Reception Diagnosis Using Antenna Test Kit

Service Category Audio/Visual/Telematics

Section Audio/Video **Market** USA

Toyota Supports ASE Certification

Applicability

YEAR(S)	MODEL(S)	ADDITIONAL INFORMATION
1986 – 2015	4Runner, Avalon, Avalon HV, Camry, Camry HV, Celica, Corolla, Cressida, Echo, FJ Cruiser, Highlander, Highlander HV, Land Cruiser, MR2, MR2 Spyder, Matrix, Paseo, Pickup, Previa, Prius, Prius C, Prius PHV, Prius V, RAV4, RAV4 EV, Sequoia, Sienna, Solara, Supra, T100, Tacoma, Tercel, Truck, Tundra, Van, Venza, Yaris	

Introduction

Toyota has developed a special Antenna Test Kit to aid in the diagnosis of vehicles with very poor, inoperative, or no AM/FM, XM Satellite, and/or GPS/DCM reception. Follow the procedures in this bulletin to address these conditions.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Reception Diagnosis Using Antenna Test Kit

Required Tools & Equipment

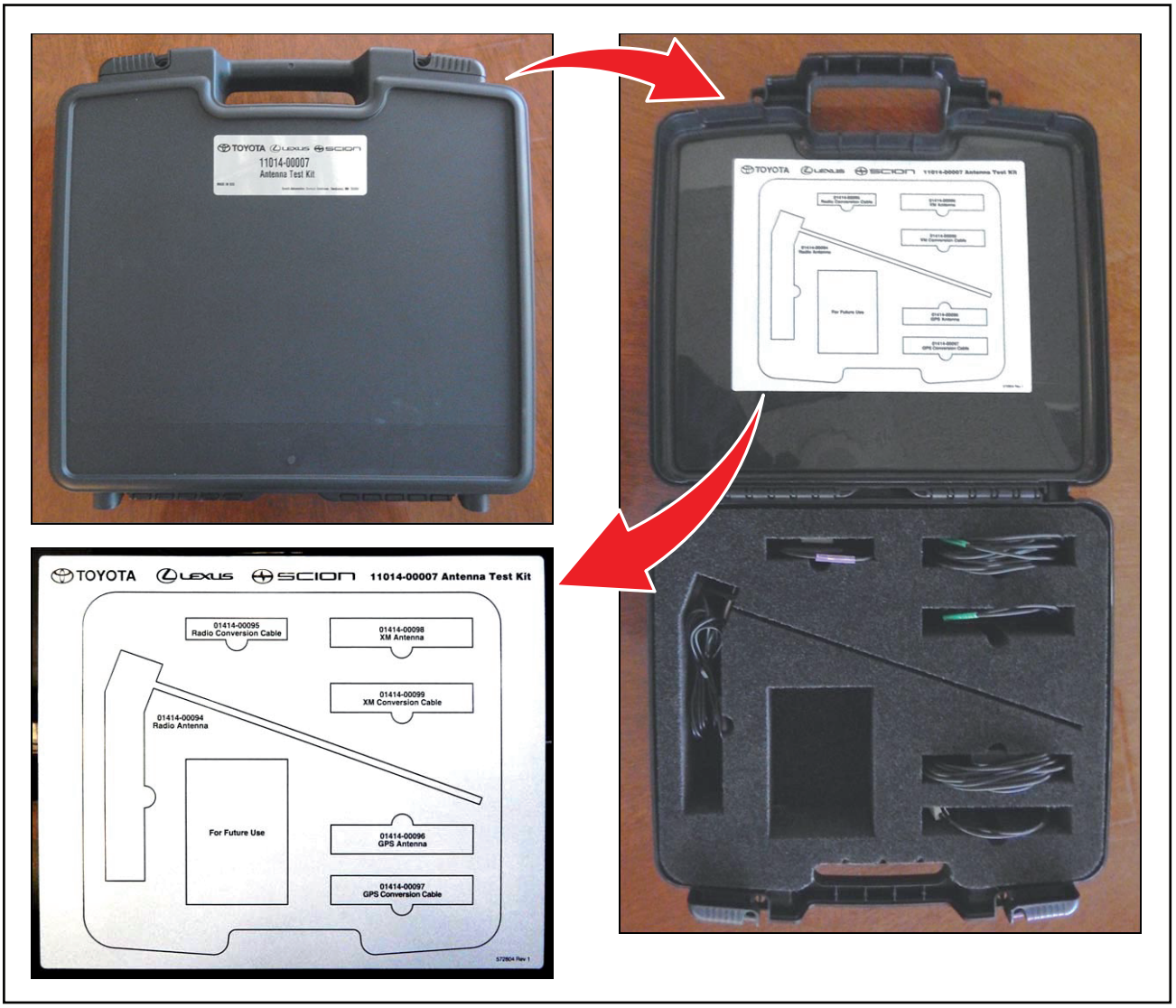
SPECIAL SERVICE TOOLS (SST)	PART NUMBER	QTY
Antenna Test Kit*	11014-00007	1

* Essential SST.

NOTE

Additional SSTs may be ordered by calling 1-800-933-8335.

Figure 1. Antenna Test Kit Components



Reception Diagnosis Using Antenna Test Kit

Required Tools & Equipment (Continued)

SST COMPONENT PART NUMBER	COMPONENT NAME
01414-00094	Radio Antenna
01414-00095	Radio Conversion Cable
01414-00098	XM Antenna
01414-00099	XM Conversion Cable
01414-00096	GPS Antenna
01414-00097	GPS Conversion Cable

Diagnostic Procedure

1. Confirm abnormal reception condition as described in the Introduction.

NOTE

Before using the Antenna Test Kit, the abnormal condition needs to be verified/duplicated and in many cases compared to a similar vehicle with the same equipment. Once a condition is duplicated and judged abnormal by comparison to a similar vehicle, the Antenna Test Kit may be a valuable tool to isolate the cause of a given condition.

The same or comparable equipment means the same model number radio, extension box type and firmware, vehicle model, and integrated navigation system. When there are firmware options, it should always be considered when verifying comparable vehicles.

Examples of Abnormal Conditions Requiring Vehicle/System Comparison:

- Radio AM and FM reception performance
- SAT radio cuts out intermittently
- HD radio cuts out intermittently
- NAV cursor jumps to a parallel road
- NAV turn-by-turn guidance timing
- HD traffic update timing

Examples of Abnormal Conditions NOT Requiring Vehicle/System Comparison:

- No AM or FM sound at all
- No XM preview channels or audio
- No GPS cursor or satellites listed in diagnostic mode

Reception Diagnosis Using Antenna Test Kit

Diagnostic Procedure (Continued)

2. Check vehicle harnesses and coax cable for the following conditions:
   - End-to-end resistance of the center conductor
   - Short from conductor to the shield
   - Short from conductor to chassis ground
   - Pin fit at each end on each terminal

NOTE

If an "end-to-end resistance check" results in the DVOM display constantly increasing in value, there might be a capacitor in the harness, making the check invalid.

Repair Procedure

AM/FM Radio Reception

1. Drive the vehicle outside and verify very poor, inoperative, or no AM/FM radio reception.
2. Gather detailed information from the customer on when and where the problem occurs (e.g., indoor/outdoor, certain locations only, certain weather conditions, AM/FM or both, or individual stations affected).
3. Check for aftermarket accessories or other items that may affect reception (e.g., Rear Seat Entertainment [RSE] system, radar detectors, FM modulator, metallic window tint, objects hanging from mirror, toll passes, items laying on dash, etc.). Disconnect or remove the component and recheck reception.
4. Check all antenna connections.
   A. Confirm secure antenna connection(s) at the back of the radio.
   B. Confirm secure antenna connections at the mast antenna or glass antenna connector.
5. Check the signal using the Antenna Test Kit.

   Disconnect the vehicle antenna and connect the Radio Antenna from the Antenna Test Kit at the back of the radio, then drive the vehicle outside. Use the Radio Conversion Cable if necessary.

Reception Diagnosis Using Antenna Test Kit

Repair Procedure

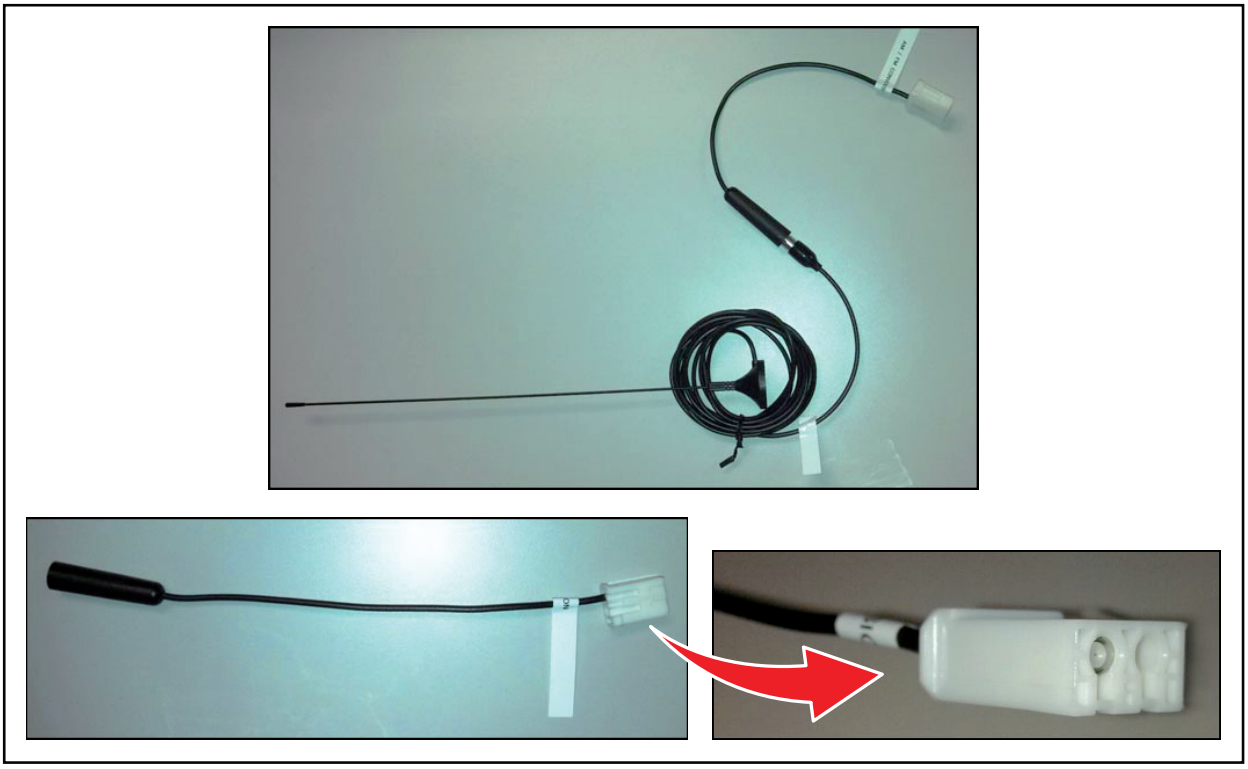
AM/FM Radio Reception (Continued)

NOTE

When connecting the test antenna, pay attention to the following:

- **The location of plugging in the antenna will determine the potential cause (at the radio connector, or at the rear of the vehicle on the coax cable).**
- **Putting the test antenna in place of a vehicle's glass or diversity antenna may provide false (better than normal or characteristic) results and might not justify a repair without vehicle performance comparison.**
- **If the test antenna does not make a difference, consider other possible interfering factors such as customer accounts, radio stations, trees, buildings, etc.**

Figure 2. Radio Antenna and Conversion Cable



Reception Diagnosis Using Antenna Test Kit

Repair Procedure

AM/FM Radio Reception (Continued)

NOTE

- **Comparison vehicles are a good resource to determine what kind of reception is available in the area.**
- **If appropriate and within dealer policy, temporarily swapping a component (radio head unit, extension box, NAV ECU, etc.) between the problem vehicle and a dealer-owned vehicle is one method to confirm the cause.**

Did the radio reception improve?

- **YES —** Continue to step 6 for vehicles with glass antenna, or step 7 for vehicles with pole antenna.
- **NO —** Refer to applicable Repair Manual for further reception diagnosis.

6. Inspect the glass antenna for open/cut patterns.
   - If an open pattern is found, repair as needed and recheck reception quality.
   - If NO open pattern is found or reception is still poor after glass antenna repair, go to step 8 for antenna amplifier systems.

NOTE

Because a noise filter may exist in the antenna plug, which plugs into the radio, the antenna cable will normally show an open circuit when checking continuity.

7. Connect the Radio Antenna from the Antenna Test Kit at the pole antenna connection.

   Did the reception improve?

   - **YES —** Replace the mast antenna assembly. (Refer to applicable Repair Manual for instructions.)
   - **NO —**
     - For vehicles with antenna amplifier systems, go to step 8.
     - For vehicles without antenna amplifier systems, refer to applicable Repair Manual for further antenna amplifier reception diagnosis.

Reception Diagnosis Using Antenna Test Kit

Repair Procedure

AM/FM Radio Reception (Continued)

8. Inspect the antenna amplifier (if equipped). (Refer to applicable Repair Manual for instructions.)
    - If antenna amplifier is receiving power:
        - For vehicles where the amplifier is part of the antenna cable, replace the antenna cable. (Refer to applicable Repair Manual for instructions.)
        - For vehicles where the amplifier is separate, plug the antenna cable directly into the antenna.
    - If antenna amplifier is NOT receiving power, inspect ANT+B wiring from radio and confirm 12V output to the antenna amplifier.

    Did the radio reception improve?

    - **YES —** Replace the antenna amplifier. (Refer to applicable Repair Manual for instructions.)
    - **NO —** If reception is still poor, refer to applicable Repair Manual for further antenna cable reception diagnosis.

XM Satellite Radio Reception

NOTE

The Antenna Test Kit is only applicable to factory-installed XM Satellite Radio.

1. Drive the vehicle outside and verify very poor, inoperative, or no XM satellite radio reception.
2. Gather detailed information from the customer on when and where the problem occurs (e.g., indoor/outdoor, certain locations only, certain weather conditions, individual stations affected).
3. Check for aftermarket accessories or other items that may affect reception (e.g., Rear Seat Entertainment [RSE] system, radar detectors, metallic window tint, objects hanging from mirror, toll passes, items laying on dash, etc.). Disconnect or remove the component and recheck reception.
4. Check all antenna connections.
    A. Confirm secure antenna connection(s) at the back of the radio/XM tuner module.
    B. Confirm secure connections at the XM antenna.
5. Check the XM satellite radio signal using the Antenna Test Kit.

    Disconnect the vehicle antenna and connect the XM Antenna from the Test Kit at the radio/XM tuner module, then drive the vehicle outside. Use the XM Conversion Cable if necessary.

Reception Diagnosis Using Antenna Test Kit

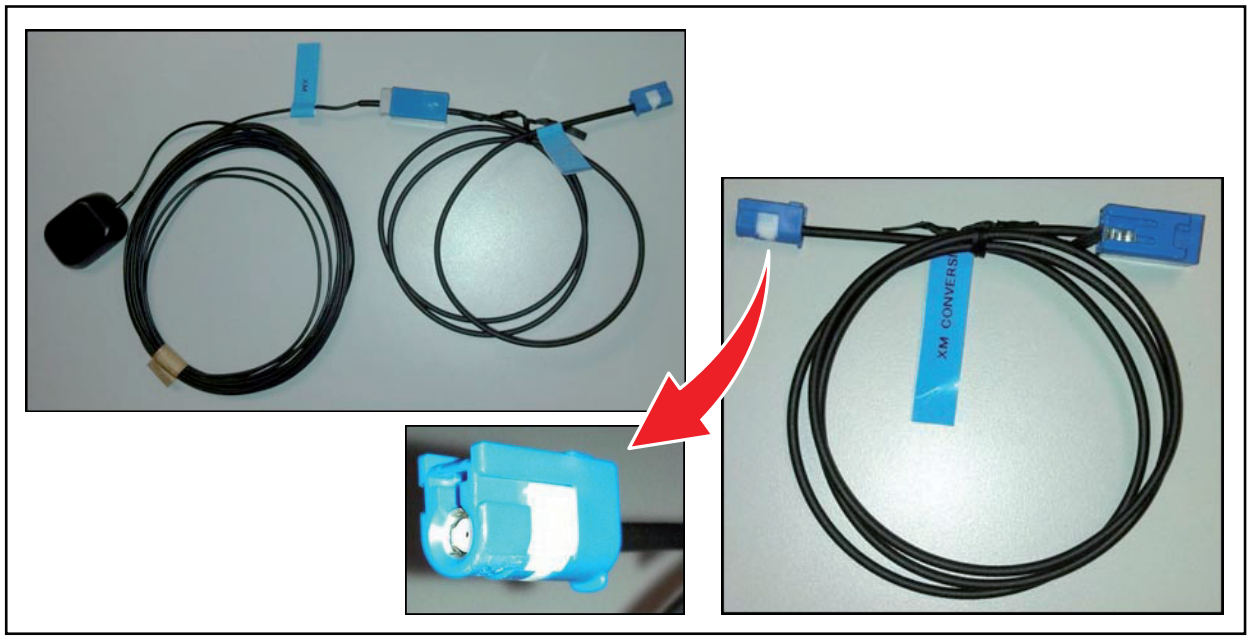
Repair Procedure

XM Satellite Radio Reception (Continued)

NOTE

- **Comparison vehicles are a good resource to determine what is available in the area.**
- **If appropriate and within dealer policy, temporarily swapping a component (radio head unit, extension box, NAV ECU, etc.) between the problem vehicle and a dealer-owned vehicle is one method to confirm the cause.**
- **If the XM test antenna does not make a difference, consider other possible interfering factors such as customer accounts, radio stations, trees, buildings, etc.**

Figure 3. XM Antenna and Conversion Cable



Did the radio reception improve?

- **YES —** Continue to step 6.
- **NO —** Replace the XM radio, and refer to applicable Repair Manual for further reception diagnosis.

Reception Diagnosis Using Antenna Test Kit

Repair Procedure

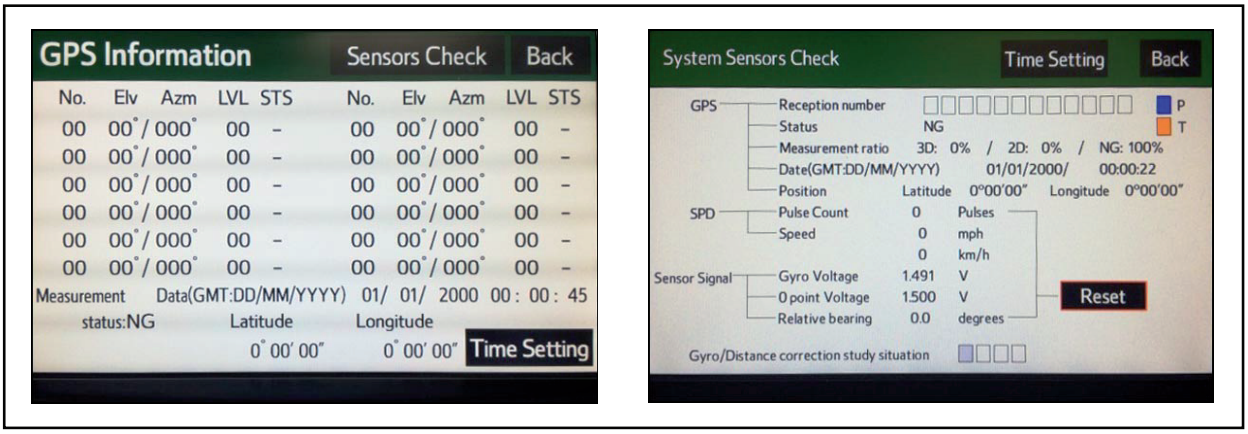
XM Satellite Radio Reception (Continued)

6. Check antenna cable continuity.
   - If antenna cable has less than 1 ohm resistance, attach test antenna to antenna cable. If reception improves, replace the XM antenna/pod. (Refer to applicable Repair Manual for instructions.)
   - If antenna cable is open, replace the antenna cable. (Refer to applicable Repair Manual for instructions.)

GPS Reception

1. Drive the vehicle outside and verify very poor, inoperative, or no reception in the navigation diagnosis screen (refer to applicable Repair Manual for details on how to navigate to this screen).

   Figure 4.



2. Gather detailed information from the customer on when and where the problem occurs (e.g., indoor/outdoor, certain locations only, certain weather conditions).
3. Check for aftermarket accessories or other items that may affect reception (e.g., Rear Seat Entertainment [RSE] system, radar detectors, metallic window tint, objects hanging from mirror, toll passes, items laying on dash, etc.). Disconnect or remove the component and recheck reception.
4. Check all antenna connections.
   A. Confirm secure antenna connection(s) at the back of the radio/navigation computer.
   B. Confirm secure antenna connections at antenna.

Reception Diagnosis Using Antenna Test Kit

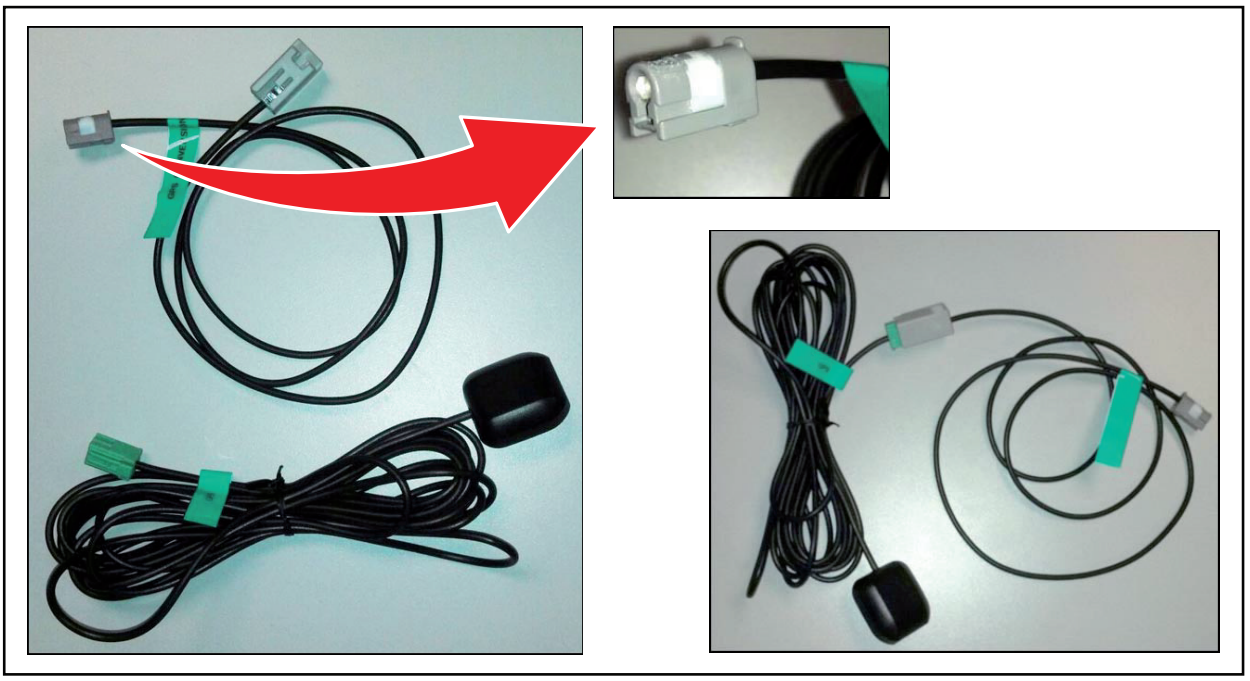
Repair Procedure

GPS Reception (Continued)

5. Check the signal using the Antenna Test Kit.

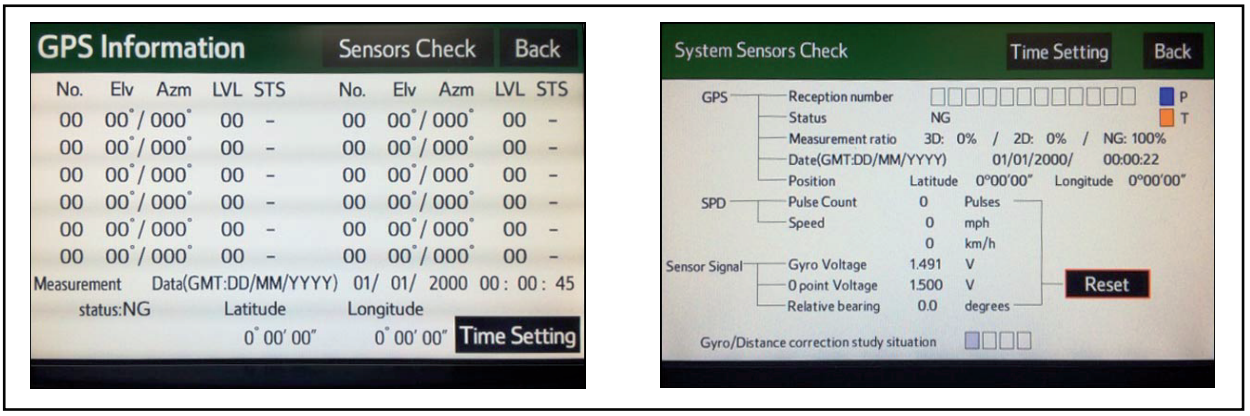
   Disconnect the vehicle antenna, connect the GPS Antenna from the Test Kit at the back of the radio/navigation computer, then drive the vehicle outside. Use the GPS Conversion Cable if necessary.

Figure 5. GPS Antenna and Conversion Cable



6. Verify reception in the navigation diagnosis screen (refer to applicable Repair Manual for details on how to navigate to this screen).

Figure 6.



Reception Diagnosis Using Antenna Test Kit

Repair Procedure

GPS Reception (Continued)

NOTE

- **Comparison vehicles are a good resource to determine what is available in the area.**
- **If appropriate and within dealer policy, temporarily swapping a component (radio head unit, extension box, NAV ECU, etc.) between the problem vehicle and a dealer-owned vehicle is one method to confirm the cause.**

Did the GPS reception improve?

- **YES —** Continue to step 7.
- **NO —** Refer to applicable Repair Manual for instructions and navigation computer reception diagnosis.

7. Check antenna cable continuity.
   - If GPS antenna cable has less than 1 ohm resistance, replace the GPS antenna. (Refer to applicable Repair Manual for instructions.)
   - If GPS antenna cable resistance is greater than 1 ohm, replace the antenna cable. (Refer to applicable Repair Manual for instructions.)

Data Communication Module (DCM) / Safety Connect Reception

For conditions where the Safety Connect call center is unable to accurately locate the customer's vehicle, follow the steps below.

NOTE

Never swap Data Communication Modules (DCM) between vehicles.

1. Drive the vehicle outside for 5 minutes with an open view to the sky and press the *SOS* button.
2. Explain to the call center that you are a technician diagnosing a reception issue and ask them to tell you where the vehicle is located.

   Did the call center provide the correct location of the vehicle within 100 meters accuracy?
   - **YES —** Gather detailed information from the customer on when and where the problem occurs (e.g., indoor/outdoor, certain locations only, certain weather conditions).
   - **NO —** Continue to step 3.

Reception Diagnosis Using Antenna Test Kit

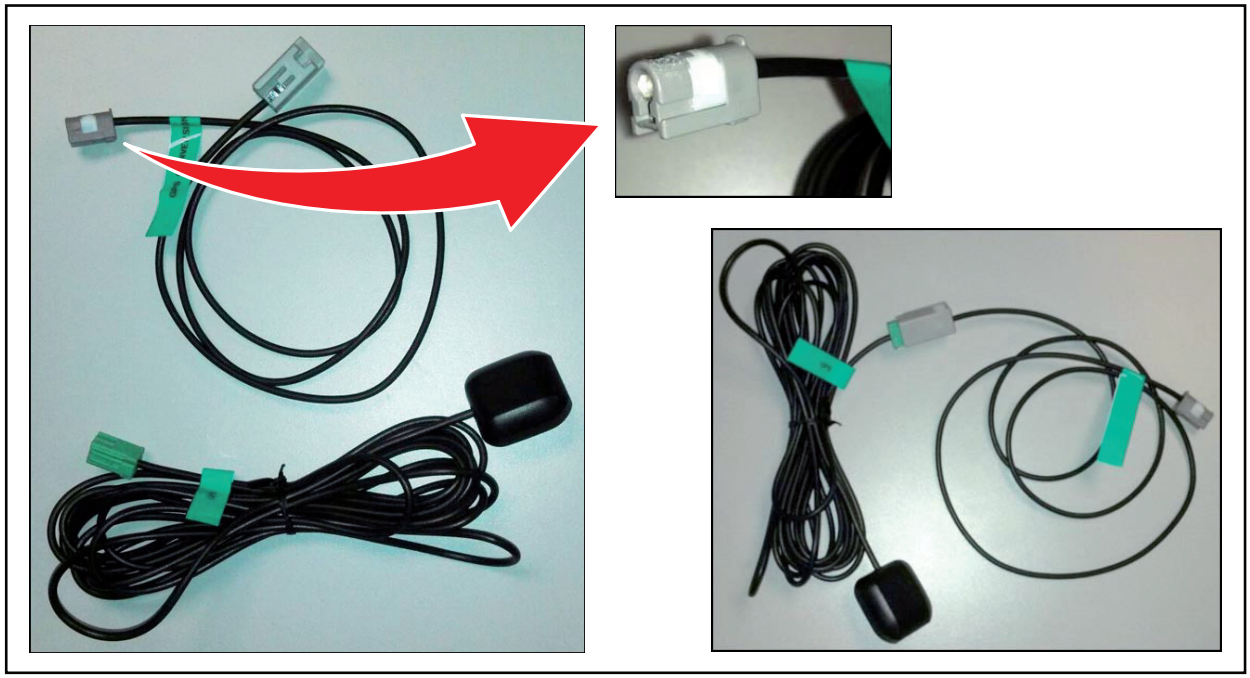
Repair Procedure

Data Communication Module (DCM) / Safety Connect Reception (Continued)

3. Connect the GPS antenna from the Antenna Test Kit to the back of the DCM and repeat step 1.

> **HINT**
> **The DCM antenna uses the same connector as the navigation ECU.**

Figure 7. GPS Antenna and Conversion Cable



Did the call center provide the correct location of the vehicle within 100 meters accuracy?

- **YES —** Continue to step 4.
- **NO —** Replace the DCM. (Refer to applicable Repair Manual for instructions.)

4. Check GPS antenna cable continuity.
   - If GPS antenna cable has less than 1 ohm resistance, replace the GPS antenna. (Refer to applicable Repair Manual for instructions.)
   - If GPS antenna cable resistance is greater than 1 ohm, replace the GPS antenna cable assembly. (Refer to applicable Repair Manual for instructions.)
5. Repeat step 1 to confirm proper Safety Connect operation.