

Auto Radio

DEALER'S MANUAL



DELCO RADIO DIVISION

GENERAL MOTORS CORPORATION

World Radio History

Foreword

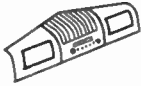
A great many factors influence the customer's appreciation of his automobile radio; the installation must be correct, and he must understand the operation of the radio as well as the effect of local reception conditions.

Past experience has proven that over 75% of the radio complaints encountered in a Car Dealer's Service Department are actually of a minor nature. These minor troubles are due to lack of understanding of radio operation, of existing local conditions, of installation problems, or a definite defect in tubes or vibrator.

Since the majority of Car Dealers have sold more than enough radios to warrant their interest in radio service, this manual has been prepared to answer all questions about minor complaints. It will help you to give your customers prompt and efficient service and will open the door to a phase of radio service that is definitely within the scope of your present personnel and equipment.

We call it Simplified Radio Service.

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WHAT TO EXPECT OF A RADIO



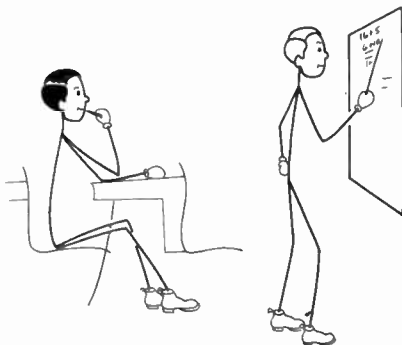
EACH auto radio is built to obtain the best possible performance in the car for which it is designed. In its compact little case it contains design refinements of the best features of large home radios. It has to out perform even the better than average home radio because of the vast difference in operating conditions imposed on the two types of radios.

The home radio is stationary and its performance characteristics are soon learned. Stations which are not received satisfactorily for various reasons, are avoided and noises are soon catalogued because father's electric razor, mother's vacuum cleaner, the oil burner, and even the local Doc's X-Ray machine always make the same characteristic noise each time they are turned on. Once these noises are identified, they are usually tolerated --or avoided by tuning in stronger stations. So, because it stays in one place, the home radio is generally operated on only two or three of the strongest and best received stations.

Therefore, due to the fact that the auto radio has to compensate for its constantly changing relationship to radio stations and man made interferences, it must perform better than the home radio to produce equivalent entertainment. Since correct use of the controls and antenna will minimize the effect of poor locations on the radio, an understanding of "What to Expect" will increase customer appreciation.

CUSTOMER INSTRUCTION

KNOWLEDGE of "What to Expect" is not only a deciding factor in a customer's appreciation of his radio, but also an essential requirement in obtaining customer satisfaction. An explanation of "What to Expect" will present the



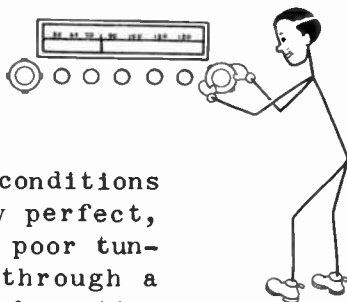
story of an auto radio immediately and prevent the customer judging it by experiences which may make him criticize the radio unfairly. Customer instruction will prevent the building of a wall of misunderstood experiences which can be surmounted later only by much selling effort.

Start the customer off on the right track with his new radio. Take a ride with him. Show him what perfect reception he can get in good locations while explaining the operation of all the controls.

Explain the effect of street car lines, neon signs, buildings, power lines, mountains, and the power of the various stations available in his locality. Don't forget to emphasize the importance of having the antenna fully extended for minimum noise and maximum distance.

Fifteen minutes of instruction on the following points may save hours of explanation and checking later on.

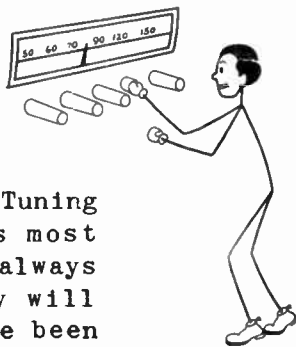
MANUAL TUNING



IN the first place, even if conditions for reception are absolutely perfect, the program may be ruined by poor tuning. If the set is tuned through a fairly strong station it will be noticed that, as the pointer approaches the station, a small amount of hiss will be heard and the station sounds as though all the bass notes had been left out; at the point of correct "on the nose" tuning the signal clears up and the program has just the right tone balance; tuning out of the signal causes high pitched reception and slight hiss again.

Be sure the radio is tuned to the center of the station signal for the best tone quality and decreased noise; don't detune the set to decrease the volume--turn the volume control down.

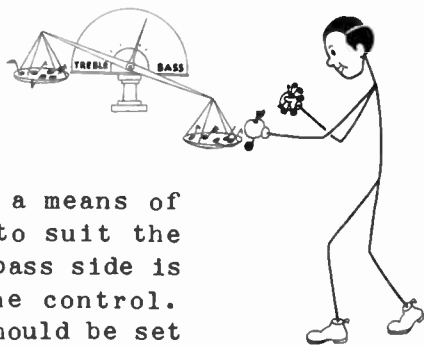
PUSH BUTTON TUNING



THE very fact that Push Button Tuning is practically automatic makes most people assume that the buttons always tune correctly. However, they will tune correctly only if they have been set up correctly and tune to the center of the signal. If they tune into the edge of the signal the program will sound high pitched as though the bass notes had been left out.

If the tone quality of a program can be improved by touching up the tuning with the manual tuning knob--reset the push button.

TONE CONTROL



THE tone control affords a means of varying the tone balance to suit the listener. If music on the bass side is preferred, adjust the tone control. However, the tone control should be set in the treble position for strictly talking programs such as news and sports events to obtain the best reproduction of speech.

Setting the tone control for bass will sometimes help to clear up static or interference if the reception of a particular program is important.

ANTENNA

THE antenna has always been a pretty important part of good radio reception and the modern auto radio antenna is still more important because it is designed as a definite part of one of the radio circuits. The radio is designed to give the best possible reception with the recommended and specified antenna. It is adjusted for maximum performance with the antenna fully extended. However, reception of local stations is often satisfactory with only a part of the antenna extended.



For trips - and to receive distant stations - extend the antenna completely.

FADING

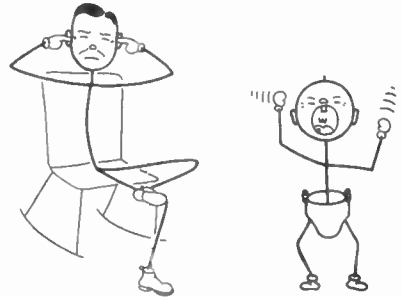
THE signal strength of a station is generally pretty constant as it is received by the home radio. But the signal reaching an auto radio may vary as much as 500 to 1 in the short distance of a city block. This sudden change may be due to tall buildings, bridges, elevated tracks, or high tension lines which absorb or deflect the station signal and prevent its full strength from reaching the antenna. The same changes may be encountered in the country, although they are generally not as sudden or severe. Using a partially extended antenna or listening to weak or distant stations will aggravate fading conditions.



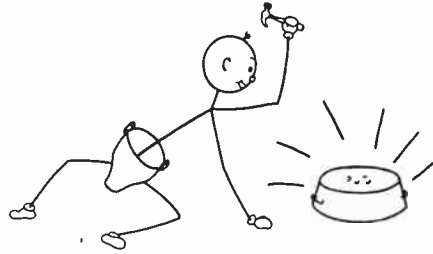
If the radio could not compensate itself automatically for these sudden changes in signal strength, radio programs would be forever dying down to a whisper and then suddenly blasting forth at full volume.

AUTOMATIC VOLUME CONTROL

THIS control is arranged so the radio operates at maximum sensitivity—maximum station getting ability—when no station is tuned in. As soon as a signal is received the control begins to decrease the sensitivity of the set and the stronger the station the less sensitive the radio. This variation in sensitivity tends to hold the received signal to the exact loud speaker level chosen by the manual volume control.



NOISES

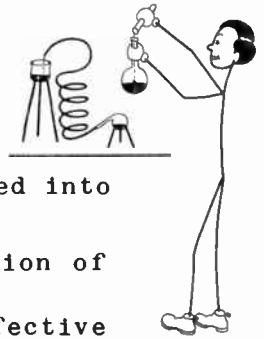


ALL radios will pick up electrical disturbances which are strong enough to reach their antennae. A great many things cause these disturbances, but the most objectionable are street car lines, neon signs and high tension power lines. Street car lines produce a swishing, rushing noise almost like water running through a narrow channel. Neon signs have a high pitched buzz like an electric razor and high tension wires generally have a low pitched hum like a speeding car that's far away. These noises are all normal but sometimes they can be avoided or reduced by tuning in stronger stations or varying the tone control.

The automatic volume control helps minimize noises because strong stations decrease the sensitivity of the radio to the point where it will not even pick up local noises. On the other hand, if the car is driven under a bridge or viaduct and the signal becomes very weak, the set may appear to be very noisy because its sensitivity has been increased tremendously and the noises crowd in--but once on the other side the noise disappears.

Distant or low power stations will always appear more noisy than strong local stations because they aren't strong enough to decrease the sensitivity of the radio and effectively block out the noise. To obtain the best reception of distant stations, THE ANTENNA MUST BE COMPLETELY EXTENDED.

COMPLAINT ANALYSIS



CUSTOMER complaints can be divided into three general types.

- A. Misunderstanding of operation of radio. (Page 1-6)
- B. Minor troubles such as: Defective tubes, vibrator, antenna or improper and incomplete installation. (Page 10,11,12,13,14)
- C. Major technical troubles. (Page 16)

Due to the fact that customer complaints may arise from both lack of knowledge of the characteristics of the radio and installation defects, as well as actual radio parts failures, it is extremely important that the Customer Contact Men obtain a complete story from the customer so the complaint can be classified as either type A, B, or C.

If a complaint falls under type A the contact man can correct the complaint while discussing it with the customer. (See pages 1-6) If a complaint falls under type B or C the contact man must give all the available information to the radio service man so he can be sure to correct the customer's complaint by following the Minor Repair procedures (Pages 9-14) or the Major repair procedure (Page 16).

The first question a Customer Contact Man should ask regarding a radio complaint is of course, "How does it act?" If the answer is, "It's noisy," other leading questions, to aid in classifying the complaint are:

- "Is it noisy all the time?"
- "Is it noisy only between stations?"
- "Is it noisy on distant stations?"
- "How far do you keep your antenna extended?"
- "Is the noise affected by rough roads?"
- "Does the noise vary with speed?"
- "Does applying the brakes affect noise?"

The first four questions are a check on a type A complaint which can be corrected by adapting the "What to Expect" explanations to fit local conditions; Customer Contact Men should be familiar with any peculiar local reception conditions.

The last three questions are checks on type B installation difficulties.

Of course there are other answers to "How does it act?"

"It cuts in and out."

"It sounds funny."

"It fades in and out."

"It won't play 'till I hit a bump."

"It won't play."

Service records over many years show that nearly all such complaints are actually minor in nature and can be corrected by anyone who will apply the following Simplified Service Procedure, a procedure which requires neither special test equipment nor technical knowledge.

MINOR REPAIRS

COMPLAINTS which fall into this classification can and should be corrected by the dealer's Servicemen in order to give prompt service to the customer, avoid removing the radio from the car, and to take advantage of the fact that analysis show more than 30 percent of the radio complaints are referred back to the Car Dealer.



The following analysis of these minor defects will serve as a guide in locating and becoming familiar with Minor repair problems.

CUSTOMER COMPLAINT

NOISY

WEAK

DEAD

INTERMITTENT

POOR TONE

LOCAL CONDITION

Antenna not extended (Page 4)

Electrical interference (Page 6)

Station too weak (Page 6)

MINOR TROUBLE

Noisy Tube (Page 11)

Antenna open or shorted (Page 10)

Noisy Vibrator (Page 12)

Installation Defects (Pages 12, 13, 14, 15)

LOCAL CONDITION

Antenna not extended (Page 4)

Station too weak (Page 6)

MINOR TROUBLE

Antenna trimmer not adjusted (Page 16)

Antenna Open or Shorted (Page 10)

Weak Tube (Page 11)

Worn Vibrator (Page 12)

Low Battery

MINOR TROUBLE

Blown Fuse (Page 11)

Dead Vibrator (Page 12)

Antenna open or shorted (Page 10)

Dead Tube (Page 11)

MINOR TROUBLE

Antenna intermittent, open or shorted (Page 10)

Tube intermittent (Page 11)

Vibrator intermittent (Page 12)

MINOR TROUBLE

Defective Tube (Page 11)

Worn Vibrator (Page 12)

Low Battery

MAJOR TECHNICAL TROUBLE

See Page 16

Page Nine



ANTENNA

THE antenna can cause a radio to appear weak, dead, noisy or intermittent.



WEAK - DEAD

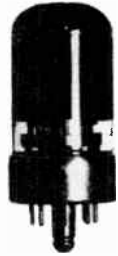
The easiest method of checking is to substitute a test antenna consisting of about 10 ft. of insulated wire connected to the end of a standard antenna lead-in. The wire should be extended through the car door and allowed to fall on the garage floor. If the radio works fairly normally on the substitute antenna, check the car antenna and lead-in for continuity (use a click or resistance meter) from the top of the antenna to the antenna lead connector. 1941 vacuum antenna used a capacity coupling between the mast and the lead-in and of course would read open on a continuity or click meter test from mast to antenna connector. Lead-ins on these antennas must be checked from end to end for continuity. Replace all defective parts.

NOISY - INTERMITTENT

With the car antenna connected to the radio and the volume control on full, wiggle the antenna lead severely. If the noise appears in the speaker, check the antenna lead for loose or broken connections and intermittent shorts to the shielding. If wiggling the antenna lead does not produce a noisy condition, jar the antenna with the handle of an insulated screwdriver. If noise results, check the antenna for intermittent shorting to the car body. Also check for continuity from the tip of the antenna to the antenna lead connector. (Check mast and lead-in separately if vacuum operated antenna.)

TUBES

TUBES can cause a radio to be weak, dead, noisy, intermittent, or distorted. Before making any tube checks, either on the car or on the bench, be sure all tubes are firmly seated in the sockets and all grid caps are in place.



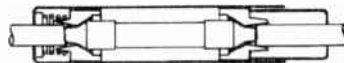
NOISY - INTERMITTENT

Disconnect the antenna lead at the radio. Turn the volume control on full. With the handle of an insulated screwdriver or a cork mallet, tap each tube. Noisy or intermittent tubes will be indicated by crackling noises in the speaker.

WEAK - DEAD - DISTORTED

With antenna connected, turn radio on and replace each tube, one at a time, with tubes known to be good. Allow at least 45 seconds for new tubes to become operative.

FUSES



AN open or blown fuse is usually caused by the vibrator. Sometimes the vibrator will stick momentarily, during its first few hours of use, and cause the fuse to blow. Replace the fuse and jar the radio as the switch is turned on. If the fuse does not blow, turn the radio on and off several times. Continued operation indicates the vibrator is now off to a good start toward normal life.

VIBRATORS

TURN radio on; if vibrator buzz cannot be heard, inspect the fuse and the ammeter lead connection at the ammeter. If they are in order replace the vibrator.



NOISY - WORN OUT

If vibrator buzz sounds intermittent, irregular, or extremely loud as compared with another radio of the same model, install a new vibrator.

WHEEL STATIC

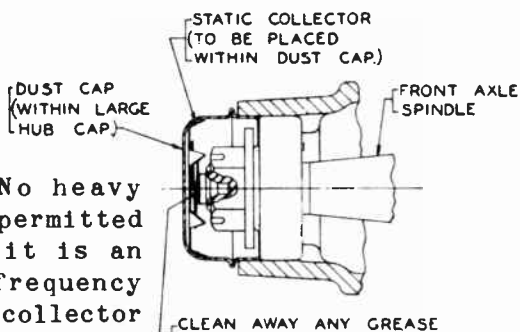
THIS noise is caused by electrical charges collecting on the wheels and then discharging to the road surface through the tires. The type of road surface affects this noise because it determines the strength of the discharge. Wheel static will seldom, if ever, appear when a car is on dirt or gravel roads, due partly to their moisture content. Some concrete roads will result in little or no noise. Some types of concrete and nearly all types of Macadam roads will produce vicious wheel static. The mildest form of wheel static will be heard as a periodic click in the loudspeaker and this clicking varies with the car speed. A slightly stronger form produces a strong click and then several weaker clicks before the next strong one occurs. The most vicious form results in constant roar. Generally none of these forms will show up at speeds of less than 25 miles an hour and they will increase in intensity as the car speed is increased.

If the noise will disappear or diminish when the brakes are applied suddenly, it is almost sure proof that the static collectors are not installed or are not functioning.

STATIC COLLECTORS

Be sure the static collectors make GOOD contact with both the hub cap and the spindle.

No heavy lubricant should be permitted at either point as it is an insulator for high frequency current. The static collector buttons ARE SELF-LUBRICATING, however if they squeak they can be lubricated with a very thin coating of vaseline.



The spindle nut cotter key must be installed so it will not foul the static collector and prevent it from touching the spindle.

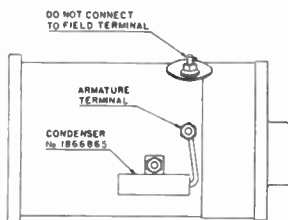
Severe tire static, which is not eliminated by correctly installed static collectors, can usually be eliminated by an application of U.S. Tire Static Neutralizer. This special powder is blown inside the tubes and can be applied by an Authorized UMS Radio Service Station or U.S. Tire Distributor.

NOTE- If the ball normally fitted to the tip of the antenna, is missing a noise similar to tire static often occurs. CHECK to see that the ball is in place on the antenna tip for all static complaints.

Under running board antennas are more subject to wheel static than cowl antennas as they will pick up noise from both the front and rear wheels. For these installations, be sure to check the rear wheel static collector installation if the front wheel collectors are properly installed but do not eliminate the noise.

GENERATOR NOISE

THE sparking of the generator brushes will produce a noise in the radio which varies with engine speed. This noise is easily identified as a very high pitched whine. When this noise appears, check the generator condenser to see if all the connections are tight and if the paint under the condenser bracket has been removed so the condenser will make good contact with the generator frame. If these points are in order, replace the generator condenser.

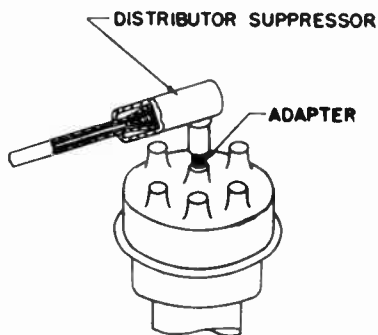


SPARK NOISE

REAMS of information could be written about the special causes of spark noise which occur due to the variations in car body insulation, in ground locations and even in the radios.

If a specially tough case is encountered,

which cannot be cured by THE SPECIFIC INSTALLATION INSTRUCTIONS FOR THAT RADIO, it should be referred to a competent auto radio serviceman.



DISTRIBUTOR SUPPRESSOR

TOOLS

MINOR repairs do not require any special tools. Any conventional assortment of wrenches, pliers, and screwdrivers will do. However, a special vibrator puller, Part Number 7239419, is available for the 1940-41 and 42 vibrators.



The radio parts stock should consist of 1940-41-42 tubes, vibrators, antennas and parts, static collectors, ammeter and generator condensers, and distributor suppressors. Some spare wire and bond straps should be available.

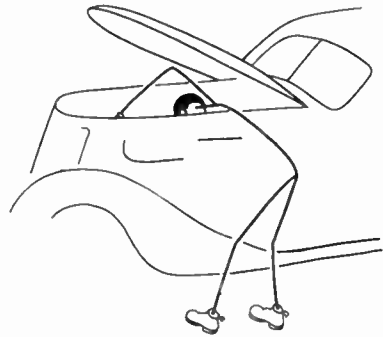
A test bench, built completely of wood, equipped with a standard antenna and an always fully charged battery should be available. If the battery can be wired permanently on the test bench, a voltmeter across its terminals and an ammeter in the "hot" lead to the radio will aid in diagnosing troubles.

Further service or parts information may be obtained from the nearest Authorized UMS Radio Service Station.

INSTALLATION

CHECKING A NEW RADIO

CAREFULLY unpack the radio and check the contents against the packing list. Don't wait until the installation is half completed to discover parts are missing.



Read the **INSTALLATION INSTRUCTIONS** carefully before proceeding.

Remove the tube cover and make sure the Tubes and Vibrator are firmly seated in their sockets; check any grid cap connections on top of tubes.

Check the radio for operation before installation. This should be done on a wood bench which has a

permanently attached test antenna and a fully charged 6 volt battery. Know how a normal radio operates on the test antenna. Check the operation of the controls and push buttons. Allow the set to play while the car is being prepared. Just before installation disconnect test antenna and with volume control turned to maximum position lightly tap the tubes with the butt end of an insulated screwdriver. Replace any noisy tubes.

FILL OUT THE WARRANTY INFORMATION ON THE STICKER IN THE TUBE LID.

INSTALLATION

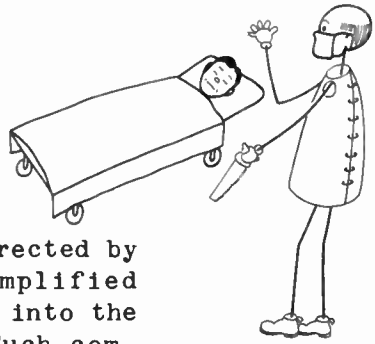
There is only one rule for a good auto radio installation. **MAKE THE INSTALLATION EXACTLY AS SPECIFIED BY THE INSTRUCTION BOOK.**

Although it is true that cars vary and some new cars of any model may not need all the bonding and suppression material supplied in the radio package, **DON'T TAKE SHORT CUTS** as these same cars will probably develop motor noise or wheel static after they are "broken in." Time, trouble and customer complaints will be avoided by doing the job right the first time.

ALWAYS SET THE RADIO ANTENNA COMPENSATOR TO MATCH THE RADIO AND ANTENNA. Failure to make this simple adjustment may spoil an otherwise perfect installation. Location and method of adjustment are covered by the Installation Instructions.

FINAL CHECK each installation before delivery to a customer. Drive to a noise-free location; check operation of all controls and push-buttons, check station getting ability and tone quality on several stations, check for wheel static, generator whine, and spark noise, as covered on pages 13-14-15. Be sure the installation is normal in every respect.

MAJOR REPAIRS



IF the complaint is not corrected by means of the preceding Simplified Service Procedure, it falls into the class of Major Repairs. Such complaints, with all available information, should be referred to an Authorized United Motors Radio Service Station.

WARRANTY

EACH radio carries a warranty which is printed on the Radio Operating Instructions which should be given to the customer.



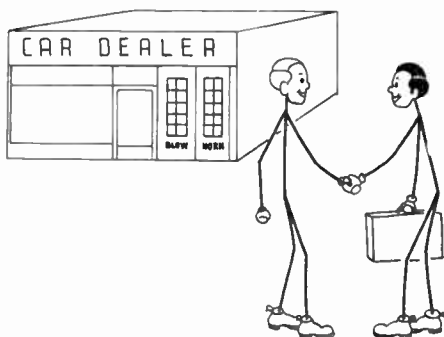
Warranty Labor will not be allowed for the following work:

1. Testing or replacing spark plug or distributor resistors.
2. Testing or replacing ammeter or generator condensers.
3. Car or radio adjustments for eliminating interference.
4. Testing or repairing car antenna.
5. Correcting any faulty radio installation.
6. Making external adjustments for antenna compensation or push button setting.
7. Eliminating tire static.
8. Setting up Push Buttons.

Improper use of the various warranty tags and forms results in a delay in service, parts replacement, and labor claims. Consult the representatives of the company handling your warranty regarding the correct use of these forms in order to avoid delay.

And thus ends our story of Simplified Service for the Dealer. We hope you have found it interesting and useful.

Don't forget that problems not solved by this manual can be handled by your nearest Authorized United Motors Radio Service Station.





**AUTHORIZED RADIO SERVICE
AVAILABLE EVERYWHERE**