

# INSTRUCTIONS FOR INSTALLATION



## **AIR-CHIEF** TWO UNIT SUPER-HETERODYNE **CAR RADIO**

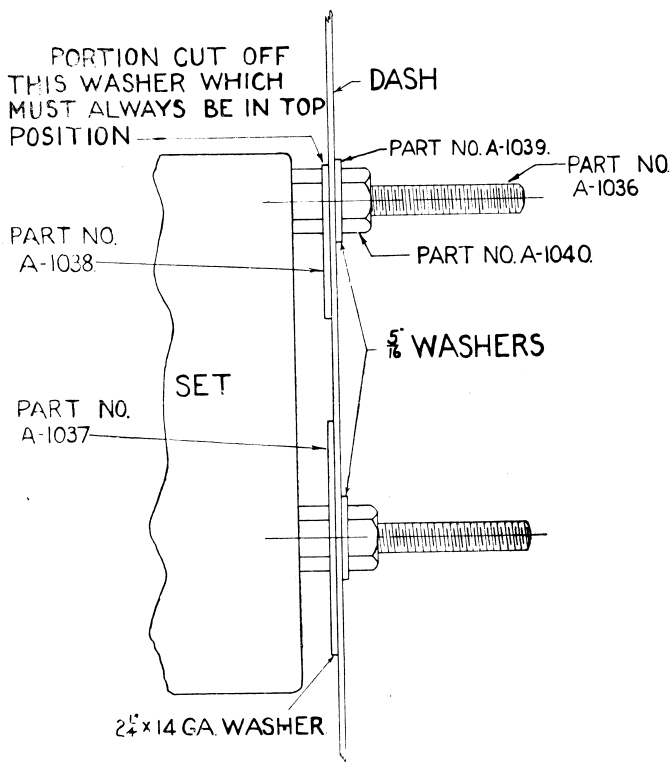
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**Models 3700 and 3701**

GENERAL MOTORS - HOLDEN'S LIMITED

AIR-CHIEF TWO UNIT CAR RADIO.

length of wire to the negative terminal of the battery. Connect a piece of wire to the aerial connection of the Set. Switch the Set on by turning the volume control in a clockwise direction, and wait for about 30 seconds for the valves to warm up. Tune in to a local station, and then lift the set three or four inches from the bench

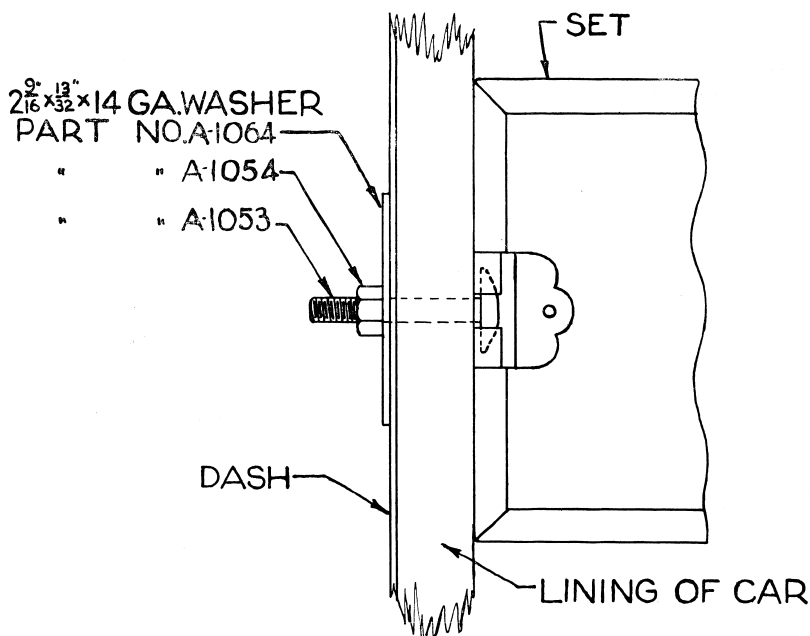


### Method of Mounting 12-volt Receiver.

FIG. 1.

and drop it. Do this two or three times, listening carefully to make certain that no short or open circuits are caused by the bumping. Such a defect is indicated by a noise in the Set.

*Important.*—Be sure that the speaker is plugged into receiver before switching on, otherwise damage will result to output tube.



*Method of Mounting 6-volt Receiver.*

FIG. 2.

## INSTALLATION

100 per cent. perfect radio reception comes from 100 per cent. perfect installation. Successful operation in car radio depends to a large extent upon the care taken in installation. Some of the most insignificant details which are prescribed as part of the installation procedure often make the difference between an installation which operates with complete satisfaction to the owner and an installation which is the source of constant annoyance. A great many of these details appear so trivial that they are frequently overlooked or neglected when installing Automobile Radio Receivers.

### **Antenna Installation:**

A good Antenna is one of the most important parts of a Car Radio installation. The Antenna, to perform its function satisfactorily, must be constructed of the proper material, must be well insulated from the car body, and must be as large as possible without coming within 5 in. of the metal parts of the car.

## AIR-CHIEF TWO UNIT CAR RADIO.

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All General Motors Closed Bodies, from 1934 models, are equipped with an Antenna, which is fitted in the roof, but when installing a Receiver in a car which is not equipped with an Antenna, it is necessary to purchase an aerial (Part No. A1034).

The most common type of roof is that with wood slat construction. In these cars, the head lining should be lowered, working from the inside from front to rear. After the head lining is down, the aerial wire may be strung back and forth from front to rear between the wood slats, as shown in Figure No. 3.

Be sure to keep the wire at least 5 in. from any metal part of the roof construction. The shielded lead-in should be brought neatly down the left-hand windshield corner post. No part of the Antenna must come within 6 in. of the dome light or dome light leads, and if the dome light leads cross the space required for the Antenna, they must be re-routed. (See Figure No. 3.)

When installing Radio to 1934 G.M.-H. closed cars, check for Antenna lead-in behind instrument panel at left windshield corner post. If not located there, lead-in will be found hanging loose behind the back of the rear seat cushion; it will need to be treated as follows:—

1. Push the outer shield along the wire for a distance of one inch, making sure that it is free from the centre conductor.
2. Test for short between shield and centre conductor, if shorted this lead will have to be removed.
3. Tape this centre conductor so it cannot come in contact with shield or any metal parts of the car, then secure the taped end of wire to woodwork of car with a staple supplied.

If Antenna lead-in was located at rear, then after carrying out the proceeding instructions, a new lead-in will have to be fitted to Antenna and brought down the left-hand corner windshield post, to do this proceed as follows:—

1. Remove header bar trim.
2. Remove cant rail trim from left-hand side as far back as front of rear door.
3. Drop head lining from left front corner until Antenna is exposed. Solder a new shielded lead-in to Antenna, making sure the shield does not touch Antenna. This lead-in can be brought down behind trim of windshield pillar in some cases, where this is not possible it can be neatly brought down along the edge of the draft piping.

## AIR-CHIEF TWO UNIT CAR RADIO.

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4. Test for short circuits and replace head lining, cant rail trim, header bar trim, and corner post trim if this has been removed.

When installing the Air Chief Auto Radio Set to 1935 closed model General Motors cars, it is necessary to use an extension lead, Part No. A1027. This is simply attached to the bayonet fitting on the present aerial lead, which will be found located at the top left-hand corner of the Header bar trim. This lead is exposed on practically all the 1935 model cars, but, on a few of the first run of bodies, this lead will be found in the same location but is tucked away in behind the Header Bar instead of being exposed. In such cases it is simply found by inserting a fish wire behind the Header Bar in the top left-hand corner, when the aerial lead with the bayonet fitting attached can be easily pulled out.

After attaching the bayonet fitting on the extension lead to the fitting on the car aerial lead this complete unit can then be neatly tucked away out of sight behind the Header Bar. The wire itself is now neatly brought down alongside the draft piping, being careful to force any surplus shielding material down along the wire towards the Set. This wire is carried alongside the draft piping well down below the level of the instrument panel. Now loosen off a few inches of the dash trim insulating pad where it is attached to this pillar. Bring the aerial extension lead in behind this dash trim at this point and then it can be led out over the dash trim further in towards the dash panel and connected up to the bayonet fitting attached to the aerial lead on the Set, any surplus wire being neatly tucked in behind the dash trim insulating pad. Re-fasten the dash trim where it was unfastened on the pillar.

On 1936 General Motors-Holdens cars, the aerial lead-in will be found in the centre, above the windscreen.

### TO FIT CONTROL CABLES

Place Set in front of you in the same direction as that in which it will fit into car, and attach the remote control as follows:—

Station Selector: Take a small screwdriver and place in bayonet hole A in "cable" junction box on side of set nearest back, and gently turn dog in clockwise direction until stop is felt, then turn station selector knob on control until indicator is at zero. Connect the bayonet adaptor C in bayonet hole A (see Fig. 4.), making sure that the male

## AIR-CHIEF TWO UNIT CAR RADIO.

dog fits into the female dog in set, and turn bayonet adaptor (hand tight only) in clockwise direction until reasonably tight.

Turn station selector knob from zero to 100, and back again to zero. This will ensure that the control is properly calibrated.

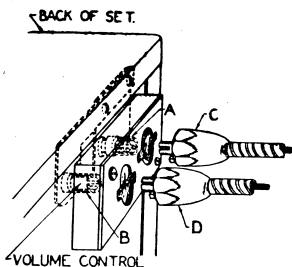


FIG. 4.

Volume Control: Connect bayonet adaptor D into bayonet hole B (see Fig. 4) and tighten bayonet adaptor (hand tight only). Plug in the pilot light lead and the set is ready for installation.

## SYNCHRO TUNING.

The synchro-tuning adjustment ensures that the aerial installed in the car is a perfect match to the receiver, thus allowing a maximum gain in the aerial circuit.

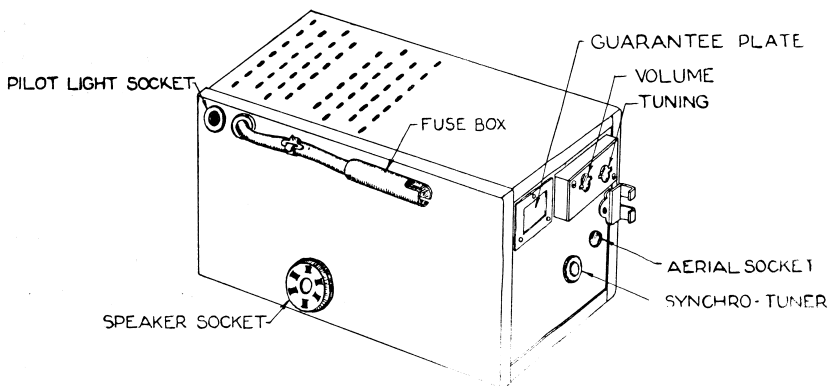


Fig. 5.

In order to make this adjustment it is necessary to tune the receiver to a weak station located at approximately 20 degrees on the dial.

## AIR-CHIEF TWO UNIT CAR RADIO.

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Having tuned in the station, the synchro-tuning adjustment screw, Fig. 5, should be located by removing the push-button cover.

The adjustment screw should then be turned in either direction until maximum signal is obtained.

The push-button may then be replaced and no further adjustment is necessary as long as the receiver operates on the same aerial.

For normal aerial installations such as shown on Fig. 3, or as found in General Motors-Holdens cars for 1936 (and earlier), the adjustment screw will need turning in an anti-clockwise direction, whilst for cars having a very high relative capacity, it will be found necessary to turn adjustment screw in a clockwise direction.

This latter type of aerial will be encountered in cars having an insulated roof as the aerial.

### ***Receiver Installation:***

The Receiver is designed for mounting on the dash, and a satisfactory location should be selected, bearing in mind:—

- A. The fittings on both sides of the dash, making sure that no wires or rods touch the case of the Receiver.
- B. The necessity of an even sweep of the cables from the Set to the remote control head.

The left-hand side of the dash will, in most cases, be found to be the most convenient position for the Receiver, as this will allow the remote control cables to reach the desired position with the minimum of sharp bends. It is also advisable to keep the Set as high as possible up the dash so that it will be clear of people's feet when resting on the toe-board.

*It should always be borne in mind that the controls will operate more smoothly if the cables are run with as little bend as possible.* To ensure this, it is advisable to temporarily mount the Control Head on the instrument panel, and, while holding the Receiver against the dash, find the most convenient position for mounting, bearing in mind the advisability of running the cables with as wide a bend as possible.

When the location of the Receiver has been fixed, mark off the mounting holes, which are to be drilled in the dash (that is, if the holes are not already provided, as in the Pontiac, Oldsmobile, and Buick range of cars) using the drilling template supplied, and drill the holes in the position indicated with a  $\frac{3}{8}$  in. Drill. Care-

## AIR-CHIEF TWO UNIT CAR RADIO.

fully clean all paint and grease from around the holes on the engine hood side of the dash so that the nuts and washers make a perfect electrical contact. *All references to removal of paint are necessary to ensure good, bright, metal-to-metal, low resistance contacts.*

Now push the Set into place, using the mounting studs and washers. Tighten the nuts on the two studs protruding through the front of the dash as shown in Figs. 1 and 2.

### INTERFERENCE SUPPRESSION

No spark plug suppressors are required.

#### ***Distributor Suppressor:***

Remove high tension lead from centre of Distributor and fit Suppressor. Insert high-tension lead securely in outer end of Suppressor.

#### ***Generator Condenser:***

Instal a by-pass Condenser, part No. A1009, on the Generator Cut-Out Relay, *having as short a lead as possible.* (See Figure No. 6.) Connect the lead of the Condenser to the Generator Terminal of the Cut-Out Relay. The other side of the Condenser is grounded to the Condenser Case, which forms the other contact to the car at the point where the Condenser Bracket is mounted in the Cut-Out Relay Bracket.

#### ***Ammeter By-Pass Condenser:***

Instal a By-Pass Condenser, part No. A1009, from the Ammeter to the grounded instrument panel, *having as short a lead as possible.*

The foregoing completes the installation of the Receiver, and with the exception of possibly a few isolated cases, the Receiver will operate perfectly without interference from the ignition system of the car.

A few cases may be encountered where ignition or other interference still persists, and in these cases reference should be made to the following section of this Instruction Book.

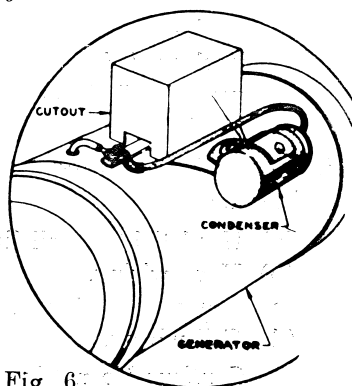


Fig. 6



## ADDITIONAL INTERFERENCE ELIMINATION

*Note.*—The material mentioned in the following section of this book is not furnished with the Receiver Package, as it is only necessary for the elimination of interference in some cases.

1. Determine whether noise enters Set through Antenna by disconnecting the Antenna lead-in from the Receiver while the motor is running, and noting the effect on spark interference.

If the interference continues with the Antenna disconnected from the Receiver, it is an indication that it is coming from the ignition circuit, and being fed into the Receiver through the radio wiring. Inspect the installation thoroughly to see that the ammeter and pilot light leads do not come too close to any high tension wiring. Determine also whether the Receiver is properly grounded, or is insulated by paint, which will have to be removed.

2. If interference is eliminated by disconnecting the Antenna lead-in from the Receiver, it may be concluded that the interference is being picked up by the Antenna. The most common source of such interference lies in radiation from the dome light wiring, which can be eliminated as follows:—

(a) Secure a By-Pass Condenser, part No. A1009.

(b) Remove the insulation from approximately one-half inch of the dome light wire close to the windshield corner post.

(c) Connect one condenser lead to the portion of the dome light wire from which the insulation has been removed, and solder and tape this joint. Secure the other lead of the condenser beneath a convenient nut, such as the one on the bolt holding the instrument panel supporting bracket. Be sure that all paint is cleaned from around the bolt in order to provide a good ground. It is essential that this condenser be connected to the dome light wire as close to the corner post as possible.

3. If interference still persists after the foregoing precautions have been taken, check the following wiring circuits:—

(a) Head light or tail light wiring.

(b) Horn wiring.

(c) Generator and starter wiring.

(d) Coil wiring.

*Caution:* Do not by-pass coil to distributor circuit.

## AIR-CHIEF TWO UNIT CAR RADIO.

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To do this, obtain a by-pass condenser, part No. A1009, and connect one lead of the condenser to the hot side of the suspected unit. Connect the condenser case to a good ground on the metal part of the car body or frame. In the majority of cases this procedure will indicate where the trouble lies. After it has been found, mount the condenser permanently and solder the leads in the proper location. Do not solder to rear of instrument panel as the heat from the iron may blister the paint.

4. **BONDING:** Using braided wire, bond to the dash all oil pipes and rods passing through the dash. Solder one end of the braided wire to these pipes, etc., and fasten the other end to the dash on the engine side with self-threading screw, so as to secure the best possible connections. It will be necessary in some cases to bond the upper section of the Windshield wiper tubing to the dash or instrument panel. To do this, solder a piece of braided wire to the tubing and ground the braided wire at the nearest point, which will give the best ground connection. (*Caution:* Do not attempt to solder the braid to the back of the instrument panel, for doing so will blister the paint.) In some cases, it may be necessary to bond the motor block to the dash. This should be done by using a piece of shield braid of large cross section, and as short as possible, leaving enough slack to compensate for normal up and down movement of the engine.

The connection should be made preferably under one of the rear head bolts, but in case this will cause a water leak, the connection should be made to the point giving the best electrical and mechanical contact. The paint should be cleaned away from the points of connection, and the end connected to the dash should be soldered to the dash, or placed under the head of a large screw, inserted through a hole drilled in the dash after the paint has been thoroughly cleaned off.

5. **THE GENERATOR:** In order to determine whether the generator is causing any noise in the radio reception, accelerate the engine and cut off the switch. Then, if a whine, decreasing in pitch as the engine stops, is noticed, the generator is causing interference. If cleaning the commutator does not remedy this, another condenser should be installed from the generator side of the cut-out to a good ground on the frame of the generator. On the other hand, if no noise is noticed immediately when the switch is turned off, you can be reasonably sure that the generator is not causing any interference.

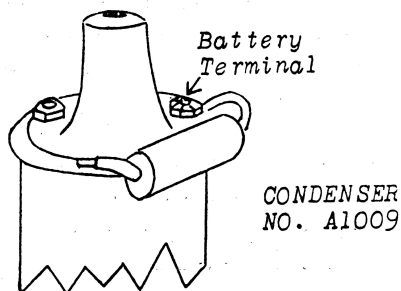
6. MISCELLANEOUS: The entire ignition system must be checked and put in perfect condition, including the distributor rotor and contact points, generator brushes, spark plugs, and all light wiring, starting motor cable, generator cable, dash wiring, and stop light switch. Examine for loose connections or leaky high tension cable in the ignition system.

By-pass supply terminal of the coil to ground with a Condenser, part No. A1009, *having as short a lead as possible.* (See Figure No. 7.)

If low tension wires are in the same manifold or supporting tube as the high tension wires of the ignition system, they should be re-routed.

Remove low tension supply leads for the Coil, Horn, etc., as far as possible from the high tension leads. If possible, partly shield them by placing them in the panel sections of the chassis frame. If necessary, re-position the low tension wiring from the instrument panel to underneath the engine hood, running the leads below rather than through the dash. In some extreme cases, it will be found necessary to shield the low tension wiring.

Make sure that the dome light switch is in the "live" rather than the "ground" lead.



*Solder this lead to brass rim. If coil has no metal rim, solder to metal can or metal coil base.*

FIG. 7.

Make sure that the instrument panel and dash are actually grounded to the frame of the car.

If the distributor is manually retractable for timing, bridge the joint with flexible copper braid.

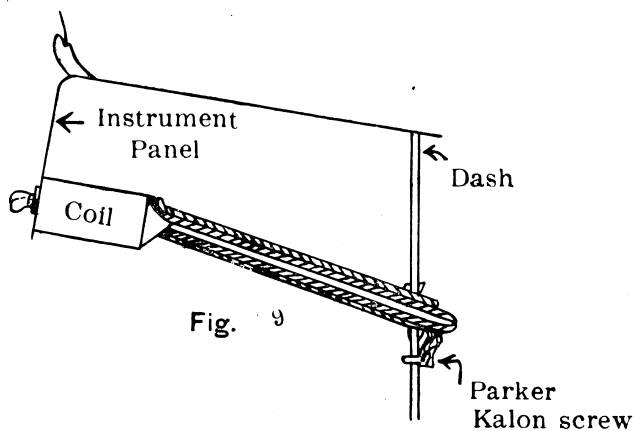
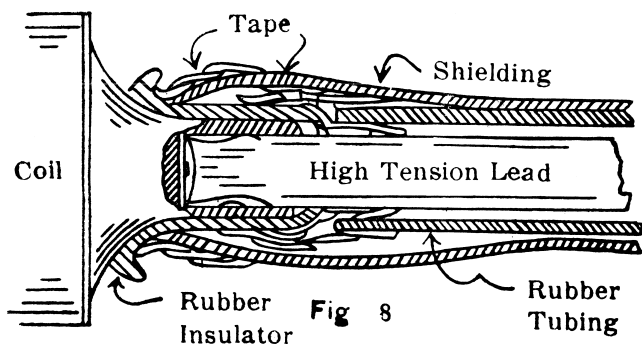
On cars where the Ignition Coil is mounted on the instrument panel, the radiated field from this coil is very strong, and will affect the Antenna direct or through either the passenger or the driver.

Obtain a rubber insulator of the type used on alligator clips, and of a size to slip over the protruding snout of the coil. Cut off enough of the small end of the insulator to enlarge the hole, so the high tension wire will slip through. Obtain a piece of rubber tubing which will also slide over the high tension wire; cut the tubing to

## AIR-CHIEF TWO UNIT CAR RADIO.

length which will permit it to extend from the end of the insulator through the dash for two inches. Cut a piece of shield braid one inch longer than the rubber tubing. Slip the tubing over the high tension lead, and the shield braid over the tubing. Slide the high tension wire through the small end of the insulator, and insert the head in the coil snout as far as it will go. Pull the insulator forward over the coil snout, and wrap two turns of tape around the high tension lead, pulling the lead forward, and taping it to the insulator so that the lead will not slide out of position.

Pull the rubber tubing forward until it touches the insulator tape, and tape the tube to the insulator. Now pull the shielding forward until it extends half-way over the coil snout. Tape the shielding down so that it cannot short to the primary. Split the end of the shield, extending through the dash to within one-half inch of the dash, and use the split portion as a pigtail to ground to the dash. (See Figures Nos. 8 and 9)



In assembling the car, often times paint, or the like, prevents good ground connection being made between the various metal parts of the car which form the ground circuit. These poor connections are not apparent from the standpoint of the operation of the car, as the voltage applied across the connections from the battery is enough to make a sufficiently good contact for that purpose. However, when a car radio is installed it is particularly desirable to maintain all the metal parts of the car at the same ground potential so that no radiation of spark interference will flow from the engine block to the dash, thence to the frame of the car for example, in order to reach the lowest ground potential. Bonding all of the oil pipes, cables, choke, and spark controls, etc., on the engine side of the dash tends to prevent radiation from the ignition circuit entering the radio set compartment under the cowl. Once the cause of interference is understood it is fairly easy to trace it to its source and to take the necessary steps for eliminating it.

### IN CASE OF TROUBLE

#### *No Reception:*

The Set may become inoperative due to several minor causes which are easily rectified, and the following items should be test ; if this condition exists:—

1, Fuse; 2, Antenna Installation; 3, Tubes; 4, Vibrator.

*Fuse:* To provide for protection for the Receiver in case of short circuits or other trouble which would place a heavy load on the battery, a 10 amp. fuse is located in the ammeter lead. This fuse is enclosed in the metal socket located in the ammeter lead approximately 8 in. from the terminal. "Blowing" of the 10 amp. fuse will be indicated by no reception, absence of the low mechanical hum, and the dial lamp will not be lit. If the dial lamp is not lit, but the radio programme can be heard, replacement of this lamp is necessary.

To gain access to the fuse it is only necessary to push the two ends of the fuse socket toward each other to disengage the bayonet locking pin, and the socket may then be taken apart by means of a slight turn of one end toward the left. The fuse may then be removed, and, if "blown," a new one of equal rating should be inserted in the socket.

If the fuse blows again after being replaced, it probably indicates a short circuit at some point in the Receiver, and the Receiver should be taken to the Dealer for service.

## AIR-CHIEF TWO UNIT CAR RADIO.

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**ANTENNA:** If the Antenna is in contact with metal parts of the car at any point, the Receiver will not pick up signals. To test for this condition, disconnect the Antenna lead-in from the Receiver, and touch the Antenna socket contact with bare end of a twenty-foot length of insulated wire stretched out on the ground. If the Receiver operates with this wire the trouble is in the car Antenna installation. During this test take care that the bare wire does not touch the shell of the Antenna socket or any metal part of the car, as this would render the test meaningless.

**TUBES:** If the dial lamp is lit and the low hum of the power unit can be heard, but the Receiver will not operate, the tubes should be checked. Remove the Receiver cover plate and press the tubes and vibrator firmly into their sockets, then examine the tubes to determine that their filaments are lit. If any of the tubes obviously have unlighted filaments they should be replaced, and if this does not clear up the trouble, all tubes should be replaced one at a time with other tubes, which are known to be in good order. If the trouble is not cleared up by this procedure, check the Antenna installation.

**VIBRATOR:** This is enclosed in a metal can near power transformer, as shown in Layout Diagram, Figure 10. To test Vibrator, simply switch power on and rest your finger on the top of this can and feel for vibration. If there is no vibration, simply withdraw Vibrator just as you would remove a valve, and insert a new one in its place.

If the foregoing tests have not located the cause of the trouble get in touch with the Dealer, who will arrange to have the Set serviced for you.

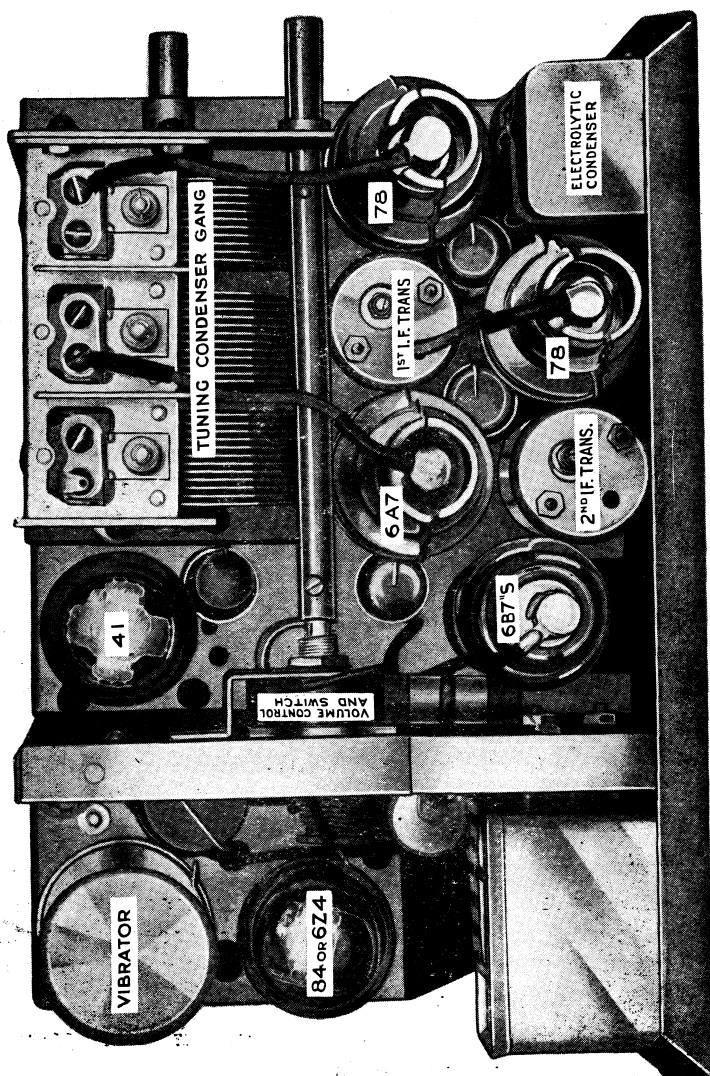
### *Interference:*

- (a) By-Pass Condensers: Each By-Pass Condenser should be shunted with one which is known to be in perfect order to determine a possible open condition in any of these condensers which might allow interference to be radiated.

A shorted condenser will, of course, affect the operation of the car, and will be noted in this way.

- (b) Receiver Case Ground: Be sure that all paint has been cleaned from around the Receiver mounting bolts on the engine side of the dash in order that the Receiver case may be grounded when the mounting nuts are thoroughly tightened. Lack of a good ground connection at this point may cause excessive interference.

# AIR-CHIEF TWO UNIT CAR RADIO.



LAY-OUT DIAGRAM.

Fig. 10.

# PRELIMINARY PROCEDURE

## 1—Tools:

Certain tools are necessary for rapid and efficient installation of Car Radios, and the list given below covers the minimum requirements of tools for this purpose:—

1. Assortment of 3 screwdrivers,  $\frac{1}{8}$  in. blade to  $\frac{3}{8}$  in.
2. Twist drills, .136 (No. 29),  $\frac{3}{8}$  in.
3. 5 in. long nose pliers.
4. 5 in. square jawed pliers.
5. 6 in. Crescent wrench, or equivalent.
6. 5 in. diagonal side cutters.
7. Medium size soldering iron.
8. Resin core solder. *Do not use Acid Solder.*
9. Two 12 in. monkey wrenches.

## 2—Receiver:

*Important:* Packed in each carton is a Packing Slip containing a list of all parts included in the package. This list should be thoroughly checked with the contents of the carton before installation is started.

Before installing the Receiver in the car, first fit the controls (see Fig. 4), then connect it to a 6 or 12 Volt Storage Battery according to the voltage of the Set, and test it to determine that it is operating properly, as explained in the next paragraph.

In the case of the Air Chief Car Radio it does not matter whether the battery cable is connected either to the positive or negative battery terminal.

Assuming that you connect it to the positive side of the battery, then one of the Mounting Studs must be connected with a short



IF FIRST CROSS BEAM  
NEARER THAN 5 INCHES  
TO FRONT OF CAR TACK  
START OF AERIAL TO  
SIDE OF SLATS.

AERIAL WIRE MUST BE FIVE  
INCHES FROM METAL CAR FRAME

METAL QUARTER DECK

TAKE UNDER SLATS  
AT THESE POINTS

FRONT  
OF  
CAR

REAR  
OF  
CAR

TAKE SHIELDED AERIAL  
LEAD DOWN CORNER  
PILLAR

NEAREST POINT OF  
AERIAL WIRE MUST  
BE AT LEAST SIX INCHES  
FROM DOME LIGHT AND  
DOME LIGHT LEADS

STARTING POINT TO BE AT  
LEAST 5 INCHES FROM METAL

ALWAYS TAKE AERIAL  
OVER TOP OF CROSS BEAMS  
AND TACK WIRES AS HIGH  
AS POSSIBLE.

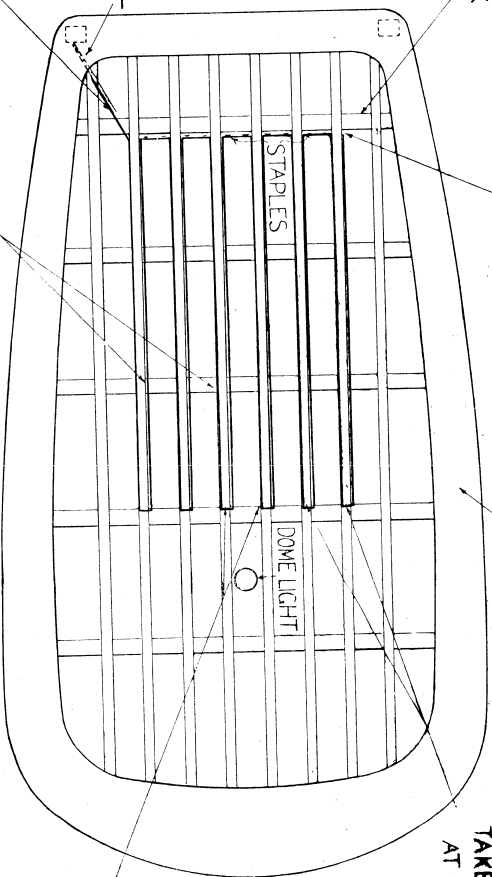


Fig. 3