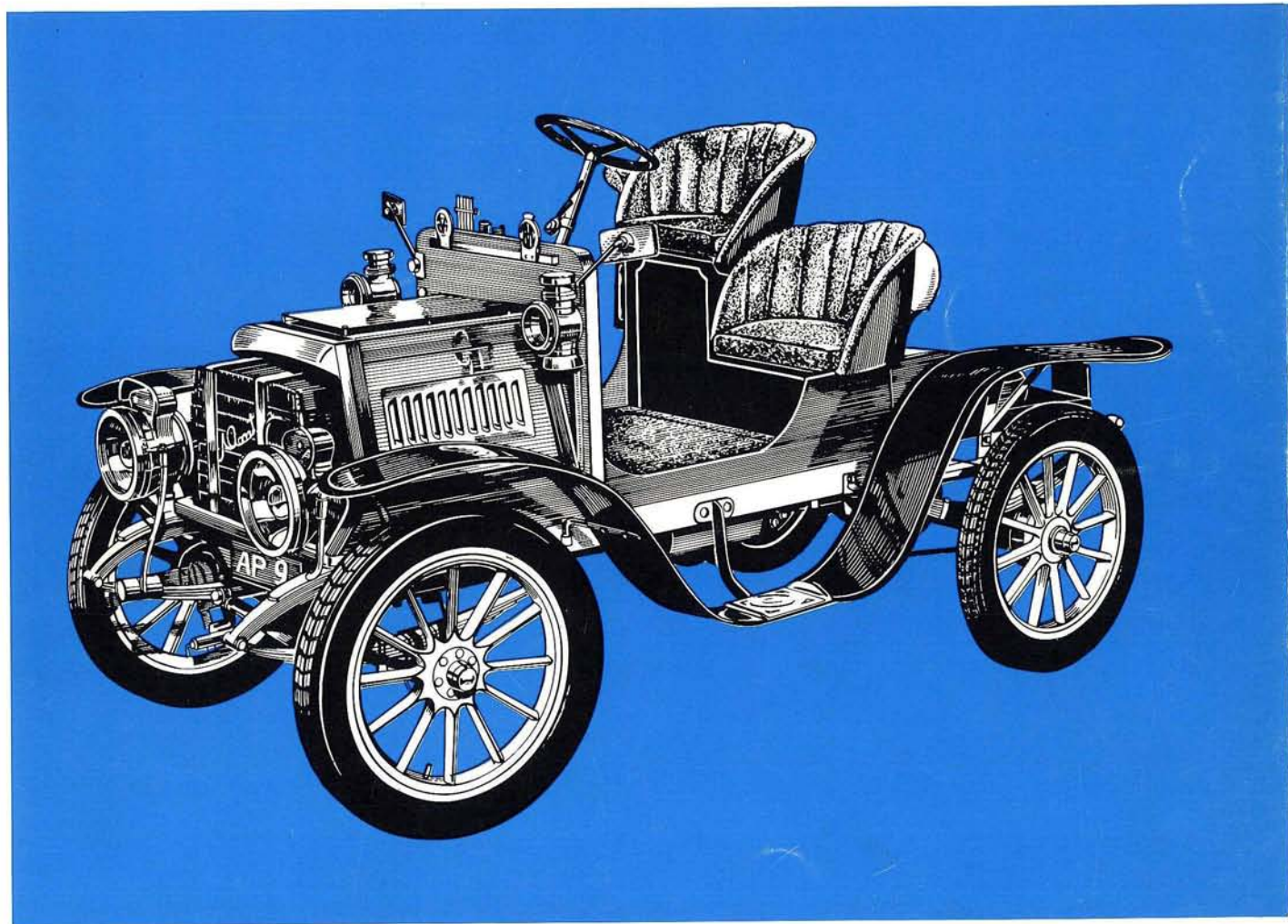


VOL. I

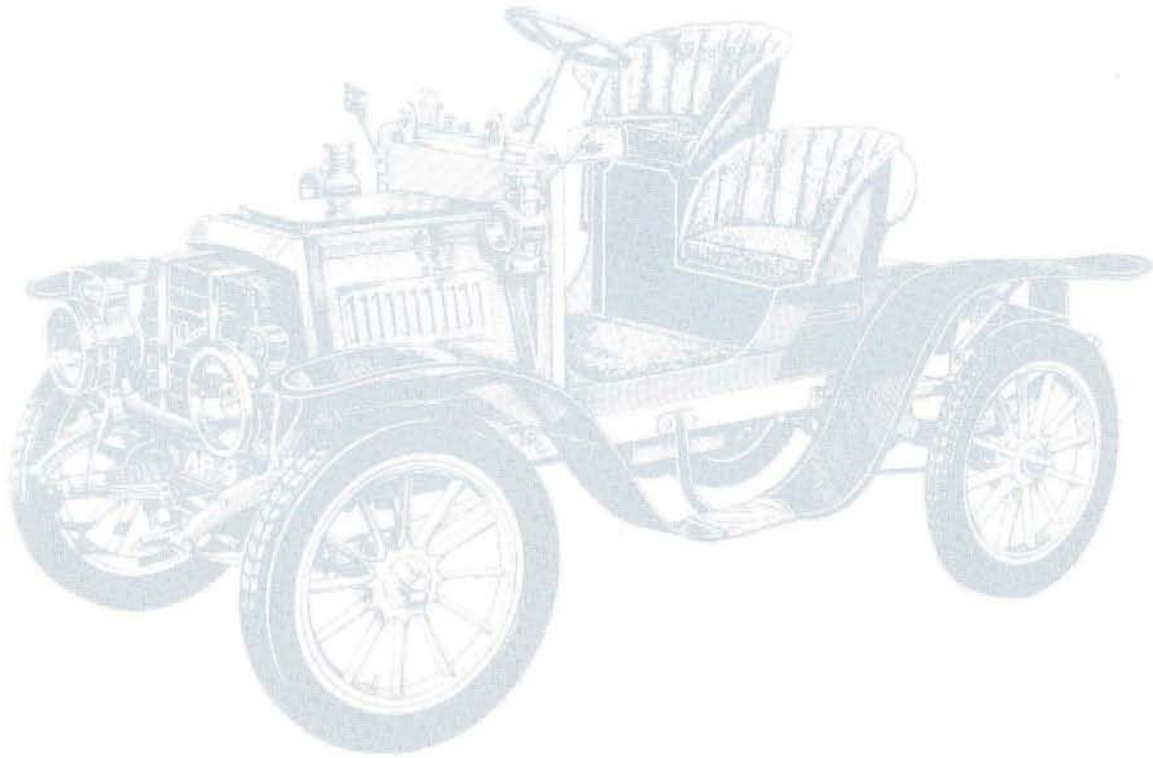
CAR HI-FI HAND BOOK



 **KENWOOD**
CAR Hi-Fi

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INTRODUCTION

KENWOOD Lineup

KENWOOD SYSTEM COMPONENTS

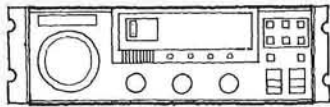
YOUR CAR — A SECOND AUDIO ROOM HI-FI SOUND ON THE ROAD

Life styles are changing. People are getting away from installing just a simple radio and cassette deck in their cars. Now the trend is towards true car hi-fi with its special audio components. In spite of the severe restrictions imposed by the harsh environment of the car interior, demand remains unabated for audio quality equal to that

found in the home, but enhanced by even superior operational controls.

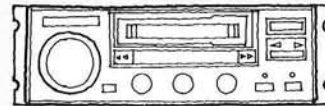
KENWOOD now is making use of know-how developed in the home audio field to achieve the same hi-fi sound quality within your car. While the basic concept remains the same, the quality of each individual component is

COMPONENTS NECESSARY FOR PRODUCING GOOD SOUND



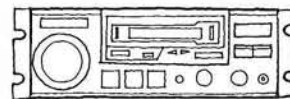
FM/AM Tuner

Hi-fi reception of FM/AM broadcasts provides another music source to accompany the cassette deck. The latest PLL synthesized tuning coupled with digital LED display, pre-set function, and one-touch automatic station selection — the latest operational advancements to ensure optimum sound quality. The built-in pre-amp enables you to adjust not only the volume but also the sound quality of the individual low and high frequency ranges, as well as to control the signal to the main amp. The power for a main amp and a graphic equalizer can be simultaneously controlled by the ON/OFF switch for the pre-amp.



Cassette Amp

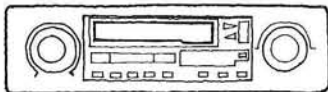
A cassette deck with a built-in stereo amp. You can create a fine system using this single unit to drive your speakers. You can, of course, use the unit just as you would a cassette deck, but the input terminals enable you to expand your system by adding a tuner or power amp to suit your individual needs.



Cassette Deck

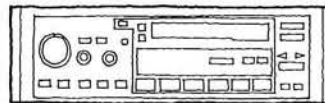
Cassette tape playback is the main sound source for your mobile hi-fi system. Performance and functions designed in response to your expectations — highly accurate sound reproduction, metal tape capability, Dolby* NR, auto-reverse function. Built-in pre-amp offers volume control and tone control of low and high frequencies.

*Trademark of Dolby Laboratories Licensing Corporation



Cassette Receiver

A cassette receiver with a built-in stereo amp. You can put together a car hi-fi system using only this one unit to drive the speakers. Balance and Fader controls enable you to adjust the all-around volume balance inside your car.

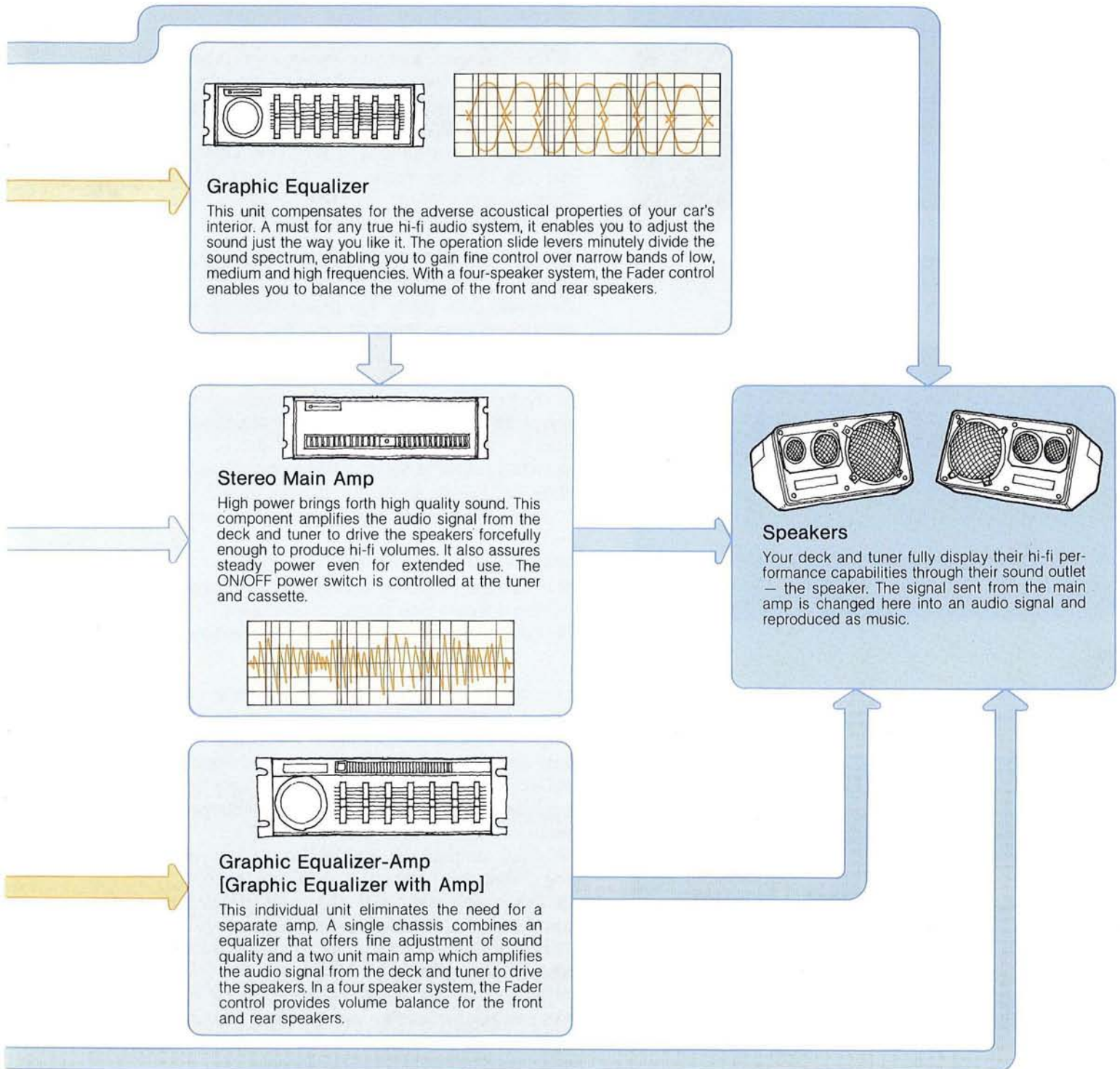


Cassette Tuner

FM/AM tuner is combined with a cassette deck in one compact chassis. A single unit to function as the heart of your car hi-fi stereo system. The built-in pre-amp controls not only the volume but the independent low and high frequency ranges; it also serves as an operations center, with left and right Balance control, Fader control, and the system's ON/OFF power switch.

being refined — all a part of developing a mobile system that incorporates the latest audio advancements. Because the driver's attention must always be focused on the road, simplified operational characteristics are especially important in car hi-fi. By introducing the latest computer tech-

nology, we are moving in the direction of effortless audio control. KENWOOD today offers car hi-fi sound that lives up to the high reputation it has achieved in the field of home audio components.



INTRODUCING THE KENWOOD LINEUP

A COLLECTION OF QUALITY REFINED

Synthesizer-Tuner

Computerized Features Bring You Optimum Hi-Fi Reception.



Excellent hi-fi reception in the harsh audio environment of your car interior — a micro-computer brain realizes this gift for all drivers. Automated features for still better listening pleasure are packed into this compact unit.

- ONE-Touch station selection, PLL synthesizer-tuning, 6-station FM and 6-station AM presetting. Digital LED display gives visual confirmation of frequencies.
- When broadcast signal becomes weak, ABSS automatically tunes in another station.
- ANRC ensures that you always enjoy optimal listening. As the broadcast grows progressively weaker, it automatically changes over from Stereo → Hi-Blend → Mono → Hi-Cut → Mute.
- Automated tuning with SCAN/SEEK functions.
- PNBS prevents interference from grating ignition noise generated in the car's electrical system.

Cassette-Receiver

Feature-packed Digital-synthesizer Cassette Receiver Designed to Fit Any Car.



Compact unit with computer controlled tuner and cassette deck, plus the handy power of a stereo main amp. Designed to fit easily into any automobile, this carefully engineered component assures that mobile hi-fi can be readily enjoyed by any car owner.

- PLL synthesizer tuner locks your broadcast frequency firmly in place. Automatic tuning features one-touch operation. A computer takes over the burdens of manual operation.
- ANRC always ensures optimum sound enjoyment.
- As the broadcast grows weaker, ANRC automatically changes over from Stereo → Hi-Blend → Mono → Hi-Cut → Mute.
- Auto-reverse, Auto-replay.
- Metal tape capability. Lets you enjoy the dynamic sound achieved by the new metal formula tapes.
- Quartz Time/Frequency digital LED display.

Cassette-Amp

The Mobile Tape Fan's First System Component.



One unit incorporates a high performance cassette deck and a powerful stereo main-amp. For the tape fan, this single unit alone suffices. Input and output terminals provide added system development possibilities.

- Deck equipped with a tough, specially designed and engineered tape mechanism that overcomes the severe audio conditions inside your car.
- Metal compatibility, Dolby* NR System ensures your enjoyment of dynamic noise-free tape sound.
- High-power amp with BTL circuitry assures faithful transmission of subtle music nuances.
- Input terminals allow for future system development by adding tuner, graphic equalizer and amp.
- For your car hi-fi speaker choose the CZ-21, a speaker that can also be used for your car radio. Your system's tape deck and radio are automatically switched over simply by inserting or removing a tape cassette.

*Trademark of Dolby Laboratories Licensing Corporation

Cassette Deck

Home Deck Performance Specs Coupled with Automated Features for the Road.



KENWOOD has invested its most advanced technology into the cassette deck, the nucleus of the car hi-fi system. Specially engineered anti-rolling mechanism, a must for smooth tape transport, helps reduce wow and flutter to 0.12% (WRM), specs comparable to home hi-fi decks. Such engineering advancements coupled with the latest automated functions add up to true hi-fi sound quality attained with a minimum of distracting operational chores while travelling on the road.

- Metal tape capability. High performance head delivers the wider dynamic range and extended frequency response of the new metal formula tapes.
- Dolby* NR System reduces annoying tape hiss.
- Cassette Stand-by mechanism, when the unit is hooked up with a tuner, automatically cuts in and starts a cassette tape when reception becomes poor.
- Key-Off Eject prevents tape injury. If the ignition is turned OFF while a tape is playing, this safety mechanism automatically ejects the tape.

*Trademark of Dolby Laboratories Licensing Corporation

Cassette-Tuner

An Automated Operations Center for Distraction-Free Hi-Fi Audio Enjoyment on the Road.



High-performance in a compact chassis. A computer controlled tuner is combined with an automated cassette deck. This unit can be readily combined with a graphic equalizer and main amp to form totalized car hi-fi sound system.

- PLL synthesizer tuner locks your broadcast frequency firmly in place. Automatic tuning features one-touch operation. A computer relieves you of the burdens of the distracting manual operations.
- When reception weakens, ABSS (Automatic Broadcast Sensor System) automatically seeks another station for you.
- ANRC (Automatic Noise Reduction Circuit) always assures your optimal enjoyment of pleasurable sound.
- As a broadcast grows weaker, ANRC automatically changes over from Stereo → Hi-Blend → Mono → Hi-Cut → Mute to bring you optimum sound quality.
- When broadcast reception becomes impossible, the cassette Stand-by mechanism automatically cuts in and starts the loaded cassette tape.
- The unit's standard DIN size is designed to fit snugly into your car's dashboard.
- Auto-Reverse and Automatic Cassette Loading mechanism offer enjoyable tape play with no distracting manual operations.
- Metal tape compatibility with Dolby* NR system. Your enjoyment of a truly dynamic tape sound is assured.
- Key-Off Eject

Even if the ignition is turned OFF while a tape is playing, the cassette will be partially ejected automatically to prevent tape damage.

*Trademark of Dolby Laboratories Licensing Corporation

Graphic Equalizer

Hi-Fi Sound Shaped Precisely with Seven Frequency-zone Slide Levers.



Numerous factors effect the acoustics of your mobile listening room — your car's interior configuration, types of materials used for interior decoration, number of passengers, speaker positions. Your graphic equalizer with its seven individual sound zone levers enables you to compensate for these factors by tailoring your responses for optimal hi-fi listening pleasure. The frequency zones cover the sound spectrum through 60Hz, 150Hz, 400Hz, 1kHz, 2.5kHz, 6kHz, 12kHz; by adjusting individually the frequency response of each zone you can shape the sound according to your particular requirements. The graphic equalizer, a must to savor thoroughly the performance capabilities of your deck and tuner.

- Fader Control gives you the option of later up-grading to a 4-speaker system. By adjusting the volume balance of the front and rear speakers, you can create a sound room on wheels that duplicates a box seat at a live performance.
- Push-type Defeat Switch, doubling as the Volume Control, lets you check the sound response before and after adjustment. This enables you to confirm the corrections for low, middle and high range frequency zones, respectively.
- Small optical fiber lights on the tips of the frequency zone slide levers enable you to confirm visually the frequency zone characteristics of your sound reproduction.

Graphic Equalizer-Amp (Graphic Equalizer with Amp)

Sound Room Control with Built-in Power Amplifiers.



How to fill your car interior with the best possible sound? Leave it to the KGC-737. In the harsh acoustical environment of your car interior where sound may be readily reflected or absorbed, the graphic equalizer with its seven frequency-zone slide levers adjusts the sound flat to eliminate peaks and valleys in frequency response and tailor the sound for maximum listening pleasure. In addition, built-in main amps of 20W + 20W drive the rear speakers and main amps of 6W + 6W drive the front speakers. A single unit that dynamically drives four speakers and finely tailors the frequency response in your mobile sound room.

- The frequency spectrum is divided into 60Hz, 150Hz, 400Hz, 1kHz, 2.5kHz, 6kHz, 12kHz. Seven frequency-zone slide levers can individually adjust low, medium and high range frequencies.
- Push-type Defeat Switch, doubling as the Volume Control, lets you compare the sound before and after adjustment.
- Fader Control balances the volume of front and rear speakers.
- Optical fiber lights on the tips of the frequency-zone slide levers lets you confirm visually the frequency-zone characteristics of your sound reproduction.

Stereo Main Amps

High Power Stereo Main Amps — Flexibility and State-Of-The-Art Hi-Fi for the Dedicated Mobile Audiophile.

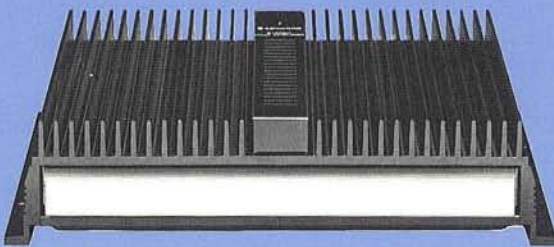
KAC-727



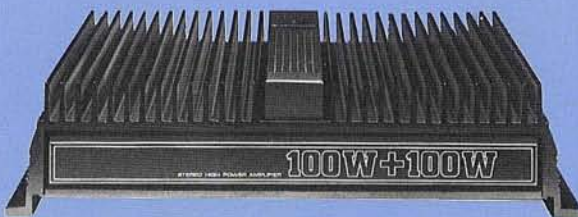
KAC-887



KAC-801



KAC-901



Main amps that determine the sound quality of your car hi-fi deliver a confirmed 20W/ch. High power using BTL circuitry and careful design to suppress distortion mean these amps dynamically convey all the nuances of your favorite music.

The KAC-887, with 2 built-in stereo main amps in one compact chassis, can readily mold a 4-speaker system.

The power source is completely remote. Because they have no operational controls, these main amps can be located anywhere. Under the seat or in the trunk are the most common locations.

By using DC-DC converters, these main amps achieve the tremendous power rating of up to 100W + 100W (70W + 70W). An overwhelming sense of power and scale is realized for music from forceful rock to the broad frequency spectrum of sound-fusion and synthesizer sound. With rigidly low distortion, reproduction is powered across a broad frequency spectrum, and a broad dynamic range — these main amps are suitable components for molding the ultimate system in car hi-fi.

Whether in the trunk or under the seat, these remote amps can be installed anywhere. They are designed tough, with large heat sinks, to stand up under continued use.

Note: When your main amp is installed in the trunk or under the seat, use DIN cable (CA-11F) to connect it with the deck or tuner. (Cord length: 2 meters. Main amp is furnished with a 3-meter electrical power extension cord.)

KENWOOD SPEAKERS FOR YOUR CAR — RUGGED DESIGN, RICH SOUND, EXCEPTIONAL QUALITY

Surface Mount Speakers

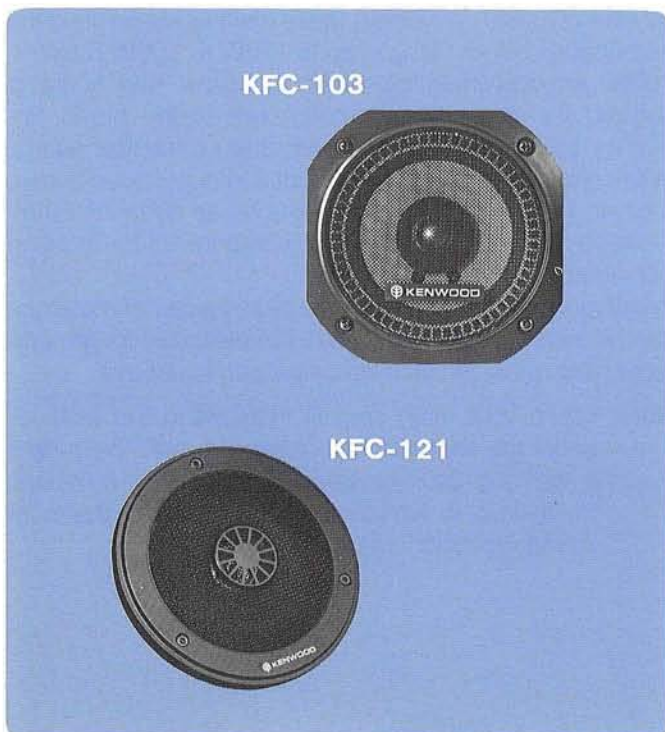


Three-way speaker system with a "dense close form" that suppresses resonance. Designed with a special beveled outer contour, this speaker system creates a rich sound environment inside your car. With an extremely durable die-cast aluminum enclosure, coupled with a tough design that handles a high power output of 60W, the KSC-701 produces a crisp, comfortable sound across a wide frequency range.



Like the KSC-701, this has a "dense closed form" resulting from the design of its durable enclosure. This true two-way speaker system achieves clear sound reproduction across a broad frequency range. Able to handle a maximum power input of 40W, the KSC-701 can easily show off the performance capabilities of your high power amp with comfortably reproduced sound.

Door Mount Speakers



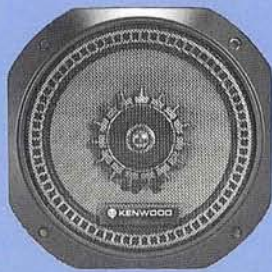
Small and Simple Installed Speakers to Round out Your Four-Speaker System. These compact speakers demonstrate their performance capabilities by improving the acoustical characteristics of your mobile sound room. Designed for easy installation in your car.

Rear Deck, Door Mount Speakers

KFC-161



KFC-162



KFC-163



Large magnetos and speaker diameters enable these rugged flush mount speakers to produce dynamic sound with rich volume. Incorporating mesh grills with good "sound escape" and unit construction with fine directivity, these speakers fill your car interior with intense, wide-ranging sound.

Rear Deck Mount Speaker

KFC-692



Designed for a maximum power input of 70 watts with a large powerful magneto, this rugged speaker virtually floods the interior of your mobile listening room with rich, wide-ranging sound. Durable mesh grill displays good directivity. This flush mount speaker is more than adequate to fully convey the high quality of your KENWOOD hi-fi car system.

CAR HI-FI SYSTEMS

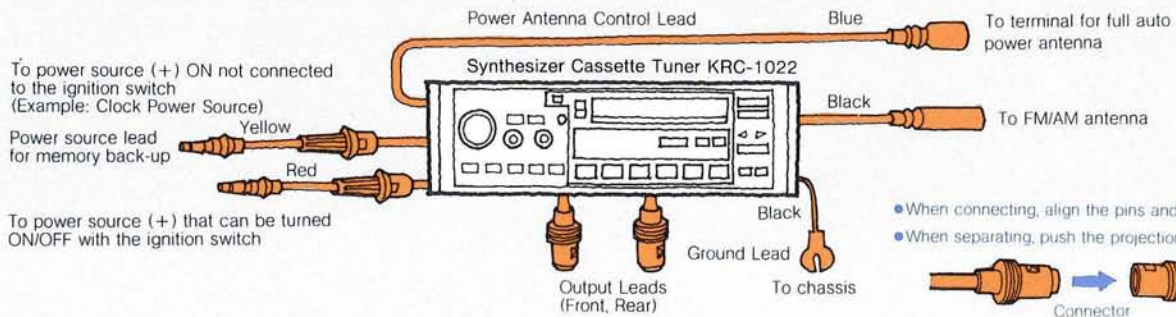
Representative **KENWOOD** Component Match-Ups

CASSETTE TUNER (KRC-1022) SYSTEMS

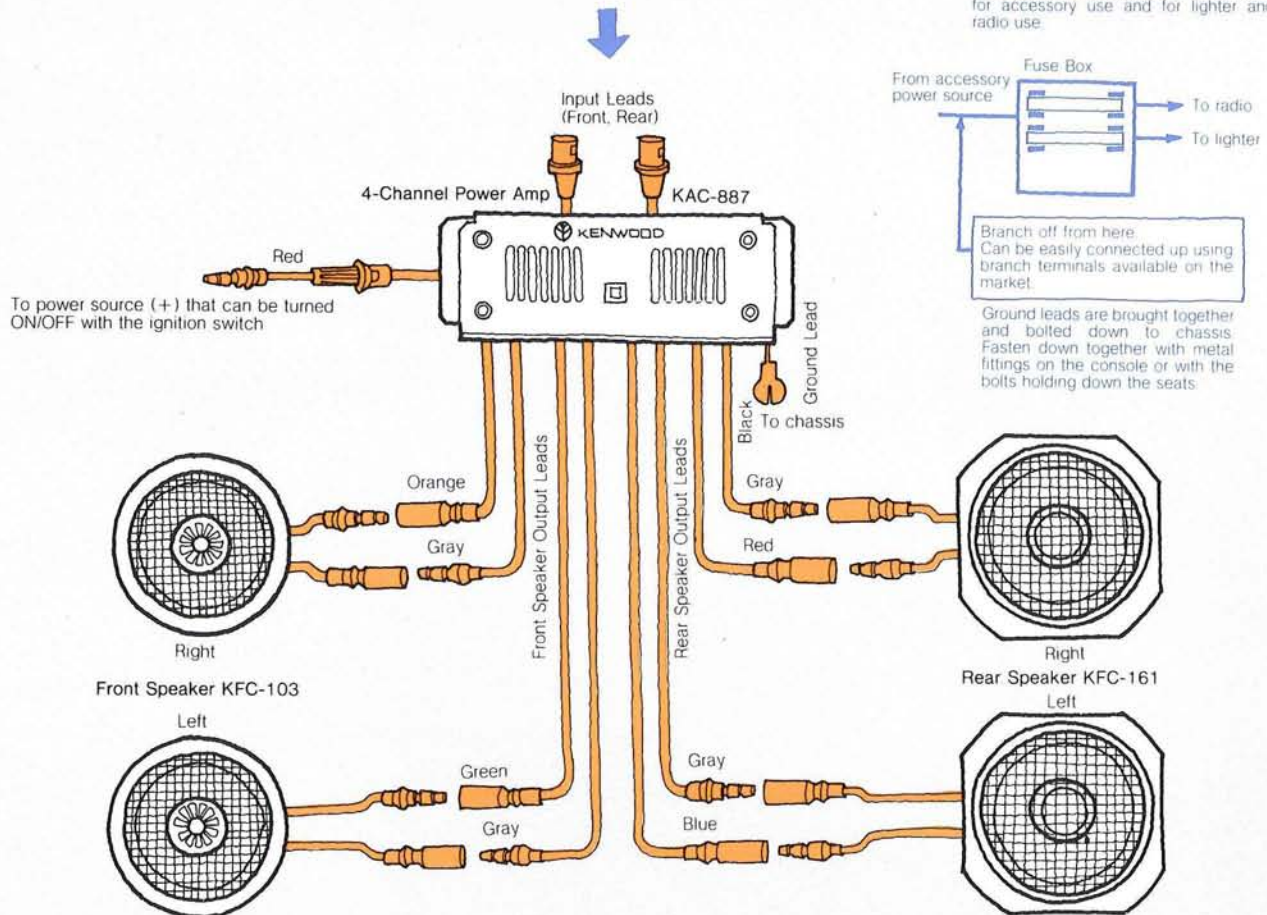
SYSTEM 1

1. The KRC-1022 Operations Center fits snugly into the dashboard. Combine it with the KAC-887 (that has four built-in main amps on a single compact chassis) to form a

system. An easy-to-use match-up that doesn't take up space — a condensation of KENWOOD quality. (See page 21.)

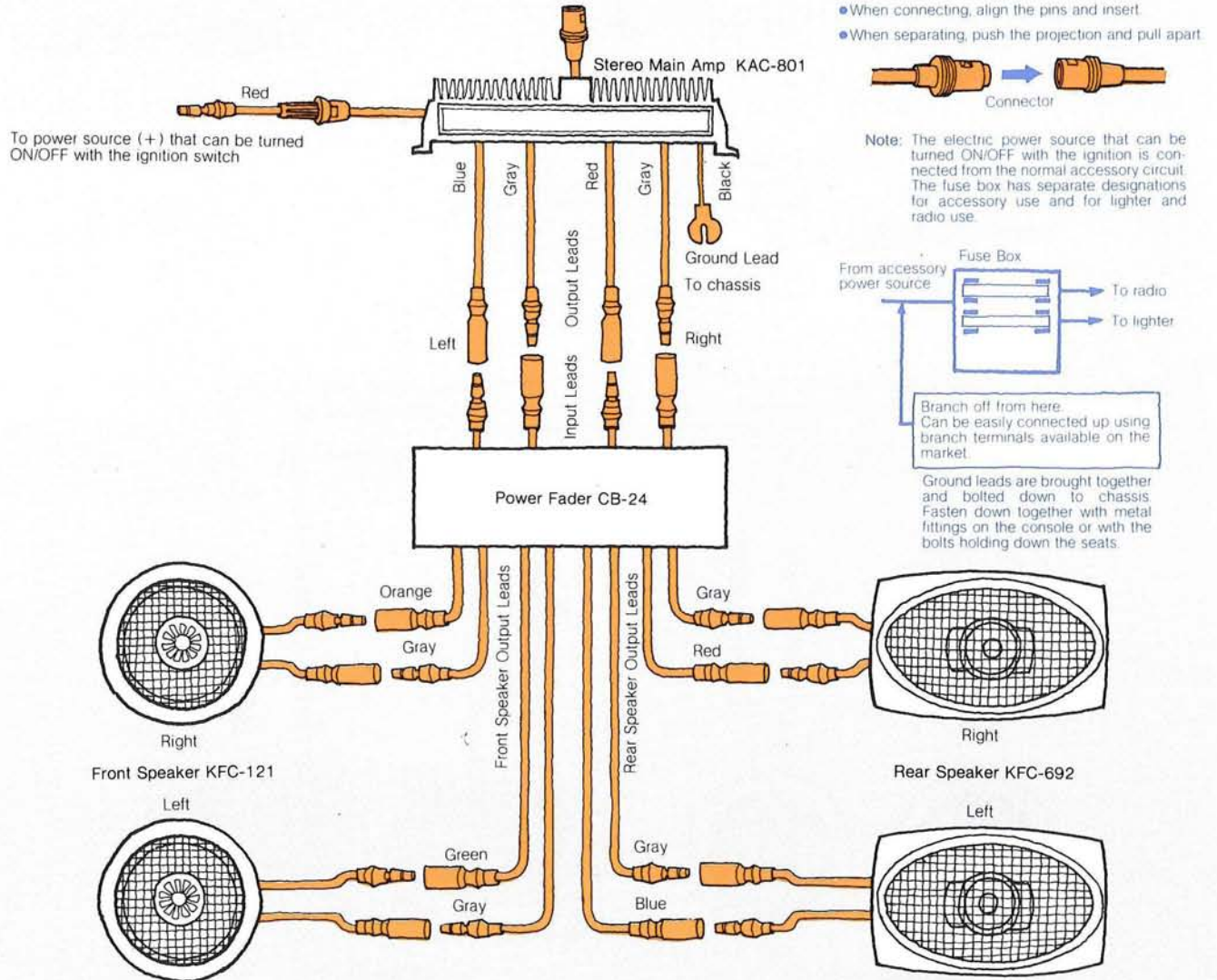
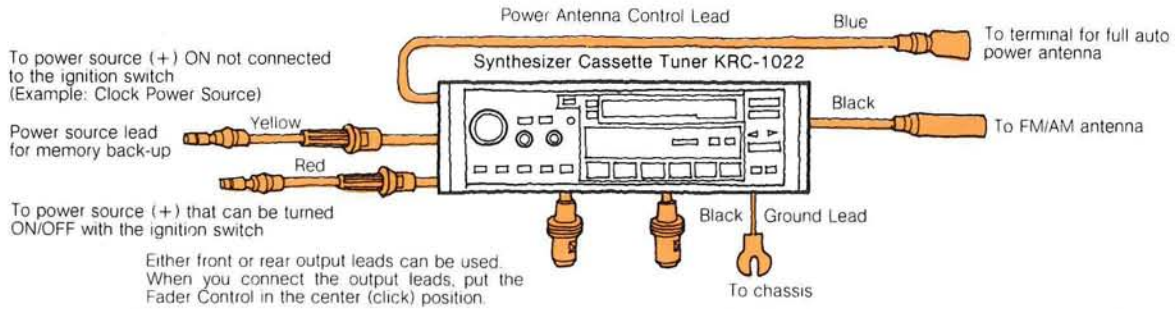


Note: The electric power source that can be turned ON/OFF with the ignition is connected from the normal accessory circuit. The fuse box has separate designations for accessory use and for lighter and radio use.



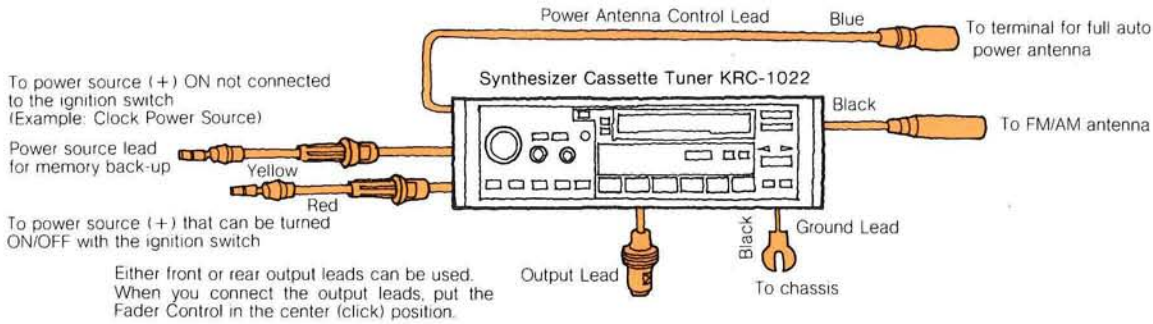
SYSTEM 2

2. For a four-channel system, combine it with the powerful KAC-801 main amp. A car hi-fi system with good operational characteristics and efficient use of space.



SYSTEM 3

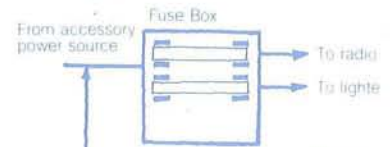
3. Combined with a graphic equalizer amplifier, makes for ready enjoyment of 4-channel stereo. The sound room characteristics of your car's interior controlled by seven slide levers. Enables you to achieve a nearly ideal acoustical chamber on wheels.



- When connecting, align the pins and insert
- When separating, push the projection and pull apart

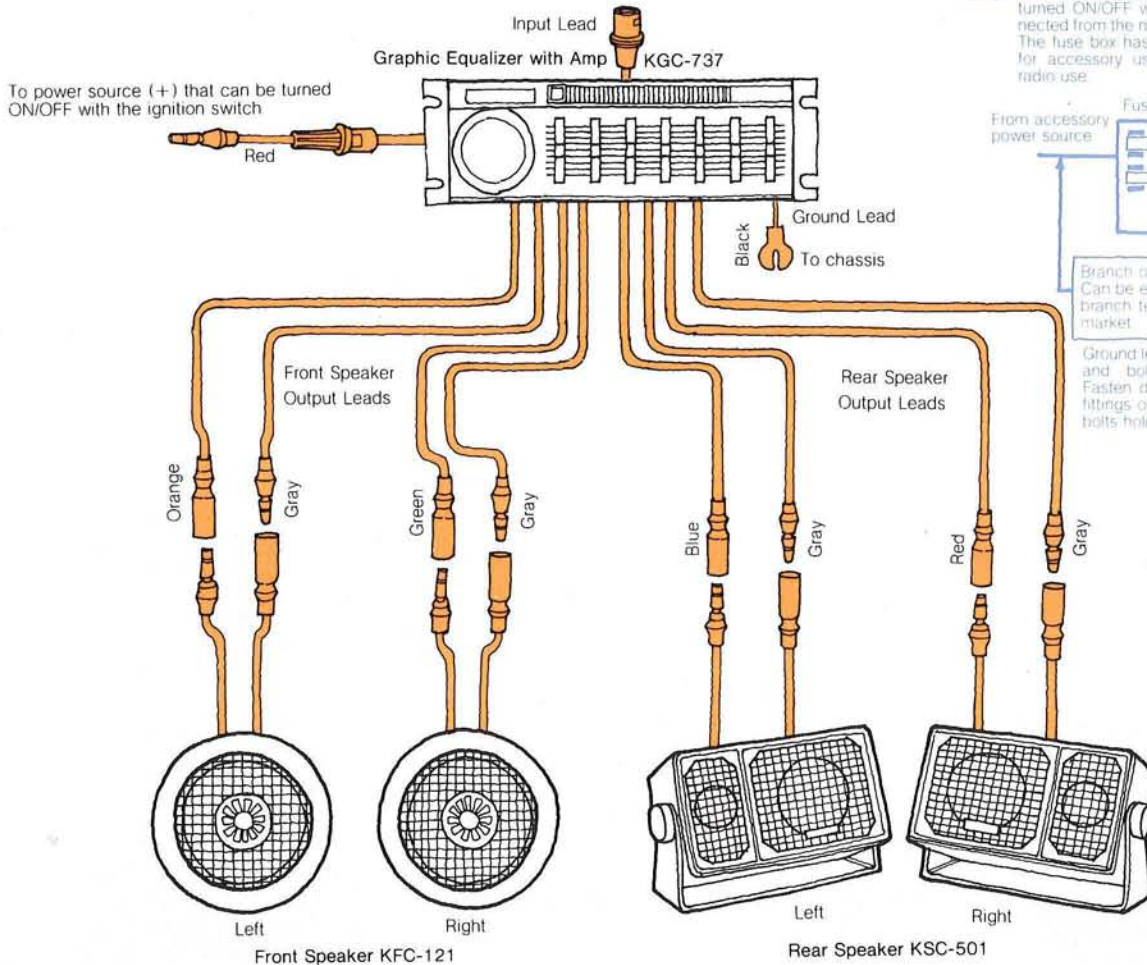


Note: The electric power source that can be turned ON/OFF with the ignition is connected from the normal accessory circuit. The fuse box has separate designations for accessory use and for lighter and radio use.



Branch off from here. Can be easily connected up using branch terminals available on the market.

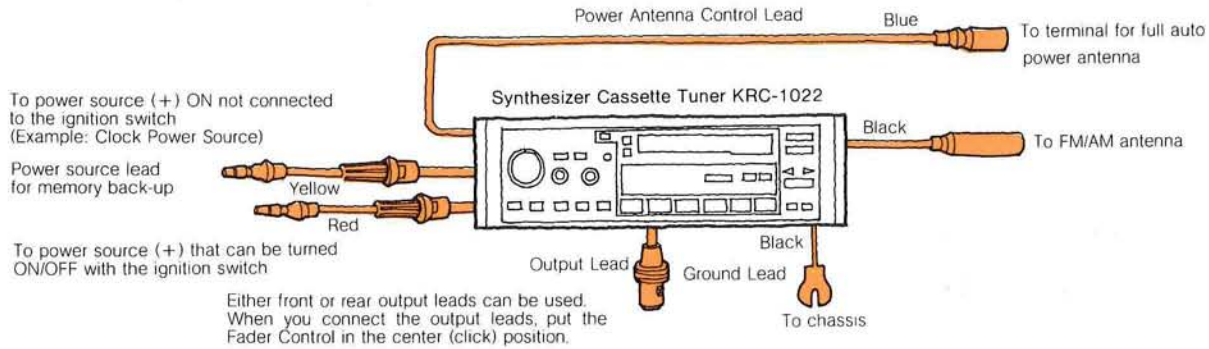
Ground leads are brought together and bolted down to chassis. Fasten down together with metal fittings on the console or with the bolts holding down the seats.



SYSTEM 4

4. KENWOOD high quality condensed into a compact system.

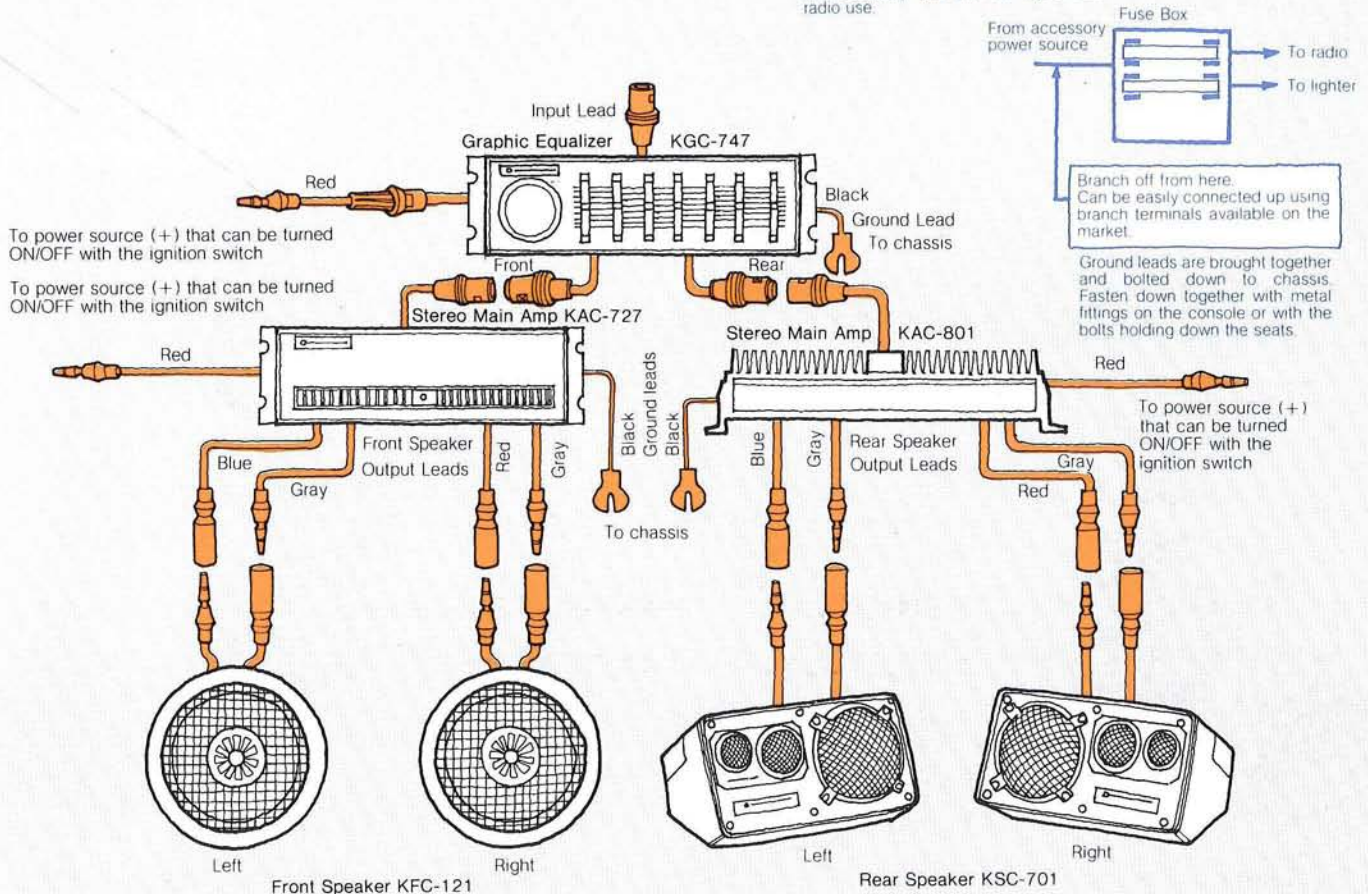
A big-power amp joined to a graphic equalizer. All accomplished in a minimum of space.



- When connecting, align the pins and insert
- When separating, push the projection and pull apart



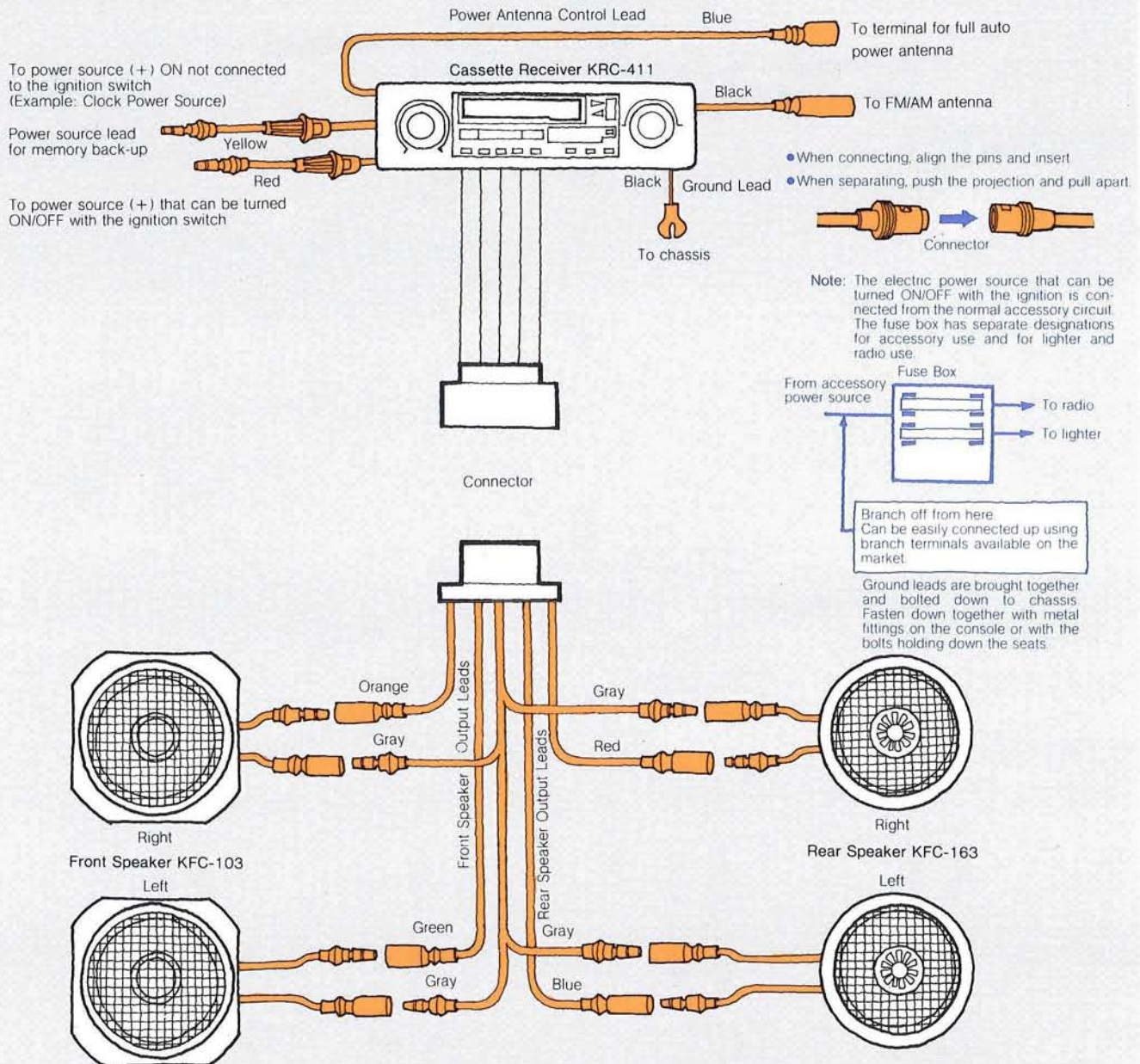
Note: The electric power source that can be turned ON/OFF with the ignition is connected from the normal accessory circuit. The fuse box has separate designations for accessory use and for lighter and radio use.



CASSETTE RECEIVER (KRC-411) SYSTEM

Match-up centering on a cassette receiver equipped with all functions in one compact body. Unit melts unobtrusively into your car interior. Excellent operational characteristics

— digital synthesizer tuner with automated tuning joined to a cassette deck with Auto-Reverse. High performance hi-fi inside your car. (See page 22.)

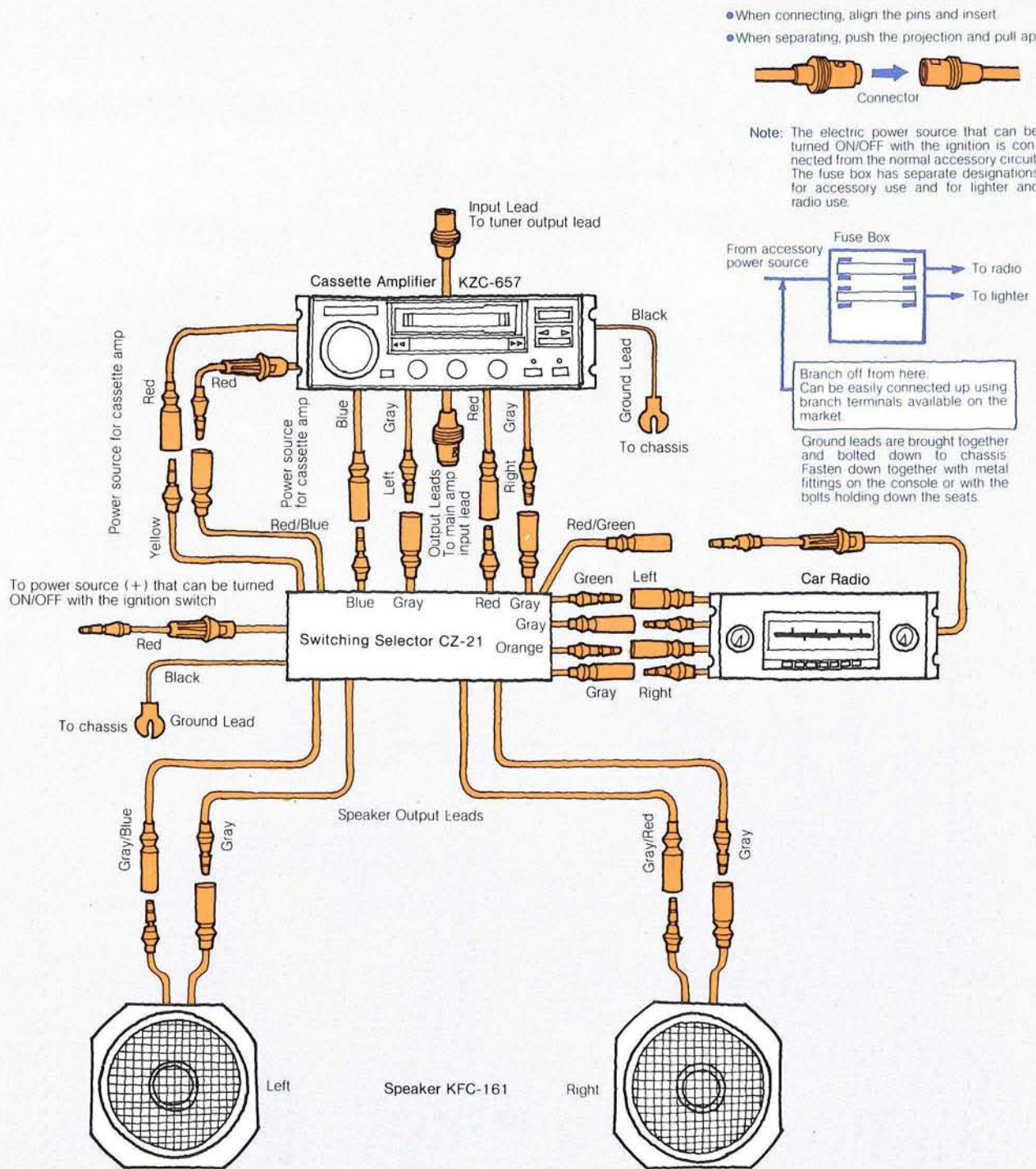


CASSETTE AMP (KZC-657) SYSTEMS

SYSTEM 1

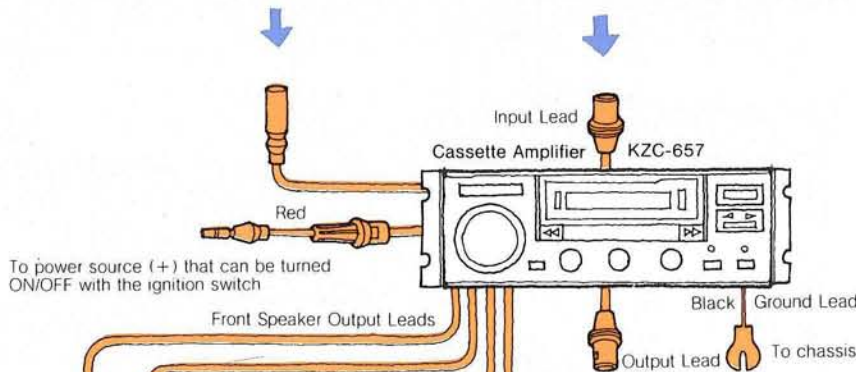
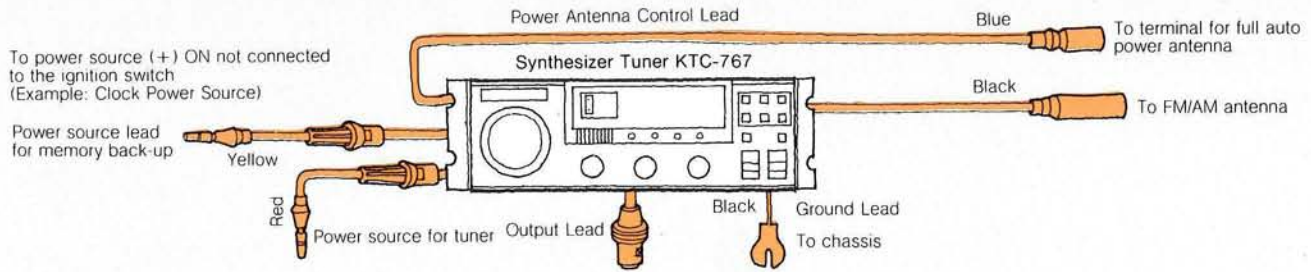
1. If you're a cassette fan, this unit is all you need. Rated at 20W + 20W, it drives high performance speakers with power to spare. Hook up the CZ-21 and you can auto-

atically change over from your factory equipped radio to tape. (See page 24.)



SYSTEM 2

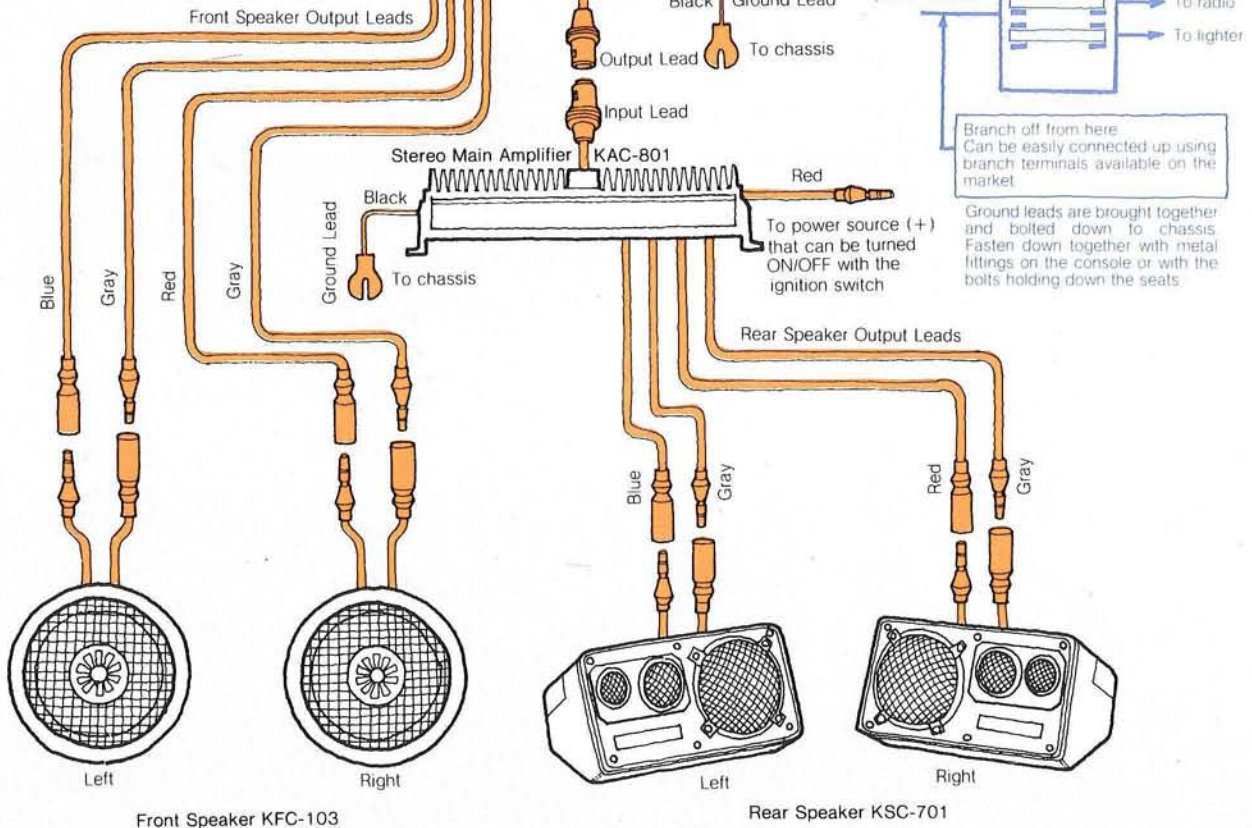
2. Create a four-channel system by matching up with a synthesizer-tuner and high power amp. A system you can upgrade in stages to suit your budget.



- When connecting, align the pins and insert
- When separating, push the projection and pull apart



Note: The electric power source that can be turned ON/OFF with the ignition is connected from the normal accessory circuit. The fuse box has separate designations for accessory use and for lighter and radio use

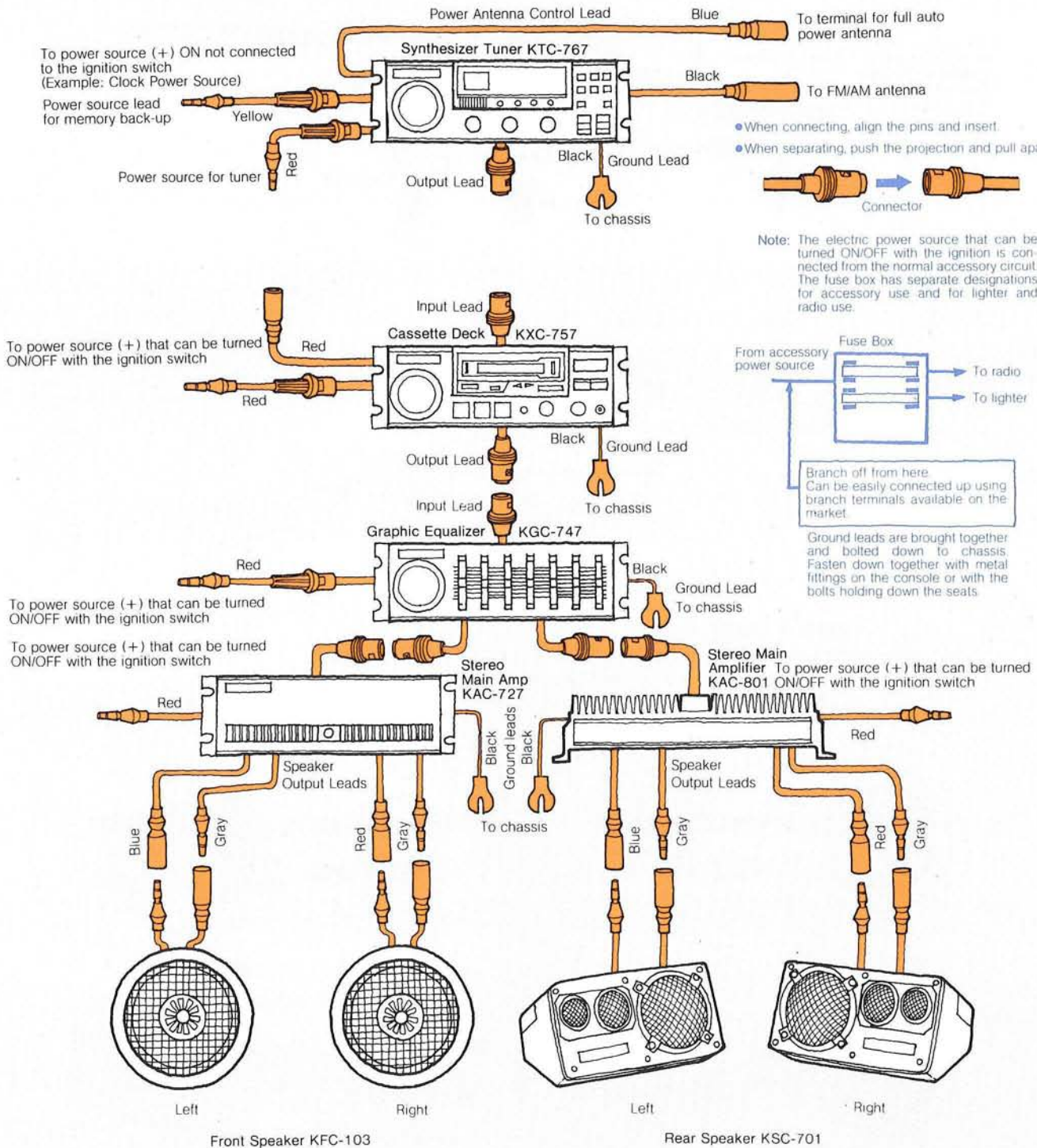


CASSETTE DECK (KXC-757) AND TUNER (KTC-767) SYSTEMS

SYSTEM 1

1. With the addition of an equalizer-amp, you can freely control the special characteristics of the sound environment inside your car. By overcoming the harsh limitations

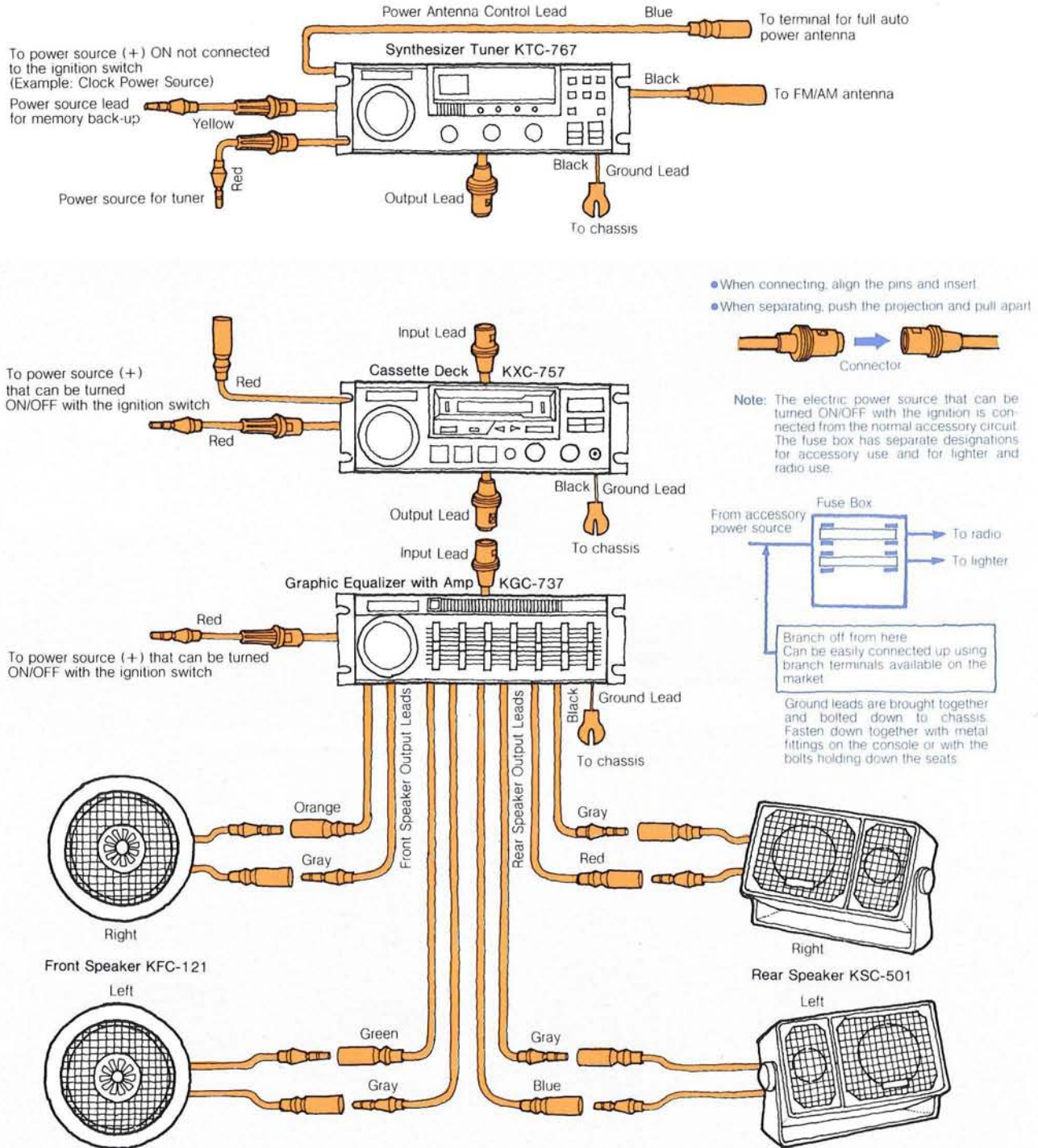
imposed on hi-fi inside your car, you realize audio quality that approaches what you enjoy at home.



SYSTEM 2

2. A full high grade system that brings together a line-up of high quality KENWOOD components. The match-up of a powerful main amp with a graphic equalizer brings us a

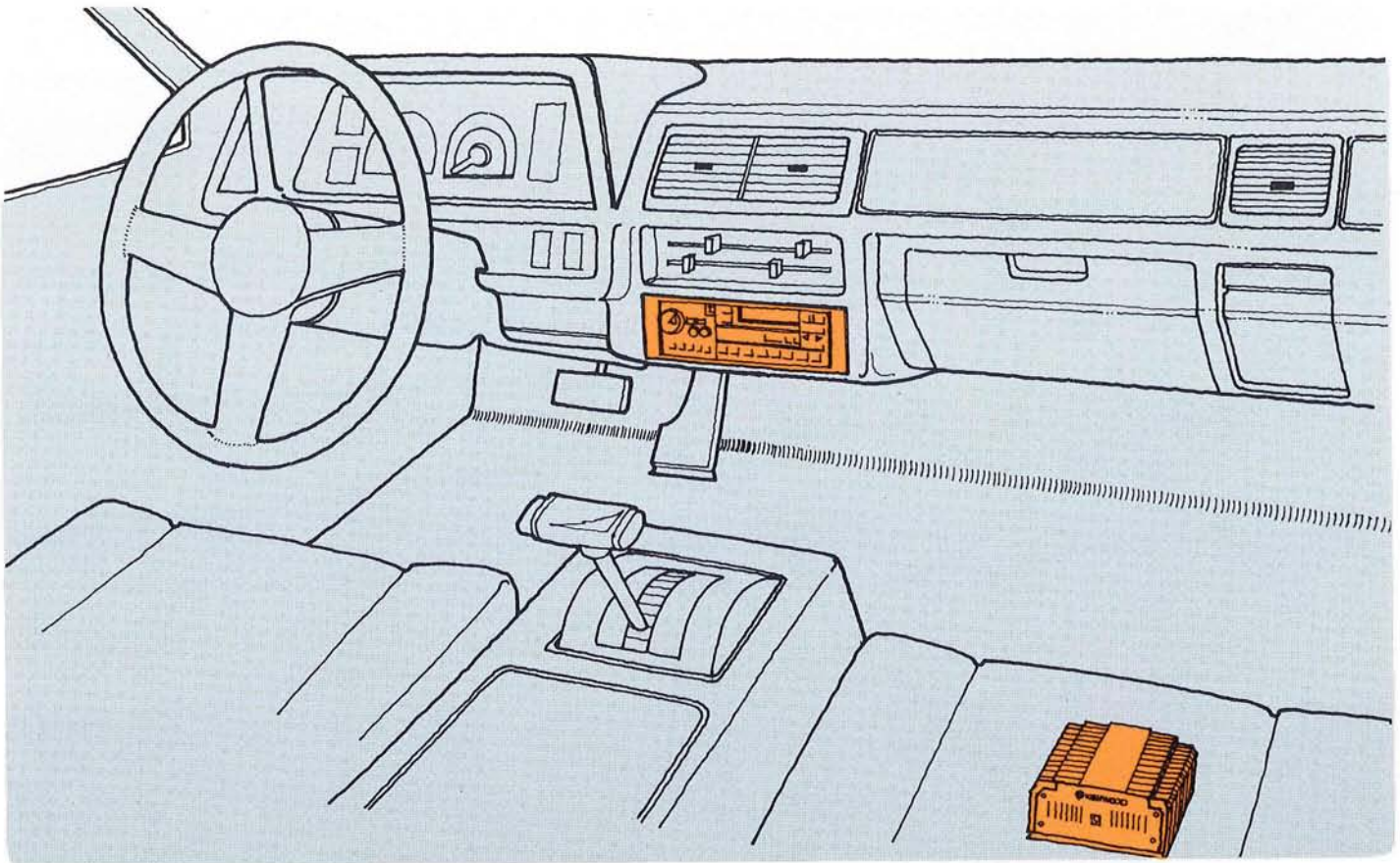
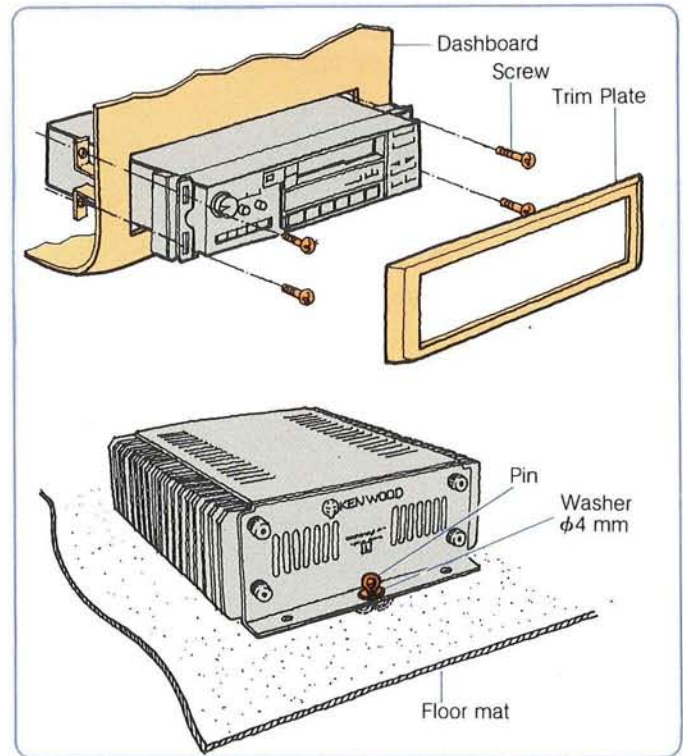
new hi-fi listening experience. KENWOOD has achieved home audio quality for the inside of your car, your audio room on wheels. (See page 23.)



SYSTEM INSTALLATION

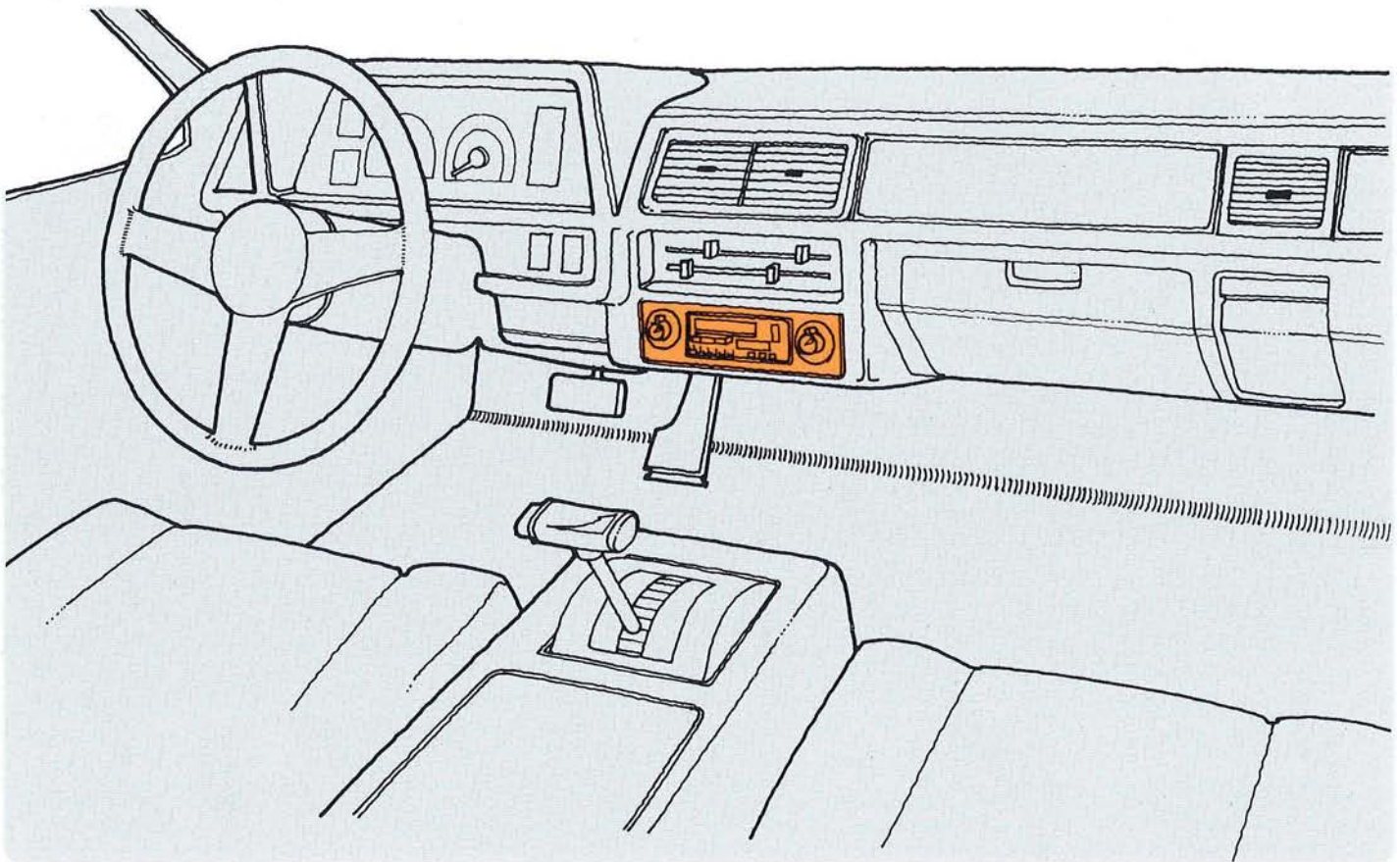
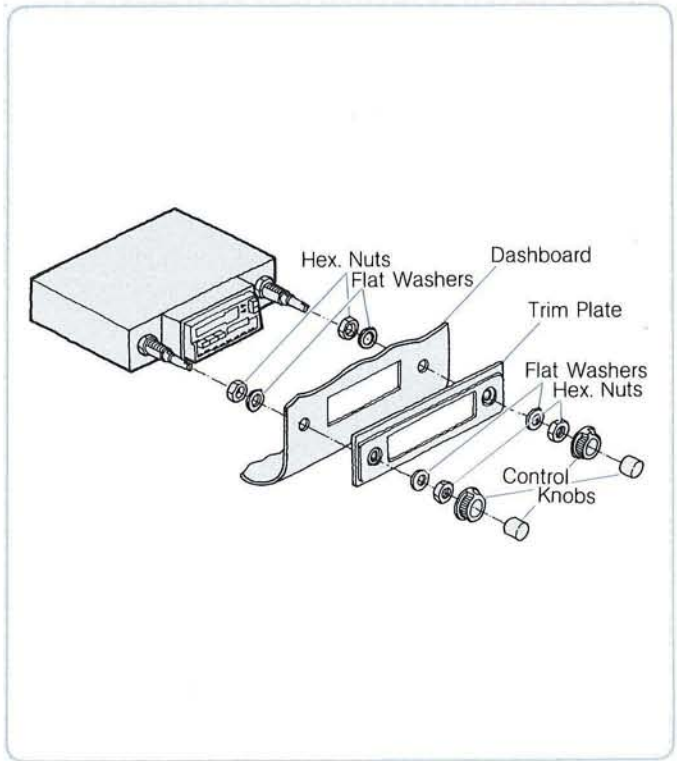
1. IN-DASH TYPE

KRC-1022 is an in-dash type of DIN size that fits snugly into the dashboard — the best position for easy operation and promises you safe driving with enjoyable car hi-fi. KAC-887 fits under the seat. Fix it to the floor mat with the attached pin.



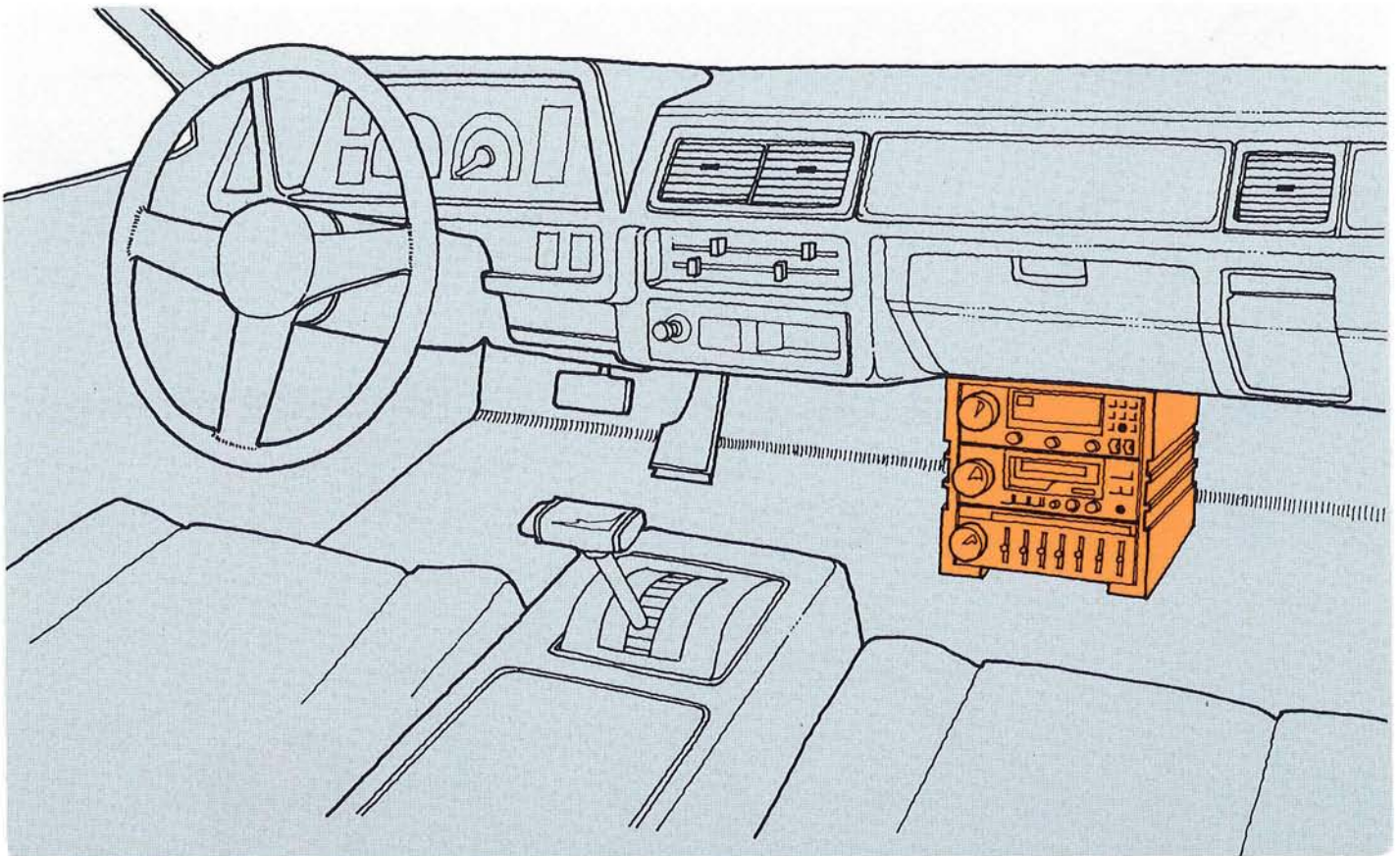
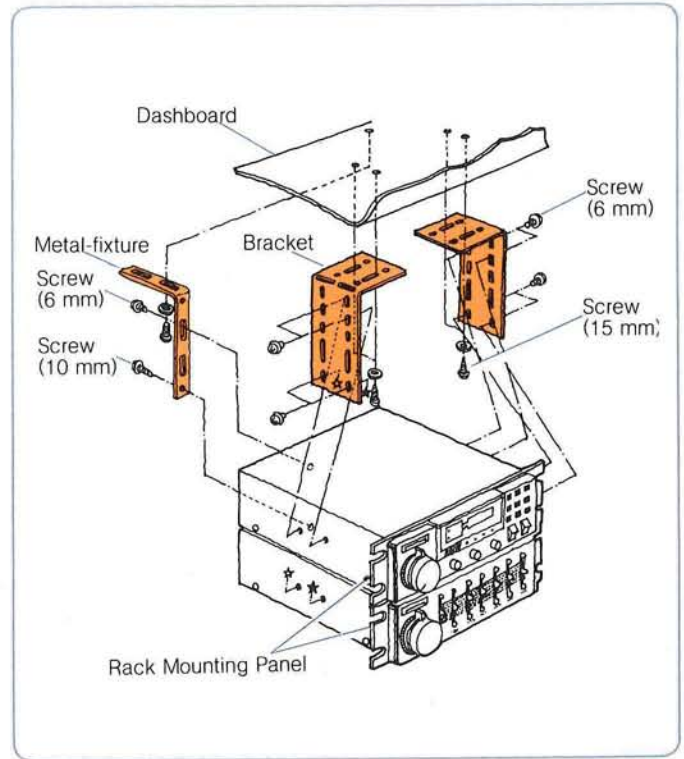
2. IN-DASH TYPE

KRC-411 goes in the dashboard. A car hi-fi system that fits in your car without taking up any extra space.



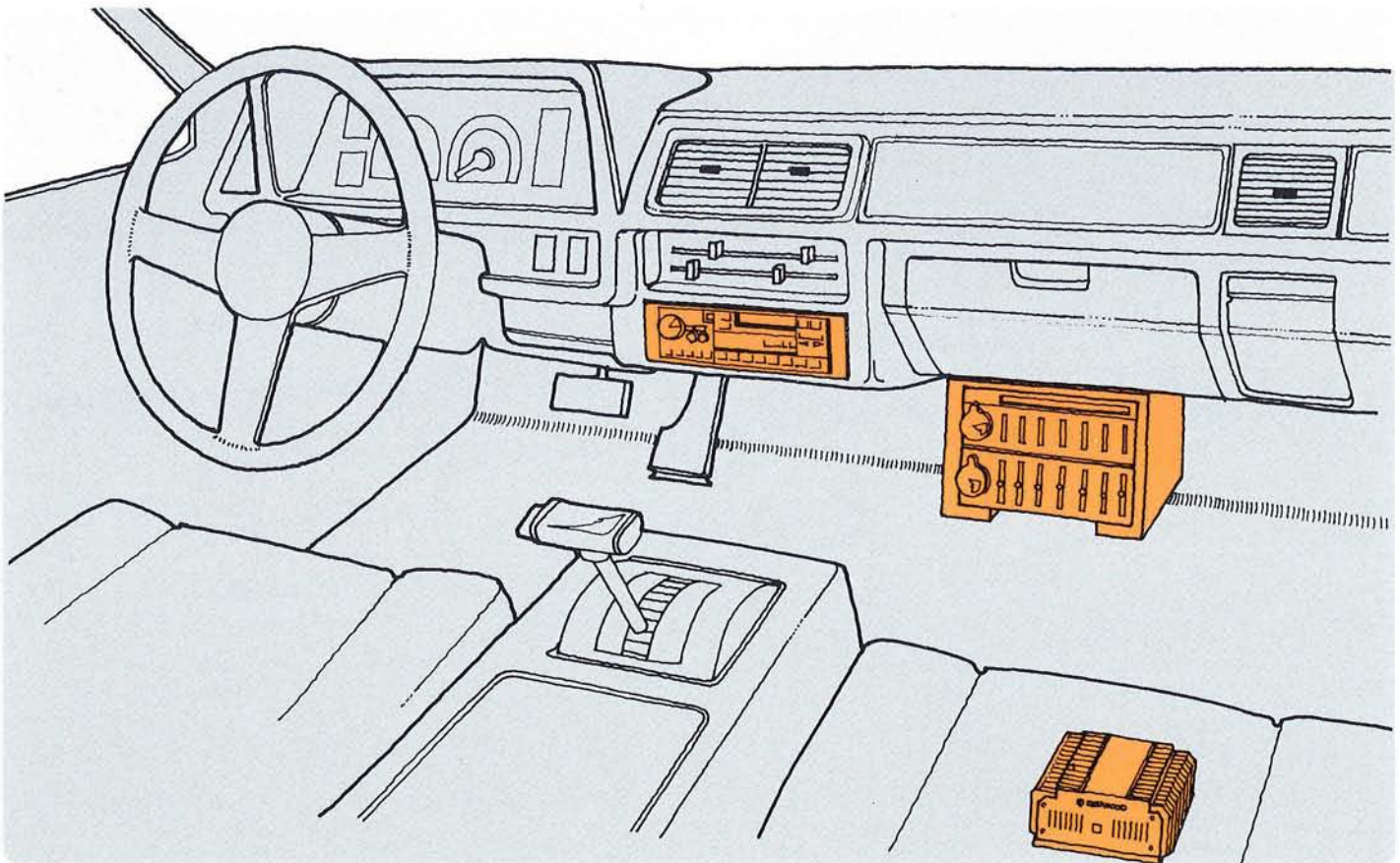
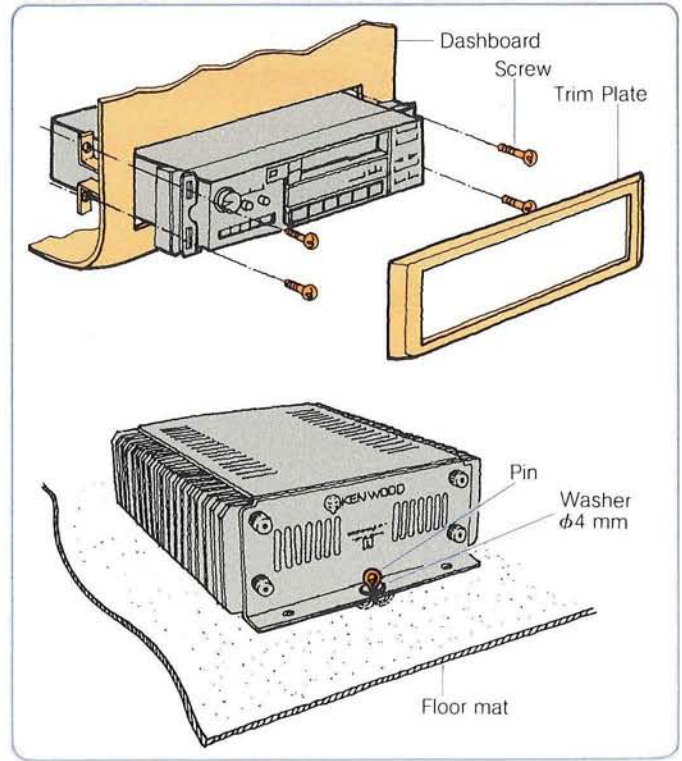
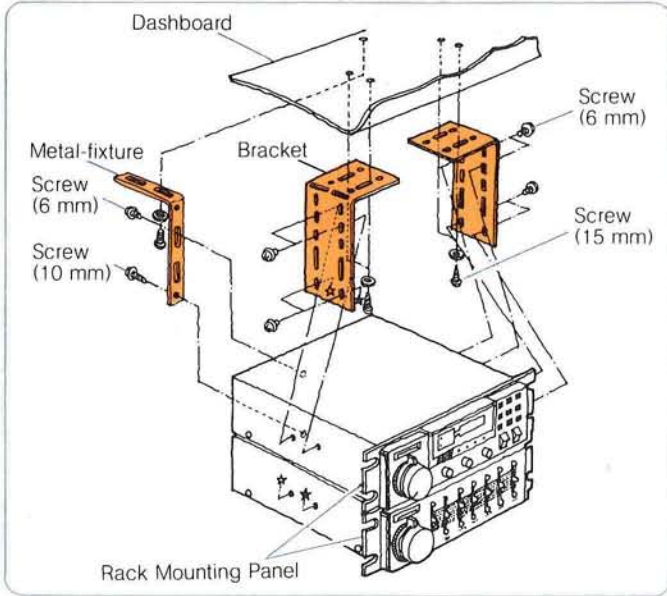
3. UNDER-DASH TYPE

If you have sufficient leg room, choose an under-dash type that can be easily installed in a shorter time and provides ease of the addition or replacement of units in the future.



4. COMBINED TYPE

Components you buy one by one to suit your budget. At the end you have finally assembled a full car hi-fi system. Can be attached with simple screws. Home audio now installed in your car.



SPEAKER INSTALLATION

Type 1 Door Flush Mount

Speakers designed for flush mounting in the front and rear doors help create a natural stereo sound environment because the sound source is located in front of the listener. Speakers such as the 12cm diameter KFC-121 and the 10cm diameter KFC-103 are especially designed to fit flush into the car door panel. These speakers can be used as the front speakers in a four-speaker system.

The photo at the right portrays the dual cone speaker KFC-121 mounted in the front door.

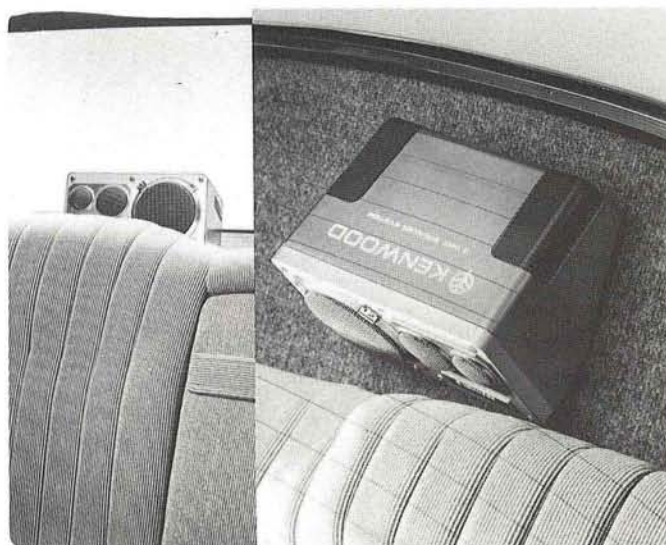


Type 2 Rear Deck Surface Mount

Rear deck surface mount speakers are the most common type of car hi-fi speakers. They can be easily installed on the rear deck without a lot of troublesome work by simply making a hole for the speaker wires.

When installing speakers on the rear deck, place the tweeter to the window side and try to leave as much space as possible between the two speaker units.

The photo at the right depicts the three-way speaker KSC-701 mounted on the rear deck.



Type 3 Rear Deck Flush Mount

Large diameter speakers can be installed flush in the rear deck. The large enclosed volume of the trunk space beneath the rear deck enables you to get an intense low range sound reproduction that exceeds the capabilities of your speaker diameter alone.

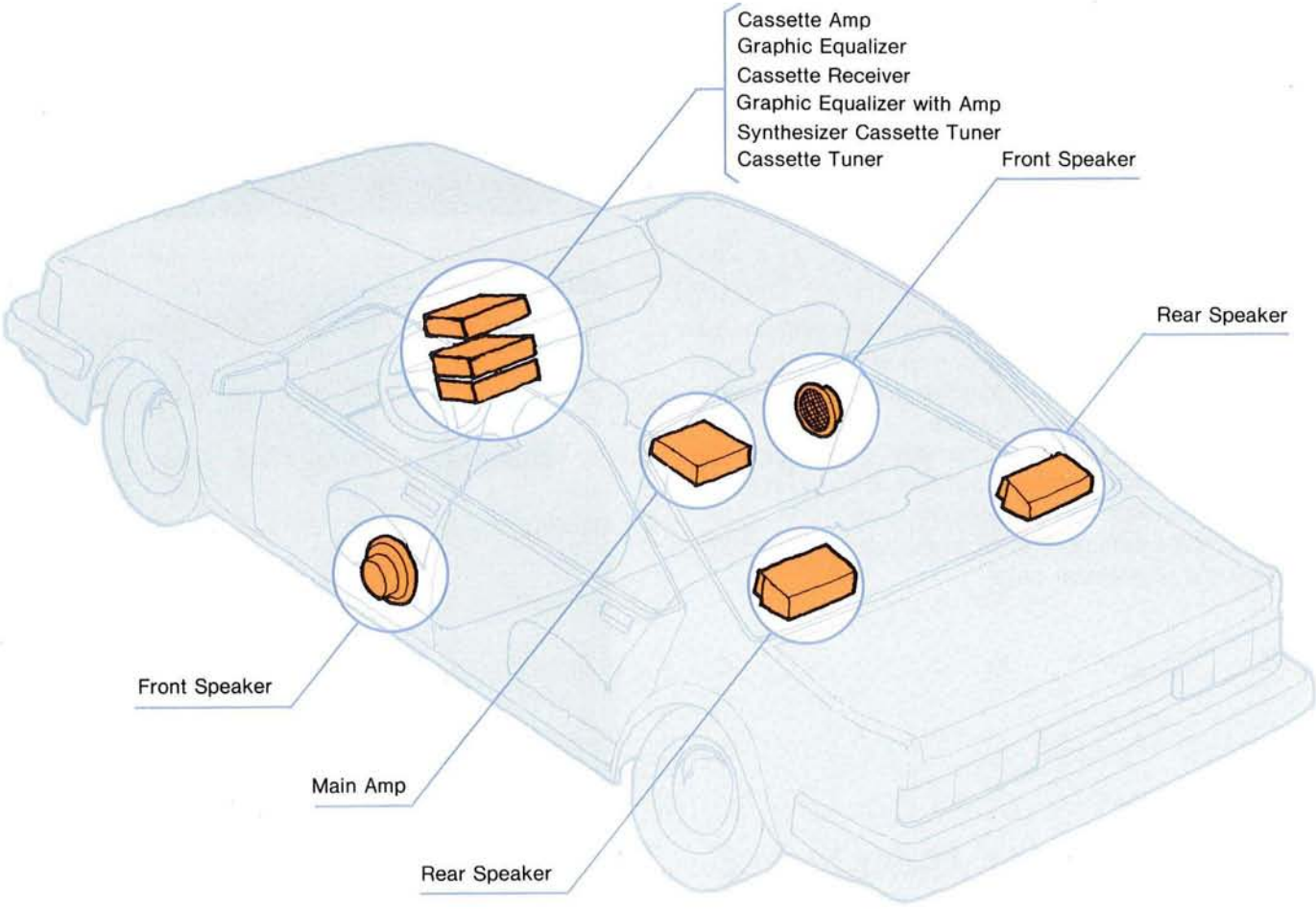
Although installation requires you to make a hole for mounting in the rear deck, anyone can perform this easy operation.

The photo at the right illustrates the 16cm coaxial two-way speaker KFC-161 installed in the rear deck.

If an obstruction in the trunk space contacts the magnet, insert a spacer. Spacer (CA-6) is convenient for such installation.



TOTAL SOUND SYSTEM



PRESERVE YOUR SOUND

Keep Your Cassettes in Their Best Standby Condition

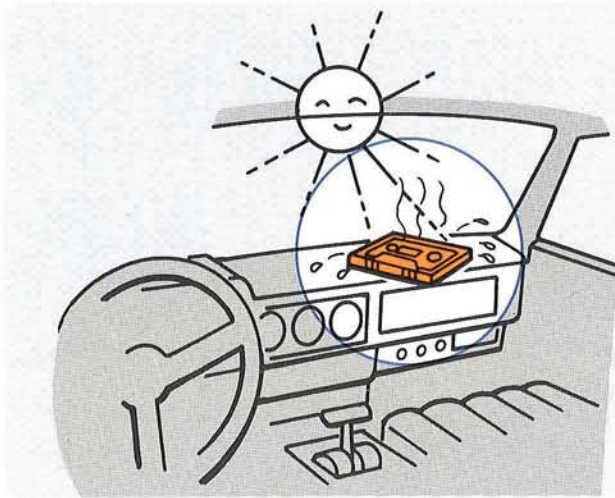
PROPER CARE FOR YOUR CASSETTE TAPES

No matter how fine a cassette deck you have, if your cassette tape is in poor condition, your deck cannot demonstrate its full capabilities. Your most carefully recorded metal or other types of tapes, if not given proper

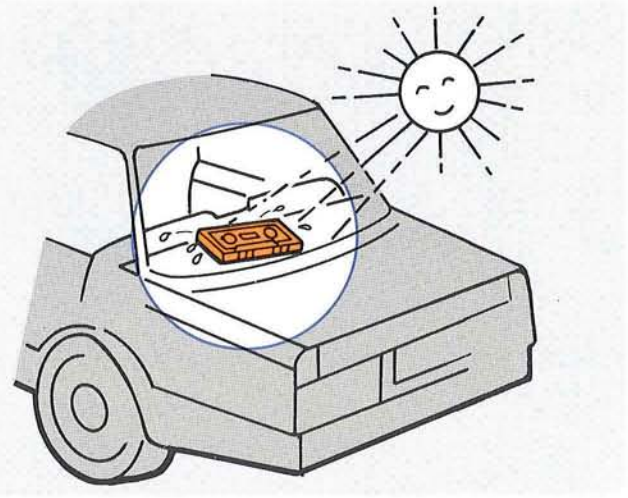
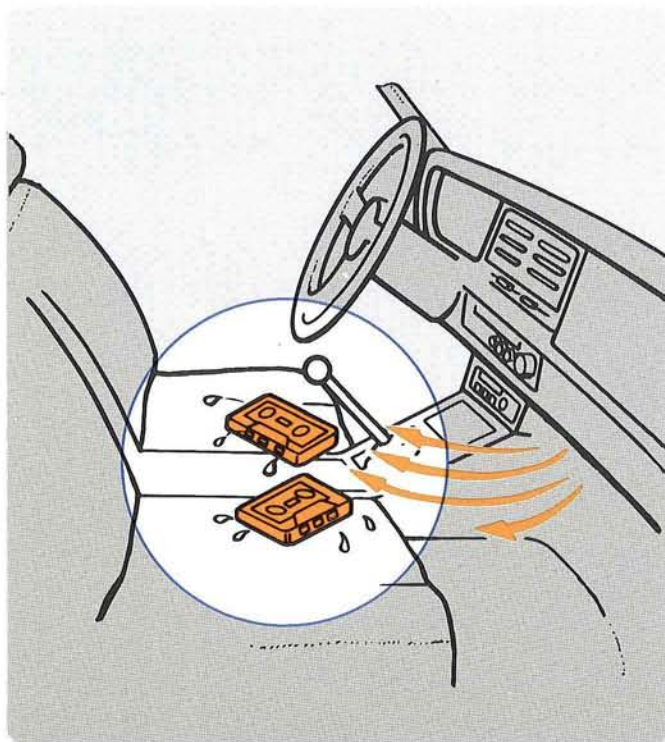
attention, may end up as a complete loss. The interior of an automobile, by no means an ideal environment for hi-fi sound reproduction, presents several inherent characteristics that invite trouble for your delicate cassette tapes.

GUARD AGAINST HEAT AND DUST WHEN STORING YOUR TAPES

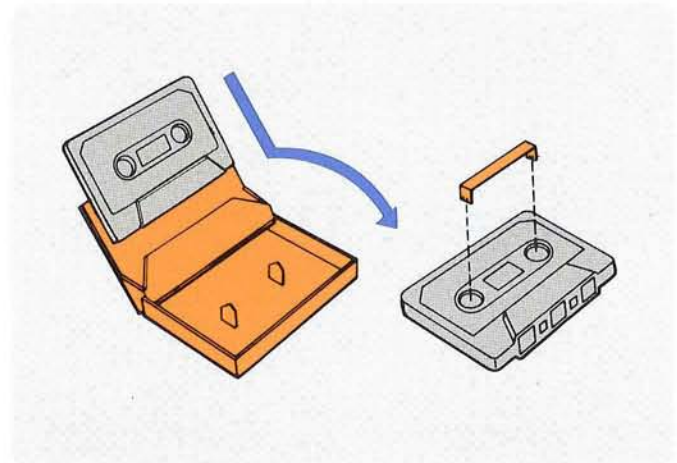
● When storing your cassette tapes in the car, strictly avoid putting them on the dash or rear deck where they can be subjected to direct sunlight. With midsummer temperatures rising to as high as 90°C, your tapes would be ruined in less than an hour.



● Avoid putting cassette tapes near the heating duct.



● Vibrations while driving may cause your tapes to become slack. Always place a tape in its cassette case or store it with its stopper attached.



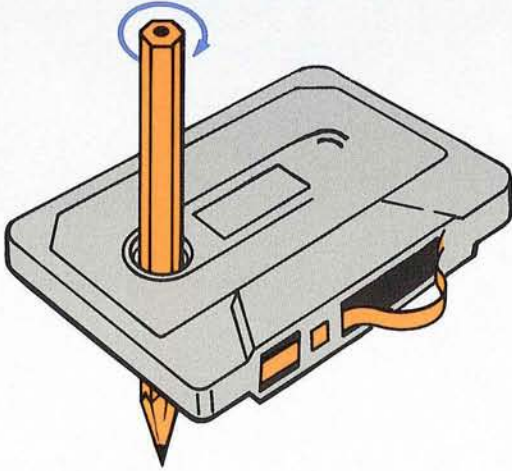
● Humidity is an arch-enemy. It is a cause of tape noise and may interfere with tape transport.

● Don't leave your favorite tapes inside your car. It is much better to take them back home each day. This is the easiest and best way to ensure that they will always give you best sound reproduction.

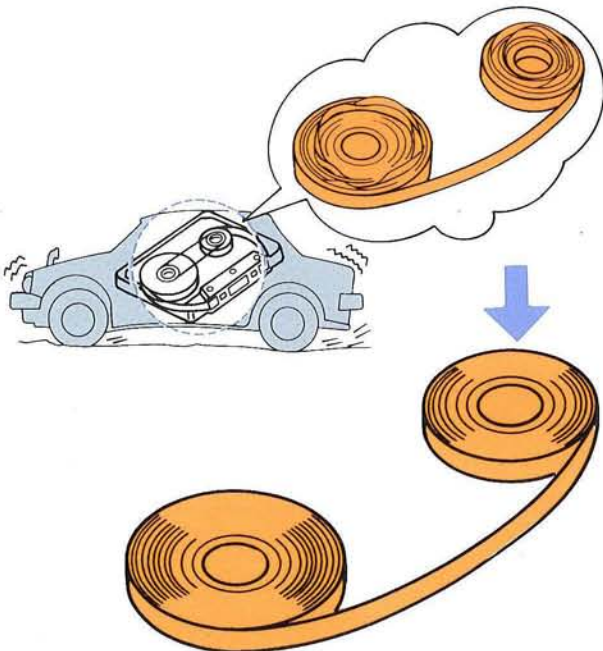
PREVENT TAPE TROUBLE BEFORE IT OCCURS

● Correct Tape Slack.

If you play slack cassette tapes the tape may be caught in the capstan and pinch roller, be stretched unevenly or curl. Before playing your tapes, remove the slack with a pencil or with the tip of your finger.



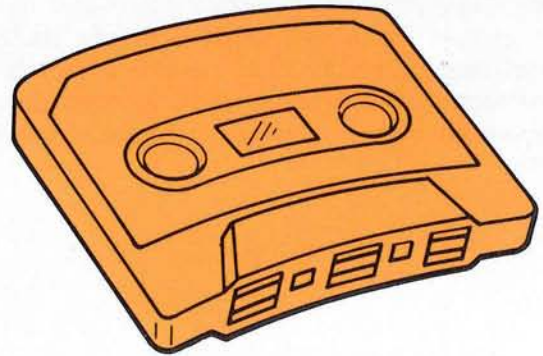
● Be Sure that Your Tape Is Properly Wound and Aligned. Vibrations when driving may cause your tapes to be wound out of alignment. Because this may lead to uneven tape transport, put your tapes in reverse or fast forward once before playing them.



● When the Tape Is Wound Too Tight or Loose.

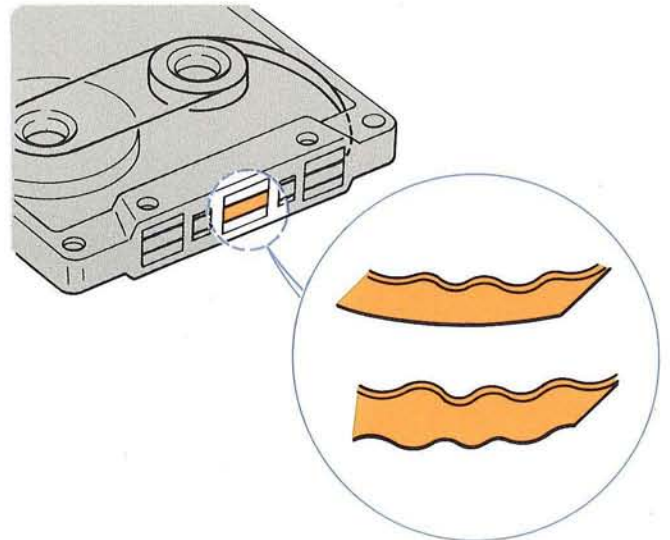
Sometimes your tape may be wound too tight or loose due to a twisted or bent cassette case. Because this is a cause of uneven tape transport, try playing the tape after putting it in fast forward or reverse several times. At times, even a tape that does not sound very good may be revived to give you continued listening pleasure, when its winding is re-adjusted in this way.

If a tape should become caught during playback or its transport speed appears uneven, that tape should be removed to avoid further problems.



● When the Tape Becomes Deformed.

Old tapes sometimes are unevenly stretched or pulled out of shape. This results in uneven tape play. Because such tapes cannot be corrected, the best advice is to dub such tapes before they are deformed.



● If Tape Squeaking Occurs, Replacement May Be the Best Policy.

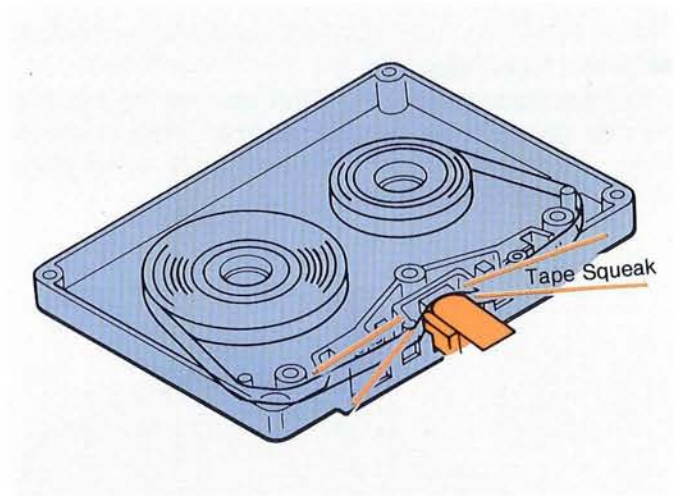
Tape squeaking during cassette play may result from the friction of the tape as it contacts the head or tape guide. The causes of this noise are various — heat and humidity, tape deformities, the influence of the tape's magnetic particles and binder. When the problem cannot be corrected by cleaning the head and tape guide, replace the tape with a new one.

● Avoid C-120 Cassette Tapes.

C-120 tapes with sixty minutes per side offer the advantages of long recording and playback times but because the tape is rather thin, its use in your automobile cassette deck is to invite trouble. If you must use long playing tapes, limit them to C-90 at the longest.

● Don't Forget Deck Maintenance.

When the head of your deck is dirty, high range sounds are not reproduced. Clean the head, capstan and pinch roller once or twice a month. Also, the head of your deck should be demagnetized once in a while to eliminate magnetism build-up.

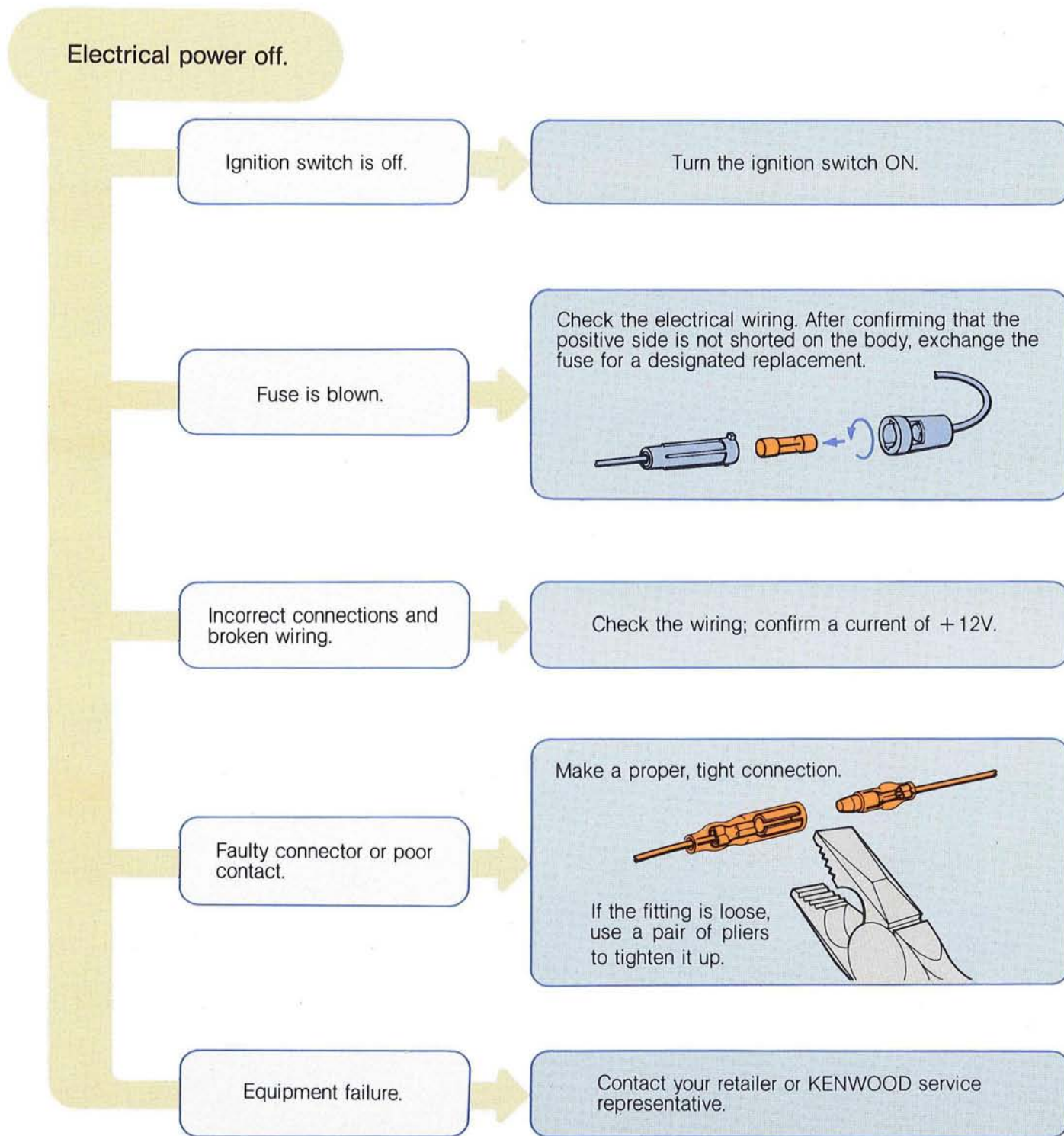


TROUBLE- SHOOTING

A Guide to Quick Troubleshooting

TROUBLESHOOTING ANYONE CAN DO

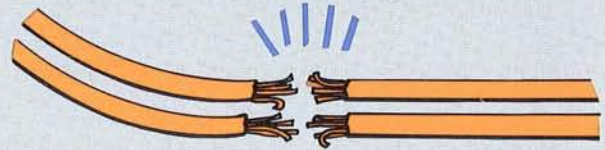
TROUBLE IN THE DECK AND TUNER



No sound.
(Electrical power on.)

Incorrect speaker wiring
hook up; broken wiring;
short.

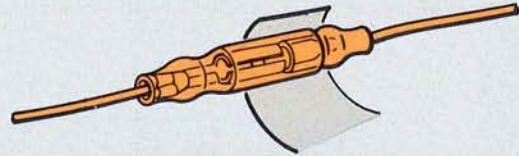
Check speaker wiring.



When running your speaker wires, be very careful around the doors and under the seats because broken connections and shorts can be caused by the speaker wiring being pinched in the door or on the sliding seat track.

Faulty speaker connector;
poor contact; short.

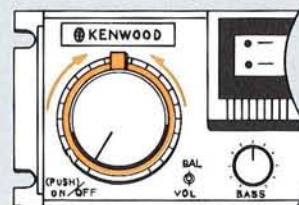
Make a proper, tight connection.



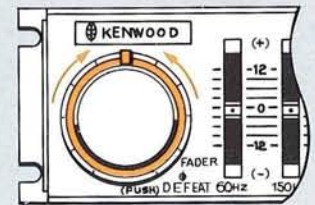
A short may be caused if the insulation slip is pulled off. Insulate it with vinyl tape.

Balance and Fader
controls are not adjusted
properly.

Adjust them correctly.



When the balance control is turned all the way to the left or right, adjust the control after resetting it in the center.



When the fader control is turned all the way to the right or left, adjust it after turning it back to the center.

Internal breakdown of
equipment.

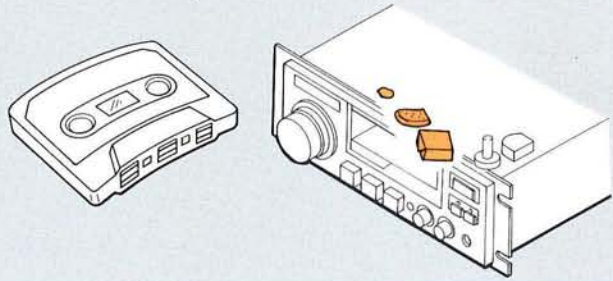
Contact your retailer or KENWOOD service
representative.

TROUBLE WITH THE CASSETTE DECK

No sound.
(With power on.)

Cassette tape not inserted properly.

When the cassette tape cannot be inserted properly due to a warped or bent case, replace it with a new tape. Remove any foreign objects that may have found their way into your deck.

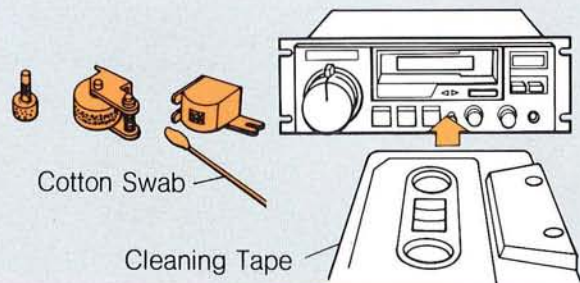


Cassette tape is unrecorded. Recording is extremely poor.

Replace with a properly recorded cassette tape.

Head is dirty.

Clean the head, capstan and pinch roller using a cleaning tape or a cleaning kit.



Cassette deck breakdown.

Contact your retailer or KENWOOD service representative.

Sound is distorted.

Cassette tape's recording level is poor.

If the recording level is too high, correctly re-record music, etc.

Distortion caused by adherence of tape to head or mechanism and deformation.

Replace with a new cassette tape.
(See illustration on the preceding page.)

Head is dirty.

Clean the head, capstan and pinch roller with a cleaning tape or cleaning kit.
(See illustration on preceding page.)

Cassette deck breakdown.

Contact your retailer or KENWOOD service representative.

Sound level is low;
High range not reproduced.

Head is dirty.

Clean head, capstan, pinch roller using cleaning tape or cleaning kit.
(See illustration on preceding page.)

Cassette deck breakdown.

Contact your retailer or KENWOOD service representative.

TROUBLES WITH THE TUNER

No sound.
(With power on.)

Cassette tape is playing.

Turn the tuner switch ON after ejecting the cassette tape.

Station not selected.

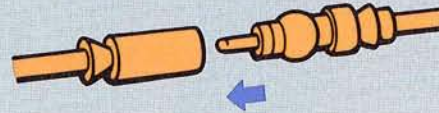
Tune it correctly.

Weak broadcast.

Change over to cassette tape.

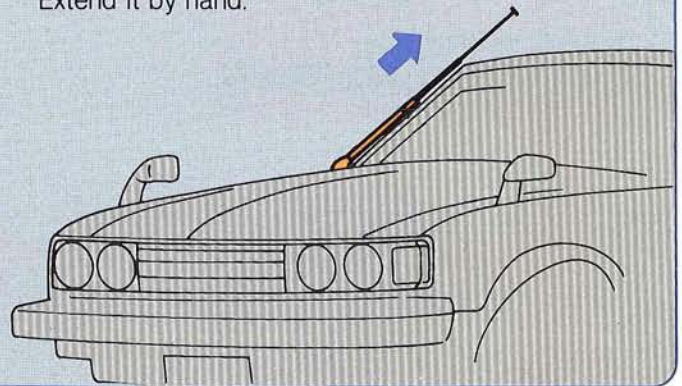
Broken wire, poor contact,
or disconnected antenna wire.

Check antenna wiring; make proper connections.



Antenna is not extended.
(Manually operated antenna.)

Extend it by hand.



Tuner breakdown.

Contact your retailer or KENWOOD service representative.

Sound is distorted.

AM reception is too strong.

Put your DX/LO switch to LO.

Too much noise.

Broadcast is weak.

Extend antenna.
Install a special antenna.

Static in the ignition line.

See page 45.

Static from electrical
source system.

See page 45.

DX/LO switch is set to
LO(AM).

Switch to DX.

Tuner breakdown.

Contact your retailer or KENWOOD service
representative.

STOP THE NOISE

Where the Noise Is Coming from and How to Prevent It

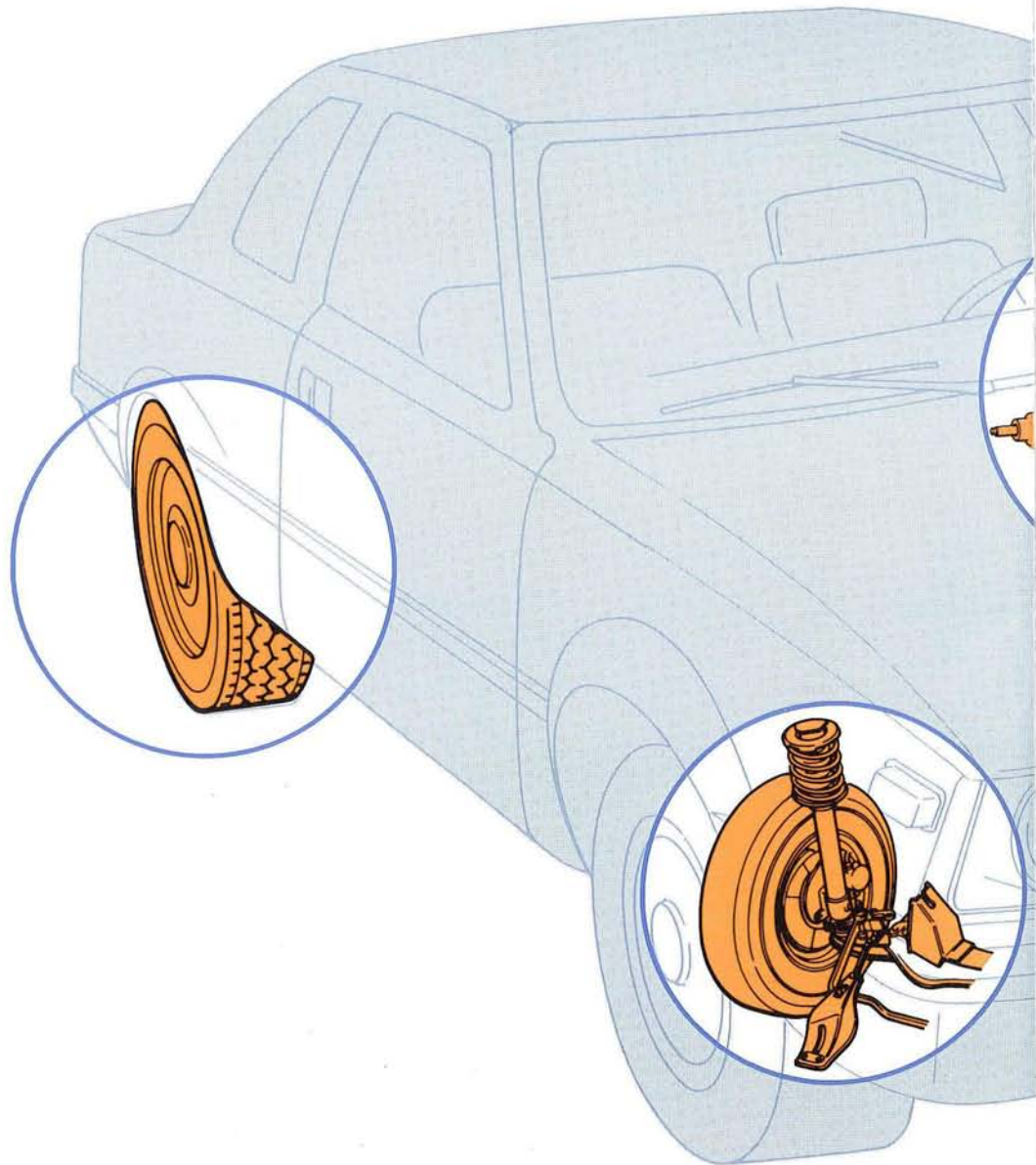
NOISE PREVENTION, THE FIRST STEP TOWARDS SOUND REPRODUCTION

The installation of your new car component system is completed at last. You set out for a test drive, your heart dancing with expectation. Suddenly you're faced with an attack of noise. What should you do. Though all KENWOOD components — decks, tuner, amps, speakers — are especially designed and equipped to prevent noise, still additional countermeasures must be taken. The interior of an automobile presents an inherently hostile environment for hi-fi sound reproduction and listening enjoyment. Special steps are necessary to suppress noise in your car's interior.

The sources of noise generation in your automobile may be broadly divided into two areas — the **mechanical system** and the **electrical system**. Noise sources in the mechanical system chiefly include:

1. Engine System
(The Engine Itself and the Exhaust Line)
2. Transmission System
3. Body and Chassis
4. Suspension
5. Steering and Brakes
6. Tires

While driving, the noise from these sources, together with noise from outside, flies directly into the listener's ears.



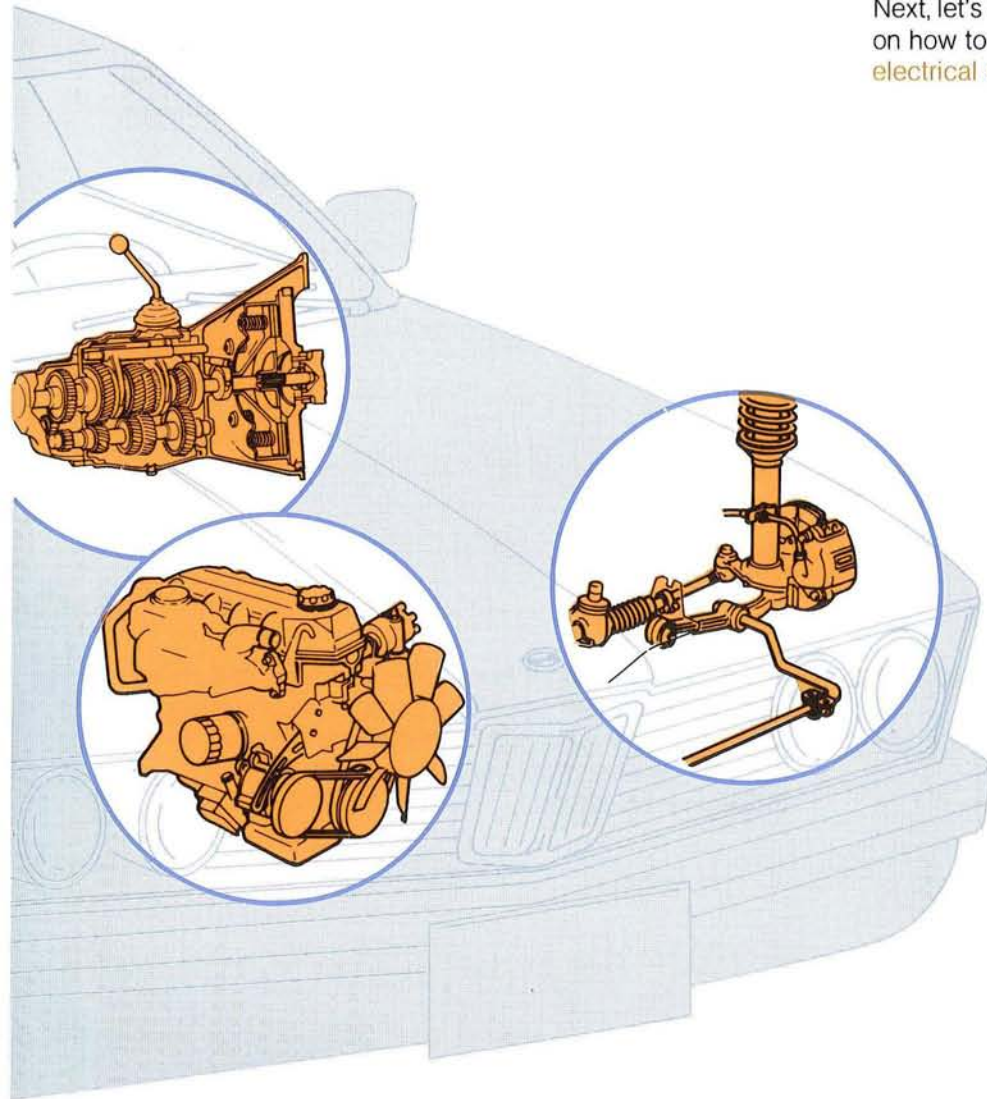
Next, let's examine the main sources of noise in the electrical system:

1. Ignition System (Spark plug equipped)
2. Alternator
3. Regulator
4. Electrical Fuel Pump
5. Various Electrical Equipment (Flashers, Wipers, Horn, Electrical Fan, Blower Motor)

The noise generated from these sources presents an elusive wave of obstacles to enjoyable hi-fi listening. This noise is amplified directly in the car components themselves or else comes through the wiring and antenna. And this is why the prevention of noise from these sources entails so many complicated problems. It is here that you should focus your efforts for noise prevention.

From this outline you can probably understand the main sources of noise generation in the car itself. But don't forget to pay attention to the **most fundamental** of your noise countermeasures namely, those when you install your component system in your automobile. For example, it is very important to be sure that the ground wires from the cassette deck, tuner and main amp are securely attached directly to a metallic part of the vehicle's body. Sometimes what looks like metal is actually a compound resin material. Pay close attention. Also, be very careful about the way you string out all the different kinds of connecting wires. If you install the component system yourself, spend extra time making sure each connection is correctly made. Think of this as a short cut to attaining hi-fi sound, for in the long run this will save you a lot of time.

Next, let's introduce some concrete measures and pointers on how to prevent noise generated in **the mechanical and electrical systems** of your automobile.



OBTAINING A QUIET CAR INTERIOR

Countermeasures for Noise Generated by the Mechanical System.

Noise generated by the engine, exhaust, suspension, namely by the mechanical system, can be easily reduced to a minimum by habitual and regular equipment inspection and maintenance. Such checks are just plain common sense for the experienced driver. Pay particular attention to the tires. During high speed driving, vibration and noise generated by contact of the road with the tires attain quite a loud volume. Give close attention to tire selection and replacement.

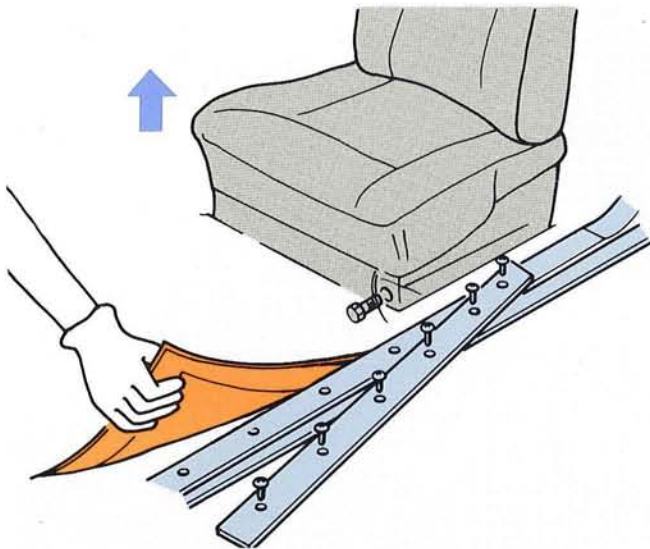
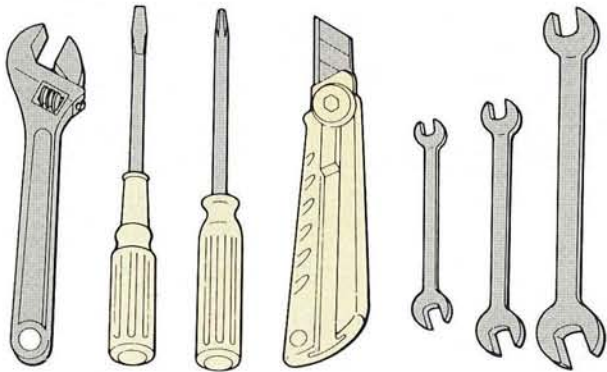
When trying to prevent noise in the mechanical system, leaving the job to a garage or car stereo installation shop is too time-consuming. For door and bonnet (hood) rattles, inspect the places where they are attached, and eliminate the loose spots yourself by tightening.

For the more progressive owner, why not try "obtaining a quiet car interior" using noise absorbent materials. Just follow the steps listed below.

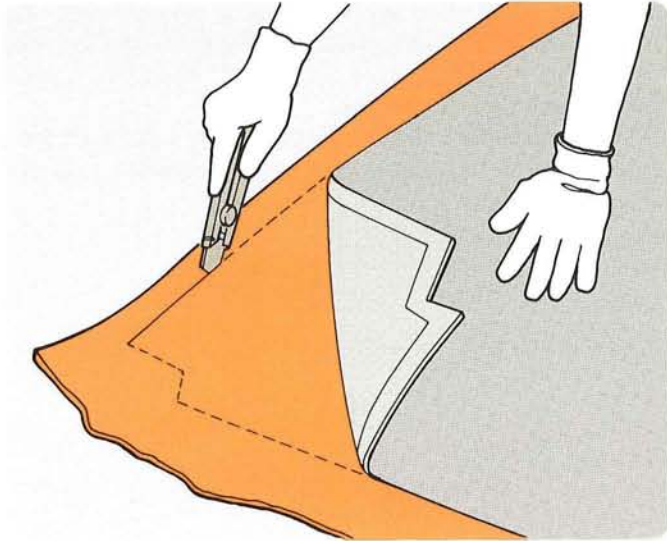
A Noiseless Strategy that Entails Covering the Floor with Noise Absorbent Material

OPERATION STEPS (Example: Sedan Models)

1. Prepare some noise absorbent material. A thick dense felt is effective; you can also make do with no longer needed blankets or carpeting.
2. The only tools required are those you keep in the car, with the addition of a utility knife.

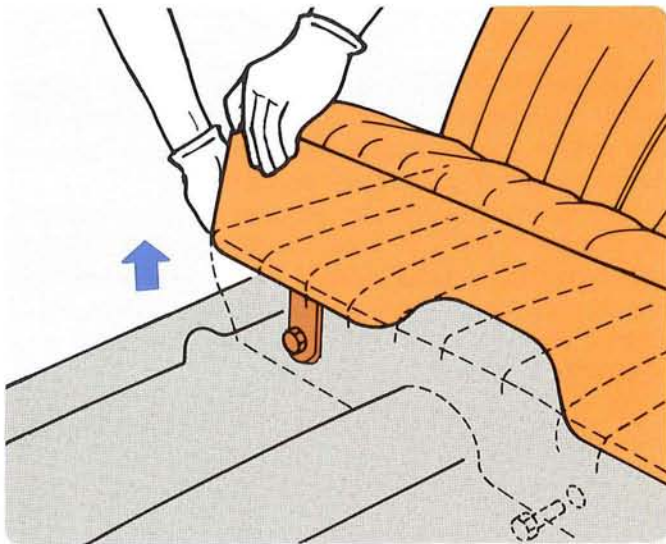


3. Remove the carpet from under the front seat. If you bought a single unit type of car component, you are going to have to take out the console box and the seat, so you can save time and trouble by doing this step when you install your car stereo.



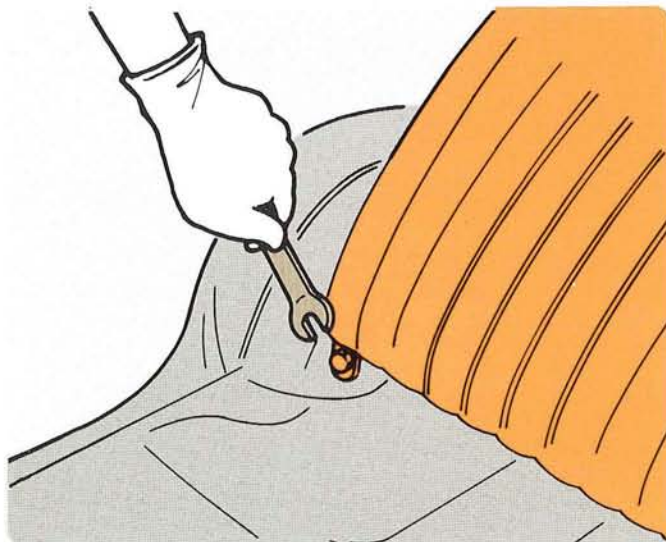
4. Align your noise absorbent material against the shape of the carpet, cut it with your utility knife and see how it fits on the floor of your car. In some places it may be necessary to push the material into the floor contours or to cut into the material so if you leave the material somewhat larger than necessary, it will be easier to work with when you are fitting it to the floor.

5. After spreading the noise absorbent material over the floor, replace the carpet and attach it in place.

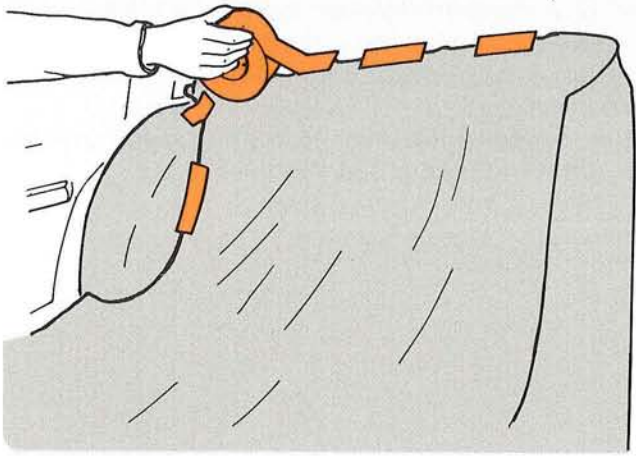


6. Take out the carpet under the rear seat and spread noise absorbent material just as you did in the front.

7. Remove the rear seat bench. Some types of cars attach their benches with hooks, but the majority can be removed by unfastening two bolts beneath the bench, and lifting it out.



8. Remove the rear seat back support. The screws that hold the back in place are located on the left and right in two spots below the seat. In addition, some cars also suspend the rear seat. So after removing the screws, lift up the seat back and take it out.



9. Prepare noise absorbent material for the rear seat back support and bench, and spread it completely over the floor. Use rubber tape and two-sided tape to keep the material from slipping out of position.

10. Restore the rear seat back and bench, and attach them firmly in place. This part of your noise prevention project is now completed.

Today, the same degree of importance is attached to the comfort of the automobile's interior as to its performance on the road. For this reason, we have recommended making a quiet, comfortable car interior that would suit the owner's desire for a hi-fi listening space. But, surprisingly, cost cutting sometimes means important things are left undone. To attain a more comfortable and relaxing audio room on wheels, it may be necessary to take that one extra progressive step and improve your car's interior based on your own ideas.

For example, measures to reduce noise in the luggage space may also be effective, especially with hatchback and station wagon models where the luggage space is actually a part of your interior sound space.

In addition another effective noise absorbent material on the market is vibration suppression rubber that can be easily attached to metal sections of your car's interior. Give it a try and you may discover a still better audio life on wheels. Experiment with those places that seem most noticeably in need of improvement.

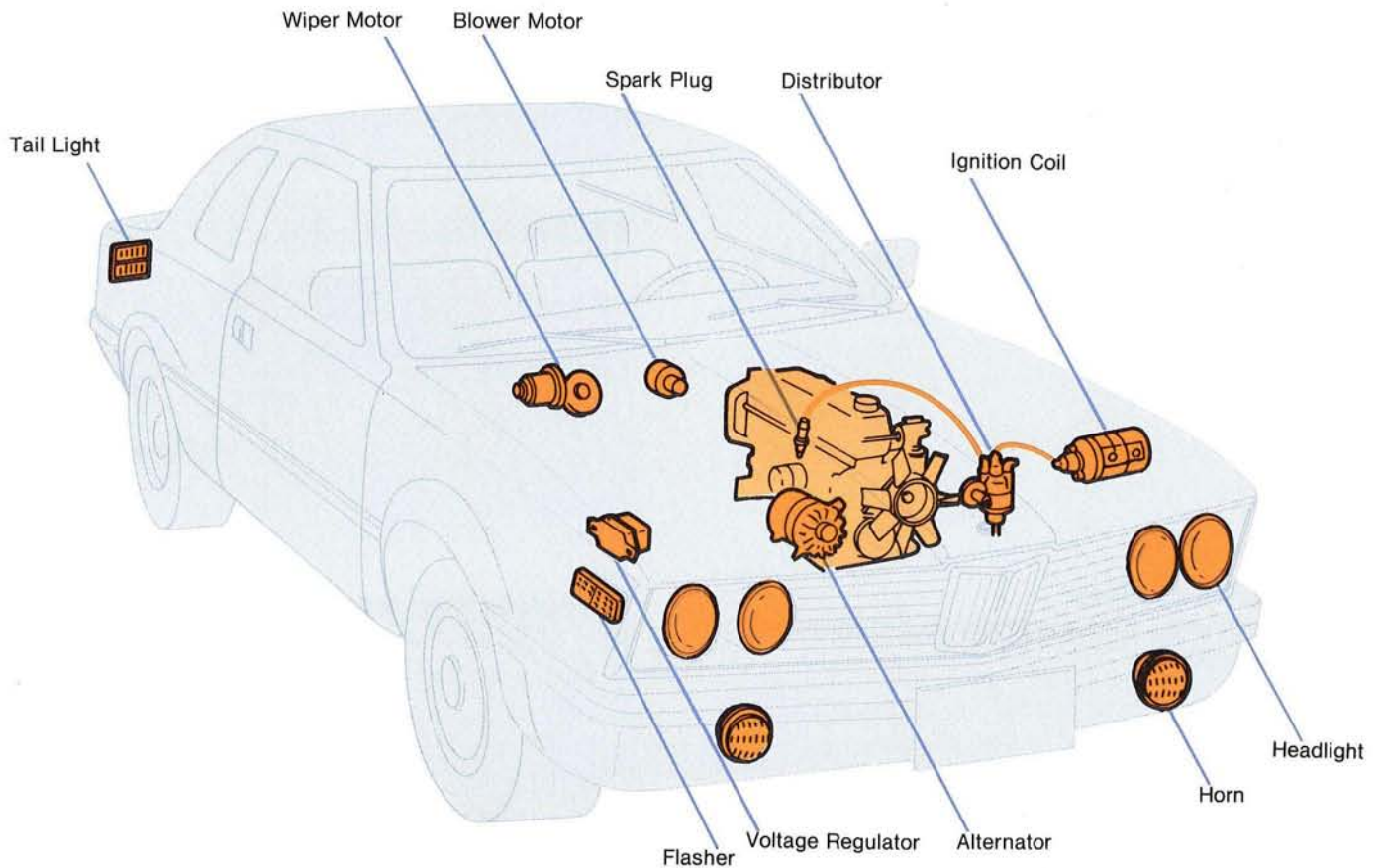
USING NOISE SUPPRESSION DEVICES

Countermeasures for Noise Generated in the Electrical System.

The sources of noise generated in the electrical system are not as simple and easy to understand as those in the mechanical system. Generally, with the profusion of electrical equipment installed on automobiles today, it is very difficult to pinpoint the exact source of the noise you may hear from the first time you turn ON your car component system. Only after long on-the-job experience can you learn to distinguish noise symptoms and recognize the sources of noise generation. For this reason, here we will point out some relatively easy-to-understand and - apply measures for noise prevention.

In order to understand the sources of noise generation, first an elementary understanding of the automobile's electrical system is necessary. The drawing below illustrates the automobile's most common electrical equipment. Begin by familiarizing yourself with this.

Note also that noise extends across all frequency ranges so that we must apply countermeasures to each respective narrow range of the spectrum.

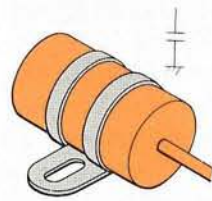


BASIC MEASURES FOR THE SUPPRESSION OF NOISE GENERATED IN THE ELECTRICAL SYSTEM

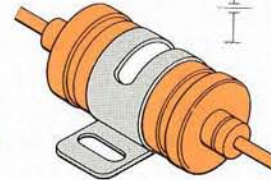
1. Use condensers.

A condenser is an AC short-circuiting circuit. It can suppress fault waves from alternating current and pulse signals. It has a special characteristic of absorbing the spark when the switch is turned ON and OFF.

Condenser Types

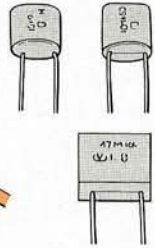


Normal Type



Feed-Through Type

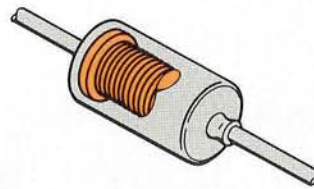
Other Types



2. Use choke oil.

It cuts off the high frequency alternating current that arises from fault waves.

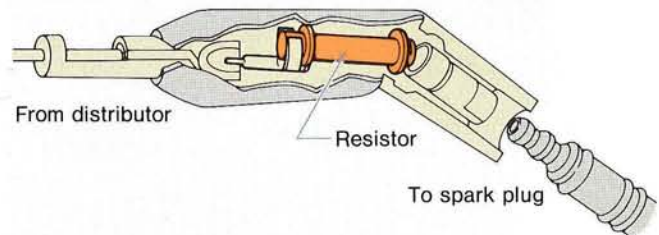
Choke Coil Types



3. Combined with resistors.

Combined with the distribution capacitance of high frequency wire, high frequency fault waves can be suppressed.

Example of Resistance Wire



4. Use Ground wires.

By using earth wires, you can prevent secondary emission from fault waves.

Example of A Ground Wire



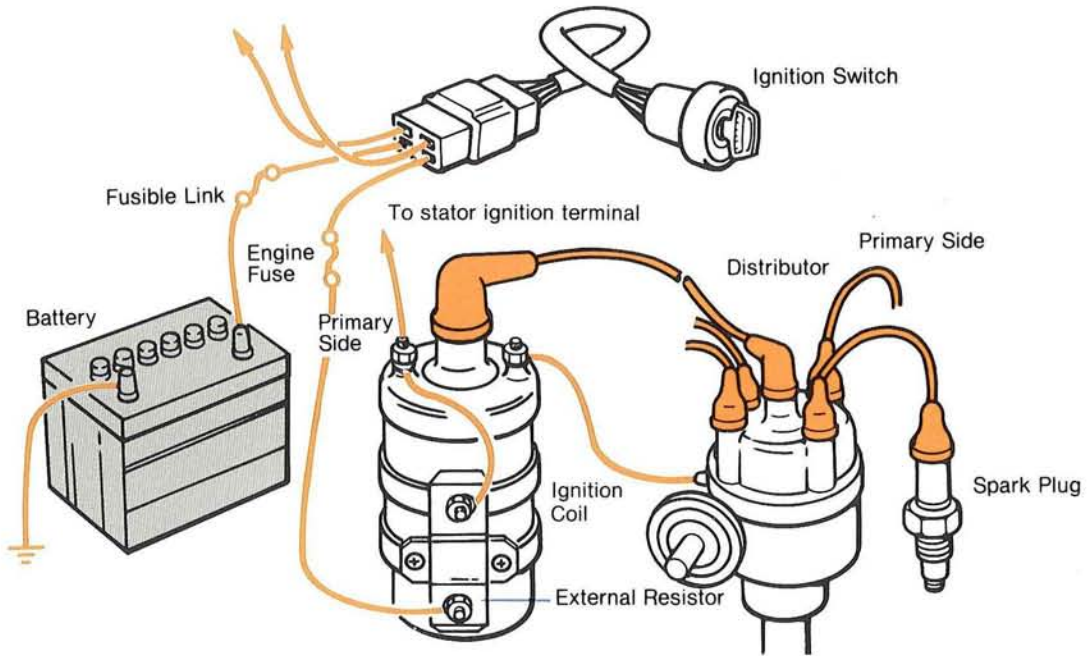
5. Install shields.

Shield with metal all the sources generating noise. The above are the basic ways to suppress noise; these can be used in combination with noise suppressors.

IGNITION SYSTEM

Typical ignition system is shown in the picture below.

Ignition System



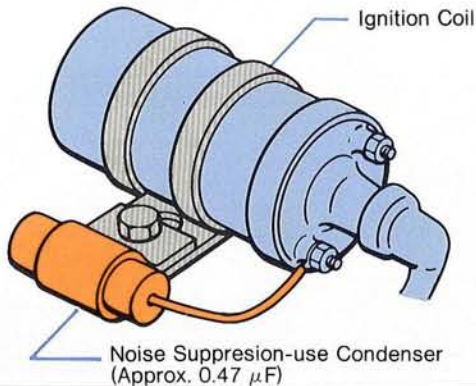
The electric current that flows on the primary side of the ignition coil generates high voltage on the secondary side through the ignition coil by means of the momentary interruption of the contact points and supplies this to the spark plug, causing spark to jump. Due to the high voltage generated and the sparking, the ignition system represents a

strong source of noise. This, then, represents an important point in your measures for noise prevention. Recently, in place of ignition coils with contact points, full-transistor and semi-transistor types are being widely adopted.

NOISE COUNTERMEASURES

1. Insert a condenser (Approx. $0.47 \mu\text{F}$) between the primary side of the ignition coil (+ side) and the ground.

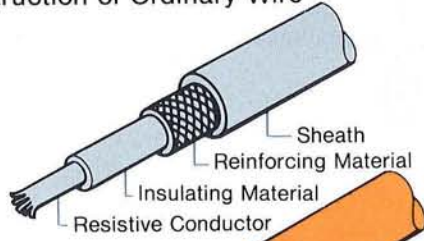
Attaching a condenser to an ignition coil



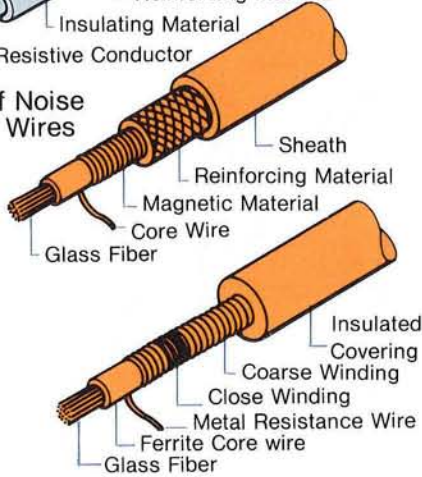
Note: In most cars this is already factory-equipped as a suppressor for radio noise. But check it periodically because an old one doesn't properly suppress noise anymore.

2. Replace the ignition wires on the secondary side with **resistor-inserted wires (resistance wires)**, or replace them with **ignition wires** designed to counter noise.

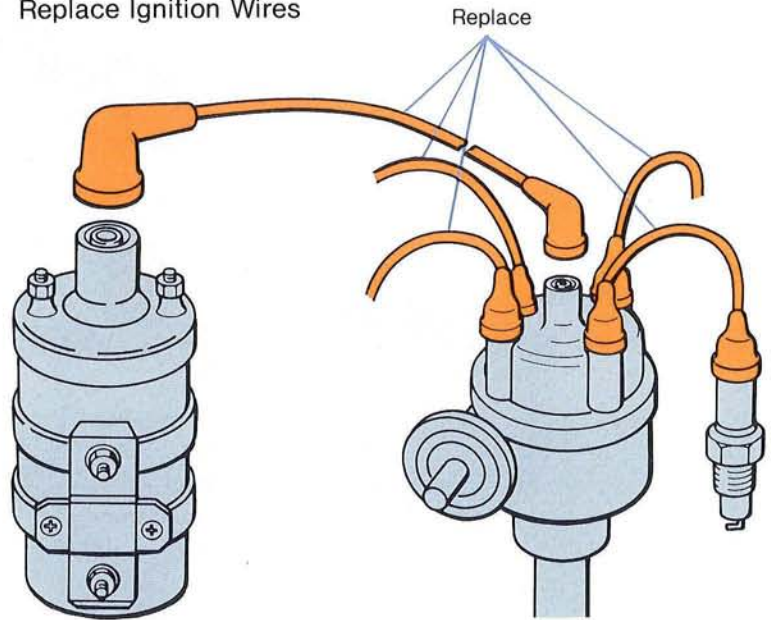
Construction of Ordinary Wire



Examples of Noise Suppressor Wires

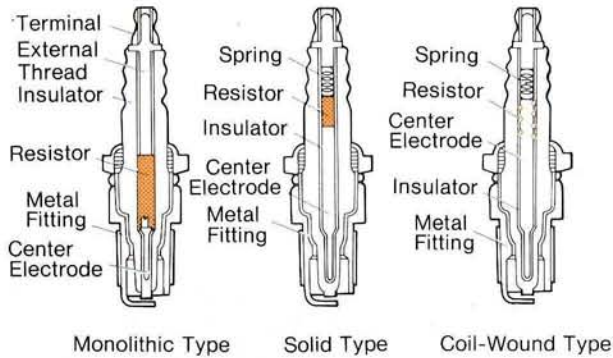


Replace Ignition Wires

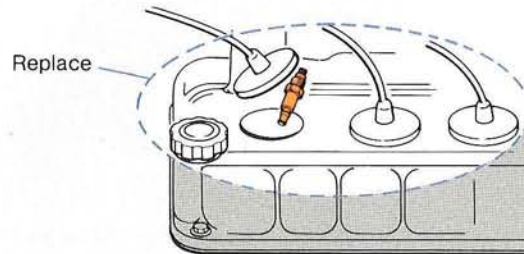
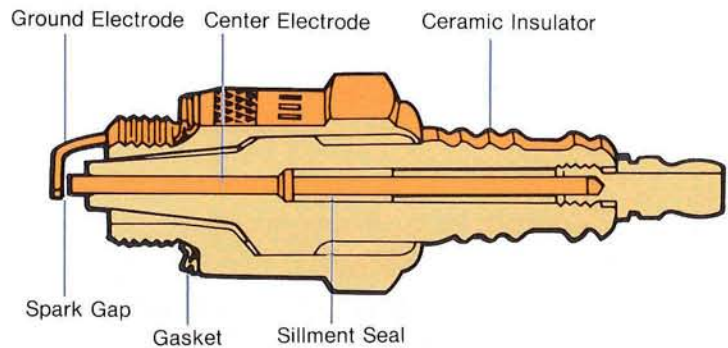


3. Replace ordinary spark plugs with **resistor spark plugs**

Examples of Resistor Spark Plugs



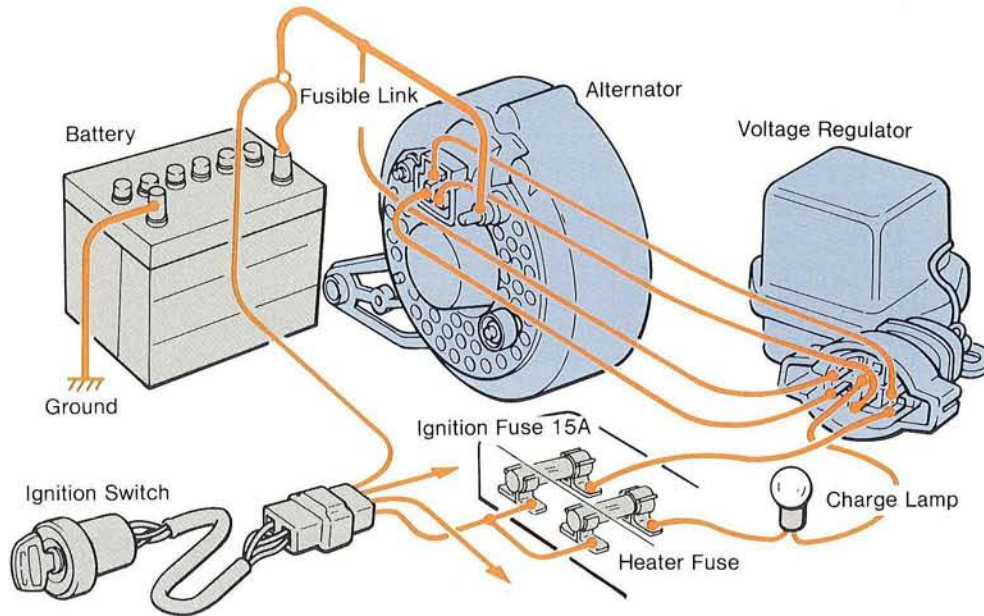
Spark Plug Structure



Note: When the total resistance of the secondary circuit increases due to the combination of such ignition wires and spark plugs, spark energy is impaired. Because power loss and fuel expenses are linked together, a balanced combination noise suppression equipment is necessary. Use the resistance value of ordinary ignition wire at around 16kΩ/m for reference.

ALTERNATOR AND VOLTAGE REGULATOR

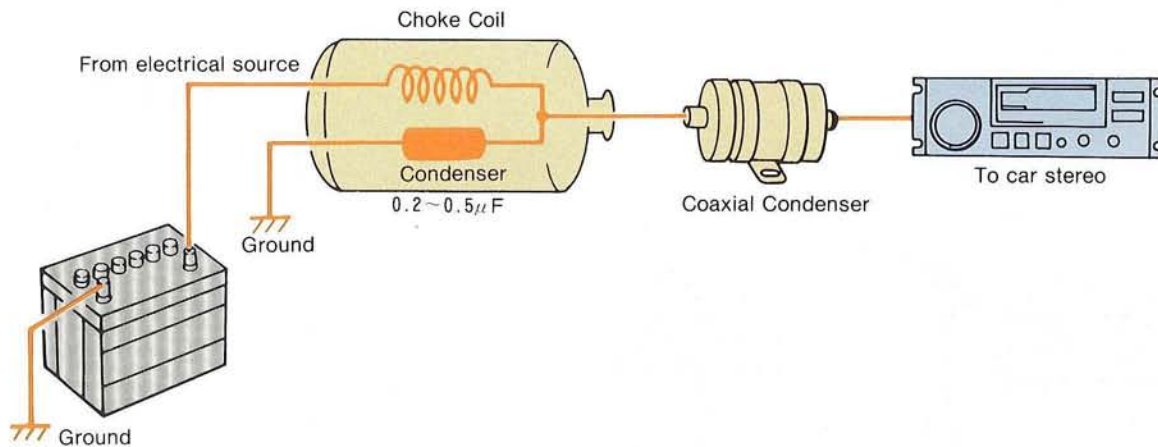
The automobile's electrical power supply system.



In an alternator, an excited electric current flows to the rotor coil through the media of the brush and slip ring. For this reason, we can consider the alternator as a source for the generation of noise and as having an effect resulting from the ripple of the rectifier wave form.

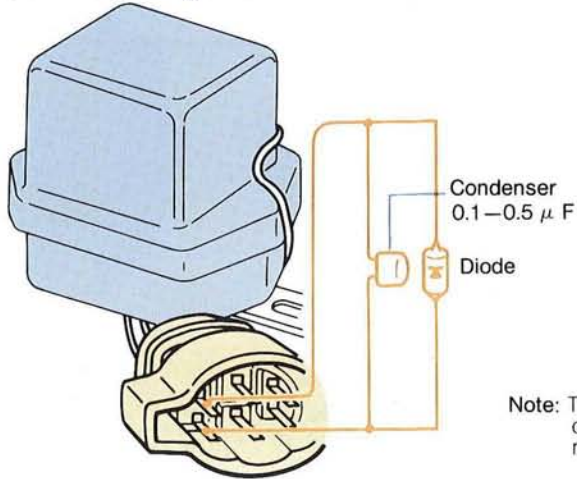
NOISE COUNTERMEASURES

1. Because ripple noise from the alternator enters through the electrical power circuit, insert an LC type filter



2. Noise that is generated by damage to the alternator brush and slip ring means inspection and adjustment are necessary. Ask your mechanic.
3. To suppress noise from the voltage regulator, insert a **condenser or diode** between the ignition terminal and the ground terminal.

Countermeasures for Voltage Regulator

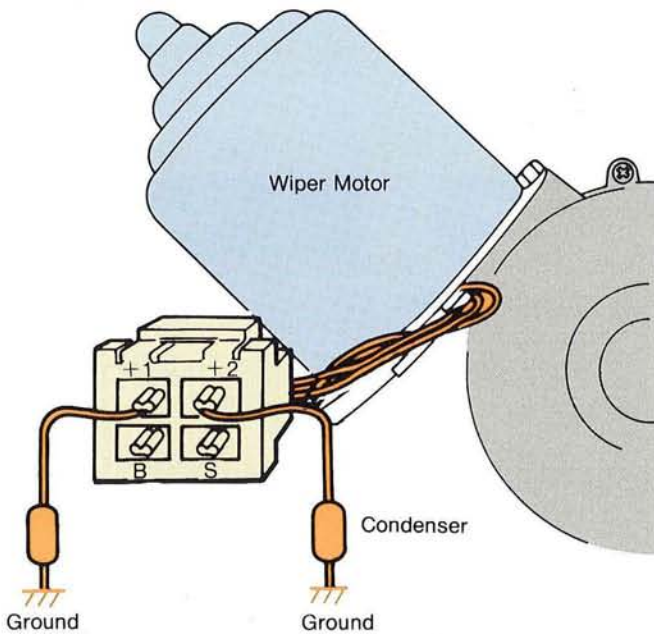


Note: Transistor type voltage regulators do not require the above countermeasures. Another noise preventive is immediate replacement of a component that becomes defective.

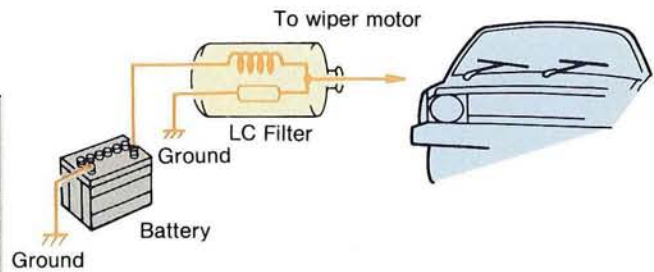
WIPER MOTOR

To counter noise when operating your wipers, insert an **LC filter** in the electrical power circuit and attach a **condenser** to the terminal of the field coil.

Insert Condenser



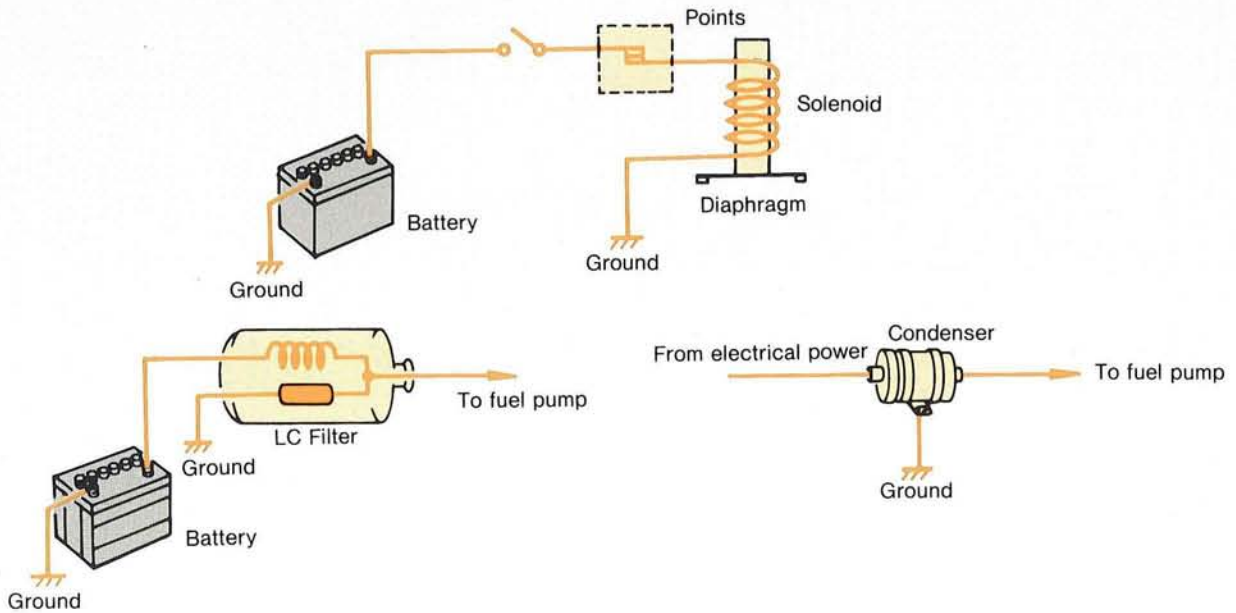
Insert LC Filter



ELECTRICAL FUEL PUMP AND HORN

Here is a simple diagram of the basics of a solenoid fuel pump and horn.

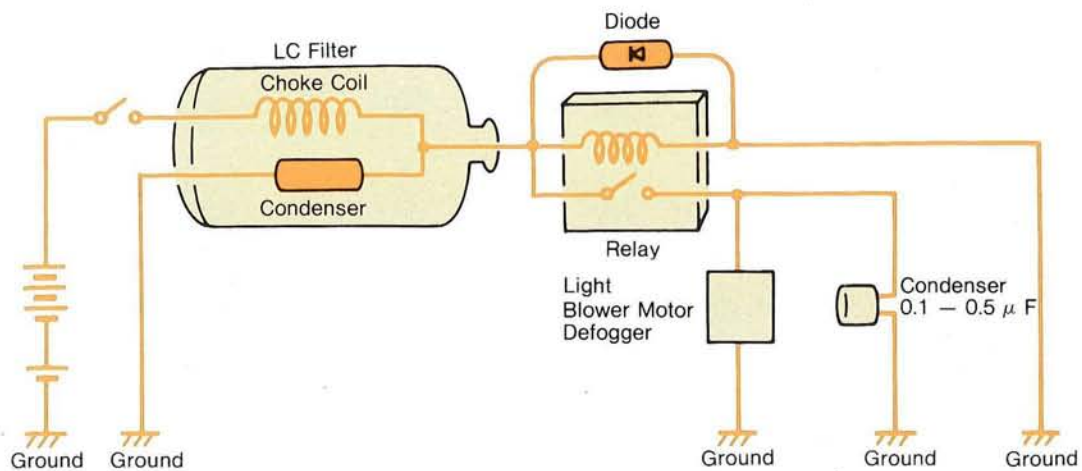
They are both operated by switching of the point. This type of noise can be suppressed by an LC filter and condenser.



ASSORTED ELECTRICAL EQUIPMENT

Noise comes from the contact points of the switch and from the motor.

Use LC filters, condensers and diodes to prevent such noise.





A product of

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