

AUDIO SYSTEM DESCRIPTION

BE2E8-01

1. RADIO WAVE BAND

The radio wave bands used in radio broadcasting are as follows:

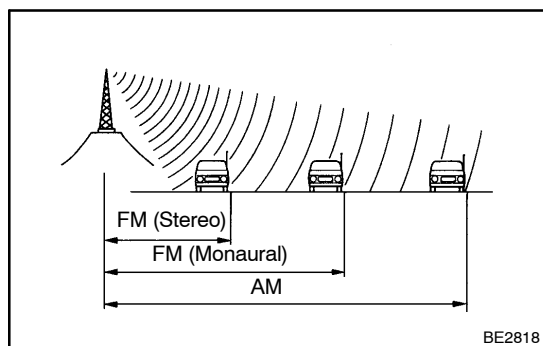
Frequency	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio wave		AM ↔		FM ↔	
Modulation	Amplitude modulation			Frequency modulation	

LF: Low Frequency

MF: Medium Frequency

HF: High Frequency

VHF: Very High Frequency

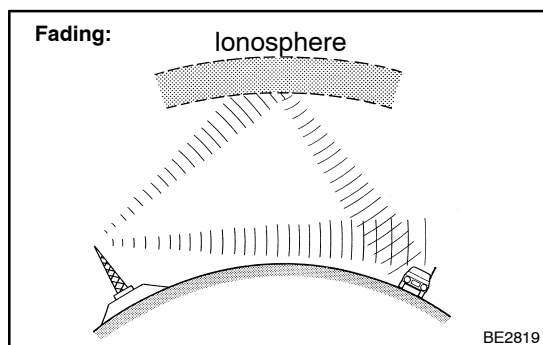


2. SERVICE AREA

There are great differences in the size of the service area for AM and FM monaural. Sometimes FM stereo broadcasts cannot be received even though AM can be received in very clearly. Not only does FM stereo have the smallest service area, but it also picks up static and other types of interference ("noise") easily.

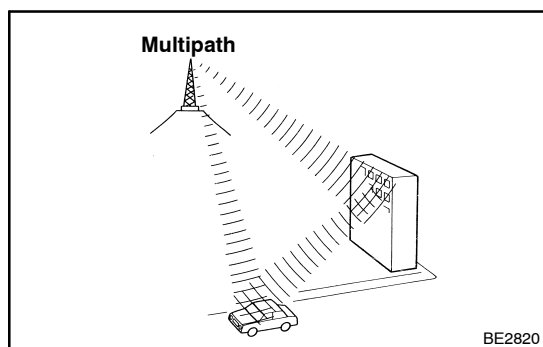
3. RECEPTION PROBLEMS

Besides the problem of static, there are also the problems called "fading", "multipath" and "fade out". These problems are caused not by electrical noise but by the nature of the radio waves themselves.

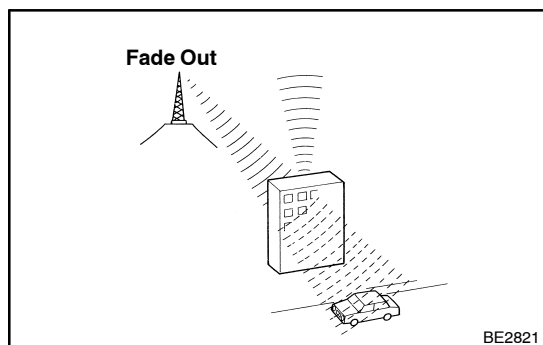


(1) Fading

Besides electrical interference, AM broadcasts are also susceptible to other types of interference, especially at night. This is because AM radio waves bounce off the ionosphere at night. These radio waves then interfere with the signals from the same transmitter that reach the vehicle's antenna directly. This type of interference is called "fading".



- (2) **Multipath**
One type of interference caused by the bounce of radio waves off of obstructions is called "multipath". Multipath occurs when a signal from the broadcast transmitter antenna bounces off buildings and mountains and interferes with the signal that is received directly.



- (3) **Fade Out**
Because FM radio waves are of higher frequencies than AM radio waves, they bounce off buildings, mountains, and other obstructions. For this reason, FM signals often seem to gradually disappear or fade away as the vehicle goes behind a building or other obstruction. This is called "fade out".

4. NOISE PROBLEMS

- (a) Questionnaire for noise:

It is very important for noise trouble shooting to have good understanding of the claims from the customers. Refer to the following questionnaire to diagnose the problem accurately.

AM	Noise occurs at a specific place.	Strong possibility of foreign noise.
	Noise occurs when listening to faint broadcasting.	There is a possibility that the same program is broadcasted from different local stations, and that might be listening a program from other station.
	Noise occurs only at night.	Strong possibility of the beat from a distant broadcasting.
FM	Noise occurs while driving on a particular area..	Strong possibility of multipath noise and fading noise caused by the changes of FM waves.

HINT:

In the condition of noise occurrence does not meet any of the above questionnaire, check the problems to "Reception Problem" on the previous page.

- (b) Matters that require attention when checking:
- Noise coming into the radio usually has no harm for daily use as the noise protection is taken, and it is very rare for an extremely loud noise to come in. When extremely loud noise comes into the radio, check if the grounding is normal where the antenna is installed.
 - Check if all the regular noise prevention parts are properly installed, and if there is any installation of non-authorized parts and non-authorized wiring.
 - If you leave the radio out of tune (not turning), it is easy to diagnose the phenomenon as noise occurs frequently.
- (c) Antenna and noise:
Electronic signal received by the antenna will reach to the radio transmitting through the core wire of the coaxial cable. Any noise wave other than radio wave is mixed into this core wire, that naturally causes noise in the radio and poor sound quality. In order to prevent the noise from coming into radio, the core wire inside the coaxial cable is covered with a mesh wire called shield wire which transmits the noise to the ground.

5. COMPACT DISC PLAYER

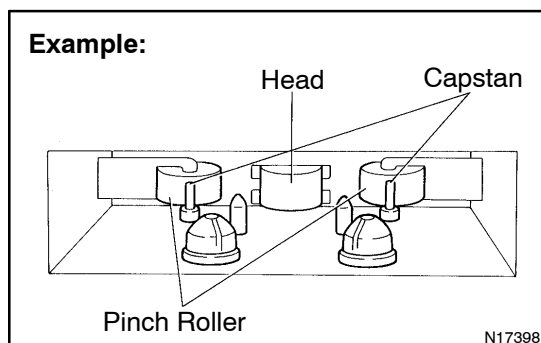
Compact Disc Players use a laser beam pick-up to read the digital signals recorded on the CD and reproduce analog signals of the music, etc.

HINT:

Never attempt to disassemble or oil any part of the player unit. Do not insert any object other than a disc into the magazine.

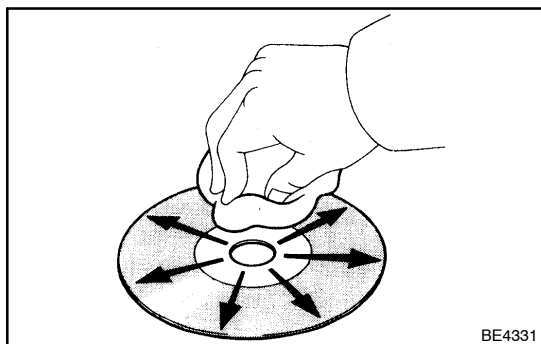
NOTICE:

CD players use an invisible laser beam which could cause hazardous radiation exposure. Be sure to operate the player correctly as instructed.



6. Tape player/head cleaning: MAINTENANCE

- (a) Raise the cassette door with your finger. Next, using a pencil or similar object, push in the guide.
- (b) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.



7. CD player/disc cleaning: MAINTENANCE

If the disc gets dirty, clean the disc by wiping the surface from the center to outside in the radial directions with a soft cloth.

NOTICE:

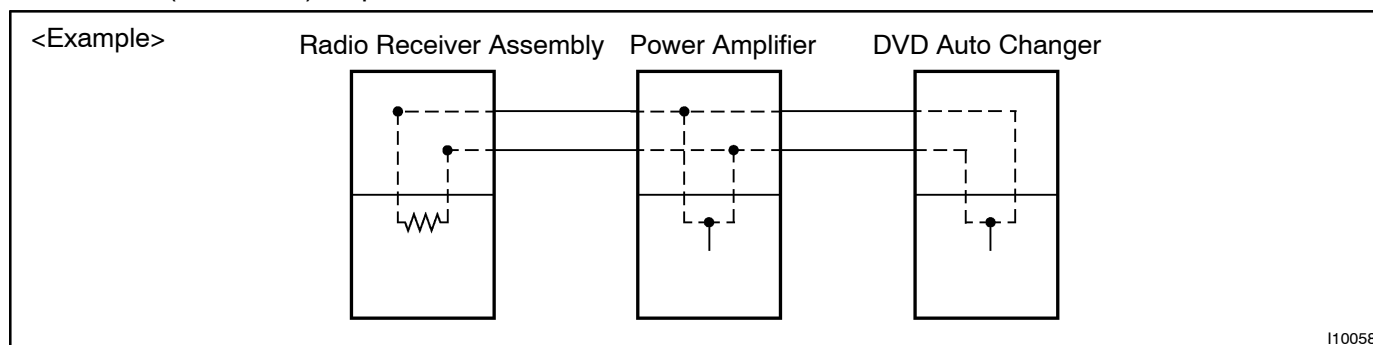
Do not use a conventional record cleaner or anti-static preservative.

8. OUTLINE OF AVC-LAN

(a) What is AVC-LAN?

AVC-LAN is the abbreviation, which stands for Audio Visual Communication-Local Area Network. This is a unified standard co-developed by 6 audio manufactures associated with Toyota Motor Corporation.

The Unified standard covers signals, such as audio signal, visual signal, signal for switch indication and communication signal. Radio receiver assembly and RSA (Rear Seat Audio) panel have a resistance (60 – 80 Ω) required for communication.



(b) Objectives

Recently the car audio system has been rapidly developed and functions have been changed drastically. The conventional system has been switched to the multi-media type such as a navigation system. At the same time the level of customers needs to audio system has been upgraded. This lies behind this standardization.

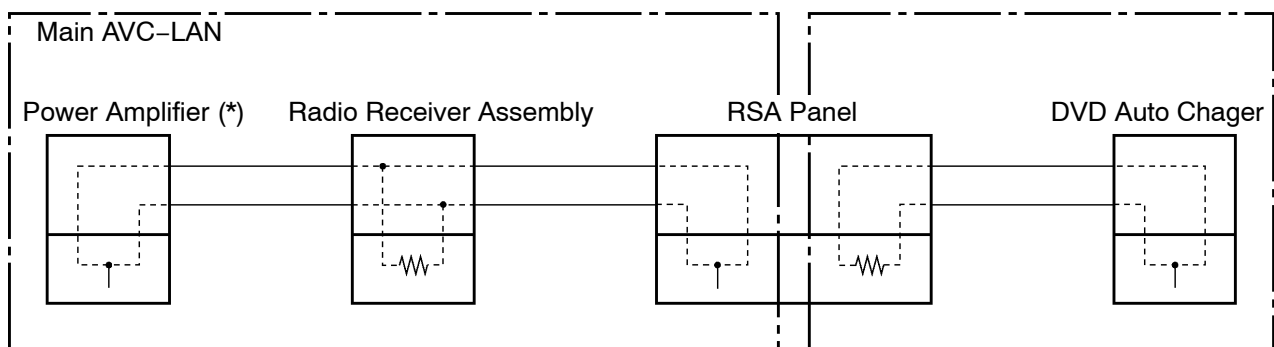
The concrete objectives are explained below.

- (1) When products by different manufactures were combined together, there used to be a case that malfunction occurred such as sound did not come out. This problem has been resolved by standardization of signals.
 - (2) Various types of after market products have been able to add or replace freely.
 - (3) Because of the above (2), each manufacture has become able to concentrate on developing products in their strongest field. This has enabled many types of products provided inexpensively.
 - (4) In general, a new product developed by one particular manufacture could not be used due to a lack of compatibility with other manufactures products. Because of this new standard, users can enjoy many compatible products from different manufacture anytime they went.
- (c) The above descriptions are the objectives to introduce AVC-LAN. By this standardization, development of new products will no longer cause systematic errors.

HINT:

- When +B short or GND short is detected in AVC-LAN circuit, communication stops. And audio system does not function normally.
- When audio system is not equipped with a navigation system, audio head unit is the master unit. When audio system is equipped with a navigation system, multi-display is the master unit.
- This system has 2 kinds of AVC-LAN, Main AVC-LAN and Sub AVC-LAN.
- RSA panel works as a master unit in the Sub AVC-LAN, but not in the Main AVC-LAN.
- The car audio system using AVC-LAN circuit has a diagnosis function.
(w/ Navigation system (see page [DI-1064](#)))
- Each product has its own specified numbers called physical address. Numbers are also allotted to each function in one product, which are called logical address.

AVC-LAN:



*: Except JBL System

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