VOL. CONTROL TO GROUND	BRAIDED SHIELDING
TONE CONTROL TO GROUND	BRAIDED SHIELDING
TONE CONTROL TO TERMINAL	BROWN

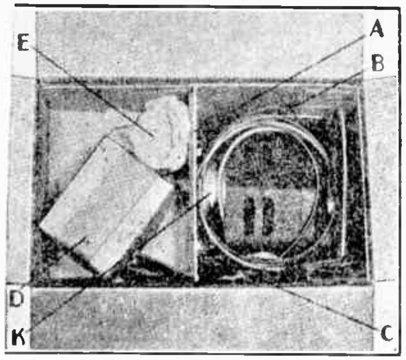


FIGURE 1.

You can play the Radio before taking it from the carton To do so, attach the antenna wire to any convenient aerial, and the battery cables to a 6-volt storage battery. Lift remote control "D" from its carton, get key from muslin sack, turn on the current and tune it in.

FIGURE 2. (BELOW)

Here's how it looks when first taken from carton and spread out for examination. Now please examine its carefully and identify the parts by the following key letters:

- "A"—Packing board (represents dash of car).
- "B"—End of antenna lead
- "C"—Remote control
- "E"—Sack—containing
  - EF Generator condenser
  - EE Suppressors.
  - ED Carriage bolt
  - EG Grounding ribbon
  - EC Felt Pad
  - EA Steering column strap
  - Strap screws
  - Straps
- "F"—Hollow mounting studs.

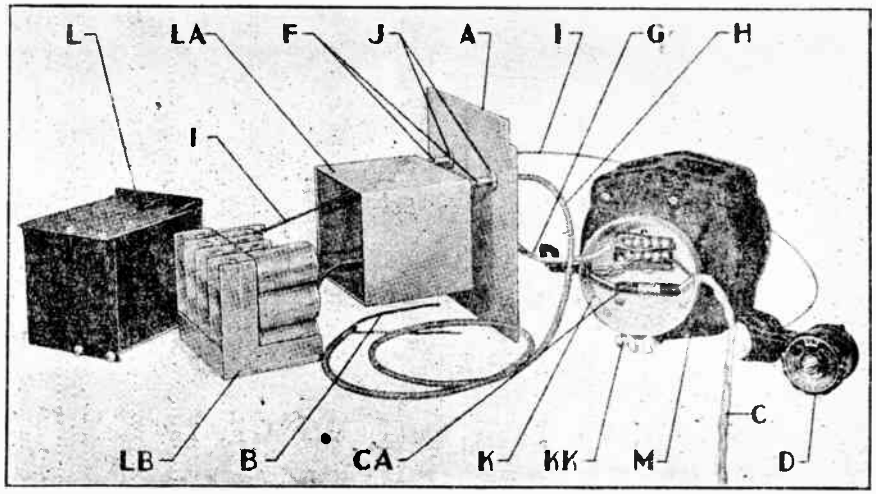


FIGURE 3.
Partly disassembled to show how various parts fit into and onto each other.

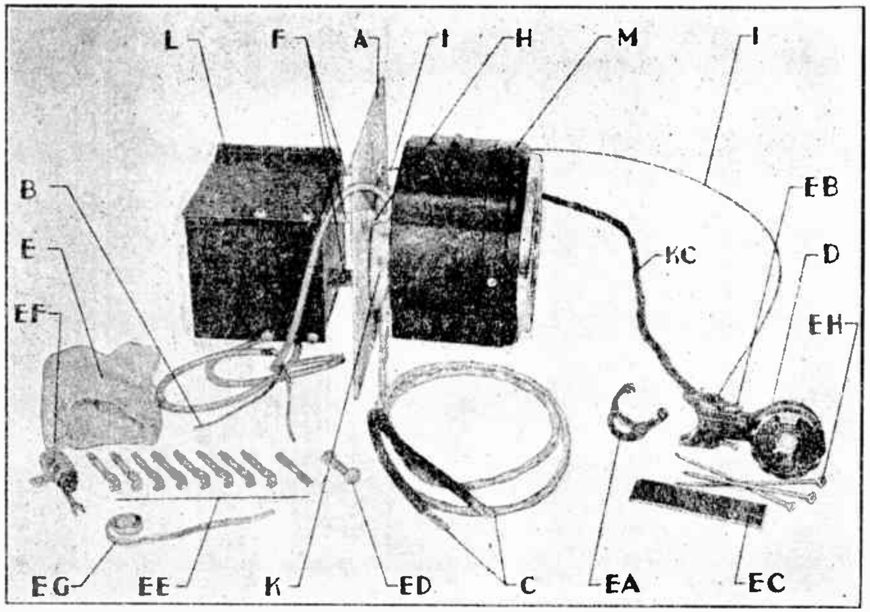


FIGURE 2.

TO INSTALL.

FIRST—

Take a look at Figure 1-A. This will give you a general idea how your complete job will look. The remote control is shown, merely for convenience of illustration, standing upright from steering column. However, the dial is set for the remote control to be mounted in a horizontal position to the RIGHT of the steering column.

Note carefully how the chassis and speaker units are mounted on the packing board "A" which represents the dash of your car. The square shaped part "L" goes on the engine side of the dash. The Speaker "M" will be on the passenger side of the dash. The Radio is attached to the dash by three hollow studs, "F". (You'll find a templet for making the dash.) The 1-inch hollow stud at the lower part of the Radio case interconnects the chassis and the speaker units by inter-set wires "G" which pass through it.

One hollow stud at the top conveys the antenna wire "B" into the Radio chassis through the shielded case "H" which is attached to the hollow stud with an adapter nut. The other hollow stud at the top carries the Control wire (Borden wire) "I" to the variable condenser.

Extra nuts "J" are used to draw the studs up snug. An outlet box (Fig. 2, 3, 4) is made of two units—"K" on back of speaker and "KA" on dash. When these are clamped together by a friction band they hold the speaker to the dash. (See Figures 3 and 4.)

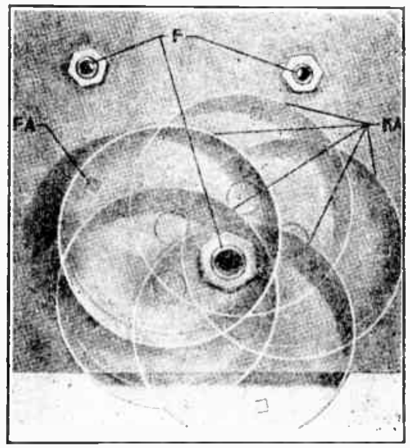


FIGURE 4.
Shows how outlet box KA can be located in various positions from 1" hollow stud.

NOBLITT SPARKS INDUSTRIES MODEL Arvin 20-A,30-A Notes

Mechanical Description of Speaker Chassis Models 20A and 30A

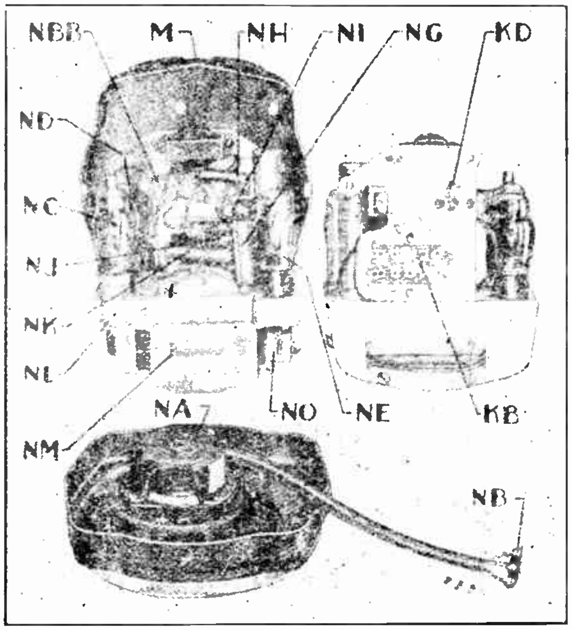


Figure 11

Figure 11 shows the speaker front removed, giving a clear indication of how the speaker is mounted. Its interconnecting cable shows the chassis proper loosened from can, a front and rear view.

Figure 12 shows the quarter view of either side of a No. 30A speaker chassis. Figure 12A shows quarter view of No. 20A speaker chassis.

Figure 13 shows speaker chassis laid on its back and the bottom coverplate disassembled so as to see into the bottom, indicating the location of the vibrator and how it is attached.

Figure 14, with step plate removed, and the location of power transformer, buffer condenser and RF choke indicated.

Following is the list and description:

NA—Speaker
6" used in Model 30A
5" used on Model 20A

NB—is terminal strip attached to NBB terminal strip on speaker chassis proper.

NC—is the 79 tube used only on Model 30A chassis.

ND—is 41 tube used on both 30A and 20A chasses.

NE—is 84 tube used on both 30A and 20A, a power rectifier tube.

NF—are filter condensers smoothing out AC waves as they come from power transformer for the high voltage "B" current.

NG—is RF by-pass condenser in the 6 volt circuit.

NH—is a condenser used only across the plates of the 79 tube and only on the 30A. It is used to reduce the high frequency response of the speaker.

NI—is a choke in the B circuit.

NJ—is a condenser.

NK—is an RF choke on the shunt side of the A or 6 volt circuit.

NL—a condenser cathode of the 41 tube.

NM—indicates the bottom plate power eliminator cover which houses the vibrator and power transformer assembly, having shelves on either side for attaching of load delay relay and audio transformer, held in place by two screws at rear of the chassis.

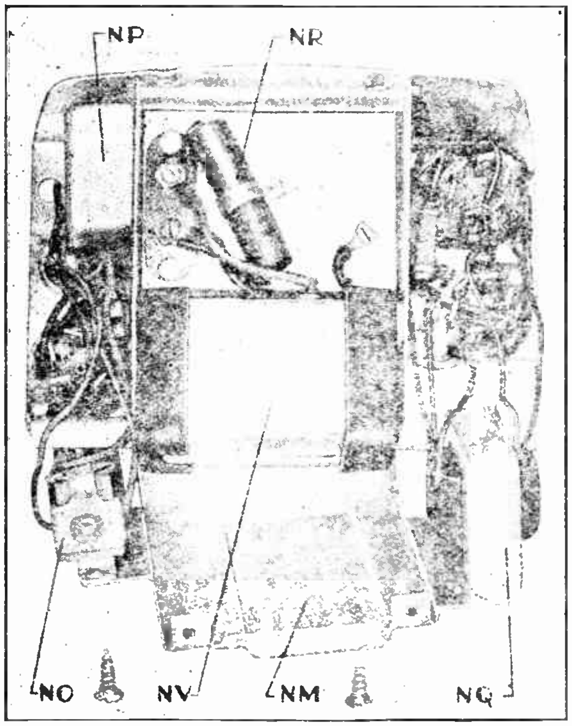


Figure 13

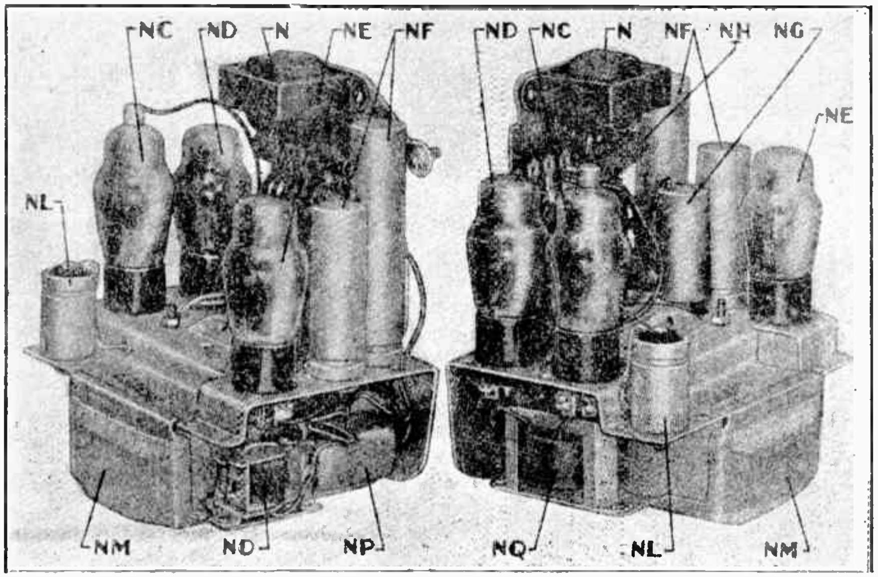
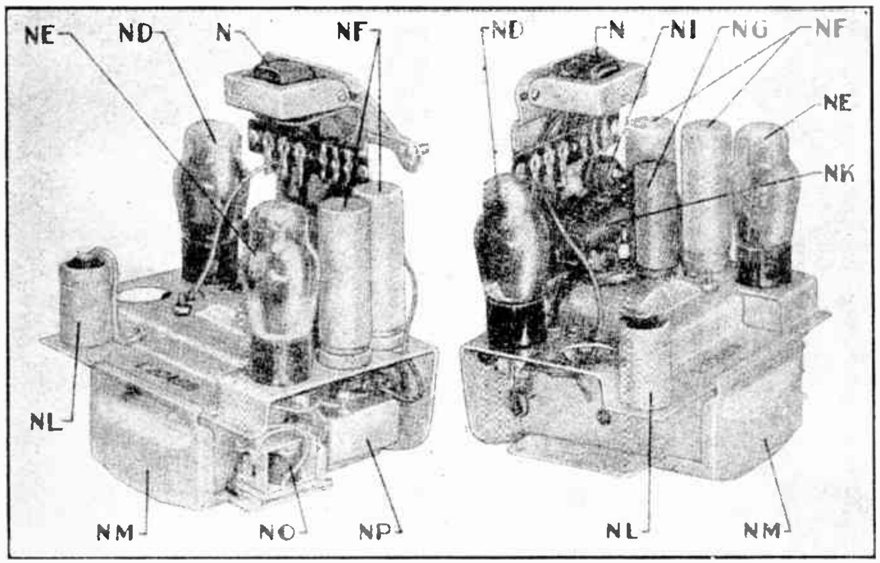


Figure 12 (above)

Figure 12-A (below)



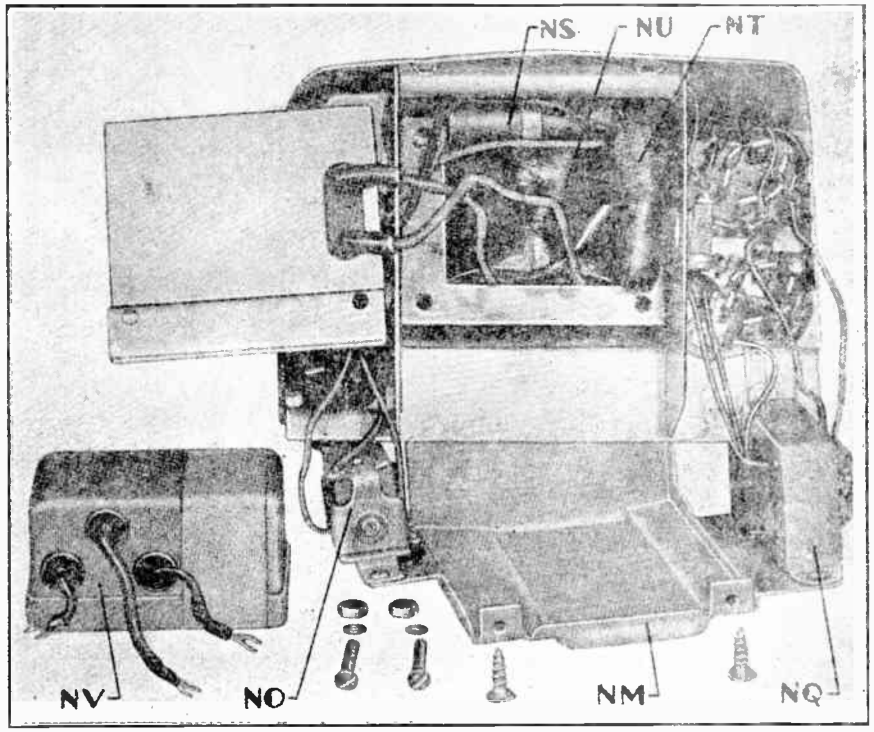


Figure 14

NO—is a relay and resistor mounted by its side which operates in combination to furnish load delay to dissipate the energy produced by the vibrator and power transformer until the tubes have heated so they can receive this power.

NP—by pass condenser on the center tap of the primary side of the power transformer.

NQ—audio transformer used only in the Model 30A.

NR—a twin condenser across the two hot 6 volt leads of the vibrator.

NS—buffer condenser on the B side of the power transformer.

NT—RF choke in the center tap of the primary of power transformer.

NU—is power transformer held in place by four screws, two of which hold stop plate—and two of which hold upper part of the chassis carrying terminal strips.

NV—is vibrator equipped with three leads—one short or ground attached to step plate—the other two attached to two screws at the same point where the condenser NR is attached, which couples in the other two outside windings of the power transformer with the vibrator. The vibrator lead is supported by two rubber or felt pads.

The above description, together with outlines indicated in circuit wiring diagrams will more than serve to show you how the wiring is arranged in the chassis.

The following Bulletins are obtainable upon application:

Bulletin No. 1—Installation Instructions.

Bulletin No. 2—Motor Noise Interference Elimination Procedude.

Bulletin No. 3—Mechanical Description of Radio Chassis.

Bulletin No. 5—Wiring Diagram and Electrical Measurement and Trouble. Shooting.

ARVIN CAR RADIO

MOTOR NOISE ELIMINATION PROCEDURE

STANDARD SUPPRESSION

Standard suppression consists of the following parts: six spark plug suppressors for six cylinder cars or eight spark plug suppressors for eight-cylinder cars, one secondary coil suppressor, and the generator condenser to be grounded with the lug on the side of the condenser can on the frame of the generator, and the wire lead is to be fastened to the hot side of the relay which in most cases is mounted above or on the side of the generator.

These parts along with a piece of tinned copper ribbon, are supplied as standard equipment with the Radio when purchased. The copper ribbon is to be used to ground the passenger compartment through the motor bulkhead into the engine compartment —suc has gas lines, chokes, free wheeling controls, Borden wires, and all other tubing and wiring shielding such as electro-lock tubing, that pacc through this bulkhead.

On most cars this standard suppression will be all that is necessary to completely eliminate motor noise in the Radio.

Special Instructions For Elimination of Motor Noise Not Removed by Standard Suppression.

After you install the Radio receiver refer to the tabulated data on suppression of motor noise interference on the particular make car in which the Radio is installed. By reading down the column beneath the "year", "serial number" or "model car", you will find certain grounds that are recommended to be made on the chassis and certain changes in the electrical connections or wiring. In most cases these recommendations will be all that are necessary to complete a perfect job.

Additional Information On Individual Makes of Cars.

AUBURN

Shield the high tension lead from coil to distributor and ground the shielding to the motor and to the frame of the distributor. Install generator condenser at ammeter and ground to the dash. On Auburns that do not have a factory equipped antenna, shield the lead in as mentioned in Special Antenna Installation Bulletin. On cars equipped with antenna at factory, push a piece of braided shielding loom over the antenna lead up into the roof structure as far as possible without grounding this loom on the antenna itself.

BUICK

Ground spark plug cover case with big tail leads to water pump nut at front of the motor and oil lines at rear end of motor. Splice one piece of large loom over all wires leading from distributor to the spark plug cover and ground this shield at cover. Solder the shielding firmly in place and make certoin that it does not come close enough to the distributor that there will be any possibility of sparks jumping over, shorting out the distributor. In some extreme cases on old model Buicks it has been found necessary to entirely shield the distributor head by taking a piece of copper screen wire approximately 4" wide by 12" or 15" long and wrapping it around and over the top of the distributor and around, between, and over the shielded lead from the coil ond the wire to the spark plugs.

Solder this screen wire in place to the shielding in both cases and tack all the ends and edges down with solder so that it remains firmly in place. In doing this make sure that you do not short the screen out on the hot wire from the battery which connects to the base of the distributor or to the adjusting screw on the back of the distributor head. Also keep this screen as far as possible away from the suppressor which you place in the top of the distributor to prevent shorting out this wire on the suppressor. Disconnect the dome light wire. Install dome light switch at the left-hand side of the dash. In extreme cases it may be found necessary to also shield the dome light wire throughout its entire length, grounding the shielding at both ends to some metal part of the car. Bond the metal mounting screws which hold the panel above the windshield in place and carry the ground lead clear to the dash of the car if necessary. Install a suppressor at the distributor and in some cases it is also necessary to install a suppressor at the coil itself in addition to the one on the distributor. It is not necessary to install suppressors at the spark plugs because the spark plug housing is grounded and effectively shields the plugs.

CHEVROLET

1930 to 1932 Inclusive

It is necessary in all Chevrolet cars to install antenna. Refer to aerial installation instructions. Carry shielding down the right hand door post and ground at the dash, as well as at the roof. The dome light wire should be disconnected and shielded up into the door post as far as possible and a dome light switch installed at the dash. This and standard suppression are generally all that are necessary.

However, in some extreme cases it is necessary to shield the high tension ignition lead from the coil to distributor, making sure that the shielding does not come close enough at either end to arc over and short out the distributor. And in some cases it is also necessary to run a separate primary lead from the switch to the distributor and shield this lead. Remove the old primary wire from the switch to the coil entirely. The three wires that run down through the loom should be removed and run through separate shielded cables. This will be found necessary only in a car that has had quite a lot of use and ignition wires are badly worn. It will sometimes help if the primary leads to the ignition coil are reversed and the two are twisted together as they come from the dash to the coil.

CHEVROLET—1933

In the 1933 Chevrolet the antenna is already installed and it is necessary to shield the lead-in from the antenna up the door post as far as possible by pushing a piece of metallic loom over the antenna lead already installed in the car. Connect the antenna lead of the Radio set to the antenna wire of the car. Tape the joint, then slide metallic shielding over this joint where the loom enters the door post, pig-tails should be attached and grounded to the dash of the car. A dome light switch should be installed and the dome light wire shielded as far up the door post as possible in all models equipped with the dome light switch either on the door post or at the roof.

On all General Motors cars in which a difficulty is encountered in removing motor noise, that difficulty may be overcome by proceeding to shield the distributor head as mentioned under BUICK in the preceding paragraph. This is not recommended, however, except as a last resort.

FORDS—Models A and B

First, see instructions for installation of antenna in any automobile. The Ford chicken wire is generally grounded all the way around and also to the center steel ribs which support the top cover. The chicken wire should be cut away from all metal parts in order that it will not be grounded and may then be used as an antenna or an extra copper screen wire installed for antenna.

The armored cable which carries the primary wire from the switch to the distributor should be grounded at the metal bulkhead and the spark control rod should be grounded to the motor block. It is not generally necessary, except in extreme cases, to shield the wire leading from the distributor to the coil. It will sometimes be found necessary to install an extra switch for the dome light and to shield the dome light wires up into the body as far as possible.

FORD—Model V-8.

On the Ford V-8 it is impossible to use a distributor suppressor so that standard suppression is not possible. It is therefore necessary to build up the rotor contacts in the distributor head so that they clear the rotor approximately .002 to .003 inch. This is best done by soldering a small bit of solder to each point of the rotor on either side, then filing down each point until they just clear. The primary wire running in the conduit that carries the high tension spark plug wire should be taken out of this conduit and shielded from the distributor through the dash. The dome light wire should also be disconnected and shielded up into the door post. The antenna lead in should be brought down the left hand door post. In most cases the dome light wire goes down the right hand door post and in that way there will be no interference between these two leads.

FRANKLIN 1930-31-32

Remove boot covering distributor and cut about six inches of conduit off which carries high tension ignition wires to plug. This makes possible the installation of a suppressor at the distributor. Peen out the rotor arm so that clearance between the rotor and contacts is .003".

Ground conduit carrying ignition wires to bulkhead on the motor side of the dash and ground coil frame to the oil line in driver's compartment.

Shield secondary lead from coil to dash and ground at dash. Cut the dome light wire and install switch at dash, close to the door post up which the wire passes. Shield the antenna lead up the right hand door post and bond to the dash.

LA SALLE
the Same as for Chevrolet

LINCOLN—All Models

In the Lincoln motor car there are two ignition coils which are mounted in the driver's compartment on the dash. The high tension leads pass through the dash into metal conduits to the distributor which is located on the motor. The leads from the coil should be well shielded and bonded to the bulkhead. A filter network is generally necessary for the dome light wire because of the complex wiring. This usually consists of a choke in series with each of the leads, by passed by condensers to ground. These chokes can be made by winding about thirty turns of No. 18 wire on a wood dowel, just about the size of a lead pencil, and are about as effective as any manufactured choke. The condenser to be used should be approximately ½ to 1 mfd. capacity and of the common paper insulated type.

MARMON
All Models Except 16 Cyl.

If the antenna is not already installed it will be necessary to install it, following the general antenna installation procedure.

Bring the lead in down the left hand door post and the dome light switch should be installed at the dash. Standard interference suppression will generally suffice for all installations with the exception that it is necessary to reduce the rotor clearance to about .002 to .003 inch.

OAKLAND
Same as for Chevrolet

OLDSMOBILE
Same as for Chevrolet

PLYMOUTH
1931 and '32 Models

Standard suppression should be followed. The distributor clearance should be reduced to .003 inch. The coil lead from the coil mounted on the dash should be shielded to the metal bulkhead and thne grounded to the oil line. The oil line should be grounded on the motor side of the dash to the metal bulkhead. The primary lead which goes from the coil to the distributor should be wrapped around this shielding about three times and reconnected. Occasionally it is necessary to install a generator condenser at the coil on the battery side to ground. The dome light switch should be installed as close to the left hand side of the dash as possible. The pigtail on the end of the antenna shield should be grounded to the dash on the right side. The antenna shield should be shoved as far up the door post as it will reach.

This procedure applies to DODGE, CHRYSLER and DE SOTO.

PONTIAC - 6
Same as for Chevrolet

PONTIAC 8 — 1933

shield the high tension lead from coil to distributor to the end of conduit, carrying ignition wires in motor compartment.

Shield and twist, after shielding primary and secondary wire to the coil, and continue shield through the dash to distributor, and ground to screws holding ignition cover to the side of the motor block. Ground the generator and radiator shell with pigtails to same point.

The Radio may be connected to the starter and ground lug to the steering column. Shield the lead in from the antenna up the right hand door post. Install dome light switch just to the right of the oil gauge. Ground aerial pigtail at right hand door post on the bolt in the lower right hand corner of instrument panel.

STUDEBAKER

Reduce the clearance between rotor and distributor coils. Shield high tension leads from coil to distributor. Ground pigtail on the end of the antenna cable to the instrument panel where antenna cable enters the door post.

ROCKNE

It is necessary on the Rockne automobile to reduce the spark gap between the distributor and rotor and to install a shielded cable between the coil and the distributor. Ground metal shielding to the oil line. Ground oil line on the motor side of the bulkhead. The dome light wire should be disconnected and a switch installed and the wire shielded from the switch to the cowl and up into the door post as far as possible. The bare antenna lead under no circumstances is to be brought down and under the cowl and exposed at any point. The shielding should be pushed up as far as possible into the door post.

Miscellaneous General Information Relative to Removing Motor Noise.

When primary wires to the coil run through the same conduit as the secondary or spark plug wire run—remove this wire from the conduit and shield it if necessary, grounding the shielding at both ends to some part of the motor block or the bulkhead between the passenger's compartment and the motor.

Also, be sure when shielding the secondary lead from the coil to the distributor to ground both ends of this shield, either to the motor or to the bulkhead. On some few cars the hood over the engine appears to be ungrounded or at least is a very high resistance ground and should be grounded with pigtails of shielding cable soldered to both sides of the hood and also to the motor bulkhead or motor block.

On cars equipped with co-incidental lock on the steering post an extra generator condenser should be installed from one switch terminal to ground. The exact terminal on which to install this condenser can be determined only by experiment. The condenser body should be grounded to the dash or to the motor bulkhead. On some Ford V-8's it is necessary to install an extra generator condenser on the generator to the other terminal of the cut-out relay, thus making two condensers on the same relay—one on each terminal to ground.

On some Chevrolets, generally of the older models, it is necessary to install an extra condenser from the primary of the ignition coil to ground. The exact terminal to connect this condenser to can only be determined by experiment. Be sure that the grounding of this condenser is solid, preferably to the motor block or to the motor bulkhead.

On all cars equipped with "Electrolock" it may be found necessary to remove the primary return wire from the switch to the coil and replace it with a new wire run through a piece of shielding loom grounded near the switch and also to the metal bulkhead on the motor side of the dash. This lead should be brought out through the dash as far as possible from the rest of the electrical wiring of the car.

It may be pointed out that loose connections anywhere in the electrical circuit of the car will cause motor noise or what appears to be motor noise. If this condition exists it is wise to check the entire electrical circuit of the car and make sure that all connections are tight before trying any other extreme methods of motor noise elimination.

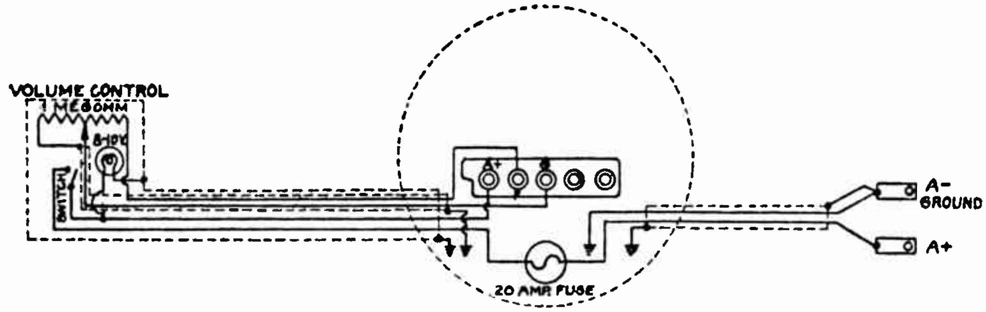
For information on cars not listed, refer to tabulated data which includes practically all makes of cars.

From time to time, as experimental work progresses, additional bulletins will be issued to supplement this information already given, and may be obtained upon application to Noblitt-Sparks Industries, Inc., Columbus, Indiana.

Noblitt-Sparks Industries Inc.,
Columbus, Indiana

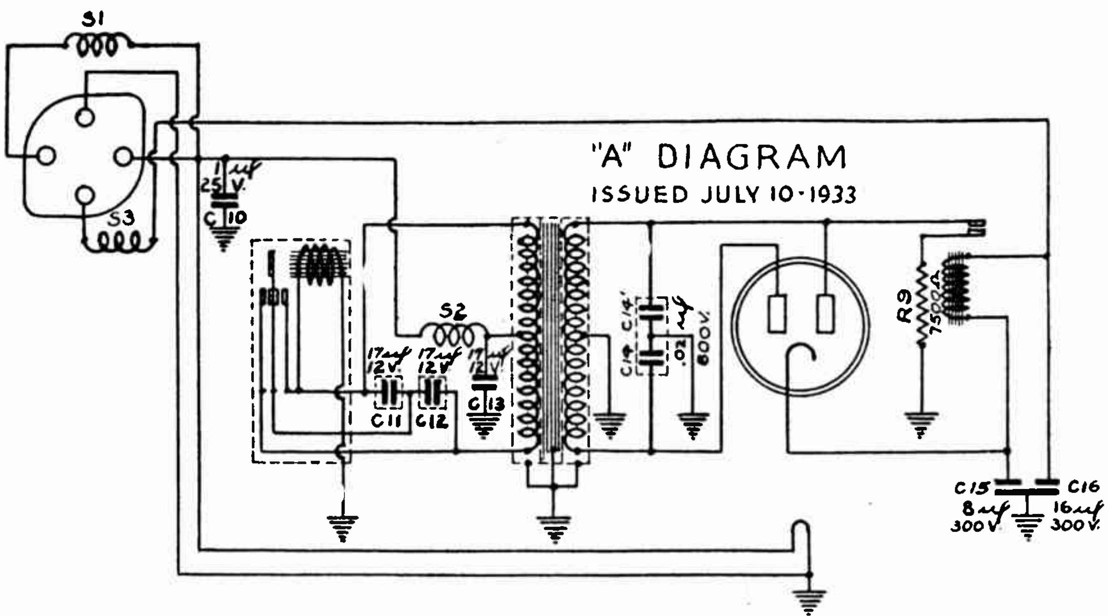
NOBLITT SPARKS INDUSTRIES

MODEL Arvin 10-A
B Supply Schem.
MODEL Arvin 20-A
Control Schem.



ARVIN CAR RADIO MODEL 20A
REMOTE CONTROL CIRCUIT DIAGRAM

WIRING COLOR CODE	
BATTERY "A+" TO SWITCH	YELLOW
BATTERY "A"- TO TERMINAL	BLACK
"A"+ TERMINAL TO SWITCH	BLACK
"B" TO ROTATING CONTACT	GREEN
"P" TO VOLUME CONTROL	BLUE
SWITCH TO DIAL LAMP	RED
VOL. CONTROL TO GROUND	BRAIDED SHIELDING

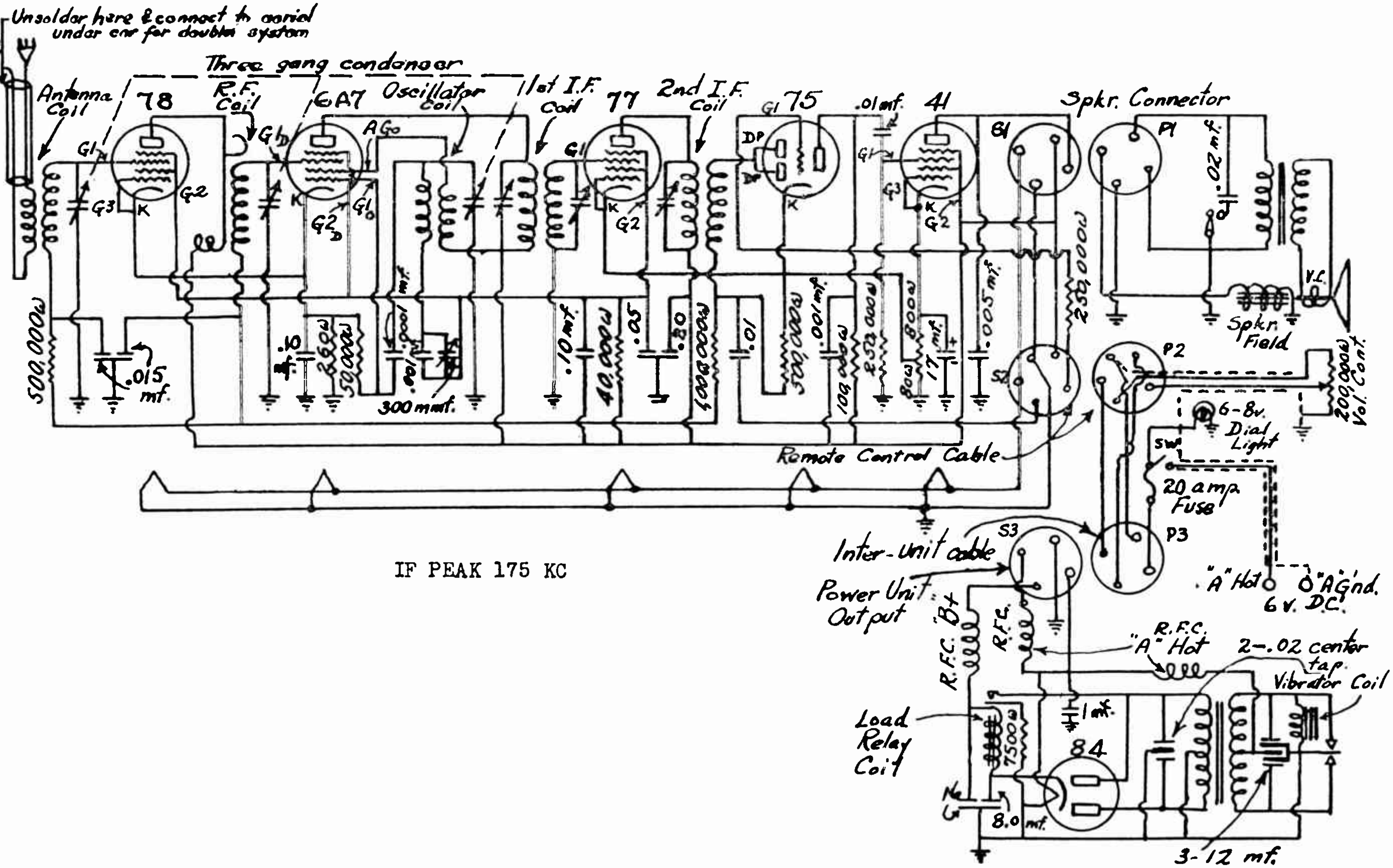


ARVIN CAR RADIO MODEL 10A
"B" POWER SUPPLY

CAPACITY VALUES			RESISTANCE VALUES		
SIGN	μf	P.V.D.C.	SIGN	Ω	WATTS
C10	1	10	R9	7500	1
C11	17	12			
C12	17	12	CHOKE SPEC.		
C13	17	12	SIGN	TURNS	GAUGE
C14	02	200	S1	100	#16
C14'	02	200	S2	100	#16
C15	8	300	S3	750	#29
C16	16	300			

CHASSIS WIRING COLOR CODE	
CATHODE & GROUND	YELLOW
PLATES	BLUE
"B" POSITIVE	RED
HEATERS	BLACK
POWER TRANS. PRIM. MID-TAP	BLACK
POWER TRANS. PRIM. END-TAP	BLUE WITH RED TRACER

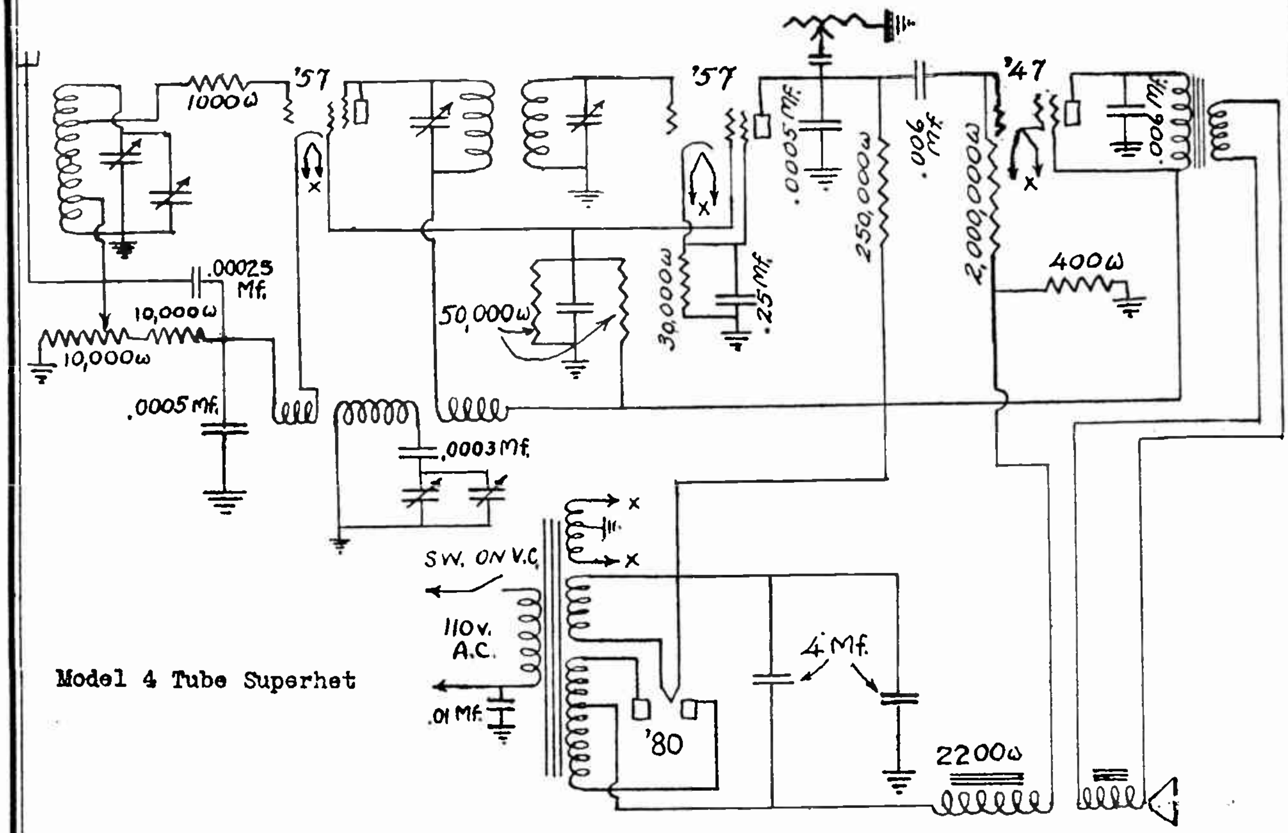
NOBLITT SPARKS INDUSTRIES



IF PEAK 175 KC

PACKARD

MODEL 4 Tube Super
MODEL 5 Auto



Model 4 Tube Superhet

Model 5 Data

The tuning range of the receiver is 550 to 1,750 kc., and reception of the 2,480-kc. police signals as an image frequency. The intermediate frequency used is 465 kc.

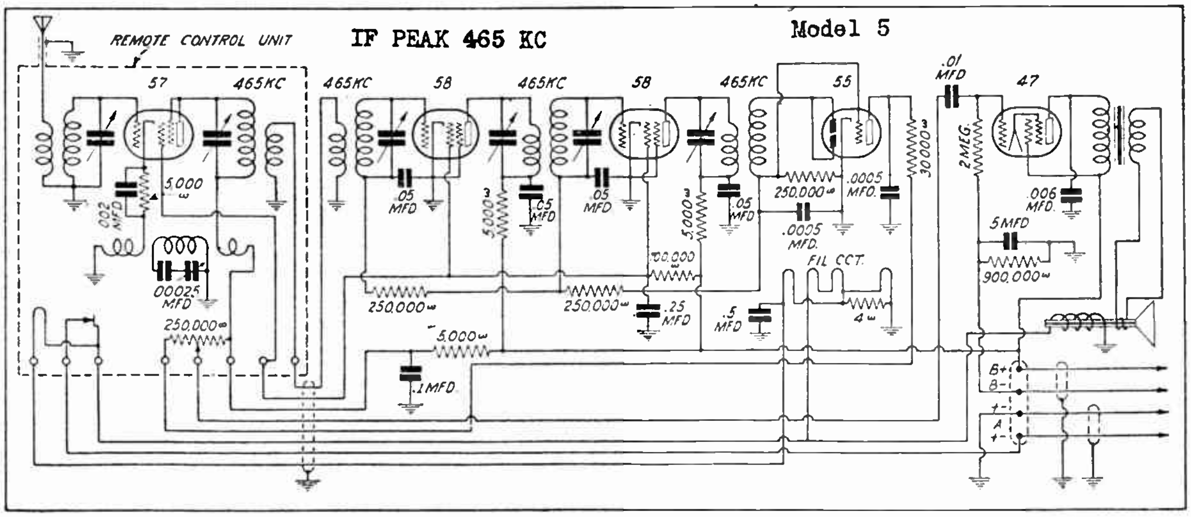
The most interesting feature of this receiver is the control unit which, instead of merely consisting of the usual remote tuning dial and volume control, actually contains the type '57 combination first detector and oscillator tube together with the associated units. This unit is then coupled to the intermediate-frequency amplifier by an i-f transmission line contained in a shield along with the "A" and "B" feed wires, etc. The intermediate frequency and audio units are in a case with an eight-inch Lansing speaker, making the whole a two-unit job with remote control and no flexible shafts.

The i-f. feed line has at each end a coil composed of three turns of wire around a standard i-f. bobbin, and the line may be 15 feet long without causing appreciable loss . . the loss with a 15-foot run being about 5 db.

The two type '58 tubes in the intermediate-frequency stages are used as standard r-f. pentodes. AVC is provided by the type '55 second detector tube which feeds the type '47 output pentode. Total plate current is 18 ma. at 180 volts.

Care should be taken with the B + terminal as it is inclined to short to the chassis, in which case the 900-ohm bias resistor for the '47 tube will blow, as well as the electrolytic condenser shunting it.

The plate winding on the oscillator coil in the control unit suffers seriously from electrolysis.



PHILCO RADIO & TELEVISION CORP.

MODEL 3
Transitone
Voltage
Electrical Values

This Receiver has been especially designed for installation and operation in automobiles. Filament and heater currents are supplied by the automobile battery. "B" and "C" voltages are supplied by four 45-volt dry "B" batteries.

Only three battery leads are required, one to the live side of the six-volt system, one to the positive terminal of the 180-volt battery, and one to the negative terminal of the 180-volt battery.

The chassis of the Receiver when installed, is grounded or bonded to the metal work and frame of the automobile, completing the circuit to the grounded side of the storage battery.

Table No. 1—Tube Socket Readings

Tube		Voltage					Plate Milli-Amperes
Type	Circuit	Filament	Plate	Screen	Cathode	Grid	
24	1st R. F.	2 V.	150	80	2	.....	1.5
24	2nd R. F.	2 V.	150	80	2	.....	1.5
24	3rd R. F.	2 V.	150	80	2	.....	1.5
71-A	Det. Rect.	5 V.	....	..	..	.....	....
01-A	Det. Amp.	5 V.	45	..	..	—1.0	1.0
01-A	1st A. F.	5 V.	140	..	..	—2.5	3.0
71-A	2nd A. F.	5 V.	142	..		—32 V.	16.0

Table 2—Resistor Data

No. on Figs. 1 and 2	Terminal	Resistance in Ohms	Color
1		10,000	Black
4		100,000	Silver Gray (Yel. Tip)
14		50,000	Orange
15		25,000	Brown (Yel. Tip)
16	1-2 3-4 4-5 5-6	250 1 30 30	Flat-Wire Wound
21		1,000,000	Green (White Tip)
22		250,000	White
23		100,000	Silver Gray (Yel. Tip)
24		100,000	Silver Gray (Yel. Tip)
26		1,000,000	Green (White Tip)
28		100,000	Silver Gray (Yel. Tip)
31		250,000	White
33	1-2 2-3	500 300	Flat-Wire Wound

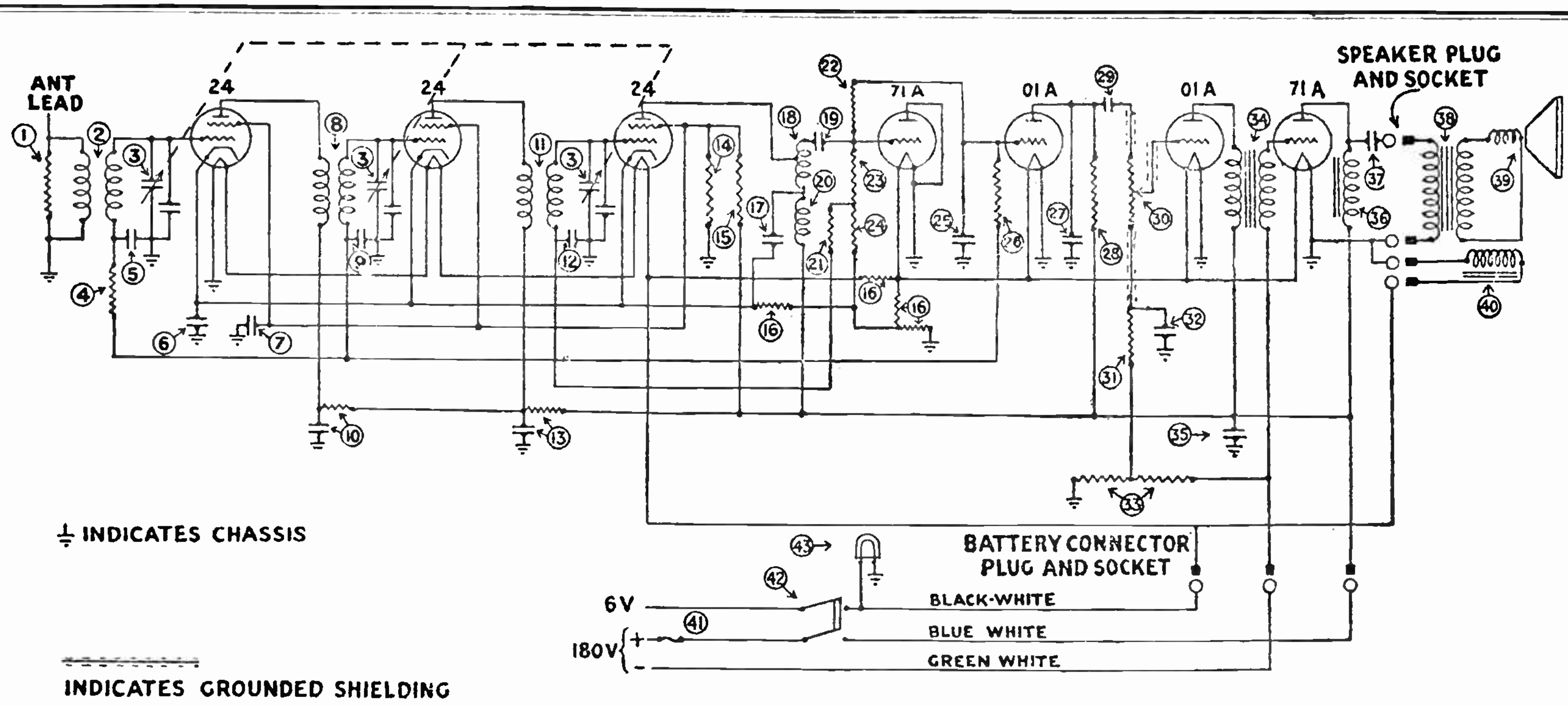
Table 3—Condenser Data

No. on Figs. 1 and 2	Capacity MFD
5 9 12	.05
6	1.0
7	.25
10 18	.05 with 250 Ohm Resistor
17	.00025
19	.00005
25	.00025
27	.00025
29	.015
32	.25
35	2.0
37	1.0

No. on Figs. 1 and 2	Description	Part No.
1	Resistor (10,000 ohms—½ watt)	4412
2	First R. F. Transformer	4401-A
3	Tuning Condenser	4372-A
4	Resistor (100,000 ohms—1 watt)	3767
5	Condenser (.05 mfd)	3615-N
6	Condenser (1.0 mfd)	4419
7	Condenser (.25 mfd)	4487
8	Second R. F. Transformer	4401-B
9	Condenser (.05 mfd)	3615-N
10	Condenser and Resistor (.05 mfd with 250 ohms)	3615-P
11	Third R. F. Transformer	4401-B
12	Condenser (.05 mfd)	3615-N

MODEL 3 Transitone Schematic Parts List

PHILCO RADIO & TELEVISION CORP.



13	Condenser and Resistor (.05 mfd with 250 ohms)	3615-C
14	Resistor (50,000 ohms—1 watt)	4237
15	Resistor (25,000 ohms—1 watt)	3656
16	Resistor (4-section)	4407
17	Condenser (.00025 mfd)	3082
18	Fourth R. F. Transformer	3775-B
19	Condenser (.00005 mfd)	3774
20	R. F. Choke	3256-A
21	Resistor (1,000,000 ohms—½ watt)	4409
22	Resistor (250,000 ohms — ½ watt)	4410
23	Resistor (100,000 ohms — ½ watt)	4411
24	Resistor (100,000 ohms — ½ watt)	4411

COMPENSATING

Compensating condensers in all Philco Transitone Receivers are carefully adjusted at the factory, and ordinarily need not be readjusted.

If necessary to readjust, a good oscillator should be used. With the Receiver and oscillator set up for operation, and the volume control of the Receiver turned on full—adjust the oscillator signal to a frequency between 1000 and 1200 kilocycles, or 100 and 120 on the Receivers. Tune the Receiver sharply to the signal and then reduce the oscillator signal so that it is barely audible in the Speaker.

Using the special fibre wrench, adjust the third compensating condenser to that point at which the maximum signal is heard in the Speaker, then adjust the second and finally the first condenser in the same manner, always adjusting for that position which gives the maximum signal.

After the adjustments are completed tune the Receiver to several broadcast programs to make sure that the stations are tuned in at the proper place on the tuning scale.

25	Condenser (.00025 mfd)	3082
26	Resistor (1,000,000 ohms — 1 watt)	4414
27	Condenser (.00025 mfd)	3082
28	Resistor (100,000 ohms — ½ watt)	4411
29	Condenser (.015 mfd)	3793-D
30	Volume Control	4463
31	Resistor (250,000 ohms — ½ watt)	4410
32	Condenser (.25 mfd)	4487
33	Resistor (2-section)	4408
34	Audio Transformer	3241
35	Condenser (2.0 mfd)	4418
36	Audio Choke	4485
37	Output Condenser (1.0 mfd)	4420

MODEL 5
Transitone
Parts List
MODEL EA
Eliminator

PHILCO RADIO & TELEVISION CORP.

MODEL 5 PARTS LIST

No. on Fig. 1 and 2	Description	Part No.
1	Antenna Transformer	32-1084
2	Tuning Condenser	31-1019
3	Condenser (.05 mfd.)	30-4020
4	Filter Condenser (.25; .25; .5; 20 mfd.)	30-4017
5	Resistor (200 ohms)	7217
6	Resistor (1300 ohms)	8267
7	Oscillator Coil	32-1085
8	Condenser (.00025 mfd.)	3082
9	Resistor (15,000 ohms)	6208
10	Padder	04000-S
11	Padder	04000-J
12	First I. F. Transformer	32-1086
13	Padder	04000-Y
14	Condenser (.5 mfd.)	30-4018
15	Resistor (1,000 ohms)	33-3017
16	Resistor (10,000 ohms)	4412
17	Padder	04000-D
18	Second I. F. Transformer	32-1087
19	Resistor (1,000,000 ohms)	4409
20	Padder	04000-M
21	Condenser (.05 mfd.)	30-4020
22	Condenser (.00025 mfd.)	3082
23	Condenser (.0005 mfd.)	3910
24	Resistor (100,000 ohms)	6099
25	Volume Control and Switch	33-5009
26	Resistor (32,000 ohms)	3525
27	Resistor (250,000 ohms)	3768
28	Resistor (500,000 ohms)	6097
29	Resistor (700 ohms)	6443
30	Resistor (400 ohms)	33-3016
31	Condenser (.006 mfd.)	30-1002
32	Output Transformer	32-7005
33	Cone	36-3027
34	Field Coil	9013
35	Pilot Lamp	6608
36	Resistor (7 ohms)	7155
37	Fuse, 15 A.	7227
38	R. F. Choke (Low voltage)	32-1083
39	Condenser (.5 mfd.)	30-4015
40	Condenser (.05 mfd.)	30-4020
41	Resistor (200 ohms)	7217
42	Vibrator	38-5036
43	Resistor (200 ohms)	7217
44	Transformer	32-7030
45	Condenser (.006 mfd.)	30-1002
46	Condenser (4 mfd.; 8 mfd.)	30-4010
47	Filter Choke	32-7026
48	R. F. Choke (High voltage)	32-1078
49	Resistor (250,000 ohms)	4410
	Control Shaft (Tuning)	28-8006
	Control Shaft (Volume)	28-8007
	Tube Kit	34-3006
	75 Tube	8002
	78 Tube	8315
	41 Tube	6446
	84 Tube	34-2001
	6A7 Tube	34-2002
	Dial	27-5006
	Antenna Lead	L-1594
	Battery Cable (Bat. end)	38-5124
	Battery Cable (Rec. end)	38-5123
	Fuse Housing	28-1269
	Male Cap (Fuse)	28-1270
	Contact (Fuse)	27-7133
	Washer	27-7132
	Spring	28-8009
	Fuse Insulator	27-7131
	Antenna Male Cap	28-1270
	Contact (Antenna)	28-7133
	Spark Plug Resistors	4531
	Dist. Resistors	4546
	Screw Type	4851
	Interference Condenser (1 mfd.)	4522
	Interference Condenser (½ mfd.)	30-4007

MODEL EF FULL WAVE VIBRATOR

(Used With Model 6F Receiver)

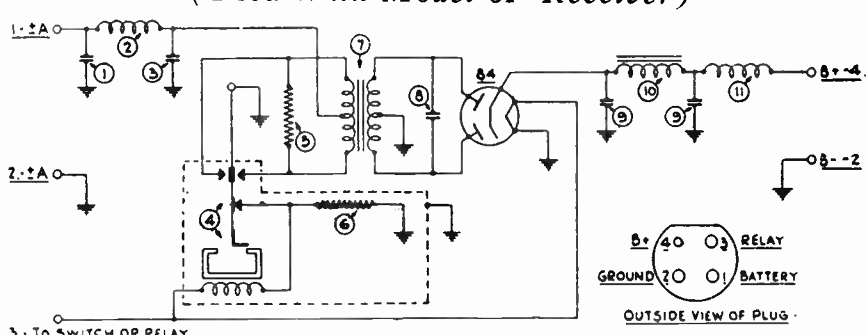


FIG. 3.

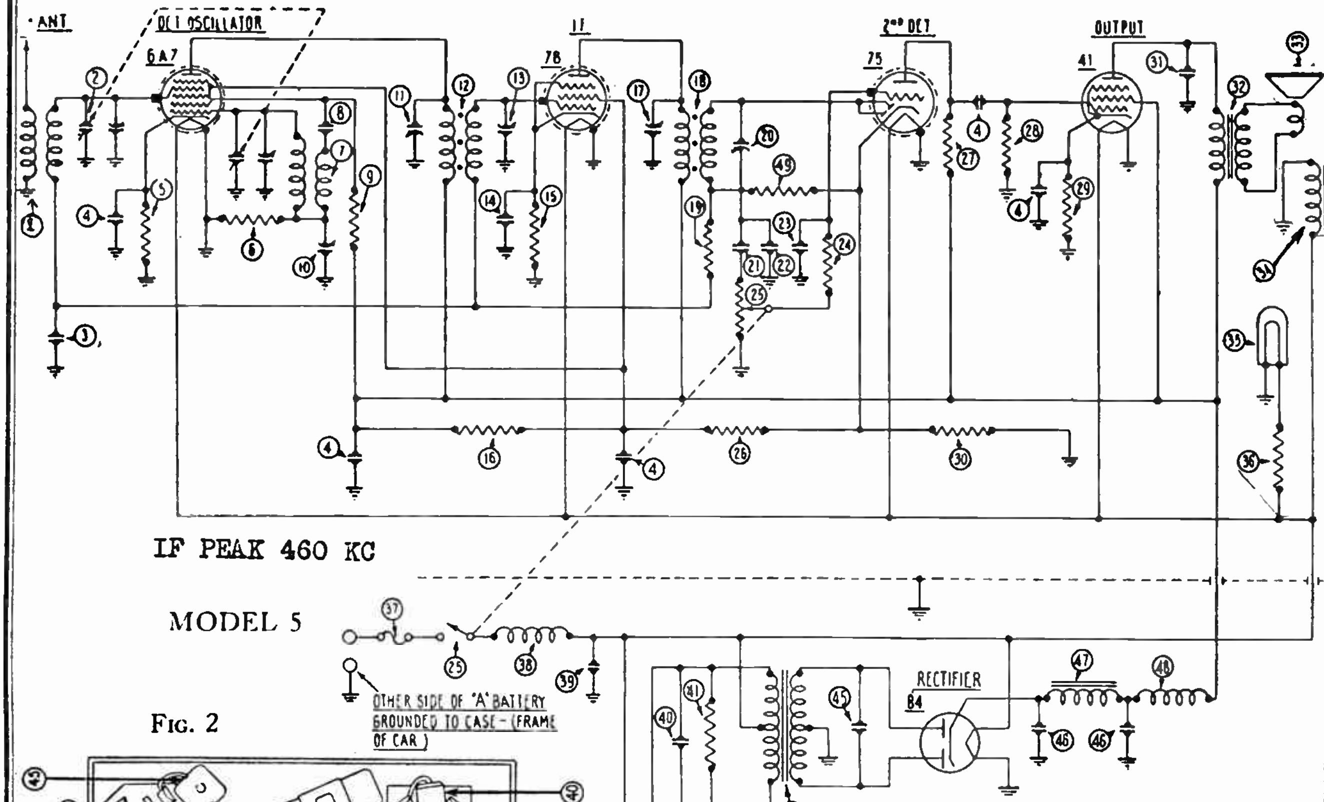
The Model EF takes the place of the EB dynamotor. The cable connection between the Vibrator and the Model 6F completes the installation of the Vibrator. Terminal 1 is connected directly to the main battery lead. Terminal 2 is the cable shield. Terminal 3 is connected to the Radio switch. Terminal 4 is the B+ high voltage lead and is connected directly to the plate circuits.

MODEL EF—PARTS LIST

No. on Fig. 3	Description	Part No.
1	Condenser (.5 mfd.)	30-4015
2	R. F. Choke (Low voltage)	32-1083
3	Condenser (.5 mfd.)	30-4015
4	Vibrator	38-5036
5	Resistor (200 ohms)	7217
6	Resistor (200 ohms)	7217
7	Transformer	32-7030
8	Condenser (.006 mfd.)	30-1002
9	Condenser (4 mfd.; 8 mfd.)	30-4010
10	Filter Choke	32-7026
11	R. F. Choke (High voltage)	32-1078
	84 Tube	32-2001
	Battery Cable (Model 6F)	41-3017

MODEL 5
Transitone
Schematic

PHILCO RADIO & TELEVISION CORP.



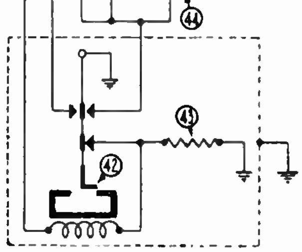
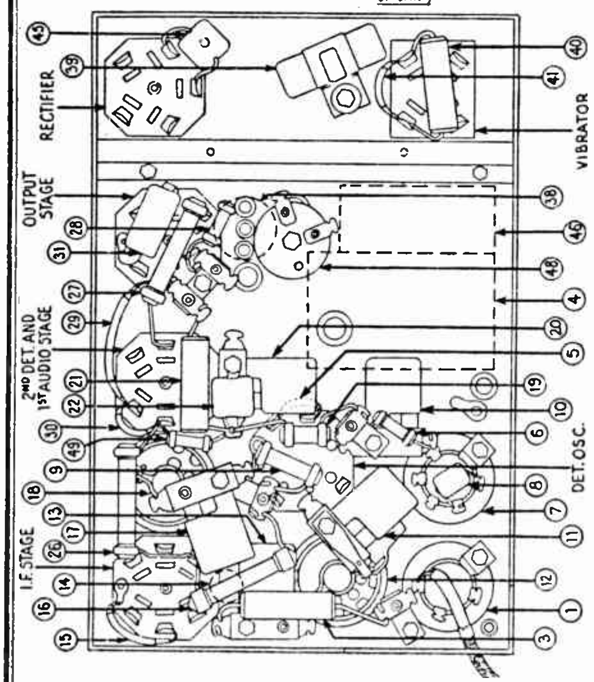


FIG. 1

FIG. 2



NOTE.—The first condensers (30-4017) were made up having five sections. The .1 mfd. section has now been removed from the can and this section replaced with a .006 mfd. condenser (Part No. 30-1001). This condenser is located in the chassis adjacent to the grid terminal of the 41 tube socket.

FILTER CONDENSER 30-4017

(4) on Figs. 1 and 2

There are five sections in this filter condenser, all terminated with wire leads. The two green leads connect to the .1 mfd. section, which is used for coupling the plate output of the 75 tube to the grid of the 41 tube.

The remaining four sections are all grounded to the can on one side. The white leads connect to two .25 mfd. sections. The first section is connected to the cathode of the 6A7 tube. The second section is connected to the screen of the 78 tube.

The red lead from the .5 mfd. section is connected to the B+ side of all the plate circuits. A 20 mfd. section terminates in a black lead, which in turn is connected to the cathode of the 41 tube.

FILTER CONDENSER 30-4010

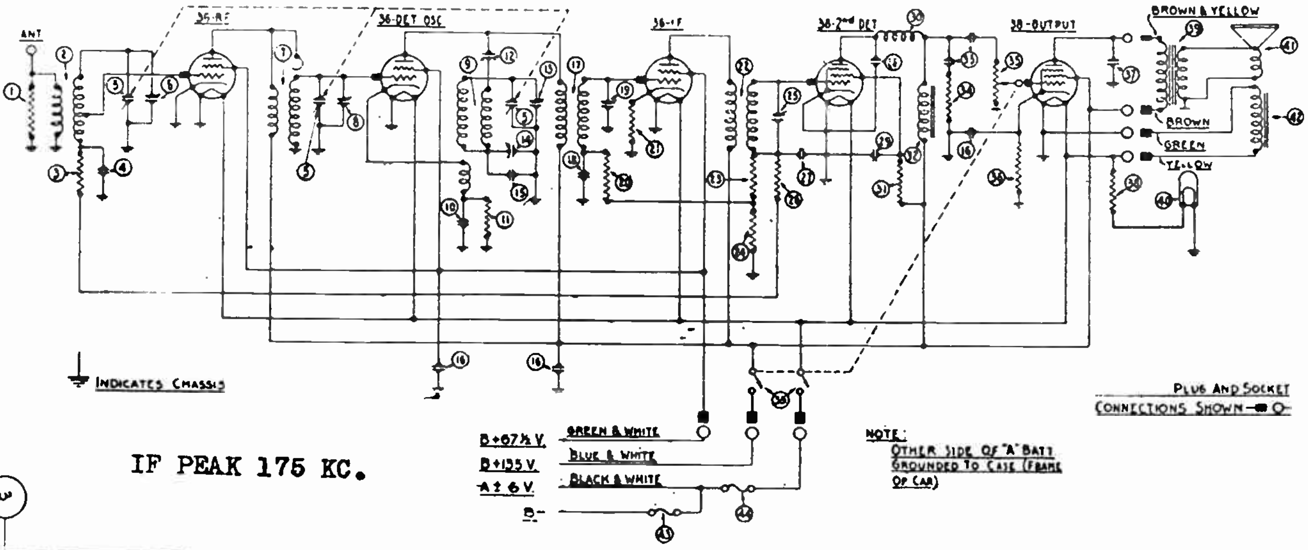
(46) on Figs. 1 and 2

This condenser consists of two sections, a 4 mfd. section and an 8 mfd. section, both of them grounded on one side.

The 4 mfd. section terminates in a red lead which is connected to the cathode of the 84 tube. The 8 mfd. section terminates in a green lead, which is connected between the two chokes in the rectifier filter circuit.

PHILCO RADIO & TELEVISION CORP.

MODEL 7 Transitone

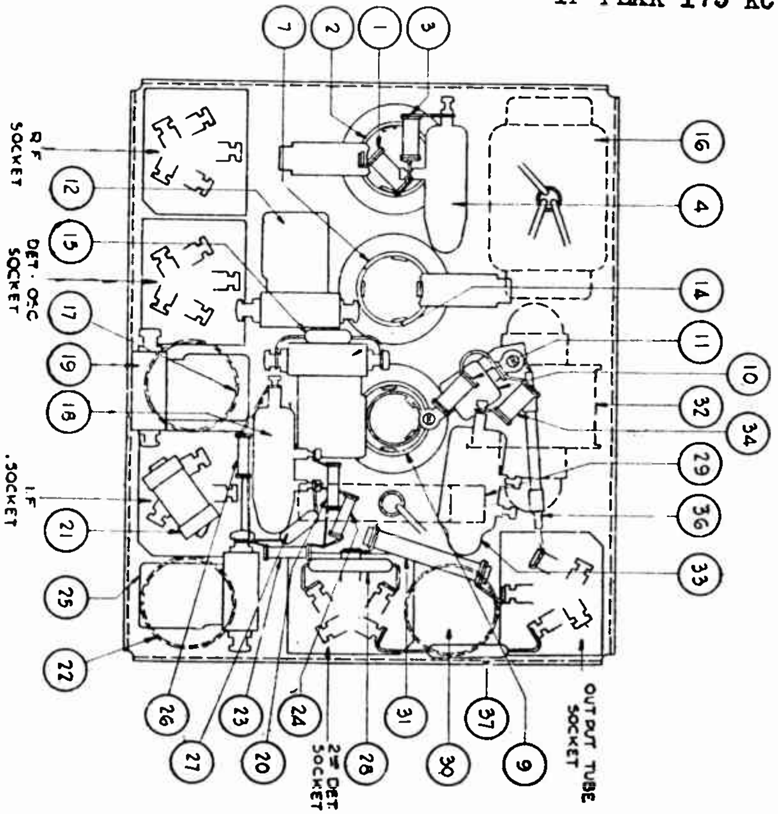


IF PEAK 175 KC.

Resistor Data

Numbers on Figs. 1 and 2.	Resistance*** Ohms
38	7*
21	225*
36	1,250**
1, 11	5,000
31, 34	50,000
3, 23, 24	99,000
20, 26	490,000

* Flat type
** Insulated covering
*** Philco utilizes the RMA color coding.



Model 7—Chassis

Condenser Data

Numbers on Figs. 1 and 2	Capacity Mfd.	Color
27	0.00025	Yellow
10, 15	0.0007	White and Golden Yellow
28, 37	0.002	Blue
33	0.015	Black Bakelite
4, 18	0.05	Black Bakelite
29	0.25	Metal
16	0.25; 0.5; 1.0	Metal

Tube Socket Readings

Tube	Filament Volts	Plate Volts	Cathode Volts	Screen Grid Volts	Plate Current
R.F.	6.0	129	0.0	61	2.8 ma.
Det-Osc.	6.0	129	6.0	61	0.8 ma.
I.F.	6.0	129	0.5	61	2.0 ma.
2nd Det.	6,0	115	0.0	50	6.0 ma.
Output	6.0	125	11.0	129	6.0 ma.

All voltages taken to chassis with A plus grounded. Detector-oscillator cathode readings taken with receiver tuned to 550 kc.

There are certain peculiarities to be found in this receiver. Two pentode tubes are used, one as the 2nd detector or demodulator and another as the output tube. The 1st detector and oscillator functions are performed by one tube. Obviously the receiver is a superheterodyne. The oscillator system and the input to the i-f system both emanate from the plate circuit of the autodyne tube. The peak frequency of the i-f system is 175 kc.

Adjusting the R.F. Padding Condensers

In order to obtain the maximum results from the radio installation, the first and second R.F. padders should be adjusted after the installation is completed.

It will be necessary to remove the front cover plate and to set up a good oscillator capable of generating a signal of approximately 1400 K.C. Connect a six foot lead to the oscillator output terminal, simply dropping it over the back of the seat, and turn on the oscillator. Turn on the receiver and tune to approximately 140 on the receiver scale. Adjust the oscillator frequency to 1400 kc When using an i-f oscillator, set it for the 175 kc. range and use the eighth harmonic. Turn on full volume on the receiver and adjust the output of the oscillator until the signal is barely audible. Tune the receiver sharply to the signal and cars and power lines, lack of signal under bridges and tunnels and in some cities, apparent fading at street crossings due to shielding by overhead cables and wires, are easy to explain to the customer and will not be construed as alibis which is likely to happen if the customer is told only after registering a complaint.

Adjusting Intermediate Frequency Stages

Remove the grid clip from the detector oscillator tube and connect the output of the oscillator to the control grid. The detector oscillator is the second tube from the right.

With the receiver and oscillator turned "on", set the oscillator for 175 kc. Adjust the oscillator attenuator so that the signal is barely audible with the receiver volume control turned on full. If the oscillator is equipped with an output meter, connect the meter and adjust the attenuator so that a half scale reading is obtained. Using a Philco No. 3164 fibre wrench, adjust the second i-f condenser. This is numbered twenty-five on the schematic and chassis view. The correct adjustment is obtained when the strongest signal is heard in the speaker or the maximum reading is secured on the meter.

Next adjust the secondary and primary i-f condensers, nineteen and twelve respectively. Disconnect the oscillator and reconnect the clip to the control grid.

High Frequency Compensator

Connect the output of the oscillator to the antenna lead and the housing of the receiver. With the receiver turned on and the oscillator set for 175 kc., tune the receiver to 1400 kc., the eighth harmonic of 175 kc., and adjust the third padder on the tuning condenser for maximum signal. This is the one on the extreme left of the housing. The purpose of this adjustment is to line up the condenser so that 1400 kc., is tuned in at 140 on the scale when the scale is set properly.

It may be necessary to adjust the first two compensators on the tuning condensers at 1400 kc., in order to get a strong enough signal through.

R.F. Compensators

After the detector oscillator has been padded at 1400 kc., adjust the first and second R.F. Condensers on tuning condenser at 1400 kc.

Low Frequency Condenser

Now tune the receiver to 700 kc. and adjust the condenser fourteen. During this operation the tuning condenser must be shifted and the compensators must be adjusted to bring in the maximum signal.

After this has been done, check the adjustment of the high frequency condenser at 1400 kc again.

then adjust the first r-f padder. This is the one mounted to the extreme right on the condenser housing. Adjust this for maximum signal and then proceed with the second padder, the one in the center. Use only the standard fibre padding wrench. Replace the front panel and the adjustment is completed.

Servicing

A great number of the demands for service made by the car owners will be imaginary and can be traced largely to ignorance of what is to be expected from automobile radio.

MODELS 8,12 Schematic Resistor Data
MODEL EA Schematic

PHILCO RADIO & TELEVISION CORP.

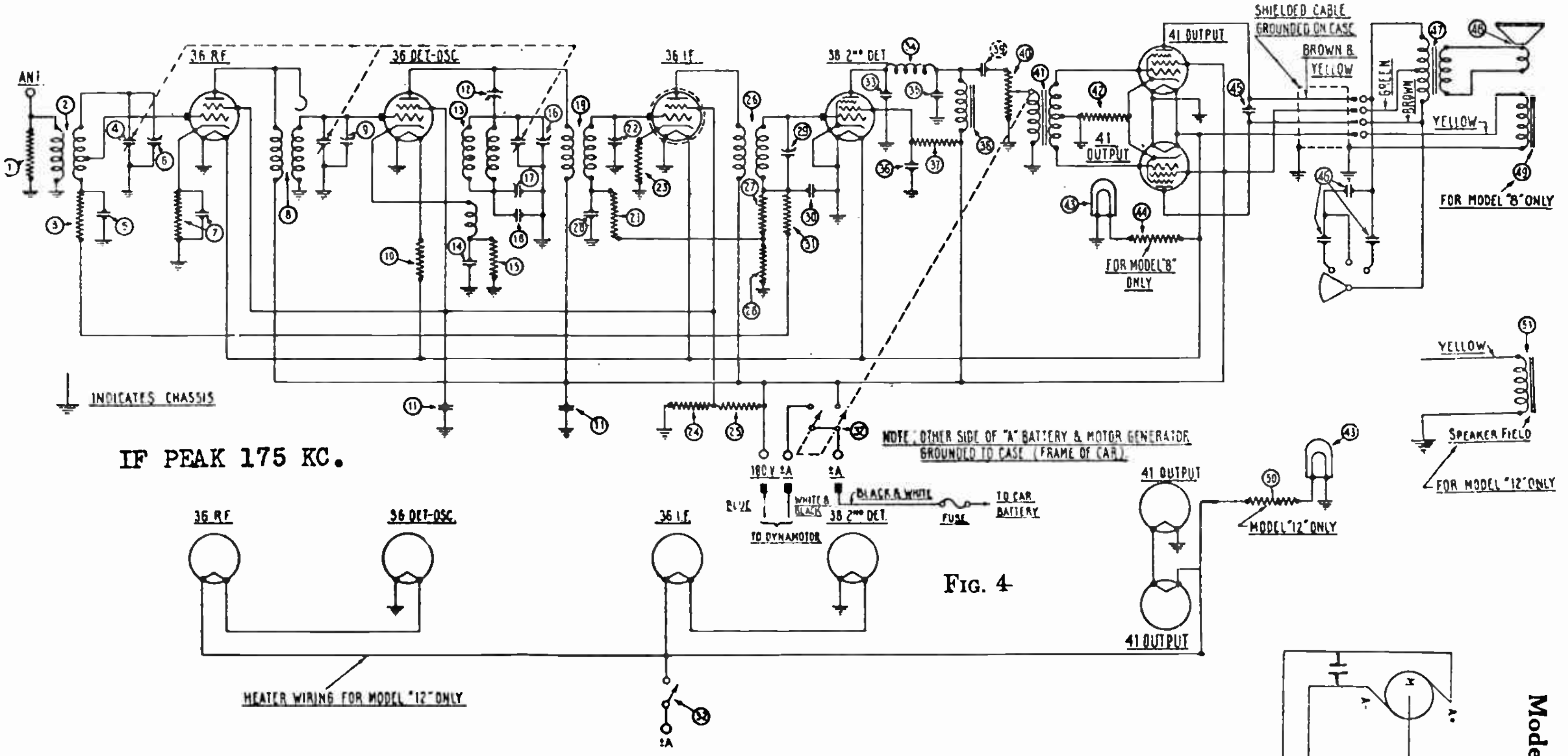


FIG. 4

Model EA Dynamotor Wiring Diagram

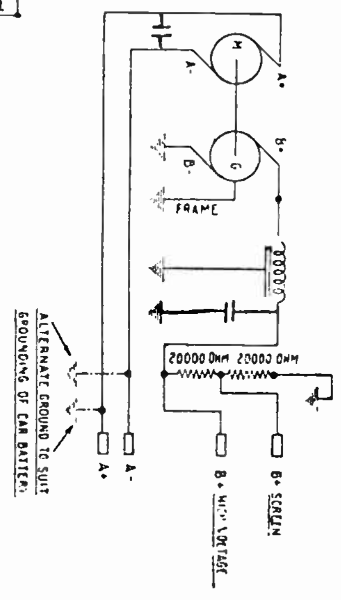


FIG. 2

Table 1—Resistor Data

Nos. on Figs. 3 and 5	Nos. on Figs. 4 and 6	Resistance (Ohms)	Color: Body	Tip	Dot
48	10	2.7		wire resistor	
38	44	7		" "	
..	50	30		" "	
21	..	225		" "	
..	23 7	500		" "	
36	42	700		" "	
1 11	1 15	5,000	Green	Black	Red
..	24 25	20,000	Red	Black	Orange
31	37	50,000	Green	Black	Orange
3 23 24	3 27 28	99,000	White	White	Orange
20 26	21 31	490,000	Yellow	White	Yellow

PHILCO RADIO & TELEVISION CORP.

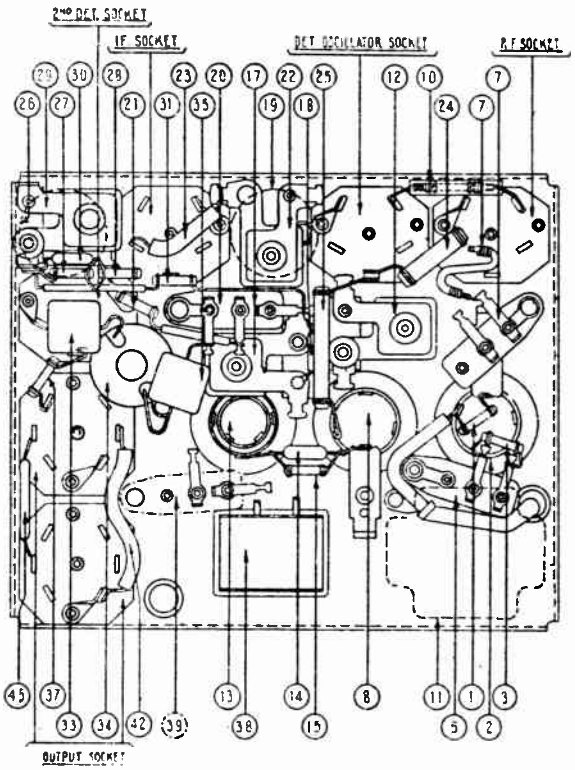
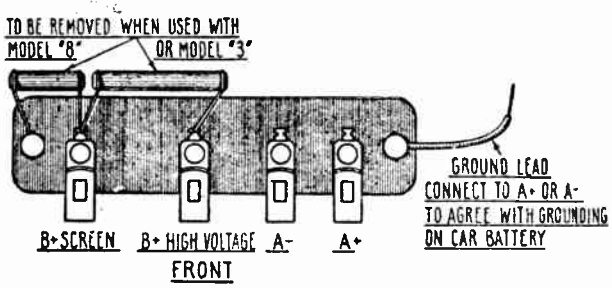


FIG. 6—**Models 8 and 12**—Chassis

Model EA Terminal Arrangement



Special Adjustments—In order to render proficient service, the installation station must be able to make the proper adjustments to the Receivers whenever they are needed. This is impossible without the use of a good service oscillator. The best and most economical oscillator for this work is the Philco Oscillator, Model 095. Complete information and instructions for its use can be had on request from your Philco Transitone distributor or from the service department at the factory.

The adjustments should be made as follows:

Intermediate Frequency or I. F. Stages—Remove the grid clip from the detector oscillator tube and connect the output of the oscillator to the control grid. The detector oscillator is the second tube from the right.

With the Receiver and oscillator turned "on", set the oscillator for 175 K. C. Adjust the oscillator attenuator so that the signal is barely audible with the Receiver volume control turned on full. If the oscillator is equipped with an output meter, connect the meter and adjust the attenuator so that a half scale reading is obtained.

Using a Philco 3164 fibre wrench, adjust the second I.F. condenser. This is numbered (25) on figs. 3 and 5 and (29) on figs. 4 and 6.

The correct adjustment is obtained when the strongest signal is heard in the speaker or the maximum reading is secured on the meter.

Next adjust the secondary and primary I.F. condensers. These are (19) and (12) respectively on figs. 3 and 5 and (22) and (12) on figs. 4 and 6.

Disconnect the oscillator and reconnect the clip to the control grid.

High Frequency Compensator—Connect the output of the oscillator to the antenna lead and the housing of the Receiver. With the Receiver turned on and the oscillator set for 175 K. C., tune the Receiver to 1400 K. C., the eighth harmonic of 175 K. C., and adjust the third padder on the tuning condenser for maximum signal. This is the one on the extreme left of the housing. The purpose of this adjustment is to line up the condenser so that 1400 K. C. is tuned in at 140 on the scale when the scale is set properly.

It may be necessary to adjust the first two compensators on the tuning condensers at 1400 K. C., in order to get a strong enough signal through.

R. F. Compensators—After the detector oscillator has been padded at 1400 K. C., adjust the first and second R. F. Condensers on tuning condenser at 1400 K. C.

Low Frequency Condenser—Now tune the Receiver to 700 K. C. and adjust the condenser (14) on figs. 3 and 5 and (17) on figs. 4 and 6. During this operation the tuning condenser must be shifted and the compensators must be adjusted to bring in the maximum signal.

After this has been done, check the adjustment of the high frequency condenser at 1400 K. C. again.

PHILCO RADIO & TELEVISION CORP.

MODELS 8,12
Condenser Data
MODEL EA
Data

Table 2—Condenser Data

Nos. on Figs. 3 and 5	Nos. on Figs. 4 and 6	Capacity (Mfd.)	Color
23	30	.00025	Yellow
10, 15	14, 18	.0007	White and Yellow
28, 34		.001	Green and White
. .	33, 35	.00125	Blue and Orange
37	45	.002	Blue
33	39	.01	Black Bakelite
4, 18	5, 7, 20	.05	Black Bakelite
29	36	.25	Metal Can
. .	11	.25, .5	Metal Can
	See Note 1	.25, .25, .5	Metal Can
16	. .	.25, .5, 20.0	Metal Can

Dynamotor—The Model EA Dynamotor is supplied as standard equipment with all Model 8 Receivers and the Model EC with the Model 12 Receivers. The Model 7 will be furnished with the Model EA Dynamotor in place of batteries when specified, or the Model EA can be ordered as a replacement unit for the Model 3 and Model 7 Receivers sold previously with batteries. The Model EA is for operation on 6 volt battery systems; the Model EC on 12 volt battery systems.

The dynamotor housing or box can be conveniently located in the floor of the car. Simply cut a hole 6⅛ by 8⁷⁄₁₆ inches in the floor and drop the box in place from the top. Fasten the flange to the floor by means of screws or bolts.

It will be necessary to drill a hole in the end of the box for the battery cable. The tapered rubber bushing must be used over the hole to make it water-proof.

When used with the Model 8 Receiver, remove the two small fixed resistors at the left end of the terminal panel.

Connect the white-black lead to the "A" terminal on the dynamotor that corresponds with the live (non-grounded) side of the car battery. The ground lead on the dynamotor must be connected to the remaining "A" terminal. The cable shield must also be connected to this terminal.

Connect the blue lead to the "B+" High Voltage terminal. The dynamotor box must be grounded securely to the frame of the car by means of a heavy copper braid.

When the Model EA is used with the Model 3 Philco Transitone Receiver, remove the two resistors at the left end of the panel. The ground lead from the filter condenser must be removed from the ground terminal and must be spliced out and connected to the B+ Screen terminal.

The "B—" lead, the black lead which is grounded at the rear end of the dynamotor, must be removed from ground and must be spliced out and connected to the B+ Screen terminal also. This terminal now becomes "B—". Connect the blue-white lead to B+ High Voltage terminal and the green-white to B+ Screen terminal.

The relay switch must be used to control the dynamotor. With the relay in the same position as described above, the middle terminal must be connected to the car battery through a 15 amp. fuse. The terminal on the right must be connected to the "A" terminal on the dynamotor that corresponds with the live (non-grounded) side of the car battery. The remaining terminal on the left must be connected to the black-white lead of the battery cable. The relay should be mounted on the frame of the car near the battery. The ground connection on the dynamotor and the shield on the cable must be connected to the other "A" terminal.

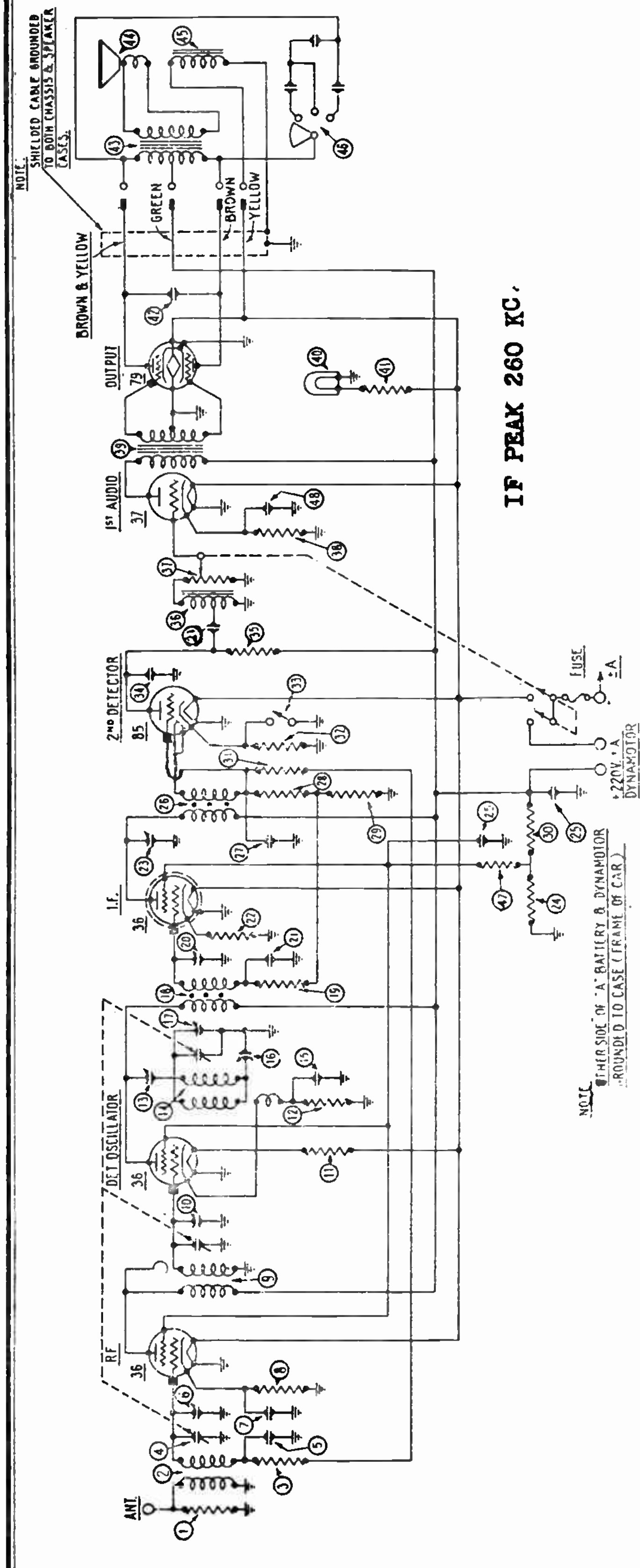
The dynamotor box must be grounded to the frame of the car by means of a heavy copper braid.

The Model EC Philco Transitone dynamotor must be used only on a 12 volt battery system.

Connect the white-black lead to the "A" terminal on the dynamotor that corresponds with the live (non-grounded) side of the car battery. The ground lead on the dynamotor must be connected to the remaining "A" terminal. The cable shield must also be connected to this terminal.

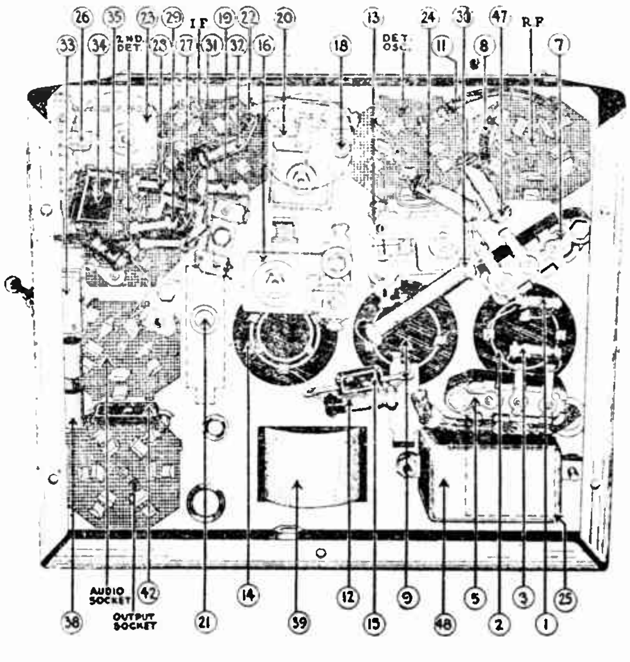
MODEL 9
Transitone

PHILCO RADIO & TELEVISION CORP.



PARTS LIST

No. in Figs. 1 and 2	Description	Part No.
1	Resistor (5,000 ohm)	6036
2	Antenna Coil	06574
3	Resistor (100,000 ohm)	6099
4	Tuning Condenser	04308
5	By-pass Condenser (.05 mfd.)	3615-AN
6	Compensator section on tuning condenser	...
7	By-pass Condenser	3615-AY
8	Resistor (500 ohm)	6977
9	R. F. Transformer	05902
10	Compensator section on tuning condenser	..
11	Resistor (2.7 ohm)	6511
12	Resistor (6,000 ohm)	7352
13	Compensator	04000-A
14	Oscillator Coil	05975
15	Condenser (.0007 mfd.)	4520
16	Compensating Cond.	04000-S
17	Compensator section on tuning condenser	..
18	First I. F. Transformer	05970
19	Resistor (500,000 ohm)	6097
20	Compensating Cond.	04000-D
21	Condenser (.05 mfd., .15 mfd.)	06091
22	Resistor (500 ohm)	6977
23	Compensating Cond.	04000-D
24	Resistor (20,000 ohm)	6650
25	Condenser (.5 mfd., .25 mfd.)	06088
26	Second I. F. Transformer	05901
27	Condenser (.00025 mfd.)	2982
28	Resistor (100,000 ohm)	6099
29	Resistor (100,000 ohm)	6099
30	Resistor (20,000 ohm)	6649
31	Resistor (500,000 ohm)	6097
32	Resistor (5,000 ohm)	6096
33	Switch	5462
34	Condenser (.00125 mfd.)	5886
35	Resistor (50,000 ohm)	4518
36	Audio Transformer	7752
37	Volume Control	7525
38	Resistor (2,500 ohm)	7775
39	Input Transformer	7652
40	Pilot Lamp	4567
41	Resistor (7 ohm)	5110
42	Condenser (.06 mfd.)	6259
43	Output Transformer	2515
44	Speaker Coil and Cone	02823
45	Speaker Field Pot	02795
46	Tone Control	05366
47	Resistor (25,000 ohm)	4516
48	Condenser	7774
	Complete Speaker Assembly (Model 6)	A-4
	Complete Speaker Assembly (Model 7)	A-4
	Complete Speaker Assembly (Model 8)	A-5
	Complete Speaker Assembly (Model 9)	A-7
	Complete Speaker Assembly (Model 12)	A-6
	Complete Speaker Assembly (Model B-6)	A-8
	Interstage Shield	05910
	Dynamotor ED	06084
	Dynamotor EA (for battery replacements)	05385
	Receiver Studs	6122
	Shielded Loom (18" high tension shield)	L-1387
	Shielded Loom (30" high tension shield)	L-1386
	Spark Plug Resistor	4531
	Distributor Resistor	4546
	Screw Type Resistor	4851
	Interference Condensers	4522
	Knobs	5166
	Speaker Extension Cables	02984
	Dynamotor Filter Choke	6658
	Dynamotor Filter Condenser (large unit)	05386
	Dynamotor Filter Condenser (small unit)	05724
	Dynamotor RF Choke	05723
	Battery Cable	05419-D
	18" Volume Control Shaft	6351
	18" Tuning Control Shaft	6352
	32" Volume Control Shaft	6128
	32" Tuning Control Shaft	6129
	48" Volume Control Shaft	6298
	48" Tuning Control Shaft	6299
	120" Volume Control Shaft	6355
	120" Tuning Control Shaft	6356
	Philco Oscillator (for adjusting Models 3, 6, 7, 8, 9)	1095
	Fibre Wrench	3164



REPLACING SPEAKER CONES—MODEL 5, 6 AND 9 RECEIVERS

THE Model 5 Receiver uses the P-11 Speaker. Normally, the cone, Part No. 36-3027, is cemented to the frame of the speaker (see Fig. 1). A cardboard spacer, No. 27-7098, not shown in the sketch, is placed between the speaker and the receiver panel to which it is fastened to prevent the frame from being warped by the speaker mounting screws.

To replace the cone of the P-11 speaker, disconnect the voice coil leads, remove the centering screw and remove the cone from the frame.

discontinued and the cone is now cemented to the speaker frame (Fig. 1). The replacement cone is No. 36-3020. It will be necessary to remove the cone and scrape the cement and cone edge from the speaker frame.

Make three spacers from regular bond letterhead paper. The spacers should be ten inches long and one-eighth inch wide. Fold each one sharply in the middle. This will then make spacers approximately .008 inch thick and 5 inches long. Place the paper spacers in the armature at right angles to prevent falling in (see Fig. 3).

Spread an even coat of Duco household cement over the face of the speaker frame. Set the cone in place with the voice coil in the armature gap. The paper spacers

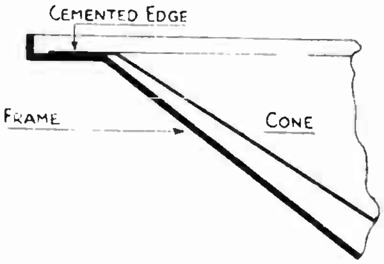


FIG. 1

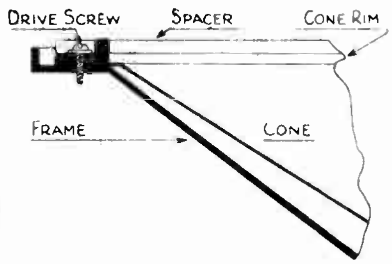


FIG. 2

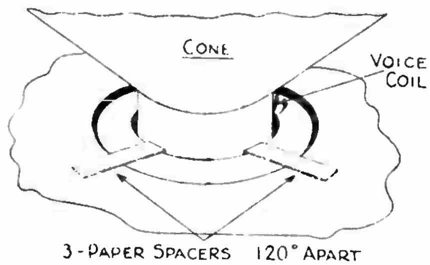


FIG. 3

The proper replacement cone is the No. 02861 cone, which has a cardboard rim. This must be fastened to the speaker frame by means of six W-451 washer head-drive screws. The holes for the drive screws are provided in the speaker frame. After tightening the drive screws and the centering screw, a cardboard spacer, No. 27-7178, must be placed between the speaker and the receiver panel to which it fastens (see Fig. 2). There are cutouts in the 27-7178 spacer for the washer head screws.

The cones in the Models 6 and 9 speakers were formerly held in place by a rim and clamp. This has been

will insure proper clearance for the voice coil on all sides. Tighten the centering screw and firmly press down the edges of the cone, so that they will be cemented securely. Allow the cement to dry thoroughly and remove the paper spacers.

Part No.		*List Price*
02861	Cone (Model 5)	$0.60
27-7178	Cardboard spacer	.03
36-3020	Cone (Models 6 and 9)	.40
W-451	Washer head drive screws	1.20/C

MODEL 5 ADJUSTMENTS

Become thoroughly familiar with the adjustment procedure and the location of the padding condensers before starting to adjust a Model 5 Receiver.

Furthermore, don't attempt to make the adjustments using a make-shift oscillator. The modern radio depends on critically tuned circuits for its exceptional performance. It is nothing short of gross carelessness to try to adjust these delicately tuned circuits using unstable oscillators which are incapable of being calibrated accurately.

Use a Philco 095 oscillator, or if your service department is fortunate enough to have one, the new Philco Signal Generator 048.

NOTE.—United Motors Service Stations, see U. M. S. Service Manual.

The intermediate frequency used is 460 K. C. Set up the oscillator or signal generator for this frequency.

Disconnect the grid lead from the 6A7 tube. Then connect the test lead to the grid of this tube and ground the shield on the Receiver housing. Use the fibre adjusting wrench 3164 for all adjustments.

Padder 10. Turn the adjusting nut in until tight. Then back off one full turn. Leave this condenser in this position until the last step.

Padder 11. This is the first I. F. primary condenser. With the Receiver and oscillator turned on and the oscillator set for 460 K. C., turn the Receiver volume control on full and adjust the oscillator attenuator. Then adjust the padder for maximum signal in the loud speaker.

Padder 13. This is the first I. F. secondary condenser. Adjust the attenuator so that the signal is barely audible. This should be repeated with each adjustment if necessary. Adjust the padder for maximum signal in the loud speaker. Repeat this procedure in the next two adjustments.

Padder 17. This is the second I. F. primary condenser.

Padder 20. This is the second I. F. secondary condenser.

Remove the oscillator connections from the 6A7 tube and reconnect the Receiver grid lead to this tube. The oscillator setting must now be changed to 1500 K. C.

The Receiver volume control must be turned on full, the oscillator lead connected to the antenna lead-in and the shield to the Receiver housing. To obtain the correct setting of the tuning condenser, open the plates as wide as possible. Place a piece of paper on the stator plates and then turn the rotor in until it strikes the paper.

Oscillator padder. This is the padder on the second section of the tuning condenser (section nearest drive mechanism). Adjust for maximum signal.

Antenna Padder. This is the remaining padder on the tuning condenser. Remove the paper from the tuning condenser and set the condenser and oscillator for 1400 K. C. Adjust the padder for maximum signal.

Low Frequency Padder 10. Set the oscillator for 600 K. C. and tune the Receiver to this frequency. Adjust the padder for maximum signal. After completing these operations, repad the antenna padder at 1400 K. C.

MODEL Transitone
Service Data

PHILCO RADIO & TELEVISION CORP.

Be Sure You Know How To Do This

The intermediate frequency of the Model 6 is 260 K.C. This is a departure from the frequency used in the Model 7 and 8 Receivers. All dealers and installation stations must be equipped with a suitable oscillator capable of producing accurately a 175 K.C. signal for the Models 7 and 8 and 260 K.C. for the Model 6.

Philco's oscillator, Model 095, priced at $28.50 net to the dealers and service stations, is the ideal oscillator for such work and can be ordered direct from your distributor.

I. F. Stages

Remove the grid clip from the detector oscillator tube and connect the output of the oscillator to the control grid. The detector oscillator is the second tube from the right.

With the Receiver and oscillator turned "on," set the oscillator for 260 K.C. and adjust the oscillator attenuator so that the signal is barely audible with the Receiver volume control turned on full. If the oscillator is equipped with an output meter, connect the meter and adjust the attenuator so that a half scale reading is obtained.

Using a Philco 3164 fibre wrench, adjust the second I. F. condenser. This is numbered (23).

The correct adjustment is obtained when the strongest signal is heard in the speaker or the maximum reading is secured on the meter.

Next adjust the secondary and primary I. F. condensers. These are (20) and (13), respectively.

Disconnect the oscillator and reconnect the clip to the control grid.

High Frequency Compensators

Connect the output of the oscillator to the antenna lead and the housing of the Receiver. With the Receiver turned on and the oscillator set for 175 K.C., tune the Receiver to 1400 K.C., the eighth harmonic of 175 K.C., and adjust the third padder on the tuning condenser for maximum signal. This is the one on the extreme left of the housing. The purpose of this adjustment is to line up the condenser so that 1400 K.C. is tuned in at 140 on the scale when the scale is set properly.

It may be necessary to adjust the first two compensators on the tuning condensers at 1400 K.C. in order to get a strong enough signal through.

R. F. Compensators

After the detector oscillator has been padded at 1400 K.C., adjust the first and second R. F. Condensers on tuning condenser at 1400 K.C.

Low Frequency Compensator

Now tune the Receiver to 700 K.C. and adjust the condenser (16). During this operation the tuning condenser must be shifted and the compensator must be adjusted to bring in the maximum signal.

After this has been done, check the adjustment of the high frequency condenser at 1400 K.C. again.

IMPORTANT.—MODEL 9 CHANGES.

Description	New Part No. replacing Old Part No.		Schematic and Base View No
Dial	8255	6043	
Padder	04000-X	04000-D	(20)
Padder	04000-J	04000-A	(13)
Resistor (13,000 ohm)	8267	7352	(12)
Antenna Coil	16914	06574	(2)
R. F. Transformer	06915	05902	(9)
Oscillator Coil	06916	05975	(14)
I. F. Transformer	06932	05901	(26)
Resistor (8,000 ohm)	8255	(Connected between terminal panel near (19) and B+ terminal of (9).	

USING THE EA DYNAMOTOR

Many Dealers and Service Stations have built up a profitable business selling and installing the EA Dynamotor for replacing "B" batteries and other power devices. A bit skeptical at first, they soon realized the market for this dynamotor and since then, repeat orders have come in, in nice volume. Intended primarily for use with the Model 3 and Model 7 as a battery replacement, service men have been quick to adapt it to all other makes of battery operated car radio.

The installation instruction label is pasted to the inside bottom of the dynamotor housing, where it can be seen by anyone making the installation. It is vitally important that these instructions be carried out in detail.

Since the EA was first placed on the market, an additional filter condenser has been placed on the "B+" lead. This condenser, 3615-AZ, is mounted on the base at the rear of the dynamotor. When one of the EA dynamotors equipped with this condenser is installed with the Model 3 Philco Transitone or any radio in which "B—" is not grounded, this additional change must be made:

> Remove the mounting screw from the 3516-AZ condenser. Bend up the ground terminal which normally is grounded by the mounting screw. Replace the mounting screw and be sure that the old ground terminal does not make contact with the screw. This is important.
>
> The "B—" lead, the black lead coming from the rear of the dynamotor, which is connected to the ground terminal on the base, must be disconnected from the ground terminal and connected to the new terminal on the 3615-AZ.
>
> The "B—" terminal on the condenser must then be connected to the "B—" terminal on the terminal panel. This was formerly the "B+" screen terminal.

This additional change must be made on all Model EA dynamotors having the 3615-AZ condenser connected to "B+" when using the dynamotor with a Model 3 or any other Receiver with a non-grounded "B—", otherwise it will be impossible to clear up the dynamotor hum.

MODEL EG VIBRATOR

The Model EF Vibrator is a part of the Model 61 Receiver. Its counterpart for "B" battery replacement service is the Model EG Vibrator. Instead of being connected with a cable and plug, it is equipped with a terminal panel for easy installation.

When used as a replacement unit for "B" batteries, simply install in the old "B" battery box or in any place that is convenient and where the Vibrator will not be exposed to water and dirt. The installation is easy, but at the same time permanent.

Simplicity in construction insures freedom from trouble and efficient operation. Cut disc tungsten points eliminate any possibility of troubles from contacts. Full wave rectification with the 84 rectifier tube developed especially for this type of service is used to give a smooth flow of power. Complete filtering eliminates all hum.

The terminal panel provides for the following connections:

A ± terminal for control, connecting to the control relay.

+B terminal, 180 volts to 200 volts for the "B" lead to the Receiver.

INT +B terminal, an intermediate voltage for Receivers requiring a tap voltage.

—B terminal, for Receivers requiring this lead. Normally it is not grounded. This, however, can be accomplished by strapping to the GND terminal.

GND terminal for grounding the chassis.

Complete instructions for installing are packed with each Vibrator.

PHILCO RADIO & TELEVISION CORP.

MODEL 5 CHANGES

THE schematic—Fig. 4 shows a portion of the Model 5 circuit with the latest changes.

The 78-tube cathode resistor has been changed from 1000 ohms to 500 ohms, a 1,500,000-ohm resistor has been added in the A. V. C. return lead to the control grids of the first and second tubes. The network and volume control circuits in the combined second detector and audio stages have been changed about.

Two other resistors, not shown, have also been changed. Resistor ⑥ in the Model 5 schematic (April "Service Broadcast") has been changed from 13,000 ohms to 25,000 ohms and resistor ⑯ has been changed from 10,000 ohms to 15,000 ohms.

The I. F. transformer ⑲ retains the same part number, but due to certain construction changes, is now marked on the bracket with yellow paint.

Fig. 5 shows the changes made in the vibrator section of the Model 5. The 200-ohm resistor ㊶ in the old schematic has been removed from across the vibrator contacts. An .05 mfd. condenser will be added to the driver contact spring to remove vibrator interference which may be picked up due to the increased sensitivity of the receiver. The thirty-turn choke, while not shown in the schematic as a part, is still used in wiring the receiver. Fig. 5 also shows a correction to the schematic in the April "Service Broadcast." The "A" lead to the "A" circuit of the receiver should be connected at the switch ahead of the "A" choke instead of being connected as shown in the earlier schematic.

The speaker in the Model 5 is now enclosed in a fabric bag, which completely covers the rear of the speaker. This prevents iron cuttings and filings from lodging in the armature gap and causing rattles and buzzes.

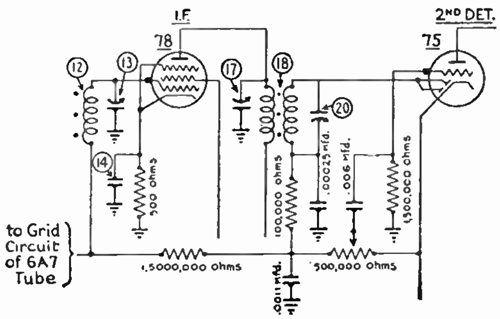


FIG. 4

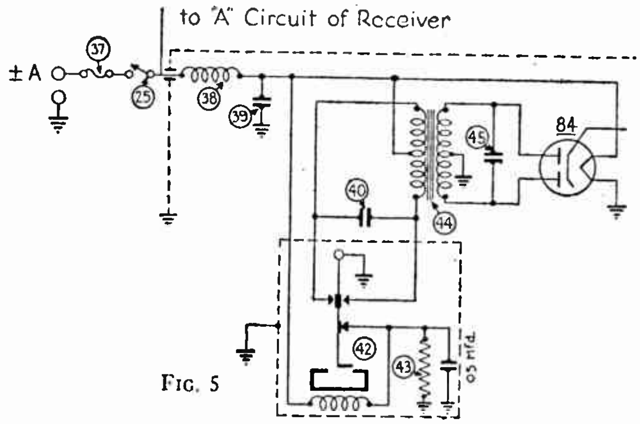


FIG. 5

MODEL 5 IMPROVEMENTS

ON some of the early Model 5 Receivers a frying or crackling noise may have been experienced. In some cases it has been blamed on the vibrators and in others on the 6A7 tube. If there are any Model 5 Receivers held up in the service shop on account of a complaint of this nature, they can easily and quickly be corrected and put back into service.

Remove the grid clip from the grid cap of the 6A7 tube and remove the grid lead from the clip. Using a stranded wire (same size as the grid lead), connect it to the grid clip and wind five turns of wire around the clip. Then splice and solder to the grid lead. Reconnect the clip to the cap on the tube. This makes an R. F. choke of just the proper size, which will eliminate practically all such complaints if they occur.

For the more obstinate cases, wind thirty turns of No. 16 solid, cotton-covered copper wire around a lead pencil. Withdrawing the pencil leaves an air-core choke, which must be installed in the "A" lead between the low-voltage R. F. choke and the heater terminal of the 84 tube. Keep the choke in the vibrator section of the base

Solder and tape the splices to prevent further trouble. The factory is installing these chokes in all Model 5 Receivers.

A visual examination of one of the latest Model 5 Receivers will give a better idea of these changes.

INSTALLING THE MODEL 5

1. Use the best antenna that it is possible to install in the car.

2. Use as little shielded antenna lead as possible.

3. After installing the Model 5 in the car and making all connections, the antenna stage should be padded to the car antenna.

Tune in a weak broadcast signal between 120 and 150 on the dial and adjust the padder on the condenser section that is adjacent to the side of the housing. Adjust the padder until the maximum signal is heard in the speaker. If no broadcast signal of the proper frequency is available, set up an oscillator or signal generator inside the car and adjust it to 1400 K. C. A six-foot lead should be connected to the oscillator to radiate the test signal. Then adjust the padder, using the standard Philco padding wrench No. 3164.

The factory is now putting a special hole in the lid of the Model 5, just to make it easier to pad this stage.

Insist on the best top antenna possible in each car. With a good antenna and the antenna stage properly padded, you will notice a big improvement in the Model 5 performance.

A SERVICE PRECAUTION

The speaker cable should be dressed toward the vibrator end of the housing. The condenser plates should be fully meshed, so that they cannot be bent out of alignment by the speaker field or cable.

MODEL 10
Transitone
Service Notes
Chassis Layout

PHILCO RADIO & TELEVISION CORP.

MODEL 10 RECEIVER

THE MODEL 10 represents the latest developments in single-unit automobile radio. Compact and easy to install, its performance is amazing.

A superheterodyne, using six of the latest tubes designed for automobile radio, it has a tremendous power output and is equipped with a full-size electro dynamic speaker, the same type as used in high-priced home radio Receivers.

Four-point tone control is provided to satisfy the individual preference. Greater sensitivity, a three-section tuning condenser giving improved selectivity and fidelity, inherently quiet circuits and all the other improvements, make this model the outstanding automobile radio.

Added to this, the ease of installation characteristic of this model (only one unit to install, one lead to the antenna and one lead to the ammeter) makes it the most desirable one to sell, install or own.

I. F. TRANSFORMER AND PADDERS

A new style I. F. transformer complete with padders is used in the Model 10.

The padders are placed in the top of the shield can one above the other.

The primary padder is adjusted by means of the screw slot, accessible through the hole in the top of the shield can. The secondary padder is adjusted by means of the small hex nut, also accessible through the hole in the top of the shield. (See Figs. 1 and 2.)

The coil windings terminate in leads instead of terminals or lugs. The color scheme of the leads is given in Fig. 1.

If replacements are ever necessary, replace the entire coil assembly 38-5274 for the first I. F. stage and 38-5275 for the second I. F. stage. Neither the coil nor the padders will be furnished separately. Order only by the above numbers.

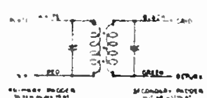


FIG. 1

MODEL 10 ADJUSTMENTS

All adjustments have been carefully checked at the factory. If, however, it is found necessary to readjust the padding condensers, this procedure must be followed carefully. Do not attempt to make any adjustments until the procedure is clearly understood or without the use of a good oscillator or signal generator and output meter. The Philco Set Tester 048 is highly recommended for this procedure and for all service work.

The Receiver must be connected to a six-volt storage battery and turned on for operation. It is assumed that tubes have been checked and that the Receiver is in good condition except for the padding adjustments.

Remove the speaker lid from the Receiver and disconnect the antenna lead from the Receiver. Remove the grid cap from the 6A7 tube (for location see Fig. 2).

Set up the signal generator and adjust it to exactly 260 K. C. Connect the generator lead to the grid cap of the 6A7 tube. (See Fig. 2.) The output meter must be connected by means of an adapter to the small prong of the speaker plug and to the chassis.

The Receiver volume control must be turned on to approximately full volume and the attenuator in the generator set for a half-scale reading of the output meter.

The padders (24) and (26) are adjusted first (Figs. 2 and 3.) Turn the adjusting screw (24) all the way in. A metal screw driver can be used for this. Then, with generator attenuator set so there is approximately half-scale reading, adjust the nut (26) with a fibre wrench for the maximum reading on the output meter.

Then adjust the screw (24) for maximum reading on the meter. This adjustment is critical. Note the maximum reading obtainable and then turn the screw in again and readjust, just bringing the adjustment up to the maximum reading. Do not pass it and then back off.

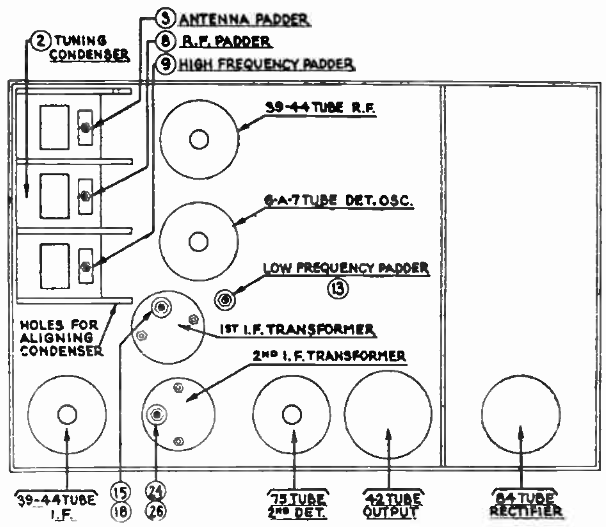


FIG. 2

Repeat the above procedure with the condensers (15) and (18).

After padding the first I. F. stage, remove the generator lead from the 6A7 tube and reconnect the grid lead to the 6A7 tube. Connect the antenna lead to the Receiver. Set the generator to 1500 K. C. and then connect the generator lead to the antenna lead.

There are four holes in line, one in each of the sections of the tuning condenser housing. (See Fig. 2.) Place a nail of the size that fits snugly through the holes and then turn the condenser plates out of mesh until they strike against the nail.

With the tuning condenser in this position adjust the

PHILCO RADIO & TELEVISION CORP.

MODEL 10
Transitone
Schematic, Chassis
Parts List

high-frequency padder (9) until the maximum reading is obtained in the output meter. This is the true setting for 1500 K. C., 150 on the dial scale

Next turn the condenser plates in mesh to 140 on the scale, 1400 K. C., and set the signal generator for 1400 K. C. The R. F. padder (8) and the antenna padder (3) are next adjusted for the maximum reading on the output meter.

Turn the condenser plates in mesh to 60 on the scale, 600 K. C., and readjust the signal generator to this frequency. Adjust the low-frequency padder (13) for the maximum meter reading.

Recheck the adjustments and then remove all test leads. If this procedure has been carefully followed and an accurately calibrated oscillator or signal generator used, the Receiver is adjusted properly.

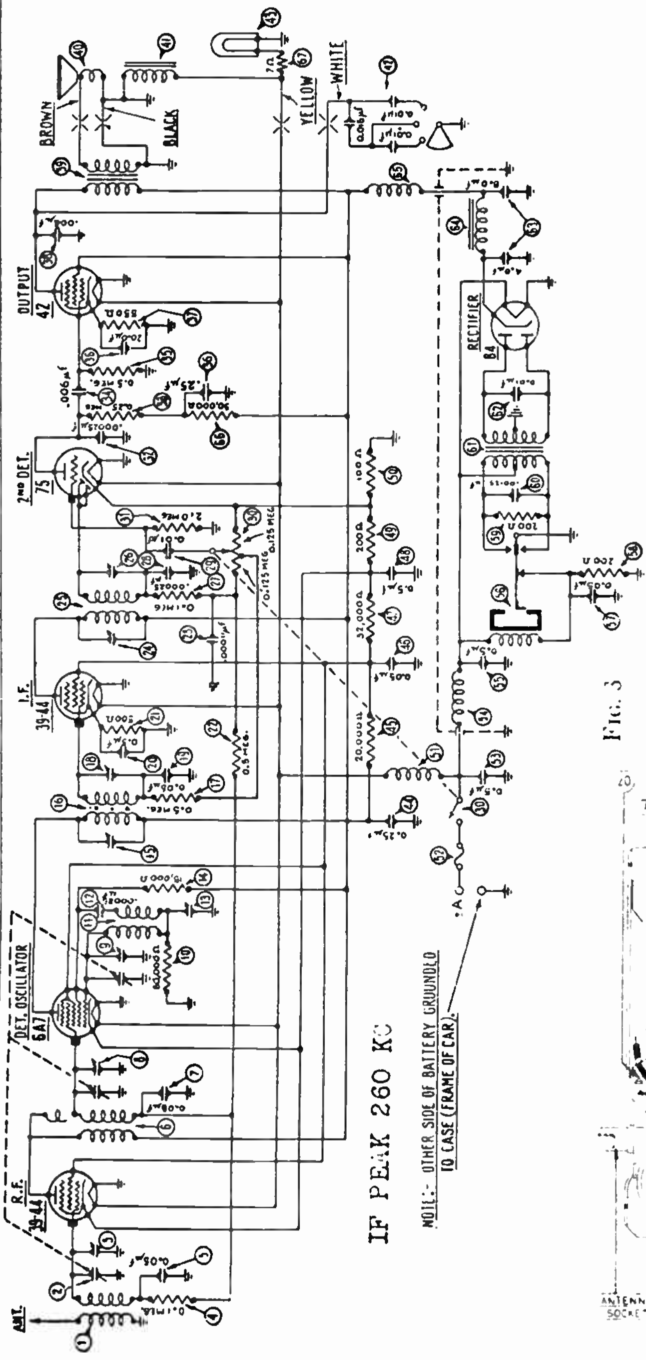


FIG. 3

MODEL 10 PARTS LIST

1	Antenna Transformer	32-1220	41	Field Coil Assembly	36-3120
2	Tuning Condenser	30-1083	42	Tone Control	30-4056
3	1st Padder (in tuning cond.)		43	Pilot Lamp	6608
4	Resistor (100,000 ohms)	6099	44	Condenser (.25 mfd.)	04360
5	Condenser (.05 mfd.)	30-4020	45	Resistor (20,000 ohms)	6649
6	R. F. Transformer	32-1221	46	Condenser (.05 mfd.)	30-4020
7	Condenser (.05 mfd.)	30-4020	47	Resistor (32,000 ohms)	3525
8	2nd Padder (in tuning cond.)		48	Condenser (.5 mfd.)	30-4048
9	3rd Padder (in tuning cond.)		49	Resistor (200 ohms)	7217
10	Resistor (50,000 ohms)	6098	50	Resistor (100 ohms)	7838
11	Oscillator Transformer	32-1222	51	A Choke	32-7109
12	Condenser (.00025 mfd.)	3082	52	15 Amp. Fuse	7227
13	Padder	04000S	53	Condenser (.5 mfd.)	30-4061
14	Resistor (15,000 ohms)	6208	54	Vibrator Choke	32-1235
15	Padder (prim. 1st I. F.)	31-6007	55	Condenser (.5 mfd.)	30-4061
16	I. F. Transformer (1st)	38-5274	56	Vibrator	38-5036
17	Resistor (500,000 ohms)	6097	57	Condenser (.05 mfd.)	30-4039
18	Padder (secondary 1st I. F.)	31-6007	58	Resistor (200 ohms)	7217
19	Condenser (.05 mfd.)	30-4020	59	Resistor (200 ohms)	7217
20	Condenser (.5 mfd.)	30-4058	60	Condenser (.00125 mfd.)	5886
21	Resistor (500 ohms)	6977	61	Power Transformer	32-7098
22	Resistor (500,000 ohms)	6097	62	Condenser (.01 mfd.)	30-4051
23	Condenser (.00011 mfd.)	4519	63	Filter Condenser	30-2015
24	Padder (prim. 2nd I. F.)	31-6008	64	B Chokes	32-7038
25	I. F. Transformer (2nd)	38-5275	65	R. F. Chokes	32-1078
26	Padder (secondary 2nd I. F.)	31-6008	66	Resistor (50,000 ohms)	4237
27	Resistor (100,000 ohms)	6099	67	Resistor (7 ohms)	5110
28	Condenser (.00025 mfd.)	3082		Spark Plug Resistors	4531
29	Condenser (.01 mfd.)	30-4051		Distributor Resistor	4546
30	Vol. Control Assembly	38-5280		Screw Type Resistor	4851
31	Resistor (2,000,000 ohms)	33-1025		Interference Condenser	30-4007
32	Condenser (.00025 mfd.)	5828		Dial	27-5022
33	Resistor (250,000 ohms)	3768		Studs	28-6036
34	Condenser (.006 mfd.)	30-4024		Nuts (mounting)	W55
35	Resistor (500,000 ohms)	6097		Knobs	03334
36	Condenser (20 mfd.; 25mfd.)	30-2027		Battery Cable	38-5286
37	Resistor (550 ohms)	6977		Antenna Lead	38-5161
38	Condenser (.006 mfd.)	30-4024		Control Unit Assembly	42-5056
39	Output Transformer	32-7106		Acorn Nut	W821
40	Cone and Coil	36-3020		Key	6091

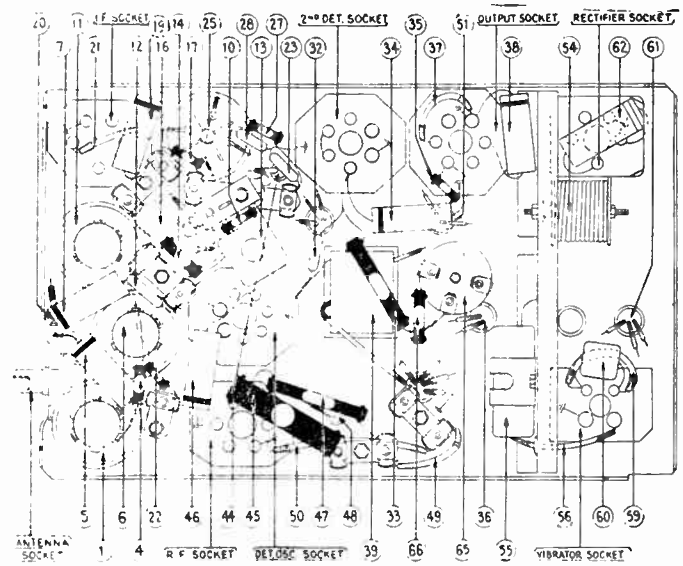
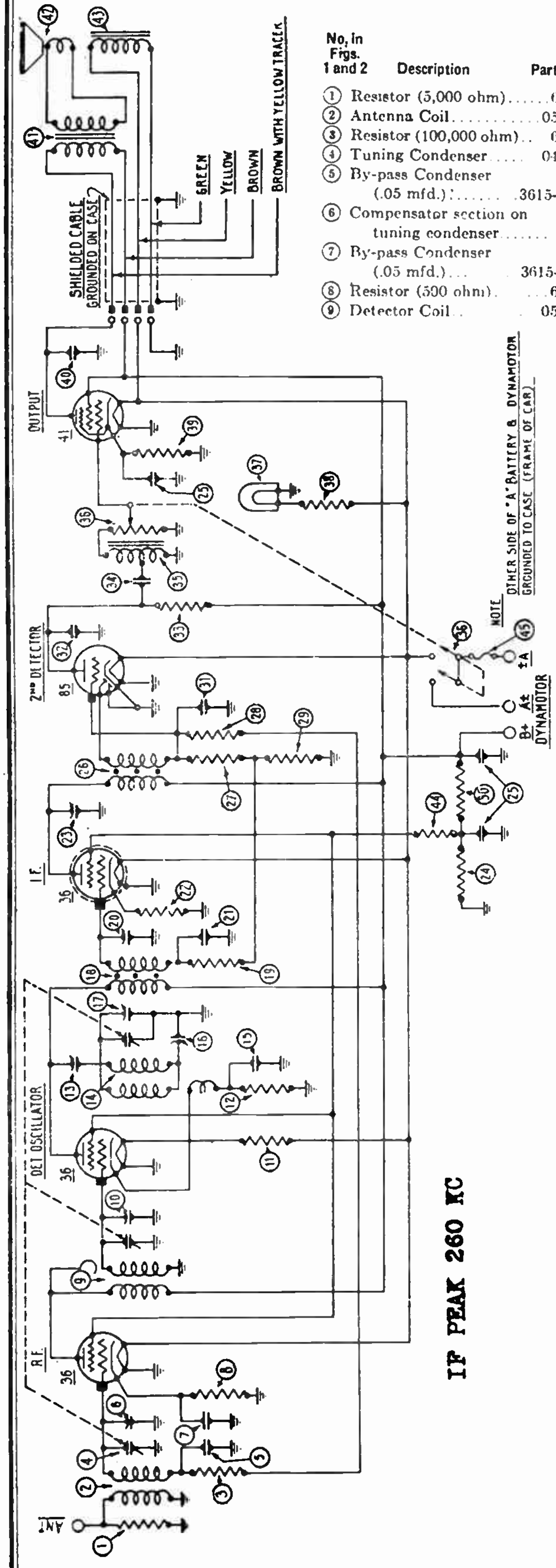


FIG. 4

PHILCO RADIO & TELEVISION CORP.

MODEL 6 Transitone

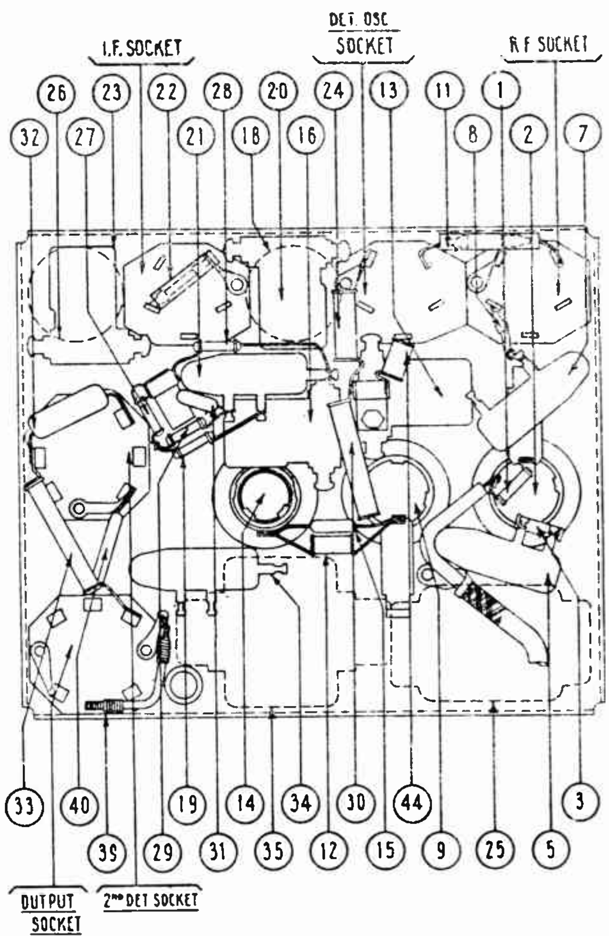


PARTS LIST

No. in Figs. 1 and 2	Description	Part No.
1	Resistor (5,000 ohm)	6096
2	Antenna Coil	05903
3	Resistor (100,000 ohm)	6099
4	Tuning Condenser	04308
5	By-pass Condenser (.05 mfd.)	3615-AN
6	Compensator section on tuning condenser	
7	By-pass Condenser (.05 mfd.)	3615-AT
8	Resistor (500 ohm)	6977
9	Detector Coil	05902

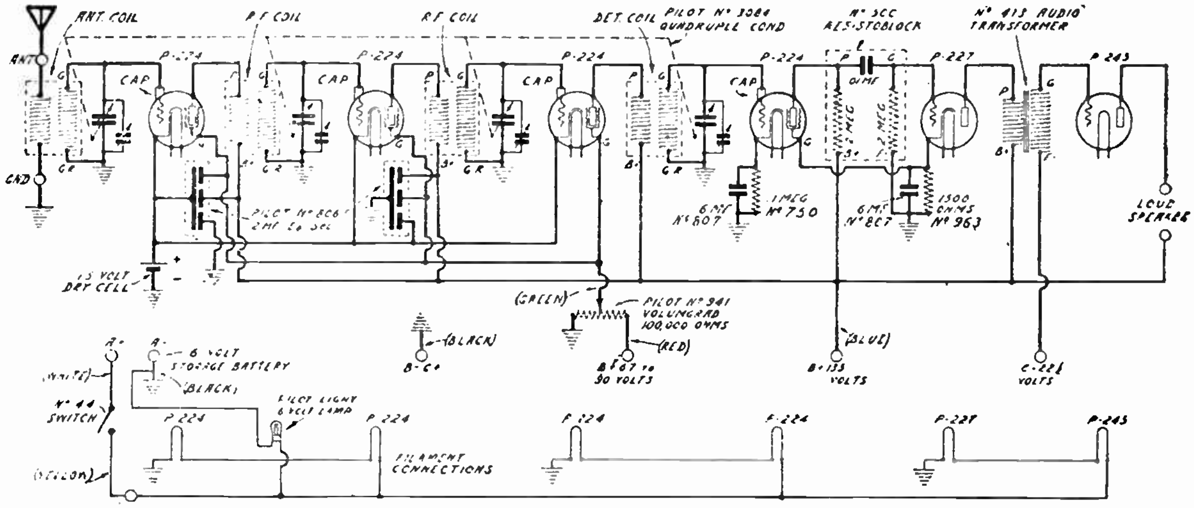
No. in Figs. 1 and 2	Description	Part No.
10	Compensator section on tuning condenser	
11	Resistor (2.7 ohm)	6511
12	Resistor (8,000 ohm)	5838
13	Compensating Cond.	04000-A
14	Oscillator Coil	05975
15	Condenser (.007 mfd.)	4520
16	Compensating Cond.	04000-S
17	Compensator section on tuning condenser	
18	First I. F. Transformer	05970
19	Resistor (500,000 ohm)	6097
20	Compensating Cond.	04000-D
21	Condenser (.05 mfd.)	3615-AK
22	Resistor (500 ohm)	6977
23	Compensating Cond.	04000-D
24	Resistor (20,000 ohm)	6650
25	Condenser (.25 mfd., .5 mfd., 8 mfd.)	04354
26	Second I. F. Transformer	05901
27	Resistor (100,000 ohm)	6099
28	Resistor (500,000 ohm)	6097
29	Resistor (100,000 ohm)	6099
30	Resistor (20,000 ohm)	6649
31	Condenser (.00025 mfd.)	3082
32	Condenser (.0002 mfd.)	4059
33	Resistor (50,000 ohm)	4237
34	Condenser (.09 mfd.)	4989-Y
35	Audio Transformer	7535
36	Volume Control (500,000 ohm) and switch	7525
37	Pilot Lamp	4567

No. in Figs. 1 and 2	Description	Part No.
38	Resistor (7 ohm)	5110
39	Resistor (700 ohm)	6443
40	Condenser (.002 mfd.)	6853
41	Output Transformer	2598
42	Cone and Coil	02823
43	Field Coil	02794
44	Resistor (25,000 ohm)	4516
	Interstage Shield	05910
	Dynamotor EB	05389
	Dynamotor EA (for battery replacements)	05388
	Receiver Studs	6122
	Shielded Loom (18" high tension shield)	L1387
	Shielded Loom (30" high tension shield)	L1386
	Spark Plug Resistor	4531
	Distributor Resistor	4546
	Screw Type Resistors	4851
	Interference Condensers	4522
	Knobs	5166
	Speaker Extension Cable	02984
	Dynamotor Filter Choke	6658
	Dynamotor Filter Condenser (large unit)	0538
	Dynamotor Filter Condenser (small unit)	05724
	Dynamotor RF Choke (small unit only)	05746
	18" Volume Control Shaft	6351
	18" Tuning Control Shaft	6352
	32" Volume Control Shaft	6128
	32" Tuning Control Shaft	6129
	48" Volume Control Shaft	6298
	48" Tuning Control Shaft	6299
	120" Volume Control Shaft	6355
	120" Tuning Control Shaft	6356
	Philco Oscillator (for adjusting Models 3, 7, 8, 6)	Model 095
	Fibre Wrench	3164

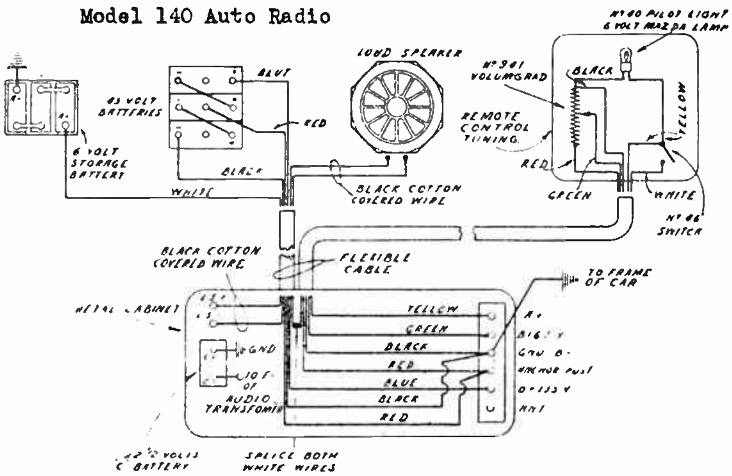


PILOT RADIO & TUBE CORP.

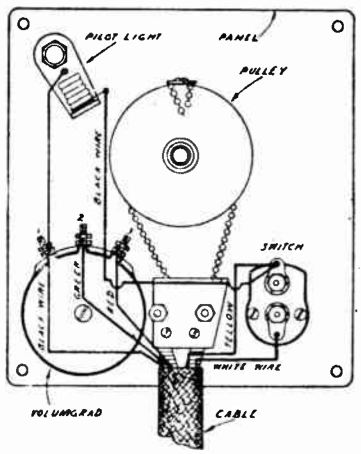
MODEL 140 Auto Radio
MODEL S.W.Converter



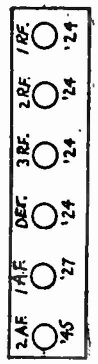
Model 140 Auto Radio

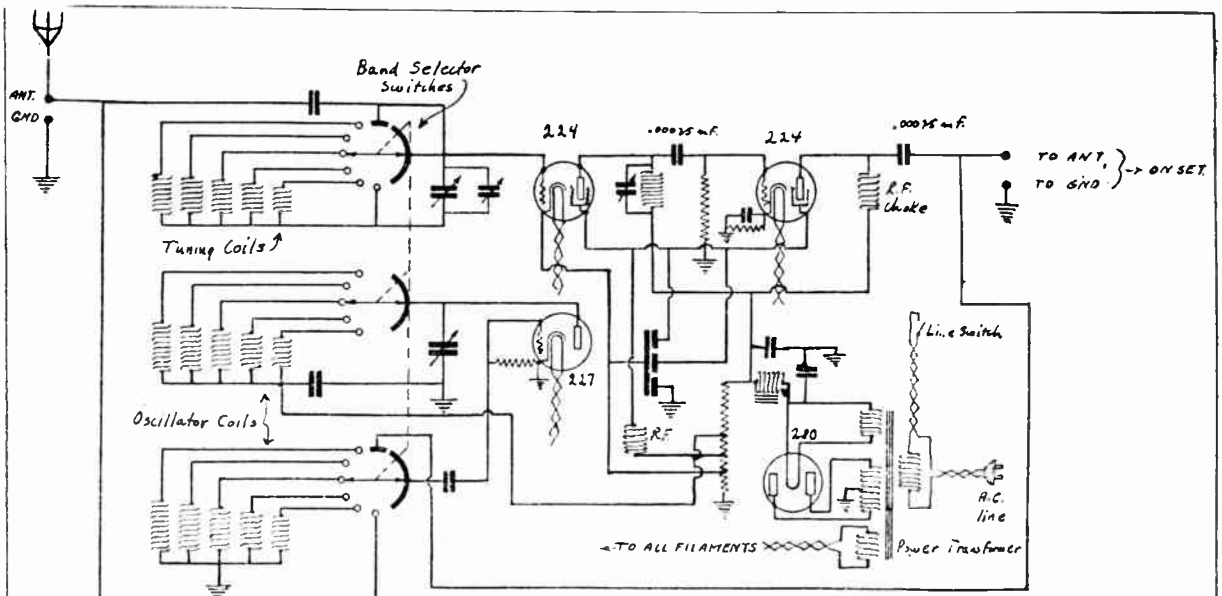


Complete diagram of connections of the "Auto Pilot," showing the receiver proper, the control panel, the loud speaker, and the "A" and "B" batteries.



The connections of the control devices in picture form.





IF PEAK 550 KC

Model S.W.Converter

AUBURN 1931

8 Cylinder

BATTERY TERMINAL GROUNDED + (Make internal change in receiver).

LOCATION OF RECEIVER—Right side under cowl close to right side of car, as high as possible.

LOCATION OF LOUDSPEAKER—Vertical center-line of loudspeaker in line with steering column, as high as possible.

LOCATION OF "B" BATTERY BOX—Under right rear floor, diagonally and close to cross-member, plug to front.

LOCATION OF ANTENNA PLATE—On right frame channel, front hanger just ahead of storage battery.

APPLICATION OF IGNITION SUPPRESSORS—
- Distributor: Splice-in type near distributor.
- Plugs: Mount vertically on plugs.

APPLICATION OF FILTER CAPACITORS—
- Generator: Fasten under outside cut-out screw, connect pigtail to inside cut-out terminal.
- Coil: Fasten under rear coil mounting nut, connect pigtail to rear coil terminal.
- Ammeter: Fasten under right upper instrument board screw, pigtail to battery terminal of ammeter.

SPECIAL NOTES—Ground cable shields to coincidental lock cable. Avoid running antenna lead-in or any cables through engine compartment. Ground antenna lead-in shield to antenna hanger stud if plate antenna is used.

BUICK 1930

40 Series

BATTERY TERMINAL GROUNDED—

LOCATION OF RECEIVER—Right side under cowl, close to right side of car and as high as possible.

LOCATION OF LOUDSPEAKER—Vertical center-line of loudspeaker 6" left of center of bulkhead and as high as possible.

LOCATION OF "B" BATTERY BOX—Under right rear floor, behind crossmember, plug to the front.

LOCATION OF ANTENNA PLATE—On right frame channel, front hanger ahead of storage battery.

APPLICATION OF IGNITION SUPPRESSORS—
- Distributor: Plug-in type.
- Plugs: Mounted at right angle to plugs under cover plate of engine.

APPLICATION OF FILTER CAPACITORS—
- Generator: Fasten under outside cut-out mounting screw. Connect pigtail to inside cut-out terminal.
- Coil: Fasten under outside coil bracket bolt, connect pigtail to outside coil terminal.
- Ammeter: Fasten under panel mounting screw below ammeter, connect pigtail to terminal giving best results.

SPECIAL NOTES—Avoid running antenna lead-in or any connecting cables through engine compartment. If roof antenna is used, lead-in should be shielded and come down right windshield column.

BUICK 50 SERIES 1932

8 Cylinder

BATTERY TERMINAL GROUNDED—

LOCATION OF RECEIVER—1" below cowl compartment and 12" from right side of car under cowl.

LOCATION OF LOUDSPEAKER—Close to left side of car under cowl, above windshield wiper tube. Tube must be bent to clear.

LOCATION OF "B" BATTERY BOX—Under right side between radius rod and frame channel, plug to the rear.

LOCATION OF ANTENNA PLATE—On left frame channel, front hanger just back of storage battery.

APPLICATION OF IGNITION SUPPRESSORS—
- Distributor: Plug-in type.
- Plugs: Splice-in type, in each plug wire near distributor.

APPLICATION OF FILTER CAPACITORS—
- Generator: Fasten under outside cut-out mounting screw, connect pigtail to inside cut-out terminal.
- Coil: Fasten under outside coil bracket bolt, connect pigtail to outside coil terminal.
- Ammeter: Fasten under bottom circuit breaker screw, connect pigtail to terminal giving best results.

line of loudspeaker in line with cowl ventilator

SPECIAL NOTES—Bend wiper tube down to clear speaker. Put tape around generator capacitor to prevent short circuit. Avoid running antenna lead-in or any connecting cables through engine compartment. There is room for "B" Battery behind rear seat back cushion in some bodies. If roof antenna is used, lead-in should be shielded and come down right windshield column. If roof antenna is used, it may be necessary to place a switch-in in the wire from the ammeter to the dome light on the lower right hand edge of instrument panel so that the dome light light is disconnected during operation.

BUICK 60 SERIES 1932

8 Cylinder

BATTERY TERMINAL GROUNDED—

LOCATION OF RECEIVER—1" below cowl compartment and ½" to right of "spark control" entrance on bulkhead under cowl.

LOCATION OF LOUDSPEAKER—Vertical center-lever when open. Lower edge of speaker even with end of lever.

LOCATION OF "B" BATTERY BOX—Battery box cannot be used. Place "B" battery sections in original packing, behind rear seat back cushion.

LOCATION OF ANTENNA PLATE—On right frame channel.

APPLICATION OF IGNITION SUPPRESSORS—
- Distributor: Plub-in type.
- Plugs: Splice-in type, in each plug wire.

APPLICATION OF FILTER CAPACITORS—
- Generator: Fasten under outside cut-out mounting screw and connect pigtail to inside cut-out terminal.
- Coil: Fasten under outside coil bracket bolt and connect pigtail to outside coil terminal.
- Ammeter: Fasten under bottom circuit breaker screw, connecting pigtail for best results.

SPECIAL NOTES—Put tape around generator capacitor to prevent short circuit. Avoid running antenna lead-in or any connecting cables through engine compartment. There is room for "B" Battery behind rear seat back cushion in some bodies. If roof antenna is used, lead-in should be shielded and come down right windshield column. If roof antenna is used it may be necessary to place a switch in the wire from the ammeter to the dome light on the lower right hand edge of instrument panel so that the dome light line may be opened during operation.

BUICK 80 SERIES 1932

8 Cylinder

BATTERY TERMINAL GROUNDED—

LOCATION OF RECEIVER—Same as 60 series.

LOCATION OF LOUDSPEAKER—Close to left side of car under cowl, bottom 2" lower than "Ride Control" rod.

LOCATION OF "B" BATTERY BOX—Same as 60 series.

LOCATION OF ANTENNA PLATE—On right frame channel, front hanger just back of battery.

APPLICATION OF IGNITION SUPPRESSORS—Same as 60 series.

APPLICATION OF FILTER CAPACITORS—
- Generator: Fasten under outside cut-out mounting screw, connect pigtail to inside cut-out terminal.
- Coil: Fasten under outside coil bracket bolt, connect pigtail to outside coil terminal.
- Ammeter: Fasten under bottom circuit breaker screw, connecting pigtail to terminal that gives best results.

SPECIAL NOTES—Same as 60 series.

BUICK 90 SERIES 1932

8 Cylinder

BATTERY TERMINAL GROUNDED—

LOCATION OF RECEIVER—Same as 60 series.

LOCATION OF LOUDSPEAKER—Close to left side of car under cowl, bottom 1½" lower than "Ride Control" rod.

LOCATION OF "B" BATTERY BOX—Under right side, between radius rod and frame channel, front hanger just back of storage battery.

APPLICATION OF IGNITION SUPPRESSORS—
- Distributor: Plug-in type.
- Plugs: Splice-in type, in each plug wire.

APPLICATION OF FILTER CAPACITORS—
- Generator: Fasten under outside cut-out mounting screw, connect pigtail to inside cut-out terminal.
- Coil: Fasten under outside coil bracket bolt, connect pigtail to outside coil terminal.
- Ammeter: Fasten under bottom circuit-breaker screw, connecting pigtail to the terminal that gives best results.

SPECIAL NOTES—Same as 60 series.

CADILLAC 1931

V-8

BATTERY TERMINAL GROUNDED + (Make internal change in receiver).

LOCATION OF RECEIVER—Close to right side of car under cowl, 7" above intersection of toe-board and bulkhead.

LOCATION OF LOUDSPEAKER—Vertical center-line of loudspeaker in line with center of bulkhead under cowl and as high as possible.

LOCATION OF "B" BATTERY BOX—Under right rear floor, behind storage battery hanger, plug to the rear.

LOCATION OF ANTENNA PLATE—On right frame channel, front hanger in line with rear end of starting motor.

APPLICATION OF IGNITION SUPPRESSORS—
- Distributor: Splice-in type,—near distributor.
- Plugs: Mounted at right angle to plugs.

APLICATION OF FILTER CAPACITORS—
- Generator: Fasten under outside cut-out mounting screw, connect pigtail to front cut-out terminal.
- Coil: Fasten under upper junction box wing nut, connect pigtail to coil wire terminal in junction box.
- Ammeter: Make hole and bolt to bottom edge of instrument panel, connect for best results.

SPECIAL NOTES—Move hole for thermometer wire 4½" to the left in bulkhead. If roof antenna is used, it may be necessary to bond to the bulkhead pipes and control rods that enter from the engine compartment. Roof antenna installed at factory, lead-in down right windshield column. Test for ground before using. Avoid running antenna lead-in or any connecting cables through engine compartment. Remove primary wire, connecting coil and junction box from secondary manifold, shield up to armor and solder thereto. Support wire along radiator brace rod with metal clamps.

CADILLAC 1931
V-12

BATTERY TERMINAL GROUNDED — (Make internal change in receiver.)

LOCATION OF RECEIVER—Close to right side of car under cowl, 6'' above intersection of toe-board and bulkhead.

LOCATION OF LOUDSPEAKER—As high as possible under cowl, between circuit breaker and gas line entrance. Stand off from bulkhead to clear gas line.

LOCATION OF "B" BATTERY BOX—Battery box cannot be used. Two strong waterproof cans each to contain two sections of "B" Battery may be constructed so as to fasten securely between the right frame channel and running board apron in front and back of running board light.

LOCATION OF ANTENNA PLATE—Do not recommend use.

APPLICATION OF IGNITION SUPPRESSORS—
Distributor: Two plug-in type.
Plugs: Splice-in type near plugs.

APPLICATION OF FILTER CAPACITORS—
Generator: Fasten under top screw of bearing plate, connect pigtail to generator terminal.
Coil: Fasten to coil clamp bolt, connect pigtail to coil terminal connected to wire from switch.
Ammeter: Make hole and bolt to bottom edge of instrument panel connecting pigtail for best results.

SPECIAL NOTES—Roof antenna installed at factory, lead-in down right windshield column. Test for ground before using. Avoid running antenna lead-in or any connecting cables through engine compartment. If roof antenna is used it may be necessary to bond to the bulkhead pipes and control rods that enter from the engine compartment.

CADILLAC 1931
V-16

BATTERY TERMINAL GROUNDED + (Make internal change in receiver.)

LOCATION OF RECEIVER—1½'' above toe-board riser and 2½'' from right side of car under cowl. Mounting bracket to stand off 2¾'' from bulkhead.

LOCATION OF LOUDSPEAKER—Vertical center line of loudspeaker in line with center of starting pedal and bottom edge 3½'' above toe-board riser.

LOCATION OF "B" BATTERY BOX—Battery box cannot be used. A heavy waterproof can may be constructed to fasten very securely between the right frame channel and the fender well underneath the front fender.

LOCATION OF ANTENNA PLATE—Under right running board. See special note for mounting instructions.

APPLICATION OF IGNITION SUPPRESSORS—
Distributor: Two splice-in type, near distributor.
Plugs: Splice-in type near plugs.

APPLICATION OF FILTER CAPACITORS—
Generator: Fasten under top screw of bearing plate, connect pigtail to generator terminal.
Coil: Fasten to coil clamp bolt, connect pigtail to coil terminal connected to wire from switch.
Ammeter: Fasten under upper right instrument board nut, try pigtail connections for best results.

SPECIAL NOTES—If roof antenna is used, it may be necessary to bond to the bulkhead pipe control rods that enter from the engine compartment. Roof antenna installed at factory, lead-in down right windshield column. Test for ground before using. Avoid running antenna lead-in or any connecting cable through engine compartment. If plate antenna is used remove inside bolts from front and rear brackets and mount under right running board. Drill brackets for five-sixteenth inch bolts and fasten with antenna hanger studs. Space plate 5'' below edge of running board.

CHEVROLET 1930
6 Cylinder

BATTERY TERMINAL GROUNDED —

LOCATION OF RECEIVER—Close to right side of car under cowl and as high as possible.

LOCATION OF LOUDSPEAKER—Close to left side of car under cowl and as high as possible.

LOCATION OF "B" BATTERY BOX—Under right rear floor diagonally behind cross member, plug to the rear.

LOCATION OF ANTENNA PLATE—On right frame channel, front hanger just ahead of storage battery.

APPLICATION OF IGNITION SUPPRESSORS—
Distributor: Plug-in type.
Plugs: Mount at right angle to plugs and swing to meet wires.

APPLICATION OF FILTER CAPACITORS—
Generator: Fasten under outside cut-out mounting screw, connect pigtail to rear cut-out terminal.
Coil: None used.
Ammeter: Fasten under lower gas gauge mounting screw, connect pigtail to battery terminal of ammeter.

SPECIAL NOTES—If roof antenna is used it may be necessary to place a switch in the wire from the ammeter to the dome light on the lower right hand edge of instrument panel. Remove red wire from starting switch and two yellow wires that connect to ignition coil, shield each one separately, and reconnect. Bond shields to bulkhead. If roof antenna is used, lead-in should be shielded and come down right windshield column. Tape should be placed over metal braid on "B" cable and cable tacked up to floor boards. "A" Battery wire should be connected directly to storage Battery. Avoid running antenna lead-in or any connecting cables through engine compartment. There is room for "B" Battery behind rear seat back cushion in some bodies. If a roof antenna is used, it may be necessary to shield the toe-board with copper screen.

CHEVROLET ALL MODELS 1932
6 Cylinder

BATTERY TERMINAL GROUNDED —

LOCATION OF RECEIVER—Close to right side of car under cowl and 14'' above floor board.

LOCATION OF LOUDSPEAKER—6'' above intersection of toe-board and bulkhead, vertical center line 5'' from left side of car under cowl.

LOCATION OF "B" BATTERY BOX—Below tool tray under right front seat, between brake rod and right frame channel, plug to the rear.

LOCATION OF ANTENNA PLATE—On right frame channel, front hanger just back of storage battery.

APPLICATION OF IGNITION SUPPRESSORS—
Distributor: Plug-in type.
Plugs: Mount at right angle to plugs and swing to meet wires.

APPLICATION OF FILTER CAPACITORS—
Generator: Fasten under outside cut-out mounting screw, connect pigtail to rear cut-out terminal.
Coil: Fasten under inside coil retaining bolt, try connecting pigtail to each coil terminal for best results.
Ammeter: Make hole and bolt to lower edge of instrument panel, connecting pigtail to the ammeter terminal that gives best results.

SPECIAL NOTES—If roof antenna is used, it may be necessary to place a switch in the wire from the ammeter to the dome light on the lower right hand edge of instrument panel. Remove red wire from starting switch and two yellow wires that connect to ignition coil, shield each one separately, and reconnect. Bond shields to bulkhead. If roof antenna is used, lead-in should be shielded and come down right windshield column. Care must be taken when attaching antenna plate not to squeeze gas line. There is room for "B" battery behind rear seat back cushion in some bodies. "A" battery wire should be connected directly to storage battery. Avoid running antenna lead-in or any connecting cables through engine compartment. Tape should be placed over metal braid on "B" cable and cable tacked up to floor boards. If a roof antenna is used, it may be necessary to shield the toe-board with copper screen.

CHRYSLER 1931
6 Cylinder

BATTERY TERMINAL GROUNDED + (Make internal change in receiver).

LOCATION OF RECEIVER—Close to right side of car under cowl, 1½'' above intersection of toe-board and bulkhead.

LOCATION OF LOUDSPEAKER—Vertical center line of loudspeaker in line with brake pedal arm, as high as possible and clear of cowl ventilator.

LOCATION OF "B" BATTERY BOX—Below metal floor under left front seat just behind crossmember. Plug to the rear.

LOCATION OF ANTENNA PLATE—On left frame channel front hanger just ahead of storage battery.

APPLICATION OF IGNITION SUPPRESSORS—
Distributor: Plug-in type.
Plugs: Mount vertically on plugs.

APPLICATION OF FILTER CAPACITORS—
Generator: Fasten under outside cut-out mounting screw, connect pigtail to rear cut-out connection.
Coil: Fasten under upper coil mounting screw, connect pigtail to right coil terminal.
Ammeter: Fasten under panel brace nut, try pigtail connections for best results.

SPECIAL NOTES—Right cowl ventilator lever must be offset 2'' to open over receiver. Roof antenna installed at factory, lead-in down right windshield column. Test for ground before using. Care must be taken when attaching antenna plate not to squeeze gas line. Shield secondary wire from coil to distributor and bond shield to bulkhead. Remove primary wire, connecting coil and breaker, from secondary manifold, shield and bond to bulkhead or engine. Avoid running antenna lead-in or any connecting cables through engine compartment. If roof antenna is used, it may be necessary to place a switch in the wire from the ammeter to the dome light, on the lower right hand edge of instrument panel.

CHRYSLER 1931
8 Cylinder

BATTERY TERMINAL GROUNDED + (Make internal change in receiver).

LOCATION OF RECEIVER—Close to right side of car under cowl, bottom even with intersection of toe-board and bulkhead.

LOCATION OF LOUDSPEAKER—Vertical center line of loudspeaker in line with left cowl ventilator lever when open, as high as possible and clear.

LOCATION OF "B" BATTERY BOX—Below tool tray under left front seat.

LOCATION OF ANTENNA PLATE—Same as 6 cylinder model.

APPLICATION OF IGNITION SUPPRESSORS—
- Distributor: Plug-in type.
- Plugs: Mount at right angle to plugs and swing to meet wires.

APPLICATION OF FILTER CAPACITORS—
- Generator: Fasten under outside cut out mounting screw, connect pigtail to rear cut-out connection.
- Coil: Fasten under upper coil mounting screw, connect pigtail to right coil terminal.
- Ammeter: Fasten under lower gas gauge nut, try pigtail connections for best results.

SPECIAL NOTES—Right cowl ventilator lever must be bent up 1". Roof antenna installed at factory, lead in down right windshield column. Test for ground before using. Shield secondary wire from coil to distributor and bond shield to bulkhead. Remove primary wire, connecting coil and breaker, from secondary manifold, shield and bond to bulkhead or engine. Avoid running antenna lead-in or any connecting cable through engine compartment. Care must be taken when attaching antenna plate not to squeeze gas line. If roof antenna is used, it may be necessary to place a switch in the wire from the ammeter to the dome light on the lower right hand edge of instrument panel so that the dome light line may be opened when the receiver is in operation.

CHRYSLER IMPERIAL 1931
8 Cylinder

BATTERY TERMINAL GROUNDED + (Make internal change in receiver).

LOCATION OF RECEIVER—Close to right side of car under cowl, 1" above intersection of toe-board and bulkhead.

LOCATION OF LOUDSPEAKER—Vertical center-line of loudspeaker in line with starting pedal, as high as possible.

LOCATION OF "B" BATTERY BOX—Below tool tray under left front seat, plug to the rear.

LOCATION OF ANTENNA PLATE—On left frame channel, front hanger just back of storage battery.

APPLICATION OF IGNITION SUPPRESSORS—
- Distributor: Splice in type near distributor.
- Plugs: Mount at right angle to plugs and swing to meet wires.

APPLICATION OF IGNITION SUPPRESSORS—
- Distributor: Plug-in type
- Plugs: Mount vertically on plugs.

APPLICATION OF FILTER CAPACITORS—
- Generator: Fasten under outside cut-out mounting screw, connect pigtail to rear cut-out terminal.
- Coil: Fasten under lower coil mounting nut. Connect pigtail to right coil terminal.
- Ammeter: Fasten under right circuit breaker mounting screw.
- Connect pigtail to the terminal that gives best results.

SPECIAL NOTES—Roof antenna installed at factory, lead-in down right windshield column. Test for ground before using. Remove primary wire, connecting coil and breaker, from secondary manifold, shield and bond to bulkhead or engine. Avoid running antenna lead-in or any connecting cable through engine compartment. Shield secondary wire from coil to distributor and bond shield to bulkhead. Care must be taken when attaching antenna plate not to squeeze gas line. If roof antenna is used, it may be necessary to place a switch in the wire fro mthe ammeter to the dome light on the lower right hand edge of instrument panel.

DE SOTO COUPE 1931
6 Cylinder

BATTERY TERMINAL GROUNDED + (Make internal change in receiver).

LOCATION OF RECEIVER—Close to right side of car under cowl, as high as possible.

LOCATION OF LOUDSPEAKER—Left side of car above steering column.

LOCATION OF "B" BATTERY BOX—Not used. Place "B" battery sections, in original packing, in rear compartment.

LOCATION OF ANTENNA PLATE—Under chassis in front of rear wheels, a hanger to each side channel.

APPLICATION OF FILTER CAPACITORS—
- Generator: Fasten under outside cut-out mounting screw, connect pigtail to rear cut-out terminal.
- Coil: None used.
- Ammeter: Fasten under panel brace screw, connect pigtail to light wire terminal of ammeter.

SPECIAL NOTES—Avoid running antenna lead-in or any connecting cables through engine compartment. Ground antenna lead-in shield to antenna lead in shield to antenna hanger stud if plate antenna is used. Roof antenna installed at factory, lead-in down right windshield pillar. Test for ground before using.

DODGE 1931
8 Cylinder

BATTERY TERMINAL GROUNDED + (Make internal change in receiver).

LOCATION OF RECEIVER—Close to right side of car, under cowl, bottom even with intersection of toe-board and bulkhead.

LOCATION OF LOUDSPEAKER—Vertical center-line of loudspeaker in line with clutch pedal arm, as high as possible and clear of cowl ventilator.

LOCATION OF "B" BATTERY BOX—Under left rear floor behind cross member, plug to the front.

LOCATION OF ANTENNA PLATE—On left frame channel, front hanger just ahead of storage battery

APPLICATION OF IGNITION SUPPRESSORS—
- Distributor: Plug-in- type.
- Plugs: Mount at right angle to plugs and swing to meet wires.

APPLICATION OF FILTER CAPACITORS—
- Generator: Fasten under outside cut-out mounting screw, connect pigtail to rear cut-out terminal.
- Coil: Fasten under upper coil mounting nut, connect pigtail to right coil terminal.
- Ammeter: Fasten under lower instrument mounting screw, try pigtail connections for results.

SPECIAL NOTES—Speedometer cable, wiper tube, and choke and heater wires must be moved 4" to the left on bulkhead. Right ventilator lever must be bent up. Roof antenna installed at factory, lead-in down right windshield column. Test for ground before using. Remove primary wire, connecting coil and breaker, from secondary manifold, shield and bond to bulkhead or engine. Care must be taken when attaching antenna plate not to squeeze gas line. Shield secondary line from coil to distributor and bond shield to bulkhead. Avoid running antenna lead-in or any connecting cables through engine compartment. If roof antenna is used, it may be necessary to place a switch in the wire from the ammeter to the dome light on the lower right hand edge of the instrument panel.

ESSEX 1930
6 Cylinder

BATTERY TERMINAL GROUNDED —

LOCATION OF RECEIVER—Right side close to side of car and high as possible.

LOCATION OF LOUDSPEAKER—Vertical center-line of loudspeaker in line with steering column, high as possible.

LOCATION OF "B" BATTERY BOX—Not used "B" battery placed behind rear seat back.

LOCATION OF ANTENNA PLATE—On left frame channel, front hanger just ahead of storage battery.

APPLICATION OF IGNITION SUPPRESSORS—
- Distributor: Plug-in type.
- Plugs: Mount vertically on plugs.

APPLICATION OF FILTER CAPACITORS—
- Generator: Fasten under outside cut-out mounting screw, connect pigtail to rear generator terminal.
- Coil: None used.
- Ammeter: Fasten with bolt through bulkhead left of junction box, connect pigtail to left terminal of junction box.

SPECIAL NOTES—Avoid running antenna lead-in or any connecting cables through engine compartment. Remove primary wire, connecting coil and breaker, from secondary manifold, shield and bond to bulkhead or engine. If roof antenna is used, lead-in should be shielded and come down right windshield column.

FORD A 1930 and 1931
4 Cylinder

BATTERY TERMINAL GROUNDED + (Make internal change in receiver).

LOCATION OF RECEIVER—Right side, parallel to side of car under cowl with special mounting plate fastened to standard plate.

LOCATION OF LOUDSPEAKER—Left side, fastened to side of car under cowl with a special mounting plate.

LOCATION OF "B" BATTERY BOX—Fasten to rear floor between drive shaft and left radius rod, plug to the front.

LOCATION OF ANTENNA PLATE—On left frame channel, front hanger 5" ahead of storage battery.

APPLICATION OF IGNITION SUPPRESSORS—
- Distributor: Plug-in type.
- Plugs: Mount vertically on plugs.

APPLICATION OF FILTER CAPACITORS—
- Generator: Fasten under outside cut-out mounting screw, connect pigtail to rear generator terminal.
- Coil: None used.
- Junction Box: Bolt to bulkhead left of junction box, connect pigtail to left terminal of junction box.

SPECIAL NOTES—"A" battery wire should be connected directly to the storage battery. Tape should be placed over metal braid on "B" cable and cable tacked up to floor board. Avoid running antenna lead-in or connecting cables through engine compartment. There is room for "B" battery behind rear seat cushion in some bodies.

HUDSON 1931
8 Cylinder

BATTERY TERMINAL GROUNDED —

LOCATION OF RECEIVER—Under cowl, center of bulkhead, high as possible.

LOCATION OF LOUDSPEAKER—Under cowl, right side of bulkhead, high as possible.

LOCATION OF "B" BATTERY BOX—Under left rear floor, behind cross-member, plug to the front.

LOCATION OF ANTENNA PLATE—Under chassis

just ahead of "B" battery box a hanger to each side channel.

APPLICATION OF IGNITION SUPPRESSORS—
Distributor: Plug in type.
Plugs: Mount at right angle to plugs and swing to meet wires.

APPLICATION OF FILTER CAPACITORS—
Generator: Fasten under outside cut-out mounting screw, connect pigtail to bottom cut-out terminal.
Coil: None used.
Ammeter: Fasten under lower ammeter mounting screw, connect pigtail to light wire terminal.

SPECIAL NOTES—Remove wire connecting coil and breaker, from secondary manifold, shield and bond to bulkhead or engine. Tape should be placed over metal braid on "B" cable tacked up to floor boards. Avoid running antenna lead in or any connecting cables through engine compartment. Put tape around generator capacitor to prevent short circuit.

LINCOLN 1931
8 Cylinder

BATTERY TERMINAL GROUNDED —
LOCATION OF RECEIVER—Right side, between cowl compartment and new center instrument panel brace, high as possible.
LOCATION OF LOUDSPEAKER—Left of center, high as possible.
LOCATION OF "B" BATTERY BOX—In special container under left side of rear floor. Standard container cannot be used.
LOCATION OF ANTENNA PLATE—On left frame channel, front hanger just ahead of storage battery.
Distributor: Two splice-in type, near distributor.
Plugs: Mount at right angle to plugs and swing to meet wires.
APPLICATION OF FILTER CAPACITORS—
APPLICATION OF IGNITION SUPPRESSORS—
Generator: Fasten under inside cut-out mounting screw, connect pigtail to bottom cut-out terminal.
Coil: Bolt to coil mounting plate, connect pigtail to battery terminal of coil. Requires one for each coil.
Ammeter: Fasten under clamp nut to right of clock, try pigtail connection for best results.
SPECIAL NOTES—Remove both instrument panel braces and replace with one in center. Move coils to special bracket fastened under two right front gear case nuts. Lengthen and shield wires from switch to coils. Change secondary loops and protect coils from wetting. Fasten speedometer cable to bulkhead. Avoid running antenna lead-in or any connecting cable through engine compartment.

OAKLAND 1931
8 Cylinder

BATTERY TERMINAL GROUNDED —
LOCATION OF RECEIVER—Right side, under cowl, 4½" above intersection of toe-board and bulkhead, close to right side of car.
LOCATION OF LOUDSPEAKER—Vertical center-line of loudspeaker in line with clutch pedal arm 5" above intersection of toe-board and bulkhead.
LOCATION OF "B" BATTERY BOX—Under right rear seat, behind crossing-member, plug to the front.
LOCATION OF ANTENNA PLATE—On left frame channel, front hanger just behind front running board brace.
APPLICATION OF IGNITION SUPPRESSORS—
Distributor: Splice-up type, near distributors.
Plugs: Mount vertically on plugs.
APPLICATION OF FILTER CAPACITORS—
Generator: Fasten under right cut-out mounting screw, connect pigtail to rear cut-out terminal.
Coil: Fasten under upper left speedometer nut, connect pigtail to right coil terminal.
Ammeter: Fasten under bottom speedometer nut, try pigtail connections for best results.
SPECIAL NOTES—If roof antenna is used, lead-in should be shielded and come down right windshield column. Avoid running antenna lead-in or any connecting cables through engine compartment. Shield secondary wire from coil to distributor and bond shield to bulkhead. Remove primary wire, connecting coil and breaker, from secondary manifold, shield and bond to bulkhead or engine. If roof antenna is used, it may be necessary to place a switch in the wire from the ammeter to the dome light on the lower right hand edge of the instrument panel. If roof antenna is used, it may be necessary to bond to the bulkhead pipes and control rods that pass through from the engine compartment.

OLDSMOBILE 1931
6 Cylinder

BATTERY TERMINAL GROUNDED
LOCATION OF RECEIVER—Right side, under cowl, 6" above intersection of toe-board and bulkhead, close to right side of car.
LOCATION OF LOUDSPEAKER—Vertical center-line of loudspeaker in line with center of steering column, 5" above intersection of toe-board and bulkhead.
LOCATION OF "B" BATTERY BOX—Under left front seat, plug to the back.
LOCATION OF ANTENNA PLATE—On right frame channel, front hanger just ahead of brake control cross shaft.
APPLICATION OF IGNITION SUPPRESSORS—
Distributor: Plug-in type.
Plugs: Mount vertically on plugs

APPLICATION OF FILTER CAPACITORS—
Generator: Fasten under outside cut-out mounting screw, connect pigtail to rear cut-out terminal.
Ammeter: Fasten under right instrument clamp screw nut, connect pigtail for best results.
SPECIAL NOTES—Remove primary wire connecting coil and breaker from wiring cable, shield and bond to bulkhead or engine. Shield secondary wire from coil to distributor and bond shield to bulkhead. Avoid running antenna lead-in or any connecting cables through engine compartment. If roof antenna is used, it may be necessary to place a switch in the wire from the ammeter to the dome light on the lower right hand edge of the instrument panel so that the dome light can be disconnected during operation of the receiver.

PACKARD 1931
8 Cylinder

BATTERY TERMINAL GROUNDED + (Make internal change in receiver).
LOCATION OF RECEIVER—Right side, under cowl, high as possible, close to right side of car.
LOCATION OF LOUDSPEAKER—Left side, high above clutch pedal, on special brackets fastened to cowl bolt and left steering column bolt on instrument panel.
LOCATION OF "B" BATTERY BOX—Battery box not used. "B" battery put in space to the rear under front seat cushion.
LOCATION OF ANTENNA PLATE—On left frame channel, front hanger.
APPLICATION OF IGNITION SUPPRESSORS—
Distributor: Splice-in type near distributor.
Plugs: Mount vertically on plugs.
APPLICATION OF FILTER CAPACITORS—
Generator: Fasten under outside cut-out mounting screw, connect pigtail to outside cut-out terminal.
Coil: Fasten to special coil bracket, connect pigtail to switch wire terminal.
Ammeter: Make hole in bottom edge of instrument panel, bolt to this, try pigtail connection to ammeter terminal that gives best results.
SPECIAL NOTES—Remove switch mechanism from base of coil. Solder connecting wires in coil together, cover with fibre disc, cut metal disc and solder in base of coil. Mount coil in horizontal position to bottom of radiator brace under hood. Reassemble switch and solder connecting terminals to outside of contact plate. Make connections from ammeter to switch and from switch to coil. Remount switch. Shield wire from switch to coil and bond to bulkhead. "A" battery wire should be connected directly to storage battery. Remove primary wire, connecting coil and breaker, from secondary manifold, shield and bond to bulkhead or engine. Ground antenna lead-in shield to antenna hanger stud if plate antenna is used. Avoid running lead-in or any connecting cables through engine compartment.

PACKARD 1932
8 Cylinder

BATTERY TERMINAL GROUNDED + (Make internal change in receiver).
LOCATION OF RECEIVER—Right side, under cowl, between cowl compartment and center of bulkhead, high as possible.
LOCATION OF LOUDSPEAKER—Vertical center-line of loudspeaker in line with foot throttle arm, as high as possible.
LOCATION OF "B" BATTERY BOX—Under left rear floor, behind crossmember, plug to the front.
LOCATION OF ANTENNA PLATE—On right frame channel, front hanger just ahead of brake control cross-shaft.
APPLICATION OF IGNITION SUPPRESSORS—
Distributor: Splice-in type, under distributor.
Plugs: Mount vertically on plugs.
APPLICATION OF FILTER CAPACITORS—
Generator: Fasten under cut-out mounting screw, try connections for best result.
Coil: Fasten to special coil bracket, connect pigtail to switch wire terminal.
Ammeter: Fasten under left ammeter clamp nut, try pigtail connections for best results.
SPECIAL NOTES—Separate coil and switch in same manner as 1930 Series except coil is to be clamped to left radiator brace under hood. "A" battery wire should be connected directly to storage battery. Put tape around generator capacitor to prevent short circuit. If roof antenna is used, lead-in should be shielded and come down right windshield pillar. Avoid running antenna lead-in or any connecting cables through engine compartment. Remove primary wire, connecting coil and breaker, from secondary manifold, shield and bond to bulkhead or engine. Ground antenna lead-in shield to antenna hanger stud if plate antenna is used.

PIERCE ARROW 1931
8 Cylinder

BATTERY TERMINAL GROUNDED + (Make internal change in receiver).
LOCATION OF RECEIVER—Right side, under cowl, 5" above intersection of toe-board and bulkhead, 2½" from right side of car.
LOCATION OF LOUDSPEAKER—Vertical center-line in line with steering column and 6" above intersection of bulkhead and steering column.
LOCATION OF "B" BATTERY BOX—Under left rear floor, close to frame, plug ahead.
LOCATION OF ANTENNA PLATE—On left frame channel, front hanger just ahead of lower front fender bracket.

RCA-VICTOR CO., INC.

MODEL M-30
Installation Notes

APPLICATION OF IGNITION SUPPRESSORS-
Distributor: Splice-in type, near distributor.
Plugs: Mount vertically on plugs.
APPLICATION OF FILTER CAPACITORS—
Generator. Fasten under outside cut-out mounting screw, connecting pigtail to rear-cut-out terminal.
Coil: Fasten under right coil mounting screw, connect pigtail to top terminal of coil.
Ammeter: Fasten under bottom speedometer nut, connect pigtail for best results.
SPECIAL NOTES—Roof antenna installed at the factory, lead-in down right windshield column. Test for ground before using. Avoid running antenna lead-in or any connecting cables through engine compartment. Remove primary wire, connecting coil and breaker, from secondary manifold, shield and bond to bulkhead or engine.

PLYMOUTH 1931
4 Cylinder

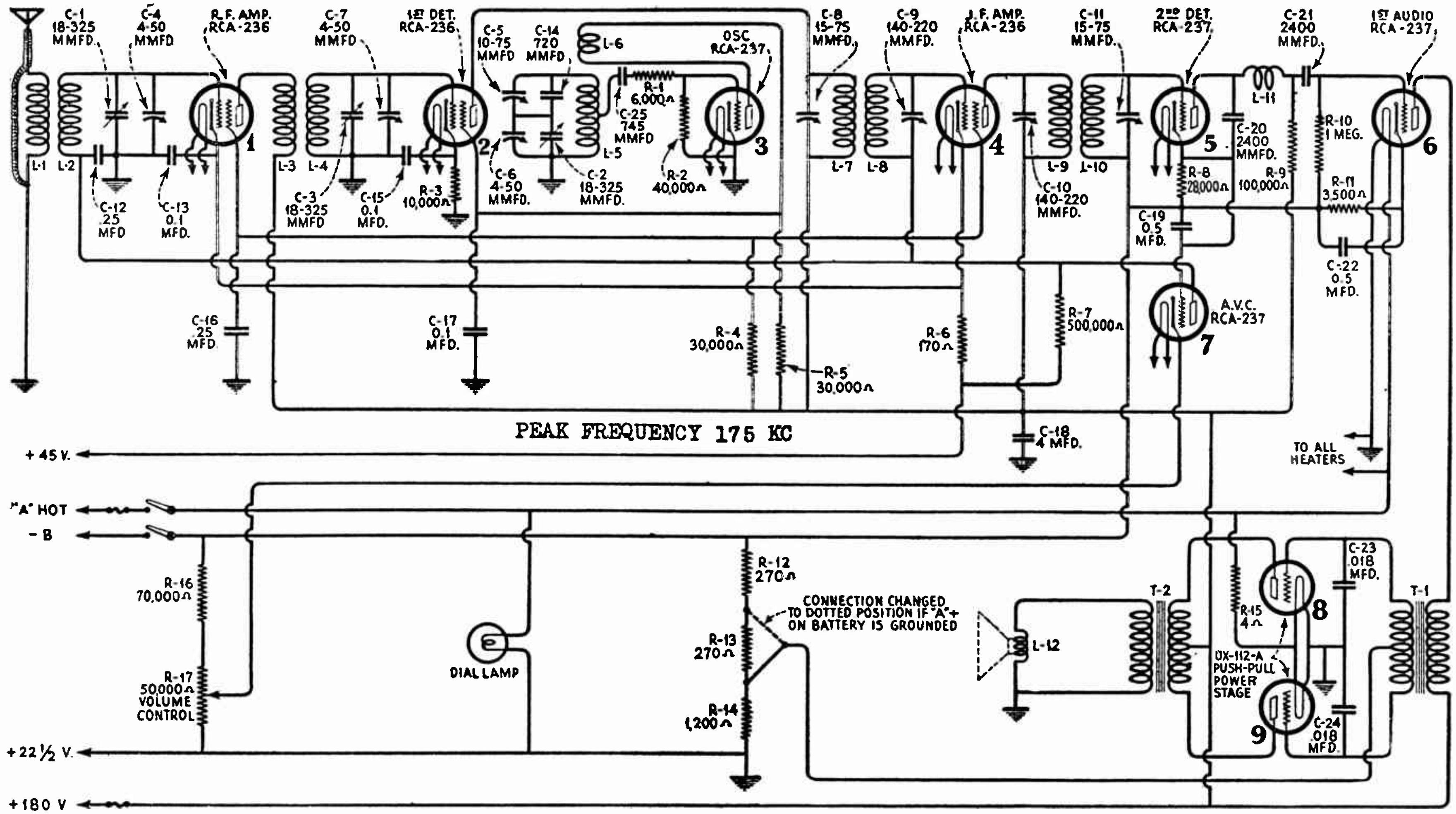
BATTERY TERMINAL GROUNDED + (Make internal change in receiver).
LOCATION OF RECEIVER—Right side, under cowl. 2" out from bulkhead and 5" above intersection of toe-board and bulkhead, close to right side of car.
LOCATION OF LOUDSPEAKER—Vertical center-line of loudspeaker in line with hole for free-wheeling control, 8" above intersection of toe-board and bulkhead.
LOCATION OF "B" BATTERY BOX—Under left rear floor, behind crossmember, plug to the left.
LOCATION OF ANTENNA PLATE—On left frame channel, front hanger just behind storage battery.
APPLICATION OF IGNITION SUPPRESSORS—
Distributor: Plug-in type.
Plugs. Mount vertically on plugs.
APPLICATION OF FILTER CAPACITORS—
Generator: Fasten under outside cut-out mounting screw, connect pigtail to rear cut-out terminal.
Coil: Fasten under upper coil mounting nut, connect pigtail to right coil terminal.
Ammeter. Fasten under lock nut under speedometer, connect pigtail to terminal that gives best results.
SPECIAL NOTES—Roof antenna installed at the factory, lead-in down right windshield column. Test for ground before using. If roof antenna is used, it may be necessary to place a switch in the wire from the ammeter to the dome light on the lower right hand edge of instrument panel. Avoid running antenna lead-in or any connecting cables through engine compartment. Shield secondary wire from coil to distributor and bond shield to bulkhead. Remove primary wire, connecting coil and breaker, from secondary manifold, shield and bond to engine or bulkhead.

PONTIAC 1931
6 Cylinder

BATTERY TERMINAL GROUNDED —
LOCATION OF RECEIVER—Right side, under cowl, 5" above intersection of toe-board and bulkhead, close to right side of car.
LOCATION OF LOUDSPEAKER—Vertical center-line of loudspeaker in line with clutch pedal arm, 5" above intersection of toe-board and bulkhead.
LOCATION OF "B" BATTERY BOX—Under left rear floor, behind crossmember, plug to the front.
LOCATION OF ANTENNA PLATE—On right frame channel, front hanger just ahead of brake control cross shaft.
APPLICATION OF IGNITION SUPPRESSORS—
Distributor: Plug-in type.
Plugs: Mount vertically on plugs.
APPLICATION OF FILTER CAPACITORS—
Generator: Fasten under outside cut-out mounting screw, connect pigtail to rear cut-out terminal.
Coil: Fasten under upper left speedometer nut, connect pigtail to battery terminal of coil.
Ammeter: Fasten under bottom speedometer nut, connect pigtail for best results.
SPECIAL NOTES—Move throttle control to wiper tube hole. Put choke control through new hole below wiper and throttle. If roof antenna is used, lead-in should be shielded and come down right windshield column. It may be necessary to place a switch in the wire from the ammeter to the dome light on the lower right hand edge of the instrument panel and bond to bulkhead pipes and control rods that enter from the engine compartment. Shield secondary wire from coil to distributor and bond shield to bulkhead. Remove primary wire connecting coil and breaker, from secondary manifold, shield and bond to engine or bulkhead.

MODEL M-30
Auto Radio
Schematic

R. C. A. VICTOR CO INC.



Model M-30 (Auto) (1931)

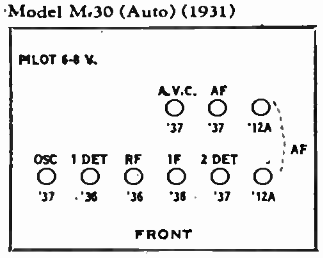


Figure 22—Schematic Wiring Diagram of Receiver Assembly

R. C. A. VICTOR CO., INC.

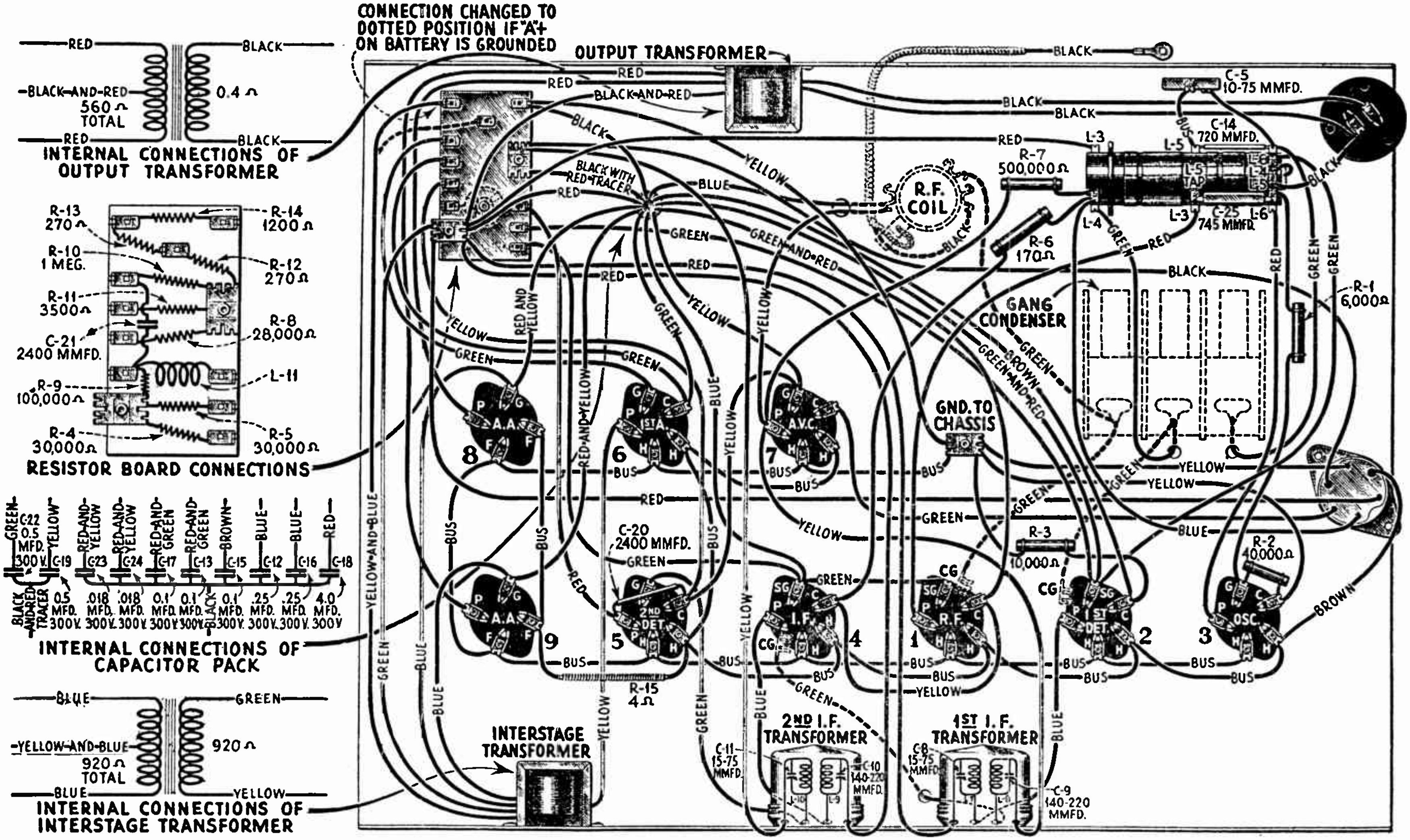


Figure 26—Wiring Diagram of Receiver Unit

SERVICE AND INSTALLATION NOTES

for

RCA Victor Automobile Radiola
Model M-30

INTRODUCTION

The RCA Victor Automobile Radiola, Model M-30, is a nine tube Super-Heterodyne radio receiver designed for automobile or motor boat use. Features of this receiver are; sensitivity and selectivity equal to that of high quality home receivers, high output Class B amplifier giving a large undistorted output with a small plate battery drain, permanent magnet dynamic loudspeaker requiring no external field supply, automatic volume control using entirely new principles of operation and extremely low battery consumption for both heater and plate supply. This feature allows the use of the automobile battery as "A" supply without imposing an additional load upon it that cannot be readily compensated for by a slight generator charging readjustment. The low plate current drain allows excellent "B" battery life. Use of the new automobile type Radiotrons eliminates the possibility of Radiotron failure due to vibration or varying heater voltage such as is encountered in automobile driving.

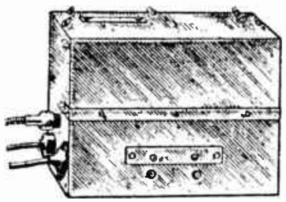


Figure 1—Receiver Assembly

In the design of this receiver, special attention has been given to the ease with which the installation may be made, and the elimination of interference originating in the ignition system. Thorough shielding of all parts together with proper design of the receiver makes it possible to reduce ignition interference to a negligible degree. This is done without any sacrifice in the sensitivity of the receiver.

A description of the various units follows.

RECEIVER ASSEMBLY

The receiver assembly, Figure 1, is housed in a metal case that acts as an effective mechanical and electrical shield. A bracket is provided for mounting so that dismounting is a comparatively simple operation, requiring the removal of but one screw.

The top section of this container is fastened by means of wing nuts. This provides for easy removal for checking or replacing Radiotrons. The battery and control box cable, the loudspeaker cable and the flexible tuning cable are all held in place by means of fittings which allow their easy removal in case the box is to be removed from its mounting. The case is finished in a dull smooth black that is not easily scratched and harmonizes with the usual car finishes.

CONTROL BOX

The control box, Figure 2, contains the station selector knob, the dial scale, the volume control and the key switch. It is provided with a felt strip and mounting clamp for attaching to the steering column of the car. The dial scale is marked in channels (multiply by 10 for kilocycles) and is of the non-glare type. The switch is provided with a key, which when removed, locks the radio at the "off" position.

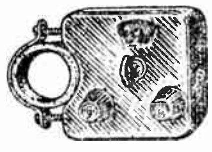


Figure 2—Control Box

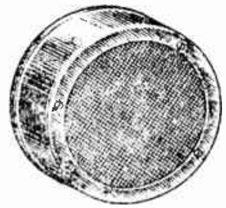


Figure 3—Loudspeaker

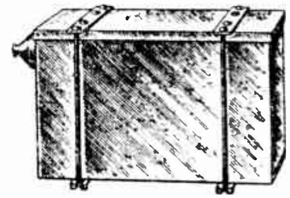


Figure 4—Battery Box

LOUDSPEAKER

The loudspeaker, Figure 3, used in the automobile equipment is of the permanent magnet, dynamic type. It is housed in a smooth black finished metal container which also acts as an effective baffle. Due to the presence of the strong magnetic field, even when the set is turned off, special provision has been made to prevent metallic substances from being drawn into the air gap of the speaker and thereby cause rattles. The speaker edge and center is entirely closed, thus preventing such entry from the front. A fine gauze covering is placed over the back, thus eliminating any such matter from entering from that side. The cord outlet is provided with a rubber bushing that closes up its opening. The speaker has excellent frequency characteristics and is of extremely rugged construction.

BATTERY BOX

A special heavy steel battery box, Figure 4, is furnished as optional equipment when it is either undesirable or impossible to install the batteries behind or under the seats or in the rear compartment of the car. This box is so constructed that the batteries may be mounted and connected therein and then lifted into position beneath the car. Four carriage bolts, each provided with two lock nuts, hold it in place.

Figure 5—Antenna Plate

ANTENNA PLATE

The antenna plate, Figure 5, is provided for use when a roof antenna is not already installed in the car. It is provided with special bolts and clamps that allow easy mounting to the frame of the car. Due to the high sensitivity of this receiver, satisfactory results may be obtained with the undercar antenna except in districts where the signal intensity of all stations is extremely low. In such cases a roof antenna must be erected in accordance with the instructions given in Part I, Section 3.

IGNITION EQUIPMENT

Six spark plug type suppressors, one distributor type suppressor and two 0.75 mfd. capacitors, Figure 6, are provided for the suppression of ignition interference so that it does not materially affect radio reception. The details of installing this equipment are covered in Part I and varies somewhat in different cars.

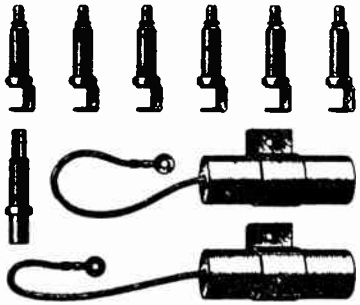


Figure 6—Ignition Equipment

PART I—INSTALLATION

Due to the nature of the installation it is advisable that the RCA Victor Automobile Radiola be installed by a competent radio service man in conjunction with an automobile mechanic. The usual automobile repair shop has the necessary tools and lifts that are desirable in making the installation. If it is necessary to erect a roof antenna, this work must be done by a competent "trim" shop working under direction of the service man. However, after making several installations the service man may feel confident enough to attempt all the installation work himself, with the exception of the roof antenna. For such work the following list of equipment is provided which will be found useful when performing such work.

1 Pair Gas Pliers	1 Heavy Duty Soldering Iron
1 Pair Diagonal Pliers	1 Medium Soldering Iron
1 Pair Long Nose Pliers	Supply of Rosin Core Solder
1 Small Crescent Wrench	Supply of Acid Core Solder
1 No. 4 Spintite Wrench	Supply of ½" Belden Braid
1 Thin Shank 6" Screw Driver	Supply of Sheet Copper
1 Small Screw Driver	1 Electric Drill with Set of Drills Up to ½"
1 Large Screw Driver	1 Set Seat and Door Protectors
1 Pair Tin Shears	1 Reamer—¾" maximum

1 Set Analyzer or Miscellaneous Voltmeters

(1) LOCATION AND MOUNTING OF UNITS

The proper method of installing the equipment of the RCA Victor Automobile Radiola is covered in the Installation Instructions packed with each equipment. However, as there are many different types of installations, this information will be repeated together with a discussion of its numerous variations.

RECEIVER UNIT

Location The usual location for the receiver unit is on the right side of the engine compartment bulkhead directly under the dash. Figure 7 shows a typical installation. In some cars this will have to be on the opposite side directly over the steering column, Figure 8. It is important that the space selected have at least four inches clearance directly over the receiver, otherwise it cannot be removed from the mounting bracket. Interference with other equipment under the dash, and interference of the mounting bolts with equipment on the engine side of the bulkhead must be avoided. Figure 8A shows an installation where the receiver is in the usual location, but the loudspeaker is in the center.

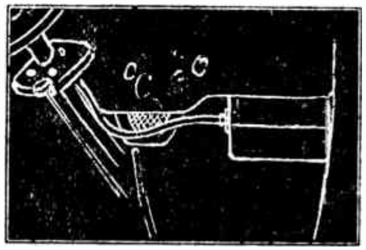


Figure 7—Usual Location of Receiver

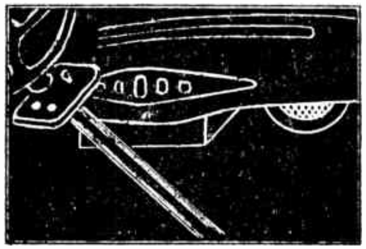


Figure 8—Receiver Over Steering Column

In some cars, the ignition coil is on the compartment side of the bulkhead or under the dash. If there is a choice of places available, the one at the greatest distance from the coil should be chosen. This is important as it reduces the ignition noise considerably.

Mounting Using the card inside of the Receiver Carton as a template, determine the proper location on the bulkhead and mark the location of the three holes with a center punch. A space at least four inches high must be left above the receiver. Extra holes are provided in the bracket to be used in case the regular holes are not satisfactory. If the bulkhead is curved, the template must be used flat and not follow the contour of the curved surface. In some cases, the receiver unit bracket must be mounted away from the bulkhead to clear obstructions. The center punch must be held perpendicular to the template when marking the holes to insure proper alignment. Next drill three ⅜ inch holes as marked. Then attach the bracket to the bulkhead by means of nuts and lockwashers furnished as shown in Figure 9.

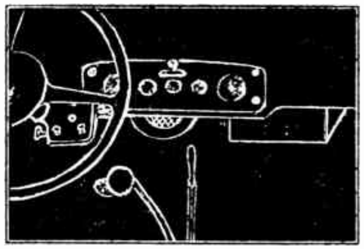


Figure 8A—Receiver on Right with Loudspeaker in Center

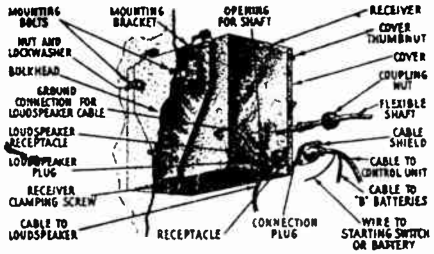


Figure 9—Details of Receiver Mounting

Remove the thumb-nuts from the top, front and sides of the receiver. Remove the packing material from around the Radiotrons and make certain that they are in the proper sockets. (See Figure 10).

Press the grid contact caps firmly over the contacts on top of all RCA-236 Radiotrons. Also make sure that the tuning capacitor rotor plates are fully meshed with the stator plates so that the flexible shaft may be easily mounted. If the positive terminal of the storage battery is grounded to the frame of the car, it will be necessary to remove the bottom of the receiver and change the yellow and blue wire from its normal position on the resistor board to that indicated by the dotted line in Figure 11. Replace the bottom, the cover and thumb-nuts making sure the nuts are tight. Hang the receiver on the bracket hooks, insert the clamp screw and washer at the bottom and tighten with a screw driver.

LOUDSPEAKER

Location The Loudspeaker may be mounted at several locations, in most automobiles. However, the preferable location is on the bulkhead facing the rear of the car and on the opposite side from that of the receiver. If several locations are available, choose the one that gives the best acoustical results. This can easily be determined by experiment by not mounting the speaker until the rest of the equipment is in place and the receiver operating.

Mounting The instructions for mounting the receiver assembly apply equally well to the loud speaker, with the exception that the loudspeaker is mounted direct, there being no bracket provided. A template is also provided for this unit. No clearance space above the loudspeaker is required.

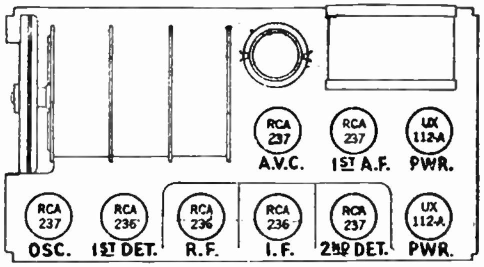


Figure 10—Radiotron Socket Location

Figure 11—Wiring Change for Cars Having Positive Side of "A" Battery Grounded

CONTROL UNIT

Location The control unit is mounted on the steering column at a convenient height for the driver. Due to the large size of the steering wheel hub on some cars, this distance must be adjusted for best visibility.

Mounting Place the felt around the steering column and hold it in place by means of string or a piece of tape. Remove one screw from the clamp and place the box and clamp around the felt. Replace the screw that was removed and tighten both screws equally

FLEXIBLE SHAFT

Location The flexible shaft is used to mechanically connect the tuning capacitor in the receiver assembly to the drive and dial in the control box. It should be placed and fastened to the car so that it connects these two points together and is clear of any foot room or instruments. On some cars a special length shaft will be required. Such flexible shafts are listed in Part IV, page 24.

Mounting Turn the Station Selector until the flat side of the shaft may be seen through the hole in the side of the unit. Insert the end of the shaft into the opening at the rear of the Control Unit making certain that it engages the end of the shaft inside of the latter. Turn the shaft until the set screw is visible and tighten the set screw against the flat side of the shaft. Thread the coupling nut of the shaft onto the Control unit.

Turn the Station Selector knob clockwise so that the dial is at the extreme counter-clockwise position. Then insert the free end of the shaft into the opening provided on the receiver, turning the Station Selector knob back and forth until the shaft meshes. Tighten the collar that holds the shaft to the receiver unit.

After completing these two operations, slowly turn the Station Selector knob to the extreme clockwise and then to the extreme counter-clockwise position. Normally, this will insure the use of the complete range of the dial. If, however, it is noticed that a slight amount of tension is present at either end of the dial, then the control unit must be turned on the steering column in the direction of the tension, while making this adjustment. Then returning it to its normal position will relieve this additional tension. Figure 12 gives the details of this latter adjustment.

ANTENNA PLATE

Location The antenna plate, if used, should be mounted under the car and as far to the rear as possible. Also it must be as low (close to the road) as possible and still maintain the clearance of the lowest point of the car from the road.

Usually, it is mounted on the opposite side from the Muffler and exhaust pipe to prevent crowding. See Figure 13. In some cases, it is desirable to mount the plate crosswise to the car chassis. Avoid any location that will place the plate in a position that will impede the free motion of the chassis parts such as springs, drive shaft, or axles, as damage to the antenna will result.

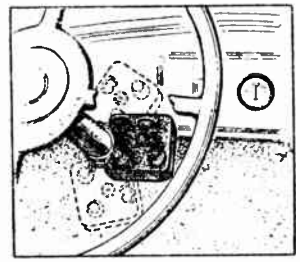


Figure 12—Position for Control Box in Order to Make Adjustments

Mounting After determining the proper location, fasten the plates together with the screws provided. Adjust the length so that the plate is as long as possible and still fulfill the foregoing conditions. Assemble the mounting bolts onto the plate as shown in Figure 5 and fasten the clamps to the car frame. Then tighten the bolt that holds the antenna plate to the bracket and the screw and lock nut that holds the bracket to the car frame. *Too much attention to the proper tightening of these screws is impossible, as any loosening of this plate that results in one end dropping while the car is driven at high speed may result in an accident.*

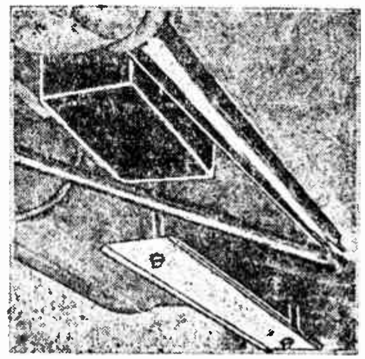


Figure 13—Typical Location of Antenna Plate and Battery Box

"B" BATTERIES

Location If possible, the "B" batteries should be mounted under one of the seats or behind the back of the rear seat. In cars having a rear compartment or trunk, the batteries may be located therein.

However, if such a place is not possible, then a battery box must be used. This box can usually be mounted under the car by fastening to the floor boards. Its location should be as far from the muffler and exhaust pipe as possible, as the heat from these parts will have a detrimental effect on the life of the batteries.

Mounting Using the cover of the battery box as a template, locate the cover on the floor boards under the car and mark the boards for the center of the four mounting bolts. Drill four ⅜" holes in the floor boards. Insert the four carriage bolts in the holes from the top. Make sure the hanger bolts are in place in the cover and fasten the cover to the four bolts in the floor board. In the case of cars having metal floor boards, machine screws with spacers must be used instead of carriage bolts. Make sure that the mounting bolts do not project too far down into the box so that they will fail to clear the batteries.

After fastening the top securely in place, place the "B" batteries in the box and connect them to the receptacle as shown in Figure 14. Slip the cambric cover over the fuse and place the paper strips and plate over the terminals. Then lift the box into place, swing the hanger bolts into place and tighten both nuts securely. Care should be taken to draw up on all four nuts gradually.

For mounting both the antenna plate and the battery box, it is desirable to place the car on a "lift."

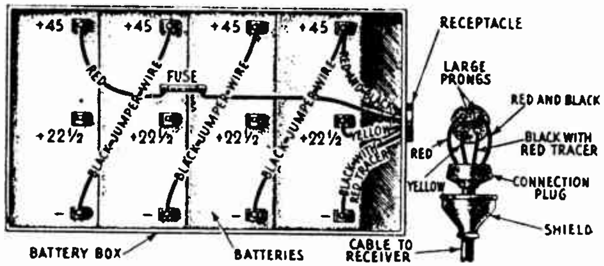


Figure 14—Battery Box Connections

IGNITION EQUIPMENT

Two .75 mfd. capacitors, six spark plug type suppressors and one distributor type suppressor are furnished to be installed in the car's ignition system so that its R.F. radiation may be reduced to a point so as not to interfere with radio reception.

One .75 mfd. capacitor is connected across the output of the generator. Remove a screw from the generator frame, usually the one holding the cut-out, insert the screw through the hole in the capacitor clamp and replace the screw. Connect the lead from the end of the capacitor to the terminal on the generator side of the cut-out switch.

The other capacitor is connected from the battery side of the ammeter to the car frame. Usually, one of the screws on the underside of the dash can be used to hold the capacitor, thereby making the ground connection. Then connect the lead to the ammeter terminal.

The spark plug type suppressors are inserted in series with each high tension lead at its point of connection to the plug. The distributor suppressor is inserted in series with the high tension lead from the coil at its point of connection to the distributor.

There are a number of variations in the installation of this ignition suppression equipment that are covered in Part II.

(2) CONNECTIONS

Loudspeaker to Receiver Insert the plug on the end of the loudspeaker cable into the two-contact receptacle on the end of the receiver. Fasten the pigtail under the self-tapping screw as shown in Figure 9

Main Cable to Receiver A long cable, from the control unit and battery box, is attached to the receiver by means of a six point female plug. Insert the plug into the receptacle on the receiver. A metal cap is fitted over two studs at the same time. Fasten the nuts over these studs securely.

Main Cables to Batteries Drill ½" hole in the toe boards directly below the end of the receiver unit to which connections are made. (If any holes that may be used for this purpose are already available, drilling additional holes is unnecessary). Pass the free end of the cable through the hole and thence to the "B" Battery location. Possibly other holes must also be drilled. Connect the "B" batteries to the cable as shown in Figure 15. The metal braid must be pushed back from the free end and taped so that sufficient length leads are obtained for connecting the batteries. If the battery box is used, solder the four prong plug onto the end of the cable as shown in Figure 14.

The cable should be fastened to the chassis of the car by means of the clamps or staples provided. Take up any slack by making a loop and tape securely.

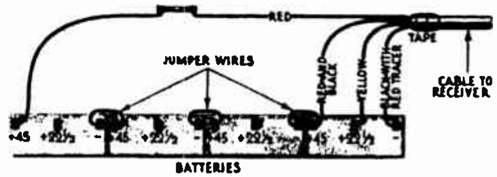


Figure 15—Cable Connections to "B" Batteries

Receiver to Antenna The antenna lead should follow the shortest practical path between the receiver and the antenna. It is very desirable to avoid passing it through the engine compartment or close to the ignition coil, if mounted on the dash or compartment side of bulkhead.

If a roof antenna is used, cut the lead from the antenna as short as possible and still allow length for connection. Then cut the antenna lead and shield from the receiver to a proper length, allowing about two inches extra on the shield so that it may be slit and braided into a pigtail. Solder and tape the connections securely. Then solder the frayed part of the pigtail and either fasten or solder it securely to the car frame. The pigtail should be as short as possible and a good electrical joint made to the car frame

Figure 16—Proper Method of Grounding Shield When Using Roof Antenna

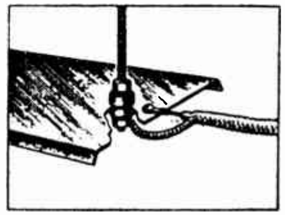


Figure 17—Proper Method of Grounding Shield When Using Plate Antenna

If the antenna plate is used, the antenna lead and shield should be cut in the same manner as for the top antenna, except that the pigtail must be slightly longer. An eyelet terminal is provided for soldering to the end of the antenna lead so that it may be held by the screw and nut at the end of the antenna plate. The pigtail should be fastened under one of the nuts that hold the plate to its mounting bolts Figures 16 and 17 illustrate the correct manner in making both types of connections.

Receiver to "A" Battery One side of the "A" Battery connection is made through the frame of the car. The "hot" side is made by means of a single lead that is brought out from the main cable. This lead is provided with a lug that should be fastened under the nut that holds the battery connection to the starting motor switch

This completes the installation. All cables should be fastened securely to the car so that interference with its operation is avoided. This is especially true of those under the dash which may interfere with the driver's foot room. The switch may then be turned "on" and the receiver operated in the usual manner. Normally, starting the car engine will not introduce any objectionable noise. However, if ignition interference is present that is objectionable, then a reference to Part II will give the details for clearing up this trouble.

(3) INSTALLATION OF ROOF ANTENNA

In cars not already equipped with roof antennae, the usual installation is that of the antenna plate. Due to the high sensitivity of this receiver, entirely satisfactory results are obtained from the plate antenna in most installations. However, if the car is to be operated in a locality remote from any stations and having a general low degree of signal strength, the erection of a roof antenna is advisable. The following details cover the procedure to be used in a majority of closed cars. This work should be done by a competent "trim" man as a degree of skill, only acquired by experience, is necessary in removing and replacing the fabric top of a car.

The antenna should be composed of copper screen having a total area of at least 10 square feet. It should be located as far to the rear as possible and insulated from any metal part of the car which may ground it. In some cars having a metal rib in the center, it will be advisable to make the antenna in two pieces and use insulated wire as straps for bonding it together. All joints together with the lead-in connections should be well soldered.

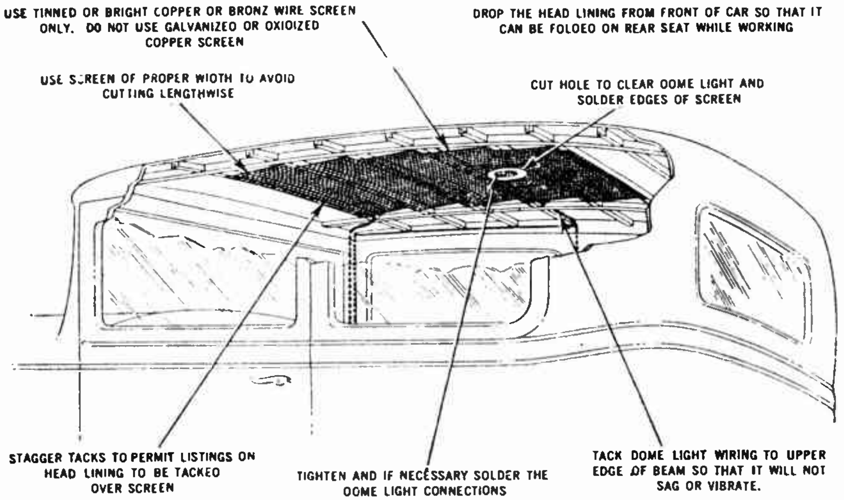


Figure 18—Details of Roof Antenna

1. First determine if there is a grounded metal screen in the roof of the car, as some cars use such a screen for the top material support. A sharp pointed instrument, connected on one side of a continuity tester, the other side being grounded, should be used. Push the point through the top lining and fish around until it comes in contact with the wire screen. If any reading is obtained, even though very small, the screen is grounded and it cannot be used for an antenna. If not, however, one corner of the head lining may be removed and a connection soldered to the screen which will make an excellent antenna.
2. If the screen is grounded or if no screen is present, it will be necessary to remove the head lining and a strip clipped from the screen several inches from all edges and from the dome light or insert a copper screen approximately of these same dimensions. If there is a possibility of the screen shifting, tack it to one of the ribs and lace the sides with cord.
3. Solder a length of shielded wire to the right front corner of the screen. Then solder or bond the shield securely to the car frame. The lead-in is then run down the right front roof support. Usually, this can follow the path of the dome light lines. It should be noted however, that if the ignition coil is mounted on either side of the dash, it is preferable to run the lead-in down the column further from the coil.
4. Again test the antenna from the set end of the lead-in to ground for any possible shorts. If none exist then replace the head lining. Figure 18 shows a typical roof antenna installation.

(4) INSTALLATIONS ON MODEL A FORDS

The Model A Ford presents a somewhat involved problem for the installation of the RCA Victor Automobile Radiola. The reason for this is that due to the gasoline tank being part of the cowl, the usual location for the set and speaker cannot be used. Two positions for the receiver and three for the speaker are possible, each having several disadvantages.

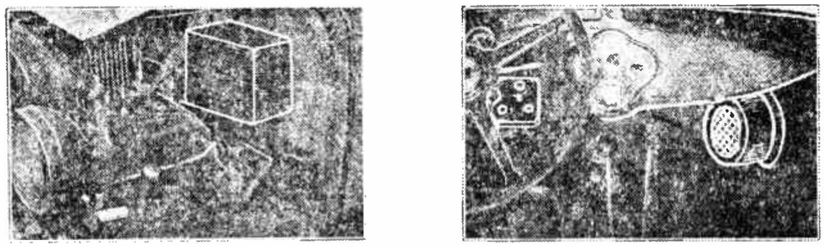


Figure 19—Location of Units in Model A Ford

The receiver unit may be mounted in the engine compartment as shown in Figure 19, more easily than at any other location. The disadvantage of this position is that due to the high noise level present even when suppressors are used, a satisfactory installation cannot always be made. The receiver is also subject to motor fumes, water and steam used in engine cleaning and the usual atmospheric conditions.

The other alternative position for the receiver is on the right side of the driving compartment as shown in Figure 20. The dimensions for a template to be mounted to the body to hold the receiver or loudspeaker are shown in Figure 21. The interference may be successfully eliminated at this location but the position of the receiver interferes with the leg room of the person riding beside the driver.

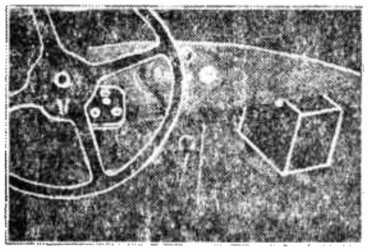


Figure 20—Alternative Position for Receiver and Loudspeaker

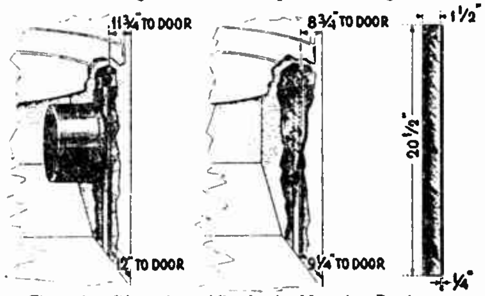


Figure 21—Dimensions of Bracket for Mounting Receiver or Loudspeaker to Side of Driver's Compartment

The loudspeaker may be mounted at either side of the car, using the same template for a bracket as that shown in Figure 21, on models not having pockets at either of these locations. On such models, such as the roadster, the loudspeaker can be mounted directly behind the gear shift lever and bolted to the seat base. This location is not seriously in the way and gives good acoustical results.

The batteries may be mounted behind the rear seat in the sedan models, in the rear compartment of coupes and roadsters or in a battery box on any model.

PART II—SUPPRESSION OF IGNITION INTERFERENCE

In general, the use of the ignition suppressors and capacitors as described in Part I of this booklet will reduce the ignition interference to a negligible amount. However, on some installations it will be found that the noise is still present to a degree that is undesirable. In such cases, the following hints will aid the installation man in clearing up this trouble.

(1) IGNITION ADJUSTMENTS ON MOTOR

The first step in clearing up a noisy installation is to thoroughly check and remedy any defects in the ignition system of the car. By this we mean the spark plugs should be cleaned and adjusted or replaced, the breaker points replaced or adjusted and synchronized if necessary, the distributor arm filled out with solder until it makes a full even contact, and the generator commutator cleaned and its brushes adjusted or replaced. Also all wiring should be cleaned and loose connections or poor joints remedied. This work is the first step in the clean-up job and it should be done by a competent ignition expert, who has been acquainted with the need of accurately making all adjustments.

Usually, such adjustments though made on a motor that is performing efficiently, will materially reduce the ignition noise in the radio receiver.

(2) BY-PASS CAPACITORS

In some installations a re-arrangement of the connections of the by-pass capacitors will be found beneficial. For example, the by-pass capacitor connected to the battery side of the ammeter, if connected to the battery side of the ignition coil may be more effective.

In other cases using an additional capacitor at the coil, a total of three for the installation, will remedy the trouble. In all cases the generator capacitor is used, although if a clicking is heard when the cut-out makes and breaks its circuit, the pigtail should be connected to the load side rather than the generator side of the cut-out relay.

On some cars, two capacitors—one on each terminal—at the ammeter will greatly reduce the noise. This is especially true of 1932 Studebakers.

(3) IGNITION COIL

The car ignition coil, due to the high electromagnetic field surrounding it, should be at as great a distance as possible from the receiver, preferably on the opposite side of the metal bulkhead. On cars that have the ignition coil mounted on the instrument board directly over the receiver unit, it may be necessary to place it in the engine compartment. Where the switch is mounted into one end of the coil, the switch assembly must be removed from the coil and a bracket provided for mounting it. The leads from the coil should be shielded and the shield grounded. (Use Packard High Tension Cable for the high tension lead to the distributor).

Another important point is that of the primary connections. While not affecting the ignition system in its relation to the car, due to the use of auto-transformers as coils, interchanging the primary leads to a coil will sometimes materially reduce the ignition noise.

(4) ANTENNA PLATE

If grounding the antenna at its point of exit from the shield reduces or eliminates the noise, then it is feeding in through the antenna. The remedy in such a case is to place the antenna further toward the rear of the car. Also lowering it, slightly will greatly increase its signal pickup. Care must be exercised when doing this, to ascertain that the road clearance of the car is not reduced. Another important point to check is the grounding of the outer end of the antenna shield. Grounding this end of the shield to the chassis in practically all cases, materially reduces ignition noise. However, in certain cases, grounding this shield may increase the noise. In such cases the shield should be insulated with tape and left ungrounded.

(5) CABLES

Proper placing of the various shielded cables may have a bearing on the ignition noise picked up as well as contact noise caused by a variable contact between the cable shields and the car frame.

The antenna lead should follow the shortest path between the receiver unit and the antenna. If there is any possibility of the shield rubbing against any of the car frame, the cable should be taped or clamped in place. The "B" battery cable should be taut and any slack taken up by means of a loop. It should also be fastened or taped securely.

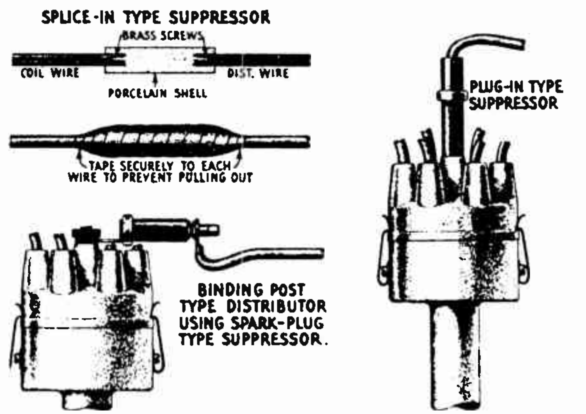


Figure 23—Installation of Various Types of Distributor Suppressors

(6) DISTRIBUTOR SUPPRESSORS

Three different styles of distributor suppressors are used, due to the variations in the distributor head connections. These are illustrated in Figure 23. The plug-in type is supplied with this equipment and is used in the majority of cars. The spark plug type with the end flattened is used in Packard and other cars having the binding post connection. The splice-in type is used on cars that do not have a readily removable connection to the distributor head. It is spliced into the high tension head, as close to the distributor as possible. This type may also be used on cars not having much room at the spark plugs, such as the Buick. While not furnished with regular equipment, the splice-in type suppressor is listed in Part IV.

PART III—SERVICE DATA

Service work in connection with the RCA Victor Automobile Radiola is very similar to that of the usual broadcast receiver. However, the following description of the circuit and method of making adjustments will be found helpful in locating and remedying any failure that may occur.

ELECTRICAL DESCRIPTION OF CIRCUIT

The following description of the circuit will give the service man a better understanding of the functioning of the receiver and thereby help him in his work. Figure 22 shows the schematic circuit diagram.

The first tube is the tuned R.F. stage. This is the screen Grid Radiotron, RCA-236. The control grid bias for this Radiotron is varied by means of the automatic volume control tube.

The output of the R. F. stage is coupled inductively to the grid coil of the first detector. At this point the oscillator output is also coupled inductively to the grid coil of the first detector.

This is a tuned grid circuit oscillator using a Radiotron RCA-237 and having a closely coupled plate coil that gives sufficient feed-back to provide stable operation. The grid circuit is so designed that by means of a correct combination of capacity and inductance a constant frequency difference between the oscillator and the tuned R. F. circuits throughout the tuning range of the receiver is obtained.

The next circuit to examine is the first detector. The circuit is tuned by means of one of the gang condensers to the frequency of the incoming signal. Radiotron RCA-236 is used in this stage. In the grid circuit is present the incoming signal and oscillator frequencies. The beat frequency —175 K.C.—appears in the plate circuit of the first detector which is accurately tuned to 175 K.C.

The next stage is that of the I.F. amplifier. A single stage is used, requiring two I.F. transformers, consisting of four tuned circuits. The plate circuit of the first detector, the grid and plate circuit of the I.F. amplifier and the grid circuit of the second detector are all tuned to 175 K.C. Radiotron RCA-236 is used in this stage and its control grid voltage is also varied by means of the automatic volume control tube.

At this point it is well to consider the action of the automatic volume control tube as it controls the R.F. and I.F. amplifiers of the receiver. The grid of the automatic volume control tube, RCA-237, is connected direct to the cathode of the second detector.

The change in the bias voltage of the second detector, due to fluctuation of the signal, is applied to the grid of the A. V. C. tube. This produces a voltage drop across a resistor in the plate circuit which constitutes the control grid bias for the R. F. and I. F. amplifier. As the value of the plate current is a direct result of the voltage applied to the grid, a greater plate current gives a greater voltage drop across the resistor in its plate circuit and therefore a higher bias on the I. F. and R. F. stage. This results in less sensitivity and vice versa. The volume control varies the bias on the grid of the volume control tube.

The second detector is of the grid-biased type, using Radiotron RCA-237. The purpose of the second detector is to extract the audio frequency component of the R.F. signal which represents the voice or musical modulations produced in the studio of the broadcasting station. The audio component is extracted and used to drive the first A.F. tubes while the R.F. current is by-passed and not further used.

The output of the second detector is coupled by means of resistance coupling to the grid of the first A. F. Radiotron RCA-237. This audio stage is used as a driver for the Class B amplifier.

The output of the first audio stage is coupled by means of transformer coupling to the grids of the Radiotrons UX-112-A used as a push-pull Class "B" power stage. This stage is so biased that normally no plate current flows. However, as the grid swings positive due to the signal voltage being applied, plate current flows which is entirely of an audio character. As there is little residual current when no signal is present, this is a very economical amplifier as well as providing a high undistorted output—2 Watts.

The entire "A" battery current drain is 2.85 Amperes and the "B" current 12 M.A. minimum and 25 M.A. average maximum.

Filament and heater current is supplied from the storage battery in the car. Plate current is supplied by means of four medium size "B" batteries. A fuse is provided in both filament and plate circuits to protect the batteries and tubes.

(1) R. F. AND OSCILLATOR ADJUSTMENTS

Four adjustable capacitors are provided for aligning the R. F. circuits and adjusting the oscillator frequency so that it will be at a 175 K. C. difference from the incoming R. F. signal throughout the tuning range of the set. Poor quality, insensitivity, and possible inoperation of the receiver may be caused by these capacitors being out of adjustment.

If the other adjustments have not been tampered with—the intermediate tuning capacitors—the following procedure may be used for adjusting these capacitors.

1. Loosen the receiver unit clamping screw and dismount the receiver from its mounting bracket. Do not remove any of the connections or the flexible cable.
2. Procure an R. F. oscillator giving a modulated signal at exactly 1400 K. C. and 600 K. C. Also procure a non-metallic screw driver—Stock No. 7065 — and a No. 5 Spintite socket wrench.
3. An output indicator is necessary. This should be a current-squared thermo-galvanometer substituted or connected in parallel to the loudspeaker leads.

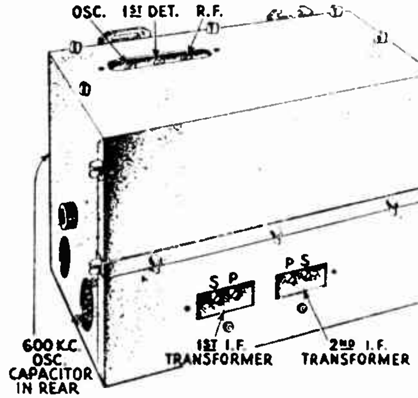


Figure 24—Location of Radio Frequency, Oscillator and Intermediate Frequency Adjustments

4. Remove the top cover of the receiver and remove the automatic volume control tube. Also ascertain that the tuning capacitor is fully meshed when the dial reads 150.
5. Place the oscillator in operation at exactly 1400 K. C. and couple it to the antenna. Set the dial at exactly 140 and adjust the coupling between the antenna and oscillator so that the output indicator does not give an excessive reading.
6. With the socket wrench, adjust the oscillator (see Figure 24), the first detector and the R. F. line-up capacitors until a maximum deflection is obtained in the output meter.
7. Set the oscillator at 600 K. C. Tune in this signal with the receiver and adjust for a deflection in the output meter. Now adjust the 600 K. C. series capacitor, Figure 24, until maximum output is obtained. Rock the tuning capacitor back and forth while making this adjustment.
8. Change the oscillator frequency to 1400 K. C. and set the dial at 140. Again make the adjustments given under 2, 3, 4, 5 and 6.

(2) I. F. TUNING CAPACITOR ADJUSTMENTS

A single intermediate frequency amplifier stage is used in this receiver. Two transformers are used and all circuits are tuned to 175 K. C. The circuits are peaked and when alignment adjustments are made, the capacitors are adjusted for maximum output. It will be necessary to remove the chassis from its mounting bracket as is the case of the R. F. adjustments.

A detailed procedure for making these adjustments follows:

a. Procure a modulated R. F. oscillator giving a signal at 175 K. C. The General Radio Type 360 is suitable. A non-metallic screw driver such as Stock No. 7065 is also necessary.

b. Connect an output meter in the circuit. A current-squared galvanometer connected either in place of or across the loudspeaker leads is suitable.

c. Remove the metal cover over the top of the receiver and then remove the oscillator and automatic volume control tube, Figure 10. Make a good ground connection between the receiver chassis and the car frame.

d. Place the oscillator in operation and connect its output between the control grid connection of the first detector and ground, see Figure 10.

e. Now adjust the secondary and primary of the second and first I. F. transformers until a maximum output is obtained in the output meter. Go through these adjustments a second time as a slight readjustment may be necessary. Be sure the output from the oscillator is not great enough to overload the first detector and I. F. tubes.

f. When the adjustments are made, the set should perform at maximum efficiency. However, due to the interlocking of adjustments, it is a good plan to always follow the I. F. adjustments with the R. F. and oscillator lineup capacitor adjustments as described in Part III, Section I.

(3) VOLTAGE READINGS AT RADIOTRON SOCKETS

The following voltages taken at each Radiotron socket with the receiver in operating condition should prove of value when checking with test sets such as the Weston Model 547, Type 3, or others giving similar readings. The plate currents shown are not necessarily accurate for each tube, as the cable in the test set will cause some circuits to oscillate, due to its added capacity. Small variations of voltages will be caused by different tubes. Therefore, the following values must be taken as approximately those that will be found under varying conditions. The numbers in column 1 indicate the tube socket numbers shown in Figure 26.

RADIOTRON SOCKET VOLTAGES

VOLUME CONTROL AT MINIMUM

Tube No.	Cathode to Heater Volts	Cathode or Filament to Control Grid Volts	Cathode to Screen Grid Volts	Cathode or Filament to Plate Volts	Plate Current M. A.	Screen Grid Current M. A.	Heater or Filament Volts
1. R. F.	18	0.5	100	136	0	0	6.0
2. 1st Det.	1.0	3.0	42	150	0.25	0.1	6.0
3. Osc.	6.0	0	—	45	3.5	—	6.0
4. I. F.	18	1.0	100	136	0	0	6.0
5. 2nd Det.	12	10	—	110	0.5	—	6.0
6. 1st A. F.	15	2.0	—	165	3.5	—	6.0
7. A. V. C.	10	1.0	—	15	0	—	6.0
8. P. W. R.	—	20	—	155	1.5	—	4.5
9. P. W. R.	—	20	—	155	1.5	—	4.5

VOLUME CONTROL AT MAXIMUM
(NO SIGNAL BEING RECEIVED)

1. R. F.	18	0.5	70	135	4.0	1.0	6.0
2. 1st Det.	1.0	3.0	42	150	0.25	0.1	6.0
3. Osc.	6.0	0	—	45	3.5	—	6.0
4. I. F.	18	0.5	70	135	4.0	1.0	6.0
5. 2nd Det.	12	10	—	110	0.5	—	6.0
6. 1st A. F.	15	2.0	—	165	3.5	—	6.0
7. A. V. C.	5.0	9.0	—	15	0	—	6.0
8. P. W. R.	—	20	—	155	1.5	—	4.5
9. P. W. R.	—	20	—	155	1.5	—	4.5

(4) TESTING CAPACITORS

The by-pass capacitors are in a metal container. The internal wiring diagram is shown in Figure 26.

The capacitors can best be tested by freeing their connections and charging them with approximately 180 volts D. C. (use the four "B" batteries) and then noting their ability to hold the charge. After charging, short circuiting the capacitor terminals with a screw driver should produce a flash the size of the flash depending on the capacity of the capacitor and the voltage used for charging. A capacitor that will not hold its charge is defective and requires replacement of the entire unit.

(5) CHECKING RESISTANCE VALUES

The values of the various resistance units in this receiver are shown in the schematic diagram, Figure 22. When testing a receiver for defects, the various values of resistance should be checked. This may be done by a resistance bridge; the voltmeter-ammeter method, or by the following method.

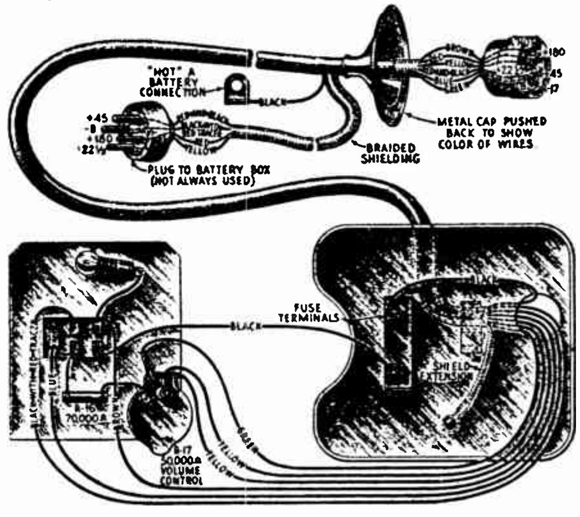


Figure 25—Control Box Wiring

For resistance of low value, 5000 ohms or less, use a voltmeter having a resistance not greater than 100 ohms per volt. For high values of resistance use a meter of 1000 ohms or more per volt. The Weston meters, Type 301 or 280, each have a resistance of 62 ohms per volt and are satisfactory for the low values. Use sufficient battery to give a good deflection on the meter, for example, a 45 volt "B" battery for a 0-50 voltmeter. Take two readings, one of the battery alone, and one of the battery with the unknown resistance in series. Then apply the following formula:

$$\left(\frac{\text{Reading obtained of battery alone}}{\text{Reading obtained with resistance in series}} - 1 \right) \text{Resistance of meter} = \text{Unknown Resistance}$$

(6) WIRING DIAGRAMS

The schematic wiring diagram is shown in Figure 22. The Control Unit wiring is shown in Figure 25 and the general wiring in Figure 26. A reference to these diagrams when locating trouble or replacing a unit will usually prove helpful. The internal connections of the cables are shown in Figure 27.

R. C. A. VICTOR CO., INC.

MODEL M-30 Auto Radio Voltage Notes Part 8

R. C. A. VICTOR CO., INC.

(7) VOLUME CONTROL

Normally, turning the volume control to the extreme counter-clockwise position will reduce the output volume of the receiver to zero. However, in event a powerful local station does not reduce to a satisfactory level, then check the following points.

a. Automatic volume control tube. Try interchanging it with others of a similar type or replacing it with a new one.

b. Volume control. Normally the volume control is of 50,000 ohms resistance. If for any reason it should be less, then the fixed resistor R-16 must also be reduced in value so that the proportion of 50,000 ohms to 70,000 ohms is maintained. For example—if the volume control measures 30,000 ohms, the fixed resistor should be replaced with one of 42,000 ohms. Such a replacement is much easier than a replacement of the complete volume control.

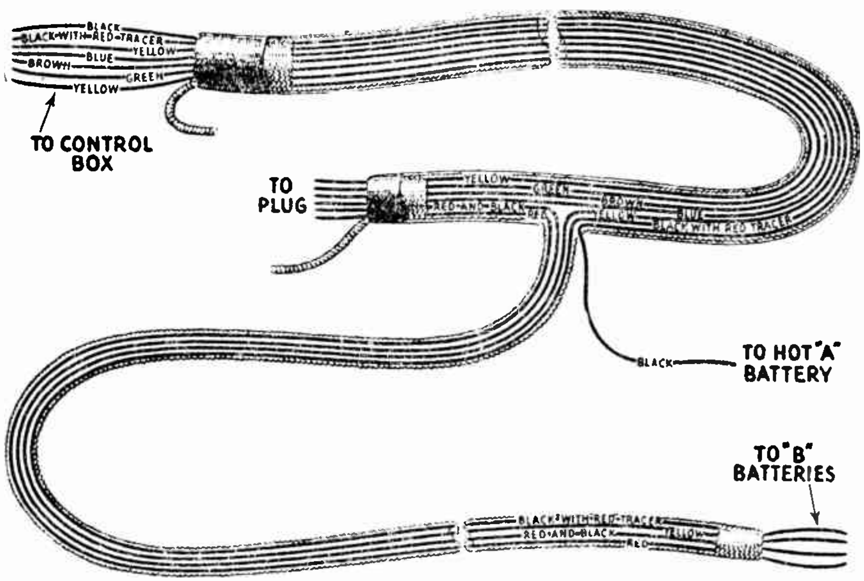
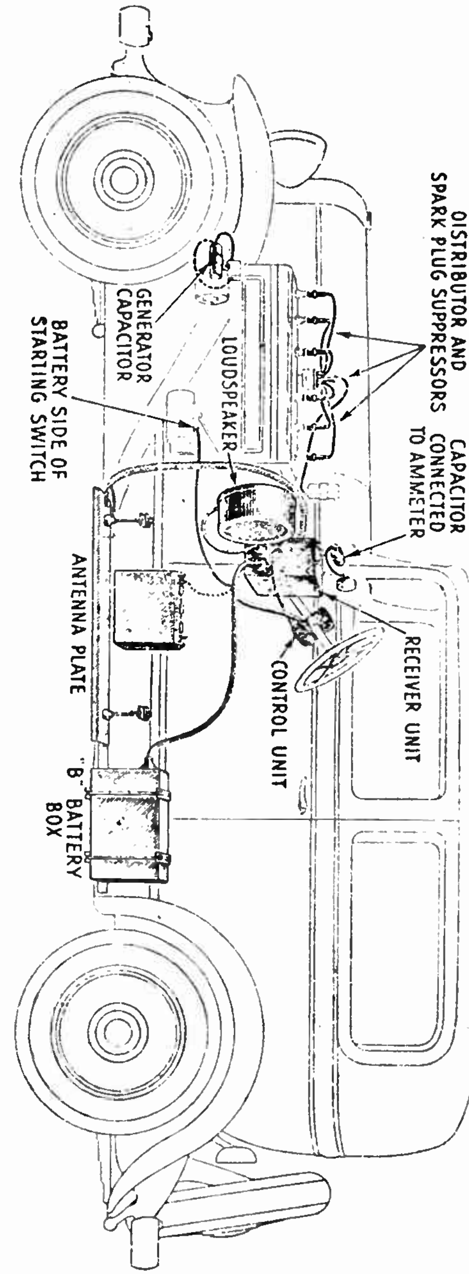


Figure 27—Internal Connections of Cables

PART IV—REPLACEMENT PARTS

On the following pages the parts that are required for replacement use are listed. It will be noted that several parts not included in the standard equipment are also listed. There are respectively, several types of ignition suppressors and special length flexible shafts. Reference to these parts has been made in the text and on some special installations they will be required.



General View of Typical Installation of Automobile Radio

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLY	
2240	Resistor—30,000 ohms—Carbon type—1 watt	$0.70
2546	Resistor—1 megohm—Carbon type—1 watt—Package of 5	3.00
2736	Resistor—170 ohms—Carbon type—1 watt—Package of 5	2.00
2741	Idler—Tuning capacitor drive idler—Package of 5	.80
2742	Spring—Tuning capacitor drive tension spring—Package of 5	.50
2747	Cap—Grid contactor cap—Package of 5	.50
2749	Capacitor—2400 mmfd.	1.50
2966	Resistor—28,000 ohms—Carbon type—1 watt—Package of 5	2.50
2994	Coil—2nd detector R.F. choke coil	.60
3048	Resistor—500,000 ohms—Carbon type—½ watt—Package of 5	2.50
3078	Resistor—10,000 ohms—Carbon type—— watt—Package of 5	2.50
3118	Resistor—100,000 ohms—Carbon type—¼ watt—Package of 5	2.00
3288	Socket—UY Radiotron socket—Complete with insulation strip	.50
6133	Socket—UX Radiotron socket—Complete with insulation strip	.50
6134	Resistor—1200 ohms—Carbon type—1 watt—Package of 5	2.00
6135	Resistor—270 ohms—Carbon type—¼ watt—Package of 5	2.00
6136	Resistor—3500 ohms—Carbon type—1 watt—Package of 5	2.00
6137	Coil—R.F. coil	1.90
6138	Coil—1st detector and oscillator coil	3.30
6139	Cord—Tuning condenser drive cord—Package of 5	.65
6140	Plug—6 prong male plug and plug receptacle	.50
6141	Receptacle—Two prong receptacle for speaker cord plug—Package of 2	.70
6142	Resistor—6,000 ohms—Carbon type—½ watt—Package of 5	2.00
6143	Resistor—10,000 ohms—Carbon type—— watt—Package of 5	2.00
6144	Resistor—4 ohms—Flexible wire type—Package of 5	1.00
6145	Cover Plate—Adjustable capacitor adjustment cover plate—Located on back receiver shield—Package of 5	.50
6146	Screw—Self tapping hex head screw—For mounting cover plates to shield—Package of 40	.60
6147	Nut—Wing nut for receiver shield—Package of 20	.60
6148	Fuse—10 amperes—Package of 5	.50
6149	Bumper—Rubber bumpers—Located on receiver mounting bracket—Package of 10	.50
6150	Plug—Six prong female plug—Located on main cable	.50

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLY—Continued	
6151	Suppressor—Spark plug type suppressor	$0.65
6152	Suppressor—Distributor type suppressor	.65
6175	Suppressor—Distributor splice-in suppressor	.65
7062	Capacitor—Adjustable capacitor—15–70 mmfd.	1.00
7065	Micarta Screw Driver—Used for I. F. and R. F. adjustment	1.10
7299	Capacitor—745 mmfd.	.70
7421	Capacitor pack—Comprising two 0.5 mfd., two 0.018 mfd., three 0.1 mfd., two 0.25 mfd. and one 4.0 mfd. capacitors in metal container	5.25
7422	Transformer—1st intermediate transformer	2.50
7423	Transformer—2nd intermediate transformer	2.50
7424	Transformer—Output transformer	1.85
7425	Transformer—Interstage transformer	2.20
7426	Board—Resistor board complete, less resistors, coil and capacitor	.75
7427	Cover plate—Intermediate adjustment cover plate—Located on front receiver shield—Package of 5	.50
7428	Cover plate—Tuning capacitor trimmer adjustment cover plate—Located on top receiver shield—Package of 5	.50
7429	Capacitor—0.625 mfd.—In metal casing with mounting bracket	2.20
8821	Capacitor assembly—Tuning capacitor assembly—Comprising 3 variable capacitors, drive bracket, drive cord, drive shaft and drum—Assembled	8.60
8822	Flexible drive shaft—Length 30″—From control box to receiver	4.90
8823	Shield—Back cover shield for receiver chassis	2.05
8824	Shield—Front cover shield for receiver chassis	1.10
8825	Shield—Top cover shield for receiver chassis	1.15
8826	Bracket—Receiver chassis mounting bracket complete with two rubber bumpers	1.20
8827	Cable—Main cable less plug—From control box to receiver chassis and battery box	2.20
8833	Flexible drive shaft—Length 42″—From control box to receiver	8.65
8834	Flexible drive shaft—Length 54″—From control box to receiver	9.35
8835	Flexible drive shaft—Length 66″—From control box to receiver	9.65
8836	Flexible drive shaft—Length 78″—From control box to receiver	10.40

Order By Stock Number Only

REPLACEMENT PARTS—(Continued)

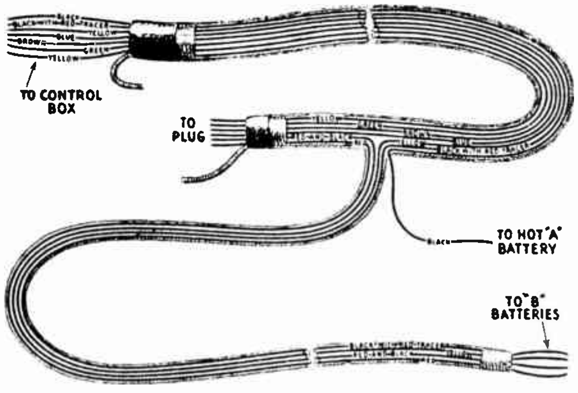
Stock No.	DESCRIPTION	List Price
	CONTROL BOX ASSEMBLY	
3287	Label—Metal trade mark label—Package of 5	$0.75
6153	Clamp—For clamping control box to steering wheel shaft—Package of 5	.50
6154	Screw—Clamp mounting screw—Package of 50	.50
6155	Shaft—Tuning dial shaft with gear and drive washer—Package of 5	1.25
6156	Switch—Lock switch—Complete with mounting nut and washer	.80
6157	Volume control—Volume control complete with mounting nut	1.50
6158	Nut—Knurled nut for lock switch—Package of 10	.50
6159	Resistor—70,000 ohms—Carbon type—½ watt—Package of 5	2.00
6160	Dial scale—Package of 5	.50
6161	Knob—Tuning control knob—Package of 5	1.50
6162	Spring—Knob tension spring—Package of 25	.50
6163	Knob—Volume control knob—Package of 5	1.50
6164	Key—Lock switch key—Package of 10	.50
6165	Lamp—Dial scale lamp—Package of 5	1.75
6169	Felt—Felt strip for steering column—Package of 10	.50
7430	Control box complete—Less flexible shaft and cable	5.25
7431	Cover assembly—Comprising top and bottom covers	1.20
7432	Bracket assembly—Comprising brackets, studs, stop washer and lamp socket—Located inside of control box	3.45
	LOUDSPEAKER ASSEMBLY	
2975	Rivet—Cone retaining ring mounting rivet—Package of 100	.50
6166	Board—Terminal board with two terminals—Located on cone bracket—Package of 5	1.00
6167	Plug—Two prong male plug—For cable No. 8832—Package of 5	.75
6170	Rivet—For mounting speaker and front grille into housing—Package of 100	.50
6171	Rivet—For mounting No. 883] bracket to housing—Package of 100	.50
7433	Screen-Speaker housing case wire screen—Package of 5	1.50
7434	Screen—Dust screen for back of speaker housing case—Package of 5	1.75
8702	Ring—Cone retaining ring	.80
8828	Magnet assembly—Comprising cone bracket, core and magnet	4.60

Stock No.	DESCRIPTION	List Price
	LOUDSPEAKER ASSEMBLY—Continued	
8829	Cone—Speaker paper cone. Package of 5	$8.00
8830	Housing—Speaker housing complete—Comprising front screen, back dust screen, case and mounting bracket	3.00
8831	Bracket assembly—Speaker housing bracket—Comprising bracket, 2 mounting bolts, 4 washers and 4 nuts	.95
8832	Cable—Speaker shielded cable less plug	.55
8838	Speaker complete—Comprising Speaker, housing case and cord—Assembled	13.50
	ANTENNA ASSEMBLY	
6129	Staple—Insulated staple—Package of 100	.75
6130	Screw and Nut—U bracket set screw—¼—16 x 1¼—Complete with lock nut—Package of 10	.50
6131	Insulator—Insulator bushing for No. 7420—Package of 10	.70
7419	Bracket—U bracket for mounting antenna plates—Package of 2	1.00
7420	Stud—Antenna plate stud—¼—16 x 8″—Complete with 5 mounting nuts—Package of 5	1.90
8819	Plate—Single antenna plate	1.75
	BATTERY BOX ASSEMBLY	
2968	Receptacle—Four prong receptacle complete	.50
6122	Clamp—Cable clamp—Package of 15	.50
6123	Plug—Four prong male plug	.50
6124	Cap—Plug cover rubber cap for No. 6123—Package of 5	1.50
6125	Fuse—¼ amperes—Package of 5	.50
6126	Clip—Fuse clip—Package of 12	.50
6127	Bolt—Carriage bolt for mounting top of box to car—5/16—18 x 1¼″—Complete with lock nut—Package of 5	.50
7418	Bolt—Hanger bolt 5/16—18 x 9¾″—Complete with two lock nuts—Package of 5	.50
8817	Box body assembly—Comprising bottom plate, 2 side plates, 2 bottom strips and receptacle—Assembled	3.45
8818	Box cover assembly—Comprising cover plate, 2 strips and 2 rubber strips—Assembled	1.70
8820	Plate and strip assembly—Cardboard plate and strip assembly comprising six strips and one plate—Package of 5	.75

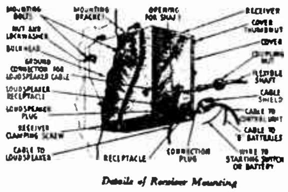
Order By Stock Number Only

MODEL M-30 Auto Radio Resistance Data

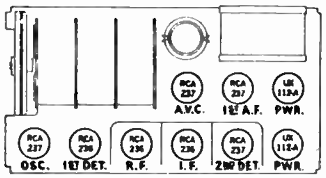
R. C. A. VICTOR CO., INC.



Internal Connections of Cables



Details of Receiver Mounting



A 4 ohm resistor is to be found between one output tube filament terminal and the "A" hot lead. This lead contains a fuse between the "A" terminal and the switch. The control grid of the AVC tube is joined directly to the cathode of the 2nd detector. The normal circuit arrangement used in the receiver assumes A- of the car battery connected to ground. If A+ is grounded, a change is required. This change is shown in the wiring diagram upon page 504-Y

RADIOTRON SOCKET VOLTAGES

VOLUME CONTROL AT MINIMUM

Tube No.	Cathode to Heater Volts	Cathode or Filament to Control Grid Volts	Cathode to Screen Grid Volts	Cathode or Filament to Plate Volts	Plate Current M. A.	Screen Grid Current M. A.	Heater or Filament Volts
1. R. F	18	0.5	100	136	0	0	6.0
2. 1st Det.	1.0	3.0	42	150	0.25	0.1	6.0
3. Osc.	6.0	0	—	45	3.5	-	6.0
4. I. F.	18	1.0	100	136	0	0	6.0
5. 2nd Det.	12	10	--	110	0.5		6.0
6. 1st A. F.	15	2.0	--	165	3.5		6.0
7. A. V. C.	10	1.0	—	15	0	-	6.0
8. P. W. R.	—	20	—	155	1.5	--	4.5
9. P. W. R.	—	20		155	1.5	-	4.5

VOLUME CONTROL AT MAXIMUM
(NO SIGNAL BEING RECEIVED)

Tube No.	Cathode to Heater Volts	Cathode or Filament to Control Grid Volts	Cathode to Screen Grid Volts	Cathode or Filament to Plate Volts	Plate Current M. A.	Screen Grid Current M. A.	Heater or Filament Volts
1. R. F	18	0.5	70	135	4.0	1.0	6.0
2. 1st Det.	1.0	1.0	42	150	0.25	0.1	6.0
3. Osc.	6.0	0	—	45	3.5	—	6.0
4. I. F.	18	0.5	70	135	4.0	1.0	6.0
5. 2nd Det.	12	10	—	110	0.5	—	6.0
6. 1st A. F.	15	2.0	—	165	3.5	—	6.0
7. A. V. C.	5.0	9.0	—	15	0	-	6.0
8. P. W. R.	—	20	—	155	1.5	-	4.5
9. P. W. R.	--	20	—	155	1.5	—	4.5

All tubes removed from sockets and all batteries disconnected. Dial lamp removed

From Chassis To	Correct		Incorrect
Aerial to Ground	28	ohms	
RF Control Grid to 45+	500,005	ohms	
RF Control Grid to Chassis	0	ohms	TC- rf Cg-Y
RF Control Grid to AVC Plate	5	ohms	BLC- in tuned circuit
RF Cathode to 45+	170	ohms	
RF Cathode to chassis	0	ohms	BC- rf K-Y
RF Screen Grid to 180+	30,000	ohms	
RF Screen Grid to chassis	0	ohms	BC- rf Sg-Y
RF Plate to 180+	58	ohms	FC-Y (4 mfd)
1 Detector Cg to chassis	5	ohms	TC- 1 D Cg-Y
1 Detector Cathode to chassis	10,000	ohms	BC- 1 DK-Y
1 Detector Screen Grid to 180+	30,000	ohms	
1 Detector Screen Grid to chassis	0	ohm	FC-Y (4 mfd) BC- 1 D Sg-Y
1 Detector Plate to 180+	89	ohms	TC- IF Tr
Oscillator Cg to chassis	40,000	ohms	Osc Grid Condenser
Oscillator Cathode to chassis	0	ohms	
Oscillator Plate to 180+	30,000	ohms	
Oscillator Plate to 1 D Screen	1	ohm	See Rf Screen
IF Control Grid to AVC Plate	40	ohms	TC- IF Tr
IF Cathode to 45+	170	ohms	
IF Screen to 180+	30,000	ohms	See RF Screen
IF Plate to 180+	40	ohms	TC- IF Tr See 1 D Plate
2 Detector Control Grid to B-	89	ohms	TC- IF Tr
2 Detector Cathode to B-	28,000	ohms	
2 Detector Plate to 180+	100,080	ohms	
2 Detector Plate to Cathode	0	ohm	BC- 2 DP- 2 DK
1 Audio Control Grid to B-	1,000,000	ohms	
1 Audio Cathode to B-	3,589	ohms	BC- 1 AF K-B-
1 Audio Plate- 180+	920	ohms	
2 AF Cg to Cg	320	ohms	
2 AF Cg to chassis (A- grounded)	1,800	ohms	BC- 2 AF Cg-P
2 AF Plate to Plate	560	ohms	
Between B- and 22+	1,715	ohms	
Across Output Transformer Secondary only	.4	ohms	
AVC Plate to 45+	500,000	ohms	
AVC Control Grid to B-	28,000	ohms	
AVC Cathode to 22+	0-29,455	ohms	

RCA-VICTOR CO., INC.

MODEL M-32
Installation Notes
Part 1

INTRODUCTION

This automobile radio receiver utilizes a highly-efficient six-tube Superheterodyne circuit, a remote control unit, and a newly-designed electrodynamic loudspeaker. Because of the inherently adverse conditions to which an instrument of this type is subjected, more attention should be given to its installation than is required by a modern radio for the home. Comparable performance, however, will be obtained if these instructions are carefully followed, both with respect to installation and operation.

Three new-type Radiotrons are used: (1) the "r-f exponential pentode" RCA-39, (2) the "duo-diode triode" RCA-85, and (3) the "a-f power pentode" RCA-89. These tubes incorporate the most recent engineering features and contribute materially to the outstanding performance of this receiver. An innovation in design is found in the use of Radiotron RCA-85 which combines automatic volume control with the normal function of the second detector in a single stage.

The receiver unit is extremely compact and is enclosed by a metallic shield case. The case may be quickly detached from its mounting bolts, thereby affording maximum convenience in replacing Radiotrons or other servicing. The remote control unit is arranged for clamping to the steering column and thus places the volume and tuning controls and the key-operated power switch readily accessible to the driver. The dial scale, located only slightly below the normal driving line of vision, is glare-proof illuminated and is calibrated to facilitate frequency selection.

High-quality reproduction is obtained by use of the new electrodynamic loudspeaker. This unit is protected against mechanical injury by enclosure in an acoustically correct and attractive metallic container equipped with tone equalizers.

Plate voltage supply for the Radiotrons is obtained from an economical "B" battery eliminator unit which is furnished as a part of the standard equipment. (A special companion model of this receiver without the eliminator and suitable for operation from external "B" batteries, is available if preferred. See Appendix I.) Equipment for the suppression of ignition interference is included with the instrument.

The use of a roof antenna in all installations is recommended. Satisfactory results in many cases, however, may be obtained with a plate-type antenna mounted beneath the floor of the car.

PART I—INSTALLATION

Equipment

A. Equipment Furnished:

1. Receiver Unit—complete with the following Radiotrons:
   (a) Three RCA-39.
   (b) One RCA-37.
   (c) One RCA-85.
   (d) One RCA-89.
2. Loudspeaker—with cable and connector plug, washer, and nuts (2).
3. "B" Battery Eliminator Unit.
4. Outfit Package—containing:
   (a) Remote Control Unit—with bracket, felt, screws, and interconnecting cable.
   (b) Switch Keys (2) and Fuse—packed in Instruction envelope (attached to control knob of item a).
   (c) Flexible Shafts (2) and Set Screws (6).
   (d) Antenna Coupling Connector Sleeve.
   (e) Mounting Brackets (4) (for receiver and "B" battery eliminator units)—complete with screws (8), bolts (8), nuts (16), washers (8), and lockwashers (8).
   (f) Insulation Bushing (for cable entrance slot in "B" battery eliminator unit).
   (g) Wiring Clamp (for loudspeaker cable).
   (h) Ignition Interference Suppression Equipment:
      6 Sparkplug type suppressors (additional obtainable from your Dealer).
      1 Distributor type suppressor.
      2 Capacitors.
   (i) Instruction Book

B. Additional Equipment Required:

1. Antenna—
   (a) Roof (built-in) type recommended.
   (b) Plate (sub-mounted) type—alternative. A special plate antenna complete with mounting clamps, studs, and lead-in wire is obtainable from your Dealer, if required.

Location of Units

The arrangement of units shown in Figure 1 is applicable to the majority of automobiles. In certain installations, however, such locations may be considered impractical or not in accordance with personal preference, thereby necessitating a slight change in layout. The following suggestions will be of assistance in determining the most suitable position for each unit in any given case.

Receiver and Loudspeaker—In mounting these units, the adaptability of both to bulkhead (the partition between the engine and driving compartments) suspension should be determined initially. Consideration should be given to the space available and to the possibility of interference of the units with other equipment beneath the instrument panel or of the mounting bolts with apparatus on the engine side of the bulkhead.

Remote Control Unit—The control unit should be mounted on the steering column in a position chosen to afford greatest accessibility.

MODEL M-32
Installation Notes
Part 2

RCA-VICTOR CO., INC.

Antenna—

Roof Type: Best results will be obtained by use of a roof antenna. The majority of modern automobiles (closed body types only) are already equipped with such an antenna installed at the factory, the lead-in wire from which will usually be found coiled up beneath the instrument panel. Many other earlier cars employ a piece of metallic screen—for top material support—which, if ungrounded (not in electrical contact with the metallic frame), may be readily utilized as an antenna.

NOTE—The presence of a top support screen and of grounds in that screen may be determined without removing any portion of the top fabric. Consult your Dealer as to the proper procedure for making this test.

In order to use an ungrounded support screen, one corner only of the head-lining need be removed. A shielded lead should be first soldered to the screen and then carried down the front pillar post nearest the receiver unit. Its shield covering must be soldered or bonded to the car frame prior to replacement of the head lining.

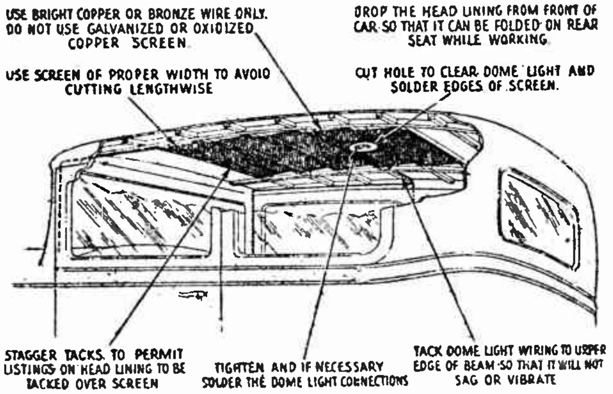


Figure 2

If the top support screen is grounded, or if no screen is present, it will be necessary to remove the entire head-lining (see Figure 2). In the former case, the screen may be insulated by removal of a strip several inches from all edges and from the dome light fixture. The possibility of subsequent shifting may be eliminated by tacking the screen to one of the ribs and by lacing the sides with cord. Where no support screen is used, a copper screen having a total area of at least ten square feet should be inserted. It should be located as far to the rear as possible and insulated from all metallic parts grounded to the frame of the car. The lead-in wire may then be attached as noted above and the head-lining replaced.

NOTE—Since a degree of skill—only acquired by experience—is necessary in removing and replacing the top fabric material, such work should be allotted to a competent "trim" man.

Plate Type: For those cases where the installation of a roof antenna is considered impractical or too costly, satisfactory reception from local or semi-distant powerful stations may be obtained by use of the special, plate-type antenna. This unit should be clamped to the frame of the chassis as far to the rear as possible. It is adjustable in length and may be mounted either lengthwise or crosswise of the chassis which position should be selected with due regard to the prevention of overcrowding. The plate must be placed as close to the ground as possible, but not below the lowest portion of the chassis at the desired location as sufficient road clearance must be retained. It is also important to avoid any position in which the plate will impede free motion of chassis parts such as springs, drive shaft, or axles in order to prevent antenna damage.

"B" Battery Eliminator—The "B" battery eliminator may be mounted at any convenient position in the car. It is preferable, however, to place this unit near the receiver and to use bulkhead suspension when sufficient space is available. To conserve mounting space, the eliminator may be fastened to the engine side of the bulkhead but, in such cases, it is important that the unit be located as far as possible from the exhaust manifold.

Mounting the Units

Details of mounting the various units are shown in Figure 1. The following procedures are recommended:

Receiver Unit—Assemble the mounting brackets (packed in receiver carton) to the rear of the shield case by means of the machine screws furnished. Support the unit in the proper location, allowing a clearance of at least one inch above the top surface to permit ready removal for servicing. On the proposed mounting surface mark the outlines of the four key-hole shaped, bracket slots. Then drill four 5/16 inch holes, coinciding with the top of the slot markings, and insert the receiver mounting bolts loosely.

The front cover of the receiver unit case (held in place by four screws) must now be removed and all packing material—inserted for protection of the Radiotrons during shipment—withdrawn. Make certain that all tubes are in position and that the control grid clips are pressed down firmly over the respective dome terminals as shown by the diagram printed on the label affixed to the top of the case. Rotate the tuning control shaft until the plates of the variable capacitor are fully meshed and adjust both shafts to positions wherein the flatted portions face upward. Then replace the front cover and tighten the cover screws in place.

NOTE—In order to further examine the radio chassis, that unit may be withdrawn from the body of the case subsequent to the removal of three screws from the lower surface. The antenna lead and the associated shield pigtail, however, must first be passed through the case side—which operation may be facilitated by detaching the small rubber bushing secured in the entrance opening

Remote Control Unit—Detach the cover of the remote control unit by removing the push-on knobs, the knurled switch-retaining nut and the two front screws. Then insert the free end (without small coupling) of each flexible shaft housing through the rear bushings, making certain that each flexible shaft enters and extends the full depth in the drilled hole in the end of the corresponding control shaft. Tighten the control shaft set screws against the flexible shafts and finally secure the rear bushing set screws against each flexible shaft housing. The cover may now be replaced and the assembly rested in an upright position near the receiver unit.

Remove the set screws from the small couplings attached to the opposite ends of the flexible shafts and insert the shaft housings through the openings in the metallic cover plate encasing the tuning and volume control shafts of the receiver unit. ***These shafts must be so inserted as to be crossed in the final assembly as indicated by Figure 1.*** Make certain that the couplings are fully engaged over the receiver control shafts and then tighten the *cover plate screws* against each flexible shaft housing. Turn the control knobs on the remote control unit until the threaded openings for the *coupling set screws* (visible through slots in cover plate bushings) are at the top and line up with the flatted portions of the receiver unit control shafts. Finally, insert and tighten both coupling set screws.

Receiver and Remote Control Assembly—Hang the receiver unit in position over the mounting bolts and tighten those bolts in place. Then attach the remote control unit to the steering column by means of the clamp and screws provided. In order to prevent damage to the finish, the felt provided should first be wrapped around the column at the desired location and fastened with tape. After completing these operations, slowly rotate the Station Selector to each extremity of the dial, in turn, to insure use of the complete range.

NOTE—In some installations it will be found necessary or desirable to shorten the flexible shafts. This may be accomplished as follows: (1) Remove the shafts from the housings; (2) cut the housings to the proper length with a hack-saw; (3) re-insert the shafts in the housings as far as possible, so that the couplings at the receiver end of the shafts are in contact with the housings; (4) solder the protruding end of each shaft. to prevent unwinding when cut, at a point 27/32 inch beyond the end of its housing (*Important—A large soldering iron must be used to insure thorough penetration of the solder through the shaft for a distance of about one quarter inch on either side of the cutting point—use only non-corrosive soldering flux*); (5) cut each soldered shaft with a hack-saw or pliers at the point mentioned—namely, 27/32 inch (as accurately as possible) from the end of the housing; (6) remove all burrs from cut ends.

Loudspeaker—Place the loudspeaker with its cone opening against the proposed mounting surface and mark an outline of the rectangular container. Determine the exact center of this area by drawing in the diagonals and mark that position with a center-punch. Next drill a ½ inch hole at the center-punch mark and mount the loudspeaker by means of the threaded stud attached to its rear bracket. In hanging this unit, choose that position wherein the cable entrance opening is at the top.

Plate Antenna—The plate antenna, if used, should be bolted to the channel members of the automobile chassis by means of the clamps provided (see Figure 1 and notes under "Location of Units"). A shielded lead-in wire is provided with this assembly which should be brought into the driving compartment of the car through a ½ inch hole drilled in the toe-board if no other opening is available. The fully-shielded end of this wire is to be connected to the receiver unit antenna lead by means of the coupling type connector, as described under "Connections—Antenna to Receiver." Cut off the opposite (unshielded) end as required for connection to the plate and to eliminate excessive slack. The pig-tail extension from the end of the shield should be soldered or securely bonded to the frame of the car.

"B" Battery Eliminator—The "B" battery eliminator is arranged for mounting in a manner similar to that employed for the receiver unit. It is important that this machine be mounted so that the internal rotating shaft will be horizontal in assembly.

Connections

Refer to Figure 1 and make connections as follows:

Main Wiring Cable—The main wiring cable for connection between the independent units of this instrument (attached to the remote control unit during shipment) should be connected as indicated graphically. If necessary, make a loop in this cable to eliminate excessive slack and tape securely.

The power input lead contained in this cable (single shielded conductor with lug) must be connected electrically to the ungrounded side of the car storage battery, preferably at the battery terminal of the ammeter. The shield pigtail of the power input lead should be soldered or securely bonded to the instrument panel or frame of the car.

Electrical connections to the "B" battery eliminator unit are accomplished by means of the five-conductor group extending from the main wiring cable. The individual (color coded) leads are to be connected to the internal screw type terminals of the eliminator unit (rendered accessible by removal of the sheet metal case) as shown in Figure C. Appendix II. ***Prior to making these connections determine which side of the car storage battery is grounded. If the positive terminal is grounded, reverse the two leads—both from same end of dynamotor—connected to terminals 1 and 3 of filter,*** as indicated in Figure C.

NOTE—The insulation bushing (contained in Outfit Package) should first be slipped over the five leads and, when replacing the cover, secured in the cable entrance slot. The shield pigtail should be brought out through the bushing and fastened beneath the nearest cover mounting screw.

The *special* four prong plug attached to the main wiring cable must be inserted in the corresponding socket located on the left side of the receiver unit and the shield pigtail should be secured beneath a convenient screw in the lower surface of the container.

Loudspeaker to Receiver—The *standard* four-prong plug attached to the loudspeaker cable must be inserted in the remaining socket located on the left side of the receiver unit. The pigtail extending from the cable shield should be secured beneath that container screw to which the shield extension from the adjacent main wiring cable is attached.

Antenna to Receiver—The shielded lead-in wire extending from the roof or plate antenna should be cut to a length sufficient to facilitate attachment to the coupling type connector (secured to the receiver antenna lead) and to eliminate excessive slack. Refer to the detailed view of this coupling connector in Figure 1, which shows clearly the connections to be made as follows:

The small copper sleeve (packed in Outfit Package) should be slipped over the shield braid of the lead-in wire and the small internal insulated conductor passed through the female portion of the coupling type connector. Solder this conductor securely to the end of the internal eyelet. Then slip the sleeve forward to a position wherein the adjacent ends of the connector and the shield braid are covered. Finally solder the sleeve both to the coupling and to the shield and connect the assembly to that portion secured to the receiver antenna lead. Make certain that the shield pigtail extending from the antenna entrance bushing in the receiver container is securely fastened beneath one of the cover screws.

Suppression of Ignition Interference

(1) Disconnect all wires from the spark plugs. Fasten one spark plug suppressor to the top of each plug and re-attach the wires to the free ends of the suppressors.

(2) If the distributor is of the plug-in type, disconnect the center wire from the head. Plug the distributor suppressor into the distributor head and insert the wire in the free end of the suppressor.

For cap-type distributors, proceed as follows: Exchange the distributor suppressor at your Dealer's for one of a special type. Cut the wire leading from the distributor to the coil and screw the suppressor into the end attached to the distributor. Screw the other end of the wire (leading to the coil) into the opposite end of the suppressor.

(3) Clamp one of the by-pass capacitors against the generator frame. The screw holding the cut-out ordinarily may also be utilized for securing this unit. Connect the capacitor lead to the terminal on the generator side of the cut-out switch. (In some cases, interference will be reduced by connecting the capacitor lead to the opposite side of the cut-out. The most suitable position for this lead must be determined by trial.)

(4) Clamp the other by-pass capacitor securely to the instrument panel (if metallic) or to a convenient portion of the metal frame of the car, and connect the capacitor lead to the battery side of the ammeter (usually the terminal with only one lead). In certain cases, interference will be reduced by connecting the lead of this capacitor to the battery side of the ignition coil instead of to the ammeter.

(5) It may be found necessary to secure the loudspeaker cable beneath the grounding clamp (packed in Outfit Package) in order to minimize ignition interference. This clamp (as shown in Figure 1) may be attached conveniently to the left side of the receiver container.

PART II—OPERATION

The instrument should be operated as follows:

1. Insert the key in the lock on the Control Unit and turn it to the "on" position clockwise.
2. Set the Volume Control (left-hand knob) at or near the extreme clockwise position. Then turn the Station Selector (right-hand knob) in either direction until a station is heard. (Note—The dial scale is calibrated in channels to aid in station identification. Add one cipher to the scale marking to obtain the actual frequency in kilocycles.)
3. After receiving a signal, turn the Volume Control counter-clockwise until the volume is reduced to a low level. Now, re-adjust the Station Selector to the position midway between the points where the quality becomes poor or the signal disappears. ***This operation insures the best quality of reproduction.***
4. Finally, advance the Volume Control (clockwise) until the desired level is obtained. Except on weak signals, the automatic volume control will maintain the volume substantially at the latter level, thereby precluding further manual adjustments. (Fading of the signal may be experienced in extreme cases, as when passing under bridges or other metallic structures, since such structures almost completely shield the antenna.)
5. When through operating, turn the key to the "off" position, counter-clockwise. The instrument is then locked by removing the key.

RCA-VICTOR CO., INC.

APPENDIX I—"B" BATTERY OPERATED MODEL

As noted in the Introductory section, a special instrument is available for "B" battery operation. This receiver is identical to the standard model except that the "B" Battery Eliminator Unit is omitted and a specially designed interconnecting cable is used. For such operation, four 45 volt "B" batteries are required and may be obtained from your Dealer.

The following parts are furnished as standard equipment with the battery operated receiver:

1 Fuse (rated 0.50 amp.)
2 Fuse Leads (with clips)
1 Fuse Insulation Sleeve
3 Battery Jumper Wires

Certain body types, such as coupes or sedans, afford sufficient space to permit internal mounting of the batteries. In these cases, it is necessary only to clamp the units in a manner to prevent injury or grounding through undue motion while the car is in operation. In such installations, the batteries will probably be most conveniently stacked "end to end" as shown in Figure 3.

For other installations, a special battery box for external mounting (also available from your Dealer) will probably be found necessary or desirable. This box (as shown in Figure 1) may be located at any position under the floorboards of the vehicle except near the exhaust line or where interference with free-moving parts of the chassis will be encountered. If placed in close proximity to the exhaust pipe or muffler, the heat radiation therefrom will cause rapid

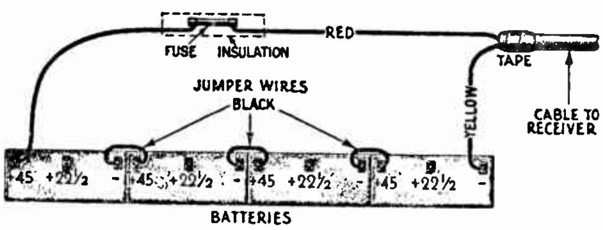


Figure 3

deterioration of the batteries. The box is of suitable dimensions to accommodate the following types of "B" batteries:

Eveready—No. 485, No. 772, No. 796
Burgess—No. 2305, No. 2308, D-308
General—"Flying Squad" V 30 DX

If the battery box is used, it may be mounted most conveniently by drilling the required four (4) three-eighths inch holes in the floorboard with the box cover serving as a template. Insert the four carriage bolts from above and fasten the box cover (with the hanger bolts inserted) in position beneath the floorboard with the nuts and lockwashers provided. Place the "B" batteries in the box and make all necessary internal connections (see Figure 4). With the fibre spacers in position above the batteries and the nuts on the hanger bolts unscrewed to the ends, lift the battery box into place, swing the hanger bolts into the case brackets and tighten all nuts. Make certain that both nuts are on each bolt and locked tightly. These operations, naturally, will be facilitated by placing the car on a lift.

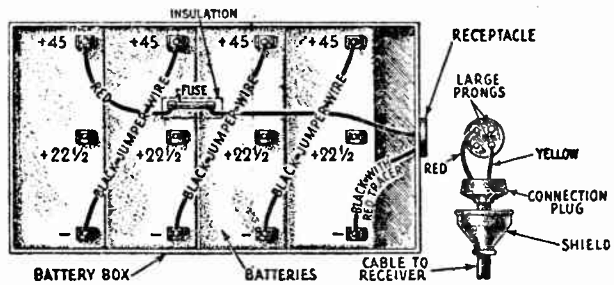


Figure 4

With the battery operated receiver, it will be noted that a plate circuit fuse must be employed. If the cable is to be connected directly to the batteries, the metal braid on the outside of the cable must be pushed back for a short distance in order to obtain leads of suitable length. As indicated in Figure 3, one fuse lead must be soldered to the cable wire and taped and the other connected to the end battery. The leads are equipped with clips (to permit ready replacement of the fuse) which in assembly are protected by an insulation sleeve. The end of the cable should be wrapped with tape for a short distance in order to prevent fraying and grounding to the battery terminals.

If the battery box is used, slip the rubber cover and the plug cap over the cable and solder the leads into the connection plug as indicated in Figure 4. Then fasten the cap to the plug, push the rubber cover forward and insert in the receptacle. One of the fuse leads must be connected to the proper terminal of the receptacle and the other to the end battery.

Worn out "B" batteries cause noisy and weak reception. Renew the batteries when they fail to give a reading of at least 35 volts per block as indicated by a high resistance voltmeter with the set turned "on."

MODEL M-32
Service Data
Voltage

RCA-VICTOR CO., INC.

APPENDIX II—SERVICE DATA

Electrical Specifications

Radiotrons Required
1 RCA-237, 3 RCA-239, 1 RCA-85, 1 RCA-89, Total—6

"A" Battery Consumption—Loudspeaker . . . 1.35 Amperes
Receiver . . . 2.15 Amperes
Converter . . . 3.0 Amperes

Plate Power Consumption . . . 35 M. A.
Undistorted Output . . . 1.25 Watts
Intermediate Frequency . . . 175 K. C.
R. F. Line-up Frequency . . . 1400 K. C.
Oscillator Line-Up Frequency . . . 1400 Only

This six tube automobile receiver gives excellent performance in respect to sensitivity, selectivity and tone quality. When used with the converter unit, operation entirely from the car battery is obtained.

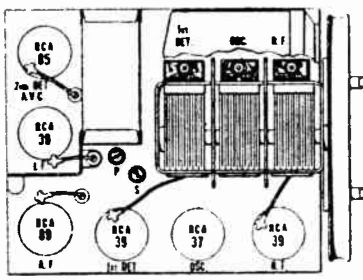


Figure A—Location of Radiotrons and Line-up Capacitors

Line-up Capacitor Adjustments

The receiver must be removed from its metal case to permit correct adjustment of the line-up capacitors. After being removed, a grounded metal plate must be provided for the receiver to rest upon, otherwise the adjustments will be found to be incorrect when the assembly is returned to its metal case. After removal from its case and placing upon the metal plate, proceed as follows:

I. F. Line-up Capacitor Adjustment—The I. F. Amplifier uses two transformers, one being of the untuned variety and one having each of its windings tuned by means of two adjustable capacitors. Figure A shows the location of these capacitors.

(a) Procure a modulated oscillator giving a signal at 175 K. C. and having its output adjustable. A non-metallic screwdriver such as Stock No. 7065 is necessary together with an output meter.

(b) Remove the receiver from its case, place it in operation and connect the output of the oscillator between the control grid and ground of the first detector. Remove the oscillator tube and connect the output meter—preferably a thermo-galvanometer—across the voice coil of the loudspeaker. Then with the volume control at maximum, reduce the oscillator outpnt until a small indication is obtained. Unless this is done, the action of the A. V. C. will make it impossible to obtain correct adjustments.

(c) Adjust the secondary and then the primary of the I. F. transformer until a maximum deflection is obtained in the output meter. This is the correct adjustment.

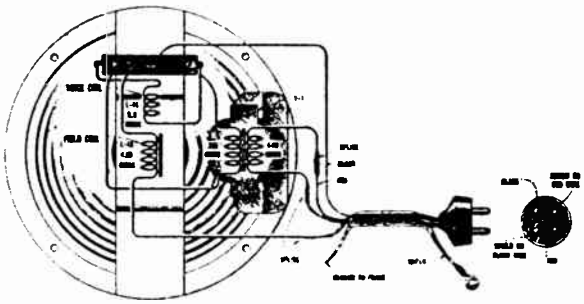


Figure B—Loudspeaker Wiring Diagram

R. F. Line-up Capacitor Adjustment—The R. F., 1st detector and oscillator stages are aligned at 1400 K. C. A modulated oscillator giving a signal at 1400 K. C. a socket wrench and an output meter are necessary for correctly making these adjustments.

(a) Remove the receiver from its metal case and place on a grounded metal plate. Connect the tuning control and place in operation. Connect the output of the oscillator between antenna and ground. Connect the output meter across the voice coil of the loudspeaker.

(b) Place the oscillator in operation at 1400 K. C. and adjust its output so that a small deflection is obtained when the receiver volume control is at maximum and the dial set at 1400. Then adjust the three line-up capacitors until a maximum deflection is obtained. This is done by means of a socket wrench.

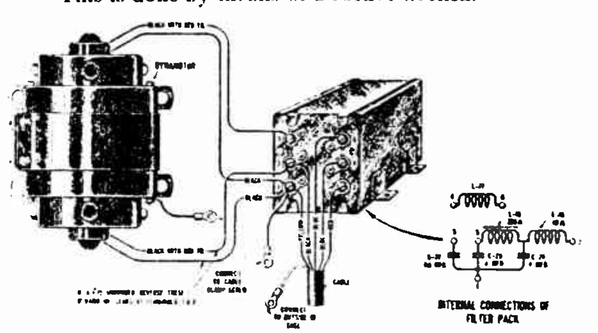


Figure C—Plate Supply Unit Wiring

RADIOTRON SOCKET VOLTAGES

Radiotron No.	Cathode or Filament to Control Grid Volts	Cathode or Filament to Screen Grid Volts	Cathode or Filament to Plate Volts	Plate Current M. A	Filament or Heater Volts
1. R.F. RCA-39	0.9	71	177	1.5	5.2
2. 1st Det. RCA-39	6.0	67	172	1.35	5.2
3. Osc. RCA-37	—	—	72	5.5	5.2
4. I.F. RCA-39	0.9	71	177	4.5	5.2
5. 2nd Det. and A.V.C. RCA-85	—	—	175	4.5	5.2
6. PWR. RCA-89	18	178	160	18.0	5.2

Voltages are those at which Radiotrons are operating and with no signal impressed on input

OTHER IMPORTANT VOLTAGES

Battery Voltage . . . 6.0 Volts
Input to Dynamotor . . . 5.75 Volts
Battery Drain . . . 5 Amperes
Output from Dynamotor . . . 178 V. at 34.5 M.A.
Loudspeaker Field Drain . . . 1.35 Amperes

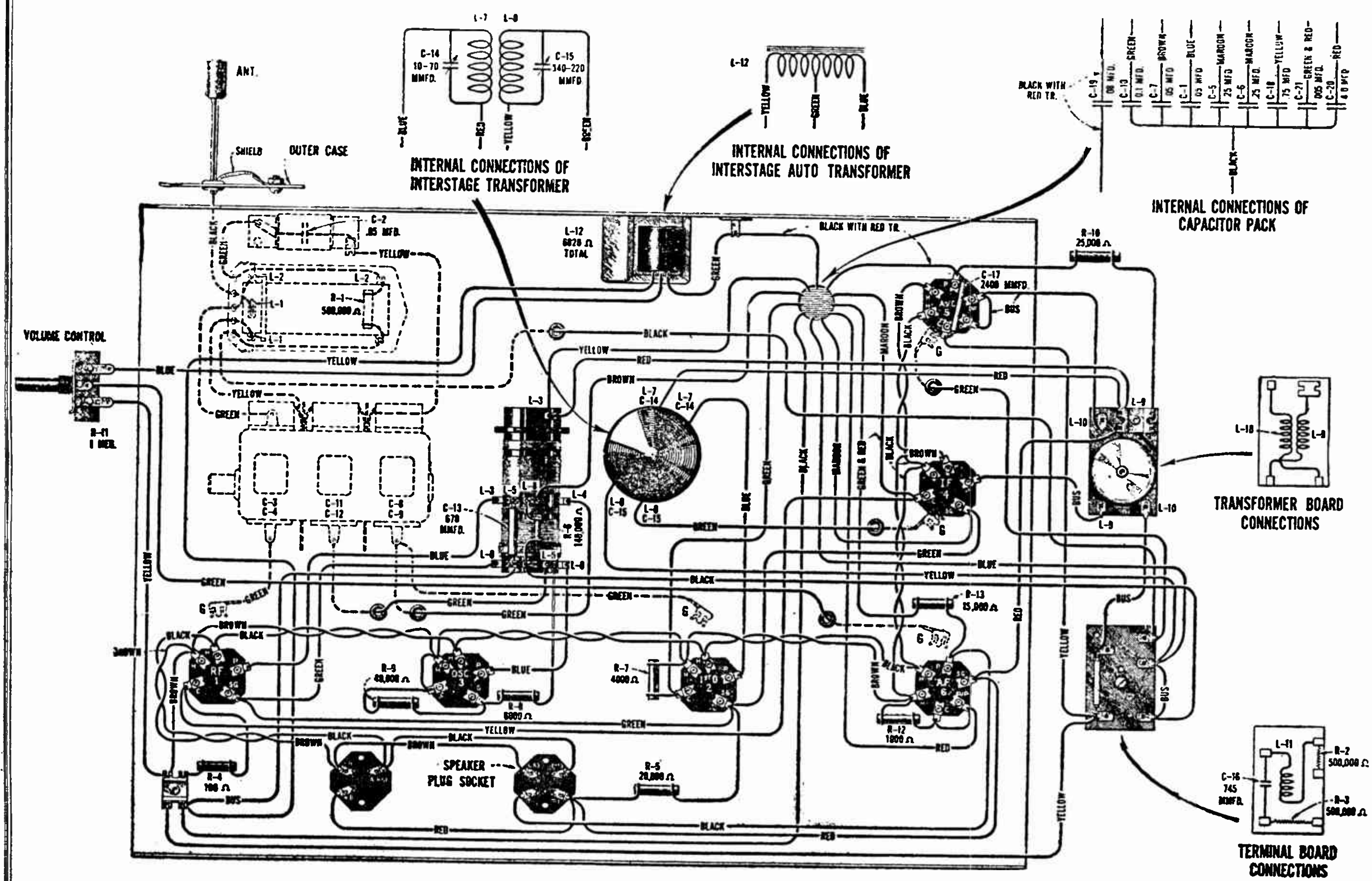


Figure E—Receiver Wiring Diagram

MODEL M-32
Schematic
Wiring Control Box

RCA-VICTOR CO., INC.

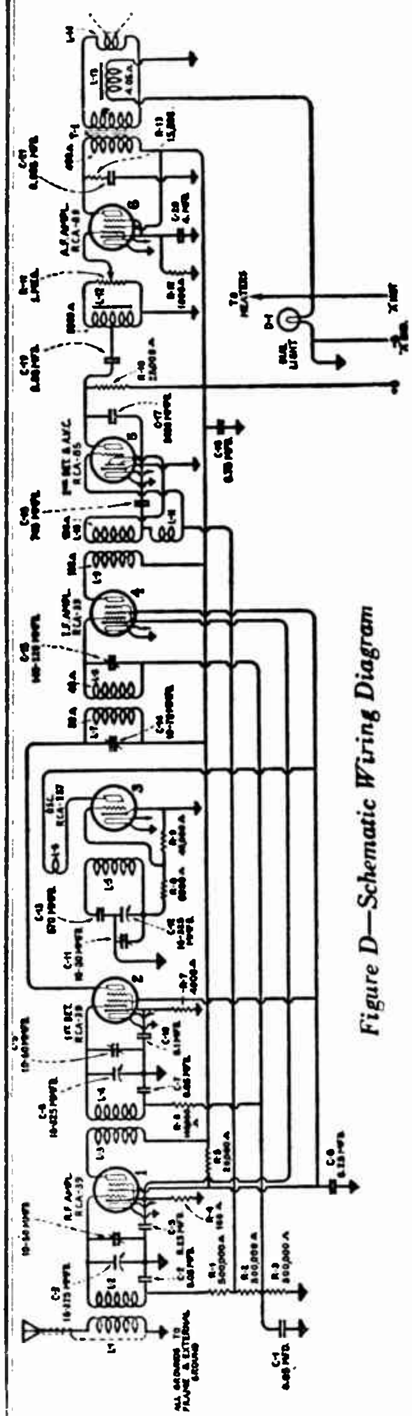


Figure D—Schematic Wiring Diagram

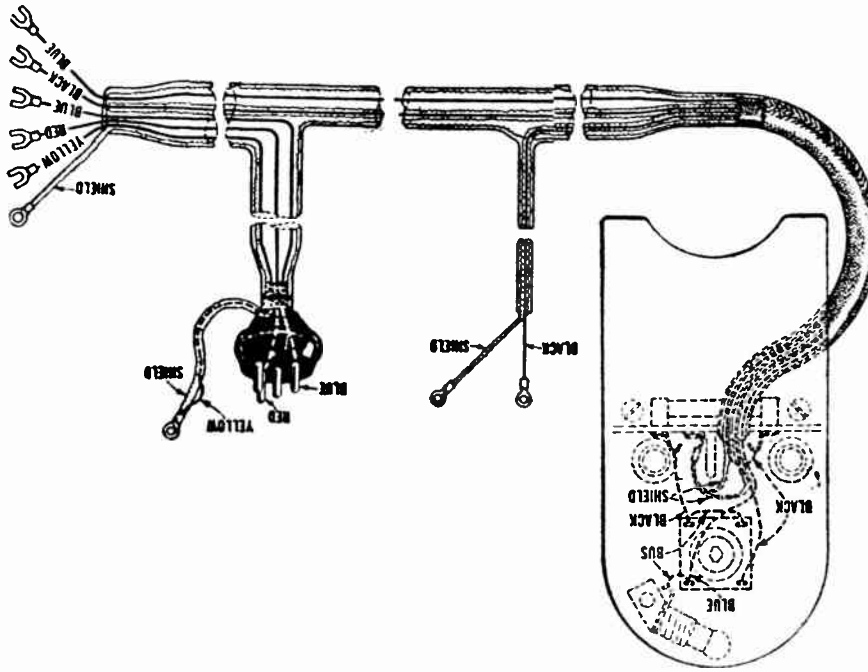
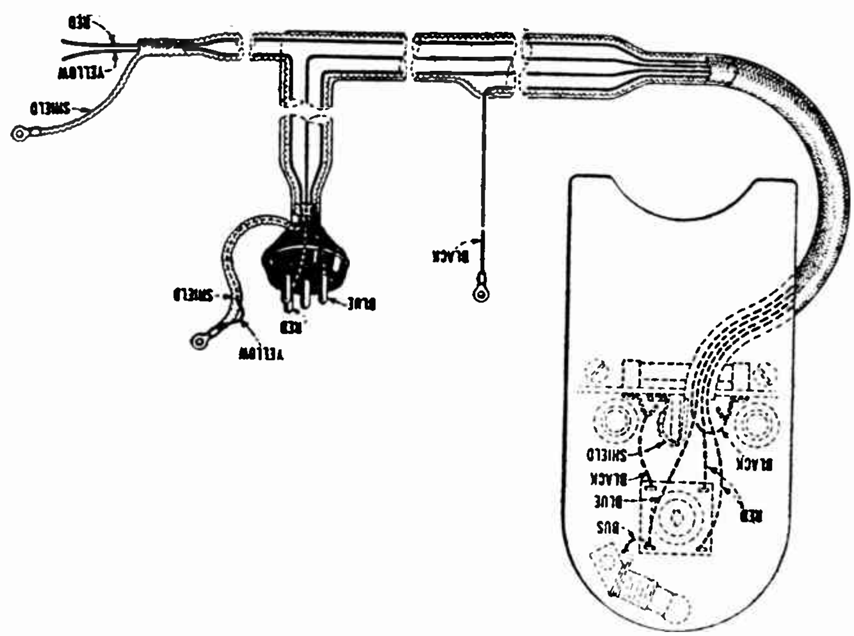


Figure F—Wiring Diagram of Control Box and Cables
Top for Battery Model and bottom for Dynamotor Model



MODEL M-32
Parts List

RCA-VICTOR CO., INC.

REPLACEMENT PARTS

(Replacement Parts May be Purchased from Authorized Dealers and Distributors Only)

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2734	Capacitor—745 mmfd.—Package of 5	$2.20
2747	Contact cap—Package of 5	.50
2749	Capacitor—2,400 mmfd.	1.50
2816	Resistor — 1,000 ohm — Carbon type — ½ watt—Package of 5	2.50
3264	Resistor—25,000 ohms—Carbon type—½ watt—Package of 5	2.00
3442	Resistor—100 ohms—Carbon type—¼ watt —Package of 5	1.00
3443	Resistor—140 ohms—Carbon type—¼ watt —Package of 5	1.00
3447	Coil—Automatic volume control coupling coil	.66
3448	Cord—3 gang tuning capacitor drive cord	.50
3454	Scale—Dial Scale	.54
6114	Resistor — 20,000 ohms — Carbon type — 1 watt—Package of 5	2.00
6143	Resistor—40,000 ohms—Carbon type—¼ watt—Package of 5	2.00
6186	Resistor—500,000 ohms—Carbon type—¼ watt—Package of 5	2.00
6192	Spring—3 gang tuning capacitor drive cord tension spring—Package of 10	.50
6241	Resistor—140,000 ohms—Carbon type—¼ watt—Package of 5	2.00
6243	Resistor — 6,000 ohms — Carbon type — ¼ watt—Package of 5	2.00
6250	Resistor — 4,000 ohms — Carbon type — ½ watt—Package of 5	2.00
6300	Socket—4 contact Radiotron socket	.55
6317	Capacitor—0.05 mfd. capacitor	.70
6320	Capacitor—670 mmfd.—Oscillator series capacitor—Package of 5	2.50
6358	Socket—3 contact socket	.38
6359	Shield—Radiotron tube shield	.36
6360	Transformer—First intermediate frequency transformer	2.14
6361	Transformer — Second intermediate frequency transformer	2.28
6362	Shaft—Tuning capacitor drive shaft with two "C" washers	.40
6363	Volume control—Complete with mounting nut	1.38
6365	Coil—Detector and oscillator coil	2.32
6366	Coil—R. F. coil assembly	1.60
7484	Socket—UY type Radiotron socket	.65
7485	Socket—Radiotron 6 contact socket	.70
7545	Transformer—Interstage auto transformer	2.48
7546	Capacitor pack—Comprising one 0.08 mfd., one 0.1 mfd., two 0.05 mfd., two 0.25 mfd., one 0.75 mfd., one 0.005 mfd., and one 4.0 mfd. capacitors in metal container	3.58
7547	Drum—For 3 gang tuning capacitor	.70
7548	Capacitor—3 gang variable tuning capacitor assembly	3.50
	CONTROL BOX ASSEMBLIES	
3444	Socket—Dial lamp socket	.38
3445	Shaft—Volume control shaft with "C" washer	.48
3446	Shaft—Station selector shaft with "C" washer	.38
3454	Scale—Dial scale	.54
6158	Nut—Knurled nut for lock switch—Pkg. of 10	.50
G5021	Knob—Station selector knob or volume control knob—Package of 5	1.50
G5022	Label—Metal trade mark label—Pkg. of 5	.75
6164	Key—For lock switch—Package of 10	.50
6357	Switch—Lock switch complete	1.46
7543	Shaft—Volume control or station selector flexible shaft—Approximately 39" long	1.92
7562	Shaft—Volume control or station selector flexible shaft—Approximately 51" long	1.62
7563	Shaft—Flexible shaft—Volume control or station selector shaft—Approx. 27" long	1.94
G7842	Cover—Control box cover assembly comprising cover, cover mounting screws, mounting clamp and clamp mounting screws	.76

Stock No.	DESCRIPTION	List Price
	ANTENNA ASSEMBLY	
3465	Cable—Antenna lead-in shielded cable	$0.35
3466	Connector—Antenna lead-in connector	.60
3491	Washer—Rubber insulating washer—Used with insulator No. 6131—Package of 4	.25
6129	Staple—Insulated staple—Package of 100	.75
6130	Screw and nut—U bracket set screw—¼—16 x 1—Complete with lock nut—Pkg. of 10	.50
6131	Insulator—Insulator bushing for No. 7420—Package of 10	.70
6381	Cable—Shielded antenna cable—For use with antenna plate	2.94
7419	Bracket—U bracket for mounting antenna plates—Package of 2	1.60
7420	Stud—Antenna plate stud—¼—16 x 8"—Complete with 5 mounting nuts—Pkg. of 5	1.90
8819	Plate—Single antenna plate	1.75
	MISCELLANEOUS PARTS	
6148	Fuse—10 amperes—Package of 5	.50
6151	Suppressor—Spark plug suppressor	.65
6152	Suppressor—Distributor suppressor	.65
6169	Felt—Felt strip for steering column-Pk. of 10	.50
7065	Screwdriver—Non metallic Screwdriver—For line-up adjustments	1.10
7429	Capacitor—0.625 mfd. capacitor in metal casing with mounting bracket	2.20
7553	Cable—Inter-connecting cable complete with male section of connector plug—For eliminator operation	2.66
7561	Cable—Inter-connecting cable complete with male section of connector plug—For battery operation	2.12
	REPRODUCER ASSEMBLIES	
6182	Terminal board—Reproducer terminal board with 3 terminals—Package of 5	.50
6364	Transformer—Output transformer	2.00
8702	Ring—Cone retaining ring	.80
8961	Coil assembly—Comprising field coil, magnet and cone support	3.34
8962	Cone—Reproducer cone	1.12
8963	Bracket — Reproducer mounting bracket complete with washer and nuts	.98
8964	Housing—Reproducer housing	2.08
8965	Screen—Dust screen	.40
	BATTERY BOX ASSEMBLY	
2968	Receptacle—Four prong receptacle complete	.50
6122	Clamp—Cable clamp—Package of 15	.50
6123	Plug—Four prong male plug	.50
6124	Cap—Plug cover rubber cap for #6123-Pk. of 5	1.50
6125	Fuse—¼ ampere—Package of 5	.50
6126	Clip—Fuse clip—Package of 12	.50
6127	Bolt—Carriage bolt for mounting top of box to car—¼—18 x 1¼"—Complete with lock nut—Package of 5	.50
7418	Bolt—Hanger bolt ¼—18 x 9½"—Complete with two lock nuts—Package of 5	.50
8817	Box body assembly—Comprising bottom plate, 2 side plates, 2 bottom strips and receptacle—Assembled	3.45
8818	Box cover assembly—Comprising cover plate, 2 strips and 2 rubber strips—Assembled	1.70
8820	Plate and strip assembly—Carboard plate and strip assembly comprising six strips and one plate—Package of 5 sets	.75
	"B" ELIMINATOR ASSEMBLIES	
3473	Brushes—One set of 2—For low voltage end of dynamotor	1.04
3474	Brushes—One set of 2—For high voltage end of dynamotor	.82
7554	Filter pack—Comprising one 0.5 mfd., two 4.0 mfd. capacitors, one reactor and two choke coils	4.87
7555	Dynamotor complete	23.52

MODEL M-34
Auto Radio
Schematic
Chassis

R. C. A. VICTOR CO., INC.

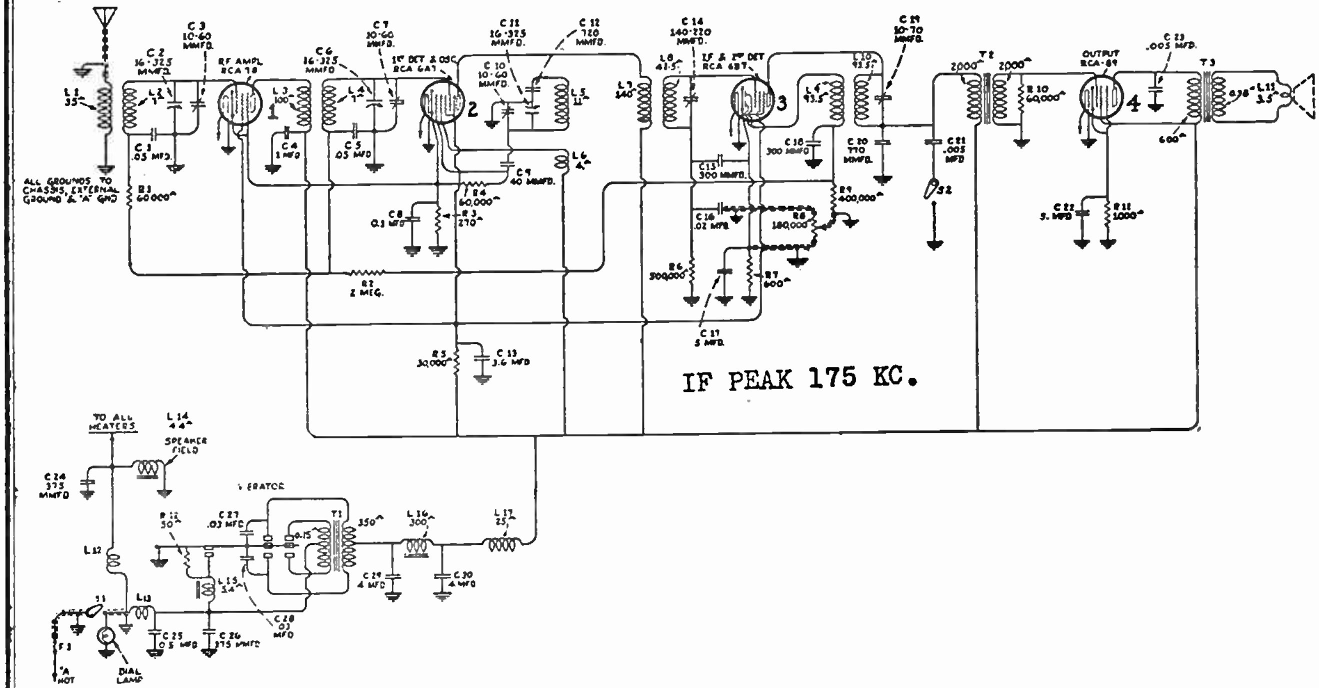


Figure A—Schematic Diagram

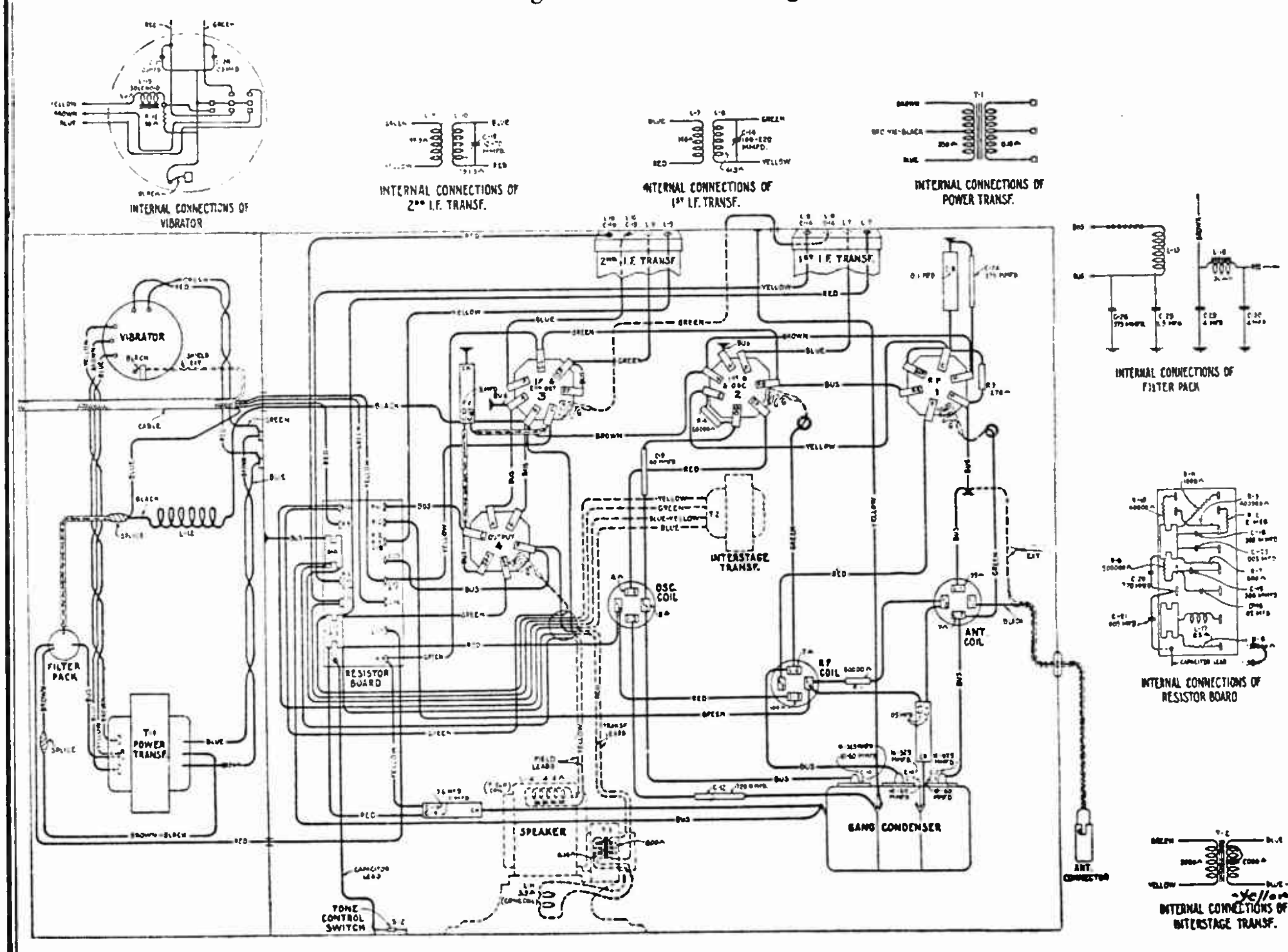


Figure B—Wiring Diagram

Instructions for

RCA Victor M-34

Automobile Receiver

INTRODUCTION

Mechanical simplicity and high-quality performance are keynotes of this automobile radio receiver. The instrument consists of a superheterodyne chassis, a loudspeaker, and a vibrator-type "B" battery eliminator mounted in a single case. It is operated entirely from the car storage battery.

A remote control unit, mounted on the steering column and connected to the receiver through a flexible shaft and cable, places all controls convenient to the driver. This unit contains the station selector control, a glare-proof illuminated dial (calibrated in station channels) and a combined volume control and "key-lock" power switch.

Equipment for the suppression of ignition interference is provided. The use of a roof (built-in or interior type) antenna is recommended.

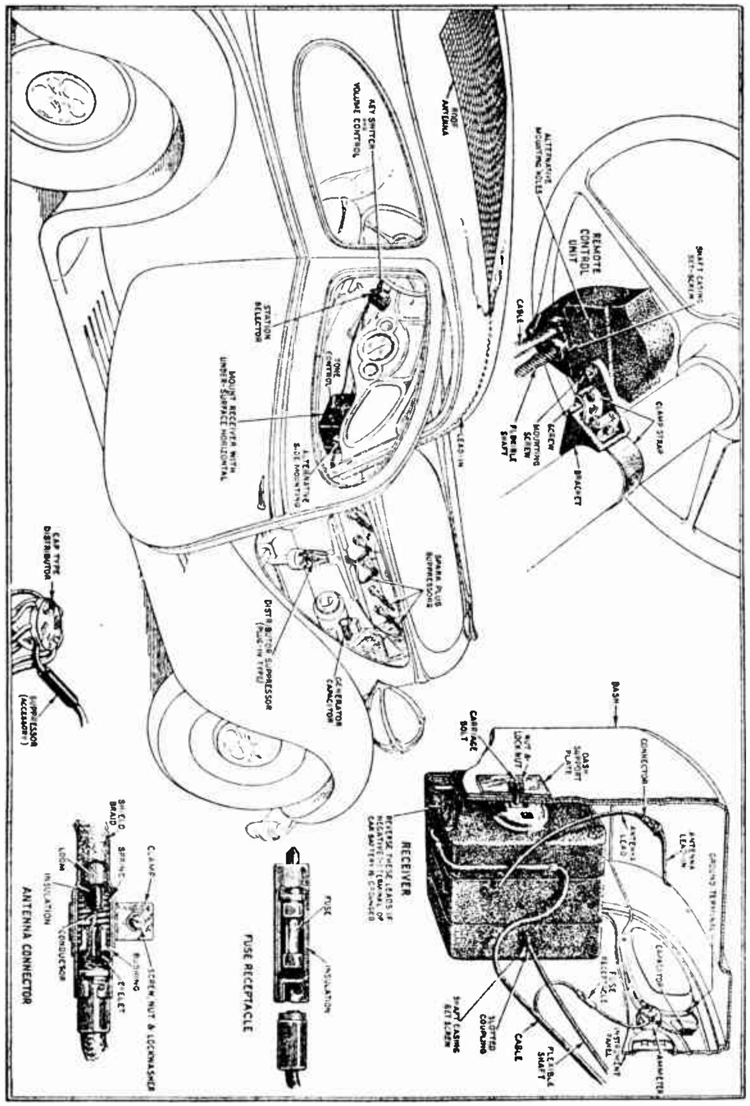


Figure 1

PART I—INSTALLATION

Procedure

1. Unpack the set from carton and check equipment. (See **"Equipment Furnished"—page 4.**)
2. Remove tube packing inside receiver case and examine tubes. (See details under **"Mounting of Units"**—page 5.) *Do not replace case cover.*
3. **CHECK POLARITY OF AUTOMOBILE STORAGE BATTERY SUPPLY.** If the negative (—) side is grounded to car frame, make changes to chassis connections shown in Figure 1. ***Do not disturb** these connections if positive (+) side is grounded.* (See details under **"Mounting of Units"—page 5.**) Replace case cover.
4. Determine most satisfactory mounting position (see details under **"Location of Units"—page 4**), spot mounting-bolt location and drill ½" diameter hole. Insert bolt through dash and assemble support plate and nuts on engine side. Hang receiver over bolt head and tighten nuts. (See Figure 1 and details under **"Mounting of Units"—page 5.**)
5. Attach remote control unit to steering column by means of mounting bracket and strap. (See Figure 1 and details under **"Mounting of Units"—page 5.**)
6. Assemble flexible shaft to receiver and remote control unit. (See Figure 1 and details under **"Mounting of Units"—page 6.**)
7. Connect metal-shielded lead from receiver to antenna by means of coupling connector. (See notes on antennas under **"Location of Units"—pages 4 and 5**—and details of lead-in under **"Connections"—pages 6 and 7.**)
8. Connect terminal at end of *black* lead from cable to binding-post of automobile ammeter (see Figure 1 and details under **"Connections"—page 7**). The ignition by-pass capacitor (equipped with two leads) should be installed at this time. (See Figure 1 and paragraph 4 under **"Suppression of Ignition Interference"—page 7.**)
9. Install spark-plug and distributor suppressors; also generator by-pass capacitor (see Figure 1 and paragraphs 1, 2 and 3 under **"Suppression of Ignition Interference"—page 7**).
10. Push knob over shaft protruding through front of remote control unit. Observing the dial scale, rotate knob slowly—first to stop position slightly beyond "150" and then reverse to other stop position slightly beyond "55."
11. Insert key in lock on remote control unit and turn to extreme clockwise position. Dial should become illuminated immediately but the tubes will not reach proper operating temperature until after approximately 45 seconds. (See details under **"PART II—OPERATION"** and **"PART III—MAINTENANCE."**)

Equipment

A. Equipment Furnished:

1. *Receiver Package*—Includes the receiver and remote control units joined by the wiring cable.

(a) The receiver contains one each of the following Radiotrons installed in sockets: RCA-78, RCA-6A7, RCA-6B7, RCA-89.

(b) The remote control unit contains one dial lamp (6-8 volts).

(c) The wiring cable includes one fuse (20 amperes) installed in attached fuse receptacle

2. *Outfit Package*—Containing:

(a) Flexible shaft ($33\frac{3}{4}$ inches long).

(b) Receiver unit mounting bolt ($\frac{5}{16}$ inch diameter), dash support plate, and nuts (2)

(c) Steering column bracket for remote control unit with strap, screws (2) and lockwasher (1).

(d) Shield clamp for antenna lead-in wire with screw (1), lockwasher (1) and nut (1).

(e) Key (1) and knob (1) for remote control unit and eyelets (2) for antenna connector packed in small envelope.

(f) Ignition Interference Suppression Equipment.

6 Spark plug type suppressors (additional obtainable from your dealer).

1 Distributor type suppressor

2 Capacitors.

(g) Instruction Book

B. Additional Equipment Required:

1. *Antenna*—One of the following types:

(a) Roof (built-in) type—recommended.

(b) Roof (interior) type for attachment to head-lining inside car—also recommended. A special antenna of this type complete with pin-hooks and lead-in wire may be purchased from your dealer

(c) Plate (sub-mounted) type for attachment to channel members of car chassis—alternative. An efficient plate antenna completely equipped for mounting and a specially-designed shielded lead-in wire also are obtainable from the dealer.

Location of Units

Receiver and Remote Control Units—The arrangement of units shown in Figure 1 is recommended and will be found applicable to the majority of automobiles. Consideration should be given to the possibility of interference of the receiver with other equipment beneath the instrument panel or of the mounting bolt with apparatus on the engine side of the dash. By placing the receiver unit toward the right-hand side of the dash, the flexible shaft will be of correct length as furnished in practically all cases. This position, however, may be considered impractical because of its universal preference for heating devices, necessitating installation of the receiver unit either near the center or at the extreme left-hand side of the dash and the use of a shorter flexible shaft. In such cases, the shaft may be either shortened (as described under "Mounting of Units") or exchanged for one of proper length by the dealer.

NOTE—Two support brackets are attached to the receiver case, one on the rear surface and the other on the right-hand side viewing the loudspeaker opening. The side bracket must be used when the unit is mounted at the extreme left-hand end of the dash in order to avoid sharp bends in the flexible shaft and resultant unsatisfactory operation.

As furnished, the remote control unit is equipped for attachment to the steering column of the car. Its clamp bracket is so designed that the driver may select from a wide variety of possible mounting positions for maximum accessibility. The associated bracket strap will be found to accommodate practically any diameter steering column. If considered desirable, however, the remote control unit may be supported upon the instrument panel by means of an accessory bracket procurable from the dealer

Antenna:

(a) *Roof (Built-in) Type*—Best results will be obtained by use of a built-in roof antenna. The majority of modern automobiles (closed body types only) are already equipped with such an antenna installed at the factory, the lead-in wire from which will usually be found coiled up beneath the instrument panel. Many other earlier cars employ a piece of metallic screen—for top material support—which, if ungrounded (not in electrical contact with the metallic frame), may be readily utilized as an antenna.

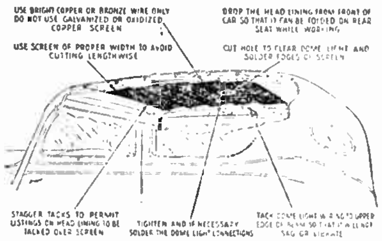


Figure 2

NOTE—The presence of a top support screen and of grounds in that screen may be determined without removing any portion of the inside fabric (head-lining). First procure any sharp-pointed metallic tool, push the point through the fabric (at several points if necessary) and feel around in an attempt to scrape the screen surface—being careful not to puncture the weather-proof top. If a screen is found, connect an ordinary dash or head-lamp between either terminal of the automobile ammeter and the tool, re-insert the tool through the head-lining and make contact with the screen. If the lamp lights, however dimly, it shall be assumed that the screen is grounded.

In order to use an ungrounded support screen, first release the head-lining at the front corner nearest the receiver. Then connect a flexible rubber-insulated lead to the corner of the screen and solder the joint. Feed the free end of the lead down the adjacent pillar-post of the car into the driving compartment and replace the head-lining.

If the top support screen is grounded, or if no screen is present, it will be necessary to drop the entire head-lining (see Figure 2). In the former case, the screen may be insulated by removal of a strip several inches from all edges and from the dome light fixture. The possibility of subsequent shifting may be eliminated by tacking the screen to one or more of the ribs and by lacing the sides with cord. Where no support screen is used, a copper screen having a total area of at least ten square feet should be inserted. It should be located as far to the rear as possible and insulated from all metallic parts grounded to the frame of the car. The antenna finally should be tested for grounds (see the foregoing "NOTE" for test procedure). If satisfactory, attach the lead-in wire and replace the head-lining of the car.

NOTE—Since a degree of skill—only acquired by experience—is necessary in removing and replacing the top fabric material, such work should be allotted to a competent "trim" man.

(b) *Roof (Interior) Type*—The accessory interior-type roof antenna also will provide very satisfactory performance and, in addition, is extremely simple to install. It may be quickly attached to the head-lining inside the car (preferably as far to the rear as possible) by means of pin-hooks, thereby precluding removal of the fabric. An antenna of this type, however, should not be used in any automobile having *a grounded* top material support screen since the proximity of that screen would seriously reduce its efficiency. Before purchase, therefore, it will be advisable to check this possibility, following the test procedure described under "*Roof (Built-in) Type.*"

As furnished, the interior-type antenna is equipped with a sufficient length of lead-in wire ready-attached. The effective antenna wire is enclosed by long-wearing paper procurable either in "gray" or "tan" finish as desired to harmonize with the car upholstery.

(c) *Plate Type*—For those cases where the installation of a built-in roof antenna is considered too costly and the interior roof antenna impractical, good reception from local or semi-distant powerful stations may be procured with the special plate-type antenna also obtainable as an accessory. This unit should be clamped to the frame of the chassis as far to the rear as possible. It is adjustable in length and may be mounted either lengthwise or crosswise of the chassis, which position should be selected with due regard to the prevention of over-crowding. The plate must be placed as close to the ground as possible, but not below the lowest portion of the chassis at the desired location, as sufficient road clearance must be retained. It is also important to avoid any position in which the plate will impede free motion of chassis parts such as springs, drive shaft, or axles in order to prevent damage to the antenna.

Mounting of Units

Details of mounting the various units are shown in Figure 1 The following procedures are recommended:

Receiver Unit—The rear cover of the receiver unit case (held in place by six screws) must be removed and all packing material (inserted for protection of the Radiotrons during shipment) withdrawn. Make certain that all Radiotrons are in the proper sockets and that the control grid clips are pressed down firmly over the respective dome terminals as shown by the diagram printed on the label affixed to the inside of the cover.

NOTE—At this point, it will be advisable to determine the electrical polarity of the storage battery supply. This may be done most conveniently by making an examination of the battery connections and ascertaining which terminal is grounded (that is, connected to the frame of the car). The positive terminal is usually marked (+) and tends to form corrosion far more rapidly than the negative (—). If the positive terminal is grounded, no change in the electrical connections of the receiver unit will be required. However, if the opposite is true, the two leads (equipped with spade terminals) located beneath the radio chassis as shown in Figure 1 must be reversed.

Now replace the rear cover and support the assembled unit against the dash in the chosen location. Allowing a clearance of at least two inches above the top surface, where possible, to permit subsequent removal of the case from the mounting bolt head, mark with a pencil or crayon on the dash four points corresponding to the corners of the adjacent case surface. Then determine the exact center of the area bounded by those four points (by drawing diagonal lines between opposite corners) and mark that position with a center-punch. Next drill a $\frac{1}{2}$ inch hole at the center-punch mark and insert the mounting bolt. The support plate and the two nuts then should be assembled upon the bolt from the engine side of the dash as shown but should not be tightened. Finally hang the receiver over the bolt head, align sides vertically and tighten the nuts in place.

Remote Control Unit—In attaching the remote control unit to the steering column of the car, it will be advisable first to examine the detailed view (in Figure 1) showing the assembly of its mounting bracket. Four small holes are contained in the associated flexible strap at distances proper for use with steering columns of the most common diameters ($1\frac{1}{2}$, $1\frac{5}{8}$, $1\frac{3}{4}$, $1\frac{7}{8}$ inches) but the strap length will be found sufficient to permit the insertion of an additional hole if necessary to accommodate a 2 inch column. The proper hole may be determined by wrapping the clamp strap tightly around the column, inserting the machine screw furnished through that hole found to be nearest in alignment with the tapped hole in the clamp bracket. Three tapped holes are provided in the back of the remote control unit, permitting support of that unit either at the right- or left-hand side or above the steering column

Flexible Shaft—Insert that end of the flexible shaft to which is attached the slotted coupling through the bushed opening in the left side of the receiver unit. Then rotate the shaft from the free end until the coupling slot is felt to engage over the pin contained in the tuning mechanism and slide the shaft forward to the full depth of the slot. With the shaft held in this position, insert the opposite end of the shaft through the bushing at the rear of the remote control unit and push forward until the flatted portion of the shaft protrudes through the front cover. Then proceed to tighten the external set-screw (located at the bottom of the case—see Figure 3) adjusting the shaft position as necessary until the screw is felt to engage in the groove. Tighten the screw fully to the bottom of the slot and then loosen it approximately one-quarter of a turn. Finally, secure the flexible casing in place by tightening the set-screws at each end.

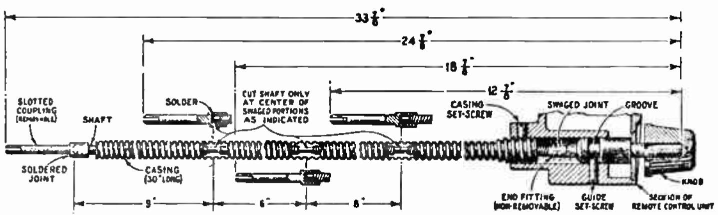


Figure 3

NOTE—In many installations it will be found necessary or desirable to use a flexible shaft of shorter length than 33⅞ inches. While it is simplest to procure a shaft of proper length from the dealer as mentioned heretofore, very little difficulty should be experienced in shortening the original part if deemed expedient. To shorten the shaft, refer to Figure 3 and proceed as follows:

1. Determine the minimum shaft length permissible for the installation.
2. Remove the slotted coupling (using a soldering iron) and withdraw the shaft from its casing.
3. Cut the shaft only at the center of a swaged joint, selecting that joint which allows at least the required length.
4. Cut from the shaft casing a length equal to the amount of shaft removed. (This operation may be simplified by placing the casing between wooden blocks in a vice so that the block ends will serve to guide the back saw blade.)
5. Replace the shaft in its casing and solder the slotted coupling to the end of the shaft.

Connections

Refer to Figure 1 and make connections as follows:

Antenna to Receiver—For least ignition interference, any portion of the antenna lead-in wire which extends behind the instrument panel or into the engine compartment of the car should be fully shielded and cut to eliminate excessive slack when attached to the receiver antenna connector. Before connecting the antenna to the receiver, the following comments applying to the particular type of antenna adopted should be observed:

(a) *Roof Antenna* (Built-in Type)—The lead-in wire from a factory-installed built-in roof antenna usually is unshielded and often is of insufficient length to reach the receiver. If necessary, an extra length of insulated wire may be spliced to the existing lead-in, in which case the joint must be soldered and wrapped with tape. In general, it will be advisable to shield the exposed length of lead-in wire, procuring for this purpose from your dealer a length of shield braid and an equivalent length of insulating loom (or rubber tubing) sufficient to extend between the end of the lead-in wire and its point of entrance from the body pillar post. Slip the loom over the lead-in wire and the shield braid over the loom.

(b) *Roof Antenna* (*Interior Type*)—If an interior type antenna is used, the lead-in wire should be brought down the outside of that front pillar post nearest the receiver.

(c) *Plate Type Antenna*—With the plate type antenna, the fully-shielded end of the special cable should be brought into the automobile driving compartment through a ½ inch hole drilled in the toe-board (if no other opening is available). This end is to be connected to the receiver unit antenna lead (as explained in following paragraphs) and the opposite (unshielded) end then cut off as required to eliminate excessive slack upon connection to the plate. The pigtail extension from the end of the shield must be soldered or bonded to the frame of the car.

Refer to the detailed view of the antenna connector shown in Figure 1 and proceed to attach the lead-in wire (if shielded) as follows: First, cut the end of the lead-in so that the internal insulated wire and loom (if present) are flush with the end of the shield covering and push back the shield approximately 1¼ inches. Cut the loom to the end of the shield and then remove sufficient insulation to expose one inch of clean bare-conductor. Now disconnect the female portion of the connector attached to the receiver antenna lead and remove the small internal bushing and spring.

To assemble, slip the bared conductor through the female portion of the connector and then through the spring and bushing, making certain that the insulation enters the end of the connector. Bend over and spread the strands of the conductor against the forward end of the bushing and then force one of the eyelets (packed in small envelope in outfit package) into the bushing to hold the conductor in position. Cut off the ends of the conductor strands approximately ¼ inch beyond the edge of the eyelet and bend the strands over toward the center of the eyelet. The assembly may be now attached to the receiver portion of the connector and the shield covering on the lead-in wire pushed forward to cover the adjacent end of the female portion. Finally, bond the shield to the connector by means of the small clamp furnished. No soldering operations are required.

NOTE—An unshielded lead-in wire (as in the case of the interior-type antenna) may be attached to the antenna connector as described above except that all references to the shield braid and loom may be neglected.

Power Supply to Receiver—The power input lead (*black* wire with fuse receptacle and terminal, extending from the receiver cable) must be connected electrically to the ungrounded side of the car storage battery. This connection preferably may be made at the battery terminal of the ammeter (usually the terminal with only one lead attached—consult wiring diagram in instruction book for automobile) and any slack length remaining should be taped securely behind the instrument panel.

Suppression of Ignition Interference

1. Disconnect all wires from the spark plugs. Fasten one spark plug suppressor to the top of each plug and re-attach the wires to the free ends of the suppressors. These suppressors may be mounted either in line with or at right angles to the plugs (as shown in Figure 1) in order to avoid interference with metallic parts grounded to the engine or frame.

2. If the distributor is of the plug-in type, disconnect the center wire from the head. Plug the distributor suppressor into the distributor head and insert the wire in the free end of the suppressor.

NOTE—For cap-type distributors, exchange the distributor suppressor at your dealer's for one of a special type. Cut the wire leading from the distributor to the coil and screw the suppressor into the end attached to the distributor. Screw the other end of the wire (leading to the coil) into the opposite end of the suppressor.

3. Clamp the generator by-pass capacitor against the generator frame. The screw holding the cut-out ordinarily may be utilized for securing this unit. Connect the capacitor lead to the terminal on the generator side of the cut-out switch. (In some cases, interference will be reduced by connecting the capacitor lead to the opposite side of the cut-out. The most suitable position for this lead must be determined by trial.)

4. The other by-pass capacitor must be connected between the battery terminal of the ammeter and any convenient screw on the instrument panel. In certain cases, interference will be reduced still further by connecting an additional capacitor (obtainable from your dealer) between the battery side of the ignition coil and the car frame.

PART II—OPERATION

The instrument should be operated as follows:

1. Insert the key in the lock on the remote control unit and turn it clockwise to the extremity of its rotation.

NOTE—This key serves to operate both the power switch and the volume control. A slight rotation clockwise will turn the power "on" and the remainder of the range permits adjustment of volume. The dial scale should become illuminated when the power is "on."

2. Rotate the Station Selector knob in either direction until a desirable station program is heard.

NOTE—The dial scale is calibrated in channels to aid in station identification. Add one cipher to the scale marking to obtain the actual frequency in kilocycles.

3. After receiving a signal, turn the Volume Control counter-clockwise until the volume is reduced to a low level. Now, readjust the Station Selector to the position midway between the points where the quality becomes poor or the signal disappears. This operation insures the best quality of reproduction.

4. Finally, advance the Volume Control (clockwise) until the desired level is obtained. Except on weak signals, the automatic volume control will maintain the volume substantially at the latter level, thereby precluding further manual adjustments. (Fading of the signal may be experienced in extreme cases, as when passing under bridges or other metallic structures, since such structures almost completely shield the antenna.)

5. Set the Tone Range Switch (located on the front of the receiver unit) for the preferred tone quality. This switch has two positions. In the counter-clockwise position, high-frequency (treble) response and static interference (when present) are decreased.

6. When through operating, turn the key to the "off" position, counter-clockwise. The instrument is then locked by removing the key.

PART III—MAINTENANCE

Noisy or weak reception may be due to one of the following causes:

Radiotrons—The Radiotrons should be tested periodically and replaced if necessary in order to maintain best performance. The efficiency of each Radiotron may be checked by comparison with a new one of the same type in its place. Spare Radiotrons of each type should be kept on hand.

Fuses—This installation is protected by one fuse (rated 20 amperes) which is mounted in the fuse receptacle contained in the power input lead. If the set fails to operate and the dial lamp does not light, this fuse should be removed for examination. If found to be burned out, the wiring should be inspected for short-circuits or grounds and all tubes tested prior to insertion of a new fuse. **The replacement fuse must be of the same ampere rating.**

"B" Battery Eliminator—This unit should operate satisfactorily with little or no attention. With the power turned "on," a slight buzz should should be noticed to emanate from the receiver. This buzz should be taken as indicative of proper operation of the "B" Battery Eliminator vibrator. Failure to observe this buzz, accompanied by repeated necessary replacement of the fuse, will denote a faulty condition, and, in such cases, the complete receiver should be taken to the dealer for inspection. **Do not attempt to adjust the vibrator yourself!**

Antenna—A properly installed roof antenna or the built-in or interior-type should require no attention. When the plate antenna is employed, the insulator bushings should be cleaned occasionally to prevent grounding.

Ignition System—The ignition system of the car must be kept in good condition. Fouled plugs or plugs with improperly adjusted gaps will affect the operation of the receiver as well as of the automobile. Burned or improperly adjusted breaker points will also impair the performance. It will be advisable to advance the generator charging rate in order to compensate for the additional drain on the car storage battery imposed by this instrument.

6104 (7-7)

PART IV—SERVICE DATA

Type and Number of Radiotrons Used	1 RCA-89, 1 RCA-78, 1 RCA-6A7, 1 RCA-6B7—Total, 4
Total Battery Current	5.5 Amperes
Undistorted Output	2.0 Watts
Loudspeaker Field Current	1.35 Amperes
Maximum Output D. C. Voltage from Rectifier	250 Volts
Total Plate Current	53 M. A.

This four tube Superheterodyne Automobile Receiver is of compact construction and gives excellent performance. Features such as unit construction (one unit contains the receiver, plate supply unit and loudspeaker), ease of installation, freedom from ignition noise and excellent sensitivity, selectivity and tone quality characterize this instrument.

Plate Supply Unit

This receiver uses a vibrator type Inverter and rectifier that provides a source of direct current voltage for use as plate and grid supply for all Radiotrons. *This unit is accurately adjusted at the factory and service adjustments should not be attempted.* Any difficulties with this unit should be referred to the nearest Distributor handling these instruments who has instructions for servicing this item.

Line-up Capacitor Adjustments

The three R. F. line-up capacitors and two I. F. tuning capacitors are accessible and may require adjustments. The R. F. adjustments are made at 1400 K. C. and the I. F. adjustments at 175 K. C. The R. F. adjustments can be made with the receiver in its case, access to the adjusting screws being obtained through a slot in the bottom of the case. For the I. F. adjustments, however, it is necessary to remove the rear cover in order to couple the oscillator to the first detector. The following procedure should be used for either adjustments:

R. F. Adjustment

The three R. F. line-up capacitors are adjusted at 1400 K. C. Proceed as follows:

(a) A fairly accurate adjustment can be made by using the ear for an indicating device, thus eliminating the need of an output meter and the necessity of removing the rear cover to connect it.

(b) Procure a modulated oscillator giving a signal at 1400 K. C. and a non-metallic screw driver.

(c) Couple the output of the oscillator from antenna to ground, set the dial at 140, and the oscillator at 1400 K. C.

(d) Place the oscillator and receiver in operation and adjust the oscillator output so that a weak signal is obtained in the loudspeaker when the volume control is at its maximum position.

(e) Then adjust the three line-up capacitors until maximum sound in the speaker is obtained. Readjust these capacitors a second time as there is a slight interlocking of adjustments.

For a more accurate adjustment, the use of an output meter is recommended. However, this will require the removal of the rear cover in order to connect the output meter across the cone coil. Also the bottom and Radiotron side of the chassis must be shielded together with the transformer so that vibrator noise will not be obtained, due to the removal of the case shielding.

I. F. Adjustments

In order to make the I. F. adjustments, it is necessary to remove the rear cover, due to the fact that the external oscillator must be connected between the control grid of the first detector and ground. Proceed as follows:

(a) Procure a modulated oscillator giving a signal at 175 K. C., a non-metallic screw driver and an output meter.

(b) Remove the receiver from its case, shield the transformer and Radiotrons as described under R. F. adjustments, place the receiver in operation and connect the oscillator output between the first detector grid and ground. Connect the output meter across the voice coil of the loudspeaker. Then connect the antenna lead to ground and adjust the tuning capacitor so that no signal except the I. F. oscillator is heard at maximum volume. With the volume control at maximum, reduce the external oscillator output until a small deflection is obtained. Unless this is done, the action of the A. V. C. will make it impossible to obtain correct adjustments.

(c) Each transformer has but one winding that is tuned by means of an adjustable capacitor, the other windings being untuned. The capacitors should be adjusted for maximum output.

At the time I. F. adjustments are made it is good practice to follow this adjustment with the R. F. adjustments, due to the interlocking that always occurs. The reverse of this, however, is not always true.

Practical Hints on Installation

The following suggestions may prove useful when making installations on the particular cars mentioned.

Chevrolet 1933—Mount chassis on left side, end against car bulkhead and use short flexible shaft. Use both capacitors, one on the ammeter and one on the generator. Use all suppressors. Place a copper screen under the toe board on right side, 10" x 10" to prevent the body from radiating ignition interference which may be picked up by the antenna. This screen must be grounded.

Plymouth 1933—Mount chassis on left side, back against car bulkhead and use 33⅞" flexible shaft. Use both capacitors, one on the ammeter and one on the generator. Use all suppressors.

Ford V-8 1932—Mount chassis on left side, end against car frame and use short flexible shaft. Use one capacitor, connected to the generator. Install eight spark plug type suppressors only, no distributor suppressor being necessary.

The majority of cars will be found to be entirely free from ignition noise when the standard equipment is used. Usually mounting the chassis on the right side of the bulkhead will be found most desirable, although if a heater is used, the left side will be preferable.

RADIOTRON SOCKET VOLTAGES

6.3 Volt Battery

Radiotron No.		Cathode to Ground	Cathode to Screen Grid Volts	Cathode to Plate Volts	Plate Current M. A.	Heater Volts
RCA-78 R. F.		3.7	92	253	7.0	6.06
RCA-6A7	First Detector	3.7	92	253	12.0 Total	6.06
	Oscillator	0	—	253		
RCA-6B7 Second Detector		3.2	92	236	6.0	6.06
RCA-89 Power		26.5	230	217	27.5	6.06

R. C. A. VICTOR CO., INC.

MODEL M-34
Auto Radio
Vibrator Notes

SERVICE DATA FOR VIBRATOR UNIT

The vibrator unit used in this receiver is of excellent design and sturdy construction. It functions as a combined A. C. generator and mechanical rectifier. Referring to Figure C, it will be noted that the primary and secondary of the transformer are center tapped. By connecting the outside of each winding to the contacts of the vibrator and using the arms and center taps of the windings as sources of input and output voltage, a combined generating and rectifying action is obtained.

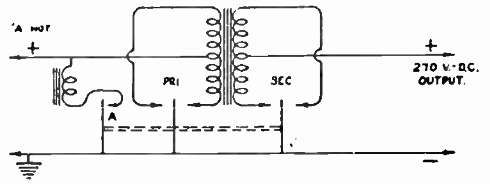


Figure C—Schematic of Vibrator Unit

When the switch is turned "on" the vibrator makes and breaks contact at point "A." This constitutes the driving action of the unit, and is in no way connected with the other circuits. The primary vibrator functions to connect the input low voltage current first across one-half and then across the other half of the primary of the transformer. This results in a pulsating direct current applied to the primary in an alternating direction. The result is an A. C. voltage emanating from the secondary of the transformer; as the transformer has a step-up ratio the A. C. secondary voltage is considerably greater than the primary. The secondary vibrator functions in a similar manner as that on the primary side, so that by reversing the alternations applied to the load, a pulsating D. C. is obtained. After filtering, this is used as plate and grid supply to all Radiotrons.

(1) Spring and Contact Adjustment Limits.

Proper adjustments of the various contacts are made in the following order and manner:

1. With 8 and 10, Figure D, firmly held against their respective stops and with 3 and 5 in contact with 8 and 10 respectively, the air gap between 1, 6 and 2, 7 shall be 0.015" plus or minus 0.005". On no particular unit however, shall the differences between the two air gaps exceed 0.005".

2. Adjust the buzzer screw, 11, Figure D, so that when the position of the armature is such that 1 and 2 are just making contact with 6 and 7 respectively, the contact between 4 and 9 shall just be breaking.

(2) Adjustment for the Reduction of Sparking.

If any pair of contacts show excessive sparking, the following procedure will in general reduce the sparking to a minimum.

For example, consider the case where excessive sparking is occurring between 6 and 1. Sparking will be reduced to a minimum by bending the armature spring on that side (secondary side) away from 6 and toward 8. (See Figure D.) If the bend is too small, only a small change will be noted. However, if an excessive bend is made, the sparking will be transferred from 6, 1 to 8, 3.

The same method may be applied to any pair of contacts. Usually only a slight bend will be necessary. Although after bending, no change in the position of the armature contacts may be noted, a sufficient change in the initial force requirements will have been made to reduce sparking.

(3) Output Voltage.

When connected to a 6 volt primary source, the output voltage across a 5,000 ohm resistor (connected in place of the receiver load at the output of the filter), must be 240 volts or greater.

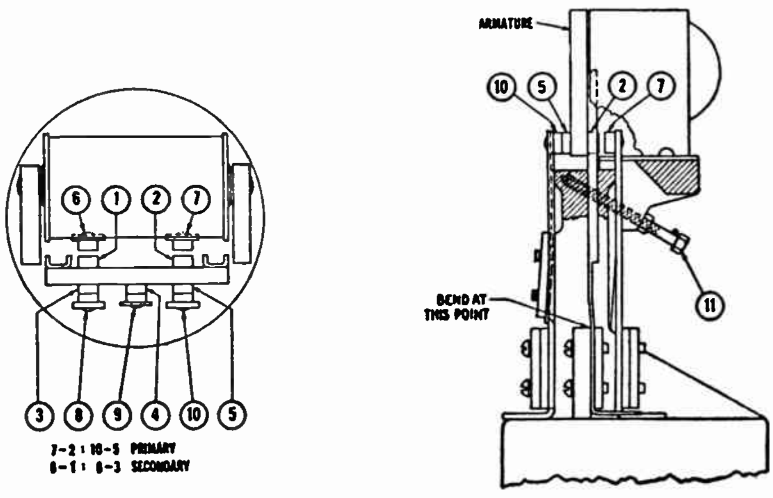


Figure D—Vibrator Contacts

R. C. A. VICTOR CO., INC.

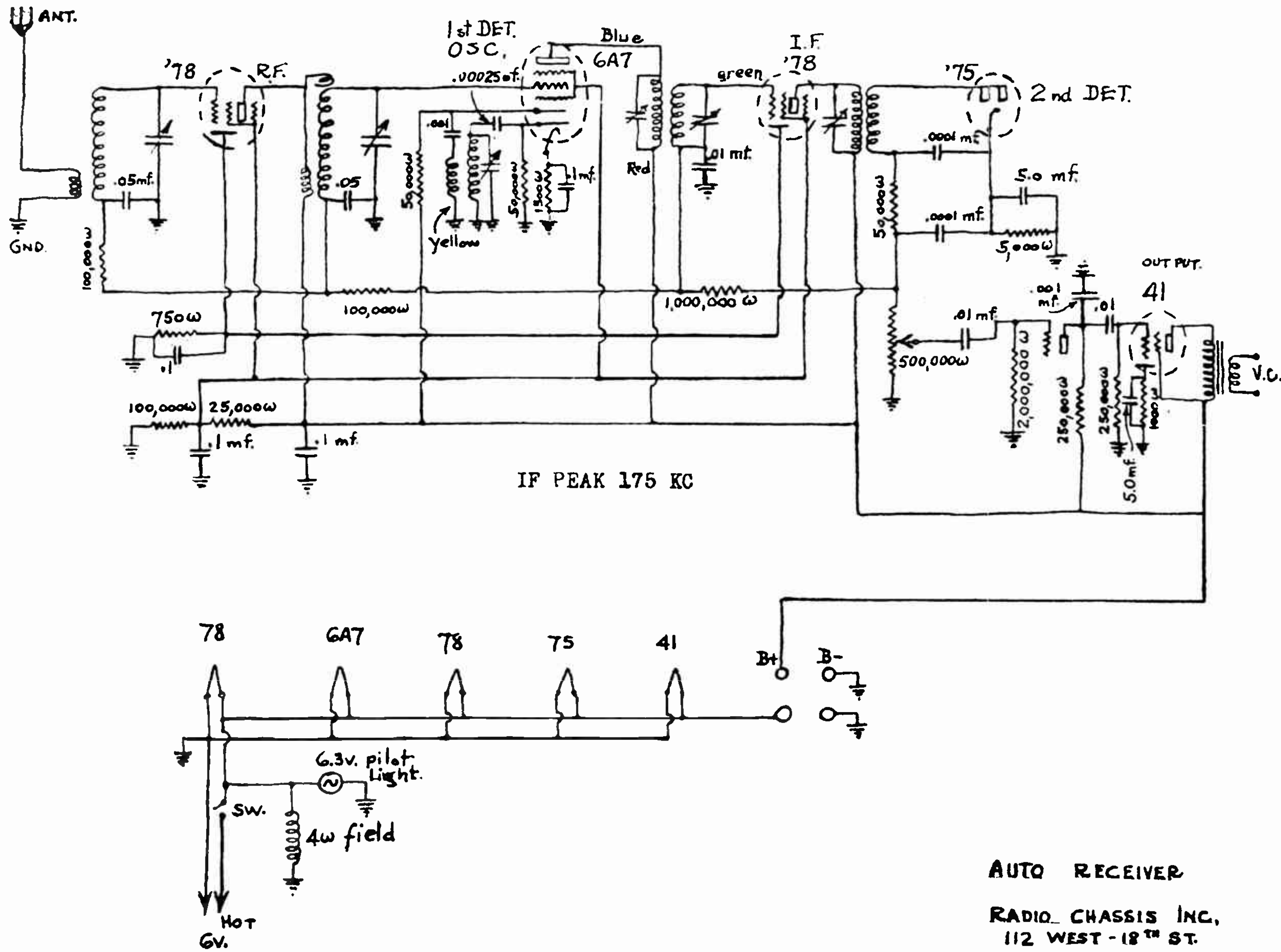
MODEL M-34
Auto Radio
Parts List

REPLACEMENT PARTS

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

Stock No.	DESCRIPTION	List Price
	RECEIVER ASSEMBLIES	
2240	Resistor—30,000 ohms—Carbon type—1 watt	$0.70
2816	Resistor—1,000 ohms—Carbon type—1 watt—Package of 5	2.50
3218	Resistor—600 ohms—Carbon type—¼ watt—Package of 5	2.50
3572	Socket—Radiotron 7 contact socket	.38
3602	Resistor—60,000 ohms—Carbon type—¼ watt—Package of 5	1.00
3616	Capacitor—300 mmfd	.34
3617	Capacitor—0.005 mfd	.38
3618	Capacitor—0.02 mfd	.38
3619	Resistor—400,000 ohms—Carbon type—¼ watt—Package of 5	1.00
3621	Coil—Choke coil—Located on resistor board	.35
3636	Transformer—1st intermediate frequency transformer	1.74
3637	Transformer—2nd intermediate frequency transformer	1.65
3641	Capacitor—0.1 mfd	.35
3644	Bracket—Condenser drive bracket and roller	.40
3645	Knob—Tone control knob—Package of 5	.90
3695	Capacitor—375 mmfd	.22
3696	Capacitor—40 mmfd	.22
3699	Capacitor—720 mmfd	.40
6135	Resistor—270 ohms—Carbon type—¼ watt—Package of 5	2.00
6186	Resistor—500,000 ohms—Carbon type—¼ watt—Package of 5	2.00
6192	Spring—Tuning condenser drive cord tension spring—Package of 10	.50
6242	Resistor—2 megohms—Carbon type—¼ watt—Package of 5	2.00
6298	Cord—Tuning condenser drive cord—Package of 5	1.00
6471	Coil—Oscillator coil assembly	.74
6472	Coil—R. F. coil assembly	.94
6488	Transformer—Interstage audio transformer	1.30
6489	Coil—Antenna coil	.86
6490	Tone control switch	.35
6492	Capacitor—Comprising one 3.6 mfd. and one 1.0 mfd. capacitors	1.08
6493	Drum—Tuning condenser drive drum	.40
6513	Capacitor—Comprising two 5.0 mfd. capacitors	1.00
6514	Capacitor—Comprising two 0.05 mfd. capacitors	.28
6515	Cable—Shielded cable with antenna connector	.32
6516	Connector—Fuse connector	.16
6517	Cable—Main cable complete with fuse connector	1.40
7485	Socket—Radiotron 6 contact socket	.70
7600	Filter pack—Comprising one reactor, one choke coil, one 0.5 mfd., two 4.0 mfd. and one 375 mmfd. capacitors	4.06
7601	Condenser—3 gang variable tuning condenser	2.84
9430	Transformer—Power transformer	3.60
	CONTROL BOX ASSEMBLIES	
3649	Key—Volume control and switch key	.18
3650	Screw—Self locking No. 10-32-$\frac{3}{16}$" fulldog point set screw—Package of 10	.32
3651	Screw—Self locking No. 10-32-$\frac{3}{16}$" cupped point set screw—Package of 10	.32
3652	Screw—Self locking No. 10-32-¼" cupped point set screw—For flexible drive shaft—Package of 10	$0.32
3690	Strap and bracket assembly—Comprising one bracket, two screws, one lock washer and one strap	.40
6161	Knob—Station selector knob—Package of 5	1.50
6496	Shaft—Flexible drive shaft complete with connectors—Approximately 24 1/16" long	1.60
6497	Shaft—Flexible drive shaft complete with connectors—Standard length—Approximately 33 7/8" long	1.75
6499	Volume control—Combination volume control and switch	1.36
6500	Nut—Volume control and switch lock nut	.24
6501	Scale—Dial scale	.40
6531	Shaft—Flexible drive shaft complete with connectors—Approximately 12 7/8" long	.85
6532	Shaft—Flexible drive shaft—Complete with connectors—Approximately 18 7/8" long	1.24
7602	Box—Control box complete	3.00
7603	Cover—Control box cover	.44
	MISCELLANEOUS PARTS	
3646	Fuse—20 amperes—Package of 5	.40
3647	Nut—Cap nut and lock washer—Package of 10	.35
3648	Screw—No. 10-32-$\frac{3}{16}$" cap screw and lock washer—Package of 10	.32
3689	Bracket—Receiver mounting bracket, bolt and nut Assembly—One set	.30
6151	Suppressor—Spark plug suppressor	.56
6152	Suppressor—Distributor suppressor	.56
6494	Capacitor—Ammeter capacitor—0.5 mfd.	.46
6495	Capacitor—Generator capacitor—0.5 mfd.	.72
	VIBRATOR ASSEMBLIES	
3611	Spring—Buzzer spring and contact point—Package of 5	.60
3612	Screw—Buzzer adjustment screw and nut—Package of 10.	.48
3613	Spring—Main contact spring and contact point—Package of 4	.62
3614	Resistor—50 ohms—Carbon type—½ watt—Package of 5.	1.00
6478	Armature assembly—Comprising armature, contacts and springs—Assembled	.86
6479	Coil—Vibrator coil assembly	1.20
6480	Capacitor and base assembly—Comprising vibrator base and two 0.03 mfd. capacitors	.78
6481	Shield—Outer shield for vibrator assembly	.32
6482	Shield—Inner shield for vibrator assembly	.40
7604	Vibrator—Vibrator assembly complete	5.64
	REPRODUCER ASSEMBLIES	
3688	Transformer—Output transformer	1.50
7607	Screen—Metal screen	.44
7608	Coil assembly—Comprising field coil, magnet and cone support	2.40
8987	Cone—Reproducer cone complete—Package of 5	5.00

RADIO CHASSIS, INC.

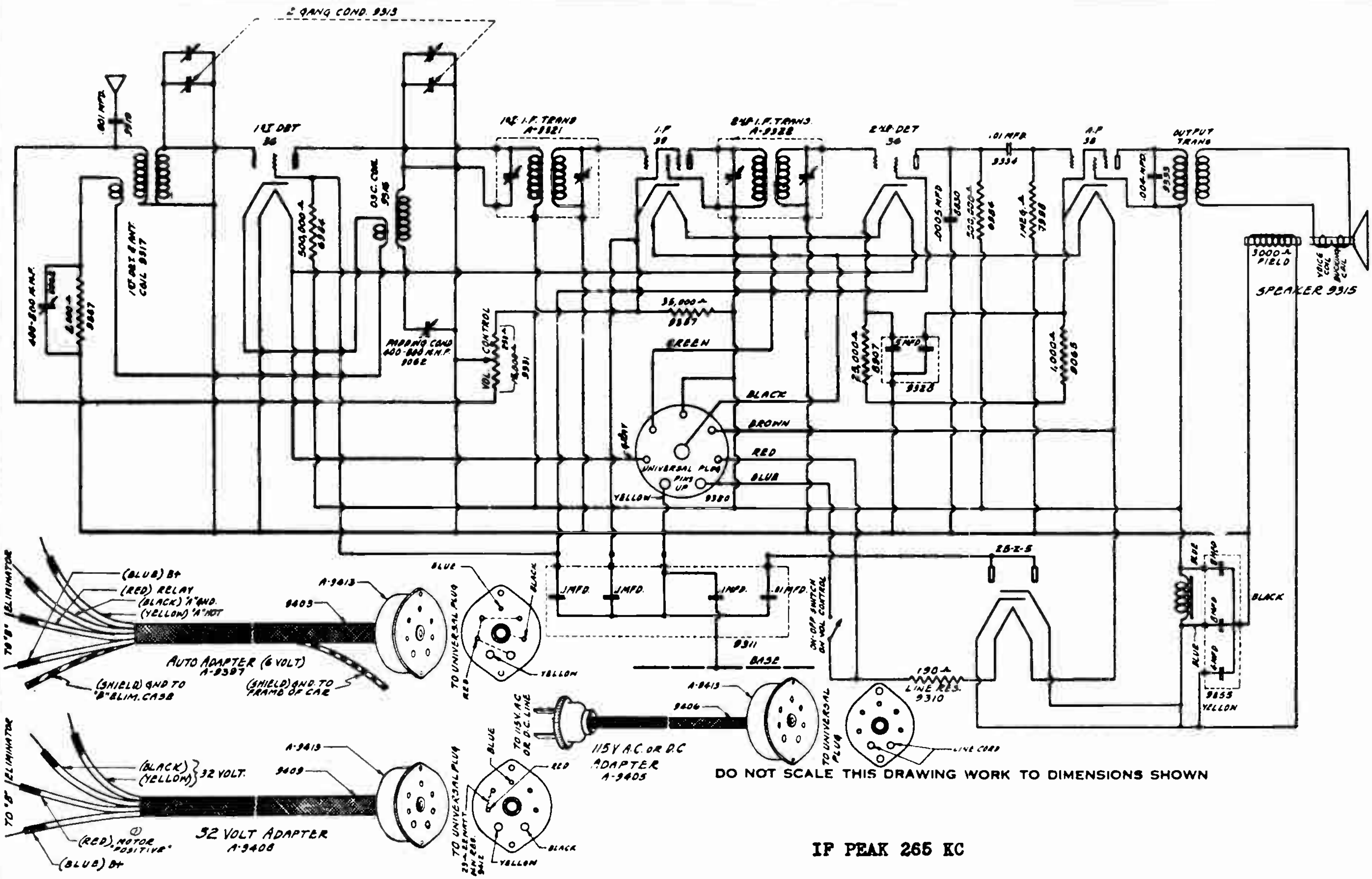


AUTO RECEIVER

RADIO CHASSIS INC.
112 WEST - 18TH ST.
N.Y.C.

MODEL 560, 561
Schematic

SENTINEL RADIO CORP.



DO NOT SCALE THIS DRAWING WORK TO DIMENSIONS SHOWN

IF PEAK 265 KC

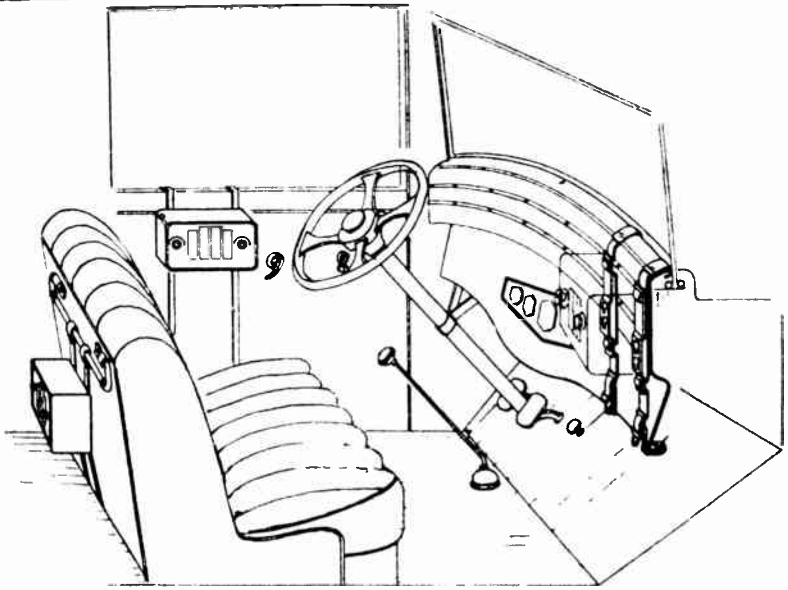
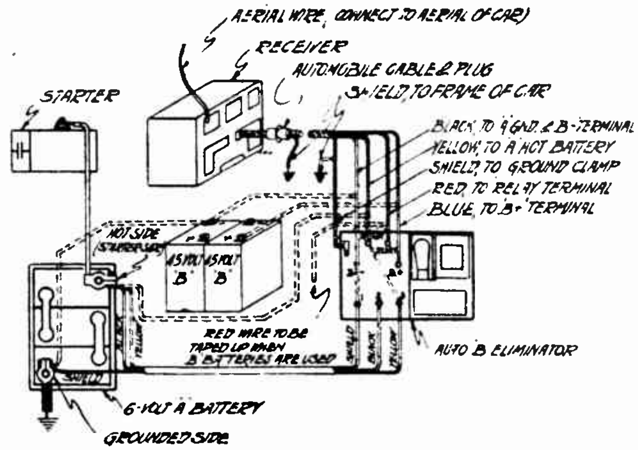
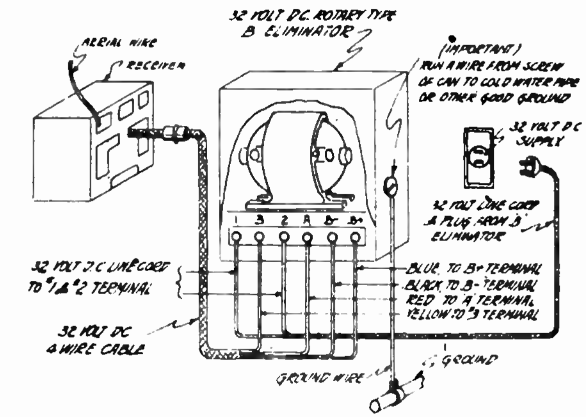


FIG. 1 SKETCH SHOWING VARIOUS MOUNTING OF RECEIVER



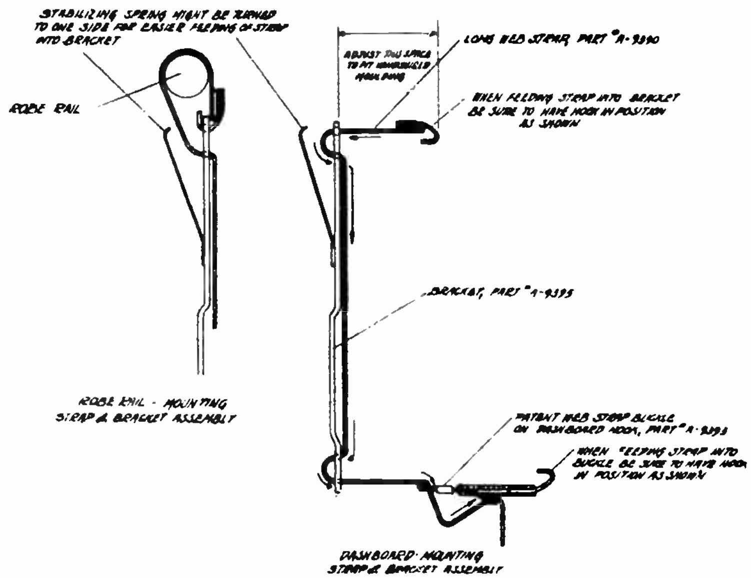
NOTE - DOTTED LINES SHOW CONNECTIONS TO B BATTERIES WHEN B ELIMINATOR IS NOT USED

FIG. 2 SKETCH SHOWING CABLE CONNECTIONS TO B ELIMINATOR OR B BATTERIES FOR 6 VOLT A AUTO OPERATION



NOTE - IF B BATTERIES ARE USED INSTEAD OF B ELIMINATOR, CONNECT THEM TO SET CABLE WIRES AS SHOWN IN DOTTED LINES IN FIG 2. THE YELLOW AND BLACK CABLE WIRES ARE CONNECTED TO LINE CORD & PLUG FOR 32 VOLT SOCKET CONNECTION.

FIG. 3 SKETCH SHOWING CABLE CONNECTIONS TO B ELIMINATOR FOR 32 VOLT D.C. OPERATION



METHOD OF FEEDING STRAP INTO BRACKET & BUCKLE
FIG. 4

MODEL 560,561
Voltage Data
Part 1

SENTINEL RADIO CORP.

SERVICE NOTES
for the
FIVE TUBE AC-DC SUPERHETERODYNE
(110 V. AC-DC, 6 V. Storage Batteries & 32 V. DC)

VOLUME CONTROL: The volume control is located on the left hand side of the chassis. It is a fifteen thousand ohm potentiometer and attenuates by controlling the bias on the intermediate frequency tube and also attenuates in the anntena circuit, by shunting the input. The off and on switch is controlled by the volume control knob. When the volume control is turned to the maximum counter-clockwise position the receiver is turned off and is placed in operation by the reversed action. The quality of the reproduced signal is not affected by the setting of the volume control, except if it is too far advanced to the right on strong local signals the detector tube will naturally overload. This condition will be indicated by the volume decreasing and the tone quality being impaired. Retarding volume control in the counter-clockwise direction will increase volume and eliminate distortion. This is natural and does not indicate a defect in the receiver or a defective volume control. A double peak will be noticed when the detector is overloaded, that is the station will be heard on either side of the correct tuning point with more volume than at the correctly tuned position. If an extremely long aerial is used the overloading position of the volume control will be further towards the minimum volume position than if a short antenna is used likewise local signals will overload the detector more readily than distant reception.

INTERMEDIATE TRANSFORMERS: The intermediate transformers are tuned to 265 kilocycles. The intermediate frequency transformer trimmers are rigidly mounted and the transformers are so constructed that the transformer rarely becomes detuned. FOR THIS REASON IT SHOULD NEVER BE NECESSARY TO RETRACK THE INTERMEDIATE TRANSFORMERS UNLESS ONE OF THE TRANSFORMERS HAS BECOME DEFECTIVE AND REQUIRES REPLACEMENT. The first and second intermediate transformers have two trimmers each which are accessible through the small holes in the side of the shield can.

ELECTRO DYNAMIC SPEAKER: The speaker has a DC field resistance of 3000 ohms.

OSCILLATOR: The 36 tube is used as a modulator (1st detector) and oscillator by a method which sacrifices none of the qualities of either function. The combined circuit is such that it is not super-critical and special selection of 36 tube is not required. Any good 36 tube with correct characteristics will work satisfactorily in this stage. If the receiver only operates over a portion of the broadcast band, (long wave length) the trouble may be due to a tube which does not have proper characteristics. The remedy is, of course, to replace the 36 tube.

ANTENNA: Approximately 25 feet of aerial wire wound on a fibre spool is provided with the receiver. The winding spool or the contact lug on spool should not be destroyed and the aerial wire should be rewound on the spool when transporting the receiver. This will prevent kinks and knots in the wire and in this way prevent the insulation from breaking down. In most locations running the aerial wire provided around the moulding of the room will provide satisfactory reception. Where distant daylight reception is desired especially in isolated communities it may be necessary to attach an additional aerial to the antenna spool contact lug. In some locations where it is inconvenient to install an additional aerial improved reception may be obtained by attaching the contact lug to a steam radiator, water pipe, electrical conduit, curtain rod, etc. Always be sure that the lug makes firm contact otherwise noisy reception will result. This will not work satisfactorily in all locations. The results can only be determined by actual experimentation.

Where the set is to be used in buildings constructed with a large amount of steel, running the aerial around the room will generally prove unsatisfactory. Dropping the aerial out of the window may improve reception considerably. If this does not improve results it will be necessary to install an additional outside antenna. Another condition which may require an outside aerial is in DC installations because when operating the receiver on DC it will be found that in most instances the noise interference is greater than when the receiver is used on AC current. DC appliances such as motors, fans, etc. as a general rule, cause more interference than similar AC equipment. Unfortunately this interference can only be eliminated at the source of the interference. By connecting the antenna to an outside aerial the interference can generally be minimized as the increased volume obtained with the longer aerial permits a lower minimum volume control setting and a consequent apparent reduction in noise interference.

TUBES: The receiver utilizes the following tubes:

One (1) Type 36 as a composite oscillator and modulator tube.
One (1) Type 39 intermediate frequency amplifier tube.
One (1) Type 36 (second) detector.
One (1) Type 38 output tube.
One (1) Type 25z5 rectifier tube.

The receiver is shipped with tubes in their respective sockets. While it is possible to remove or install some of the tubes by removing the back of the cabinet it is suggested that the set be removed from the cabinet whenever the tubes are to be checked. To do this remove the back of the cabinet, volume control and tuning control knobs, and the four screws which hold the set to the cabinet. This will permit removal of the chassis from the cabinet by sliding the chassis outward through the back of the cabinet. Excessive hum when tuning in stations may be caused by a defective 36, 39 or 25z5 tube. Installing new tubes will indicate the defective tube or tubes. Be sure when replacing tubes that the new AC type (humless type heaters) be used. Otherwise the hum level may be high. In a great many cases considerable difference in hum will be noticed even between tubes made by the same manufacturer.

VOLTAGE TABLE: Never check voltages until all tubes are fully warmed up to proper operating condition. The voltage table #1 is taken at 115 volts (AC) line with the volume control in the full on position. It must be remembered that the voltage readings vary directly as the line voltage and also with the accuracy of the meters used. A variation of 10% plus or minus is permissible. THE VOLTAGES WILL BE APPROXIMATELY AS GIVEN FOR EITHER DC OR AC OPERATION.

TUBE VOLTAGES — Table #1

Type of Tube	Position of Tube	Filament Volts	Plate Volts	Screen Volts	C Volts
36	Composite Oscillator & Modulator	5.5	108	21*	2.5
39	Intermediate Frequency	5.6	108	108	2.5
36	Detector	5.7	27*	21*	2.5
38	Output	5.8	103	108	1.5*
25z5	Rectifier	29.0	52.5 MA		

MODEL 560,561
Voltage Data
Part 2

SENTINEL RADIO CORP.

The voltage table #2 is for 6 volt battery operation with a B eliminator which is especially designed for the model #561 receiver. The voltages as given will be correct for 32 volt DC operation in conjunction with a B eliminator of the recommended factory type. It will be found that on certain types of eliminators which do not have sufficient output or a low 6 volt battery, the readings will be lower than that given in the voltage table.

TUBE VOLTAGES — Table #2

Type of Tube	Position of Tube	Filament Volts	Plate Volts	Screen Volts	C Volts
36	Composite Oscillator & Modulator	5.8	112	25*	2.5
39	Intermediate Frequency	5.8	112	112	2.9
36	Detector	5.8	28*	25*	2.0
38	Output	5.8	108	112	1.5*
25z5	Rectifier	52.5 MA			

* These readings for both Table #1 and #2 are only comparative and are not true voltages applied. The voltmeter, when readings are taken at these points, is in series with a very high resistance.

IMAGE SUPPRESSION: Occasionally in some locations interference in the form of whistles or stations which are tuned in on dial settings other than the station's frequency may be encountered. This is a rare occurrence and is called image interference caused by two signals whose frequencies differ by twice the intermediate frequency. This should not be confused with heterodyne whistles which are caused by two stations being received whose frequencies are the same nor by local stations whose frequencies are close to some out-of-town stations frequency which might result in reception from both stations. To overcome this possibility of image interference an image suppression circuit is incorporated in the receiver. The image adjusting condenser is mounted on the back of the chassis below the first IF transformer shield and is accessible through the hole in the chassis. If a whistle or interfering station is received on a frequency other than its fundamental, tune the receiver to this interference and adjust the image suppression condenser until the interference disappears or until the interference is at the minimum point. UNLESS THERE IS AN ACTUAL IMAGE INTERFERENCE DO NOT ATTEMPT TO ADJUST THE IMAGE SUPPRESSION CIRCUIT.

INTERMEDIATE FREQUENCY ALIGNMENT: Only when an intermediate transformer has become defective, due to an open or burned out winding, should it be necessary to readjust the intermediate stages. Should this occur it is necessary that an oscillator be used with some type of output measuring device so as to correctly tune the transformers. To align the intermediate transformers connect the high side of the oscillator output to the control grid of the 36 oscillator modulator tube leaving the grid cap disconnected from the tube. The ground side of the test oscillator should be connected to the gang condenser frame and MUST NOT OTHERWISE BE GROUNDED. Set the oscillator at 265 kilocycles (this must be accurate) and adjust the output of the oscillator so that a convenient reading is obtained on the output meter. BE SURE THAT OUTPUT OF THE OSCILLATOR IS NOT SO HIGH AS TO OVERLOAD THE DETECTOR. IF DURING THE ALIGNMENT THE DETECTOR OVERLOADS REDUCE THE OUTPUT OF THE OSCILLATOR. Align the first intermediate transformer by turning the intermediate frequency trimmer screw up and down until maximum reading is obtained on the output motor. Both the primary and secondary trimmer screws should be adjusted in this manner. It is always best to recheck the grid side of the intermediate frequency transformer adjustment to make certain the alignment of the secondary has not been changed by the adjustment of the primary. The same procedure is followed in aligning the second intermediate transformer. After both intermediate transformers are adjusted the alignment of the intermediate stage is complete and the trimmer should not be further disturbed, and the grid cap should be connected to the grid of the 36 tube.

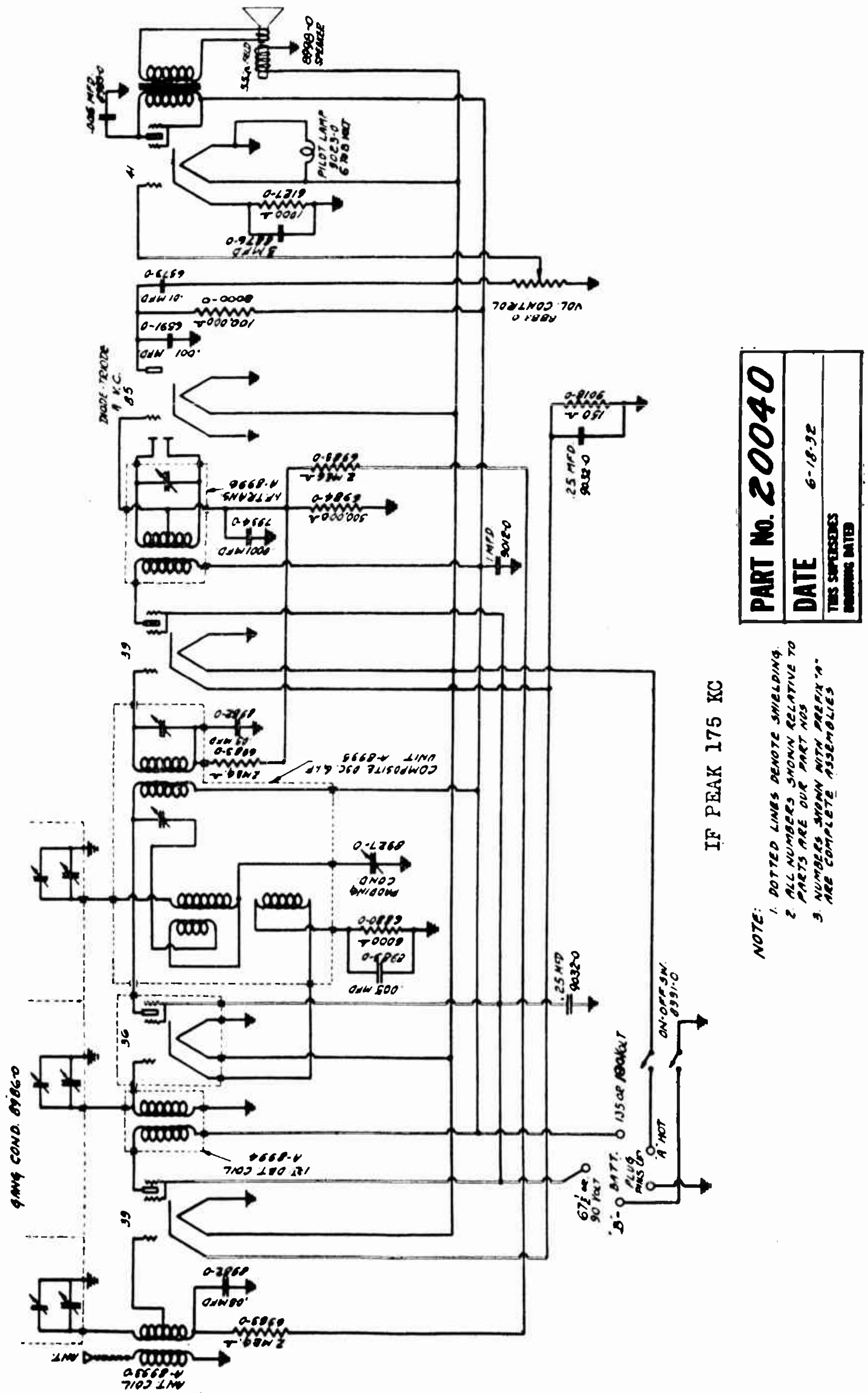
VARIABLE CONDENSER ALIGNMENT: If the intermediate frequency stage has been realigned or if an antenna or oscillator coil requires replacement it will be necessary to realign the variable condenser. The front section of the variable condenser (looking at the front of the receiver) is the oscillator section, the other section tunes the antenna stage. Tune the receiver to 1720 kilocycles on the dial and set the oscillator at this frequency. BE SURE THAT OUTPUT OF THE OSCILLATOR IS NOT SO HIGH AS TO OVERLOAD THE DETECTOR. IF DURING THE ALIGNMENT THE DETECTOR OVERLOADS REDUCE THE OUTPUT OF THE OSCILLATOR. Next adjust the trimmer screws of the oscillator and antenna sections which are mounted on top of the variable condensers so as to obtain maximum output reading. It will be found that the oscillator section trimmer condenser will in most cases have to be adjusted to minimum capacity and in some instances it may be necessary to remove the trimmer screw entirely. After the trimmers have been correctly adjusted, at this frequency, tune the receiver to 600 kilocycles and adjust the oscillator to 600 K.C. Next, adjust the oscillator padding condenser (which is located directly below the variable condenser and accessible through the hole in the front of the chassis) to obtain maximum reading on the output meter. If the above is correctly followed the receiver will now track correctly over the entire band from 1720 KC to 550 KC. It is always advisable to align the receiver, whenever possible, with the tubes that are to be used in the set.

AUTO INSTALLATION: The receiver may be mounted in any convenient place in the automobile such as the robe rail in back of the front seat, between the dashboard and windshield frame or on the under side of the dashboard head. It is well to remember that the further away from the motor the less the ignition noise is likely to be. The receiver should be so mounted that it does not strike the body through bouncing or road jars as the cabinet may be damaged if the set is permitted to swing freely. The mounting brackets have lugs on both ends which should be hooked between the windshield frame or robe rail or wherever the set is to be mounted and the bottom lug hooked to some part of the body or body bolts and the slack in the straps taken up by adjusting the adjusting buckle so that the set is held rigidly in position. The four studs provided should be screwed into the four threaded holes in the back of the chassis. Each of the strap mounting brackets has two holes into which the stud should be inserted and by pulling upward on the straps the stud will be locked into position. Pushing the strap downward will unlock the studs and permit removal of the brackets.

CAR ANTENNA: It is very important that a good aerial be used as an insufficient or ineffective aerial will result in poor reception. A simple aerial installation that will give good results can be had by using about 50 feet of stranded insulated wire, running the wire under the car back and forth between the two running boards, using care not to stretch the wire too tightly as the bouncing of the car will break the wire. An aerial in the top of the car insulated from the body will in most instances be an excellent one. Many of the latest model automobiles are factory equipped with this type aerial. A strap type or plate type antenna mounted beneath the automobile will generally be an effective antenna. The closer to the ground this type of aerial is permitted to extend the greater its efficiency.

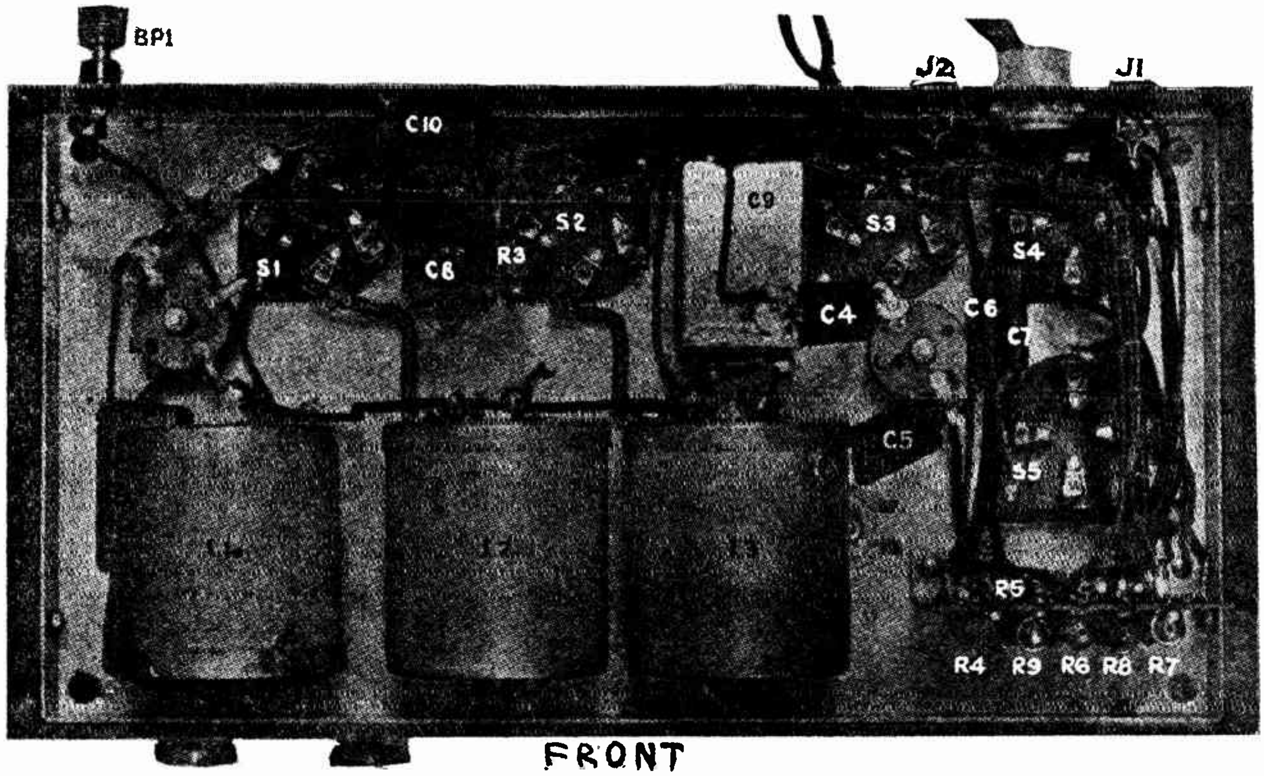
MODEL 261

SENTINEL RADIO CORP.

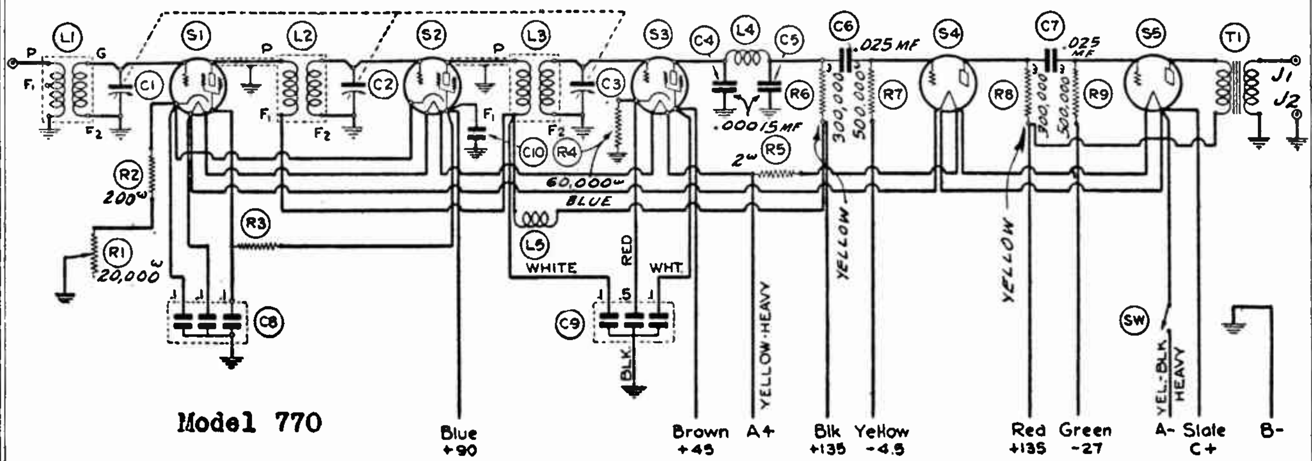


SILVER-MARSHALL, INC.

MODEL 770 Auto
Schematic, Chassis

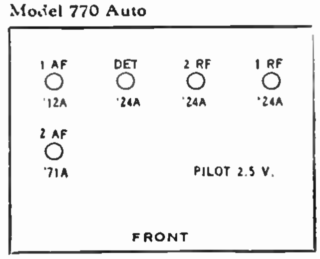


Bottom view of 770 chassis showing location of coils, resistors, and other material which will be of value in replacing parts.



Schematic diagram of 770 Auto-Set.

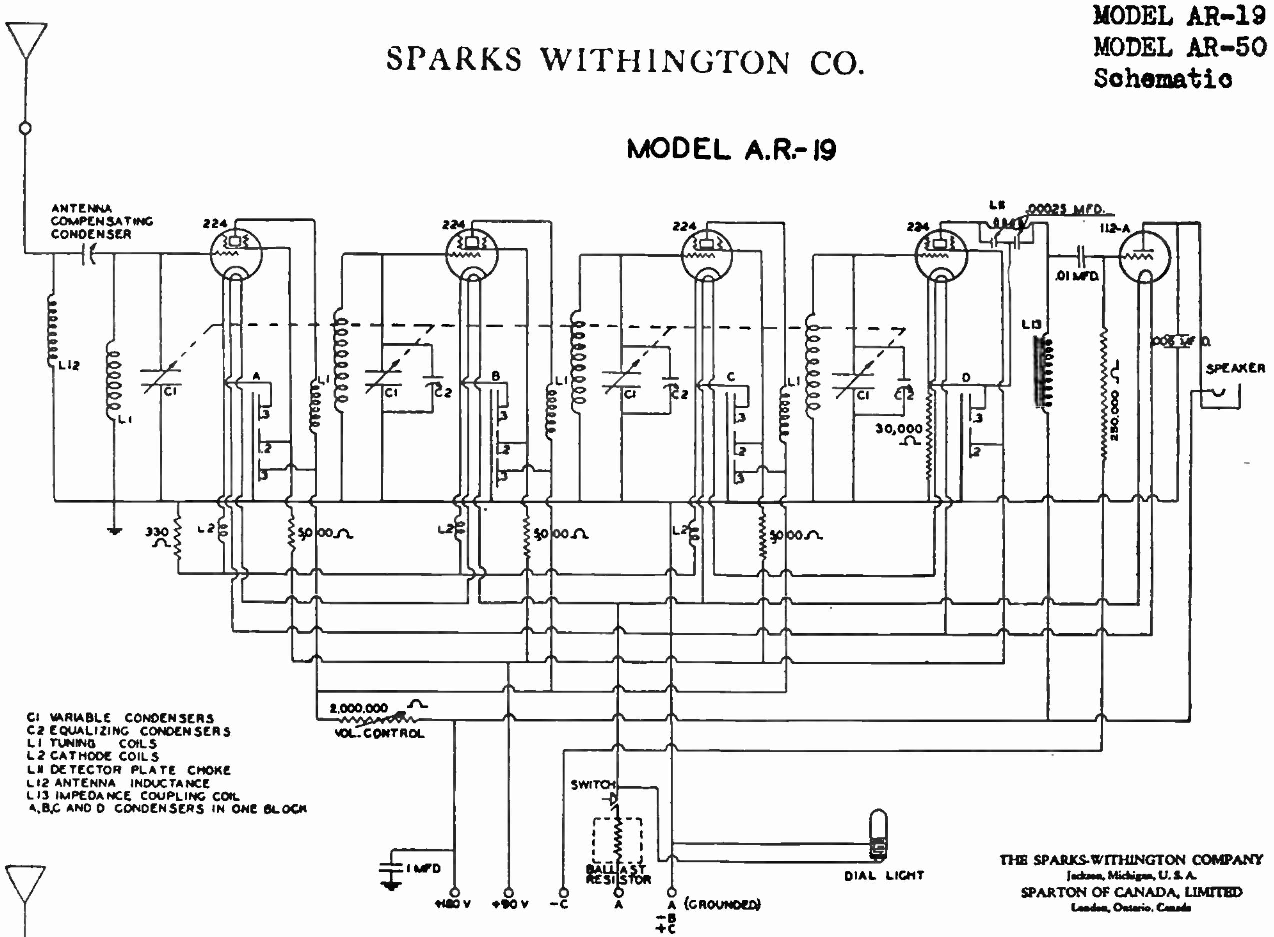
Model 770 Auto



SPARKS WITHINGTON CO.

MODEL AR-19
MODEL AR-50
Schematic

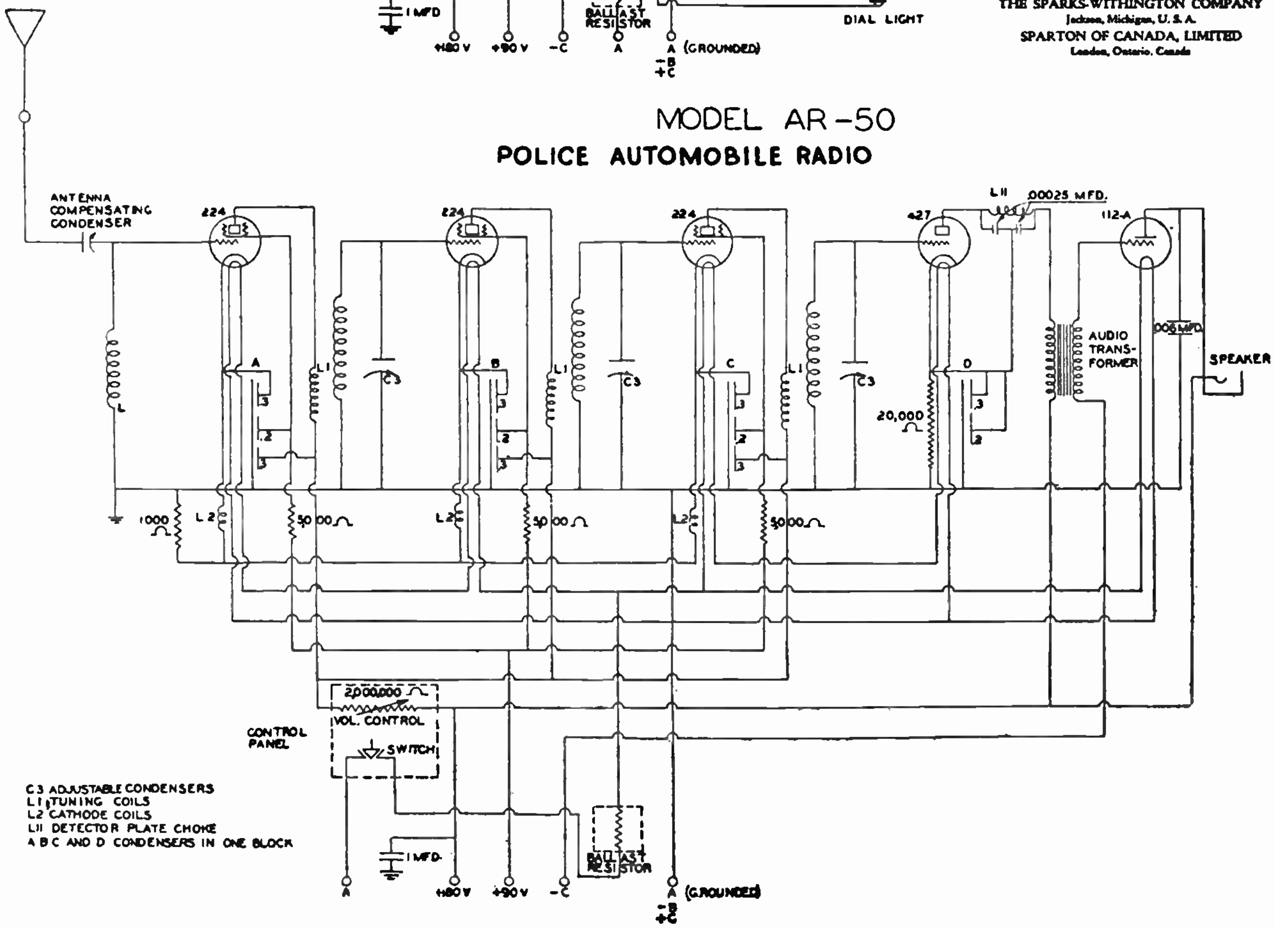
MODEL A.R.-19



C1 VARIABLE CONDENSERS
C2 EQUALIZING CONDENSERS
L1 TUNING COILS
L2 CATHODE COILS
L11 DETECTOR PLATE CHOKE
L12 ANTENNA INDUCTANCE
L13 IMPEDANCE COUPLING COIL
A, B, C AND D CONDENSERS IN ONE BLOCK

THE SPARKS-WITHINGTON COMPANY
Jackson, Michigan, U. S. A.
SPARTON OF CANADA, LIMITED
London, Ontario, Canada

MODEL AR-50
POLICE AUTOMOBILE RADIO



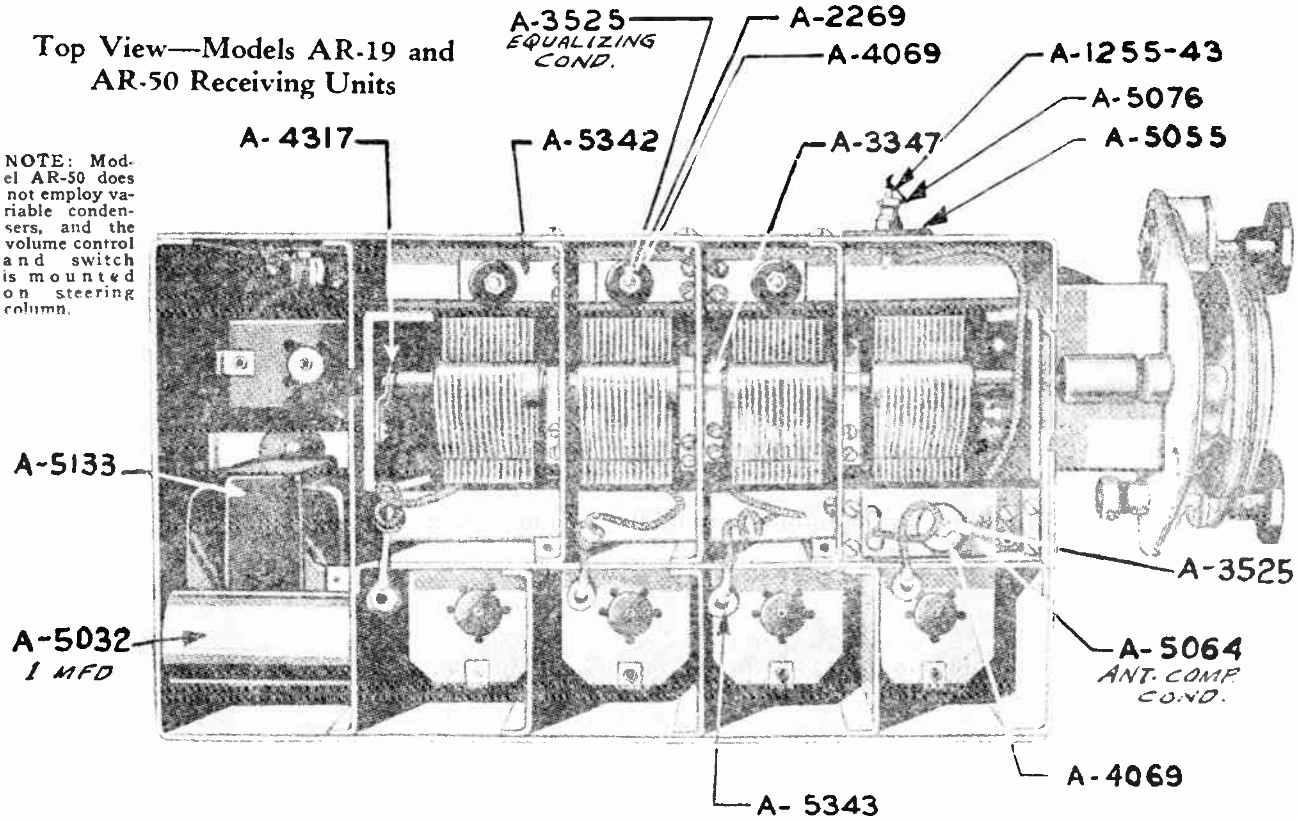
C3 ADJUSTABLE CONDENSERS
L1 TUNING COILS
L2 CATHODE COILS
L11 DETECTOR PLATE CHOKE
A B C AND D CONDENSERS IN ONE BLOCK

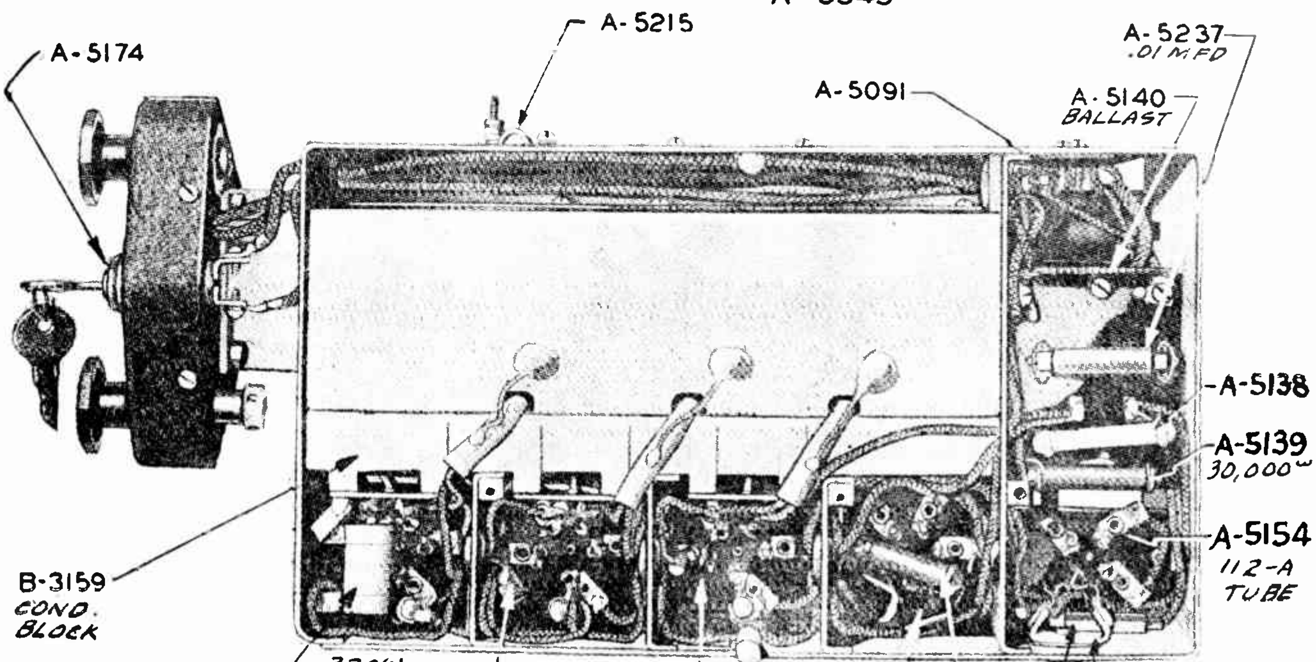
MODEL AR-19
MODEL AR-50
Chassis

SPARKS WITHINGTON CO.

Top View—Models AR-19 and AR-50 Receiving Units

NOTE: Model AR-50 does not employ variable condensers, and the volume control and switch is mounted on steering column.



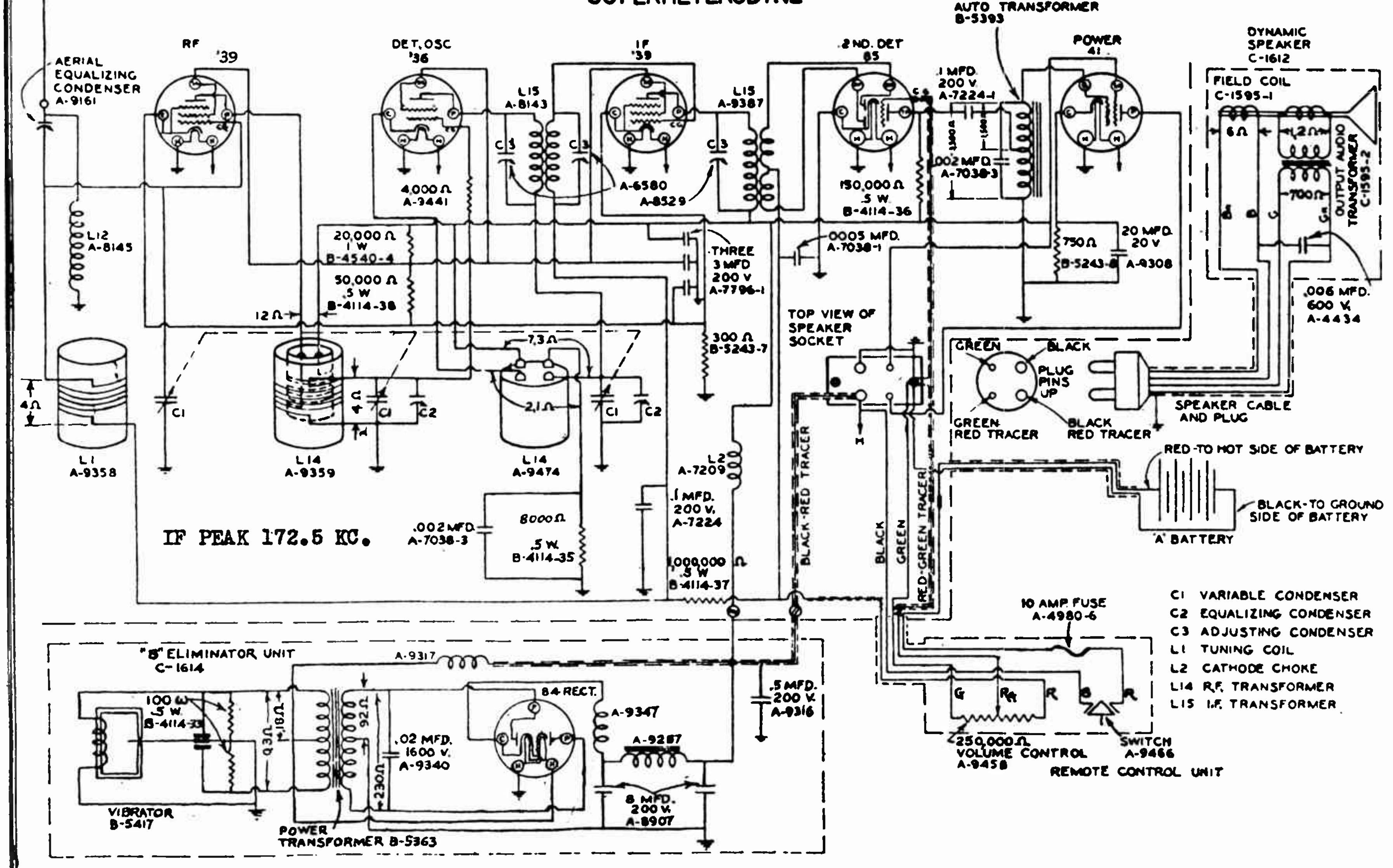


Bottom View
Models AR-19 and AR-50 Receiving Units

NOTE: In Model AR-50, A-5139 resistor is replaced with A-4261 resistor; A-5174 key switch is replaced with A-5903 toggle switch.

PART #A5217 FOR SPARK PLUG—.01 MFD
PART #A5238 FOR GENERATOR—.01 MFD

SCHEMATIC DIAGRAM
SPARTON MODEL 33
AUTOMOBILE RADIO RECEIVER
SUPERHETERODYNE



SPARKS WITHINGTON CO.

MODEL 33 Schematic,

MODEL 33
Voltage
Socket View

SPARKS WITHINGTON CO.

ANTENNA

The receiver is equipped with pin jack post. A low capacity shielded lead-in wire is furnished. The shield must be grounded as close to the antenna post as possible. A clamp is attached to the receiver for this purpose. Keep lead-in wire as short as possible. When under hood mounting is found necessary, the antenna post may pick up motor noise, in which case it will be necessary to shield it. The lead-in wire should be brought down the body post nearest the end of the receiver that has the antenna post so as to keep the lead-in wire as short as possible. The shielded portion of the lead-in should extend from the receiver to a point approximately eight inches from the aerial proper and the shielding must be grounded at this point to the metal framework of the car by soldering a piece of wire to the shield and fastening the wire under a convenient screw head.

There are various types af antennae. but the recommended type is the roof antenna. Many automobile manufacturers install antennas in the roof of the cars at the factory. The lead-in wire is usually coiled up under one side of the instrument panel.

Every antenna should be checked for ground in the following manner: Using a continuity tester consisting of a low range high resistance voltmeter (1.5 or 3.0 volt scale) in series with a dry cell, touch one lead from the continuity tester to the antenna and touch the other lead from the continuity tester to the body or other grounded portion of the car. If any reading is obtained, even though very small, the antenna is grounded and cannot be used for an aerial until the ground is removed.

If a continuity tester is not available, connect 200 volts of "B" battery in series with a 200 volt, 1000 ohm per volt, sensitive meter. Touch one lead from the meter to the antenna and touch the other lead from the batteries to a grounded portion of the car. If the sensitive meter reads more than two volts, even when the roof of the car is damp, it indicates that antenna is grounded. *The ground must then be removed.*

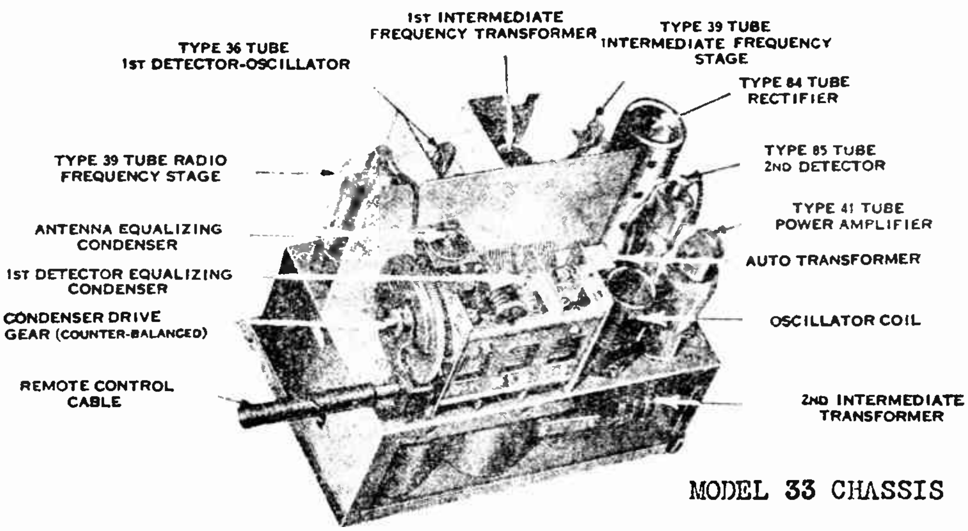
Under car antennas are not recommended, but where it is impossible to install a roof antenna, we suggest an antenna formed by placing not less than four square feet of copper screen between two pieces of water-proof material, such as leatherette, and sewing it in. The water-proof insulating material is then fastened to the frame of the car. It may be necessary to make the antenna in two pieces in order to obtain four square feet of screen. Care must be taken to make sure that the screen is not or cannot become grounded to the frame of the car. Test for ground in the same manner as instructed for roof antenna.

ADJUSTING THE ANTENNA CIRCUIT

The antenna circuit must be adjusted to be in perfect resonance with the particular antenna to which the receiver is connected. Tune in the station the receiver will be operated on. A distant location, or a point of low signal strength, will permit the best adjustment, for a weak signal produces the sharpest resonance point. The adjusting screw is under the hole-cover nearest the dial drive adjustment hole. With a small insulated handle screw driver, turn the screw to the right or left slowly to the position of maximum volume. Once made, the adjustment need never be changed unless the antenna system is altered, or the receiver is operated on a different kilocycle frequency.

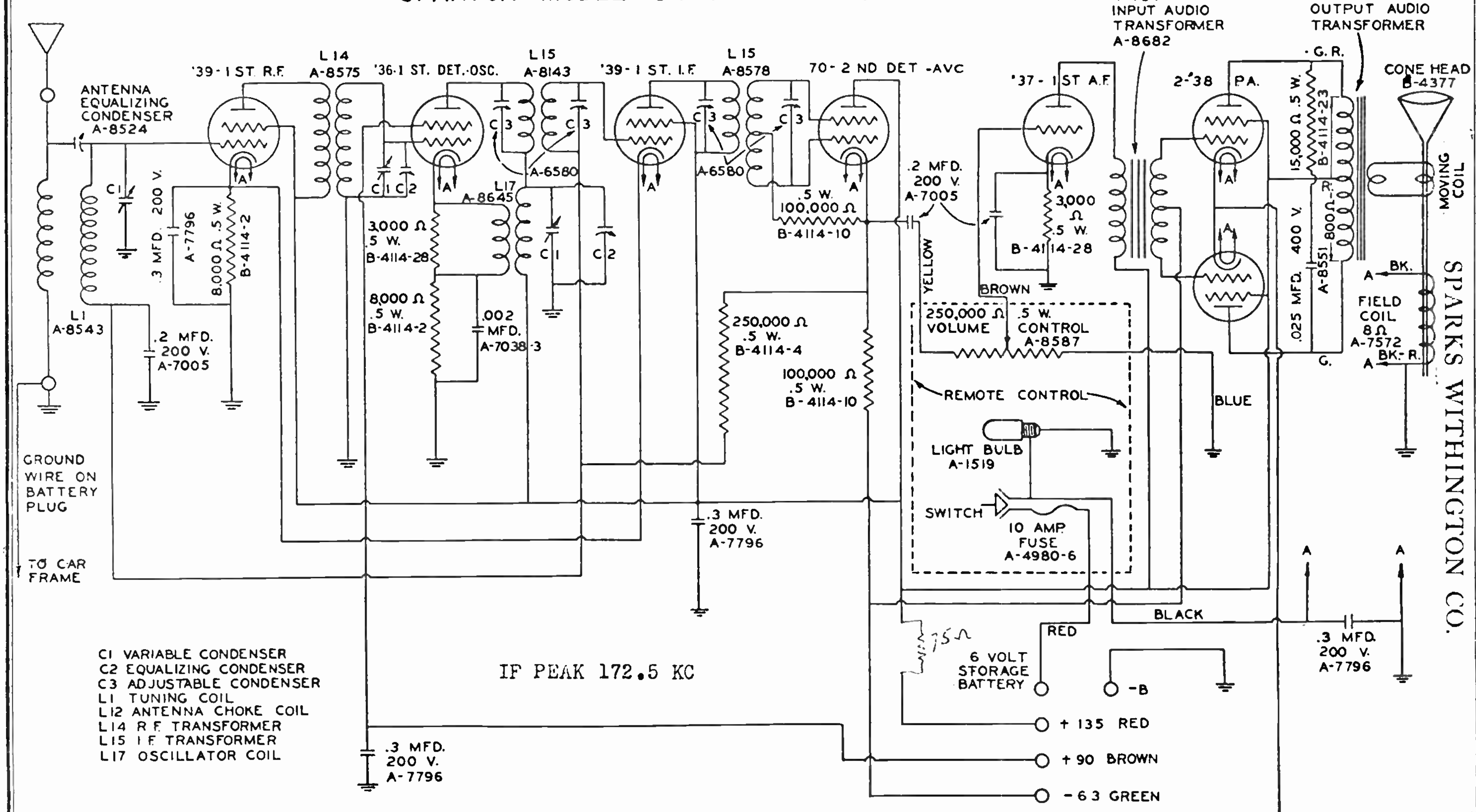
MODEL 43	Filament or Heater	Plate	Control Grid	Screen Grid	Plate Current M.A.
39 1st R.F.	6	135	- 3	85	4.5
39 2nd R.F.	6	135	- 3	85	4.5
39 3rd R.F.	6	135	- 3	85	4.5
36 Det.	6	132	-10	63	1
37 AVC	6	--	-18	--	0
38 Power	6	180	-18	180	9

MODEL 33	Filament or Heater	Plate	Control Grid	Screen Grid	Plate Current M.A.
'39 R.F.	6.3	195	- 3.5	100	4.2
'36 1st Det-Osc.	6.3	195	-12.	100	1.5
'39 I.F.	6.3	195	- 3.5	100	4.2
85 2nd Det.-AVC	6.3	30	--	--	1.5
41 Power	6.3	195	-15.	195	16.
84 Rect.	6.3	220	---	---	20 per plate



MODEL 33 CHASSIS

SCHEMATIC DIAGRAM
SPARTON MODEL 34 SUPER-HETERODYNE



If high notes predominate and the pitch of the speaker is to be lowered, replace the 150,000 ohm resistor in series with the .025 mfd condenser connected across the output transformer primary with a 15,000 ohm resistor. The condenser remains as heretofore

SPARKS WITHINGTON CO.

MODEL 34
Chassis
Voltage

SPARKS WITHINGTON CO.

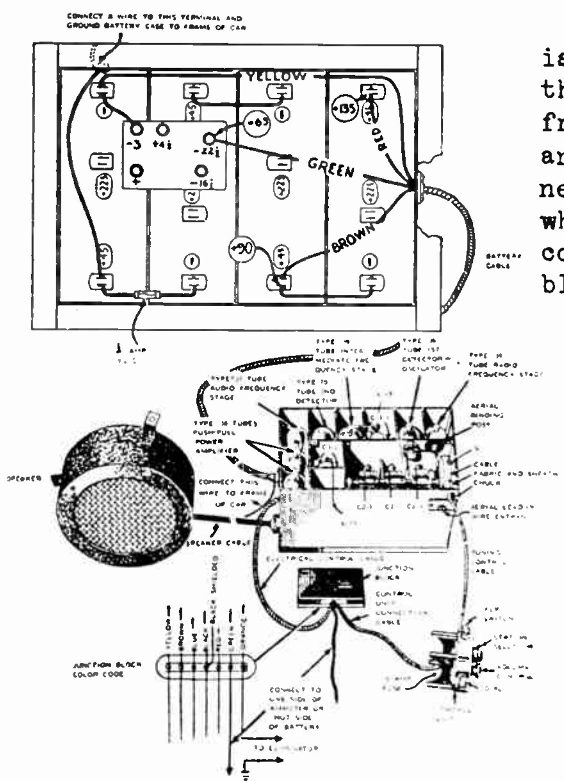
Sparton Model 34 Super-Heterodyne Schematic Diagram and Voltage Analysis

VOLTAGE ANALYSIS

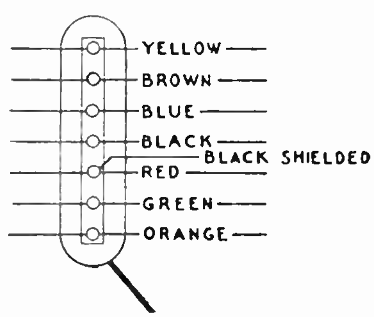
Condition of "A" Battery—Good
Condition of "B" Battery—Good
Condition of "C" Battery—Good
Position of Volume Control—Full with No Signal

Tube	Location	Heater or Filament	Plate	Control Grid —	Screen Grid +	Plate Current M. A.
'39	R. F. Stage	6.3	90	3.0	90	4.0
'36	1st Det.-Osc.	6.3	120	15	90	2.0
'39	I. F. Stage	6.3	90	3.0	90	4.0
70	2nd Det.-AVC	6.3	180	——	——	1.0
'37	A. F. Stage	6.3	125	10	——	4.0
'38	Power Stage	6.3	180	19.5	180	8.0—10
'38	Power Stage	6.3	180	19.5	180	8.0—10

MODEL 34 CHASSIS
and associated equipment

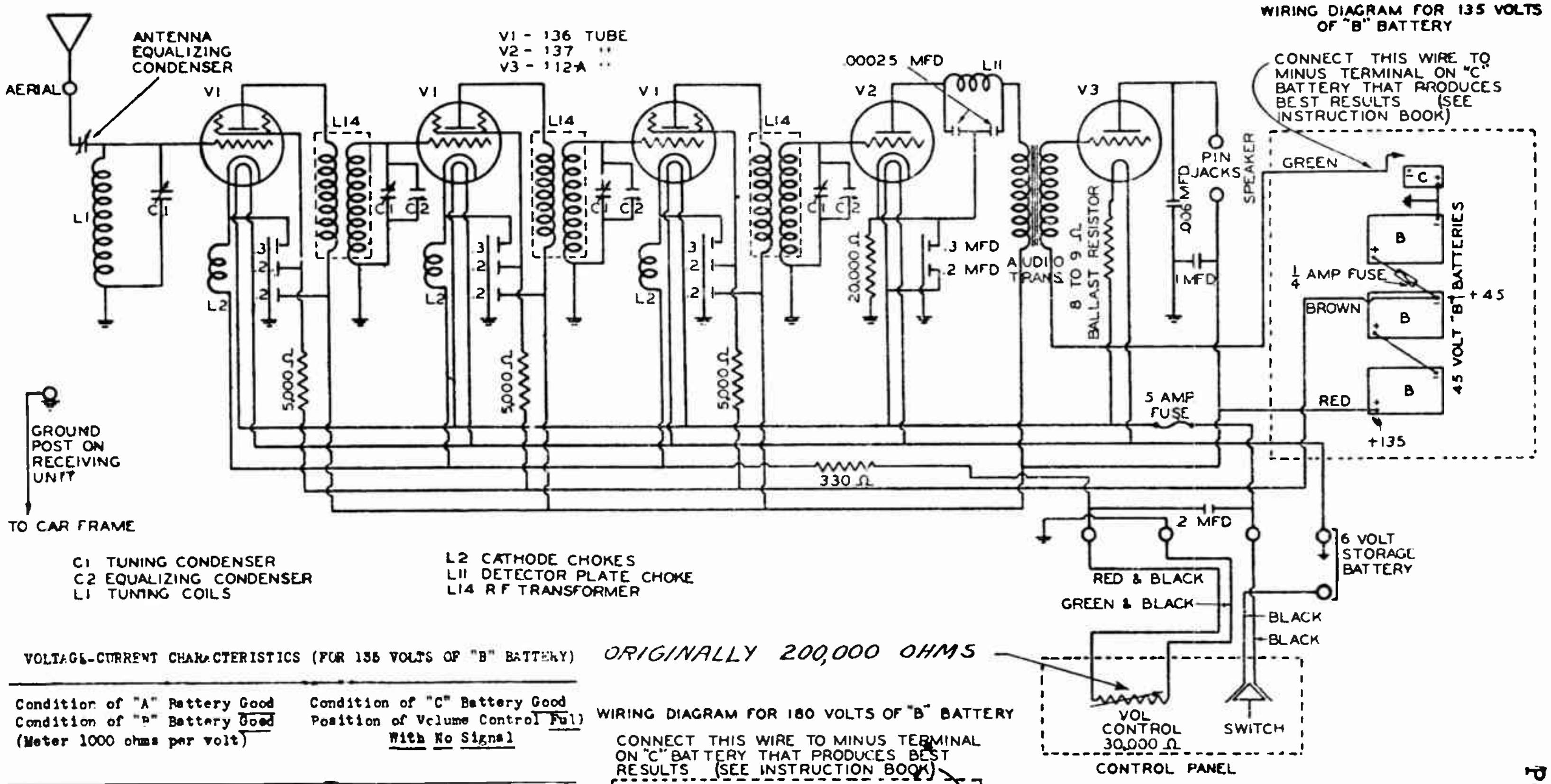


The black shielded "A" battery wire is shown connected to the center terminal on the Junction Block to which the black wire from the control unit also connects. This is an error. The black shielded wire should connect to the terminal on the Junction Block to which the red wire from the control unit is connected. The following diagram shows the black shielded wire properly connected.



C2-1 Antenna Equalizing Condenser
C2-2 1st Detector Equalizing Condenser
C2-3 Oscillator Equalizing Condenser

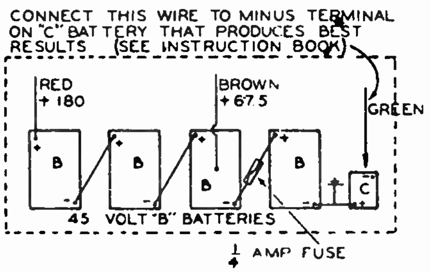
C3-1 I. F. Input Stage Adjustable Condenser
C3-2 I. F. Output Stage Adjustable Condenser
L15 I. F. Transformer



C1 TUNING CONDENSER
C2 EQUALIZING CONDENSER
L1 TUNING COILS

L2 CATHODE CHOKES
L11 DETECTOR PLATE CHOKE
L14 R F TRANSFORMER

WIRING DIAGRAM FOR 180 VOLTS OF "B" BATTERY



VOLTAGE-CURRENT CHARACTERISTICS (FOR 135 VOLTS OF "B" BATTERY)

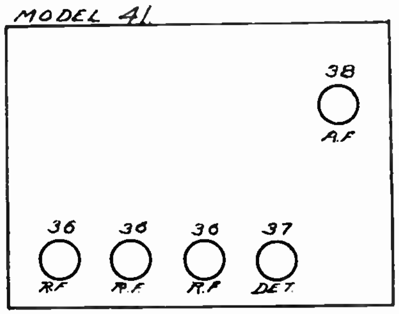
Condition of "A" Battery Good
Condition of "B" Battery Good
(Meter 1000 ohms per volt)

Condition of "C" Battery Good
Position of Volume Control Full
With No Signal

Operation Voltages

Tube Type	Location	Filament or Heater	Plate	Control Grid--	Screen Grid	Plate Current
'36	1st R.F.	6	135	1.5	67.5	1.5
'36	2nd R.F.	6	135	1.5	67.5	1.5
'36	3rd R.F.	6	135	1.5	67.5	1.5
'37	Detector	6	125	10	67.5	.5
'38	Power	4-5	135	18	135	6-8

MODEL 41



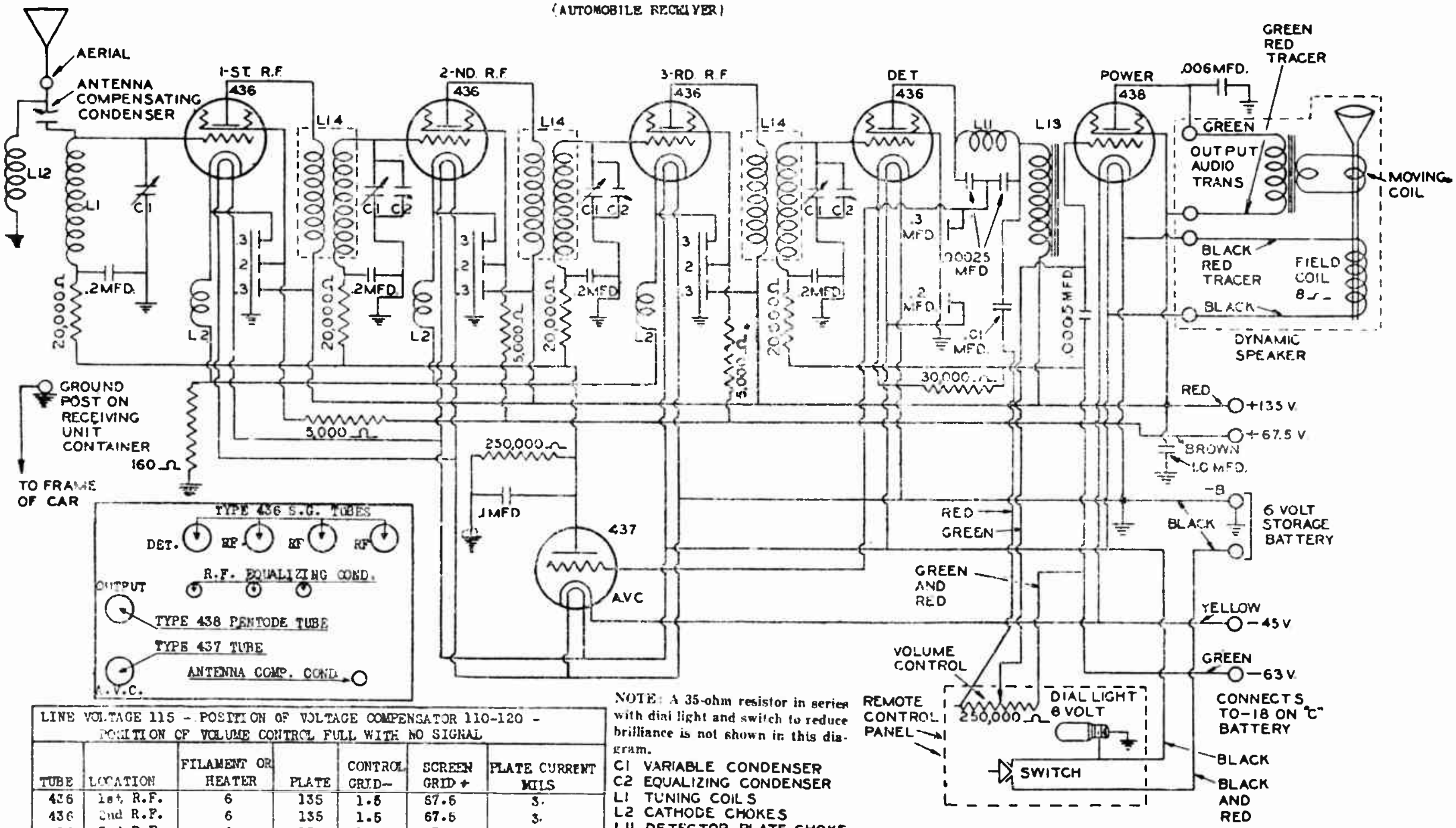
SPARKS WITHINGTON CO.

POLICE AUTO RECEIVER

MODEL 41
Schematic
Voltage

SPARTON MODEL 40 SCHEMATIC DIAGRAM

(AUTOMOBILE RECEIVER)



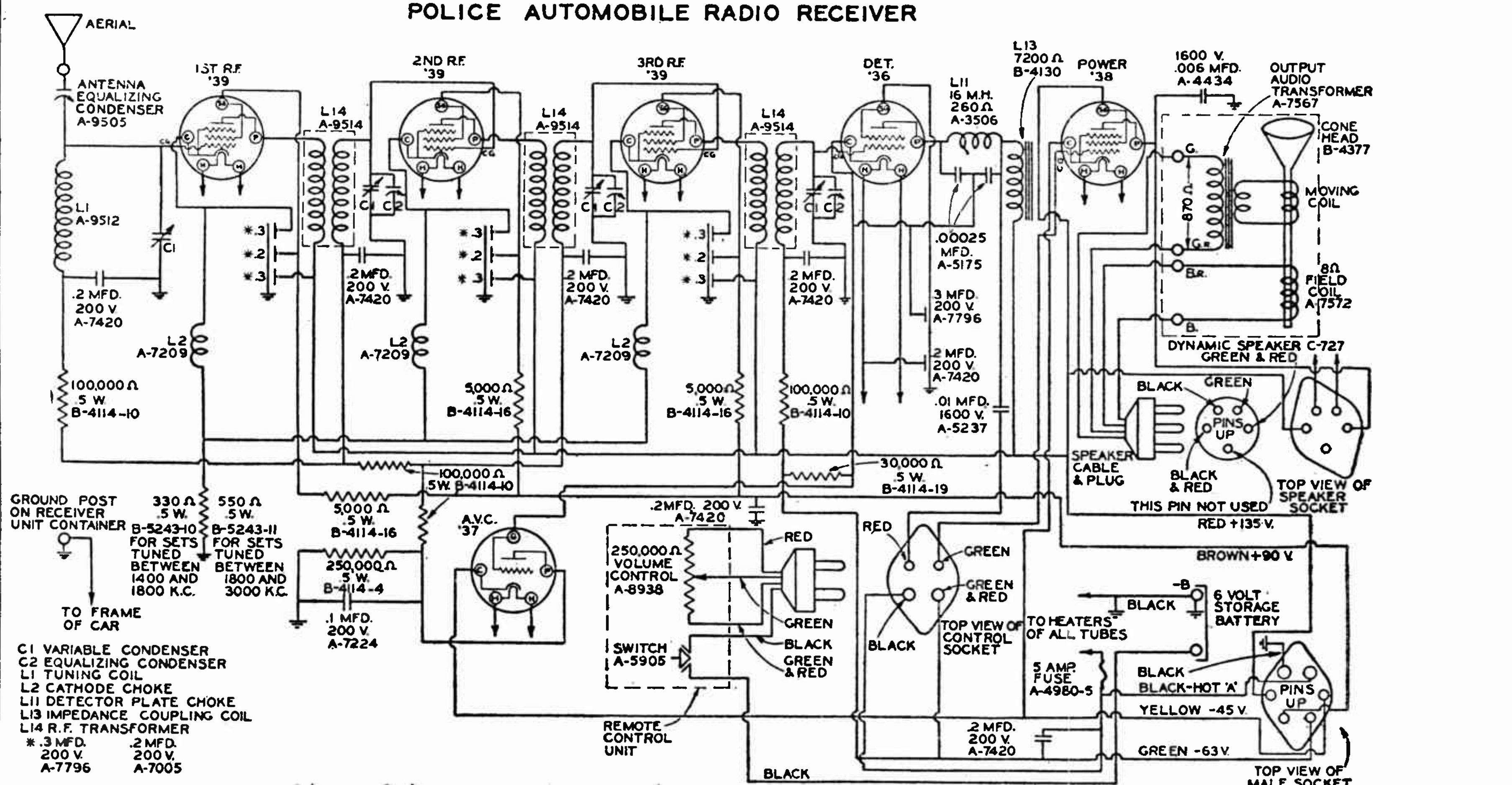
LINE VOLTAGE 115 - POSITION OF VOLTAGE COMPENSATOR 110-120 - POSITION OF VOLUME CONTROL FULL WITH NO SIGNAL						
TUBE	LOCATION	FILAMENT OR HEATER	PLATE	CONTROL GRID−	SCREEN GRID +	PLATE CURRENT MILS
436	1st R.F.	6	135	1.5	67.5	3.
436	2nd R.F.	6	135	1.5	67.5	3.
436	3rd R.F.	6	135	1.5	67.5	3.
436	Detector	6	132	10.	67.5	.1
437	A. V. C.	6	----	18.	----	0.
438	Power	6	136	18.	135.	8.

NOTE: A 35-ohm resistor in series with dial light and switch to reduce brilliance is not shown in this diagram.

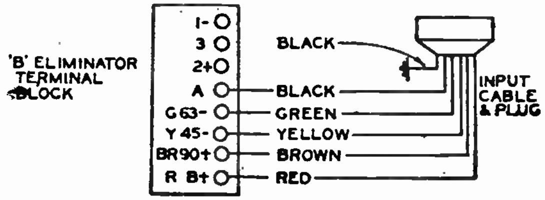
C1 VARIABLE CONDENSER
C2 EQUALIZING CONDENSER
L1 TUNING COILS
L2 CATHODE CHOKES
L11 DETECTOR PLATE CHOKE
L12 ANTENNA CHOKE COIL
L13 IMPEDANCE COUPLING COIL
L14 R F TRANSFORMER

SPARKS WITHINGTON CO.

SPARTON MODEL 43
POLICE AUTOMOBILE RADIO RECEIVER



Voltage data on page preceding



CHANGES IN MODEL 43 SCHEMATIC DIAGRAM

Effective July 14, 1933

Change .006 Mfd. Condenser A-4434 to .003 Mfd. Condenser A-9793
Change 330 Ohm Resistor B-5243-10 to 160 Ohm Resistor B-5243-17
Change 550 Ohm Resistor B-5243-11 to 230 Ohm Resistor B-5243-18

SPARKS WITHINGTON CO.

MODEL 43 Schematic Changes

MOUNTING THE RECEIVER

The receiver is designed for mounting on the bulk head. Other mounting positions ate on the floor boards between seats, or on the side of car in back of driver's seat.

WARNING: Keep all battery cables, speaker cable, antenna lead-in, etc., out of the motor compartment. This is important for elimination of motor interference.

Mount receiver on the driver's side of the bulkhead where it will not be subject to the great temperature changes that are encountered under the hood. More satisfactory service is assured when mounted in this position, together with easier elimination of motor interference. In rare instances, it is sometimes necessary to mount the receiver on the motor side of the bulk head, but this is not a recommended position.

When mounted on the driver's side of the bulk head, it should be located so the tubes point down. When mounted in the motor compartment and other locations, the tubes should point up. This makes servicing and replacement of tubes easy.

Attention should be given to the loud speaker location before receiver is mounted. When the receiver is mounted on the driver's side of the bulk head, select a position which will not interfere with the foot when the brake pedal is depressed, and high enough up so that it will be out of sight and out of way as much as possible. The two mounting brackets should be adjusted along the receiver case so that the four bolts are located in the most accessible place. For mounting the brackets, drill four 11/32 inch holes through the automobile bulk head. To locate mounting holes, fasten the receiver to the brackets and hold it in the position in which it will be installed. *Four spacers are furnished and should be placed on the mounting bolts between the brackets and the bulkhead. This will allow room for cables and wires behind the receiver.*

MOUNTING THE REMOTE CONTROL UNIT

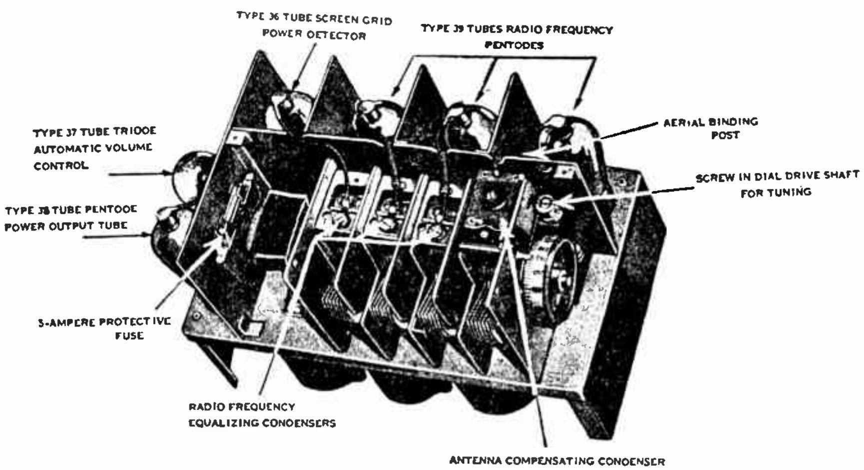
The remote control unit should be mounted on the right hand side of the steering column. The perforated clamp does not require excessive tightening to hold the control securely in place.

MOUNTING THE SPEAKER

The speaker may be mounted either directly against the automobile body under the cowl, or cornerwise between the bulk head and the side of the body. It should not be mounted too far up behind the instrument panel. because when mounted too high the realistic tone quality of the speaker will be slightly muffled. The speaker cable, even though it is well shielded, is slightly susceptible to interfering currents carried on wires which run adjacent to it; therefore, the cable must be grounded by a clamp to the metal bulk head and it should be kept well away from all other wires.

"A" BATTERY CONNECTION

The heavy metal shielded wire coming from the control cable should be connected directly to the hot (ungrounded) terminal of the storage battery. A large lead-coated terminal is connected to the lead for this purpose.



When "B" batteries are used, the battery box can be suspended through the floor boards. Cut an opening 13⅛ inches by 8¾ inches so that the battery box will slide through and can be screwed down at its flanges. Keep the battery box away from the muffler and exhaust pipe as far as possible, as excessive heat will cause batteries to deteriorate rapidly.

The cable from the receiver to the battery box should be secured to the framework of the car so it will not rattle or vibrate and cause excessive wear on the wires which it encloses. Run a ground wire from the battery box to the frame of the car.

Place the "B" and "C" batteries in the battery box in the position shown in the wiring diagram. If necessary pack pieces of bristol board around them so they are held securely and cannot move. Place the insulated sheet over the "B" batteries. *Before the box cover is placed in position, see that the rubber gasket is around the flange so as to keep water out.*

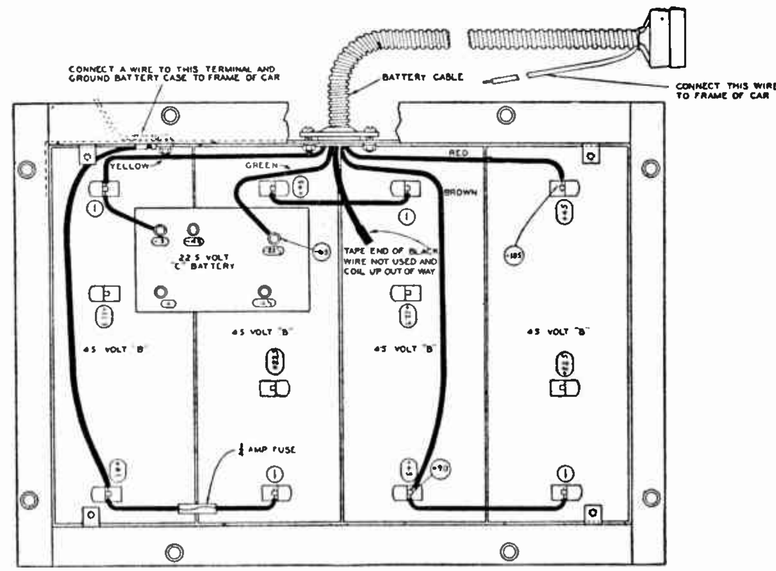
BATTERIES REQUIRED

Four regular size 45 volt "B" batteries, or
Three heavy duty 42 volt "B" batteries.
One 22½ volt "C" battery with a —3 volt tap.

"B" batteries should not be used after the voltage has dropped below 39 volts per 45 volt battery as the sensitivity and tone quality of the receiver is impaired.

If any one of the "B" batteries or the "C" battery should show corrosion or bulging, it should be removed immediately regardless of its voltage reading.

If it is desired to use "B" and "C" batteries, the black wire (which is not used) should be thoroughly insulated on the end with tape and coiled up out of the way. The "B" and "C" battery connections are as follows:

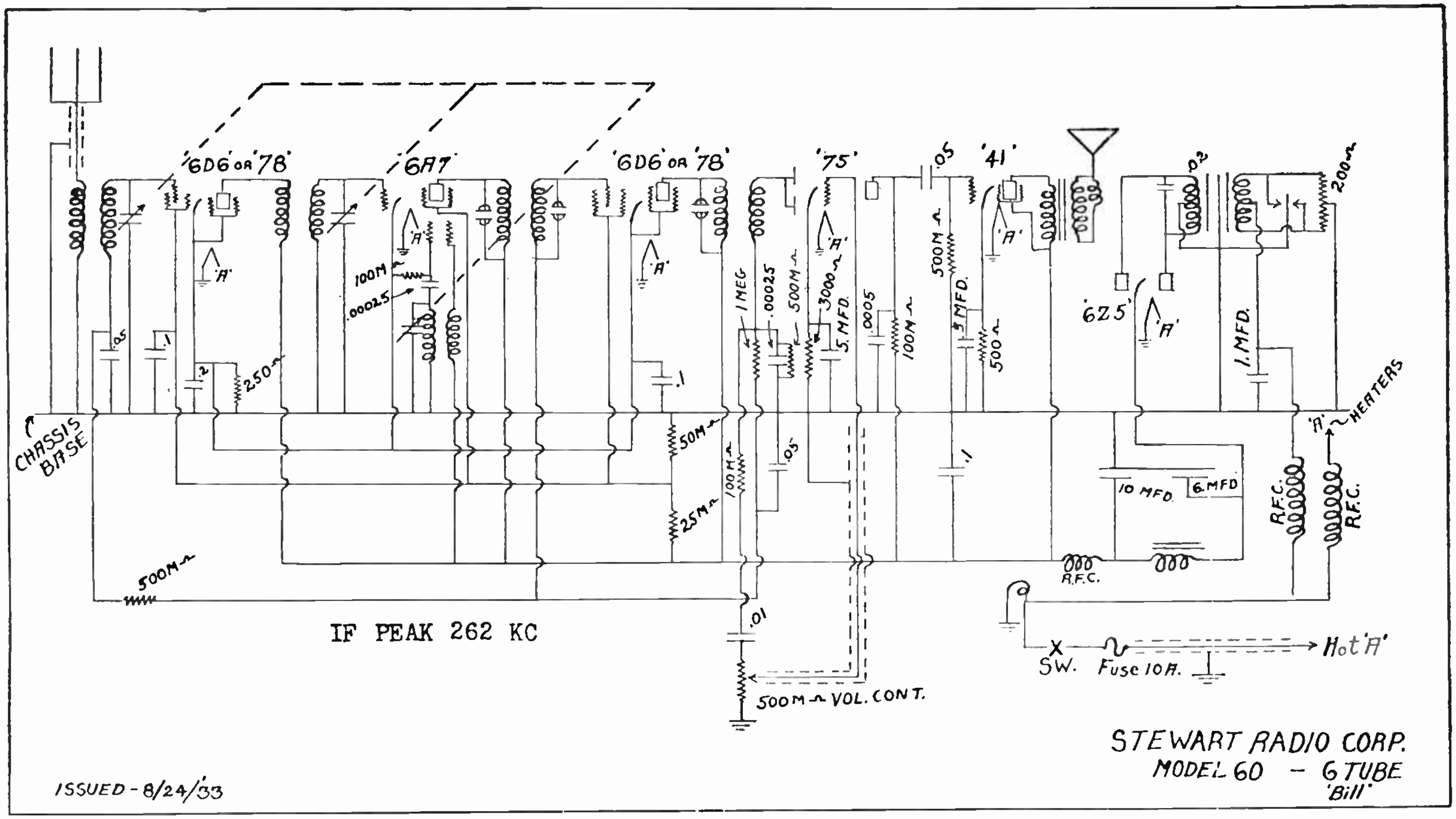


"B" AND "C" BATTERY WIRING DIAGRAM FOR 180 VOLTS "B" BATTERY
For 135 volts "B" battery connect red wire to +90 on "B" battery and green wire to —16½ on "C" battery

CABLE PLUG COVER

The cable plug cover mounts over the three cable plugs where they plug into the chassis to electrically shield them and to keep out moisture. The cover should be placed with the slots pointing downward.

STEWART RADIO CORP.



Six tubes—Type 6D6 (or 78) Radio Frequency Amplifier: Type 6A7 Oscillator and Modulator: Type 6D6 (or 78) Intermediate Frequency Amplifier: Type 75 Detector. Audio Frequency Amplifier: Type 41 Pentode Power Output Amplifier: Type 6Z5 Rectifier.

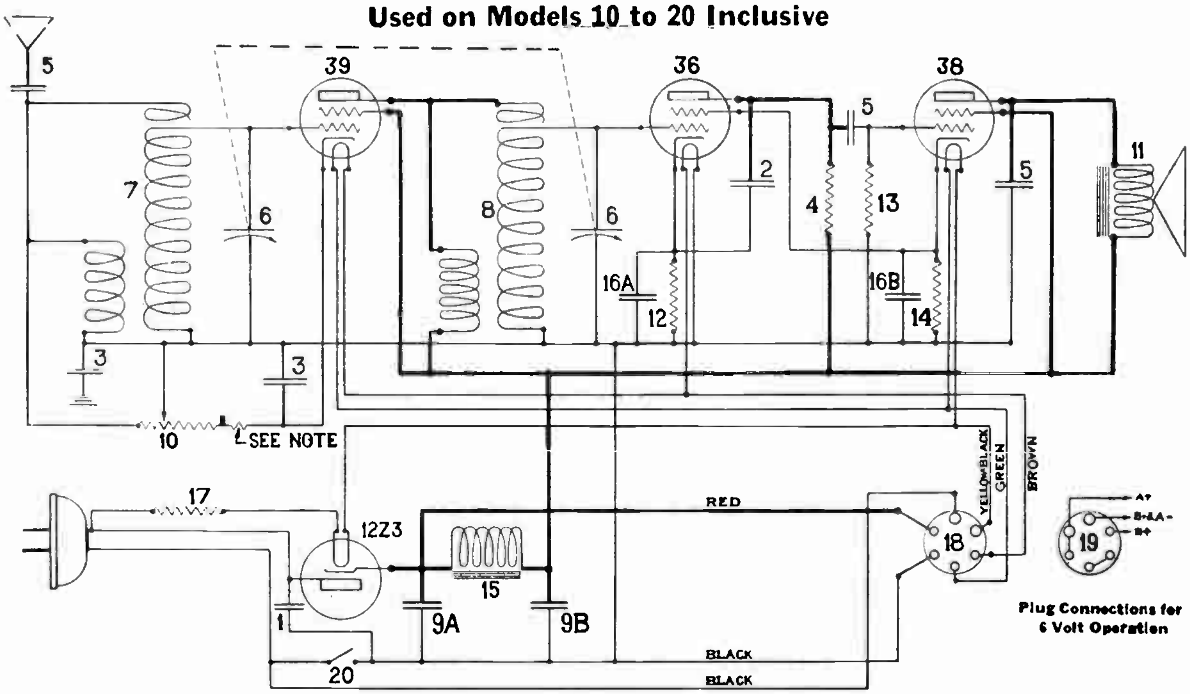
Entire Unit mounts by means of a single bolt. Current supply obtained by simply connecting *one wire* direct to ammeter

MODEL 108, 108-X
(Models 10 to 20 inc.)

STEWART - WARNER CORP.

Circuit Data for Stewart-Warner Chassis Series 108 and 108-X

Used on Models 10 to 20 Inclusive



NOTE: In some receivers, a 140 ohm, ¼ watt carbon resistor, part 81646 is connected in series with the volume control; in other sets this resistor is built into the volume control.

LINE VOLTAGE 115 VOLTS A. C. ★ Voltage Table ★ VOLUME CONTROL FULL ON

Type of Tube	Tube Circuit	Filament to Condenser	Plate to Condenser	Screen Grid to Condenser	Cathode to Condenser
39	R. F.	** (See Note)	107	107	1.5
36	Det.	** (See Note)	1.3‡	9	1.3
38	Output	** (See Note)	103	107	9
12Z3	Rect.	** (See Note)		....	122

IMPORTANT NOTE

★These voltages will be obtained when the set is operated at 115 volts, 60 cycles A. C. For D. C. operation, voltages will be somewhat lower. All voltage readings have been taken between tube prongs and the variable condenser frame, *not the chassis*. The chassis cannot be used in this receiver as a reference point for voltage readings.

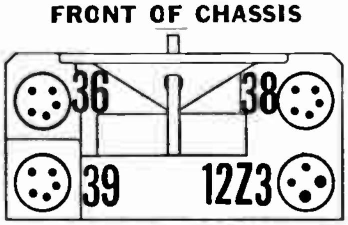
**Filament voltage readings will vary widely, depending upon the resistance of the A. C. voltmeter. With high resistance rectifier type meters, voltage readings will be approximately 6.3 for the detector and amplifier tubes, and 12.6 for the 12Z3 rectifier. With ordinary A. C. Voltmeters, readings will be very much less.

‡This reading is obtained with a 30-volt scale, one thousand ohms per volt instrument. Higher resistance meters or higher scale readings will give greater voltage readings.

PARTS LIST

Diag. No.	Part No.	Description
1	67298	.01 mfd. 600 V cartridge condenser
2	81158	.0001 mfd. mica condenser
3	81630	.1 mfd. 100 V cartridge condenser
4	81644	2.1 meg. ¼ W. carbon resistor
	81646	140 ohm ¼ W. carbon resistor
5	81657	.003 mfd. mica condenser
6	81662	Variable condenser
7	81664	Antenna Coil
8	81666	Detector Coil
9A, 9B	81678	4 mfd. 150 V dry electrolytic condensers (in one unit)
10	81679	250,000 ohm volume control and switch
11	81680	Speaker
12	81681	29,000 ohm ¼ W. carbon resistor
13	81682	1.1 meg. ¼ W. carbon resistor
14	81683	1600 ohm ½ W. carbon resistor
15	81694	Filter choke
16A, 16B	81698	5 mfd. 20 V dry electrolytic condensers (in one unit)
17	81785	Power cord assembly
18	81834	Battery cable socket
19	81861	6 volt battery cable
	81863	12 volt battery cable
	81865	32 volt battery cable
20	.....	Switch on back of 81679

FRONT OF CHASSIS

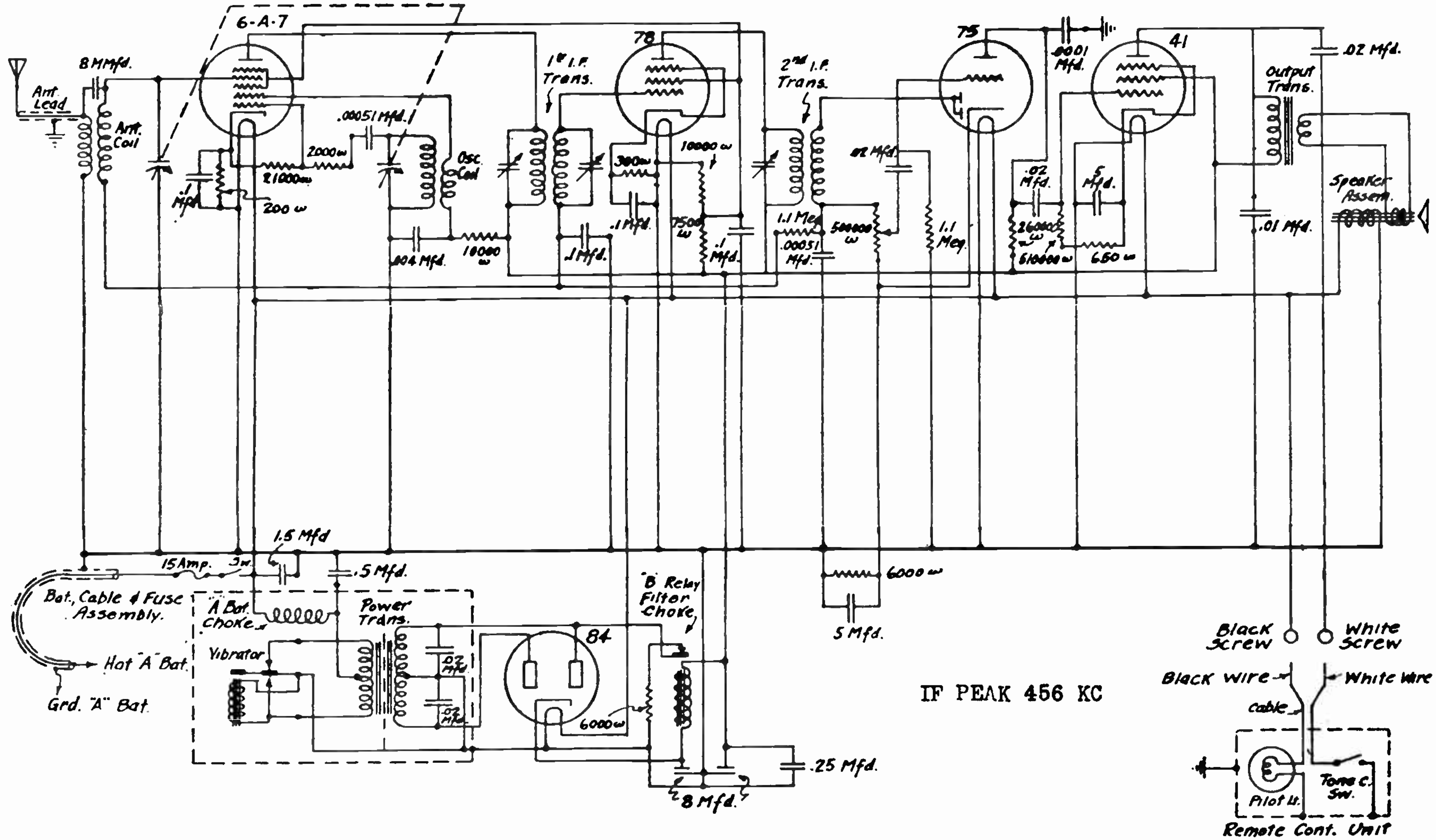


USING MODEL 108-X IN AUTOMOBILE

Two #81884 brackets and a #81861 6-volt adaptor cable are needed. The plug at the cable's end fits the socket at the rear of set. Clip the yellow A lead to the positive terminal of storage battery and the yellow-black wire labeled -A to the negative terminal of battery. Connect these leads to battery terminals instead of ammeter or other convenient connection points.

MODEL R-112
Schematic

STEWART-WARNER CORP.



STROMBERG - CARLSON TEL. MFG. CO.

SECTION 3—LOCATION OF UNITS

RECEIVER UNIT:

This unit should be located at the passenger side of the dash and should be mounted up as high as possible. When locating this unit care should be taken that the control shafts can be run from the Remote Control Unit on the steering column, with a minimum of bending. If it is not possible to mount the Receiver Unit on the dash proper, it may be located on one side of the dash compartment by using the end mounting slot on the receiver and providing a special metal mounting brace for attaching the receiver to the car body. In some cases, the Receiver Unit may be mounted on the dash directly in front of the steering column, using the end mounting slot and employing two short (twenty inch) control shafts, P-23613 and P-23615, (furnished on special order), instead of the thirty inch shafts furnished with the receiver. It is desirable to leave about two inches clearance above the Receiver Unit to facilitate installation and removal (hooking over and unhooking) from the one bolt mounting. Mounting in the engine compartment is not recommended.

SPEAKER-POWER UNIT:

This unit may be mounted in the center of the dash, on the dash in front of the driver, or directly below the receiver unit on the passenger side of the dash if the receiver is mounted high enough to allow space. When locating the Speaker-Power Unit, it is desirable to allow enough space in front of it so that the box baffle may be easily removed to give access to the operating parts. This unit also may be mounted on one side of the dash compartment, if a suitable metal mounting brace is provided.

REMOTE CONTROL UNIT:

This unit is designed to mount on the steering column in one of several positions provided by the combinations of screw holes in the back of the unit and in the mounting bracket.

SECTION 4—MOUNTING OF UNITS

RECEIVER UNIT:

This unit should be mounted in the most desirable location selected as outlined in Section 3. The method of assembly of the one bolt mounting is clearly illustrated in Fig. 2.

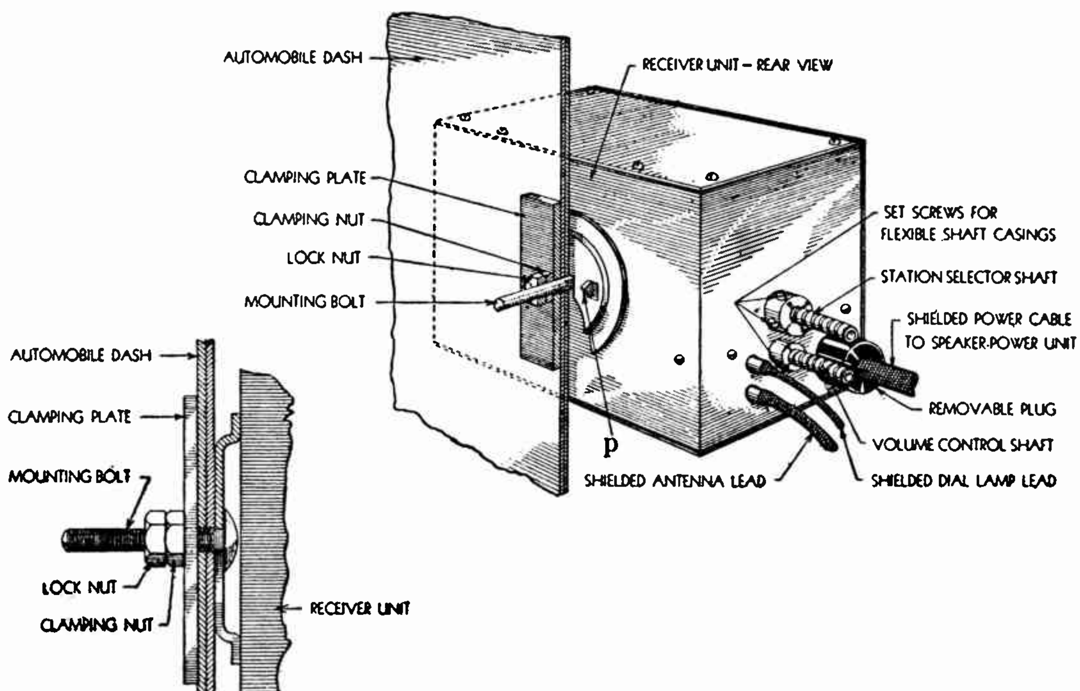


Fig. 2. Mounting of Receiver Unit.

MODEL 33
Speaker Unit

STROMBERG - CARLSON TEL. MFG. CO.

To locate the correct point for drilling the ½ inch hole for the receiver mounting bolt, first hold the Receiver Unit against the dash in the location selected and mark with a pencil or crayon the position of the four corners of the unit, second, locate the center of this area by drawing diagonal lines between the corners and third, mark that position with a center punch.

An alternative method of locating the mounting hole which may be used if the passenger compartment side of the dash is not metal is to hold the Receiver Unit in the selected location and push it firmly against the dash so that the small protruding points "P" Fig. 2 of the mounting disc will make noticeable marks on the dash. The hole for the mounting bolt should then be located half way between these marks.

Next, drill the ½ inch hole and insert the mounting bolt. The receiver Clamping Plate and the two nuts furnished should be assembled on the bolt on the motor compartment side of the dash, Fig. 2, leaving the nuts loose until the receiver is in place. Hang the Receiver Unit over the bolt head and align the sides of the unit vertically, and immediately tighten the nuts in place, using the outer one as a lock-nut.

SPEAKER-POWER UNIT:

This unit should likewise be mounted in the most desirable location as described in Section 3. The method of mounting and the proper assembling of the back cover and spacing block are shown in Fig. 3.

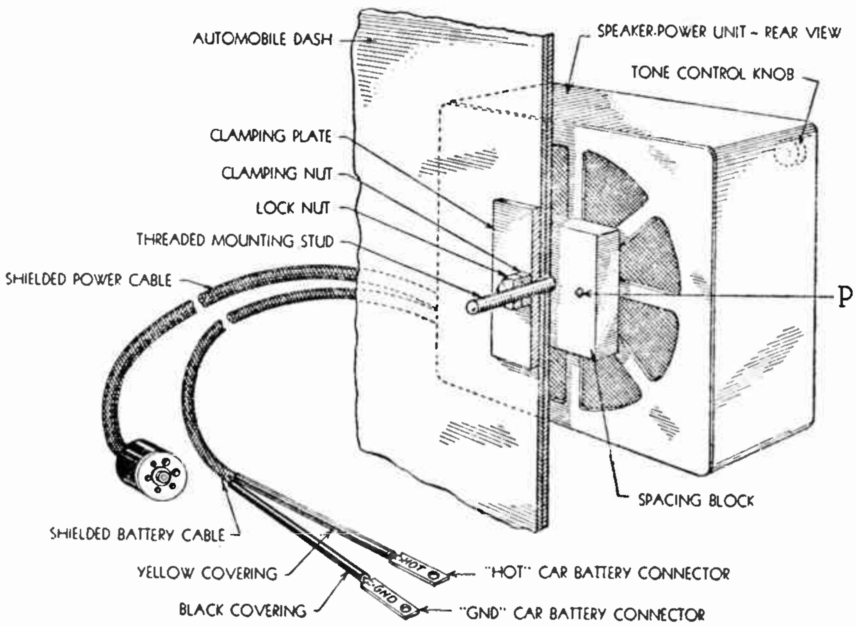


Fig. 3. Mounting of Speaker-Power Unit.

Locate the point where the ½ inch hole for the mounting stud is to be drilled by measurement or by using the metal back plate of the unit as a template. After this hole is drilled, the Speaker-Power Unit is mounted as shown in Fig. 3, the Clamping Plate and two nuts located on the motor side of the dash holding this unit in place. Tighten down the nuts, using the outer nut for a lock nut. Make sure that the weight of the unit is supported by the spacing block and that no strain is put on the case when the nuts are properly tightened. The pointed pins "P" Fig. 3 are designed to hold the Speaker-Power Unit from turning on the dash, when mounted.

STROMBERG - CARLSON TEL. MFG. CO.

MODEL 33
Remote Control

Remote Control Unit:

The Remote Control Unit should be mounted on the steering column as shown in detail in Figs. 4 and 5. It will be noted that four angles of attachment of the mounting bracket to the control unit are available. Select the desired angle and fasten the bracket to the control unit as shown in Fig. 4. Wrap a couple turns of black friction tape around the steering column (same width as the clamp strap) at the height where it is desired to mount the remote control unit. Now, clamp the mounting bracket to the steering column.

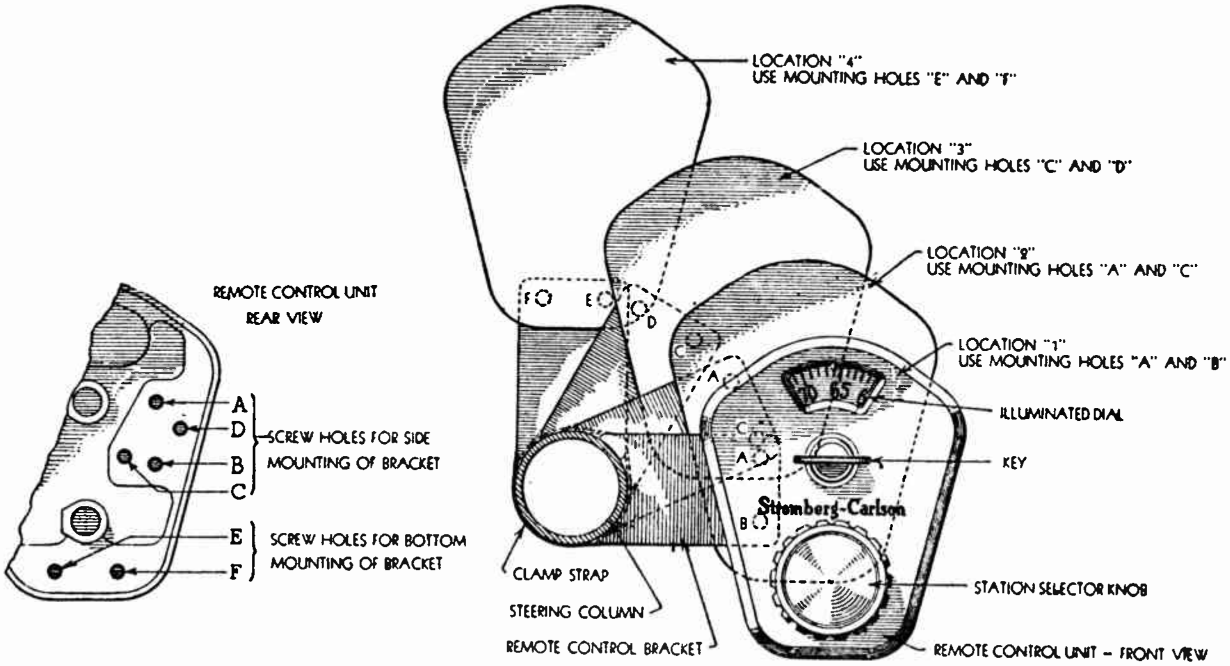


Fig. 4. Arrangement of Possible Angles of Mounting of Remote Control Unit.

The clamping strap is provided with holes in both ends arranged so that it may be adjusted for the various sizes of steering columns. Select the combination of holes, one in each end, which is proper to fit the column and assemble as shown in Fig. 5. This may be done by first turning the screw completely through the holes in the strap so as to pull the ends together against the bracket, and then tightening the nut down with a socket wrench.

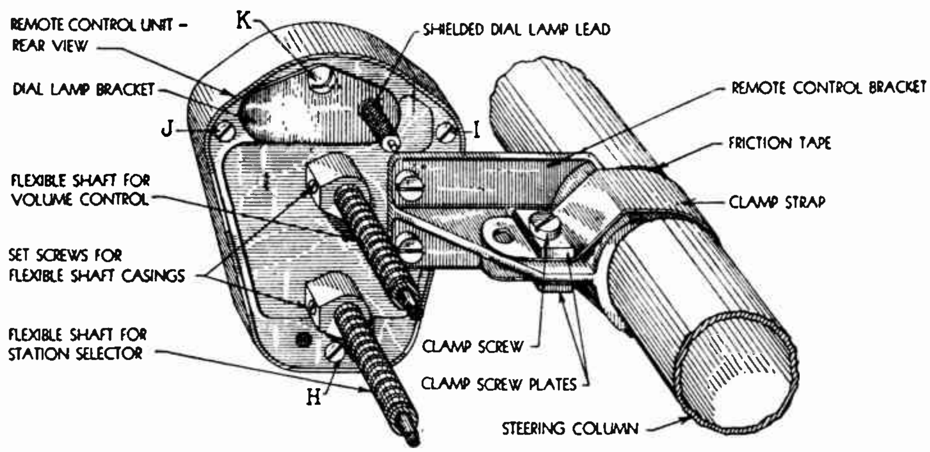


Fig. 5. Mounting of Remote Control Unit on Steering Column.

STROMBERG - CARLSON TEL. MFG. CO.

the shielded lead should be cut off to the proper length to meet the antenna wire where it emerges from the post. The fabric braid can be pushed back to enable a ground connection to be made to the shield at this point. No greater length of shielded lead than absolutely necessary should be used.

In special cases where a "Triangular Under-Car Antenna System" is employed, it may be desirable to run the shielded lead down to the point where the lead splices on to the antenna wire. This is necessary if there is pickup of ignition noise on the antenna lead where it goes through the floor boards. If the shielded lead is used in this manner under the car, it should be covered with both rubber and friction tape as protection against moisture.

After the shielded Antenna lead is installed, the connection is made to the receiver by means of the small bayonet connector (male portion in the receiver unit) attached to the end of this lead as shown in Fig. 2.

If an antenna system is already built in the car be sure to test before using as it may be grounded or poorly insulated.

Dial Lamp:

The Dial Lamp Lead is connected to the Receiver Unit by means of a bayonet connector similar to that used for the antenna except the female portion is in the receiver and the male portion on the lead. See Fig. 2.

Power Cable:

This connection is made by inserting the plug on the end of the large shielded cable attached to the Speaker-Power Unit into the male receptacle in the Receiver Unit as shown in Fig. 2. This plug is provided with a snap fastener to prevent the connection jarring loose.

Battery Cable:

The connection of the Battery Cable to the car battery is made by removing the bolts of the battery lugs and putting them through the lead covered cable connectors, Fig. 3, provided on the end of the shielded two-wire cable from the Speaker-Power Unit. The bolts with the connectors on are then replaced in the battery lugs and securely tightened, after which the ends of the connectors are bent down as shown in Fig. 7. This arrangement allows the battery to be changed without disturbing the connections for the radio. **Be sure that the lug marked GND (conductor covered with black tubing) is connected to the grounded side of the battery.**

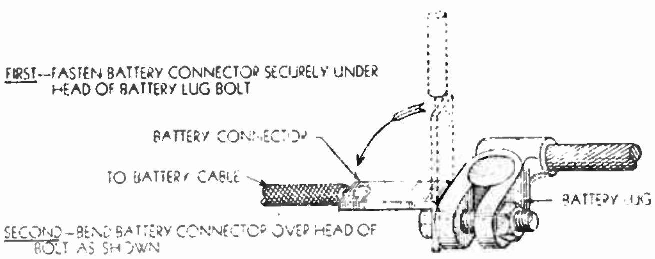


Fig. 7. Method of Attaching Battery Cable Connectors to Battery Lug Bolts.

Polarity Connection:

The polarity connection on the back of Speaker-Power Unit should be checked as shown in Fig. 8.

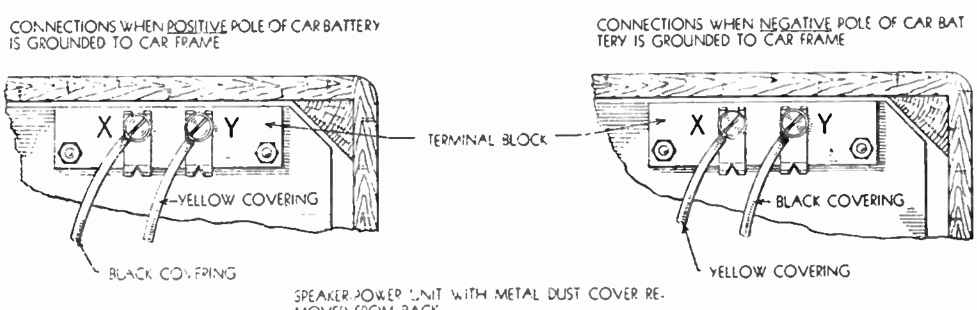


Fig. 8. Polarity Reversing Connections on Back of Speaker-Power Unit.

STROMBERG - CARLSON TEL. MFG. CO.

MODEL 33
Vibrator

The following tests are those which the dealer or installer should be prepared to make to insure proper operation of the receiver.

1. Tubes and Dial Lamp

The tubes should be tested periodically and replaced when necessary to maintain best performance. The efficiency of each tube may be checked by comparison of a new one of the same type in its place. Spare tubes of the following types should be kept on hand for this purpose: No. 37, No. 41, No. 78, No. 6A7, No. 6B7.

The tubes are made readily accessible without dismounting the Receiver Unit by removing the six screws (standard 6-32 thread) holding the front cover of the receiver. When this cover is taken off, the tubes may be easily removed for changing.

If the dial lamp fails to light, remove dial lamp bracket, which is held in place by screw "K" Fig. 5, and replace with a new P-23535 Dial Lamp.

2. Self-Rectifying Vibrator Unit

The P-23466 Elkonode Vibrator Unit, designed for use in the No. 33 Receiver, may be checked by substituting the unit to be tested in a receiver kept set up for this purpose. If the unit under test performs correctly in this set, but does not operate in a satisfactory manner in the receiver being tested, the trouble will be found elsewhere in the circuit. If the check shows that the unit does not operate correctly, it should be replaced with a new one. The Elkonode Vibrator Unit is readily removed without dismounting the speaker power unit by taking out the four screws ("A" Fig. 11) holding the case, removing the tone control knob, lifting case off, and removing the two screws marked N in Fig. 11. The Elkonode unit may then be removed from its socket. Replace only with a Stromberg-Carlson P-23466 Elkonode, as that type only is designed to work in this circuit. DO NOT ATTEMPT TO SERVICE ELKONODE UNITS.

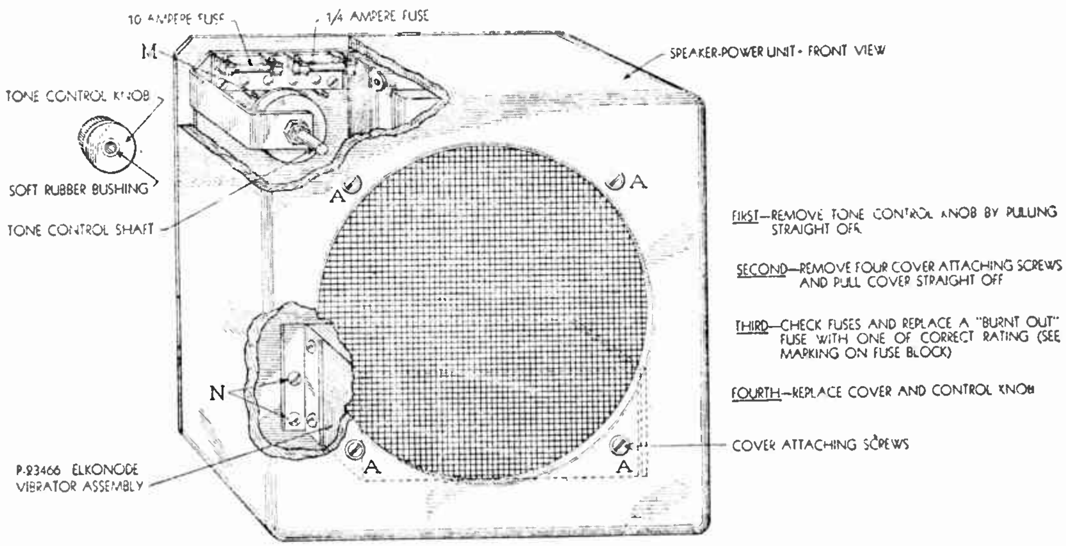


Fig. 11. Location of Fuses and Elkonode Vibrator in Speaker-Power Unit.

The dealer or installer should in addition be prepared to check the wiring of the receiver and Speaker-Power Unit and to measure the voltages given in Section 10 "Servicing". He should have on hand a supply of 10-ampere fuses (P-23172) and ½ ampere fuses (P-23171).

ANTENNA:

A properly installed roof antenna should require no attention. When an under-car antenna is employed, the insulators should be cleaned occasionally to prevent grounding.

IGNITION SYSTEM:

The ignition system of the car must be kept in good condition. Fouled plugs or plugs with incorrectly adjusted gaps will affect the operation of the receiver as well as that of the car. Burned or incorrectly adjusted breaker points will also affect the performance unfavorably. It is advisable to advance the charging rate of the generator in order to compensate for the additional drain on the car battery due to the radio receiver.

Continuity Test—Receiver Unit

This test is made with all tubes removed from sockets and the power cord removed from the receiver unit. The On-Off switch should be turned "Off" The readings given are in ohms as measused on a Weston Volt-ohmmeter No. 663. See Fig. 13.

Measurements Made Between Points		*Ohms*	*If resistance differs greatly from value shown. Check the following*
3	1	Open	Capacitors C4, C5, C24 or grounds in wiring or apparatus.
6	1	Open	Defective Switch or Capacitor C23.
7	5	0	Wiring of heater circuits.
8	3	70	Primary of R. F. Transformer L3.
9	3	20,000	R16 or wiring.
10-11	1	450	Cathode Resistor of No. 78 Tube R2.
12	1	0	Ground Connection.
13	5	0	Wiring of heater circuits.
14	3	20	Primary of 1st I. F. Transformer L7.
15	3	20,000	R16 or wiring.
16	3	1	Plate winding of oscillator coil L5.
17	18	50,000	Grid Leak R5 or Grid Capacitor C9.
18	1	500	Cathode Resistor R4.
19	1	0	Ground Connection.
20	5	0	Wiring of heater circuits.
21	3	15	Primary of second I. F. Transformer L11.
22	3	20,000	R16 or wiring.
23	25	200,000	Secondary of Second I. F. Transformer L9 or R8, or R11.
24	1	1,000,000	Secondary of Second I. F. Transformer L10 or R9.
25	1	2,600	Resistors R6 and R7.
26	1	0	Ground Connection.
27	1	0	Ground Connection.
28	3	5,500	Primary of Audio Transformer L12 or Choke L15.
29	1	0-10 (Switch "off")	Volume Control Potentiometer.
30	1	3,000	Cathode Resistor R14.
31	5	0	Wiring of heater circuits.
32	1	0	Ground Connection.
33	2	0	Wiring of output tubes
33	39	Open	Capacitors C22.
34	3	0	Wiring of output tubes.
35	1	2700-3700	Secondary of Audio Transformer L13 or L14.
36	1	150	Cathode Resistor R15 or wiring.
37	5	0	Wiring of heater circuits.
38	1	0	Ground Connection.
39	4	0	Wiring of output tubes.
40	3	0	Wiring of output tubes.
41	1	2700-3700	Secondary of audio transformer L13 or L14.
42	1	450	Cathode Resistor R15 or wiring.
43	5	0	Wiring of heater circuits.
44	1	2000	Secondary of first I. F. Transformer L8 and Resistor R6.
45	1	1,100,000	Secondary of R. F. Transformer L4; Resistors R3, R9, R10 or Capacitors C6, C13, C16.
46	1	1,100,000	Secondary of Antenna Transformer L2; Resistors R1, R9, R10 or Capacitors C2, C13, C16.
47	1	25	Primary of Ant. Transformer.
47	46	Open	Capacitor C1.

Note—Due to manufacturing tolerances on carbon resistors, the values in the above table may vary plus or minus 10 per cent.

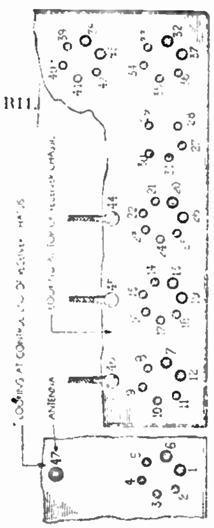


Fig. 13. Location of Points for Continuity Test.

Voltage Table.

These voltage readings are obtained by measuring between the various tube socket contacts and chassis base, with the tubes in place. Fig. 12 shows the terminal layout of the sockets with the proper terminal numbers. The terminals of each socket are numbered, starting with one heater pin as 1 and proceeding clockwise around the pin circle to the other heater pin. This is done looking at the bottom of the socket.

Voltages are read on the meter scale (1000 ohms per volt) normally used for the magnitude of the particular voltage except as otherwise specified. The voltages given are those obtained when the battery voltage is 6.3 volts.

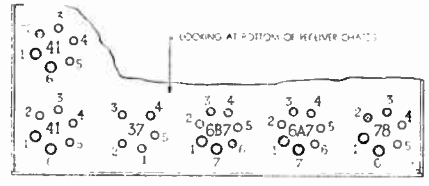


Fig. 12. Location of Socket Terminals for Measuring Voltages.

			Terminals of Sockets						
Tube	*Circuit*	*Grid Clip*	1	2	3	4	5	6	7
No. 78	R. F. Amp.	0	−6.1	+187	+81	+2.9	2.9	0	—
No. 6A7	Det. Osc.	0	−6.1	+187	+81	+187	−2 250 Scale	−3.6	0
No. 6B7	I. F. Det.	8.1	−6.1	+187	+81	+3 100 Scale	0	+12	0
No. 37	A. F. Amp.	—	0	+166	0	+11	−6.1	—	—
No. 41	Output	—	0	+184	+187	0	+14.5	−6.1	—

Note—These readings are made with the positive pole of the storage battery grounded. If the negative is grounded, the heater voltages will naturally be reversed. These voltages will vary slightly from the average given due to tolerances in resistors, variations in tubes, battery voltage differences, etc.

			Terminals of Sockets						
Tube	*Circuit*	*Cap*	1	2	3	4	5	6	7
78	R. F. Amp.	Control Grid	"Hot" Heater	Plate	Screen	Suppressor	Cathode	Grounded Heater	—
6A7	Det. Osc.	Detector Control Grid	"Hot" Heater	Plate of Detector	Screen	Plate of Osc.	Control Grid of Osc.	Cathode	Grounded Heater
6B7	I. F. Det.	Control Grid	"Hot" Heater	Plate	Screen	Audio Diode	A. V. C. Diode	Cathode	Grounded Heater
37	A. F. Amp.	—	Grounded Heater	Plate	Control Grid	Cathode	"Hot" Heater	—	—
41's	Outputs	—	Grounded Heater	Plate	Screen	Control Grid	Cathode	"Hot" Heater	—

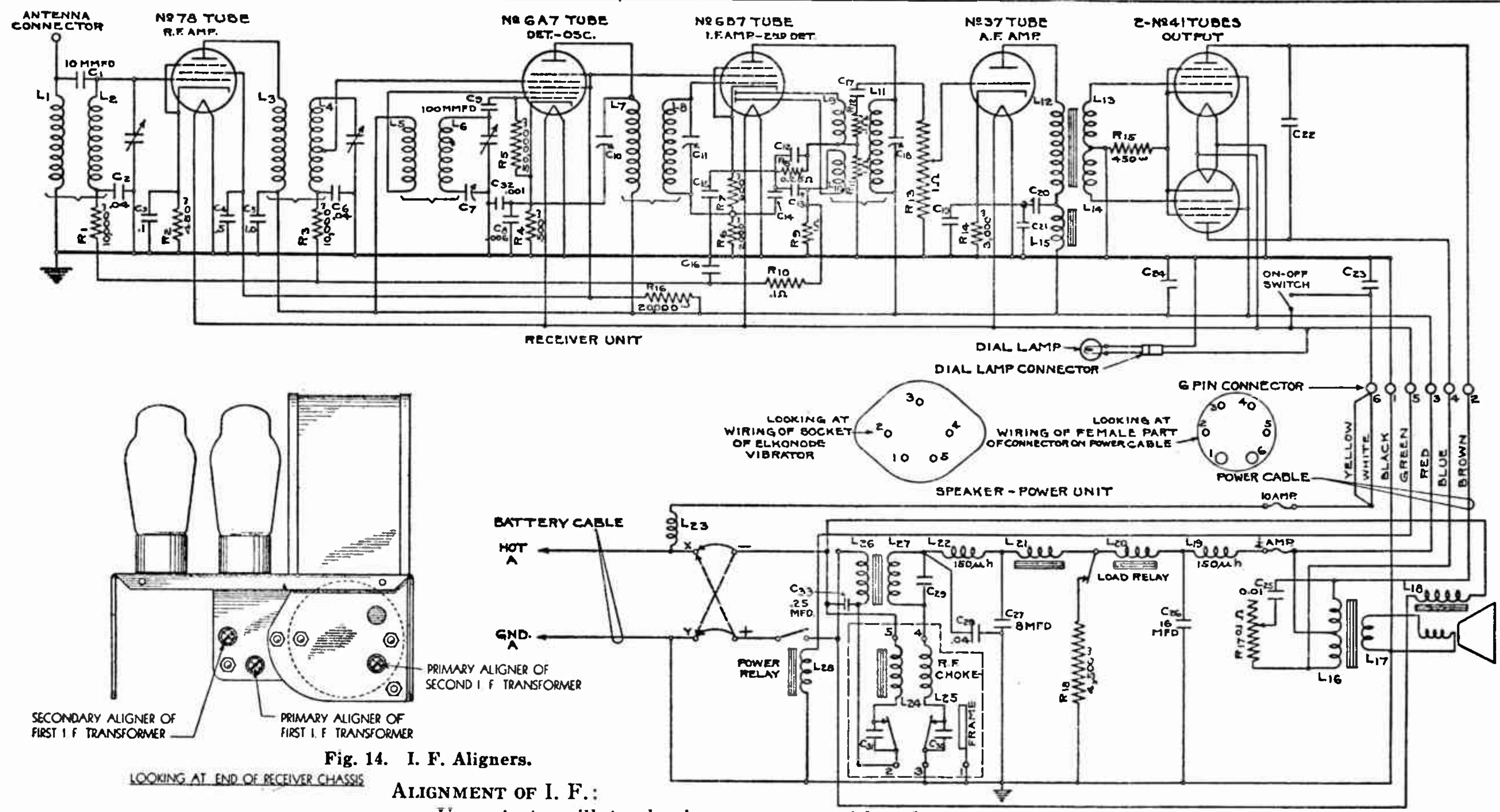


Fig. 14. I. F. Aligners.

LOOKING AT END OF RECEIVER CHASSIS

IF PEAK 260 KC

ALIGNMENT OF I. F.:

Use a test oscillator having an output with a frequency of 260 kilocycles. Connect the leads from this oscillator between the grid (top cap) of the No. 6A7 tube and chassis base. A .5 mfd. capacitor should be connected in series with the lead going to the grid to insulate the 260 k. c. oscillator source from the voltages of the No. 6A7 tube.

Connect the output meter across terminal "M" of the fuse block (See Fig. 11) and the speaker-power supply frame. This puts the meter across the moving coil of the speaker (4 ohms impedance). The signal applied should be very weak, just sufficient to show a deflection on the output meter.

Now adjust the aligners of the primary and the secondary of the first I. F. transformer (See Fig. 14) for the peak swing on the output meter. It will be necessary to check over these adjustments as they are somewhat interdependent. Now, adjust the aligner of the primary of the second I. F. transformer in the same manner. For this aligning operation an insulated screwdriver should be used, a Formica rod with a small piece of metal inserted in the end will serve.

Alignment of R. F. and Oscillator:

Now put the output of the oscillator on the antenna input terminal through a 200 mmfd. capacitor, the "low" side of the oscillator being connected to the chassis base.

Now tune the test oscillator to 1400 k. c. and set the dial of the remote control unit at 140. Make sure that the signal applied is only strong enough to give a deflection on the output meter. Now, adjust the oscillator shunt aligner (Fig. 15) for maximum meter deflection. Then, adjust the R. F and Antenna Aligners (Fig. 15) in the same manner.

Now, set the test oscillator frequency to 600 k. c. and adjust the oscillator series aligner for maximum meter deflection. If this adjustment was very far out, it is advisable to re-set to 1400 k. c. and check the oscillator shunt aligner.

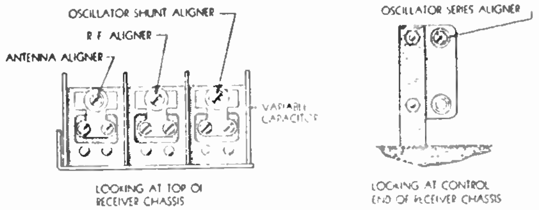


Fig. 15.
R. F. and Oscillator Aligners.

SECTION II—IDENTIFICATION OF CIRCUIT CONSTANTS

Resistors

R1	Bias Feed of R. F. Amplifier 10,000 Ohms, Type D; Brown, Black, Orange.
R2	Cathode Resistor of R. F. Amplifier—150 Ohms, Type D; Yellow, Green, Brown.
R3	Bias Feed of First Detector 10,000 Ohms, Type T; Brown, Black, Orange.
R4	Cathode Resistor of No. 6A7 500 Ohms, Type D; Green, Black, Brown.
R5	Grid Leak of Oscillator 50,000 Ohms, Type D; Green, Black, Orange.
R6	Delay Bias Resistor of Cathode of No. 6B7 2,000 Ohms, Type D; Red, Black, Red.
R7	Grid Bias Resistor of Cathode of No. 6B7 600 Ohms, Type D; Blue, Black, Brown.
R8	Audio Diode Load .25 Megohm, Type D; Red, Green, Yellow.
R9	A. V. C. Diode Load 1.0 Megohm, Type D; Brown, Black, Green.
R10	Feeder of A. V. C. voltage .1 Megohm, Type D; Brown, Black, Yellow.
R11	"Q" Resistor for Audio Diode 1.0 Megohm, Type D; Brown, Black, Green.
R12	Filter Resistor in Volume Control Circuit .1 Megohm, Type D; Brown, Black, Yellow.
R13	Volume Control Potentiometer 1.0 Megohm.
R14	Bias Resistor of Audio Amplifier 3,000 Ohms, Type D; Orange, Black, Red.
R15	Bias Resistor of Output Tubes 150 Ohms, Type B; Yellow, Green, Brown.
R16	Screen Series Resistor 20,000 Ohms, Type B; Red, Black, Orange.
R17	Temporary Load Resistor 1,500 Ohms, Vitreous Enamel.

Inductances

L1	Primary of Antenna Transformer .9 Mh. 25 Ohms.	(P-23561)
L2	Secondary of Antenna Transformer.	
L3	Primary of R. F. Transformer 5.5 Mh. 73 Ohms.	(P-23562)
L4	Secondary of R. F. Transformer.	
L5	Plate Winding of Oscillator Coupler.	(P-23563)
L6	Grid Winding of Oscillator Coupler.	
L7	Primary of First I. F. Transformer 5.5 Mh.; 20 Ohms.	(P-23579)
L8	Secondary of First I. F. Transformer 5.5 Mh.; 20 Ohms.	
L9	Secondary of Second I. F. Transformer 5.5 Mh.; 45 Ohms.	(P-23515)
L10	Secondary of Second I. F. Transformer 5.5 Mh.; 45 Ohms.	
L11	Primary of Second I. F. Transformer—5.5 Mh.; 45 Ohms.	

Inductances (Contd.)

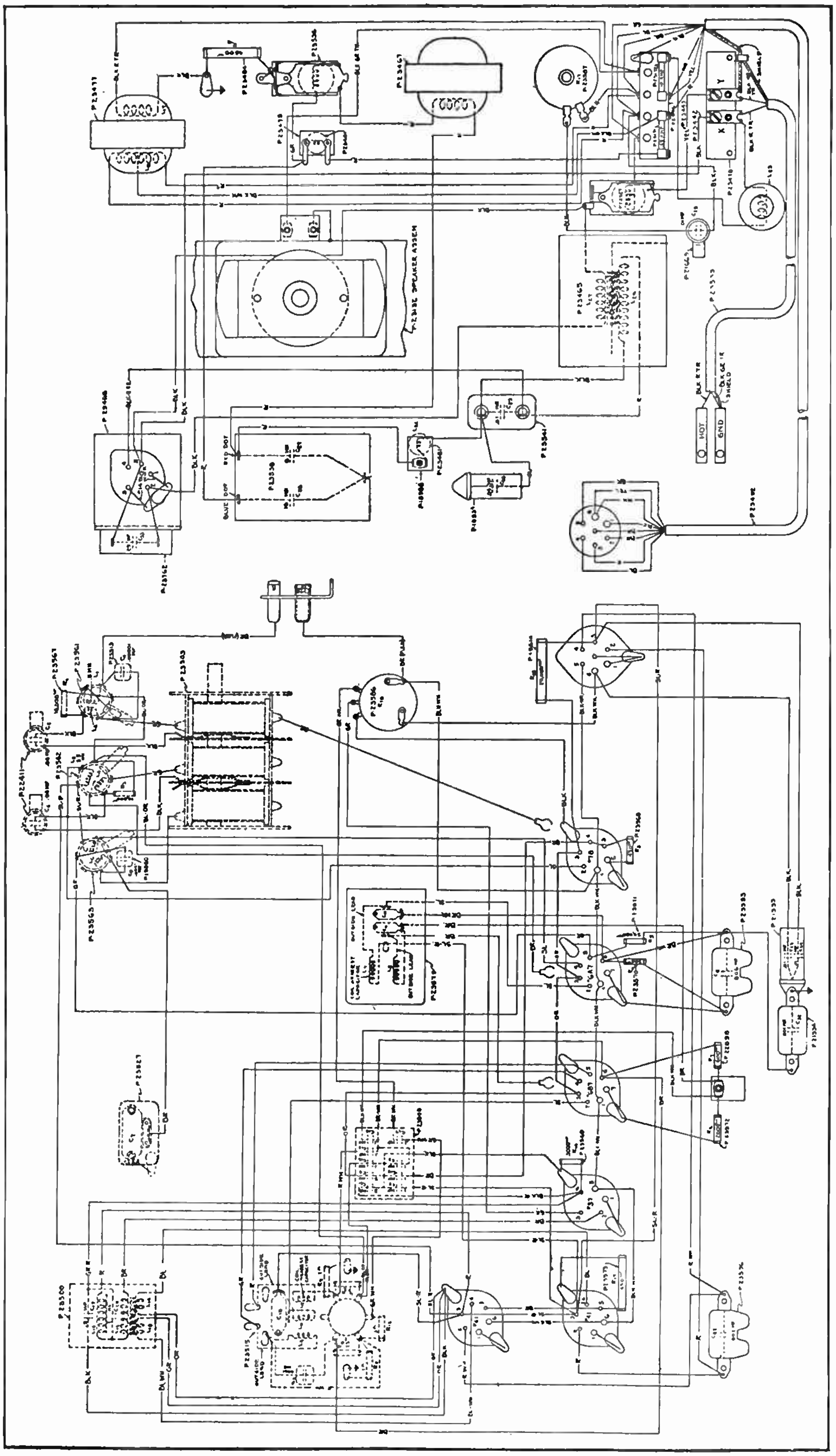
L12	Primary of Audio Input Transformer—2,400 Ohms.	(P-23500)
L13	Secondary of Audio Input Transformer. 7,000 Ohms	
L14	Secondary of Audio Input Transformer.	
L15	Plate Circuit Choke—2,800 Ohms.	
L16	Primary of Audio Output Transformer—530 Ohms.	(P-23417)
L17	Secondary of Audio Output Transformer.	
L18	Field of Electro-Dynamic Speaker—6 Ohms.	
L19	R. F. Choke—150 Microhenries (P-23481)	
L20	Load Relay Winding—48 Ohms. (In P-23537 Relay)	
L21	Filter Choke—210 Ohms (P-23467)	
L22	R. F. Choke—150 Microhenries. (P-23481)	
L23	R. F. Choke "A" Supply Circuit to Chassis. (P-23651)	
L24	Driving Coil of Elkonode. (In P-23466 Elkonode Assembly)	
L25	R. F. Choke. (In P-23466 Elkonode Assembly)	
L26	Primary of Power Transformer.	(P-23465)
L27	Secondary of Power Transformer—90 Ohms.	
L28	Winding of Power Relay—Ohms. (P-23537)	

Capacitors

C1	Antenna Series Capacitor—10 Mmfd. (P-23513)	
C2	A. V. C. By-Pass in R. F. Amplifier—.04 Mfd. (P-22411)	
C3	Cathode Resistor By-pass in R. F. Amplifier—.1 Mfd. (In P-23508)	
C4	Screen By-pass .5 Mfd. (In P-23508)	
C5	Plate Circuit By-pass—1.0 Mfd. (In P-23508)	
C6	A. V. C. By-pass in First Detector Circuit—.04 Mfd. (P-22411)	
C7	Oscillator Series Aligner. (P-23527)	
C8	Cathode By-pass No. 6A7 Tube—.006 Mfd. (P-23595)	
C9	Grid Capacitor of Oscillator—100 Mmfd. (P-19560)	
C10	Tuning Capacitor for Primary of First I. F. Transformer.	
C11	Tuning Capacitor for Secondary of First I. F. Transformer.	
C12	By-pass for Audio Diode Load—100 Mmfd. (P-19560)	
C13	By-pass for A. V. C. Diode Load—.1 Mfd. (In P-23508)	
C14	By-pass for Grid Bias Resistor of No. 6B7—.1 Mfd. (In P-23508)	
C15	By-pass for Grid and Delay Bias Resistors of No. 6B7—.1 Mfd. (In P-23508)	
C16	By-pass for A. V. C. Filter Circuit—.1 Mfd. (In P-23508)	
C17	Stopping Capacitor Audio Diode Circuit—.1 Mfd. (In P-23508)	
C18	Tuning Capacitor Primary of Second I. F. Transformer.	
C19	By-pass for Cathode Resistor No. 37 Tube—.5 Mfd. (In P-23500)	
C20	Plate Circuit Capacitor No. 37 Tube—.15 Mfd. (In P-23500)	
C21	By-pass for Cathode Resistor No. 37 Tube—.5 Mfd. (In P-23508)	
C22	By-pass for Plate Circuits Output Tubes—.002 Mfd. (P-23596)	
C23	By-pass for "Hot" A Circuit—.01 Mfd.	(P-21535)
C24	By-pass for "B—" Circuit—.01 Mfd.	
C25	Tone Control Capacitor .01 Mfd. (P-21669)	
C26	Filter Capacitor—16 Mfd.	(P-23538)
C27	Filter Capacitor—8 Mfd.	
C28	Filter Capacitor—.04 Mfd. (P-19597)	
C29	Secondary Capacitor (P-23541)	
C30	Vibrator Capacitor.	(In P-23466 Vibrator Assembly)
C31	Vibrator Capacitor.	
C32	Cathode By-pass No. 6A7—.001 Mfd. (P-19334)	
C33	Primary Capacitor, Vibrator Circuit—.25 Mfd. (P-23765)	

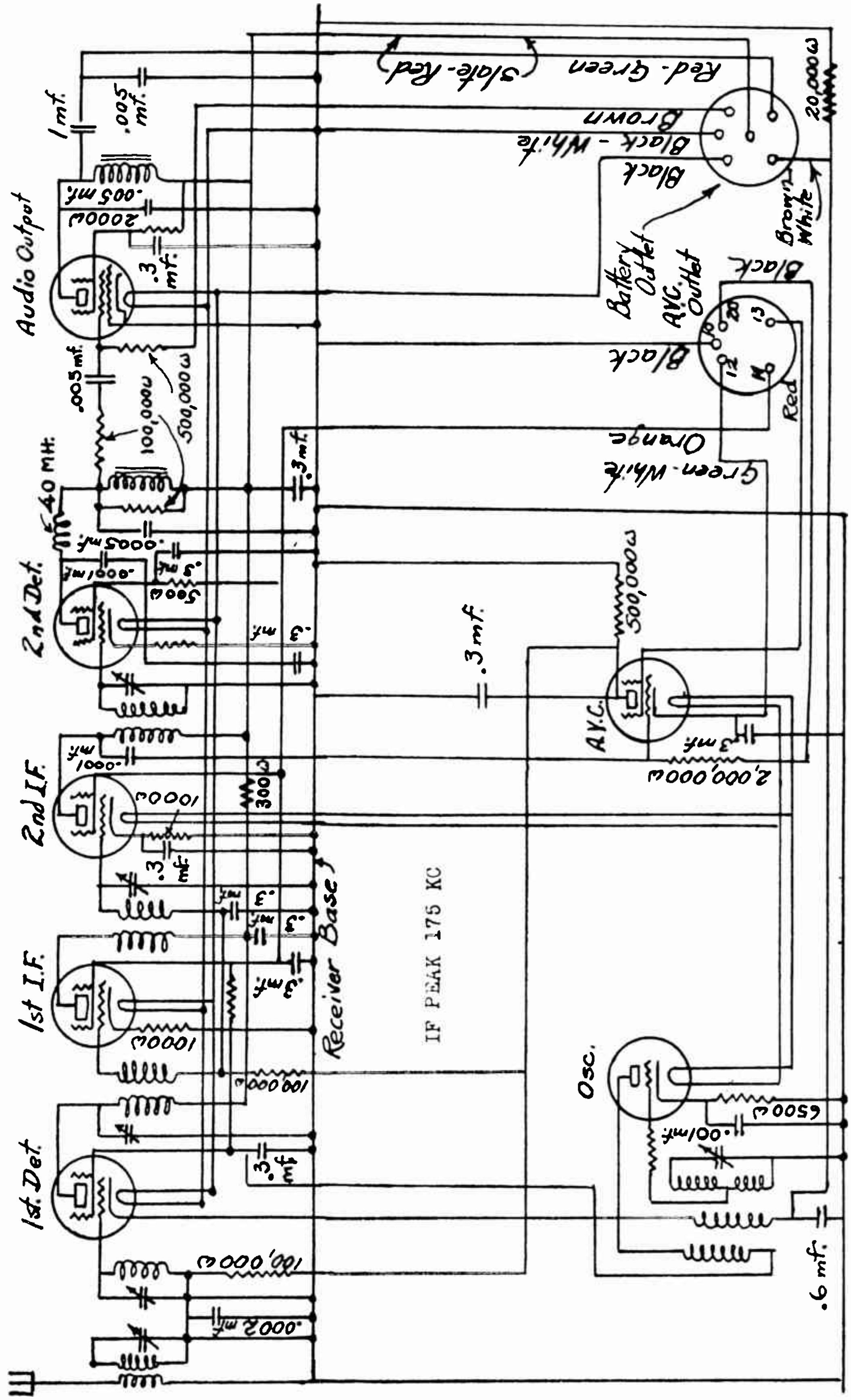
STROMBERG - CARLSON TEL. MFG. CO.

MODEL 33
Chassis Wiring
Socket Layout



MODEL Compact
Police Receiver
Schematic

STROMBERG - CARLSON TEL. MFG. CO.



STROMBERG - CARLSON TEL. MFG. CO.

MODEL Compact
Police Receiver
Wiring, Socket

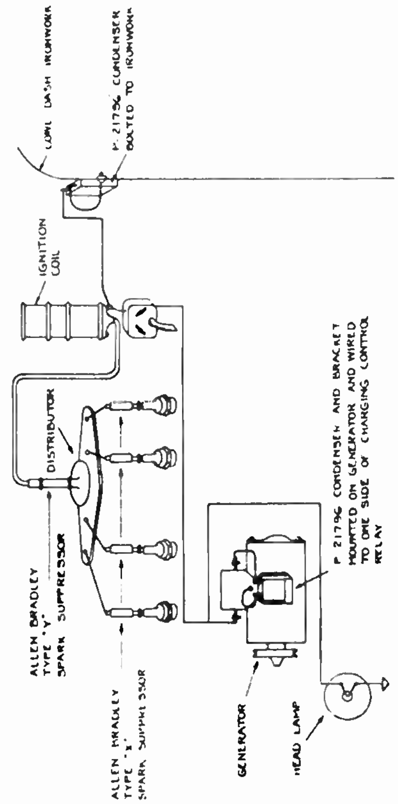


FIG 3 WIRING AND EQUIPMENT FOR SPARK AND GENERATOR NOISE SUPPRESSION ALSO SEE FIG 4

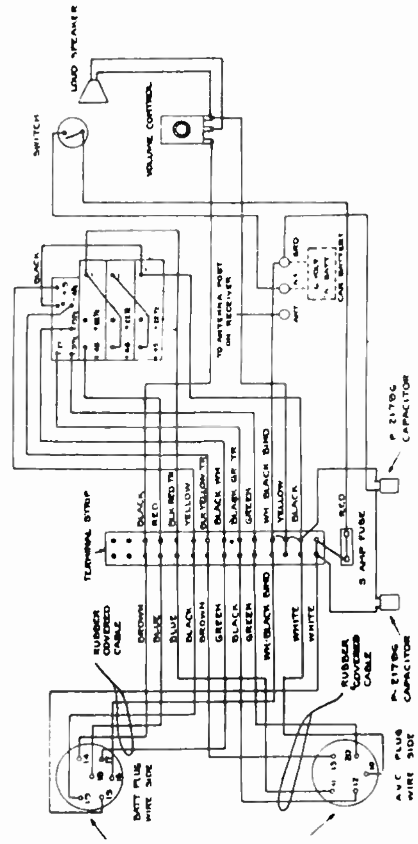


FIG 4 WIRING CONNECTIONS AT TERMINAL STRIP DRY CELL BATTERIES ETC

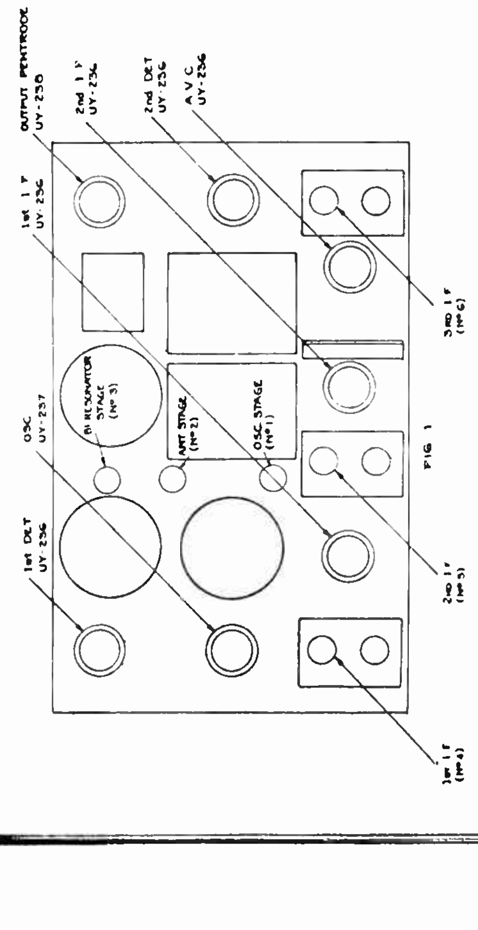


FIG 1

TUBE AND ALIGNING LOCATIONS FOR STROMBERG-CARLSON AUTOMOBILE POLICE RECEIVER

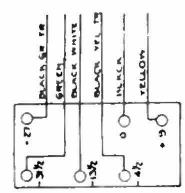


FIG B

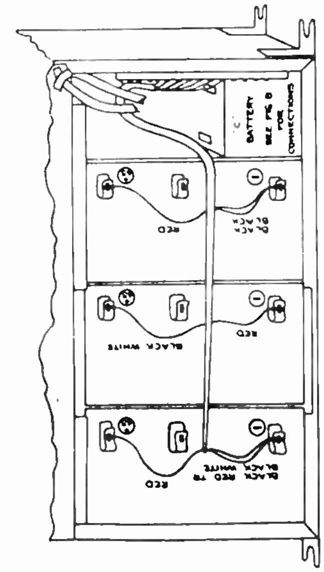


FIG A

FIG 2 DRY CELL CONNECTIONS

MODEL Compact
Police Receiver
Alignment

STROMBERG-CARLSON TEL. MFG. CO.

FREQUENCY ADJUSTMENT AND ALIGNING

Since this receiver employs automatic volume control it is advisable to use a visual tuning meter in changing the frequency adjustment or aligning it. The meter recommended is a Weston milliameter Model 301 Scale 0-5.

If it is necessary to change the tuning of the receiver so as to receive signals from a broadcast station having a different frequency from that to which the receiver was tuned to when first supplied, the following instructions should be observed.

First see that all tubes are inserted and in their correct sockets. See Drawing Fig. 1. Then connect the tuning meter in the cathode circuit of the first I.F. tube, thus; Remove terminal 'A' (see wiring diagram of receiver) from the frame of receiver and connect a wire from this terminal to one side of tuning meter, then connect the other side of meter to the frame of the receiver. Remove the dust protector cap and insert special aligning wrench Pc. 16570, in aperture #1 (oscillator stage), see Dwg. Fig. 1. Make sure wrench is turning the adjusting screw in the aligning capacitor and turn until the desired station is received. Further tuning is made by adjusting the antenna stage and bi-resonator stage (apertures #2 and #3). The maximum signal strength or resonance point will be indicated by the greatest swing of the tuning meter towards zero.

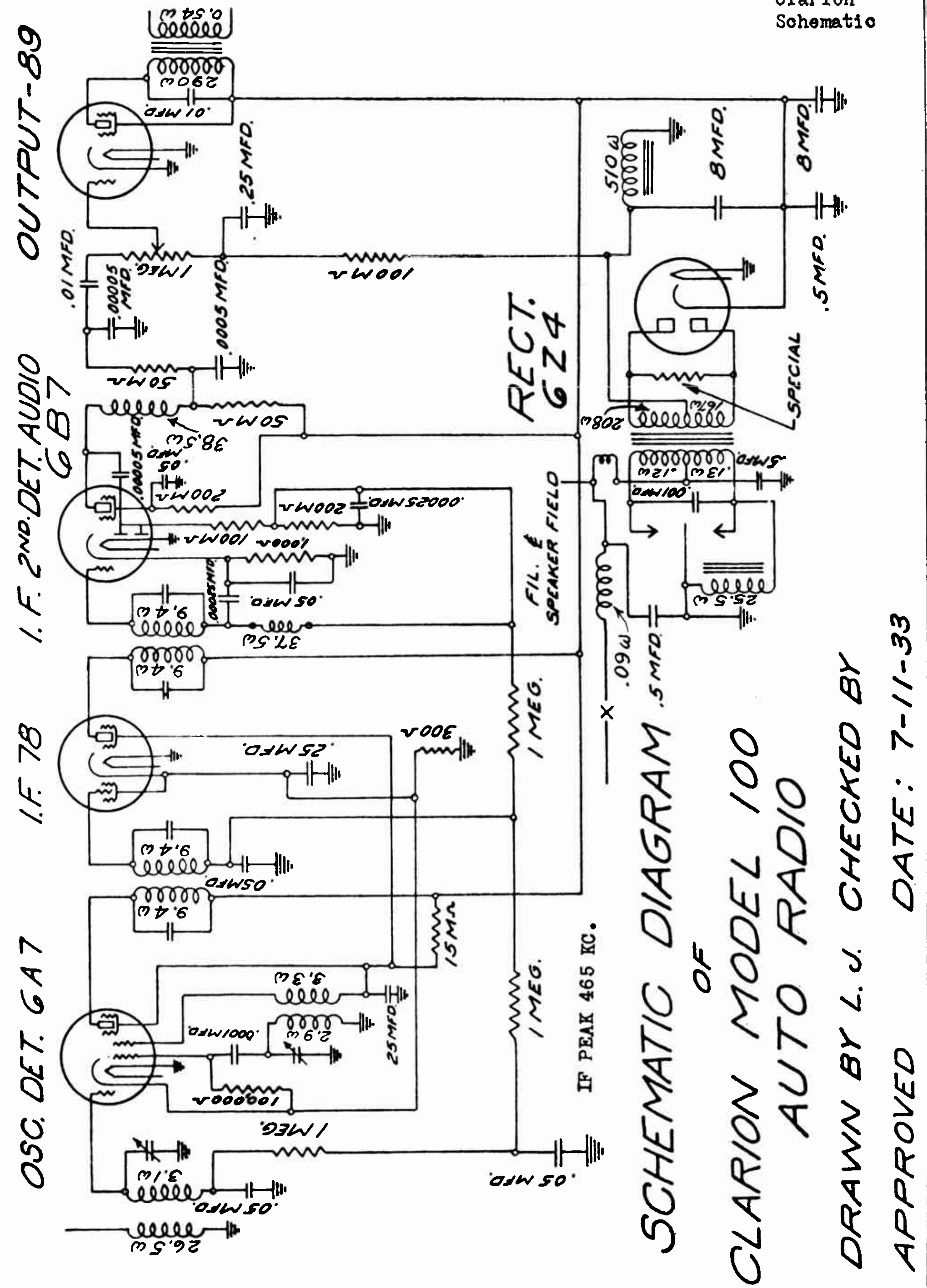
Note carefully in aligning the receiver always adjust the oscillator stage (aperture #1) first, then the antenna stage (aperture #2) and last the bi-resonator stage (aperture #3). If any difficulty is experienced in adjusting to the desired frequency, remove the antenna lead from the antenna binding post and place it under the clip on the first detector tube with tube left in. Then adjust the oscillator stage (aperture #1) only, after which the antenna should be replaced on the antenna binding post and proceed to adjust #2 and #3 as described previously.

If after making the above adjustments the receiver still seems to be functioning at a low signal level, the I.F. stages, apertures 4, 5 and 6, can be checked. It should only be necessary to change these in very rare instances as they are adjusted to a definite frequency at the factory and if changed to any degree in the field, resulting reception will be very poor and it would be practically impossible to re-adjust these I.F. stages to correct values again without special instruments.

The receiver as it leaves the factory is adjusted exactly to the frequency specified by the customer. It is possible for a slight change to have come about during shipment which prevents maximum signal strength in reception. In this case the receiver can be adjusted as described in the foregoing paragraphs except that in adjusting the oscillator, antenna and bi-resonator stages, apertures #1, #2 and #3, the adjusting screw should be turned but very slightly since it is not a question of changing the frequency in this instance, but of tuning to the resonance point. With respect to the I.F. stages apertures 4, 5 and 6 it is better not to touch these except on rare occasions for the reasons as stated in paragraph five.

TRANSFORMER CORP. OF AMERICA

MODEL AR-100
Clarion
Schematic



MODEL AR-100
Clarion
Installation

TRANSFORMER CORP. OF AMERICA

EDGE OF RADIO WHEN
MOUNTED FROM SIDE

INSTRUCTIONS FOR INSTALLING MODEL AR-100 CLARION AUTOMOBILE RADIO

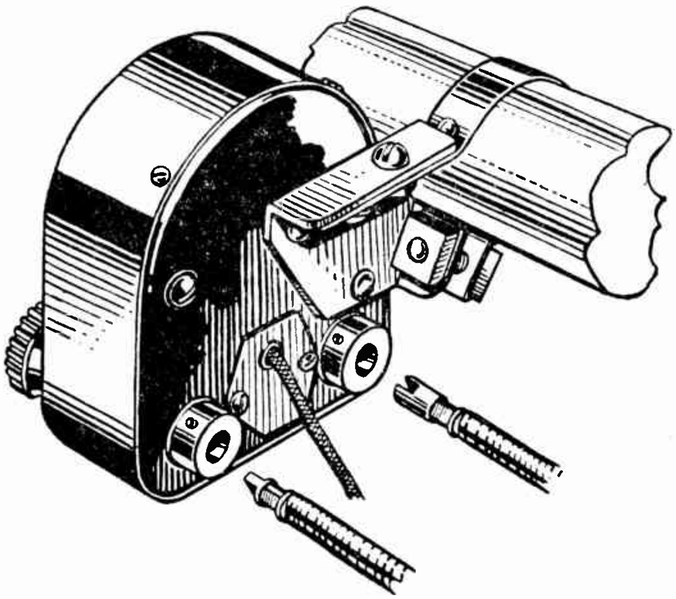
The equipment furnished with this receiver consists of remote control drive and cables, six spark plug suppressors, one by-pass condenser for generator, one distributor suppressor and three mounting studs with nuts and washers.

It will be noted that provision is made for mounting the receiver in any one of three positions in order to allow for variations in different cars.

A template is supplied for drilling three, half-inch holes in the bulkhead after the most convenient mounting position has been determined.

After these holes have been drilled, insert three studs in the bushings on the receiver and secure the receiver to the bulkhead using the washers and nuts supplied on the motor side.

After this has been done, mount the remote control driving unit on the steering column, making certain that the control cables from the receiver reach the drive unit in as direct a line as possible. The drive is mounted on the steering column as shown in the sketch.



Move the flexible shaft around to make the pointer read on the end of the scale at the end of the condenser rotation. If further fine calibration is desired, it will be necessary to adjust at the bushing of the variable condenser within the chassis. To replace the pilot lamp, remove the small plate at the back of the remote control head.

The battery connections (the shield and wire with fuse), should preferably be made directly on the battery posts but in some cars satisfactory results are secured by connecting the outer shield of this wire to the frame of the car (or grounded side of the battery), while the fused terminal is connected to the "Hot" side of the battery or to the ammeter.

The antenna lead (white wire) should be as short and direct as possible. In cars not equipped with built-in antenna, a plate or cable underneath the car will be found very satisfactory. In fact best results are usually obtained with an under-car antenna.

While some cars will not need them, most cars require that suppressors be placed on each spark plug and in the distributor lead. Cables leading from the distributor to the spark plugs should be inspected, and any having faulty insulation should be replaced. The by-pass condenser should be mounted on the generator. The condenser may usually be mounted by one of the screws holding the cut out switch with the lead from the condenser connected to the generator side of the cut-out.

In certain cases, an additional by-pass condenser which may be secured from your dealer, may be required on the ammeter. This is sometimes necessary when the battery cable from the set is connected at the ammeter.

When the set has been installed it may be placed in operation by inserting the volume control key knob and turning it in a clockwise direction. The tubes require about one minute to reach their operating condition. The desired station is tuned by means of the tuning knob. As this receiver has automatic volume control, it works at maximum sensitivity when no station is tuned in. Any static heard between stations disappears when the station is properly tuned.

To turn the set off, turn the volume control counter clockwise until dial light goes off and remove the volume control knob. Have a competent auto electrician set up the generator to take care of the additional five ampere drain of the set. On cars with rubber mounting at the motor, it may be necessary to bond the motor to the frame.

Where antenna lead from set runs near the ignition coil of car, it may be necessary to slip a piece of shielded loom over the antenna wire.

OVERALL SIZE OF TEMPLET INDICATES
EDGE OF RADIO WHEN MOUNTED
FROM REAR.

P-4909

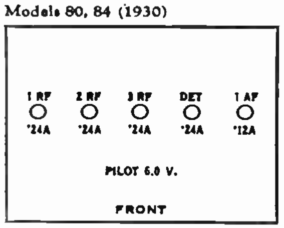
MODEL 80 SCHEMATIC VOLTAGE

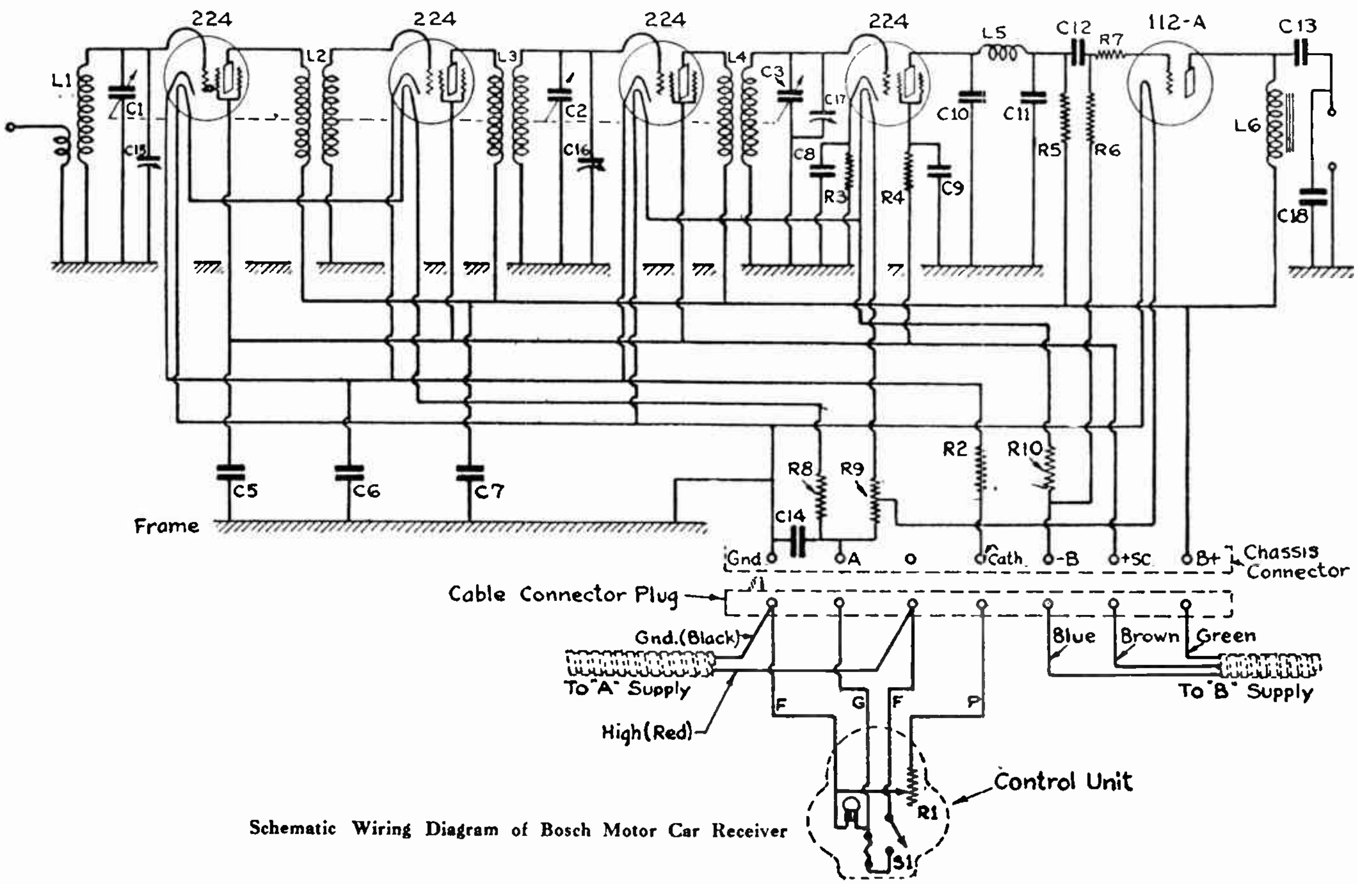
UNITED AMERICAN BOSCH CORP.

TABLE OF SOCKET VOLTAGES

STAGE	TUBE	FIL.	PLATE	SCREEN	GRID	PLATE M.A. Normal	PLATE M.A. Test
1st RF	224	2.0	170	75	3.5	3.0	5.00
2nd RF	224	2.0	170	75	3.5	3.0	5.00
3rd RF	224	2.0	170	75	3.5	3.0	5.00
Det.	224	2.0	50	15	1.0		
Audio	112-A	4.8	165		0.1	6.5	9

Models 80, 84 (1930)





Schematic Wiring Diagram of Bosch Motor Car Receiver

L-1—1st RF Coil
L-2—2nd RF Coil
L-3—3rd RF Coil
L-4—Detector Coil
L-5—Detector Choke
L-6—Output Choke
R-1—Volume Control 18,000 ohms
R-2—1st RF Bias Resistor 500 ohms
R-3—Detector Bias Resistor 25,000 ohms
R-4—Detector Screen Resistor 500,000 ohms
R-5—Detector Plate Resistor 500,000 ohms
R-6—Audio Grid Resistor 2 meg.
R-7—Series Grid Resistor 250,000 ohms
R-8—Filament Resistor 1.3 ohms
R-9—Filament Resistor 1.1 ohms
R-10—Audio Bias Resistor 900 ohms
C-1—1st RF Tuning Condenser
C-2—2nd RF Tuning Condenser
C-3—3rd RF Tuning Condenser
C-5—Screen By-pass Condenser .5mf.
C-6—Cathode By-pass Condenser .5mf.
C-7—Plate By-pass Condenser 1.mf.
C-8—Detector Cathode Condenser .5mf.
C-9—Detector Screen Condenser .5mf.
C-10—Detector Plate Condenser .0001mf.
C-11—Detector Plate Condenser .0001mf.
C-12—Coupling Condenser .002mf.
C-13—Output Condenser 1.mf.
C-14—Filament By-pass Condenser
C-15—1st RF Alignment Condenser
C-16—3rd RF Alignment Condenser
C-17—Det. Alignment Condenser
C-18—Speaker Condenser

MODEL 80
Installation Notes

UNITED AMERICAN BOSCH CORP.

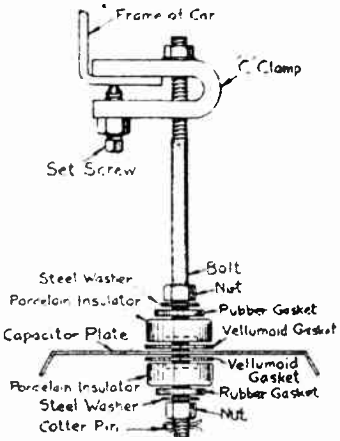


Fig. 5—Capacitor Plate.

Capacitor Plate:

In Figure 5 is shown the means by which this plate is supported underneath the chassis of the automobile. The insulation has been very carefully considered and is so designed that it is unaffected by mud, water, or dust. A location on either side of the car frame or one across the rear, parallel to the axle, will be satisfactory. The plate is adjustable and it is desirable that it be lengthened as much as is possible without interfering with the mechanism of the car. Do not, however, bring the plate too near the motor compartment. Make sure that the clamping nut of the capacitor plate supporting bolt is tightened before fastening the clamp in place on the car frame with the pointed screw. The clamping nut, besides locking the supporting bolt, also serves to reinforce the "C" clamp against any tendency to open. Complete the installation by tightening the set screw and lock nut. The capacitor plate must be mounted as low as possible without interfering with the road clearance, and not too closely to large metal objects, such as "B" battery box, muffler, or car frame.

Chassis:

The chassis mounting is a rigid frame "D" having two adjustable brackets, "C" to support it against the dash board. Refer to Figure 2. In the installation of the set these brackets are assembled and the frame work used as a template to locate the holes in the dash board for the holding bolts. The bracket must be so located that clearance will be obtained for all obstructions. On the engine side, care should be taken to avoid interference with the vacuum tank or other devices mounted there. In using this bracket as a template, do not fail to use the radio set as a guide to obtain clearance for the projection of the set and for the control shaft and the battery cable. Drill the holes as located, using a 5/16" diameter drill in order that unavoidable irregularities in the location of the holes may be taken care of when the set is screwed in place. Next, mount the chassis on its rubber cushions and secure the entire assembly in position. Drive the holding bolts from the front and pull the set securely in place. In some cases, where the dashboard is free of all obstructions, it is possible to dispense with the brackets "C" and bolt the mounting frame directly against the engine bulkhead. This type of installation provides slightly more leg room. The frame is used as a template for laying out the mounting holes as before.

Capacitor Coupler:

This unit must be mounted at the nearest convenient point to the capacitor plate. The mounting bracket is permanently fastened to the coupler and it is only necessary to bolt the bracket to the car frame. See Figure 6.

The coupler is provided with two connecting leads. The red lead should be cut to a length just sufficient to reach the capacitor plate and the spade terminal (which is shipped loosely clipped to the wire) soldered to the end. Connection is made at the capacitor plate by means of a terminal screw and clip.

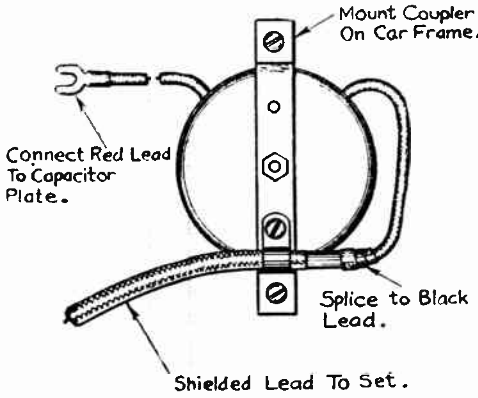


Fig. 6—Coupler.

The shielded lead from the receiver must be tightly clamped in the cable clamp provided on the coupler unit. Connect the wire in the shielded lead to the black wire from the coupler and carefully solder and tape the joint. Be careful that the woven shielding is effectively grounded through the clamp provided on the coupler, and is kept back from the joint in order to prevent a short circuit.

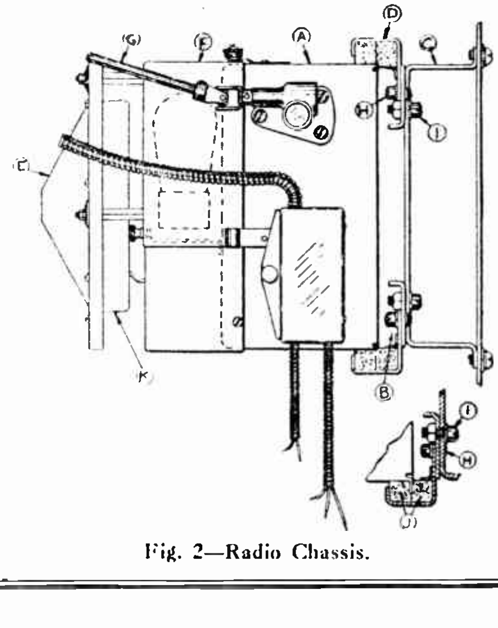
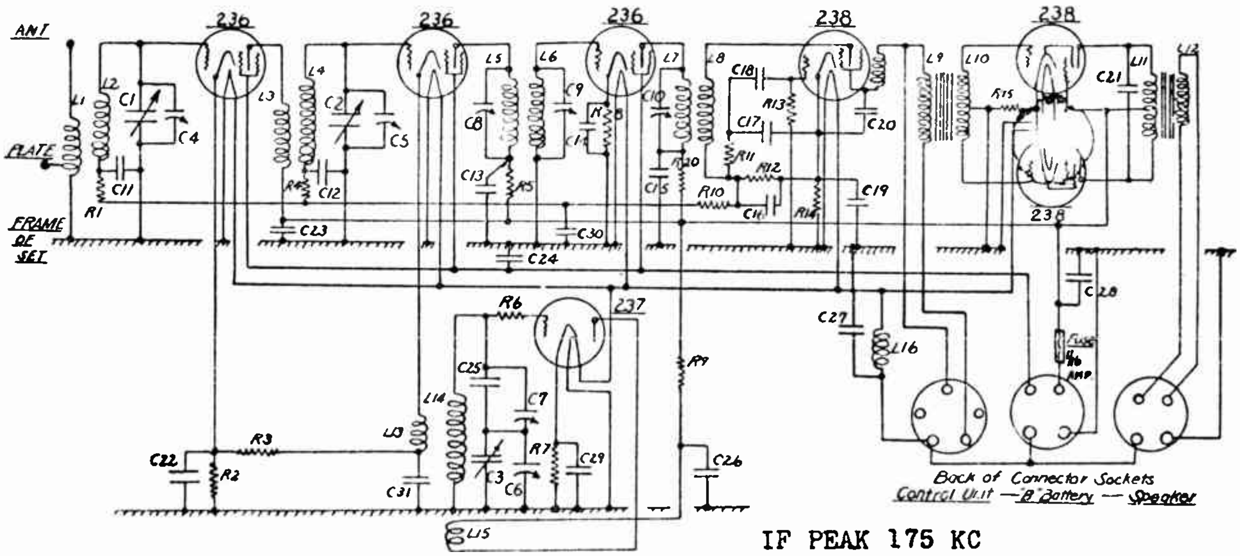


Fig. 2—Radio Chassis.

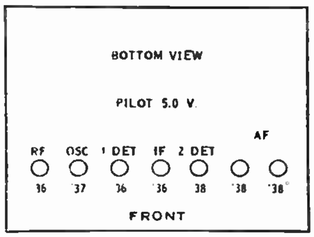
UNITED AMERICAN BOSCH CORP

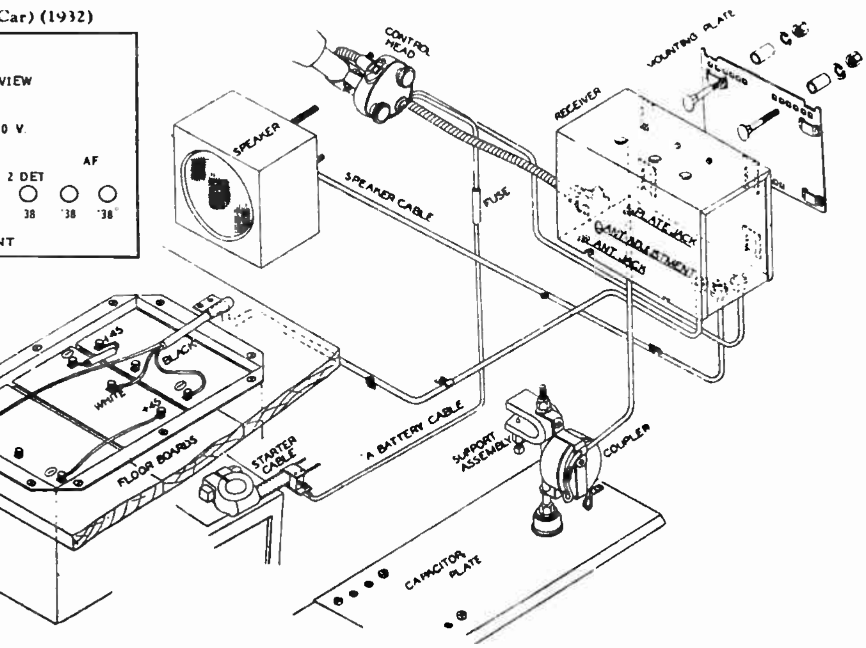
MODEL 100 Auto
Advertised 9-20
Schematic
Values



IF PEAK 175 KC

Model 100 (Motor Car) (1932)





Stage	Tube	Fil	Cathode	Grid	Screen	Plate	M.A.
RF	236	5.8	5	1.0	60	130	1
Osc	237	5.8	3.0	8.0	—	130	[illegible]
1st Det	236	5.8	9.0	5	55	120	1
IF	236	5.8	2.0	2.5	60	130	1.5
2nd Det	238	5.8	5.0	1	120	*1	*.6
Audio	238	5.8	12	12	135	130	10
Audio	238	5.8	12	12	135	130	10

Note: The values in the table are only approximate, due to unavoidable differences in tube

Symbols and Electrical Values

R1 —10,000 ohms
R2 — 3,000 ohms
R3 — 5,000 ohms
R4 —10,000 ohms
R5 — 1,000 ohms
R6 — 1,000 ohms
R7 — 3,000 ohms
R8 — 1,500 ohms
R9 — 5,000 ohms
R10— .5 megohm
R11—100,000 ohms
R12— .5 megohm
R13— .1 megohm

R14— 2,000 ohms
R15— 1,500 ohms
R16— 1,000 ohms
C1, C2, C3, C4, C5, C6 — Condenser Gang with Alignment Condensers
C7 —100 to 200 mmf.
C8 — 75 to 140 mmf.
C9 — 75 to 140 mmf.
C10— 75 to 140 mmf.

C11— .05 mfd.
C12— .05 mfd.
C13— .05 mfd.
C14— .05 mfd.
C15— .05 mfd.
C16— .00025 mfd.
C17— .0001 mfd.
C18— .01 mfd.
C19— .5 mfd.
C20— .0011 mfd.
C21— .004 mfd.
C22— .05 mfd.
C23— .05 mfd.

C24— .25 mfd.
C25—1100 mmf.
C26— .05 mfd.
C27— .25 mfd.
C28— .25 mfd.
C29— .05 mfd.
C30— .25 mfd.
C31— .05 mfd.
L1, L2 — Antenna Coil
L3, L4 — Radio Frequency Coil

L5, L6 — Intermediate Coil
L7, L8 — Intermediate Coil
L9, L10 — Audio Input Transformer
L11, L12 — Audio Output Transformer
L13, L14, L15 — Oscillator Coil
L16—Filter

MODEL 100 Auto
Advertised 9-20
Data

UNITED AMERICAN BOSCH CORP.

MODEL 100 SUPERHETERODYNE MOTOR CAR RADIO

This is a seven tube, superheterodyne receiver with full automatic volume control, push-pull pentode output and electro dynamic speaker. The Magmotor, a source of "B" current, is supplied as an accessory.

TUBES are furnished with receiver as follows:

- 1 type 236, radio frequency amplifier.
- 1 type 237, oscillator.
- 1 type 236, first detector.
- 1 type 236, intermediate frequency amplifier.
- 2 type 238, as push-pull audio amplifiers.
- 1 type 238, diode triode which functions as a second detector, and audio-amplifier, and with its related circuit, furnishes voltage for automatic volume control.

The type 238 tubes used in the last three positions named above, are pentode power output tubes. All of the tubes used in this receiver are designed especially for automobile use to withstand the vibration and heater voltage fluctuation to which they are subjected.

CHASSIS contains the tubes, tuning condensers and elements of the electrical circuit. (See circuit diagram). It is enclosed in a metal box provided with mounting hooks for easy attachment to a MOUNTING PLATE designed to be mounted either side of the bulkhead. Shielding is complete and internal filtering is so arranged that a minimum of engine interference obtains. Speaker, battery box, control head and plate antenna, find easy attachment to the chassis through cable plug connections inserted on the under side of chassis.

CONTROL UNIT fastens to the steering column and regulates the station selection and volume level. Cable is connected internally with plug for chassis connection.

FLEXIBLE SHAFT connects control unit and chassis drive. It consists of three layers of five strands of wire wound in alternate directions, enclosed in flexible tube: provides accurate tuning unaffected by excessive vibration.

LOUD SPEAKER of electro dynamic type consumes 1¼ amperes from storage battery. Cable is connected internally with plug for chassis connection.

MAGMOTOR using permanet magnet field delivers 40 M. A. of plate current at 160 volts (at the tubes) with an "A" battery drain of 2 amperes. Self-enclosed with filtering to eliminate brush interference. Cable connected internally with plug for chassis connection.

IGNITION SUPPRESSION is accomplished through use of 9 resistors in ignition circuits and grouning of cable shields.

BATTERY BOX of heavy weather proof steel, for optional use to contain 3 special Heavy Duty automobile type "B" batteries. Battery box hangs from floor boards of car, access from the top. Cable furnished with plug for chassis connection.

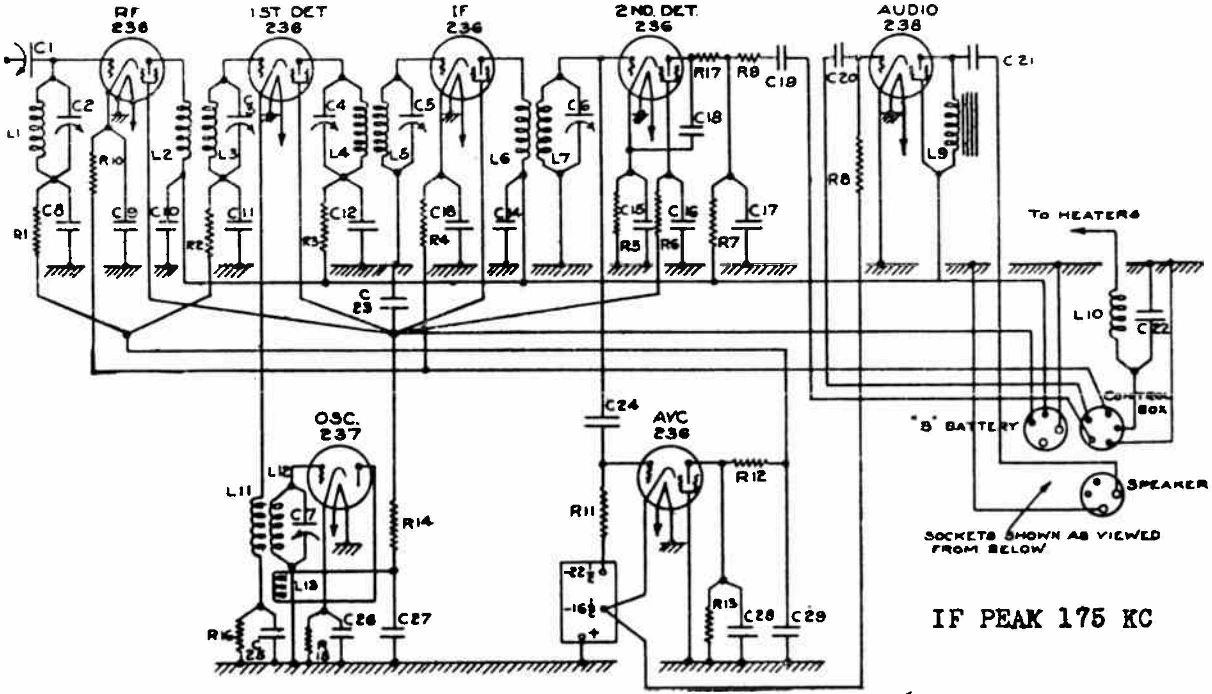
PLATE ANTENNA for optional use when there is no roof antenna in car: clamps to frame of car with hardened set screws. Step down transformer fastened to bracket; cable attached to plate with plug for chassis connection.

"B" Battery Cable

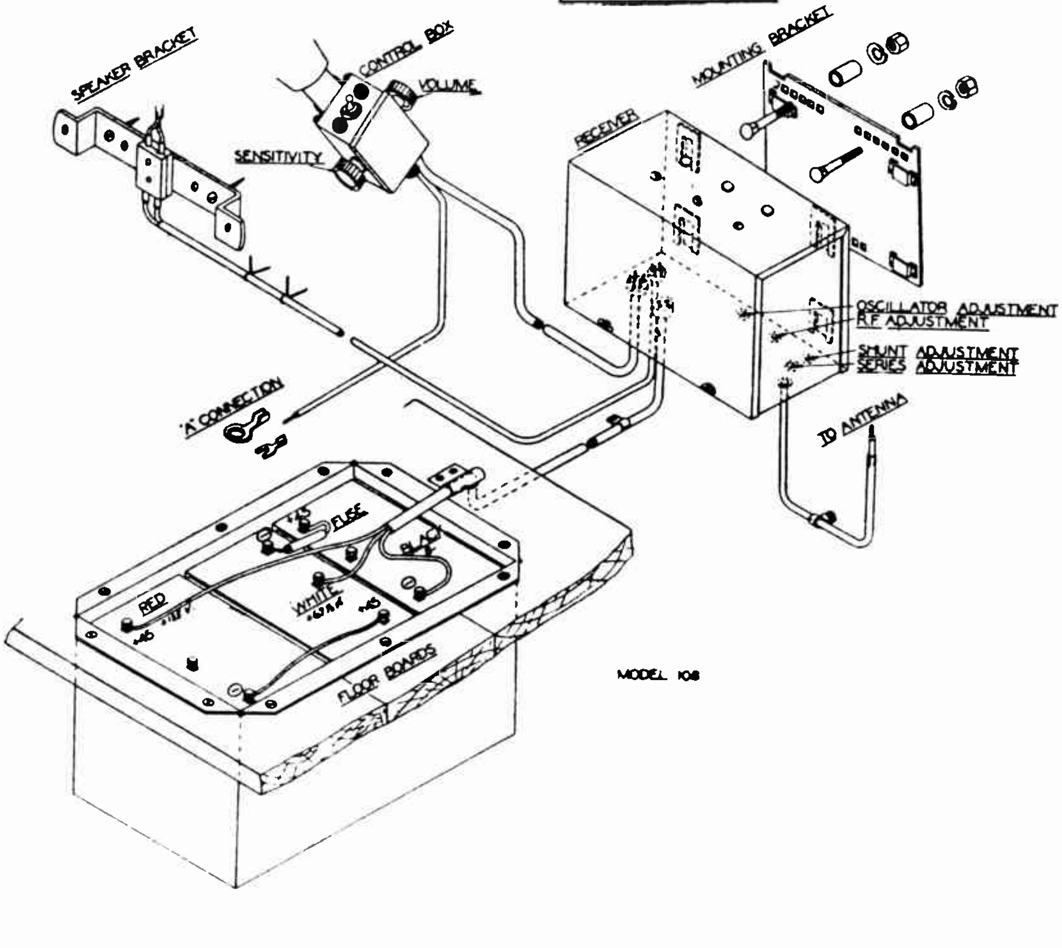
- B-	Black
+67½ B	White
+135 B	Red

UNITED AMERICAN BOSCH CORP.

MODEL 108
Police Auto
Schematic



IF PEAK 175 KC



MODEL 108

C1	75 to 140 mmf	Antenna Series Condenser
C2	7 to 70 mmf	Antenna Shunt Condenser
C3	75 to 140 mmf	Tuning Condenser (1st. Det.)
C4	75 to 140 mmf	Tuning Condenser (I.F.)
C5	75 to 140 mmf	Tuning Condenser (I.F.)
C6	75 to 140 mmf	Tuning Condenser (2nd Det.)
C7	100 to 280 mmf	Oscillator Tuning Condenser
C8	.05 mfd	By-pass Condenser (RF)
C9	.05 mfd	By-pass Condenser (RF)
C10	.05 mfd	By-pass Condenser (RF)
C11	.05 mfd	By-pass Condenser (1st. Det.)
C12	.05 mfd	By-pass condenser (1st. Det.)
C13	.05 mfd	By-pass Condenser (IF)
C14	.05 mfd	By-pass Condenser (IF)
C15	.25 mfd	By-pass Condenser (2nd. Det.)
C16	.25 mfd	By-pass Condenser (2nd Det.)
C17	.00025 mfd	By-pass Condenser (2nd Det.)
C18	.00025 mfd	By-pass Condenser (2nd Det.)
C19	.006 mfd	Audio Condenser
C20	.05 mfd	Audio Condenser
C21	.5 mfd	Audio Blocking Condenser
C22	.25 mfd	Heater By-pass Condenser
C23	.25 mfd	Screen By-pass condenser
C24	.0001 mfd	AVC Condenser
C25	.05 mfd	By-pass Condenser (1st. Det.)
C26	.05 mfd	By-pass Condenser (Osc.)
C27	.05 mfd	By-pass Condenser (Osc.)
C28	.25 mfd	By-pass Condenser (AVC)
C29	.25 mfd	By-pass Condenser (AVC)
R1	10,000 ohms	Grid Resistor (RF)
R2	10,000 ohms	Grid Resistor (1st. Det.)
R3	1,000 ohms	Plate Resistor (1st. Det.)
R4	1,000 ohms	Cathode Resistor (IF)
R5	1 megohm	Cathode Resistor (2nd. Det.)
R6	500,000 ohms	Screen Resistor (2nd. Det.)
R7	500,000 ohms	Plate Resistor (2nd. Det.)
R8	1 megohm	Audio Grid Resistor
R9	100,000 ohms	Plate Resistor (2nd Det.)
R10	1,000 ohms	Cathode Resistor (RF)
R11	2 megohm	AVC Grid Resistor
R12	100,000 ohms	AVC Resistor
R13	600,000 ohms	AVC Plate Resistor
R14	1,000 ohms	Oscillator Plate Resistor
R15	2,000 ohms	Oscillator Cathode Resistor
R16	20,000 ohms	1st. Det. Cathode Resistor
R17	10,000 ohms	2nd. Det. Plate Resistor

ADJUSTMENT OF THE RECEIVER.

After the receiver has been installed it is necessary to adjust it to the frequency of the transmitting station. Even if the set has been shipped with the proper setting, a slight readjustment will be necessary. The procedure is the same in both cases.

The positions of the four alignment condensers which take care of the adjustment are shown on the installation drawing. The car should be in the vicinity of th transmitting station when the alignment is made, in order to assure adequate signal strength. Proceed as follows:

1. Switch the receiver "on" and turn the volume and sensitivity control to maximum position.

2. Adjust OSCILLATOR condenser until the signal is picked up, using a special screw driver with an insulated tip. (Such an American Bosch Service Tool #432).

3. Reduce the sensitivity control until the station can just be heard, and re-adjust the OSCILLATOR until the signal is loudest.

4. Reduce the sensitivity conrol until the station can just be heard and adjust the RF alignment for maximum volume. As the volume increases, reduce the sensitivity as far as possible. This permits a sharper adjustment to be made, as the ear is more sensitive to changes in volume when the signal is faint.

5. Screw the SERIES antenna condenser in as far as possible. Pay no attention to the signal while doing this.

6. Attempt to find a poition of the SHUNT condenser which will give maximum volume Always reduce the sensitivity control when increased response of the set results from the various adjustments which you are making.

7. If no position of te SHUNT condenser will give a point of maximum volume or "peak", unscrew it as far as possible and slowly unscrew the SERIES condenser until the adjustment is obtained. Endeavor to obtain this adjustment with the SERIES condenser screwed IN as far as possible.

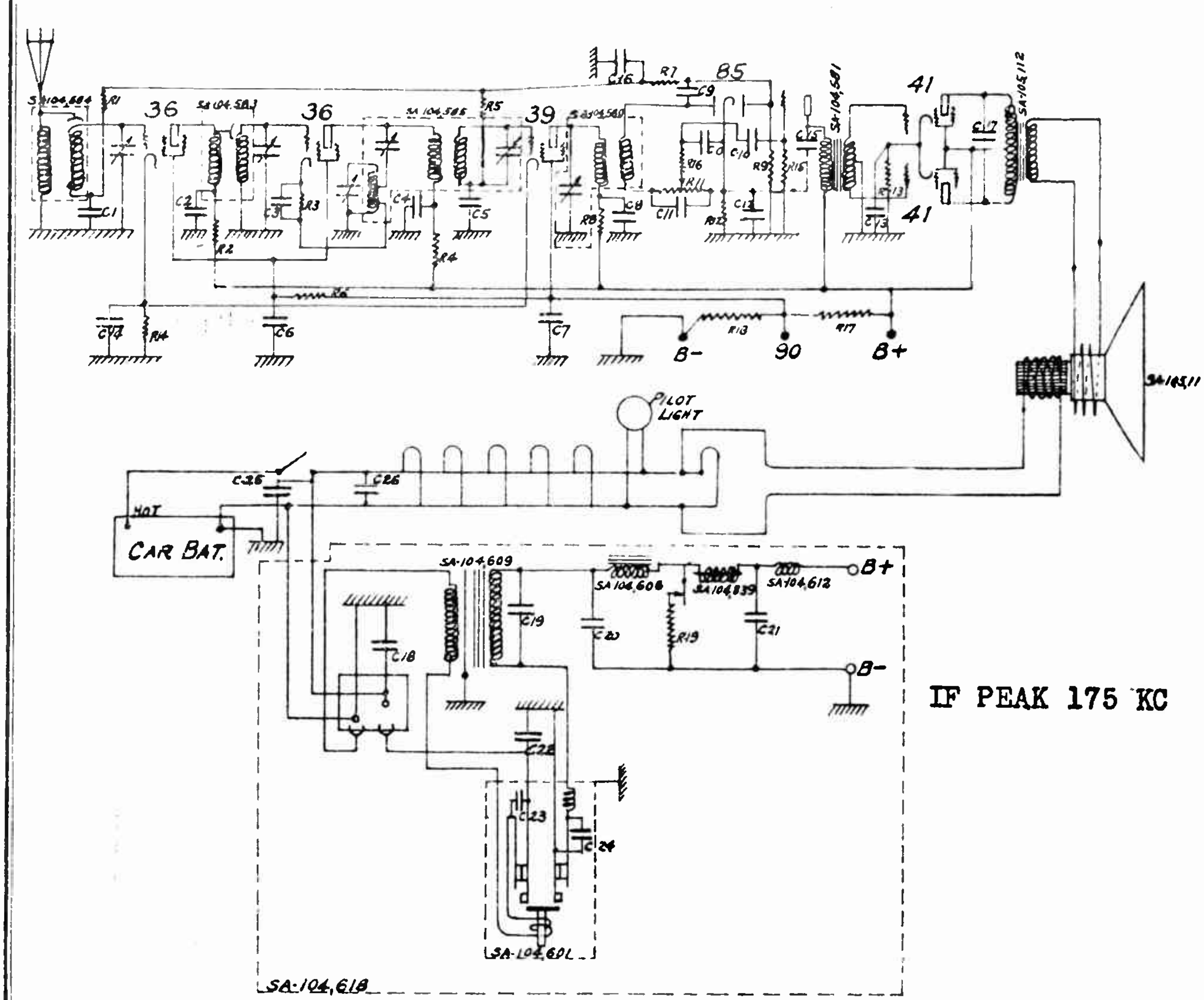
The relative position of the shunt condenser is unimportant.

FUSES

A 1/16 ampere fuse is located in the B Battery jumper wire, as described under "B" Battery Cable". The "A" fuse is located in the control box and may be reached for replacement by simply removing the cover.

MODEL 150
Schematic

UNITED AMERICAN BOSCH CORP.



IF PEAK 175 KC

3	R1	100.000 Ω ½ WATT	SA-100.727
3	R2	1.000 Ω "	SA-100.729
1	R3	7500 Ω "	SA-104 824
3	R4	1000 Ω "	SA-100.729
3	R5	100.000 Ω "	SA-100.727
4	R6	5.000 Ω "	SA-100.824
4	R7	0.5 MEG. "	SA-100.194
2	R8	1.000 Ω "	SA-100.729
4	R9	0.5 MEG "	SA-100.194
	R10		
6	R11	0.5 MEG VOL. CONT.	SA-104.605
4	R12	1800 Ω ½ WATT	SA-102.961
1	R13	600 Ω 1 WATT	SA-105.004
4	R14	500 Ω ½ WATT	SA-99.583
2	R15	1 MEG "	SA-100.815
2	R16	50.000 Ω "	SA-100.512
2	R17	40.000 Ω "	SA-103.410
2	R18	75.000 Ω "	SA-101.163
5	R19	5.000 Ω 10 WATT	SA-104.704

1	C0	.0001 MFD.	SA-101.143
3	C1	.05 - 2-PLY	SA-102.493
3	C2	.05 - 3 PLY	SA-102.492
1	C3	.002 - 4-PLY	SA-103.852
3	C4	.05 - 3-PLY	SA-102.492
3	C5	.05 - 2-PLY	SA-102.493
4	C6	.1 - 2-PLY	SA-102.495
4	C7	.05 - 2-PLY	SA-102.493
2	C8	.05 - 3-PLY	SA-102.492
2	C9	.0001 MFD	SA-101.143
2	C10	.01 - 3 PLY	SA-102.500
2	C11	.0001 MFD.	SA-101.143
1	C12	.5 - 2 PLY	SA-102.499
1	C13	.5 - 2-PLY	SA-102.499
4	C14	.25 - 2-PLY	SA-102.497
1	C15	.002 - 4-PLY	SA-103.852
4	C16	.05 - 2 PLY	SA-102.493
1	C17	.002 - 4 PLY	SA-103.852
5	C18	.002 - 4 PLY	SA-103.852
5	C19	.01 MF.-1600 V	SA-104.837
5	C20	8 MFD	SA-104.614
5	C21	8 MFD	SA-104.614
5	C22	.002 - 4-PLY	SA-103.852
5	C23	.5 - —	SA-104.601
5	C24	.01 -	
5	C25	.5 - 2 PLY	SA-102.499
1	C26	.002 - 4 PLY	SA-103.852

MODEL 150
Socket Layout
Wiring Diagram

UNITED AMERICAN BOSCH CORP.

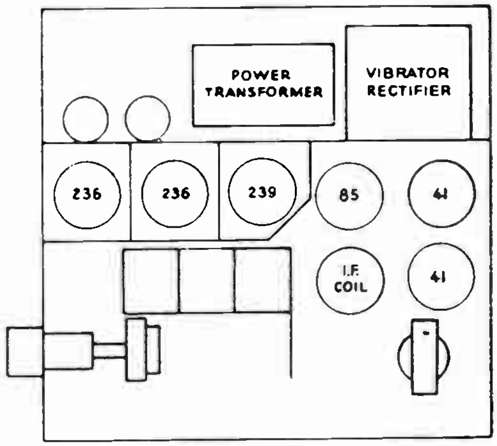


Fig. 1

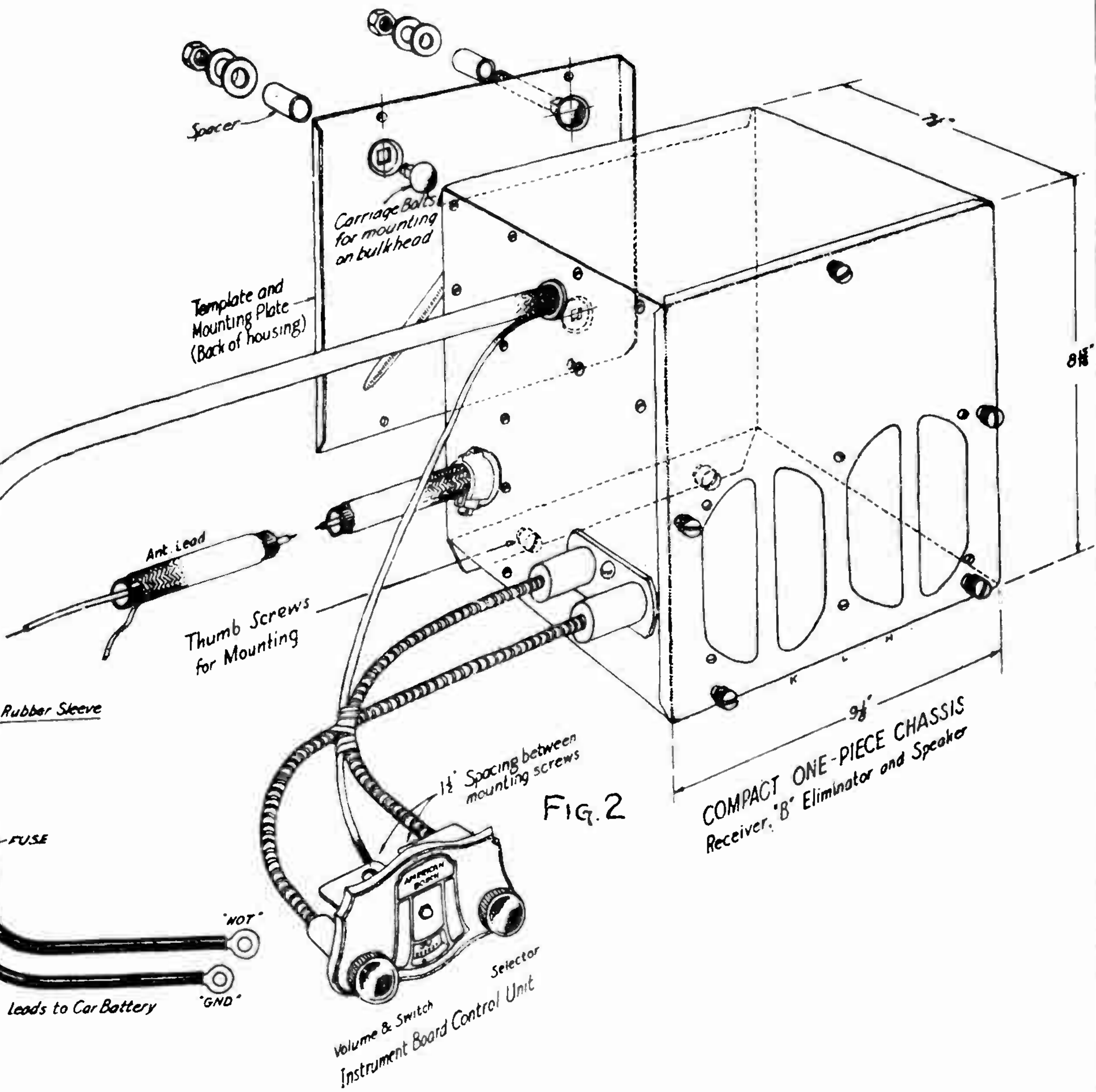
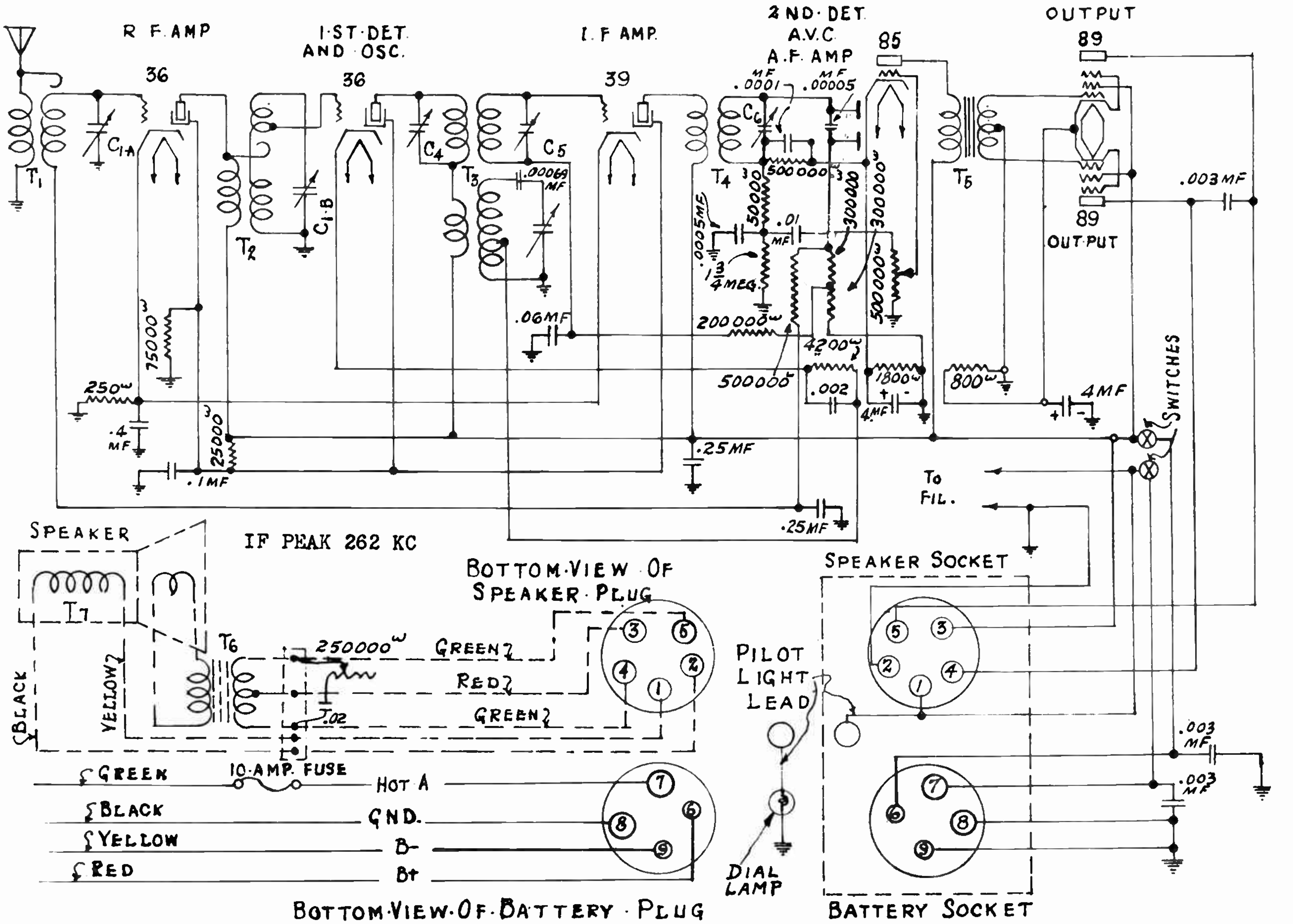
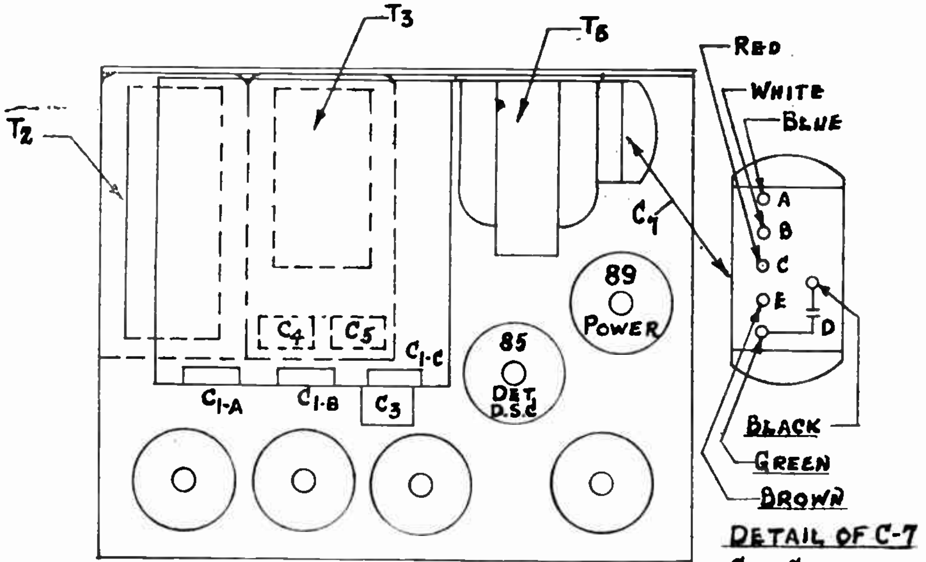


Fig. 2



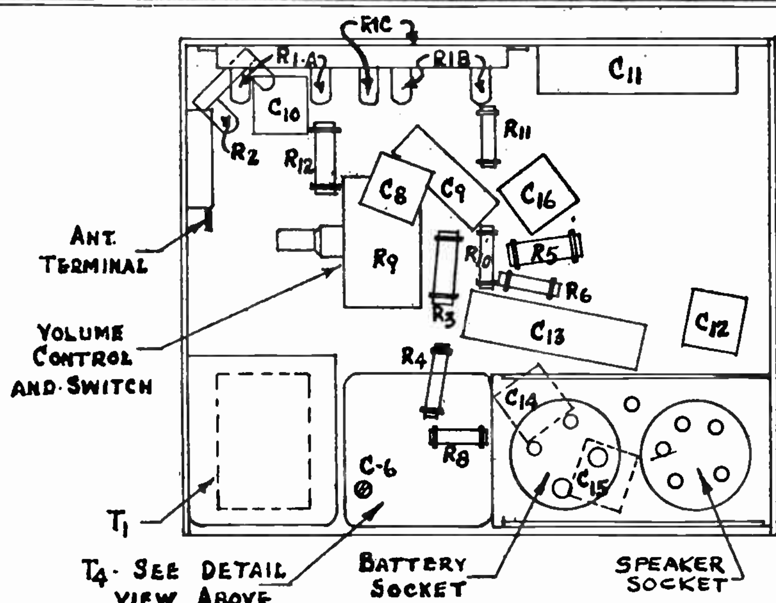
UNITED MOTORS SERVICE

MODEL 2035
First Type
Schematic



TOP · VIEW · OF · CHASSIS

DETAIL OF C-7
CAN COMMON TO·A·B·C·E



BOTTOM VIEW OF CHASSIS

Tube	Position	Plate (Voltages)	Screen (Voltages)	*Cathode (Voltages)	Filament (Voltages)	Plate (Milliamperes)	Screen (Milliamperes)	Grid Test
236	R. F.	133	63	1.8	5.8	2.5	.01 to .15	2.8
236	1st Det.	133	63	4.	5.8	.8	.01 to .04	.8
239	I. F.	133	63	1.8	5.8	3.7	1.03	.4
85	(A.V.C.) (2d Det.) (A.F.)	118	--	1.5	5.8	4.	---------	---
89	Power	120	123	14.5	5.8	7.5	1.1	---
89	Power	120	123	8.7	5.8	7.5	1.1	---

*NOTE: The Cathode voltage (14.5) listed for one of the type 89 tubes is the actual cathode voltage applied to the element of the tube. However, the voltages listed for the remainder of the tubes read bucking filament volts on normal cathode scale.
For example: The reading obtained for the other 89 Tube should be 14.5 volts minus 5.8 volts, or 8.7 volts.

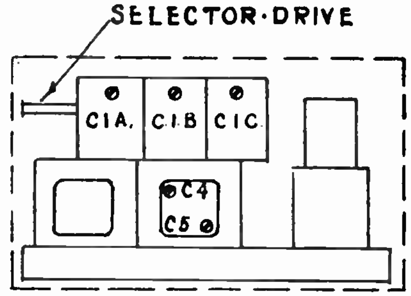
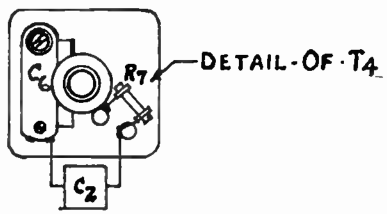
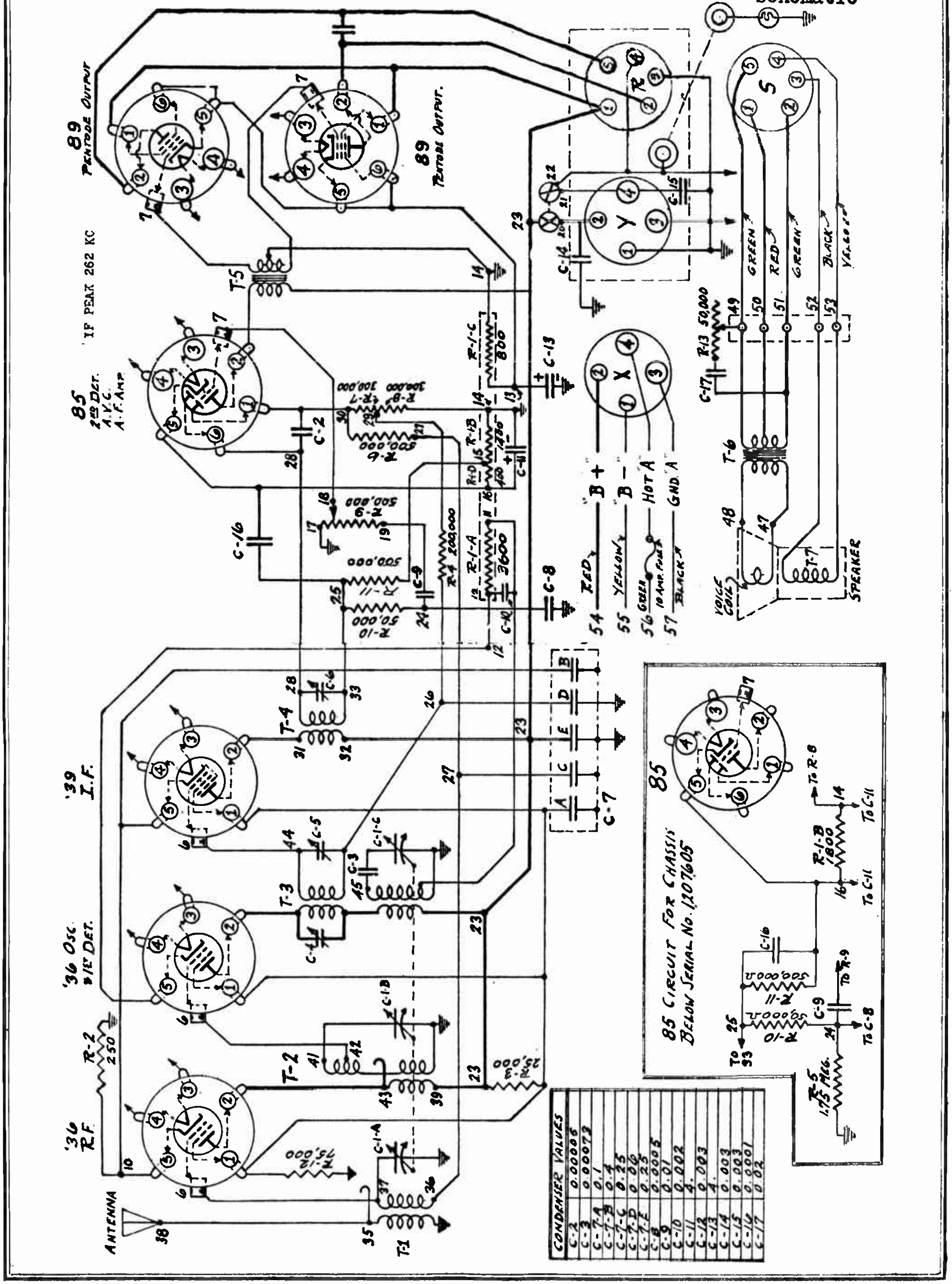


FIG. 2-FRONT VIEW OF CHASSIS.



UNITED MOTORS SERVICE

MODEL 2035
Revised Circuit
Schematic



CONDENSER VALUES	
C-2	0.00005
C-3	0.00073
C-7-A	0.1
C-7-B	0.4
C-7-C	0.25
C-7-D	0.06
C-7-E	0.25
C-8	0.0005
C-9	0.01
C-10	0.002
C-11	4.
C-12	0.003
C-13	4.
C-14	0.003
C-15	0.003
C-16	0.0001
C-17	0.02

LOCATING TROUBLES ISOLATED BY VOLTAGE TESTS

(By Means of Resistance Measurements)

Description of Incorrect Voltage	Test From	To	Correct Reading (In Ohms)	Part or Parts Probably Causing Incorrect Voltage
A. No. Filament (A) Voltage at any Socket	1. Hot "A" Lead	X4	Zero	Fuse, or Green Lead of "A" Cable Switch or Wiring
	2. Ground	Y4	*Zero	
B. No. Plate (B) Voltage at any Socket	1. 54	X2	*Zero	"B" Cable
	2. 23	Y2	*Zero	Switch ("B" Sec.)
	3. Ground	Y2	100,000	C-14 Condenser
	4. Ground	23	100,000	C-7-E Condenser
C. "89" Sockets				
a. Plate Voltage	1. R2	R5	Open	C-12 Condenser
	2. S2	S5	900	T6 Transformer
	3. S2	S1	450	T6 Transformer
b. Screen Voltage	1. R1	A1	Zero	Wiring
	2. R1	B1	Zero	Wiring
c. Cathode Voltage	Ground	B5	800	C-13 Condenser or R-1-C Resistor
d. Supressor Grid Voltage	Ground	B5	800	C-13 Condenser or R-1-C Resistor
D. 85 Socket				
a. Plate Voltage	85 Det. #2	23	2600	T5 Transformer
b. A.V.C. Plate or Det. Plate Voltage	1. 85 Det. #6	25	5	T4 Transformer
	2. 24	25	50,000	R10 Resistor
	3. 85 Det. #5	25	500,000	R11 Resistor or C-16 Condenser
	4. 85 Det. #1	29	300,000	R-7 (Encl. in T4)
	5. 29	14	300,000	R-8 Resistor
	6. 15	16	400	R-1-D Resistor
	7. 15	14	1,400	R-1-B Resistor
	**8. 14	16	1,800	R-1-B Resistor
	9. 85 Det. #1	28	1,100,000	C-2 Condenser
	10. Ground	26	500,000	C-7-D Condenser
	11. 24	19	Open	C-9 Condenser
	12. 24	GND	551,000	C-8 Condenser

* Switch--on
** Disconnect C-11 Electrolytic Condenser and Test separately

Description of Incorrect Voltage	Test From	To	Correct Reading (In Ohms)	Part or Parts Probably Causing Incorrect Voltage
E. 39 I. F. Socket				
a. Plate Volts	I.F. #2	23	5	T-4 Transformer
b. Screen Volts	1. I.F. #1	23	25,000	R-3 or C-7-A
	2. I.F. #1	GRD	75,000	R-12 or C-7-A
c. Cathode Volts	I.F. #5	GRD	250	R-2 or C-7-B
F. Osc. & 1st. Det.				
a. Plate Volts	Osc. #2	23	5	T-3 Coil
b. Screen Volts	1. Osc. #1	23	25,000	R-3 or C-7-A
	2. Osc. #1	GRD	75,000	R-12 or C-7-A
c. Cathode Volts	Osc. #5	11	*3,600	R-1-A or C-10
G. 236 R. F. Socket				
a. Plate Volts	R.F. #2	23	5	T-2 Coil
b. Screen Volts	1. R.F. #1	23	25,000	R-3 or C-7-A
	2. R.F. #1	GRD	75,000	R-12 or C-7-A
c. Cathode Volts	R.F. #5	GRD	250	R-2 or C-7-B
H. Speaker				
a. Weak	S3	S4	6	T-7 Speaker Field
b. Distorted	1. S1	S5	900	T-8, C-17 or R-13
	2. 46	49	50,000	R-13 Resistor

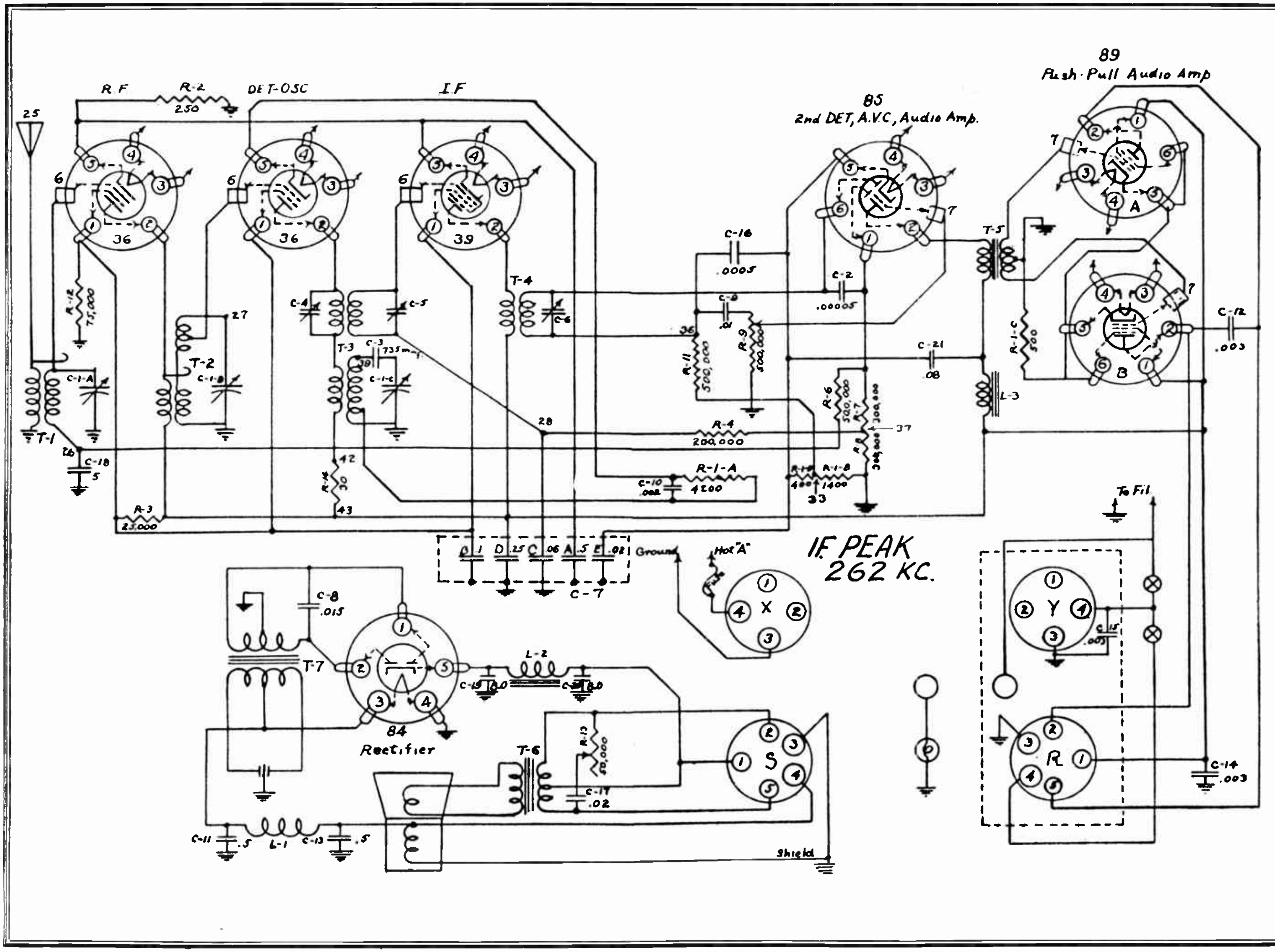
NOTE: It will be necessary to disconnect one lead of C-2, C-7 (All Sections), C-10, C-11, C-14, C-16, C-17 Condensers in order to test them accurately.

Refer to "Testing Electrolytic Filter Condensers" for details on testing C-11 and C-13 condensers.

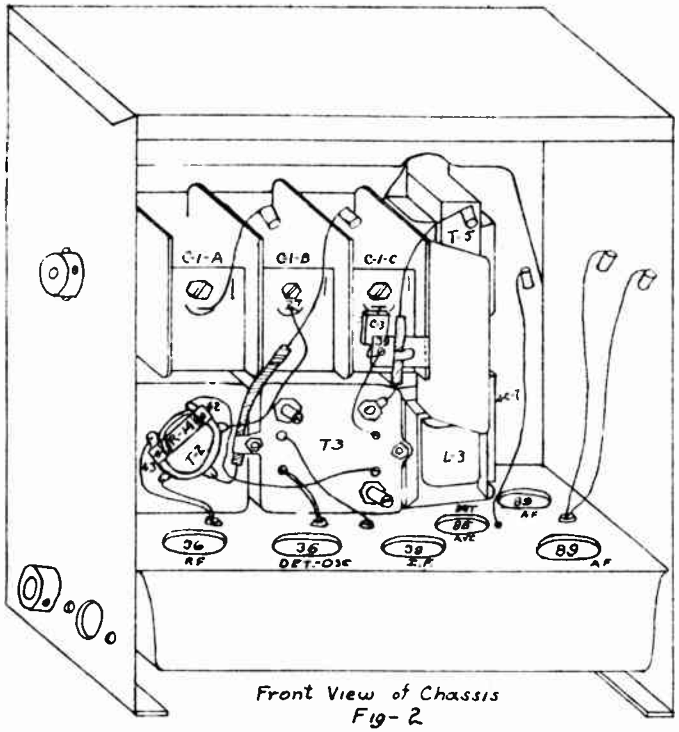
* R-1-A Resistor originally measured 4200 ohms. This was changed to 3150 ohms at Serial No. 1207605, to 4000 ohms at Serial No. 1207761 and finally to 3600 ohms at Serial No. 1222409.

MODEL 4036, B-O-P
Schematic

UNITED MOTORS SERVICE

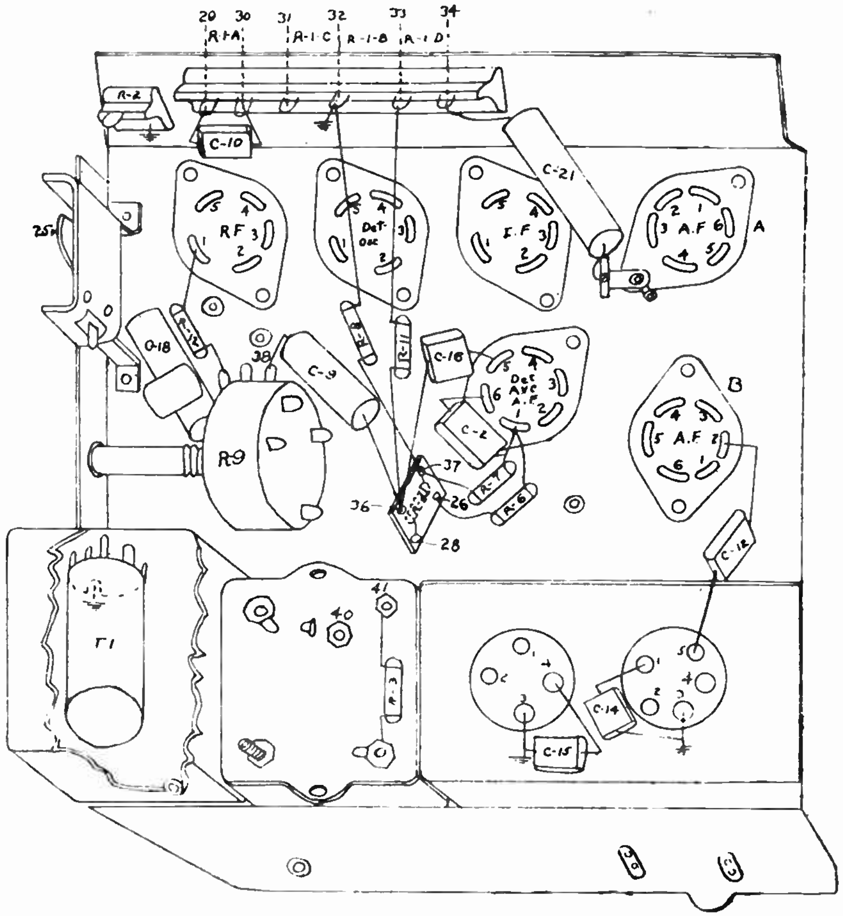


MODEL 4036, B-O-P
Voltage
Socket Layout
Chassis Layout



Front View of Chassis
Fig- 2

Parts Location



Tube	Screen Contact #1	Plate Contact #2	Heater Contact #3	Heater Contact #4	Cathode Contact #5	Gnd. Contact #6
236 RF	85	165	0	6.0	2.1	
236 Osc.	85	165	0	6.0	6.0	
239 IF	85	165	0	6.0	2.1	
85 Det.	0-A.V.C.	125	0	6.0	7.5	.2 Det.
A-89 AF	165	160	6.0	0	30.0	30.0
B-89 AF	165	160	0	6.0	30.0	30.0
84 Rect.	3.5	3.5	0	6.0	180	

1207625	CONDENSER	Molded bakelite.........	C-2	.00005 Mfd.
1207626	CONDENSER	Molded bakelite....... .	C-3	.000735 Mfd.
			(C-7-A	.5
			(C-7-B	.1
1207824	CONDENSER	Block..................	(C-7-C	.06
			(C-7-D	.25
			(C-7-E	.02
1207694	CONDENSER	Metal case..............	C-8	.015
1207628	CONDENSER	Tubular type............	C-9	.01
1207615	CONDENSER	Molded bakelite.........	C-10	.002
1207691	CONDENSER	Tubular type (metal case)	C-11	.5
1207617	CONDENSER	Molded bakelite.........	C-12	.003
1207691	CONDENSER	Tubular type (metal case)	C-13	.5
1207617	CONDENSER	Molded bakelite.........	C-14	.003
1207617	CONDENSER	Molded bakelite.........	C-15	.003
1207636	CONDENSER	Molded bakelite.........	C-16	.0005
1207799	CONDENSER	Tone control............	C-17	.02
1207693	CONDENSER	Tubular type (metal case)	C-18	.5
1207830	CONDENSER	Dry electrolytic........	C-19	8.0
1207830	CONDENSER	Dry electrolytic........	C-20	8.0
1207794	CONDENSER	Tubular type............	C-21	.08
1849014	CONDENSER	Generator by-pass..............		.5
1849161	CONDENSER	Ammeter by-pass...............		.5
			(R-1-A	4,200 Ohms
1207842	RESISTOR	Candohm.............	(R-1-B	1,400 "
			(R-1-C	500 "
			(R-1-D	400 "
1207611	RESISTOR	Candohm.............	R-2	250 "

		Body	End	Spot	Res.	(Ohms)	Watts
1204135	RESISTOR	Red	Green	Orange	R-3	25,000	.1
1204136	RESISTOR	Red	Black	Yellow	R-4	200,000	.1
1204139	RESISTOR	Green	Black	Yellow	R-6	500,000	.1
1204139	RESISTOR	Orange	Black	Yellow	R-7	300,000	.1
1204139	RESISTOR	Orange	Black	Yellow	R-8	300,000	.1
1207607	RHEOSTAT	Volume	control		R-9	500,000	
1204138	RESISTOR	Green	Black	Yellow	R-10	500,000	.1
1204138	RESISTOR	Green	Black	Yellow	R-11	500,000	.1
1204141	RESISTOR	Purple	Green	Orange	R-12	75,000	.1
1207861	SPEAKER						
1207566	Coil	Field				6 Ohms	
1207758	VIBRATOR						
1207825	TRANSFORMER	Audio input					
1207827	TRANSFORMER	Output					
1207860	SHIELD	Vibrator trans. (inc. C-20)					
1207866	TRANSFORMER	Vibrator					

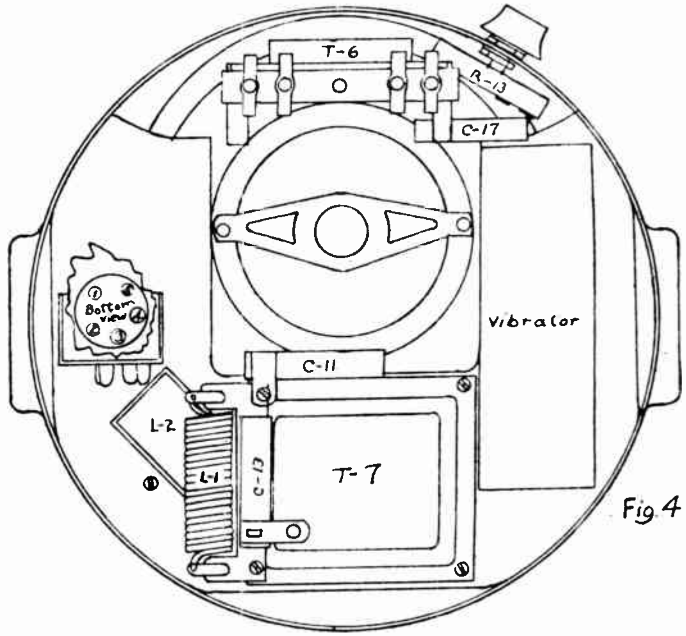


Fig 4

Location of Speaker Parts and Vibrator Assembly

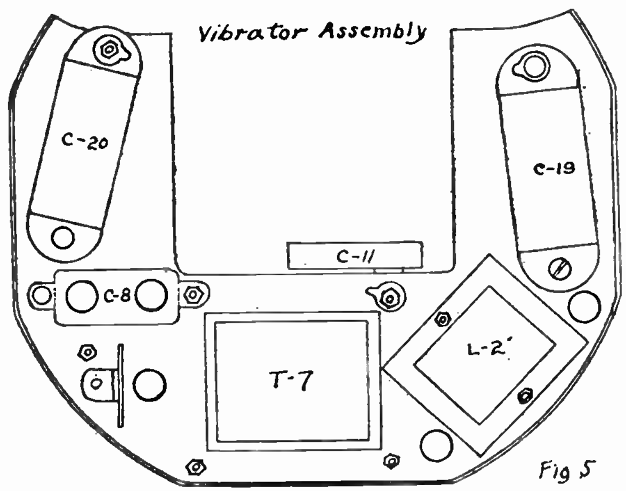


Fig 5

MODEL 4036, B-O-P
Chassis Changes

UNITED MOTORS SERVICE

A special antenna package, for cars not having factory antenna installation, is now available as U.M.S. Part No. 1207612.

Antenna Package:
- 1 Antenna assembly
- 24 Trimmers' tacks, 2½ oz.
- 1 Instruction book

C-7 Condenser Block

A few of the chassis above Serial No. 1278233 may have the brown and blue wires of the condenser block interchanged. This can be determined by examining the brown lead; if it has been spliced, the leads have been connected in reverse order to increase the capacity from the grid of the I.F. tube to ground as a preventive against "motor-boating." New condensers should be installed with the blue lead connected to point 28 (Fig. 3 of Bulletin S-BOP-1).

R-14 Resistor

The R-14 resistor (30 ohms) has been omitted on all B-O-P receivers having a serial number above 1310001. Do not install a R-14 resistor in chassis having a serial number above 1310001.

Control Unit Selector Shaft Stop

A new and more efficient selector shaft stop has been designed. This stop is used in all B-O-P receivers having a serial number above 1304616. Original Part #1203854--New Part #1207955. These parts are NOT interchangeable.

Vibrator Supply Fuse

All B-O-P receivers having a serial number above 1292774 will have a five ampere fuse in the 6 volt side of the vibrator circuit between S-4 and L-1 on Fig. 1 of S-BOP-1.

The new parts are:

1207956	Fuse Holder
142630	Fuse--5 ampere

Pontiac Distributor Suppressors

The Pontiac distributor suppressors now have a value of 10,000 ohms plus or minus 20%. Higher values will affect the idling characteristics of the motor. See Bulletin E-4, page 1. Original Part #1201277--25,000 ohms. New Part #1207818--10,000 ohms.

Pontiac installation instructions should be followed very closely in order to eliminate the spark interference.

UNITED MOTORS SERVICE

MODEL 4036, B-O-P
Service Notes

If set goes dead at the lower frequency range of the dial and functions satisfactorily at the upper frequency ranges, check the oscillator tube by replacing it.

Excessive buzz or crackle around low frequency end of dial may be due to defective 36 tubes.

Excessive hum on high volume may be due to defective 85 tube.

Excessive hum over broadcast range may be due to a defective 89 tube. Oscillation, howl; microphonic action may be due to a defective 39.

Poor quality may be due to any tube becoming defective.

C-2, C-18 or C-7-C, becoming shorted, will cause the H.V.C. to cease functioning and low volume will result.

Oscillation may be caused by open by-pass condensers or it may be caused by not replacing the plate and grid leads in their original places after repairing the chassis.

There are three special parts packages for the B-O-P radio. The chassis and speaker are standard for all three installations, i.e, Buick, Olds and Pontiac.

The Buick package of parts is as follows:

1 Volume control drive shaft assembly 18"
1 Selector drive shaft assembly 18"
8 Spark plug suppressor (screw type)
1 Distributor suppressor

The Olds package of parts is as follows:

1 Volume control drive shaft assembly 18"
1 Selector drive shaft assembly 18"
8 Spark plug suppressor (Standard type)
1 Distributor suppressor

The Pontiac package of parts is as follows:

1 Volume control drive shaft assembly 24"
1 Selector drive shaft assembly 24"
1 Steering column spacer
1 Shielded primary replacement lead
1 Shield for H. T. coil lead
8 Spark plug suppressor (Standard type)
1 Distributor suppressor

All other necessary installation parts are included in the chassis-speaker package.

PEAKING ADJUSTABLE CONDENSERS

The complete Condenser Aligning Kit is now available under part No. 1207804. This kit contains all the small parts which are necessary for the proper aligning of the condensers on the U.M.S., B-O-P. and Chevrolet Radio Receivers.

All of the adjustable condensers, commonly called trimmer condensers, are very accurately adjusted at the factory and will not need any further adjustment unless a coil or I. F. transformer is changed or the adjustments are tampered with in the field.

DO NOT attempt to change the setting of any of the trimmer condensers unless it is definitely known that adjustment is necessary, and an accurate test oscillator and a screw driver (with fibre handle) are available. Using a standard metal screw driver for this purpose will not give accurate adjustment

Proceed as follows:

A. Disconnect the antenna lead-in from the chassis.

B. Ground the antenna terminal on the chassis to the frame of the chassis.

C. Set "test oscillator" to 262 kilocycles. Some oscillators are not equipped with a frequency of 262 K.C. but do have a frequency of 130 K.C. In this case, the second harmonic of 130 K.C., namely 260 K.C., may be used.

D. Connect the output leads of the test oscillator to the grid of the 1st Detector tube and to ground (frame of the chassis) Leave grid cap in place.

E. Connect an output meter across the plates of the type 89 tubes. If the output meter is not protected, place a .1 mfd. condenser in series with the meter.

F. Turn the tuning condenser rotor to minimum capacity (rotor plates out of stator places).

G. Adjust I. F. Trimmers in the following order, in each case leaving the trimmer set for maximum output as shown by the output meter** (See note

- * C-4, Plate circuit of 1st Det.
- C-5, Grid circuit of I. F. Amp.
- C-6, Diode Input circuit.

* See Fig 2. and 3 for location of condensers.

H. Remove connection grounding the antenna (reverse of instructions under B)

I. Insert the Calibration Block, Part No. 1206418, between the center (2nd R. F.) condenser and the rear of the chassis as follows: Lay the block on the bench with the largest flat side down and the cut-out edge toward the operator. Pick up the block between the first and second fingers of the hand so that the side having the beveled and cut-out edges faces the knuckles of the hand, and the fingers are as close to the beveled corners as is possible. Insert the hand in the case over the center tuning condenser (condenser plates fully closed) and place the Block between the condenser bracket and the chassis back, with the largest face of the Block flat against the back of the chassis. The Block will fit quite tightly and the left side must rest against the shield between the 1st and 2nd R.F. condensers in order to clear the condenser wiper spring.

J. Attach the test oscillator to antenna terminal and ground (frame) of the chassis. (Ant. on test oscillator to Ant. on chassis and ground on test oscillator to frame of chassis.)

K. Set test oscillator at 1400 K.C.

L. Open tuning condenser until it stops against the Calibration Block

M. Place Tube Shield in position around 236 Det.-Osc. tube. Adjust the trimmer condensers on the tuning condenser to maximum output, as measured by the output meter, in the following order:

C-1-C--Oscillator trimmer
C-1-B--2nd R. F. trimmer
C-1-A--1st R. F. trimmer

*NOTE: To insure sharp peaking of all trimmers, set the oscillator output below the point of start of A.V.C. action. Set the output of the oscillator so that it is less than half the maximum output available.

UNITED MOTORS SERVICE

MODEL 4036, B-O-P
Resistance Data

SPECIAL TESTS

These tests cover all parts of the circuit which are not shown up as defective by the voltage tests.

	Test from	To	Correct resistance in ohms	Probable location of trouble if incorrect reading is obtained
1.	Ground (frame)	25	32	T-1 Antenna coil Pri.
2.	236 RF #6	26	6	T-1 " " Sec.
3.	236 Osc. #6	27	2.5	T-2 RF coil Sec.
4.	236 Osc. #6	Gnd.	4	T-2 RF " "
5.	239 Osc. #6	28	50	T-3 IF " "
6.	Ground	29	1	T-3 Osc. coil
7.	"	35	4	T-3 " "
8.	85 Det. #6	36	23	T-4 IF coil Sec.
9.	28	37	200,000	R-4 Resistor
10.	85 Det. #1	26	500,000	R-6
11.	85 Det. #1	37	300,000	R-7
12.	37	Grd.	300,000	R-8
13.	33	36	500,000	R-11
14.	85 Det. #7	Grd.	0-500,000	Vol.Control (Rotate)
15.	89 AF #7 (a)	Grd.	4,000	T-5 Input Trans. Sec.
16.	89 AF #7 (b)	Gnd.	4,500	T-5 " " "
17.	36	38	Open	C-9
18.	85 Det. #1	85 Det. #6	1,100,000	R-11; R-1-B;R-8;R-7
19.	39	(Tuning Cond. (stator plates	Open	C-3
20.	Voice coil lead	Input trans. lead	2	Defective voice coil or Input Trans. Sec.

NOTE--Disconnect the voice coil lead at one of its terminals on the lower side of the input transformer and test from the end of the disconnected lead to the terminal from which it came.

LOCATING TROUBLES ISOLATED BY VOLTAGE TESTS

The voltmeter tests of the chassis merely serve to isolate the defect in some particular stage of the circuit. The actual fault must be located, in that stage, by means of a point-to-point check of the resistance values of the defective stage.

NOTE: All tubes should be removed from the chassis before making these tests, unless they are known to be good tubes.

Description of incorrect voltage	Test from	To	Correct reading (in OHMS)	Part or parts probably causing incorrect voltage
A. No filament voltage at any socket	1. Hot "A" lead	X4	Zero	Fuse or green lead
	2. Y4	RF #4	*Zero	Switch
	3. Y4	R #4	Zero	Switch
	4. Y4	Gnd.	#Open	C-15
	5. S4	"	6	Speaker field
B. No plate voltage at any socket	1. Rect. #5	Gnd.	Open	C-19; C-20
	2. " "	S-1	350	L-2
	3. R-1	Gnd.	100,000	C-14;C-7-D;C-7-B; R-3; R-12
C. 89 sockets (a) Plate volts	1. S-1	S-5	425	Output Trans.Pri.
	2. S-1	S-2	225	" " "
	3. R-2	R-5	Open	C-12
(b) Screen "	1. R-1	89 #1 (A)	Zero	Defective wiring
	2. R-2	89 #1 (B)	"	" "
(c) Cathode volts	1. Gnd.	89 #5 (B)	500	R-1-C
(d) Suppressor grid volts	1. Gnd.	89 #5 (B)	500	R-1-C
D. 85 Socket (a) Plate volts	1. R-1	85 #2	9,500	L-3;T-5
(b) A.V.C. and Det. plate V.	1. 34	Gnd.	1,800	R-1-B; R-1-D
	2. 34	85 #6	500,000	R-11;T-4;C-9
	3. 85 #6	85 #1	1,000,000	R-7; R-8;R-1-B; R-11;C-2;C-9
(c) Cathode volts	1. Gnd.	85 #5	1,800	R-1-B; R-1-D; C-7-E
E. 39 IF socket (a) Plate volts	1. IF #2	41	52	T-4 Pri.
	2. 41	Gnd.	100,000	C-1-D; R-3; R-12
(b) Screen volts	1. IF #1	41	25,000	R-3
	2. IF #1	Gnd.	100,000	R-3; R-12; C-1-D; C-7-B
(c) Cathode volts	IF #5	Gnd.	250	R-2; C-7-A

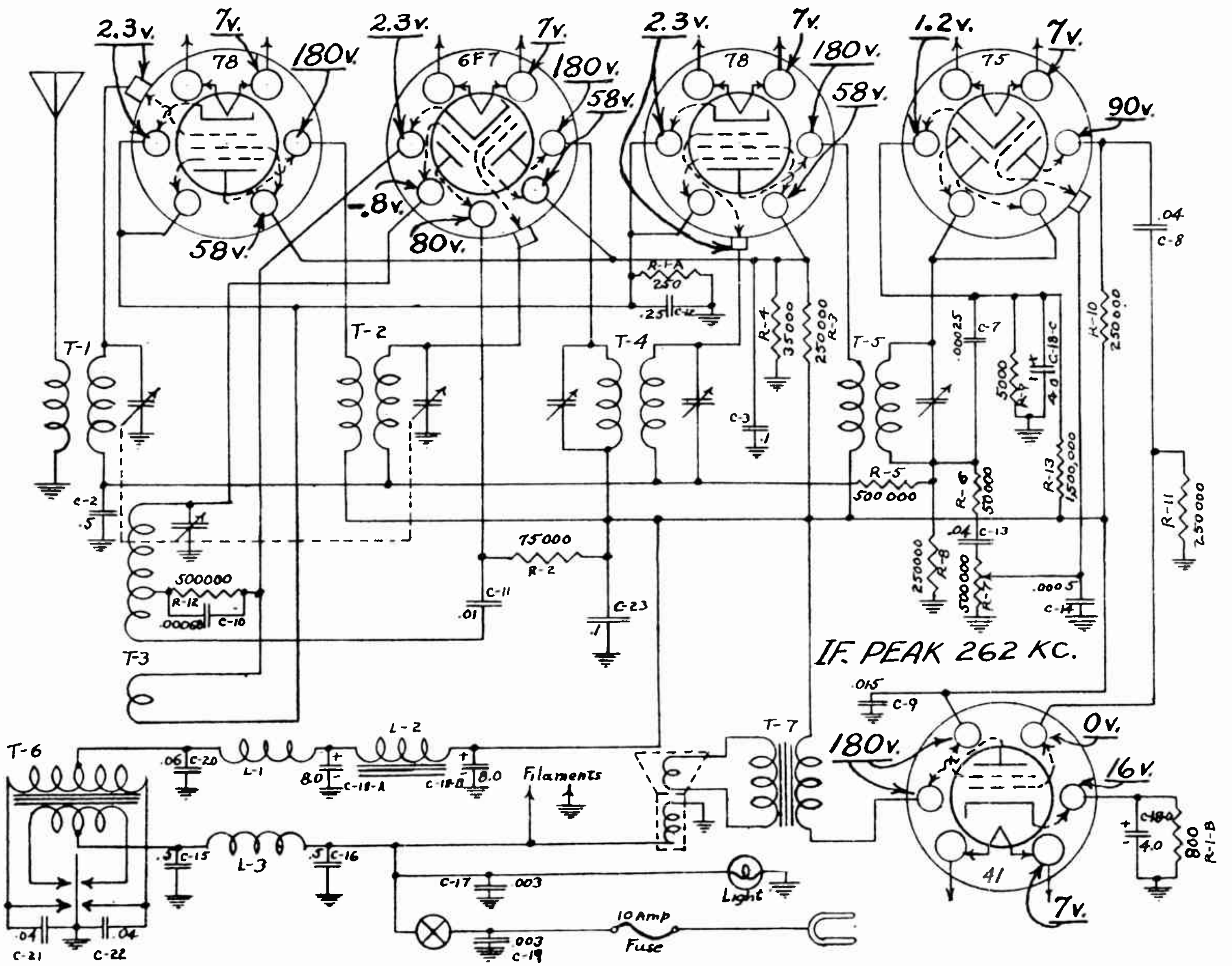
* Switch on # Switch off

Description of incorrect voltage	Test from	To	Correct reading (in ohms)	Part or parts probably causing incorrect voltage
F. 36 Osc. socket (a) Plate volts	1. Osc. #2	42	36	T-3
	2. 42	43	30	R-14
(b) Screen volts	1. Osc. #1	41	25,000	R-3
	2. Osc. #1	Gnd.	100,000	R-3; R-12; C-7-D C-7-B
(c) Cathode	1. Osc. #5	Gnd.	4,200	R-1-A; C-10; T-3
G. 36 F. socket (a) Plate volts	1. RF #2	43	75	T-2
(b) Screen volts	1. RF #1	41	25,000	R-3
	2. RF #1	Gnd.	100,000	R-3; R-12; C-7-D; C-7-B
(c) Cathode	1. RF #5	Gnd.	250	R-2; C-7-A
H. Speaker (a) Weak	S-4	Gnd.	6	Speaker field
(b) Distorted	1. S-1	S-5	200	T-6 Trans.
	2. S-1	S-2	225	T-6 Trans.
	3. S-2	S-5	425	T-6; C-17; R-13
I. Inoperative power unit (a) Vibrator operates	1. Check 84 tube			
	2. Rect. #1	Rect. #2	350	T-7 Sec; C-8
	3. Rect. #1	Gnd.	175	T-7 Sec; C-8
	4. Rect. #5	Gnd.	Open	C-14; C-20
	5. Rect. #5	S-1	350	L-2
(b) Vibrator inoperative	1. S-4	Gnd.	6	C-11; C-13; Vibrator
	2. S-4	Rect. #3	2	L-1

NOTE--It will be necessary to disconnect one lead of all condensers, which have one terminal grounded, in order to test them accurately.

MODEL 4037 Schematic

UNITED MOTORS SERVICE



MODEL 4037
Service Hints
Alignment

UNITED MOTORS SERVICE

SERVICE HINTS

The Battery Cable consists of a single fused lead which should be fastened to the ammeter. Advances in filtering methods minimize chassis pick-up due to connecting the battery cable to the ammeter rather than to the battery.

The paint must be removed from the dash under the chassis mounting washers in order to provide a good ground for the receiver as no other ground is used. R. F noise due to the vibrator will appear if good ground connections are not made at the dash.

A very slight amount of Chassis pick-up may appear in an installation on a car having the coil mounted behind the instrument panel. Take precautions to see that a good ground is made between the control unit and the instrument panel. The location of the Ammeter and dial light lead with respect to the coil is very important. Moving these leads as far away from the coil as possible and locating them against a brace or any metal support under the cowl will reduce the interference to a minimum.

The 6F7 tube is a two unit Tube and the oscillator section may cease functioning without affecting the amplifier section of the tube or its reading in a tube checker. If the set does not function; operates weakly or not at all at the 550 end of the dial, remove the grid cap of the 78 I.F. tube and make and break the grid contact several times; if very loud pops occur in the speaker the 6F7 is probably defective and should be replaced.

All chassis having a Serial number below Serial #1349259 have a 500,000 ohm resistor connected between the screen (#2) of the 78 I.F. tube and the cathode (#5) of the 75 tube.

All chassis having a serial number above #1349259 have a 1,500,000 ohm resistor between the B plus terminal of the diode coil (2nd I.F.) and the cathode (#5) of the 75 tube.

PEAKING: The peaking operation for this receiver is similar to that on the Model 4036. The I.F. stages should be peaked at 262 KC. Peak the I.F. trimmer, which is in the I.F. coil can having only one adjusting screw, first.

Peak the parallel trimmers, on the top of the tuning condenser, at 1400 KC., the oscillator section (beneath the volume control) first.

VIBRATORS. Sometimes a small amount of dirt will lodge between the contacts and result in such high contact resistance that the vibrator will not start. If such is apparently the case, remove the transformer-vibrator from the chassis. Disconnect ONLY the red B plus lead from the iron core choke. Turn the receiver "on" (there must be a connection between the vibrator case and the chassis) and start the vibrator by snapping the reed back and forth with a pencil. If the vibrator starts to function, allow it to run without stopping until the dirt has been burned out as indicated by the cessation of brilliant sparking. The vibrator should now start under its own power and should continue to function properly. If the vibrator still fails to start properly, replace the vibrator unit.

UNITED MOTORS SERVICE

MODEL 4037
Parts List

UMS Part No.	Part Name	Description	Code	Spec.
1207991	Condenser	3--Gang Tuning	C-1A,B,C	
1208024	"	Tubular (Metal Case)	C-2	.5 Mfd.
1207908	"	"	C-3	.1
1207760	"	Molded Bakelite	C-7	.0005 "
1207930	"	Tubular	C-8	.04 "
1208025	"	"	C-9	.015 "
1208026	"	Molded Bakelite	C-10	.00068 "
1207909	"	Tubular	C-11	.01 "
1207931	"	Tubular	C-12	.25 "
1207930	"	"	C-13	.04 "
1207636	"	Molded Bakelite	C-14	.0005 "
1208027	"	Tubular (Metal Case)	C-15	.5 "
1208027	"	Tubular (Metal Case)	C-16	.5 "
1207617	"	Molded Bakelite	C-17	.003 "
			(C-18A	8.0 "
1207995	"	Electrolytic Block	(C-18B	8.0 "
			(C-18C	4.0 "
			(C-18D	4.0 "
1207617	"	Molded Bakelite	C-19	.003 "
1208028	"	Tubular	C-20	.06 "
1849014	"	Generator By-pass		.5 "
1849161	"	Ammeter By-pass		.5 "

		Body	End	Spot	Res.	Code	Watt
1207986	Resistor		Candohn		250	R-1A	
					800	R-1B	
1208044	Resistor	Purple	Green	Orange	75,000	R-2	.5
1208045	Resistor	Red	Green	Orange	25,000	R-3	.5
1208046	Resistor	Orange	Green	Orange	35,000	R-4	.1
1204138	Resistor	Green	Black	Yellow	500,000	R-5	.1
1204140	Resistor	Green	Black	Orange	50,000	R-6	.1
1208047	Resistor	Red	Green	Yellow	250,000	R-10	.1
1208047	Resistor	Red	Green	Yellow	250,000	R-11	.1
1208048	Resistor		Candohm		5,000	R-9	
1207821	Resistor		Spark Plug		20,000		
1204138	Resistor	Green	Black	Yellow	500,000	R-12	.1
1208069	Resistor	Brown	Green	Green	1,500,000	R-13	.1
1207818	Resistor		Distributor		12,500		
1207994	Volume Control					R-7	
1208052	Coil		Field				6 Ohm
1208000	Vibrator		Inc. C-21 and C-22				

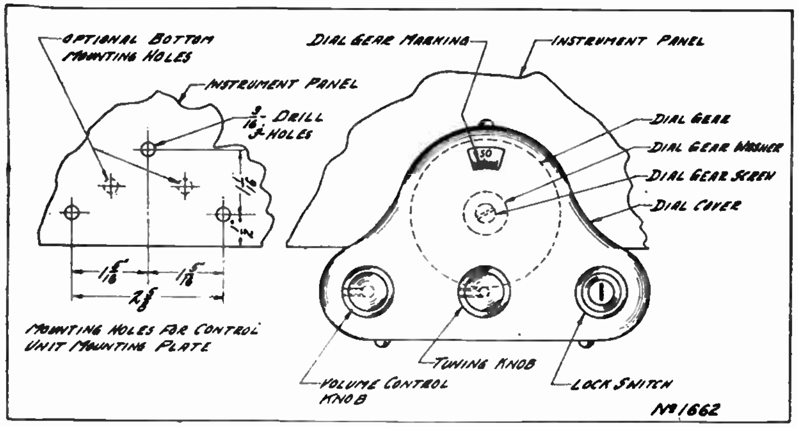


Fig. 3. Details of Control Unit Mounting

ATTACHING DRIVE CABLE TO CHASSIS

Before mounting control unit attach drive cable to chassis. It will be noted that there is a brass bearing and pinion gear on both ends of the drive cable. These two bearings should be greased before installing the cable. On one end of the cable there is a shaft extending beyond the pinion gear. This end goes into the control unit. The other end of the drive shaft with only the pinion gear on the end of the bearing goes into the chassis.

Place cable in hole in gear housing on side of chassis as far as it will go so that the pinion gear and rotor shaft gear mesh. The cable casing must go to the bottom of the counter bore in gear housing. Tighten the two set screws down on drive cable casing.

MOUNTING CONTROL UNIT AND ATTACHING DRIVE CABLE TO UNIT

To mount the control unit and attach drive cable proceed as follows:

Remove volume control and tuning knobs by means of set screws. See Fig. 3.

Remove top dial-cover plate screw, loosen bottom two dial cover screws and take off dial cover plate.

Remove dial gear screw and washer and take off dial gear. See Fig. 3.

Place control unit mounting plate on the instrument panel at desired location with volume control and shaft connector extending under bottom of the instrument panel.

Mark top mounting hole location and drill hole through instrument panel, per diagram.

Insert screw through top mounting hole of control unit mounting plate and hole in instrument panel. Place lock washer and nut on screw and fasten securely in place. Now drill the two bottom holes.

If the instrument panel is of such shape or is so arranged that the two bottom mounting holes in control unit mounting plate can not be used, drill two additional holes in mounting plate as shown in Fig. 3, called optional mounting holes.

Then insert screws in two bottom holes. Place lock washers and nuts on screws and tighten.

If there is a bead or flange on bottom of instrument panel, put spacer washers (not supplied) back of control unit to keep it parallel with panel.

Now insert end of drive cable through hole at back of control unit mounting plate. The drive cable must be placed all the way in so that end of cable casing reaches the bottom of the counterbore. Then tighten down two set screws in shaft connector on cable casing.

After drive cable has been attached to control unit mounting plate remove hairpin spring from control unit mounting plate and place circular portion of spring in groove near end of shaft bearing. Then insert the two projecting ends of this spring into the slots of the bracket from which the spring was removed.

SETTING DIAL GEAR

Next fasten tuning knob on tuning shaft by means of set screw. Turn knob to the right as far as it will go. Then put on dial gear so that the zero mark is at top center.

Now put on dial gear washer and put in dial gear screw. See Fig. 3.

Remove tuning knob and put dial cover plate back on by means of the three screws which pass through the three brackets in the control unit mounting plate.

Replace volume control and tuning knobs by means of the two set screws.

Mounting Junction Box

The junction box should be mounted to the dash board close to the chassis as shown in Fig. 1.

If the chassis is mounted at the right front part of the dash board under the cowl, the junction box is mounted to the left of it with the speaker tip jacks at the top. When mounted this way the opening for the cable from the battery box will be at the left and the opening for the cable from the chassis will will be at the right of the junction box.

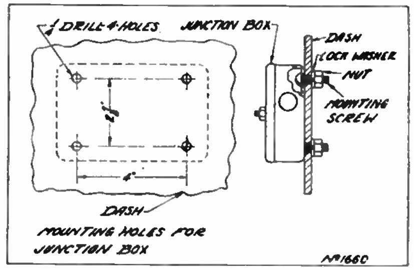


Fig. 4. Details of Junction Box Mounting.

Details of the mounting holes required for the junction box are shown in Fig. 4. Very little difficulty will be experienced in mounting this unit as not much space is required and it can be put at any convenient location where it is readily accessible for making the wiring connections, also voltage tests, etc. The junction box may in some instances be mounted to the side of the chassis when no other convenient location for attaching it can be found.

Installing Speaker

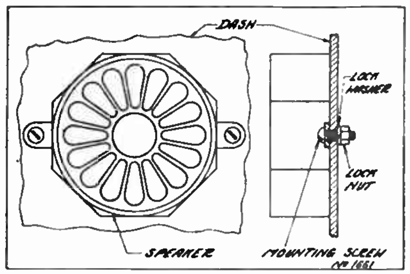


Fig. 5. Details of Speaker Mounting.

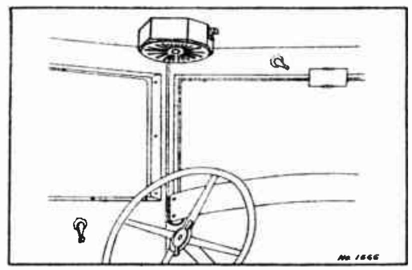


Fig. 6. Mounting Speaker at Top of Car.

A magnetic cone speaker as shown in Fig. 12 is supplied for U. S. Model 30 Automobile Receiver. The unit is contained in an attractive wood and metal octagonal case.

If the chassis is mounted at the right side of the dash under the cowl, the speaker can generally be mounted on the left side of the dash. It should be secured to the dash by the angle brackets furnished with the speaker. See Fig. 5. Three brackets should be used in mounting the speaker to avoid vibration. The brackets are placed on the end faces of the speaker that are most convenient when mounting the speaker.

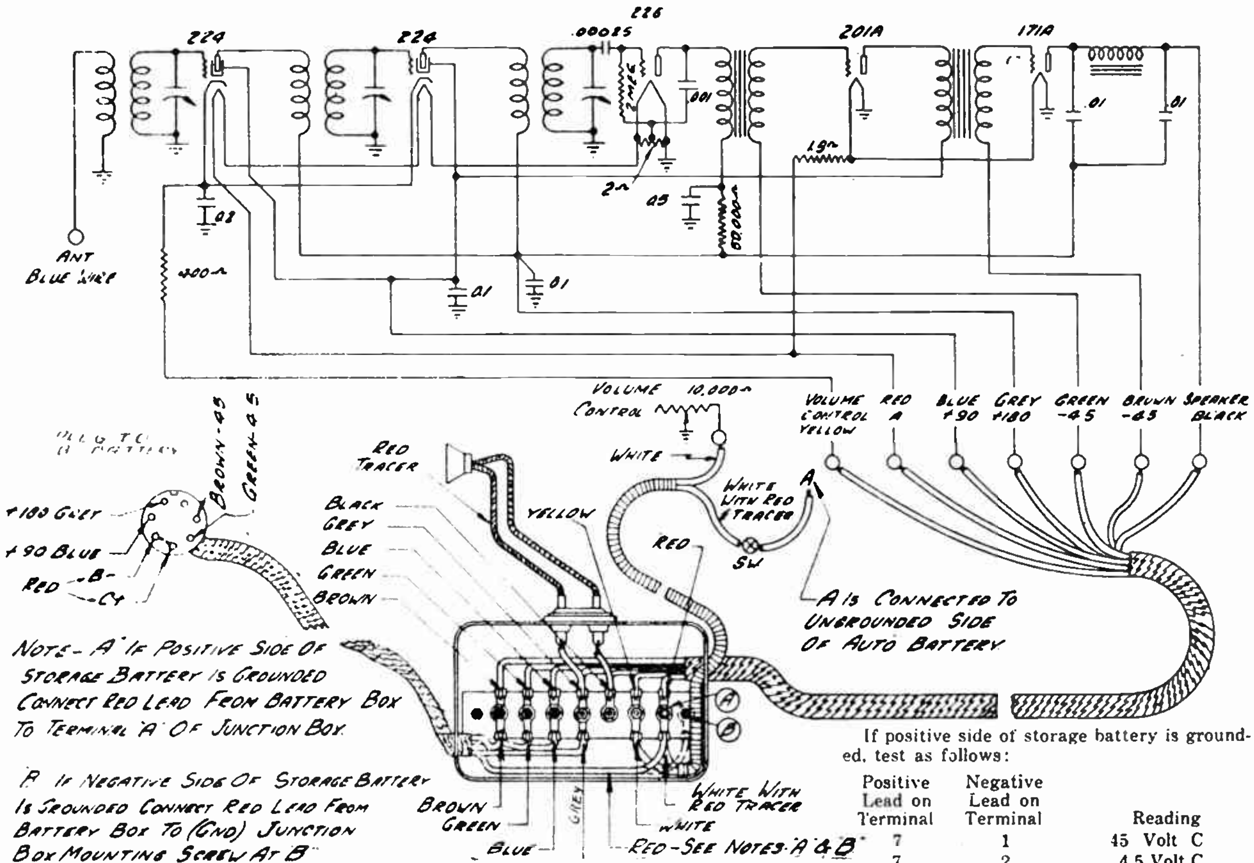
The speaker may also be mounted at the top of the car as shown in Fig. 6, at any point where the roof bows are accessible for the bracket mounting screws.

The speaker brackets should be securely screwed to the speaker case and to the supporting dash board or roof bow to avoid mechanical vibration.

The speaker is furnished with a 3 ft. cord which is sufficient to reach to the junction box if the speaker is mounted on the dash. If it is mounted on the top, an extension cord may be required.

MODEL 30 Auto Radio

U. S. RADIO & TELEVISION CORP.



If positive side of storage battery is grounded, test as follows:

Positive Lead on Terminal	Negative Lead on Terminal	Reading
7	1	45 Volt C
7	2	4.5 Volt C
3	7	90 Volt B
4	7	180 Volt B
Ground	7	6 Volt A

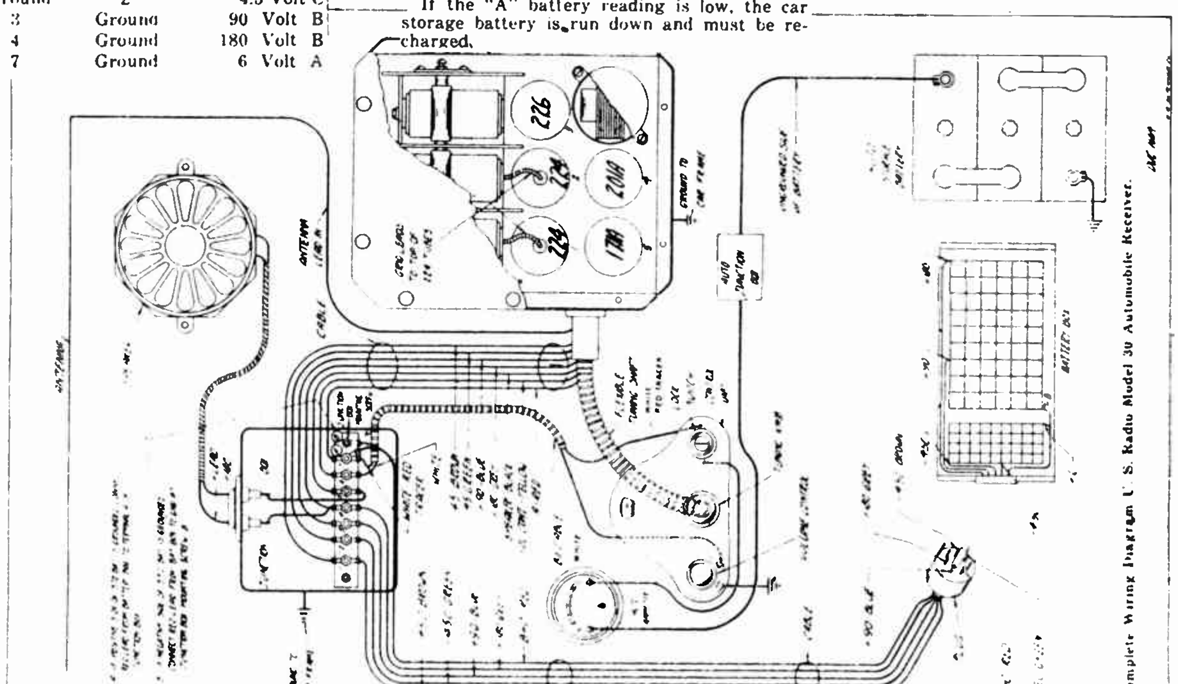
If any reading is below the lower limits as shown on the following list, a new battery box unit will be required.

Regular Rating	Lower Limit
180 Volt B	140 Volt
90 Volt B	70 Volt
45 Volt C	35 Volt
4.5 Volt C	3.5 Volt

If the "A" battery reading is low, the car storage battery is run down and must be recharged.

If negative side of battery is grounded, test as follows:

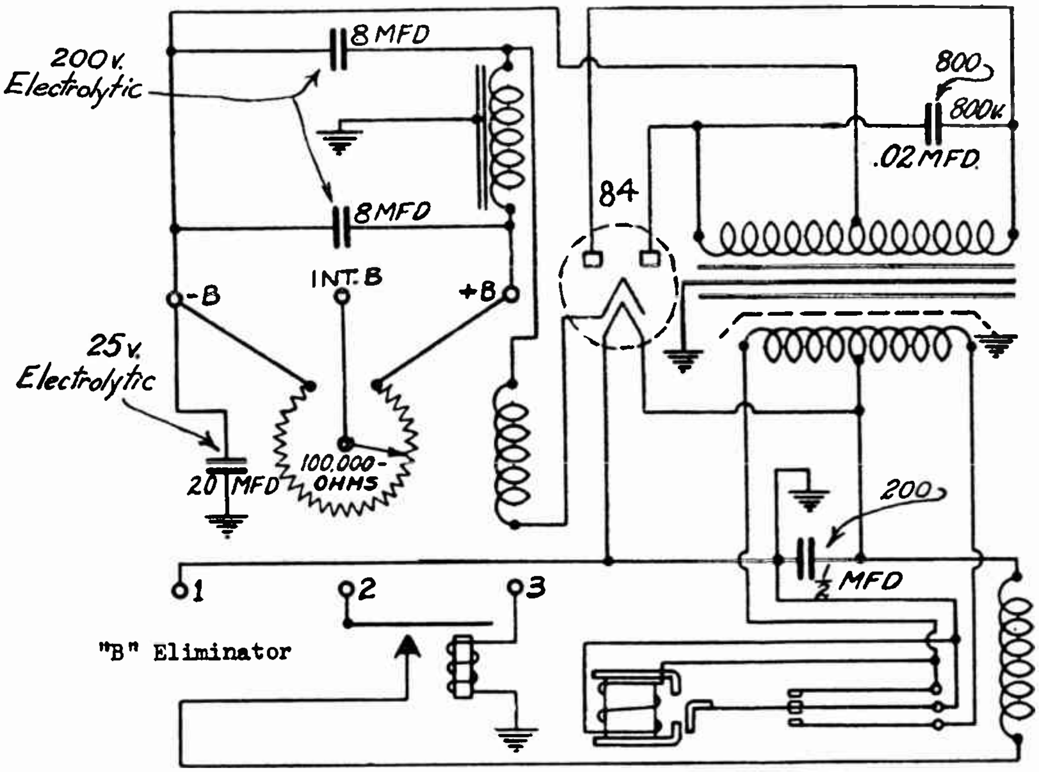
Positive Lead on Terminal	Negative Lead on Terminal	Reading
Ground	1	45 Volt C
Ground	2	4.5 Volt C
3	Ground	90 Volt B
4	Ground	180 Volt B
7	Ground	6 Volt A

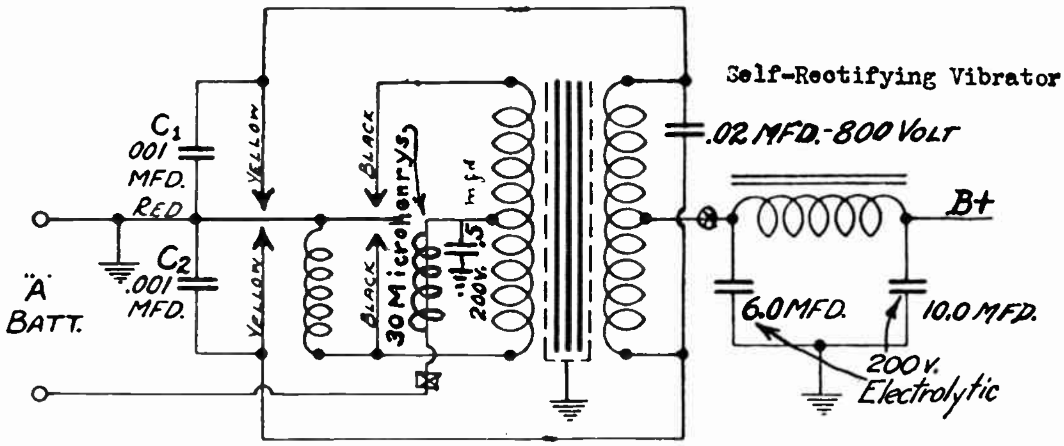


Complete Wiring Diagram U. S. Radio Model 30 Automobile Receiver.

UTAH RADIO PRODUCTS CO

MODEL "B" Elim.
MODEL Self-Rectifying Vibrator
Schematics





C1 and C2 are contained in Vibrator Unit.

Center tap of transformer must be B+; if polarity is reversed, switch the black leads from Vibrator.

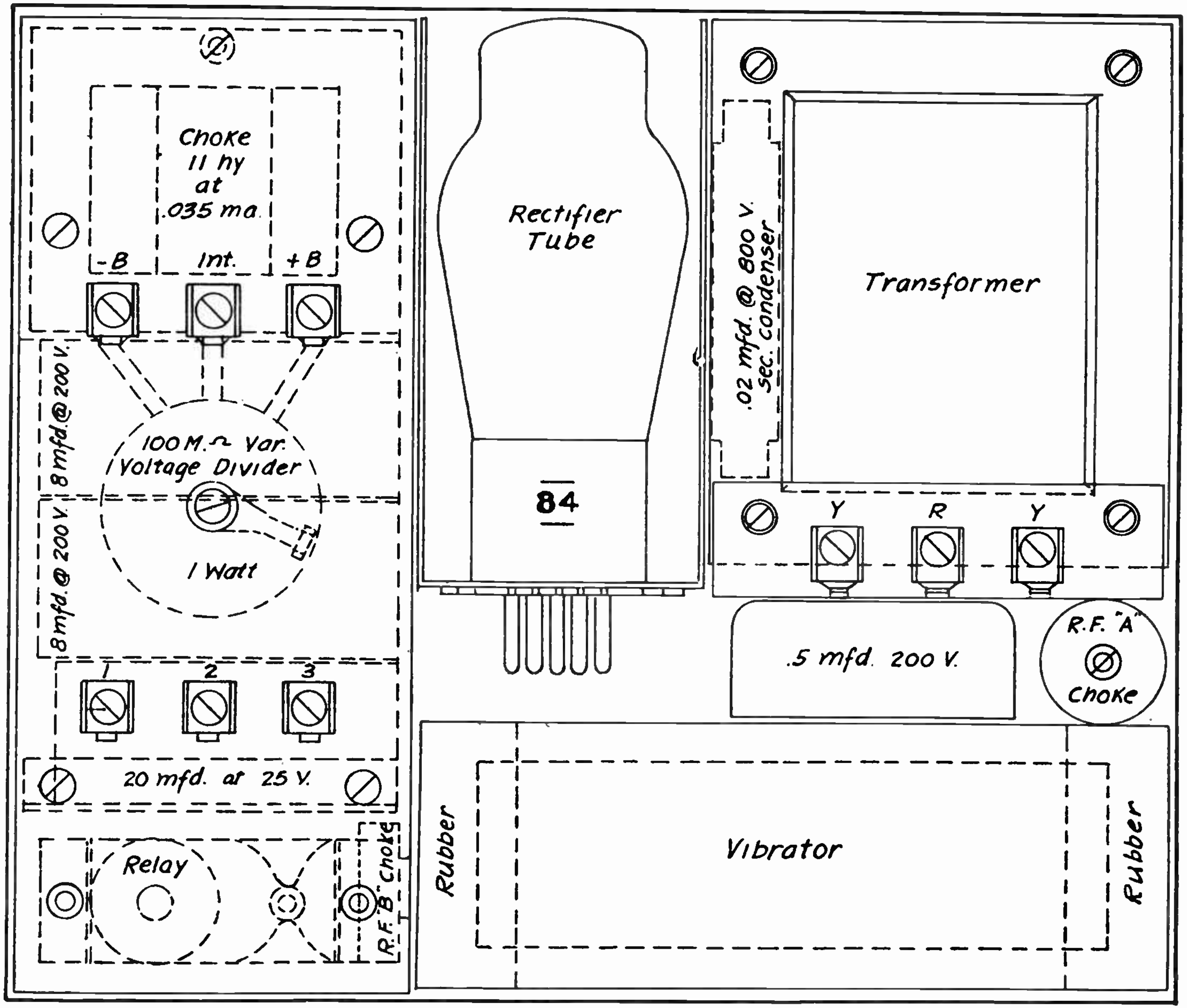
In some cases it may be necessary to insert an R.F. Choke of approximately 2 M.H. between center tap of transformer and filter choke. A by-pass condenser of approximately .02 mfd. should then be connected from center tap of transformer to ground.

It is usually necessary to put a 30 microhenry choke in series with the hot "A" lead, and by-passing it, with a .5 mfd. condenser to ground, for the elimination of R.F. pickup

"Note" 'B' - must be grounded.

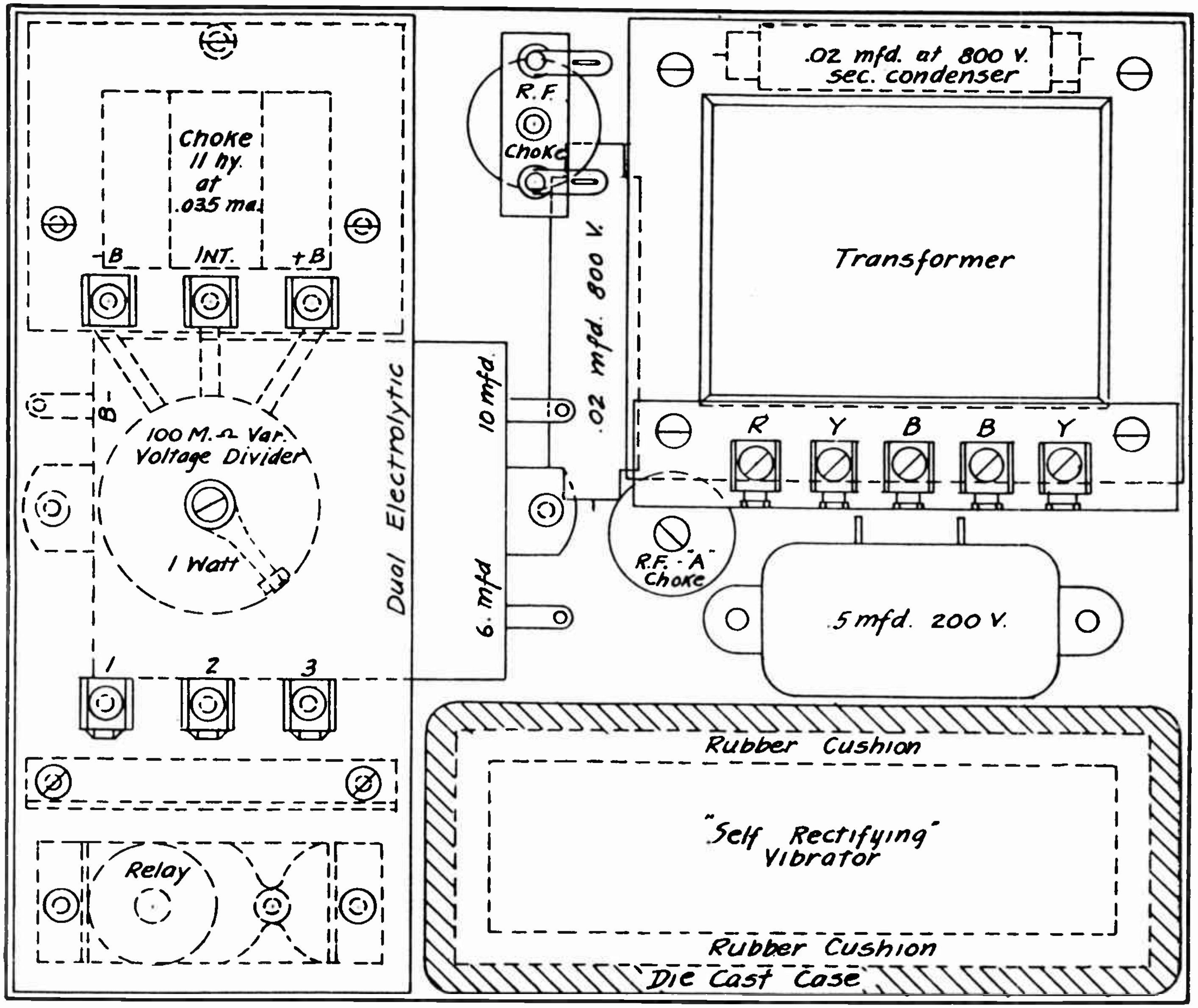
MODEL "B" Elim.
Layout

UTAH RADIO PRODUCTS CO



MODEL Self-Rectifying Vibrator, Layout

UTAH RADIO PRODUCTS CO



MODEL 062 Auto Radio Data

WELLS - GARDNER & CO.

Mounting "B" Eliminator and Relay

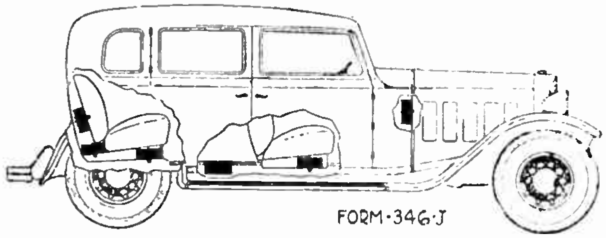


Fig. 7—"B" Eliminator Locations

In addition to the following instructions, a complete installing bulletin for the "B" eliminator is furnished by the manufacturer with each unit. The "B" eliminator can be conveniently mounted in a number of locations in the car as shown in Fig. 7. Under the front seat or in the motor compartment under the hood is a convenient place. The eliminator should be at least 12" away from any ignition or lighting wires of the automobile. Never install the eliminator on end, that is, with the mounting brackets at the top and bottom. Short out the "B" fuse when a "B" Eliminator is used.

In Fig. 1 the "B" eliminator is shown under the front seat, at the right hand side, for illustrative purposes. If, as shown in the illustration, the antenna lead comes down the right front corner post and the "B" eliminator is under the front seat, it should be moved to the left as far as possible. In general, mount it on the opposite side of the car that the antenna lead is installed.

The relay should be mounted near the car storage battery so that the two leads will reach. It is mounted on the frame of the car. Before making any connections to the battery, determine which side is grounded and which side is ungrounded. Then find out if the ungrounded or hot side is positive or negative. This will vary with the make of car.

In Fig. 8 is shown how the connections are made in either case. Unscrew the clamp-bolts on the battery and connect lug of yellow lead to the "hot" side of the battery and the lug of the black lead to the grounded side. The bolt goes through the hole in the lug and the lug is bent over. Connect the shielded two-lead cable from the "A" battery and relay to the "B" eliminator. Note that the proper connections will depend on which side the battery is grounded. The "B" cable connections from the chassis may then be completed to the "B" eliminator. It is important that the "B" cable to the eliminator be located as far away from the "A" supply cable as possible. Run them to the "B" eliminator at opposite sides of the car as shown in Fig. 1.

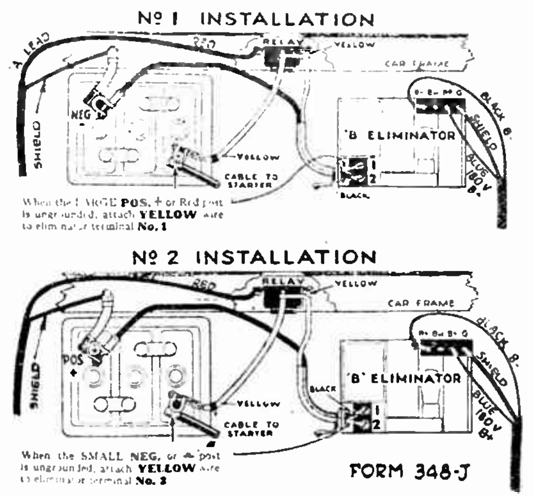


Fig. 8—"B" Eliminator Connections

Suppression of Ignition and Generator Noise

After the receiver is in satisfactory working order, start the motor and note the amount of noise. As a general rule, spark plug suppressors, a distributor suppressor and a ½ mfd. condenser on the generator are all that is required for the reduction of ignition and generator noise. If these items do not reduce the noise sufficiently, other measures as described below are required.

One spark plug suppressor is required for each plug. The method of mounting is shown in Fig. 12. Remove the wire from the top of the plug, put the suppressor on, and attach the wire to the top of the suppressor.

A distributor suppressor is put in the high tension lead, between the coil and the distributor head. Position "C," Fig. 12, on the distributor head is the most satisfactory and most commonly used point of mounting. If this is not practical, the high tension line may be cut *close to the distributor head* and the distributor suppressor with wood screw ends inserted in the line as shown in position "B."

The ½ mfd. generator condenser is installed as shown in Fig. 12. The lead from the condenser goes to one side of the cut-out connection on the generator. The mounting clamp grounds the other side of the condenser.

After the above procedure has been followed, again start the motor. If noisy operation persists, a number of steps can be taken and the various suggestions as given can be tried until the noise is satisfactorily reduced.

Try two suppressors in the high tension line, one at the coil end in addition to one at the distributor end, position "C," Fig. 12.

Ground all cables and tubing which pass through the dash, such as oil lines, gas lines, etc. Ground to the dash or at the nearest convenient point on the frame with a good short ground connection. Use the left-over shield from the "B" battery lead for this purpose.

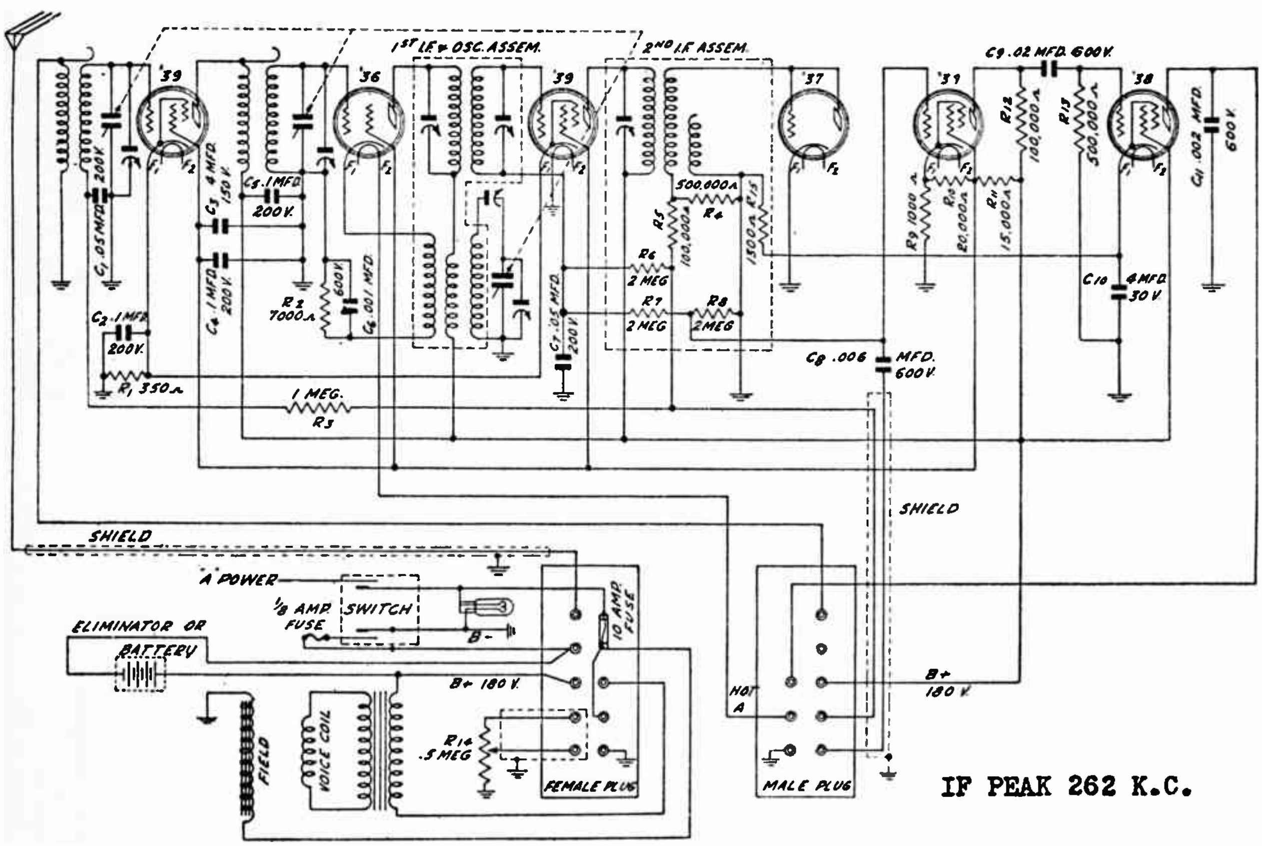
If the chassis and coil are both in back of the dash (under the cowl), take off the coil and mount it on the front of the dash (in the engine compartment). If the coil cannot be moved, place a copper can over it and ground the can at the coil mounting.

Clean and respace spark plugs—clean and check distributor points—check distributor condenser.

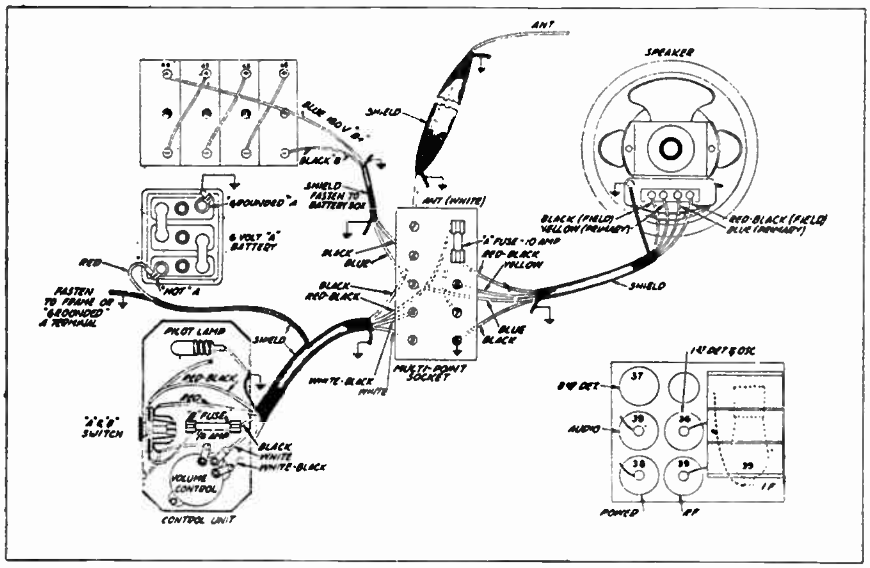
In some cases, the high and low tension leads between the coil and distributor are run close together. In some cases they are in the same conduit. If this is the case, remove the low tension lead from this conduit.

MODEL 062 Auto Radio
Schematic

WELLS - GARDNER & CO.



IF PEAK 262 K.C.



VOLTAGE DATA

Tube	Plate	Screen	Grid	Plate MA.
R-F.	177	80	3	3.6
1st Det.	173	76	7*	.9*
I-F.	177	80	3	3.6
2nd Det.	0	0	0	0
1st A-F.	54	77	6	1.2
Output	159	165	15.5	10.0

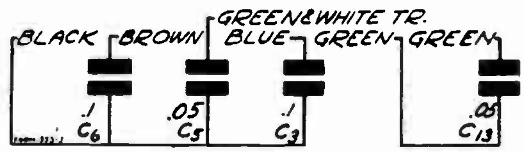
* Will vary with dial setting.

WELLS - GARDNER & CO.

MODEL V6Z2
Schematic
Voltage

Trying Out the Set and Adjusting

After the wiring has all been completed and before the chassis is permanently installed, try out the set and adjust the antenna trimmer. The location of the tubes is shown in Fig. 7. To adjust the antenna trimmer, tune in a weak signal between 1200 and 1400 K.C. with the volume control about three-fourths on. On one end of the chassis box is a small metal plate. Remove this plate. Directly under the hole in the chassis box is the antenna trimmer condenser screw. Turn this adjusting screw up or down until maximum output is obtained.



Condenser Block—Internal Wiring

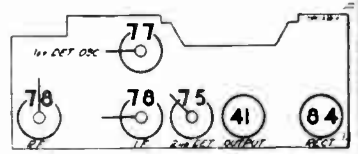
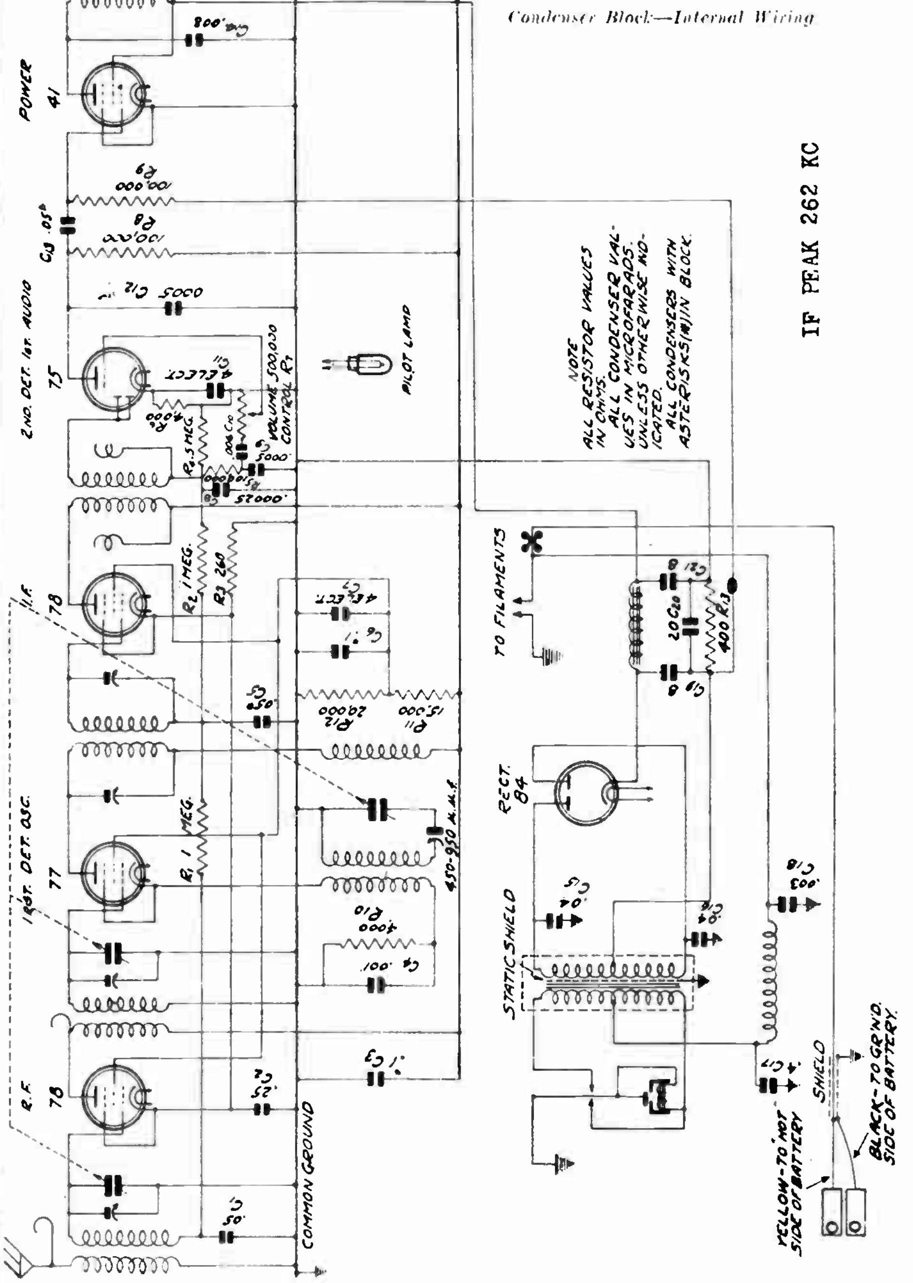


Fig. 7—Location of Tubes



IF PEAK 262 KC

	Across Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate MA
78 R.F.	6.1	182	80	3*	7.0
77 1st Det. & Osc.	6.1	178	77	5**	1.3**
78 I.F.	6.1	182	80	3.*	7.0
75 2nd Det. 1st Audio	6.1	70x		1.4*	.35
41 Output	6.1	172.5	176.5	12.5xx	16.0
84 Rect.	6.1	205			17.5 per plate

*-Cathode to Ground. **-Subject to Variation. x-Triode Plate to Cathode
xx-Read Across 400-Ohm Resistor, R13

MODEL V6Z2
Mounting Notes

WELLS - GARDNER & CO.

Mounting the Chassis

The chassis is mounted on the dash by means of two brackets as shown in Fig. 2. Two mounting screws are used to secure each bracket to the end of

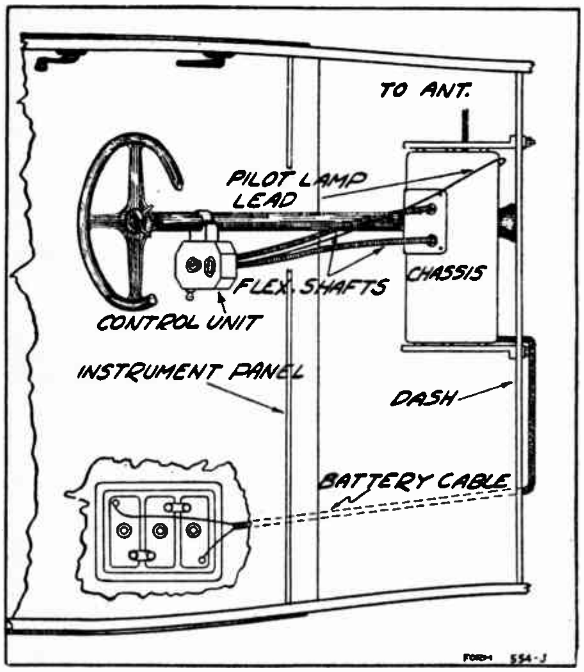


Fig. 2—General Installation—Top View

the chassis box. Six embossings with inset nuts are provided on each end of the chassis box. Any two of these may be used for the bracket screws, thus providing great flexibility in mounting.

Each nut has a mounting screw in it and if any of these are in the way of the mounting bracket, they can be taken out.

The chassis should be mounted with the speaker grill facing toward the driver. In this position, the anchor bushings in which the flexible drive shafts are placed will come out of the top.

The location of the chassis will very often depend on the space available. To the left of the center, as shown in Fig. 2, is a good location. The chassis should be mounted in such a way that the flexible drive shafts to the control unit will be in as straight a line as possible or with large radius bends. *In general, it will be advisable to consider the possibility of a car heater installation at the right side of the dash (facing forward).* In practically every case no difficulty will be experienced in mounting the heater and chassis on the dash.

The possibility of interference with the legs of the driver or passenger in the front seat and the possibility of interference with the controls of the car should also be considered before the location of the chassis is definitely decided on.

Before mounting the chassis read the section on "Attaching the Flexible Drive Shafts."

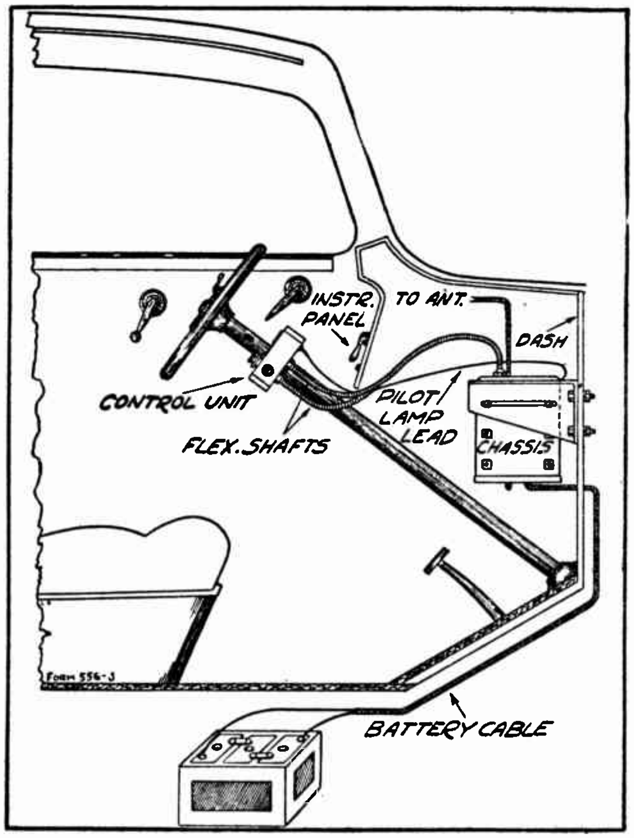


Fig. 3—General Installation—Side View

When the location is decided on, drill the four mounting holes required. The location and size of these holes is shown in Fig. 4. A template for drilling these holes is supplied with the receiver. Four ¼" mounting bolts, four washers, four lockwashers, and four nuts are provided. The mounting bolt is put through the bracket and dash with the shank

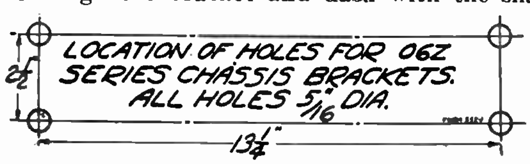


Fig. 4—Mounting Hole Location

extending into the engine compartment. A washer, the lockwasher and nut, are then put on. Mount the brackets permanently, but do not mount the chassis permanently until all connections are completed, the tubes are all inserted, the receiver tried out, and the antenna trimmer adjusted (explained later).

WELLS - GARDNER & CO.

MODEL V6Z2
Flexible Drive

Attaching the Flexible Drive Shafts

After the control unit and chassis are in position, the flexible drive shafts may be attached. Two 34" shafts are supplied, unless otherwise specified. These shafts may also be had in 14", 20", and 45" lengths. The flexible drive shafts should always be installed with a minimum amount of bending. Always keep the radius of the bend as large as possible.

The 34" shafts supplied with the receiver may be cut to a shorter length if necessary. The shaft (inside portion) should first be brazed at the point to be cut. It should then be cut with a three-corner file or edge of a grinding wheel. *Do not use a hack saw.* After the shaft is cut, file it down in one place a slight amount to provide a flat surface for the set screw. The casing which is 1½" shorter must be cut to correspond. This should be tinned or brazed first at the point to be cut and may then be cut with a hack saw.

After the length and position of the shafts is decided on they may be secured to the chassis. The shafts are already secured at the control unit. It is advisable to attach the flexible shafts with the chassis on the mounting brackets, but if the chassis is accessible, it may be removed from the brackets. Keep it as close to its regular position as possible so that the flexible shaft will not turn after the chassis is replaced on the brackets. In general, it may be moved up or down, but should not be moved sideways or be turned. Just over the speaker grill on the chassis box will be seen an angle plate. Remove this plate. Before proceeding further with attachment of the shafts see if the receiver is in working order by operating it with the cover off and necessary connections completed, as explained further in this manual.

In Fig. 5 is shown a cross-sectional view of the flexible drive shaft connections at the chassis end. First put the angle plate on the chassis box temporarily with two screws. Then center the volume control anchor bushing on this plate. To do this, loosen the nut which holds this bushing in place (see Fig. 5). Center the bushing by eye so that the center of it is in a line with the center of the volume control coupling. Then tighten the nut down.

Next, take the angle plate off. Extend the volume control flexible shaft and casing several inches through the hole in the anchor bushing of the angle plate so that the plate will be on the casing and out of the way. Turn the volume control coupling counter-clockwise until the switch is snapped to the off position. Lock the receiver on the control unit and turn the volume control knob counter-clockwise until it is in the locked position. Then loosen both set screws in the volume control coupling and insert the flexible shaft in the coupling (see Fig. 5). Tighten the outer set screw first on one of the *four flat faces* of the flexible shaft and then tighten the inner set screw. For purposes of illustration, the set screws in Fig. 5 are shown extending sideways in the coupling, but should actually extend towards the box opening in order to get at them. Then temporarily place the chassis on the mounting brackets if it has been taken off and check the operation of the switch, volume control, and lock. The switch should be off when the volume control knob is in the locked position. It may be necessary to loosen the inner set screw and do a slight amount of adjusting until the proper setting is obtained.

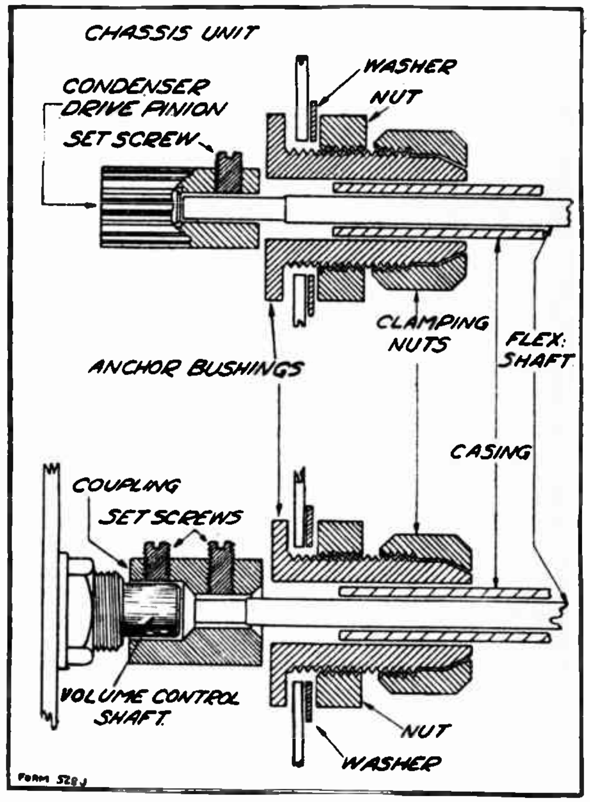


Fig. 5—Details of Flexible Drive Shaft Connections

To attach the tuning condenser flexible shaft, first center the anchor bushing by eye as was explained above. Then extend the tuning condenser flexible shaft into the hole at the center of the tuning condenser drive pinion. Turn the large gear on the tuning condenser rotor shaft until the rotor plates are completely in mesh. Then turn the station selector knob on the control unit until the dial gear is at the low frequency end stop. The set screw in the drive pinion should then be tightened down on one of the four flat faces of the shaft.

The operation of this control should also be tried out after the shaft is in place. In order to get accurate calibration it may be necessary in some instances to loosen the set screw of the large gear on the tuning condenser rotor shaft and adjust the setting of this gear.

Next, slide the angle plate into position and fasten it in place by means of the four screws. Then tighten down the clamping nuts on the two flexible shaft casings, *but do not tighten these nuts excessively.*

MODEL V6Z2
Control Unit
Alignment Data

WELLS - GARDNER & CO.

Mounting the Control Unit

The control unit is mounted on the steering column under the steering wheel as shown in Figs. 2 and 3. A clamp is used to hold it in position.

The outer portion of the clamp is screwed to the inner portion by means of the four 8-32x3/8" fillister head screws supplied with the receiver. See Fig. 1.

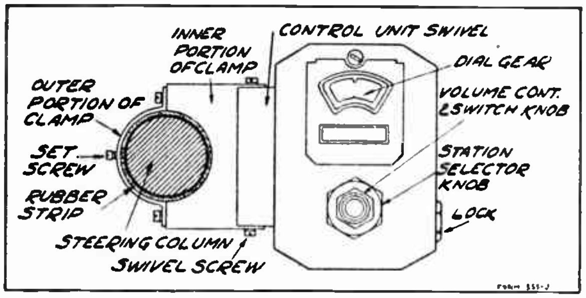


Fig. 1—Method of Mounting Control Unit

Two rubber strips are provided, one 1/8" thick and the other 1/16" thick. These are wrapped around the steering column under the clamp. Either or both of these strips may be used, depending on the thickness of the column. Wrap the rubber strips around the column in such a way as to allow the set screws which hold the clamp in position to pass through. When the clamp is in place, take the two 8-32 headless cup point set screws and screw them down on the steering column through the tapped holes in the clamp.

The control unit is generally about 4" below the wheel, but this will vary with individual cases. The length of the drive shaft and interference with driver's legs will also govern the location of the control unit.

There are two screws which hold the inside portion of the clamp to the control unit swivel. By loosening these two screws, the box can be swung around if such a position is handier from the standpoint of the person operating the set. Instructions for attaching the pilot lamp lead are contained in the article "Completing the Wiring Connections.

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself in broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide accurately calibrated signals over the broadcast band and accurately calibrated signals at and around 262 K.C., the intermediate frequency and an output indicating meter are desirable.

First set the signal generator at approximately 262 K.C. Connect the antenna lead from the generator to the control grid of the I.F. 78 tube, through a .05 mfd. condenser. The ground lead of the generator goes to the ground of the receiver. Turn the rotor plates of the tuning condenser completely out and keep the signal weak enough to prevent A.V.C. action. Note from Fig. 9 that the second I.F. transformer is self tuned and cannot be adjusted. Adjust the frequency of the signal generator until the output meter shows maximum output. The intermediate frequency setting of the generator is then correct, although it may be a very small percentage higher or lower than 262 K.C.

Next connect the signal lead from the signal generator to the grid of the 1st detector tube through a .05 mfd. condenser. Then adjust the two intermediate frequency condensers for maximum output. One of the I.F. condenser screws is reached through the hole on the top of the 1st I.F. assembly can. The other I.F. condenser screw is reached from the bottom of the sub-panel through a hole at the bottom of this assembly.

Now set the signal generator for a signal of exactly 1400 K.C. The antenna lead from the generator is, in this instance, connected to the antenna lead of the receiver. Connect the flexible drive shaft to the chassis if it has been disconnected. As explained previously, the dial scale should be at the low frequency end stop when the rotor is completely in mesh. Then turn the station selector knob until the dial scale is at 1400 K.C.

Then adjust the three trimmer condensers on the gang tuning condenser for maximum output, adjusting the oscillator section first.

Next, set the signal generator for a signal of 600 K.C. and adjust the oscillator 600 K.C. trimmer. The adjusting screw for this condenser is reached through a hole in the back wall of the sub-panel.

A non-metallic screwdriver is necessary for this adjustment. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting, at the same time adjusting the 600 K.C. trimmer screw until the highest output is obtained.

Then set the signal generator again for a signal of 1400 K.C. and check the adjustment of the tuning condenser trimmers at this frequency for maximum output.

WELLS - GARDNER & CO.

MODEL V6Z2
Parts List

Replacement Parts for Series V6Z2 Receivers

CHASSIS PARTS

Part No.	Description	List Price
P-1780	No. 75 Tube Socket	$0.10
P-1761	No. 77 Tube Socket	.10
P-1762	No. 78 Tube Socket	.10
P-1665	No. 41 Tube Socket	.10
P-1803	No. 84 Tube Socket	.10
P-1805	Single Pin Jack	.10
P-1799	Tube Shield Assembly	.25
P-20681	Chassis Box	4.00
P-20657	Chassis Box Cover	1.10
P-20680	Angle Plate	.25
P-70740	Shielded Antenna Lead	.40
P-70744	Shielded "A" Battery Lead	1.15
P-1824	Anchor Bushing, complete with nuts and washers	.35
P-1804	Vibrator Unit (in cast metal case)	6.00
P-10266	Vibrator Unit Rubber Cushion, pair	.10
P-20660	Vibrator Unit Box	.70
P-20661	Vibrator Unit Box Cover	.20
P-1572	Fuse Clip Assembly	.10
P-10260	Cardboard Baffle	.20
P-1624	10 Amp. Fuse	.10
P-1774	Electrodynamic Speaker	3.75
P-20675	Volume Control and Pinion Gear Bracket	.15
P-20545	Pinion Bearing	.10
P-20546	Pinion Compression Spring	.10
P-20544	Pinion Bracket	.10
P-20586	Drive Pinion	.10
P-20585	Cond. Drive Gear	.25
P-30417	Volume Control Coupling	.10
P-10263	Rubber Tube Bumper—Square	.10
P-10210	Rubber Tube Bumper—Round	.10
P-10213	Rubber Band for Tube	.10
P-50569	Filter Choke Assembly	1.60
P-50585	Power Trans. Assembly—Less condensers and brackets	3.25
P-5099	Antenna R. F. Transformer—Less Can	1.20
P-5065	Interstage R. F. Transformer—Less Can	1.00
P-5105	Second I. F. Transformer and Can Assembly	.95
P-5096	First I. F. and Oscillator Transformer and Can Assembly	2.70
P-5097	Single Solenoid "A" Choke	.25
P-40431	Antenna R. F. Can	.15
P-1826	Interstage R. F. Can	.10

Resistors

Part No.	Code No.	Resistance	Type	List Price
P-A95105	R-1	1 Megohm	Carbon	$0.25
P-A95105	R-2	1 Megohm	Carbon	.25
P-B94261	R-3	260 ohm	Carbon	.35
P-A95504	R-4	.5 Megohm	Carbon	.25
P-A95104	R-5	100,000 ohm	Carbon	.25
P-A94402	R-6	4,000 ohm	Carbon	.20
P-A91061	R-7	0-500,000 ohm	Volume Control and Switch	$1.15
P-A95104	R-8	100,000 ohm	Carbon	.25
P-A95104	R-9	100,000 ohm	Carbon	.25
P-A94402	R-10	4,000 ohm	Carbon	.20
P-B94153	R-11	15,000 ohm	Carbon	.25
P-B94203	R-12	20,000 ohm	Carbon	.25
P-C94401	R-13	400 ohm	Carbon	.20

Condensers

Part No.	Code No.	Capacity	Voltage	Type	List Price
P-80862	C-1	.05 mfd.	200 V.	Tubular	$0.30
P-80888	C-2	.25 mfd.	200 V.	Tubular	.35
P-80821-B	C-4	.001 mfd.	600 V.	Molded	.25
P-80937	C-7 C-11	4.0 mfd. 4.0 mfd.		Electrolytic Block in can	1.25
P-80919	C-8	.00025 mfd.	600 V.	Molded	.20
P-80945	C-9	.0005 mfd.	600 V.	Molded	.15
P-80898	C-10	.006 mfd.	600 V.	Tubular	15
P-80945	C-12	.0005 mfd.	600 V.	Molded	.15
P-80966	C-14	.008 mfd.	600 V.	Tubular	20
P-80963	C-15 C-16	.04 mfd. .04 mfd.	400 V. 400 V.	Dual Tubular	.30
P-80960	C-17	.4 mfd.	15 V.	In Metal Can	.50
P-80959	C-18	.003 mfd.	600 V.	Molded	.35
P-80956	C-19 C-20 C-21	8.0 mfd. 20.0 mfd. 8.0 mfd.	225 V. 25 V. 225 V.	Electrolytic Block in Can	2.25
P-80955	C-3 C-5 C-6 C-13	.1 mfd. .05 mfd. .1 mfd. .05 mfd.	300 V. 200 V. 200 V. 300 V.	Bypass Block in Can	1.35
P-1539	600 K. C. Trimmer Condenser				.45
P-80957	Three-Gang Variable Condenser				3.00

CONTROL UNIT PARTS

Part No.	Description	List Price
P-1816	Celluloid Dial Strip Only	$0.15
P-1825	Dial Gear and Strip Assembly	.40
P-20509B	Control Unit Swivel	.15
P-20510A	Steering Post Apron	.30
P-20511	Steering Post Clamp	.15
P-20689	Control Unit Cover	.35
P-70746	Pilot Lamp Cable Only	.40
P-1415A	Pilot Lamp Socket and Clip	.15
P-1563A	6-8 Volt Pilot Lamp	.25
P-20692	Volume Control Drive Shaft	.10
P-20703	Drive Shaft Pinion	.15
P-20691	Dial Gear Pinion (Hollow Center)	.15
P-30413	Entry Plate Assembly for Key	.30
P-30414	Key	.15
P-1813	Small Knob	.15
P-1814	Large Knob	.20

ADDITIONAL ITEMS

1 — 1550	14" Flexible Drive Shaft	.90 ea.
1 — 1553	20" Flexible Drive Shaft	1.25 ea.
1 — 1551	34" Flexible Drive Shaft	1.65 ea.
1 — 1552	45" Flexible Drive Shaft	2.00 ea.
1 — 91011	Spark Plug Suppressor	.50 ea.
1 — 91012	Distributor Suppressor, Wood Screw Ends	.50 ea.

MODEL V622
Wiring Data
Antenna Notes

WELLS - GARDNER & CO.

Completing the Wiring Connections

Pilot Lamp

The pilot lamp lead is in a shielded cable which extends out from the control unit box. On the rear wall of the chassis, near one of the ends, will be seen a tip jack. Insert the tip on the end of the pilot lamp lead into this jack. There is also a pigtail or shield extension at the end of this lead. Ground this pigtail with one of the angle plate screws (see Fig. 6). Double up the pilot lamp lead if it is too long—*Do not cut this lead.*

Antenna Cable

Bring the antenna cable of the receiver in the most direct manner possible to the lead-in from the antenna and connect it to the latter. Keep it as high as possible and as far away from any car wiring as possible. Care should be taken not to have the antenna wire come in contact with the shield wires. Ground the pigtail of the antenna cable shield at the antenna end. The pigtail of this shield at the chassis end is grounded under one of the chassis mounting screws.

In some cases the shielded antenna lead from the receiver is not long enough to reach to the column at which the antenna lead-in comes down. In a case of this kind, cover the exposed portion of the lead-in wire with braided shield from the point where it leaves the column to the point of connection to the antenna lead of the receiver. Connect the two wires together and connect the two shields together, care being taken that no strand of the shield touches the antenna wire.

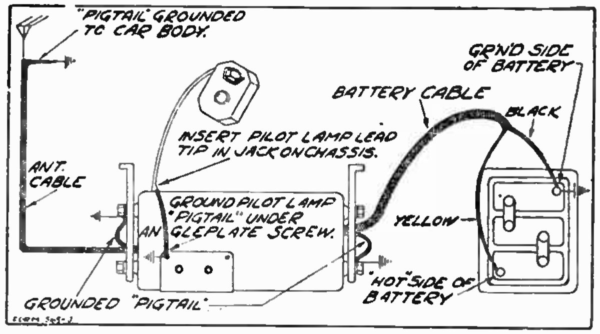


Fig. 6—External Wiring Connections

Battery Cable

The battery cable should be brought over to the storage battery in the most convenient manner possible. In Figs. 2 and 3 it is shown passing through a hole in the dash, thence down and under the floor board to the battery. In other installations, it may be more convenient to bring this cable down in back of one of the side pads and thence to the battery. The lug on the yellow lead of this cable is connected to the "Hot" or ungrounded side of the battery (the "Hot" or ungrounded side may be positive or negative, depending on the make of car). The lug on the black lead is connected to the grounded side of the battery. The pigtail of the shield of this cable at the chassis end should be grounded under one of the chassis mounting screws.

Antenna

A roof antenna is recommended, as by far the best results will be obtained. A large percentage of cars at the present time come equipped by the factory with built-in roof antennas. In those cars which do not have an antenna, one will have to be put in.

First determine if the top has a grounded chicken wire mesh. To do this, use a continuity meter. By means of a wire, attach a darning needle to one of the prods. Poke the darning needle into the roof material and turn it around until it comes in contact with the chicken wire. Then ground the other prod and if the continuity meter shows a complete circuit, the chicken wire mesh is grounded. In a case of this kind, it will be necessary to get inside of the roof and it is advisable to employ the services of an auto "top man" or an upholsterer.

It will be necessary to remove the top material and cut away the chicken wire from the side supports until it is at least 3″ away from ground at any point. It should also be at least 3″ away from the dome light and the dome light wiring. The chicken wire may then be laced to the points from which it was cut with a heavy, waxed cord. The chicken wire will then make a satisfactory antenna, or a copper screen may be used.

If the chicken wire is not grounded, it may be used as the antenna by taking down the roof material at one corner and soldering the lead-in wire to it. If it is not desired to take down the roof material a piece of copper screening can be tacked to the roof on the inside of the car. At least six square feet should be used. Keep it at least 3″ away from any grounded metal parts on all sides. After the screen is in place, it can be covered over with cloth which matches the roof material. Solder the lead-in wire to the screen and bring it down the front corner post nearest to the set.

Another, and a very simple way in which an antenna can be secured to the inside of the car roof is to use one of the car-roof antennas which are now being made up especially for this purpose. There is one type of antenna which consists of copper strips laid back and forth between two pieces of cardboard. The cardboard is then covered over with material which matches the roof material. This antenna can be had in several colors and is tacked in place on the inside of the car roof in a few minutes.

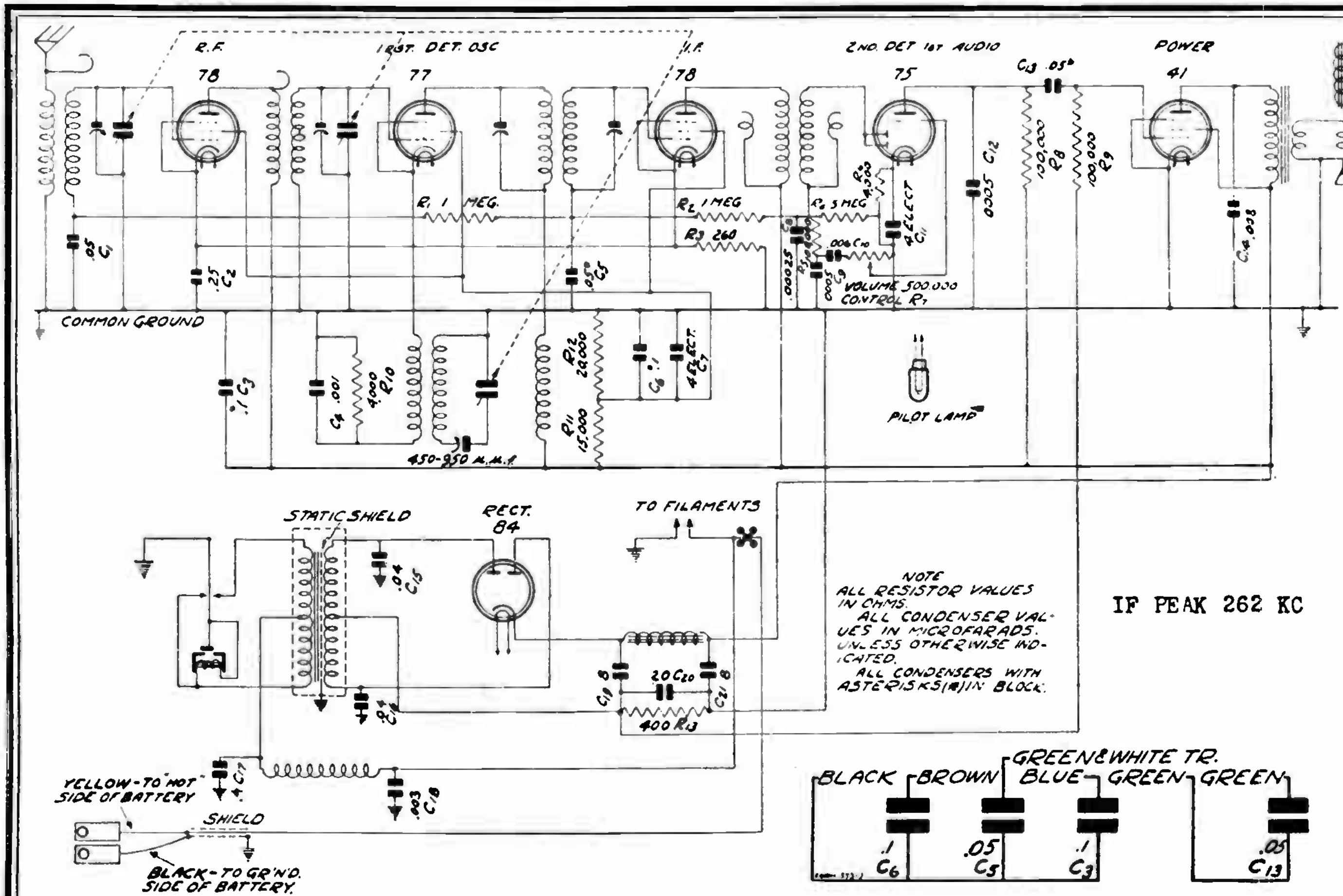
MODEL Z621
Schematic
Voltage
Socket

WELLS-GARDNER & CO.

	Across Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate MA
78 R.F.	6.1	182	80	3*	7.0
77 1st Det. & Osc.	6.1	178	77	5**	1.3**
78 I.F.	6.1	182	80	3.*	7.0
75 2nd Det. 1st Audio	6.1	70x		1.4*	.35
41 Output	6.1	172.5	176.5	12.5xx	16.0
84 Rect.	6.1	205			17.5per plate

*-Cathode to Ground. **-Subject to Variation. x-Triode Plate to Cathode
xx-Read Across 400-Ohm Resistor, R13

IF PEAK 262 KC



Condenser Block—Internal Wiring

Trying Out the Set and Adjusting

After the wiring has all been completed and before the chassis is permanently installed, try out the set and adjust the antenna trimmer. The location of the tubes is shown in Fig. 8. To adjust the antenna trimmer, tune in a weak signal between 1200 and 1400 K.C. with the volume control about three-fourths on. On one end of the chassis box are two small metal plates. Remove the smaller of these two plates. Directly under the hole in the chassis box is the antenna trimmer condenser screw. Turn this adjusting screw up or down until maximum output is obtained.

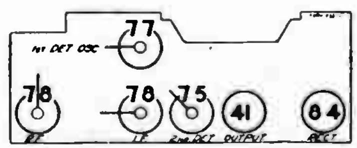


Fig. 8—Location of Tubes

MODEL 26Z1
Alignment
Wiring

WELLS - GARDNER & CO.

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself in broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide accurately calibrated signals over the broadcast band and accurately calibrated signals at and around 262 K.C., the intermediate frequency and an output indicating meter are desirable.

First set the signal generator at approximately 262 K.C. Connect the antenna lead from the generator to the control grid of the I.F. 78 tube, through a .05 mfd. condenser. The ground lead of the generator goes to the ground of the receiver. Turn the rotor plates of the tuning condenser completely out and keep the signal weak enough to prevent A.V.C. action. Note from Fig. 10 that the second I.F. transformer is self tuned and cannot be adjusted. Adjust the frequency of the signal generator until the output meter shows maximum output. The intermediate frequency setting of the generator is then correct, although it may be a very small percentage higher or lower than 262 K.C.

Next connect the signal lead from the signal generator to the grid of the 1st detector tube through a .05 mfd. condenser. Then adjust the two intermediate frequency condensers for maximum output. One of the I.F. condenser screws is reached through the hole on the top of the 1st I.F. assembly can. The other I.F. condenser screw is reached from the bottom of the sub-panel through a hole at the bottom of this assembly.

Now set the signal generator for a signal of exactly 1400 K.C. The antenna lead from the generator is, in this instance, connected to the antenna lead of the receiver. Connect the flexible drive shaft to the chassis if it has been disconnected. As explained previously, the dial scale should be at the low frequency end stop when the rotor is completely in mesh. Then turn the station selector knob until the dial scale is at 1400 K.C.

Then adjust the three trimmer condensers on the gang tuning condenser for maximum output, adjusting the oscillator section first.

Next, set the signal generator for a signal of 600 K.C. and adjust the oscillator 600 K.C. trimmer. The adjusting screw for this condenser is reached through a hole in the back wall of the sub-panel.

A non-metallic screwdriver is necessary for this adjustment. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting, at the same time adjusting the 600 K.C. trimmer screw until the highest output is obtained.

Then set the signal generator again for a signal of 1400 K.C. and check the adjustment of the tuning condenser trimmers at this frequency for maximum output.

Completing the Wiring Connections

Antenna Cable

Bring the antenna cable of the receiver in the most direct manner possible to the lead-in from the antenna and connect it to the latter. Keep it as high as possible and as far away from any car wiring as possible. Care should be taken not to have the antenna wire come in contact with the shield wires. Ground the pigtail of the antenna cable shield at the antenna end. The pigtail of this shield at the chassis end is grounded under one of the chassis mounting screws.

In some cases the shielded antenna lead from the receiver is not long enough to reach to the column at which the antenna lead-in comes down. In a case of this kind, cover the exposed portion of the lead-in wire with loom and braided shield from the point where it leaves the column to the point of connection to the antenna lead of the receiver. Connect the two wires together and connect the two shields together, care being taken that no strand of the shield touches the antenna wire.

Battery Cable

The battery cable should be brought over to the storage battery in the most convenient manner possible. In Figs. 4 and 5 it is shown passing through a hole in the dash, thence down and under the floor board to the battery. In other installations, it may be more convenient to bring this cable down in back of one of the side pads and thence to the battery. The lug on the yellow lead of this cable is connected to the "Hot" or ungrounded side of the battery (the "Hot" or ungrounded side may be positive or negative, depending on the make of car). The lug on the black lead is connected to the grounded side of the battery. The pigtail of the shield of this cable at the chassis end should be grounded under one of the chassis mounting screws.

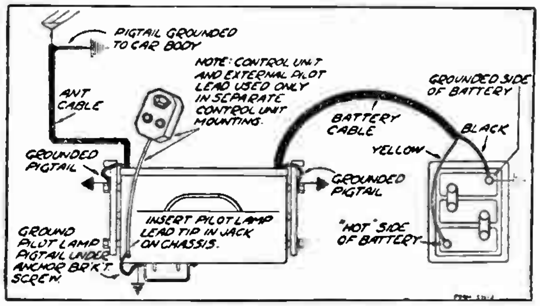


Fig. 7—External Wiring Connections

Pilot Lamp (For Separate Control Unit Only)

When a separate control unit is used connect the pilot lamp as follows:

The pilot lamp lead is in a shielded cable which extends out from the control unit box. On the rear wall of the chassis, near one of the ends, will be seen a tip jack. Insert the tip on the end of the pilot lamp lead into this jack. There is also a pigtail or shield extension at the end of this lead. Ground this pigtail with one of the anchor bracket screws (see Fig. 7). Double up the pilot lamp lead if it is too long—*Do not cut this lead.*

WELLS - GARDNER & CO.

MODEL 26Z1
Antenna
Mounting Notes

Antenna

A roof antenna is recommended, as by far the best results will be obtained. A large percentage of cars at the present time come equipped by the factory with built-in roof antennas. In those cars which do not have an antenna, one will have to be put in.

First determine if the top has a grounded chicken wire mesh. To do this, use a continuity meter. By means of a wire, attach a darning needle to one of the prods. Poke the darning needle into the roof material and turn it around until it comes in contact with the chicken wire. Then ground the other prod and if the continuity meter shows a complete circuit, the chicken wire mesh is grounded. In a case of this kind, it will be necessary to get inside of the roof and it is advisable to employ the services of an auto "top man" or an upholsterer.

It will be necessary to remove the top material and cut away the chicken wire from the side supports until it is at least 3″ away from ground at any point. It should also be at least 3″ away from the dome light and the dome light wiring. The chicken wire may then be laced to the points from which it was cut with a heavy, waxed cord. The chicken wire will then make a satisfactory antenna, or a copper screen may be used.

If the chicken wire is not grounded, it may be used as the antenna by taking down the roof material at one corner and soldering the lead-in wire to it. If it is not desired to take down the roof material a piece of copper screening can be tacked to the roof on the inside of the car. At least six square feet should be used. Keep it at least 3″ away from any grounded metal parts on all sides. After the screen is in place, it can be covered over with cloth which matches the roof material. Solder the lead-in wire to the screen and bring it down the front corner post nearest to the set.

Another, and a very simple way in which an antenna can be secured to the inside of the car roof is to use one of the car-roof antennas which are now being made up especially for this purpose. There is one type of antenna which consists of copper strips laid back and forth between two pieces of cardboard. The cardboard is then covered over with material which matches the roof material. This antenna can be had in several colors and is tacked in place on the inside of the car roof in a few minutes.

Integral Mounting of Chassis

By integral or all-in-one mounting of the chassis is meant operating the receiver by means of the controls on the chassis box (and not with a separate control unit). This method is the simplest, as no changes are required on the receiver. It can be installed in several ways, as explained below and as illustrated in Fig. 1. Still other methods of mounting and locations for the chassis will suggest themselves, depending on the space available and variations in the construction of different cars.

Floor or Shelf Mounting

In Fig. 1(A) is shown how the chassis can be placed on the floor in front of the front seat. There are four rubber mounting feet on the bottom of the box, on which it stands. It may also be placed in back of the front seat (B) so as to be in the rear compartment of the car. In some cars, there is room enough between the two front seats for the chassis box to be placed. In coupes, the chassis may be placed on the shelf in back of the seat. Still other locations, as mentioned above, can be used, depending on the space available in different cars.

After the position is decided on, the chassis is permanently mounted in place by means of the two case mounting feet supplied for this method of mounting. These mounting feet are shown in Fig. 1. One side of the foot, which is a small angle bracket, is secured to the end of the chassis box by means of one of the chassis mounting screws. The other side of the foot is screwed to the floor board or surface on which the chassis is resting, with a wood screw. The two feet are placed diagonally, that is on one end of the chassis box it is at the front, while on the other end it is at the rear.

Flush Mounting of Chassis

In Fig. 1(C) is also shown how the chassis can be mounted on the dash by means of brackets, in such a way that the front portion of the box with the controls, is flush, or nearly so, with the instrument panel. This is a very desirable method of installation, as the receiver is rigidly in place, out of the way, and the controls are very accessible.

When mounted this way, two side case brackets (long type) are used, one on each end of the box, as shown in Fig. 1. Two mounting screws are generally used to secure each bracket to the end of the chassis box. Three may be used in cases where the distance between the instrument panel and dash is small. Six embossings with inset nuts are provided on each end of the chassis box. Any two of these or

MODEL Z6Z1
Mounting Notes

WELLS - GARDNER & CO.

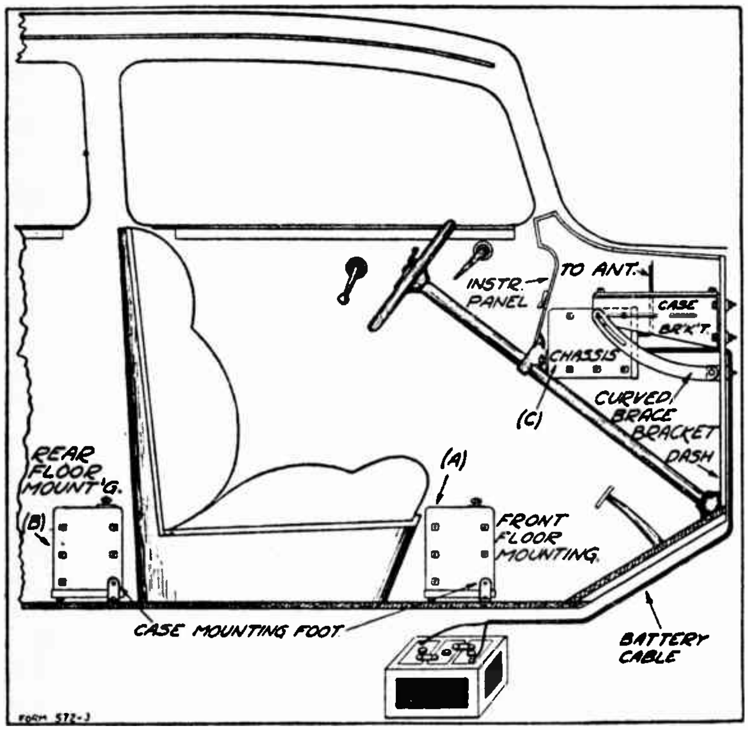


Fig. 1—Integral Mounting—Side View

three, as mentioned above, may be used for the bracket screws, which, together with the slots in the brackets, provides great flexibility in mounting. In addition to the side case brackets, two curved brace brackets and one cross strap brace as shown in Figs. 1 and 2 are used.

The chassis should be mounted as close to the center of the instrument panel as possible. This makes the controls accessible to people in either front seat. As stated above, it should be mounted so that the front side of the box with the controls, is flush or nearly so with the instrument panel of the automobile. If car apparatus or space available prevent the mounting of the chassis at the center,

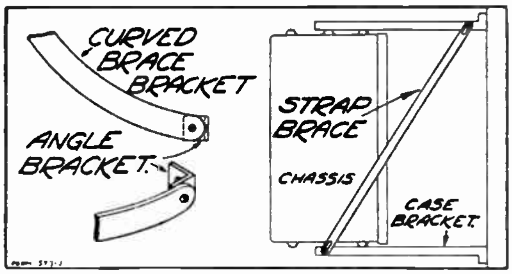


Fig. 2—Angle Brackets and Strap Brace

it may have to be moved to either side. In some instances, it can be mounted at the center of the instrument panel, but may have to be moved down and nearer to the dash than as shown in Fig. 1. Consideration should be given to the possibility of interference with the legs of the driver or passenger in the front seat and also to the possibility of interference with the controls of the car, such as pedals, gear shift lever, and hand brake lever, before the location is definitely decided on. The possibility of a car heater installation may also be considered. After the location is decided on, drill the four mounting holes required. The location and size of these holes is shown in Fig. 3. A template for drilling these holes is supplied with the receiver. Six ¼" mounting bolts, six washers, six lockwashers and six nuts are provided. The mounting bolt is put through the bracket and dash with the shank extending into the engine compartment. A washer, the lockwasher and nut, are then put on. Mount the brackets permanently, but do not mount the chassis permanently until the wiring connections are completed, the tubes are all inserted, the receiver tried out, and the antenna trimmer adjusted (explained later).

When the case brackets are in place, the curved brace brackets can be installed. These can be put on in a number of different ways. The front or back case bracket screw can be used and the brace bracket itself can be mounted upward or downward. As a general rule it is mounted on the bracket screw farthest away from the dash and downward as shown in Fig. 1 The small angle brackets supplied with the receiver are secured at the base of the curved brace brackets as shown in Figs. 1 and 2, by means of the No. 10-32 ⅜" Round Head Screw, nut and washer supplied. After the position of the brace brackets is decided on, put them in place and start the holes for them with a center punch. These brackets are bolted to the dash in the same manner as explained above for the case brackets.

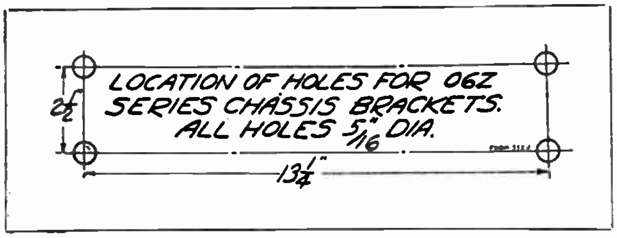


Fig. 3—Mounting Hole Location

Next, put the strap brace in place. This is mounted diagonally across the two brace brackets as shown in Fig. 2. There is a tapped hole at either end of the top flange of the case brackets which are used for this purpose. Two 10-32 ¼" long bolts are provided for the strap brace.

Separate Control Unit Mounting of Chassis

In this method of mounting, the chassis is mounted on the dash and is operated from a separate remote control unit which is on the steering column. Two flexible shafts mechanically connect the control unit and the chassis. This method of mounting is very desirable as the controls are most accessible to the driver. The items required for this method of mounting are shown in the installation list at the back of the manual. The procedure for this method of installation is as follows:

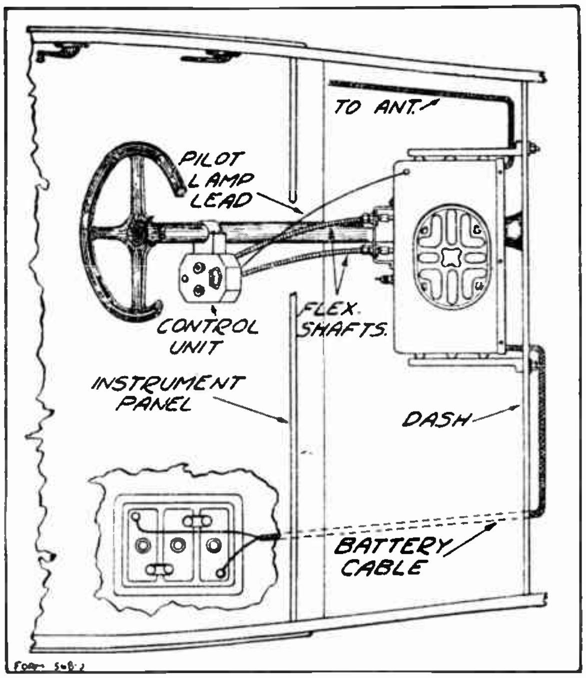


Fig. 4—Chassis with Control Unit—Top View

Mounting the Control Unit

The control unit is mounted on the steering column under the steering wheel as shown in Figs. 4 and 5. A clamp is used to hold it in position.

The outer portion of the clamp is screwed to the inner portion by means of the four 8-32x$\frac{3}{8}$" fillister head screws supplied with the receiver.

Two rubber strips are provided, one $\frac{1}{8}$" thick and the other $\frac{1}{16}$" thick. These are wrapped around the steering column under the clamp. Either or both of these strips may be used, depending on the thickness of the column. Wrap the rubber strips around the column in such a way as to allow the set screws which hold the clamp in position to pass through. When the clamp is in place, take the two 8-32 headless cup point set screws and screw them down on the steering column through the tapped holes in the clamp.

The control unit is generally about 4" below the wheel, but this will vary with individual cases. The length of the drive shaft and interference with driver's legs will also govern the location of the control unit.

There are two screws which hold the inside portion of the clamp to the control unit swivel. By loosening these two screws, the box can be swung around if such a position is handier from the standpoint of the person operating the set. Instructions for attaching the pilot lamp lead are contained in the article "Completing the Wiring Connections."

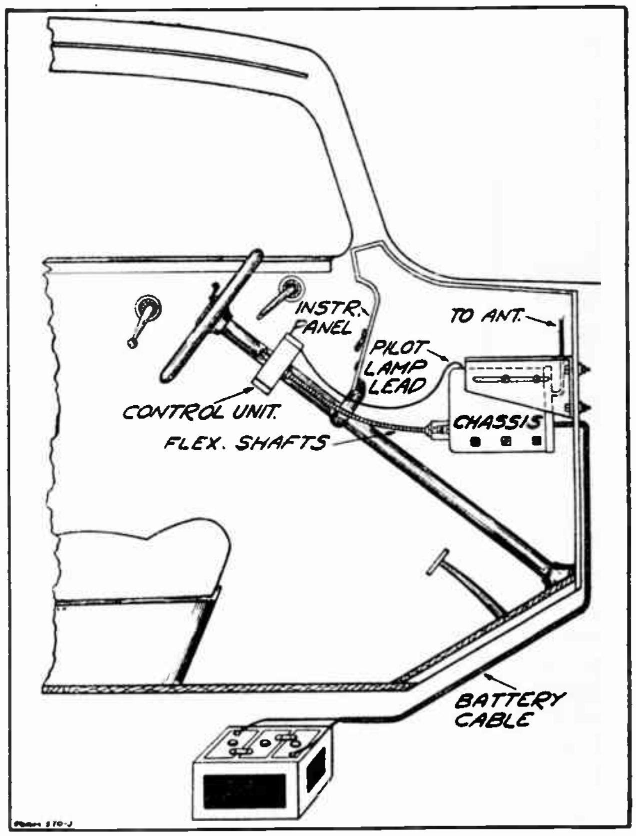


Fig. 5—Chassis with Control Unit—Side View

Mounting the Chassis

The chassis is mounted on the dash by means of two short brackets, as shown in Figs. 4 and 5. Two or three mounting screws are used to secure each bracket to the end of the chassis box. Three are used if the chassis is close to the dash and two if it is set out some distance. In general, keep the chassis as close to the dash as possible. The procedure for attaching the brackets to the chassis box and to the dash is the same as explained above for mounting the side case brackets under the article, "Flush Mounting of Chassis." No curved brace brackets or strap braces are used in this method of mounting.

The chassis should be mounted with the speaker grill facing down and the side with lock and controls facing the listener, as shown in Fig. 4. Before mounting the chassis, the flexible drive shaft con-

MODEL Z6Z1
Flexible Drive

WELLS - GARDNER & CO.

nections as explained in the next article must be made.

The location of the chassis will very often depend on the space available. To the left of the center, as shown in Fig. 4, is a good location. The chassis should be mounted in such a way that the flexible drive shafts to the control unit will be in as straight a line as possible or with large radius bends. *In general, it will be advisable to consider the possibility of a car heater installation at the right side of the dash (facing forward).* In practically every case no difficulty will be experienced in mounting the heater and chassis on the dash. The chassis should be mounted in such a way that the lock *which remains on the chassis box will be accessible.*

The possibility of interference with people in the front seats and with car controls, as mentioned previously, should also be considered.

When the location is decided on, drill the four mounting holes required as shown in Fig. 3 and proceed as explained above. Mount the brackets permanently, but do not mount the chassis permanently until the wiring connections are completed, all tubes are in the sockets, the flexible drive shafts connected, and the antenna trimmer adjusted (explained later).

Attaching the Flexible Drive Shafts

After the control unit is mounted and the chassis is temporarily mounted, the flexible drive shafts may be attached. Two 34" shafts are supplied unless otherwise specified. These shafts may also be had in 14", 20" and 45" lengths.

The flexible drive shafts should always be in-

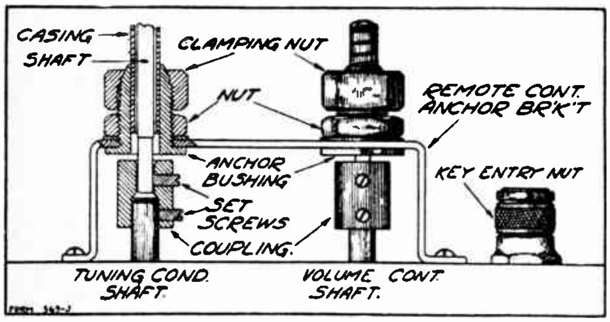


Fig. 6—Details of Flexible Drive Shaft Connections

stalled with a minimum amount of bending. Always keep the radius of the bend as large as possible. The larger the radius of the bend, the easier the shaft will turn.

The 34" shafts supplied with the receiver may be cut to a shorter length if necessary. The shaft (inside portion) should first be brazed at the point to be cut. It should then be cut with a three-corner file or edge of a grinding wheel. *Do not use a hack saw.* After the shaft is cut, file it down in one place a slight amount to provide a flat surface for the set screw. The casing which is 1½" shorter must be cut to correspond. This should be tinned or brazed first at the point to be cut and may then be cut with a hack saw.

It is advisable to attach the flexible shafts with the chassis on the mounting brackets, but if the chassis is inaccessible, it may be removed from the brackets. Keep it as close to its regular position as possible so that the flexible shaft will not turn after the chassis is replaced on the brackets. In general, it may be moved up or down, but should not be moved sideways or be turned.

To attach the flexible shafts to the chassis, first turn the on-off switch knob to the off position and the station selector knob to the low frequency end stop. Then remove the two knobs. These two knobs are then put on the control unit. Loosen the set screws on the two couplings and slip them over the two shafts as shown in Fig. 6. Then secure the remote control anchor bracket in place on the chassis box by means of the four 6-32-¼" screws. The dial gear and pilot lamp remain in the chassis box.

Next, center the two anchor bushings on the anchor bracket. To do this, first loosen the nut which holds the bushing in place. Center the bushing so that the center of it is in line with the center of the shaft below. Then tighten the nut. Turn the on-off switch and volume control knob on the control unit to the extreme counter-clockwise position. Then extend the volume control flexible shaft into the coupling and tighten the two set screws in this coupling. The outside set screw should be tightened down *on one of the four flat faces* of the shaft. Then tighten down the clamping nut on the volume control shaft casing, *but do not tighten this nut excessively.*

To attach the tuning condenser flexible shaft, proceed in the same manner as above, except that the dial gear in the control unit should first be turned to the low frequency end stop. After the two shafts are connected, mount the chassis in place temporarily if it has been taken off and check the operation of both tuning condenser and volume control. The switch should be off when the volume control knob is in the locked position. It may be necessary to loosen the inner set screw and do a slight amount of adjusting until the proper setting is obtained. In case the dial gear in the control unit is not correctly calibrated or does not coincide with the dial gear calibration in the chassis box, further adjustment of this control can be brought about in the same manner, that is, by first loosening the inner set screw of the coupling. The clamping nut of the tuning condenser shaft anchor bushing is tightened down as explained above.

MODEL Z6Z1
Parts List

WELLS - GARDNER & CO.

Replacement Parts for Series Z6Z1 Receivers

CHASSIS PARTS

Part No.	Description	List Price
P-1780	No. 75 Tube Socket	$0.10
P-1761	No. 77 Tube Socket	.10
P-1762	No. 78 Tube Socket	.10
P-1665	No. 41 Tube Socket	.10
P-1803	No. 84 Tube Socket	.10
P-1805	Single Pin Jack	.10
P-1799	Tube Shield Assembly	.25
P-20656	Chassis Box	4.00
P-20657	Chassis Box Cover	1.10
P-70740	Shielded Antenna Lead	.40
P-70744	Shielded "A" Battery Lead	1.15
P-1804	Vibrator Unit (in cast metal case)	6.00
P-10266	Vibrator Unit Rubber Cushion, pair	.10
P-20660	Vibrator Unit Box	.70
P-20661	Vibrator Unit Box Cover	.20
P-1572	Fuse Clip Assembly	.10
P-10260	Cardboard Baffle	.20
P-1624	10 Amp. Fuse	.10
P-1774	Electrodynamic Speaker	3.75
P-20585	Cond. Drive Gear	.25
P-1801	Volume Control and Drive Bracket	.30
P-20635	Cond. Drive Pinion	.15
P-20677	Pinion Adjustment Plate	.10
P-20614	Lock Lever	.10
P-20658	Tension Spring	.10
P-30419	Entry Plate Assembly	.10
P-1830	Dial Gear and Strip Assembly	.40
P-1816	Celluloid Dial Strip only	.15
P-1810	Pilot Lamp Socket and Spring Clip	.10
P-1563	6-8 Volt Pilot Lamp	.25
P-10263	Rubber Tube Bumper—Square	.10
P-10210	Rubber Tube Bumper—Round	.10
P-10213	Rubber Band for Tube	.10
P-50569	Filter Choke Assembly	1.60
P-50585	Power Trans. Assembly—Less condensers and brackets	3.25
P-5099	Antenna R. F. Transformer—Less Can	1.20
P-5065	Interstage R. F. Transformer—Less Can	1.00
P-5105	Second I. F. Transformer and Can Assembly	.95
P-5096	First I. F. and Oscillator Transformer and Can Assembly	2.70
P-5097	Single Solenoid "A" Choke	.25
P-40431	Antenna R. F. Can	.15
P-1826	Interstage R. F. Can	.10

Resistors

Part No.	Code No.	Resistance	Type	List Price
P-A95105	R-1	1 Megohm	Carbon	$0.25
P-A95105	R-2	1 Megohm	Carbon	.25
P-B94261	R-3	260 ohm	Carbon	.35
P-A95504	R-4	.5 Megohm	Carbon	.25
P-A95104	R-5	100,000 ohm	Carbon	.25
P-A94402	R-6	4,000 ohm	Carbon	.20
P-91066	R-7	0-500,00 ohm	Volume Control and Switch	$1.15
P-A95104	R-8	100,000 ohm	Carbon	.25
P-A95104	R-9	100,000 ohm	Carbon	.25
P-A94402	R-10	4,000 ohm	Carbon	.20
P-B94153	R-11	15,000 ohm	Carbon	.25
P-B94203	R-12	20,000 ohm	Carbon	.25
P-C94401	R-13	400 ohm	Carbon	.20

Condensers

Part No.	Code No.	Capacity	Voltage	Type	List Price
P-80862	C-1	.05 mfd.	200 V.	Tubular	$0.30
P-80888	C-2	.25 mfd.	200 V.	Tubular	.35
P-80821-B	C-4	.001 mfd.	600 V.	Molded	.25
P-80937	C-7 C-11	4.0 mfd. 4.0 mfd.		Electrolytic Block in can	1.25
P-80919	C-8	.00025 mfd.	600 V.	Molded	.20
P-80945	C-9	.0005 mfd.	600 V.	Molded	.15
P-80898	C-10	.006 mfd.	600 V.	Tubular	15
P-80945	C-12	.0005 mfd.	600 V.	Molded	.15
P-80966	C-14	.008 mfd.	600 V.	Tubular	20
P-80963	C-15 C-16	.04 mfd. .04 mfd.	400 V. 400 V.	Dual Tubular	.30
P-80960	C-17	.4 mfd.	15 V.	In Metal Can	.50
P-80959	C-18	.003 mfd.	600 V.	Molded	.35
P-80956	C-19 C-20 C-21	8.0 mfd. 20.0 mfd. 8.0 mfd.	225 V. 25 V. 225 V.	Electrolytic Block in Can	2.25
P-80955	C-3 C-5 C-6 C-13	.1 mfd. .05 mfd. .1 mfd. .05 mfd.	300 V. 200 V. 200 V. 300 V.	Bypass Block in Can	1.35
P-1539	600 K. C. Trimmer Condenser				.45
P-80957	Three-Gang Variable Condenser				3.00

CONTROL UNIT PARTS

(When Separate Control Unit Is Used)

Part No.	Description	List Price
P-1816	Celluloid Dial Strip	$0.15
P-1825	Dial Gear and Strip Assembly	.40
P-20509B	Control Unit Swivel	.15
P-20510A	Steering Post Apron	.30
P-20511	Steering Post Clamp	.15
P-20693	Control Box Cover	.35
P-20635	Cond. Drive Pinion	.15
P-70746	Pilot Lamp Cable only	.40
P-1415A	Pilot Lamp Socket and Clip	.15
P-1563A	6-8 Volt Pilot Lamp	.25
P-30426	Ornamental Plug	.10
P-30414	Key	.15

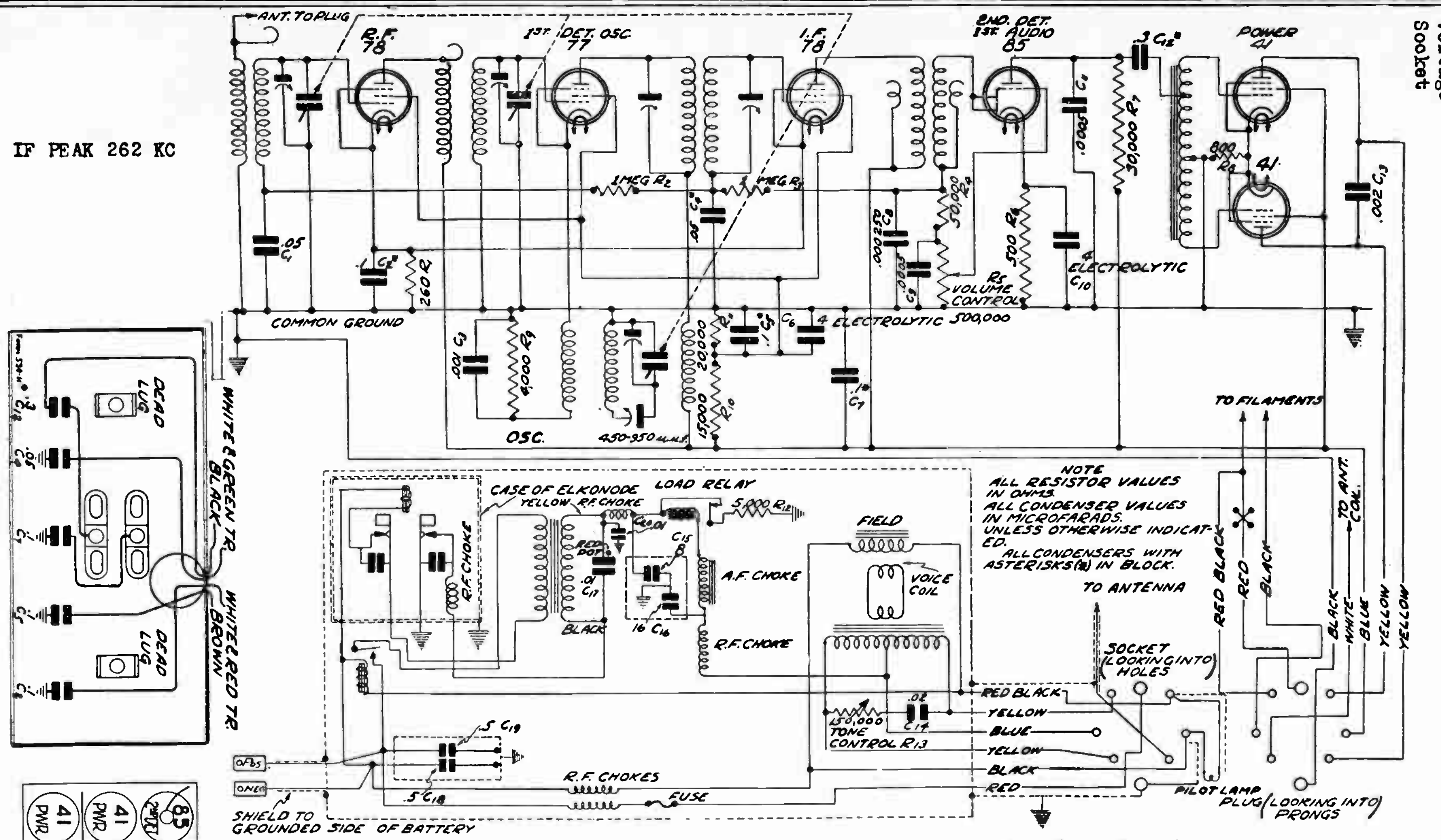
ITEMS WHICH MAY BE REQUIRED IN SOME CASES

1—1550	14" Flexible Drive Shaft—For Control Unit Mounting	$ .90 ea.
1—1553	20" Flexible Drive Shaft—For Control Unit Mounting	1.25 ea.
1—1551	34" Flexible Drive Shaft—For Control Unit Mounting	1.65 ea.
1—1552	45" Flexible Drive Shaft—For Control Unit Mounting	2.00 ea.
1—91011	Spark Plug Suppressor—All methods of mounting	.50 ea.
1—91012	Distributor Suppressor, Wood Screw Ends—All methods of mounting	.50 ea.

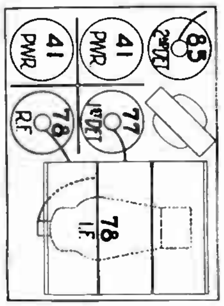
MODEL 06-W Schematic Voltage Socket

WELLS - GARDNER & CO.

IF PEAK 262 KC



Condenser Block—Internal Wiring



Location of Tubes

	Across Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate MA
78 R.F.	6.1	182	80	3**	7.0
77 1st Det.& Osc.	6.1	178	77	8 x	1.3 x
78 I.F.	6.1	182	80	3**	7.0
85 2nd Det.& 1st A.F.	6.1	70*		1.8**	3.5
41 Output	6.1	162	168.5	17	11.0

*-Triode Plate to Cathode. **-Cathode to Ground x-Subject to variation

NOTE:- All voltages are at 185 volts input from "B" Eliminator

WELLS - GARDNER & CO.

MODEL 06-W
Mounting Data

Mounting the Control Unit

The control unit is mounted on the steering column under the steering wheel as shown in Figs. 1 and 2. A clamp is used to hold it in position.

The outer portion of the clamp is screwed to the inner portion by means of the four 8-32x3/8" fillister head screws supplied with the receiver.

Two rubber strips are provided, one 1/8" thick and the other 1/16" thick. These are wrapped around the steering column under the clamp. Either or both of these strips may be used, depending on the thickness of the column. Wrap the rubber strips around the column in such a way as to allow the set screws which hold the clamp in position to pass through. When the clamp is in place, take the two 8-32 headless cup point set screws and screw them down on the steering column through the holes in the clamp.

The control unit is generally about 4" below the wheel, but this will vary with individual cases. The length of the drive shaft and interference with driver's legs will also govern the location of the control unit.

There are two screws which hold the inside portion of the clamp to the bracket on the box. By loosening these two screws, the box can be swung around if such a position is handier from the standpoint of the person operating the set. Instructions for attaching the pilot lamp are contained in the article "Completing the Wiring Connections."

Mounting the Chassis

The chassis is mounted in back of the dash as shown in Figs. 1 and 2. It should be mounted in such a way that the flexible drive shafts to the control unit will be in as straight a line as possible. The chassis is mounted with the anchor bushing into which the flexible drive shafts go, facing the control unit. In the illustrations mentioned above, the chassis is on the right side of the dash which is a good location from the standpoint of flexible drive shaft arrangement. *Before mounting the chassis read the section on "Attaching the Flexible Drive Shafts."*

The chassis is secured to the dash by means of the dash mounting plate (see Fig. 3). First drill the three mounting holes required for the dash mounting plate. The location and size of these holes is shown in Fig. 3. A template for drilling these holes is supplied with the set. Three 4" square head mounting bolts are supplied. Take two of these,

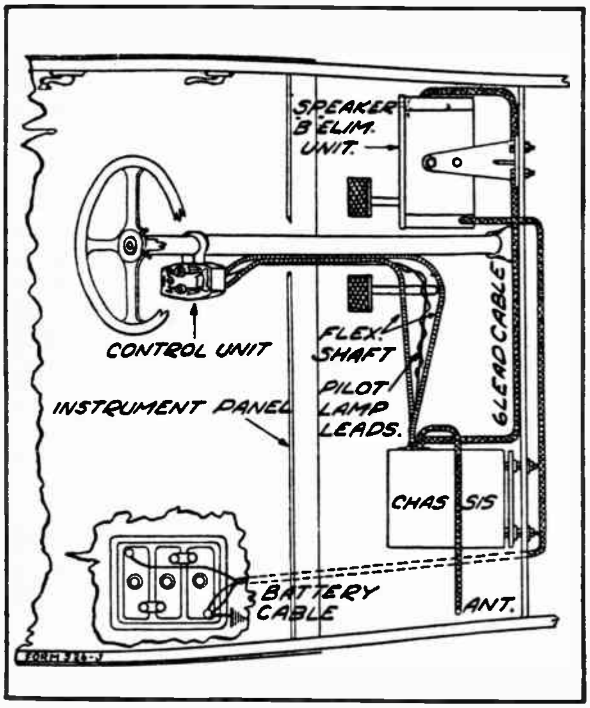


Fig. 1—General Installation—Top View

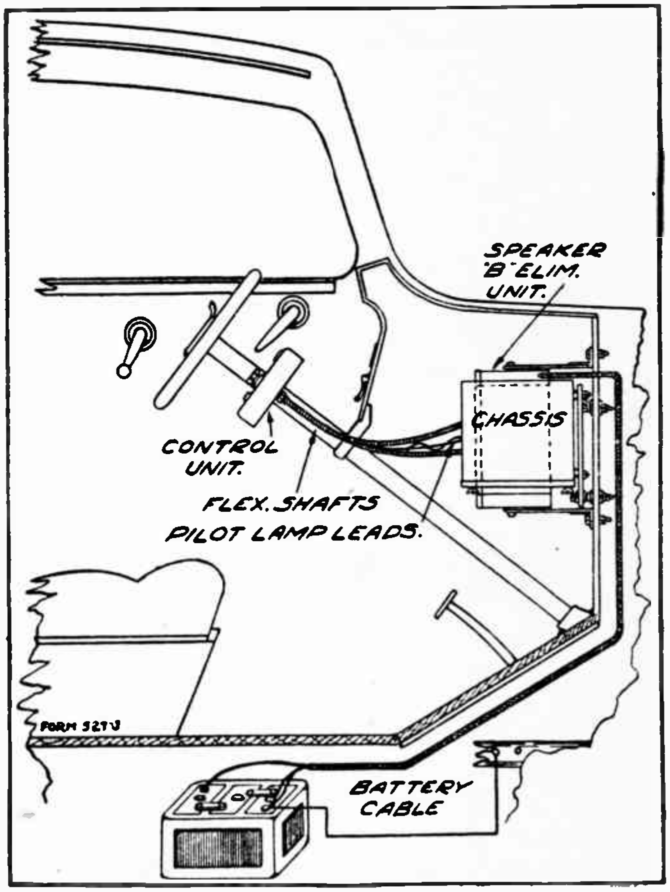


Fig. 2—General Installation—Side View

MODEL 06-W
Mounting Data

WELLS - GARDNER & CO.

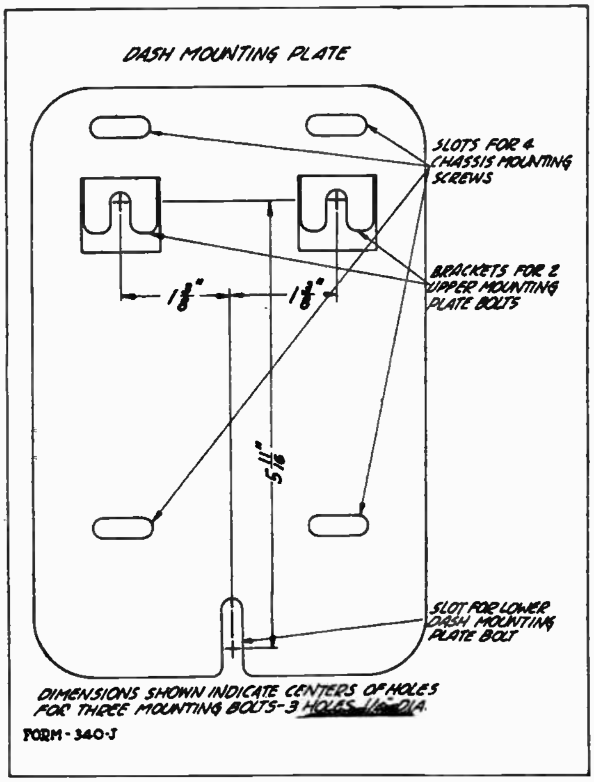


Fig. 3—Dash Mounting Plate

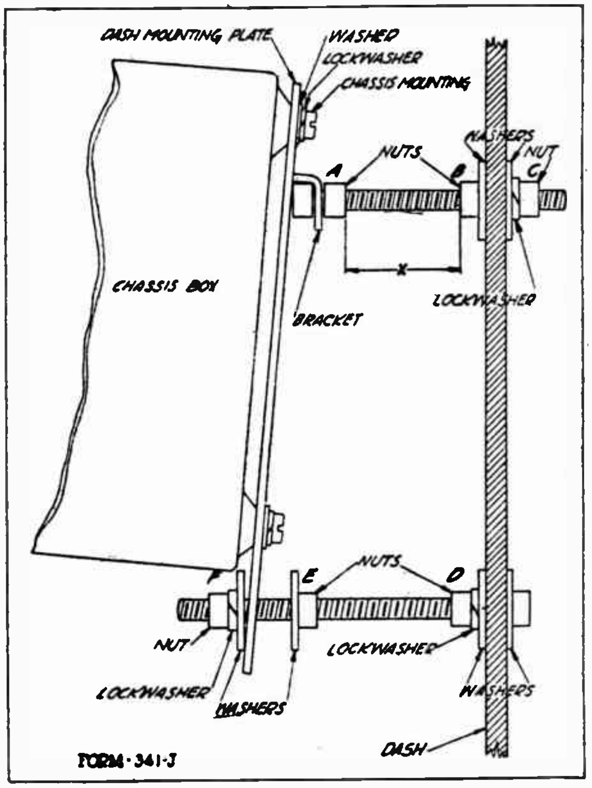


Fig. 4—Details of Chassis Mounting on Dash

which will be used for the upper part of the mounting plate and screw on nut "A" (see Fig. 4). The nut should be just far enough away from the head of the bolt to permit the bracket of the mounting plate to slip down as shown in the illustration. Then put on nut "B" and the washer, after which the two bolts can be put through the dash, with the shanks extending into the engine compartment, as shown in Fig. 4. A washer, lockwasher, and nut are then put on these bolts from the front of the dash to hold them in place.

The distance "X" between nuts "A" and "B" determines how far out the chassis is mounted from the dash. When there is a lot of apparatus in back of the dash, such as wires, tubing, etc., the chassis will have to set out far enough to clear it. However, in most cars, there is no interfering apparatus and therefore the distance "X" will be zero.

Then put a washer on the third mounting bolt and put this bolt through the lower mounting hole with the head on the engine side of the dash, as shown in the illustration. Put on a washer, lockwasher, and nut "D" and tighten it up. Then put on nut "E" with a washer as shown. Nut "E" should be screwed down until it is about 1/4" from nut "D," when distance "X," as explained above, is zero.

Next, secure the dash mounting plate to the chassis box by means of the four chassis mounting screws. Note that the broad or narrow face of the chassis box can be secured to the dash mounting plate. Use whichever side will be best from the standpoint of attachment of the flexible drive shafts.

All the tubes should be in the sockets, the antenna trimmer adjusted (as explained later) and the flexible drive shafts connected before the chassis is permanently installed. Complete information on the latter procedure is contained in the article on attaching the flexible drive shafts.

The four mounting screws pass through the four slots in the mounting plate (Fig. 3). After they are in place and tight, the dash mounting plate with chassis attached is slipped over the three mounting bolts. The two upper brackets on the plate slip down in back of nut "A" as shown in Fig. 4 and the slot at the bottom of the plate slips over the shank of the lower mounting bolt in back of nut "E." The plate will then hang with the bottom farther away from the dash than the top. A washer, lockwasher, and nut "F" are then put on the lower mounting bolt. Nut "F" is screwed on until the mounting plate is tight up against the washer in back of nut "E." In this position, the bracket at the top of the mounting plate should butt up against nut "A" and be tight. Also the mounting plate will be approximately parallel with the dash.

WELLS - GARDNER & CO.

MODEL 06-W
Flexible Drive

Attaching the Flexible Drive Shafts

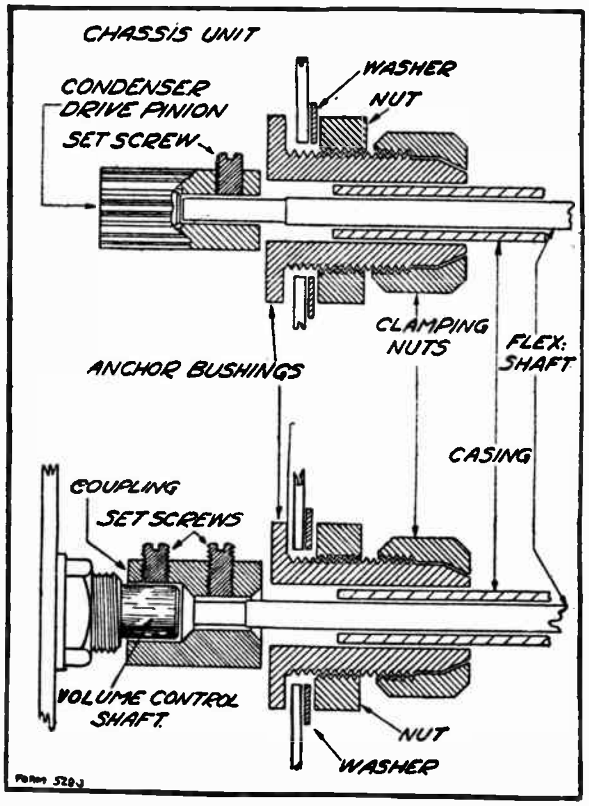


Fig. 6—Details of Flexible Drive Shaft Connections

After the control unit and chassis are in position, the flexible drive shafts may be attached. Two 34″ shafts are supplied, unless otherwise specified. These shafts may also be had in 14″, 20″, and 45″ lengths.

The flexible drive shafts should be put on with a minimum amount of bending. In general, one large radius 90° bend is all that is necessary.

The 34″ shafts supplied with the receiver may be cut to a shorter length if necessary. The shaft (inside portion) should first be brazed at the point to be cut. It should then be cut with a three-corner file or edge of a grinding wheel.* *Do not use a hack saw.* The casing which is 1½″ shorter must be cut to correspond. This should be tinned or brazed first at the point to be cut and may then be cut with a hack saw.

After the length and position of the shafts is decided on, remove the chassis and mounting plate from the mounting bolts. As the shafts are already secured at the control unit, it is necessary only to secure them at the chassis end. Before attaching the shafts, see if the set is in working order. Put the 8-prong socket in place on the chassis and operate the set with the cover off.

In Fig. 6 is shown a cross-sectional view of the flexible drive shaft connections at the chassis end. First put the tube cover plate on the chassis box temporarily with two screws. This is the large plate held in position ordinarily by means of five screws. Then center the volume control anchor bushing on this plate. To do this, loosen the nut which holds this bushing in place (see Fig. 6). Center the bushing by eye so that the center of it is in a line with the center of the volume control coupling. Then tighten the nut down.

Next, take the tube cover plate off. Extend the volume control flexible shaft and casing several inches through the hole in the anchor bushing of the tube cover plate so that the plate will be on the casing and out of the way. Turn the volume control coupling counter-clockwise until the switch is snapped to the off position. Lock the receiver on the control unit and turn the volume control knob counter-clockwise until it is in the locked position. Then loosen both set screws in the volume control coupling and insert the flexible shaft in the coupling (see Fig. 6). Tighten the outer set screw first on one of the four flat faces of the flexible shaft and then tighten the inner set screw. Then again temporarily hang the chassis on the mounting bolts. Next, check the operation of the switch, volume control and lock. The switch should be off when the volume control knob is in the locked position. It may be necessary to loosen the inner set screw and do a slight amount of adjusting until the proper setting is obtained.

Next, slide the tube cover plate into position and fasten it in place by means of the five screws. Then tighten down the clamping nut on the volume control shaft casing but *do not tighten this nut excessively.*

To attach the tuning condenser flexible shaft, first center the anchor bushing by eye as was explained above. Then extend the tuning condenser flexible shaft into the hole at the center of the tuning condenser drive pinion. With the rotor plates completely in mesh, turn the dial gear in the control unit until it is at the low frequency end stop. The set screw may then be tightened and the clamping nut secured on the casing as was explained above. In some instances, it may be necessary to loosen the set screw of the large gear on the tuning condenser rotor shaft and adjust the setting of this gear in order to get an accurate calibration.

***If the flexible shaft is cut as mentioned above, file it down in one place a slight amount to provide a flat surface for the set-screw.**

MODEL 06-W
Alignment
Speaker Data

WELLS - GARDNER & CO.

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself in broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment.

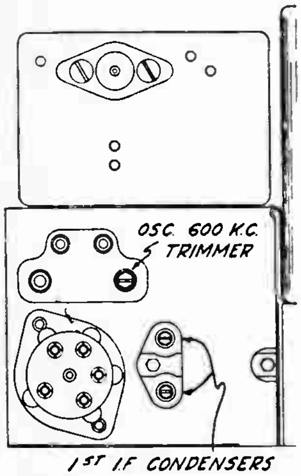


Fig. 12—Location of Trimmers

A signal generator that will provide accurately calibrated signals over the broadcast band and accurately calibrated signals at and around 262 K.C., the intermediate frequency and an output indicating meter are desirable.

First set the signal generator at approximately 262 K.C. Connect the antenna lead from the generator to the control grid of the I.F. 78 tube, through a .05 mfd. condenser. The ground lead of the generator goes to the ground of the receiver. Turn the rotor plates of the tuning condenser completely out and keep the signal weak enough to prevent A.V.C. action. Note from Fig. 10 that the second I.F. transformer is self tuned and cannot be adjusted. Adjust the frequency of the signal generator until the output meter shows maximum output. The intermediate frequency setting of the generator is then correct, although it may be a very small percentage higher or lower than 262 K.C.

Next connect the signal lead from the signal generator to the grid of the 1st detector tube through a .05 mfd. condenser. Then adjust the two intermediate frequency condensers for maximum output. The location of the adjusting screws for these condensers is shown in Fig. 12.

Now set the signal generator for a signal of exactly 1400 K.C. The antenna lead from the generator is, in this instance, connected to the antenna lead of the receiver. Connect the flexible drive shaft to the chassis if it has been disconnected. As explained previously, the dial scale should be at the low frequency end stop when the rotor is completely in mesh. Then turn the station selector knob until the dial scale is at 1400 K.C.

Then adjust the three trimmer condensers on the gang tuning condenser for maximum output, adjusting the oscillator section first (section farthest from drive gear).

Next set the signal generator for a signal of 600 K.C. and adjust the oscillator 600 K.C. trimmer. The location of this condenser is shown in Fig. 12.

A non-metallic screwdriver is necessary for this adjustment. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting, at the same time adjusting the 600 K.C. trimmer screw until the highest output is obtained.

Then set the signal generator again for a signal of 1400 K.C. and check the adjustment of the tuning condenser trimmers at this frequency for maximum output.

Mounting the Speaker-"B" Eliminator

The speaker-"B" eliminator is mounted on the back of the dash by means of two brackets, as shown in Fig. 5. Usually the space available will govern the location of the speaker and position of it on the mounting brackets. However, the matter of acoustics should be given careful consideration. One of the most desirable positions from the standpoint of acoustics is that shown by the solid lines in Fig. 5 (A). In this position the sound waves travel in the most direct lines toward the listener.

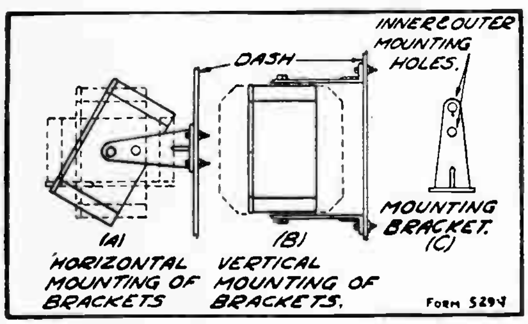


Fig. 5—Method of Mounting Speaker

After the speaker is mounted and regardless of the position of the brackets, loosen the bracket bolts and turn it to several positions in order to get the best one from the standpoint of tone quality.

Other considerations governing the location of the speaker are the cables and the tone control. The speaker should be so mounted that the two shielded cables, one to the storage battery and one to the chassis, will be long enough and can be most conveniently brought over. The tone control knob on the speaker box should be preferably on the bottom, so that it can be reached easily.

After the position of the speaker is decided on, drill the four $\frac{5}{16}$" holes required for the bracket mounting bolts. A template for these holes is supplied with the receiver. The holes are arranged in a rectangle. The centers of the holes, the small dimension are $2\frac{3}{8}$" apart and the long dimension 10" apart. In Fig. 5 is shown how the brackets can be mounted horizontally (A) or vertically (B), and the different positions in which the speaker itself can be placed. There are two holes in each bracket as shown in Fig. 5 (C) which determine the distance of the speaker box from the dash. The grilled portion of the box at the front should face the listener.

MODEL Auto Radio Superheterodyne WHOLESALE RADIO SERVICE CO., INC.

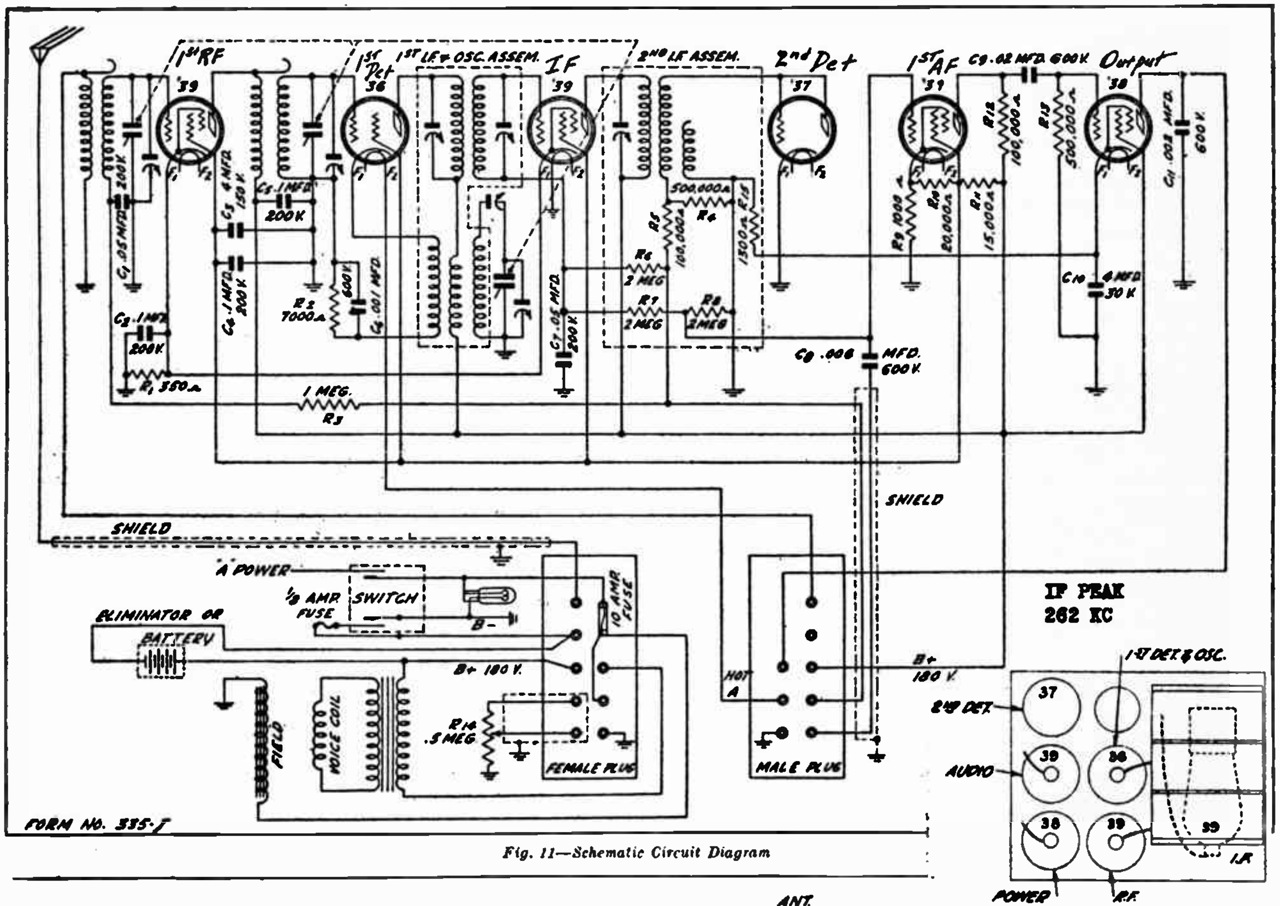
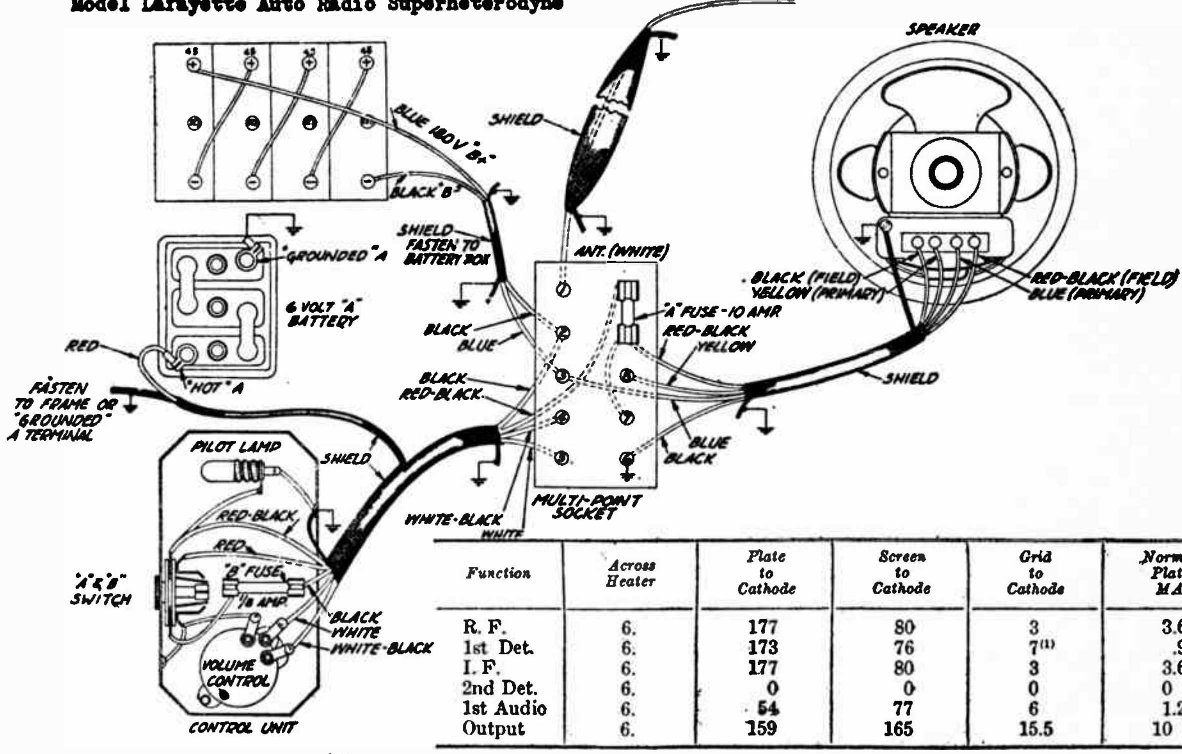


Fig. 11—Schematic Circuit Diagram

Model Lafayette Auto Radio Superheterodyne



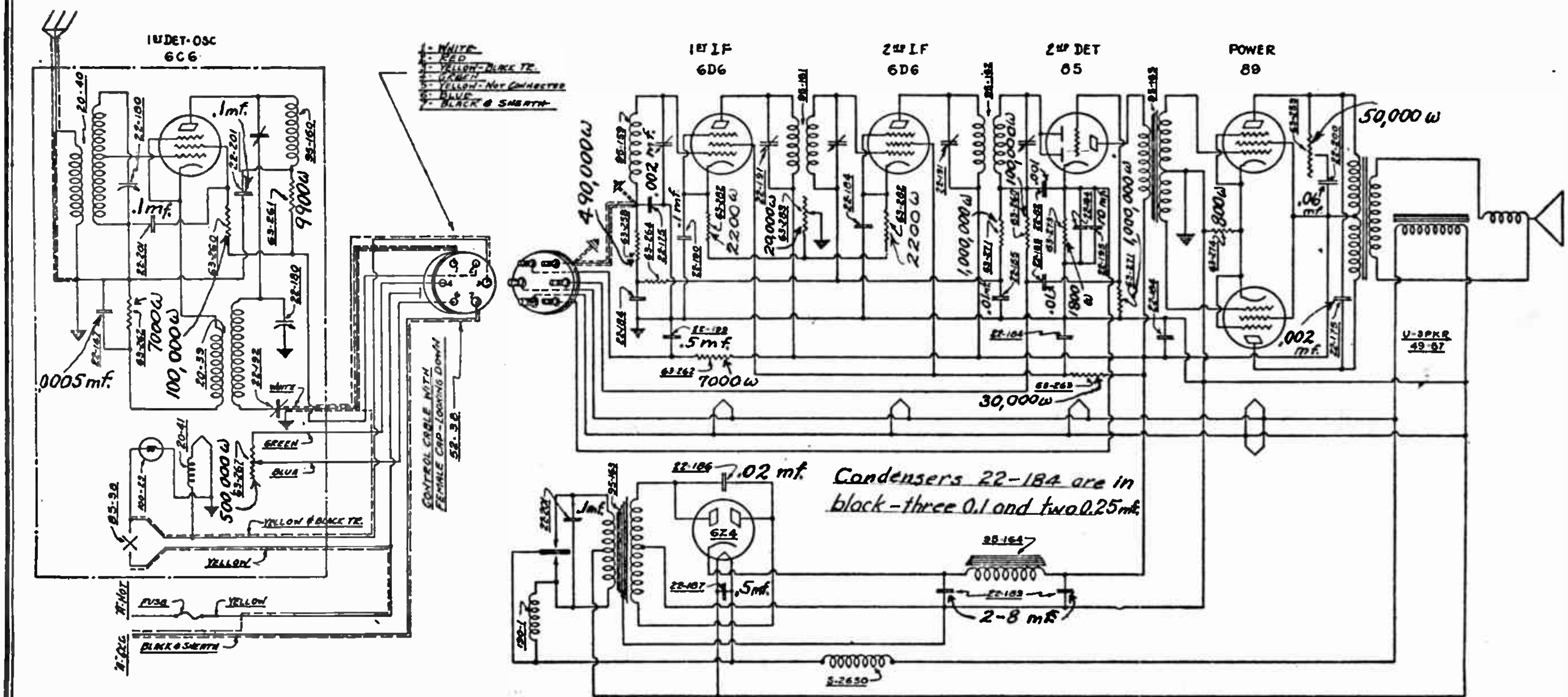
Function	Across Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate MA
R. F.	6.	177	80	3	3.6
1st Det.	6.	173	76	7[1]	.9[1]
I. F.	6.	177	80	3	3.6
2nd Det.	6.	0	0	0	0
1st Audio	6.	54	77	6	1.2
Output	6.	159	165	15.5	10

(1) Will vary with dial setting.

NOTE: All bias voltages must be read from cathode to ground.

MODEL 460
Schematic

ZENITH RADIO CORP.



Intermediate Frequency	485 K.C.
Sensitivity in Microvolts	1.5
Power in Milliwatts	2200
Power Consumption in Watts	36

TUBE OPERATING VOLTAGES

Position	Tube	Ef	Ek	Eg¹	Eg²	Eg³	Ep
1st Detector	6C6	4.8	6.5	0	6.5	120	150
1st I.F. Amp.	6D6	5.3	10.5	*	10.5	103.5	165
2nd I.F. Amp.	6D6	5.3	10.5	*	10.5	103.5	165
2nd Detector	85	5.3	8.	0	—	—	156
P. P. Audio	89	5.3	17.	0	17.	165	165
	89	5.3	17.	0	17.	165	165

f—Filament. k—Cathode. g^1—Control grid. g^2—Suppressor grid. g^3—Screen grid. p—Plate.
*Depends on applied signal strength. All voltages measured from indicated points to ground.

MODEL 460
Socket, Trimmers
Alignment

ZENITH RADIO CORP.

If the receiver is entirely inoperative the fuse should be examined. It is contained in an insulated holder at the "Hot" battery terminal. Be sure to replace the spaghetti insulator over the fuse if necessary to change it. The next important step is to very carefully check the tubes both in the control head and speaker chassis. This has been found to be the most common cause of service in an auto receiver. The extreme vibration to which the tubes are subjected will occasionally develop a short in the elements in spite of the precautions that have been taken in their construction. A loud hum and lack of sensitivity can usually be attributed to a defective 6C6. Microphonic howl can be traced to the 89's. Replacement is recommended for such complaints, since the average tube checker will not show up this condition. An intermittent cutting out accompanied with rasping and other noises will usually be found in either of the 6D6's. The chassis may be taken out for inspection by simply removing the cable plug and three round-head hexagon nuts on the front of the case.

Alignment

Every Zenith Automobile receiver is balanced on an accurate, temperature controlled crystal oscillator before leaving the factory and unless a part is changed or the calibration has shifted, the adjustments should not be tampered with. Where it is absolutely necessary, however, a good test oscillator capable of delivering a modulated signal at 1500, 600 and 485 K.C. will be required.

To balance the I.F. circuit remove the cap and lead from the grid of the 6C6 tube in the control head and attach the test oscillator to the grid and to ground. Set to 485 K.C. and first adjust the primary I.F. trimmer shown (A) in Figure 1. Next trim the secondary (B). Now turn the plate trimmer (C) on the side of the chassis base to resonance, with a No. 4 Spintite wrench. Its (2nd I.F.) transformer is directly above the adjustment. Set the screw (D) in the top of the transformer shield to resonance also. The third I.F. transformer is adjusted through a hole in the rear of the chassis and also on top of the transformer indicated at E and F. This completes the I.F. circuit. Replace the grid lead on the 6C6 and screw the metal cap back in position.

Next attach the test oscillator to the antenna and ground lead of the control head and set it to 1500 K.C. Remove the control head cover and set the variable condenser trimmers (G and H) to a point where the 1500 K.C. signal is loudest at that frequency on the dial. Then set the test oscillator to 600 K.C. and rock the dial slowly at that frequency; at the same time turn the padder condenser adjusting screw. This trimmer is reached by removing the button plug on the bottom of the control head. The adjustments should be gone over twice to insure greater precision.

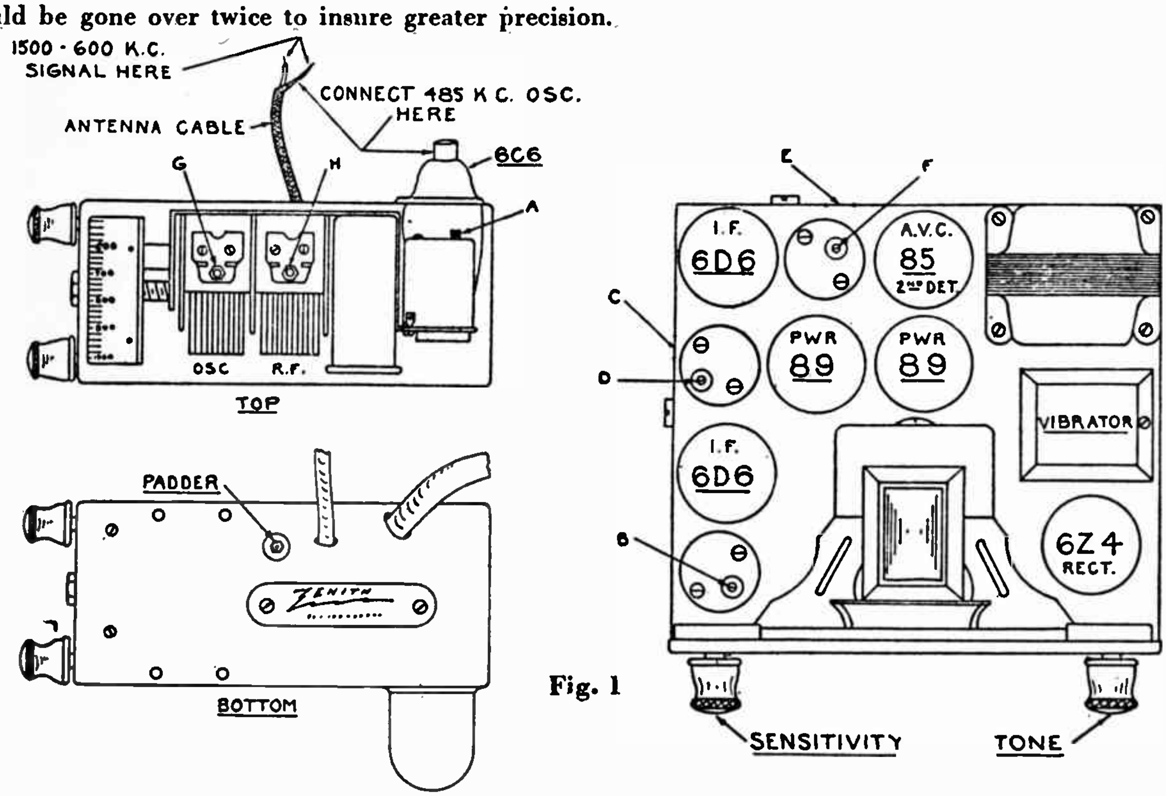


Fig. 1

MODEL 460
Notes

ZENITH RADIO CORP.

Antenna

Automobile manufacturers are realizing the general trend by the public in the use of a radio receiver in the car. As a consequence, practically all late models are equipped with a roof antenna which is suitable for broadcast reception. If there is any question as to whether the particular car in which the installation will be made is equipped with an antenna, the local sales agency will furnish this information. Where it is already incorporated, the lead-in will be found most generally under the instrument panel, beneath the right hand windshield post, and if not shielded, this should be done, at least between the point where it comes through the post over to where it attaches to the antenna cable on the control head. This shielding should be grounded to the instrument panel. Factory built antennas should first be checked with a continuity meter, in order to make certain that they are not grounded. It is possible that when the aerial was installed at the factory, it might have shorted to the body at some point inside the roof.

If the car is not equipped with an aerial, there are several means whereby suitable pickup may be provided. Among these are the plate antenna, the running board type, or the roof antenna. After repeated tests we have found that the last mentioned gives best results and is less likely to pick up motor interference.

A piece of copper screening approximately two and one-half feet square, placed between the headlining and the top covering, is very satisfactory. This is installed by first removing the upholstered moulding around the headlining and then dropping the headlining about half way from the front in sedans, or completely in a coupe. If it is found that chicken wire is used in the top construction, a piece should be cut out large enough to allow at least six inches spacing around the copper mesh, or if preferred, the chicken wire can simply be left in place and segregated around a portion two to two and a half feet square. A cut out around the edges of about six inches is satisfactory. The copper screen, or remaining portion of the chicken wire, should be securely tacked to the ribs and the lead-in wire soldered to the left front corner. The headlining should then be very carefully tacked back into position and the lead-in brought down the left hand corner post and behind the instrument panel.

In roadsters, or convertible models, where the antenna efficiency will become poor if installed in the top, the plate or running board system is advisable. It is important, however, that the lead-in be shielded and grounded in several places from the plate to the receiver, inasmuch as they are more apt to pick up motor noises.

Never bring the lead-in through the motor compartment, since it will always result in motor noise which it will be impossible to eliminate. Also, when making the installation, be sure that the battery lead from the receiver does not go out to the motor compartment and that it is attached directly to the battery and not at the ammeter or starter.

Receiver

Although installation of the receiver itself is covered in the instruction manual, there are several suggestions which will prove helpful to the serviceman.

In some cases it might be found that the control head cannot be mounted parallel to the steering column because of insufficient space between the wheel and the instrument panel and, if mounted horizontally, it blocks essential instruments from the driver's vision. Where this is true it may be placed in the glove compartment. This is done by removing the glove compartment from the instrument panel and screwing the control head direct to the bottom without using the mounting clamps. If the control head does not go back far enough to allow room for the door to close, the rear end of the box can be cut off and the head allowed to protrude from the rear.

The best place for the speaker chassis unit is, of course, on the steering column, beneath the instrument panel. However, if space is not available or some of the control rods are in the way, it should be fastened to the bulkhead. The speaker chassis may be set either in the normal position or upside down, without interfering with its performance. The three carriage bolts and carriage bolt brackets, in connection with the wooden mounting blocks, give a very satisfactory and firm method of support.

Inasmuch as the battery cable has a grounded shield, it should not be placed behind the instrument panel in such a way that it might accidentally touch the ammeter or any other hot battery terminal so as to cause a short circuit. The cable should be placed as close as possible to the dashboard and taped to some solid member, to hold it securely.

The shielded lead on the control head cable must be attached to the instrument panel, or other grounded part of the car. This may be done underneath, so as to keep it out of sight.

The antenna circuit is inductively coupled to the type 6C6 through coil 20-40. This tube acts as the first detector and, through plate feed-back and inductance 2039, as an oscillator. An I.F. frequency of 485 K.C. is developed and transferred from the control head to the speaker chassis through the connecting cable. Part of the first I.F. transformer 95-160 is in the head, while the secondary 95-159 is contained in the chassis. A 6D6 in the first I.F. stage feeds another 6D6 in the second I.F. stage through another I.F. transformer. The third I.F. transformer, 95-162, couples to a half wave dual diode triode type 85. A.V.C. action and 2nd detection takes place at this point and the audio signal is transformer coupled to a pair of type 89's in the push-pull output stage.

The power supply is of the built-in vibrator type, using a tube 6Z4, step-up transformer and buzzer in a full wave rectifier circuit. Choke 95-164 and condensers 22-183 are the essential filter components. The volume control, although in the control head, is wired in the cathode circuit of the 2nd detector.

MODEL 460
Parts List

ZENITH RADIO CORP.

CONTROL HEAD ASSEMBLY

15-15	Control Box Tube Cap		$0.25
20-39	Oscillator Coil		.65
20-40	Antenna Coil		1.00
20-41	Filament Choke		.15
22-147	.0005 mfd. Condenser	(Cathode Bypass)	.15
22-180	Variable Condenser		2.00
22-192	7 Plate Series Trimmer Condenser	(R. F. Coupling)	.45
22-201	.1 mfd. 200 volt Condenser	(Screen Bypass)	.35
34-26	Hypoid Pinion Gear		.10
46-66	Control Knob		.15
52-38	Multicord Cable and Female Plug Assembly		3.50
52-39	Antenna Cable		.25
57-373	Escutcheon Plate		.30
63-260	100M ohm 1/4 watt Resistor	(Screen)	.20
63-261	9900 ohm 1/4 watt Resistor	(Plate)	.20
63-262	7M ohm 1/4 watt Resistor	(Cathode)	.20
63-276	500M ohm Volume Control		.65
78-68	6-C-6 Tube Socket		.10
80-90	Tuning Shaft Spring		.01
85-38	On and Off Switch		1.00
100-23	6.3 volt Dial Lamp		.20
126-121	Dial Lamp Shield		.10
126-122	Detector and Oscillator Coil Shields		.15
136-5	10 amp. Auto Fuse		.12
S-2638	Dial Light Socket Assembly	(Less Lamp)	.15
S-2640	Dial and Hypoid Gear Assembly		1.00
6-C-6	1st Detector Oscillator Tube		1.80

SPEAKER CHASSIS ASSEMBLY

15-16	Tube Shield Cap		.10
22-82	.001 mfd. Condenser	(2nd Det. Cathode)	.25
22-175	.002 mfd. Condenser	(1st I.F. Grids and Power Plates)	.25
22-183	2-8 mfd. Condenser	(Filter Block)	1.30
22-184	Condenser Block	(Three .1 and two .25 mfd.)	1.20
22-185	.01 mfd. 200 volt Condenser	(2nd Det. Anode and Grid)	.15
22-186	.02 mfd. 800 volt Condenser	(Rectifier Plates)	.25
22-187	.5 mfd. 200 volt Condenser	(Rectifier Filaments)	.40
22-190	.1 mfd. 200 volt Condenser	(1st I.F. Cathodes)	.15
22-191	3 Plate I.F. Trimmer 25-125 M M F	(1st and 2nd I.F. Plate)	.30
22-195	10 mfd. 25 volt Condenser	(2nd Detector Cathode)	.55
22-199	.5 mfd. 200 volt Condenser	(1st I.F. Grid)	.25
22-200	.06 mfd. 200 volt Condenser	(Tone Control)	.20
22-201	.1 mfd. 200 volt Condenser	(Vibrator Filter)	.15
46-66	Control Knob		.15
49-57	Dynamic Speaker		5.00
58-16	Female Battery Plug		.12
63-253	50M ohm Tone Control		.60
63-258	490M ohm 1/4 watt Resistor	(1st I.F. Grid)	.20
63-260	100M ohm 1/4 watt Resistor	(2nd Det. Anode)	.20
63-262	7M ohm 1/4 watt Resistor	(Det. Osc. Plate)	.20
63-263	30M ohm 1/2 watt Resistor	(I.F. Screens)	.20
63-264	240M ohm 1/4 watt Resistor	(1st I.F. Grid)	.20
63-271	1 megohm 1/4 watt Resistor	(2nd Det. Anode)	.20
63-273	1800 ohm 1/4 watt Resistor	(2nd Det. Cathode)	.20
63-274	800 ohm 1/4 watt Resistor	(Power Bias)	.20
63-282	2200 ohm 1/4 watt Resistor	(I.F. Cathode)	.20
63-283	20M ohm Sensitivity Control		.60

78-64	85 Tube Socket	.10
78-65	89 Tube Socket	.20
78-67	6-Z-4 Tube Socket	.10
78-69	6-D-6 Tube Socket	.10
93-177	Cushion Washer for Vibrator Mounting	.10
95-159	1st I.F. Grid Coil Assembly	.90
95-161	2nd I.F. Transformer	.90
95-162	3rd I.F. Transformer	.90
95-163	Rectifier Transformer	2.00
95-164	Power Choke	1.20
95-165	Push Pull Input Transformer	1.65
110-21	Grill Cloth	.05
126-123	Tube Shield	.10

190-1	Vibrator Assembly		8.75
S-2650	Vibrator Choke Assembly		.25
6-Z-4	Rectifier Tube	(1 used)	1.75
6-D-6	I. F. Tube	(2 used)	1.80
85	A. V. C. 2nd Detector Tube	(1 used)	1.60
89	Power Output Tube	(2 used)	1.80

STANDARD SUPPRESSOR EQUIPMENT

22-193	.5 mfd. 200 volt Ignition Coil Condenser	.35
22-194	.5 mfd. 200 volt Generator Coil Condenser	.45
63-268	Spark Plug Suppressor	.40
63-269	Distributor Suppressor	.40