

ACCESSORIES & EQUIPMENT

Rear View Monitor System (Diagnostics & Circuit Tests) - Sienna

REAR VIEW MONITOR SYSTEM

PRECAUTION

PRECAUTION

1. PRECAUTION FOR DISCONNECTING CABLE FROM NEGATIVE BATTERY TERMINAL

NOTE: After turning the ignition switch off, waiting time may be required before disconnecting the cable from the battery terminal. Therefore, make sure to read the disconnecting the cable from the battery terminal notice before proceeding with work. Refer to PRECAUTION .

2. IGNITION SWITCH EXPRESSIONS

- a. The type of ignition switch used on this model differs according to the specifications of the vehicle. The expressions listed in the table below are used in this information.

Expression	Ignition Switch (Position)	Engine Switch (Condition)
Ignition switch off	LOCK	Off
Ignition switch ACC	ACC	On (ACC)
Ignition switch ON	ON	On (IG)
Engine start	START	Start

3. NOTES FOR REAR TELEVISION CAMERA ASSEMBLY

- a. Notes for the rear television camera assembly
1. The rear view monitor system may not function properly if subjected to a severe blow by any hard object.
 2. Do not scrub the cover part of the camera (resin made). Scrubbing may scratch the cover and affect the image. Prevent organic solvents, waxes, bond removing solvents or glass coating from adhering to the cover. If such material adheres to the cover, clean it off immediately and wash it with water.
 3. Exposing the camera to a sudden temperature change may affect proper functioning of the camera.
 4. A clear image may not appear if the camera is dirty with snow, mud, etc. In that case, wash it

with water and wipe off the lens. Use a detergent to remove dirt if necessary.

b. Images may be unclear even in normal conditions if:

1. The camera lens is frosted over (the image immediately after turning the ignition switch to ON may be blurred or darker than normal).
2. A strong beam of light, such as a sunbeam or headlight, hits the camera.

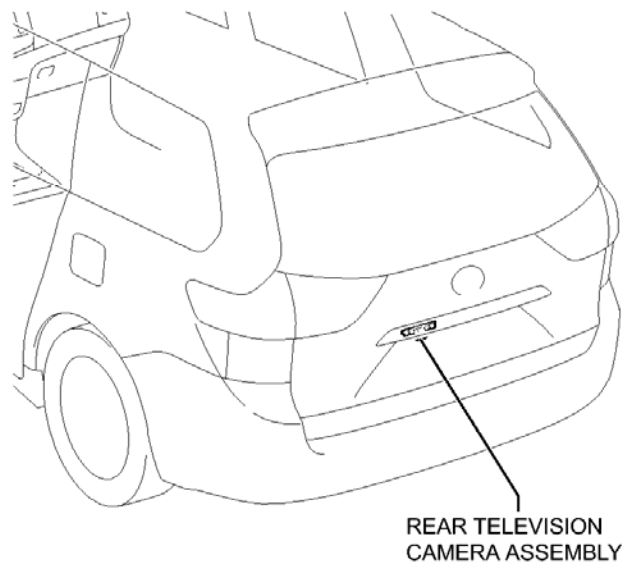
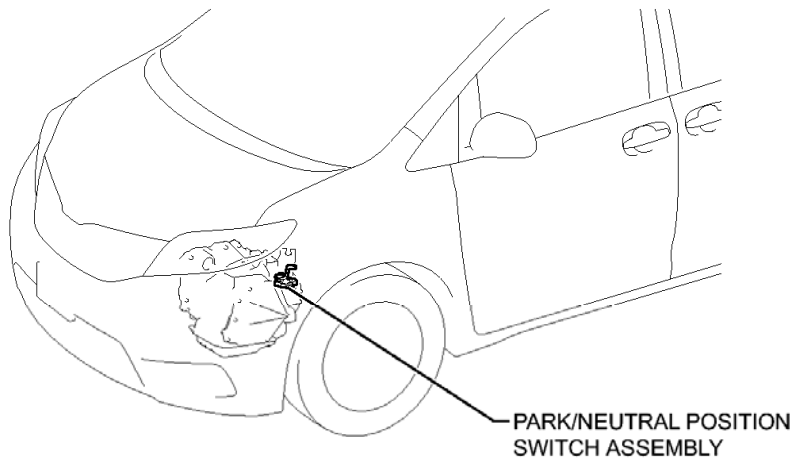
HINT:

When a strong light, such as a sunbeam reflected off the vehicle body, hits the camera, the image may be blurred. This is called the "SMEAR" phenomenon, specific to the CCD camera.

3. It is too dark around the camera (at night, etc.).
4. The ambient temperature around the camera is either too high or too low.

PARTS LOCATION

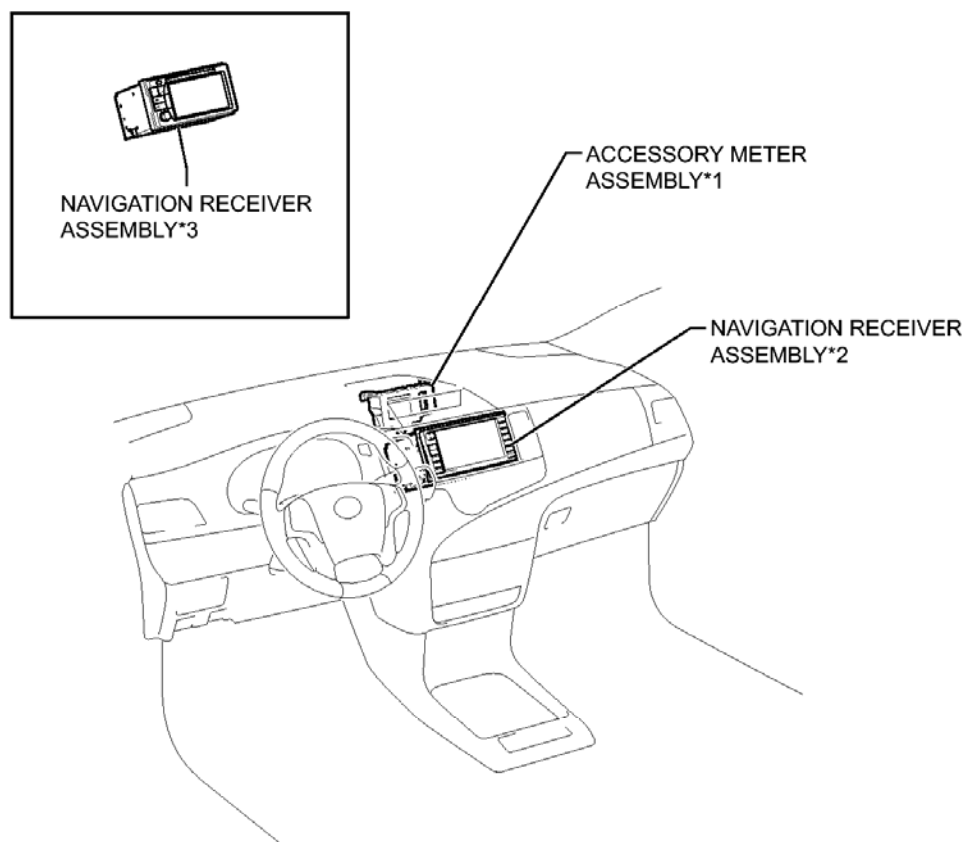
ILLUSTRATION



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Fig. 1: Rear View Monitor System Component Locations (1 Of 2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ILLUSTRATION



*1: w/o Navigation System

*2: w/ Navigation System for DVD

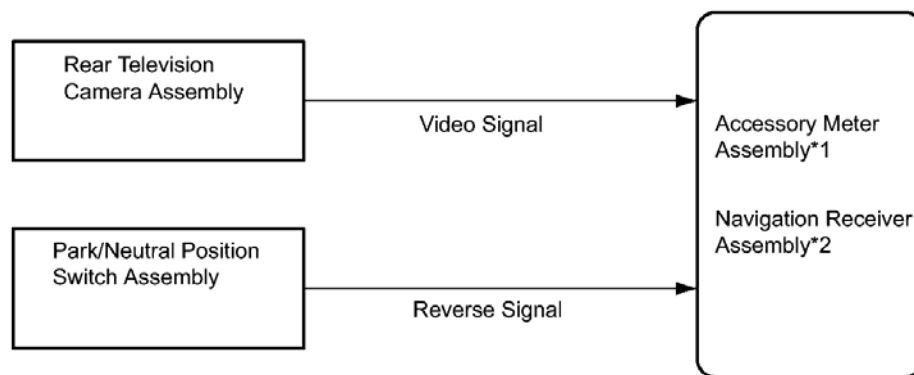
*3: w/ Navigation System for SD

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Fig. 2: Rear View Monitor System Component Locations (2 Of 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

SYSTEM DIAGRAM

SYSTEM DIAGRAM



*1: w/o Navigation System *2: w/ Navigation System

Fig. 3: Rear View Monitor System Diagram

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

SYSTEM DESCRIPTION

SYSTEM DESCRIPTION

1. GENERAL

- a. To assist the driver in parking the vehicle by displaying an image of the area behind the vehicle, this system has a rear television camera assembly mounted on the back door. The system displays the image on the accessory meter assembly*1 or navigation receiver assembly*2.

*1: w/o Navigation System

*2: w/ Navigation System

- b. This system consists of the following components:

1. Accessory meter assembly (w/o Navigation System)
2. Navigation receiver assembly (w/ Navigation System)
3. Rear television camera assembly
4. Park/neutral position switch assembly

2. FUNCTION OF COMPONENTS

Components	Function
	Receives video signals which contain an image of the area

Accessory meter assembly*1 Navigation receiver assembly*2	behind the vehicle taken with the rear television camera assembly. • Performs control of the system by receiving the reverse signal from the park/neutral position switch assembly.
Rear television camera assembly	• Mounted on the back door to transmit an image of the area behind the vehicle to the accessory meter assembly*1 or navigation receiver assembly*2. • Has a color video camera that uses a CCD (Charge Coupled Device) and a wide-angle lens.
Park/neutral position	Transmits a reverse signal to the accessory meter assembly*1

switch assembly	or navigation receiver assembly*2.
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*1: w/o Navigation System

*2: w/ Navigation System

3. OPERATION EXPLANATION

- a. The accessory meter assembly*1 or navigation receiver assembly*2 receives the reverse signal when the ignition switch is turned to ON and the shift lever is moved to R. After receiving the reverse signal, the accessory meter assembly*1 or navigation receiver assembly*2 switches to the rear view monitor system.

*1: w/o Navigation System

*2: w/ Navigation System

HOW TO PROCEED WITH TROUBLESHOOTING

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

Use the following procedures to troubleshoot the rear view monitor system.

1. VEHICLE BROUGHT TO WORKSHOP

NEXT: Go to next step

2. INSPECT BATTERY VOLTAGE

- a. Measure the battery voltage.

Standard voltage

11 to 14 V

If the voltage is below 11 V, replace or recharge the battery before proceeding to the next step.

NEXT: Go to next step

3. CUSTOMER PROBLEM ANALYSIS

NEXT: Go to next step

4. PROBLEM SYMPTOM CONFIRMATION

NEXT: Go to next step

5. PROBLEM SYMPTOMS TABLE

- a. Refer to PROBLEM SYMPTOMS TABLE.

RESULT

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B --> Go to step 7

A: Go to next step

6. OVERALL ANALYSIS AND TROUBLESHOOTING

- a. Terminals of ECU. Refer to TERMINALS OF ECU.

NEXT: Go to next step

7. ADJUST, REPAIR OR REPLACE

NEXT: Go to next step

8. CONFIRMATION TEST

NEXT --> END

PROBLEM SYMPTOMS TABLE

PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

REAR VIEW MONITOR SYSTEM

Symptom	Suspected Area	See
When the shift lever is in R, the rear view monitor image is not displayed (screen is not black).	Reverse signal circuit	Refer to <u>Reverse Signal Circuit</u>
	Accessory meter assembly power source circuit*1	Refer to <u>Accessory Meter does not Illuminate</u>
	Navigation receiver assembly power source circuit*2	Refer to <u>Navigation Receiver Assembly Power Source Circuit</u>
	Navigation receiver assembly power source circuit*3	Refer to <u>Navigation Receiver Assembly Power Source Circuit</u>
	Accessory meter assembly*1	Refer to <u>REMOVAL</u>
	Navigation receiver assembly*4	Refer to <u>REMOVAL</u>
When the shift lever is in R, the rear view monitor image is not displayed (screen is black).	Image from camera for rear view monitor is abnormal	Refer to <u>Image from Camera for Rear View Monitor is Abnormal</u>
	Accessory meter assembly*1	Refer to <u>REMOVAL</u>
	Navigation receiver assembly*4	Refer to <u>REMOVAL</u>
When the shift lever is not in R, the rear view monitor image is displayed.	Reverse signal circuit	Refer to <u>Reverse Signal Circuit</u>
	Accessory meter assembly*1	Refer to <u>REMOVAL</u>
	Navigation receiver assembly*4	Refer to <u>REMOVAL</u>
Image from the camera for the rear view monitor is abnormal (color, distorted picture).	Image from camera for rear view monitor is abnormal	Refer to <u>Image from Camera for Rear View Monitor is Abnormal</u>
	Accessory meter assembly*1	Refer to <u>REMOVAL</u>
	Navigation receiver assembly*4	Refer to <u>REMOVAL</u>

*1: w/o Navigation System

*2: w/ Navigation System for DVD

*3: w/ Navigation System for SD

*4: w/ Navigation System

TERMINALS OF ECU

TERMINALS OF ECU

1. REAR TELEVISION CAMERA ASSEMBLY

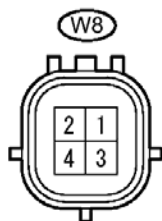


Fig. 4: Rear Television Camera Assembly Connector End View
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Disconnect the W8 rear television camera assembly connector.
- b. Measure the resistance and voltage according to the value(s) in the table below.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
W8-3 (CGND) - Body ground	Shield - Body ground	Ground	Always	Below 1 ohms
W8-4 (CB+) - Body ground	R - Body ground	Power source	Ignition switch ON, shift lever in R	5.5 to 7.05 V

If the result is not as specified, there may be a malfunction on the wire harness side.

- c. Reconnect the rear television camera assembly connector.
- d. Measure the waveform according to the value(s) in the table below.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
W8-2 (CV+) - W8-1 (CV-)	B - W	Video signal	Ignition switch ON, shift lever in R	Pulse generation (See Fig. 5)
			Ignition switch ON, shift lever in R, screen blacked out by covering camera lens	Pulse generation (See Fig. 5)

HINT:

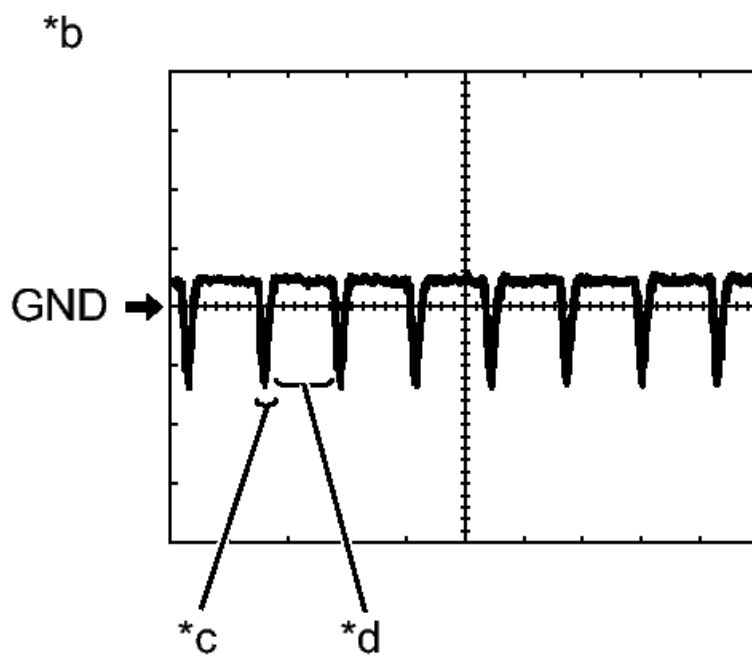
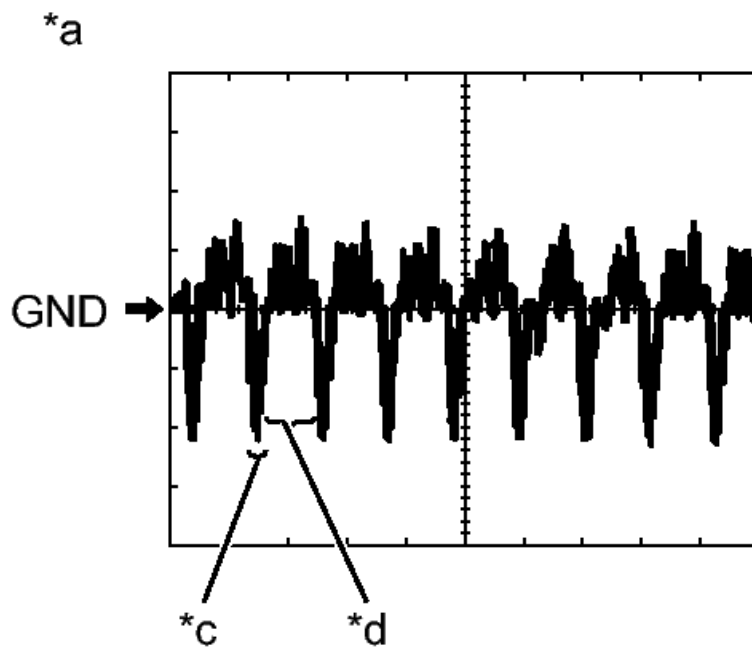
A waterproof connector is used for the rear television camera assembly. Therefore, inspect the waveform at the accessory meter assembly*1 or navigation receiver assembly*2 with the connector connected.

*1: w/o Navigation System

*2: w/ Navigation System

If the result is not as specified, the rear television camera assembly may have a malfunction.

- e. Using an oscilloscope, check the waveform.



H

Fig. 5: Identifying Waveform 1 & 2

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

HINT:

A waterproof connector is used for the rear television camera assembly. Therefore, inspect the waveform at the accessory meter assembly*1 or navigation receiver assembly*2 with the connector connected.

*1: w/o Navigation System

*2: w/ Navigation System

1. Waveform 1 (Reference)

MEASUREMENT CONDITION

Item	Content
Terminal No. (Symbol)	W8-2 (CV+) - W8-1 (CV-)
Tool Setting	200 mV/DIV., 50 μsec./DIV.
Condition	Ignition switch ON, shift lever in R

HINT:

The video waveform changes according to the image sent by the rear television camera assembly.

2. Waveform 2 (Reference)

MEASUREMENT CONDITION

Item	Content
Terminal No. (Symbol)	W8-2 (CV+) - W8-1 (CV-)
Tool Setting	200 mV/DIV., 50 μsec./DIV.
Condition	Ignition switch ON, shift lever in R, screen black

	out by covering camera lens
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HINT:

The video waveform changes according to the image sent by the rear television camera assembly.

TEXT IN ILLUSTRATION

*a	Waveform 1
*b	Waveform 2
*c	Synchronized Signal
*d	Video Waveform

2. **ACCESSORY METER ASSEMBLY (w/o Navigation System)**
3. **NAVIGATION RECEIVER ASSEMBLY (w/ Navigation System for DVD)**
4. **NAVIGATION RECEIVER ASSEMBLY (w/ Navigation System for SD)**

CIRCUIT TESTS

Reverse Signal Circuit

DESCRIPTION

The accessory meter assembly*1 or navigation receiver assembly*2 receives a reverse signal from the park/neutral position switch assembly.

*1: w/o Navigation System

*2: w/ Navigation System

WIRING DIAGRAM

w/o Navigation System:



Fig. 6: Reverse Signal Circuit Wiring Diagram (w/o Navigation)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

w/ Navigation System:



Fig. 7: Reverse Signal Circuit Wiring Diagram (w/ Navigation)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

PROCEDURE

1. SYSTEM CHECK

- a. Check the vehicle specifications.

RESULT

Result	Proceed to
w/o Navigation System	A
w/ Navigation System	B

B --> See step 4

A: Go to next step

2. INSPECT ACCESSORY METER ASSEMBLY

***a**

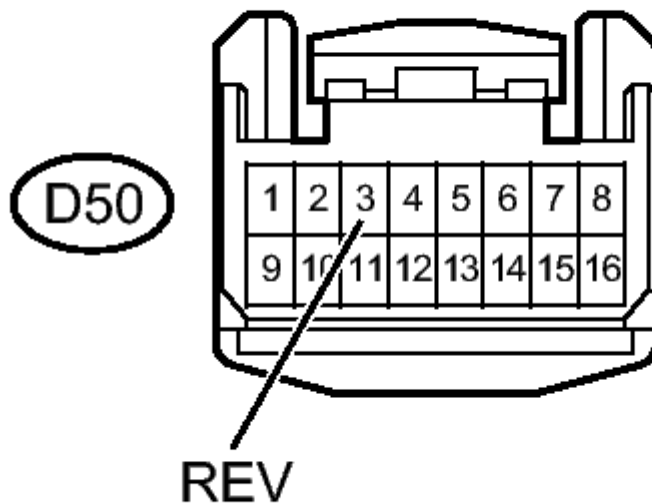


Fig. 8: Checking D50 Accessory Meter Assembly With Connector End View
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Disconnect the D50 accessory meter assembly connector.
- Measure the voltage according to the value(s) in the table below.

Standard Voltage

Tester Connection	Switch Condition	Specified Condition
	Ignition	

D50-3 (REV) - Body ground	switch ON, shift lever in R	11 to 14 V
	Ignition switch ON, shift lever in not R	Below 1 V

TEXT IN ILLUSTRATION

Front view of wire harness *a connector (to Accessory Meter Assembly)

NG --> See step 3

OK --> See step 6

3. CHECK HARNESS AND CONNECTOR (ACCESSORY METER ASSEMBLY - PARK/NEUTRAL POSITION SWITCH ASSEMBLY)

- Disconnect the D50 accessory meter assembly connector.
- Disconnect the B3 park/neutral position switch assembly connector.
- Measure the resistance according to the value(s) in the table below.

Standard Resistance

Tester Connection	Condition	Specified Condition
D50-3 (REV) - B3-2 (RL)	Always	Below 1 ohms
D50-3 (REV) - Body ground	Always	10 kohms or higher

RESULT

Result	Proceed to

NG	A
OK (for U660E)	B
OK (for U660F)	C
OK (for U760E)	D

B --> See step 7

C --> See step 8

D --> See step 9

A --> REPAIR OR REPLACE HARNESS OR CONNECTOR

4. INSPECT NAVIGATION RECEIVER ASSEMBLY

- a. Disconnect the D55 navigation receiver assembly connector.

***a**

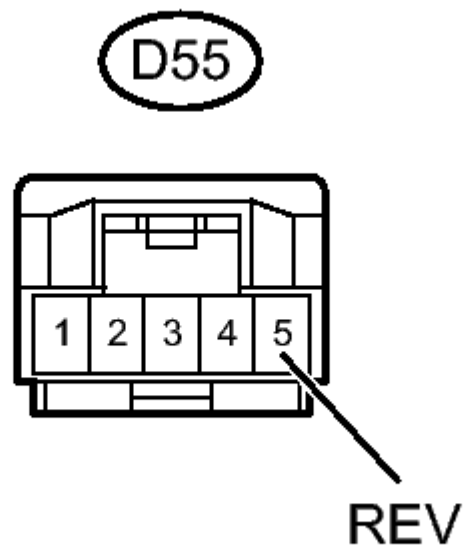


Fig. 9: Inspecting Navigation Receiver Assembly With Connector End View
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Measure the voltage according to the value(s) in the table below.

Standard Voltage

Tester Connection	Switch Condition	Specified Condition
D55-5 (REV) - Body ground	Ignition switch ON, shift lever in R	11 to 14 V
	Ignition switch ON, shift lever in not R	Below 1 V

TEXT IN ILLUSTRATION

*a	Front view of wire harness connector (to Navigation Receiver Assembly)
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NG --> See step 5

OK --> See step 6

5. CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - PARK/NEUTRAL POSITION SWITCH ASSEMBLY)

- Disconnect the D55 navigation receiver assembly connector.
- Disconnect the B3 park/neutral position switch assembly connector.
- Measure the resistance according to the value(s) in the table below.

Standard Resistance

Tester Connection	Condition	Specified Condition
B3-2 (RL) - D55-5 (REV)	Always	Below 1 ohms
B3-2 (RL) - Body ground	Always	10 kohms or higher

RESULT

Result	Proceed to
NG	A
OK (for U660E)	B
OK (for U660F)	C
OK (for U760E)	D

B --> See step 7

C --> See step 8

D --> See step 9

A --> REPAIR OR REPLACE HARNESS OR CONNECTOR

6. **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE. Refer to PROBLEM SYMPTOMS TABLE**
7. **REPLACE PARK/NEUTRAL POSITION SWITCH ASSEMBLY. Refer to REMOVAL**
8. **REPLACE PARK/NEUTRAL POSITION SWITCH ASSEMBLY. Refer to REMOVAL**
9. **REPLACE PARK/NEUTRAL POSITION SWITCH ASSEMBLY. Refer to REMOVAL**

SYMPTOM TESTS

Image from Camera for Rear View Monitor is Abnormal

DESCRIPTION

The display signal of the rear television camera assembly is transmitted to the accessory meter assembly*1 or navigation receiver assembly*2.

*1: w/o Navigation System

*2: w/ Navigation System

WIRING DIAGRAM

w/o Navigation System:

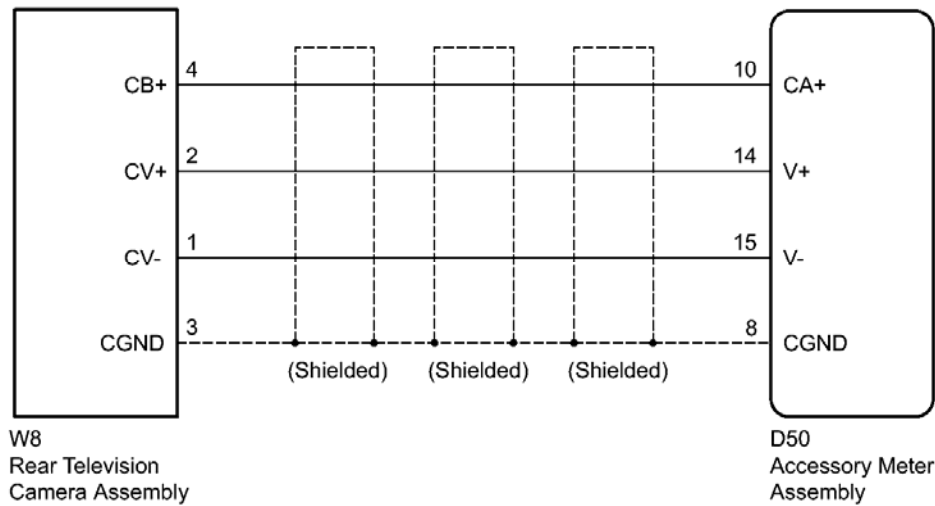


Fig. 10: Rear Television Camera Assembly Wiring Diagram (w/o Navigation)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

w/ Navigation System:

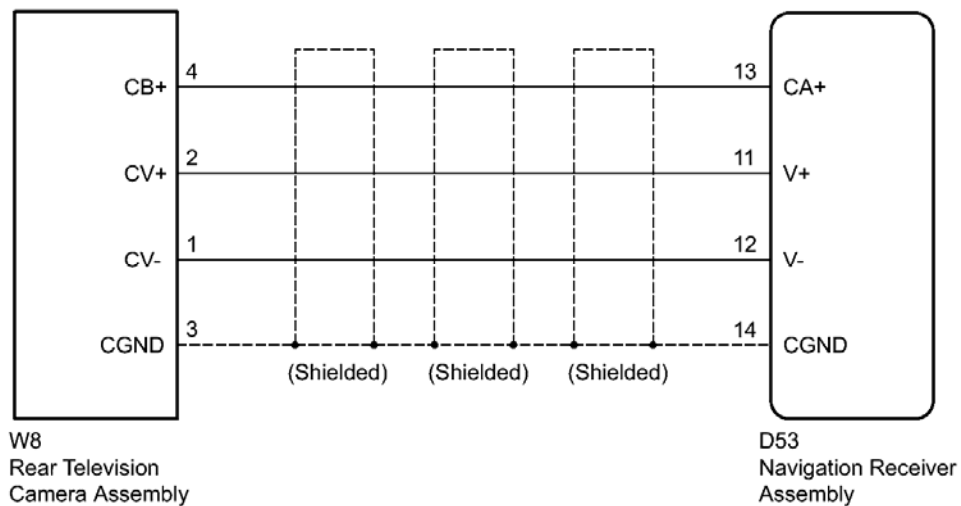


Fig. 11: Rear Television Camera Assembly Wiring Diagram (w/ Navigation)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

PROCEDURE

1. SYSTEM CHECK

- a. Check the vehicle specifications.

RESULT

Result	Proceed to
w/o Navigation System	A
w/ Navigation System	B

B --> See step 5

A: Go to next step

2. CHECK HARNESS AND CONNECTOR (ACCESSORY METER ASSEMBLY - REAR TELEVISION CAMERA ASSEMBLY)

- a. Disconnect the D50 accessory meter assembly connector.
- b. Disconnect the W8 rear television camera assembly connector.
- c. Measure the resistance according to the value(s) in the table below.

Standard Resistance

Tester Connection	Condition	Specified Condition
D50-10 (CA+) - W8-4 (CB+)	Always	Below 1 ohms
D50-14 (V+) - W8-2 (CV+)	Always	Below 1 ohms
D50-15 (V-) - W8-1 (CV-)	Always	Below 1 ohms
D50-8 (CGND) - W8-3 (CGND)	Always	Below 1 ohms

D50-10 (CA+) - Body ground	Always	10 kohms or higher
D50-14 (V+) - Body ground	Always	10 kohms or higher
D50-15 (V-) - Body ground	Always	10 kohms or higher
D50-8 (CGND) - Body ground	Always	10 kohms or higher

NG --> REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

3. INSPECT ACCESSORY METER ASSEMBLY

- a. Reconnect the accessory meter assembly connector.
- b. Measure the resistance according to the value(s) in the table below.

*a

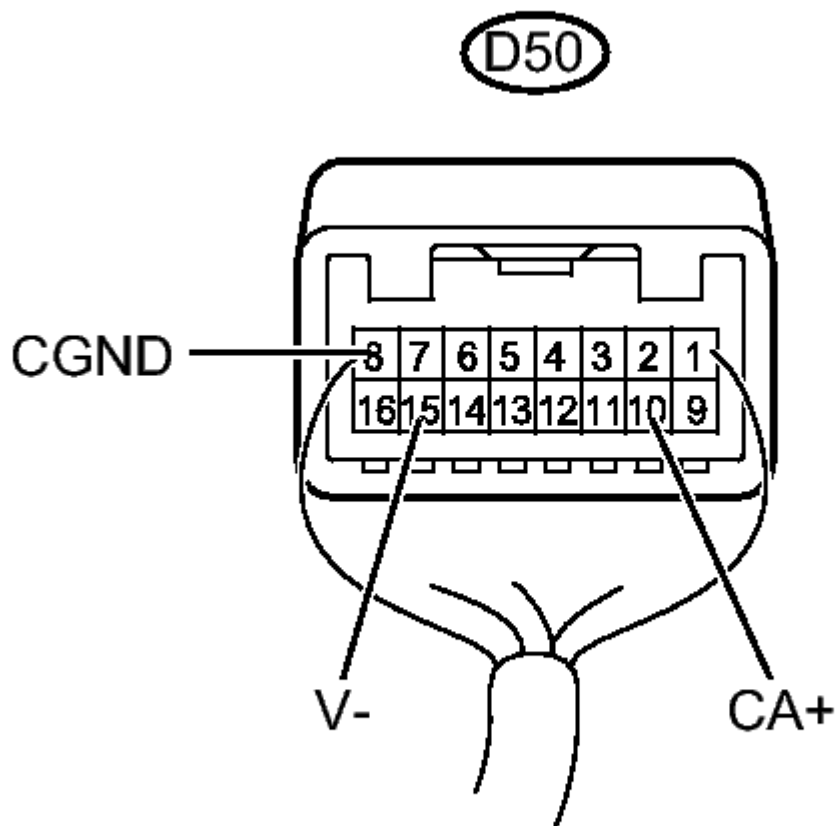


Fig. 12: Inspecting Accessory Meter Assembly With D50 Connector End View
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard Resistance

Tester Connection	Condition	Specified Condition
D50-15 (V-) - Body ground	Always	Below 1 ohms
D50-8 (CGND) - Body ground	Always	Below 1 ohms

- c. Measure the voltage according to the value(s) in the table below.

Standard Voltage

Tester Connection	Condition	Specified Condition
D50-10 (CA+) - D50-8 (CGND)	Ignition switch ON, shift lever in R	5.5 to 7.05 V

TEXT IN ILLUSTRATION

*a	Component with harness connected (Accessory Meter Assembly)
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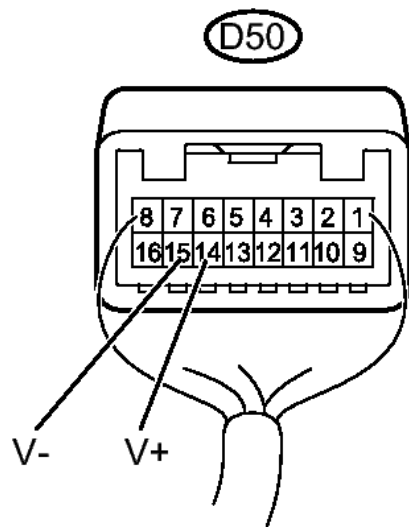
NG --> See step 8

OK: Go to next step

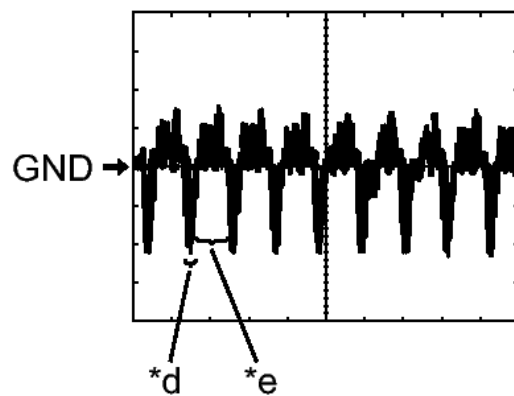
4. INSPECT REAR TELEVISION CAMERA ASSEMBLY

- Reconnect the rear television camera assembly connector.
- Check the waveform of the rear television camera assembly using an oscilloscope.

*a



*b



*c

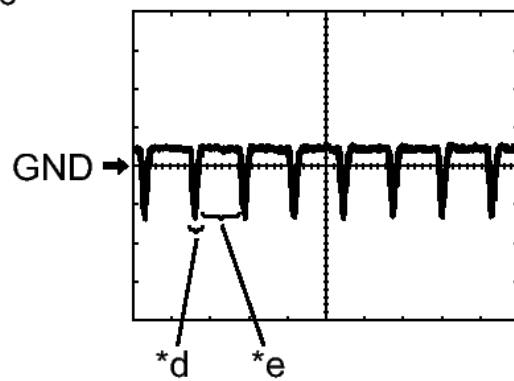


Fig. 13: Inspecting Rear Television Camera Assembly With Waveform References
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

A waterproof connector is used for the rear television camera assembly. Therefore, inspect the waveform at the accessory meter assembly with the connector connected.

MEASUREMENT CONDITION

Item	Content
Terminal No. (Symbol)	D50-14 (V+) - D50-15 (V-)
Tool Setting	200 mV/DIV., 50 μsec./DIV.
Condition	Waveform 1: Ignition switch ON, shift lever in R Waveform 2: Ignition switch ON, shift lever in R, screen blackened out by covering camera lens

OK

Waveform is as shown in the illustration.

HINT:

The video waveform changes according to the image sent by the rear television camera assembly.

TEXT IN ILLUSTRATION

*a	Component with harness connected (Accessory Meter Assembly)
*b	Waveform 1

*c	Waveform 2
*d	Synchronized Signal
*e	Video Waveform

NG --> See step 9

OK --> See step 10

5. CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - REAR TELEVISION CAMERA ASSEMBLY)

- Disconnect the D53 navigation receiver assembly connector.
- Disconnect the W8 rear television camera assembly connector.
- Measure the resistance according to the value(s) in the table below.

Standard Resistance

Tester Connection	Condition	Specified Condition
D53-13 (CA+) - W8-4 (CB+)	Always	Below 1 ohms
D53-11 (V+) - W8-2 (CV+)	Always	Below 1 ohms
D53-12 (V-) - W8-1 (CV-)	Always	Below 1 ohms
D53-14 (CGND) - W8-3 (CGND)	Always	Below 1 ohms
D53-13 (CA+) - Body ground	Always	10 kohms or higher
D53-11 (V+) - Body ground	Always	10 kohms or higher
D53-12 (V-) - Body ground	Always	10 kohms or higher

D53-14 (CGND) - Body ground	Always	10 kohms or higher
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NG --> **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK: Go to next step

6. INSPECT NAVIGATION RECEIVER ASSEMBLY

- Reconnect the navigation receiver assembly connector.
- Measure the resistance according to the value(s) in the table below.

*a

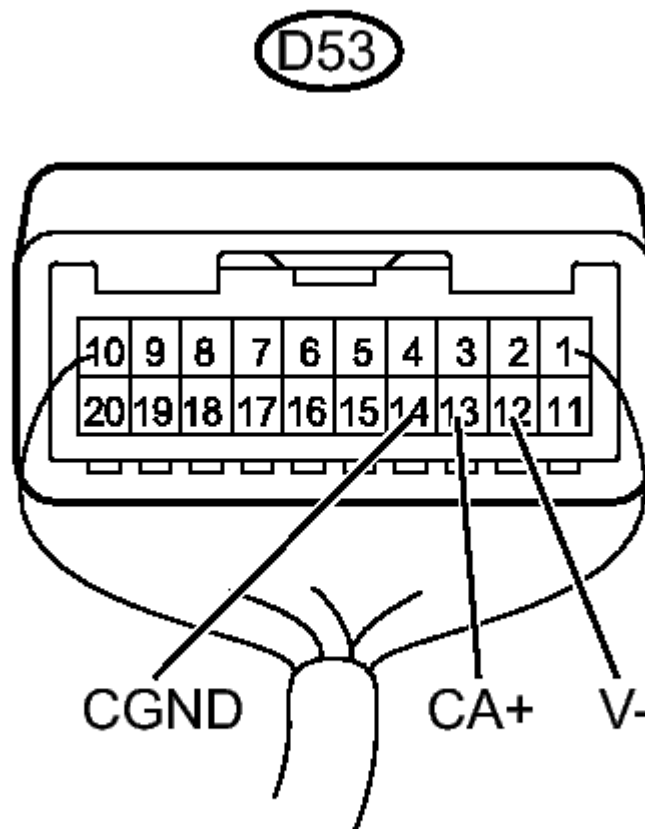


Fig. 14: Inspecting Navigation Receiver Assembly With D50 Connector End View
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard Resistance

Tester Connection	Condition	Specified Condition
D53-12 (V-) - Body ground	Always	Below 1 ohms
D53-14 (CGND) - Body ground	Always	Below 1 ohms

- c. Measure the voltage according to the value(s) in the table below.

Standard Voltage

Tester Connection	Condition	Specified Condition
D53-13 (CA+) - D53-14 (CGND)	Ignition switch ON, shift lever in R	5.5 to 7.05 V

TEXT IN ILLUSTRATION

*a	Component with harness connected (Navigation Receiver Assembly)
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NG --> See step 11

OK: Go to next step

7. INSPECT REAR TELEVISION CAMERA ASSEMBLY

- Reconnect the rear television camera assembly connector.
- Check the waveform of the rear television camera assembly using an oscilloscope.

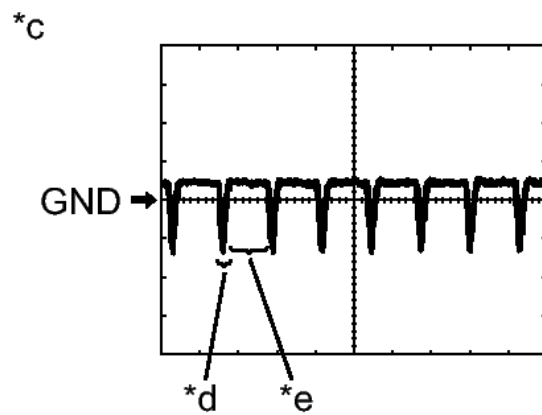
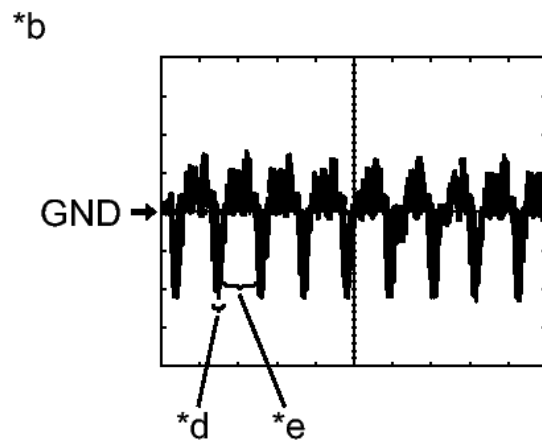
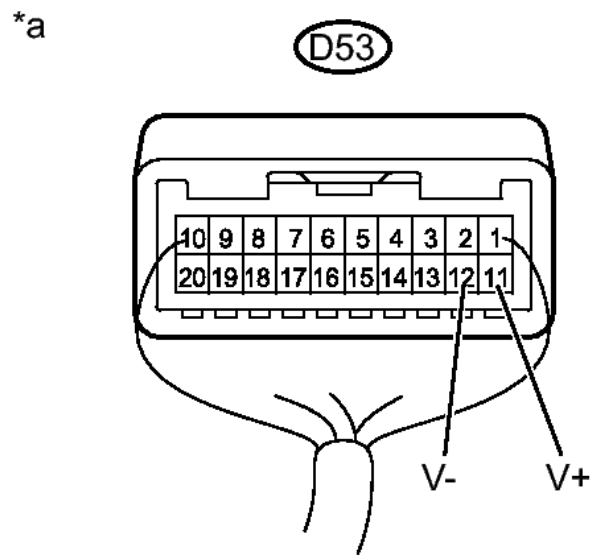


Fig. 15: Inspecting Rear Television Camera Assembly With Waveform References
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

A waterproof connector is used for the rear television camera assembly. Therefore, inspect the waveform at the accessory meter assembly with the connector connected.

MEASUREMENT CONDITION

Item	Content
Terminal No. (Symbol)	D53-11 (V+) - D53-12 (V-)
Tool Setting	200 mV/DIV., 50 μsec./DIV.
Condition	Waveform 1: Ignition switch ON, shift lever in R Waveform 2: Ignition switch ON, shift lever in R, screen blackened out by covering camera lens

OK

Waveform is as shown in the illustration.

HINT:

The video waveform changes according to the image sent by the rear television camera assembly.

TEXT IN ILLUSTRATION

*a	Component with harness connected (Navigation Receiver Assembly)
*b	Waveform 1

*c	Waveform 2
*d	Synchronized Signal
*e	Video Waveform

NG --> See step 12

OK --> See step 13

8. **REPLACE ACCESSORY METER ASSEMBLY. Refer to REMOVAL**
9. **REPLACE REAR TELEVISION CAMERA ASSEMBLY. Refer to REMOVAL**
10. **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE. Refer to PROBLEM SYMPTOMS TABLE**
11. **REPLACE NAVIGATION RECEIVER ASSEMBLY. Refer to REMOVAL**
12. **REPLACE REAR TELEVISION CAMERA ASSEMBLY. Refer to REMOVAL**
13. **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE. Refer to PROBLEM SYMPTOMS TABLE**