

2002 ACCESSORIES & EQUIPMENT

Audio System - RAV4

BODY ELECTRICAL SYSTEM

PRECAUTION

NOTE: Take care to observe the following precautions when performing inspections or removal and replacement of body electrical related parts.

1. Headlight System

Halogen bulbs have pressurized gas inside and require special handling. They can burst if scratched or dropped. Hold a bulb only by its plastic or metal case.

Don't touch the glass part of a bulb with bare hands.

2. SRS (Supplemental Restraint System)

The RAV4 is equipped with an SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag, failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in **AIR BAG SAFETY PRECAUTIONS** .

3. Audio System

If the negative (-) terminal cable is disconnected from the battery, the preset AM, FM1 and FM2 stations stored in memory are erased, so be sure to note the stations and reset them after the battery terminal is reconnected.

4. Mobile Communication System

If the vehicle is equipped with a mobile communication system, refer to precautions in **IF VEHICLE IS EQUIPPED WITH MOBILE COMMUNICATION SYSTEM** .

AUDIO SYSTEM

DESCRIPTION

1. Radio Wave Band

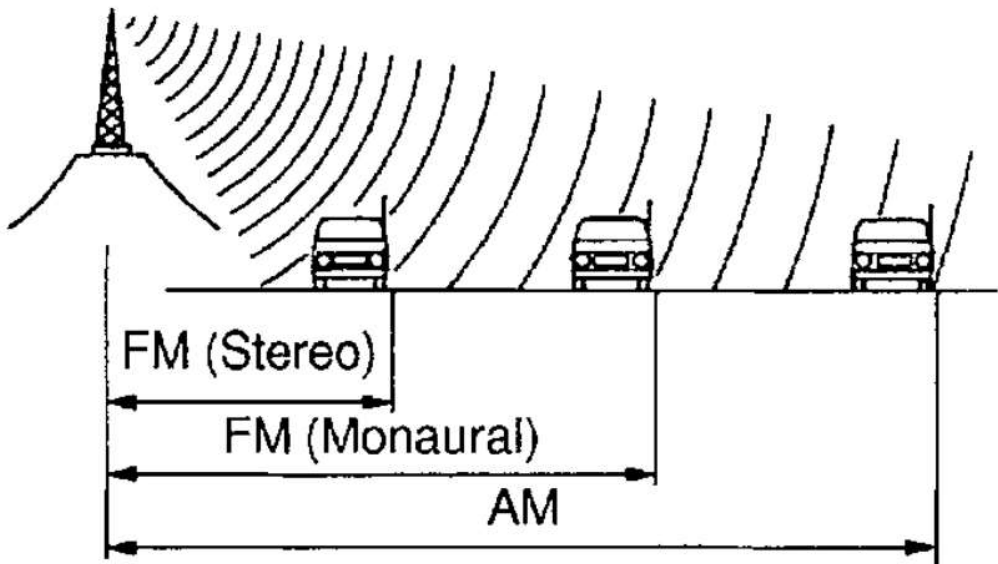
The radio wave bands used in radio broadcasting are as follows:

Frequency	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio wave	LW	AM (MW)	SW	FM (UKW)	
Modulation	Amplitude modulation			Frequency modulation	

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Fig. 1: Displaying Radio Wave Band Specifications
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Service Area



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Fig. 2: Displaying FM & AM Service Area
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

There are great differences in the size of the service area for AM and FM monaural. Sometimes FM stereo broadcasts cannot be received even through AM comes 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 static problem, 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.

- Fading

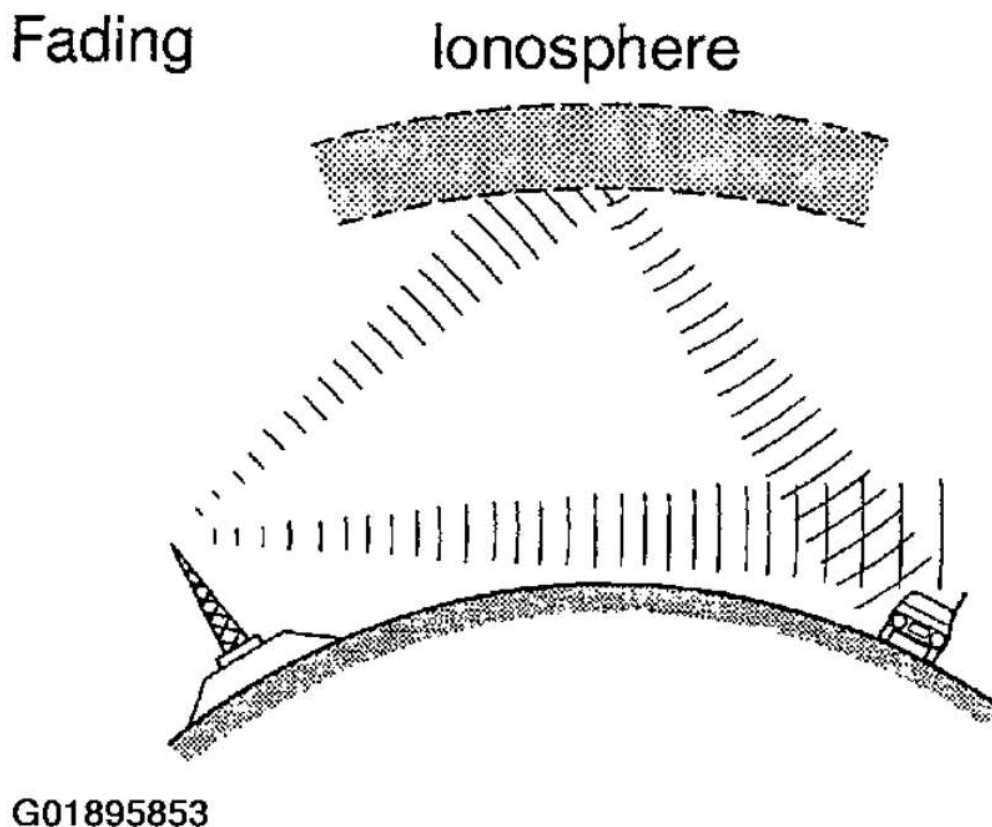
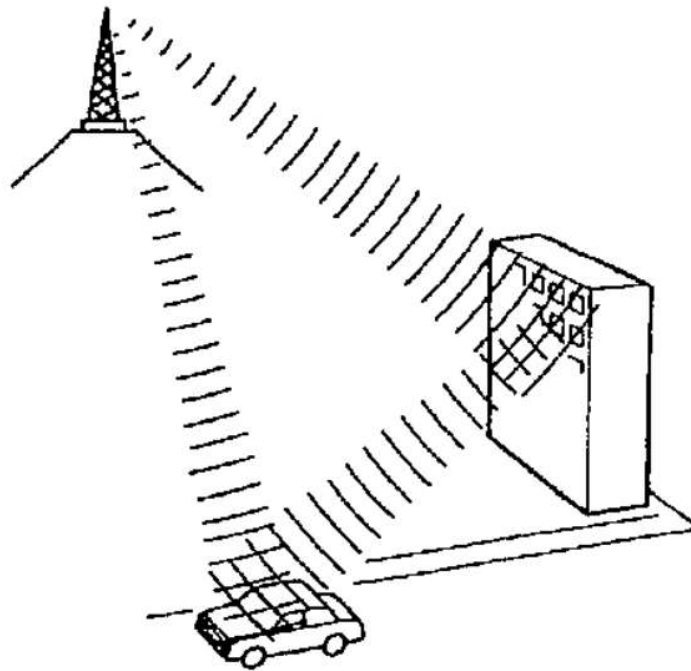


Fig. 3: Displaying Fading Interference
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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".

- Multipath

Multipath



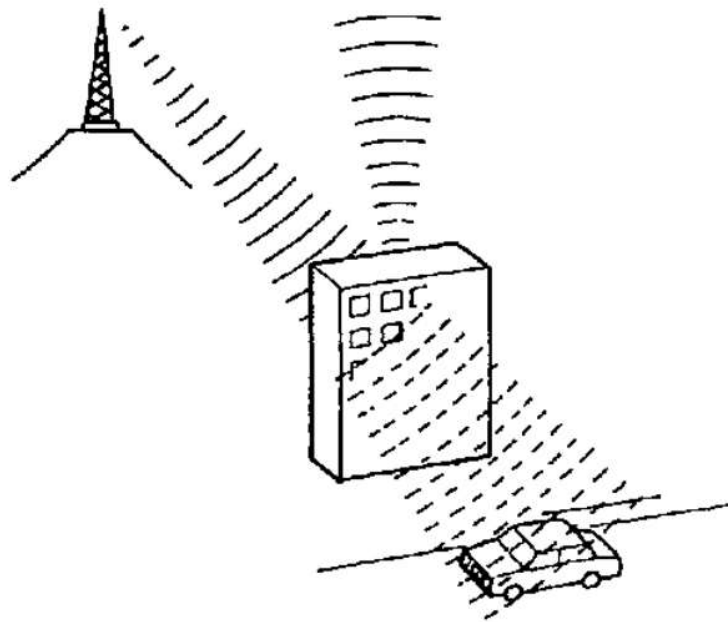
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Fig. 4: Displaying Multipath Reception Problems
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Interference caused by bouncing of radio waves off 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.

- Fade out

Fade Out



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Fig. 5: Displaying Fade Out Reception Problems
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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 obstructions. This is called "fade out".

4. Noise Problems

- a. Questionnaire for noise:

For noise troubleshooting it is very important to understand the claims from the customers well, so make the best use of the following questionnaire and 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 case that the same program is broadcasted from each local station and that may be the case you are listening to different station if the program is the same.
	Noise occurs only at night.	Strong possibility of the beat from a distant broadcasting.
FM	Noise occurs while driving and at a specific place.	Strong possibility of multipath noise and fading noise caused by the changes of FM waves.

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Fig. 6: Displaying Noise Problems

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: In the case that the noise occurrence condition does not meet any of the above, check based on the "Trouble Phenomenon". Refer to previous page for multipath and fading.

b. Matters that require attention when checking:

- Noise coming into the radio usually has no harm for practical use as the noise protection is taken and it is hardly thinkable 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 tuning), it is easy to diagnose the phenomenon as noise occurs frequently.

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.

NOTE: Never attempt to disassemble or oil any part of the player unit.

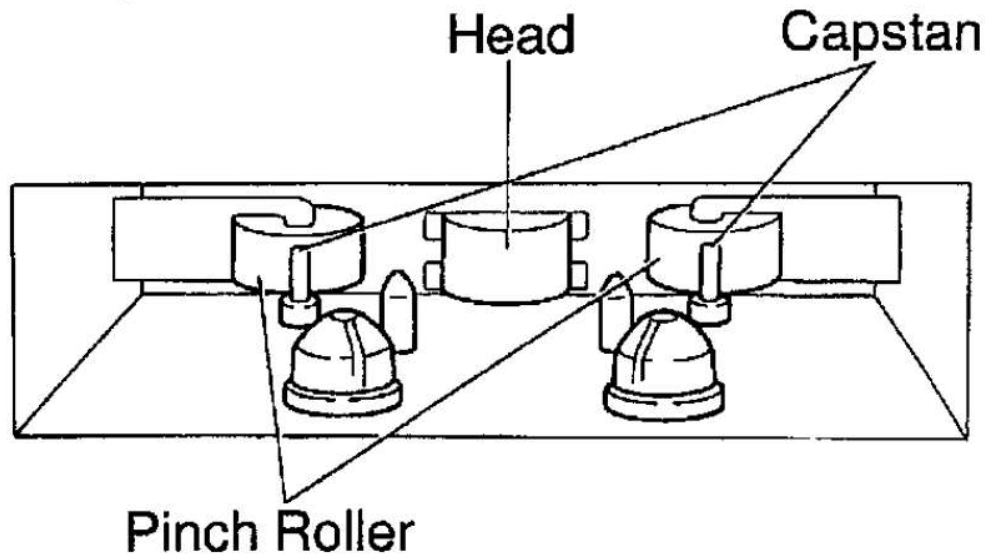
Do not insert any object other than a disc into the magazine.

NOTE: 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

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

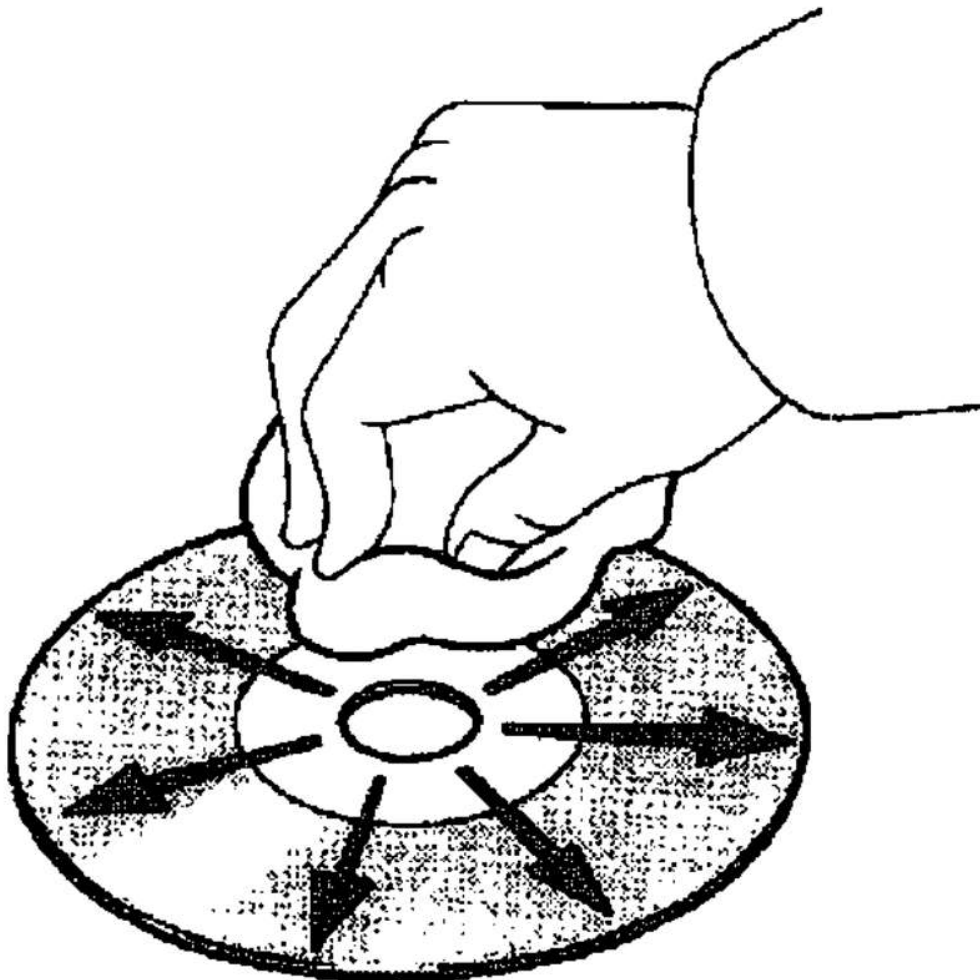
Example



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Fig. 7: Displaying Head Surface, Pinch Rollers & Capstans
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. CD player/disc cleaning: MAINTENANCE



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Fig. 8: Wiping CD With Soft Cloth

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

NOTE: 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 manufacturers associated with Toyota Motor Corporation.

The Unified standard covers signals, such as audio signal, visual signal, signal for switch indication and communication signal.

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 manufacturers 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 manufacturer has become able to concentrate on developing products in their strongest field. This has enabled many types of products provided inexpensively.
 4. Conventionally, a new product developed by a manufacturer could not be used due to a lack of compatibility with other manufacturer's products. Because of this new standard, users can enjoy compatible products provided for them timely.
- c. The above descriptions are the objectives to introduce AVC-LAN. By this standardization, development of new products will no longer cause systematic errors. Thus, this is very effective standard for a product in the future.

NOTE:

- **When +B short or GND short is detected in AVC-LAN circuit, communication stops. Accordingly the 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, navigation ECU is the master unit.)**
- **The car audio system using AVC-LAN circuit has a diagnosis function.**
- **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.**

9. **Diagnosis Function**

Error codes over tuner and connected equipment are displayed on the screen of tuner.

a. **Diagnosis start-up.**

For shifting to diagnosis mode, push "CD" switch 3 times with pressing "1" and "6" of PRESET switch at the same time while the audio power is OFF and ACC is ON.

To exit from diagnosis mode, press "CD" switch for 2 seconds or turn the ignition key OFF. (When "1-190" is displayed, the mode is transferred to LAN check mode.)

b. **LAN check**

When starting up the diagnosis mode, the mode turns to LAN check mode, the screen displays the code numbers (physical address) of tuner and connected equipment. Smaller codes are displayed in order, displayed code numbers are switched by operating TUNE "UP" or "DOWN" switch. In LAN check mode, by pressing "5" of PRESET switch for more than 2 secs., diagnosis memory of each equipment can be deleted, when deletion is completed, the mode returns to LAN check mode.

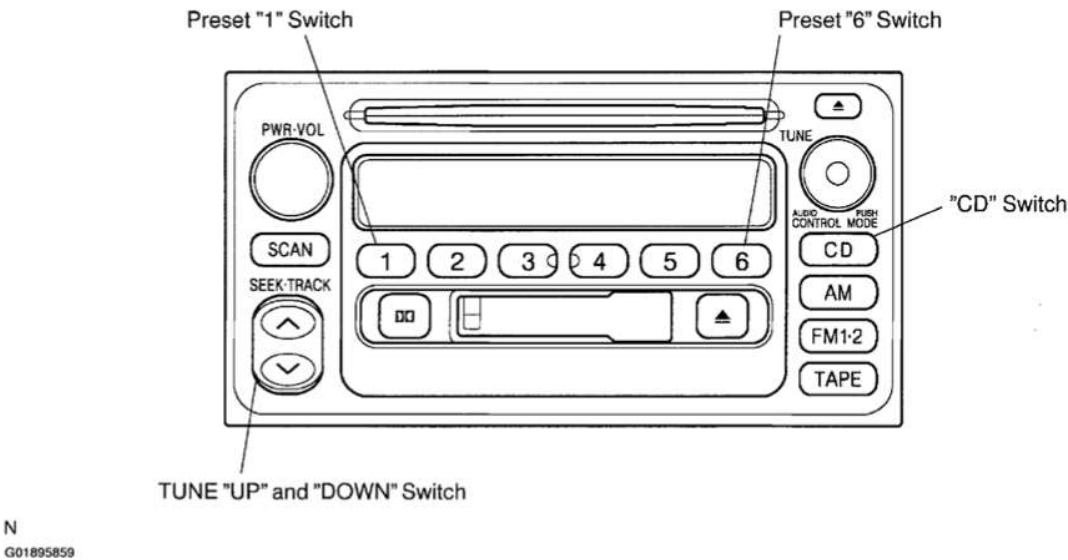


Fig. 9: Locating Radio Switches
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Code No. (physical address) List

Code No. (physical address)	Equipment name
190	Radio receiver assembly (Audio head unit)

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Fig. 10: Displaying Code No. (Physical Address) List
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

c. System check.

- When pressing "1" of PRESET switch in LAN check mode, the mode turns to the system check mode, the system performs self diagnosis of connected equipment and displays the results. ("SYS" (showing the system is under detection) is displayed.)
- Perform the operation shown in the following illustration, then read the result of the inspection.

NOTE:

- It sometimes takes approx. 40 secs. till the system inspection is completed.
- The chart below is an example of when diagnosis code "21" appears on the physical address (190) equipment. (ROM error occurs on the radio receiver.)

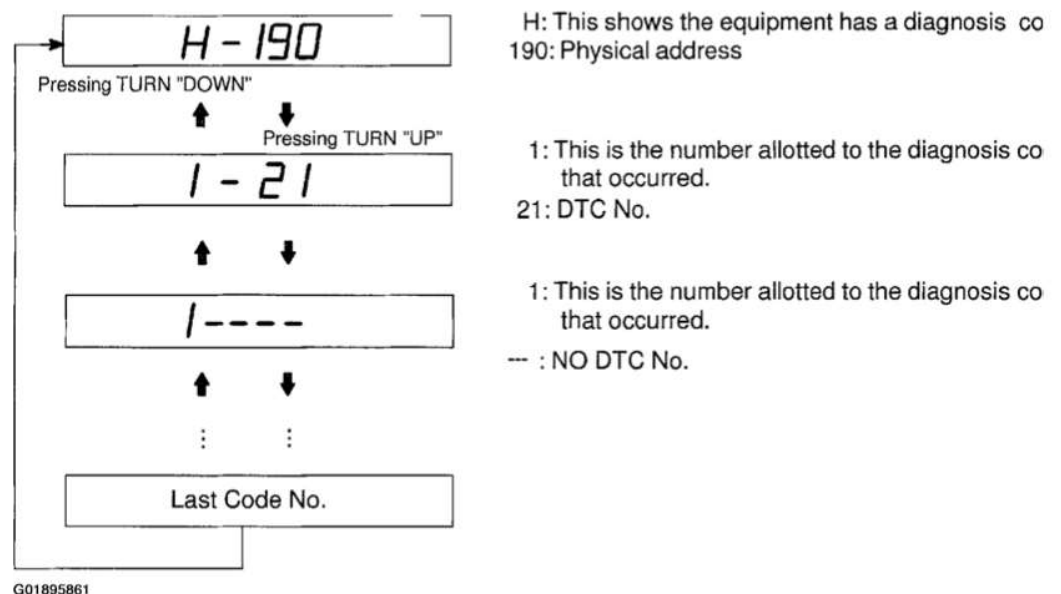


Fig. 11: Displaying Code21 Physical Address Example
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- The smaller code numbers (physical address) are displayed in order (code No., diagnosis code, support code of diagnosis code (object equipment)).
- When no error is detected in the system, "00" is displayed.
- When an error code is detected, up to 6 codes per one system are displayed. Pressing TUNE "UP" or "DOWN" switches the display.

- In the system check mode, when pressing "6" of PRESET switch the mode returns to LAN check mode.

d. Diagnosis memory.

1. In LAN check mode, when pressing "2" of PRESET switch the mode turns to the diagnosis memory mode. ("CODE" is displayed.)

The results of self diagnosis performed over tuner and connected equipment are memorized and displayed.

2. Perform the operation shown in the following illustration, then read the result of the inspection.

NOTE:

- The smaller code numbers (physical address) are displayed in order (code No., periodic communication number when error occurs, diagnosis code, and support code of diagnosis code (object equipment)).
- When no error is detected in the system, "00" is displayed. When an error code is detected, up to 6 codes per one system are displayed. Pressing TUNE "UP" or "DOWN" switches the display. Each diagnosis code is same as code in the system check mode.
- When pressing "6" of PRESET switch, the mode returns to LAN check mode.
- The following illustration below is an example of when diagnosis code "D1" appears on the code (190) and (240 or 360) equipment. (Communication error occurs between the radio receiver and CD changer.)

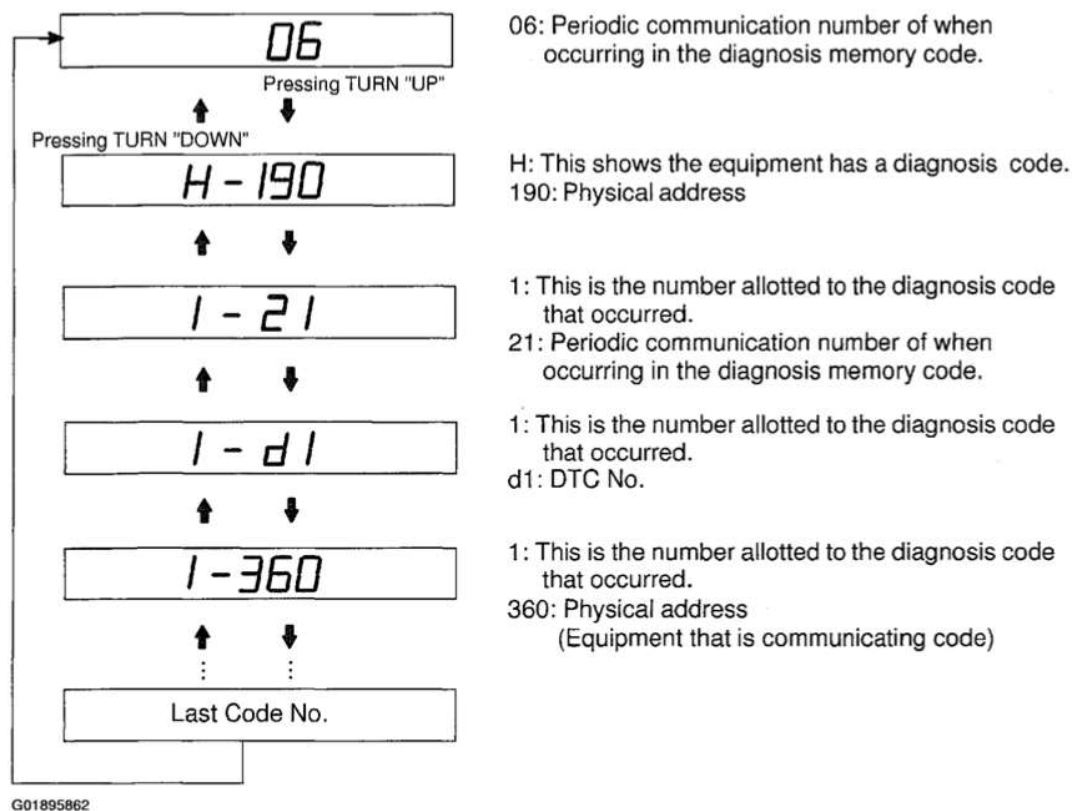


Fig. 12: Displaying Diagnostics Code D1 Example
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

e. Diagnosis memory clear.

1. After error is fixed, start up the diagnosis mode.
2. Continue pressing preset switch "5" for 2 secs. (CLr is displayed.)
3. Press the preset switch "2" and transfer to the diagnosis memory mode, and check that the normal code (00) is output.

f. **Diagnosis Code List**

- If there is "O" in the column of system check, an error can be detected when the mode is switched to the system check mode.
- If there is "O" in the column of diagnosis mode, each unit is monitoring whether or not it has failure. In case of detecting failure, it memorizes DTC.

Parts Name	DTC	Diagnosis item	Diagnosis content	Countermeasure and inspected parts	System Check	Diagnosis memory
Head Unit (190)	42	FM tuner error	There is an error in FM tuner.	Radio receiver check.	X	○
	50	Cassette error	There is an error in cassette deck.		X	○
	51	Cassette eject error	Cassette can not be ejected from Head Unit.		X	○
	D1	Transmitter error	Communication with the equipment that is communicating has failed successively.	Radio receiver check. Wire harness and connector check.	○	○
	D2	Periodic communication no response	Error in periodic communication.	• Wire harness and connector	X	○
	FF	Diagnosis no response	Result of diagnosis is not issued from start to finish.	Radio receiver check.	○	X
AMP (440)	D1	Transmitter error	Communication with the equipment that is communicating has failed successively.	Stereo component amplifier check.	○	○
	D4	Periodic communication error	Connection confirmation has not come from the equipment that is communicating	• Radio receiver check. • Wire harness check.	X	○

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Fig. 13: Displaying Diagnostics Code List
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TROUBLESHOOTING

CAUTION: When replacing the internal mechanism (computer part) of the audio system, be careful that no part of your body or clothing comes in contact with the terminals of the leads from the IC, etc. of the replacement part (spare part).

NOTE: This inspection procedure is a simple troubleshooting process which should be carried out on the vehicle during system operation and was prepared on the assumption of system component troubles (except for the wires and connectors, etc.).

Always inspect the part with trouble taking the following items into consideration.

- Open or short circuit of the wire harness

- Connector or terminal connection fault

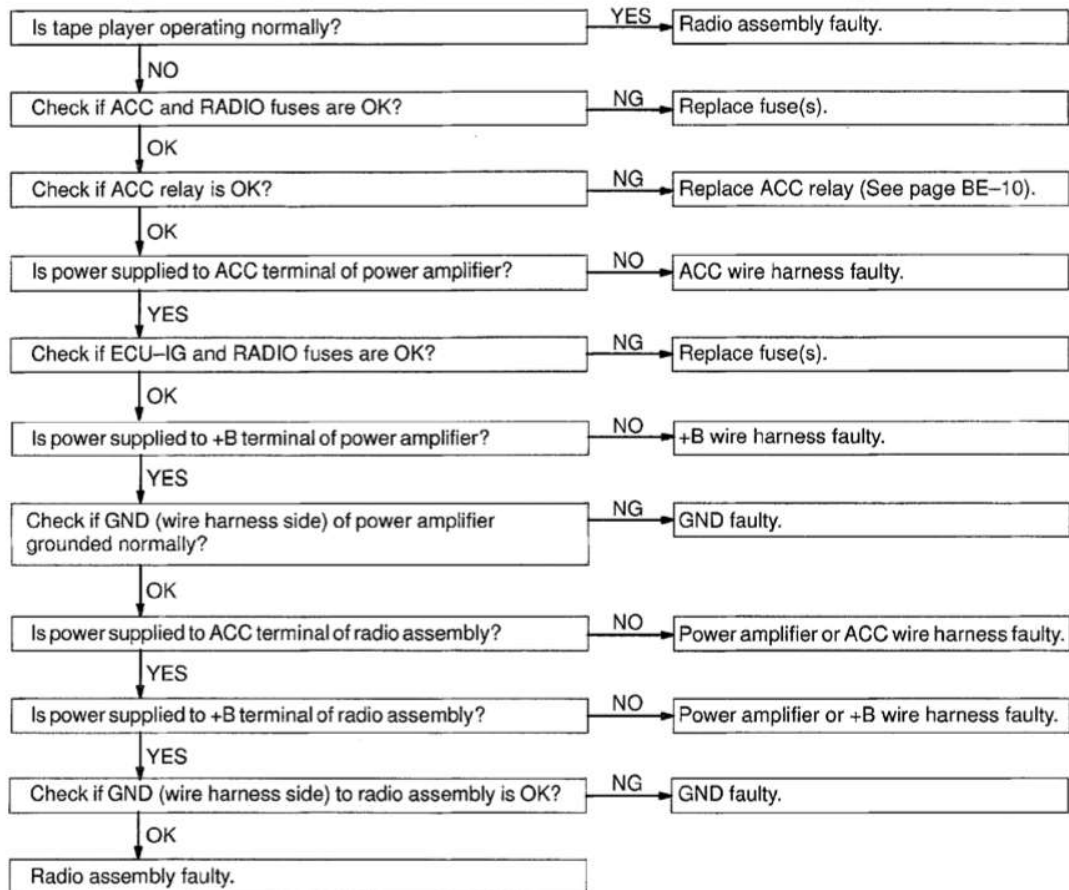
PROBLEM SYMPTOM

Component/Problem	See
Radio	
Radio Not Operating When Power Switch Turned ON	1
Display Indicated When Power Switch Turned To ON, But No Sound (Including Noise) Is Produced	2
Noise Present, But AM-FM Not Operating	3
Any Speaker Does Not Work	4
Any AM-FM Does Not Work	5
Few Preset Tuning Bands	5
Reception Poor	6
Sound Quality Poor	7
Preset Memory Erased	8
Tape Player	
Cassette Tape Cannot Be Inserted	1
Cassette Tape Inserted, But No Power	2
Power Coming In, But Tape Player Not Operating	3
Any Speaker Does Not Work	4
Sound Quality Poor	5
Tape Jammed, Malfunction With tape Speed Or Auto-Reverse	6
Cassette Will Not Eject	7
CD Player	
CD Cannot Be Inserted	1
CD Inserted, But No Power	2
Power Coming In, But CD Player Not Operating	3
Sound Jumps	4
Sound Quality Poor (Volume Faint)	5
Any Speaker Does Not Work	6
Speaker Will Not Be Ejected	7
Power Amplifier	
No Power Coming In	1
Power Coming In, But Power Amplifier Not Operating	2
Any Speaker Does Not Work	3
Noise	
Noise Occurs	1
Noise Produced By Vibration Or Shock While Driving	2
Noise Produced When Engine Starts	3

The term "AM" includes LW, MW and SW, and the term "FM" includes UKW.

Radio

1. Radio Not Operating When Power Switch Turned To "ON"

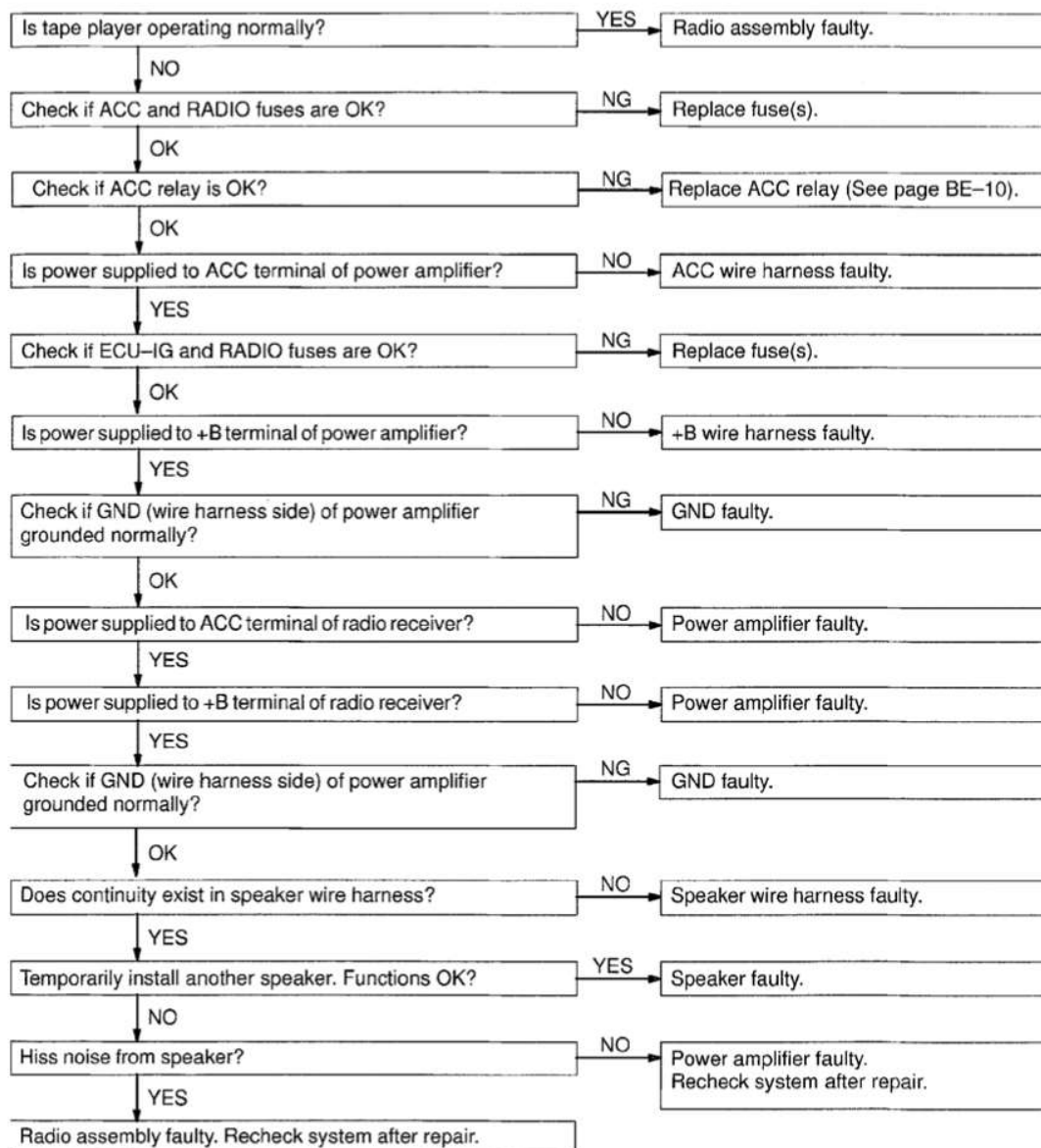


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Fig. 14: Troubleshooting No Power Coming In (Radio)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Display Indicates When Power Switch Turned To "ON", But No Sound (Including "Noise") Is Produced



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Fig. 15: Troubleshooting Power Coming On But Radio Not Operating (Radio)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Noise Present, But AM-FM Not Operating



Fig. 16: Troubleshooting Noise Present, AM-FM Not Operating (Radio)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. Any Speaker Does Not Work

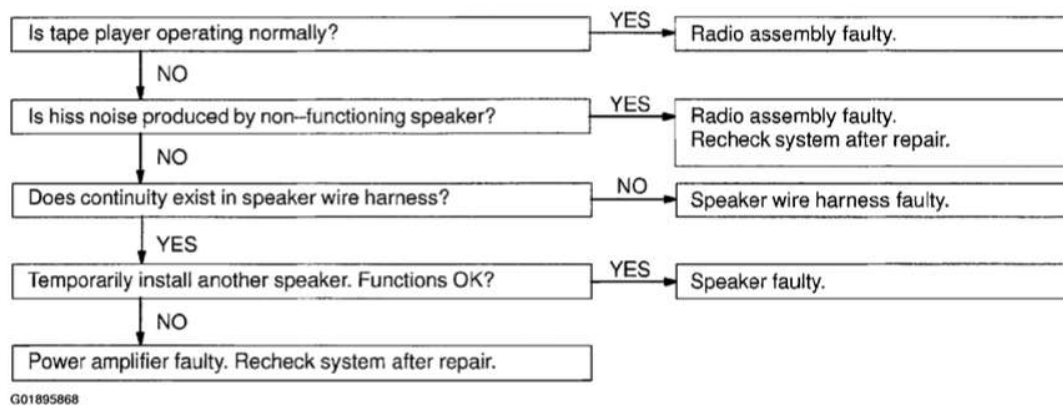


Fig. 17: Troubleshooting Any Speaker Does Not Work (Radio)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. Any AM Or FM Does Not Work & Few Preset Tuning Bands

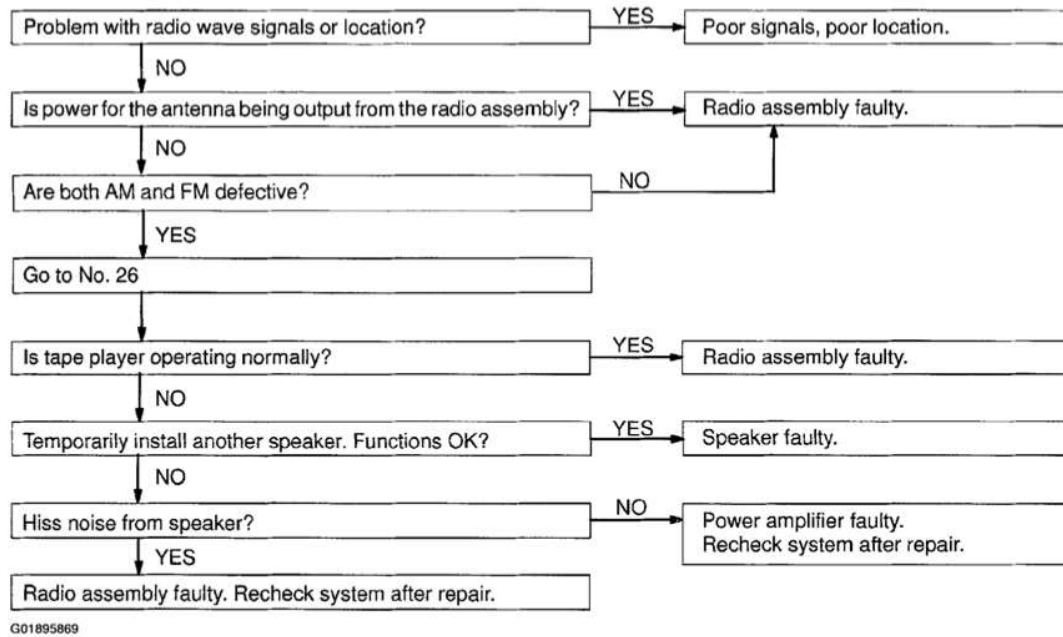


Fig. 18: Troubleshooting AM Or FM Does Not Work & Few Preset Tuning Bands (Radio)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. Poor Reception

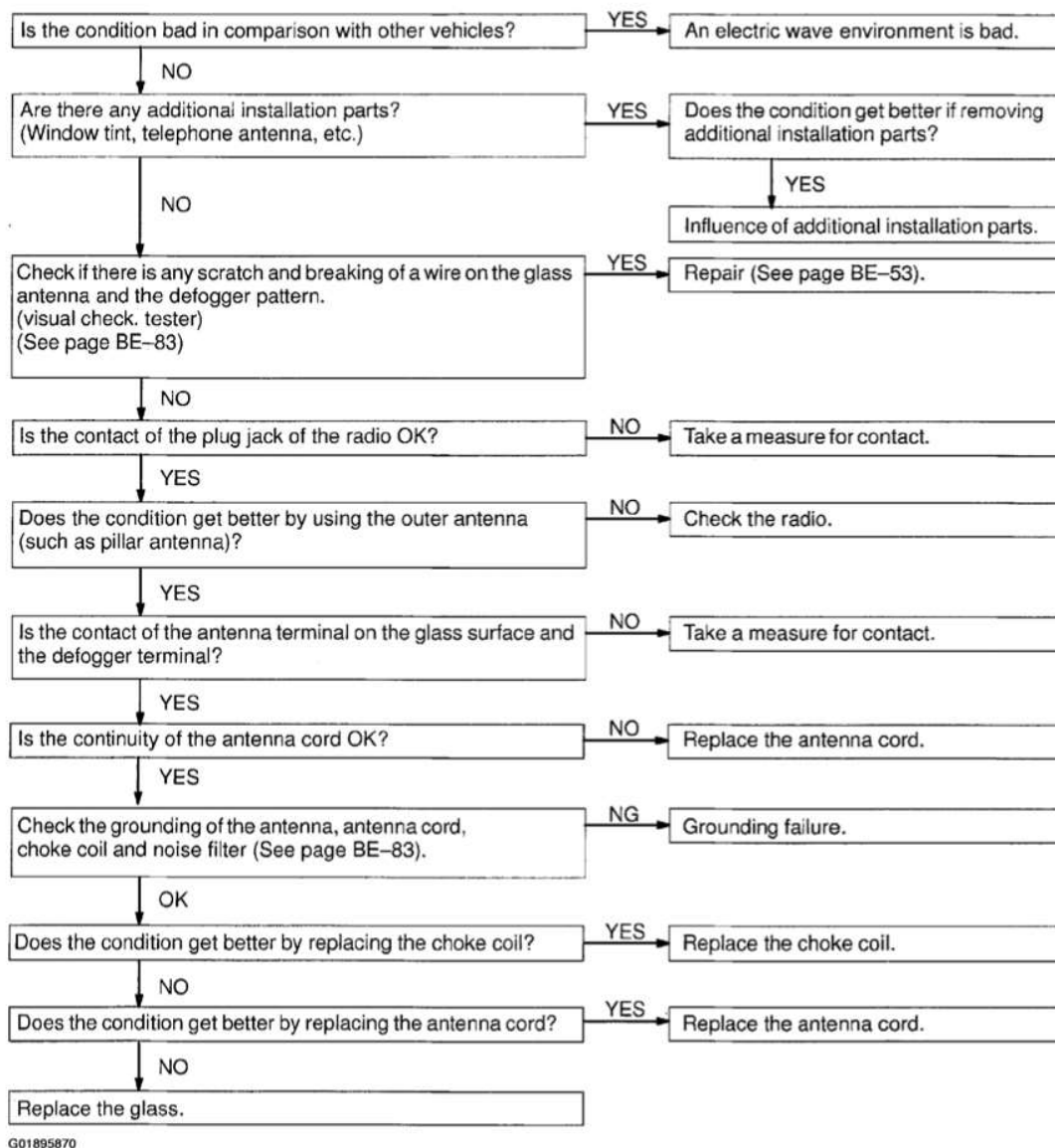


Fig. 19: Troubleshooting AM Or FM Poor Reception (Radio)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. Sound Quality Poor

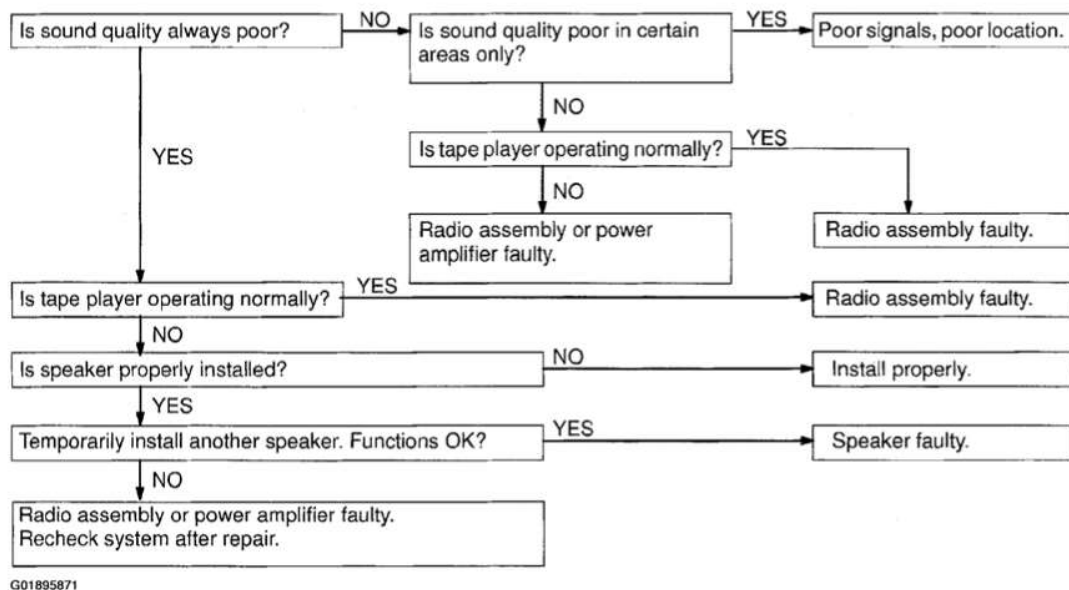


Fig. 20: Troubleshooting Poor Sound Quality (Radio)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. Preset Memory Disappears

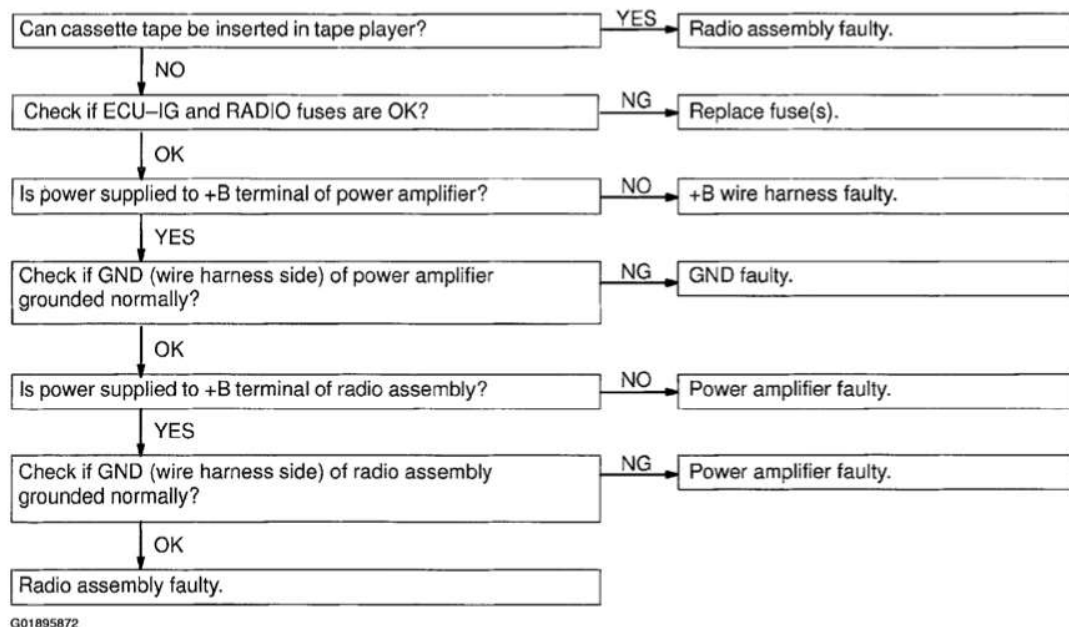
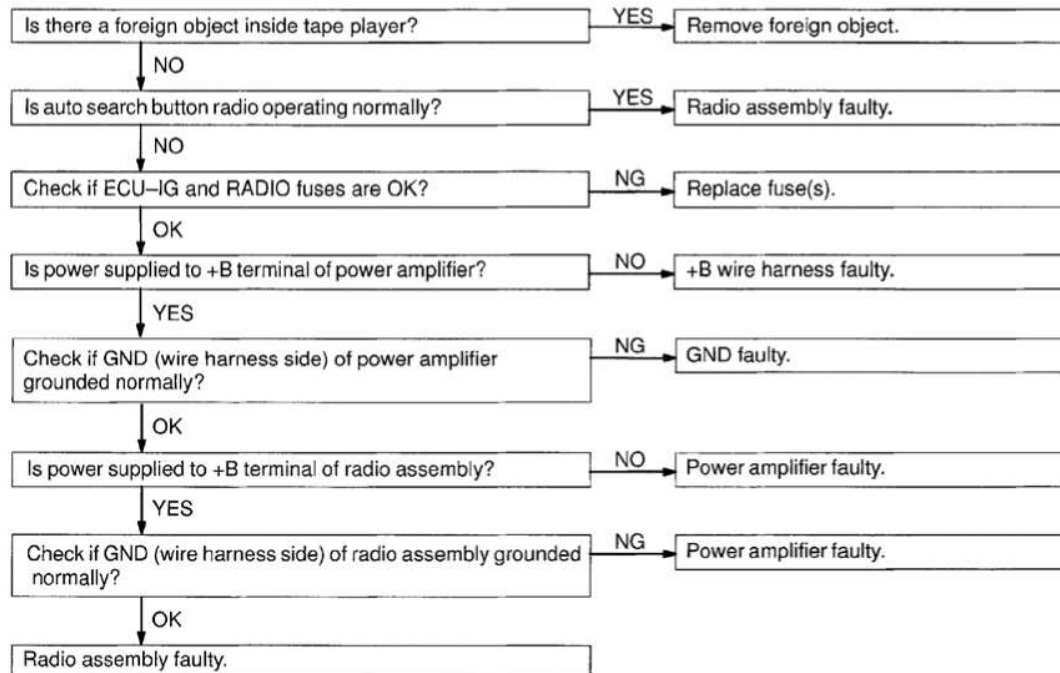


Fig. 21: Troubleshooting Preset Memory Disappears (Radio)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Tape Player

1. Cannot Be Inserted



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Fig. 22: Troubleshooting Cassette Tape Cannot Be Inserted (Tape Player)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Cassette Tape Inserted, But No Power

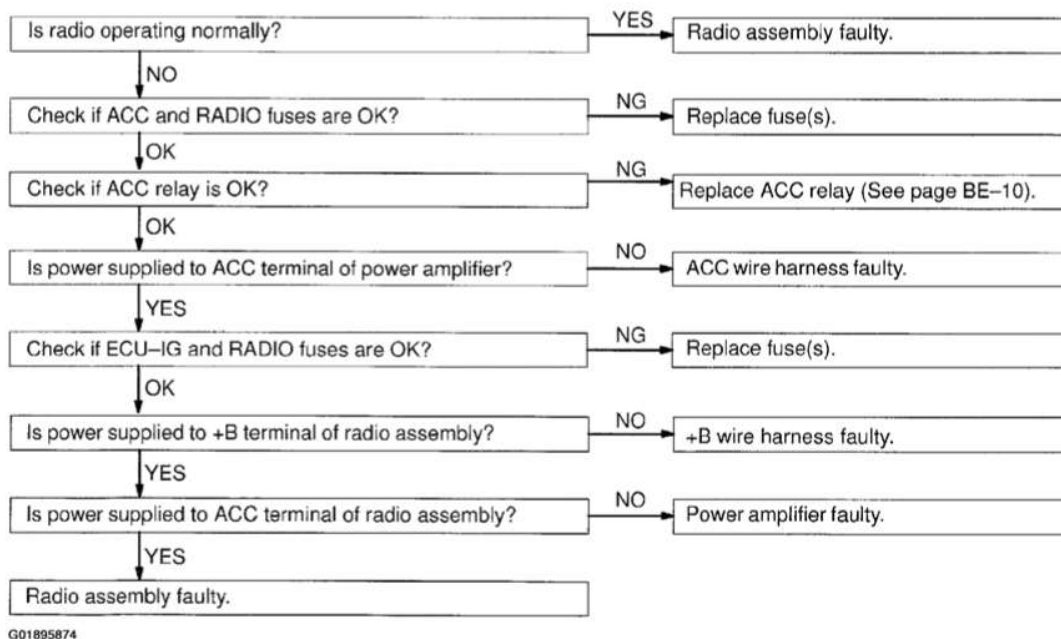


Fig. 23: Troubleshooting No Power W/Cassette Inserted (Tape Player)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Power Coming In, But Tape Player Not Operating

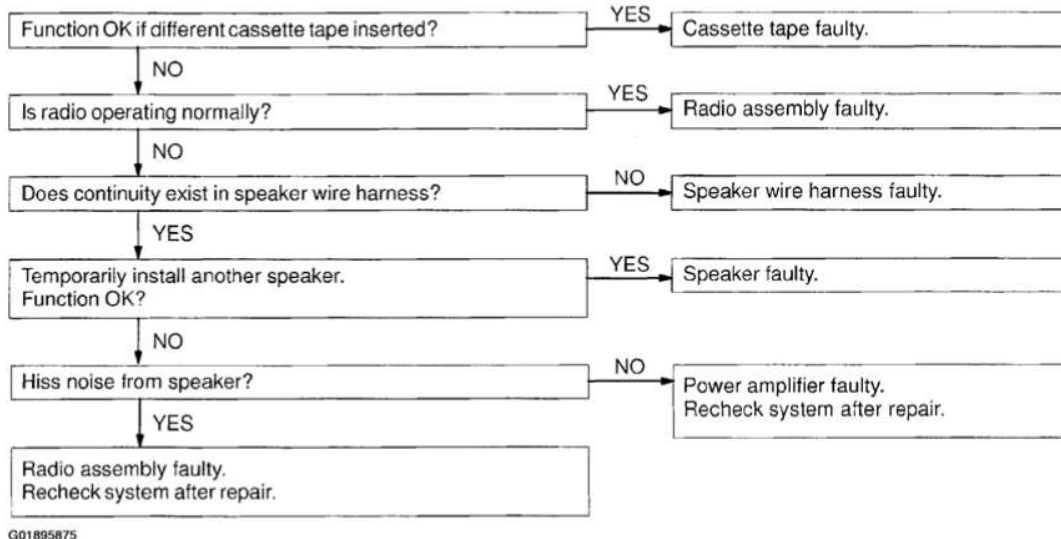


Fig. 24: Troubleshooting Tape Player Not Operating W/Power In (Tape player)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. Any Speaker Does Not Work

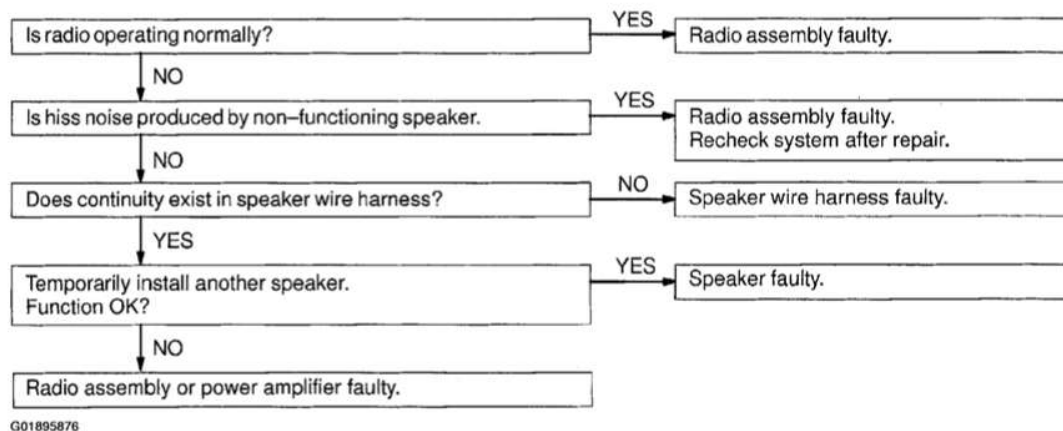


Fig. 25: Troubleshooting Any Speaker Does Not Work (Tape Player)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. Sound Quality Poor (Volume Faint)

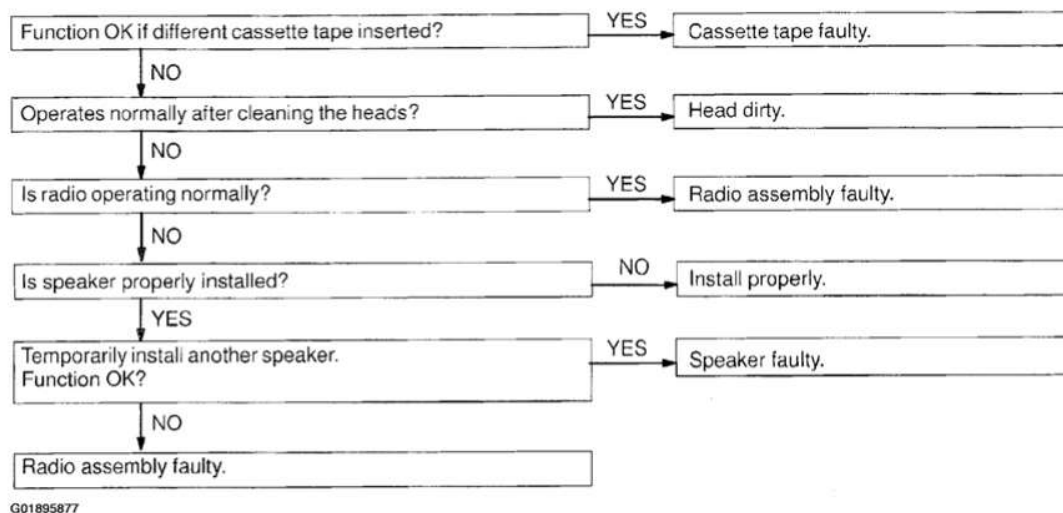


Fig. 26: Troubleshooting Poor Sound Quality (Tape Player)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. Tape Jammed, Malfunction With Tape Speed Or Auto-Reverse

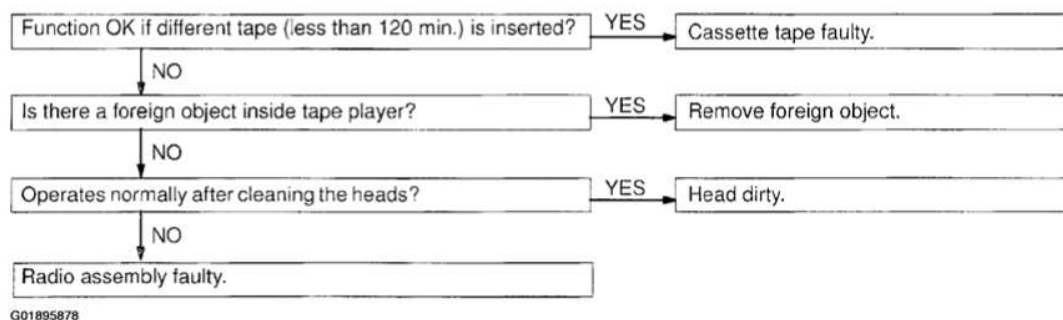


Fig. 27: Troubleshooting Tape Malfunction (Tape Player)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. Cassette Tape Will Not Be Ejected

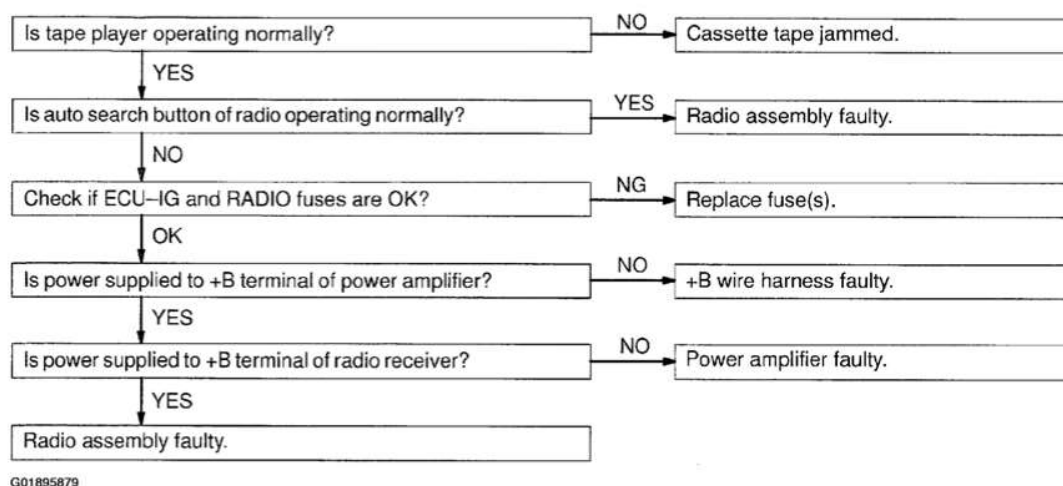


Fig. 28: Troubleshooting Cassette Tape Won't Eject (Tape Player)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

CD Player

1. CD Cannot Be Inserted

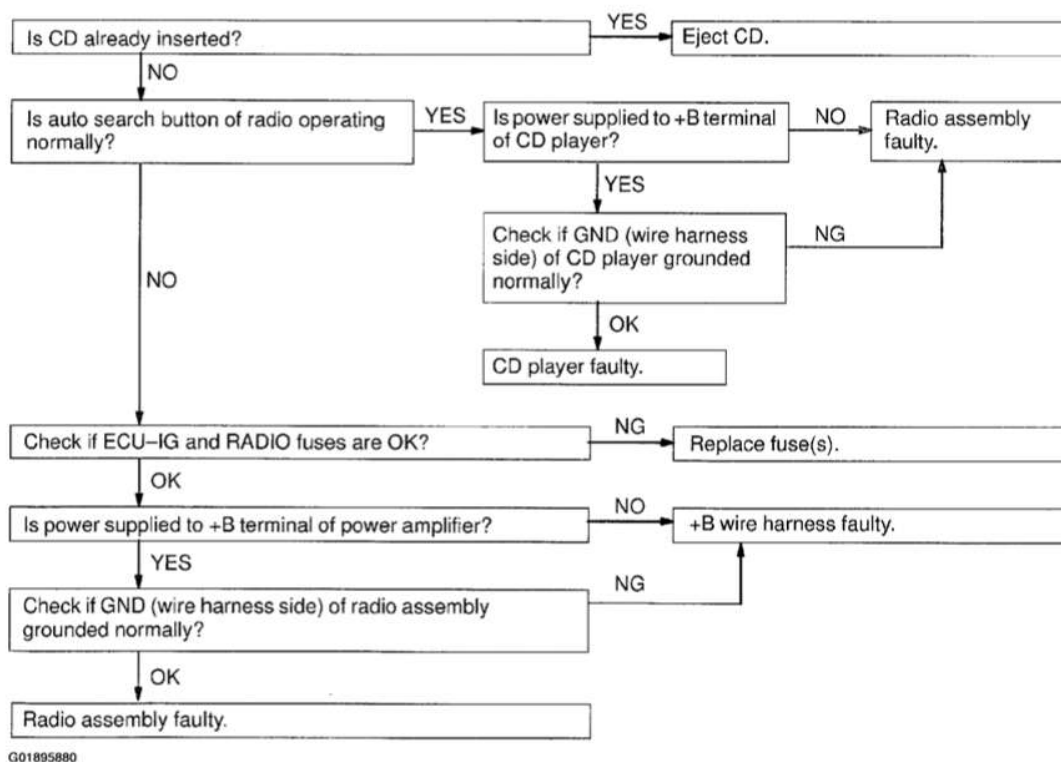


Fig. 29: Troubleshooting Cannot Insert CD (CD Player)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. CD Inserted, But No Power

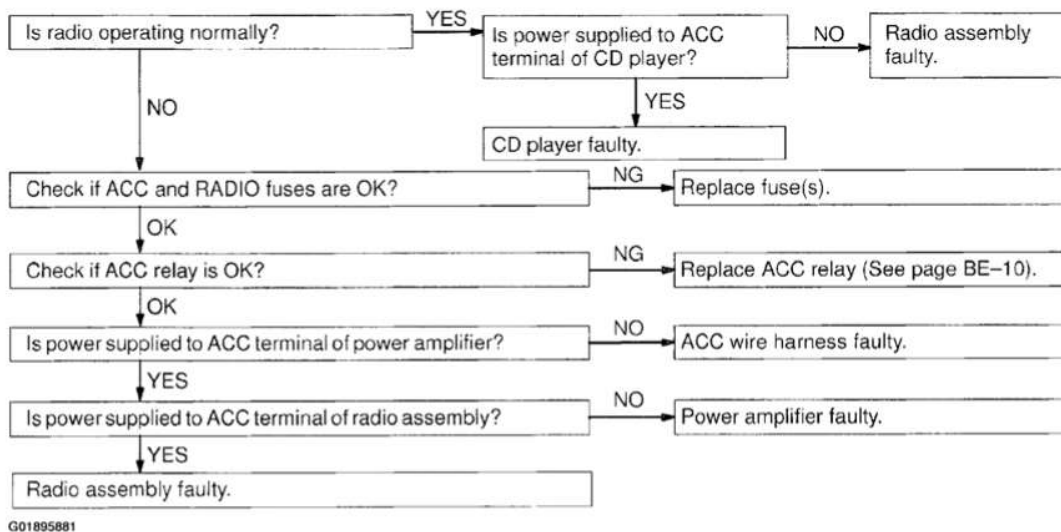
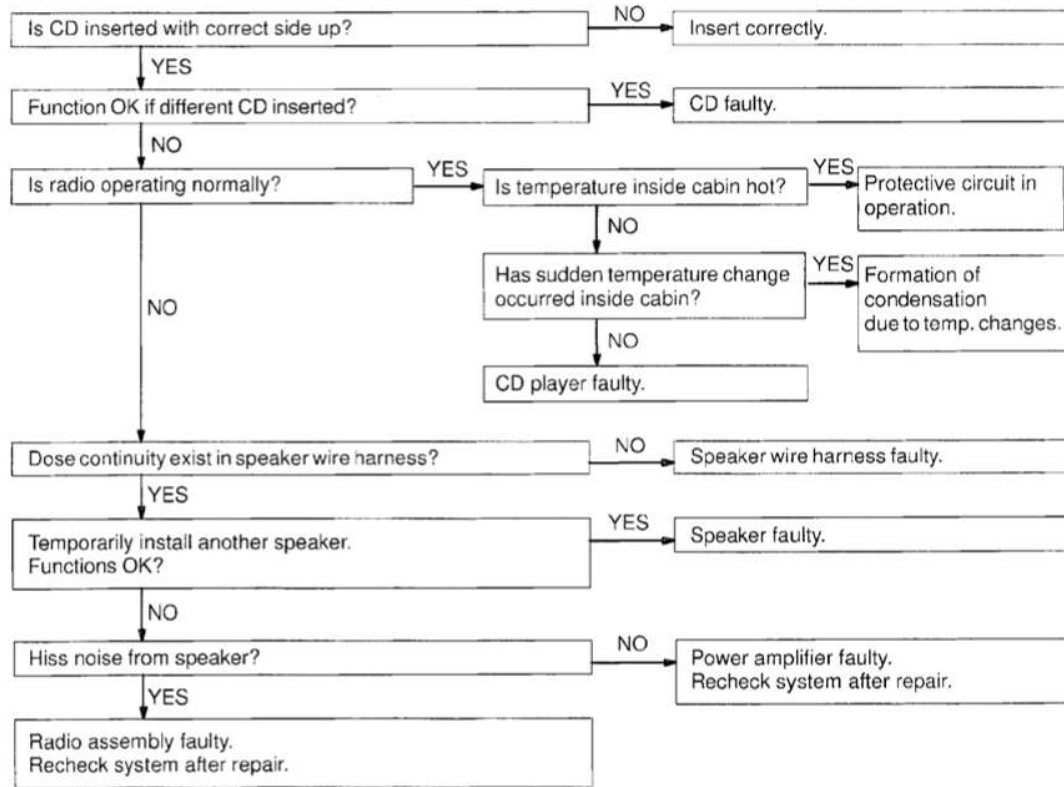


Fig. 30: Troubleshooting No Power W/CD Inserted (CD Player)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Power Coming In, But CD Player Not Operating



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Fig. 31: Troubleshooting Not Operating W/Power In (CD Player)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. Sound Jumps

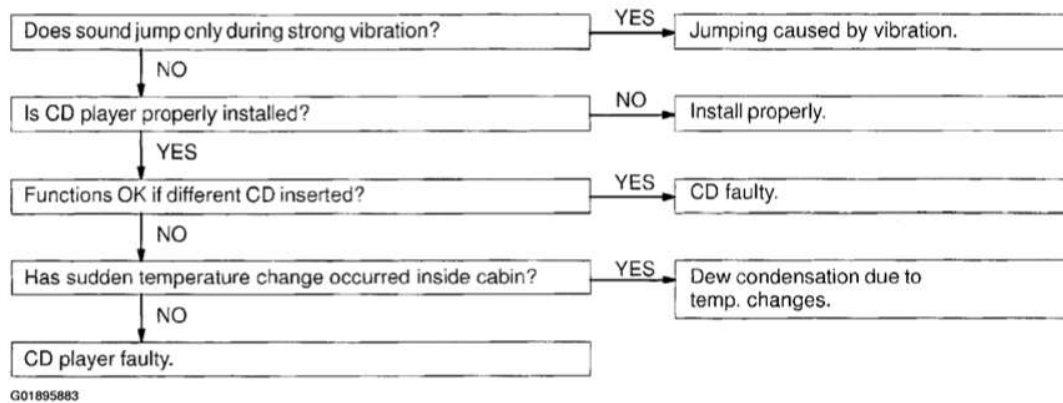


Fig. 32: Troubleshooting Sound Skips (CD Player)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. Sound Quality Poor (Volume Faint)

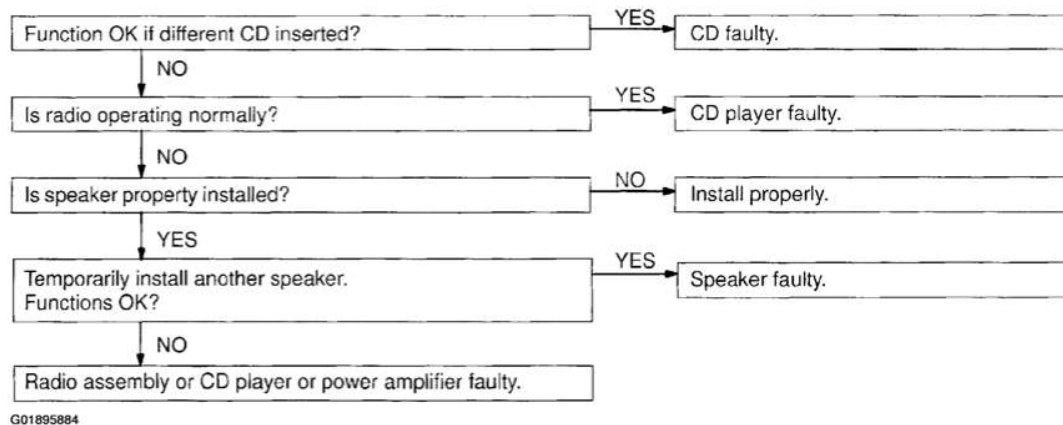


Fig. 33: Troubleshooting Poor Sound Quality (CD Player)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. Any Speaker Does Not Work

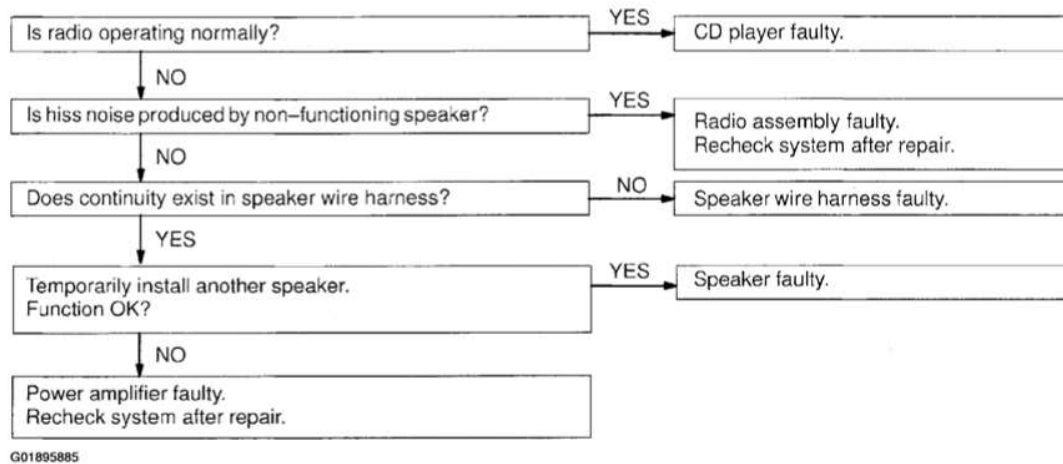


Fig. 34: Troubleshooting Speakers Do Not Work (CD Player)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. CD Will Not Be Ejected

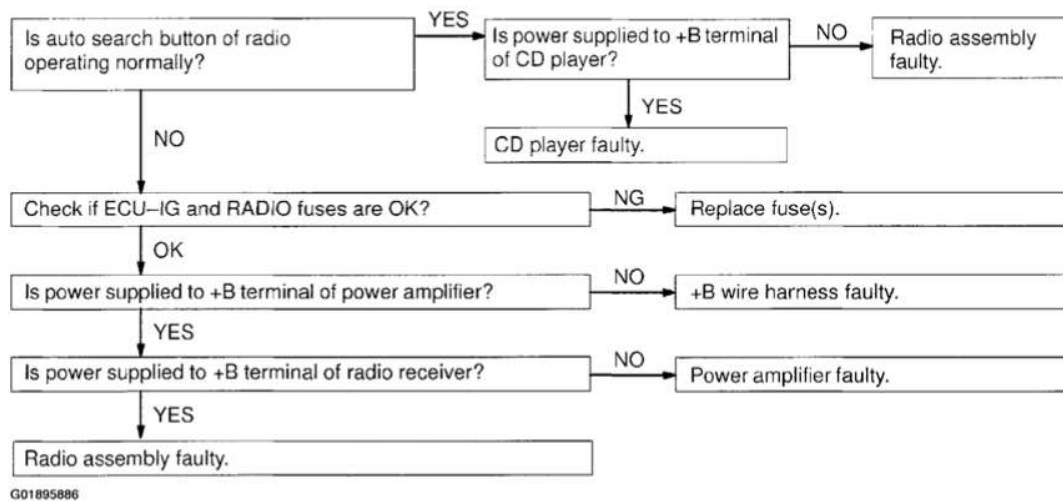


Fig. 35: Troubleshooting Unable To Eject CD (CD Player)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Power Amplifier

1. No Power Coming In

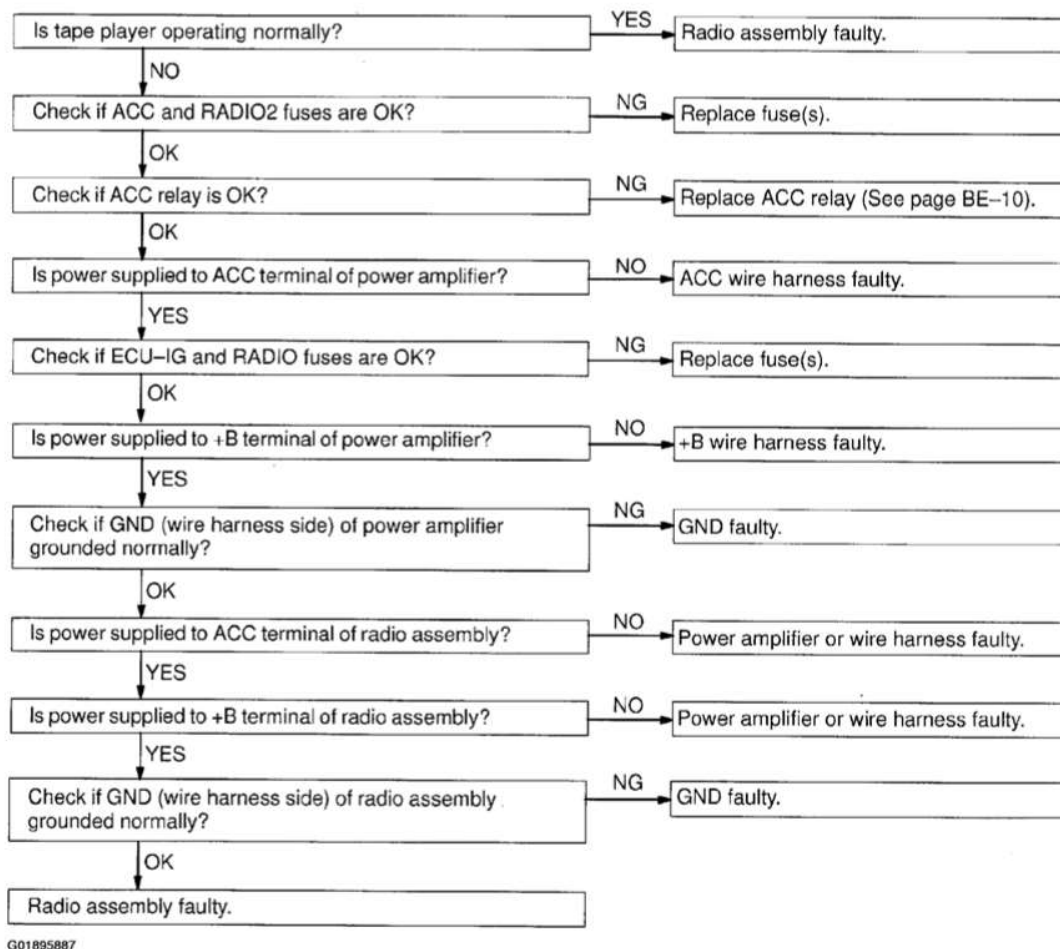


Fig. 36: Troubleshooting No Power Coming In (Power Amplifier)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Power Coming In, But Woofer (Power) Amplifier Not Operating

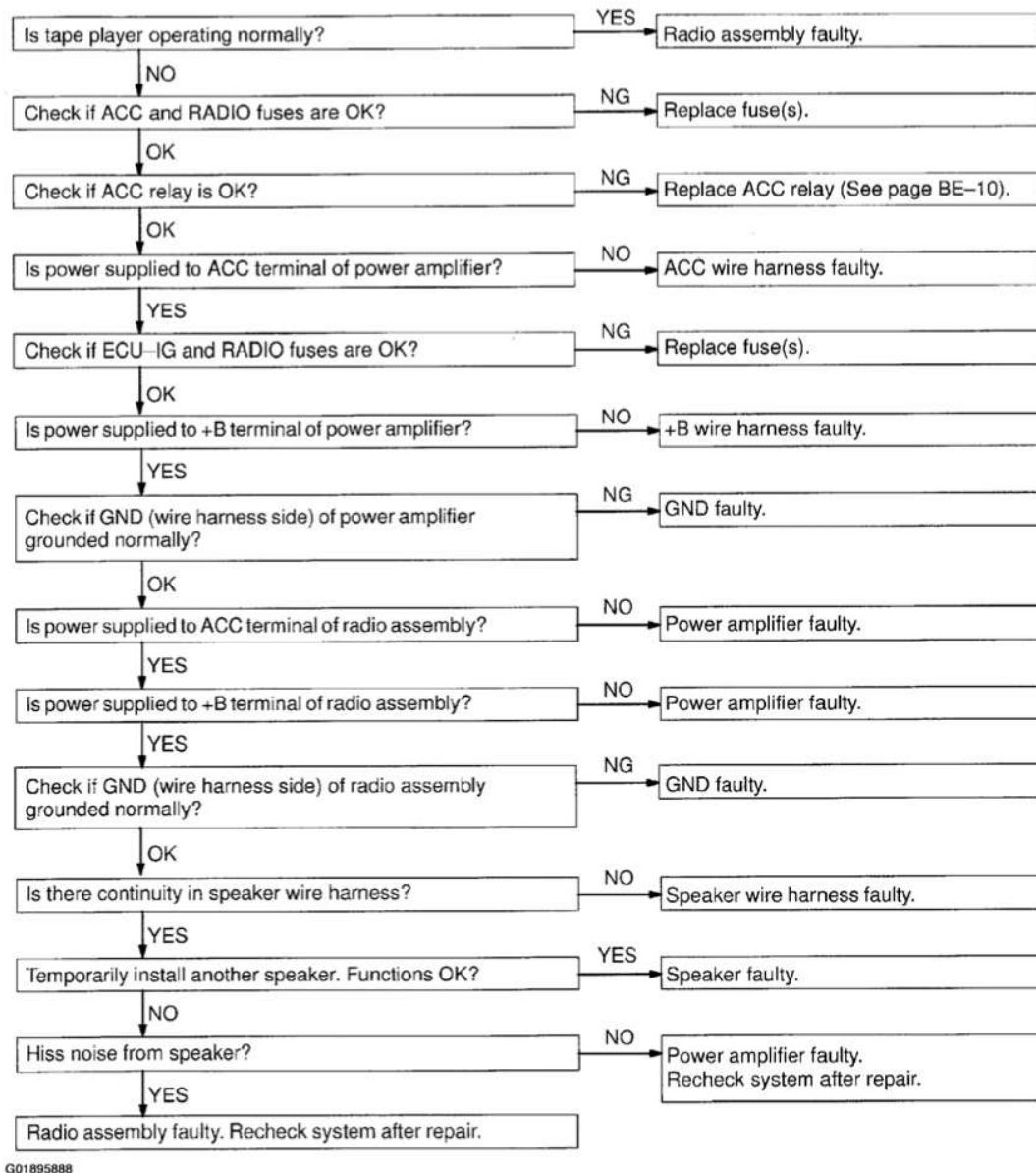


Fig. 37: Troubleshooting Power In Woofer Amplifier Not Operating (Power Amplifier)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Any Speaker Does Not Work

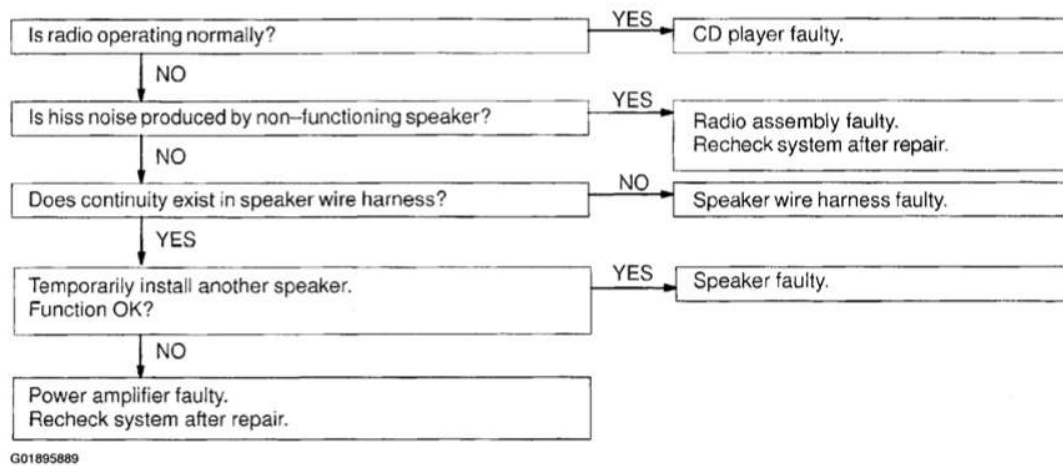


Fig. 38: Troubleshooting Any Speaker Does Not Work (Power Amplifier)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Noise

1. Noise Occurs

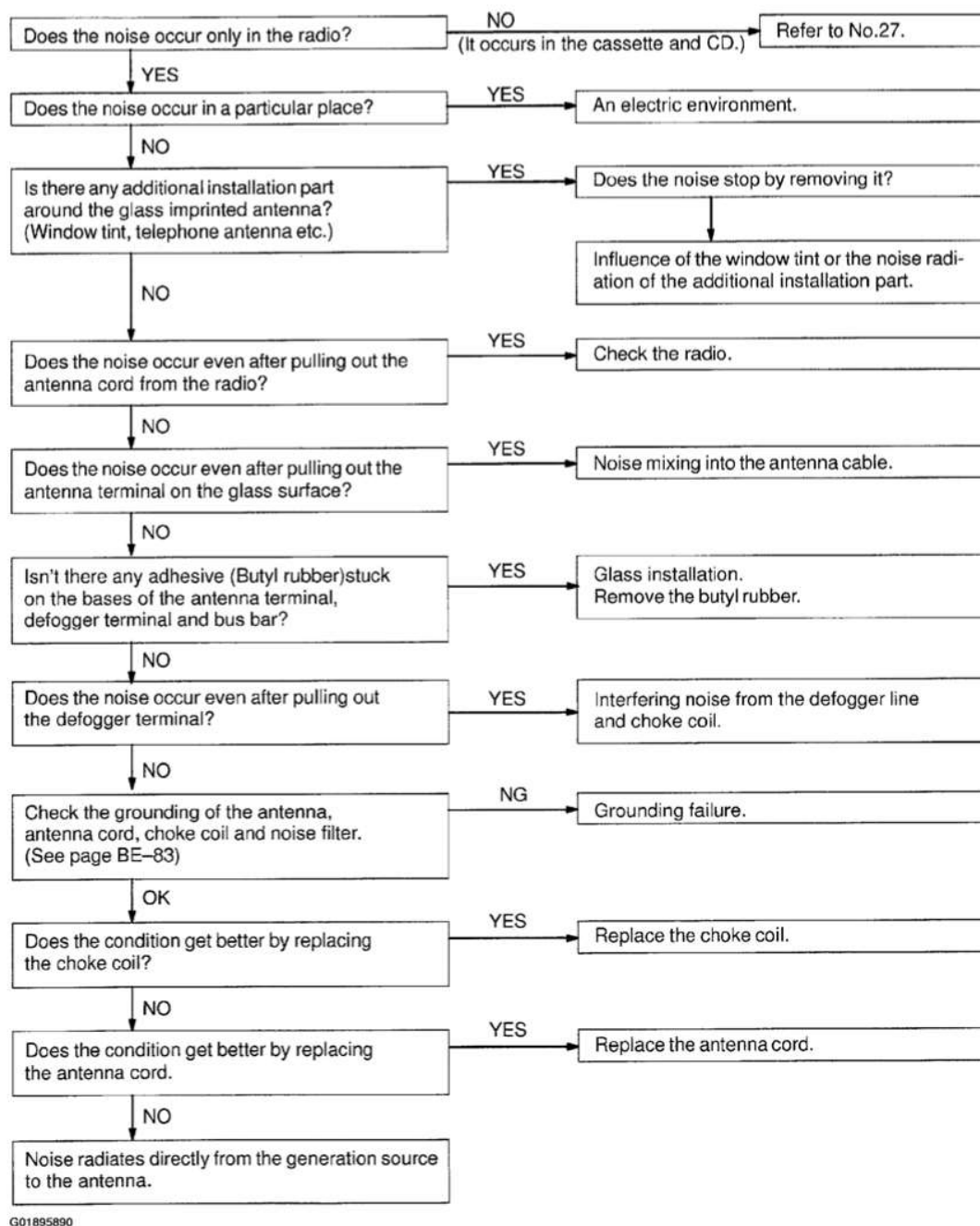


Fig. 39: Troubleshooting Noise Occurring
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Noise Produced By Vibration Or Shock While Driving

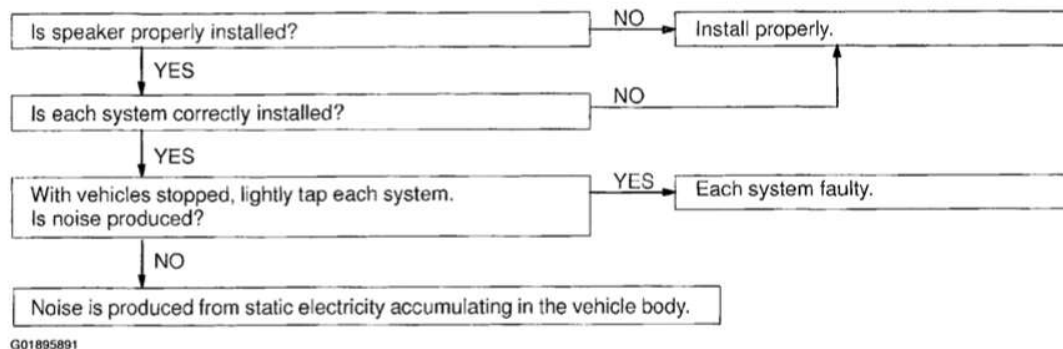


Fig. 40: Troubleshooting Vibration Or Shock Produces Noise During Driving
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Noise Produced When Engine Starts

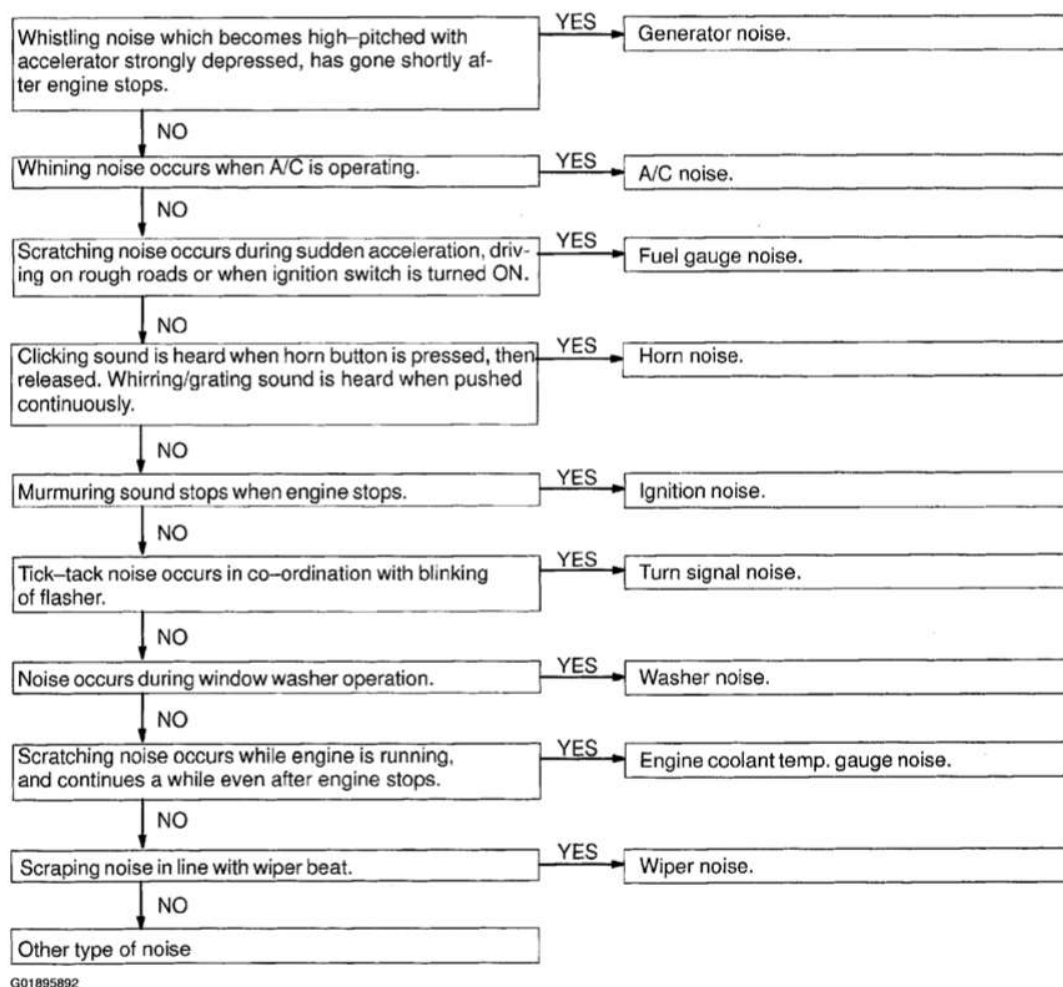
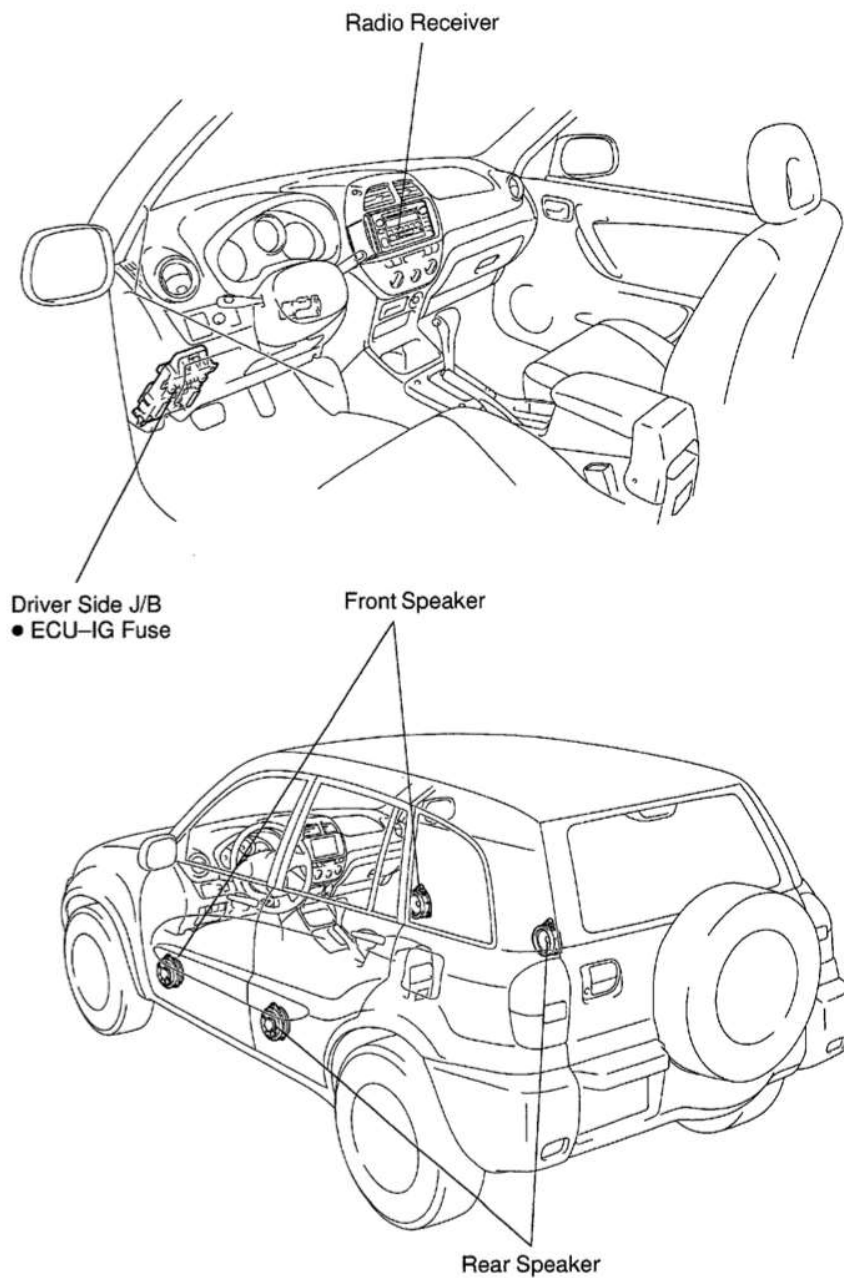


Fig. 41: Troubleshooting Engine Starting Produces Noise
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

LOCATION



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Fig. 42: Locating Audio System Components

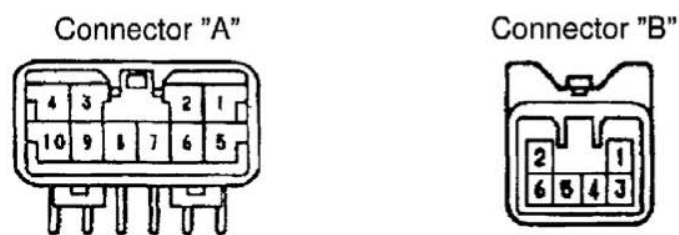
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

Inspect Radio Receiver Assembly Circuit

Disconnect the connectors from the radio receiver assembly, and inspect the connector on the wire harness side.

Radio Receiver Side



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Fig. 43: Identifying Connector A & B Terminals For Radio Receiver W/O Power Amplifier (Wire Harness Side)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Tester connection	Condition	Specified condition
A1 – Ground (FR+)	Audio sounding	5 – 7 V
A2 – Ground (FL+)	Audio sounding	5 – 7 V
A3 – Ground (ACC)	Ignition switch ACC	Battery voltage
A4 – Ground (+B)	Constant	Battery voltage
A5 – Ground (FR–)	Audio sounding	5 – 7 V
A6 – Ground (FL–)	Audio sounding	5 – 7 V
A7 – Ground (E)	Constant	Continuity
A10 – Ground (ILL+)	Light control switch TAIL or HEAD	Battery voltage
B1 – Ground (RR+)	Audio sounding	5 – 7 V
B2 – Ground (RL+)	Audio sounding	5 – 7 V
B3 – Ground (RR–)	Audio sounding	5 – 7 V
B6 – Ground (RL–)	Audio sounding	5 – 7 V

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Fig. 44: Connector A & B Terminal Specifications For Radio Receiver W/O Power Amplifier
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the circuit is not as specified, inspect the circuits connected to other parts.