

RADIO / TAPE PLAYER

ALL SERIES

WARNING: IF EQUIPPED WITH AIR CUSHION RESTRAINT SYSTEM, DO NOT ATTEMPT ANY ADJUSTMENT, REPAIR OR REMOVAL OF ANY ACCESSORY OR COMPONENTS WHICH WOULD REQUIRE REMOVAL OR DISCONNECTING OF ANY COMPONENT OF THE AIR CUSHION RESTRAINT SYSTEM UNTIL THE DISCONNECTION PROCEDURE IS COMPLETED. THIS PROCEDURE MUST BE FOLLOWED TO PREVENT ACCIDENTAL DEPLOYMENT OF THE SYSTEM WHICH COULD RESULT IN PERSONAL INJURY AND/OR DAMAGE TO THE SYSTEM'S COMPONENTS.

A.C.R.S. DISCONNECTION PROCEDURE

1. Turn ignition switch to "LOCK" position. Disconnect the negative battery cable from the battery and tape end.

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DESCRIPTION AND OPERATION

GENERAL DESCRIPTION

The radio system consists of three components: (1) a radio receiver; (2) one or more speakers; and (3) an antenna

embedded in the windshield or a front fender mounted power antenna (B-C-E Series only). Three different receivers are available for the H and X Series; AM, AM/FM and AM/FM Stereo with single front and rear speakers. Five different receivers are available for the B-C-E Series;

AM, AM/FM, AM/FM stereo, AM/tape player, and AM/FM stereo-tape player.

AM/tape player, and AM/FM stereo-tape player.

All speakers have an impedance of 10 ohms. When replacing a speaker, the replacement speaker should have the same impedance for satisfactory results.

RADIO NOISE INTERFERENCE SUPPRESSORS

Four noise suppressor capacitors are used to eliminate radio interference.

Three of the capacitors are exterior mounted, one on the blower motor (on FM radios only), one is mounted internally inside the integrated voltage regulator/generator and one on the primary side of the ignition coil within the HEI distributor assembly. The interior mounted capacitor is attached to the brake pedal support bracket and connected to the terminal on the fuse block, on B-C-E cars and attached to the fuse block on A-H and X cars. The delcotron and fuse block capacitors are rated at 0.5 MFD, the blower motor capacitor at .25 MFD and the HEI distributor at .3 MFD. All models have resistor spark plugs, .125 inch rotor gap, and spark plug wires with an approximate resistance of 2000 ohms per foot.

Various types of ignition suppressors are used to prevent spark noise from interfering with radio reception. Failure of any of these parts to function properly is accompanied by a popping noise. The noise increases as the engine is accelerated and varies with engine speed.

AM-FM RADIO

This radio is identical to the AM radio, as far as the operation of the ON-OFF and volume control, tone control, manual tuning control, and pushbuttons are concerned. The AM/FM selector bar is located directly below the dial face on all series. Movement of the bar to the left exposes the letters "FM" and switches the radio to FM operation. Movement of the bar to the right provides AM radio operation. An automatic frequency control circuit is incorporated in the FM portion of the radio and automatically keeps the receiver on frequency. This eliminates any station detuning due to temperature changes around the radio.

STEREO AM/FM RADIO

The stereo system includes a special AM/FM receiver with a multiplex section and four speakers (2 speakers on H and X cars). The radio is designed to receive and reproduce the dual stereo FM signal, as well as monaural AM/FM signals.

The right front and left front speakers are one channel, and the left rear and right rear are the other channel (A-B-C-E cars). This gives a surrounding sound effect. Operation of the controls is identical to previous AM/FM receivers, except the word "STEREO" lights up to the right of the dial when tuned to a stereo signal.

The receivers operate with 12 volts DC input. All speakers have an impedance of 10 ohms. When replacing a speaker, the replacement speaker should have the same impedance for satisfactory results.

Two radio/tape combinations are available: One is an AM/radio/tape, and the other is a stereo AM/FM tape. The pushbuttons and control knobs operate in the same manner as the AM/FM radios.

This unit uses a standard eight-track tape cartridge that is inserted through the spring-loaded radio dial (tape door).

RADIO CONTROLS

Volume Switch and Tone Controls

The left knob turns the radio ON and OFF, and controls the volume. On the stereo radio the knob controls the volume in both channels simultaneously and on radio/tape combinations the knob changes the tape programs when depressed. The tone control ring around the left knob is turned counterclockwise for bass tones and clockwise for treble tones. When indexed at the detent, it provides a balanced normal tone. On the stereo radio, this control varies the tone in both channels simultaneously.

For best stereo reception, neutralize the tone control by turning it to the center detent position, then adjust the front and rear speaker control so that the sound is balanced to your ears. Centering the tone control permits normal response from the speakers, and balanced speaker output is desirable for greatest stereo effect.

Station Selector and Speaker Control

The right knob is used to tune stations manually. The ring around the knob is the front-rear speaker(s) control. When the ring is turned all the way clockwise the volume of the rear speaker(s) is increased. As the ring is turned counterclockwise, the rear speaker(s) volume decreases while the front speaker(s) volume increases. When the ring is turned all the way counterclockwise, the front speaker(s) is stronger. This control has no effect on the balance of stereo channels.

ELECTRICALLY OPERATED ANTENNA

The electrically operated antenna is designed for improved AM/FM fringe area, and FM Metropolitan area performance. It is mounted in the right front fender assembly.

There are two controls for the antenna; an automatic control and a manual control. The automatic antenna control is integral with the radio on-off control. The antenna raises when the switch is positioned in the normal position to a pre-set height of 10 inches \pm 4 inches when the radio is turned on and fully retracts when the radio or ignition switch is turned off. A manual antenna up-down control switch is located in the instrument panel cover. The switch has a detent hold when placed in the HI Lock position. In this position the antenna will extend fully each time the radio is turned on and will retract fully when the radio or ignition switch is turned off until the switch is moved manually from the HI position. The switch can also be used to raise the antenna to a height other than the pre-set height for fringe area reception or to lower the antenna when necessary to clear overhead objects.

The antenna is operated by a reversible electric motor. The motor drives a gear and pulley assembly that extends or retracts a delrin cable fastened to the smallest of the three antenna sections. The action of the delrin cable, as it is extended, forces the antenna rod upward.

In lowering the antenna, the delrin cable is retracted. This pulls the three sections of the antenna rod downward.

The antenna should never be raised or lowered by hand as the operating mechanism could be seriously damaged.

DIAGNOSIS

RADIO TROUBLE DIAGNOSIS

Because radio problems are most often repaired at United Delco authorized Warranty Repair Stations, the tendency for many dealer servicemen is to remove the set when a problem is reported, without any preliminary diagnosis. This results in a large number of radios showing up as "NO TROUBLE FOUND" units when received by the Warranty Repair Stations. This indicates that the trouble can often be corrected without removal of the radio.

The inconvenience to an owner of driving without a radio while his set is being serviced at a Warranty Station can frequently be avoided if the following quick checks are used to eliminate external radio system problems before removing the radio for repair.

Always determine from the owner the exact nature of the radio problem as an aid to diagnosis. Knowing whether the condition is intermittent or constant, whether it occurs with engine off or running, with car stationary or moving, will help to pinpoint the problem.

Dead Radio

1. Check the fuse and connectors to the radio.
2. Check the speaker - listen for a thump when the radio is first turned on. If no thump, check the speaker and connectors.
3. Check the antenna - is the antenna plugged into the radio - is the windshield antenna "pigtail" plugged into the lead-in On "B-C-E" Series with fender mounted power antenna, is the antenna lead-in screwed into the antenna?

Check the windshield antenna with the Kent-Moore Tool J-23520 and the power antenna with Kent-Moore Tool J-22194.

4. If the trouble is not found, remove radio for repair.

Weak on AM

1. Peak the antenna trimmer adjustment. On "B-C-E" Series with fender mounted power antenna trim the radio with antenna fully extended.
2. Check the antenna using the J-23520 on the windshield and the lead-in cable or the J-22194 on the power antenna.
3. If the windshield has been replaced, check around the pigtail to insure white or clear RTV or equivalent was used at this location.
4. If the problem is not found, remove the radio for repair.

Intermittent

1. Check connections to the radio and speakers by wig-

gling the wires and bumping the bottom of the radio with the heel of your hand.

2. Check connections to the antenna.
3. Check the radio installation for a good ground (all bolts tight).
4. Remove radio for repair if the problem is not discovered.

Noisy - AM Static

1. Trim antenna trimmer, power antenna fully extended. Check and tighten firmly antenna lead-in connection on power antenna (B-C-E Series). Check resistance of power antenna lead-in cable shielding. (ground to ground). If resistance is not zero OHMS replace cable. Storm and fluorescent or neon sign noise is normal for AM.

2. Motor noise and switch pops.

DO NOT REMOVE RADIO Go to the source of the noise in the car and suppress the noise by adding capacitors, chokes, or rerouting wires.

Noisy on FM

1. Flutter or Multipath.

This condition may be objectionable but is normal for some FM reception areas. The customer's radio operation should be compared to a "known good car" in the same area to determine if the flutter is normal. This can be done by driving a short distance in both cars. Be sure customer fine tunes radio to FM station after using pushbutton to locate station. If radio is not fine tuned, noise and weak reception will be present.

2. Motor Noise and Switch Pops

DO NOT REMOVE RADIO Refer to "Noisy AM Static".

Windshield Antenna

The windshield antenna is installed to improve antenna reliability, extend the life of the antenna, to eliminate antenna replacements due to vandalism, to eliminate antenna wind noise, and to enhance the appearance of the automobile.

With the windshield antenna the radio will perform equally as well as previous radio installations. Customers may notice a faint "swish" sound on weak FM stations, as the windshield wipers pass over the windshield antenna elements when it is raining. *This is a normal occurrence.*

It is extremely important that the AM antenna trimmer adjustment at the radio be checked before any complaint of poor AM reception is further diagnosed. It is equally important that the dealership readjust the antenna trimmer after reinstallation of a repaired radio or if a new windshield is installed.

Testing

The following guide will aid in further diagnosing the radio system, using the windshield antenna tester J-23520 and systems checker J-22194 available from Kent-Moore Corporation.

Substitute a known good speaker or switch to rear speaker if car is so equipped.

Radio plays okay Replace speaker.

Radio still plays intermittently, even with a known good speaker Malfunctioned receiver.

RADIO STATIONS MIX TOGETHER

(Carefully trim radio. However, if two or more signals are picked up at the same time, there is no known way to separate them.)

RADIO NOISY

Static - Start engine, rev up engine several times, and listen for speaker static.

Static Heard

Trim radio - check for spark plug wire breakdown, loose or improperly-seated wire, or loose or missing engine ground strap. Check and tighten firmly the antenna lead-in connection on power antenna (B-C-E Series). Check resistance of power antenna lead-in cable shielding (ground to ground). If resistance is not zero ohms replace cable.

Check suppressors on voltage regulator, Delcotron, blower motor and resistor on timing control solenoid.

Static Still Present

(Malfunctioned receiver.)

WEAK RADIO SIGNAL - WINDSHIELD ANTENNA

(Place radio to AM band, just off a station, and turn volume up full. Hold tester J-23520 to antenna beginning at upper corner of antenna on both sides of windshield.)

High-Pitch Sound Heard through Radio Speaker when Both Antenna Wires are Tested

Windshield antenna is okay - Check radio and speaker with radio system tester J-22194.

High-Pitch Sound Heard through only one Antenna Wire

Check the problem antenna by moving the tester until sound begins - this is the area of the defect. Replace windshield.

No High-Pitch Sound is Heard through Either Antenna Wire

Unplug antenna lead at the radio and touch tester to antenna socket in the radio

(a) If High-Pitch Sound Is Heard

(Remove windshield lower reveal molding.)

Disconnect pigtail at windshield, connect lead-in extension J-22276 to antenna lead-in and plug into J-22194 system tester.

The spring shield must be on the tester J-23520 at all times to direct the signal only to the area being tested. Always check the testers on a known good car to make sure they are operating properly and that the batteries are not weak or dead.

The radio trouble diagnosis guide is intended as an aid in locating minor faults which can be corrected without a specialized knowledge of radio and without special radio test equipment. If the suggestions given here do not affect a correction, further testing should be *done only by a trained radio technician having proper test equipment.*

DIAGNOSIS GUIDE

RADIO DEAD

(Turn on radio.)

No Thump Heard

(Check fuse.)

Fuse blown Replace fuse and check for short or open in wiring.

Fuse okay Check receiver and speaker connectors.

Connectors loose or defective Correct as required.

Connectors okay Check speaker with radio systems tester J-22194. Substitute a known good speaker or switch to rear speaker if car is so equipped.

Radio does not play even with a known good substitute speaker Malfunctioned receiver. Remove for servicing.

Radio plays with substitute speaker Replace speaker.

Thump Heard

(Check antenna connection at back of radio at base of windshield or on "B-C-E" Series with power antenna check lead-in at the antenna.)

Connections malfunctioning Correct as necessary.

Connections okay Substitute a known good lead-in cable.

Radio plays Malfunctioned cable.

Radio still won't play, even with a known good lead-in cable Substitute and trim a known good radio.

Good radio plays Malfunctioned radio.

Good radio still won't play Malfunctioned antenna. Change windshield or power antenna.

RADIO CUTS ON AND OFF

(Check for malfunctioned or loose receiver or antenna connectors at the rear of radio or base of windshield or on power antennas at the lead-in connection.)

Malfunctioning or loose connectors Repair as necessary.

Connectors okay Substitute a known good lead-in cable.

Radio plays okay Malfunctioned cable.

Radio still cuts out with a known good lead-in cable Check speaker with radio system tester J-22194. Substi-

Insert a 1/8 inch diameter conductive object into lead-in cable at cowl and attach alligator clip.

Cable tests okay Replace windshield.

(b) If No High-Pitch Sound Is Heard

(Check radio and speaker with system checker J-22194.)

Replace malfunctioning components.

WEAK RADIO SIGNAL - POWER ANTENNA

Tune radio to a station at or near 1400 KHz that can barely be heard with volume on full. Fully extend antenna and adjust trimmer screw until the position is found that gives maximum volume. Adjust trimmer on AM/FM sets in AM position only. Check lead-in and antenna with system checker J-22194, if okay - malfunctioned receiver.

DISTORTED TONE

(Turn on radio, adjust for high volume and maximum bass. Check speaker with radio systems tester J-22194. Substitute a good speaker or switch to rear speaker if car is so equipped.)

NO DISTORTION

Replace speaker.

DISTORTION

Malfunctioned receiver - remove for servicing.

RADIO SUPPRESSION

This suppression guide is intended for radio shop and dealership personnel alike. There are four sections in all to this radio noise suppression guide. These four sections complement one another. That is, what is learned about backway ignition noise will be helpful information when dealing with backway alternator whine.

This guide describes isolation and solution procedures for motor noise - alternator whine switch pops and blower motor noise. These four subjects will make up the various sections.

Definitions will be desirable before beginning. What is referred to as Motor Noises is ignition noise, frying noise or popping depending on who you are talking to.

Alternator Whine is the siren-like background whine that increases and decreases with motor RPM's.

Switch Pops are noises caused by customer-actuated or automatic switches that, when actuated, cause a momentary pop or crack in the radio's speakers.

Blower Motor Noise is the easiest of all to describe, because as the blower motor changes speed the noise in the radio changes with it.

These definitions will be expanded on as each section is covered, but with this much said, you have a foundation to work from.

MOTOR NOISE

The most difficult and least understood area of auto radio

servicing by the majority of radio shops has to be motor noise diagnosis and its elimination. The object of this guide will be to lay out guidelines for troubleshooting motor noise in automobiles.

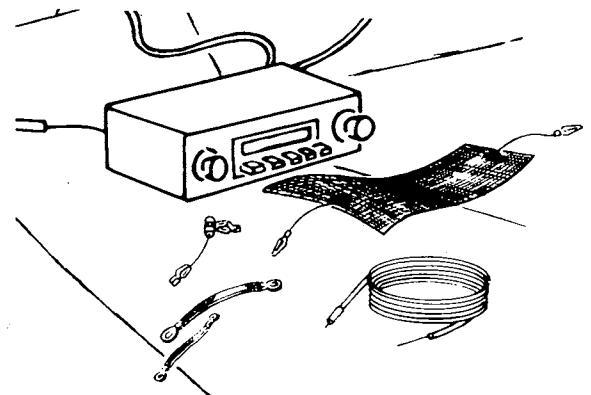
When troubleshooting an automobile radio with noise, it is wise to remember the following:

1. Be logical
2. Be systematic
3. Use tools which are readily available

The best way to be logical when working on noise is to remember your objectives. The objectives are, to find the noise source. By knowing that answer, you can pinpoint what is causing the noise. These two objectives hold the key to solving many noise problems.

After the source of the noise has been located, go through and systematically check the engine compartment and dash to further pinpoint the source of the noise. Don't try to take short cuts and above all, never assume that something is o.k. because the car engine is running properly.

When troubleshooting noise, only a few tools are necessary in addition to your normal tool box. The recommended tools are: a lead-in (long), some suppressors, a piece of screen and of course, the most obvious the radio itself. (See figure 9C-1). The last item listed is the most useful tool and all too often the most overlooked tool. Just think for a moment how logical that is. If the problem is noise amplified by the radio, then why not use the radio to pinpoint the noise.



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Figure 9C-1 Some of the Tools Used For Noise Suppression

One very basic step, applicable to all types of noises is to make certain that all components that need to be grounded, are truly grounded. Check to see if the radio is grounded through the mounting brackets. Are the bushing nuts tight Is the antenna lead-in making a good connection to the radio ground Is each applicable piece of suppression equipment making contact with the bare metal surface of the car chassis Noise is a form of RF. RF "sees" a poor ground as a radiator for its dirty work.

POINT OF ENTRY

After determining that all components of the radio system are well-grounded, move to the second step in the proce-

sure - determining how the noise is getting into the radio. There are five ways the noise can get into the radio.

1. Radiated into the antenna (Frontway) 90%
2. On the A+ line to the radio (Backway) 9%
3. Radiated into the radio . 0.8%
4. Problem in the radio 0.1%
5. Radiated in on the speaker leads 0.1%

As indicated by the approximate percentages, most of the motor noise problems fall into the first two classifications. It is a simple matter to determine which of these two cases you have. Just unplug the antenna and install a dummy antenna to eliminate error. See figure 9C-2. If the noise remains, it is probably coming in on the A+ line to the radio; if it disappears, it is front-way noise coming in on the antenna. These two conditions have different solutions and are handled in different ways. We'll discuss backway noise first.

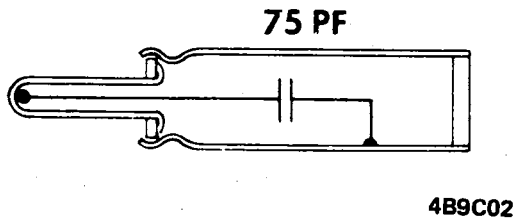


Figure 9C-2 Make This Dummy Antenna From an Old Antenna Lead-in and a 75PF Capacitor.

This tool prevents spurious responses from causing interference and it prevents RF detuning

BACKWAY NOISE

Motor noise on the A+ line is usually the result of voltage spikes on this line being so large that the input filter circuit in the radio cannot handle them. There are two ways to handle this problem.

1. Find out what is causing the noise on the line and eliminate it, or
2. Add external filters to reduce the spikes to a point where the radio filter can handle the spikes.

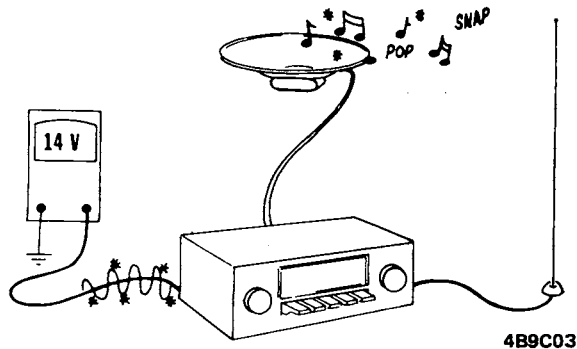


Figure 9C-3 Backway Noise Enters the Radio on the 14 VDC Line

Pursuing the first course of action is the more difficult. The motor noise spikes are getting on the line because a wiring harness is too close to ignition wiring. The primary area to check is the distributor cap. Try rerouting any harnesses which are unusually close to the distributor cap or coil.

The other approach is usually easier to work with and often times is more fruitful. When pursuing the suppression course of action, it is important to remember that motor noise generally peaks out in the 27 MHz range. Harmonics and subharmonics of 27 MHz are 88, 98 and 108 MHz.

As a result of this phenomena, large capacitances (10 MFD or above) are less effective in suppressing the noise. The following checks will usually take care of most A+ line motor noise problems:

- a. Temporarily connect a .3 MFD or .5 MFD ignition-type capacitor to the fuse block (various terminals). See figure 9C-4.
- b. Temporarily connect a choke package to the radio A+ line.
- c. Temporarily connect a .5 MFD to a 2 MFD capacitor to the battery terminal of the alternator.
- d. Try moving wires in the various harnesses on the lower part of the dash.

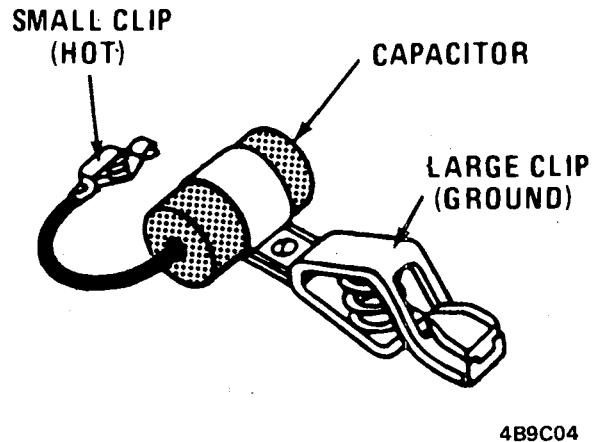


Figure 9C-4 For Making Quick Checks, Make This .5 MFD Capacitor with Alligator Clips

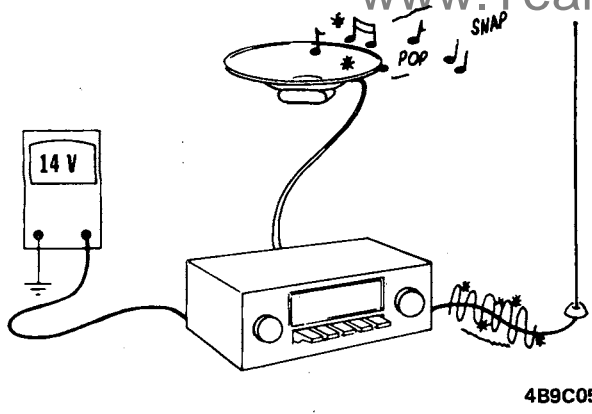
FRONT WAY NOISE

Motor noise coming in on the antenna system should be approached with simplicity in mind. Since the noise is a radiated signal, you have to either suppress it or shield it from the antenna. To suppress the motor noise or shield it from the antenna, you have to know where it is coming from. Generally speaking, the noise will be coming from one of two places:

1. Radiated upward from the dash.
2. Radiated from the engine compartment.

Locating the source of the noise is easier than you would image. To do this, you will need the following:

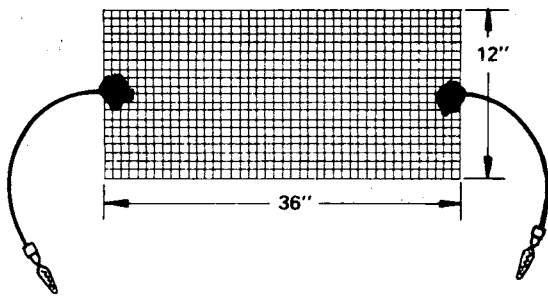
- a. A radio (operating)in the car.



489C05

Figure 9C-5 Frontway Noise comes in on the Antenna Line

- b. a 36" x 12" piece of screen with two clip leads (See figure 9C-6).
- c. A long lead-in (five to six feet) (See figure 9C-7).

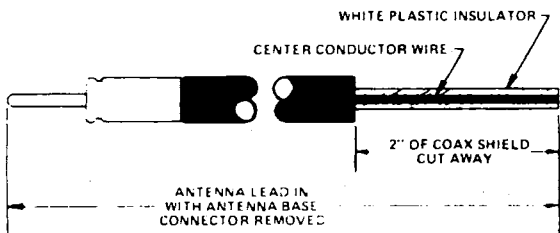


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Figure 9C-6 This Screen is Used to Shield the Windshield from the Instrument Panel Area

Using these tools, try to shield the antenna from the noise or try to locate the source of the noise with a test probe.

With the radio on, the antenna plugged in, and the engine running, take the piece of screen and lay it on the top of the dash. Attach clip leads on either end of the screen and clip the free ends of the leads to the car chassis (bare metal). If the noise disappears or is reduced in intensity, it is being radiated up through the dash. The screen is



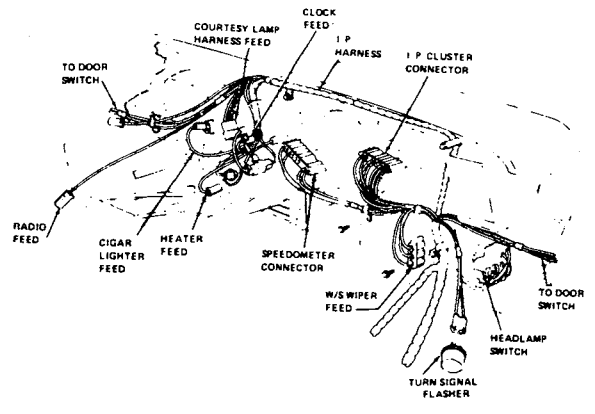
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Figure 9C-7 Make this Handy Probe for Sensing "Hot Spots"

providing the shield necessary to remove noise from the antenna.

To further pinpoint the source of the noise, you can make a test probe out of the long lead-in and use it with the radio to find "hot spots" in the harnesses, or in the upper part of the dash. (See figures 9C-7 and 9C-8).

Unplug the antenna and plug the test probe into the antenna socket. Turn the radio on, start the car and start probing the upper dash area with the other end of the lead-in. Be careful not to grab the probe-end while making this check, as it will cause erroneous results.



489C08

Figure 9C-8 Typical Instrument Panel Electrical Routing

As you proceed, keep in mind that a wiring harness that is noisy is a likely suspect for your condition in the radio. Your next step in that case will be to:

1. Try rerouting the harness to the lower part of the dash.
2. Try adding a .5 MFD capacitor from the wires in the harness to ground, or
3. Screen the dash in the area you found the screen to be effective.

NOISE RADIATED THROUGH THE BULKHEAD

If the screen on the top of the dash reduces the noise but you can find no "hot spots" or hot harness in the upper dash, then you probably have a bulkhead ignition noise problem. The handiest item known for checking the bulkhead is the probe again. This time check the lower bulkhead, heater duct area, accelerator pedal linkage for a "hot spot." When you find the hot spot, it is usually very easy to figure out what you have to suppress to correct the problem.

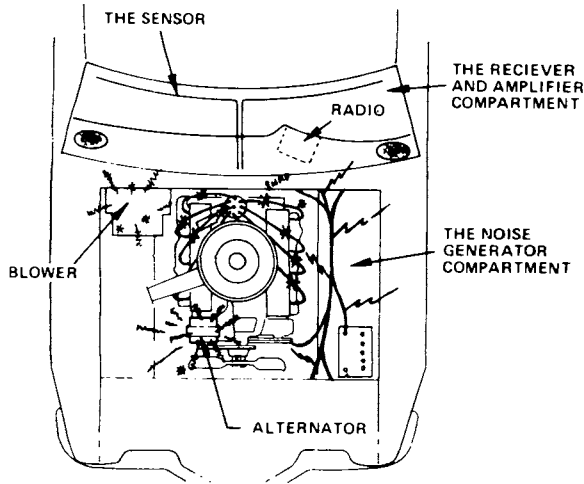
COMPARE TO BE SURE

A word of caution is necessary before using this probe method to troubleshoot the car. There are certain areas of the dash and bulkhead which will exhibit "normal hot spots." In any case, it is advisable to compare "hot spots" of the defective car with a good car. By doing this you will not only pinpoint your problem but will gain valuable

experience on what should be normal in the many types of cars.

NOISE FROM UNDER THE HOOD (See figure 9C-10)

The third source of radiated motor noise is the engine compartment. Consider once again what you have done. Unplugging the antenna caused the noise to disappear. Screening the top of the dash didn't affect the noise at all. The only place left is the engine compartment.



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Figure 9C-10 The Engine Compartment Radiates Noise From Several Sources

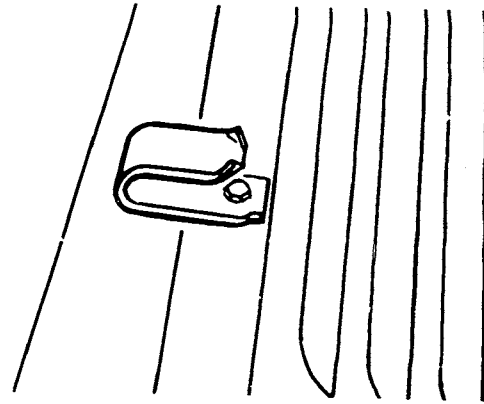
Motor noise from this area can be broken down into three types:

1. Radiated because of lack of shielding.
2. Radiated because of an improperly operating primary ignition system.
3. Radiated because of an improperly operating secondary ignition system.

The first time you raise the hood on a car with this problem you should check for the following:

- a. Engine to bulkhead bond.
- b. Good ground of the hood. Normally the hood is grounded through the hood hinges however; in extreme cases of engine ignition radiation, an optional hood clip can be installed. See Figure 9C-11.
- c. Is the coil capacitor present (as required) and on the + side of the coil (See Figure 9C-12).
- d. Are the wiper hoses the non-conductive type (Black with a white stripe).
- e. Are there any wires unusually close to the distributor cap and coil
- f. Is the lead-in fastened to the mounting bracket

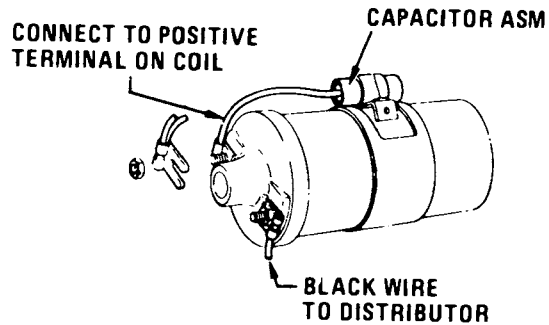
What you're doing is checking to make sure the antenna is shielded from the engine compartment. If inspection



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Figure 9C-11 Optional Hood Ground Clip

shows something to be lacking that is supposed to be there, then add it before going any further. Generally speaking, you are examining the rear end of the engine compartment (close to the bulkhead) for this type abnormality.



4B9C11

Figure 9C-12 Make Sure the Capacitor has a Good Ground

Improperly operating ignition systems are probably the most misunderstood and overlooked source of engine radiation in automobiles. To clear up the confusion in the area, look at ignition noise as one of two types - primary ignition noise or secondary ignition noise.

Primary Ignition Noises

Primary ignition noise is a result of a problem in the low voltage side of the ignition system. (Points, points-shield, capacitor or 12 volt winding on the coil). This type of ignition noise usually effects only the AM band. The noise normally appears as a:

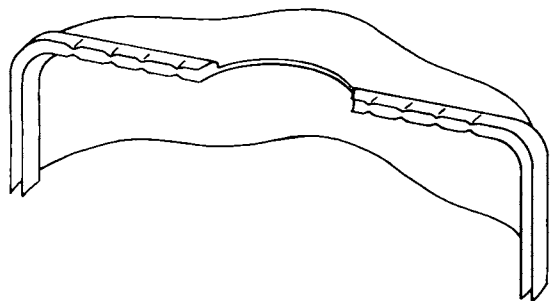
1. Frequency varying with RPM (Rate)
2. Amplitude varying with RPM (Strength)
3. Constant audio level - intermittent with RPM (Cuts in and out)

The first two of these classifications are usually the result of poor grounds on the points and coil capacitors, malfunctioning points or a wire routing problem. Be sure the points-shield is in place on applicable cars.

The third classification can fool you at times. When this condition exists in the radio, try turning on the headlights and heater fan in their maximum operating mode. By doing this you put a heavy drain on the battery causing the regulator to engage. If doing this causes the noise to disappear, you have regulator *breaker point noise and not ignition noise. (Type 3 above). A new regulator usually corrects this problem.

If the noise does not drop off when you load the battery, you have primary ignition noise. (Type 1 or 2 above). Once again check the points, capacitors, etc., associated with the low voltage side of the ignition system. Also, check the distributor points shield. First, make certain that the shield is there if recommended for the car; secondly, it should be tight; and last and most important, the shield, a two-section unit, has to make good contact along the entire overlapping edge. A great many noise problems of this type have been cured by removing the shield, and, using a pair of diagonal pliers and placing a crimp pattern along the edge of the bottom shield. (See figure 9C-13).

* Integrated circuit regulator does not have breaker points.



4B9C12

Figure 9C-13 By Crimping One Half of the Point Shield, Good Contact Surface is Assured Across Both Surfaces

If you don't correct the problem with these fixes, then try grounding the hood with bonding straps or hood clips and also try a new antenna lead-in. Try using the probe under the hood to find an unusually hot spot.

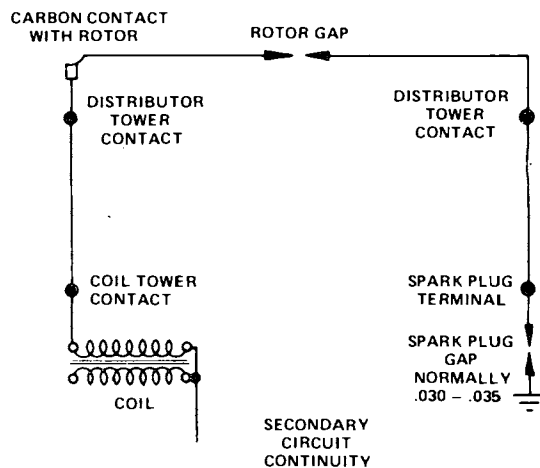
Secondary Ignition Noise

The second type of ignition defect is called secondary ignition noise because it is caused by a failure in the high voltage side of the ignition system. (Distributor cap, rotor, coil wire, coil, spark plug wiring, spark plugs). Secondary motor noise will always affect FM but, if severe enough, may affect AM also. Normally, you will find one of the following conditions in the radio:

1. Motor noise all over FM band (and possibly on AM)
2. Motor noise (loud) off station but not on a strong station

When these conditions exist in the radio, then you will more than likely find:

- a. Distributor cap carbon ball eroded away, or cracked or loose cap.
- b. A rotor with a burned black spot on the wiper
- c. A coil wire not fully seated and not making contact with coil or distributor
- d. A malfunctioning coil
- e. An oily film on some of the lead terminals



4B9C13

Figure 9C-14 Small Gaps of .002-005. at Any of the Points Represented by a Dot Can Cause Radiated Ignition Noise

If you find a bad cap or rotor, change them both. Don't take a chance of the problem showing up again.

Be certain to check whether the coil wire is fully inserted. It may look like it is o.k. but push in on the wire. If it slips through the rubber cap and seats, then pull the wire off. You will probably find the end heavily carboned; also check for an oily film on the contact surfaces. Clean it with a steel brush and re-insert it. If it doesn't cure the problem then change the wire itself.

If the noise in question sounds like one or two cylinders and definitely not all of them, then the problem is after the coil. Check to make sure that all plug wires are not only fitting tight on the plugs but also are all the way down in the distributor cap. If the noise persists, then you have a bad plug or plug wire. Once again get out the probe which plugs into the radio. Have someone sit in the car and listen to the radio while you go from plug to plug with the probe. The person in the car should notice an appreciable increase in the plug noise when you reach the malfunctioning plug.

ALTERNATOR WHINE

Alternator whine has been described as an annoying high pitched whistle, or a siren that increases and decreases with engine RPM. Alternator whine can affect the auto entertainment product in a variety of ways. It might be:

1. Heard a low volume only.
2. Heard at low volume, but increases as the volume control is increased.
3. Heard on AM only.
4. Heard on tape only.

Similar to other motor noises, alternator whine can get into the system in the following three ways:

- a. Radiated into the antenna (frontway).
- b. Radiated into the radio.
- c. Carried in on the A+ line (backway).

When attacking this problem, it is assumed that you will be working with the radio in operation in the car.

Make certain that the antenna system is well grounded; check for a good connection between radio and antenna and also between radio and chassis before beginning diagnosis. Corrosion or other causes of poor connections make the radio system more susceptible to all noises. Before attempting to eliminate this noise, determine how the noise is affecting the radio. Also, determine the type of noise. For instance, is it a high pitched siren on AM only, or does it affect tape only.

BACKWAY ALTERNATOR WHINE

Some cars, because of differences in alternators, accessories, or harness locations, exhibit more backway alternator whine than others.

If your customer brings you a vehicle with a whine complaint, use the following steps to prove that you truly have backway alternator whine.

1. Tune the radio to an AM station at mid-band or above.
2. Start the engine.
3. Listen for a whine that increases and decreases with the motor RPM's.

For combination radio/tape players, insert a tape upside down to turn the set on without music.

4. It may be necessary to turn the volume to three-quarters full and load the alternator by turning the lights on to Hi-beam.
5. Remove the antenna lead-in from the radio.
6. Listen for a whine that increases and decreases with the motor RPM.
7. If the whine is gone, proceed to frontway alternator whine; if not, continue.

Alternator diagnosis should be performed at the dealership. The usual defects with alternators include open or shorted diodes and open or shorted stators. When the output voltage from a malfunctioning alternator is viewed on an oscilloscope, it appears as excessive or erratic ripple. (Figure 9C-15).

BACKWAY FIXES

External to the radio, there are two or three things to try to eliminate the backway whine.

1. Try adding a .5 to a 2 MFD capacitor to the alternator output terminal.

2. Try adding a .5 MFD capacitor to the accessory terminal at the fuse block.

3. Try adding a filter package.

The filter package has been designed for use with the ten-pin Delco connector used since 1971. But do not add an additional filter to a unit that already has an add-on filter.

RADIO CHECKS

Within the radio, there are several areas to examine: (United Delco Service Centers).

1. Check the ten-pin connector for a broken ground connection.
2. Try adding a 250 MFD capacitor to the spark plate.
3. Solder circuit board screws to the main circuit board.
4. Reroute all A+ and dial light leads away from the audio board.

FRONTWAY ALTERNATOR WHINE

To check for frontway noise, unplug the antenna as suggested in Steps 1, through 6 of the Backway Section. If the noise disappears when the antenna is removed, you have a case of frontway alternator whine. This is to say, one part of the car harness is radiating excessively and the antenna is a good sensor. Your job is to detect where and why so as to eliminate the noise at its source.

"Hot" wires or "hot spots" on a harness can best be detected by employing our old favorite--the probe. Again, experience and common sense are invaluable aids in this area. That is, by using a comparably equipped "normal" car, you can verify any odd indications concerning "hot spots." Note: Use the probe both in the engine and passenger compartment.

FRONTWAY FIXES

Aids in reducing frontway noise include:

1. Make certain that a good ground is available to the antenna system. Measure continuity to chassis.
2. Try a hood grounding clip.
3. Try running the offending wire through a shielded (grounded) cable.
4. Try a screen shield above the instrument panel area (for windshield antennas with passenger compartment radiated problems).
5. Try adding a .5 MFD to under-dash circuits.

In summary, backway and frontway alternator whine both involve coupling an unwanted signal - whine - into the radio. Determine the point of entry, the source, and the means of elimination in that order.

SWITCH POPS

A snap, crackle, or pop heard in the radio when the customer directly or indirectly activates some electrical

1. Brake lights.
2. Turn signals.
3. Cigarette lighter.
4. Headlights.
5. Horn relay.
6. Ignition key buzzer.
7. Seat belt buzzer.
8. Emergency flashers.
9. Electric Windows.

These noises are considered normal because they are (1) customer activated - (the customer did something and a noise results); and (2) do not affect a majority of cars - (only a small percentage have the condition);

In order to eliminate a switch pop, you need a knowledge of what causes the pop. Consider this example with brake lights. (See figure 9C-16). The customer applies the brakes, pedal movement activates the brake light switch, the switch contacts meet, a sudden surge of current flows to the brake light through the wiring harness, these wires act as radiating antennas, the sensitive car radio intercepts this radiated power surge and a "pop" is heard in the speaker.

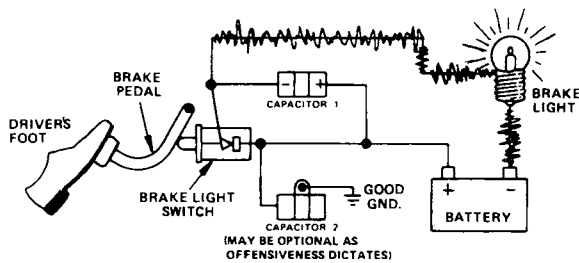


Figure 9C-16 Power Surges on any Switch Line Results in Switch Pops in the Radio

Generally whenever switch contacts are opened or closed with voltage across the contacts, an arc is produced. This arc has two characteristics which affect radio performance.

1. The arc will put a voltage spike (magnitude depending on load) on the cars wiring harness. The harness made up of wire and looped through the dash will act like a transformer and couple the signal into the antenna. The spike may also be carried on the radio A+ line.
2. Also, the arc will radiate a broad band of frequencies similar to that produced by a bolt of lightning (but shorter in duration and magnitude.) This radiation can be coupled to the antenna either directly or through the car wiring harness.

SWITCH POP ELIMINATION

There are two ways to eliminate this type of noise from the radio.

1. Suppress the switch causing the problem.
2. Shield the switch from the antenna.

The best way to suppress a pop caused by a switch is (as shown in figure 9C-16) to put a capacitor on the switch. Usually a .5 MFD capacitor can be tried in two positions on the switch:

- a. Across the contacts.
- b. From the hot side of the switch to ground.

Sometimes a capacitor in both positions will cure the problem.

The other approach is to shield the antenna from the switch. This is sometimes an effective but often a tedious job. If the noise is being radiated from the dash, then the dash should be shielded with a screen to suppress the noise. This requires removing the instrument panel cover and connecting a metal screen to the top of the frame.

The screen should be tried only when the noises are radiated from the instrument panel and there are too many switches to suppress individually. It may be used as a last resort if nothing else in the line of suppression seems to affect the noise.

BLOWER MOTOR NOISE

One type of noise not previously mentioned is blower motor noise. This noise shows up as static in the radio which will follow blower motor speed. The noise is caused by arcing but this time it's the motor brushes. Suppression is the best solution. Try adding a .25 MFD feed-through capacitor on the blower motor power lead. (See Figure 9C-17). Be sure the capacitor has a good ground or the noise will not be eliminated. If the noise persists, try another .5 MFD in parallel with the feed-through. If that doesn't cure the noise, you may have to replace the motor.

SUMMARY

As stated at the beginning, this guide is aimed at giving general guidelines for troubleshooting motor noise. If you follow it, you will solve at first the simple motor noise complaints and later after some experience, you will be able to tackle the real problem cases. As far as the real wierd ones go, don't lose your cool and above all, don't skip steps.

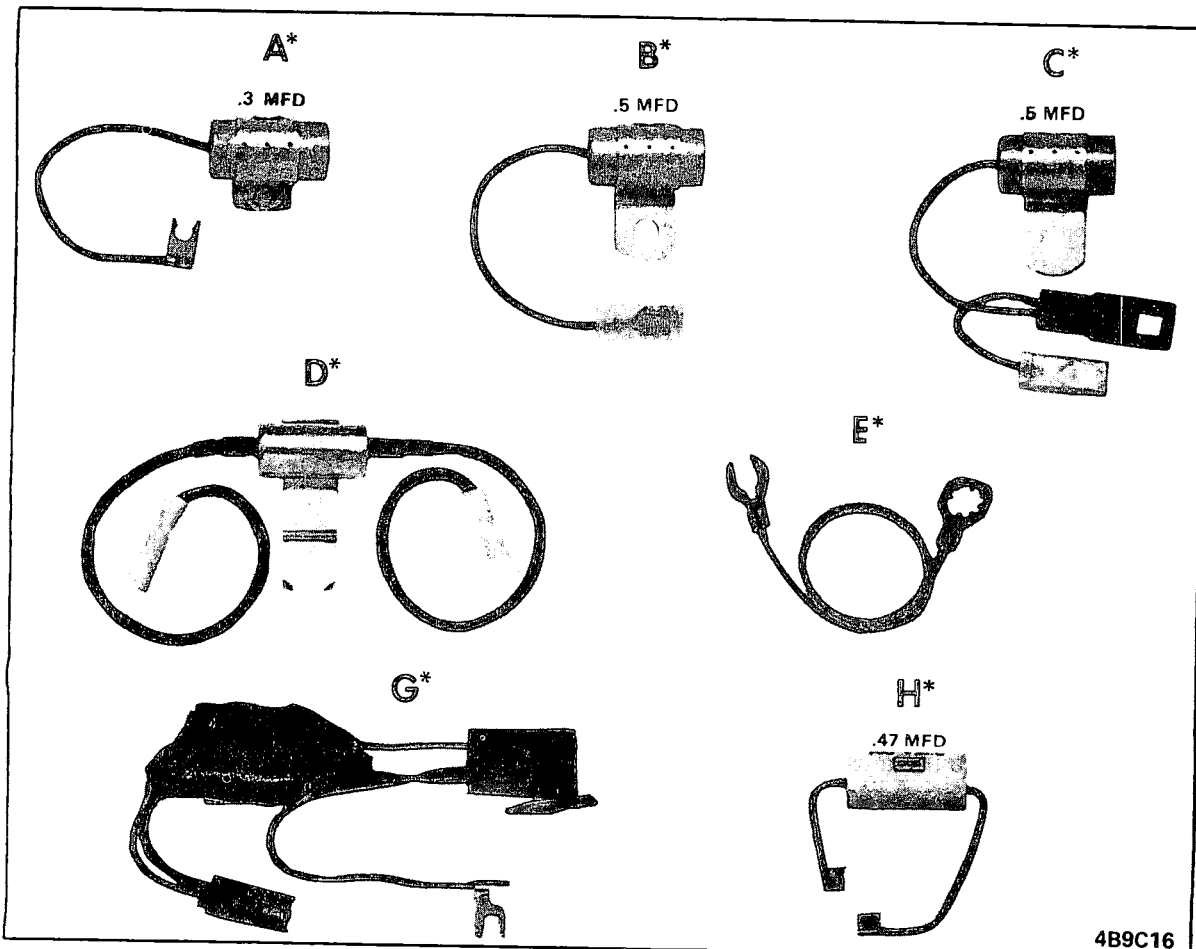
The summary list will be aided only by experience. That is, as you gain experience in solving motor noise problems, you can begin to categorize in your mind the various classes of motor noise. Then, if the conditions are identical, and the noise sounds the same, you'll have experience to rely on that may help guide you more quickly to a specific fix.

SUMMARY LIST

- (1) Identify noise source
 - a. Alternator whine.
 - b. Ignition noise.
 - c. Switch pops and click--check relays, stop lights, directional signals, etc.

NOISE SUPPRESSION EQUIPMENT

ILLUS. NO.	DESCRIPTION	APPLICATION
A	COIL TYPE CAPACITOR .3 MFD CAPACITOR	GENERAL PURPOSE
B	.5 MFD UNIVERSAL CONNECTOR	FUSE BLOCK OR ALTERNATOR WHINE
C	.5 MFD, DUAL CONNECTOR	GENERAL PURPOSE
D	COAXIAL FEED-THROUGH	BLOWER MOTOR
E	GROUND BRAID	AS APPLICABLE
F	HOOD GROUND CLIP	GROUNDS HOOD TO CAR CHASSIS
G	FILTER PKG.	BACKWAY ALTERNATOR WHINE
H	.47 MFD	TURN SIGNAL NOISE



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*OR EQUIVALENT

Figure 9C-17 Noise Suppression Equipment

e. Blower motor noise.

(2) Confirm above

a. Disable alternator by removing belt or field wire.

b. Ignition noise-increases with RPM and has characteristic popping sound.

c. Disconnect "A" lead or "hot wire" to suspected switch.

(3) Disconnect antenna

a. Noise remains then go to Backway Noise.

b. Noise gone then go to Frontway Noise.

RADIO/TAPE PLAYER TROUBLE DIAGNOSIS

The tape player trouble diagnosis guide is intended as an aid in locating minor faults which can be corrected without a specialized knowledge of electronics and without special test equipment. If the suggestions given here do not affect a correction, further testing should be done only by a trained radio technician having proper test equipment. It should first be determined if the owner's tape and not the player is at fault. Substituting a known good tape cartridge for the owner's is a simple check.

Because tape player service problems are generally corrected by United Motors Service repair shops, there is a tendency for many dealer servicemen to remove a set when a problem is reported. The irritation to an owner of having to drive with the tape player removed can frequently be avoided if the tape player trouble diagnosis guide is used to eliminate problems which can be easily fixed or which are not even caused by a faulty player.

DIAGNOSIS GUIDE

PLAYER NOISY

(Set all controls to mid-position. Insert test tape.)

A. Noise on One Channel

(Check interconnecting cable and connections.)

Cable and/or connectors loose or malfunctioning Replace or correct as required.

Cable and connectors okay Check speakers by substitution.

Speaker malfunctioned Replace speaker.

Speaker okay Remove player for repair.

B. No Noise

(Jar player with heel of hand.)

Noisy Check speaker connections.

Loose or malfunctioning connections Replace or correct as required.

Connections okay Remove player for repair.

No noise Player okay.

C. Noise on Both Channels

(Check speaker and power line connections.)

Connections loose or malfunctioning Correct as required.

Connections okay Check for loose mounting (player or speakers).

Loose mounting (player or speakers) Correct as required.

Mounting okay Remove player for repair.

PLAYER SPEED INCORRECT

(Set all controls to mid-position. Insert test tape.)

Speed too slow, too fast, or constantly changing Remove player for repair.

Speed normal Player okay.

PLAYER DEAD

(Set all controls to mid-position. Insert test tape and listen for speaker "thump".)

A. No Thump Heard in One Channel Only

(Check interconnecting cable and connectors.)

Cable and/or connections loose or malfunctioning Replace or correct as required.

Cable and connectors okay Check speaker by substitution.

Speaker malfunctioned Replace speaker.

Speaker okay Remove player for repair.

B. No Thump Heard

(Check fuse.)

Fuse blown Replace fuse and check for short or open in wiring.

Fuse not blown Check speaker and power line connections.

Connections loose or malfunctioning Correct as required.

Connections okay Remove player for repair.

C. Thump Heard

Remove player for repair.

ELECTRIC ANTENNA DIAGNOSIS

Condition	CAUSE	Correction
Antenna does not operate when ignition and radio switches are turned "ON".	Open radio fuse Open antenna fuse Antenna relay disconnected Antenna wiring connector disconnected Antenna relay mounting loose or not grounded to bulkhead Antenna not grounded (open) at fender mount Radio power connector disconnected Relay power wire disconnected at harness Relay inoperative (click should be audible when radio switch is turned "OFF") By-passed up/down limit switch Antenna motor inoperative	Replace radio fuse in fuse block Replace antenna fuse in fuse block Connect wiring connectors to relay (on bulkhead) Connect antenna wiring connector to harness connector Tighten relay mounting screws to secure proper ground Remount antenna to fender to secure proper ground Connect power connector to radio receiver Connect relay to harness connector Replace relay Replace up/down limit switch (on antenna) as assembly Replace antenna motor
Antenna operates automatically and down into fender, but cannot be operated to full height by antenna manual switch	Antenna manual switch disconnected or Malfunctioned Antenna manual switch does not make contact in "UP" position Red wire disconnected at connector Limit switch does not close (check for power at red wire at connector with non powered test light)	Connect manual switch connector to harness connector Replace antenna switch (in Instrument Panel) as assembly Connect red wire to wiring connector and secure connector Replace limit switch (on antenna) as assembly
Antenna operates automatically up, down into fender, and manually to full height, but cannot be operated downward by manual switch	Manual antenna switch wire open Manual antenna switch does not make contact in "Down" position	Repair wire as necessary Check for loose connection. If secure, replace antenna switch assembly
Motor runs but antenna does not move; or only moves short distance up or down	"DELRIN" cable slipping at engagement point inside motor housing "DELRIN" disconnected from mast Stripped drive gears inside motor housing Slipping clutch inside motor housing	Replace "DELRIN" cable and antenna mast section as assembly Replace "DELRIN" cable and antenna mast section as assembly Replace drive gears Replace clutch assembly
Motor continues to run without stopping after ignition switch is turned "OFF" and mast has secured into fender (one to five clutch clicks are normal after antenna has lowered into fender before motor stops)	Malfunctioned or by-passed "Down" limit switch	Replace up/down limit switch (on antenna) as assembly
With ignition and radio switches "ON", antenna extends to full height before motor stops	Malfunctioned limit switch Antenna manual switch in "UP" position	Replace up/down limit switch (on antenna) as assembly Place manual antenna switch in "OFF" position (between up and down)

ANTENNA TRIMMER ADJUSTMENT

An antenna trimmer adjustment is provided for matching the antenna coil in the receiver to the car antenna. This adjustment must always be made after installation of receiver, windshield antenna, power antenna or after any repairs to these units. This adjustment should also be performed whenever the AM radio reception is unsatisfactory.

This adjustment applies only to AM radios or to the AM portion of AM-FM radios. Trimming for FM reception is accomplished automatically whenever the antenna is raised to 31 inches on cars with whip antennas.

1. Fully extend power antenna if equipped.
2. On cars with dealer installed whip antennas, raise antennas to 31 inches.
3. Tune radio to a weak station near 1400 KHz which can barely be heard with volume turned fully on.
4. Remove right inner and outer knobs.
5. On cars having a rear speaker, it is necessary to fabricate a jumper wire and insert it into center and an outside hole unless it is a stereo radio. Cars with factory installed rear speaker have a built in fader. Dealer installed rear speakers use a hang-on fader.

There are three small holes (electrical connecting points) in receiver which are located directly behind right knob. When a non-stereo car is equipped with a rear speaker, the right larger knob (rear speaker control) has three prongs which interconnect these points. When the rear speaker control is removed to gain access to the trimmer screw behind it, two of the holes (the center and an outside hole) must be interconnected by a short piece of jumper wire to channel sound to a speaker. It is generally desirable to trim the radio while using the front speaker.

6. Adjust trimmer screw until maximum volume is achieved.
7. Reinstall both right knobs.

RADIO PUSH BUTTON SET-UP PROCEDURE

1. Turn on the radio.
2. Pull buttons outward. It is desirable to set up the push buttons in logical sequence. For example -- lowest frequency on first buttons, next higher frequency station on second button, etc.
3. Select either the AM or FM band. Carefully tune in the desired station manually, then push the button all the way in.
4. Move dial pointer away from the selected station and try the button to make certain the station is properly tuned in. Fine tuning will usually be required for optimum reception.
5. Turn the tuning knob back and forth to make certain that best tuning is obtained with the push button. If the best tuning is not obtained, repeat Steps 2, 3, and 4.
6. Any single push button on the AM/FM or stereo radios can be adjusted for BOTH A/M and F/M reception. This provides five A/M and five F/M station capability.

On push button selection, if the program sounds shrill or distorted, it is probably caused by improper tuning and can be corrected by adjusting the tuning knob slightly. Since the low notes are more affected by tuning than the high ones, it is preferable to tune the receiver to a point where the low notes are heard best, and high notes are clear but not shrill. This point may be most readily found by listening to the background noise of a station and tuning for the lowest noise level of the station. Turning the control knob back and forth until the station is almost lost on either side will enable the operator to hear the difference in reception and select the intermediate position giving best results.

TAPE PLAYER - PERIODIC MAINTENANCE

With use, lubricant and oxide from the player may build up on the capstan, head and tape guide. This may cause the tape to slip or run slowly. A head cleaning tape cartridge which contains a mildly abrasive tape is designed to remove these deposits. The cleaning tape cartridge is inserted in the tape player and allowed to run for approximately 30 seconds. This procedure is recommended after every 50 hours of operation or sooner if necessary. No lubricants should be used since they will cause the player to operate improperly especially at extreme temperatures.

ELECTRICALLY OPERATED ANTENNA - PERIODIC MAINTENANCE

Many antenna troubles can be prevented by cleaning and lightly oiling the antenna rod at periodic intervals. Cleaning is easily performed at oil change intervals, or when a car is being washed, by wiping the rod with a soft cloth. If car has been undercoated, check to make sure that drain holes in the motor housing below the body tube mounting point have not been plugged.

MOISTURE IN CYLINDER

Weak reception or fading may be caused by moisture in the support tube, due to condensation or leakage through the insulation bushings. If trouble has been traced to moisture in the tube, the antenna must be removed, disassembled and thoroughly cleaned. All moisture can be removed by blowing it out with compressed air, then pushing a clean, dry cloth through the support tube, as far as possible. Before assembling antenna, check drain holes in motor housing below body tube mounting point to be sure they are not obstructed.

MAJOR REPAIR

REMOVAL AND INSTALLATION OF RADIO - H SERIES

1. Disconnect the negative battery cable.
2. Remove clock knob and wood grain trim panel. (If equipped).
3. Remove instrument panel cover by removing all attaching screws, glove box and 4 attaching nuts from the inner side of the dash above the glove box opening.
4. Remove the 2 nuts securing the column to the upper bracket guide and lower the column.

CAUTION: *This steering column to dash bracket fastener is an important attaching part in that it could affect the performance of vital components and systems, and/or could result in major repair expense. It must be replaced with one of the same part number, or with an equivalent part, if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.*

5. Remove 1 screw attaching cluster assembly to dash support above steering column.
6. Disconnect speedometer cable from speedometer head.
7. Remove screws from cluster assembly and carefully pull forward. (Toward rear of car).
8. Remove knobs and escutcheons from radio control shafts.
9. Remove screw, attaching radio support to the lower dash.
10. Disconnect all electrical connectors and unplug antenna lead-in.
11. Install radio in reverse of removal torquing steering column to dash bracket nuts to 15-25 lb. ft. and trim radio.

REMOVAL AND INSTALLATION OF FRONT SPEAKER - H SERIES

1. Disconnect the negative battery cable.
2. Remove clock knob and wood grain trim panel. (If equipped).
3. Remove instrument panel cover by removing all attaching screws, glove box and 4 attaching nuts from the inner side of the dash above the glove box opening.
4. Remove the 2 nuts securing the column to the upper bracket guide and lower the column.

CAUTION: *This steering column to dash bracket fastener is an important attaching part in that it could affect the performance of vital components and systems, and/or could result in major repair expense. It must be replaced with one of the same part number, or with an equivalent part, if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.*

5. Remove 1 screw attaching cluster assembly to dash support above steering column.
6. Disconnect speedometer cable from speedometer head.
7. Remove screws from cluster assembly and carefully pull forward. (Toward rear of car).
8. Carefully unsnap main distributor duct from upper dash.
9. Disconnect speaker plug and 1 screw from speaker and remove.

10. To install, reverse removal procedures torquing steering column to dash bracket nuts to 15-25 lb. ft.

REMOVAL AND INSTALLATION OF FRONT SPEAKER - X SERIES

(Without Air Conditioning)

1. Remove negative cable from battery.
2. Reach up under instrument panel and disconnect electrical connector from speaker.
3. Remove (1) screw securing speaker to mounting bracket and remove speaker.
4. To install, reverse removal procedures attaching speaker connector before turning on the radio.

REMOVAL AND INSTALLATION OF FRONT SPEAKER - X SERIES

(With Air Conditioning)

1. Remove negative cable from battery.
2. Remove glove box.
3. Remove ash tray and bracket.
4. Remove center air conditioning deflector.
5. Remove center outlet housing.
6. Remove lower distributor duct and flexible hose.
7. Remove center upper duct and disconnect speaker wire.
8. Remove (1) mounting screw and remove speaker.
9. To install, reverse removal procedures attaching the speaker connector before turning on the radio.

REMOVAL AND INSTALLATION OF AM, AM-STEREO TAPE PLAYER, AM-FM, AM-FM STEREO, AM-FM STEREO TAPE PLAYER - X SERIES

1. Disconnect battery.
2. Remove radio knobs, bezels, nuts and side brace screw, disconnect antenna lead-in and connectors.
3. Remove radio from under dash. 4. To replace, reverse removal procedures.

REMOVAL AND INSTALLATION OF RADIO DIAL LIGHT - X SERIES

1. Remove radio as outlined under radio removal and installation.
2. Remove tape and/or cover from top of radio for access to dial light.
3. Remove light from socket.
4. To replace, reverse removal procedures.

REMOVAL AND INSTALLATION OF ANTENNA LEAD-IN - X SERIES

Removal

1. Disconnect lead-in at radio.
2. Connect 3 ft. length of wire to lead-in connector to aid in pulling new lead-in into place.

3. Remove lower windshield trim moulding at rear of hood.

4. Disconnect windshield rubber connector from antenna lead-in connector at cowl.

5. Remove the two attaching screws from the connector for the antenna lead-in to cowl.

6. Pull lead-in out until wire attached in step 2 is accessible. Disconnect wire from lead-in.

INSTALLATION

1. Wrap pull-in wire around new antenna lead-in and start feeding lead-in through cowl.

2. Apply silicone base sealer to cowl where lead-in attaches to cowl.

3. Pull lead-in into place and install attaching screws.

4. Connect windshield rubber connector to antenna lead-in.

5. Install lower windshield trim moulding.

6. Remove pull-in wire from antenna lead-in connector and plug lead-in into radio.

REMOVAL AND INSTALLATION OF RADIO - A SERIES

Removal

1. Remove radio knobs and escutcheons.

2. Disconnect center air duct assembly control (if equipped) by removing 2 retaining screws.

3. Disconnect left air conditioning hose if equipped.

4. Disconnect antenna lead-in, radio and speaker(s) connections.

5. Loosen 1 radio support nut.

6. Remove 2 front attaching nuts at radio face and slide radio towards front of car and downward.

7. Install in reverse of removal, trimming radio before installing right radio knob.

REMOVAL AND INSTALLATION OF RADIO-TAPE PLAYER - A SERIES

The integral radio/tape unit consists of 2 units, the radio/tape unit and remote convector. Should the radio/tape unit require servicing, it must be serviced with the remote convector, not as an individual component.

1. Refer to radio R and I procedures.

2. Remove the screws retaining the convector assembly to the lower edge of the instrument panel on the passenger side.

3. Install in reverse of removal, trimming radio before installing right radio knob. See Figure 9C-44.

REMOVAL AND INSTALLATION OF SPEAKER(S) - A SERIES

Center Speaker

1. Disconnect speaker wires from rear of the radio.

2. Remove 4 vertical screws on the upper horizontal surface of the instrument panel and from behind the glove box door remove 2 screws. Remove glove box and release clip on passenger side and lift off instrument cover assembly.

3. Remove screw at speaker bracket and remove speaker.

FRONT DUAL SPEAKER SYSTEM - A SERIES

Center Stereo Speaker

1. Refer to center speaker R and I for removal of the center stereo speaker. Disconnect the green and black wires from receptacles B and D from the speaker connector.

2. Install in reverse of removal making sure the speaker wires are installed into the correct receptacles.

To remove the passenger side stereo speaker, it is not necessary to remove the instrument panel cover.

Right Stereo Speaker

3. Disconnect the speaker wires from the rear of the radio.

4. Remove from the connector plug, the green and black wires (receptacles A/C) for the right speaker.

5. If equipped with A/C disconnect right hose and remove 1 bracket screw and lower speaker from beneath the instrument panel assembly.

6. Install in reverse of removal making sure speaker wires are connected into the correct receptacles of radio connector.

REMOVAL AND INSTALLATION OF POWER ANTENNA - B-C-E SERIES

1. Disconnect antenna lead-in cable and electrical connector.

2. On top of fender, remove special nut with spanner wrench J9215, adapter, and trim adapter pad.

3. Remove two antenna mounting bracket to wheelhouse panel screws.

4. Remove assembly from car and remove the bottom antenna to mounting bracket nut and washer (E Series). B-C Series position assembly and remove from underneath car between exhaust manifold and frame.

5. Install in reverse of removal and trim radio with antenna extended fully. On B-C cars, tape wiring to tube assembly before positioning between exhaust manifold and frame.

ELECTRIC ANTENNA UNIT DISASSEMBLY AND ASSEMBLY

Disassembly

1. Remove three screws securing clamp at top of support tube to support tube and remove clamp.

2. Remove two screws holding lead-in receptacle to support tube and remove receptacle.

3. Unsolder mast wire from pin and insulator assembly, and separate assembly from mast wire.

CAUTION: Do not overheat pin by slow soldering because excessive heat may damage insulator.

4. Remove three screws securing support tube to drive assembly and remove support tube with top insulator attached by pulling it loose from drive assembly.
5. Unscrew tip from inner telescopic section.
6. Remove outer mast sections with insulator bushing attached, from tubular fitting on drive assembly.
7. Inner mast section with delrin cable attached can be detached from drive assembly by applying 12 volts to black motor lead, while grounding motor. Pull remainder of cable out by hand. Keep cable taut to prevent kinking or bending.
8. Remove bottom insulator from tubular fitting with the aid of a small drill inserted through each of the drain holes at bottom of tubular fitting.

Assembly

1. Insert delrin cable into drive assembly as far as possible without applying force. Then apply 12 volts to white motor lead while grounding motor, to retract cable into drive assembly. Be certain to keep cable taut to prevent kinking.
2. Insert bottom insulator in tubular fitting with slotted protrusion down, aligning slots of insulator with ears in tubular fitting.
3. Place outer mast section over inner section, aligning slots of pin and insulator assembly with ears in tubular fitting.
4. Install tip on inner telescopic section.
5. Place support tube over mast assembly, aligning tang on tube with slot provided in tubular fitting. Pull mast wire through pin and insulator hole before securing support tube with three screws.
6. Insert mast wire into pin and insulator assembly, and solder. Be certain to use only resin type solder. Do not overheat.
7. Position lead-in receptacle over pin and insulator assembly and secure with two screws.
8. Install clamp over support tube and secure with three screws.

DOG ASSEMBLY - DISASSEMBLY, ADJUSTMENT AND REASSEMBLY

Disassembly

1. Clamp antenna lower mounting boss in vise.
2. Remove retaining spring clips securing automatic switch assembly to drive housing and remove switch assembly.
3. Pull out locking pin between dog assembly and shaft and using a 1/2 inch open end wrench, remove the dog assembly from shaft by turning the dog counterclockwise.

Assembly

1. Loosely install dog assembly on shaft by turning in clockwise direction.

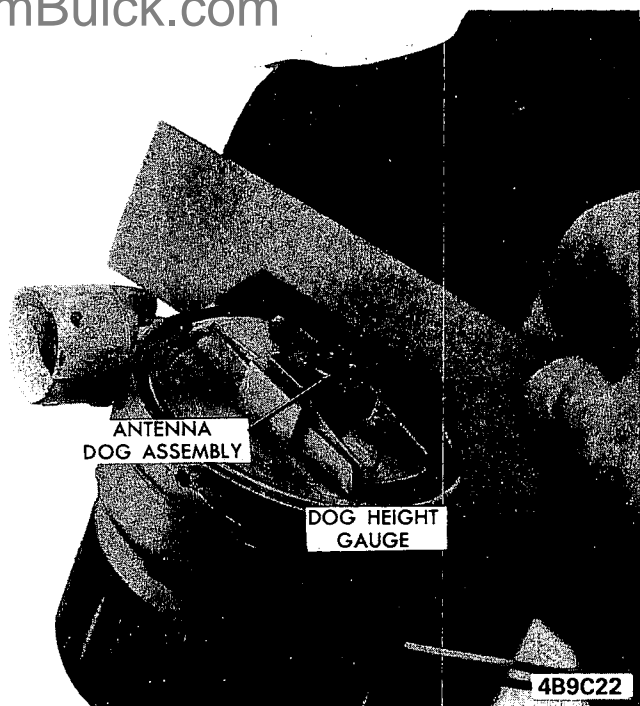


Figure 9C-20 Adjusting Dog Height

2. Using the template provided with new dog, measure distance between top of longest pin on dog to base of drive housing. Adjust as necessary. See Figure 9C-20.
3. Drive locking pin between dog assembly and shaft leaving end of pin 1/8" above shaft assembly.
4. Position automatic switch assembly to drive housing and secure with retaining spring clips and wrap entire assembly with electrical tape covering the clips.
5. Remove antenna assembly from vise.

AUTOMATIC SWITCH ASSEMBLY - REMOVE AND REPLACE

Removal

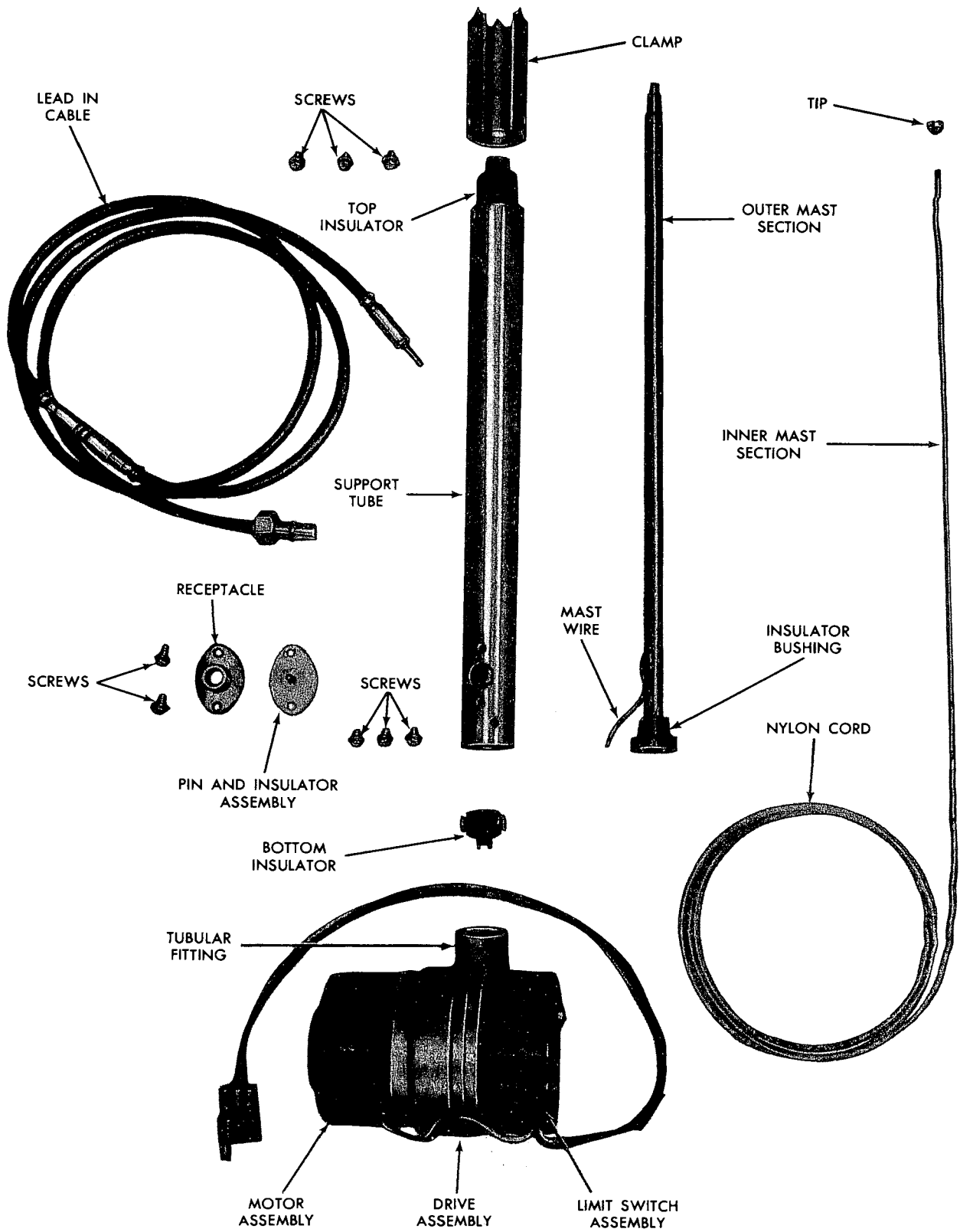
1. Remove retaining spring clips securing automatic switch assembly to drive housing and remove assembly.
2. Remove protective cover from motor and unsolder black and white wires.
3. Remove rubber grommet from wires.

Installation

1. Install rubber grommet on new wires and switch assembly.
2. Solder white wire on inside terminal (toward support tube) and black wire on outside terminal.
3. Position rubber grommet and wires onto motor housing and install protective cover over motor, making sure grommet slot in cover is installed into grommet.
4. Install new automatic switch and housing assembly to drive housing and fasten with retaining spring clip.

REMOVAL AND INSTALLATION OF RADIO-RADIO TAPE UNIT - B-C-E SERIES

The integral radio/tape unit consists of 2 units, the radio/-



4B9C23

Figure 9C-21 Electric Antenna-Disassembled

tape unit and remote convector. Should the radio/tape unit require servicing, it must be serviced with the remote convector, not as an individual component.

If equipped with air cushion restraint system, turn ignition switch to "LOCK" position and disconnect the negative battery cable from the battery and tape the end.

1. Disconnect the battery.
2. Remove the lower right instrument panel trim by carefully prying and pulling the trim out.
3. Remove the radio knobs and escutcheons from the control shafts.
4. Remove the retaining nuts (2) from the threaded portion of the control shaft.
5. Remove the plastic trim plate.
6. Unplug the radio, speaker wiring and the antenna lead-in.
7. Remove the rear radio attaching nut and pull out radio.
8. Install in reverse of removal and trim radio.

REMOVAL AND INSTALLATION OF FRONT CENTER SPEAKER - B-C-E SERIES

If equipped with air cushion restraint system, turn ignition switch to "LOCK" position and disconnect the negative battery cable from the battery and tape the end.

1. Disconnect the battery.
2. Remove the glove box door.
3. Remove the speedometer trim bezel.
4. From the rear of the radio, unplug the speaker connection.
5. Remove all instrument pad attaching screws and release 4 clips located behind the instrument panel by grasping the tongue of the far right hand side clip and squeezing and pulling forward.
6. Remove the speakers.
7. To install reverse the removal procedures.

REMOVAL AND INSTALLATION OF FRONT DUAL SPEAKER SYSTEM - B-C-E SERIES

Removal

If equipped with air cushion restraint system, turn ignition

switch to "LOCK" position and disconnect the negative battery cable from the battery and tape the end.

1. Disconnect the battery.
2. Remove the glove box door.
3. Remove the speedometer trim bezel.
4. Disconnect the speaker wires from the rear of the radio.
5. Remove all instrument pad attaching screws and release 4 clips located behind the instrument panel by grasping the tongue of the far right hand side clip and squeezing and pulling toward the rear of the car.
6. Remove the speaker.
7. To install reverse the removal procedures.

REMOVAL AND INSTALLATION OF RIGHT STEREO SPEAKER - B-C-E SERIES

Turn ignition switch to "LOCK" position. Disconnect the negative battery cable from the battery and tape end if equipped with air cushion restraint system.

1. Disconnect the negative battery cable.
2. Disconnect the speaker wires from the rear of the radio.
3. Remove the glove box.
4. Disconnect the right air conditioning flexible hose (if equipped).
5. Remove the speaker.
6. To install reverse the removal procedures.

REMOVAL AND INSTALLATION OF WINDSHIELD GLASS WITH BUILT-IN ANTENNA

Removal and Installation

Before removing windshield glass, disconnect antenna lead at lower center of windshield. If glass is to be reinstalled, fold and tape lead wire back onto outer surface of windshield to protect it during glass removal and installation.

1. Remove and install windshield.
2. Connect windshield antenna lead to radio lead in cable.
3. Trim radio.

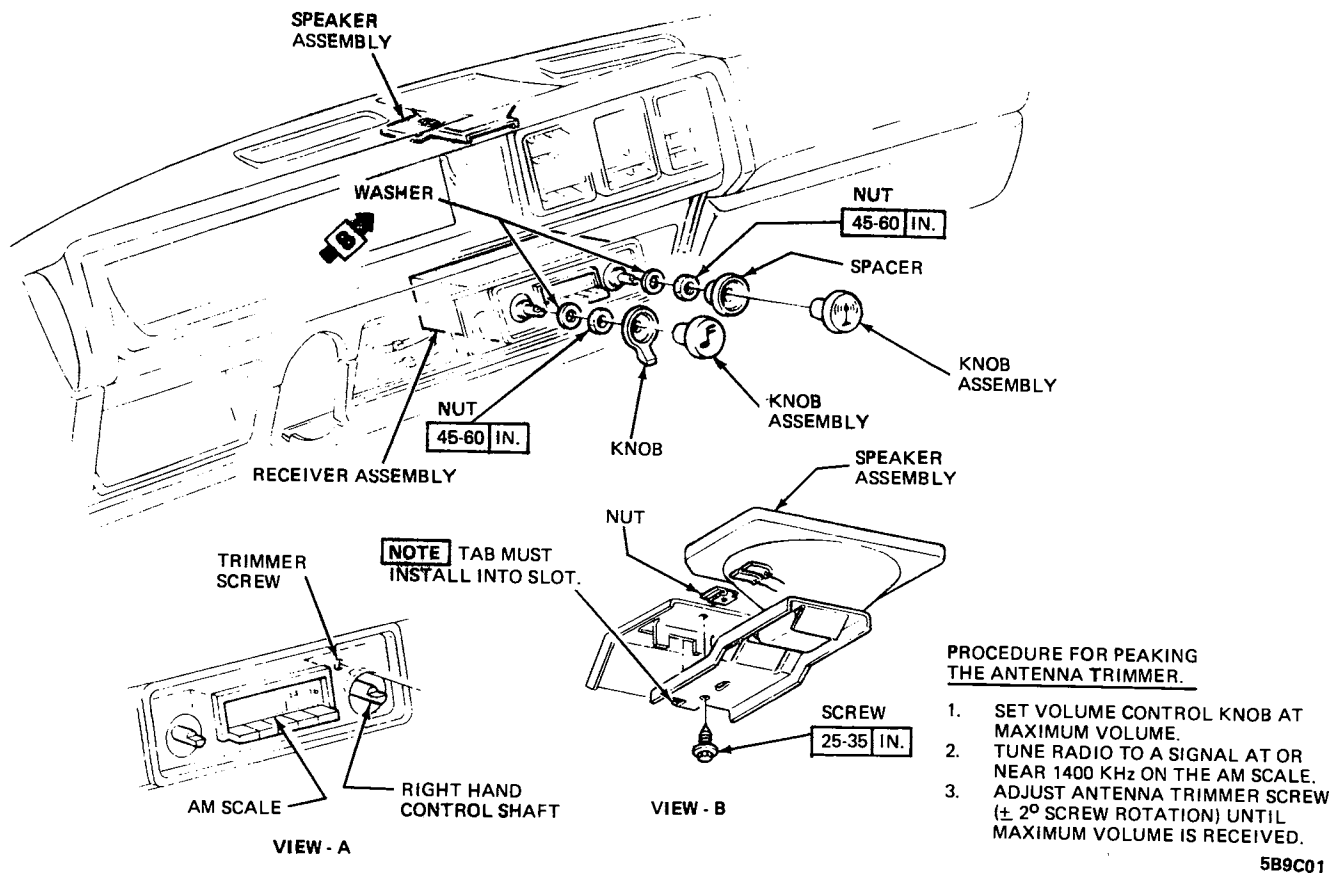


Figure 9C-25 - Radio, Speaker and Antenna Trimmer - H Series

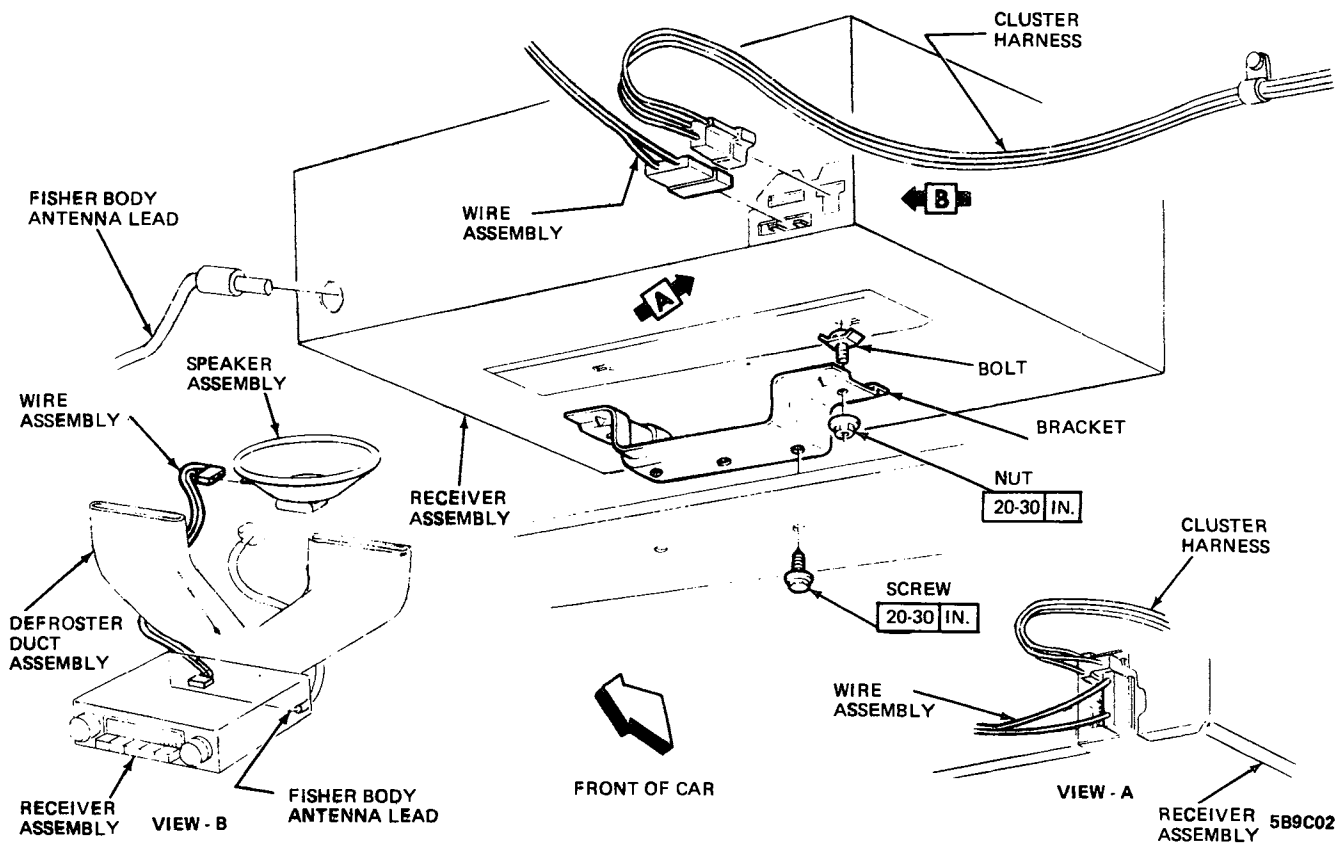
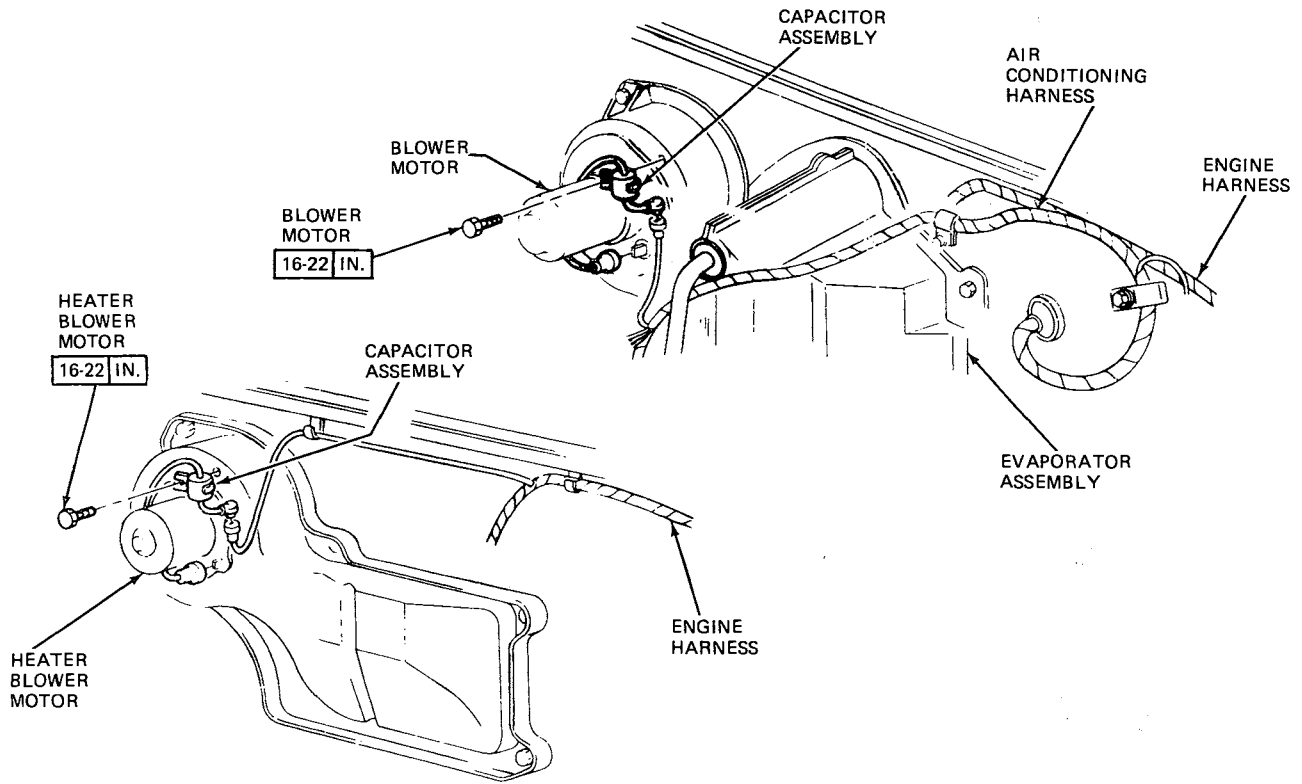
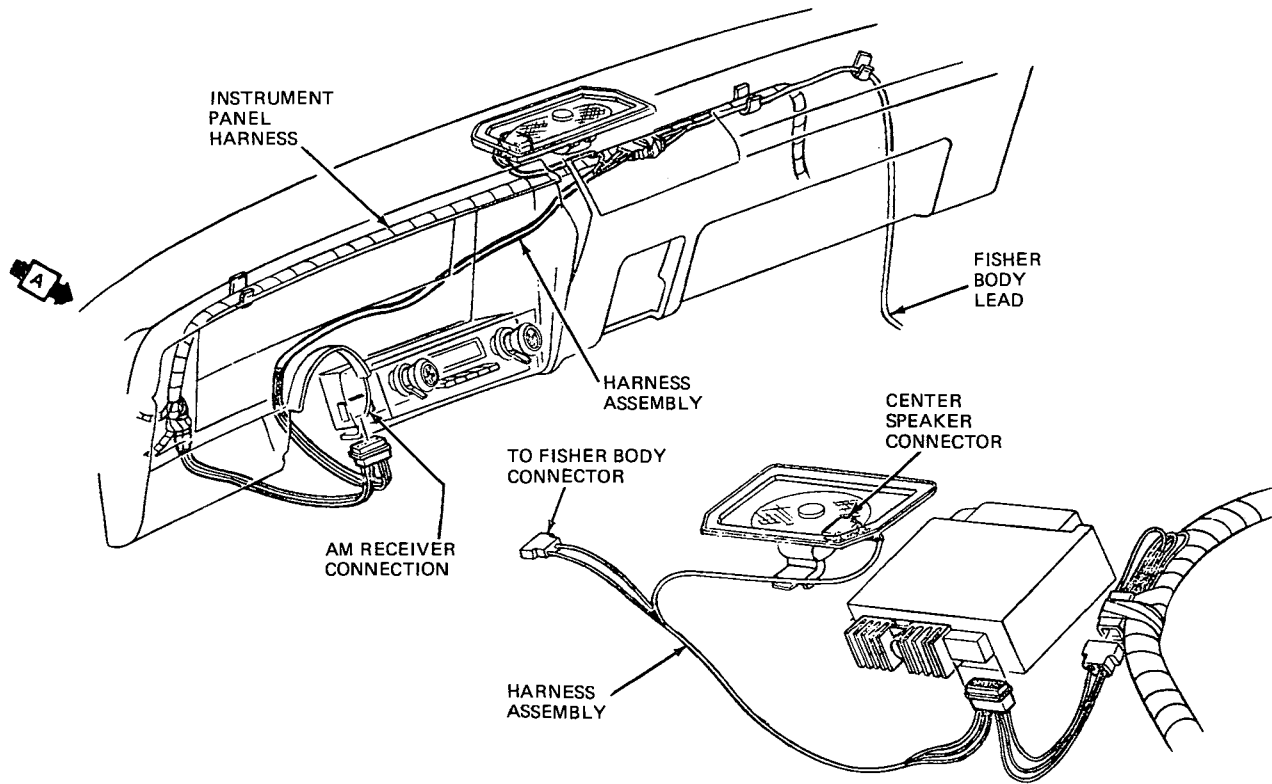


Figure 9C-26 - Radio Mounting and Wiring - H Series



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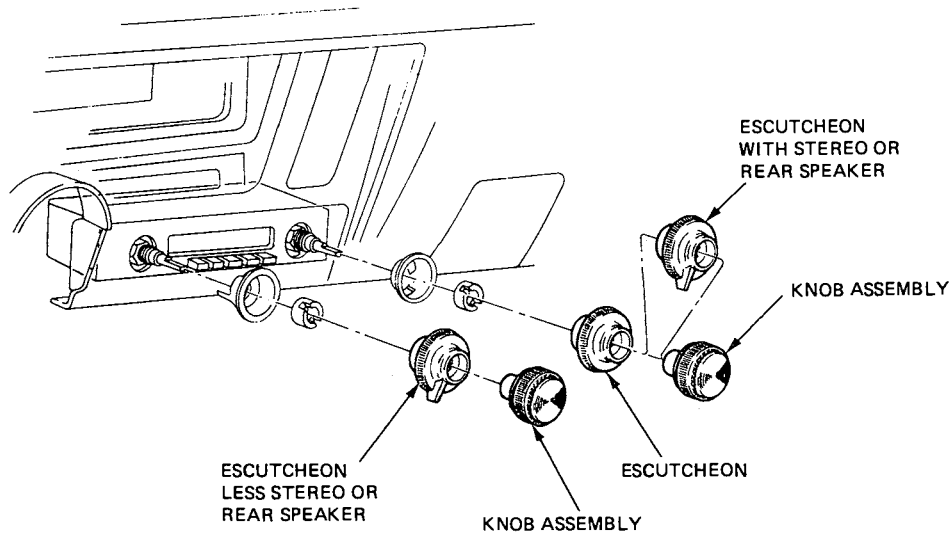
Figure 9C-27 - Radio-Capacitors - H Series



VIEW - A AM/FM RECEIVER SHOWN

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Figure 9C-28 - Radio Wiring - H Series



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Figure 9C-30 - Radio and Speaker - X Series

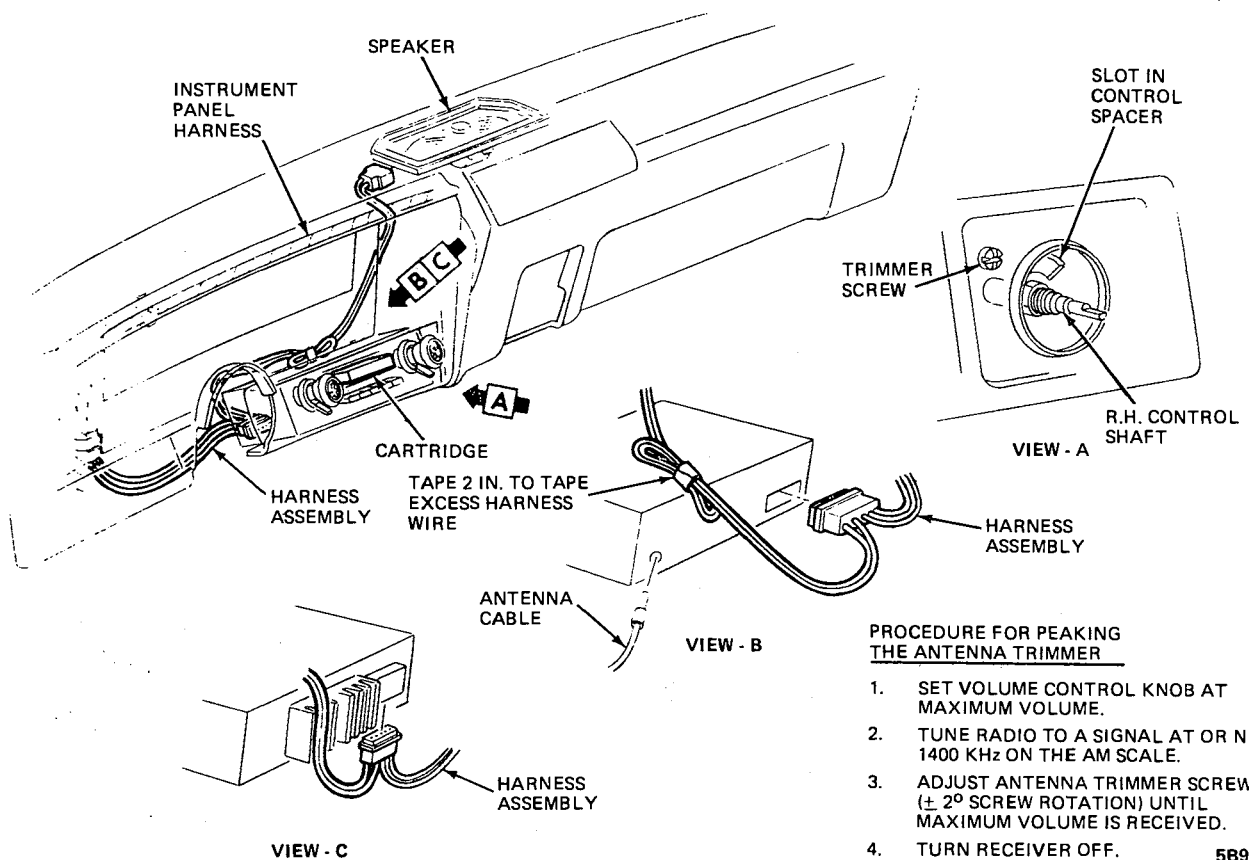


Figure 9C-31 - Radio Wiring and Antenna Trimmer - X Series

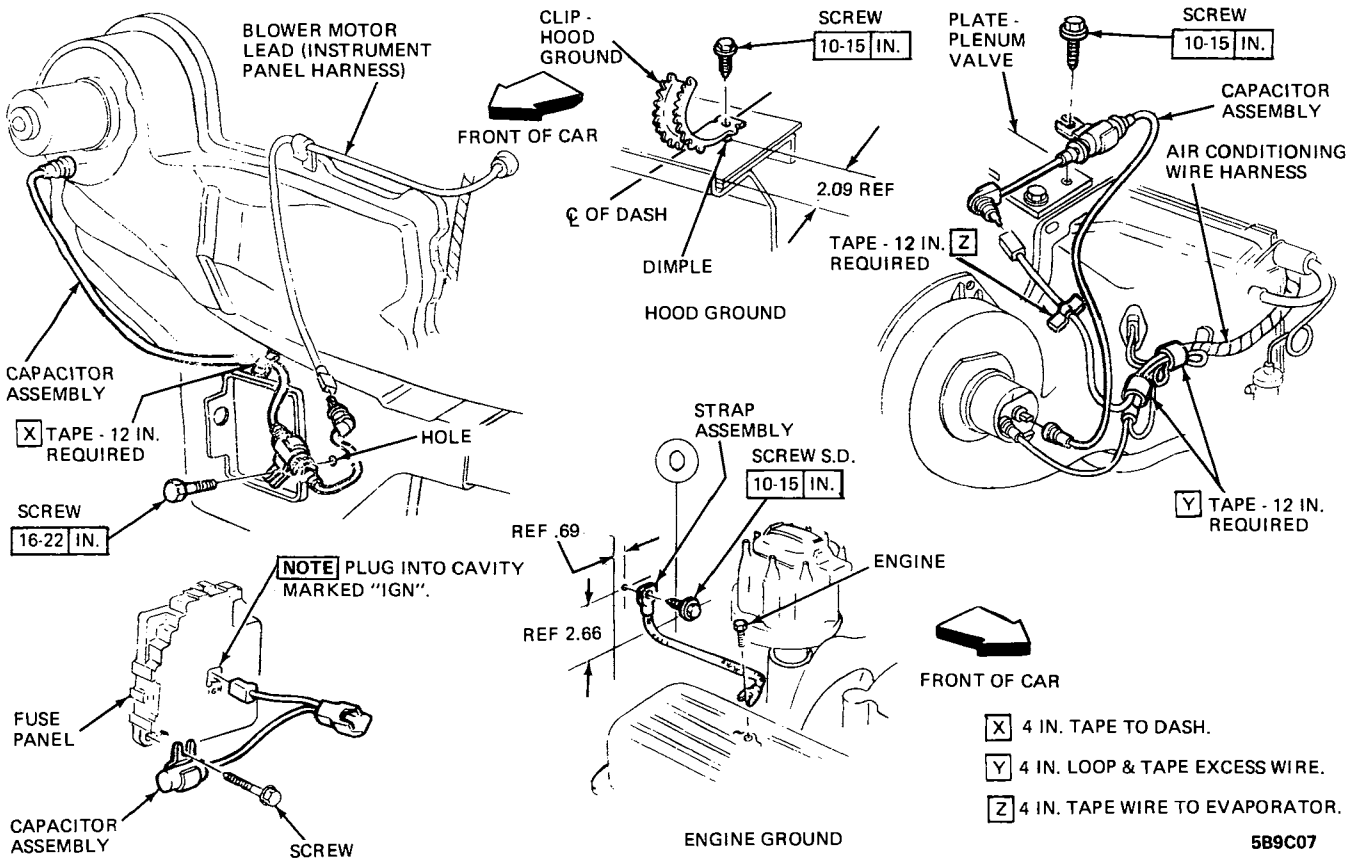


Figure 9C-32 - Radio Capacitors - Clip and Ground Strap - X Series

B ROUTE WIRES OVER TOP OF VACUUM HOSE & HEATER CONTROL

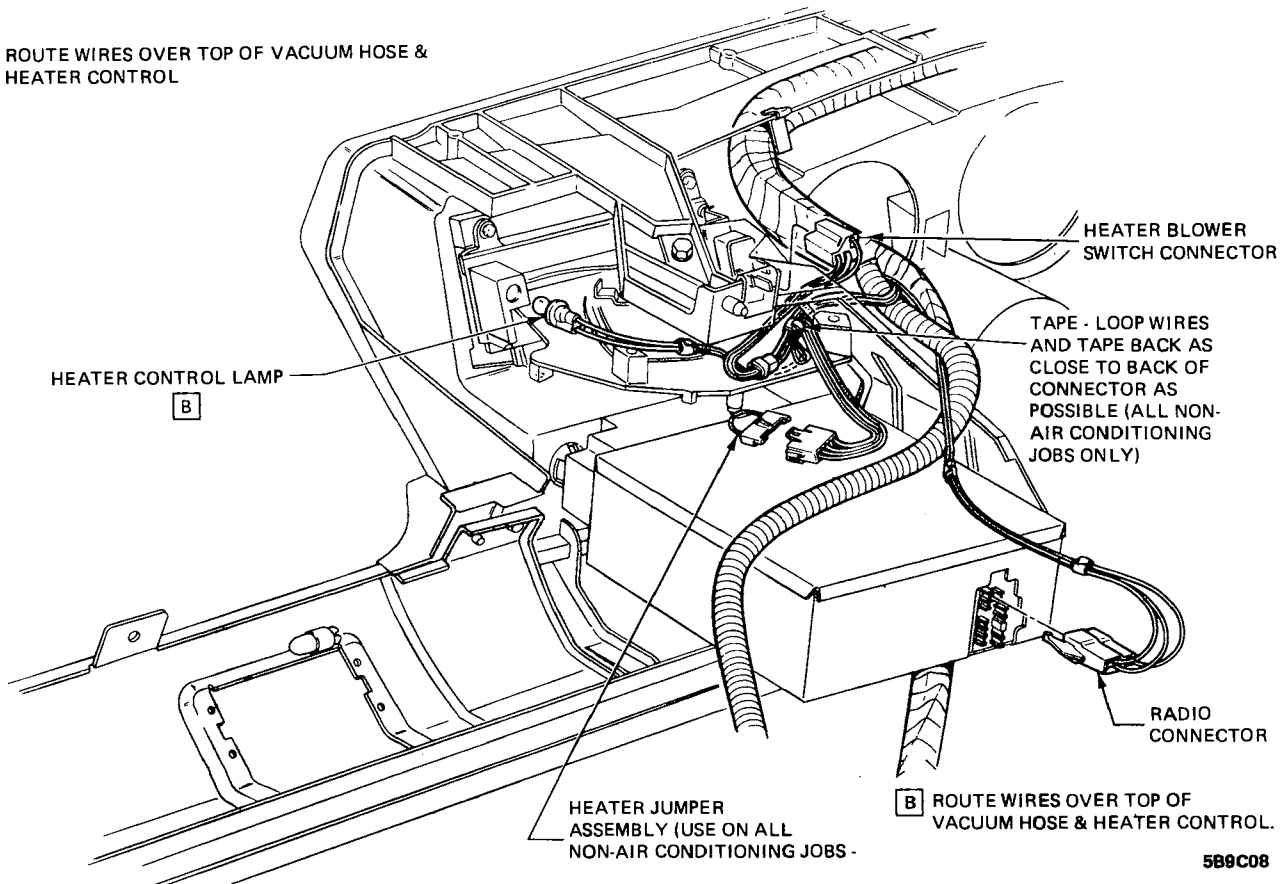


Figure 9C-33 - Wiring Right Side of Instrument Cluster - A Series

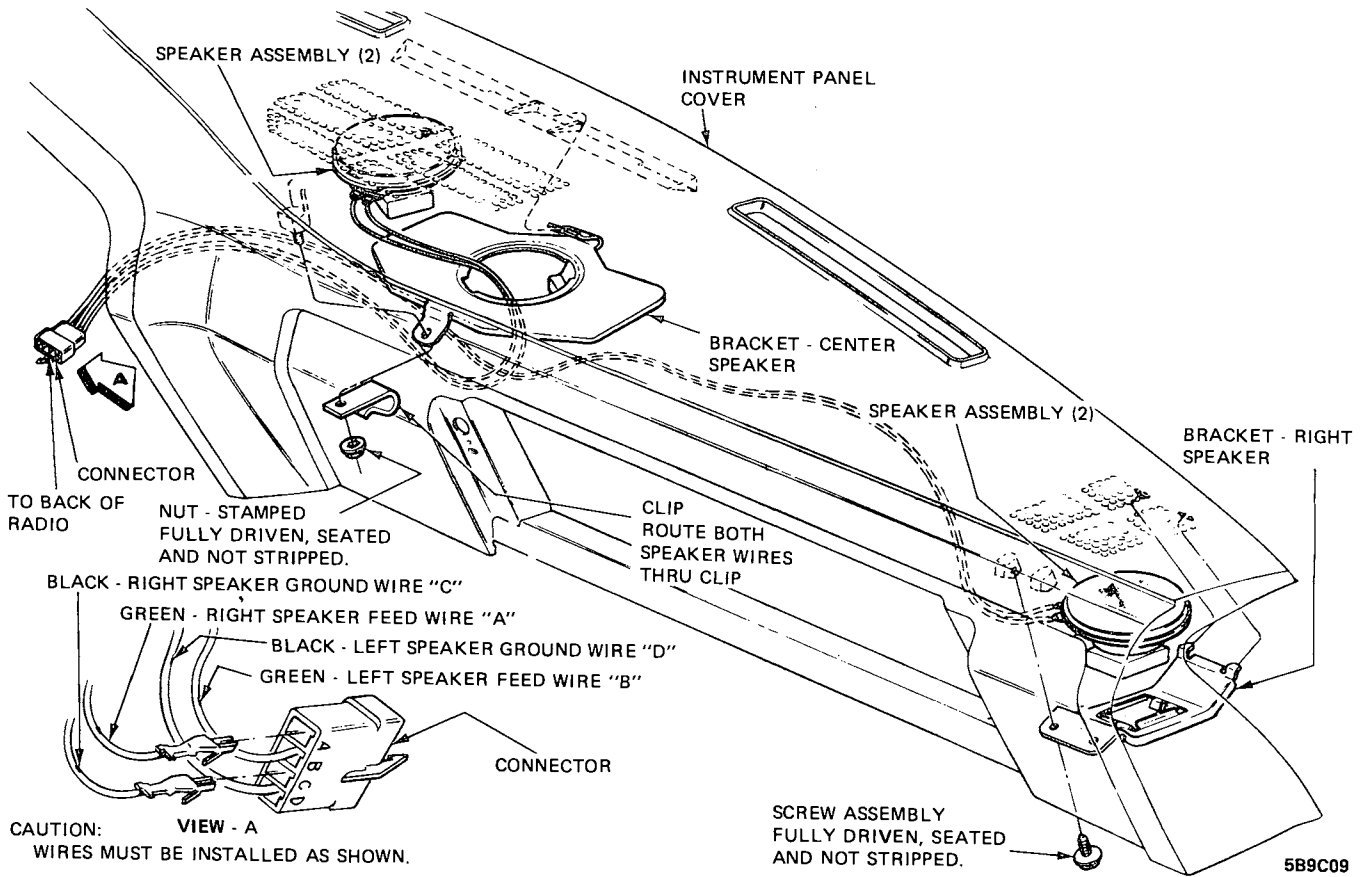


Figure 9C-34 - Radio Speakers - Stereo - A Series

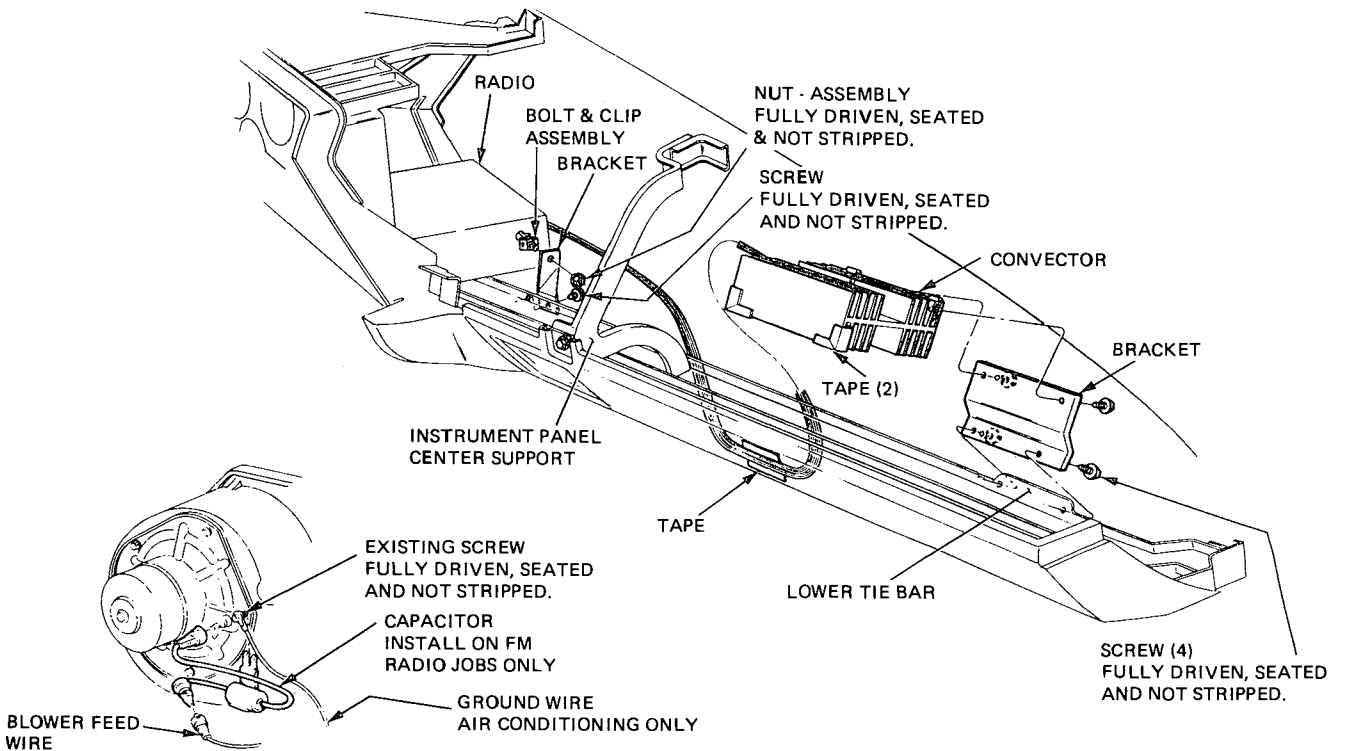
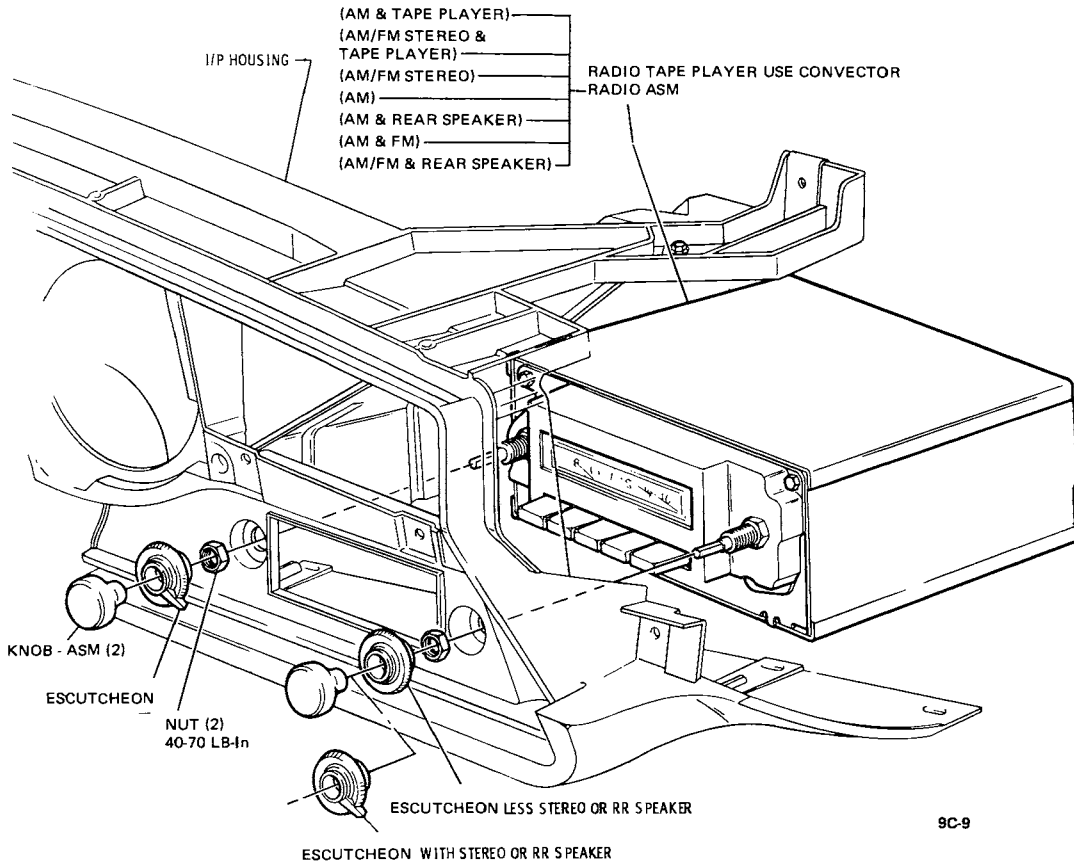


Figure 9C-35 - Radio - Convector - Radio Tape Player Combination - A Series



9C-9

Figure 9C-36 - Radio Receiver and Knobs - A Series

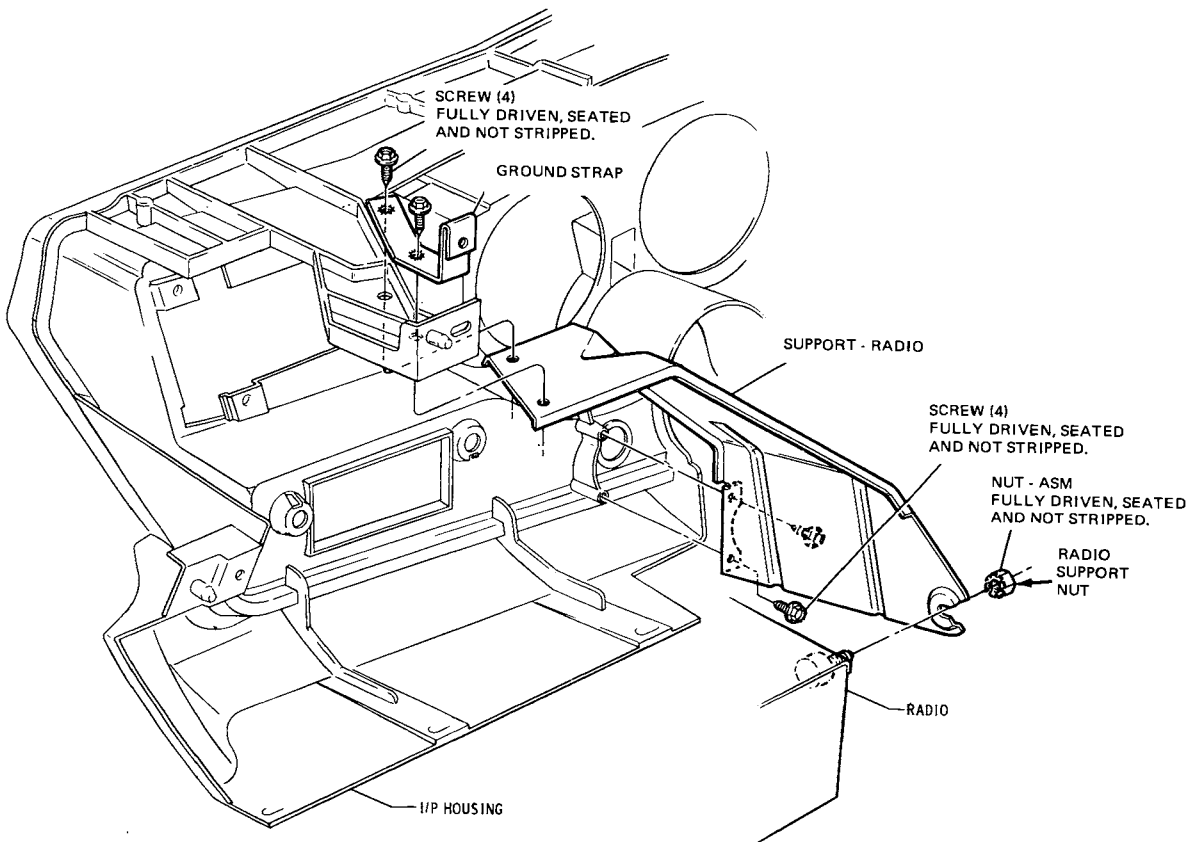
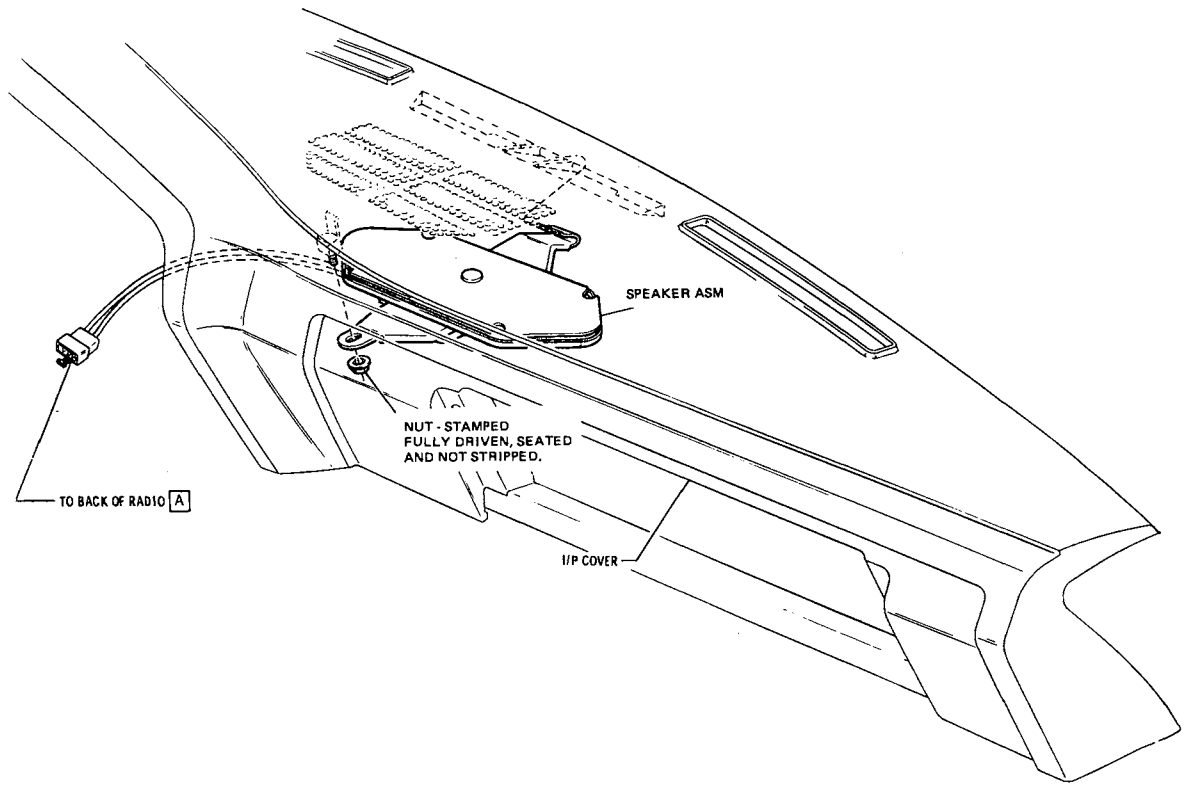
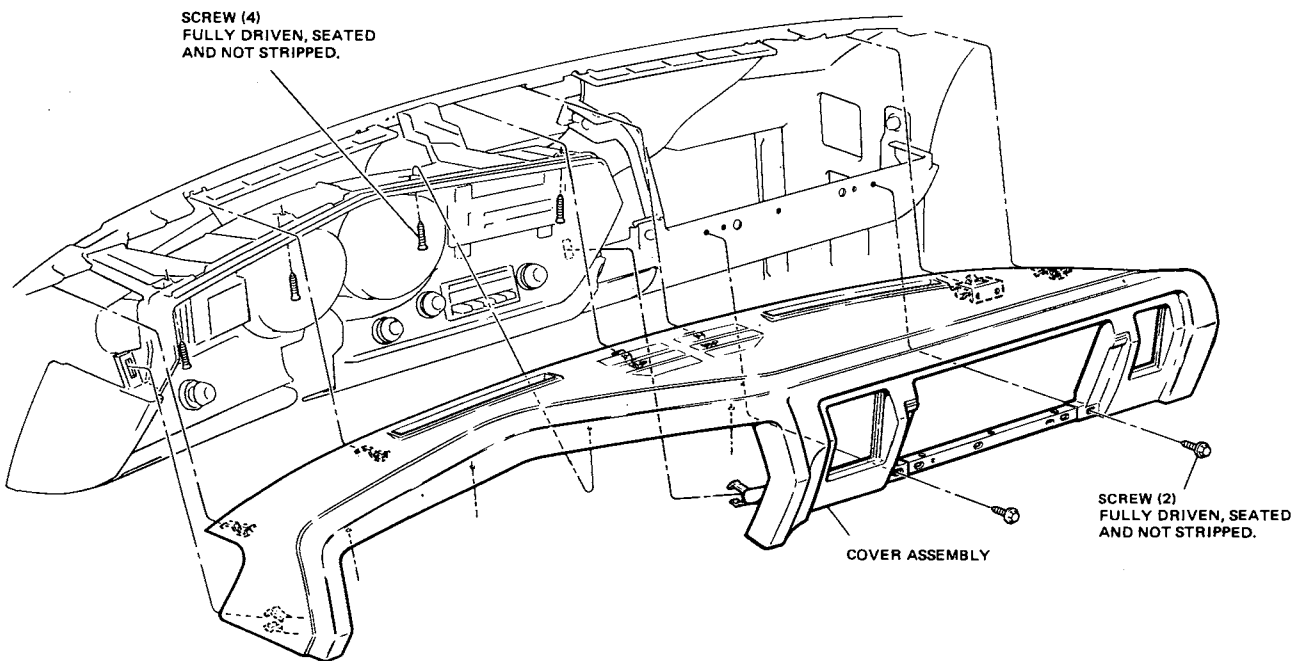


Figure 9C-37 - Radio Support - A Series



9C-12

Figure 9C-38 - Radio Speaker - Less Stereo - A Series



9C-13

Figure 9C-40 - Instrument Panel Cover Assembly - A Series

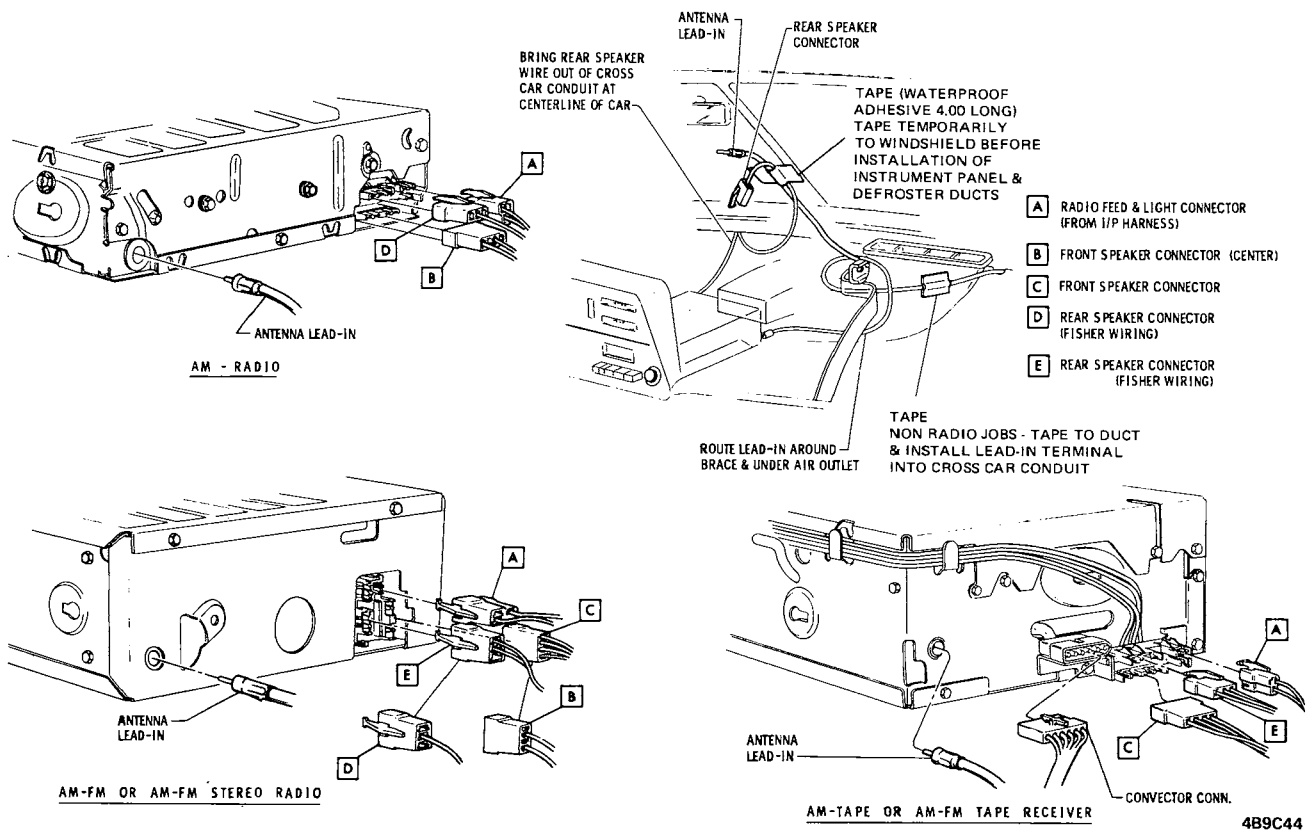
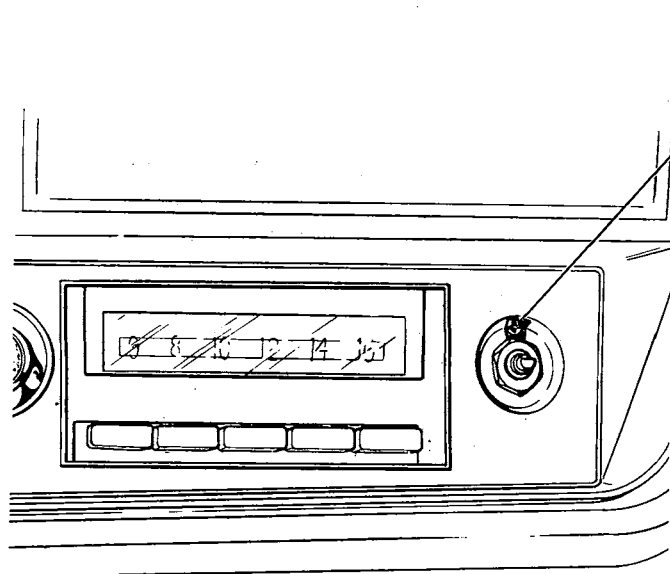


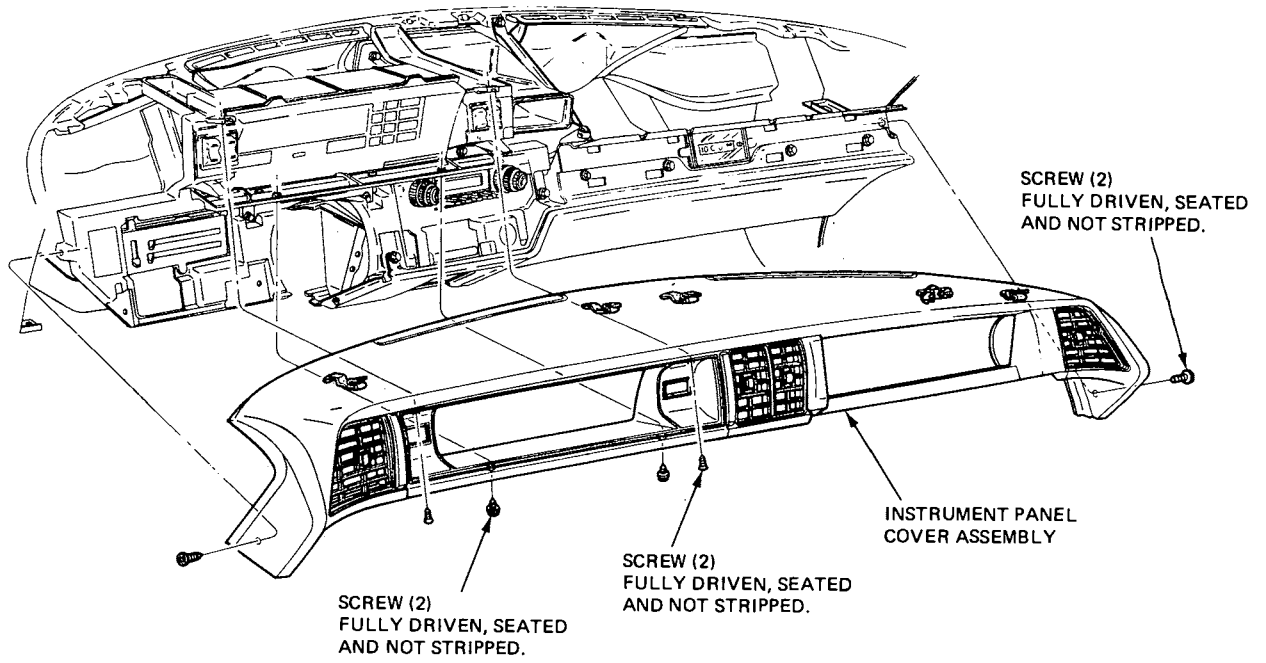
Figure 9C-41 - Radio and Speaker(s) Connections - A Series

RADIO ANTENNA TRIMMER SCREW ADJUSTMENT



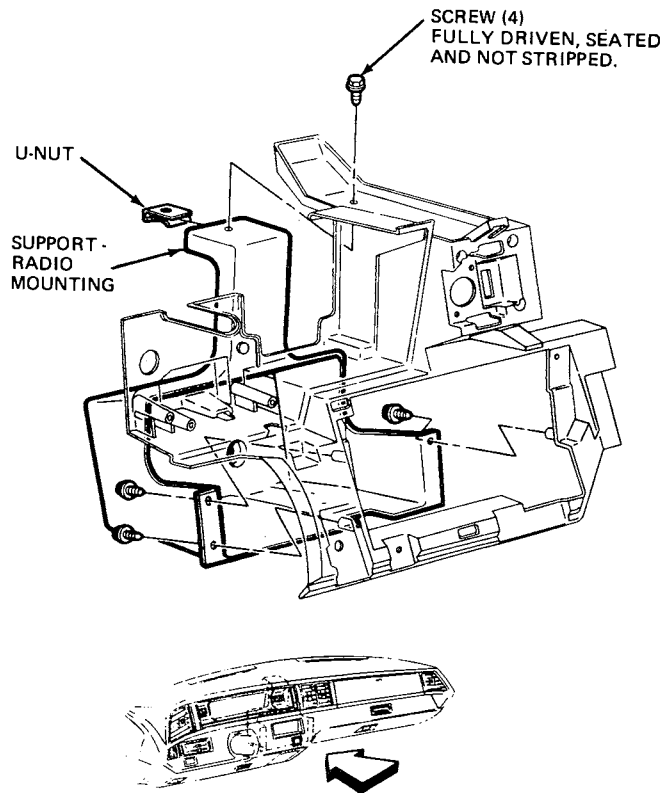
1. TUNE RADIO TO A STATION AT OR NEAR 1400 KHz THAT CAN BARELY BE HEARD WITH VOLUME FULL ON. (A PROPERLY ADJUSTED SIGNAL GENERATOR MAY BE SUBSTITUTED).
2. INSERT A SCREWDRIVER THROUGH THE OPENING IN THE RECEIVER AND SLOWLY TURN THE TRIMMER SCREW BACK AND FORTH UNTIL THE POSITION IS FOUND THAT GIVES MAXIMUM VOLUME.
3. ADJUST TRIMMER ON AM/FM SETS IN AM POSITION ONLY.

Figure 9C-42 - Antenna Trimmer Adjustment - A Series



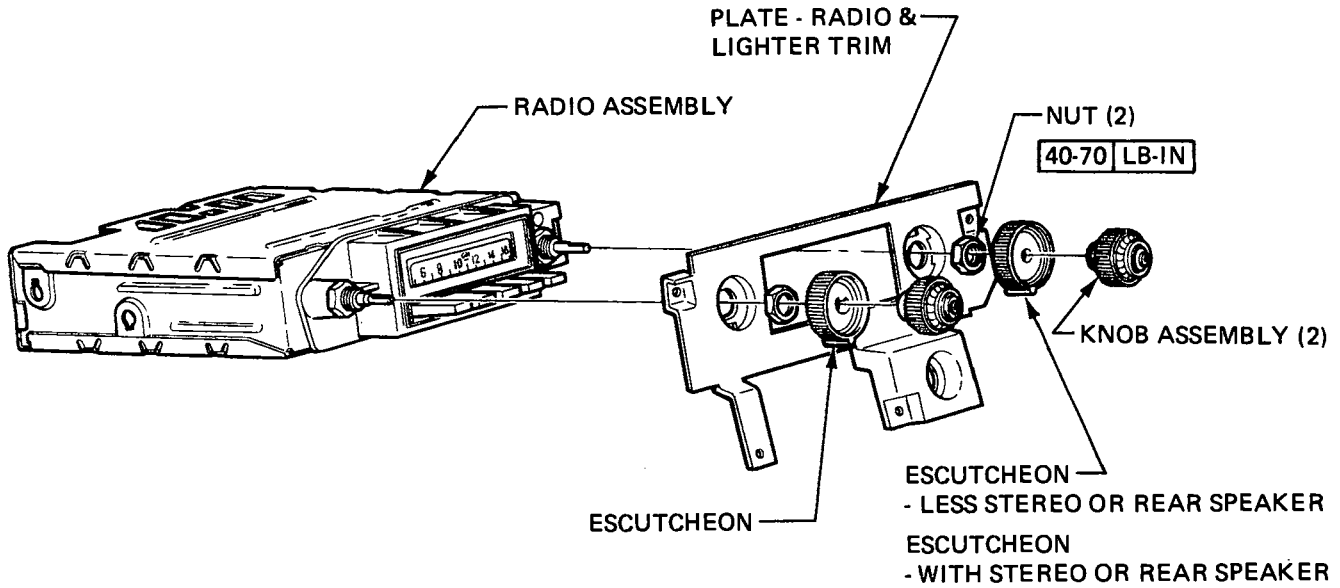
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Figure 9C-43 - Instrument Panel Cover Assembly - B-C-E Series



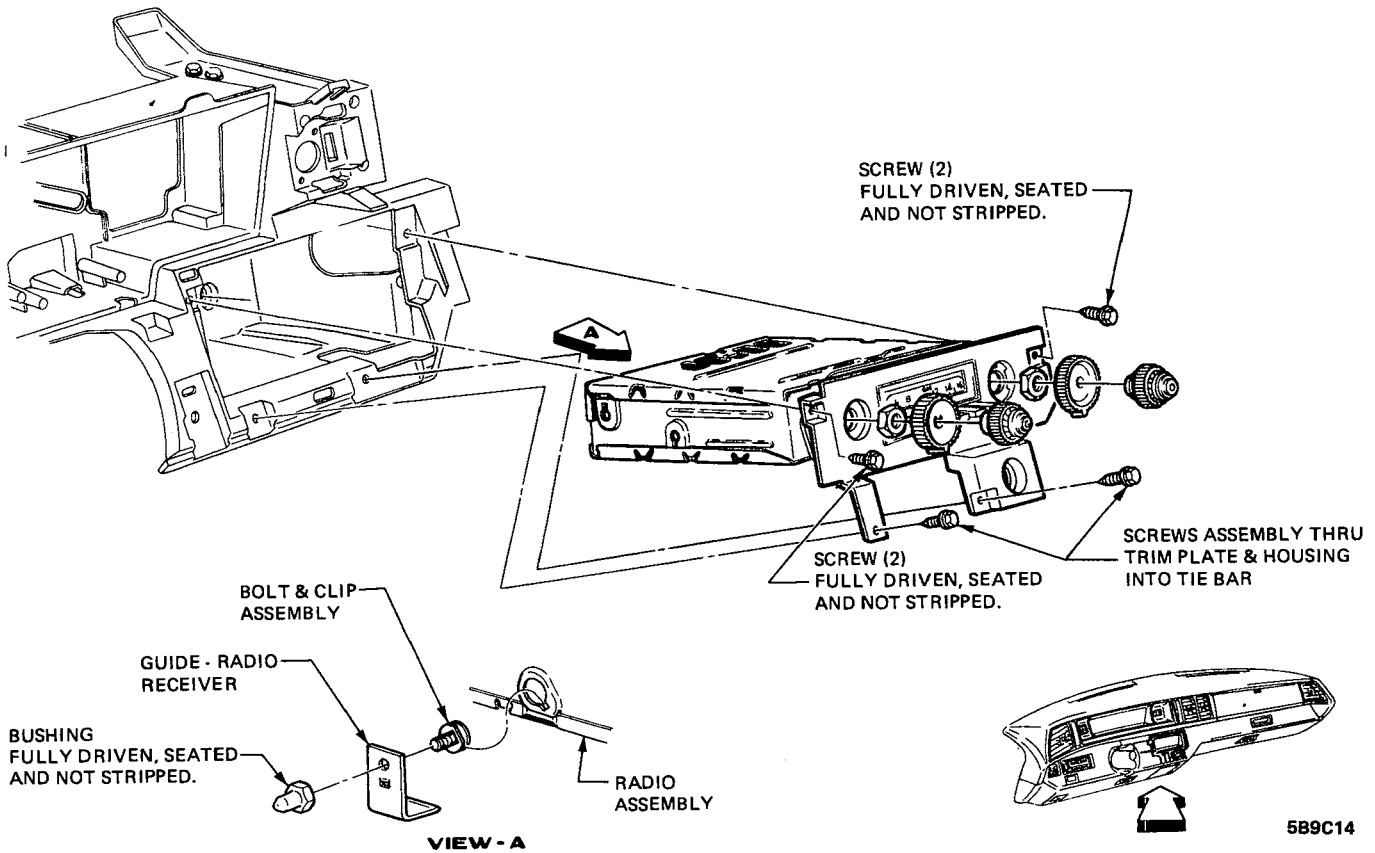
5B9C12

Figure 9C-44 Radio-Mounting Support to Housing - B-C-E Series



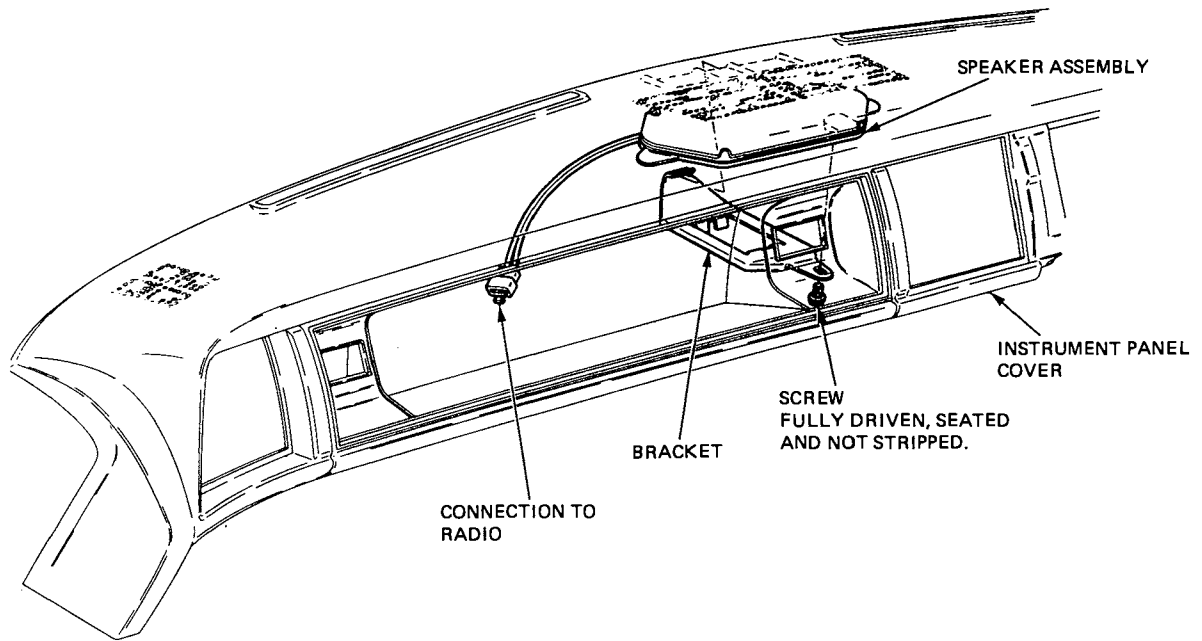
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Figure 9C-45 - Radio-Receiver - Knobs and Trim Plate - B-C-E Series



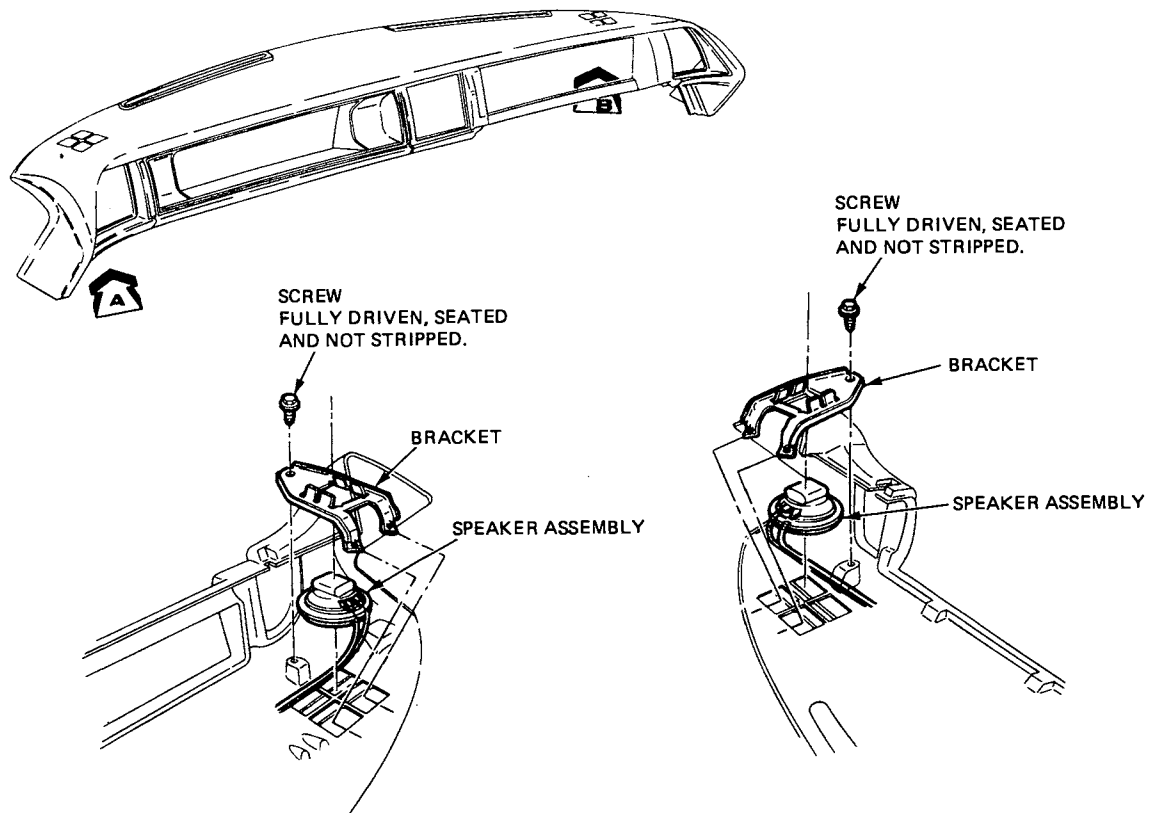
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Figure 9C-46 - Radio-Installation to Housing - B-C-E Series



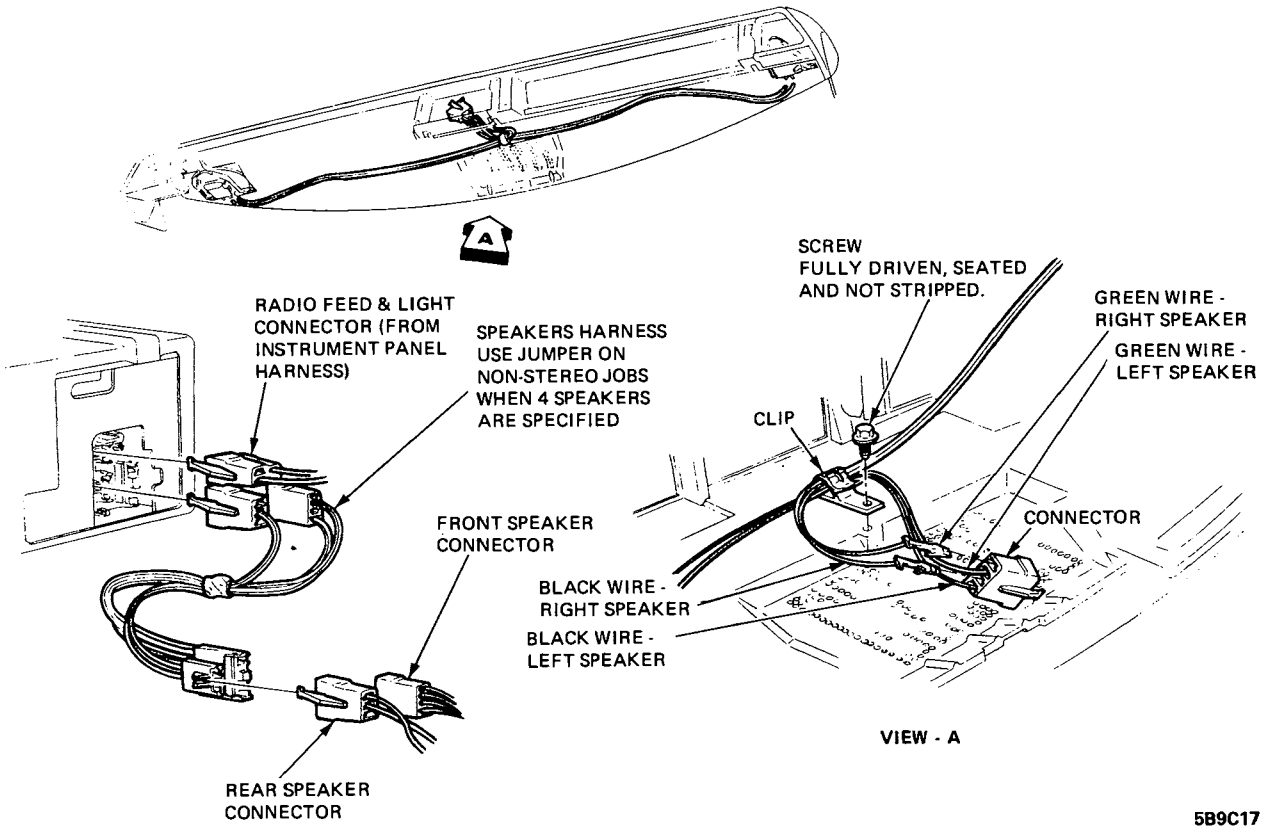
5B9C15

Figure 9C-47 - Radio-Front Speaker - Center (Non-Stereo) - B-C-E Series



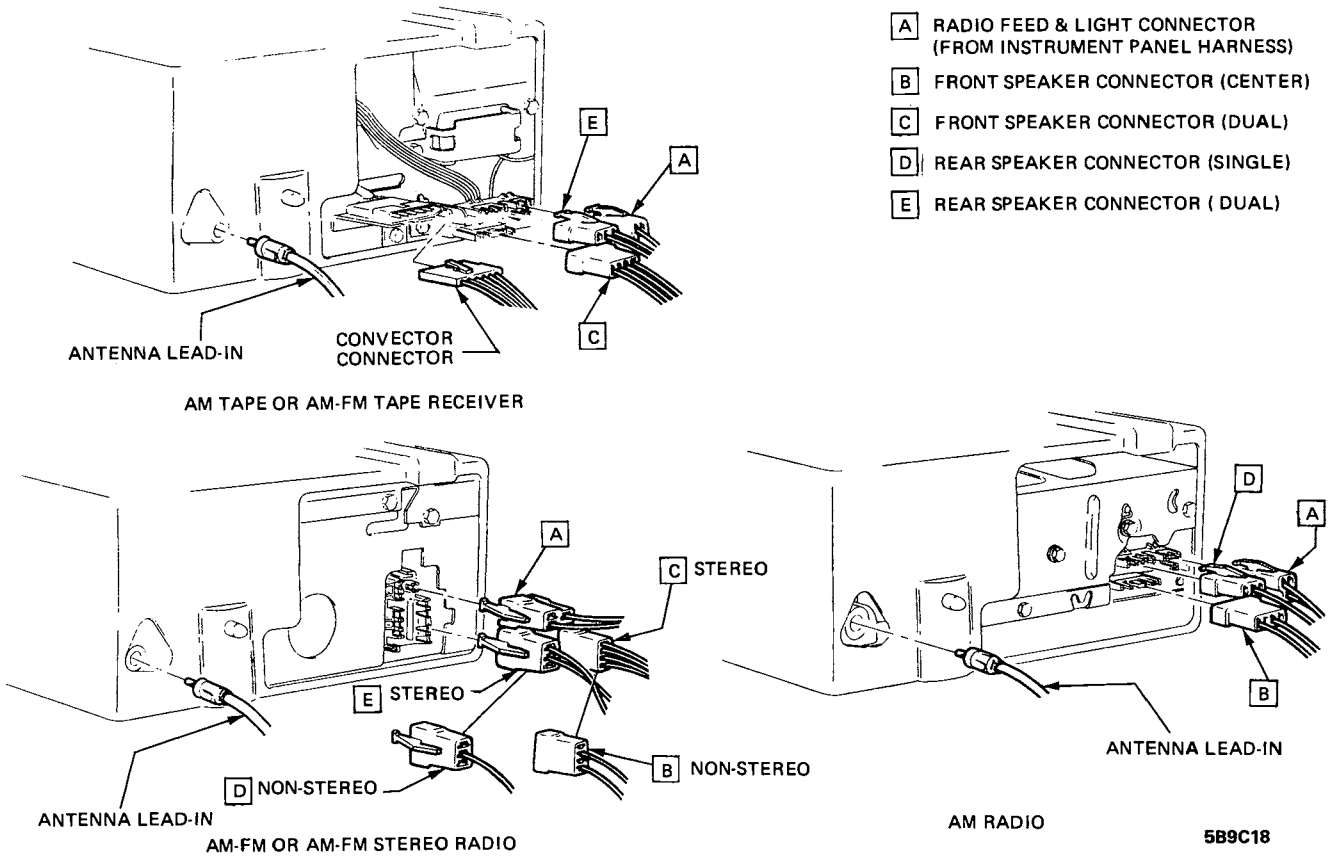
5B9C16

Figure 9C-48 - Radio-Front Speaker - Right and Left - Stereo - B-C-E Series



5B9C17

Figure 9C-50 - Radio - Front Speaker Wire Routing - Stereo - B-C-E Series



5B9C18

Figure 9C-51 - Radio Connectors - Feed - Speakers and Antenna - B-C-E Series

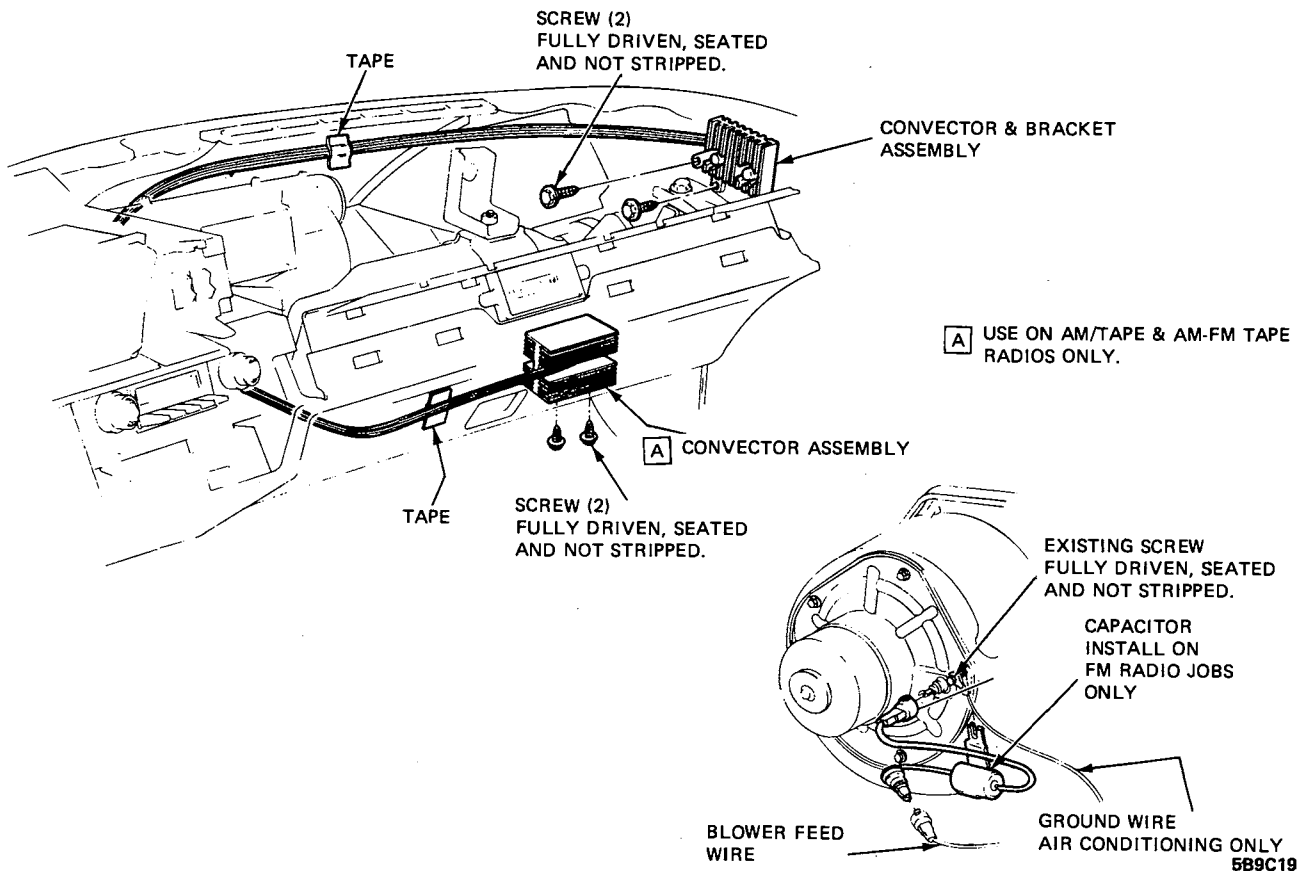


Figure 9C-52 - Radio-Blower Capacitor and Convector - B-C-E Series

RADIO ANTENNA TRIMMER SCREW ADJUSTMENT

FOR CARS WITH POWER ANTENNA, FULLY EXTEND ANTENNA BEFORE MAKING THE FOLLOWING ADJUSTMENTS:

TUNE RADIO TO A STATION AT OR NEAR 1400 KHZ. THAT CAN BARELY BE HEARD WITH VOLUME FULL ON. (A PROPERLY ADJUSTED SIGNAL GENERATOR MAY BE SUBSTITUTED).

INSERT A SCREWDRIVER THROUGH THE OPENING IN THE RECEIVER & CAREFULLY TURN THE TRIMMER SCREW BACK & FORTH UNTIL THE POSITION IS FOUND THAT GIVES MAXIMUM VOLUME. ADJUST TRIMMER OF AM/FM SETS IN AM POSITION ONLY.

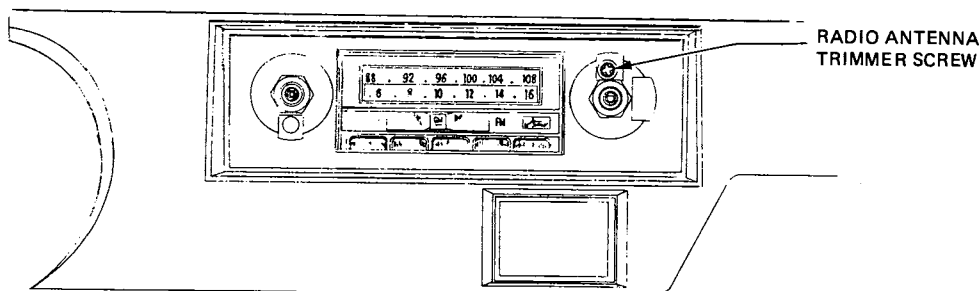


Figure 9C-53 - Radio-Antenna Adjustment - B-C-E Series

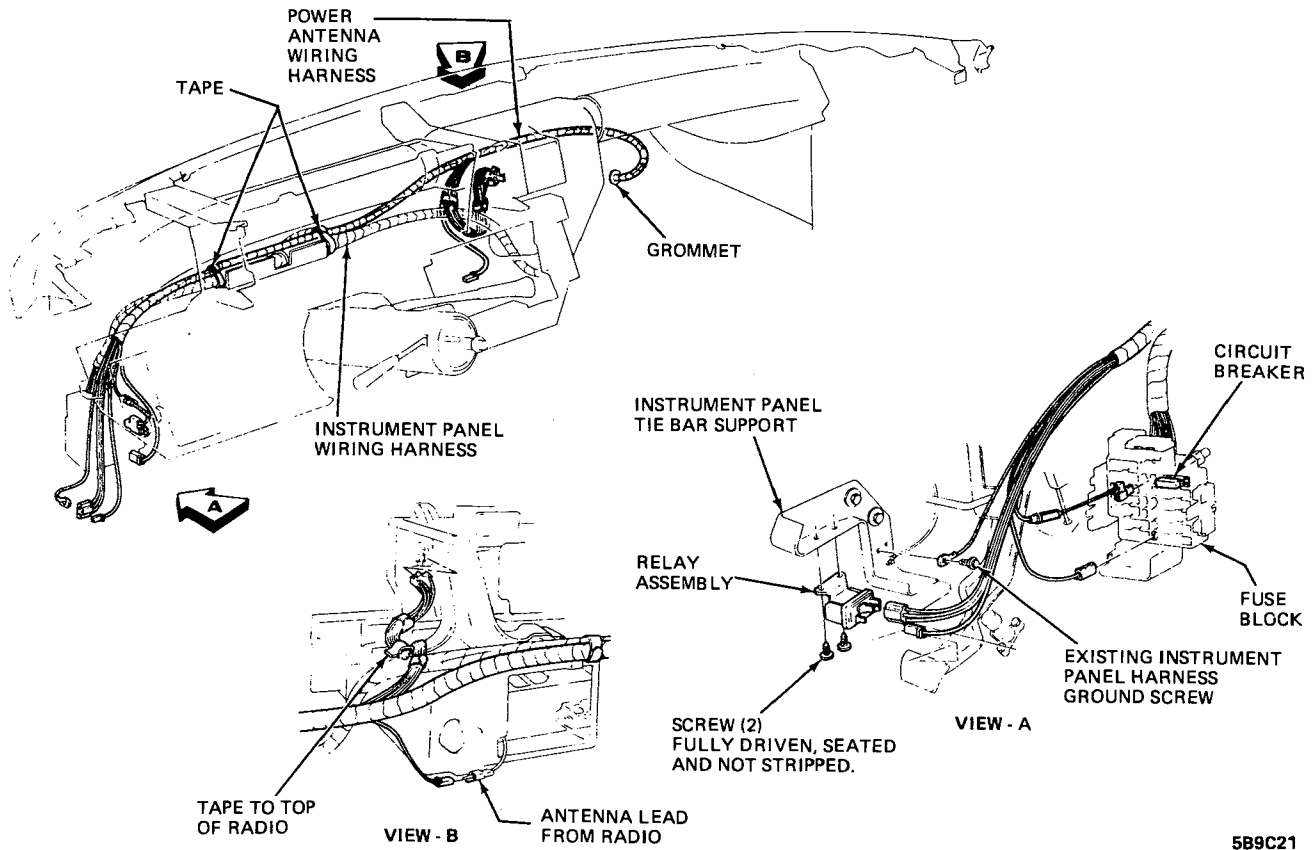
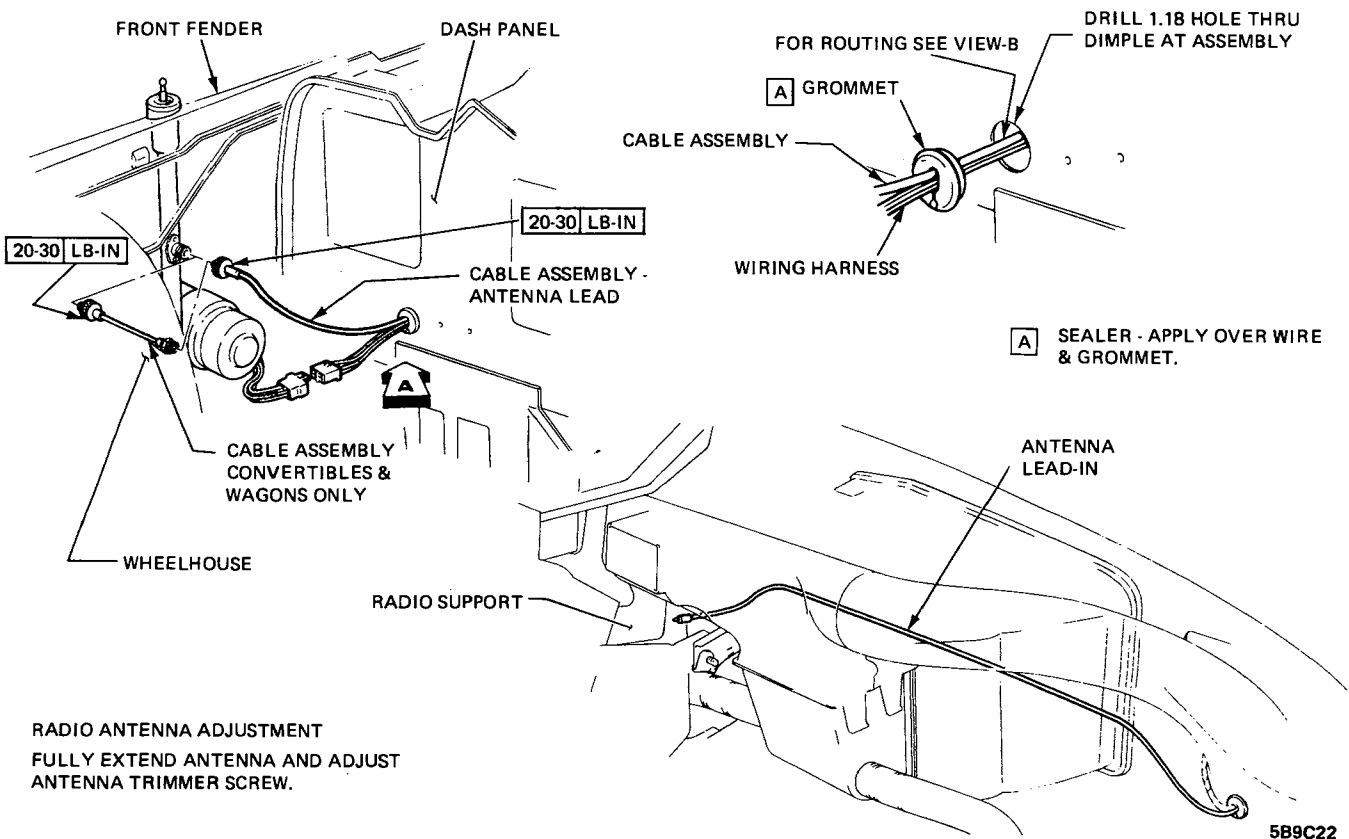
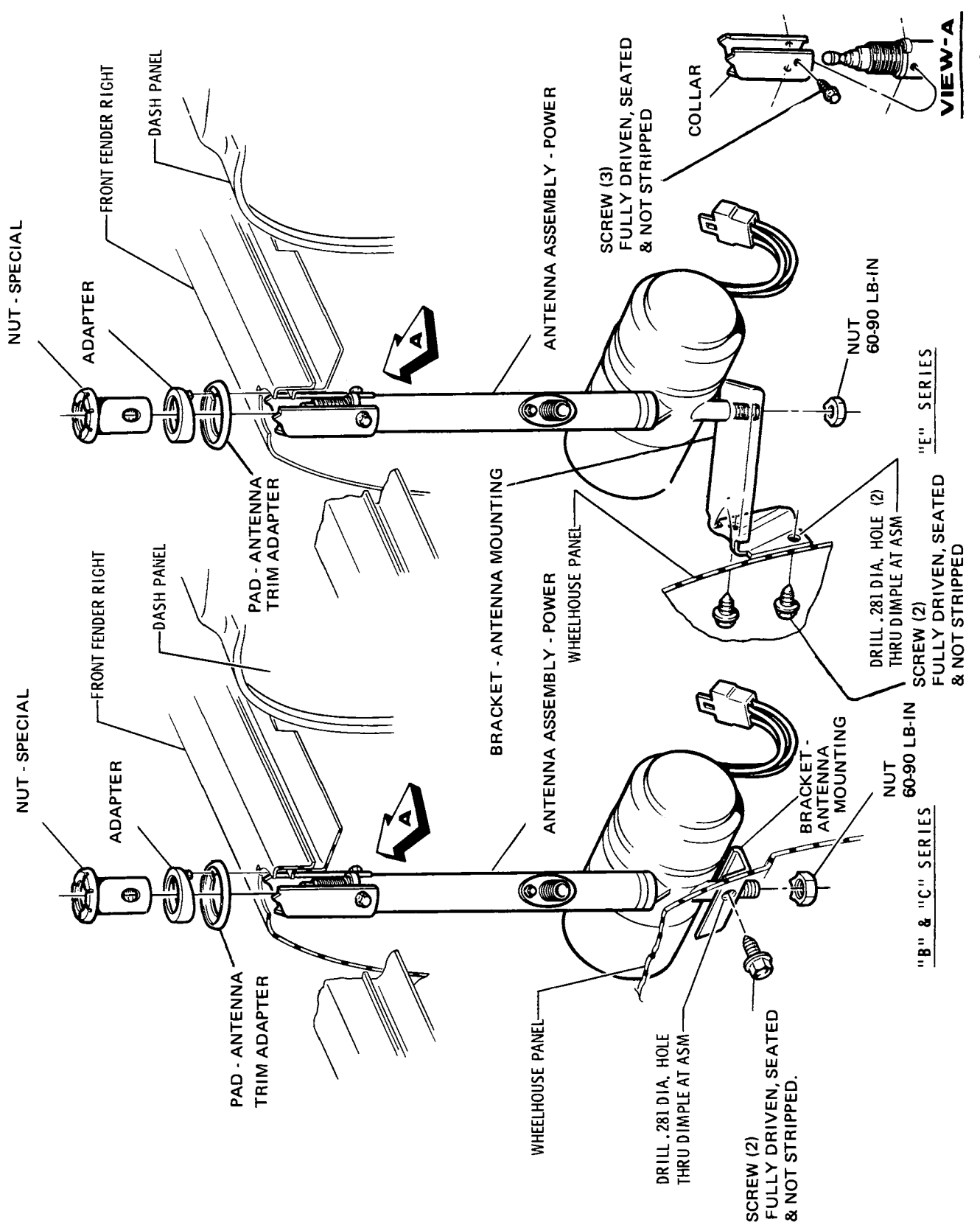


Figure 9C-54 - Power Antenna - B-C-E Series



RADIO ANTENNA ADJUSTMENT
FULLY EXTEND ANTENNA AND ADJUST
ANTENNA TRIMMER SCREW.

Figure 9C-55 - Power Antenna - B-C-E Series



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Figure 9C-56 - Power Antenna Mounting - B-C-E Series