

GROUP 54Ba

SIMPLIFIED WIRING SYSTEM (SWS)

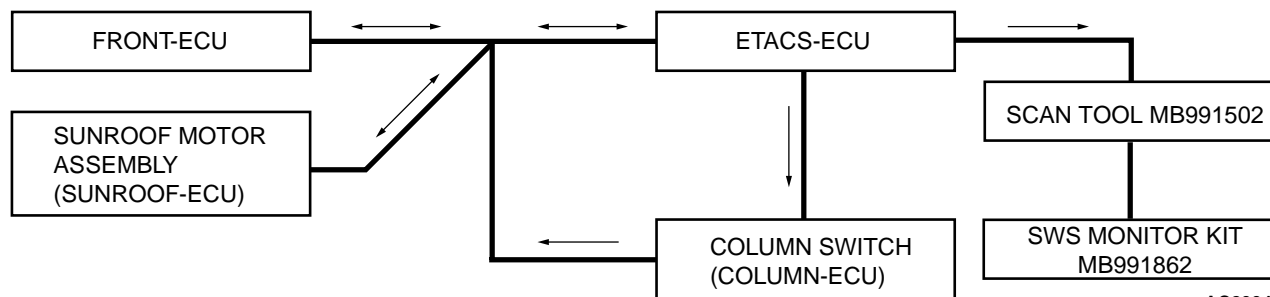
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GENERAL DESCRIPTION

COMMUNICATION METHOD

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As shown below, signal wires used exclusively for transmitting multiplex signal data connect the ETACS-ECU, front-ECU, column switch (incorporating the column-ECU) and sunroof motor assembly (incorporating the sunroof-ECU) and these components communicate with each other.

OPERATION

TONE ALARM FUNCTION

Ignition key reminder tone alarm function

When the driver's door is opened (driver's door switch ON) without removing the ignition key [ignition switch to the "LOCK" (OFF) or "ACC" position], the tone alarm will sound intermittently to remind the driver that the ignition key has not been removed.

Light reminder tone alarm function

When the driver's door is opened (driver's door switch ON) with lighting switch (taillight switch or headlight switch) in the ON position and ignition switch in the "LOCK" (OFF) or "ACC" position, the tone alarm will sound continuously to remind the driver that the lights (taillights or headlights) are ON. This function does not work if the taillights or headlights are switched off through the headlight automatic shutdown function. In addition, the ignition key reminder tone alarm function has a priority over this function.

Seat belt tone alarm function

When the ignition switch is turned to the "ON" position without fastening the seat belts (seat belt switch OFF), the tone alarm will sound for approximately six seconds to warn the driver to fasten the seat belts. When the seat belts are fastened, the tone alarm will stop sounding.

CENTRAL DOOR LOCKING SYSTEM

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Central door locking system operation

- When the driver's inside lock knob is locked or unlocked, the lock relay inside the ETACS-ECU turns on to lock or unlock all doors.
- With all the doors locked, turning the key in the driver's door unlocks the door. Turning it again makes the door unlock relay close to send a signal for unlocking all doors.
- When the door lock switch (built into the power window switch) is operated, the lock or unlock relay inside the ETACS-ECU is turned on to lock or unlock all doors.

POWER WINDOW RELAY CONTROL

Power window relay operation

If the ignition switch is turned to "ON" position, the power window relay is energized to activate the power windows.

Power window timer function

When the ignition switch is turned from the "ON" position to "LOCK" (OFF) or "ACC" position, the power windows can be operated for 30 seconds. If any door is opened for the 30 seconds, the power windows will be immobilized at that point.

KEYLESS ENTRY SYSTEM

If the RKE transmitter "LOCK" or "UNLOCK" switch is pressed while the ignition key is removed, the doors can be locked or unlocked. If the doors are closed, the hazard warning lights, the dome light and the horn will operate due to answerback function. Because of the answerback function, the hazard warning lights flash twice, and the horn sounds once, the dome light flashes twice when the doors are locked. Meanwhile, when the doors are unlocked, the hazard warning lights flash and the dome light illuminates for 15 seconds. The hazard and the horn answerback functions can be cancelled by using the RKE transmitter.

SUNROOF

Sunroof Operation

- All of the slide open/close, tilt up/down, and stop operations can be performed by a single switch.
- When the roof lid glass is tilted up, the sunshade opens approximately 98 mm (3.9 inches) in combined operation with the roof lid glass for better ventilation.
- A jam preventing mechanism has been adopted. When a slide-close or tilt-down operation is blocked by an external force, the roof lid glass moves back and stops.
- The electronic sunroof system cannot be operated manually. The sunroof wrench that was used in previous models is not provided. If the anti-jam mechanism reverses the sunroof five or more times consecutively due to deformation or other problem with the sunroof components, it deactivates and allows the sunroof to make small movements [30 mm (1.2 inches)] until it closes completely.

Sunroof Timer Function

When the ignition switch is turned from "ON" position to "LOCK" (OFF) or "ACC" position, the sunroof can be operated for thirty seconds. If any door is opened for the 30 seconds, the sunroof will be immobilized at that point.

WINDSHIELD WIPERS AND WASHERS

Windshield low-speed (and high-speed) wiper operation

- If the windshield low-speed wiper switch is turned to the ON position with the ignition switch at the "ACC" or "ON" position, the column switch sends a low-speed wiper ON and high-speed wiper OFF signals to the front-ECU. This turns the wiper signal on and the wiper speed control relay off (low-speed), causing the wipers to operate at low-speed.
- If the windshield high-speed wiper switch is turned to the ON position, the column switch sends a low-speed wiper OFF and high-speed wiper ON signals to the front-ECU. This turns both the wiper signal and the wiper speed switching relay on (high-speed), causing the wipers to operate at high-speed.

NOTE: The windshield wiper speed is changed by wiper speed control relay incorporated in front-ECU. When the wiper speed control relay is at "ON" position, the windshield wiper operates at high-speed, and the wiper speed control relay is at "OFF" position, the windshield wiper operates at low-speed.

Windshield intermittent wiper operation

The ETACS-ECU calculates the wiper operation interval according to the voltage signal sent from the column switch. Then the ETACS-ECU sends a signal to the front-ECU. The front-ECU determines the wiper operation interval and turns on the wiper relay signal relay. This causes the wiper auto stop relay to turn on. Then the wiper auto stop relay will turn off after the wipers reach the park position. This causes the wiper signal relay and then the wipers to turn off. If the wiper signal relay remains off for the wiper operation interval, the relay turns on again, causing the wipers to operate in intermittent mode.

Windshield mist wiper operation

- If the windshield mist wiper switch is turned to the ON position with the ignition switch at the "ACC" or "ON" position, the mist wiper high-speed operation signal is sent to the front-ECU. This signal turns on the wiper speed switching relay, causing the wipers to work at high-speed while the mist switch is on.
- While the windshield mist wiper switch remains turned on when the intermittent mode is still working, the wipers work as the mist wiper. However, the wipers return to the intermittent mode again when the switch is changed back to "INT" position.

- To prevent the windshield mist wiper from operating when the windshield wiper switch is turned OFF, the windshield mist wiper does not work for 0.5 second after the windshield intermittent wiper switch, the windshield low-speed wiper switch and the windshield high-speed wiper switch are turned OFF.

Windshield washer operation

- If the windshield washer switch is turned to ON position with the ignition switch at "ACC" or "ON" position, the windshield washer ON signal is sent to the front-ECU, causing the windshield wiper signal to turn on after 0.3 second. After the windshield washer switch signal turns off, the windshield wiper signal turns off in three seconds.
- If the windshield washer switch is turned on while the windshield wiper is at intermittent mode, when the windshield washer switch is turned OFF within 0.2 second, the wiper works only once to perform mist operation by the windshield washer switch. When the ON condition of the windshield washer switch continues more than 0.2 second, the wiper performs the same movement as normal condition from the time when 0.2 second has elapsed and then returns to the intermittent motion.

REAR WIPER AND WASHER

Rear wiper operation

If the rear wiper and washer switch is turned to "INT" position with the ignition switch at "ACC" or "ON" position, the ETACS-ECU turns ON the rear wiper drive signal for three seconds (approximately two cycles), then 7.4 seconds later the intermittent motion operates every eight seconds. If the selector lever is moved to the "R" position when the rear wiper and washer switch is turned to the "INT" position and the ignition switch is at the "ACC" or "ON" position, the park/neutral position switch "R" turns ON. One second later, the ETACS-ECU turns ON the rear wiper drive signal for three seconds (approximately two cycles). Then, 7.4 seconds later, the intermittent motion of eight seconds' cycle is restored.

Rear washer operation

If the rear wiper and washer switch is turned to the ON (washer) position with the ignition switch at the "ACC" or "ON" position, the rear washer ON signal is sent to the ETACS-ECU, causing the rear wiper signal to turn on after 0.3 second. After the rear washer switch signal turns off, the rear wiper signal turns off

in three seconds. If the rear washer switch is turned to the ON position while the rear wiper is in intermittent mode, the rear washer works for that period when the washer switch remains on. Then the rear wipers return to the intermittent mode.

SEAT BELT WARNING LIGHT

If the driver turns the ignition switch to the "ON" position without wearing the seat belt, the seat belt warning light illuminates to alert the driver to wear the seat belt.

HEADLIGHT

Headlight automatic shutdown function

When the headlights or taillights are on, and the ignition switch is turned from "ON" to "LOCK" (OFF) or "ACC" position or the ignition key is removed, the headlights will be switched off in three minutes. If the driver's door is opened within that three-minute period, the headlights will be switched off automatically. This prevents the battery from discharging.

NOTE: The headlight automatic shutdown function can be disabled by the SWS configuration function. Refer to P.54Ba-23.

Headlight dimmer switch automatic resetting function

This function allows the dimmer switch to be reset to the low-beam position whenever the headlight switch is turned to the ON position.

FLASHER TIMER

Turn-signal light

When the ignition switch is turned to the "ON" position and turn-signal light switch is placed in the ON position for right or left turn-signaling, the system generates turn-signal light drive signals (flashing signals). The system also notifies of a blown turn-signal light bulb by shortening the flashing intervals of the corresponding indicator light.

Hazard warning light

The system detects a change from OFF to ON of the hazard warning input signal and activates or shuts off the hazard warning lights accordingly.

DOME LIGHT

With the dome light switch in the "door controlled operation" (middle) position, the ETACS-ECU controls the dome light operation as follows:

- When a door is opened from outside or inside [with the ignition switch turned to "LOCK" (OFF)]: When a door is opened, the ETACS-ECU causes the dome light to be illuminated at 100% intensity. When the door is closed, it dims the dome light to 65% intensity and approximately 30 seconds later, turns out the light completely. During this period (timer controlled period), the dome light goes out if the ignition switch is turned "ON" or the doors are locked.
- When a door is opened or closed with the ignition switch in the "ON" position: The dome light illuminates at 100% intensity when a door is opened and turned out when it is closed.
- When no door is opened and the ignition key is removed: The dome light is illuminated at 100% intensity and turned off approximately 30 seconds later. During that time (timer-controlled period), the dome light goes out if the ignition key is inserted and turned to "ON" or the door locking system is activated.
- Dome light's answerback operation in response to door lock control by keyless entry system: To allow the driver to confirm the doors have locked by the keyless entry system, the ETACS-ECU causes the dome light to blink twice when the doors are locked by the RKE system and to illu-

minate for approximately 15 seconds when the doors are locked. The dome light's answerback operation in response to a keyless entry system control action is accompanied by flashing of the hazard warning lights.

Interior light automatic shutoff function

Operation of interior light automatic shutoff function

This function prevents the battery from being discharged when the door is open or the dome light remains on with the ignition switch at the "LOCK" (OFF) position. The ETACS-ECU turns on its "keep" relay to switch off the battery power supply to the interior lights when the interior light loaded signal and all door switches remain on for approximately 30 minutes with the ignition switch at positions other than ACC. Then the interior lights will be switched off. If the ignition switch is turned on again, the ETACS-ECU turns on its "keep" relay to illuminate the interior lights.

Door-ajar indicator light

Operation of the door-ajar indicator light

This indicator light warns the driver that door(s) are not closed. If a door switch is on, the ETACS-ECU operates the door-ajar indicator light on the combination meter.

SWS DIAGNOSIS

GENERAL DESCRIPTION

BEFORE CARRYING OUT TROUBLESHOOTING

Before carrying out troubleshooting, check the following two items.

- Make sure that the ETACS-ECU, the junction block (J/B), the front-ECU and the engine compartment relay box are connected securely.

- Make sure that fuses and fusible links related to relevant systems are not blown.

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SWS DIAGNOSTIC TROUBLESHOOTING STRATEGY

1. Gather information about the problem from the customer.
2. Verify that the condition described by the customer exists.

NOTE: If an error occurs in the SWS communication line, the ECU isolated from the communication line performs a fail-safe or backup operation, so the problem may not match the one shown in the Trouble Symptom Chart. However, the cause of the failure can be tracked down by performing the following troubleshooting with the SWS monitor.

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3. Version number and destination check

Check whether the SWS version number (0) and destination (North America) meet the vehicle specifications. If they are different, replace the ETACS-ECU with a correct one.

4. Use scan tool to select "ECU COMM CHK" on the SWS monitor display.

Check whether the communication status of the input- or output-signal-side ECU associated with the defective function is normal.

- If "OK" is displayed for all related ECUs, they communicate with each other normally and the input or output signal circuit system may be defective. Therefore, check SWS monitor service data.
 - If "NG" is displayed for any of the related ECUs, something may be wrong with the ECU for which "NG" appears, its power supply or grounding system, or a wiring harness or connector between the SWS monitor and the ECU. Check the wiring harness and connectors associated with the ECU and examine the ECU itself.
5. Service data on the SWS monitor

Select the defective function from the function-specific diagnostic menu, and check the service data that appears for each function item.

NOTE: In addition to the function-specific diagnostic menu, a service data menu is available for SWS monitor service data to check all items for each ECU.

- (1) When the SWS communication line is monitored.
 - (2) You can determine whether the problem lies in the input or output signal circuit system by checking whether communication data is correct.
- The switch condition does not meet the service data display: Input signal system related to defective functions
 - The switch condition meets the service data display: Output signal system related to defective functions
6. Check of input signal circuit system

Check relevant switch, sensor, input signal-side ECU and their wiring harness and connector.
 7. Check of output signal circuit system

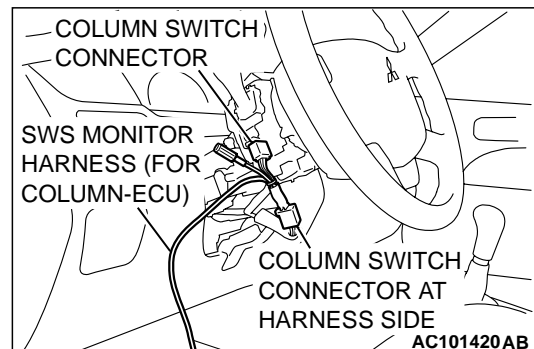
Check an output signal-side ECU, electrical load components and their wiring harness and connector.

HOW TO CONNECT SWS MONITOR

CAUTION

Always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting the SWS monitor kit and scan tool MB991502. Connect the DLC harness before connecting the column-ECU harness. Be sure to connect SWS monitor kit MB991862 after turning on the scan tool MB991502.

1. Remove the steering column cover.
2. Remove the steering column switch connector.

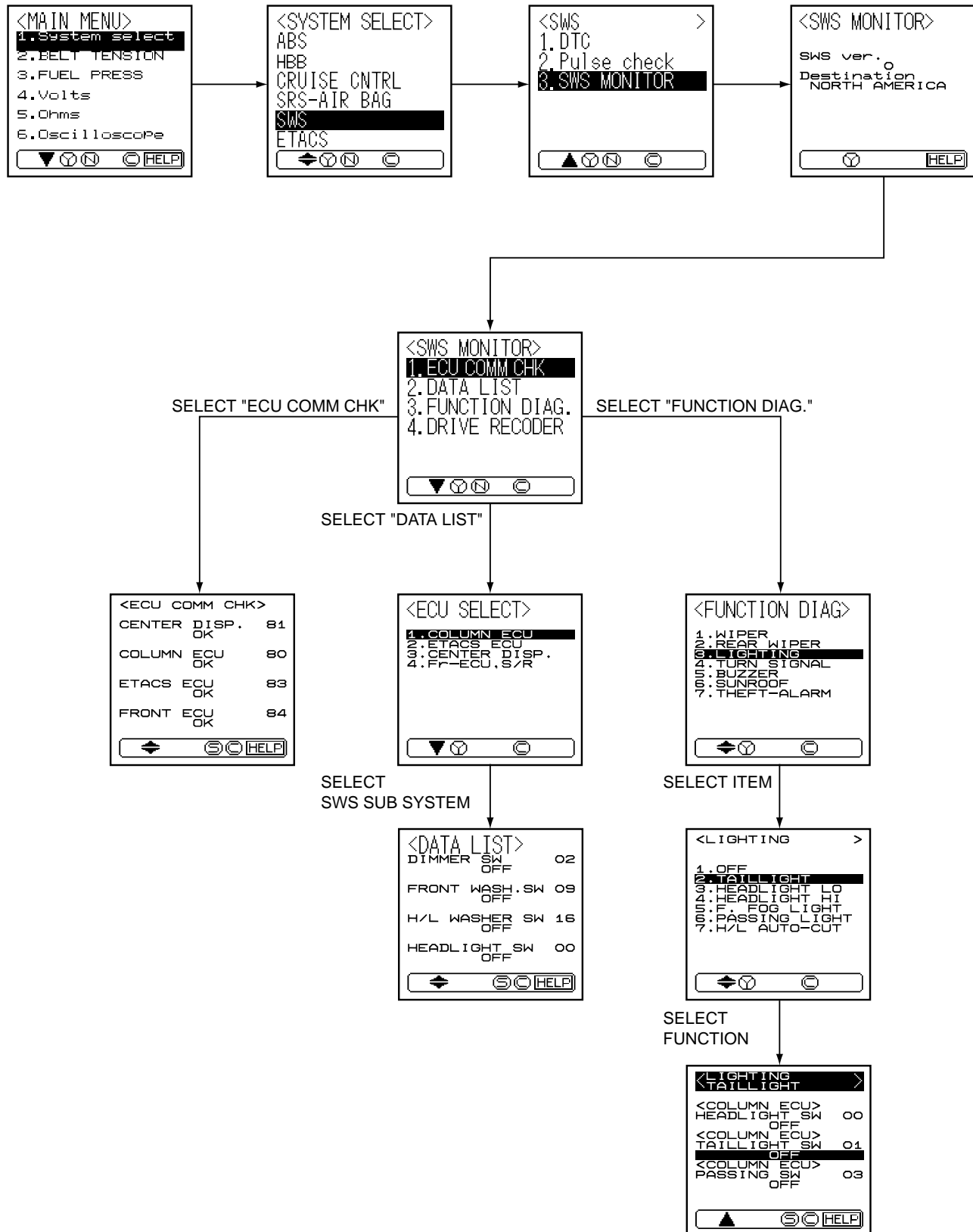


3. Connect the SWS monitor harness (for column-ECU).

HOW TO USE SWS MONITOR

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Troubleshooting with SWS monitor showing sample scan tool MB991502 screens.



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HOW TO CHECK ECUs

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1. Use the scan tool and the SWS monitor kit to check ECUs. (Refer to MUT-II Reference Manual)
2. The following ECUs can be checked by using the scan tool and the SWS monitor kit.

NOTE: The "ECU COMM CHK" function checks a communication status of ECUs "NG" does not always mean ECU malfunction. If a malfunction is found by the "ECU COMM CHK", proceed "Symptom Procedure" (Refer to [P.54Bb-2](#)).

SWS monitor kit-compatible ECUs and their conditions

ECU TO BE CHECKED	DISPLAY ON SCAN TOOL	NORMAL CONDITION	ECU CONDITION
Column switch (column-ECU)	COLUMN ECU	OK*1	All of the column switch, power supply, ground and interconnecting communication line are normal
ETACS-ECU	ETACS ECU	OK	All of the ETACS-ECU switch, power supply, ground and interconnecting communication line are normal
Front-ECU	FRONT ECU	OK*2	All of the front-ECU, power supply, ground and interconnecting communication line are normal
Sunroof motor assembly (sunroof-ECU)	SUNROOF ECU	OK*2	All of the sunroof motor assembly, power supply, ground and interconnecting communication line are normal
Other SWS-related ECUs	Other ECUs	NG	ECUs are not used

NOTE:

- *1: If the ignition switch is turned to the "LOCK" (OFF) or "ACC" when "NG" is displayed beside the "ETACS ECU" or the signal request line is abnormal, the scan tool shows "NG" beside the "COLUMN ECU".

- *2: When "NG" is displayed beside the "ETACS ECU", the scan tool shows "NG" beside the "FRONT ECU" and "SUNROOF ECU".

SERVICE DATA CHECK

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1. Use the scan tool and the SWS monitor kit to check "Service Data."

This "Service Data" check is applicable for signals, which are transmitted and received through the SWS communication line. For input signals, which are not compatible with the SWS monitor kit, refer to the Pulse Check procedure (by using the scan tool or voltmeter) [P.54Ba-16](#).

2. The following input signals can be checked by using the scan tool and the SWS monitor kit.

NOTE: If a problem is found in the "Service Data" check, refer to the Problems during Input Signal Check <SWS monitor>. (Refer to [P.54Bc-2](#).)

<DATA LIST REFERENCE TABLE>

- COLUMN ECU (column switch)

CHECK ITEM	ITEM NO.	DISPLAY ON SCAN TOOL	CHECK CONDITION	NORMAL CONDITION
Dimmer switch	02	DIMMER SW	Dimmer switch: ON	ON
			Dimmer switch: OFF	OFF
Windshield washer switch	09	FRONT WASH.SW	Windshield washer switch: ON	ON
			Windshield washer switch: OFF	OFF

CHECK ITEM	ITEM NO.	DISPLAY ON SCAN TOOL	CHECK CONDITION	NORMAL CONDITION
Headlight switch	00	HEADLIGHT SW	Lighting switch: HEAD	ON
			Lighting switch: Other than HEAD	OFF
Windshield high-speed wiper switch	07	HI WIPER SW	Wiper switch: HI	ON
			Wiper switch: Other than HI	OFF
With or without windshield intermittent wiper interval adjusting knob	15	INT WIPE KNOB	Vehicles with intermittent wiper adjusting knob	EQUIP
			Vehicles without intermittent wiper adjusting knob	NON
Windshield intermittent wiper switch	05	INT WIPER SW	Wiper switch: INT	ON
			Wiper switch: Other than INT	OFF
Windshield low-speed wiper switch	06	LO WIPER SW	Wiper switch: LO	ON
			Wiper switch: Other than LO	OFF
Wind shield mist wiper switch	08	MIST WIPER SW	Wiper switch: Mist	ON
			Wiper switch: Other than "Mist" position	OFF
Passing light switch	03	PASSING SW	Passing light switch: ON	ON
			Passing light switch: OFF	OFF
Tail light switch	01	TAILLIGHT SW	Lighting switch: TAIL	ON
			Lighting switch: OFF	OFF
Turn-signal light switch (LH)	11	T/S LH SW	Turn-signal light switch: LH	ON
			Turn-signal light switch: Other than LH	OFF
Turn-signal light switch: RH	10	T/S RH SW	Turn-signal light switch: RH	ON
			Turn-signal light switch: Other than RH	OFF
Rear wiper switch	13	REAR WIPER SW	Rear wiper switch: INT	ON
			Rear wiper switch: Other than INT	OFF
Rear washer switch	14	REAR WASH.SW	Rear wiper switch: Washer	ON
			Rear wiper switch: Other than "Washer" position	OFF

• ETACS ECU

CHECK ITEM	ITEM NO.	DISPLAY ON SCAN TOOL	CHECK CONDITION	NORMAL CONDITION
Tone alarm	43	BUZZER	1. Ignition switch: LOCK (OFF) 2. Key reminder switch: ON 3. Front door switch: ON (front door open)	ON
			When requirements for sounding each warning tone alarm are not satisfied	OFF
Front door switch	32	FRONT DOOR SW	Front door switch (right or left): right or left door switch is on (right or left front door is open)	ON
			Front door switches (right and left): both right and left door switches are off (both right and left front doors are closed)	OFF
Headlight automatic shutdown function	35	H/L AUTO-CUT	1. Lighting switch: Other than OFF 2. Ignition switch: from ON or START to LOCK (OFF) or ACC 3. Front door switch: ON (front door open)	OFF to ON (after approximately one second)
			When requirements for the headlight automatic shutdown are not satisfied	OFF
Ignition switch (IG1)	30	IG SW (IG1)	Ignition switch: ON or START	ON
			Ignition switch: LOCK (OFF) or ACC	OFF
Ignition switch (ACC)	31	IG SW (ACC)	Ignition switch: ACC or ON	ON
			Ignition switch: LOCK (OFF) or START	OFF
Park/neutral switch ("R" position)	41	PNP SW (R)	Park/Neutral position switch: R position	ON
			Park/Neutral position switch: Other than R position	OFF
Windshield intermittent wiper interval	37	INT WIPE TIME	1. Ignition switch: ACC or ON 2. Operate the intermittent wiper adjusting knob, and change the wiper interval	The scan tool displays intermittent wiper interval in response to the intermittent wiper adjusting knob positions

NOTE: For item number 43, the scan tool also display "ON" when the light reminder tone alarm or R (reverse) position warning tone alarm is triggered.

• FRONT ECU

CHECK ITEM	ITEM NO.	DISPLAY ON SCAN TOOL	CHECK CONDITION	NORMAL CONDITION
Response by the front-ECU	70	FRONT ECU ACK	Lighting switch is at position other than OFF (excluding when high-beam is on) or the wiper switch is at position other than OFF	NORMAL ACK
			<ul style="list-style-type: none"> • Ignition switch: ON or START • Lighting switch: OFF • Wiper switch: OFF 	SLEEP ACK
			<ul style="list-style-type: none"> • Lighting switch: HEAD • Headlight: High-beam 	HI-BEAM ACK
			-	NO ACK

NOTE: For item number 70, the scan tool also displays "NG" under the "ECU COMM CHK" when it displays "NO ACK" under the front-ECU check.

<FUNCTION DIAGNOSIS>

The table below shows the service data and their normal condition, which are displayed during the "FUNCTION DIAG." The row "Normal conditions" shows values, which are shown when each operation is made.

• WIPER

ITEM	ITEM NO.	INPUT SIGNAL	DISPLAY ON SCAN TOOL	NORMAL CONDITION
F.WIPER HI	05	Windshield intermittent wiper switch	INT WIPER SW	OFF
	06	Windshield low-speed wiper switch	LO WIPER SW	OFF
	07	Windshield high-speed wiper switch	HI WIPER SW	ON
	08	Wind shield mist wiper switch	MIST WIPER SW	OFF
	09	Windshield washer switch	FRONT WASH.SW	OFF
	31	Ignition switch (ACC)	IG SW (ACC)	ON
	70	Response by the front-ECU	FRONT ECU ACK	NORMAL ACK or HI-BEAM ACK

ITEM	ITEM NO.	INPUT SIGNAL	DISPLAY ON SCAN TOOL	NORMAL CONDITION
F.WIPER INT	05	Windshield intermittent wiper switch	INT WIPER SW	ON
	06	Windshield low-speed wiper switch	LO WIPER SW	OFF
	07	Windshield high-speed wiper switch	HI WIPER SW	OFF
	08	Wind shield mist wiper switch	MIST WIPER SW	OFF
	09	Windshield washer switch	FRONT WASH.SW	OFF
	31	Ignition switch (ACC)	IG SW (ACC)	ON
	37	Windshield intermittent wiper interval	INT WIPE TIME	The scan tool displays intermittent wiper interval in response to the intermittent wiper adjusting knob positions
	70	Response by the front-ECU	FRONT ECU ACK	NORMAL ACK or HI-BEAM ACK
F.WIPER LO	05	Windshield intermittent wiper switch	INT WIPER SW	OFF
	06	Windshield low-speed wiper switch	LO WIPER SW	ON
	07	Windshield high-speed wiper switch	HI WIPER SW	OFF
	08	Wind shield mist wiper switch	MIST WIPER SW	OFF
	09	Windshield washer switch	FRONT WASH.SW	OFF
	31	Ignition switch (ACC)	IG SW (ACC)	ON
	70	Response by the front-ECU	FRONT ECU ACK	NORMAL ACK or HI-BEAM ACK

ITEM	ITEM NO.	INPUT SIGNAL	DISPLAY ON SCAN TOOL	NORMAL CONDITION
F.WIPER MIST	05	Windshield intermittent wiper switch	INT WIPER SW	OFF
	06	Windshield low-speed wiper switch	LO WIPER SW	OFF
	07	Windshield high-speed wiper switch	HI WIPER SW	OFF
	08	Wind shield mist wiper switch	MIST WIPER SW	ON
	09	Windshield washer switch	FRONT WASH.SW	OFF
	31	Ignition switch (ACC)	IG SW (ACC)	ON
	70	Response by the front-ECU	FRONT ECU ACK	NORMAL ACK or HI-BEAM ACK
F.WIPER WASH	08	Wind shield mist wiper switch	MIST WIPER SW	OFF
	09	Windshield washer switch	FRONT WASH.SW	ON
	31	Ignition switch (ACC)	IG SW (ACC)	ON
	70	Response by the front-ECU	FRONT ECU ACK	NORMAL ACK or HI-BEAM ACK

• REAR WIPER

ITEM	ITEM NO.	INPUT SIGNAL	DISPLAY ON SCAN TOOL	NORMAL CONDITION
REAR WASHER	14	Rear washer switch	REAR WASH.SW	ON
	31	Ignition switch (ACC)	IG SW (ACC)	ON
REAR WIPER	13	Rear wiper switch	REAR WIPER SW	ON
	14	Rear washer switch	REAR WASH.SW	OFF
	31	Ignition switch (ACC)	IG SW (ACC)	ON
REV.INTERLOCK	13	Rear wiper switch	REAR WIPER SW	ON
	31	Ignition switch (ACC)	IG SW (ACC)	ON
	41	Park/neutral switch ("R" position)	PNP SW (R)	ON

• LIGHTING

ITEM	ITEM NO.	INPUT SIGNAL	DISPLAY ON SCAN TOOL	NORMAL CONDITION
H/L AUTO-CUT	00	Headlight switch	HEADLIGHT SW	Either is on
	01	Tail light switch	TAILLIGHT SW	
	30	Ignition switch (IG1)	IG SW (IG1)	OFF
	32	Front door switch	FRONT DOOR SW	ON
	35	Headlight automatic shutdown function	H/L AUTO-CUT	ON
	70	Response by the front-ECU	FRONT ECU ACK	NORMAL ACK or HI-BEAM ACK
OFF	00	Headlight switch	HEADLIGHT SW	OFF
	01	Tail light switch	TAILLIGHT SW	OFF
	03	Passing light switch	PASSING SW	OFF
	04	Automatic lighting switch	AUTOLAMP SW	OFF
	30	Ignition switch (IG1)	IG SW (IG1)	ON
	35	Headlight automatic shutdown function	H/L AUTO-CUT	OFF
	70	Response by the front-ECU	FRONT ECU ACK	NORMAL ACK or SLEEP ACK
HEADLIGHT HI	00	Headlight switch	HEADLIGHT SW	ON
	02	Dimmer switch	DIMMER SW	ON
	03	Passing light switch	PASSING SW	ON
	30	Ignition switch (IG1)	IG SW (IG1)	ON
	35	Headlight automatic shutdown function	H/L AUTO-CUT	OFF
	70	Response by the front-ECU	FRONT ECU ACK	HI-BEAM ACK
HEADLIGHT LO	00	Headlight switch	HEADLIGHT SW	ON
	03	Passing light switch	PASSING SW	OFF
	30	Ignition switch (IG1)	IG SW (IG1)	ON
	35	Headlight automatic shutdown function	H/L AUTO-CUT	OFF
	70	Response by the front-ECU	FRONT ECU ACK	NORMAL ACK

ITEM	ITEM NO.	INPUT SIGNAL	DISPLAY ON SCAN TOOL	NORMAL CONDITION
PASSING LIGHT	03	Passing light switch	PASSING SW	ON
	70	Response by the front-ECU	FRONT ECU ACK	NORMAL ACK or HI-BEAM ACK
TAILLIGHT	00	Headlight switch	HEADLIGHT SW	OFF
	01	Tail light switch	TAILLIGHT SW	ON
	03	Passing light switch	PASSING SW	OFF
	30	Ignition switch (IG1)	IG SW (IG1)	ON
	35	Headlight automatic shutdown function	H/L AUTO-CUT	OFF
	70	Response by the front-ECU	FRONT ECU ACK	NORMAL ACK

NOTE: When checking the input signals (off, tail, low-beam or high-beam), turn the ignition switch to the "ON" position in order to disable the headlight automatic shutdown function. However, the headlight operation does not depend on the ignition switch positions, the scan tool does not display the title "IGNITION SWITCH".

For checking item "HI (High-beam)", the scan tool displays "OFF" on the item number 2 "Dimmer SW" when the headlights are at high-beam. Therefore, the scan tool should display "ON" momentarily when the dimmer switch is operated.

• TURN SIGNAL

ITEM	ITEM NO.	INPUT SIGNAL	DISPLAY ON SCAN TOOL	NORMAL CONDITION
TURN-SIG.LH	10	Turn-signal light switch (RH)	T/S RH SW	OFF
	11	Turn-signal light switch (LH)	T/S LH SW	ON
	30	Ignition switch (IG1)	IG SW (IG1)	ON
TURN-SIG.RH	10	Turn-signal light switch (RH)	T/S RH SW	ON
	11	Turn-signal light switch (LH)	T/S LH SW	OFF
	30	Ignition switch (IG1)	IG SW (IG1)	ON

• BUZZER

ITEM	ITEM NO.	INPUT SIGNAL	DISPLAY ON SCAN TOOL	NORMAL CONDITION
KEY REMND.ALM	30	Ignition switch (IG1)	IG SW (IG1)	OFF
	32	Front door switch	FRONT DOOR SW	ON
	43	Tone alarm	BUZZER	ON
LGT MONI.ALM	00	Headlight switch	HEADLIGHT SW	Either is on
	01	Tail light switch	TAILLIGHT SW	
	30	Ignition switch (IG1)	IG SW (IG1)	OFF
	32	Front door switch	FRONT DOOR SW	ON
	35	Headlight automatic shutdown function	H/L AUTO-CUT	OFF
	43	Tone alarm	BUZZER	ON
OTHER ALARM	30	Ignition switch (IG1)	IG SW (IG1)	ON
	43	Tone alarm	BUZZER	ON

NOTE: The headlight automatic shutdown function works in approximately one second after the lighting monitor tone alarm starts sounding, and then the tone alarm ceases sounding.

PULSE CHECK

M1549015100186

1. The input signals (signals other than SWS communication line signals), which are compatible with the SWS monitor by using the scan tool or voltmeter, can be confirmed by the Pulse Check. (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points [P.00-6](#).)

2. Use the scan tool or voltmeter to check the following input signals.

NOTE: If a problem is found the Pulse Check, proceed to the Problems during Input Signal Check <Scan tool or voltmeter> (Refer to [P.54Bc-2](#)).

Switches and their conditions, which are applicable for Pulse Check

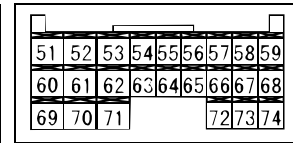
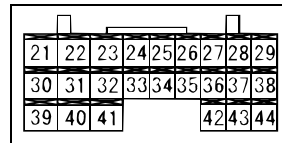
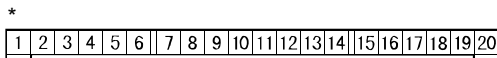
INPUT SIGNAL	REQUIREMENTS FOR SOUNDING TONE ALARM
Key reminder switch	When the inserted ignition key is pulled out
Hazard warning light switch	When the switch is turned from off to on
Seat belt which	When the seat belt is fastened
All door switches (excluding front door switch)	Either of the doors (excluding front door) is opened
Key cylinder	When the key cylinder is locked or unlocked
Driver's door lock actuator	When the driver's key cylinder or inside lock knob is unlocked

INPUT SIGNAL		REQUIREMENTS FOR SOUNDING TONE ALARM
Door lock switch		When a door is locked or unlocked by a door lock switch
Vehicle speed sensor <M/T> or vehicle speed signal <A/T>		When the vehicle speed reaches 10 km/h or more
Keyless entry system transmitter	Switches	When the switch is turned from off to on
Receive a interior light loaded signal		Illuminate any of the interior lights.

CHECK AT ECU TERMINAL

M1549001200276

1. ETACS-ECU



AC101265

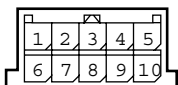
NOTE: *: The terminal 1 to 20 connectors can not be measured as the ETACS-ECU is installed directly on the junction block. Therefore, this information is only for reference.

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION	NORMAL VALUE
1	Output to power window relay	When the power windows can work	Battery positive voltage
2	Battery positive voltage (for central door lock)	Always	Battery positive voltage
3	Ground (for ECU)	Always	0 V
4	Power supply to ignition switch (ACC)	Ignition switch: "ACC"	Battery positive voltage
5	Output to dome light	When dome light is on	2 V or less
6	Power supply to interior light (dome light)	Always (when interior light shutoff function is not operating)	Battery positive voltage
7	Input from door switches	Either of door switches: ON (Door open)	0 V
8	Power supply to ignition switch (IG1)	Ignition switch: "ON"	Battery positive voltage
9	Output to turn-signal light (RH)	When turn-signal light (RH) is on	Battery positive voltage
10	Input from driver's door switch	Driver's door switch: ON (Driver's door open)	0 V
11	Battery power supply (for turn-signal light)	Always	Battery positive voltage
12	Output to door lock	When door lock actuator is operating (doors locked)	Battery positive voltage

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION	NORMAL VALUE
13	Output to door unlock (excluding driver's door)	When door lock actuator is operating (doors unlocked)	Battery positive voltage
14	Output to turn-signal light (LH)	When turn-signal light (LH) is on	Battery positive voltage
16	Output to rear wiper	When rear wiper is operating	Battery positive voltage
17	Input of rear wiper automatic stop signal	When rear wiper is operating	Battery positive voltage
18	Power supply to ignition switch (ACC)	Ignition switch: "ACC"	Battery positive voltage
19	–	–	–
20	Battery power supply (for ECU)	Always	Battery positive voltage
21	Input of driver's seat belt switch signal	Driver's seat belt switch: ON (seat belts unfastened)	0 V
22	Output to door unlock (for driver's door)	When driver's door lock actuator is operating (doors unlocked)	Battery positive voltage
23	Output to rear washer	When rear washer is operating	Battery positive voltage
25	Input of driver's door lock key cylinder switch (UNLOCK) signal	Driver's door lock key cylinder switch: UNLOCK	0 V
30	Input of key reminder switch signal	Key reminder switch: ON (ignition key removed)	0 V
33	Input of front passenger's door lock key cylinder switch (LOCK) signal	front passenger's door lock key cylinder switch: LOCK	0 V
	Input of door lock switch signal (LOCK)	Door lock switch (incorporated in power window switch): LOCK	0 V
34	Input of front passenger's door lock key cylinder switch (UNLOCK) signal	Front passenger's door lock key cylinder switch: UNLOCK	0 V
	Input of door lock switch signal (UNLOCK)	Door lock switch (incorporated in power window switch): UNLOCK	0 V
36	Input of driver's door lock actuator switch (UNLOCK) signal	Driver's door lock actuator switch: UNLOCK	0 V
39	Input of "R" position signal from park/neutral position switch	Ignition switch: "ON," Selector lever: "R"	Battery positive voltage
42	Input of driver's door lock key cylinder switch (LOCK) signal	Driver's door lock key cylinder switch: LOCK	0 V
	Input of door lock switch signal (LOCK)	Door lock switch (incorporated in power window switch): LOCK	0 V
44	Output to horn	When the keyless entry horn answerback function operates the horn	2 V or less
51	Output to data link connector	When DTC sets	0 – 12 V (pulse signal)
		When input check signal is output	0 – 12 V (when input pulse signal is fluctuating)

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION	NORMAL VALUE
53	Output to the door-ajar indicator light	Any door is open	2 V or less
55	Input of hazard warning light switch signal	Hazard warning light switch: ON (When the switch is depressed)	0 V
56	Ground (for sensor)	Always	0 V
59	SWS communication line	Always	0 – 12 V (pulse signal)
63	Input of vehicle speed signal	When the vehicle is being driven	0 – 12 V (pulse signal)
65	Input of front passengers's door switch signal	Front passenger's door switch: ON (Front passenger's door open)	0 V
66	Input of signal from windshield intermittent wiper interval adjusting knob	Ignition switch: "ACC," Windshield intermittent wiper interval adjusting knob: "FAST" → "SLOW"	0 → 2.5 V
67	Input of diagnosis indication selection	When scan tool is connected	0 V
68	Output of data request signal	Always	0 – 12 V (pulse signal)
69	–	–	–
71	Power supply to interior light	Always (when interior light shutoff function is not operating)	Battery positive voltage
72	Output to the high-beam indicator light	Headlight: High-beam	2 V or less
73	Output to seat belt warning light	When seat belt warning light is on	2 V or less

2. COLUMN SWITCH

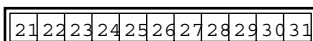
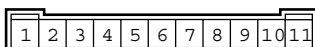


ACX01512

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION	NORMAL VALUE
1	Battery power supply	Always	Battery positive voltage
2	Input of data request signal	Always	0 – 12 V (pulse signal)
3	SWS communication line	Always	0 – 12 V (pulse signal)
4	Ground	Always	0 V
6	Output of signal from windshield intermittent wiper interval adjusting knob	Igniting switch: "ACC," Windshield intermittent wipe interval adjusting knob: "FAST" → "SLOW"	0 → 2.5 V

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION	NORMAL VALUE
8	Output of backup signal from windshield wiper switch	Windshield low-speed wiper switch or windshield high-speed wiper switch: ON	0 V
9	Power supply to ignition switch (IG1)	Ignition switch: "ON"	Battery positive voltage
10	Output of backup signal from headlight switch	Ignition switch: "ON," Headlight switch: ON	0 V

3. FRONT-ECU



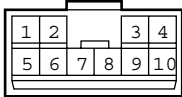
ACX01513

NOTE: Terminal voltages can not be measured as the front-ECU is installed directly on the relay box. Therefore, this information is only for reference.

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION	NORMAL VALUE
2	Output to headlight (high-beam)	When headlights (high-beam) are on	Battery positive voltage
3, 4	Battery power supply (for headlight)	Always	Battery positive voltage
5	Battery power supply (for taillight)	Always	Battery positive voltage
6	Output to headlight (low-beam)	When headlights (low-beam) are on	Battery positive voltage
7	Battery power supply (for ECU)	Always	Battery positive voltage
8	Output to taillights	When taillights are on	Battery positive voltage
21	Output to windshield washer	When windshield washer is on	Battery positive voltage
22	SWS communication line	Always	0 – 12 V (pulse signal)
23	Input of automatic stop signal to windshield wiper	When windshield wiper is on	Battery positive voltage
24	Power supply to ignition switch (ACC)	Ignition switch: "ACC"	Battery positive voltage
25	Input of backup signal from headlight switch	Headlight switch: ON	0 V
26	Input of backup signal to windshield wiper	Windshield low-speed wiper switch or windshield high-speed wiper switch: ON	0 V
27	Output to windshield wiper (low-speed)	When windshield wiper is on (at low speed)	Battery positive voltage

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION	NORMAL VALUE
28	Output to windshield wiper (high-speed)	When windshield wiper is on (at high speed)	Battery positive voltage
30	Power supply to ignition switch (IG2)	Ignition switch: "ON"	Battery positive voltage
31	Ground	Always	0 V

4. SUNROOF MOTOR ASSEMBLY



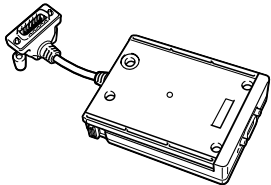
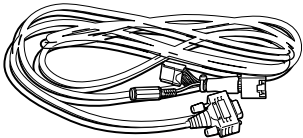
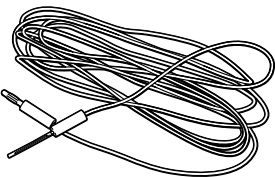
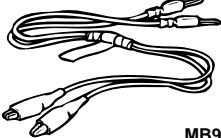

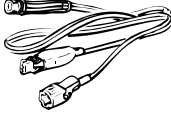
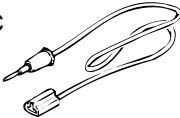

ACX01514

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION	NORMAL VALUE
1	Battery power supply (for motor)	Always	Battery positive voltage
2	Power supply to ignition switch (IG2)	Ignition switch: ON	Battery positive voltage
5	Ground	Always	0 V
6	Input signal ("CLOSE/DOWN") from the sunroof switch	Sunroof switch: "CLOSE/DOWN"	0 V
7	Input signal ("UP") from the sunroof switch	Sunroof switch: "UP"	0 V
8	Input signal ("OPEN") from the sunroof switch	Sunroof switch: "OPEN"	0 V
10	SWS communication line	Always	0 – 12 V (pulse signal)

SPECIAL TOOLS

M1549000300322

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
<p align="right">B991502</p>	MB991502 Scan tool (MUT-II)	MB991496-OD	Checking the diagnostic trouble code and input signal

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
<p>A</p>  <p>B</p>  <p>C</p>  <p>B991862</p>	<p>MB991862 A: MB991806 B: MB991812 C: MB991822</p>	<p>SWS monitor kit A: SWS monitor cartridge B: SWS monitor harness (for column-ECU) C: Probe harness</p>	<p>SWS communication line check (ECU check and service data)</p>
 <p>MB991529</p>	<p>MB991529 Diagnostic trouble code check harness</p>	<p>Tool not necessary if the scan tool (MUT-II) is available</p>	<p>Checking input signal when using a voltmeter</p>
<p>A</p>  <p>B</p>  <p>C</p>  <p>D</p>  <p>MB991223AD</p>	<p>MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222 Harness set A: test harness B: LED harness C: LED harness adaptor D: Probe</p>	<p>General service tools</p>	<p>Making voltage and resistance measurement during troubleshooting A: Connector pin contact pressure inspection B: Power circuit inspection C: Power circuit inspection D: Commercial tester connection</p>

ON-VEHICLE SERVICE

ADJUSTMENT PROCEDURES OF SWS

FUNCTION <Vehicles with keyless entry system>

M1549002500247

Required Special Tools:

- MB991223: Harness Set
- MB991502: Scan Tool (MUT-II)
- MB991529: Diagnostic Trouble Code Check Harness

The following functions can be enabled or disabled by operating input switches in a special manner. This set mode is stored after the battery is disconnected.

- Keyless entry hazard answerback function
- Headlight automatic shutdown function
- Initialization of above mentioned functions

NOTE: The keyless entry hazard answerback can be also adjusted by operating the RKE transmitter. (however, this adjustment can be done more easily by operating the transmitter.) Refer to GROUP 42, Keyless Entry System – On-vehicle Service – Enabling/disabling the Answerback Function P.42-61.

Entry conditions for adjustment mode

1. Set switches to the following conditions:
 - Hazard warning light switch: OFF
 - Diagnosis control: ON (Connect scan tool MB991502 to the data link connector, or connect the data link connector terminal 1 to ground.)
 - Key reminder switch: OFF (insert the ignition key)
 - Ignition switch: "LOCK" (OFF)
 - Driver's door switch: OFF (driver's door closed)
2. If the windshield washer switch remains on for 10 seconds or more, the tone alarm incorporated in the ETACS-ECU sounds once, and then enter the adjustment mode.

Release conditions for the adjustment mode

The adjustment mode will be released under one of the following conditions:

- Diagnosis control: ON (Disconnect scan tool MB991502 from the data link connector, or disconnect the data link connector terminal 1 from ground.)
- Key reminder switch: ON (ignition key removed)
- Ignition switch: Turn to the positions other than "LOCK" (OFF).
- Driver's door switch: ON (driver's door opened)
- After three minutes while the adjustment is not made (If any adjustment has been made within the three-minute period, cancel or complete the operation, and then release the adjustment mode within three minutes).
- When any other warning tone alarms sound

Configuration of Functions

ITEMS	ADJUSTMENT PROCEDURES
Keyless entry hazard answerback	<p>If the transmitter "LOCK" switch is turned on twice within two seconds, the lock answerback function is enabled or disabled.</p> <ul style="list-style-type: none"> • If the function is enabled, the tone alarm sounds once. (initial status) • If the function is disabled, the tone alarm sounds twice. <p>If the transmitter "UNLOCK" switch is turned on twice within two seconds, the unlock answerback function is enabled or disabled.</p> <ul style="list-style-type: none"> • If the function is enabled, the tone alarm sounds once. (initial status) • If the function is disabled, the tone alarm sounds twice.
Vehicle speed-dependent wiper function	<p>The vehicle speed-dependent wiper function is enabled or disabled by turning on the windshield wiper mist switch for two seconds or more.</p> <ul style="list-style-type: none"> • Enabled: the tone alarm sounds once. (initial status) • Disabled: the tone alarm sounds twice.
Headlight automatic shutdown function	<p>If the passing switch is turned ON for more than two seconds with the headlight switch turned to ON and the turn signal light switch (RH) turned ON, the headlight automatic shutdown function is switched in the following order: (Next to "c", the function returns to "a" and repeats the sequence from "a".)</p> <ol style="list-style-type: none"> With the ignition switch in "LOCK" (OFF) position, the automatic shutdown function is enabled when the lighting switch is turned ON and the tone alarm sounds once. If the function is disabled, the tone alarm sounds twice. When the function is enabled (While the ignition switch is at "LOCK" (OFF) position, the automatic shutdown function is enabled when the lighting switch is turned ON.), the tone alarm sounds three times. (initial status)
The delay-off time of the dome light	<p>When the turn-signal light switch is moved in the order of LH → RH → LH → RH → LH, the dome light delay-off time will be changed as follows. (Next to "e", the function returns to "a" and repeats the sequence from "a".)</p> <ol style="list-style-type: none"> 30 seconds: the tone alarm sounds once. 10 seconds: the tone alarm sounds twice. 0 second (no delay-off time): the tone alarm sounds three times. 15 seconds: the tone alarm sounds four times. (initial status) 7.5 seconds: the tone alarm sounds five times.
Interior light automatic shutoff function	<p>The interior light automatic shutdown function is disabled or enabled by turning the hazard warning light switch for two seconds or more.</p> <ul style="list-style-type: none"> • Enabled: the tone alarm sounds once. (initial status) • Disabled: the tone alarm sounds twice.
Initialization of above mentioned functions	<p>If the windshield washer switch is turned ON for more than 20 seconds, the tone alarm sounds twice and all functions are initialized. (The configuration mode entry tone alarm sounds after 10 seconds, but the switch must kept ON for 20 seconds to achieve initialization.)</p> <p>If the windshield washer switch is kept ON for more than 20 seconds without prior entry of the configuration mode, the configuration mode is entered after 10 seconds and initialization does not take place.</p>