

ENGINE AND EMISSION CONTROL

CONTENTS

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ENGINE CONTROL SYSTEM	3	AUTO-CRUISE CONTROL SYSTEM ..	5
GENERAL INFORMATION	3	GENERAL INFORMATION	5
SERVICE SPECIFICATIONS	3	SERVICE SPECIFICATIONS	5
ON-VEHICLE SERVICE	3	SPECIAL TOOL	5
Accelerator Cable Check and Adjustment ...	3	TROUBLESHOOTING	6
ACCELERATOR CABLE AND PEDAL	4		

CONTINUED ON NEXT PAGE

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*)

ON-VEHICLE SERVICE	21	Positive Crankcase Ventilation System Check	34
Auto-cruise Control Cable Check and Adjustment	21	PCV Valve Check	34
Auto-cruise Control Main Switch Indicator Lamp Check	22	EVAPORATIVE EMISSION CONTROL SYSTEM	34
Auto-cruise Control Switch Check	22	General Information	34
Auto-cruise Control Component Check	23	System Diagram	35
AUTO-CRUISE CONTROL*	25	Purge Control System Check	35
EMISSION CONTROL SYSTEM	30	Purge Port Vacuum Check	36
GENERAL INFORMATION	30	Purge Control Solenoid Valve Check	36
Emission Control Device Reference Table ..	30	EXHAUST GAS RECIRCULATION (EGR) SYSTEM	37
SERVICE SPECIFICATIONS	31	General Information	37
VACUUM HOSE	31	Operation	37
Vacuum Hose Piping Diagram	31	System Diagram	37
Vacuum Circuit Diagram	32	Exhaust Gas Recirculation (EGR) Control System Check	38
Vacuum Hose Check	33	EGR Valve Check	38
Vacuum Hose Installation	33	EGR Port Vacuum Check	39
CRANKCASE EMISSION CONTROL SYSTEM	33	EGR Control Solenoid Valve Check	39
General Information	33	CATALYTIC CONVERTER	40
System Diagram	33	General Information	40
		CANISTER/TWO-WAY VALVE	41

ENGINE CONTROL SYSTEM

17100010058

GENERAL INFORMATION

A cable-type accelerator mechanism and a suspended-type pedal have been adopted.

SERVICE SPECIFICATIONS

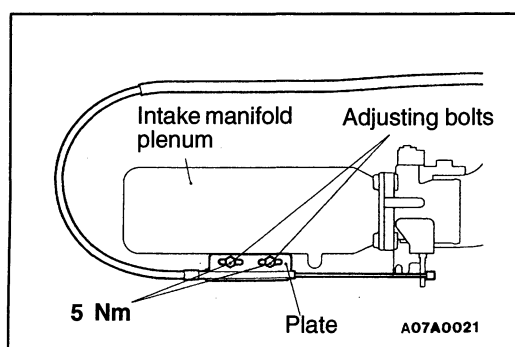
17100030061

Items	Standard value
Accelerator cable play mm	1-2
Engine idle speed r/min	850±100

ON-VEHICLE SERVICE

17100090120

ACCELERATOR CABLE CHECK AND ADJUSTMENT



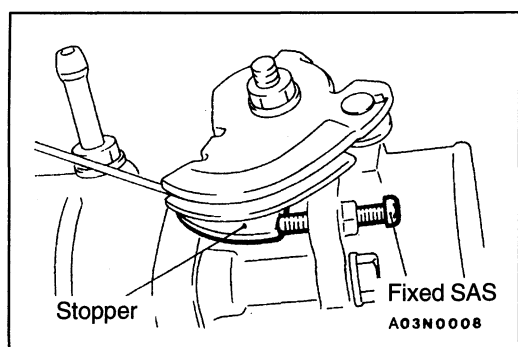
1. Turn A/C and lamps OFF.
Inspect and adjust at no load.
2. Warm engine until stabilized at idle.
3. Confirm idle speed is at prescribed value.

Standard value: 850±100 r/min

4. Stop engine (ignition switch OFF).
5. Confirm there are no sharp bends in accelerator cable.
6. Check inner cable for correct slack.

Standard value: 1-2 mm

7. If there is too much slack or no slack, adjust play by the following procedures.
 - (1) Loosen the adjusting bolt to release the cable.
 - (2) Move the plate until the inner cable play is at the standard value, and then tighten the adjusting bolt to the specified torque.



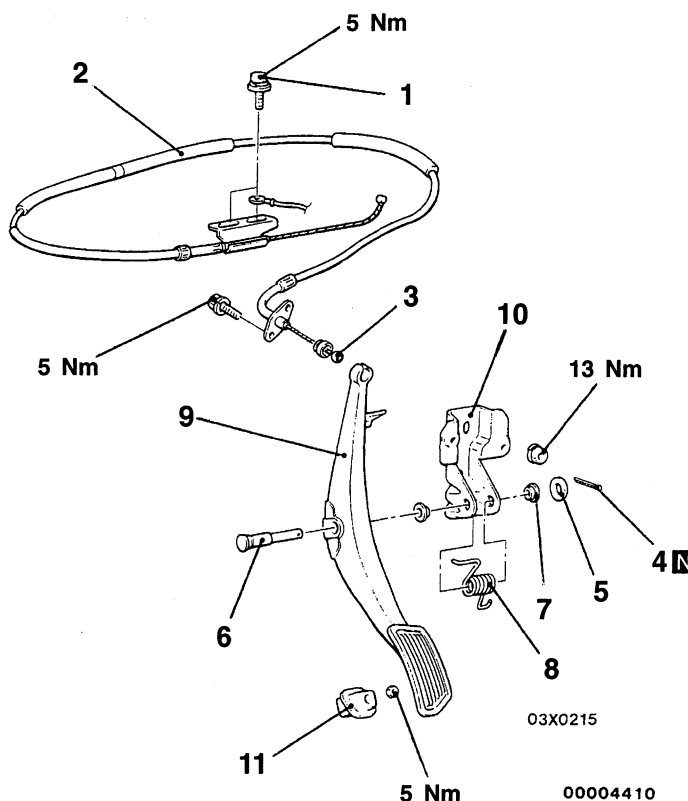
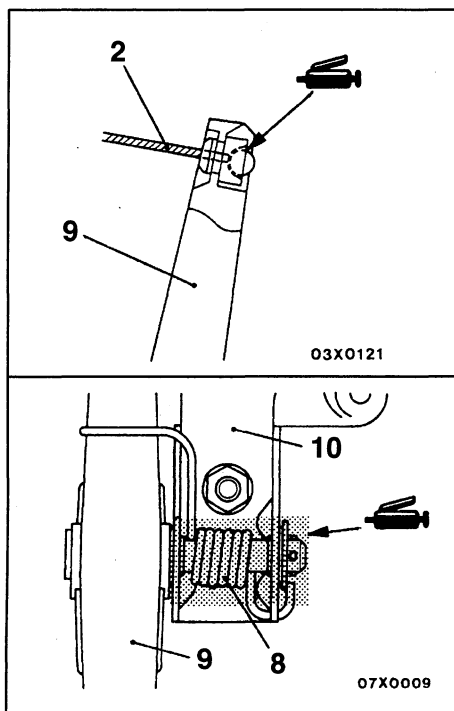
8. Adjust accelerator cable play and confirm throttle lever stopper touches the fixed SAS.

ACCELERATOR CABLE AND PEDAL REMOVAL AND INSTALLATION

17100120126

Post-installation Operation

- Accelerator Cable Adjustment (Refer to P.17-3.)

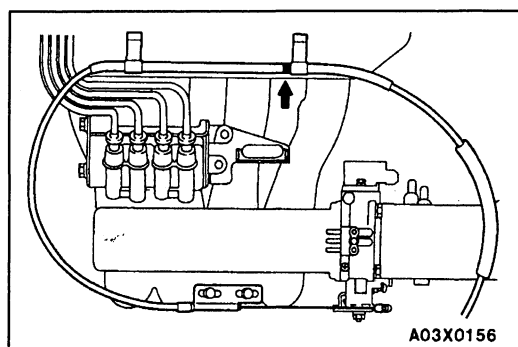


Accelerator cable removal steps

- A◄
1. Adjusting bolts
 2. Accelerator cable

Accelerator pedal removal steps

3. Accelerator cable connection
4. Split pin
5. Washer
6. Accelerator pedal pin
7. Bushing
8. Spring
9. Accelerator pedal arm
10. Accelerator pedal bracket
11. Accelerator pedal stopper



INSTALLATION SERVICE POINT

►A◄ ACCELERATOR CABLE INSTALLATION

Clamp the accelerator cable so that its marking is as shown.

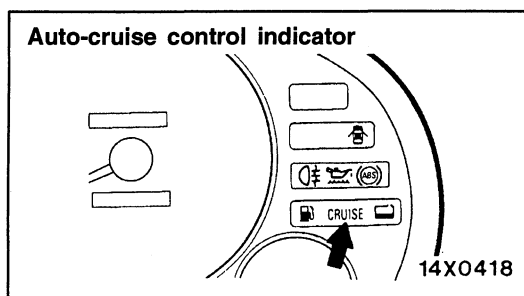
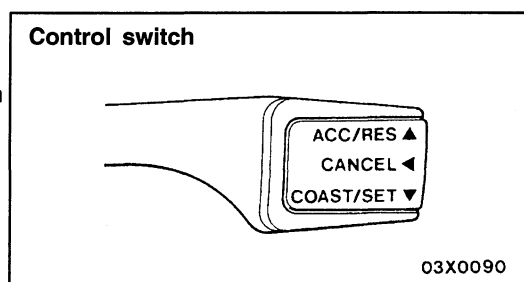
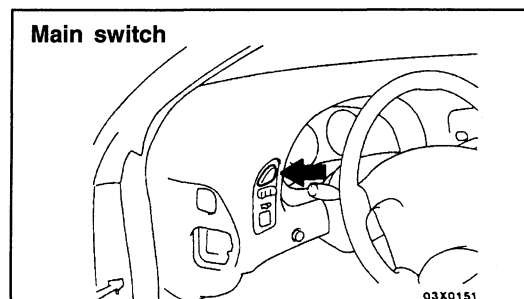
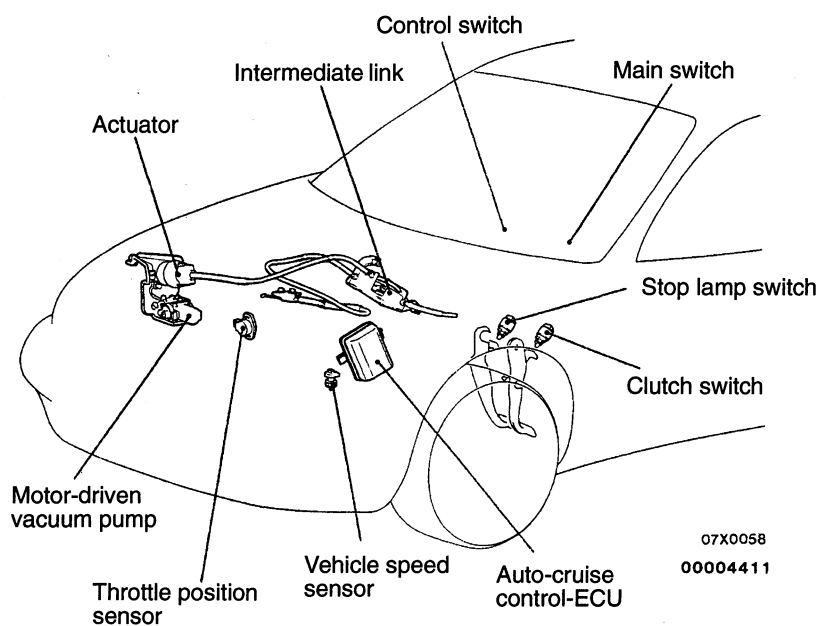
AUTO-CRUISE CONTROL SYSTEM

17200010099

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.



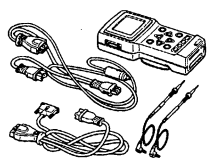
SERVICE SPECIFICATIONS

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Items	Standard value
Accelerator cable play mm	0–1
Throttle cable play mm	1–2
Auto-cruise control cable play mm	1–2

SPECIAL TOOL

17200060049

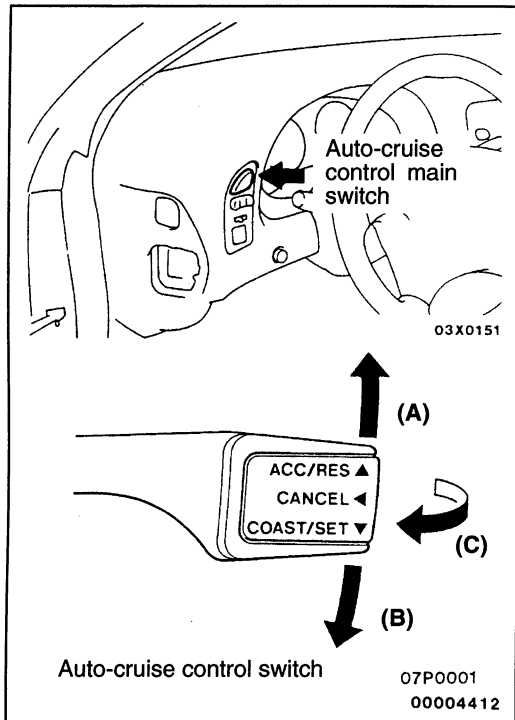
Tool	Number	Name	Use
	MB991502	MUT-II sub assembly	- Reading diagnosis codes - Auto-cruise control system check

TROUBLESHOOTING

17200200106

STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING

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



DIAGNOSIS FUNCTION

17200210079

METHOD OF READING THE DIAGNOSIS CODES

1. Connect the MUT-II to the diagnosis connector (16-pin) under the instrument under cover. (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points.)
2. With the ignition switch in the ON position, turn the auto-cruise control main switch to ON and take a reading of the diagnosis codes.

METHOD OF ERASING THE DIAGNOSIS CODES

The diagnosis codes can be erased by disconnecting the (–) cable from the battery for 10 seconds or more and then re-connecting it, or by the following procedure.

1. Turn the ignition switch to ON.
2. After pushing the auto-cruise control switch in the direction of arrow (B) in the illustration, press the cruise control main switch to the ON position, and within 1 second after doing this, push the cruise control switch back in the direction of arrow (A).
3. After pushing the auto-cruise control switch once more in the direction of arrow (A) in the illustration and keeping it in this position, press the stop lamp switch to the ON position for 5 seconds or more.

INPUT SWITCH CODE CHECK METHOD

1. Connect the MUT-II to the diagnosis connector (16-pin) under the instrument under cover.
2. Turn the ignition switch to ON.
3. After pushing the auto-cruise control switch in the direction of arrow (B) in the illustration, press the cruise control main switch to the ON position, and within 1 second after doing this, push the cruise control switch back in the direction of arrow (A).
4. Operate each switch listed in the input check table and take a reading of the input switch codes with the MUT-II.

Input Check Table

Code No.	Input operation	Operation judgement
21	SET switch ON	Auto-cruise control-ECU judges that SET switch is ON
22	RESUME switch ON	Auto-cruise control-ECU judges that RESUME switch is ON
23	Stop lamp switch (ON when brake pedal depressed)	Auto-cruise control-ECU judges that stop lamp switch is ON
24	Vehicle speed signal	Auto-cruise control-ECU judges that vehicle speed is 40 km/h or higher
25		Auto-cruise control-ECU judges that vehicle speed is lower than 40 km/h
26	Clutch switch (ON when clutch pedal depressed)	Auto-cruise control-ECU judges that clutch switch
27	CANCEL switch ON	Auto-cruise control-ECU judges that CANCEL switch is ON
28	Throttle position sensor signal	Auto-cruise control-ECU judges that throttle position sensor voltage is 1.5 V or more
29	Idle switch	Auto-cruise control-ECU judges that idle switch is OFF

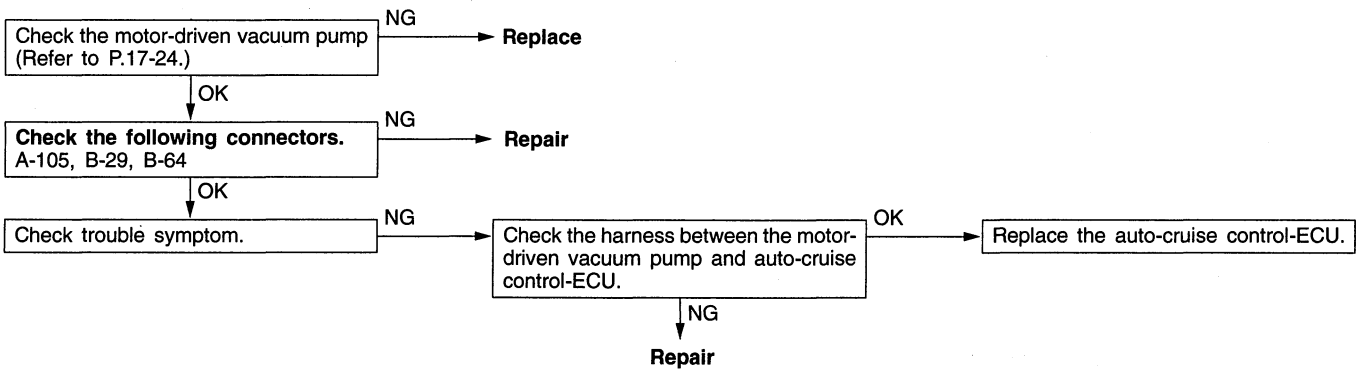
INSPECTION CHART FOR DIAGNOSIS CODES

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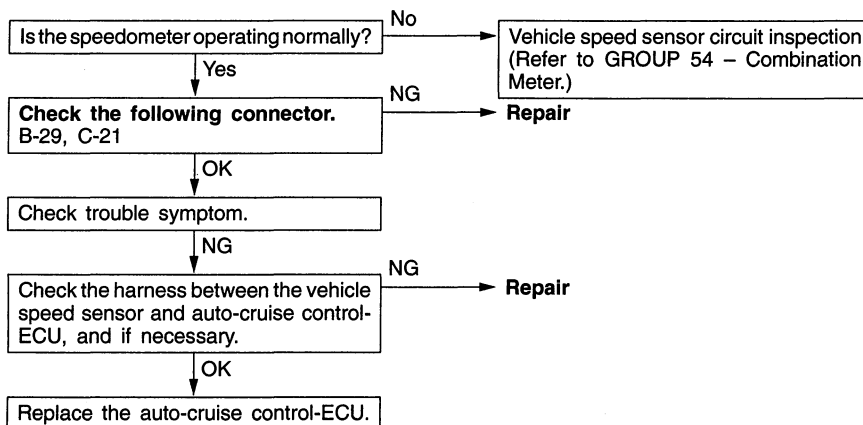
Code No.	Diagnosis item	Reference page
11	Motor-driven vacuum pump drive system	17-8
12	Vehicle speed sensor system	17-8
14	Motor-driven vacuum pump power supply system	17-9
15	Auto-cruise control switch	17-9
16	Auto-cruise control-ECU	17-9
17	Throttle position sensor system	17-10

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

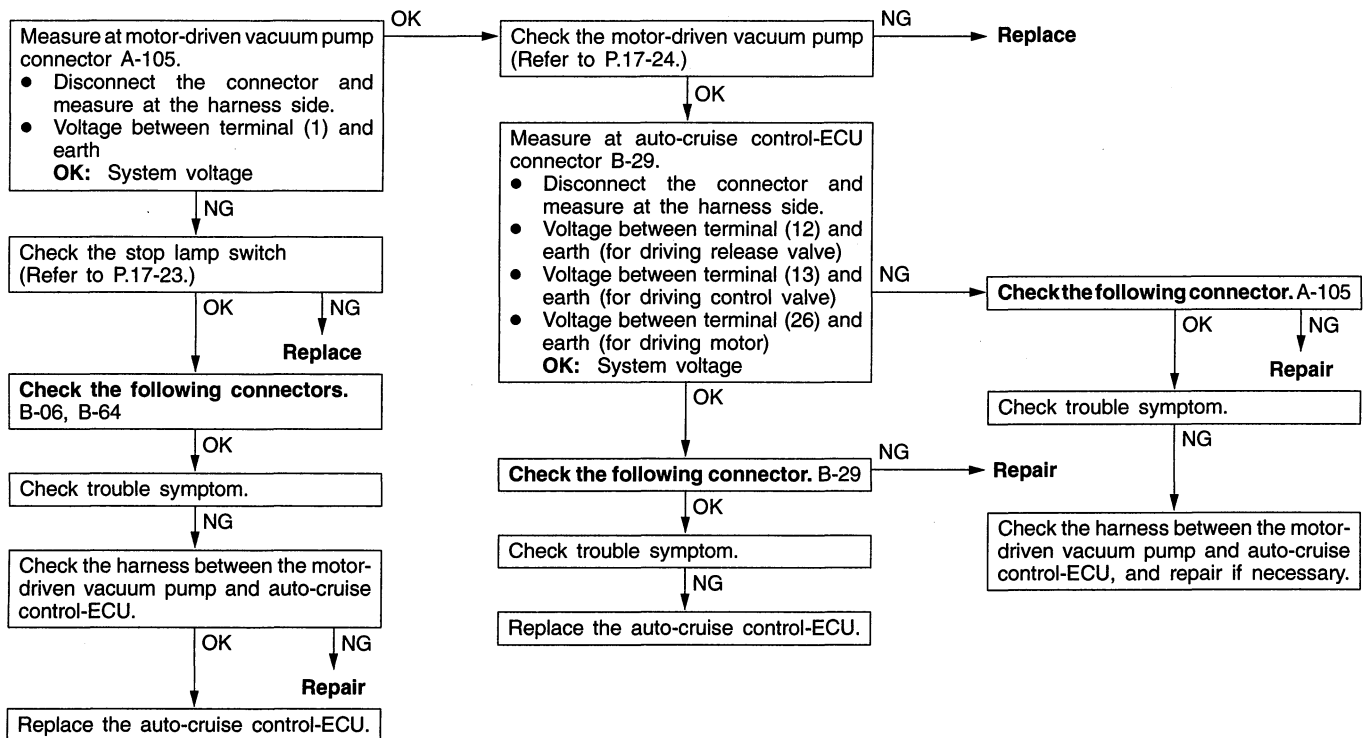
Code No. 11 Motor-driven vacuum pump drive system	Probable cause
This diagnosis code is output if the release valve, control valve or motor drive signals from the electric vacuum pump are not input to the auto-cruise control-ECU.	• Malfunction of the motor-driven vacuum pump • Malfunction of the connector • Malfunction of the harness • Malfunction of the auto-cruise control-ECU



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.	• Malfunction of the vehicle speed sensor • Malfunction of the connector • Malfunction of the harness • Malfunction of the auto-cruise control-ECU



Code No. 14 Motor-driven vacuum pump power supply system	Probable cause
This diagnosis code is output when none of the drive signals from the release valve, control valve and motor of the motor-driven vacuum pump are input to the auto-cruise control-ECU.	• Malfunction of the stop lamp switch • Malfunction of the connector • Malfunction of the harness • Malfunction of the auto-cruise control-ECU • Malfunction of the motor-driven vacuum pump



Code No. 15 Auto-cruise control switch	Probable cause
This diagnosis code is output if the cruise control RESUME switch, SET switch or CANCEL switch remains ON.	• Malfunction of the auto-cruise control switch

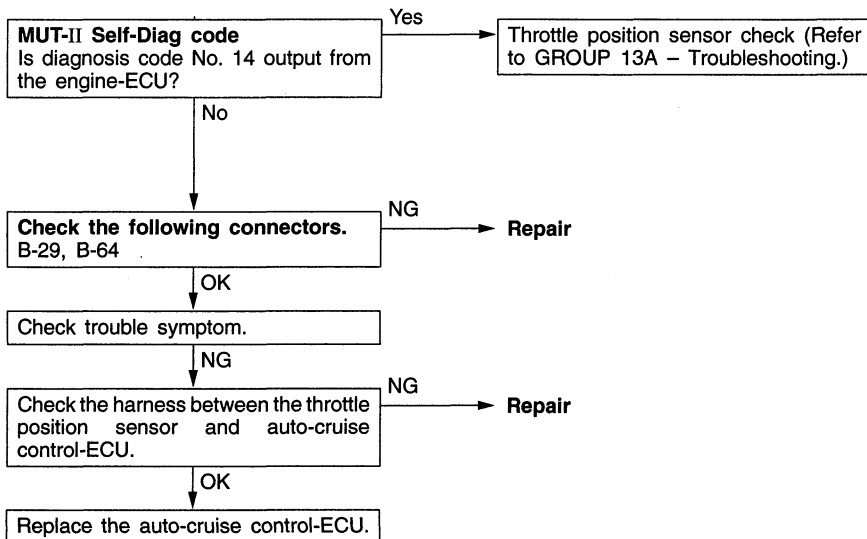
Replace the auto-cruise control switch.

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.	• Malfunction of the auto-cruise control-ECU

Replace the auto-cruise control-ECU.

17-10 ENGINE AND EMISSION CONTROL – Auto-cruise Control System

Code No. 17 Throttle position sensor system	Probable cause
This diagnosis code is output if a voltage of 1.5 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.	• 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

17200230105

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	Communication with all systems is not possible.	1	17-11
	Communication with auto-cruise control-ECU only is not possible.	2	17-12
Input switch inspection using the MUT-II is not possible. (However, diagnosis inspection is possible.)		3	17-13

Trouble symptom		Inspection procedure No.	Reference page
Auto-cruise control is not cancelled.	Even if brake pedal is depressed	4	17-14
	Even if clutch pedal is depressed	5	17-15
	Even if CANCEL switch is set to ON	6	17-15
The diagnosis result displayed on the MUT-II is normal even though auto-cruise control cannot be set.		7	17-15
Auto-cruise control cannot be set.		8	17-16
Hunting (repeated acceleration and deceleration) occurs at the set vehicle speed.		9	17-16
Even though auto-cruise control main switch is ON, switch indicator lamp does not illuminate. (However, auto-cruise control is normal.)		10	17-16
Auto-cruise control main switch illumination lamp does not illuminate.		11	17-17
Auto-cruise control indicator lamp inside combination meter does not illuminate. (However, auto-cruise control is normal.)		12	17-17

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

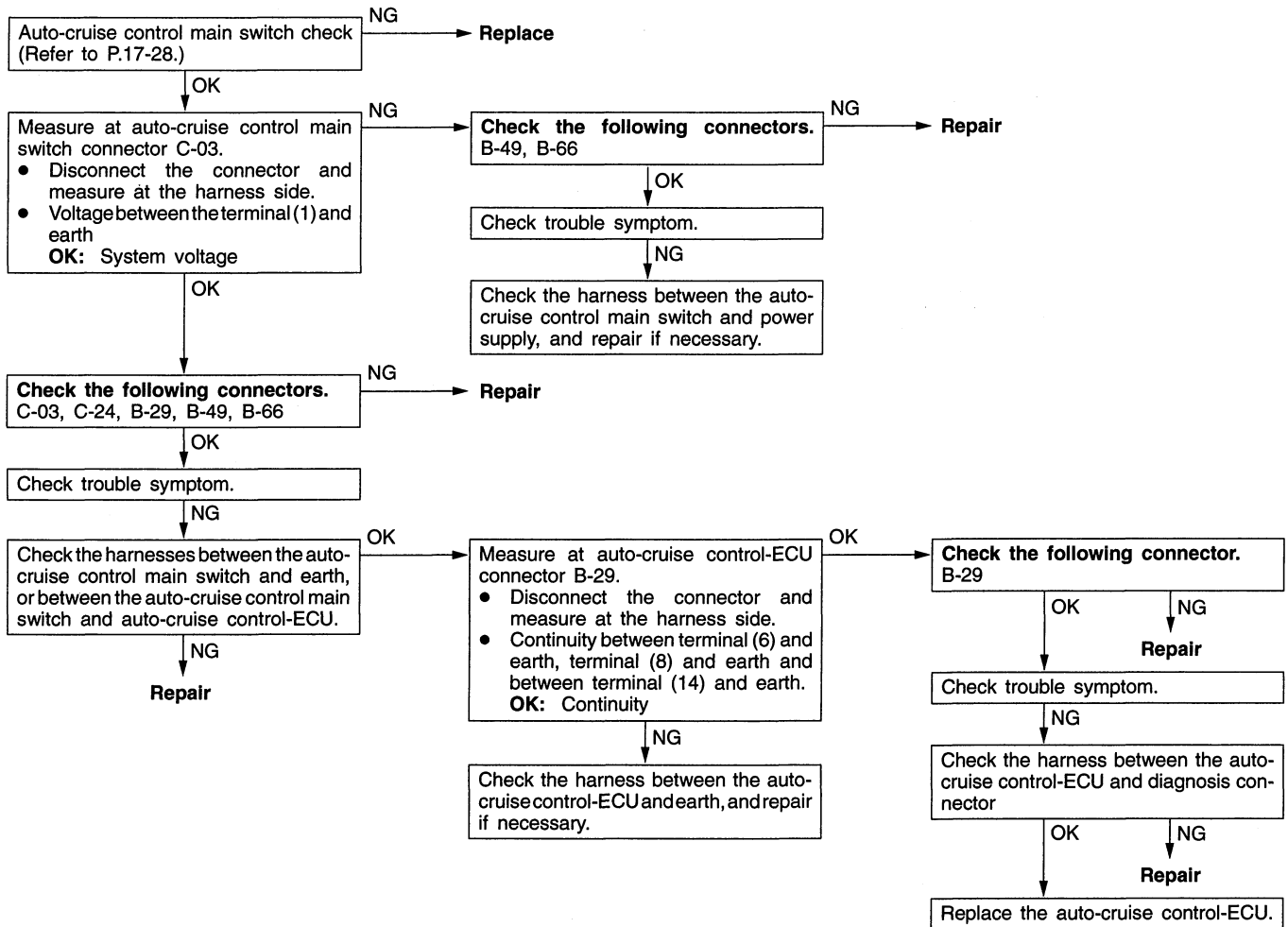
Inspection Procedure 1

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.	• Malfunction of the connector • Malfunction of the harness

Refer to GROUP 13A – Troubleshooting

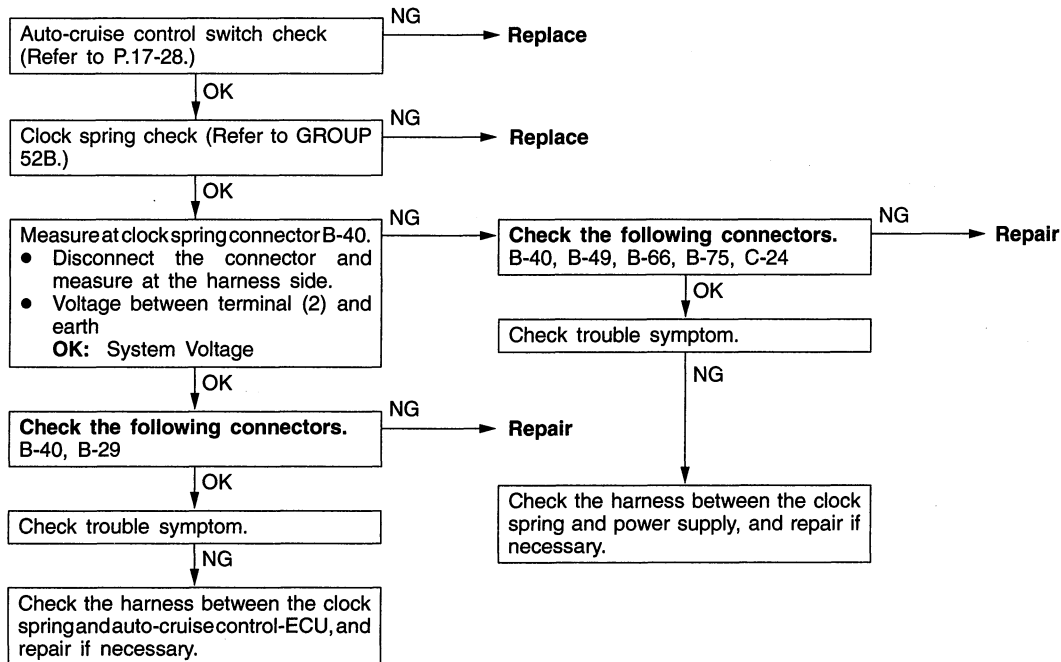
Inspection Procedure 2

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.	• Malfunction of the auto-cruise control main switch • Malfunction of the connector • Malfunction of the harness • Malfunction of the auto-cruise control-ECU



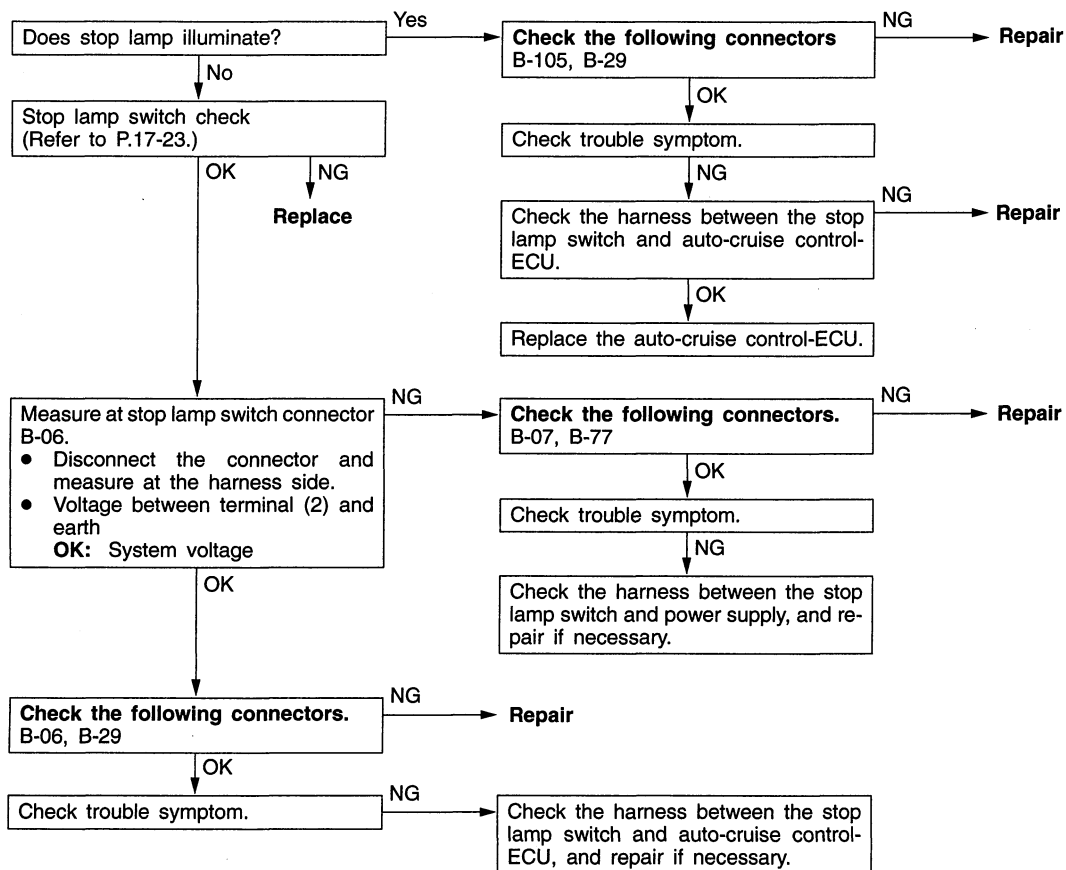
Inspection Procedure 3

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.	• Malfunction of the auto-cruise control switch • Malfunction of the clock spring • Malfunction of the connector • Malfunction of the harness



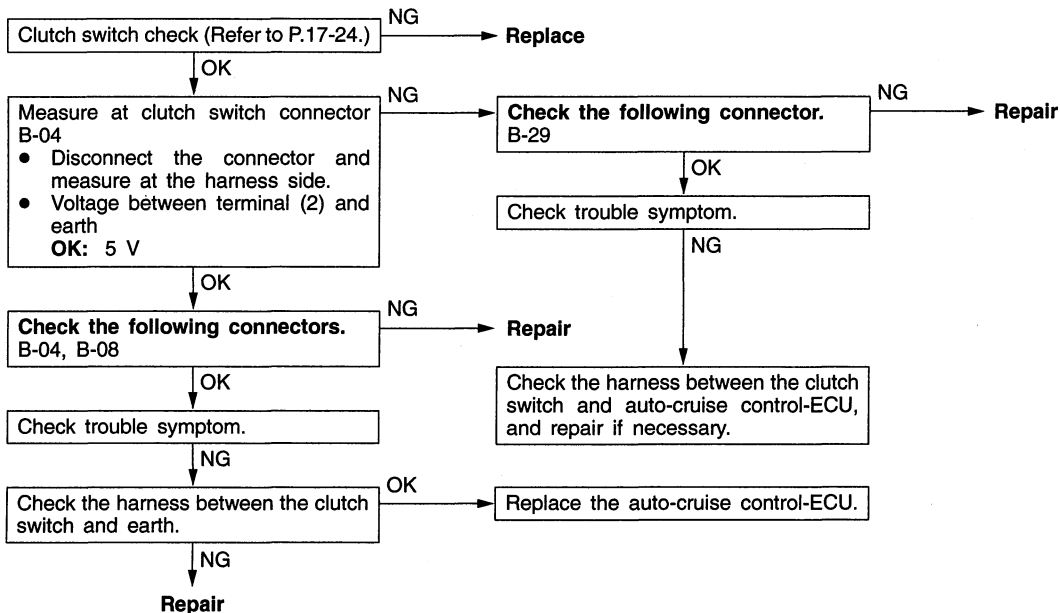
Inspection Procedure 4

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.	• Malfunction of the stop lamp switch • Malfunction of the connector • Malfunction of the harness • Malfunction of the auto-cruise control-ECU



Inspection Procedure 5

Even if clutch pedal is depressed, auto-cruise control is not cancelled.	Probable cause
The cause is probably a malfunction of clutch switch or clutch circuit.	• Malfunction of the clutch switch • Malfunction of the connector • Malfunction of the harness • Malfunction of the auto-cruise control-ECU



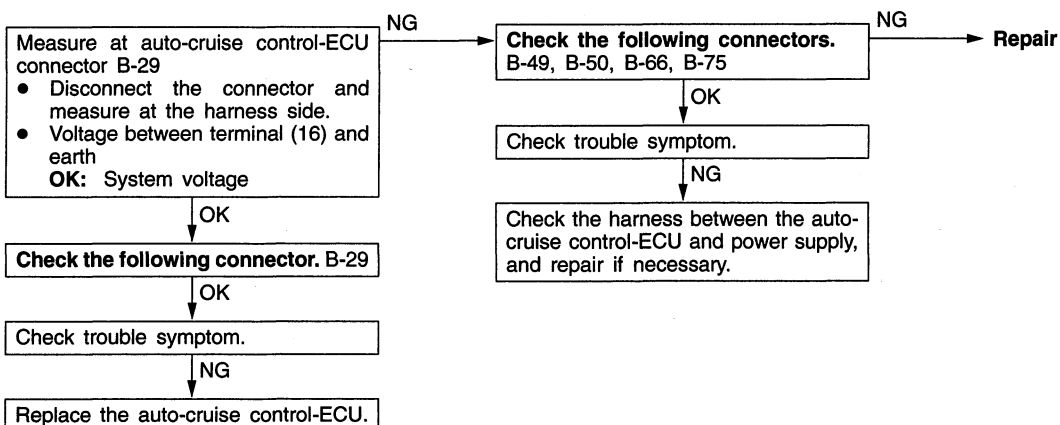
Inspection Procedure 6

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.	• Malfunction of the auto-cruise control-ECU

Replace the auto-cruise control switch.

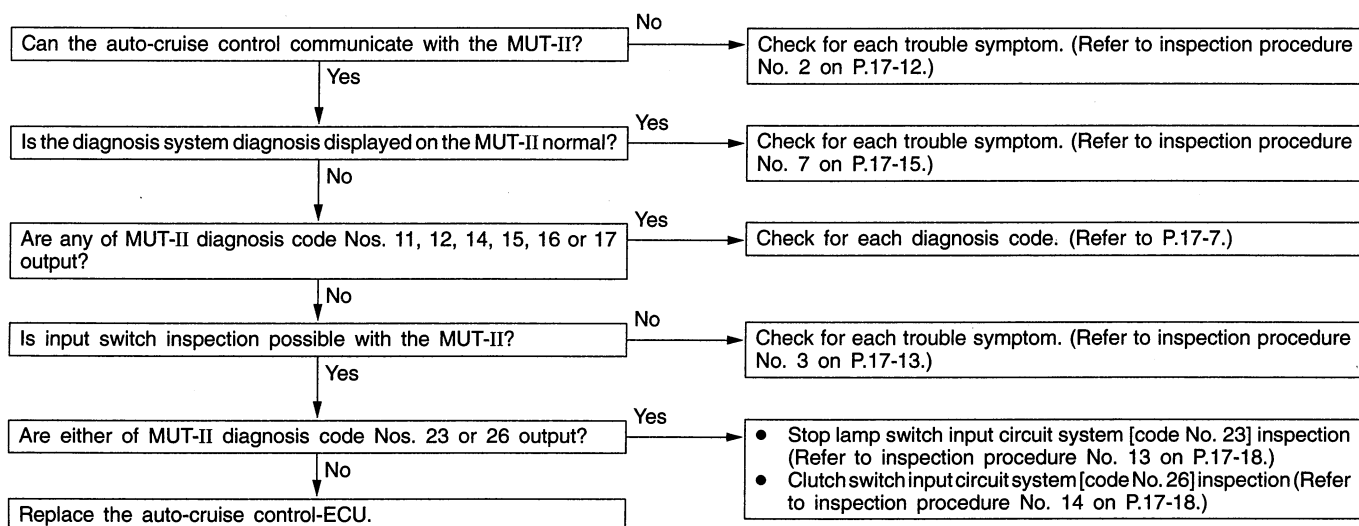
Inspection Procedure 7

The diagnosis result displayed on the MUT-II is normal even though auto-cruise control cannot be set.	Probable cause
Because of an open-circuit in the battery backup circuit system, the fail-safe function prevents diagnosis codes from being memorised and displayed even though auto-cruise control is cancelled.	• Malfunction of the connector • Malfunction of the harness • Malfunction of the auto-cruise control-ECU



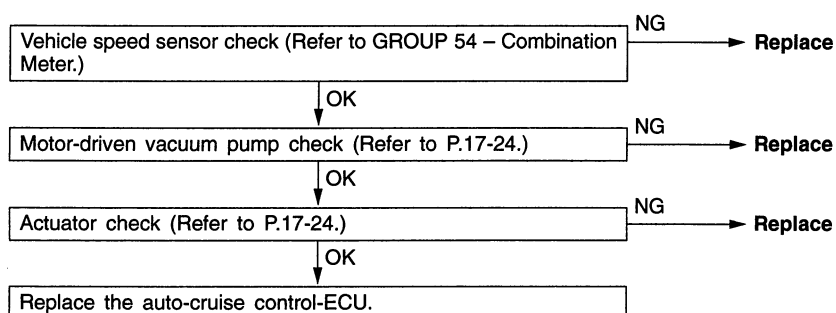
Inspection Procedure 8

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.	• Malfunction of the auto-cruise control main switch • Malfunction of the auto-cruise control switch • Malfunction of the clock spring • Malfunction of the harnesses or connectors • Malfunction of the clutch switch • Malfunction of the auto-cruise control-ECU



Inspection Procedure 9

Hunting (repeated acceleration and deceleration) occurs at the set vehicle speed.	Probable cause
The cause is probably a malfunction of vehicle speed sensor or incorrect vacuum in the motor-driven vacuum pump or actuator.	• Malfunction of the vehicle speed sensor • Malfunction of the motor-driven vacuum pump • Malfunction of the actuator • Malfunction of the auto-cruise control-ECU



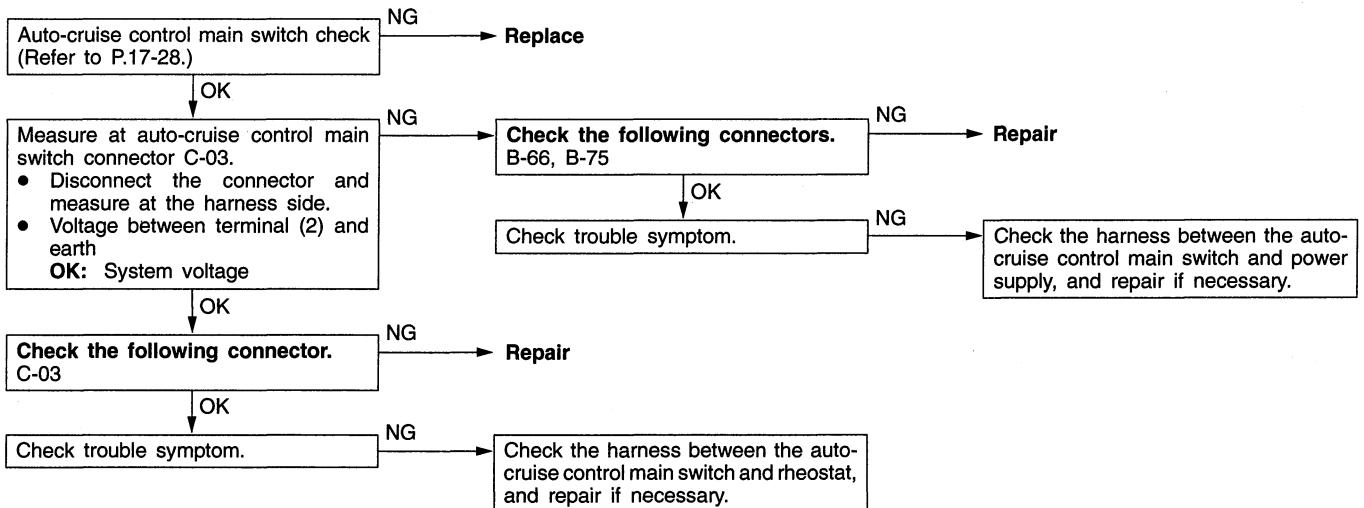
Inspection Procedure 10

Even though auto-cruise control main switch is ON, switch indicator lamp does not illuminate. (However, auto-cruise control is normal.)	Probable cause
Blown bulb in auto-cruise control main switch	• Malfunction of the auto-cruise control main switch

Replace the auto-cruise control main switch.

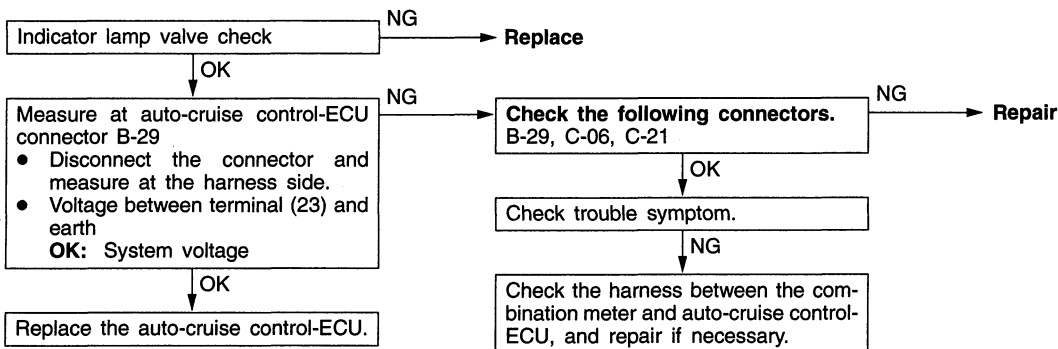
Inspection Procedure 11

Auto-cruise control main switch illumination lamp does not illuminate.	Probable cause
The cause is probably a malfunction of auto-cruise control main switch or a malfunction of harness or connector.	• Malfunction of the auto-cruise control main switch • Malfunction of the connector • Malfunction of the harness



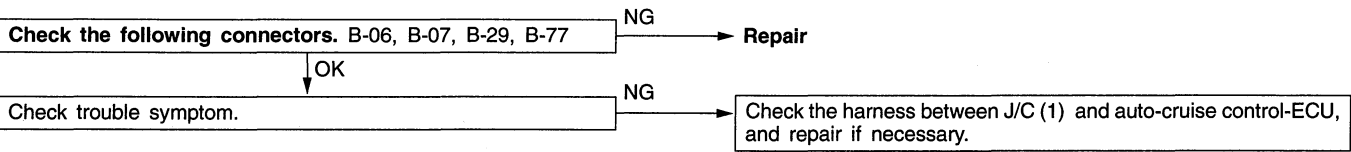
Inspection Procedure 12

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 valve or a malfunction of connector or harness.	• Malfunction of the valve • Malfunction of the harness • Malfunction of the connector • Malfunction of the auto-cruise control-ECU



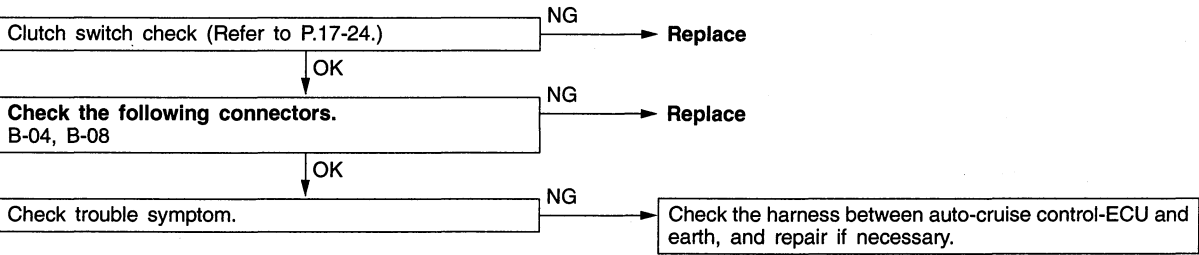
Inspection Procedure 13

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



Inspection Procedure 14

Clutch switch input circuit system inspection (Code No. 26)



CHECK AT THE ECU TERMINALS

17200270053

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

03X0097

Terminal No.	Check item	Check conditions		Normal condition
1	Clutch switch input	When pedal is not depressed	When clutch switch is OFF	System voltage
		When pedal is depressed	When clutch switch is ON	0V
2	ECU power supply	When ignition switch is ON		System voltage
4	Closed throttle position switch output	When accelerator pedal is depressed	When closed throttle position switch is OFF	4.5–5.5V
		When accelerator pedal is not depressed	When closed throttle position switch is ON	0V
5	Throttle position sensor input	When accelerator pedal is fully depressed		4.0–5.5V
		When accelerator pedal is released		0.5–0.7V
6	Earth	At all times		Continuity
8	Earth	At all times		Continuity
12	Auto-cruise vacuum pump release valve and control valve input	When driving at constant speed using the SET switch	Release valve closed	0V
13			Control valve closed	0V
12		When accelerating with the RESUME switch while driving at constant speed	Release valve closed	0V
13			Release valve closed	0V
12		When decelerating with the SET switch while driving at constant speed	Release valve closed	0V
13			Control valve open	System voltage
12		When canceling constant-speed driving with the CANCEL switch	Release valve open	System voltage
13			Control valve open	System voltage
14	Earth	At all times		Continuity
15	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
16	ECU backup power supply	At all times		System voltage

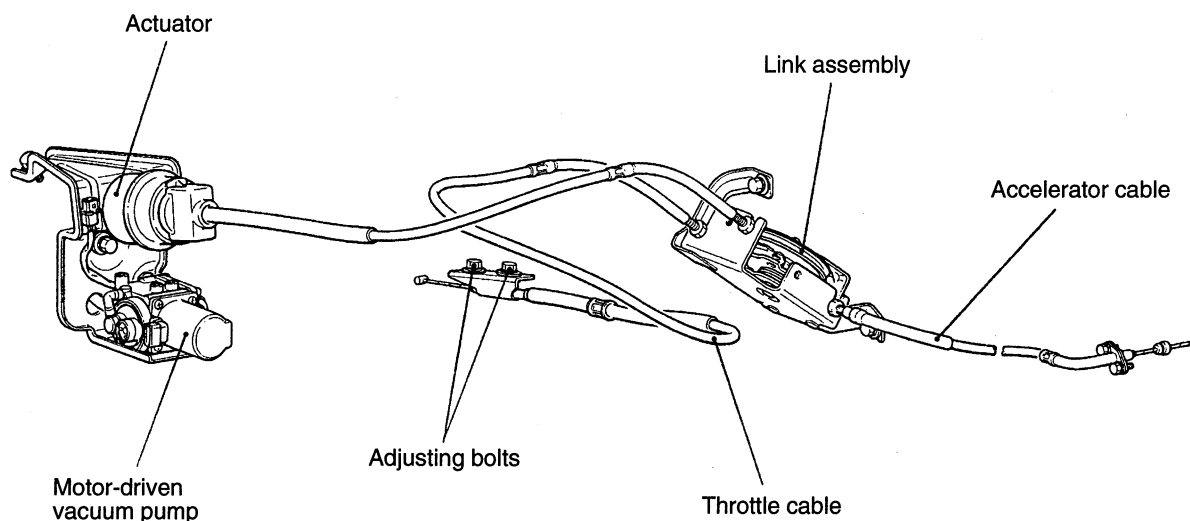
17-20 ENGINE AND EMISSION CONTROL – Auto-cruise Control System

Terminal No.	Check item	Check conditions		Normal condition
18	Auto-cruise control switch input	When SET switch is pressed	When SET switch is ON	3V
		When SET switch is not pressed	When SET switch is OFF	0V
		When RESUME switch is pressed	When RESUME switch is ON	6V
		When RESUME switch is not pressed	When RESUME switch is OFF	0V
		When CANCEL switch is pressed	When CANCEL switch is ON	System voltage
		When CANCEL switch is not pressed	When CANCEL switch is OFF	0V
19	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	4.5 V or more
20	ACC power supply	When ignition switch is in ACC position		System voltage
23	Indicator input (inside combination meter)	When driving at constant speed	When indicator is illuminated	0V
		When constant-speed driving is cancelled	When indicator is switched off	System voltage
24	Diagnosis control input	When ignition switch is ON		4V or more
25	Surge absorption circuit terminal	When auto-cruise main switch is ON		System voltage
26	Auto-cruise vacuum pump motor input	When driving at constant speed using the SET switch	Motor stopped	System voltage
		When accelerating with the RESUME switch while driving at constant speed	Motor running	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

17200090123

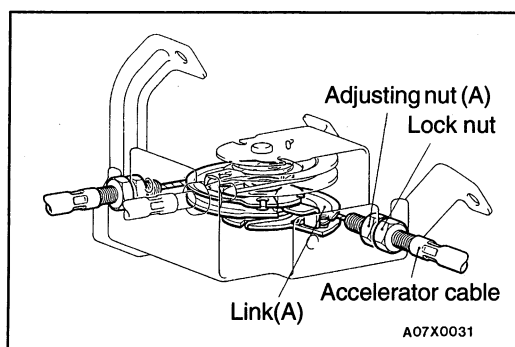
AUTO-CRUISE CONTROL CABLE CHECK AND ADJUSTMENT



B07X0035

1. Remove the link protector. (Refer to P.17-25.)
2. Check the slack in each of the inner cables in the accelerator cable, auto-cruise control cable and throttle cable.

If the slack in an inner cable is excessive, or if there is no play, loosen the adjusting bolts and the nuts in the throttle lever and each link, to release the throttle lever and each link. (The bolts and nuts should not be removed.)



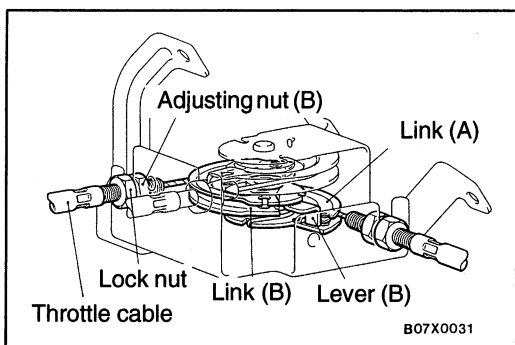
A07X0031

ACCELERATOR CABLE

1. Adjust with the adjusting nut A so when the link A hits the stopper, the accelerator cable play (inner cable play) reaches the standard value.

Standard value: 0–1 mm

2. Fix the accelerator cable with the lock nut.



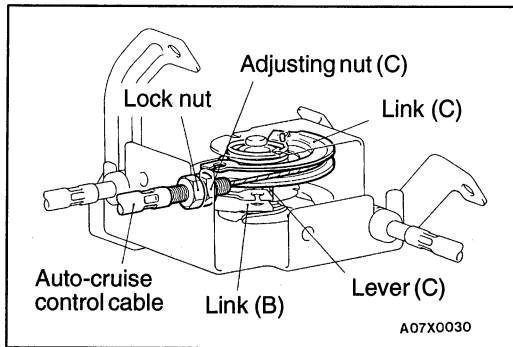
B07X0031

THROTTLE CABLE

1. Adjust with the adjusting nut B so when the lever B hits the link A, the throttle cable play (inner cable play) reaches the standard value.

Standard value: 1–2 mm

2. Fix the throttle cable with the lock nut.
3. Tighten the throttle lever-side adjusting bolt to the specified torque.

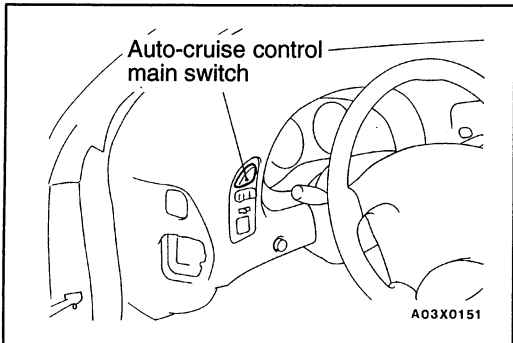


AUTO-CRUISE CONTROL CABLE

1. Adjust with the adjusting nut C so when the lever C stopper hits the link B, the auto-cruise control cable play (inner cable play) reaches the standard value.

Standard value: 1–2 mm

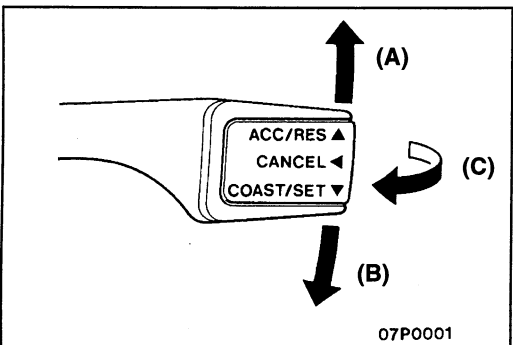
2. Fix the auto-cruise control cable with the lock nut.



AUTO-CRUISE CONTROL MAIN SWITCH INDICATOR LAMP CHECK

17200160060

1. Turn the ignition key to ON
2. Check that the indicator within the switch illuminates when the main switch is switched ON.



AUTO-CRUISE CONTROL SWITCH CHECK

17200120105

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 vehicles 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 hold, 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

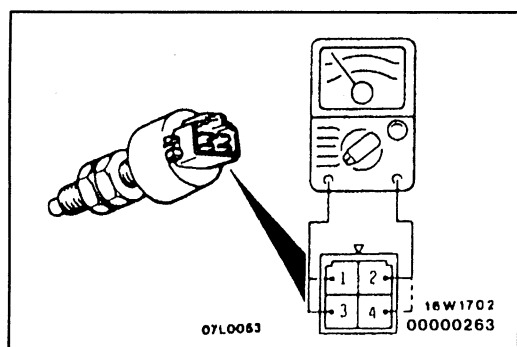
1. Set to the desired speed.
2. Push the auto-cruise control switch in the direction of arrow (B).
3. Check to be sure that deceleration continues while the switch is pressed, and that when it is released the constant speed at the time when it was released becomes the driving speed.

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

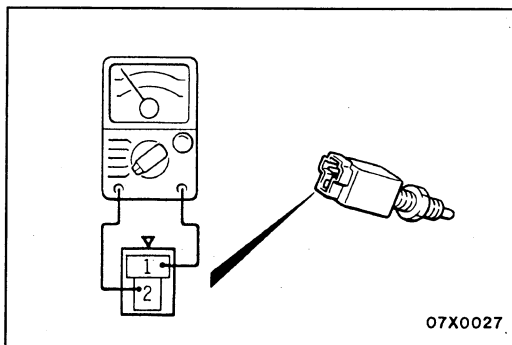
1. Set the auto-cruise speed control.
2. When any of the following operations are performed while at constant speed during auto-cruise control, check if normal driving is resumed and deceleration occurs.
 - a. The auto-cruise control switch is pushed in the direction of arrow (C).
 - b. The brake pedal is depressed.
 - c. The clutch pedal is depressed.
3. At a vehicle speed of 40 km/h or higher, check if when the RESUME switch is switched ON, 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 COMPONENT CHECK**

17200170124

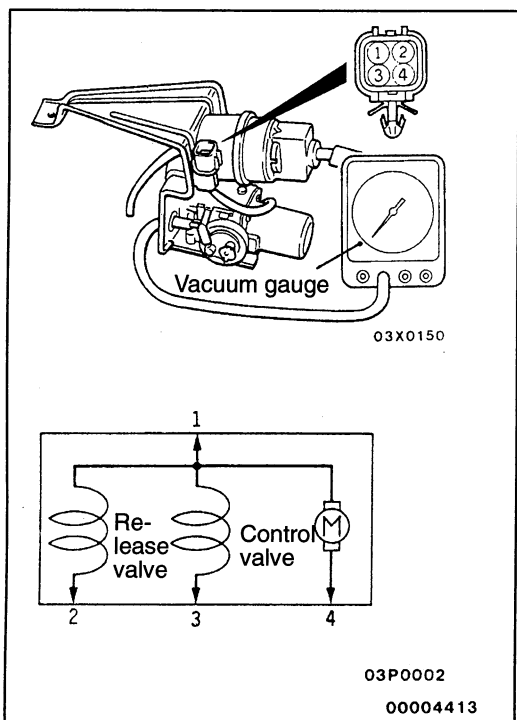
STOP LAMP SWITCH

Measurement conditions	For stop lamp circuit terminal No.		For auto-cruise control circuit terminal No.	
	2	3	1	4
When brake pedal depressed.	○	○		
When brake pedal not depressed.			○	○



CLUTCH SWITCH

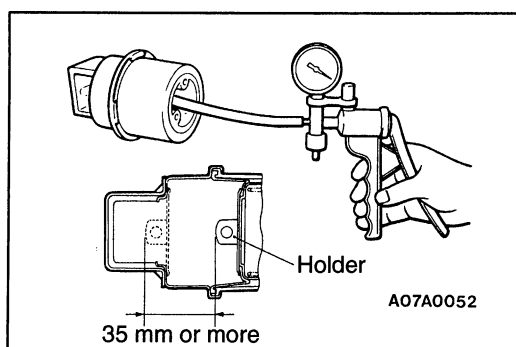
Measurement conditions	Terminal No.	
	1	2
When clutch pedal depressed.	○	○
When clutch pedal not depressed.		



MOTOR-DRIVEN VACUUM PUMP

1. Disconnect the vacuum hose from the motor-driven vacuum pump and connect a vacuum gauge to the vacuum pump.
2. Disconnect the electric vacuum pump connector.
3. Check that the reading on the vacuum gauge matches the values in the table below when the battery is connected to each connector terminal.

Terminal No.				Valve condition	Vacuum gauge kPa
1	2	3	4		
⊕	⊖	⊖	⊖	Release valve closed Control valve closed	53 or more
⊕	⊖	⊖	⊖	Release valve open	20 or less
⊕	⊖	⊖	⊖	Control valve open	

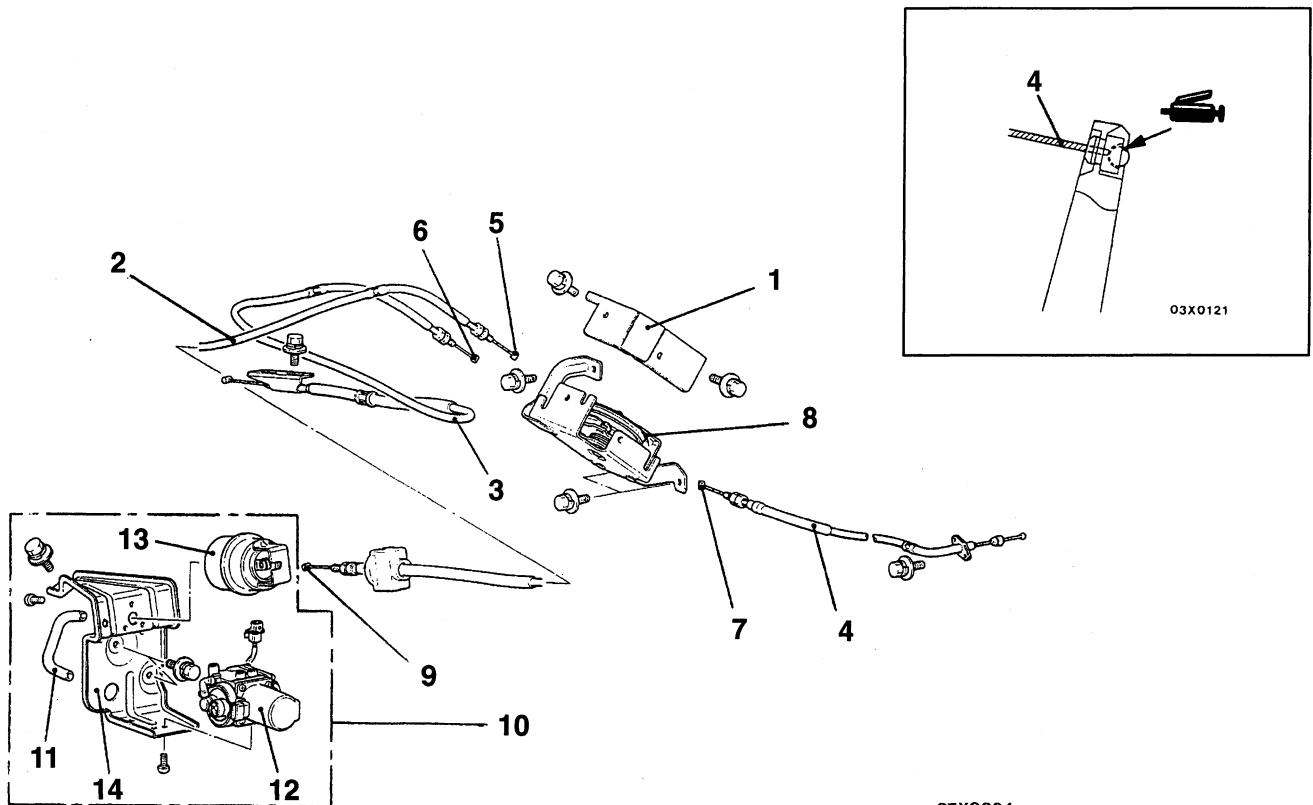


ACTUATOR

1. Remove the actuator.
2. Apply negative pressure to the actuator with the vacuum pump and check that the holder moves more than 35 mm. In addition, check that there is no change in the position of the holder when negative pressure is maintained in that condition.
3. First install the actuator and then inspect and adjust the auto-cruise control cable (Refer to P.17-22.)

AUTO-CRUISE CONTROL REMOVAL AND INSTALLATION

17200140118



00004414

Auto-cruise control cable, throttle cable and accelerator cable removal steps

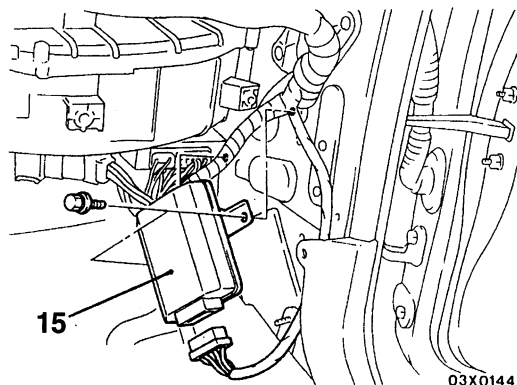
1. Link protector
 - Auto-cruise control cable adjustment (Refer to P.17-22.)
2. Auto-cruise control cable
3. Throttle cable
4. Accelerator cable

Link assembly removal steps

1. Link protector
 - Auto-cruise control cable adjustment (Refer to P.17-22.)
5. Auto-cruise control cable connection
6. Throttle cable connection
7. Accelerator cable connection
8. Link assembly

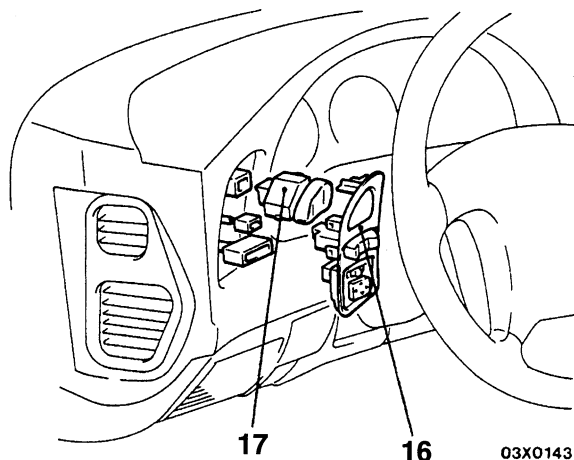
Vacuum pump and actuator removal steps

9. Auto-cruise control cable connection
10. Auto-cruise vacuum pump and actuator assembly
11. Vacuum hose
12. Motor-driven vacuum pump
13. Actuator
14. Actuator bracket



Control unit removal steps

- Cowl side trim
(Refer to GROUP 52A)
15. Auto-cruise control-ECU



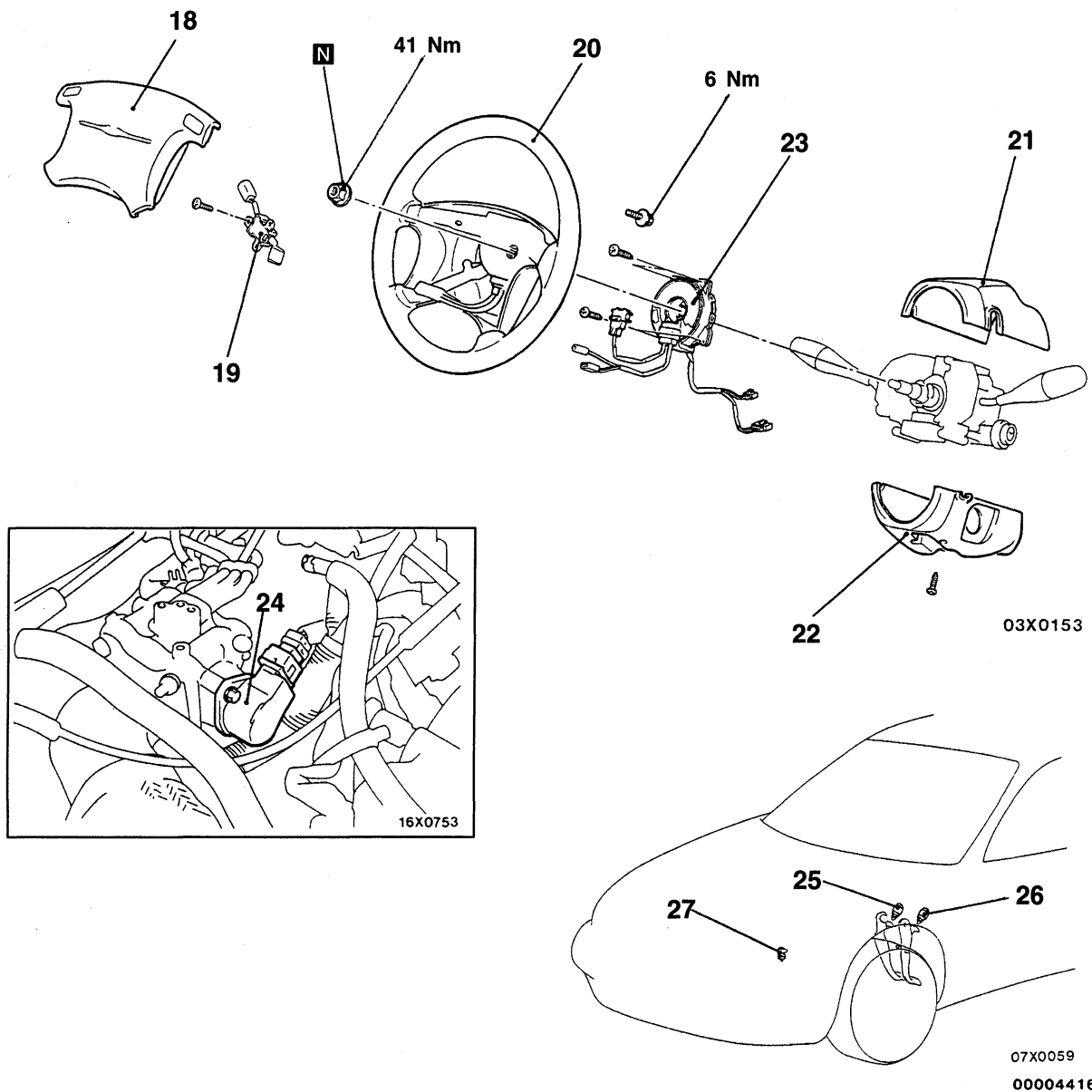
00004415

Main switch removal steps

16. Instrument panel switch
17. Main switch

CAUTION: SRS

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

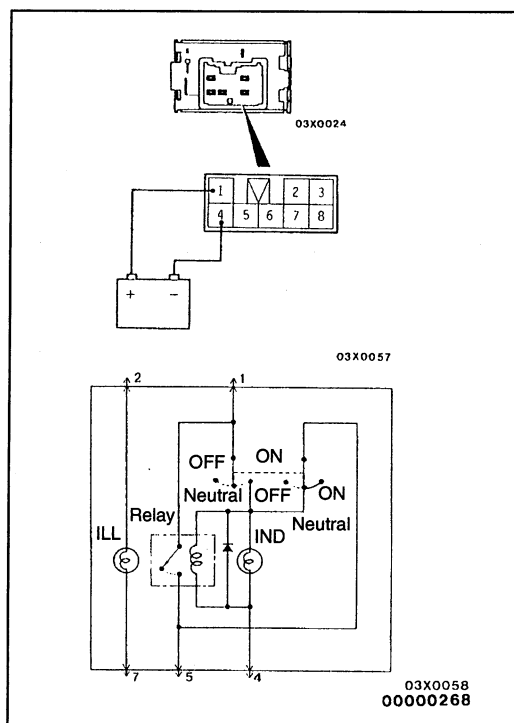


Control switch and clock spring removal steps

18. Air bag module
(Refer to GROUP 52B.)
19. Control switch
20. Steering wheel
21. Steering column upper cover
22. Steering column lower cover
 - Instrument under cover (Refer to GROUP 52A.)
23. Clock spring
(Refer to GROUP 52B.)

Sensor removal steps

24. Throttle position sensor
25. Stop lamp switch
26. Clutch switch
27. Vehicle speed sensor

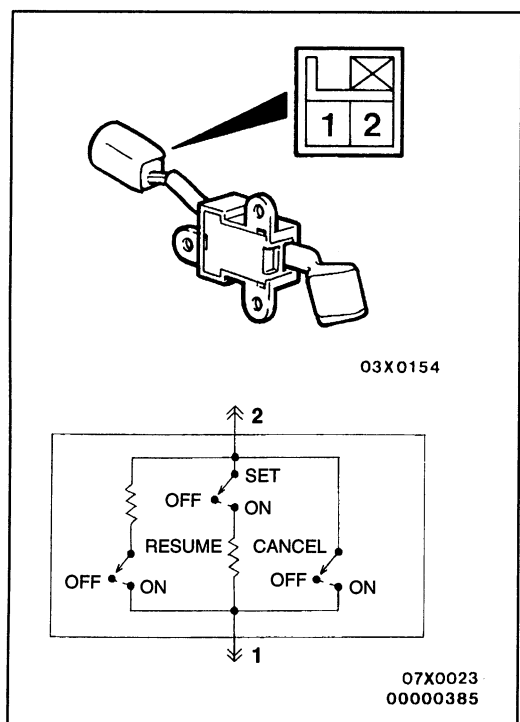


INSPECTION

17200110102

MAIN SWITCH CHECK

Switch position	Terminal No.						
	1	IND	4	5	2	ILL	7
OFF	⊕		⊖		⊖	⊕	
Neutral	⊕		⊖		⊖	⊕	
ON	⊕	⊕	⊖		⊖	⊕	

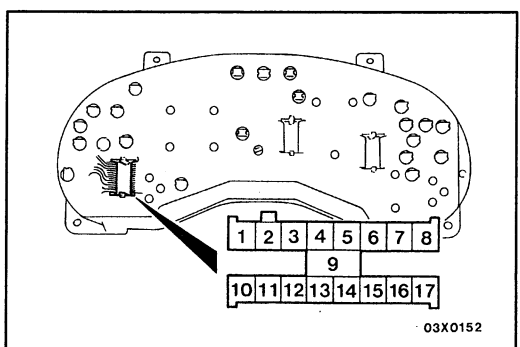


CONTROL SWITCH CHECK

17200120112

Measure the resistance between the terminals when each of the SET, RESUME and CANCEL 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	Approx. 0 Ω
RESUME switch ON	Approx. 820 Ω
SET switch ON	Approx. 2,700 Ω



AUTO-CRUISE CONTROL INDICATOR CHECK

17200190083

- Remove the combination meter.
(Refer to GROUP 54 – Combination meter.)
- Check the continuity between terminals (10) and (16).
If there is no continuity, replace the auto-cruise control indicator.

CLOCK SPRING CHECK

17200280032

Refer to GROUP 52B – Air Bag Module and Clock Spring.

THROTTLE POSITION SENSOR

17200290028

Refer to GROUP 13A – On-vehicle Service.

VEHICLE SPEED SENSOR

17200300035

Refer to GROUP 54 – Combination Meter.

EMISSION CONTROL SYSTEM

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 ON/OFF type solenoid valve (Purpose: HC reduction)
Exhaust emission control system	Air-fuel ratio control device–MPI system	Oxygen sensor feedback type (Purpose: CO, HC, NOx reduction)
	Exhaust gas recirculation system • EGR valve • EGR control solenoid valve	Equipped Single type Duty cycle type solenoid valve (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	×					17-34
Purge control solenoid valve		×				17-36
MPI system component		×	×			GROUP 13A
Catalytic converter				×		17-40
EGR valve					×	17-38
EGR control solenoid valve					×	17-39

SERVICE SPECIFICATIONS

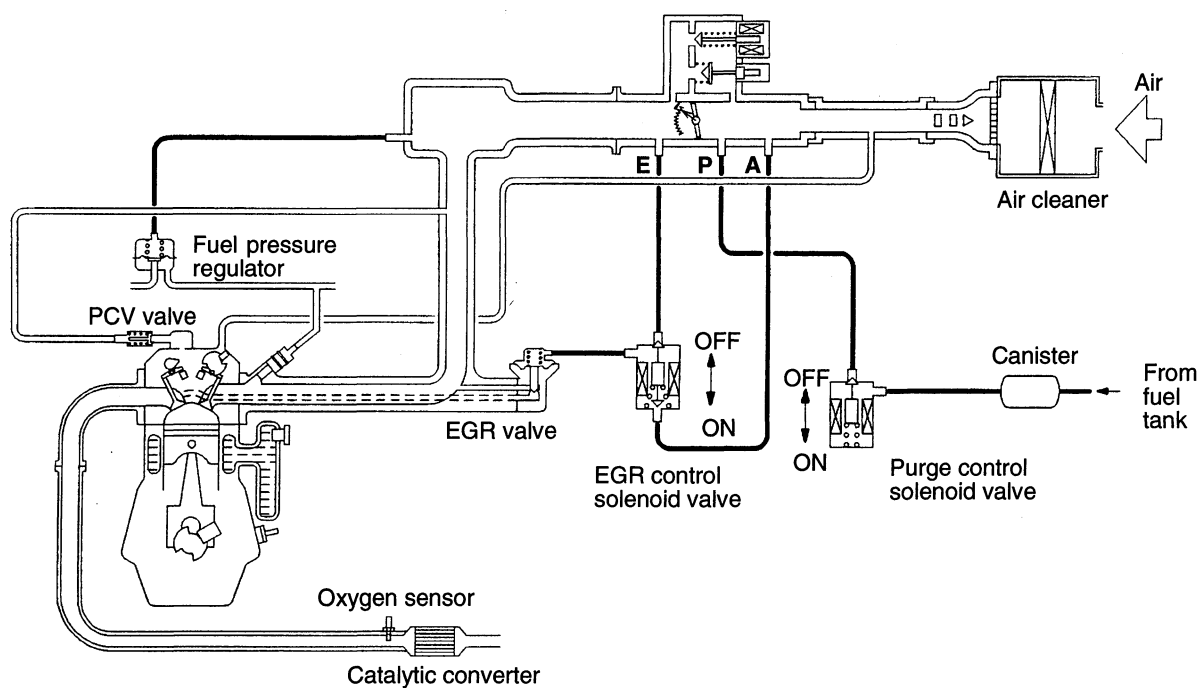
17300030128

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

VACUUM HOSE

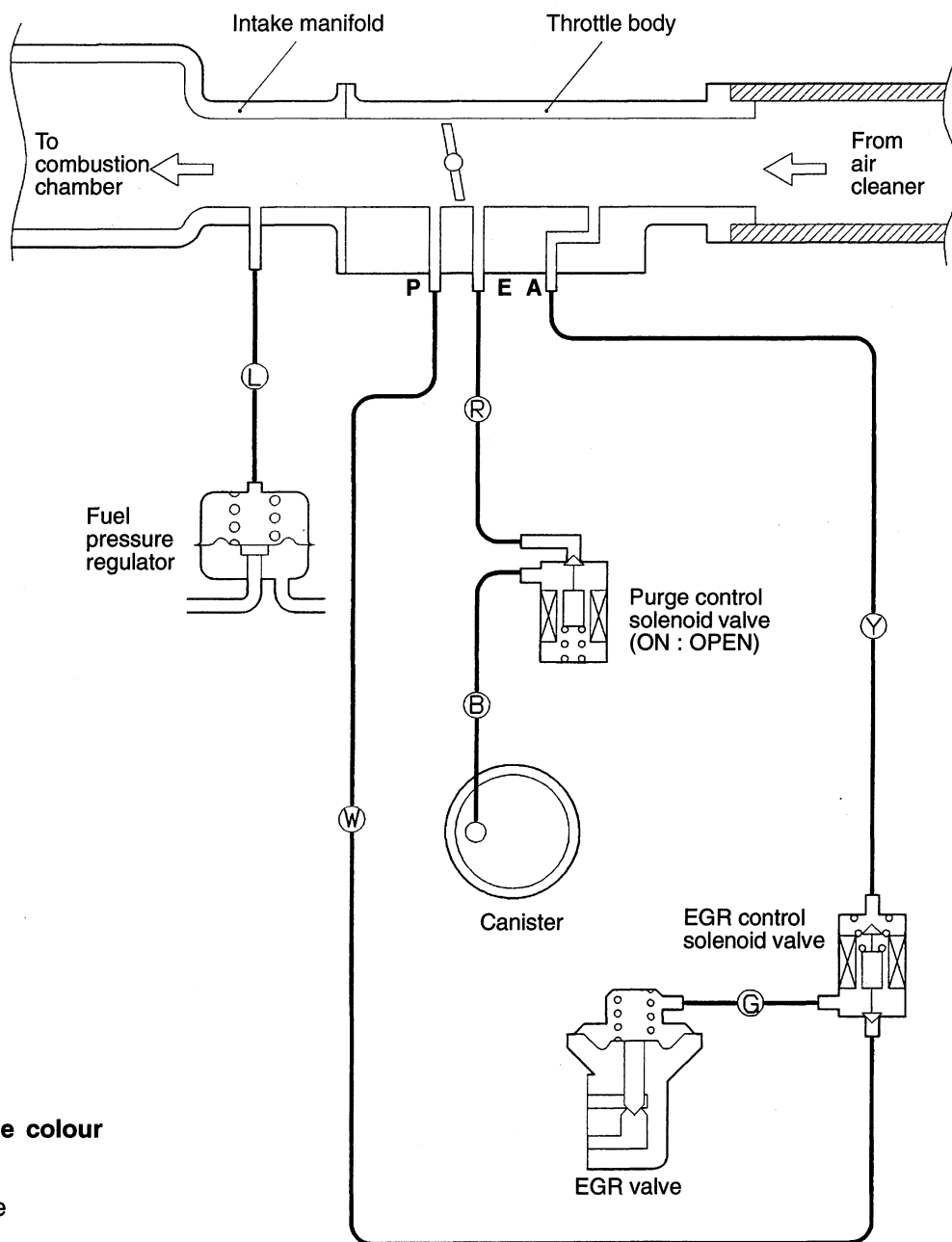
17300090133

VACUUM HOSE PIPING DIAGRAM



6FU2520

VACUUM CIRCUIT DIAGRAM



Vacuum hose colour

- B: Black
- G: Green
- L: Light blue
- R: Red
- W: White
- Y: Yellow

6EM0509

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

17300500117

GENERAL INFORMATION

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

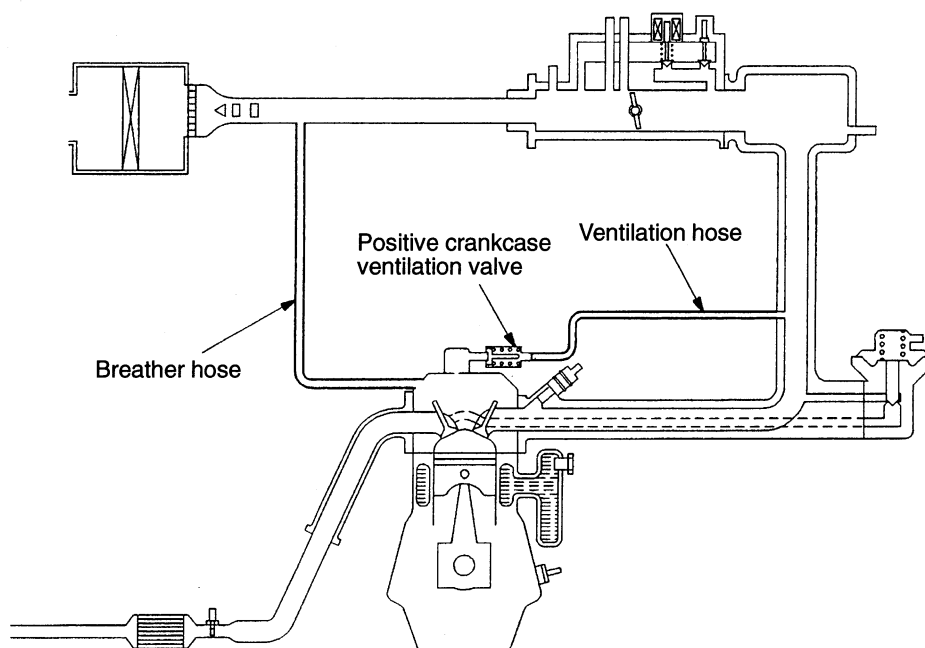
Fresh air is sent from the air cleaner into the crankcase through the breather hose. The air becomes mixed with the blow-by gases inside the crankcase.

The blow-by gas inside the crankcase is drawn into the intake manifold through the positive

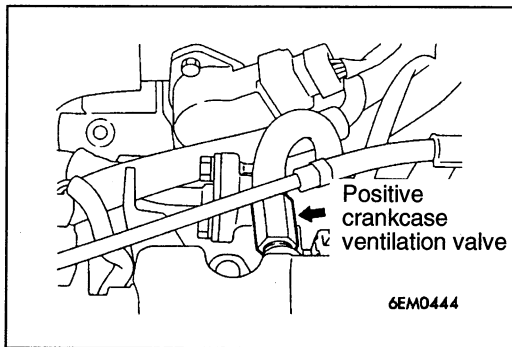
crankcase ventilation valve.

The positive crankcase ventilation 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



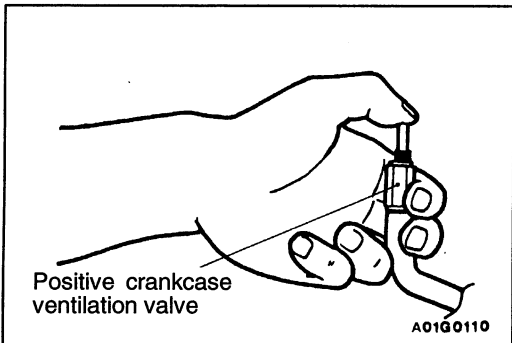
6EM0510



POSITIVE CRANKCASE VENTILATION SYSTEM CHECK

17300110112

1. Remove the ventilation hose from the positive crankcase ventilation valve.
2. Remove the positive crankcase ventilation valve from the rocker cover.
3. Reinstall the positive crankcase ventilation valve at the ventilation hose.
4. Start the engine and run at idle.

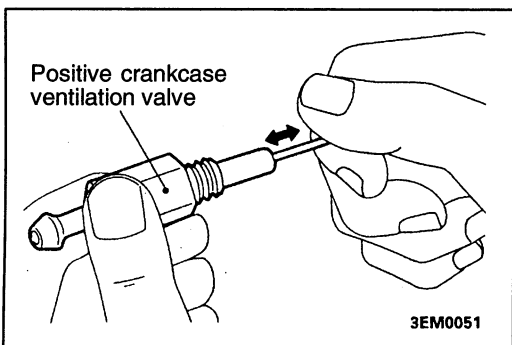


5. Place a finger at the opening of the positive crankcase ventilation valve and check that vacuum of the intake manifold is felt.

NOTE

At this moment, the plunger in the positive crankcase ventilation valve moves back and forth.

6. If vacuum is not felt, clean the positive crankcase ventilation valve or replace it.



PCV VALVE CHECK

17300120115

1. Insert a thin rod into the positive crankcase ventilation valve from the side shown in the illustration (rocker cover installation side), and move the rod back and forth to check that the plunger moves.
2. If the plunger does not move, there is a clogging in the positive crankcase ventilation valve. In this case, clean or replace the valve.
3. Install positive crankcase ventilation valve and tighten to specified torque.

Tightening torque: 10 Nm

EVAPORATIVE EMISSION CONTROL SYSTEM

17300510172

GENERAL INFORMATION

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

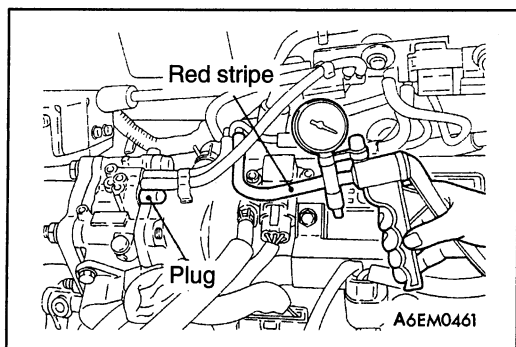
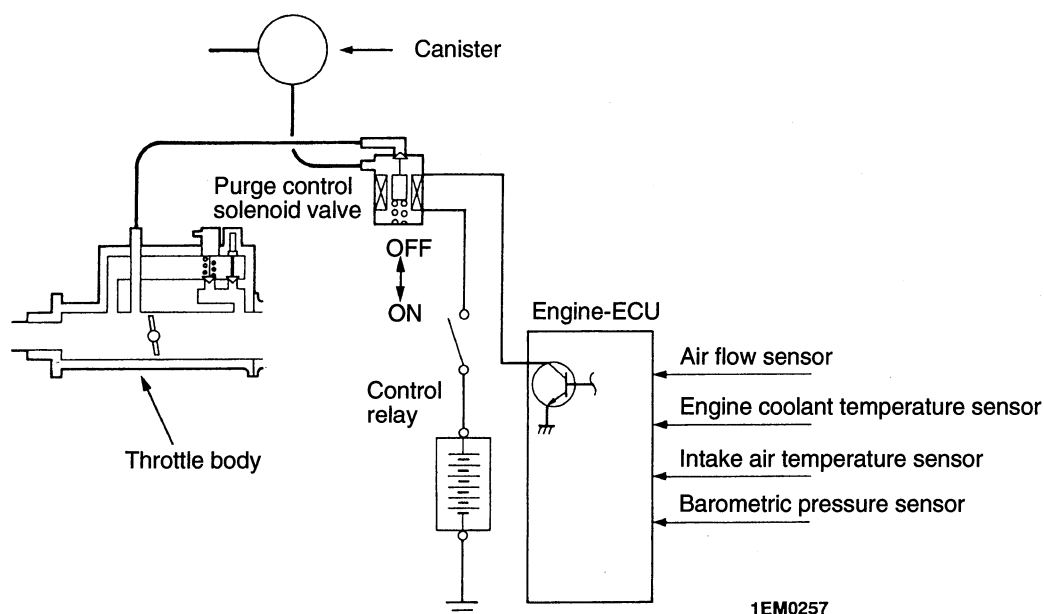
Fuel vapours from the fuel tank flow through the fuel tank pressure control valve and vapour pipe/hose to be stored temporarily in the canister. When driving the vehicle, fuel vapours stored in the canister flow through the purge solenoid and purge port and go into the intake manifold to be

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



PURGE CONTROL SYSTEM CHECK

17300140159

1. Disconnect the vacuum hose (red stripe) from the throttle body 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 while the engine is idling, and check the condition of the engine and the vacuum.

When engine is cold

(Engine coolant temperature: 40°C or less)

Vacuum	Engine condition	Normal condition
53 kPa	3,000 r/min	Vacuum is maintained

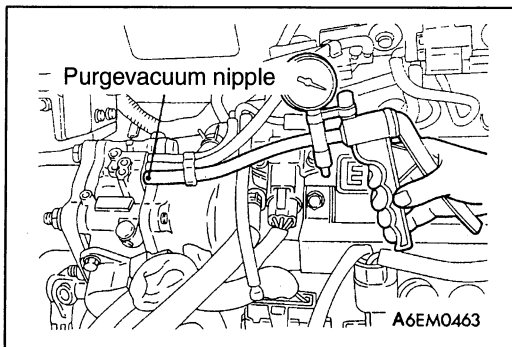
When engine is hot

(Engine coolant temperature: 80°C or higher)

Vacuum	Engine condition	Normal condition
53 kPa	At idle	Vacuum is maintained
	3,000 r/min	Vacuum will leak for approximately 3 minutes after the engine is started. After 3 minutes have passed, the vacuum will be maintained momentarily, after which it will again leak.*

NOTE

*: The vacuum will leak continuously if the atmospheric pressure is approximately 77 kPa or less, or the temperature of the intake air is approximately 50°C or higher.



PURGE PORT VACUUM CHECK

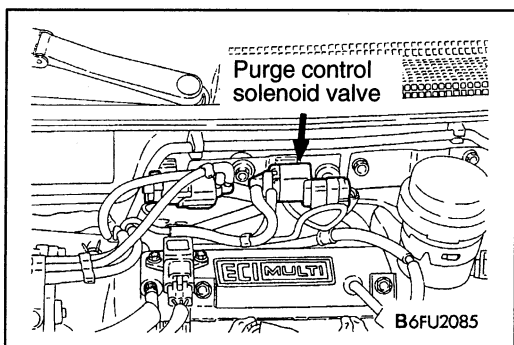
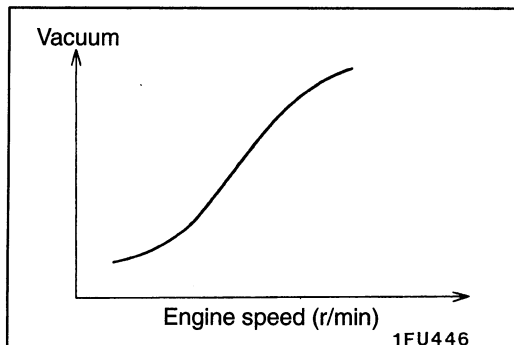
17300150121

1. Disconnect the vacuum hose (red stripe) from the throttle body purge vacuum nipple and connect a hand vacuum pump to the nipple.

2. Start the engine and check that, after raising the engine speed by racing the engine, purge vacuum raises according to engine speed.

NOTE

If there is a problem with the change in vacuum, the throttle body purge port may be clogged and require cleaning.



PURGE CONTROL SOLENOID VALVE CHECK

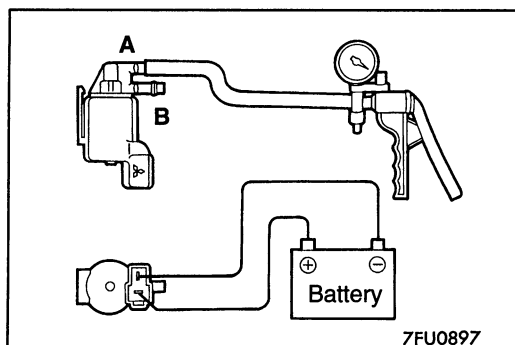
17300170110

NOTE

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

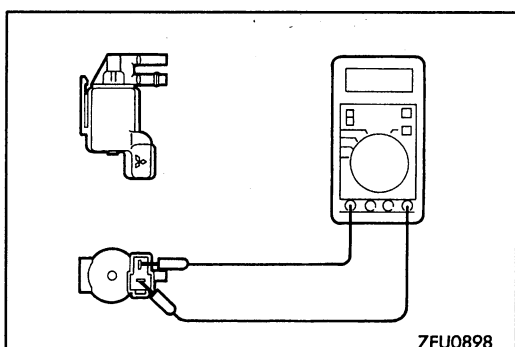
1. Disconnect the vacuum hose (black stripe, red stripe) from the solenoid valve.
2. Disconnect the harness connector.
3. Connect a hand vacuum pump to nipple (A) of the solenoid valve (refer to the illustration at left).
4. Check airtightness by applying a vacuum with voltage applied directly from the 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

17300520120

GENERAL INFORMATION

The exhaust gas recirculation (EGR) system lowers the nitrogen oxide (NO_x) emission level. When the air/fuel mixture combustion temperature is high, a large quantity of nitrogen oxides (NO_x) 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 NO_x.

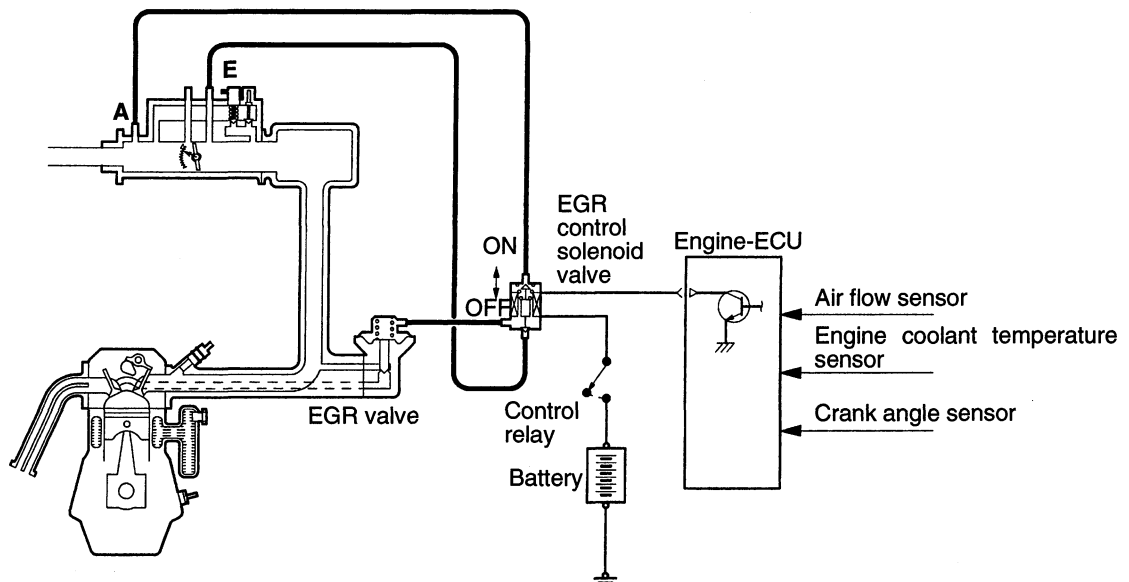
The EGR flow rate is controlled by the EGR valve so as not to decrease the driveability.

OPERATION

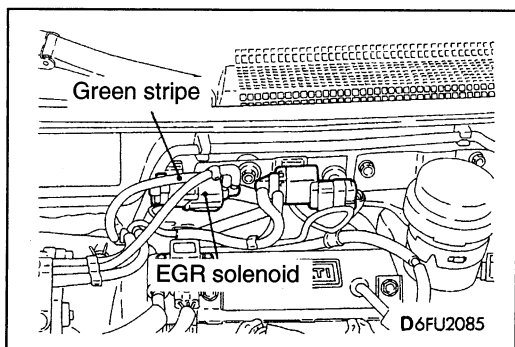
The EGR valve is being closed and does not recirculate exhaust gases under one of the following conditions. Otherwise, the EGR valve is opened and recirculates exhaust gases.

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

SYSTEM DIAGRAM



6EM0432



EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM CHECK

17300260138

1. Disconnect the vacuum hose (green stripe) from the EGR control solenoid valve, and then connect a hand vacuum pump via the three-way terminal.
2. When the engine is hot or cold, check the condition of vacuum by racing the engine.

When engine is cold

(Engine coolant temperature: 20°C or less)

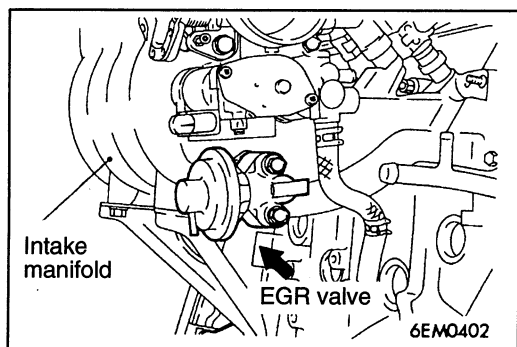
Throttle valve	Normal vacuum condition
Open quickly	No vacuum will generate (the same as barometric pressure.)

When engine is hot

(Engine coolant temperature: 80°C or higher)

Throttle valve	Normal vacuum condition
Open quickly	It will momentarily rise over 13 kPa

3. Disconnect the three-way terminal.
4. Connect the hand vacuum pump to the EGR valve.
5. Check whether the engine stalls or the idling is unstable when a vacuum of 30 kPa or higher is applied during idling.



EGR VALVE CHECK

17300280103

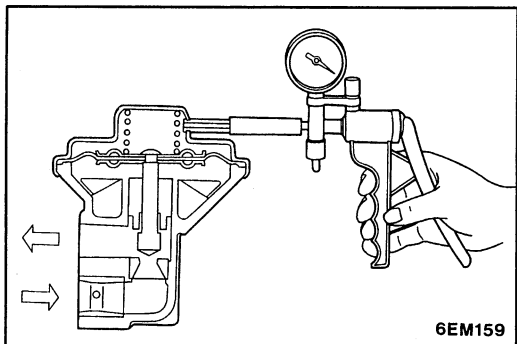
1. Remove the EGR valve and inspect for sticking, carbon deposits, etc. If found, clean with a suitable solvent so that the valve seats correctly.
2. Connect a hand vacuum pump to the EGR valve.
3. Apply 67 kPa of vacuum, and check that the vacuum is maintained.

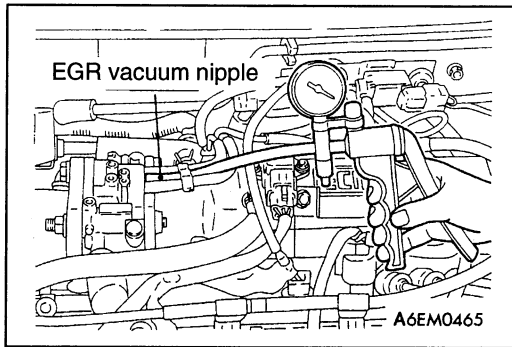
4. Apply a vacuum and check the passage of air by blowing through one side of the EGR passage.

Vacuum	Passage of air
5.3 kPa or less	Air is not blown out
26 kPa or more	Air is blown out

5. Replace the gasket, and tighten to the specified torque.

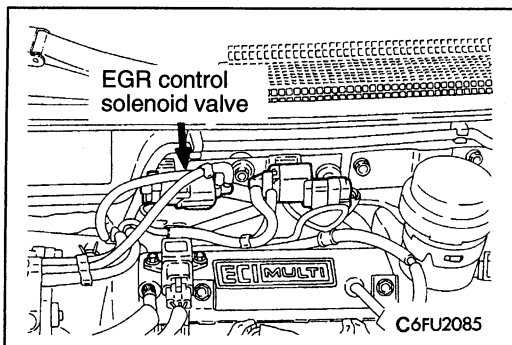
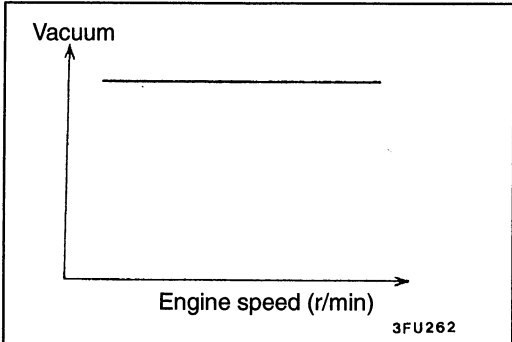
Tightening torque: 22 Nm



**EGR PORT VACUUM CHECK**

17300290090

1. Disconnect the vacuum hose (white stripe) from the throttle body EGR vacuum nipple and connect a hand vacuum pump to the nipple.
2. Start the engine and check to see that, after raising the engine speed by racing the engine, vacuum remains fairly constant.

**EGR CONTROL SOLENOID VALVE CHECK**

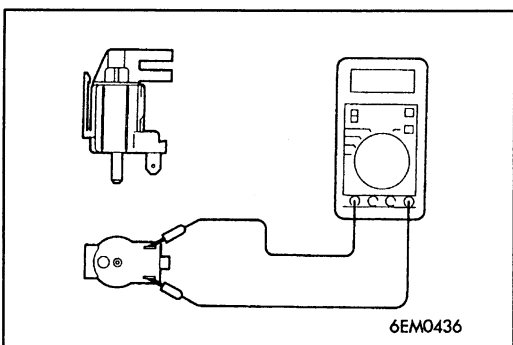
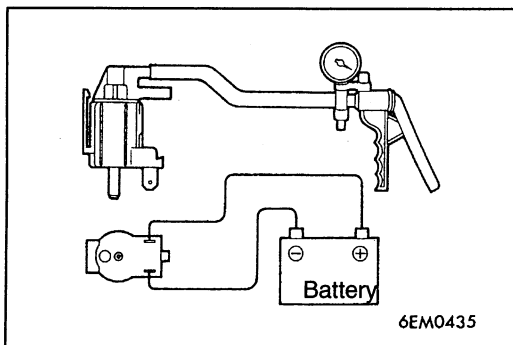
17300310116

NOTE

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

1. Disconnect the vacuum hose (yellow stripe, white stripe, green stripe) from the solenoid valve.
2. Disconnect the harness connector.
3. Connect a hand vacuum pump to the nipple to which the white-striped vacuum hose was connected.
4. Check airtightness by applying a vacuum with voltage applied directly from the battery to the EGR control solenoid valve and without applying voltage.

Battery voltage	B Nipple condition	Normal condition
Not applied	Open	Vacuum maintained
Applied	Open	Vacuum leaks
	Closed	Vacuum maintained



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

Standard value: 36–44Ω (at 20°C)

CATALYTIC CONVERTER

17300530109

GENERAL INFORMATION

The three-way catalytic converter, together with the closed loop air-fuel ratio control based on the oxygen sensor signal, oxidizes carbon monoxides (CO) and hydrocarbons (HC) and reduces nitrogen oxides (NOx).

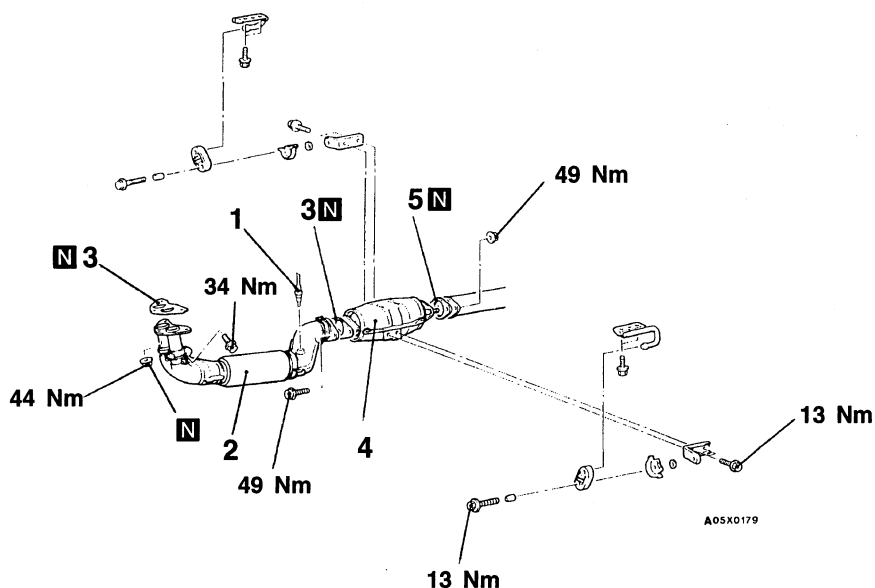
When the mixture is controlled at stoichiometric air-fuel ratio, the three-way catalytic converter provides the highest purification against the three constituents, namely, CO, HC and NOx.

REMOVAL AND INSTALLATION

17300390103

Pre-removal and Post-installation Operation

- Under Cover Removal and Installation



Removal steps

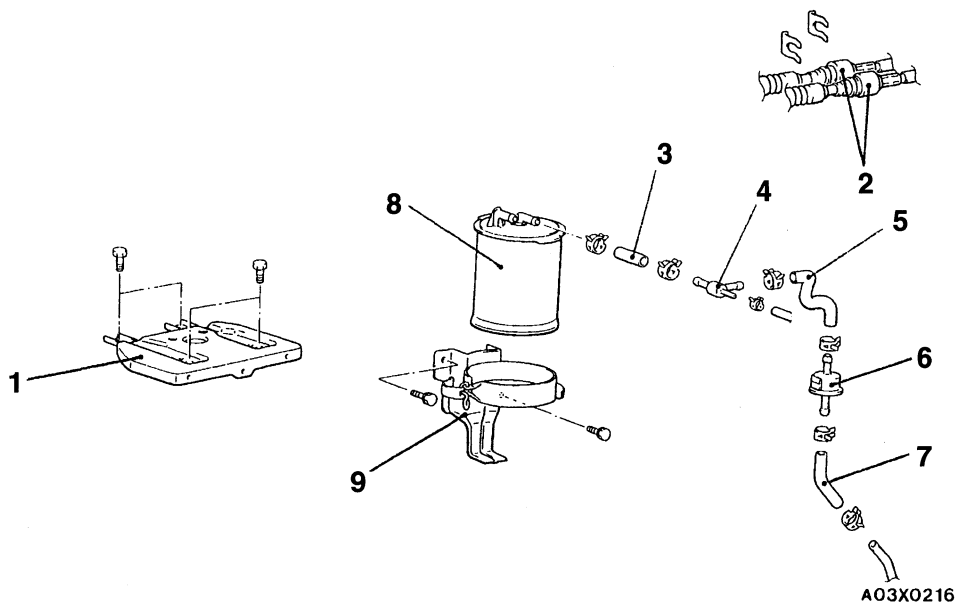
1. Oxygen sensor (Refer to GROUP 15 – Exhaust Pipe and Main Muffler)
2. Front exhaust pipe
3. Gasket
4. Catalytic converter
5. Gasket

CANISTER/TWO-WAY VALVE

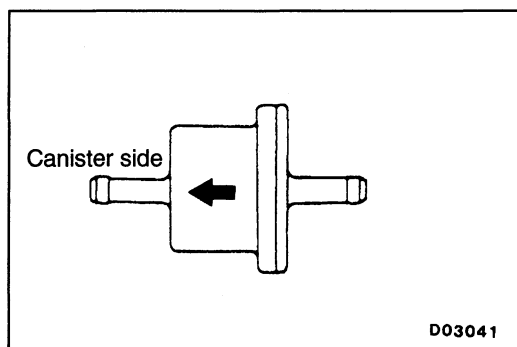
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REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
 Battery Removal and Installation

**Removal steps**

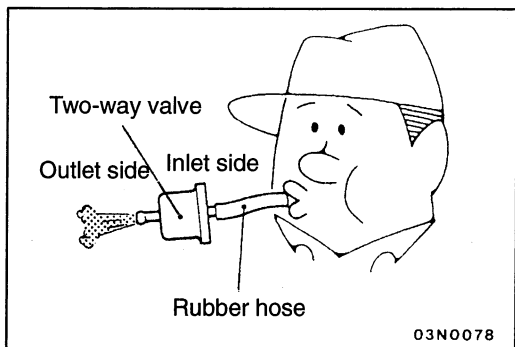
1. Battery bracket
2. Shift cable and select cable connection
3. Vapour hose
4. Connector
5. Vapour hose
6. Two-way valve
7. Vapour hose
8. Canister
9. Canister holder assembly



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INSTALLATION SERVICE POINT**►A◄ TWO-WAY VALVE INSTALLATION**

Install so that the installation direction of the two-way valve is correct.



INSPECTION

17300490032

TWO-WAY VALVE SIMPLE CHECK

Attach a clean hose and check the operation of the two-way valve.

Inspection procedure	Normal condition
Lightly blow from inlet side (fuel tank side).	Air passes through with a slight feeling of resistance
Lightly blow from outlet side	Air passes through