SERVICE REFERENCE BOOK

AUTOMOTIVE RADIO SERVICE

Prepared by

CHRYSLER CORPORATION

PLYMOUTH, DODGE, DE SOTO AND CHRYSLER DIVISIONS

Vol. 4 **No. 7**

TECH SEZ:

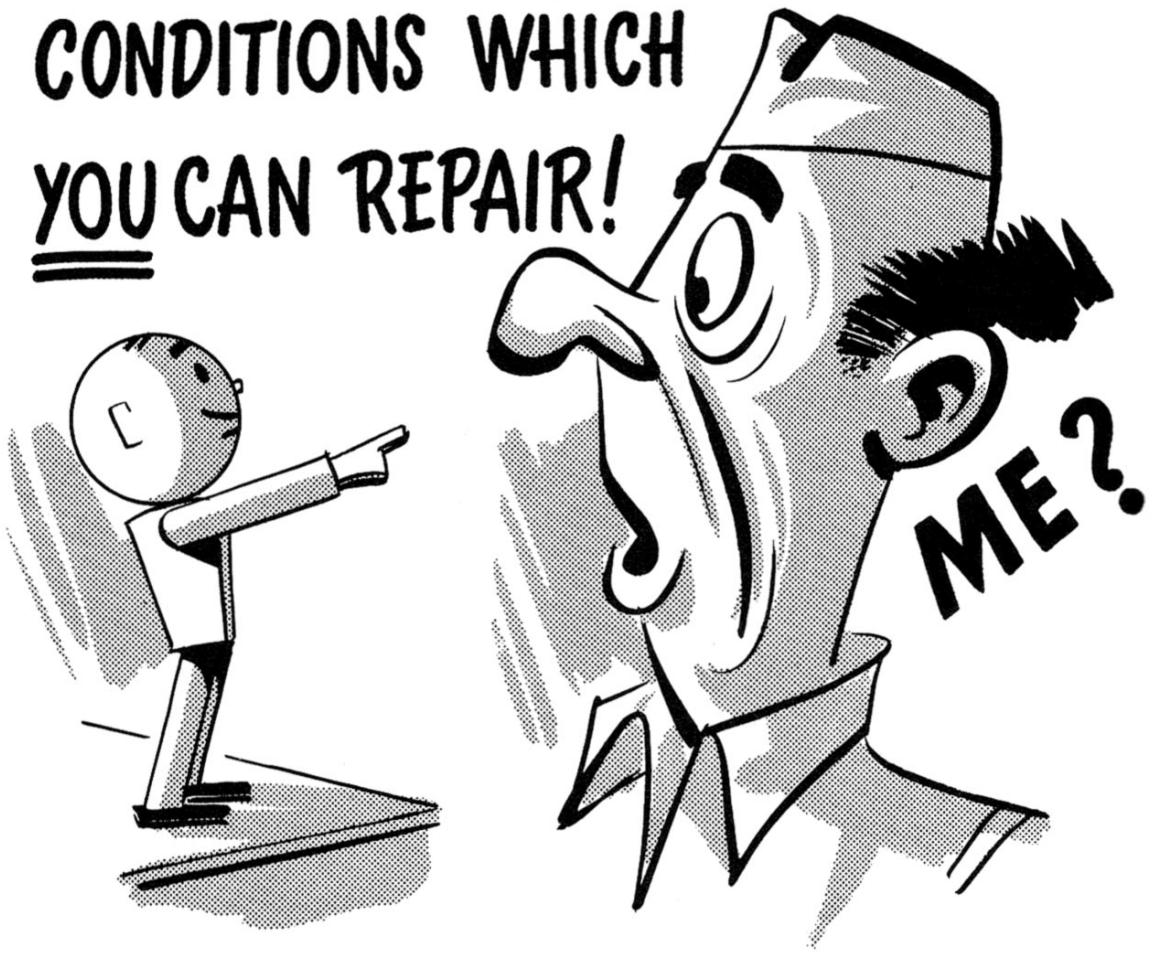
RADIO SERVICE CAN BE A PLUS SERVICE FOR YOU

This month we've got a film jam-packed with radio trouble-shooting for you mechanics. But, mind you, we're not trying to make radio repairmen outta you! However, this film ought to aid you to make a lot of first aid checks for radios that can add that little bit of extra service that sends the customer away with that "I'll-come-back" feeling. A lot of the mystery that appears to surround radio work will disappear after you've seen this film and read the reference book.

HERE'S WHAT WE'RE COVERIN' THIS MONTH...

CHECKING A DEAD RADIO

Checking a dead radio to find the cause of failure isn't as difficult as it first appears. The majority of failures are from relatively simple causes; conditions which *you* can repair.



Suppose we start out with a dead radio and show you just how easy it is to track down and remedy a radio failure. A dead radio is any radio which does not play, or which plays so faintly you can barely hear it.

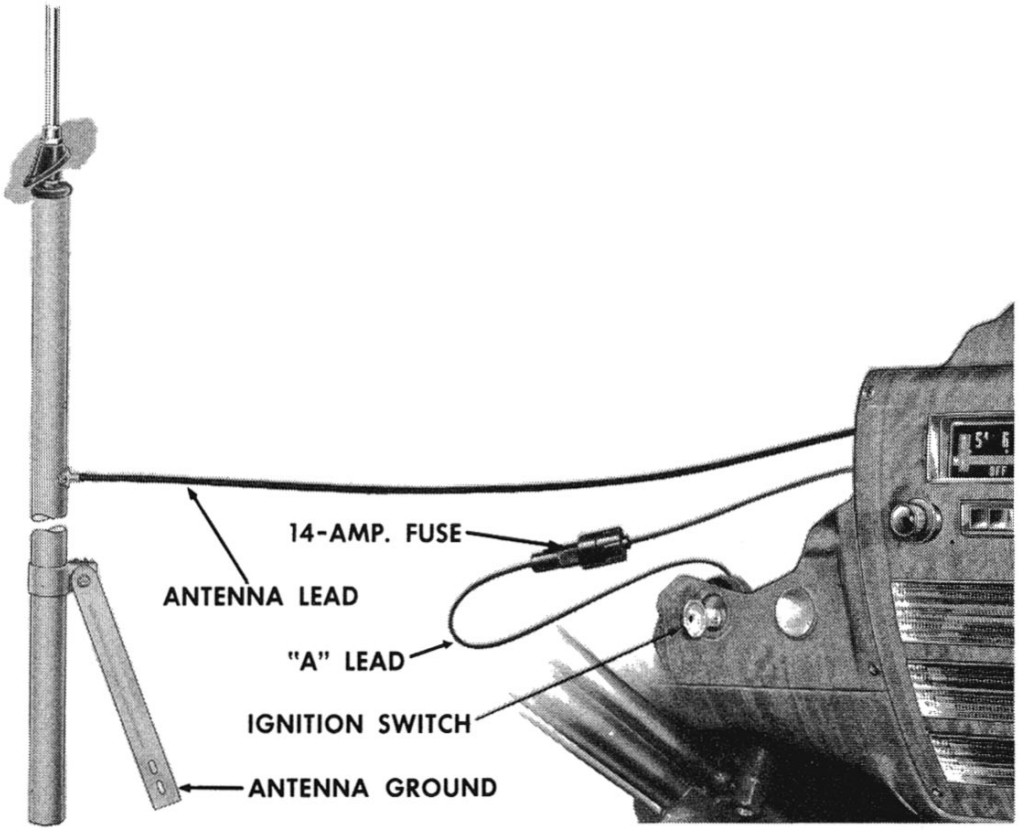
TESTING IN THE CAR

Park the car in a relatively quiet spot in the shop.

Stop the engine and turn the ignition key to the ON, or the ACCESSORY position.

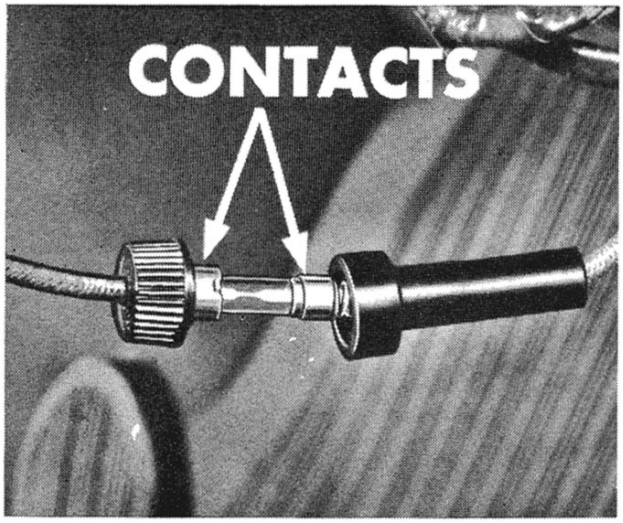
Turn the radio volume control to the ON position, and listen for the characteristic vibrator hum. If the vibrator *does not* hum, you will know that the difficulty is probably in one of two places; either in the vibrator itself, or in the "A" lead, which carries current to the radio.

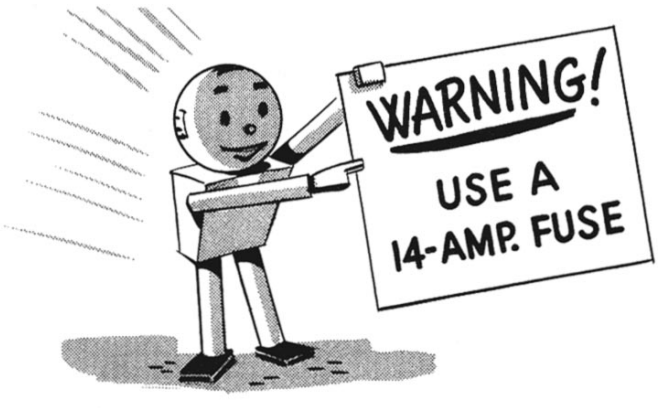
Check the "A" lead circuit first. This check can be made without removing the set from the car.



CHECKING THE "A" LEAD

Fuse—Remove the fuse from the fuse holder located in the "A" lead and inspect it. Even though the fuse appears to be all right, replace it. Fuses can fail in such a way that the failure may not always be determined by visual inspection. While the fuse is removed, inspect the fuse holder and contacts for corrosion. If corrosion is present, clean the contact surfaces, or replace the "A"' lead. When you put in this new fuse and close the holder, make sure that there is enough spring tension to insure a good contact. A broken or corroded spring in the holder isn't very common, but it is one of those things that can happen and which can be a difficult condition to find. Be sure to use a 14-amp. fuse! A higher capacity fuse may result in extensive damage to the radio set.



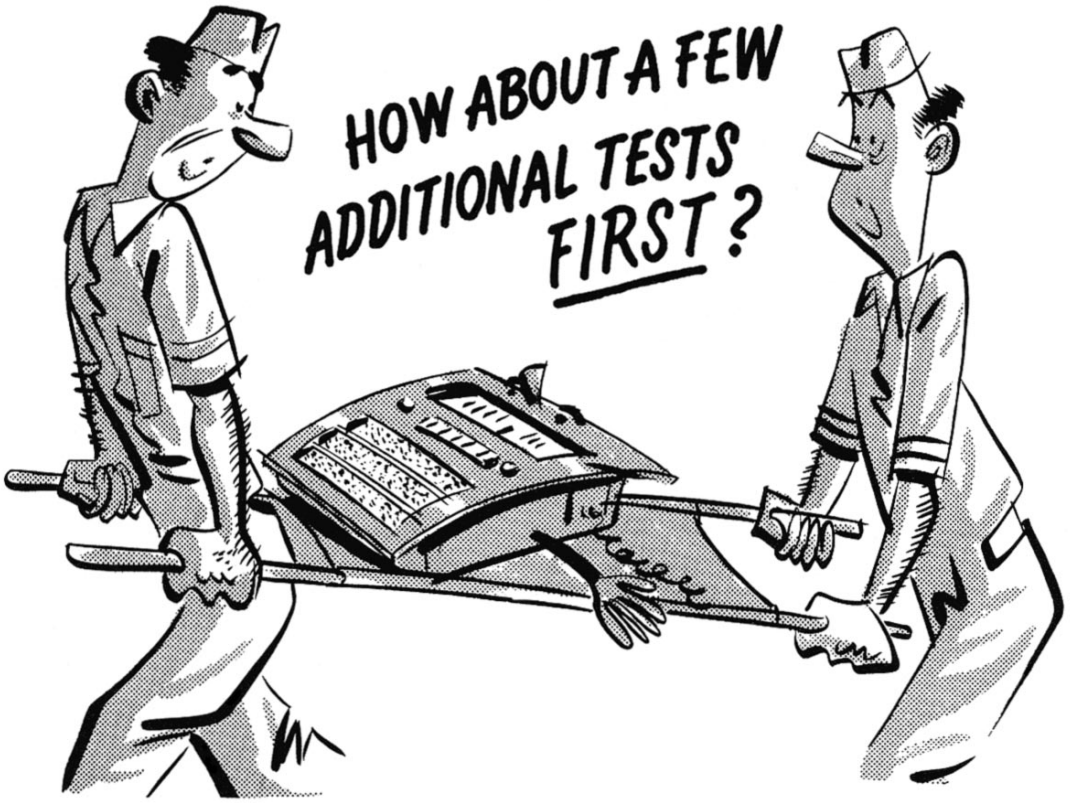


"A" Lead—If replacing the fuse does not correct the condition, make a careful visual check of the "A" lead for damage and for tight connections.

> **NOTE:** The "A" lead may be connected either to the "hot" terminal of the fuel gauge or to the accessory terminal of the ignition switch.

Now remove and inspect the other end of the "A" lead. Make sure that it is clean and that it is making good contact in the radio set.

Actually, these three checks can be made in a fraction of the time it takes to explain the operation, and they prove to you that power is getting to the set. Often these checks will locate the cause of the "dead" radio. However, if the set is still dead, you'll have to make additional tests.



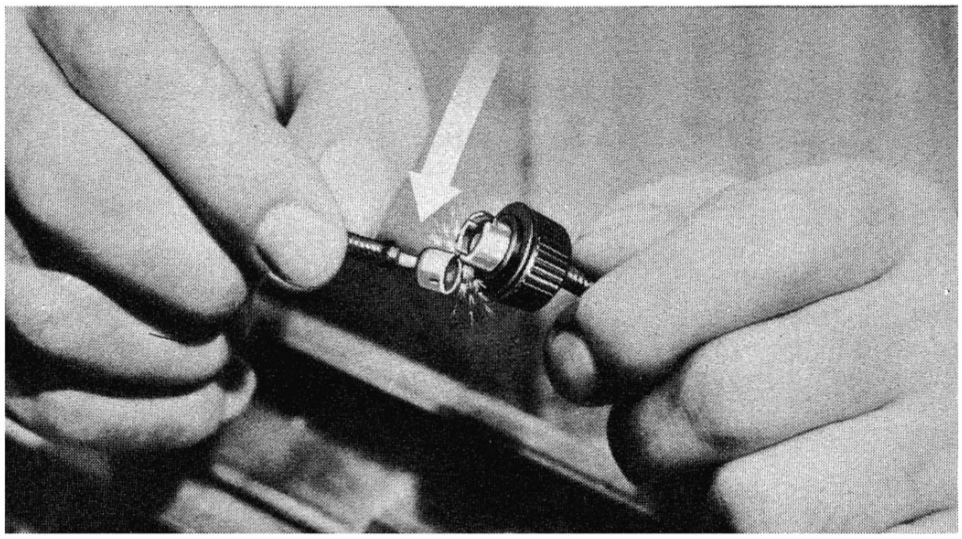
Vibrator—If, after checking the "A" lead and fuse, the vibrator still does not hum, you'll know that the vibrator is the next point you'll have to check.

Just what *is* a vibrator and what does it *do?* A vibrator is nothing more than an automatic vibrating electric switch. It gets its name from the pair of vibrating tungsten points which are the heart of this vibrator. When these points vibrate, the six-volt direct current from the battery is changed into a pulsating direct current. The transformer, which will not operate on steady direct current, receives this pulsating current and builds it up to the higher voltage necessary to operate the radio set.

What is there about the vibrator that causes trouble? Well, once in a while these tungsten points stick together. This allows more than the normal 14 amps. of electricity to pass into the fuse, and the fuse blows out. These fuses will continue to blow as long as the vibrator points stick. These vibrator points can often be freed up by "flashing" the fuse contacts.

"Flashing" the Vibrator—Pull the two halves of the fuse holder back so that the two fuse contact ends are exposed.

Flash these two contacts together with a striking motion, like you were striking the heads of two matches together. This sends a surge of electricity to the vibrator and will usually free up the sticking points. But, a word of caution: Don't hold the contacts together. If you do, it will send too much amperage into the set and probably cause damage to the internal circuits.



If you find that fuses continue to blow after you have flashed the vibrator points, there is only one thing left to do. Replace the vibrator.

Fuses Blow Periodically—You may find an occasional case where there is a spread of several hours, days or even several months, in the life of a fuse. As we've discussed before, this erratic fuse life is caused by sticking vibrator points. So, if the fuse has been replaced two or three times, replace the vibrator.

EFFECT OF GENERATOR CHARGING RATE

Some mechanics, and radiomen too, have put the finger on the generator and generator regulator as the cause of early vibrator failures, and for blown fuses. Now is the time to correct this mistaken impression.

A normal, controlled charging rate does not burn up vibrators, or blow radio fuses. If, by chance, the generator regulator *did* get out of control, it would cause other difficulties before it affected the radio. For example: Early distributor point failure; abnormal "boiling off" of the battery water; and short life of the headlights and other light bulbs are symptoms of a high charging rate. So, don't blame the generator or the generator regulator for radio failures.

THE ANTENNA CIRCUIT

Let us assume that the vibrator does hum, but the radio still does not play, or plays very faintly with the volume turned to the fully ON position. Actually, when you hear the vibrator hum, you know the "A" lead circuit is complete, and that current is reaching the set; also, since the vibrator is operating, current is being transmitted *into* the set.

Therefore, the remaining causes of failure to operate can be divided into *two* general classes:

Either the antenna circuit is not bringing a signal into the set, or there is a failure in a tube or some other part of an internal circuit. The first place to check is the antenna circuit. After all, the antenna is just a device that picks the signal out of the air and channels it into the set. Inside the set, the signal is amplified several times. So you can see that an open or short circuit in this antenna circuit would keep the signal from getting through to the set.

A radio repairman, working with instruments, can quickly check out an antenna circuit and pinpoint the trouble. A mechanic can find out all he needs to know about this antenna circuit in a few moments by making a substitution check.

Disconnect the old antenna and plug in an antenna you know to be good. It isn't necessary to mount the test antenna on the car—just hold it out the window. If the set still won't play, even with the new antenna, but you do get a hum from the vibrator (as you did before the antenna substitution), you can be certain that the installed antenna and its circuit are in good condition. The next check would be of the tubes. This step usually means removing the set from the car.

TESTING ON THE BENCH

You don't need an elaborate test bench set-up to track down the kind of trouble you can fix. Get the following items:

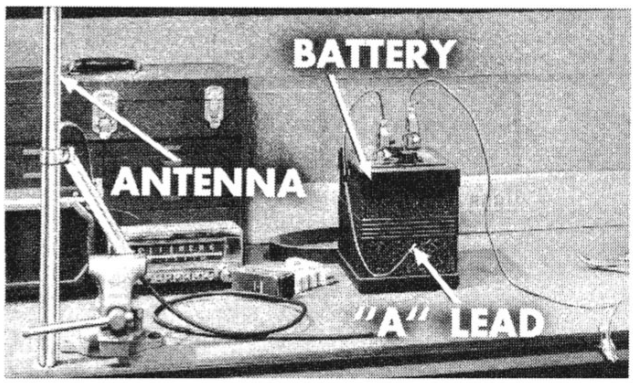
A good, fully charged battery (6 volts)

A ground cable

An "A" lead

An Antenna

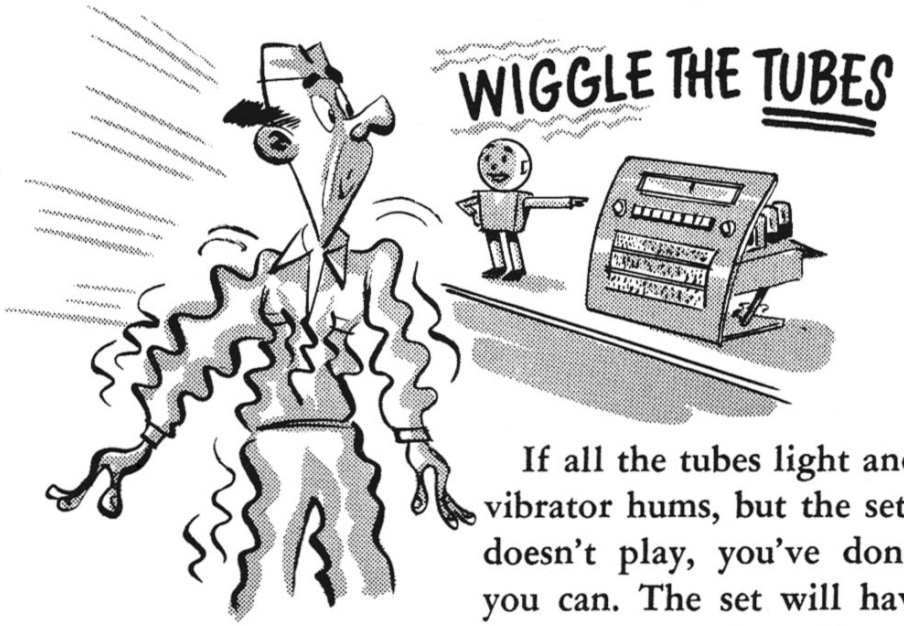
Ground the positive lead from the battery, and connect the negative lead to the "A" lead socket of the radio. Since this negative connection must be made through a 14-amp. fuse, the simplest connection can be made by using an "A" lead assembly, complete with 14-amp. fuse. Ground the external case of the antenna, and plug the lead into the antenna socket of the radio and you're ready to make a bench check of the set.



Vibrator and Tube Replacement—Before making any checks, make certain that the control unit cable is properly seated in its socket. Turn the radio on and listen for the vibrator hum. If no hum is heard, replace the vibrator. If no hum is heard from the replacement vibrator, check the fuse to make certain that it wasn't blown by the old vibrator. If your in-the-car checks have indicated vibrator trouble, it's a good bet that a replacement vibrator will solve your problems.

If the new vibrator hums, but the radio still does not play, the finger points to the tubes. So start making a substitution check of the tubes.

All tubes should light up. If a tube does not light, remove it and install a new tube. Many mechanics check for faulty tubes by "feel." After the set has been turned on for several minutes, all of the tubes should feel warm. It's not a bad idea to wiggle each tube before you make a replacement. Wiggling insures that the tubes are tight in their sockets.



If all the tubes light and the vibrator hums, but the set still doesn't play, you've done all you can. The set will have to be sent out to the radio service station for repair.

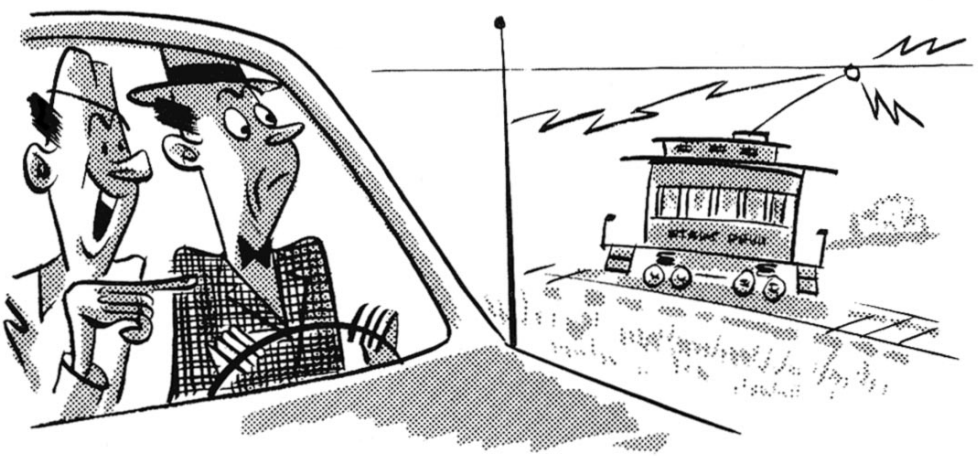
RADIO INTERFERENCE

Automobile radios may be subject to three general types of interferences: (1) external, (2) internal, and (3) background noises. It is very important to identify the type of interference before attempting to determine the cause of the trouble.

Be sure to find out from the customer: (1) kind of interference noise, (2) under what condition he gets this noise and, if possible, (3) have him turn on the radio and demonstrate the noise to you. In cases where the interference is intermittent, this demonstration is not always possible.

EXTERNAL INTERFERENCE

You might call this type of interference, man-made interference. It is caused by streetcars, buses, power lines, neon signs, etc.—all man-made. Most owners realize that this man-made interference is not the fault of the radio set itself. Actually, a powerful and sensitive set is more apt to pick up objectionable external interference than is a less powerful, less sensitive set. There is nothing that you can do to prevent a radio from picking up strong external interferences. What you *can* do is to show the customer that it *is* external interference, and not some other type. You can usually do this by having the customer drive with you into a locality that is relatively free of this man-made interference. If the interference lessens, or disappears altogether, it should convince the customer that his noisy radio is the result of external interference and is not the fault of the set.



INTERNAL INTERFERENCE

There are three basic causes of internal interference which are apt to be more prevalent: (1) ignition, (2) generator, and (3) tire static. Suppose we take the first two—ignition and generator—and try to pin them down. Start by making this check:

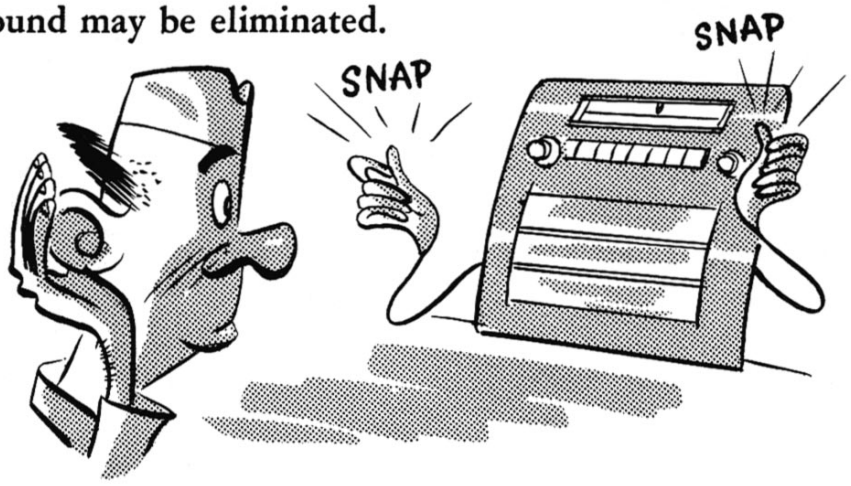
Turn the radio on while the engine is running.

Tune the radio so that it does not bring in a radio signal, but does bring in the maximum amount of interference noises.

Then shut the ignition off.

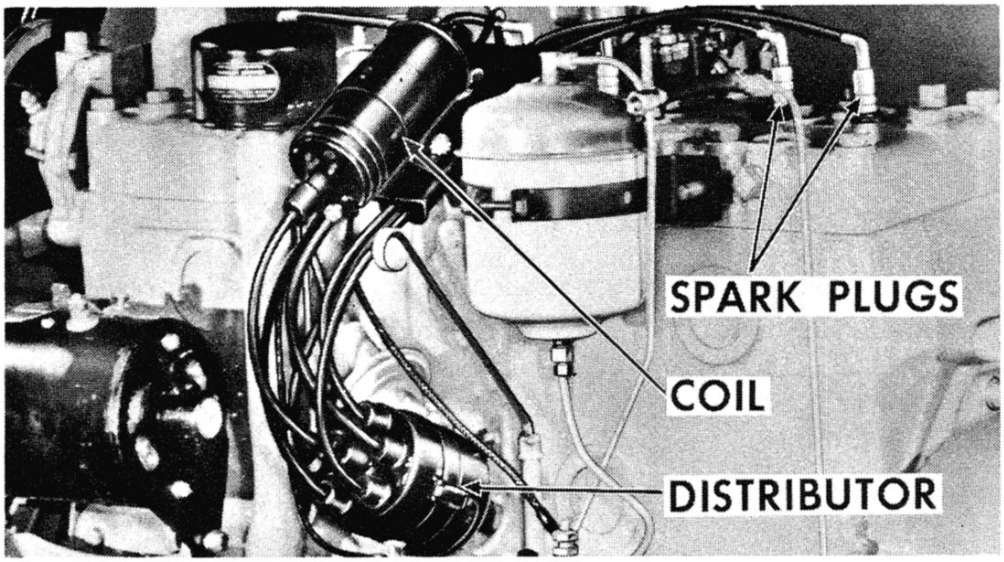
If the noise stops when the engine stops, you'll know that the interference is in the ignition or the generator.

Suppose we take these interferences one at a time and explain how each sounds, what causes the sound, and how the sound may be eliminated.



Ignition Interference—Ignition noise is familiar to all mechanics as a sharp, regular snapping noise that increases in frequency as the engine speed is increased, and decreases when the speed is decreased. Ignition interference is usually traced to the ignition secondary circuit.

You'll find that a loose high tension wire is the most common cause of ignition noise. Often this type of noise can be eliminated by making certain that there is a good electrical connection at—(1) the high tension terminal of the coil, (2) at the coil and spark plug wire terminal of the distributor cap, and (3) at each of the spark plugs.

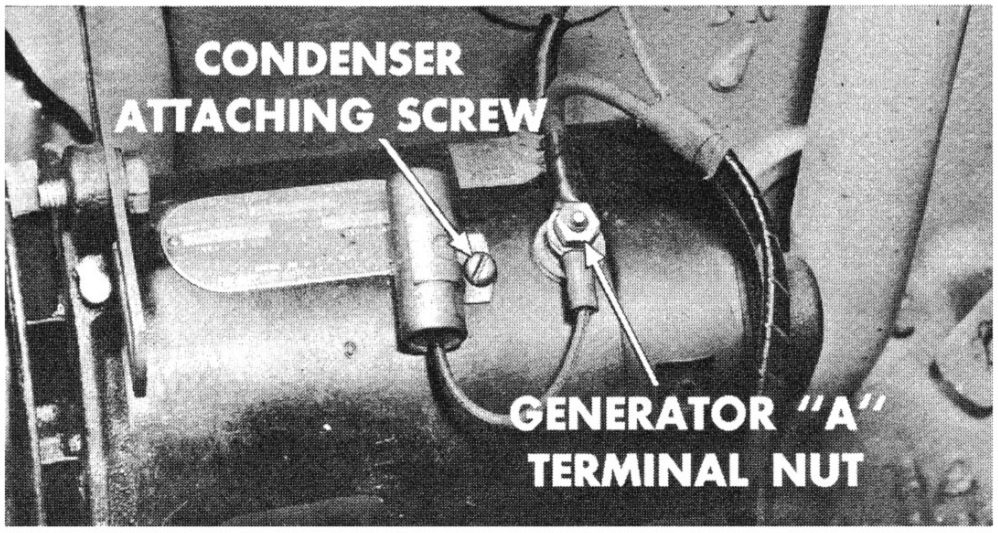


If this quick check of the ignition secondary circuit doesn't uncover the trouble, you'll have to make a complete check of the ignition system to locate the trouble. You'll usually find that the condition which is causing radio noise may also contribute to sub-standard engine performance. By locating and correcting this ignition interference, you may also help to correct sub-standard engine performance. So, actually, you would be performing two services in one for your customer.

Antenna Ball—That little ball on the end of the antenna is important. It's there to let the static electricity which is picked up by the car leak off into the air. If that ball is missing, the end of the antenna has sharp edges and perhaps ragged points. Static electricity will discharge from these points with a snap, like the electricity discharges across the points of a spark plug. This electrical discharge will be noticed in the reception of your radio, and will sound like outside interference. As we said, this ball allows the electricity to leak off into the air without a sound. So, if the ball is broken off, the antenna should be repaired or replaced.

Generator Interference—As all of us know, generator noises start out at low engine speeds as a low-pitched whine, increasing gradually to a high-pitched whine as the engine speed is increased, and decreasing in pitch as the engine speed is decreased.

If this type of noise is present, check to make sure that the generator "A" terminal nut and the condenser attaching screw are tight. If this fails to eliminate the noise, install a new condenser.



In cases where replacing the condenser does not eliminate the noise, remove the generator band and inspect the brushes and the commutator. Replace any worn brushes. Clean the commutator, if found to be dirty. Watch for abnormal arcing at the brushes. This arcing is an indication that the brushes are not seated properly. In extreme cases, you may even have to remove the generator, turn down the commutator and undercut the mica. Then sand in the brushes to make certain that they make good contact.

Tire Static—Noise caused by tire static is one of those will-o-the-wisp, elusive types of interference. It's present at one time; absent at another. You will find that tire static is seldom objectionable on rainy days. Wet pavements tend to allow this electrical static charge, which builds up in the car and the tires, to discharge to the pavement as fast as it builds up. In other words, a wet pavement makes a good ground. The static charges can't build up enough voltage to cause radio interference.

Tire static is most noticeable while driving on dry concrete, or on dry blacktop roads. This fact alone should give you all the clues you'll need to track down and correct cases of tire static interference. If you suspect that the interference is caused by tire static, drive the car down a dirt or graveled road. Most of the noise should disappear, if it is caused by tire static. Tire static suppression powder (Package Part No. 123 3883), and a special injector (Part No. 123 3884) are available through MoPar.

BACKGROUND INTERFERENCE

Background noises are the noises you get when you tune in a weak or distant station. There isn't much you can do about this type of interference, but an explanation of why it happens might help you to identify this type of noise.

You've probably noticed that some weak or distant stations come in clear on certain days and not so clear on other days. You've also probably noticed that the weather has something to do with reception of these weak or distant stations; that the signal gets through better under some atmospheric conditions. When the very weak radio signal comes through to your set, you have to turn the volume up to hear the signal. Since the radio doesn't know the difference between the weak signal and surrounding man-made static, it amplifies both the signal and the static. Result—noisy reception and objectionable interference. As we said before, there isn't much you can do about this type of interference. Actually, it is a form of external interference.

OTHER TYPES OF INTERFERENCE

So far we've covered the more common causes of interference. These shouldn't be too difficult for you to locate. Now and then, however, you are apt to run up against various other causes of interference which are not going to be so easy to diagnose and fix. If you get stumped by one of these uncommon interference conditions, you had better make a few more installation and loose wire checks. If these don't turn up the cause of the interference, turn the radio—car and all—over to a qualified radio repairman. However, try these additional loose wire checks before you turn the radio over to the repairman.

Loose Car Wiring—Once in a blue moon, loose primary wires will cause or contribute to objectionable interference. In most cases this interference will be intermittent, and therefore mighty hard to diagnose. About all that you can do about it is to make a check of all connections to the lights, horn, heater, cigar lighter, and other accessories.

RADIO INSTALLATION AND ADJUSTMENT

Proper installation and adjustment of a radio helps eliminate causes of interference complaints. You'll find it a lot easier to check a radio for proper installation and adjustment, than to try to determine the exact cause of interference caused by poor installation or improper adjustment.

Since all of us are interested in the quickest and easiest way to diagnose radio troubles, suppose we run through the important points to watch for when installing and adjusting a radio in a car. Knowing what is right and what is wrong in installation and adjustment procedures will help you to know what to look for when you get an interference complaint that is a bit off the beaten path. The more you know about the radio, the better you're going to be able to lick any radio problems that come your way.

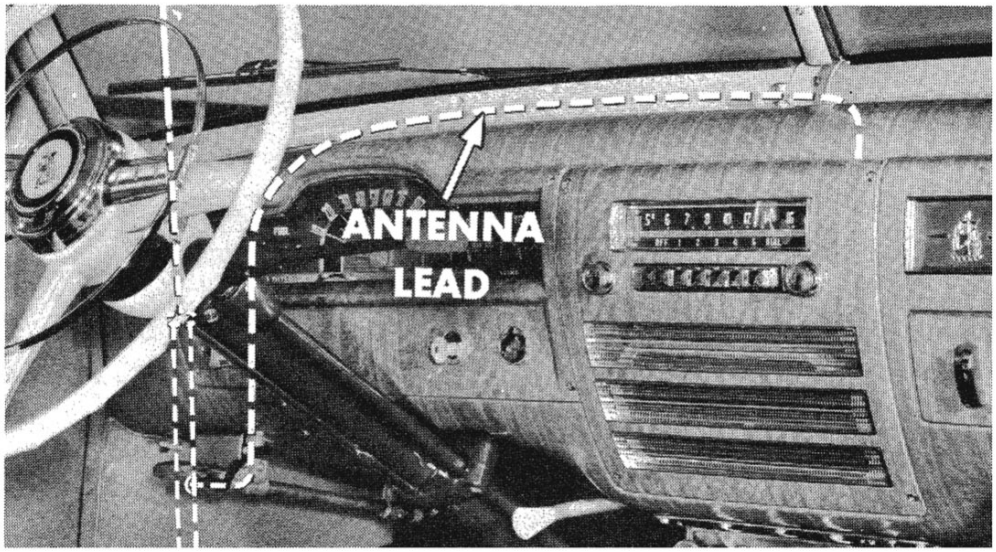
INSTALLATION

The following points are important to proper car radio installation:

Make certain that all antenna mounting screws are tight. Pay particular attention to the antenna ground connection, to see that it is tightly attached to the antenna and to the body metal.

If these points are not tight, there will be intermittent noise in the set just as there would be from any loose electrical connection.

Run the antenna lead to the radio, making sure that this lead is far above, and as far away from the car wiring as possible. Under no circumstance should any car or accessory wiring be coiled about the antenna lead. The antenna lead tends to pick up interference directly from the car wiring if placed too close to this wiring. Make certain that the antenna lead is tucked out of the way so that it will not drop down and be caught and pulled loose from its connections. Plug the antenna lead into the radio, making certain that it is firmly in place, assuring a good contact. The antenna lead is shielded and in some cases has a pigtail with a little eyelet. This pigtail must also be grounded.



Connect the "A" lead to the accessory terminal of the ignition switch. Install a 14-amp. fuse in the fuse holder. Plug the "A" lead securely into the radio.

Make certain that the radio is securely fastened in place. Check all attaching screws, bolts, and braces to insure proper grounding of the set, and to reduce to a minimum jiggling or jouncing of the set when the car is on the road.

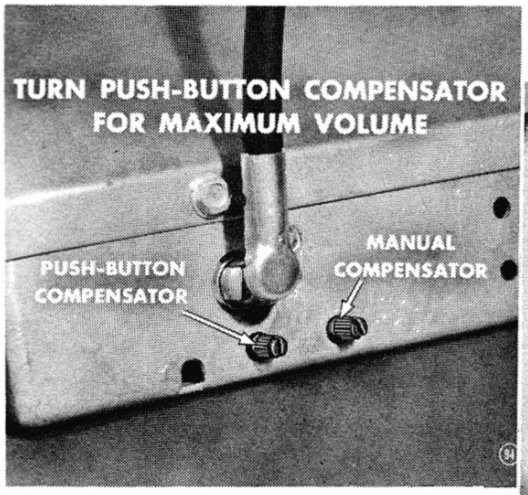
ADJUSTING AND TUNING THE SET

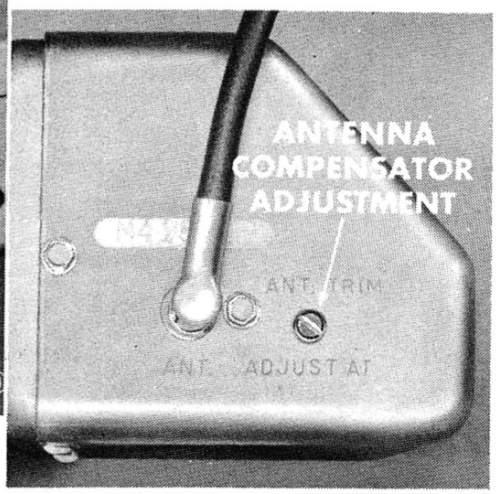
Proper adjustment of the radio is essential to good reception. A properly adjusted radio is far less susceptible to interference and objectionable static than an improperly adjusted radio. There are no short-cuts to radio adjustment. Attention to detail in the adjustments listed below is very important.

Difference Between 800 and 600 Series Radio Sets—The actual operation of tuning the set varies between the 800 series (or the set with five push-button stations) and the 600 series (or the set with four push-button stations) because of differences in the construction of the set.

For example: The 800 Series set has both a manual and push-button antenna compensator. The 600 Series set has only the manual antenna compensator.

The 800 Series set has a separate electrical tuning circuit for each push button, while the 600 Series set has one tuning circuit for both push button and manual tuning.





The push-button covers, of sets used on 1951 models, are removed from the push buttons when tuning the 800 Series set push-button station selectors. The covers used with the 600 Series set are simply pulled out about a quarter of an inch, but are not removed from the push button. There are other differences, of course, but they are important only to the radio technician.

If a set is new, turn it on and let it warm up for at least twenty minutes before attempting any adjustments. This twenty-minute warm-up period is necessary. It allows the set to reach maximum fidelity, and also gives it time to dry up moisture that may have accumulated while the set was in stock. If you make any adjustments without waiting for the twenty-minute warm-up period, the set will be adjusted to the lower degree of fidelity present at that moment. If the set has been in regular service, however, a few minutes warm-up is sufficient before making adjustments.

If practical, park the car in a shielded place. By this we mean a steel-constructed building or under a viaduct where the signals are weak. You can't always do this, but at least you can park the car in the area of your shop where the signals are the weakest.

Manual Antenna Compensator Adjustment—The first step in tuning the set is to make the manual antenna compensation. This is the operation which adjusts the installed set to the installed antenna. The antenna compensator adjustment knobs, or screws, are located near the antenna lead socket.

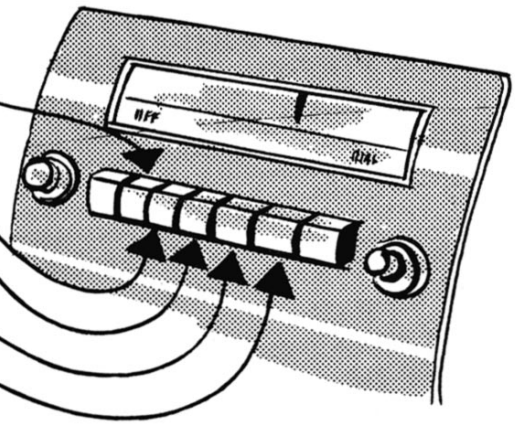
Extend the antenna fully. Turn the volume control to maximum and adjust the tone control to VOICE.

Tune in a weak station, near 1400 kilocycles, with the manual control. This is important! Only a weak station will give you the conditions you need to do a good job of adjusting for antenna compensation.

When you have the station tuned in manually, adjust the manual antenna compensator to obtain maximum volume.

Kilocycle Range for Push-Button Tuning—When selecting the five best stations for push-button tuning, the stations must fall within the following kilocycle ranges:

Button No. 1—535-1020 kc
Button No. 2—610-1200 kc
Button No. 3—700-1410 kc
Button No. 4—740-1500 kc
Button No. 5—840-1600 kc



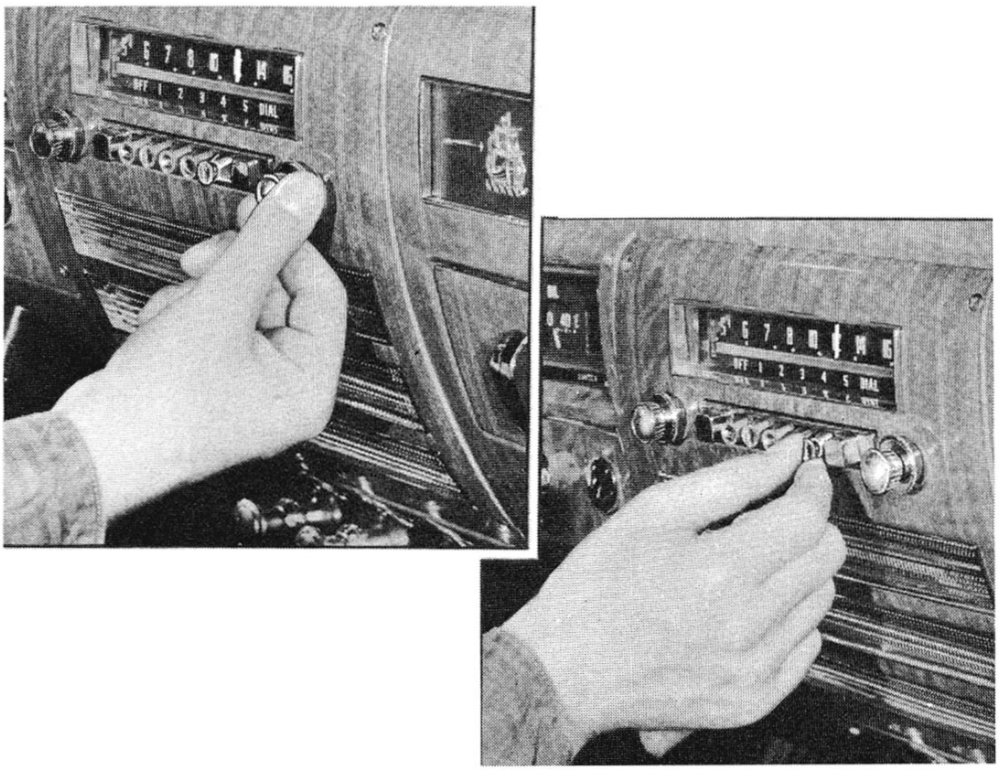
PUSH-BUTTON COMPENSATOR ADJUSTMENT—800 SERIES

Since the 800 Series set has a separate compensator adjustment for the push-button circuits, the next step is to make this adjustment.

IMPORTANT: The push-button antenna compensation is made on No. 5 button ONLY.

Manually tune in a station as close to 1200 kilocycles as possible. Listen to the program enough to be able to identify it. Then push No. 5 button and turn the knob or screw in the end of the button until you have brought in the same program you had when you tuned in the 1200 kilocycle station manually. Be sure you bring in the station as clearly as it was when you tuned it in manually. Then, adjust the push button antenna compensator to get maximum volume. Do not disturb the previous adjustment you made to the manual antenna compensator.

The remaining station selector push buttons should next be adjusted just as you tuned in the station for No. 5 button. Do not make further adjustment of the push-button antenna compensator, however—that adjustment is made only when tuning in the No. 5 push button.



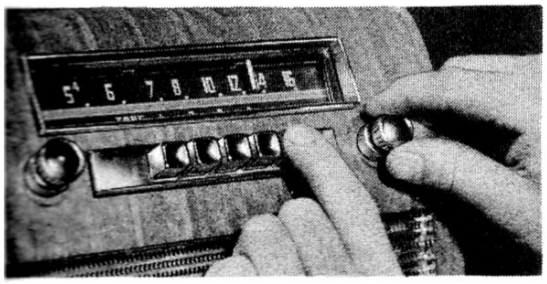
PUSH-BUTTON ADJUSTMENT—600 SERIES

Be sure the set is warm before making adjustments. If the set has been in service, it should warm up about two minutes; if it is a new set, it should warm up a full twenty minutes before making adjustments.

Decide, from the kilocycle table, the four stations to which the push buttons are to be set. Set the station with the lowest kilocycle range first, and the station with the highest kilocycle range last.

Starting with the No. 2 button (the No. 1 button is the tone control button), pull the button cover outward about a quarter of an inch (for the 1951 model set).

Push the button in lightly, and hold it in that position. Manually tune in the station you want. When you get the station as clearly as possible, push the button in firmly, moving the cover back into position over the button.



Adjust each of the remaining three buttons in the same manner.

When you have completed the push-button adjustments, recheck all of them to be sure they are properly located on the stations. Do this by listening to the tone of the program when the button is pushed in, and then tune in the same station manually to see if there is any difference in the quality of reception. If the reception is clearer when the station is tuned in manually, you'll have to reset the push button.

QUESTIONNAIRE

TEST YOURSELF

WITH THESE QUESTIONS!

1. A 14-amp. fuse is used in an automobile radio circuit. RIGHT ☐ WRONG ☐

2. The vibrator is a device for changing direct current to a pulsating current. RIGHT ☐ WRONG ☐

3. "Flashing" is a procedure used to free up the sticking points of the vibrator. RIGHT ☐ WRONG ☐

4. The generator regulator should be checked immediately if the fuse blows, because the generator charging rate may be too high. RIGHT ☐ WRONG ☐

5. A substitution check, using an antenna known to be good, is a quick way to check the installed antenna circuit. RIGHT ☐ WRONG ☐

6. If the vibrator hums but the set does not play, the next point to check is the tubes. RIGHT ☐ WRONG ☐

7. If you get interference noise with the engine running, and lose this noise when the engine stops, you probably have ignition or generator interference. RIGHT ☐ WRONG ☐

8. Proper installation and adjustment of a radio helps to eliminate causes of interference. RIGHT ☐ WRONG ☐

9. A loose high tension wire is a common cause of ignition interference. RIGHT ☐ WRONG ☐

10. An antenna compensator is a unit for adjusting the installed set to the installed antenna. RIGHT ☐ WRONG ☐

LITHO IN U.S.A.