

# AUDIO SYSTEM

## DESCRIPTION

05IRH-01

### 1. RADIO WAVE BAND

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

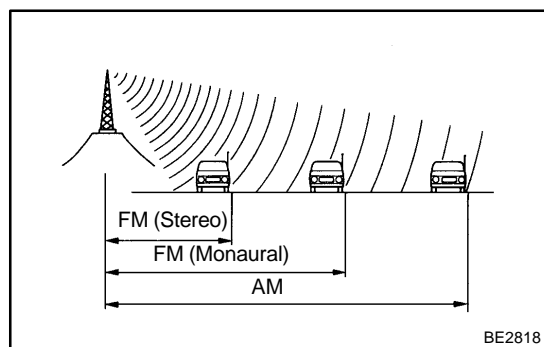
Frequency	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio wave		AM		FM	
Modulation	Amplitude modulation			Frequency modulation	

LF: Low Frequency

MF: Medium Frequency

HF: High Frequency

VHF: Very High Frequency



### 2. SERVICE AREA

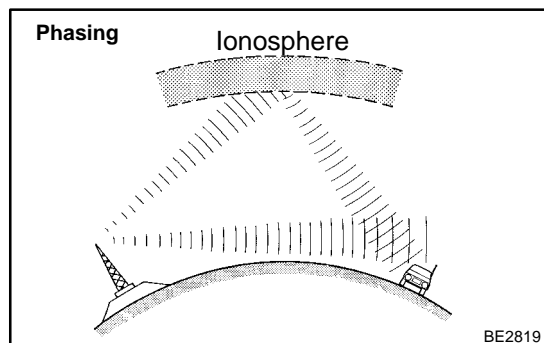
- (a) There is a great difference in the size of the service areas for AM and FM broadcasting. Sometimes an FM stereo broadcast cannot be received even though AM can be received very clearly.

FM stereo has the smaller service area, it also picks up static and other types of interference ("noise") easily.

### 3. RECEPTION PROBLEMS

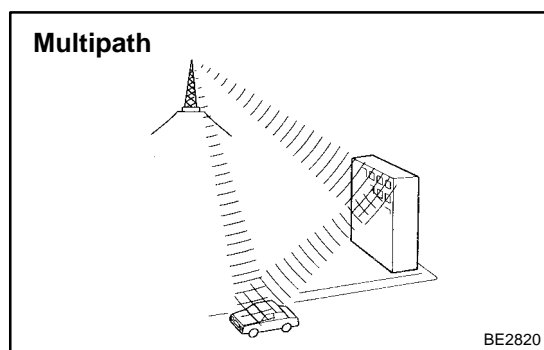
HINT:

Besides the problem of static, there are other problems, such as "phasing", "multipath" and "fade out". These problems are caused not by electrical noise but by the nature of the radio waves themselves.

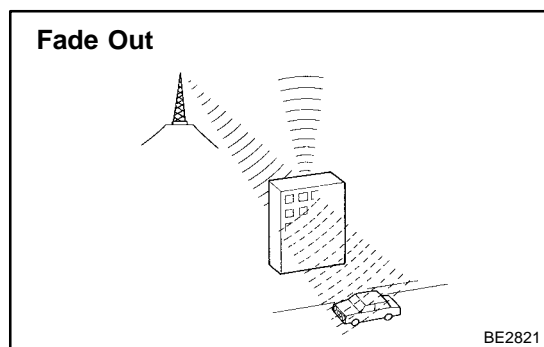


- (a) Phasing

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 that reach the vehicle's antenna directly from the same transmitter. This type of interference is called "phasing".



- (b) **Multipath**  
Interference caused by reflection of radio waves against obstructions is called "Multipath". Multipath occurs when radio signals emitted from the broadcast transmitter antenna are reflected against tall buildings or mountains and interferes with other signals which are to be received directly.



- (c) **Fade Out**  
FM radio wave tends to be reflected against obstructions such as tall buildings or mountains because FM frequency is higher than that of AM. For this reason, FM signals often seem to gradually disappear or fade away as the vehicle goes behind those obstructions. This phenomenon is called "fade out".

#### 4. NOISE PROBLEMS

- (a) It is very important for technicians to understand a customer's claim about noise clearly. Use the following table to diagnose the phenomena.

Radio wave	Condition in which noise occurs	Probable cause
AM	Noise occurs at a specific place.	Strong possibility of foreign noise.
	Noise occurs when listening to faint broadcasting.	The same program may be broadcasted from some local stations. If the program is the same, one of those may be tuned in.
FM	Noise occurs only at night.	Strong possibility of beat from a distant broadcasting.
	Noise occurs at a specific place during driving.	Strong possibility of multipath noise and phasing noise caused by changes of FM frequency.

#### HINT:

If the condition when the noise occurs does not meet any of the above, find out the cause based on "Reception Problems". Refer to the description about Multipath and Phasing mentioned previously.

#### 5. COMPACT DISC PLAYER

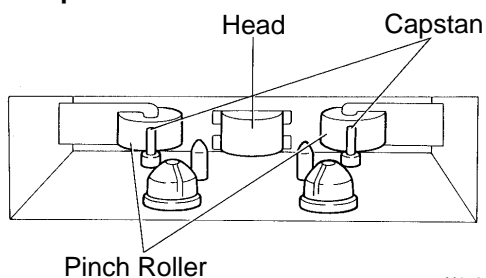
- (a) Compact Disc (hereafter called "CD") Players use a laser beam pick-up to read the digital signals recorded on the CD and reproduce analog signals of the music, etc. 4.7 in. (12 cm) and 3.2 in. (8 cm) discs are available for the CD player.

#### HINT:

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

#### NOTICE:

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

**Example:**

N17398

**6. MAINTENANCE****Tape Player/Head Cleaning:**

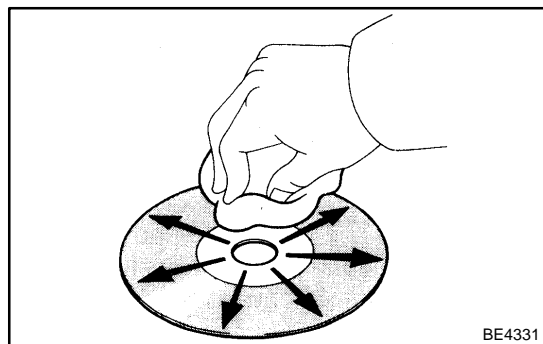
- (a) Raise the cassette door with your finger. Using a pencil or similar object, push in the guide.
- (b) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.

**7. MAINTENANCE****CD Player/Disc Cleaning:**

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.**



BE4331

**8. AVC-LAN Description**

- (a) What is AVC-LAN?

AVC-LAN, an abbreviation for "Audio Visual Communication Local Area Network", is a united standard developed by the manufacturers in affiliation with Toyota Motor Corporation. This standard pertains to audio and visual signals as well as switch and communication signals.

**Example:**

P

I39082

- (b) Purpose:

Recently, car audio systems have rapidly developed and the functions vastly changed. The conventional car audio system is being integrated with multi-media interfaces similar to those in navigation systems. At the same time, customers are demanding higher quality from their audio systems. This is merely an overview of the standardization background. The specific purposes are as follows.

- (1) To solve sound problems, etc. caused by using components of different manufacturers through signal standardization.
- (2) To allow each manufacturer to concentrate on developing products they do best. From this, reasonably priced products can be produced.

**HINT:**

- If a +B or GND short is detected in the AVC-LAN circuit, communication is interrupted and the audio system will stop functioning.

- If an audio system is equipped with a navigation system, the multi-display unit acts as the master unit. If the navigation system is not equipped, the audio head unit acts as the master unit instead. If the radio and navigation assy is equipped, it is the master unit.
- The radio receiver assy provides resistance to make communication possible.
- The car audio system with an AVC-LAN circuit has a diagnostic function.
- Each component has a specified number (3-digit) called a physical address. Each function has a number (2-digit) called a logical address.

#### **9. Communication system outline**

- (a) Components of the audio system communicate with each other via the AVC-LAN.
- (b) Radio receiver assy has enough resistance (60 to 80  $\Omega$ ) necessary for transmitting the communication. This is essential for communication.
- (c) If a short circuit or open circuit occurs in the AVC-LAN circuit, communication is interrupted and the audio system will stop functioning.

#### **10. Diagnostic function outline**

- (a) The audio system has a diagnostic function (the result is indicated on the master unit).
- (b) A 3-digit hexadecimal component code (physical address) is allocated to each component on the AVC-LAN. Using this code, the component in the diagnostic function can be displayed.