

AUTO-CRUISE CONTROL SYSTEM

GENERAL

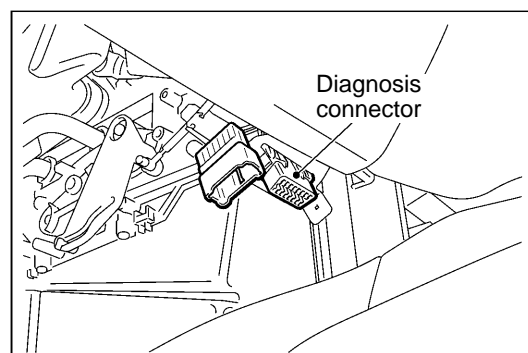
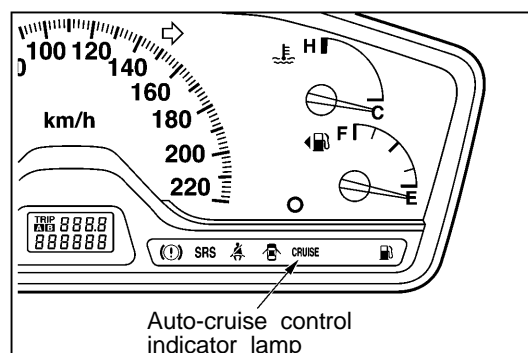
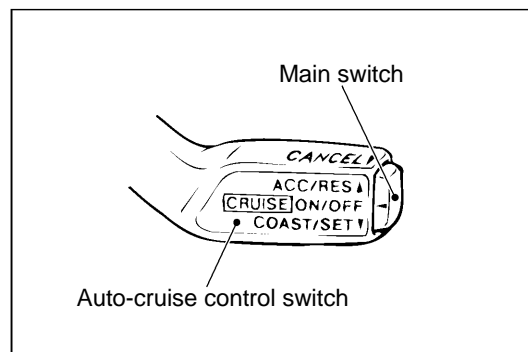
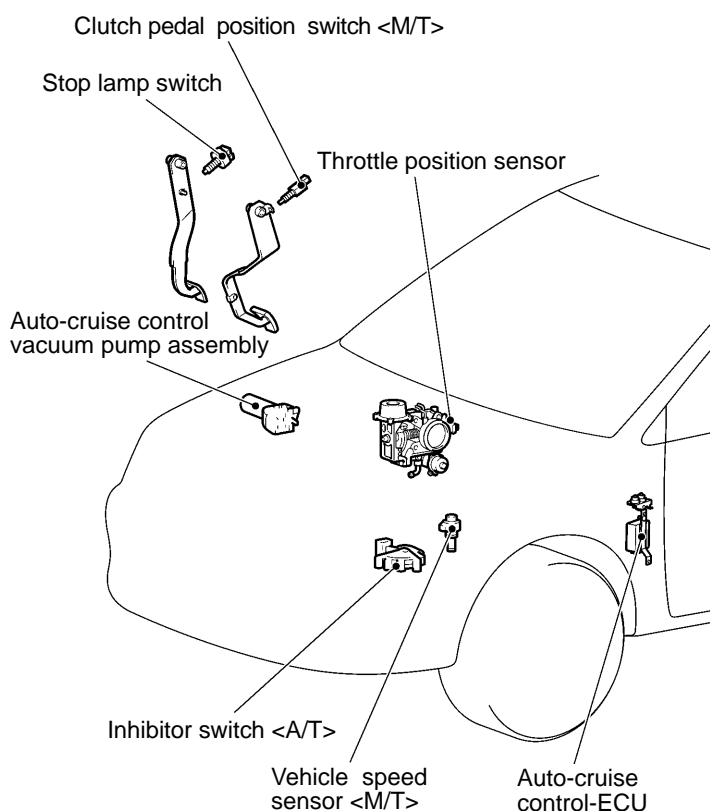
OUTLINE OF CHANGE

Due to the addition of an auto-cruise control system, the following service procedures have been added. The other service procedures are the same as before.

GENERAL INFORMATION

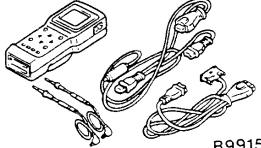
By using the auto-cruise control, the driver can drive at the desired speed (in a range of

approximately 40 – 200 km/h) without depressing the accelerator pedal.



AC309760

SPECIAL TOOL

Tool	Number	Name	Use
 B991502	MB991502	MUT-II sub assembly	<ul style="list-style-type: none"> Reading diagnosis codes Auto-cruise control system check

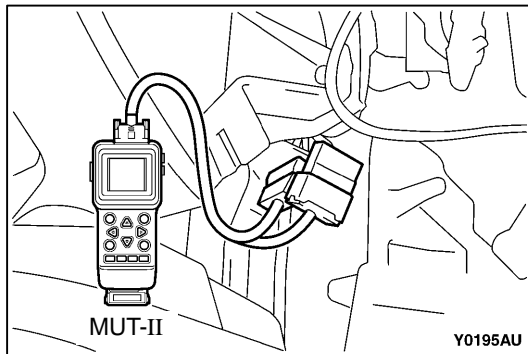
TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING

Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.

NOTE

Check that the vacuum hose is connected correctly and is not damaged, and then carry out the diagnosis.



DIAGNOSIS FUNCTION

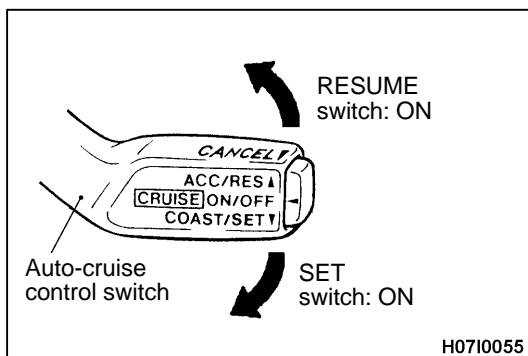
METHOD OF READING THE DIAGNOSIS CODES

Using the MUT-II

Caution

Before connecting or disconnecting the MUT-II, turn the ignition switch to the “LOCK” (OFF) position.

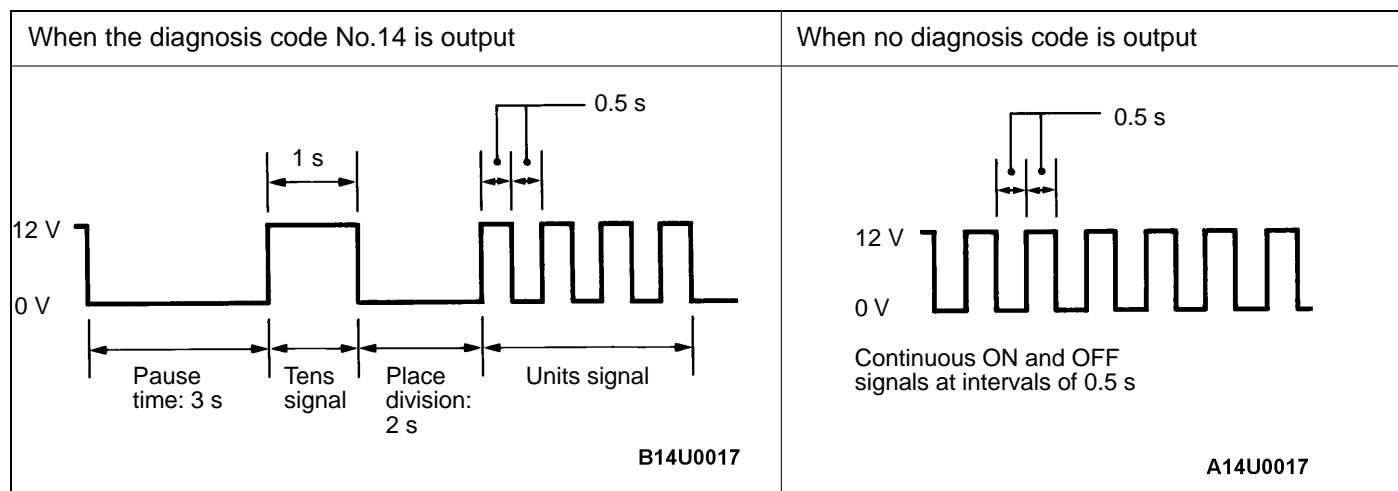
1. Connect the MUT-II to the diagnosis connector (16-pin) under the instrument under cover.
2. Turn the ignition switch ON.
3. Use the MUT-II to check for auto-cruise control system diagnosis codes.
4. Turn the ignition switch OFF.
5. Disconnect the MUT-II.



Using a Auto-cruise Control Indicator Lamp

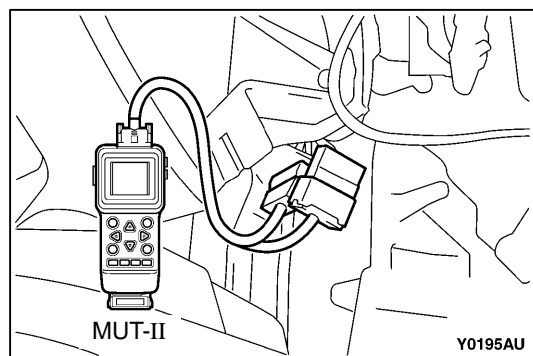
1. Turn the ignition switch ON with the SET switch ON. Then, turn the RESUME switch ON within 1 second.
2. Read a diagnosis code by observing the flash display pattern of the auto-cruise control indicator lamp in the combination meter.

Indication of diagnosis code by auto-cruise control indicator lamp



NOTE

Other on-board diagnostic items are also output as voltage waveforms corresponding to diagnosis code numbers.



METHOD OF ERASING THE DIAGNOSIS CODES

The diagnosis codes can be erased by the following procedure.

NOTE

The diagnosis code will not be erased even if the battery (–) terminal is disconnected.

Using the MUT-II

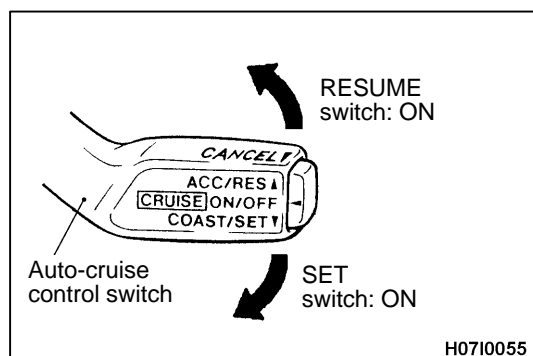
Caution

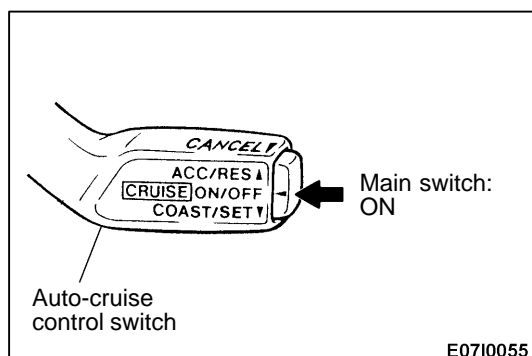
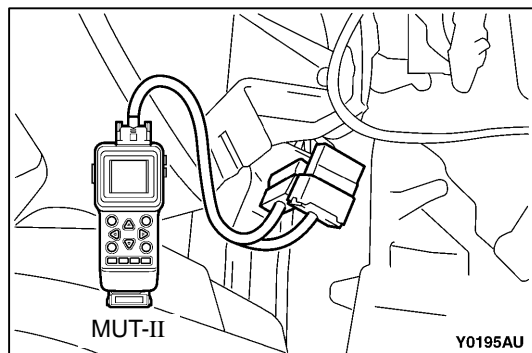
Before connecting or disconnecting the MUT-II, turn the ignition switch to the “LOCK” (OFF) position.

1. Connect the MUT-II to the diagnosis connector (16-pin) under the instrument under cover.
2. Turn the ignition switch ON.
3. Use the MUT-II to erase for auto-cruise control system diagnosis codes.
4. Turn the ignition switch OFF.
5. Disconnect the MUT-II.

Without using the MUT-II

1. Turn the ignition switch ON with the SET switch ON. Then, turn the RESUME switch ON within 1 second.
2. Depress the brake pedal for 5 seconds or more with the SET switch ON again.





INSPECTION USING MUT-II DATA LIST

Caution

Before connecting or disconnecting the MUT-II, turn the ignition switch to the “LOCK” (OFF) position.

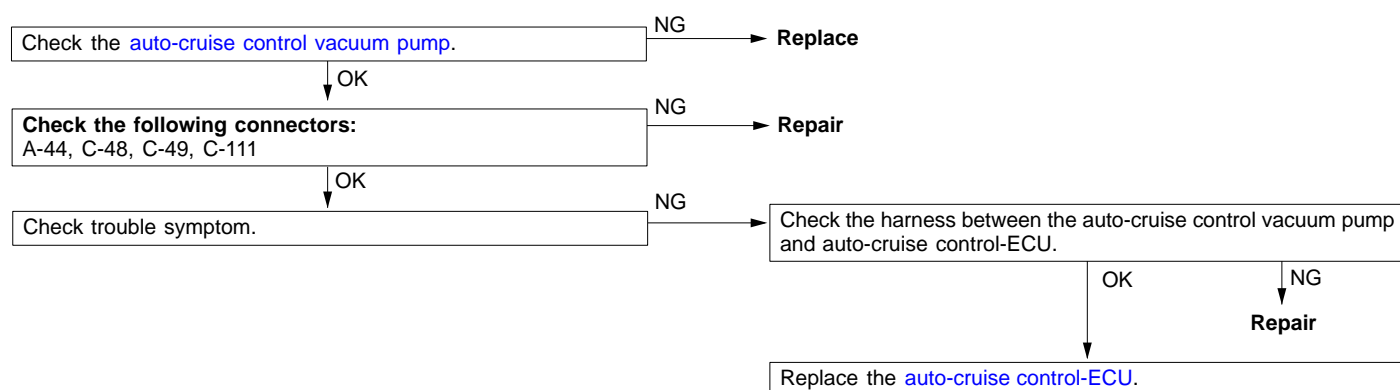
1. Connect the MUT-II to the diagnosis connector (16-pin) under the instrument under cover.
2. Turn the ignition switch ON, and then turn on the main switch.
3. Carry out inspection by means of the data list function. If there is an abnormality, check and repair the chassis harnesses and components.
(Refer to [Data List Reference Table](#).)
4. Re-check using MUT-II and check to be sure that the abnormal input and output have returned to normal because of the repairs.
5. Erase the diagnosis code(s).
6. Turn the ignition switch OFF.
7. Disconnect MUT-II from the diagnosis connector.
8. Start the engine again and do a test drive to confirm that the problem is eliminated.

INSPECTION CHART FOR DIAGNOSIS CODES

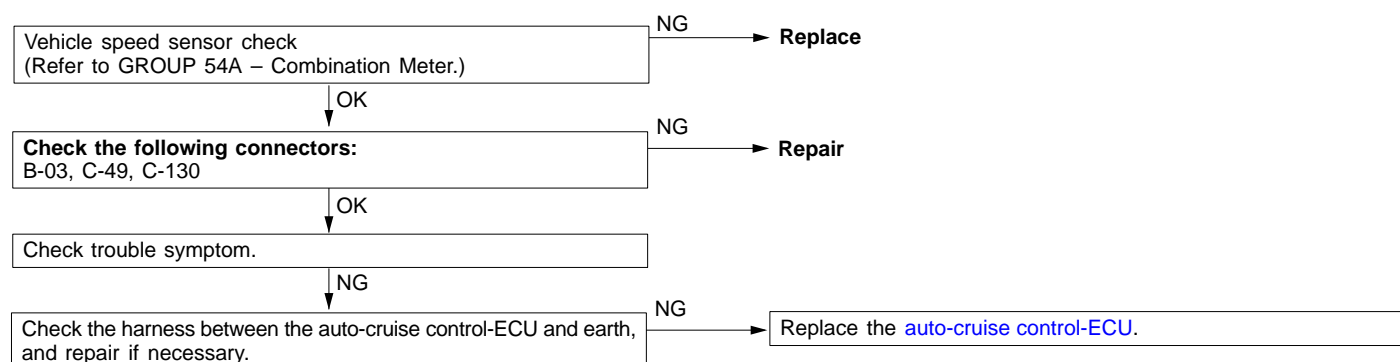
Code No.	Diagnosis item
11	Auto-cruise control vacuum pump drive system
12	Vehicle speed sensor signal system <M/T>
	Vehicle speed sensor signal system <A/T>
14	Auto-cruise control vacuum pump power supply system
15	Auto-cruise control switch
16	Auto-cruise control-ECU
17	Throttle position sensor system

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

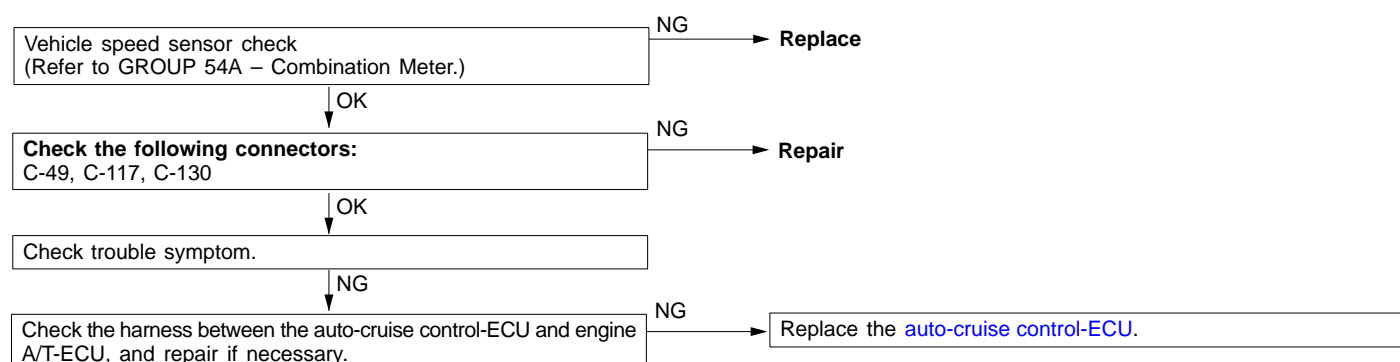
Code No. 11 Auto-cruise control vacuum pump drive system	Probable cause
This diagnosis code is output if the release valve, control valve or motor drive signals from the auto-cruise vacuum pump are not input to the auto-cruise control-ECU.	<ul style="list-style-type: none"> • Malfunction of the auto-cruise control vacuum pump • Malfunction of the connector • Malfunction of the harness • Malfunction of the auto-cruise control-ECU



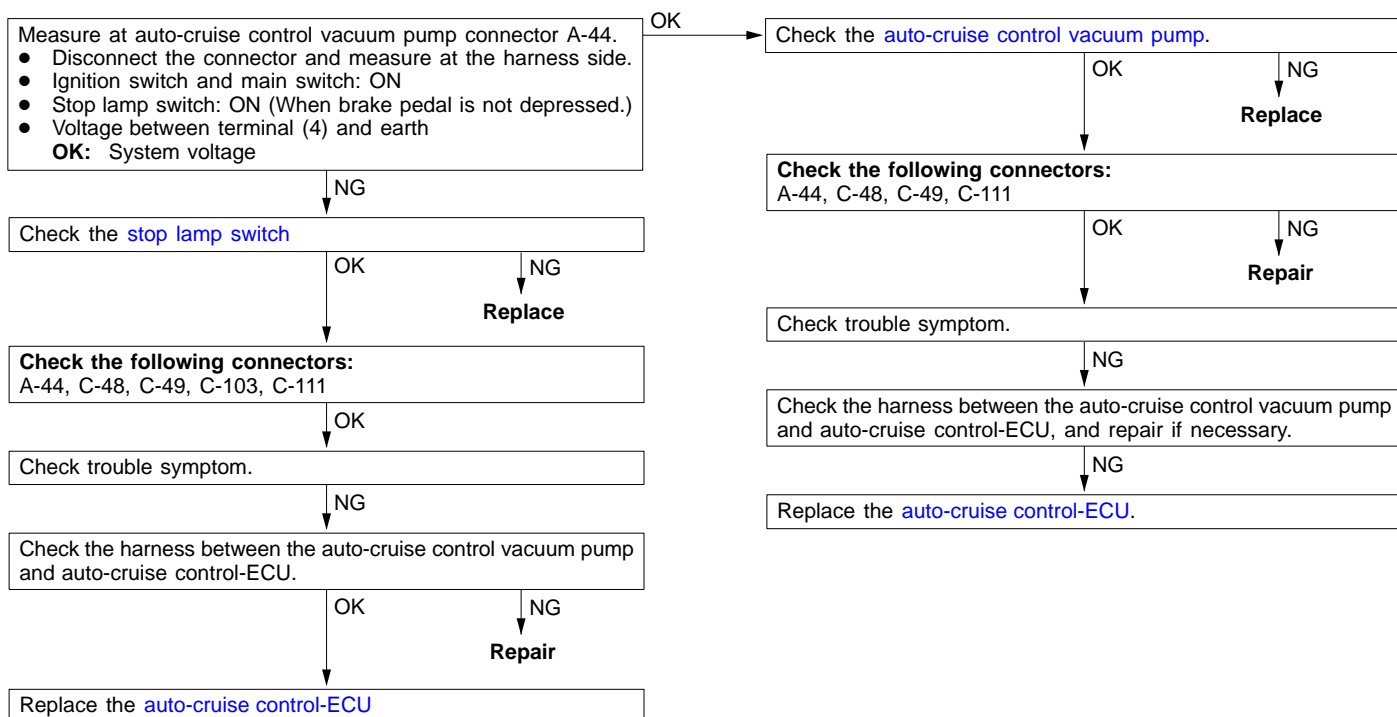
Code No. 12 Vehicle speed sensor signal system <M/T>	Probable cause
This diagnosis code is output if the vehicle speed signals from the vehicle speed sensor are not input to the auto-cruise control-ECU when the vehicle speed is 40 km/h or more.	<ul style="list-style-type: none"> • Malfunction of the vehicle speed sensor • Malfunction of the connector • Malfunction of the harness • Malfunction of the auto-cruise control-ECU



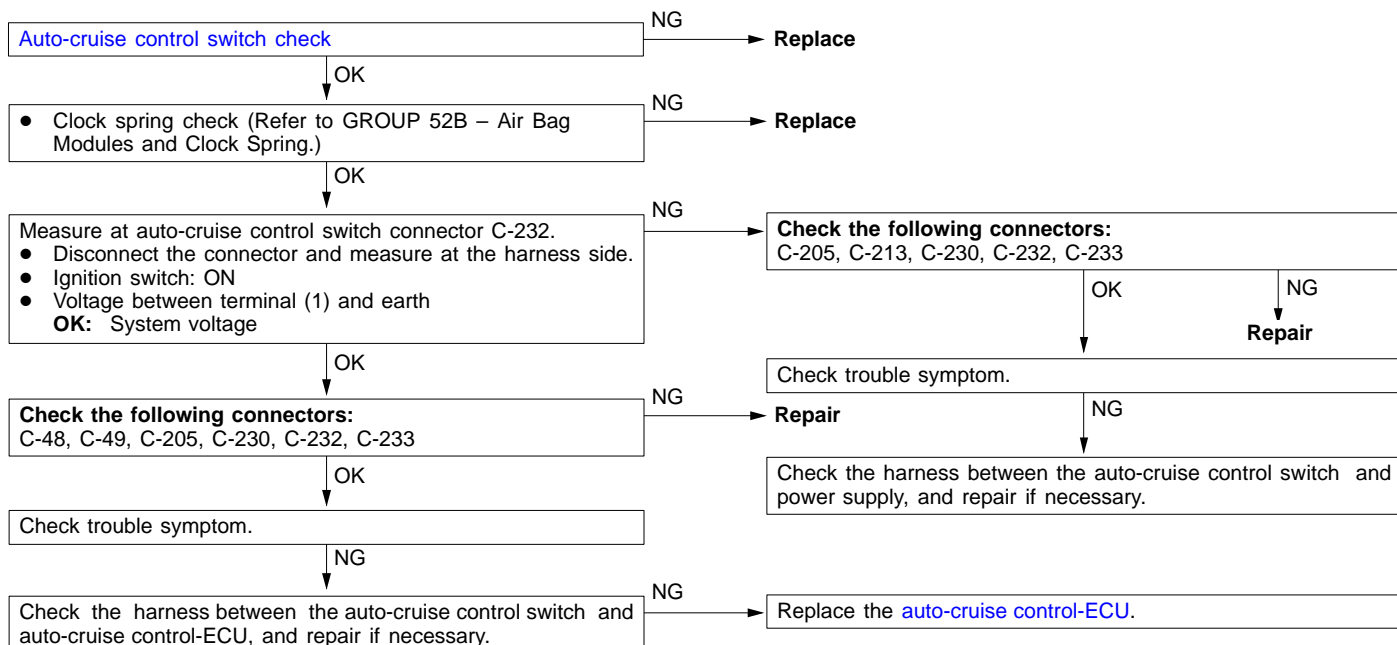
Code No. 12 Vehicle speed sensor signal system <A/T>	Probable cause
This diagnosis code is output if the vehicle speed signals from the engine A/T-ECU are not input to the auto-cruise control-ECU when the vehicle speed is 40 km/h or more.	<ul style="list-style-type: none"> • Malfunction of the output shaft speed sensor. • Malfunction of the connector • Malfunction of the harness • Malfunction of the auto-cruise control-ECU



Code No. 14 Auto-cruise control vacuum pump power supply system	Probable cause
<p>This diagnosis code is output when none of the drive signals from the release valve, control valve and motor of the auto-cruise vacuum pump are input to the auto-cruise control-ECU.</p>	<ul style="list-style-type: none"> • Malfunction of the stop lamp switch • Malfunction of the connector • Malfunction of the harness • Malfunction of the auto-cruise control-ECU • Malfunction of the auto-cruise control vacuum pump



Code No. 15 Auto-cruise control switch	Probable cause
<p>This diagnosis code is output if the cruise control RESUME switch or SET switch remains ON.</p>	<ul style="list-style-type: none"> • Malfunction of the auto-cruise control switch • Malfunction of the clock spring • Malfunction of the connector • Malfunction of the harness • Malfunction of the auto-cruise control-ECU



17 ENGINE AND EMISSION CONTROL – Auto-cruise Control System

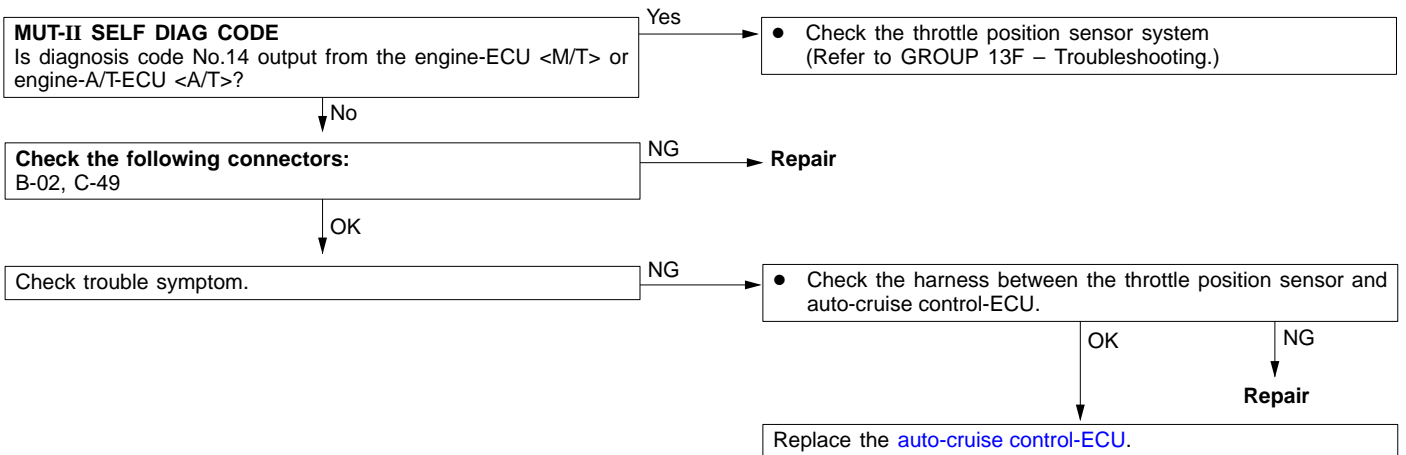
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Code No. 16 Auto-cruise control-ECU	Probable cause
This diagnosis code is output if there is an abnormality in the CANCEL hold circuit or the microprocessor monitor circuit in the auto-cruise control-ECU.	<ul style="list-style-type: none">• Malfunction of the auto-cruise control-ECU

Replace the [auto-cruise control-ECU](#).

Code No. 17 Throttle position sensor system	Probable cause
This diagnosis code is output if a voltage of 2.5 V or more when the idle switch is ON or 0.2 V or less when the idle switch is OFF is output for a continuous period of 4 seconds or more.	<ul style="list-style-type: none">• Malfunction of the throttle position sensor• Malfunction of the connector• Malfunction of the harness• Malfunction of the auto-cruise control-ECU



INSPECTION CHART FOR TROUBLE SYMPTOMS

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Trouble symptom		Inspection procedure No.
Communication with MUT-II is not possible.	Communication with all systems is not possible.	1
	Communication with auto-cruise control-ECU only is not possible.	2
Auto-cruise control is not cancelled.	Even if brake pedal is depressed	3
	Even if clutch pedal is depressed <M/T>	4
	Even if select lever is set to N range <A/T>	5
	Even if CANCEL switch is set to ON	6
Auto-cruise control cannot be set.		7
Hunting (repeated acceleration and deceleration) occurs at the set vehicle speed. <M/T>		8
Hunting (repeated acceleration and deceleration) occurs at the set vehicle speed. <A/T>		9
Auto-cruise control indicator lamp inside combination meter does not illuminate. (However, auto-cruise control is normal.)		10

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

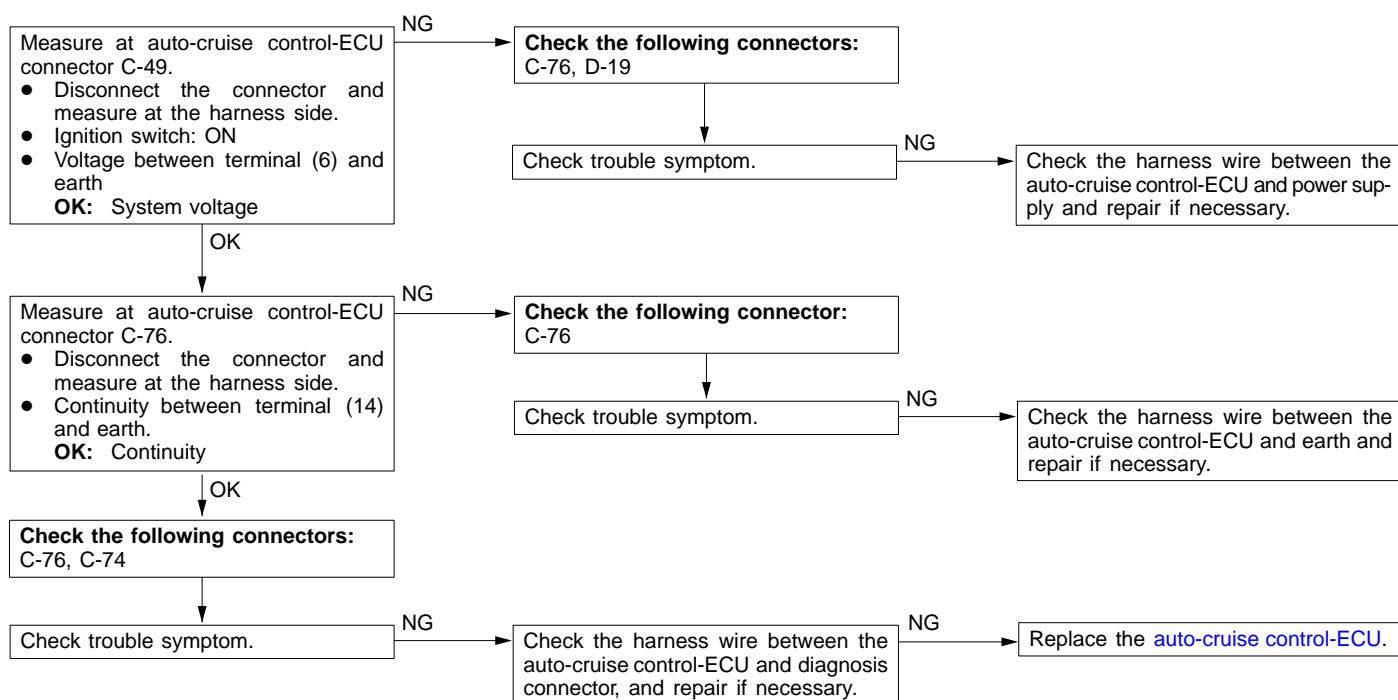
Inspection Procedure 1

Communication with MUT-II is not possible. (Communication with all system is not possible.)	Probable cause
The reason is probably a defect in the power supply system (including earth) for the diagnosis line.	<ul style="list-style-type: none"> • Malfunction of the connector • Malfunction of the harness

Refer to GROUP 13F – Troubleshooting.

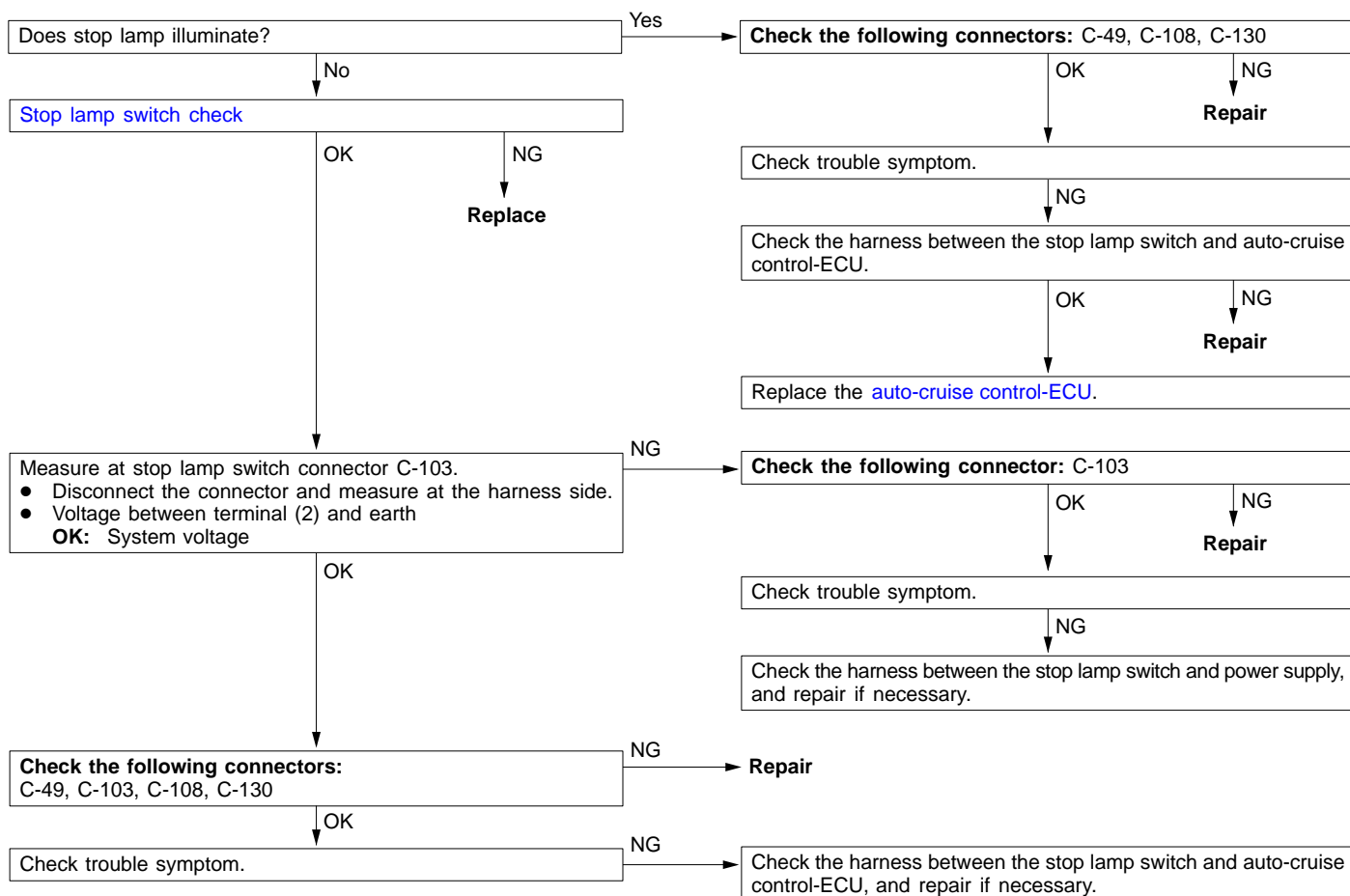
Inspection Procedure 2

Communication with MUT-II is not possible. (Communication with auto-cruise control-ECU only is not possible.)	Probable cause
One of the following causes may be suspected. <ul style="list-style-type: none"> • No power supply to auto-cruise control-ECU. • Defective earth circuit of auto-cruise control-ECU. • Defective auto-cruise control-ECU. • Improper communication line between auto-cruise control-ECU and MUT-II. 	<ul style="list-style-type: none"> • Malfunction of auto-cruise control-ECU power supply circuit • Malfunction of auto-cruise control-ECU • Open circuit between auto-cruise control-ECU and diagnosis connector



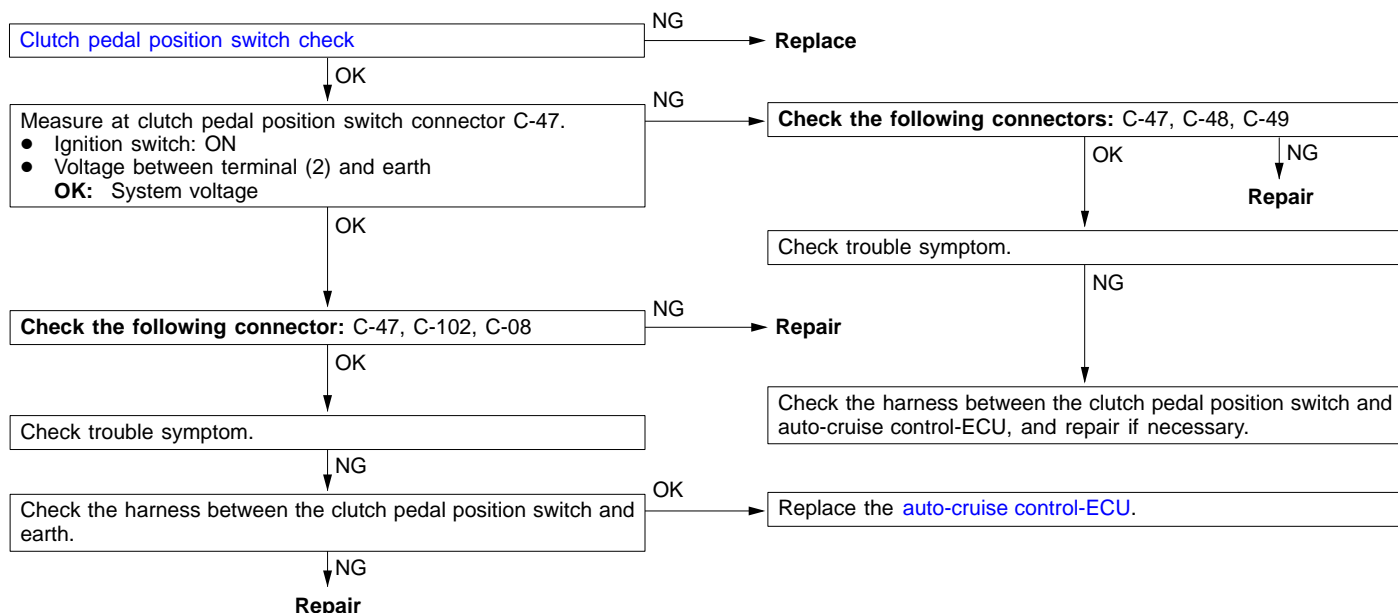
Inspection Procedure 3

Even if brake pedal is depressed, auto-cruise control is not cancelled.	Probable cause
The cause is probably a malfunction of stop lamp switch or a malfunction of stop lamp circuit.	<ul style="list-style-type: none"> Malfunction of the stop lamp switch Malfunction of the connector Malfunction of the harness Malfunction of the auto-cruise control-ECU



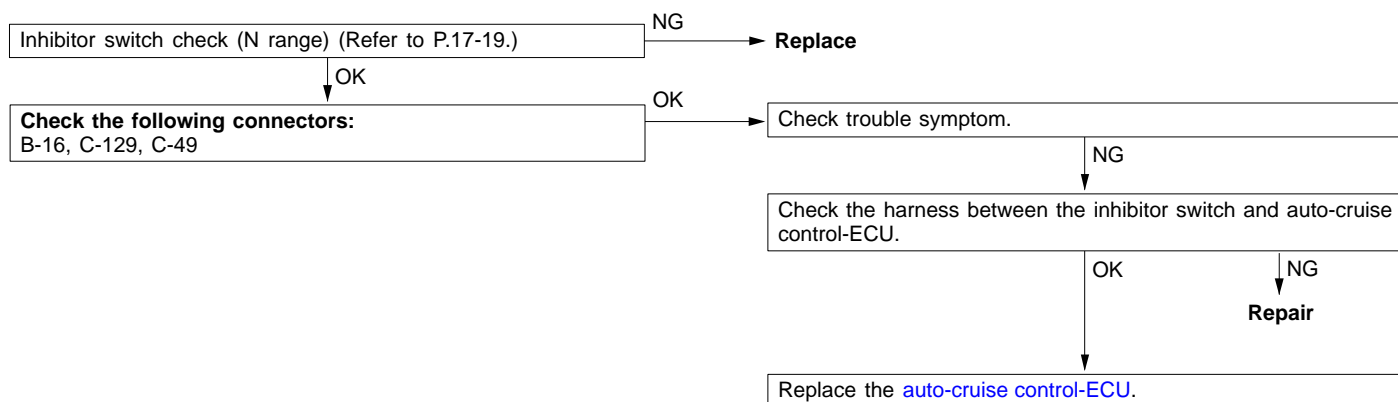
Inspection Procedure 4

Even if clutch pedal is depressed, auto-cruise control is not cancelled. <M/T>	Probable cause
The cause is probably a malfunction of clutch pedal position switch or clutch circuit.	<ul style="list-style-type: none"> Malfunction of the clutch pedal position switch Malfunction of the connector Malfunction of the harness Malfunction of the auto-cruise control-ECU



Inspection Procedure 5

Even if select lever is set to N range, auto-cruise control is not cancelled. <A/T>	Probable cause
The cause is probably an open-circuit in the output signal circuit in N range.	<ul style="list-style-type: none"> Malfunction of the inhibitor switch Malfunction of the connector Malfunction of the harness Malfunction of the auto-cruise control-ECU



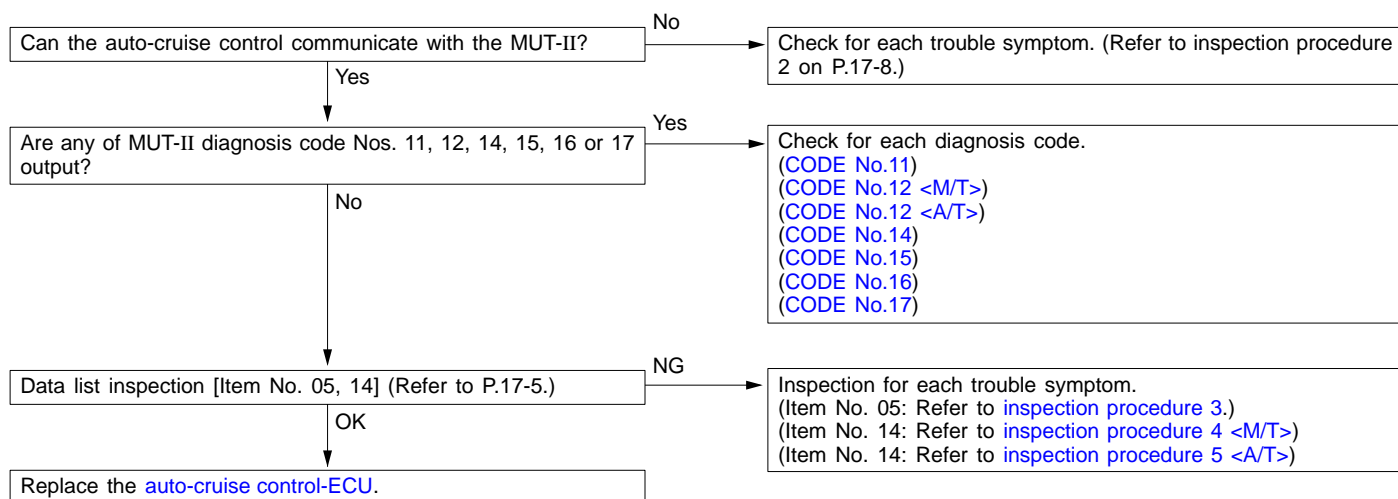
Inspection Procedure 6

Even if auto-cruise control CANCEL switch is set to ON, auto-cruise control is not cancelled.	Probable cause
The cause is probably an open-circuit in the circuit inside the CANCEL switch.	<ul style="list-style-type: none"> Malfunction of the auto-cruise control-ECU

Replace the [auto-cruise control switch](#)

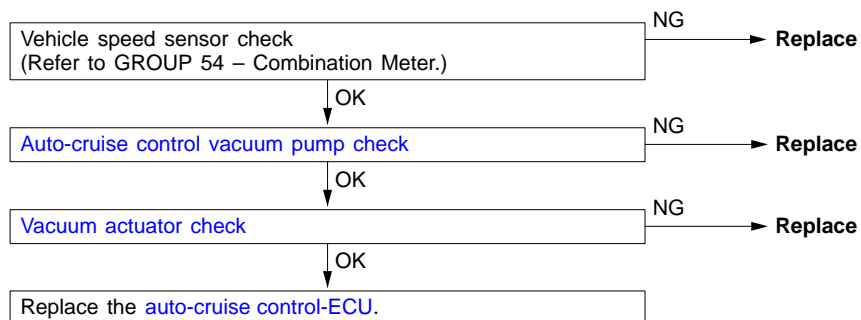
Inspection Procedure 7

Auto-cruise control cannot be set.	Probable cause
The cause is probably that the fail-safe function is cancelling auto-cruise control. In this case, the MUT-II can be used to check the trouble symptoms in each system by inspecting the diagnosis codes. The MUT-II can also be used to check if the circuits of each data list are normal or not by inspecting the data list codes.	<ul style="list-style-type: none"> Malfunction of the auto-cruise control switch Malfunction of the auto-cruise control-ECU



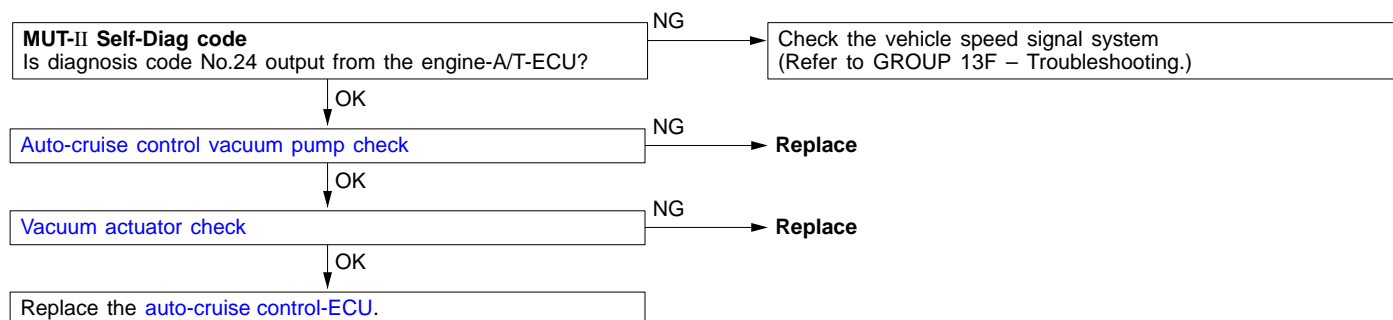
Inspection Procedure 8

Hunting (repeated acceleration and deceleration) occurs at the set vehicle speed. <M/T>	Probable cause
The cause is probably a malfunction of vehicle speed sensor or incorrect vacuum in the auto-cruise control vacuum pump or vacuum actuator.	<ul style="list-style-type: none"> Malfunction of the vehicle speed sensor Malfunction of the auto-cruise control vacuum pump Malfunction of the vacuum actuator Malfunction of the auto-cruise control-ECU



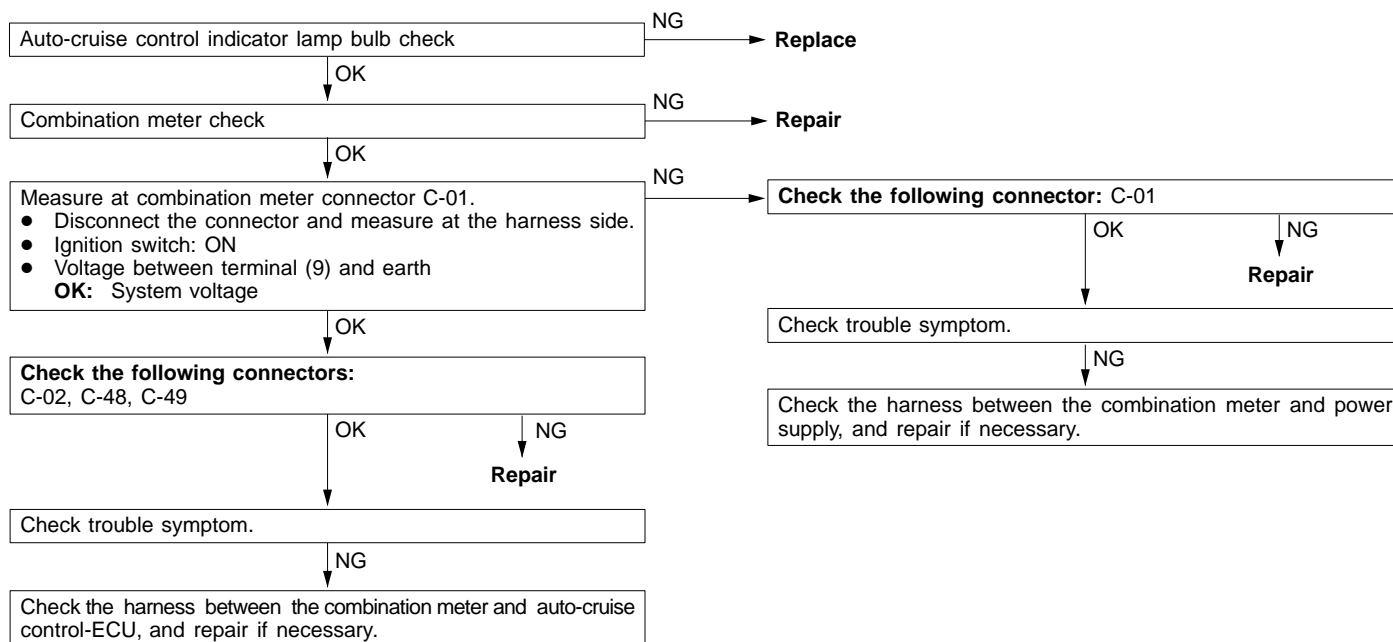
Inspection Procedure 9

Hunting (repeated acceleration and deceleration) occurs at the set vehicle speed. <A/T>	Probable cause
The cause is probably a malfunction of vehicle speed sensor or incorrect vacuum in the auto-cruise control vacuum pump or vacuum actuator.	<ul style="list-style-type: none"> Malfunction of the output shaft speed sensor Malfunction of the auto-cruise control vacuum pump Malfunction of the vacuum actuator Malfunction of the auto-cruise control-ECU



Inspection Procedure 10

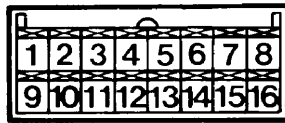
Auto-cruise control indicator lamp inside combination meter does not illuminate. (However, auto-cruise control is normal.)	Probable cause
The cause is probably a malfunction of bulb or a malfunction of connector or harness.	<ul style="list-style-type: none"> Malfunction of the bulb Malfunction of the harness Malfunction of the connector Malfunction of the auto-cruise control-ECU



DATA LIST REFERENCE TABLE

Item No.	Check item		Check requirement	Normal value
01	Auto-cruise control switch	MAIN	MAIN switch: ON	ON
			MAIN switch: OFF	OFF
02		SET	SET switch: ON	ON
			SET switch: OFF	OFF
03		RESUME	RESUME switch: ON	ON
			RESUME switch: OFF	OFF
04		CANCEL	CANCEL switch: ON	ON
			CANCEL switch: OFF	OFF
05	Stop lamp switch		Brake pedal: Depressed	ON
			Brake pedal: Released	OFF
08	Idle position switch		Accelerator pedal: Released	ON
			Accelerator pedal: Depressed	OFF
10	Vehicle speed sensor		Road test the vehicle	The speedometer and the MUT-II display the same value
13	Throttle position sensor		Accelerator pedal: Released	335 – 935 mV
			Accelerator pedal: Depressed	The more deeply the pedal is depressed, the higher value the MUT-II displays
			Accelerator pedal: Fully depressed	4,500 – 5,500 mV
14	Clutch switch <M/T>		Clutch pedal: Depressed	ON
			Clutch pedal: Released	OFF
	Inhibitor switch <A/T>		Selector lever: N or P position	ON
			Selector lever: Other than N or P position	OFF
15	A/T control signal		Driving on level load	OFF
			Driving on uphill grade	ON

CHECK AT ECU TERMINALS



X0072AA

Terminal No.	Check item	Check conditions		Normal condition
1	Throttle position sensor input	When accelerator pedal is fully depressed		4.5 – 5.5 V
		When accelerator pedal is released		0.3 – 1.0 V
2	Idle position switch output	When accelerator pedal is depressed	When idle position switch is OFF	4 V or more
		When accelerator pedal is not depressed	When idle position switch is ON	2.5 V or less
3	A/T control output	Ignition switch: ON		System voltage
4	Stoplamp switch input	When brake pedal is depressed	When stop lamp switch is ON	System voltage
		When brake pedal is not depressed	When stop lamp switch is OFF	0 V
5	Pump power supply	Ignition switch: ON Main switch: ON Stoplamp switch: ON (When brake pedal is not depressed)		10 V or more
6	ECU power supply	Ignition switch: ON		System voltage
7	Auto-cruise control vacuum pump release valve and control valve input	When decelerating with the SET switch while driving at constant speed	Release valve open	1 V or less
8			Control valve open	10 V or more
7		When cancelling constant speed driving with the CANCEL switch	Release valve open	10 V or more
8			Control valve open	System voltage
9	Auto-cruise control switch input	When main switch is ON		Approx. 7.0 V
		When input switch has not been operated	When all switches are OFF	3.5 – 5.0 V
		When input switch is pushed down	When SET switch is ON	0.4 – 2.3 V
		When input switch is pushed up	When RESUMRE switch is ON	2.3 – 3.5 V
		When input switch is pulled forward	When CANCEL switch is ON	0.4 V or less
10	Vehicle speed sensor input	When vehicle is moved forwards and backwards, sensor turns ON and OFF repeatedly	When sensor is ON	0 V
			When sensor is OFF	4.5 V or more

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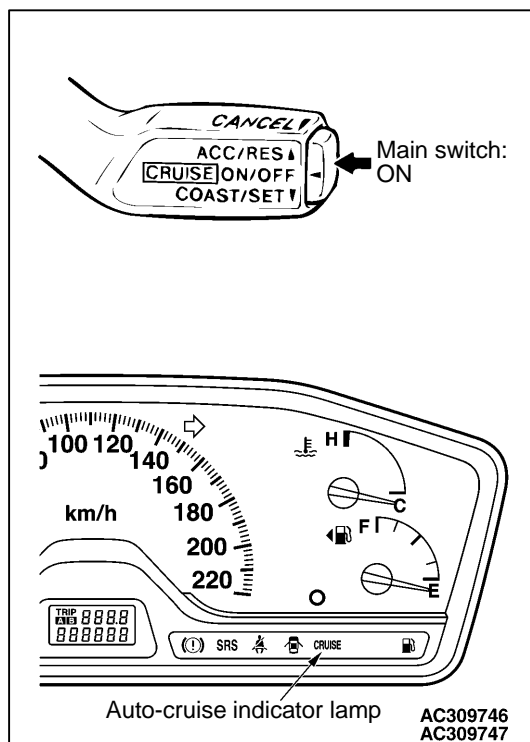
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Terminal No.	Check item	Check conditions		Normal condition
12	ACC power supply	When ignition switch is in ACC position Main switch: ON		System voltage
13	Clutch pedal position switch input <M/T>	When pedal is not depressed	When clutch pedal position switch is OFF	System voltage
		When pedal is depressed	When clutch pedal position switch is ON	0 V
	Inhibitor switch input <A/T>	When selector lever is in a position other than N or P range	When inhibitor switch is OFF	System voltage
		When selector lever is in N or P range	When inhibitor switch is ON	0 V
14	Earth	At any time		0 V
15	Indicator lamp input (inside combination meter)	When main switch is ON	When indicator lamp is illuminated	0 V
		When main switch is OFF	When indicator lamp is switch off	System voltage
16	Auto-cruise control vacuum pump motor input	When driving with the constant speed control	Motor stopped/running	System voltage/0 V
		When accelerating with the ACCELERATOR switch while driving at constant speed	Motor stopped/running	System voltage/0 V
		When decelerating with the COAST switch while driving at constant speed	Motor stopped	System voltage
		When cancelling constant speed driving with the CANCEL switch	Motor stopped	System voltage

ON-VEHICLE SERVICE

AUTO-CRUISE CONTROL SWITCH CHECK

1. Turn the ignition key to ON.
2. Check to be sure that the indicator lamp within the combination meter illuminates when the main switch is switched ON.



AUTO-CRUISE CONTROL SETTING

1. Switch ON the main switch.
2. Drive at the desired speed within the range of approximately 40 – 200 km/h.
3. Push the auto-cruise control switch in the direction of arrow.
4. Check to be sure that when the switch is released the speed is the desired constant speed.

NOTE

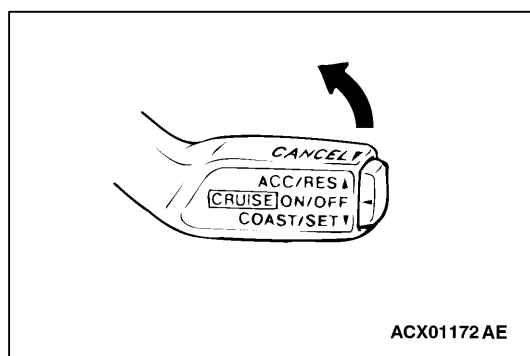
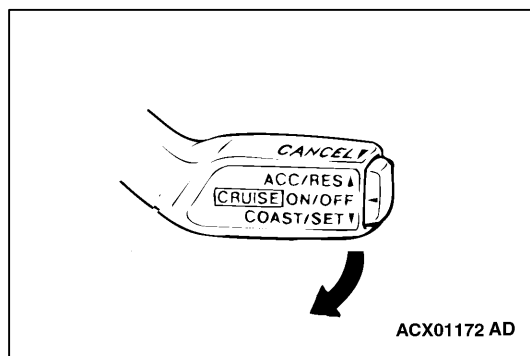
If the vehicle's speed decreases to approximately 15 km/h below the set speed because of climbing a hill for example, the auto-cruise control will be cancelled.

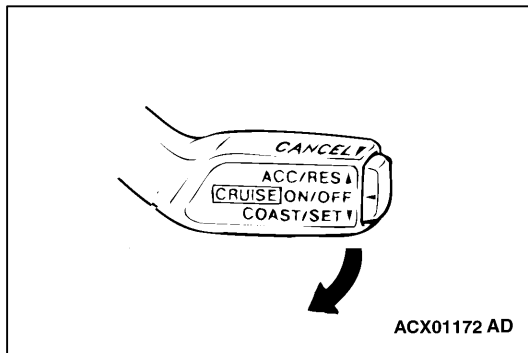
SPEED-INCREASE SETTING

1. Set to the desired speed.
2. Push the auto-cruise control switch in the direction of arrow.
3. Check to be sure that acceleration continues while the switch is held, and that when it is released the constant speed at the time when it was released becomes the driving speed.

NOTE

Acceleration can be continued even if the vehicle speed has passed the high-speed limit (approx. 200 km/h). But the speed when the auto-cruise control switch is released will be recorded as the high-speed limit.



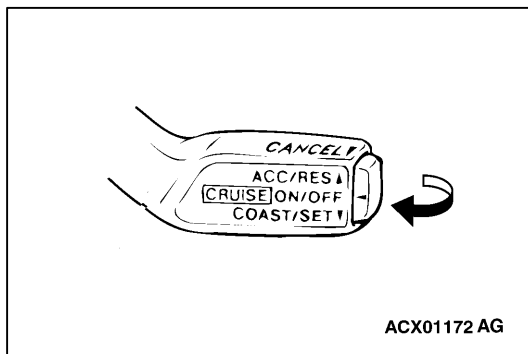


SPEED-REDUCTION SETTING

1. Set to the desired speed.
2. Push the auto-cruise control switch in the direction of arrow.
3. Check to be sure that deceleration continues while the switch is pressed, and that when it is released the constant speed at the time when it was released becomes the driving speed.

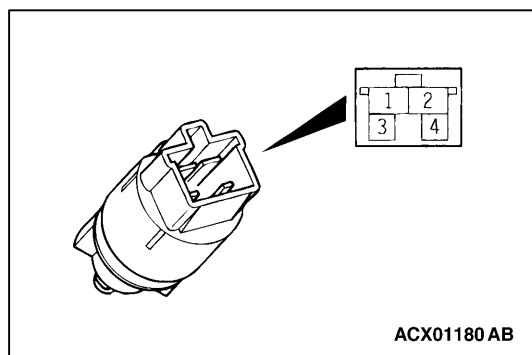
NOTE

When the vehicle speed reaches the low limit (approximately 40 km/h) during deceleration, the auto-cruise control will be cancelled.



RETURN TO THE SET SPEED BEFORE CANCELLATION AND AUTO-CRUISE CONTROL CANCELLATION

1. Set the auto-cruise speed control.
2. When any of the following operations are performed while at constant speed during auto-cruise control, check if normal driving is resumed and deceleration occurs.
 - a. The auto-cruise control switch is pushed in the direction of arrow.
 - b. The brake pedal is depressed.
 - c. The clutch pedal is depressed. <M/T>
 - d. The selector lever is moved to the N range. <A/T>
3. At a vehicle speed of 40 km/h (25 mph) or higher, check if when the "ACC/RES" switch is switched ON, the vehicle speed returns to the speed before auto-cruise control driving was cancelled, and constant speed driving occurs.
4. When the "CRUISE" (MAIN) switch is turned to the "OFF" while driving at constant speed, check if normal driving is resumed and deceleration occurs.



AUTO-CRUISE CONTROL COMPONENT CHECK STOP LAMP SWITCH

1. Disconnect the connector.
2. Check for continuity between the terminals of the switch.

Measurement conditions	Terminal No.			
	1	2	3	4
When brake pedal is depressed. (for stop lamp circuit)	○—○			
When brake pedal is not depressed. (for auto-cruise control circuit)			○—○	

CLUTCH PEDAL POSITION SWITCH <M/T>

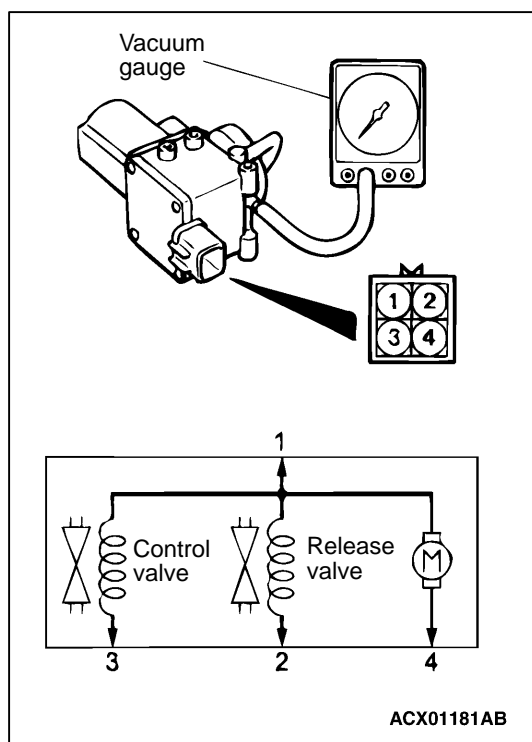
Refer to GROUP 21 – On-vehicle Service.

INHIBITOR SWITCH CHECK (N, P RANGE) <A/T>

Refer to GROUP 23B – On-vehicle Service.

THROTTLE POSITION SENSOR

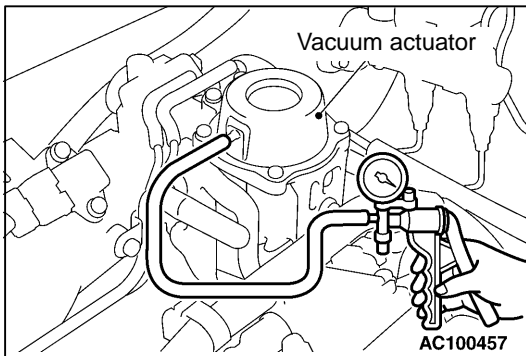
Refer to GROUP 13F – On-vehicle Service.



AUTO-CRUISE CONTROL VACUUM PUMP

Check the auto-cruise control vacuum pump and valves according to the following procedure:

1. Connect the positive battery terminal to auto-cruise control vacuum pump connector terminal 1, and the negative battery terminal to terminals 2, 3, and 4. Then the vacuum gauge should read 27 kPa or more.
2. The vacuum should be maintained when terminal 4 is disconnected from the negative battery terminal while terminals 1, 2, and 3 remain connected. Then the vacuum gauge should read 0 kPa when terminal 2 is disconnected from the negative battery terminal while terminals 1, and 3 remain connected.
3. The vacuum should be maintained when terminal 4 is disconnected from the negative battery terminal while terminals 1, 2, and 3 remain connected. Then the vacuum gauge should read 0 kPa when terminal 3 is disconnected from the negative battery terminal while terminals 1, and 2 remain connected.



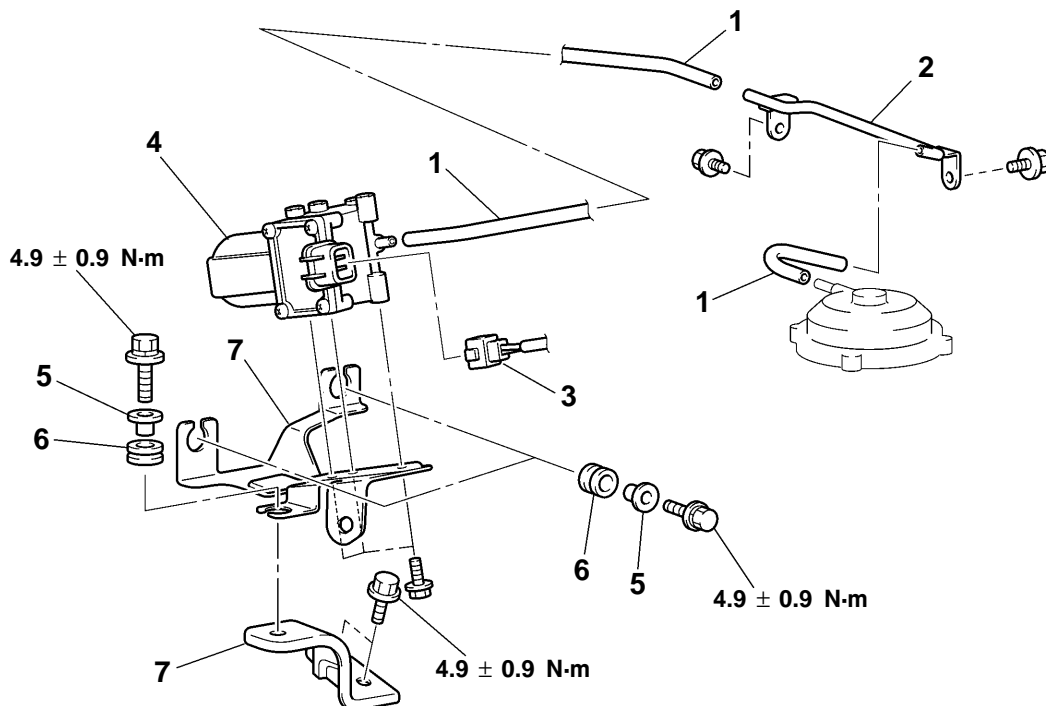
VACUUM ACTUATOR

1. Disconnect the vacuum hose from the vacuum actuator, and connect a hand vacuum pump to the actuator.
2. Check that the throttle lever operates when applying vacuum, and the vacuum is kept.

VEHICLE SPEED SENSOR CHECK

Refer to GROUP 54A – Combination meters.

AUTO-CRUISE CONTROL REMOVAL AND INSTALLATION



Removal steps

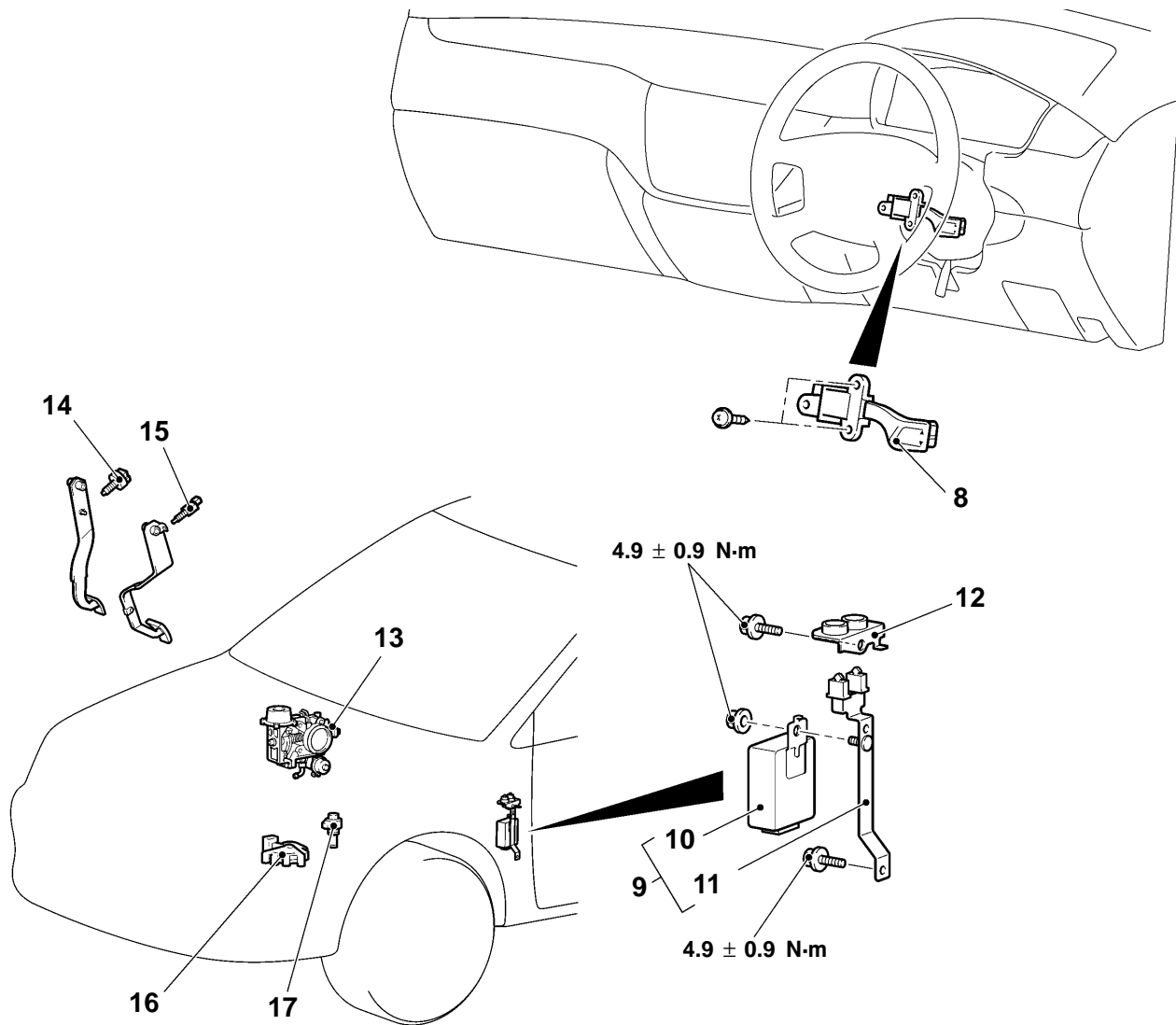
1. Vacuum hose
2. Vacuum pipe
3. Auto-cruise control vacuum pump connector
4. Auto-cruise control vacuum pump assembly

5. Spacer
6. Rubber mount
7. Pump bracket

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CAUTION: SRS

Before removal of air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Modules and Clock Spring.



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Auto-cruise control switch removal steps

- Steering wheel (Refer to GROUP 37A – Steering Wheel and Shaft.)
- 8. Auto-cruise control switch

Auto-cruise control-ECU removal steps

- Glove box (Refer to GROUP 52A – Instrument Panel.)
- Cowl side trim (Refer to GROUP 52A – Trims.)
- 9. Auto-cruise control-ECU and bracket assembly
- 10. Auto-cruise control-ECU
- 11. Lower bracket
- 12. Upper bracket

Sensor removal

- 11. Throttle position sensor
- 12. Stop lamp switch (Refer to GROUP 35A – Brake Pedal.)
- 13. Clutch pedal position switch <M/T> (Refer to GROUP 21A – Clutch Pedal.)
- 14. Inhibitor switch <A/T>
- 15. Vehicle speed sensor <M/T>

