

ENGINE AND EMISSION CONTROL

CONTENTS

ENGINE CONTROL SYSTEM	3	EMISSION CONTROL SYSTEM	30
GENERAL	3	GENERAL	30
Outline of Change	3	Outline of Change	30
ACCELERATOR CABLE AND PEDAL	3	GENERAL INFORMATION	30
AUTO-CRUISE CONTROL SYSTEM		Emission Control Device Reference	
<4G64-GDI>	5	Table	30
GENERAL	5	SERVICE SPECIFICATION	31
Outline of Change	5	SPECIAL TOOL	31
GENERAL INFORMATION	5	VACUUM HOSE	31
SPECIAL TOOL	5	Vacuum Hose Piping Diagram	31
TROUBLESHOOTING	6	Vacuum Circuit Diagram	32
ON-VEHICLE SERVICE	18	Vacuum Hose Check	32
AUTO-CRUISE CONTROL	20	Vacuum Hose Installation	32
AUTO-CRUISE CONTROL SYSTEM		CRANKCASE EMISSION CONTROL	
<EXCEPT 4G64-GDI>	21	SYSTEM	33
GENERAL	21	General Information	33
Outline of Change	21	System Diagram	33
TROUBLESHOOTING	21	Component Location	33
ON-VEHICLE SERVICE	29	EVAPORATIVE EMISSION CONTROL	
AUTO-CRUISE CONTROL	29	SYSTEM	34
		General Information	34
		System Diagram	34
		Component Location	34
		Purge Control System Check	35

Purge Port Vacuum Check	35	System Diagram	37
Purge Control Solenoid Valve Check	36	Component Location	37
EXHAUST GAS RECIRCULATION (EGR)		Exhaust Gas Recirculation (EGR) Control	
SYSTEM	37	System Check	38
General Information	37	EGR Valve (Stepper Motor)	
Operation	37	Check	38

ENGINE CONTROL SYSTEM <4G64-GDI>

GENERAL

OUTLINE OF CHANGE

The following service procedures for the accelerator pedal with the accelerator pedal position sensor (APS) have been added to correspond to the introduction of the 4G64-GDI engine.

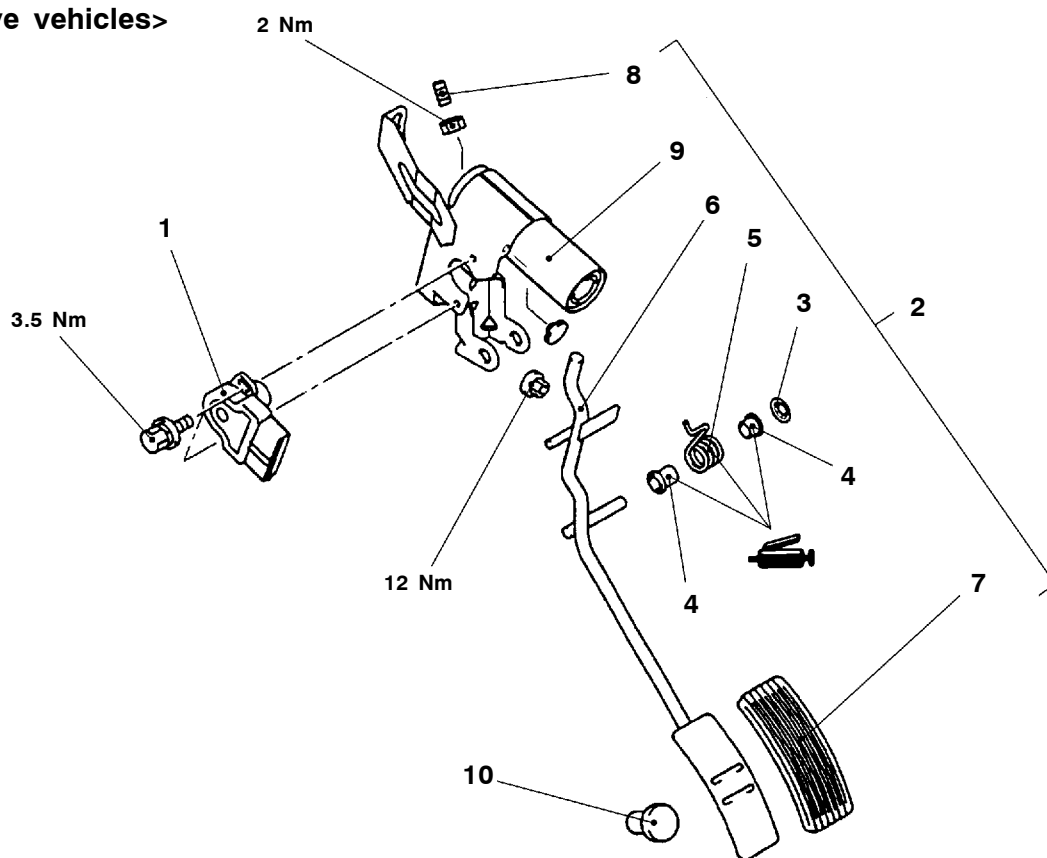
ACCELERATOR CABLE AND PEDAL

REMOVAL AND INSTALLATION

Post-installation Operation

Check and Adjustment of the Accelerator Pedal Position Sensor (Refer to GROUP 13I – On-vehicle Service.)

<L.H. drive vehicles>

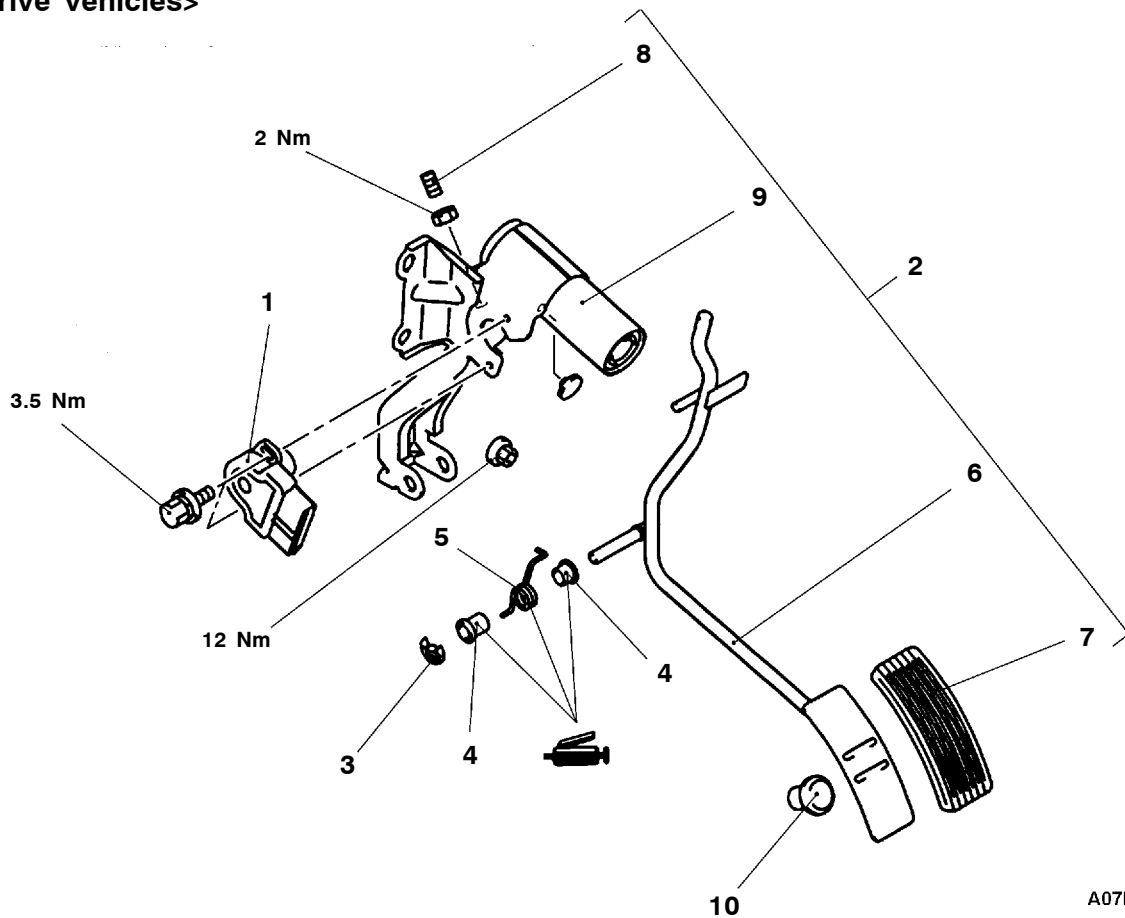


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Removal steps

- | | |
|--------------------------------------|------------------------------|
| 1. Accelerator pedal position sensor | 6. Accelerator pedal |
| 2. Accelerator pedal assembly | 7. Accelerator pedal pad |
| 3. Snap ring | 8. Adjusting screw |
| 4. Bushing | 9. Accelerator pedal bracket |
| 5. Return spring | 10. Stopper |

<R.H. drive vehicles>



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Removal steps

- | | |
|--------------------------------------|------------------------------|
| 1. Accelerator pedal position sensor | 6. Accelerator pedal |
| 2. Accelerator pedal assembly | 7. Accelerator pedal pad |
| 3. Snap ring | 8. Adjusting screw |
| 4. Bushing | 9. Accelerator pedal bracket |
| 5. Return spring | 10. Stopper |

AUTO-CRUISE CONTROL SYSTEM <4G64-GDI>

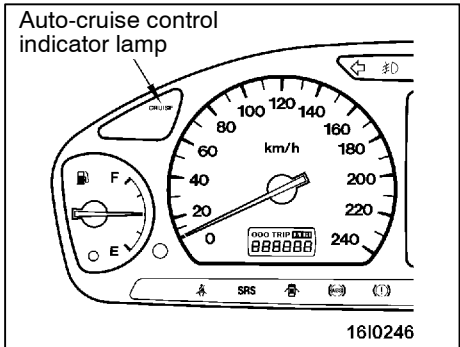
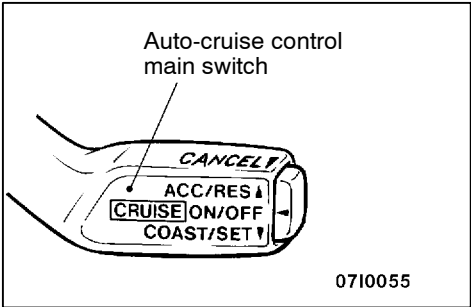
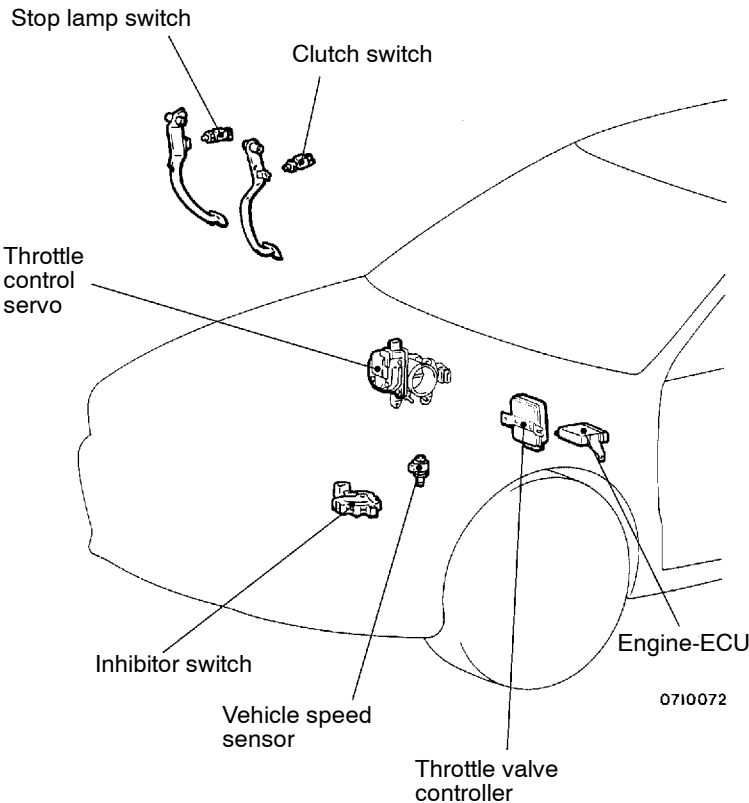
GENERAL

OUTLINE OF CHAGNE

The following service procedures have been added to correspond to the introduction of the electronically controlled throttle valve system and a built-in auto-cruise control switch.

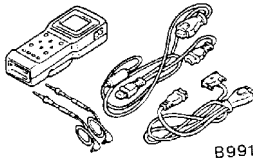
GENERAL INFORMATION

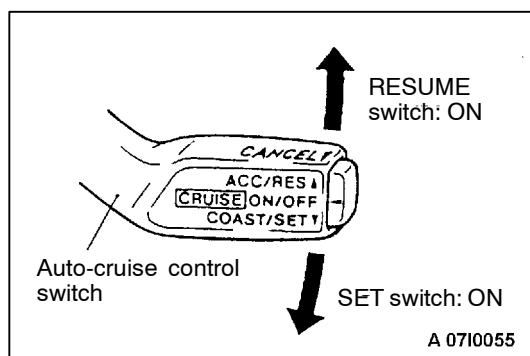
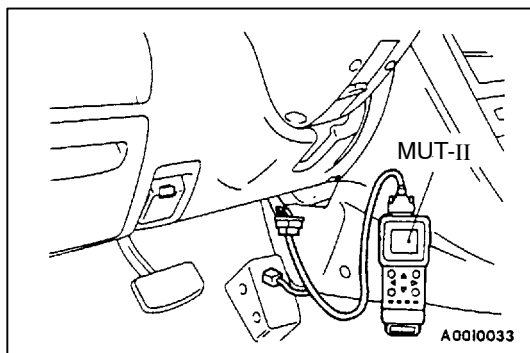
By using the auto-cruise control, the driver can drive at the speed he/she likes (in a range of approximately 40–200 km/h) without depressing the accelerator pedal.



00009997

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

DIAGNOSIS FUNCTION

METHOD OF READING THE DIAGNOSIS CODES

WHEN USING THE MUT-II

Connect the MUT-II to the diagnosis connector and take a reading of the diagnosis codes.

Caution

Turn off the ignition switch before connecting or disconnecting the MUT-II.

WHEN USING THE AUTO-CRUISE CONTROL INDICATOR LAMP

1. Turn the ignition switch to ON, and then turn on the MAIN switch of the auto-cruise control switch.
2. Turn off the MAIN switch of the auto-cruise control switch and the ignition switch.
3. While the MAIN switch and the SET switch of the auto-cruise control switch remain on, turn the ignition switch to ON. Then turn on the RESUME switch of the auto-cruise control switch within one second.

Indication of diagnosis code by the auto-cruise control indicator lamp

When the diagnosis code No.23 is output	When no diagnosis code is output

METHOD OF ERASING DIAGNOSIS CODES

WHEN USING THE MUT-II

Connect the MUT-II to the diagnosis connector and erase the diagnosis code.

Caution

Turn off the ignition switch before connecting or disconnecting the MUT-II.

WHEN NOT USING THE MUT-II

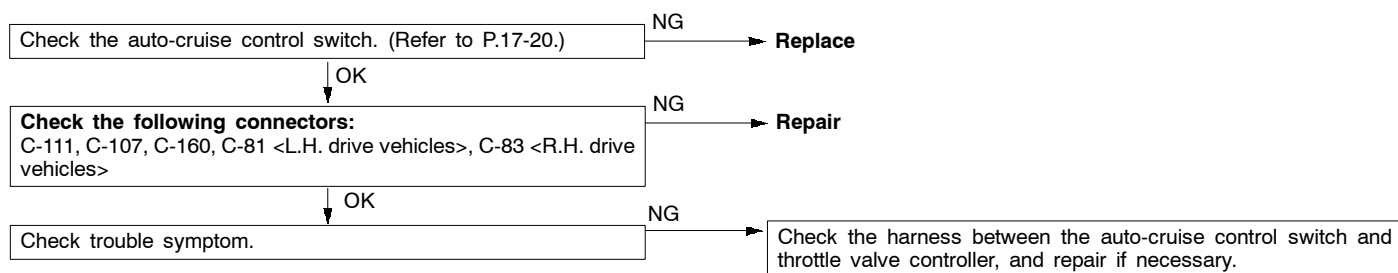
1. Turn the ignition switch to OFF.
2. After disconnecting the battery cable from the battery (-) terminal for 10 seconds or more, reconnect the cable.

INSPECTION CHART FOR DIAGNOSIS CODES

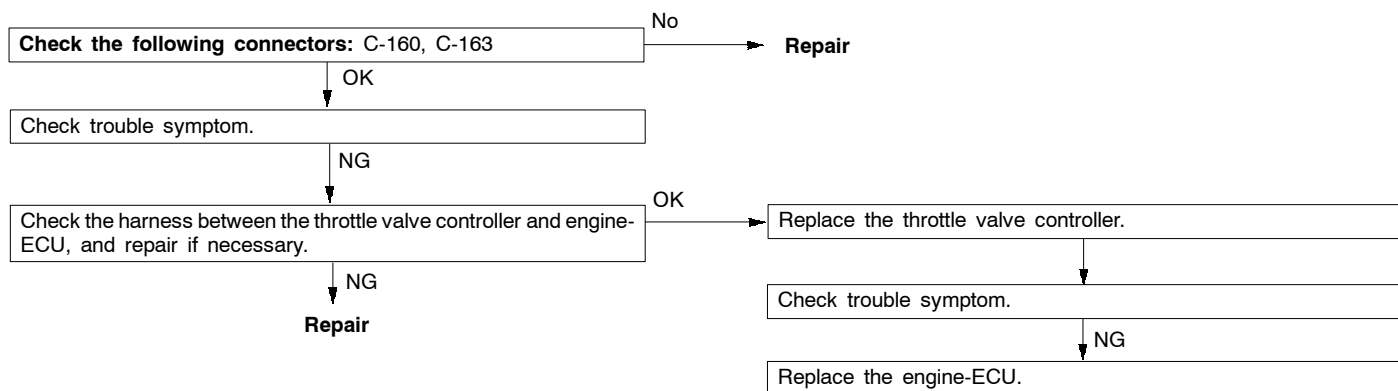
Code No.	Diagnosis item	Reference page
15	Auto-cruise control switch system	17-7
21	Cancel latch signal system	17-7
22	Stop lamp switch system	17-8
23	Engine-ECU system	17-9

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

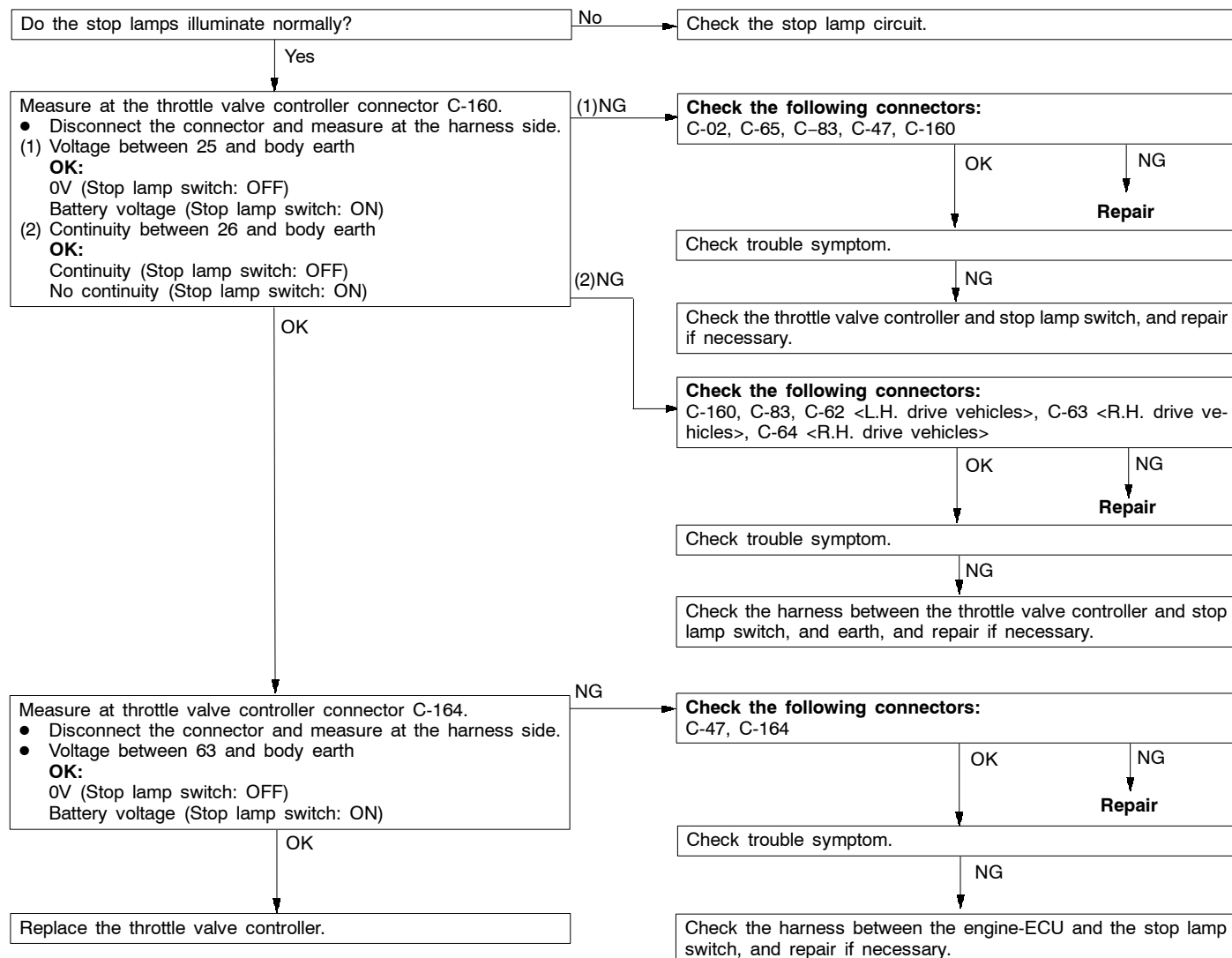
Code No. 15 Auto-cruise control switch system	Probable cause
This diagnosis code is output if the RESUME and SET switches of the auto-cruise control switch remain on.	<ul style="list-style-type: none"> • Malfunction of the auto-cruise control switch • Malfunction of the connector • Malfunction of the harness



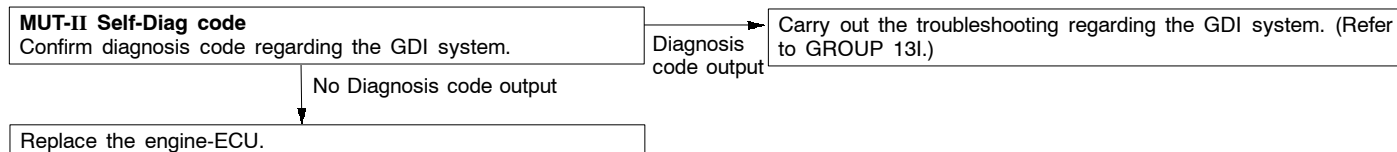
Code No. 21 Cancel latch signal system	Probable cause
The throttle valve controller and the engine-ECU send a cancel holding information to the engine-ECU via a cancel latch signal line and the serial communication line. This diagnosis code is output if there is a failure in the cancel latch signal line, or a disaccord in the communication data.	<ul style="list-style-type: none"> • Malfunction of the connector • Malfunction of the harness • Malfunction of the throttle valve controller • Malfunction of the auto-cruise control-ECU



Code No. 22 Stop lamp switch system	Probable cause
This diagnosis code is output when the throttle valve controller detects a failure in the stop lamp switch output.	<ul style="list-style-type: none"> • Malfunction of the connector or harness wire • Malfunction of the stop lamp switch • Malfunction of the throttle valve controller



Code No. 23 Engine-ECU system	Probable cause
This diagnosis code is output if the engine-ECU system is defective as follows: <ul style="list-style-type: none"> • Communication error between the throttle valve controller and the engine-ECU • Malfunction of the throttle position sensor • Malfunction of the accelerator pedal position sensor • Malfunction of the throttle control servo • Malfunction of the vehicle speed sensor 	<ul style="list-style-type: none"> • Malfunction of the connector • Malfunction of the harness • Malfunction of the engine-ECU



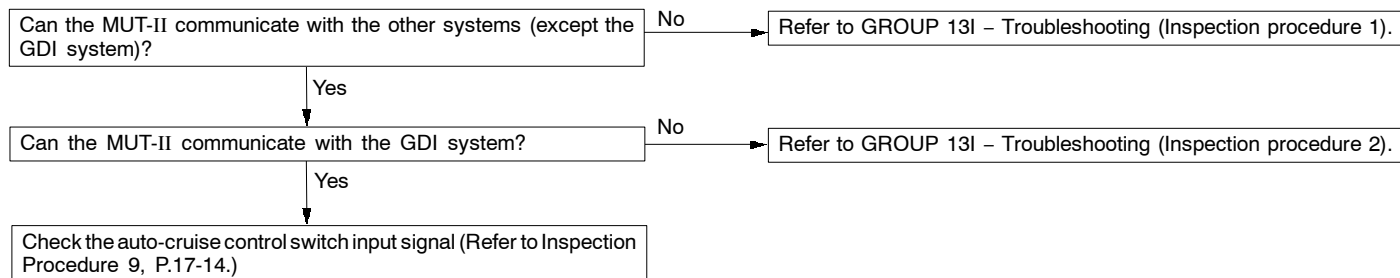
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is not possible.		1	17-10
Auto-cruise control is not cancelled.	Even if brake pedal is depressed	2	17-10
	Even if clutch pedal is depressed <M/T>	3	17-11
	Even if select lever is set to N range <A/T>	4	17-11
	Even if CANCEL switch is set to ON	5	17-12
Auto-cruise control cannot be set.		6	17-12
Hunting (repeated acceleration and deceleration) occurs at the set vehicle speed.		7	17-13
When the MAIN switch of the auto-cruise control switch is turned on, the auto-cruise control indicator lamp does not illuminate. (However, the auto-cruise control is normal.)		8	17-13

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

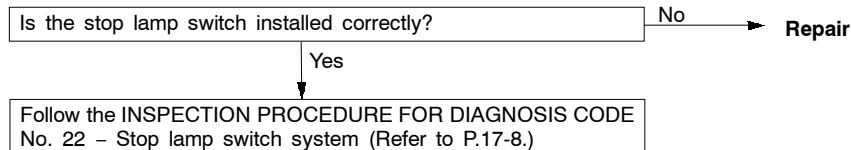
Inspection Procedure 1

Communication with MUT-II is not possible.	Probable cause
<p>If the MUT-II can not also communicate with the systems other than the GDI system, the diagnosis line circuit may be defective. If the MUT-II can not communicate with only the GDI system and the auto-cruise control system, the harness wire between the engine-ECU and the diagnosis connector, may be defective.</p> <p>In addition, if the the MUT-II can not communicate with only the auto-cruise control system, the auto-cruise control switch circuit may be defective.</p>	<ul style="list-style-type: none"> • Malfunction of the connector or harness • Malfunction of the auto-cruise control switch • Malfunction of the throttle valve controller • Malfunction of the engine-ECU



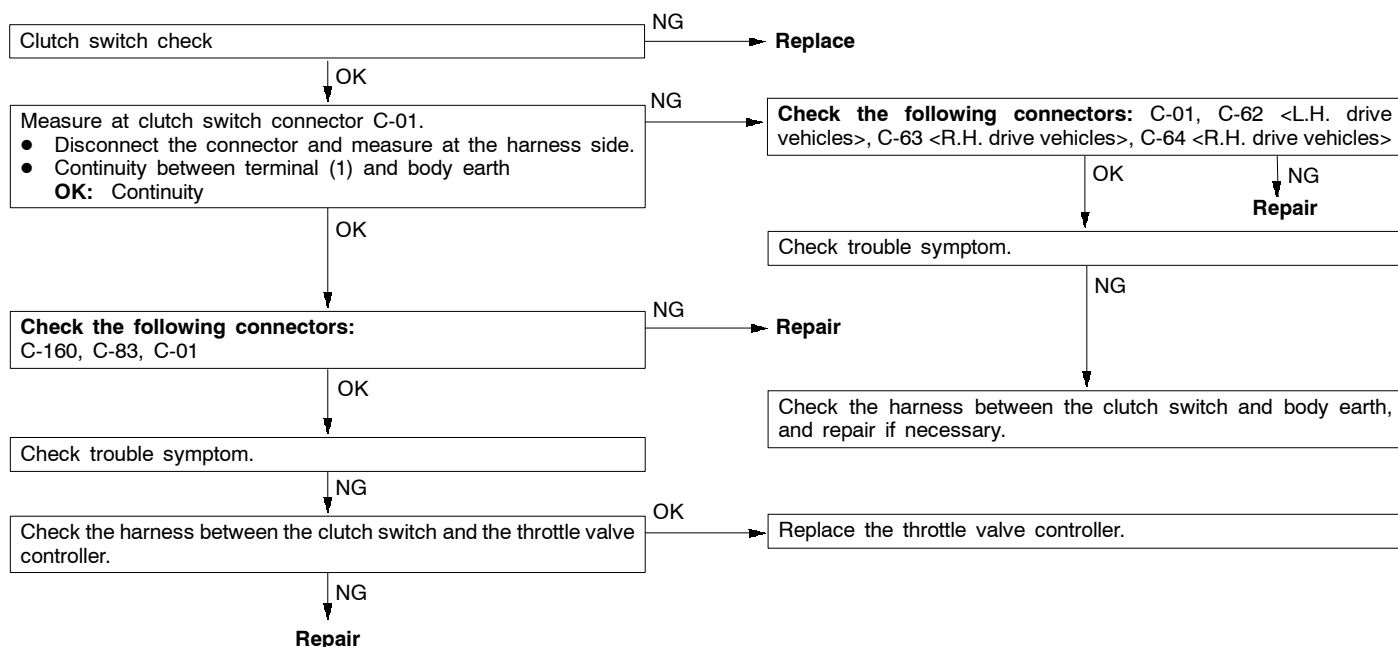
Inspection Procedure 2

Auto-cruise control can not be cancel even if brake pedal is depressed.	Probable cause
<p>The cause is probably a malfunction of the stop lamp switch, or the stop lamp circuit.</p>	<ul style="list-style-type: none"> • Malfunction of the connector or the harness • Malfunction of the stop lamp switch • Malfunction of the throttle valve controller • Malfunction of the engine-ECU



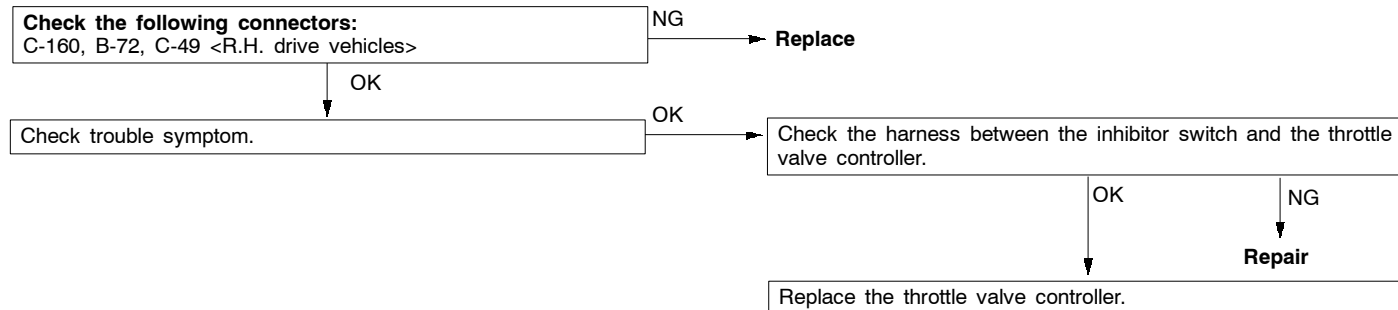
Inspection Procedure 3

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



Inspection Procedure 4

Even if select lever is set to N range, auto-cruise control is not cancelled. <A/T>	Probable cause
The cause is probably a defective inhibitor switch circuit.	<ul style="list-style-type: none"> • Malfunction of the connector or harness • Malfunction of the inhibitor switch • Malfunction of the throttle valve controller



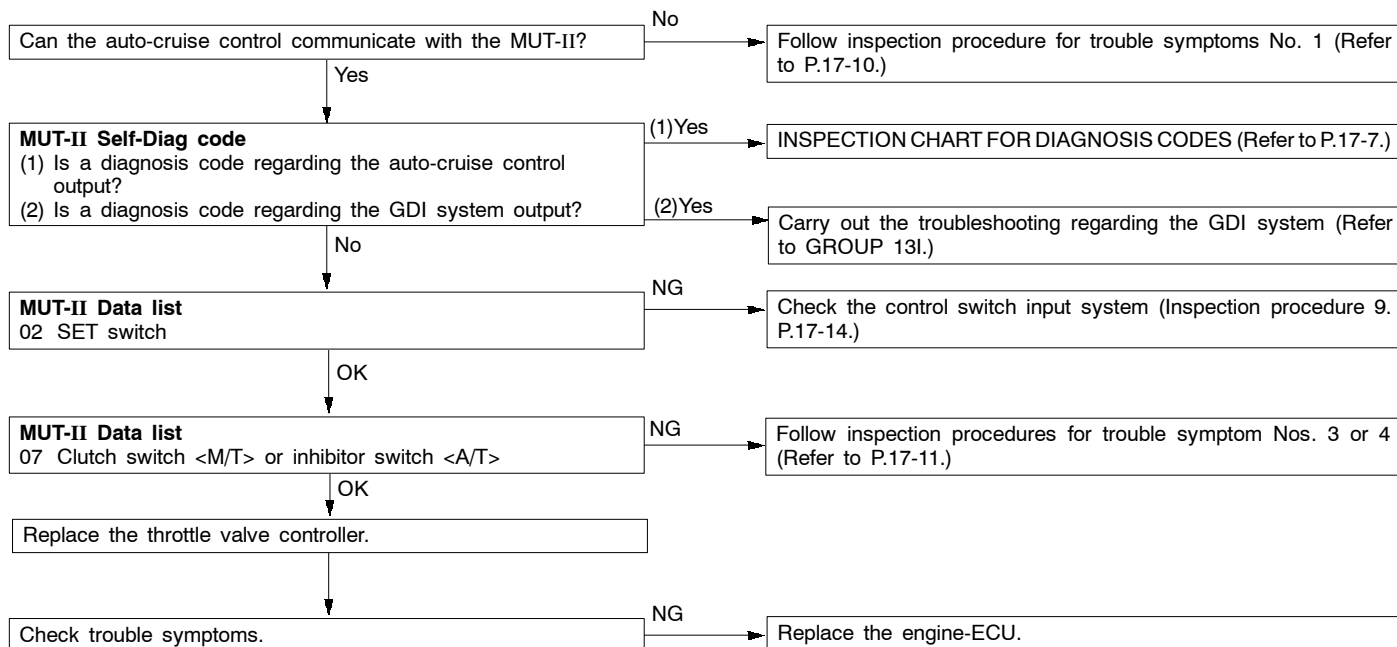
Inspection Procedure 5

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 switch

Replace the auto-cruise control switch.

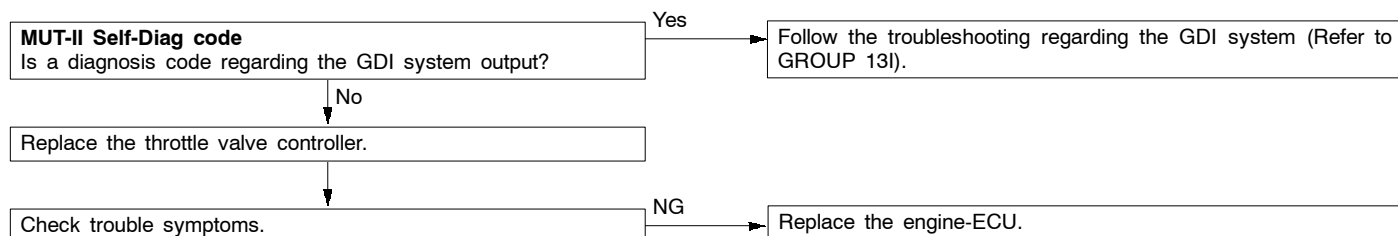
Inspection Procedure 6

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 input switch are normal or not by inspecting the input switch codes.	<ul style="list-style-type: none"> Malfunction of the auto-cruise control switch Malfunction of the harnesses or connectors Malfunction of the control switch Malfunction of the throttle valve controller Malfunction of the engine-ECU



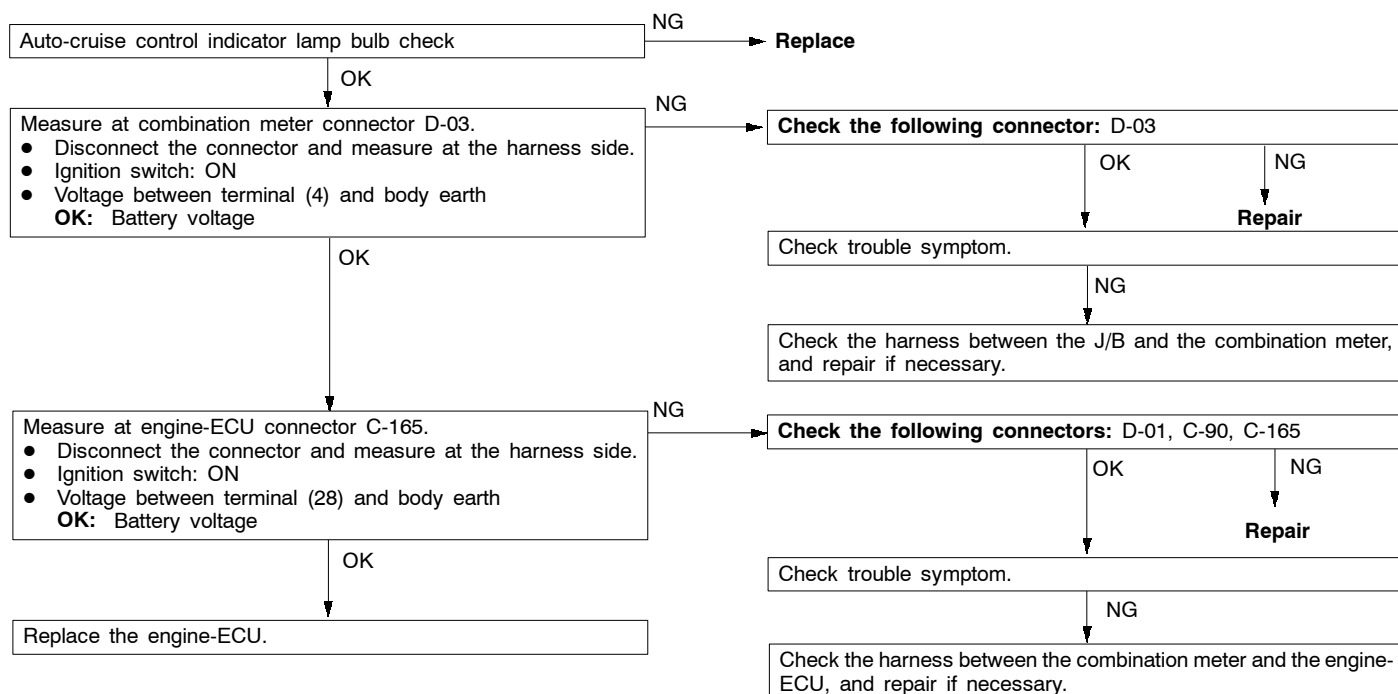
Inspection Procedure 7

Hunting (repeated acceleration and deceleration) occurs at the set vehicle speed.	Probable cause
The cause is probably a malfunction of vehicle speed sensor or throttle control servo. In either case, a diagnosis code regarding the GDI system must be confirmed.	<ul style="list-style-type: none"> • Malfunction of the connector and harness • Malfunction of the vehicle speed sensor • Malfunction of the throttle control servo • Malfunction of the throttle valve controller • Malfunction of the engine-ECU



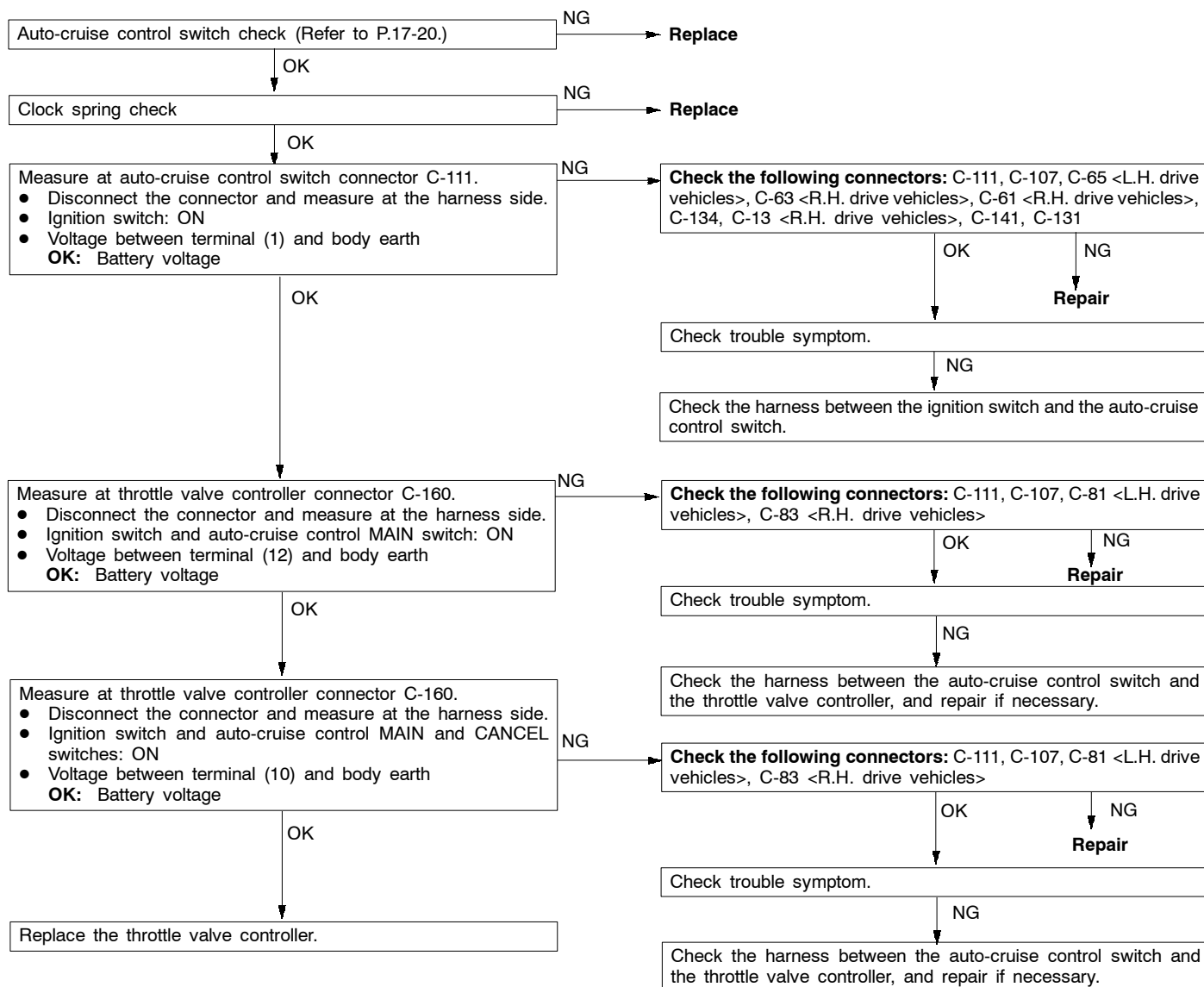
Inspection Procedure 8

When the MAIN switch of the auto-cruise control switch is turned on, the auto-cruise control indicator lamp does not illuminate. (However, the auto-cruise control is normal.)	Probable cause
There may be a burnt-out bulb or a malfunction of the auto-cruise control indicator lamp circuit.	<ul style="list-style-type: none"> • Burnt-out bulb • Malfunction of the connector and harness • Malfunction of the engine-ECU



Inspection Procedure 9

Auto-cruise control switch input system check



DATA LIST REFERENCE TABLE

For the data, which is input to the throttle valve controller and the engine-ECU, the following items can be read out by using the MUT-II.

HOW TO READ OUT DATA LIST

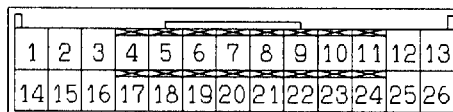
1. Connect the MUT-II to the 16-pin diagnosis connector.

Caution

Turn off the ignition switch before connecting and disconnecting the MUT-II.

2. Turn the ignition switch to ON, and then turn on the auto-cruise control MAIN switch.
3. Select "auto-cruise control" on the MUT-II menu, and then read out the data list.

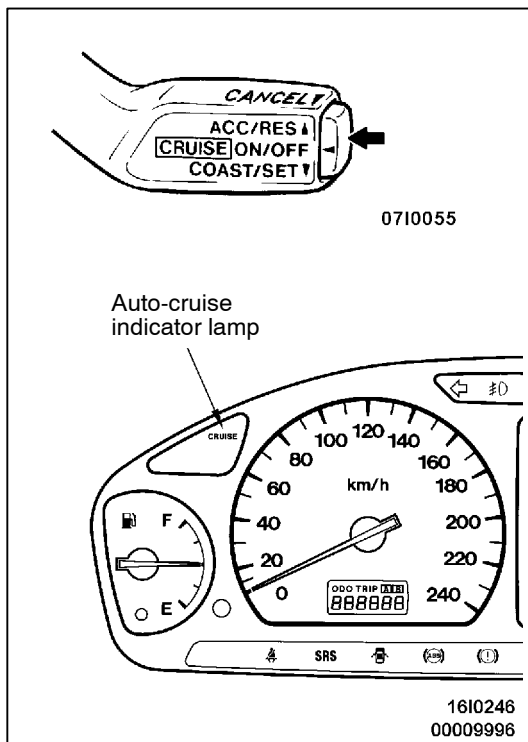
Item No.	Check item		Check conditions	Normal condition
01	Auto-cruise control switch	MAIN	MAIN switch: ON	ON
			MAIN switch: OFF	OFF
02		SET	SET switch: ON	ON
			SET switch: OFF	OFF
03		RESUME	RESUME switch: ON	ON
			RESUME switch: OFF	OFF
04		CANCEL	CANCEL switch: ON	ON
			CANCEL switch: OFF	OFF
05	Stop lamp switch	Brake pedal: Depressed	ON	
		Brake pedal: Released	OFF	
06	Stop lamp switch	Brake pedal: Depressed	OFF	
		Brake pedal: Released	ON	
07	Clutch switch <M/T>	Clutch pedal: Depressed	ON	
		Clutch pedal: Released	OFF	
	Inhibitor switch <A/T>	Selector lever: N position	ON	
		Selector lever: Other than N position	OFF	
08	Idle position switch	Accelerator pedal: Released	ON	
		Accelerator pedal: Depressed	OFF	
09	Auto-cruise control	Auto-cruise control: Activated	ON	
		Auto-cruise control: No activated	OFF	
10	Vehicle speed sensor	Road test the vehicle	The speedometer and the MUT-II display the same value.	
11	Throttle position sensor 1	Accelerator pedal: Fully depressed	450 – 1,000 mV	
		Accelerator pedal: Depressed	The more deeply the pedal is depressed, the higher value the MUT-II displays	
		Accelerator pedal: Released	4,200 – 4,900 mV	
12	Throttle position sensor 2	Accelerator pedal: Fully depressed	300 – 1,000 mV	
		Accelerator pedal: Depressed	The more deeply the pedal is depressed, the higher value the MUT-II displays	
		Accelerator pedal: Released	4,500 – 5,500 mV	

CHECK AT THE THROTTLE VALVE CONTROLLER TERMINALS


00009994

Terminal No.	Check item	Check conditions		Normal condition
1	Throttle control servo (A+)	Ignition switch: ON Accelerator pedal: Fully depressed position to released position		Value changes
9	Throttle control servo (B+)			
14	Throttle control servo (A−)			
15	Throttle control servo (B−)			
2	Throttle control servo power supply	Ignition switch: ON		Battery voltage
3, 4, 16	Earth	−		0 V
5	Power supply	Ignition switch: ON		Battery voltage
6	Sensor power supply	Ignition switch: ON		4.5 – 5.5 V
7	Throttle position sensor 1	Ignition switch: ON	Accelerator pedal: Released	0.4 – 0.8 V
			Accelerator pedal: Fully depressed	3.9 – 4.9 V
10	Auto-cruise control switch	Ignition switch: ON MAIN switch: ON	SET switch: ON	Approximately 3 V
			RESUME switch: ON	Approximately 6 V
			CANCEL switch: ON	Battery voltage
			All swishes: OFF	0 V
11	Clutch switch <M/T>	Ignition switch: ON	Clutch pedal: Depressed	0 V
			Clutch pedal: Released	8 – 14 V
	Inhibitor switch <A/T>	Ignition switch: ON	Selector lever: N or P position	0 V
			Selector lever: Other than the above	8 – 14 V
12	Auto-cruise control switch	Ignition switch: ON	MAIN switch: ON	Battery voltage
			MAIN switch: OFF	0 V
17	Sensor earth	−		0 V

Terminal No.	Check item	Check conditions		Normal condition
20	Accelerator pedal position sensor 2	Ignition switch: ON	Accelerator pedal: Released	0.7 – 1.4 V
			Accelerator pedal: Fully depressed	4 V or more
22	Ignition switch (IG)	Ignition switch: ON		Battery voltage
23	Auto-cruise control cancel latch signal	Auto-cruise control: Activated		0 V
		Auto-cruise control: Not activated		Battery voltage
25	Stop lamp switch	Brake pedal: Depressed		Battery voltage
		Brake pedal: Released		0 V
26	Stop lamp switch	Ignition switch: ON	Brake pedal: Depressed	0 V
			Brake pedal: Released	Battery voltage



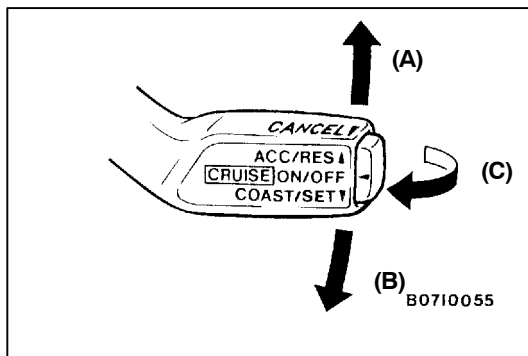
ON-VEHICLE SERVICE

The other items than the below are the same as the ones for 4G63-MPI.

AUTO-CRUISE CONTROL SWITCH CHECK

AUTO-CRUISE MAIN 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 (B).
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 (A).
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

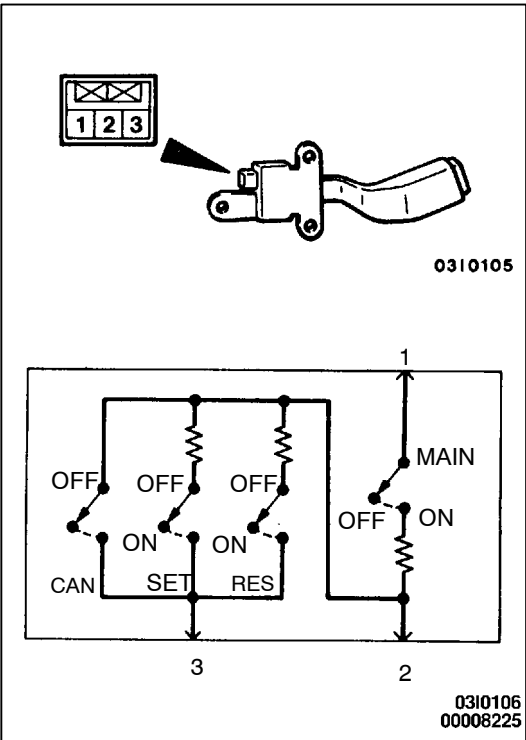
1. Set to the desired speed.
2. Push the auto-cruise control switch in the direction of arrow (B).
3. Check to be sure that deceleration continues while the switch is pressed, and that when it is released the constant speed at the time when it was released becomes the driving speed.

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 (C).
 - 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. When the auto-cruise control switch is pushed in the direction of arrow (A) at a vehicle speed of 40 km/h or higher, check if the vehicle speed returns to the speed before auto-cruise control driving was cancelled, and constant speed driving occurs.
4. When the MAIN switch is turned to OFF while driving at constant speed, check if normal driving is resumed and deceleration occurs.



AUTO-CRUISE CONTROL

INSPECTION

AUTO-CRUISE CONTROL SWITCH CHECK

Measure the resistance between the terminals when each of the SET, RESUME, CANCEL and MAIN switches is pressed. If the values measured at this time correspond to those in the table below, then there is no problem.

Switch position	Resistance between terminals	
Switch OFF	No continuity	
CANCEL switch: ON	Terminals 1 and 3	Approx. 3.9 kΩ
	Terminals 2 and 3	Approx. 0 Ω
RESUME switch: ON	Terminals 1 and 3	Approx. 4.8 kΩ
	Terminals 2 and 3	Approx. 910 Ω
SET switch: ON	Terminals 1 and 3	Approx. 4.1 kΩ
	Terminals 2 and 3	Approx. 220 Ω
MAIN switch: ON	Terminals 1 and 2	Approx. 3.9 kΩ

AUTO-CRUISE CONTROL <EXCEPT 4G64-GDI>

GENERAL

OUTLINE OF CHANGE

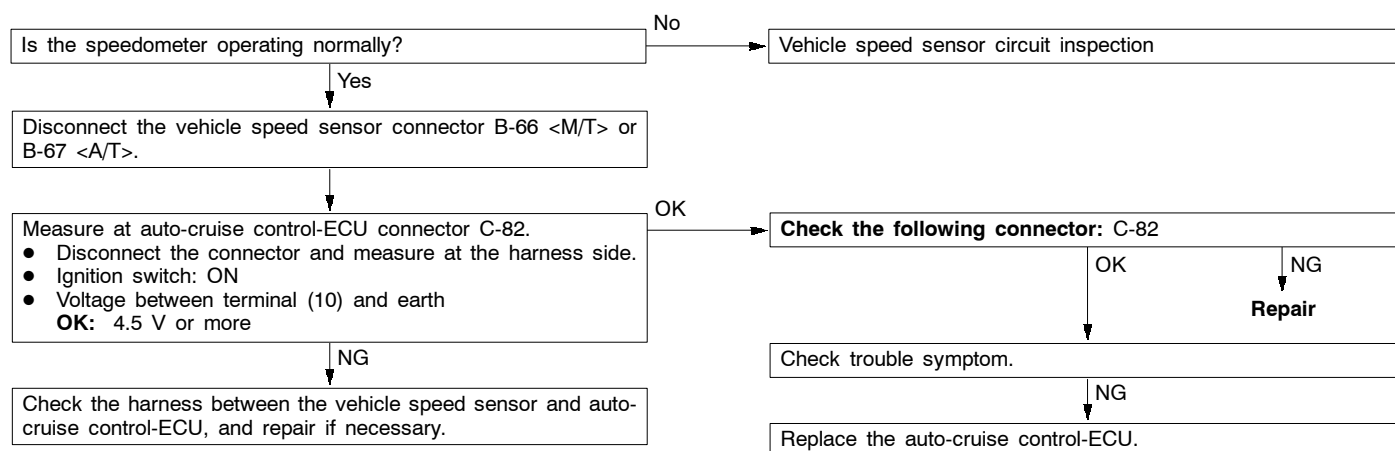
- The following service procedure has been added as an integrated auto-cruise control switch has been newly used.

TROUBLESHOOTING

- The other items than the below are the same as before.

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. 12 Vehicle speed signal system	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



INSPECTION CHART FOR TROUBLE SYMPTOMS

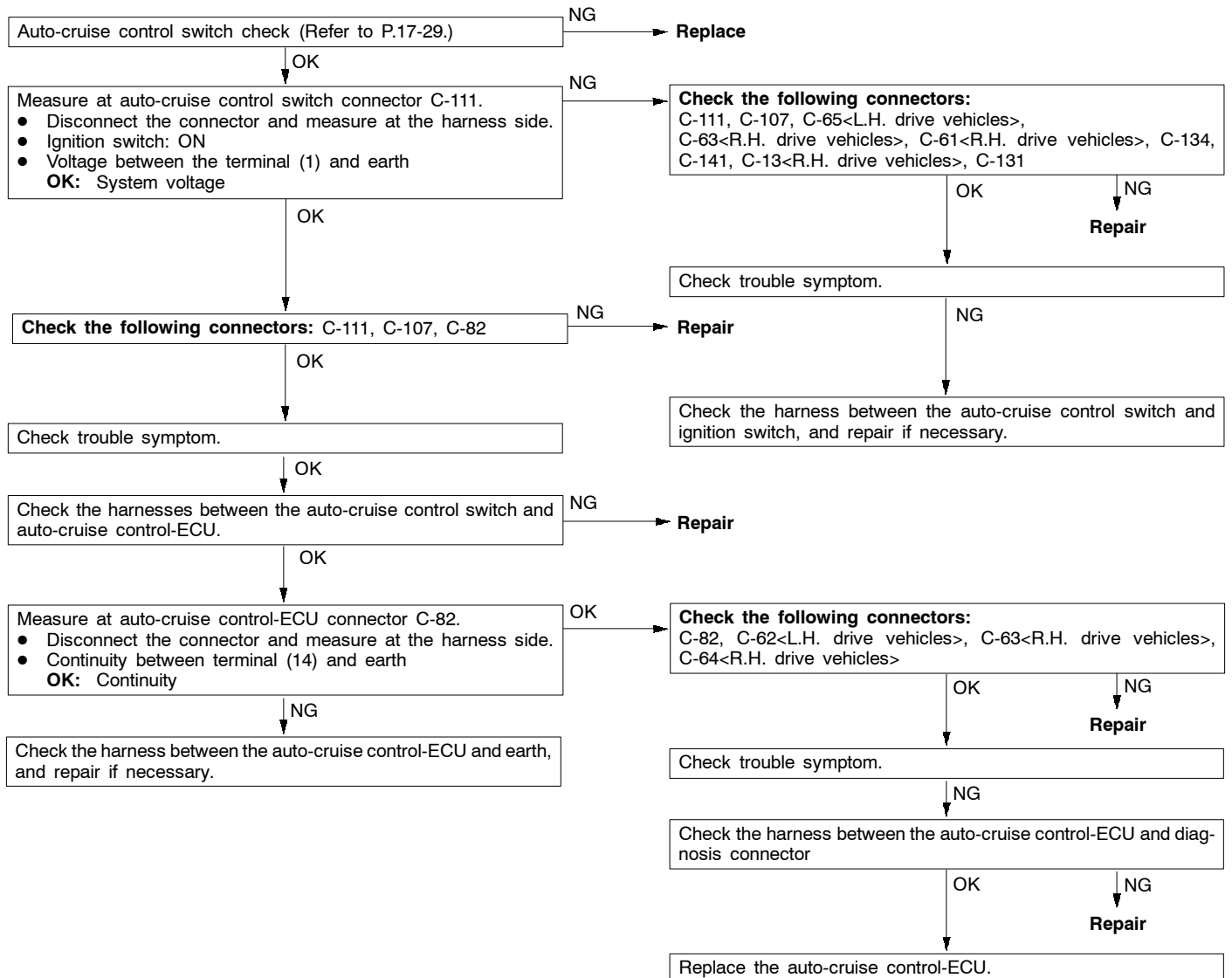
Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	Communication with all systems is not possible.	1	*
	Communication with auto-cruise control-ECU only is not possible.	2	17-23
Input switch inspection using the MUT-II is not possible. (However, diagnosis inspection is possible.)		3	17-24
Auto-cruise control is not cancelled.	Even if brake pedal is depressed	4	*
	Even if clutch pedal is depressed <M/T>	5	*
	Even if select lever is set to N range <A/T>	6	*
	Even if CANCEL switch is set to ON	7	*
Auto-cruise control cannot be set.		8	17-25
Hunting (repeated acceleration and deceleration) occurs at the set vehicle speed.		9	*
Even if auto-cruise control MAIN switch is set to ON, auto-cruise indicator lamp in combination meter does not illuminate. (However, auto-cruise control is normal.)		10	17-26

*: Refer to '97 GALANT Workshop Manual (Pub. No. PWDE9611).

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

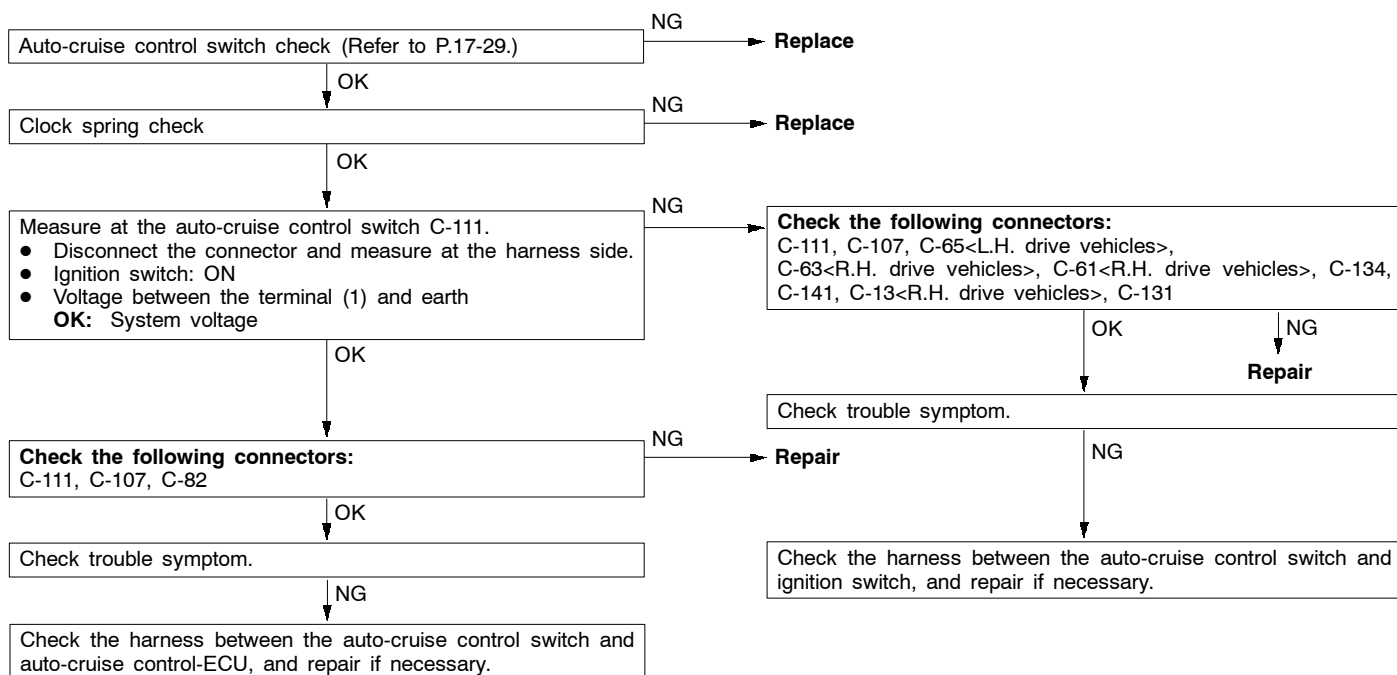
Inspection Procedure 2

Communication with MUT-II is not possible. (Communication with auto-cruise control-ECU only is not possible.)	Probable cause
The cause is probably a malfunction of auto-cruise control MAIN switch circuit or a malfunction of auto-cruise control-ECU earth circuit.	<ul style="list-style-type: none"> • Malfunction of the auto-cruise control switch • Malfunction of the connector • Malfunction of the harness • Malfunction of the auto-cruise control-ECU



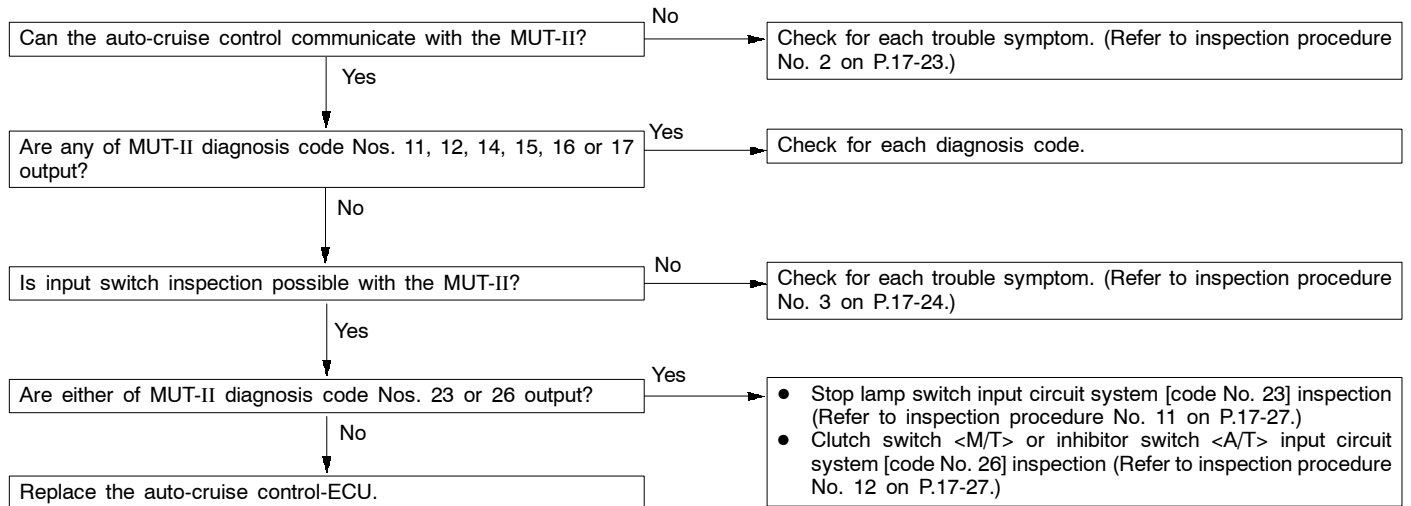
Inspection Procedure 3

Input switch inspection using the MUT-II is not possible. (However, diagnosis inspection is possible.)	Probable cause
The cause is probably a malfunction of auto-cruise control switch circuit system.	<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



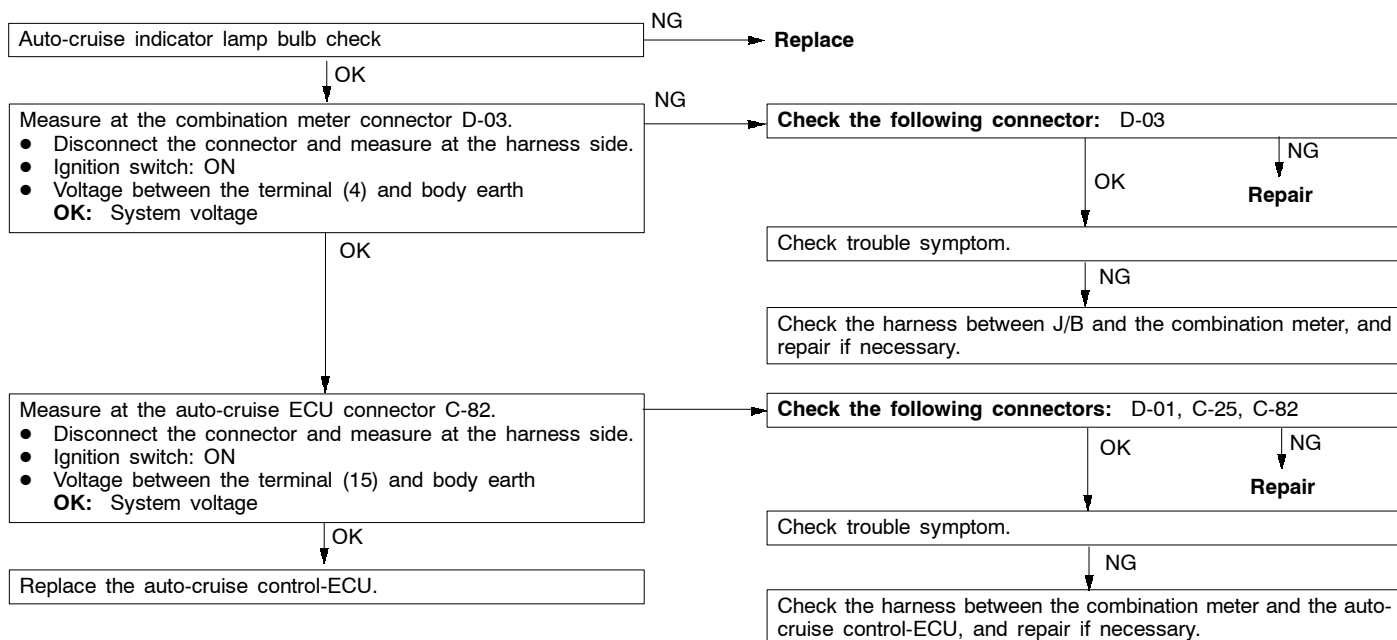
Inspection Procedure 8

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 input switch are normal or not by inspecting the input switch codes.	<ul style="list-style-type: none"> • Malfunction of the auto-cruise control switch • Malfunction of the clock spring • Malfunction of the harnesses or connectors • Malfunction of the clutch switch <M/T> • Malfunction of the auto-cruise control-ECU



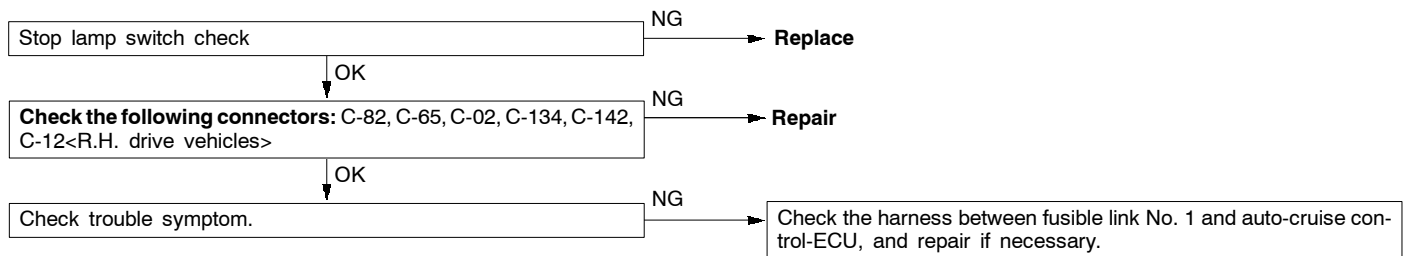
Inspection Procedure 10

Even if auto-cruise control MAIN switch is set to ON, auto-cruise indicator lamp in combination meter does not illuminate. (However, auto-cruise control is normal.)	Probable cause
Bulb or auto-cruise indicator lamp circuit is suspected to be faulty.	<ul style="list-style-type: none"> • Malfunction of the bulb • Malfunction of the connectors or harnesses • Malfunction of the auto-cruise control-ECU



Inspection Procedure 11

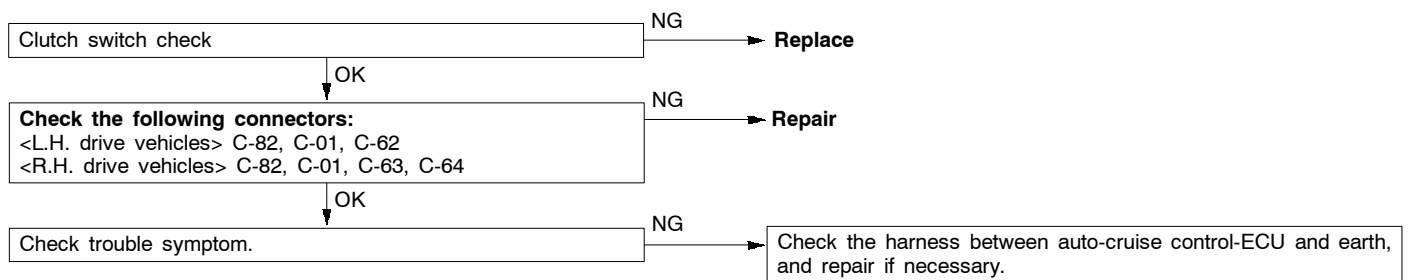
Stop lamp switch input circuit system inspection (Code No. 23)



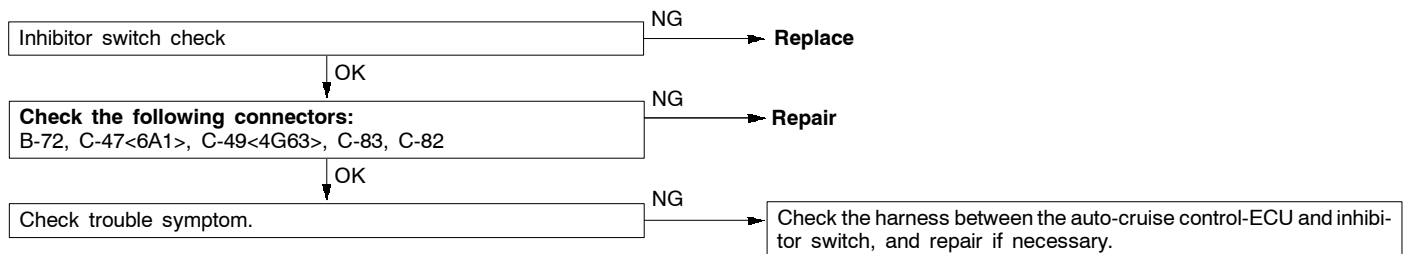
Inspection Procedure 12

Clutch switch <M/T> or inhibitor switch <A/T> input circuit system inspection (Code No. 26)

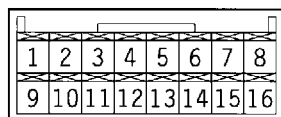
<M/T>



<A/T>



CHECK AT THE ECU TERMINALS



0710059

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

NOTE

*: Vehicles with TCL

Terminal No.	Check item	Check conditions		Normal condition
11	Diagnosis control input	When ignition switch is ON		4V or more
12	ECU power supply	Ignition switch : ON Main switch : ON		System voltage
13	Clutch switch input <M/T>	When pedal is not depressed	When clutch switch is OFF	5V
		When pedal is depressed	When clutch switch is ON	0V
	Inhibitor switch input <A/T>	When select lever is in a position other than N range	When inhibitor switch is OFF	5V
		When select lever is in N range	When inhibitor switch is ON	0V
14	Earth	At any time		Continuity
15	Indicator lamp input (inside combination meter)	When driving at constant speed	When indicator lamp is illuminated	0V
		When constant-speed driving is cancelled	When indicator lamp is switched off	System voltage
16	Auto-cruise vacuum pump motor input	When driving at constant speed using the SET switch	Motor stopped/running	System voltage/0V
		When accelerating with the RESUME switch while driving at constant speed	Motor stopped/running	System voltage/0V
		When decelerating with the SET 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

Same as the procedure for 4G64-GDI. (Refer to P.17-18.)

AUTO-CRUISE CONTROL

INSPECTION

AUTO-CRUISE CONTROL SWITCH CHECK

Same as the procedure for 4G64-GDI. (Refer to P.17-20.)

EMISSION CONTROL SYSTEM

GENERAL

OUTLINE OF CHANGE

- The following service procedures have been added to correspond to the introduction of the 4G64–GDI engine.

GENERAL INFORMATION

The emission control system consists of the following subsystems:

- Crankcase emission control system
- Evaporative emission control system
- Exhaust emission control system

Items	Name	Specification
Crankcase emission control system	Positive crankcase ventilation (PCV) valve	Variable flow type (Purpose: HC reduction)
Evaporative emission control system	Canister Purge control solenoid valve	Equipped Duty cycle type solenoid valve (Purpose: HC reduction)
Exhaust emission control system	Air-fuel ratio control device–GDI system	Oxygen sensor feedback type (Purpose: CO, HC, NOx reduction)
	Exhaust gas recirculation system • EGR valve	Equipped Stepper motor type (Purpose: NOx reduction)
	Catalytic converter	Monolith type (Purpose: CO, HC, NOx reduction)

EMISSION CONTROL DEVICE REFERENCE TABLE

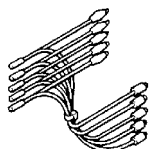
Related parts	Crankcase emission control system	Evaporative emission control system	Air/fuel ratio control system	Catalytic converter	Exhaust gas recirculation system	Reference page
PCV valve	×					17-38*
Purge control solenoid valve		×				17-36
GDI system component		×	×			GROUP 13I
Catalytic converter				×		17-47*
EGR valve					×	17-38

*: Refer to '97 GALANT Workshop Manual (Pub.No. PWDE9611).

SERVICE SPECIFICATIONS

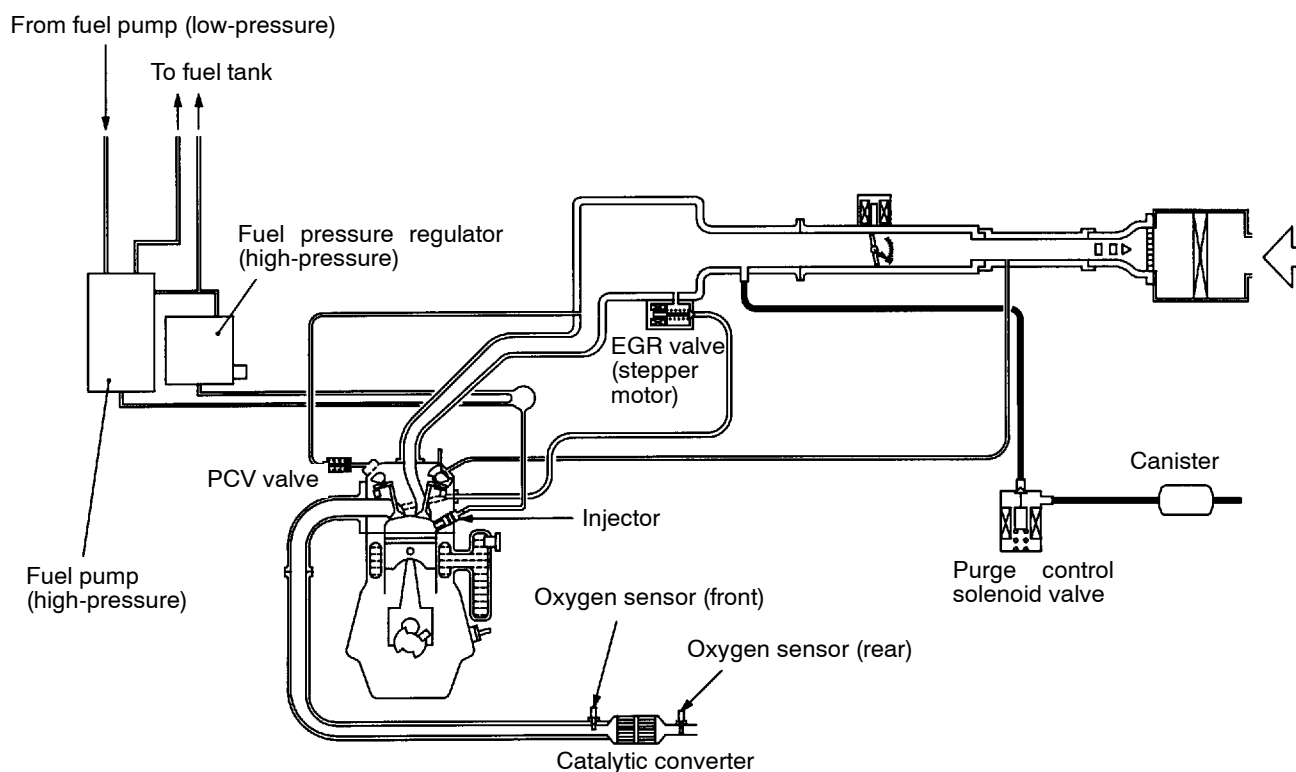
Items	Standard value
Purge control solenoid valve coil resistance (at 20°C) Ω	36 – 44
EGR valve coil resistance (at 20°C) Ω	10 – 20

SPECIAL TOOL

Tool	Number	Name	Use
 B991658	MB991658	Test harness set	Inspection of EGR valve

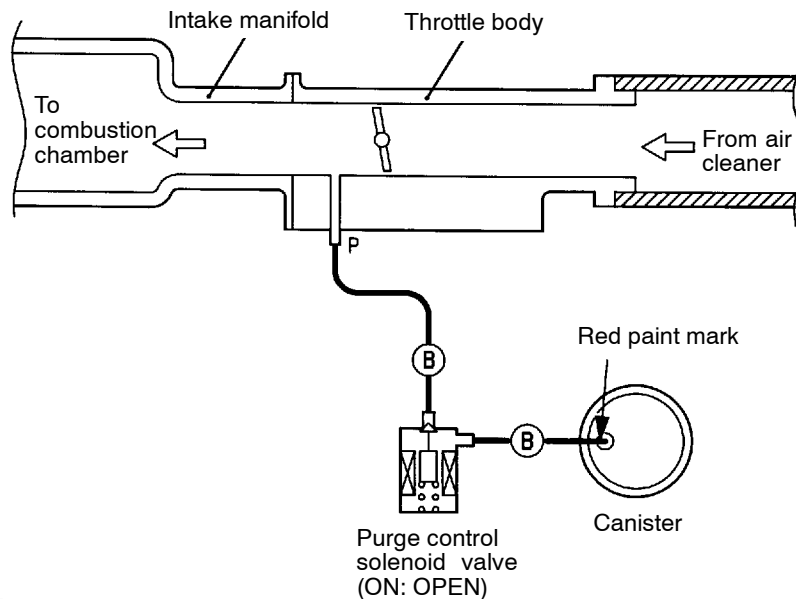
VACUUM HOSE

VACUUM HOSE PIPING DIAGRAM



6EM0710

VACUUM CIRCUIT DIAGRAM



Vacuum hose colour
B: Black

6EM0711

VACUUM HOSE CHECK

1. Using the piping diagram as a guide, check to be sure that the vacuum hoses are correctly connected.
2. Check the connection condition of the vacuum hoses, (removed, loose, etc.) and check to be sure that there are no bends or damage.

VACUUM HOSE INSTALLATION

1. When connecting the vacuum hoses, they should be securely inserted onto the nipples.
2. Connect the hoses correctly, using the vacuum hose piping diagram as a guide.

CRANKCASE EMISSION CONTROL SYSTEM

GENERAL INFORMATION

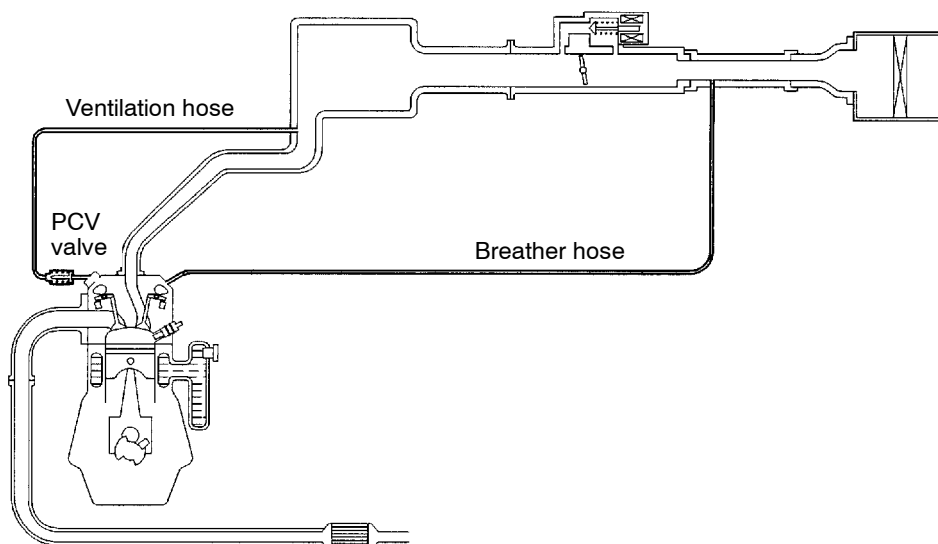
The crankcase emission control system prevents blow-by gases from escaping inside the crankcase into the atmosphere.

Fresh air is sent from the air cleaner into the crankcase through the breather hose. The air becomes mixed with the blow-by gases inside the crankcase.

The blow-by gas inside the crankcase is drawn into the intake manifold through the positive crankcase ventilation (PCV) valve.

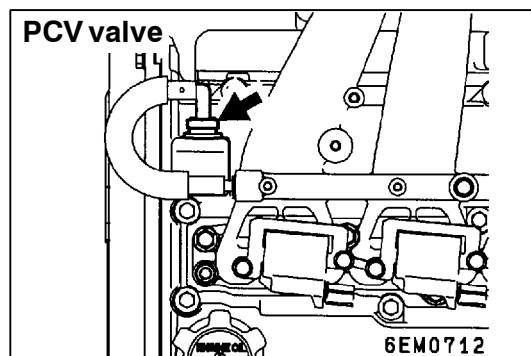
The PCV valve lifts the plunger according to the intake manifold vacuum so as to regulate the flow of blow-by gas properly. In other words, the blow-by gas flow is regulated during low load engine operation to maintain engine stability, while the flow is increased during high load operation to improve the ventilation performance.

SYSTEM DIAGRAM



9EM0205

COMPONENT LOCATION



EVAPORATIVE EMISSION CONTROL SYSTEM

GENERAL INFORMATION

The evaporative emission control system prevents fuel vapours generated in the fuel tank from escaping into the atmosphere.

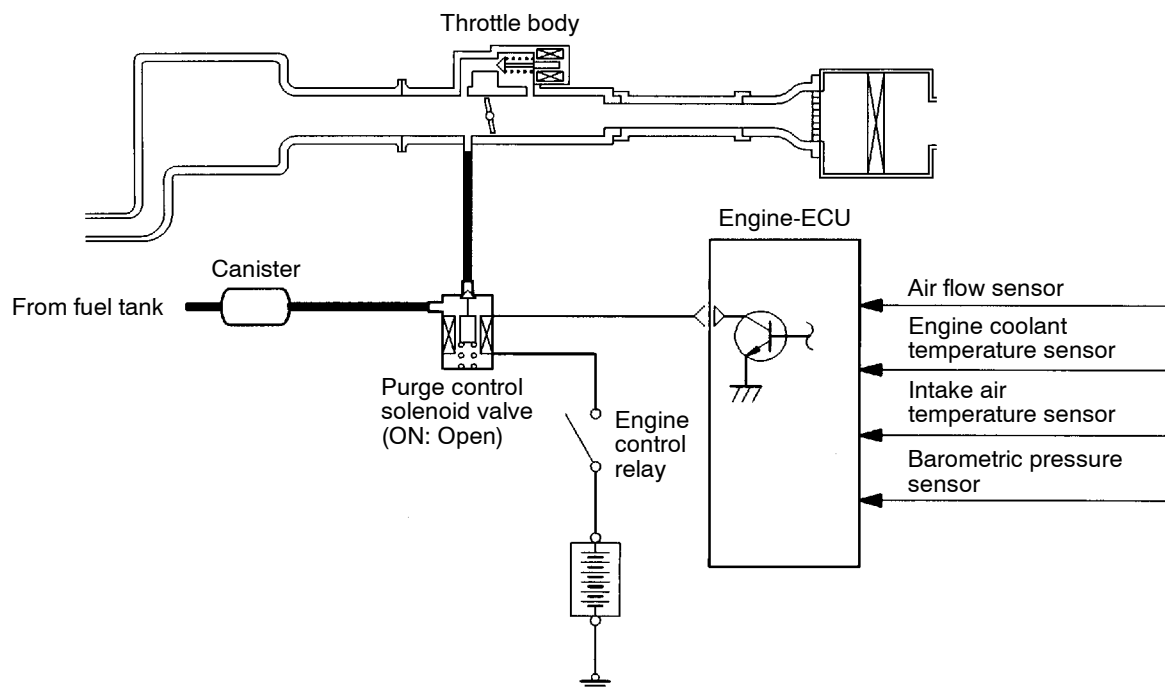
Fuel vapours from the fuel tank flow through the fuel tank pressure control valve and vapour pipe/hose to be stored temporarily in the canister. When driving the vehicle, fuel vapours stored in the canister flow through the purge solenoid and purge port and go into the intake manifold to be

sent to the combustion chamber.

When the engine coolant temperature is low or when the intake air quantity is small (when the engine is at idle, for example), the engine control unit turns the purge solenoid off to shut off the fuel vapour flow to the intake manifold.

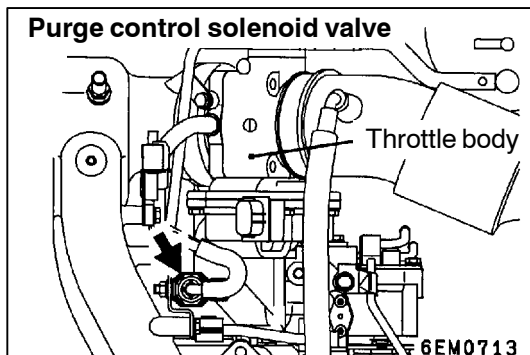
This does not only insure the driveability when the engine is cold or running under low load but also stabilize the emission level.

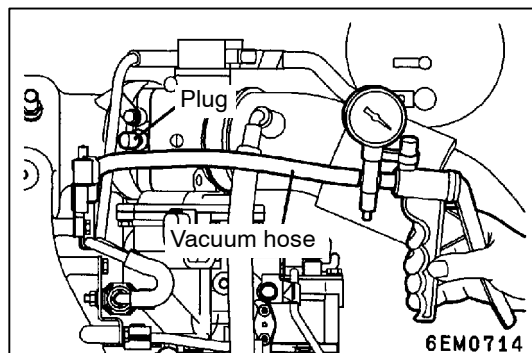
SYSTEM DIAGRAM



9EM0248

COMPONENT LOCATION





PURGE CONTROL SYSTEM CHECK

1. Disconnect the vacuum hose from the intake manifold and connect it to a hand vacuum pump.
2. Plug the nipple from which the vacuum hose was removed.
3. When the engine is cold or hot, apply a vacuum of 53 kPa, and check the condition of the vacuum.

When engine is cold

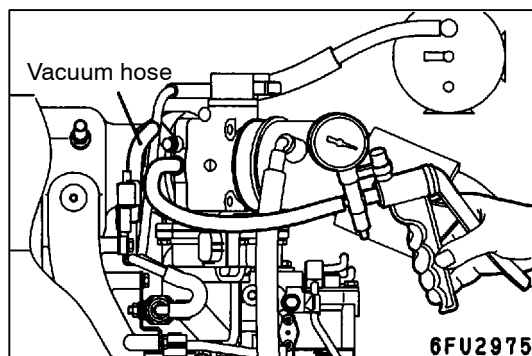
(Engine coolant temperature: 40°C or less)

Engine condition	Normal condition
At idle	Vacuum is maintained
3,000 r/min	

When engine is hot

(Engine coolant temperature: 80°C or higher)

Engine condition	Normal condition
At idle	Vacuum is maintained
3,000 r/min (fore approximately 3 minutes after the engine is started.)	Vacuum will leak.



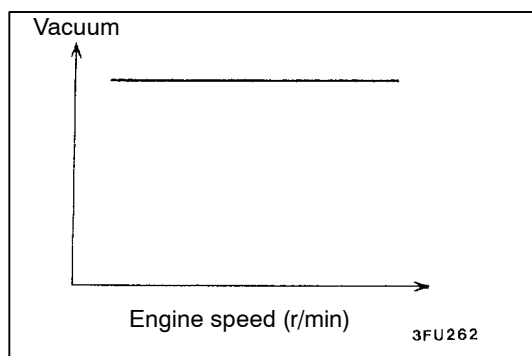
PURGE PORT VACUUM CHECK

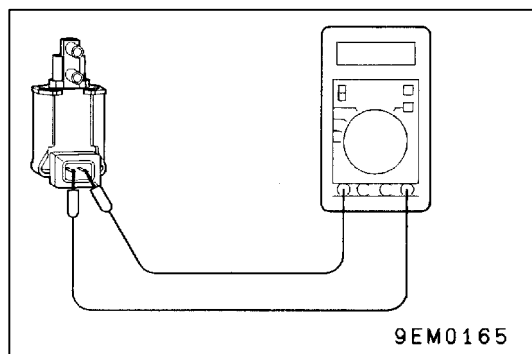
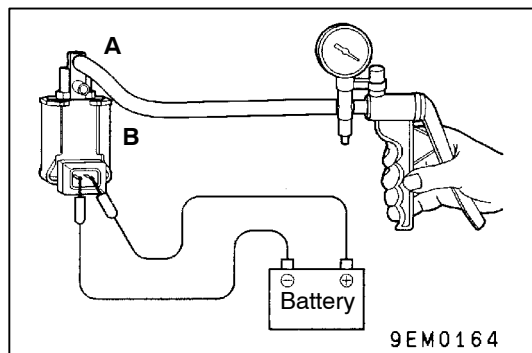
1. Disconnect the vacuum hose from the intake manifold purge vacuum nipple and connect a hand vacuum pump to the nipple.

2. Start the engine and check that the vacuum remains fairly constant after racing the engine.

NOTE

If vacuum changes, it is possible that the throttle body purge port may be clogged and require cleaning.





PURGE CONTROL SOLENOID VALVE CHECK

NOTE

When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

1. Disconnect the vacuum hose from the solenoid valve.
2. Disconnect the harness connector.
3. Connect a hand vacuum pump to nipple (A) of the solenoid valve (refer to the illustration at left).
4. Check airtightness by applying a vacuum with voltage applied directly from the battery to the purge control solenoid valve and without applying voltage.

Battery voltage	Normal condition
Applied	Vacuum leaks
Not applied	Vacuum maintained

5. Measure the resistance between the terminals of the solenoid valve.

Standard value: 36 – 44 Ω (at 20°C)

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

GENERAL INFORMATION

The exhaust gas recirculation (EGR) system lowers the nitrogen oxide (NOx) emission level. When the air/fuel mixture combustion temperature is high, a large quantity of nitrogen oxides (NOx) is generated in the combustion chamber. Therefore, this system recirculates part of emission gas from

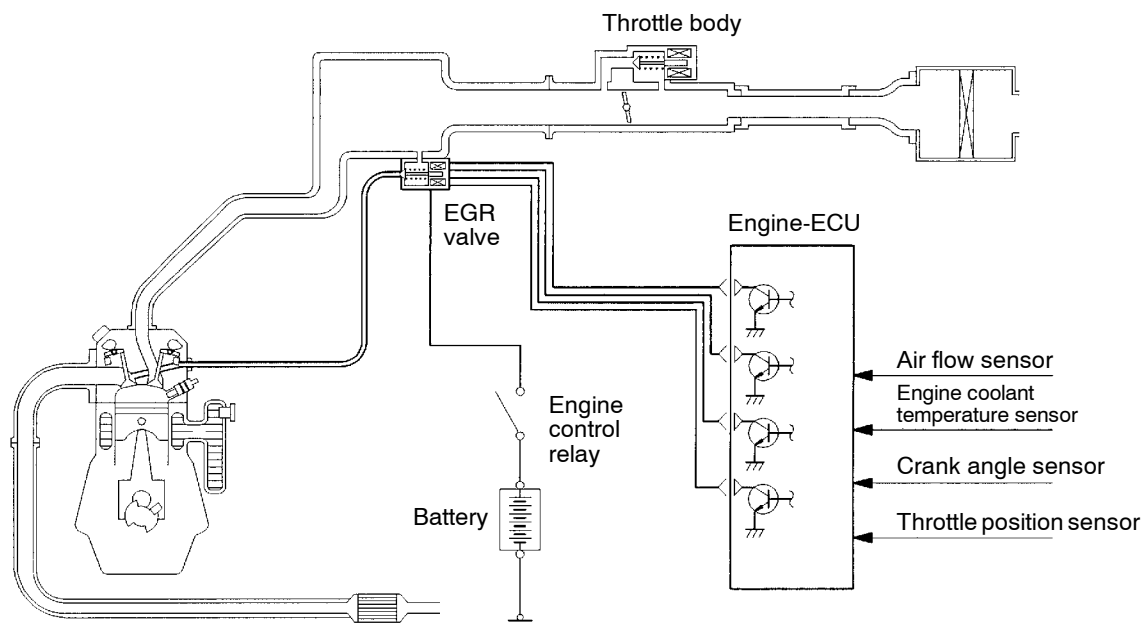
the exhaust port of the cylinder head to the combustion chamber through the intake manifold to decrease the air/fuel mixture combustion temperature, resulting in reduction of NOx. The EGR flow rate is controlled by the EGR valve so as not to decrease the driveability.

OPERATION

The EGR valve is being closed and does not recirculate exhaust gases under one of the following conditions. Otherwise, the EGR valve is opened and recirculates exhaust gases.

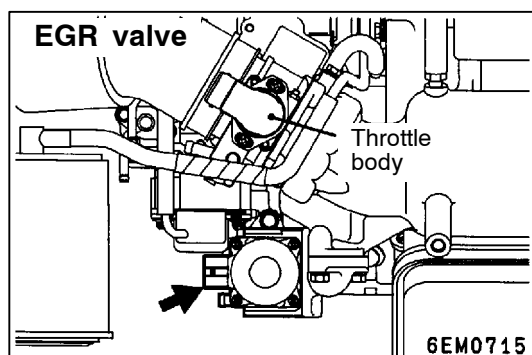
- The engine coolant temperature is low.
- The engine is at idle.
- The throttle valve is widely opened.

SYSTEM DIAGRAM



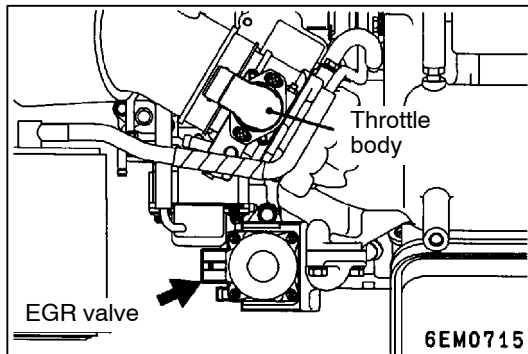
9EM0203

COMPONENT LOCATION



EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM CHECK

Refer to GROUP 13I – Troubleshooting.



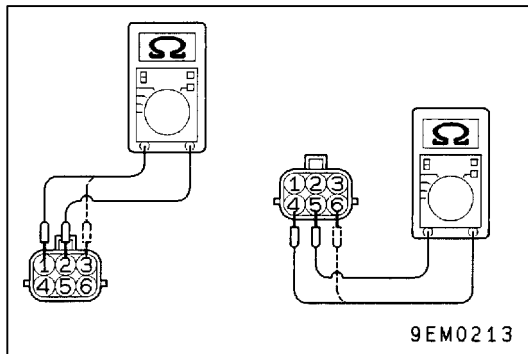
EGR VALVE (STEPPER MOTOR) CHECK

Checking the Operation Sound

1. Check that the operation sound of the stepper motor can be heard from the EGR valve when the ignition switch is turned to ON (without starting the engine).
2. If the operation sound cannot be heard, check the stepper motor drive circuit.

NOTE

If the circuit is normal, the cause is probably a malfunction of the stepper motor or of the engine-ECU.



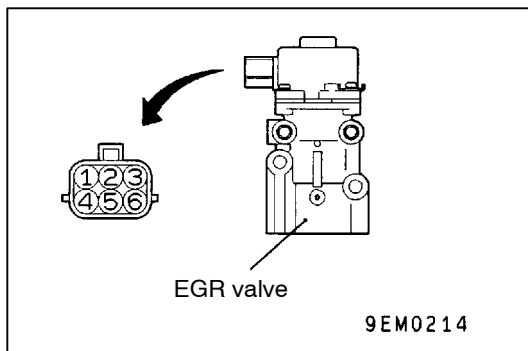
Checking the Coil Resistance

1. Disconnect the EGR valve connector.
2. Measure the resistance between the EGR valve-side connector terminal No.2 and terminal No.1 or terminal No.3.

Standard value: 10 – 20 Ω (at 20°C)

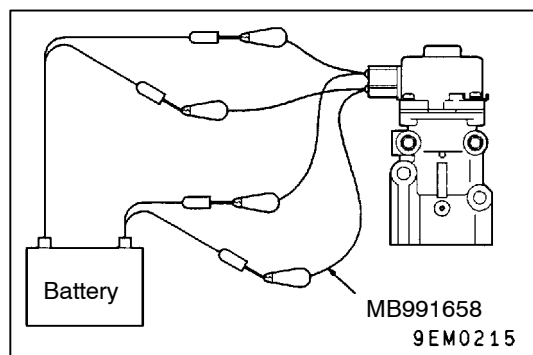
3. Measure the resistance between the EGR valve-side connector terminal No.5 and terminal No.4 or terminal No.6.

Standard value: 10 – 20 Ω (at 20°C)



Operation Check

1. Remove the EGR valve.
2. Connect the special tool (test harness set) to the EGR valve-side connector.
3. Connect terminal No.2 and terminal No.5 to the positive (+) terminal of power supply of approximately 6 V.
4. Connect each clip to the negative (-) terminal of power supply in the order given below to test if any vibration occurs (as though the stepper motor is shaking slightly) due to the operation of the stepper motor.



- (1) Connect terminal No.1 and terminal No.4 to the negative (-) terminal of the power supply.
 - (2) Connect terminal No.3 and terminal No.4 to the negative (-) terminal of the power supply.
 - (3) Connect terminal No.3 and terminal No.6 to the negative (-) terminal of the power supply.
 - (4) Connect terminal No.1 and terminal No.6 to the negative (-) terminal of the power supply.
 - (5) Connect terminal No.1 and terminal No.4 to the negative (-) terminal of the power supply.
 - (6) Repeat the test in the order from (5) to (1).
5. If the results of testing show that the vibration could be felt, the stepper motor is normal.

NOTES