13A-1

FUEL

CONTENTS

13109000195

ELECTRONIC CONTROL TYPE CAREURETTOR

VARIABLE VENTURINN/RECAREUREDI/OR

DIESEL FUEL

FUEL SUPPLY 13F

TRACTION CONTROLSYSTEM (TCL)

NOTE

THE GROUPS MARKED BY MARE NOT IN THIS MANUAL

MULTIPOINT FUEL INJECTION (MPI)

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MULTIPOINT FUEL INJECTION (MPI) <4G1>

13100010142

GENERAL INFORMATION

The Multipoint Fuel Injection System consists of sensors which detect the engine conditions, the engine-ECU which controls the system based on signals from these sensors, and actuators which operate under the control of the engine-ECU. The engine-ECU carries out

FUEL INJECTION CONTROL

The injector drive times and injector timing are controlled so that the optimum air/fuel mixture is supplied to the engine to correspond to the continually-changing engine operation conditions.

A single injector is mounted at the intake port of each cylinder. Fuel is sent under pressure from the fuel tank by the fuel pump, with the pressure being regulated by the fuel pressure regulator. The fuel thus regulated is distributed to each of the injectors.

Fuel injection is normally carried out once for each cylinder for every two rotations of the crankshaft. The firing order is 1-3-4-2. This is

IDLE AIR CONTROL

The idle speed is kept at the optimum speed by controlling the amount of air that bypasses the throttle valve in accordance with changes in idling conditions and engine load during idling. The engine-ECU drives the idle speed control (ISC) motor to keep the engine running at the pre-set idle target speed in accordance with the engine coolant temperature and air

IGNITION TIMING CONTROL

The power transistor located in the ignition primary circuit turns ON and OFF to control the primary current flow to the ignition coil. This controls the ignition timing in order to provide the optimum ignition timing with respect to the

SELF-DIAGNOSIS FUNCTION

- When an abnormality is detected in one of the sensors or actuators related to emission control, the engine warning lamp (check engine lamp) illuminates as a warning to the driver.
- When an abnormality is detected in one of the sensors or actuators, a diagnosis

activities such as fuel injection control, idle speed control and ignition timing control. In addition, the engine-ECU is equipped with several diagnosis modes which simplify troubleshooting when a problem develops.

called sequential fuel injection. The engine-ECU provides a richer air/fuel mixture by carrying out "open-loop" control when the engine is cold or operating under high load conditions in order to maintain engine performance. In addition, when the engine is warm or operating under normal conditions, the engine-ECU controls the air/fuel mixture by using the oxygen sensor signal to carry out "closed-loop" control in order to obtain the theoretical air/fuel mixture ratio that provides the maximum cleaning performance from the three way catalyst.

conditioner load. In addition, when the air conditioner switch is turned off and on while the engine is idling, the ISC motor operates to adjust the throttle valve bypass air amount in accordance with the engine load conditions in order to avoid fluctuations in the engine speed.

engine operating conditions. The ignition timing is determined by the engine-ECU from the engine speed, intake air volume, engine coolant temperature and atmospheric pressure.

code corresponding to the abnormality is output.

 The RAM data inside the ENGINE-ECU that is related to the sensors and actuators can be read by means of the MUT-II. In addition, the actuators can be force-driven under certain circumstances.

OTHER CONTROL FUNCTIONS

- 1. Fuel Pump Control Turns the fuel pump relay ON so that current is supplied to the fuel pump while the engine is cranking or running.
- 2. A/C Relay Control Turns the compressor clutch of the A/C ON and OFF.
- 3. Fan Relay Control The revolutions of the radiator fan and

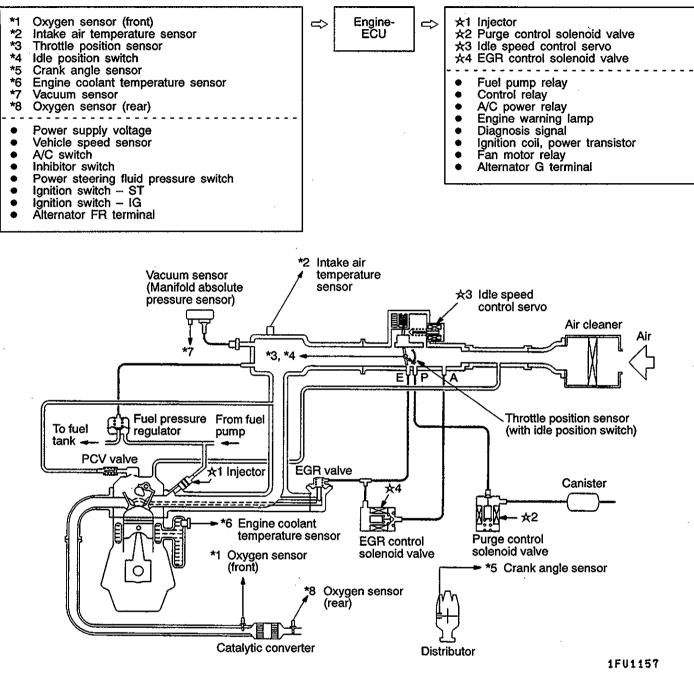
GENERAL SPECIFICATIONS

condenser fan are controlled in response to the engine coolant temperature and vehicle speed.

- 4. Purge Control Solenoid Valve Control Refer to GROUP 17.
- 5. EGR Control Solenoid Valve Control Refer to GROUP 17.

Items		Specifications	
Throttle body	Throttle bore mm	46	
	Throttle position sensor	Variable resistor type	
	Idle speed control servo	Stepper motor type (Stepper motor type by-pass air control system with the air volume limiter)	
	Idle position switch	Rotary contact type, within throttle position sensor	
Engine-ECU	Identification model No.	E2T65774 <vehicles immobilizer="" system="" without=""> E2T65775 <vehicles immobilizer="" system="" with=""></vehicles></vehicles>	
Sensors	Vacuum sensor (Manifold absolute pres- sure sensor)	Semiconductor type	
	Intake air temperature sensor	Thermistor type	
	Engine coolant temperature sensor	Thermistor type	
	Oxygen sensor	Zirconia type	
	Vehicle speed sensor	Magnetic resistive element type	
	Inhibitor switch	Contact switch type	
	Crank angle sensor	Hall element type	
	Power steering fluid pressure switch	Contact switch type	
Actuators	Control relay type	Contact switch type	
	Fuel pump relay type	Contact switch type	
	Injector type and number	Electromagnetic type, 4	
	Injector identification mark	CDH116	
	EGR control solenoid valve	ON/OFF type solenoid valve	
	Purge control solenoid valve	ON/OFF type solenoid valve	
Fuel pressure regulator	Regulator pressure kPa	329	

MULTI-POINT FUEL INJECTION SYSTEM DIAGRAM



SERVICE SPECIFICATIONS

Items		Specifications
Basic idle speed r/min		750±50
Idle speed when A/C is ON r/min		850 at neutral position
Throttle position sensor adjust	ing voltage mV	4001,000
Throttle position sensor resista	ance kΩ	3.5–6.5
Idle speed control servo coil resistance Ω		28–33 (at 20°C)
Intake air temperature sensor	20°C	2.33.0
resistance kΩ	80°C	0.30-0.42
Engine coolant temperature	20°C	2.1–2.7
sensor resistance kΩ	80°C	0.26–0.36
Oxygen sensor output voltage V		0.61.0
Fuel pressure kPa	Vacuum hose disconnection	324–343 at curb idle
	Vacuum hose connection	Approx. 265 at curb idle
Injector coil resistance Ω	·	13-16 (at 20°C)

SEALANT

13100050038

Item	Specified sealant	Remark
Engine coolant temperature sensor threaded portion	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

13100030131

SPECIAL TOOLS

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13100060123

Tool	Number	Name	Use
A Contraction	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe	 Fuel gauge simple inspection A: Connector pin contact pressure inspection B, C: Power circuit inspection D: Commercial tester connection
B	·		
0 			
	MB991502	MUT-II sub assembly	 Reading diagnosis code MPI system inspection
	MB991348	Test harness set	Inspection using an analyzer
-	MB991519	Alternator harness connector	Measurement of voltage during troubleshooting
	MD998463	Test harness (6-pin, square)	 Inspection of idle speed control servo Inspection using an analyzer
V	MD998464	Test harness (4-pin, triangle)	Inspection of oxygen sensor

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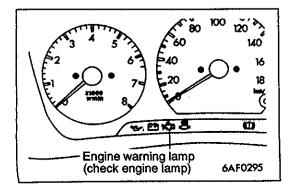
Tool	Number	Name	Use
	MD998709	Adaptor hose	Measurement of fuel pressure
E	MD998742	Hose adaptor	Measurement of fuel pressure
	MD998706	Injector test set	Checking the spray condition of injectors
MB991607	MB991607	Injector test harness	
MD928741	MD998741	Injector test adaptor	
	MB991608	Clip	

TROUBLESHOOTING

13100850034

DIAGNOSIS TROUBLESHOOTING FLOW

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



DIAGNOSIS FUNCTION

13100860129

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

If an abnormality occurs in any of the following items related to the Multipoint Fuel Injection (MPI) system, the engine warning lamp will illuminate.

If the lamp remains illuminated or if the lamp illuminates while the engine is running, check the diagnosis code output.

Engine warning lamp inspection items

Engine-ECU	
Oxygen sensor	<u></u>
Vacuum sensor	
Intake air temperature sensor	
Throttle position sensor	
Engine coolant temperature sensor	
Crank angle sensor	
Ignition timing adjustment signal	
Injector	
Immobilizer system	

Caution

Engine warning lamp will come on even when terminal for ignition timing adjustment is short-circuited. Therefore, it is not abnormal that the lamp comes on even when terminal for ignition timing adjustment is short-circuited at the time of ignition timing adjustment.

METHOD OF READING AND ERASING DIAGNOSIS CODES

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

INSPECTION USING MUT-II DATA LIST AND ACTUATOR TESTING

- Carry out inspection by means of the data list and the actuator test function.
 If there is an abnormality, check and repair the chassis harnesses and components.
- 2. After repairing, re-check using the MUT-II and check that the abnormal input and output have returned to normal as a result of the repairs.
- 3. Erase the diagnosis code memory.
- 4. Remove the MUT-II.
- 5. Start the engine again and carry out a road test to confirm that the problem has disappeared.

FAIL-SAFE FUNCTION REFERENCE TABLE

13100910121

When the main sensor malfunctions are detected by the diagnosis function, the vehicle is controlled by means of the pre-set control logic to maintain safe conditions for driving.

Malfunctioning item	Control contents during malfunction		
Vacuum sensor	 Uses the throttle position sensor signal and engine speed signal (crank angle sensor signal) to take reading of the basic injector drive time and basic ignition timing from the pre-set mapping. Fixes the ISC servo in the appointed position so idle control is not performed. 		
Intake air temperature sensor	Controls as if the intake air temperature is 45°C.		
Throttle position sensor (TPS)	No increase in fuel injection amount during acceleration due to the throttle position sensor signal.		
Engine coolant temperature sensor	Controls as if the engine coolant temperature is 80°C.		
Oxygen sensor (front)	Air/fuel ratio feedback control (closed loop control) is not performed.		
Oxygen sensor (rear)	Performs the feedback control (closed loop control) of the air/fuel ratio by using only the signal of the oxygen sensor (front) installed on the front of the catalytic converter.		
Communication wire with transmission control unit 	Ignition timing is not retarded during transmission gear shifting (overall engine and transmission control).		
Alternator FR terminal	Does not control the output of the alternator according to an electrical load. (works as a normal alternator)		

INSPECTION CHART FOR DIAGNOSIS CODES

13100870122

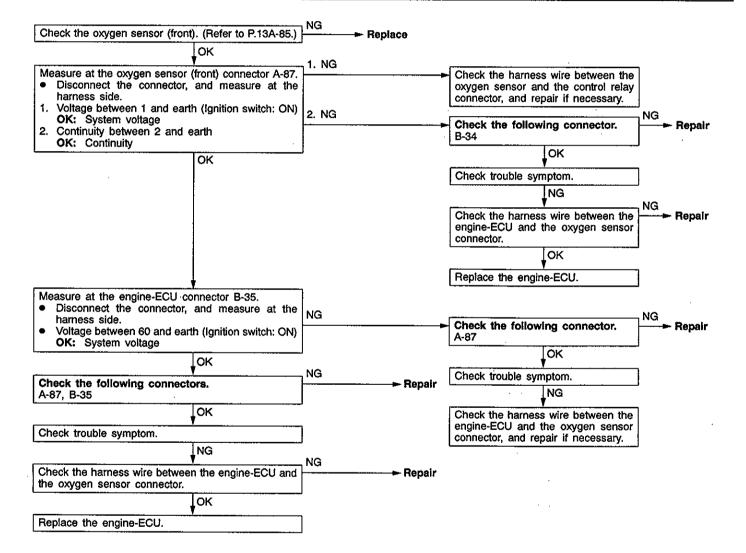
Code No.	Diagnosis item	Reference page
_11	Oxygen sensor (front) system	13A-12
13	Intake air temperature sensor system	13A-13
14	Throttle position sensor system	13A-14
21	Engine coolant temperature sensor system	13A-15
22	Crank angle sensor system	13A-16
24	Vehicle speed sensor system	13A-17
32	Vacuum sensor system	13A-18
36*	Ignition timing adjustment signal system	13A-19
41	Injector system	13A-19
54	Immobilizer system	13A-20
5 9	Oxygen sensor (rear) system	13A-21
61	Communication wire with A/T-ECU system 	13A-22
64	Alternator FR terminal system	13A-22

NOTE

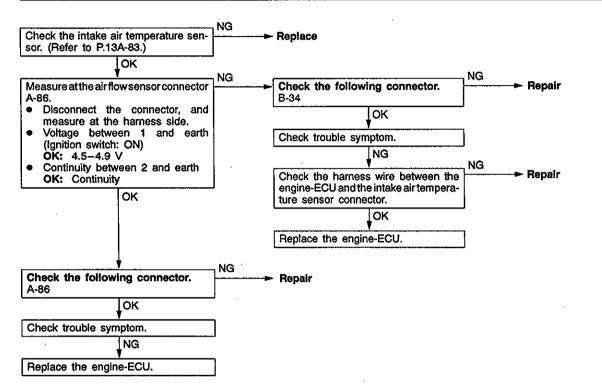
*: Malfunction code No. 36 is not memorized.

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. 11 Oxygen sensor (front) system	Probable cause			
 Range of Check 3 minutes have passed after engine was started. Engine coolant temperature is approx. 80°C or more. Intake air temperature is 20-50°C. Engine speed is approx. 2,000-3,000 r/min Vehicle is moving at constant speed on a flat, level road surface Set conditions The oxygen sensor (front) output voltage is around 0.6 V for 30 seconds (does not cross 0.6 V for 30 seconds). When the range of check operations given above which accompany starting of the engine are carried out four time in succession, a problem is detected after each operation. 	 Malfunction of the oxygen sensor (front) Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU 			



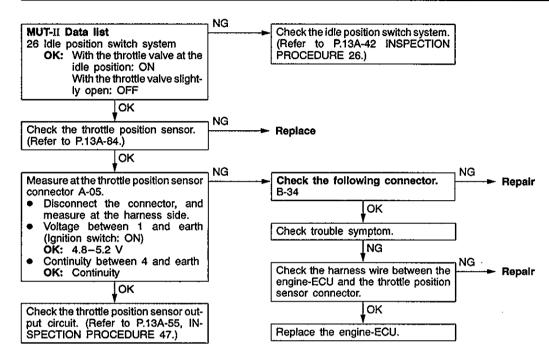
Code No. 13 Intake air temperature sensor system	Probable cause
 Range of Check Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions Sensor output voltage is 4.6 V or more (corresponding to an intake air temperature of -45°C or less) for 4 seconds. Sensor output voltage is 0.2V or less (corresponding to an intake air temperature of 125°C or more) for 4 seconds. 	 Matfunction of the intake air temperature sensor Improper connector contact, open circuit or short-circuited harness wire of the intake air temperature sensor circuit Malfunction of the engine-ECU



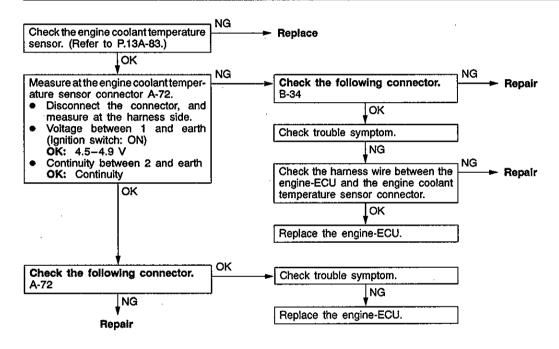
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MPI <4G1> - Troubleshooting

Code No. 14 Throttle position sensor system	Probable cause			
 Range of Check Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions When the idle position switch is ON, the sensor output voltage is 2 V or more for 4 seconds. 	 Malfunction of the throttle position sensor or maladjustment Improper connector contact, open circuit or short-circuited harness wire of the throttle position sensor circuit Improper "ON" state of idle position switch Short circuit of the idle position switch signal line 			
 The sensor output voltage is 0.2 V or less for 4 seconds. 	Malfunction of the engine-ECU			



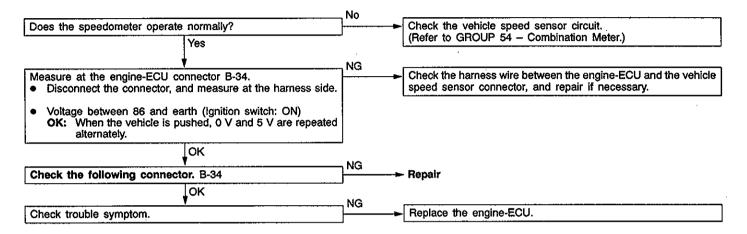
Code No. 21 Engine coolant temperature sensor system	Probable cause
 Range of Check Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions Sensor output voltage is 4.6 V or more (corresponding to an engine coolant temperature of -45°C or less) for 4 seconds. or Sensor output voltage is 0.1 V or less (corresponding to an engine coolant temperature of 140°C or more) for 4 seconds. 	 Malfunction of the engine coolant temperature sensor Improper connector contact, open circuit or short-circuited harness wire of the engine coolant temperature sensor circuit Malfunction of the engine-ECU
 Range of Check Ignition switch: ON Engine speed is approx. 50 r/min or more Set conditions The sensor output voltage increases from 1.6 V or less (corresponding to an engine coolant temperature of 40°C or more) to 1.6 V or more (corresponding to an engine coolant temperature of 40°C or less). After this, the sensor output voltage is 1.6 V or more for 5 minutes. 	

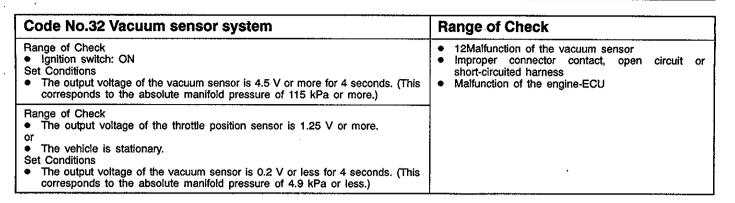


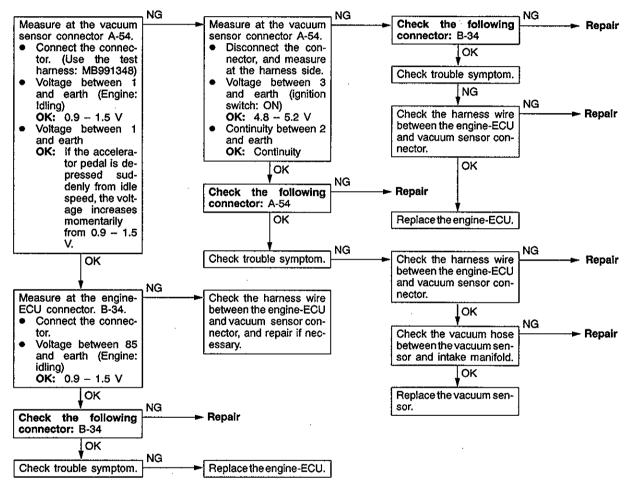
13A-16

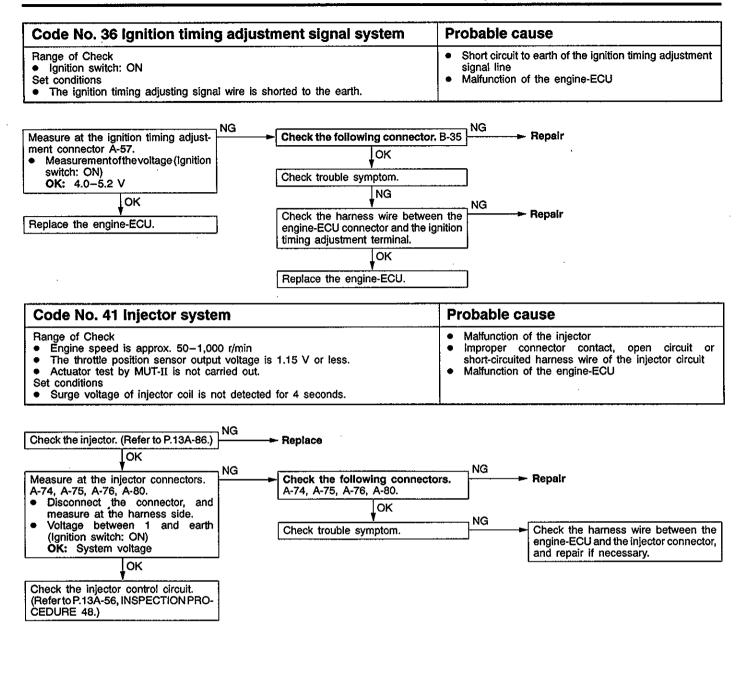
Code No. 22 Crank angle sensor system			.	Probable caus	Se
Range of Check Engine is cranking. Set conditions Sensor output voltage does not change for 4 seconds (no pulse signal input.)		nput.)	 Malfunction of the crank angle sensor Improper connector contact, open circuit or short-circuited harness wire of the crank angle sensor circuit Malfunction of the engine-ECU 		
	_ок				
Measure at the distributor connector A-68. Connect the connector. (Use the test harness: MB991348.) Voltage between 5 and earth (Engine: cranking) OK: 0.4-4.0 V Voltage between 5 and earth (Engine: idling) OK: 1.5-2.5 V			Replace	the engine-ECU.	· · · · · · · · · · · · · · · · · · ·
NG Measure at the distributor connector A-68. Disconnect the connector, and measure at the harness side. Voltage between 6 and earth (Ignition switch: ON) OK: System voltage Voltage between 5 and earth (Ignition switch: ON) OK: 4.8-5.2 V 3. Continuity between 7 and earth	1. NG 2. NG 3. NG	•	control r	elay connector, and he following con-	veen the crank angle sensor and the d repair if necessary. NG Repair
OK: Continuity]			ouble symptom.	¬ NG
Check trouble symptom.]		between	the harness wire theengine-ECUand nk angle sensor or. LOK	
Replace the distributor.]		Replace	the engine-ECU.	
				ae harness wire betw nd repair if necessa	ween the crank angle sensor and the ary.

Code No. 24 Vehicles speed sensor system	Probable cause
 Range of check Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Idle position switch: OFF Engine speed is 3,000 r/min or more. Driving under high engine load conditions. Set conditions Sensor output voltage does not change for 4 seconds (no pulse signal input). 	 Matfunction of the vehicle speed sensor Improper connector contact, open circuit or short-circuited harness wire of the vehicle speed sensor circuit Matfunction of the engine-ECU









13A-20

Code No.54 Immobilizer system	Probable cause
Range of Check Ignition switch: ON Set Conditions Improper communication between the engine-ECU and immobilizer-ECU 	 Radio interference of ID codes Incorrect ID code Malfunction of harness or connector Malfunction of immobilizer-ECU Malfunction of engine-ECU

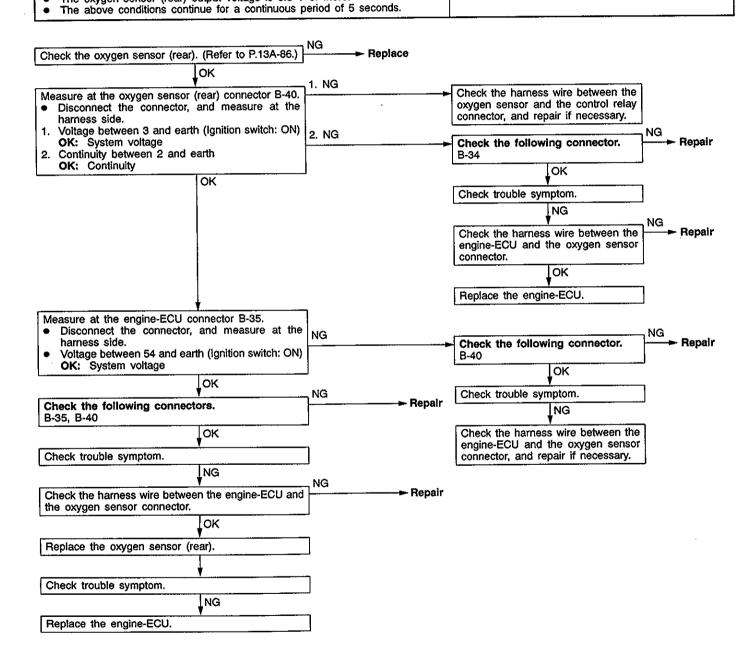
NOTE

- (1) If the ignition switches are close each other when starting the engine, radio interference may cause (1) this code to be displayed.(2) This code may be displayed when registering the key ID code.

	Yes			
Is there another ignition key near the ignition key that is inserted in the ignition switch?]		Remove the extra ignition key.	r
	1	NO		÷.
		NG	Check trouble symptom.	·
No				
\	, Yes			
Is a diagnosis code output from the immobilizer-ECU?				(Refer to GROUP 54 - Ignition
No	J		Switch and Immobilizer System	ı.)
······	n NG			
Check the following connectors. B-24, B-32, B-35			Repair	
ОК	-			
Check trouble symptom.]			
NG	-			
Check the harness wire between the engine-ECU and the immobiliz-	<u>ок</u>		Replace the immobilizer-ECU.	
er-ECU.				NG
NG	-			
Ť			Check trouble symptom.	
Repair				NG
			Replace the engine-ECU.	۲ ـــــــــــ

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Code No. 59 Oxygen sensor (rear) system	Probable cause			
 Range of Check 3 minutes have passed after engine was started. Engine coolant temperature is approx. 80°C or more. Idle position switch: OFF The throttle position sensor output voltage is 4.1 V or more. Open loop control in operation 20 seconds have passed after deceleration finished. Set conditions The oxygen sensor (rear) output voltage is 0.1 V or less. The difference in the maximum and minimum values for the oxygen sensor (rear) output voltage is 0.5 V or more. 	 Malfunction of the oxygen sensor (rear) Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU 			



Code No. 61 Communication wire with A/T	F-ECU sy	stem	Probable cause
 Range of Check 60 seconds or more have passed immediately after engin Engine speed is approx. 50 r/min or more Set conditions The voltage of the torque reduction request signal from the A 1.5 seconds or more. 			 Malfunction of the harness wire and the connector Malfunction of the engine-ECU Malfunction of the A/T-ECU
Check the following connectors. B-35, B-37, B-39	NG ∎	► Repair	
OK			
Check trouble symptom.]		
NG			
Check the harness wire between the engine-ECU and the A/T-ECU	п ^{ок}	Replac	e the engine-ECU.
connector.		Tiepiac	
NG	.		
Repair		Check	trouble symptom.
			NG
,		Replac	e the A/T-ECU.
Code No. 64 Alternator FR Terminal System			Probable cause
 Range of Check, Set Conditions The alternator FR terminal signal voltage remains high for approwhile the engine is running. 	ximately 20 se	econds	 Open circuit in alternator FR terminal circuit Malfunction of the engine-ECU
 Measure at the alternator connector A-83. Connect the connector. Voltage between 4 and earth (Engine: Idling) (Radiator fan: Stopped) (Headlamp: OFF → ON) OK: 1.8 - 2.4 → 1.0 - 1.6 V 	ок	Replac	e the engine-ECU.
ING	_		
 Measure at the alternator connector A-83. Disconnect the connector, and measure at the harness side. Voltage between 4 and earth (Ignition switch: ON) OK: 4.8 - 5.2 V 	- NG	connec	the following tor. B-36 OK trouble symptom.
ОК		Oneck	NG
Check the following connector, A-83	NG	- Repair	
ОК			
Check trouble symptom.	ר		the harness wire Repair
NG		and the nector.	n the engine-ECU e alternator con-
Check the harness wire between the engine-ECU and the alternator connector.	- NG	- Repair	OK
OK		Replace	e the engine-ECU.
Replace the alternator.	7	L	

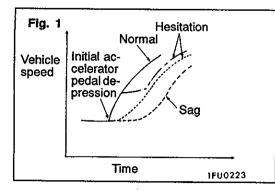
INSPECTION CHART FOR TROUBLE SYMPTOMS

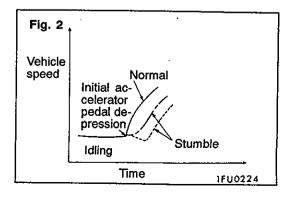
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	Trouble symptom	Inspection procedure No.	Reference page
Communication	Communication with all systems is not possible.		13A-25
with MUT-II is impossible.	Communication with engine-ECU only is not possible.	2	13A-26
Engine warning lamp and	The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position.	3	13A-27
related parts	The engine warning lamp remains illuminating and never goes out.	4	13A-27
Starting	No initial combustion (starting impossible)	5	13A-28
	Initial combustion but no complete combustion (starting impossible)	6	13A-29
	Long time to start (improper starting)	7	13A-30
Idling stability	Unstable idling (Rough idling, hunting)	8	13A-31
(Improper idling)	Idling speed is high. (Improper idling speed)	9	13A-32
	Idling speed is low. (Improper idling speed)	10	13A-33
Idling stability (Engine stalls)	When the engine is cold, it stalls at idling. (Die out)	11	13A-34
	When the engine becomes hot, it stalls at idling. (Die out)	12	13A-35
	The engine stalls when starting the car. (Pass out)	13	13A-36
	The engine stalls when decelerating.	14	13A-36
Driving	Hesitation, sag or stumble	15	13A-37
	The feeling of impact or vibration when accelerating	16	13A-37
	The feeling of impact or vibration when decelerating	17	13A-38
	Poor acceleration	18	13A-38
	Surge	19	13A-39
	Knocking	20	13A-39
Dieseling		21	13A-39
Too high CO and	HC concentration when idling	22	13A-40
Low alternator o	utput voltage (approx. 12.3 V)	23	13A-41

PROBLEM SYMPTOMS TABLE (FOR YOUR INFORMATION)

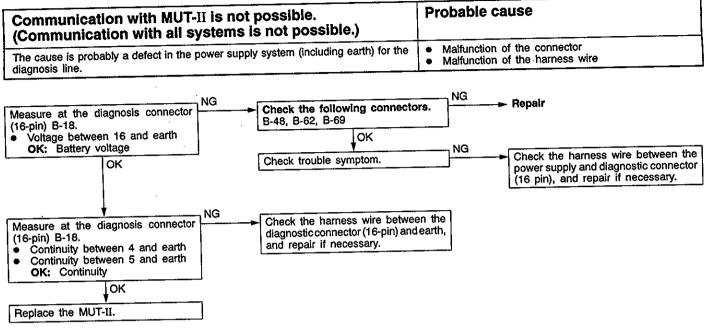
Items		Symptom				
	Won't start	The starter is used to crank the engine, but there is no combustion within the cylinders, and the engine won't start.				
Starting	Fires up and dies	There is combustion within the cylinders, but then the engine soon stalls.				
	Hard starting	Engine starts after cranking a while.				
	Hunting	Engine speed doesn't remain constant; changes at idle.				
Rough idle		Usually, a judgement can be based upon the movement of the tachometer pointer, and the vibration transmitted to the steering wheel, shift lever, body, etc. This is called rough idle.				
ldling stability	Incorrect idle speed	The engine doesn't idle at the usual correct speed.				
	Engine stall (Die out)	The engine stalls when the foot is taken from the accelerator pedal, regardless of whether the vehicles is moving or not.				
	Engine stall (Pass out)	The engine stalls when the accelerator pedal is depressed or while it is being used.				
Hesitation Sag		"Hesitation" is the delay in response of the vehicle speed (engine speed) that occurs when the accelerator is depressed in order to accelerate from the speed at which the vehicle is now traveling, or a temporary drop in vehicle speed (engine speed) during such acceleration. Serious hesitation is called "sag". (Refer to Fig. 1)				
	Poor acceleration	Poor acceleration is inability to obtain an acceleration corresponding to the degree of throttle opening, even though acceleration is smooth, or the inability to reach maximum speed.				
Driving	Stumble	Engine speed increase is delayed when the accelerator pedal is initially depressed for acceleration. (Refer to Fig. 2)				
	Shock	The feeling of a comparatively large impact or vibration when the engine is accelerated or decelerated.				
	Surge	This is repeated surging ahead during constant speed travel or during variable speed travel.				
	Knocking	A sharp sound like a hammer striking the cylinder walls during driving and which adversely affects driving.				
Stopping	Run on ("Dieseling")	The condition in which the engine continues to run after the ignition switch is turned to OFF. Also called "Dieseling".				





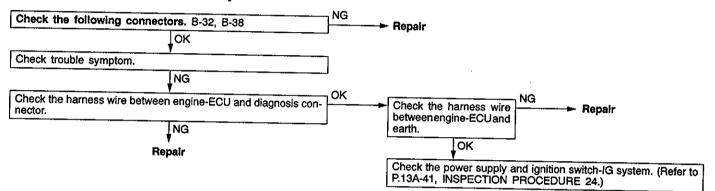
INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

INSPECTION PROCEDURE 1

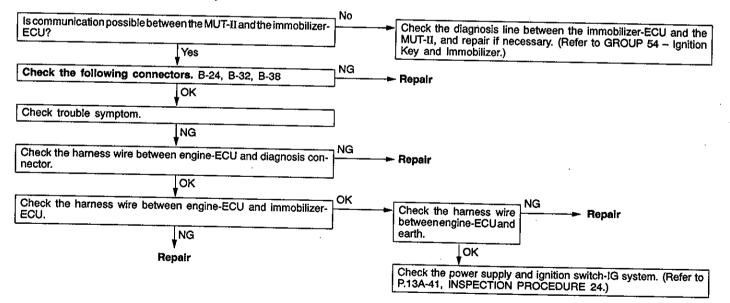


MUT-II communication with engine-ECU is impossible.	Probable cause
 One of the following causes may be suspected: No power supply to engine-ECU. Defective engine-ECU. Defective engine-ECU. Improper communication line between engine-ECU and MUT-II 	 <vehicles immobilizer="" system="" without=""></vehicles> Malfunction of engine-ECU power supply circuit Malfunction of engine-ECU Open circuit between engine-ECU and diagnosis connector <vehicles immobilizer="" system="" with=""></vehicles> Malfunction of engine-ECU power supply circuit Malfunction of engine-ECU Malfunction of engine-ECU Malfunction of immobilizer-ECU Malfunction of immobilizer-ECU Open circuit between immobilizer-ECU and diagnosis connector Open circuit between engine-ECU and immobilizer-ECU

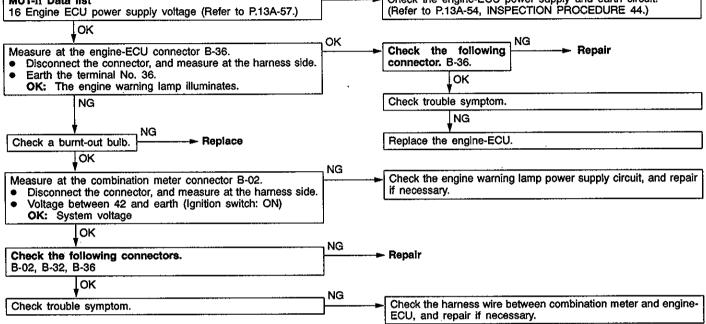
<Vehicles without immobilizer system>



<Vehicles with immobilizer system>



The engine warning lamp does not illuminate right after **Probable cause** the ignition switch is turned to the ON position. Because there is a burnt-out bulb, the engine-ECU causes the engine warning lamp • Burnt-out bulb to illuminate for five seconds immediately after the ignition switch is turned to ON. Defective warning lamp circuit • Malfunction of the engine-ECU If the engine warning lamp does not illuminate immediately after the ignition switch • is turned to ON, one of the malfunctions listed at right has probably occurred. NG MUT-II Data list Check the engine-ECU power supply and earth circuit.



INSPECTION PROCEDURE 4

The engine warning lamp remains illumination goes out.	ng and neve	r Probable cause
In cases such as the above, the cause is probably that the engine a problem in a sensor or actuator, or that one of the malfunctions occurred.		
MUT-II Self-Diag code Are diagnosis codes displayed?		fer to P.13A-11, INSPECTION CHART FOR DIAGNOSIS
No Measure at the combination meter connector B-02. Disconnect the connector, and measure at the harness side. Disconnect the engine-ECU connector Continuity between 53 and earth OK: No continuity		eck the harness wire between combination meter and engine- U connector, and repair if necessary.
ОК	•	

Replace the engine-ECU.

No initial combustion (starting impossible)			Probable cause
In cases such as the above, the cause is probably that a spar or that the supply of fuel to the combustion chamber is defec In addition, foreign materials (water, kerosene, etc.) may be n	ctive.		 Malfunction of the ignition system Malfunction of the fuel pump system Malfunction of the injectors Malfunction of the engine-ECU Malfunction of the immobilizer system <only immobilizer="" system="" vehicles="" with=""></only> Foreign materials in fuel
Charle hattan when an line	ר NG		
Check battery voltage when cranking. OK: 8 V or higher		Check	the battery. (Refer to GROUP 54 - Battery.)
Ток	J		
Is an immobilizer-ECU diagnosis code displayed? <only immobilizer="" system="" vehicles="" with=""></only>	Yes		the immobilizer. to GROUP 54 - Ignition Key and Immobilizer.)
No	-	<u> </u>	
MUT-II: Inspection of no initial combustion. (Refer to P.13-48, INSPECTION PROCEDURE 36.)]		
ок	-		
Can any sound be heard from the injectors when cranking?	NG }───►		the injector system. (Refer to P.13A-19, INSPECTION PRO-
ОК	-	CEDU	RE FOR DIAGNOSIS CODE 41.)
Ignition system: Inspection of no initial combustion. (Refer to P.13A-48, INSPECTION PROCEDURE 37.)]		
ок	-		
 Check the following items. Check the ignition coll, spark plugs, spark plug cables. (Re Check if the injectors are clogged. Check if foreign materials (water, alcohol, etc.) got into fuel 		JP 16 –	On-vehicle service.)

Check the compression pressure. Check the immobilizer system. (Refer to GROUP 54 – Ignition Key and Immobilizer.) <only vehicles with immobilizer system> ۲

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Initial combustion but no (starting impossible)	o complete combusti	ion		Probable cause	
In such cases as the above, the caus sparks but the sparks are weak, or	se is probably that the spark plu the initial mixture for starting	ugs are gener is not approp	rating priate.	 Malfunction of the ignition Malfunction of the injecto Foreign materials in fuel Poor compression Malfunction of the engine 	r system
Check battery voltage when crankir	ng.	NG	Check	the battery. (Refer to GROU	⊃ 54 – Battery.)
OK: 8 V or higher		L L			
lок					,
MUT-II: Check if uncompleted com (Refer to P.13A-49, INSPECTION F					
ОК		NG .			
Can any sound be heard from the	injectors when cranking?		Checkt	he injector system, (Refer to P.	13A-19, INSPECTION PRO-
OK			CEDUF	RE FOR DIAGNOSIS CODE	41.)
Is starting good if the engine is crank slightly depressed?	ed with the accelerator pedal	Yes		ISC servo for op-	Check the ISC servo sys- tem. (Refer to P.13A-46,
No		J		OK	INSPECTION PROCE- DURE 33.)
				an the throttle valve area. (Reck and adjust the fixed SAS	
t l		NG			
Check the ignition timing when cra OK: Approx. 5°BTDC	nking.		Check	that the distributor is installe	d properly.
OK	<	3			
Check the following items. Check the ignition coil, spark p Check if the injectors are clogg Check the compression pressu Check fuel lines for clogging. Check if foreign materials (water	ged. re. (Refer to GROUP 11A –	On-vehicle S			

In takes too long time to start. (Incorrect sta	arting)	Probable cause
In cases such as the above, the cause is probably that the spark is difficult, the initial mixture for starting is not appropriate, or su pressure is not being obtained.	k is weak and ignition ifficient compression	 Malfunction of the ignition system Malfunction of the injector system Inappropriate gasoline use Poor compression
Check battery voltage when cranking OK: 8 V or higher	NG	k the battery. (Refer to GROUP 54 - Battery.)
ОК		
MUT-II: Check if uncomplete combustion occurs. (Refer to P.13A-49, INSPECTION PROCEDURE 38.)]	
ок		
Can any sound be heard from the injectors when cranking?		k the injector system. (Refer to P.13A-19, INSPECTION PRO-
ок		JRE FOR DIAGNOSIS CODE 41.)
Check the ignition timing when cranking, OK: Approx. 5°BTDC	NG ► Chec	k that the distributor is installed properly.
ļок		
Check the following items. • Check the ignition coil, spark plugs, spark plug cables. (Re • Check if the injectors are clogged. • Check the compression pressure. (Befer to GBOUR 11A -		,

Check the compression pressure. (Refer to GROUP 11A – On-vehicle Service.)
 Check if foreign materials (water, alcohol, etc.) got into fuel.

Unstable idling (Rough idling, hunting)		Probable cause
In cases as the above, the cause is probably that the ignition syste idle speed control (ISC) or compression pressure is defective. Because the range of possible causes is broad, inspection is narro items.		 Malfunction of air-fuel ratio control system
	Yes	After warming-up, let the engine run at idling for 10 minutes.
Were the battery terminals disconnected?	>	After warming-up, let the engine full at tuning for 10 minutes.
No	- Yes	
MUT-II Self-Diag code Are diagnosis codes displayed?		Refer to P.13A-11, INSPECTION CHART FOR DIAGNOSIS CODES.
No	_ _ Yes	
Does idling speed fluctuate excessively?		Check if hunting occurs.
No	- _ NG	(Refer to P.13A-49, INSPECTION PROCEDURE 39.)
Check the ISC servo for operation sound. (Refer to P.13A-88.)] >	Check the ISC servo system. (Refer to P.13A-46, INSPECTION PROCEDURE 33.)
ок	_ NG	
Check the injector for operation sound.	>	Check the injector system. (Refer to P.13A-19, INSPECTION PRO- CEDURE FOR DIAGNOSIS CODE 41.)
Įок		
MUT-II: Check if idling speed is unstable. (Refer to P.13A-50, INSPECTION PROCEDURE 40.)		
ок	_ NG	
Check the ignition timing. (Refer to GROUP 11A - On-vehicle Service.)	}	Check that the distributor is installed properly.
ок		
 Check the following items. Check the ignition coil, spark plugs, spark plug cables. (Re Check the purge control system. (Refer to GROUP 17 - E Check the EGR control system. (Refer to GROUP 17 - E Check the compression pressure. (Refer to GROUP 11A - Check if foreign materials (water, alcohol, etc.) got into fue 	Emission Con mission Cont - On-vehicle	rol System.) rol System.)

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Idling speed is high. (Improper idling speed)		Probable cause
In such cases as the above, the cause is probably that the intak idling is too great.	e air volume	during	 Malfunction of the ISC servo system Malfunction of the throttle body
	_ Yes		
MUT-II Self-Diag code Are diagnosis codes displayed?	-	- Refer CODE	to P.13A-11, INSPECTION CHART FOR DIAGNOSIS S.
No	_ NG	·	
Check the ISC servo for operation sound. (Refer to P.13A-88.) OK]	- Check (Refer	the ISC servo system. to P.13A-46, INSPECTION PROCEDURE 33.)
MUT-II Data list	NG	- Check	the idle position switch system.
26 Idle position switch (Refer to P.13A-57.)	J		to P.13A-42, INSPECTION PROCEDURE 26.)
MUT-II Data list	NG	Check	the engine coolant temperature sensor system.
21 Engine coolant temperature sensor (Refer to P.13A-57.)]	(Refer	to P.13A-15, INSPECTION PROCEDURE FOR DIAGNOSIS
	– NG		
MUT-II Data list 28 A/C switch (Refer to P.13A-57.)			the A/C switch and A/C relay system. to P.13A-44, INSPECTION PROCEDURE 30.)
ОК	_		
Basic idle adjustment (Refer to P.13A-76.)]		
Check trouble symptom.	NG	Clean	the throttle valve area. (Refer to P.13A-75.)
······································		L	
		Check	and adjust the fixed SAS. (Refer to P.13A-76.)

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INSPECTION PROCEDURE 10

Idling speed is low. (Improper idling speed)			Probable cause
In cases such as the above, the cause is probably that the intak- idling is too small.	e air volume	during	 Malfunction of the ISC servo system Malfunction of the throttle body
MUT-II Self-Diag code Are diagnosis codes displayed? No Check the ISC servo for operation sound. (Refer to P.13A-88.) OK MUT-II Data list 26 Idle position switch (Refer to P.13A-57.) OK MUT-II Data list	Yes NG NG NG	CODE Check (Refer Check (Refer	the ISC servo system. to P.13A-46, INSPECTION PROCEDURE 33.) the idle position switch system. to P.13A-42, INSPECTION PROCEDURE 26.) the engine coolant temperature sensor system.
21 Engine coolant temperature sensor (Refer to P.13A-57.) OK MUT-II Data list	J 7 NG	CODE	to P.13A-15, INSPECTION PROCEDURE FOR DIAGNOSIS 21.) the ignition switch ST and inhibitor switch system .
29 Inhibitor switch (Refer to P.13A-57.) OK Basic idle adjustment (Refer to P.13A-76.)]		to P.13A-43, INSPECTION PROCEDURE 28.)
Check trouble symptom.]	Clean	the throttle valve area. (Refer to P.13A-75.)
		Check	and adjust the fixed SAS. (Refer to P.13A-76.)

When the engine is cold, it stalls at idling.	Die out)		Probable cause
In such cases as the above, the cause is probably that the air/fuel m when the engine is cold, or that the intake air volume is ins		opriate	 Malfunction of the ISC servo system Malfunction of the throttle body Malfunction of the injector system Malfunction of the ignition system
	Yes		
Were the battery terminals disconnected?	•	After v	varming-up, let the engine run at idling for 10 minutes.
No	_, Yes		·
MUT-II Self-Diag code Are diagnosis codes displayed?		Refer CODE	to P.13A-11, INSPECTION CHART FOR DIAGNOSIS S.
No			
Does the engine stall right after the accelerator pedal is released	? Yes		the throttle value Check and adjust the
No		area. (I	Refer to P.13A-75.) fixed SAS. (Refer to P.13A-76.)
*	No		
Is engine-idling stable after the warming-up?	>	- Check (Refer	if the unstable idling (Rough idling, hunting). to P.13A-31, INSPECTION PROCEDURE 8.)
Yes		Ļ	
Check the ISC servo for operation sound. (Refer to P.13A-88.	NG	Check	the ISC servo system.
ОК		(Refer	to P.13A-46, INSPECTION PROCEDURE 33.)
	NG		
Check the injector for operation sound.	_}►	- Check	the injector system. (Refer to P.13A-19, INSPECTION PRO- RE FOR DIAGNOSIS CODE 41.)
OK			
MUT-II Data list	NG	Check	the idle position switch system.
26 Idle position switch (Refer to P.13A-57.)			to P.13A-42, INSPECTION PROCEDURE 26.)
OK	NG		
MUT-II Data list 21 Engine coolant temperature sensor (Refer to P.13A-57.)		- Check (Refer CODE	the engine coolant temperature sensor system. toP.13A-15, INSPECTION PROCEDURE FOR DIAGNOSIS
OK			<u> </u>
MUT-II Actuator test	NG	Check	the EGR control solenoid valve system. (Refer to P.13A-47,
10 EGR control solenoid valve (Refer to P.13A-61.)		INSPE	CTION PROCEDURE 35.)
ОК			
Check the fuel pressure. (Refer to P.13A-78.)			
ок			
Check the ignition timing. (Refer to GROUP 11A - On-vehicle Service.)	NG	Check	that the distributor is installed properly.
ОК			
 Check the following items. Check the ignition coil, spark plugs, spark plug cables. (R Check the compression pressure. (Refer to GROUP 11A - Check the engine oil viscosity. 	efer to GROU - On-vehicle \$	JP 16 - Service.)	On-vehicle Service.)

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When the engine is hot, it stalls at idling. (Di	e out)	Probable cause
In such cases as the above, the cause is probably that ignition syste idle speed control (ISC) or compression pressure is defective. In addition, if the engine suddenly stalls, the cause may also be a contact.		 Malfunction of air-fuel ratio control system
	Yes	After warming-up, let the engine run at idling for 10 minutes.
Were the battery terminals disconnected?]₽	After warning-up, let the engine fun at fulling for to minutes.
Į No	, Yes	
MUT-II Self-Diag code Are diagnosis codes displayed?		Refer to P.13A-11, INSPECTION CHART FOR DIAGNOSIS CODES.
No	- NG	
Check the ISC servo for operation sound. (Refer to P.13A-88.)		Check the ISC servo system.
ОК		(Refer to P.13A-46, INSPECTION PROCEDURE 33.)
t de la constante de	NG	
Check the injector for operation sound.	►	Check the injector system. (Refer to P.13A-19, INSPECTION PRO-
ОК	_	CEDURE FOR DIAGNOSIS CODE 41.)
t de la construcción de la const	Vaa	
Does the engine stall right after the accelerator pedal is released?	} <mark>Yes</mark>	Clean the throttle valve Check and adjust the
No	-	area. (Refer to P.13A-75.) fixed SAS. (Refer to P.13A-76.)
	-, No	
Does the engine stall easily again?	}►	While carrying out an intermittent malfunction simulation test (Reference) to GROUP 00—Points to Note for Intermittent Malfunctions.), check
Yes		for sudden changes in the signals shown below.
MUT-II: Engine stalling inspection when the engine is warm and	ר	Crank angle sensor signal Primary and secondary Injector drive signal ignition signal
idling. (Refer to P.13A-51, INSPECTION PROCEDURE 41.)		 Fuel pump drive signal
ОК		Engine ECU power supply voltage
		voitage
¥	ר NG	Check that the distributor is installed properly.
Check the ignition timing. (Refer to GROUP 11A – On-vehicle Service.)		
lok		
Check the following items.		
 Check the ignition coil, spark plugs, spark plug cables. (Relation) 	efer to GROU	DUP 16 - On-vehicle Service.)
 Check if the injectors are clogged. Check the compression pressure. (Refer to GROUP 11A - 	- On-vehicle	Service.)
· Check if foreign materials (water, alcohol, etc.) got into fue	el.	

•

The engine stalls when starting the car	The engine stalls when starting the car. (Pass out)	
cases such as the above, the cause is probably misfiring due to a weak spark, r an inappropriate air/fuel mixture when the accelerator pedal is depressed.		 Drawing air into intake system Malfunction of the ignition system
MUT-II Self-Diag code Are diagnosis codes displayed?	Yes Refer CODE	to P.13A-11, INSPECTION CHART FOR DIAGNOSIS S.
MUT-II Actuator test 10 EGR control solenoid valve (Refer to P.13A-61.)	NG INSPE	the EGR control solenoid valve system. (Refer to P.13A-47, CTION PROCEDURE 35.)
 Check the following items. Check the ignition coil, spark plugs, spark plug cabl Check if air was drawn into the intake system. Broken intake manifold gasket Broken or disconnected vacuum hose Improper operation of the PCV valve Broken air intake hose 	es. (Refer to GROUP 16 -	On-vehicle Service.)

INSPECTION PROCEDURE 14

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The engine stalls when decelerating.	Probable cause
In cases such as the above, the cause is probably that the intake air volume is insufficient due to a defective idle speed control (ISC) servo system.	Malfunction of the ISC system

	_ Yes	
Were the battery terminals disconnected?	} ►	After warming-up, let the engine run at idling for 10 minutes.
No	_ ⊣Yes	
MUT-II Self-Diag code Are diagnosis codes displayed?	-	Refer to P.13A-11, INSPECTION CHART FOR DIAGNOSIS CODES.
Νο		· · ·
MUT-II Data list 26 Idle position switch (Refer to P.13A-57.)	NG ┣	Check the idle position switch system. (Refer to P.13A-42, INSPECTION PROCEDURE 26.)
ок		······································
MUT-II Data list 14 Throttle position sensor (Refer to P.13A-57.)	NG	Check the throttle position sensor system. (Refer to P.13A-14, IN- SPECTION PROCEDURE FOR DIAGNOSIS CODE 14.)
ок	-	
 MUT-II Data list 45 ISC servo position Is the idle speed control (ISC) servo position drops to 0-2 steps when decelerating (engine r/min less than 1,000)? 	Yes	Check the vehicle speed sensor system. (Refer to P.13A-17, IN- SPECTION PROCEDURE FOR DIAGNOSIS CODE 24.)
No		
MUT-II Actuator test 10 EGR control solenoid valve (Refer to P.13A-61.)	NG	Check the EGR control solenoid valve system. (Refer to P.13A-47, INSPECTION PROCEDURE 35.)
ОК	-	
Check the following items. • Check the ignition coil, spark plugs, spark plug cables. (Re	fer to GROU	P 16 - On-vehicle Service.)

Clean the throttle valve area.
Check and adjust the fixed SAS.

Hesitation, sag or stumble		Probable cause
In cases such as the above, the cause is probably that ignition syst or compression pressure is defective.	em, air/fuel mix	Malfunction of the ignition system Malfunction of air-fuel ratio control system Malfunction of the fuel supply system Malfunction of the EGR control solenoid valve system Poor compression
MUT-II Self-Diag code Are diagnosis codes displayed?		Refer to P.13A-11, INSPECTION CHART FOR DIAGNOSIS CODES.
No Check the injectors for operation sound.		Check the injector system. (Refer to P.13A-19, INSPECTION PRO-
OK	NG	CEDURE FOR DIÁGNOSIS CODE 41.)
Check the ignition timing. (Refer to GROUP 11A – On-vehicle Service.)] - [Check that the distributor is installed properly.
ок	<u> </u>	
MUT-II: Check if hesitation, sag, stumble or poor acceleration occur. (Refer to P.13A-52, INSPECTION PROCEDURE 42.)		
ок	_	
Check the fuel pressure. (Refer to P.13A-78.)		
ok		
Check the following items. Check the ignition coil, spark plugs, spark plug cables. (Re Check the EGR control system. (Refer to GROUP 17 - Er	efer to GROUI	2 16 – On-vehicle Service.) I System.)

- Check the compression pressure. (Refer to GROUP 11A On-vehicle Service.) Check the fuel filter or fuel line for clogging.
- •

INSPECTION PROCEDURE 16

The feeling of impact or vibration when accelerating	Probable cause
In cases such as the above, the cause is probably that there is an ignition leak accompanying the increase in the spark plug demand voltage during acceleration.	Malfunction of the ignition system

MUT-II Self-Diag code Are diagnosis codes displayed?	Yes Refer to P.13A-11, INSPECTION CHART FOR DIAGNOSIS CODES.
No	
Check the following items. • Check the ignition coil, spark plugs, spark plug cables • Check for occurrence of ignition leak	s. (Refer to GROUP 16 – On-vehicle Service.)

Check for occurrence of ignition leak.

The feeling of impact or vibration when dec	elerating	. Probable cause
Malfunction of the ISC system is suspected.		Malfunction of the ISC system
MUT-II Self-Diag code Are diagnosis codes displayed?	Yes	- Refer to P.13A-11, INSPECTION CHART FOR DIAGNOSIS CODES.
Check the ISC servo for operation sound. (Refer to P.13A-88.) OK MUT-II Data list 14 Throttle position sensor (Refer to P.13A-57.) OK	NG NG	Check the ISC servo system. (Refer to P.13A-46, INSPECTION PROCEDURE 33.) Check the throttle position sensor system. (Refer to P.13A-14, IN- SPECTION PROCEDURE FOR DIAGNOSIS CODE 14.)
MUT-II Data list 26 Idle position switch (Refer to P.13A-57.) OK	NG	Check the idle position switch system. (Refer to P.13A-42, INSPECTION PROCEDURE 26.)
Clean the throttle valve area. (Refer to P.13A-75.)]	
INSPECTION PROCEDURE 18		

Poor acceleration			Probable cause
Defective ignition system, abnormal air-fuel ratio, poor compres are suspected.		ə, etc.	 Malfunction of the ignition system Malfunction of air-fuel ratio control system Malfunction of the fuel supply system Poor compression pressure Clogged exhaust system
	ੇ Yes	r	
MUT-II Self-Diag code Are diagnosis codes displayed?		Refer CODE	to P.13A-11, INSPECTION CHART FOR DIAGNOSIS S.
No	- NG		
Check the injectors for operation sound.			the injector system. (Refer to P.13A-19, INSPECTION PRO-
ок	_	CEDUI	RE FOR DIAGNOSIS CODE 41.)
Check the ignition timing. (Refer to GROUP 11A – On-vehicle Service.)	NG	Check	that the distributor is installed properly.
ок	3		
MUT-II: Check if hesitation, sag, stumble or poor acceleration occur. (Refer to P.13A-52, INSPECTION PROCEDURE 42.)]		
Гок	5	•	
Check the fuel pressure. (Refer to P.13A-78.)]		
юк	-		
Check the following items. • Check the ignition coil, spark plugs, spark plug cables. (Re • Check the compression pressure. (Refer to GROUP 11A – • Check the fuel filter or fuel line for clogging. • Broken air intake hose • Clogged air cleaner	fer to GROU On-vehicle S	P 16 – ervice.)	On-vehicle Service.)

L

Clogged air cleaner

Surge		Probable cause
Defective ignition system, abnormal air-fuel ratio, etc. are	suspected.	 Malfunction of the ignition system Malfunction of air-fuel ratio control system Malfunction of the EGR control solenoid valve system
MUT-II Self-Diag code Are diagnosis codes displayed?	Yes	to P.13A-11, INSPECTION CHART FOR DIAGNOSIS
No Check the injectors for operation sound.		k the injector system. (Refer to P.13A-19, INSPECTION PRO- JRE FOR DIAGNOSIS CODE 41.)
Check the ignition timing. (Refer to GROUP 11A - On-vehicle Service.)	NG ►Chec	k that the distributor is installed properly.
MUT-II: Check if surge occurs. (Refer to P.13-53, INSPECTION PROCEDURE 43.)		
Check the fuel pressure. (Refer to P.13A-78.)	`	
Check the following items. • Check the ignition coil, spark plugs, spark plug cables. • Check the EGR control system. (Refer to GROUP 17	. (Refer to GROUP 16 Emission Control Sys	– On-vehicle Service.) stem.)

INSPECTION PROCEDURE 20

Knocking	Probable cause
In cases as the above, the cause is probably that the detonation control is defective or the heat value of the spark plug is inappropriate.	 Inappropriate heat value of the spark plug

Check the following items.

•

Spark plugs Check if foreign materials (water, alcohol, etc.) got into fuel.

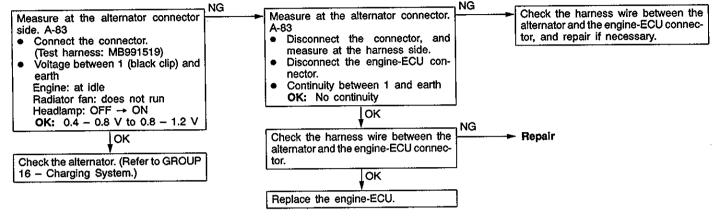
INSPECTION PROCEDURE 21

Dieseling	Probable cause
Fuel leakage from injectors is suspected.	Fuel leakage from injectors

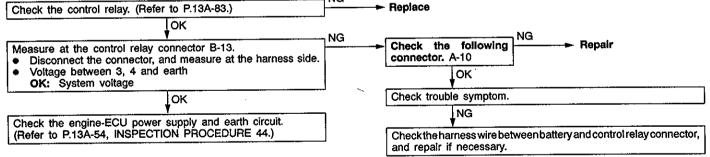
Check the injectors for fuel leakage.

Too high CO and HC concentration when id	ling		Probable cause
Abnormal air-fuel ratio is suspected.			 Malfunction of the air-fuel ratio control system Deteriorated catalyst
	_ Yes		
MUT-II Self-Diag code Are diagnosis codes displayed?		Refer	to P.13A-11, INSPECTION CHART FOR DIAGNOSIS S.
No			· · · · · · · · · · · · · · · · · · ·
Check the ignition timing. (Refer to GROUP 11A – On-vehicle Service.)		- Check	that the distributor is installed properly.
ок	 NG		
MUT-II Data list 21 Engine coolant temperature sensor. (Refer to P.13A-57.)		(Refert	the engine coolant temperature sensor system. toP.13A-15, INSPECTION PROCEDURE FOR DIAGNOSIS
ОК	_	CODE	21.)
*	- NG	<u> </u>	
MUT-II Data list 13 Intake air temperature sensor (Refer to P.13A-57.)		Checki INSPE	the intake air temperature sensor system. (Refer to P.13A-13, CTION PROCEDURE FOR DIAGNOSIS CODE 13.)
OK			
MUT-II Data list	<u>ר NG</u>	Check	the oxygen sensor (rear) system. (Refer to P.13A-21, IN-
 59 Oxygen sensor (rear) (Refer to P.13A-57.) Transmission: 2nd gear <m t="">, Ł range </m> Driving with throttle widely open OK: 600 - 1,000 mV 		SPECT	TION PROCEDURE FOR DIAGNOSIS CODE 59.)
ок			
MUT-II Data list 11 Oxygen sensor (front) (Refer to P.13A-57.) OK: 600 – 1000 mV when racing suddenly	NG	Check SPECT	the oxygen sensor (front) system. (Refer to P.13A-12, IN- ION PROCEDURE FOR DIAGNOSIS CODE 11.)
Lock			
MUT-II Data list	∩ к		e the oxygen sensor.
11 Oxygen sensor (front) (Refer to P.13A-57.) OK: Repeat 0 400 mV and 600 1,000 mV alternately when		L	
idling.		Check	trouble symptom.
NG			NG
Check the fuel pressure. (Refer to P.13A-78.)	7		
ОК			
 Check the following items. Check the injectors for operation sound. Check the injectors for fuel leakage. Check the ignition coil, spark plugs, spark plug cables. (Refer the compression pressure. (Refer to GROUP 11A Check the positive crankcase ventilation system. (Refer to Check the purge control system. (Refer to GROUP 17 - E Check the EGR control system. (Refer to GROUP 17 - E 	On-vehic GROUP mission (ile Service.) 17 – Emissi Control Syste	on Control System.)
		<u> </u>	
Check the trouble symptom.]		
NG	-		
Replace the catalytic converter.	1		

Low alternator output voltage (approx. 12.3 V)	Probable cause
The alternator may be defective, or malfunctions, which are listed in the right column, may be suspected.	 Malfunction of charging system (Refer to GROUP 16 — Charging System.) Short circuit in harness between alternator G terminal and engine-ECU Malfunction of engine-ECU



Power supply system and ignition switch-IG system	Probable cause
When an ignition switch ON signal is input to the engine-ECU, the engine-ECU turns the control relay ON. This causes battery voltage to be supplied to the engine-ECU, injectors and air flow sensor.	 Malfunction of the ignition switch Malfunction of the control relay Improper connector contact, open circuit or short-circuited harness wire Disconnected engine-ECU earth wire Malfunction of the engine-ECU

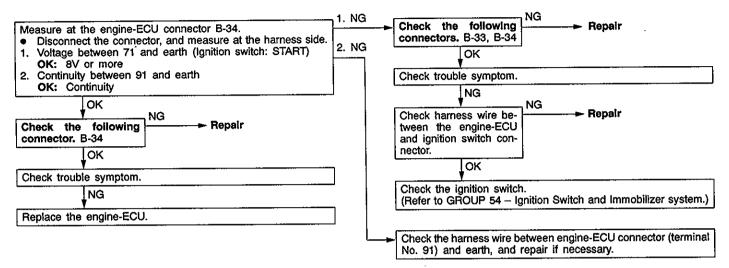


Fuel pump system	Probable cause
The engine-ECU turns the fuel pump relay ON when the engine is a and this supplies power to drive the fuel pump.	 Malfunction of the fuel pump relay Malfunction of the fuel pump Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU
Check the fuel pump operation. (Refer to P.13A-81.)	NG Check the fuel pump circuit. (Refer to P.13A-54, INSPECTION PROCEDURE 45.)
Check the fuel pump relay. (Refer to P.13A-83.)	NG ────► Replace
OK Measure at the fuel pump relay connector B-12.	NG Check the fuel pump drive control circuit.
 Connect the connector. Voltage between 1 and earth MUT-II Actuator test: Fuel pump drive OK: System voltage 	(Refer to P.13A-55, INSPECTION PROCEDURE 46.)
ОК	,
Check the harness wire between fuel pump relay connector and fuel pump drive terminal, and repair if necessary.	

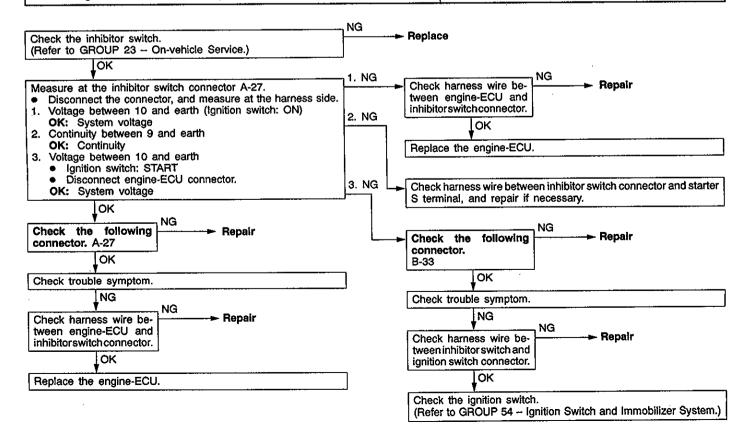
Idle position switch system	Probable cause			
The idle position switch inputs the condition of the accelerator pedal, i.e. whether it is depressed or released (HIGH/LOW), to the engine-ECU. The engine-ECU controls the idle speed control servo-based on this input.	 Maladjustment of the accelerator pedal Maladjustment of the fixed SAS Maladjustment of the idle position switch and throttle position sensor Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU 			

Check the idle position switch. (Refer to P.13A-84.)	G	SOL
ОК		
Measure at the throttle position sensor connector A-05. Disconnect the connector, and measure at the harness side. Voltage between 3 and earth (Ignition switch: ON) OK: 4 V or higher	G Check the following OK	Repair
 Continuity between 4 and earth OK: Continuity 	Check trouble symptom.	
ок	NG	
Check the following Repair	Check the harness wire between e sensor connector.	ngine-ECU and throttle position
 ок	ОК	NG
Check trouble symptom.	Replace the engine-ECU.	Repair
NG		
Replace the engine-ECU.		

Ignition switch-ST system <m t=""></m>	Probable cause			
The ignition switch-ST inputs a HIGH signal to the engine-ECU while the engine is cranking.	 Malfunction of ignition switch Improper connector contact, open circuit or			
The engine-ECU controls fuel injection, etc. during starting based on this input.	short-circuited harness wire Malfunction of the engine-ECU			



Ignition switch-ST and inhibitor switch system 	Probable cause
 The ignition switch-ST inputs a HIGH signal to the engine-ECU while the engine is cranking. The engine-ECU controls fuel injection, etc. during starting based on this input. The inhibitor switch inputs the condition of the select lever, i.e. whether it is in P or N range or in some other range, to the engine-ECU. The engine-ECU controls the idle speed control (ISC) servo based on this input. 	 Malfunction of ignition switch Malfunction of inhibitor switch Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU.



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Power steering fluid pressure switch system	n	Probable cause		
The presence or absence of power steering load is input to the engine-ECU. The engine-ECU controls the idle speed control (ISC) servo based on this input.		 Malfunction of power steering fluid pressure switch Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU 		
Check the power steering fluid pressure switch. (Refer to GROUP 37A – On-vehicle Service.) OK Measure at the power steering fluid pressure switch connector A-78. • Disconnect the connector, and measure at the harness side. • Voltage between 1 and earth (Ignition switch: ON) OK: System voltage OK Check the following connector. A-78 OK Check trouble symptom. NG Replace the engine-ECU.	Che Che twe pow sure	NG NG NG NG NG NG NG NG NG NG		
INSPECTION PROCEDURE 30 A/C switch and A/C relay system		Probable cause		
When an A/C ON signal is input to the engine-ECU, the engin control of the idle speed control (ISC) servo, and also operates the magnetic clutch.	ne-ECU carries ou ne A/C compresso	Malfunction of A/C control system		
Check the A/C compressor relay. (Refer to GROUP 55 – On-vehicle Service.) OK Measure at the engine-ECU connectors B-36, B-37. Disconnect the connectors, and measure at the harness side. <vehicles immobilizer="" system="" without=""> Voltage between 22 and earth, and 45 and earth (Ignition switch: ON, A/C switch: ON) OK: System voltage Short circuit between 22 and earth (Ignition switch: ON, A/C switch: ON) OK: A/C compressor clutch turns on. <vehicles immobilizer="" system="" with=""> Voltage between 8 and earth, and 45 and earth (Ignition switch: ON, A/C switch: ON) OK: System voltage Short circuit between 8 and earth (Ignition switch: ON, A/C switch: ON) OK: System voltage Short circuit between 8 and earth (Ignition switch: ON, A/C switch: ON) OK: A/C compressor clutch turns on.</vehicles></vehicles>	OK Che con Che	ace ck the A/C system. (Refer to GROUP 55 – On-vehicle Service.) ck the following NG Ck trouble symptom. ↓ NG ace the engine-ECU.		

Measure at the engine-ECU connector B-37. Disconnect the connector, and measure at the harness side. Voltage between 20 and earth, and 21 and earth (Ignition switch: ON) OK: System voltage Short circuit between 20 and earth (Ignition switch: ON) OK: Condenser fan runs. Short circuit between 21 and earth (Ignition switch: ON) OK: Radiator fan runs.	Fan motor relay system (Radiator fan, A/C cor	Probable cause			
Measure at the engine-ECU connector B-37. Disconnect the connector, and measure at the harness side. Voltage between 20 and earth, and 21 and earth (Ignition switch: ON) OK: System voltage Short circuit between 20 and earth (Ignition switch: ON) OK: Condenser fan runs. Short circuit between 21 and earth (Ignition switch: ON) OK: Radiator fan runs.			 Malfunction of fan motor relay Malfunction of fan motor Improper connector contact, open circuit or short-circuited harness wire 		
	 Measure at the engine-ECU connector B-37. Disconnect the connector, and measure at the harness side. Voltage between 20 and earth, and 21 and earth (Ignition switch: ON) OK: System voltage Short circuit between 20 and earth (Ignition switch: ON) OK: Condenser fan runs. Short circuit between 21 and earth (Ignition switch: ON) 	Check	K the following► Repairactor. B-37OKOKNG		

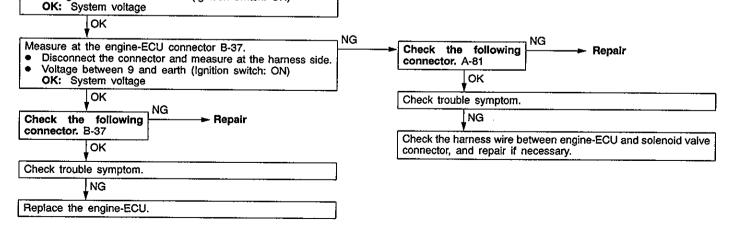
- Check the A/C condenser fan circuit. (Refer to Electrical Wiring.) ٠

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Ignition circuit system		Probable cause
The engine-ECU interrupts the ignition coil primary current by turning the power transistor inside the engine-ECU ON and OFF.		 Malfunction of ignition switch Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU
Measure at the distributor connector A-68. Disconnect the connector and measure at the harness side. Voltage between 1 and earth (Ignition switch: ON) OK: System voltage Continuity OK Check ignition coil and power transistor unit circuit. (Refer to P.13A-56, INSPECTION PROCEDURE 49.)	2. NG Chec betwu ignitic Chec (Refe	k the following ectors. B-32, B-70 NG OK OK k trouble symptom. NG NG NG k the harness wire een distributor and on switch connector. NG OK OK k the ignition switch. OK er to GROUP 54 – Ignition Switch and Immobilizer System.)
		k the harness wire between distributor connector and earth, repair if necessary.

Idle speed control (ISC) servo (Stepper mot	Probable cause			
The engine-ECU controls the intake air volume during idling by the servo valve located in the bypass air passage.	sing Malfunction of ISC servo Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU 			
Check the ISC servo (Refer to P.13A-88.) OK Measure at the ISC servo connector A-56. Disconnect the connector and measure at the harness side. Voltage between 2 and earth, and 5 and earth	- NG	Check the harness wire between control relay and ISC servo con- tector, and repair if necessary.		
(Ignition switch: ON) OK: System voltage				
ок				
 Measure at the engine-ECU connector B-37. Disconnect the connector, measure at the harness side. Voltage between each of 4, 5, 17, 18 and earth (Ignition switch: ON) 	1 10	Check the following NG connector. A-56		
OK: System voltage		Check trouble symptom.		
OK NG	_	NG		
Check the following Repair connector. B-37	((heck harness wire between engine-ECU and ISC servo connector, nd repair if necessary.		
Check trouble symptom.	_NG ▶──►	leplace the engine-ECU.		
NSPECTION PROCEDURE 34	J (
Purge control solenoid valve system		Probable cause		
The purge control solenoid valve controls the purging of air from inside the intake manifold.	the canister loca	 Malfunction of solenoid valve Improper connector contact, open circuit or short-circuited harness wire. Malfunction of the engine-ECU 		
	– NG			
Check the purge control solenoid valve. (Refer to GROUP 17 - Emission Control System.)		eplace		
ОК				
 Measure at the purge control solenoid valve connector A-81. Disconnect the connector and measure at the harness side. Voltage between 2 and earth (Ignition switch: ON) 	NG Check the harness wire between control relay and solenoid v connector, and repair if necessary.			



EGR control solenoid valve system		Probable cause
The EGR control solenoid valve is controlled by the negative pres EGR operation leaking to port "A" of the throttle body.	ssure resulting	from Malfunction of solenoid valve Improper connector contact, open circuit or short-circuited harness wire. Malfunction of the engine-ECU
Check the EGR control solenoid valve. (Refer to GROUP 17 – Emission Control System.)	NG NG	Replace Check the harness wire between control relay and solenoid valve
Measure at the EGR control solenoid valve connector A-88. Disconnect the connector and measure at the harness side. Voltage between 1 and earth (Ignition switch: ON) OK: System voltage OK	NG	connector, and repair if necessary.
 Measure at the engine-ECU connector B-37. Disconnect the connector and measure at the harness side. Voltage between 6 and earth (Ignition switch: ON) OK: System voltage 		Check the following → Repair connector. A-88
OK NG		Check trouble symptom.
Check the following Repair		NG
OK		Check the harness wire between engine-ECU and solenoid valve connector, and repair if necessary.
Check trouble symptom.]	
NG		
Replace the engine-ECU.]	

MUT-II: Inspection of no initial combustion

MUT-II Data list 16 Voltage of engine-ECU power source (Refer to P.13A-57.)	NG	- Check the power supply and ignition switch-IG system. (Refer to P.13A-41, INSPECTION PROCEDURE 24.)
OK Does the camshaft rotate at the engine cranking? (When oil filler cap is removed.)	No	Check timing belt for breakage.
Yes	- - Yes	
MUT-II Self-Diag code Are diagnosis codes displayed?		Refer to P.13A-11, INSPECTION CHART FOR DIAGNOSIS CODES.
No	 No	
MUT-II Data list 22 Crank angle sensor OK: Cranking speed is displayed.		Check the crank angle sensor system. (Referto P.13A-16, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 22.)
ОК	_ _ NG	
MUT-II Actuator test 07 Fuel pump (Refer to P.13A-61.)		Check the fuel pump system. (Refer to P.13A-42, INSPECTION PROCEDURE 25.)
ок	– – NG	
MUT-II Data list 21 Engine coolant temperature sensor (Refer to P.13A-57.)]	Check the engine coolant temperature sensor system. (Referto P.13A-15, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)

INSPECTION PROCEDURE 37

Ignition system: Inspection of no initial combustion. Does the engine tachometer display the cranking speed? • Set the tachometer of primary voltage detection type. • OK OK Check the ignition timing when cranking. • OK: OK: • OK:

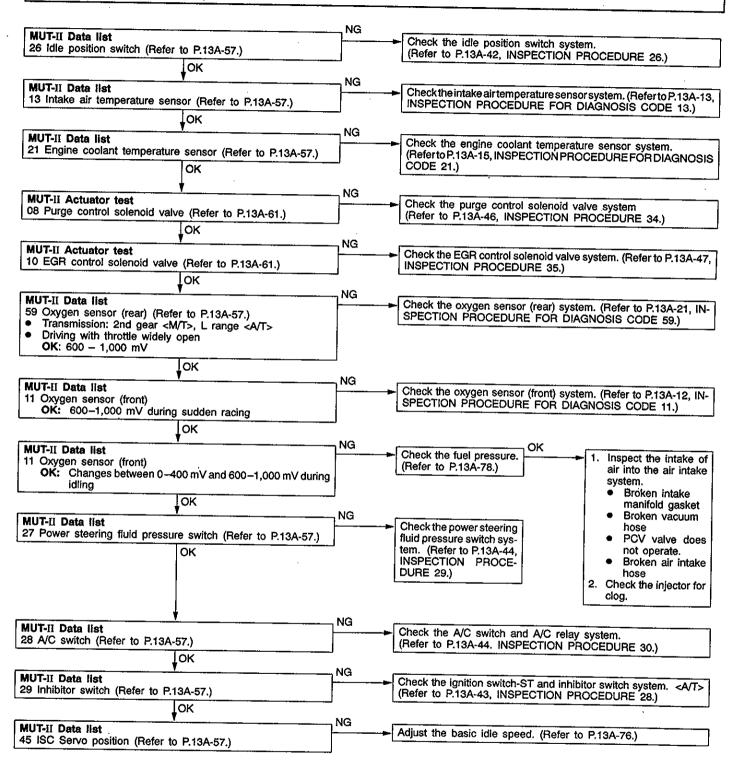
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INSPECTION PROCEDURE 38

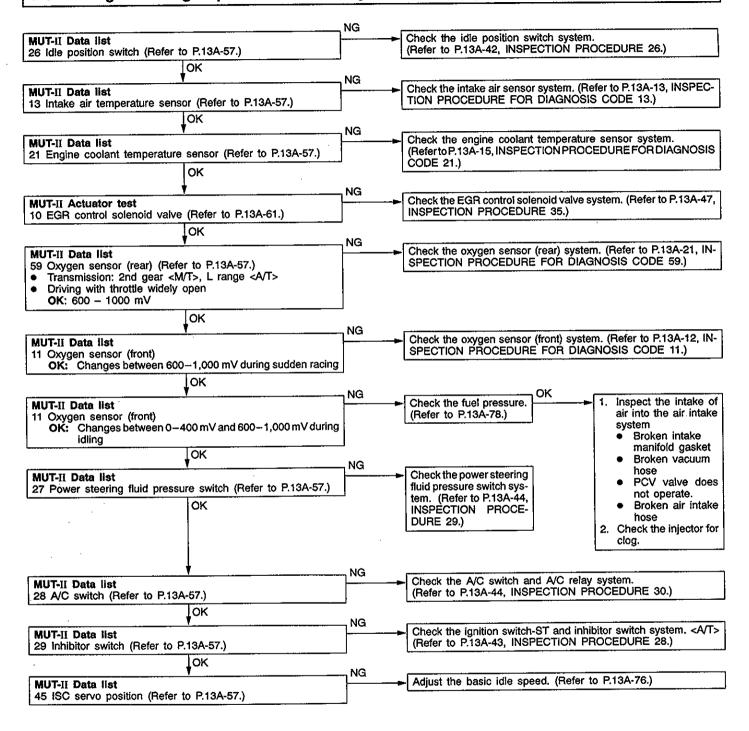
MUT-II: Check if uncomplete combustion occurs. Yes Refer to P.13A-11, INSPECTION CHART FOR DIAGNOSIS CODE MUT-II Self-Diag code Are diagnosis codes displayed? No NG Check the fuel pump system. (Refer to P.13A-42, INSPECTION PROCEDURE 25.) MUT-II Actuator test 07 Fuel pump (Refer to P.13A-61.) OK Check the engine coolant temperature sensor system. (Refer to P.13A-15, INSPECTION PROCEDURES FOR DIAGNO-SIS CODE 21.) NG MUT-II Data list 21 Engine coolant temperature sensor (Refer to P.13A-57.) OK NG Check the ignition switch-ST system <M/T>. (Refer to P.13A-43, INSPECTION PROCEDURE 27.) **MUT-II Data list** 18 Ignition switch-ST (Refer to P.13A-57.) Check the Ignition switch-ST and inhibitor switch system <A/T>. (Refer to P.13A-43, INSPECTION PROCEDURE 28.)

Check if hunting occurs.		
Clean the throttle body. (Re	efer to P.13A-75.)	
Clean the thouse body. ().		
Check and adjust the fixed	I SAS. (Refer to P.13A-76.)	
Check trouble symptom.		
	NG	
Inspect the intake of air in Broken intake manifold Broken air intake hose Broken vacuum hose Positive crankcase ven	gasket	

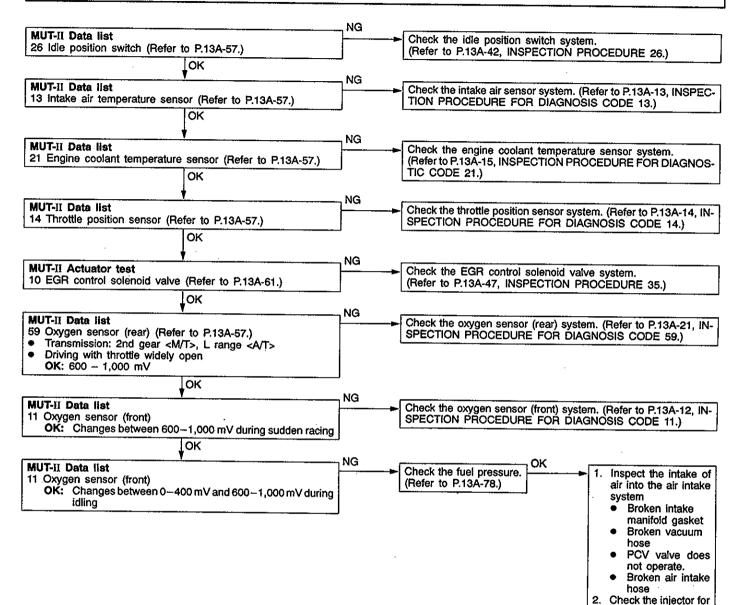
MUT-II: Check if idling speed is unstable.



MUT-II: Engine stalling inspection when the engine is warmed up and idling.

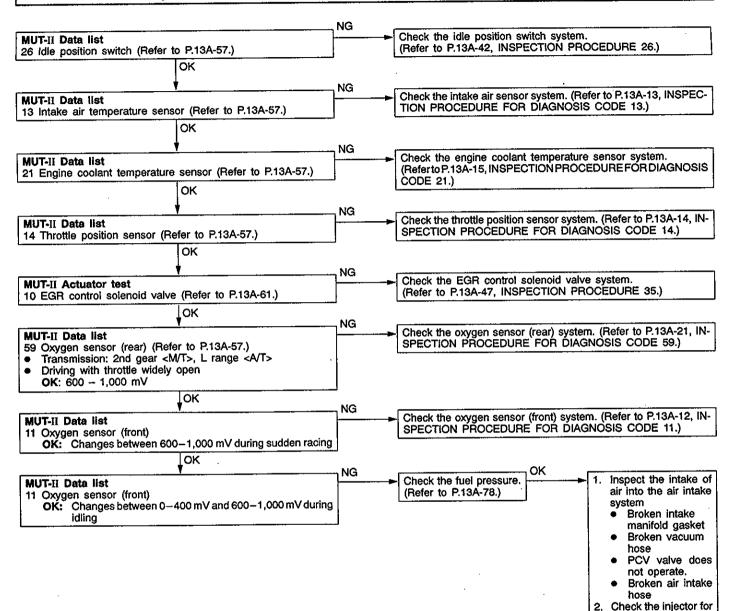


MUT-II: Check if hesitation, sug, stumble or poor acceleration occurs.



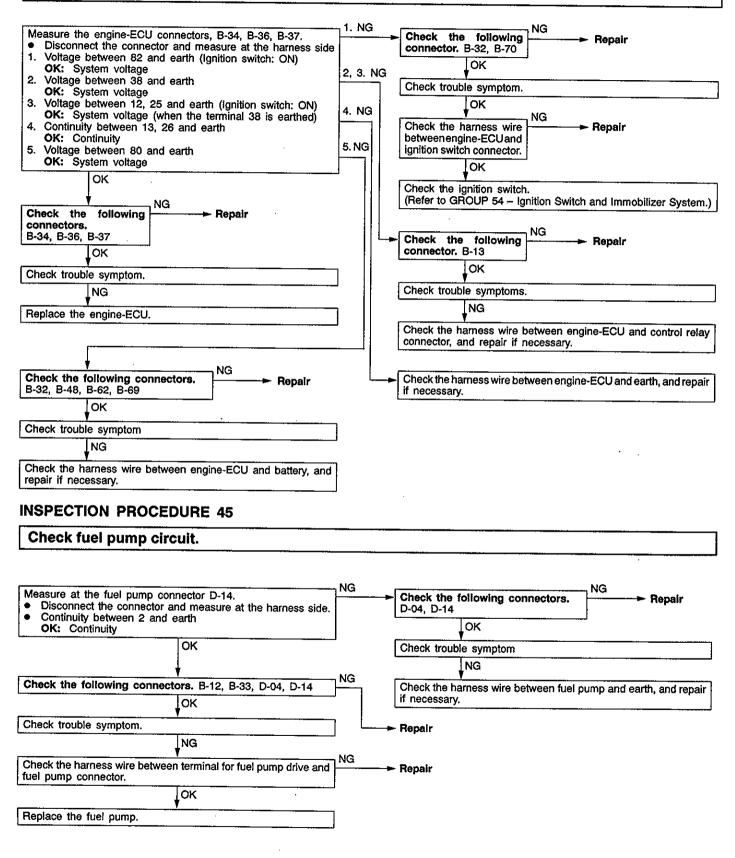
clog.

MUT-II Check if surge occurs.

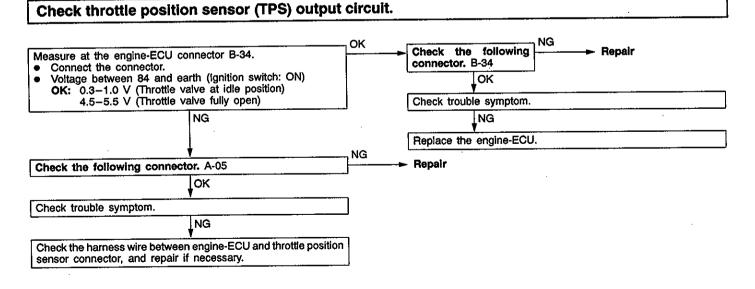


clog.

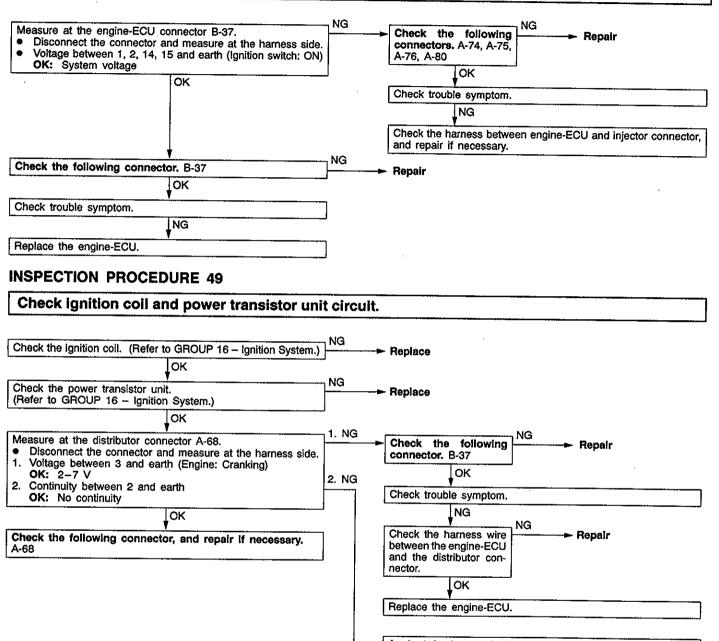
Check the engine-ECU power supply and earth circuit.



Check the fuel pump drive control circuit. NG NĠ Check the following Repair Measure at the fuel pump relay connector B-12. connectors. B-32, B-70 Disconnect the connector and measure at the harness side. Voltage between 4 and earth (Ignition switch: ON) OK • OK: System voltage Check trouble symptom. OK NG NG Measure at the engine-ECU connector B-37. NG Disconnect the connector and measure at the harness side. Check the harness wire Repair <Vehicles without immobilizer system> between fuel pump relay Voltage between 8 and earth (Ignition switch: ON) and ignition switch con-٠ OK: System voltage nector. <Vehicles with immobilizer system> OK Voltage between 22 and earth (Ignition switch: ON) OK: System voltage Check the ignition switch. (Refer to GROUP 54 – Ignition Switch and Immobilizer System.) OK NG - Repair Check the following connector. B-12 OK Check trouble symptom. NG Check the harness wire between engine-ECU and fuel pump relay connector, and repair if necessary. NG Check the following connector. B-37 Repair OK Check trouble symptom. NG Replace the engine-ECU.



Check injector control circuit



 As short circuit occurs between power transistor unit and combination meter (tachometer), check the harness wire, and repair if necessary.

DATA LIST REFERENCE TABLE

13100890098

Caution

When shifting the select lever to D range, the brakes should be applied so that the vehicle does not move forward.

NOTE

- *1. The idle position switch normally turns off when the voltage of the throttle position sensor is 50–100 mV higher than the voltage at the idle position. If the throttle position switch turns back on after the throttle position sensor voltage has risen by 100 mV and the throttle valve has opened, the idle position switch and the throttle position sensor need to be adjusted.
- *2: In a new vehicle [driven approximately 500 km or less], the air intake plenum pressure is sometimes 10% higher than the standard pressure.
- *3. The injector drive time represents the time when the cranking speed is at 250 r/min or below when the power supply voltage is 11 V.
- *4. In a new vehicle [driven approximately 500 km or less], the injector drive time is sometimes 10% longer than the standard time.
- *5. In a new vehicle [driven approximately 500 km or less], the step of the stepper motor is sometimes 30 steps greater than the standard value.

ltem No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
11	Oxygen sensor -(front)	ensor warmed up ront) Air/fuel mixture is	When at 4,000 r/min, engine is suddenly decelerated	200 mV or less	Code No. 11	13A-12
		made leaner when de- celerating, and is made richer when racing.	When engine is suddenly raced	600-1,000 mV		
		Engine:After having warmed up The oxygen sensor signal is used to check	Engine is idling	400 mV or less (Changes) 600-1,000 mV		
	the air/fuel mixture ratio, and control condition is also checked by the ECU.	2,500 r/min				
13	Intake air temperature sensor		When intake air temperature is –20°C	20°C	Code No. 13	13A-13
		When intake air temperature is 0°C	0°C			
			When intake air temperature is 20°C	20°C		
		When intake air temperature is 40°C	40°C	_		
		When intake air temperature is 80°C	80°C			
14	Throttle	Ignition switch: ON	Set to idle position	300-1,000 mV	Code No.	13A-14
	position sensor	Gradually open	Increases in proportion to throttle opening angle			
			Open fully		4,500-5,500 mV	

13A-58

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ltem No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
16	Power supply voltage	Ignition switch: ON		System voltage	Procedure No. 24	13A-41
18	Cranking signal (ignition	Ignition switch: ON	Engine: Stopped	OFF	Procedure No. 27 <m t=""></m>	13A-43 <m t=""> 13A-43</m>
	switch-ST)		Engine: Cranking	ON	Procedure No. 28 	
21	Engine coolant temperature sensor	Ignition switch: ON or with engine running	When engine coolant temperature is –20°C	20°C	Code No. 21	13A-15
:	361301		When engine coolant temperature is 0°C	0°C		
			When engine coolant temperature is 20°C	20°C		
			When engine coolant temperature is 40°C	40°C		-
			When engine coolant temperature is 80°C	80°C		
22	Crank angle sensor	 Engine: Cranking Tachometer: Connected 	Compare the engine speed readings on the tachometer and the MUT-II.	Accord	Code No. 22	13A-16
		 Engine: Idling Idle position switch: ON 	When engine coolant temperature is20°C	1,475–1,675 rpm		
			When engine coolant temperature is 0°C	1,345–1,545 rpm		
			When engine coolant temperature is 20°C	1,300–1,500 rpm		
			When engine coolant temperature is 40°C	1,1601,360 rpm		
			When engine coolant temperature is 80°C	650–850 rpm		

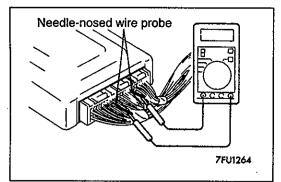
ltem No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
26	Idle position switch	Ignition switch: ON Check by operating	Throttle valve: Set to idle position	ON	Procedure No. 26	13A-42
	repeatedly	accelerator pedal repeatedly Throttle valve: OFF*1 Slightly open	OFF*1			
27	Power steering fluid	Engine: Idling	Steering wheel stationary	OFF	Procedure No. 29	13A-44
	pressure switch		Steering wheel turning	ON		
28	A/C switch	Engine: Idling (when A/C switch is	A/C switch: OFF	OFF	Procedure No. 30	13A-44
		ON, A/C compressor should be operating.)	A/C switch: ON	ON		
29	Inhibitor switch	Ignition switch: ON	P or N	P or N	Procedure No. 28	13A-43
			D, 2, L or R	D, 2, L or R		
32	Vacuum sensor*2	 Engine coolant temperature: 80 – 95°C 	Engine: Stopped (At altitude of 0 m)	101 kPa	Code No. 32	13A-18
	 Lamps, ele cooling fan ar accessories: Transmission: 	• Lamps, electric cooling fan and all	Engine: Stopped (At altitude of 600 m)	95 kPa	_	
		 Transmission: Neutral (P range 	Engine: Stopped (At altitude of 1,200 m)	88 kPa		
		for A/T) Ignition switch: ON	Engine: Stopped (At altitude of 1,800 m)	81 kPa		
			Engine: Idling	24.3 - 37.7 kPa		
			When engine is sud- denly raced	Increases		
36	Ignition tim- ing adjust- ment mode	Engine: Idling	Ignition timing ad- justment terminal is earthed	ON	Code No. 36	13A-19
·			Ignition timing ad- justment terminal is disconnected from earth	OFF		
41	Injectors *3	Engine: Cranking	When engine coolant temperature is 0°C (injection is carried out for all cylinders simultaneously)	19–29 ms	_	-
			When engine coolant temperature is 20°C	39–59 ms		
			When engine coolant temperature is 80°C	8.8-13.2 ms		

ltem No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
41	Injectors*4	 Engine coolant temperature: 80–95°C 	Engine is idling	1.7-2.9 ms		-
		 Lamps, electric cooling fan and all accessories: OFF 	2,500 r/min	1.4-2.6 ms		
		Transmission: Neutral (A/T : P range)	When engine is suddenly raced	Increases		
44	Ignition coils and power transistors	 Engine: After having warmed up Timing lamp is set. (The timing lamp is 	Engine is idling	2-18 °BTDC	-	-
		(The timing lamp is set in order to check actual ignition timing.)	2,500 r/min	25-45 °BTDC		
45	ISC (stepper) motor position *5	 Engine coolant temperature: 80–95°C Lamps, electric 	A/C switch: OFF	2–25 STEP		-
		 cooling fan and all accessories: OFF Transmission: Neu- tral (A/T : P range) 	A/C switch: OFF → ON	Increases by 1070 steps		
		 Idle position switch: ON Engine: Idling When A/C switch is ON, A/C compressor should be operating 	 A/C switch: OFF Select lever: N range → D range 	Increases by 5–50 steps		
49	A/C relay	Engine: After having warmed up/Engine is idling	A/C switch: OFF	OFF (Compressor clutch is not operating)	Procedure No. 30	13A-44
			A/C switch: ON	ON (Compressor clutch is operating)		
59	Oxygen sensor (rear)	 Transmission: 2nd gear <m t="">, L range </m> Drive with throttle widely open 	3,500 r/min	600 – 1,000 mV	Code No. 59	13A-21

ACTUATOR TEST REFERENCE TABLE

ltem No.	Inspection item	Drive contents	Inspection	contents	Normal condition	Inspection procedure No.	Reference page
01	Injectors	Cut fuel to No. 1 injector	Engine: After having wa gine is idling	armed up/En-	Idling condition becomes different (becomes unsta- ble).	Code No. 41	13A-19
02		Cut fuel to No. 2 injector	(Cut the fuel s injector in turn	and check			
03		Cut fuel to No. 3 injector	cylinders which idling.)	n don't affect			i
04		Cut fuel to No. 4 injector					
07	Fuel pump	Fuel pump operates and fuel is recircu- lated.	 Engine: Cranking Fuel pump: Forced driving Inspect 	Pinch the return hose with fingers to feel the pulse of the fuel being recirculated.	Pulse is felt.	Procedure No. 25	13A-42
			according to both the above condi- tions.	Listen near the fuel tank for the sound of fuel pump operation.	Sound of operation is heard.		
08	Purge control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON		Sound of operation can be heard when solenoid valve is driven.	Procedure No. 34	13A-46
10	EGR control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON		Sound of operation can be heard when solenoid valve is driven.	Procedure No. 35	13A-47
20	Condenser fan	Drive the fan motors (condenser)	 Ignition switch: ON A/C switch: ON 		Fan motor runs	Procedure No. 31	13A-45
21	Radiator fan	Drive the fan motors (radia- tor)	 Ignition sw 	vitch: ON	Fan motor runs	Procedure No. 31	13A-45

13100900128



CHECK AT THE ENGINE-ECU TERMINALS

13100920094

TERMINAL VOLTAGE CHECK CHART

- Connect a needle-nosed wire probe (test harness: MB991223 or paper clip) to a voltmeter probe.
 Insert the needle-nosed wire probe into each of the
- 2. Insert the needle-nosed wire probe into each of the engine-ECU connector terminals from the wire side, and measure the voltage while referring to the check chart.

NOTE

- 1. Make the voltage measurement with the engine-ECU connectors connected.
- 2. You may find it convenient to pull out the engine-ECU to make it easier to reach the connector terminals.
- 3. The checks can be carried out off the order given in the chart.

Caution

Short-circuiting the positive (+) probe between a connector terminal and earth could damage the vehicle wiring, the sensor, engine-ECU or all of them. Be careful to prevent this!

- 3. If voltmeter shows any division from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
- 4. After repair or replacement, recheck with the voltmeter to confirm that the repair has corrected the problem.

Engine-ECU Connector Terminal Arrangement

9FU0393

NOTE

*: Vehicles with immobilizer system

Terminal No.	Check item	Check condition (Engine condition)	Normal condition
1	No. 1 injector	While engine is idling after having warmed up,	From 11–14 V, momentarily
14	No. 2 injector	suddenly depress the accelerator pedal.	drops slightly
2	No. 3 injector		
15	No. 4 injector		

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Terminal No.	Check item	Check condition (Engine condition)	Normal condition
4	Stepper motor coil <a1></a1>	Engine: Soon after the warmed up engine is started	System voltage ++ 0 V (Changes repeatedly)
17	Stepper motor coil <a2></a2>		
5	Stepper motor coil <b1></b1>		
18	Stepper motor coil <b2></b2>		
6	EGR control solenoid	Ignition switch: ON	System Voltage
	valve	While engine is idling, suddenly depress the accelerator pedal.	From system voltage, momentarily drops
8 or 22*	Fuel pump relay	Ignition switch: ON	System voltage
		Engine: Idle speed	0–3V
9	Purge control sole-	Ignition switch: ON	System voltage
	noid valve	Running at 3,000r/min while engine is warming up after having been started.	0–3V
10	Power transistor unit	Engine r/min: 3,000 r/min	0.3–3.0V
12	Power supply	Ignition switch: ON	System voltage
25			
20	Condenser fan motor relay	Condenser fan is not operating (Engine coolant temperature is 90°C or less)	System voltage
		Condenser fan is operating (Engine coolant temperature is 105°C or more)	0-3V
21	Radiator fan motor relay	Radiator fan is not operating (Engine coolant temperature is 90°C or less)	System voltage
		Radiator fan is operating (Engine coolant temperature is 90 – 105°C)	0-3V
22 or 8*	A/C relay	 Engine: Idle speed A/C switch: OFF → ON (A/C compressor runs) 	System voltage or momen- tarily 6V or more → 0-3V
33	Alternator G terminal	 Engine: Warm, idle (radiator fan: OFF) Headlamp: OFF → ON Rear defogger switch: OFF → ON 	0.4 0.8 V to 0.8 1.2 V
41	Alternator FR termi- nal	 Engine: Warm, idle (radiator fan: OFF) Headlamp: OFF → ON Rear defogger switch: OFF → ON 	1.8 – 2.4 V to 1.0 – 1.6 V
36	Engine warning lamp	Ignition switch: OFF \rightarrow ON	$0-3V \rightarrow 9-13V$ (After several seconds have elapsed)

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Terminal No.	Check item	Check condition (Engir	ne condition)	Normal condition
37	Power steering fluid pressure switch	Engine: Idling after warming up	When steering wheel is stationary	System voltage
			When steering wheel is turned	0–3V
38	Control relay (Power supply)	Ignition switch: OFF		System voltage
	(Fower supply)	Ignition switch: ON	······································	0-3V
45	A/C switch	tch Engine: Idle speed	Turn the A/C switch OFF	0–3V
			Turn the A/C switch ON (A/C compressor is operating)	System voltage
52	Ignition timing adjustment terminal	Ignition switch: ON	Earth the ignition timing adjustment terminal	0–1V
			Remove the earth connection from the ignition timing adjustment terminal	4.05.5V
54 Oxygen sensor heater (rear)		Engine: Idling after warming up		0-3V
		Engine r/min: 5,000 r/min		System voltage
60	Oxygen sensor heater (front)	Engine: Idling after warming up		0–3V
	neater (nonty	Engine r/min: 5,000r/m	in.	System voltage
71	Ignition switch – ST	Engine: Cranking		8V or more
72	Intake air temperature sensor	5	When intake air temperature is 0°C	3.2–3.8V
			When intake air temperature is 20°C	2.3-2.9V
			When intake air temperature is 40°C	1.5–2.1V
		· · ·	When intake air temperature is 80°C	0.4–1.0V
75	Oxygen sensor (rear)	 Transmission: 2nd gear <m t="">, L range </m> Engine r/min: 3,500 r/min or more Driving with the throttle valve widely open 		0.6 – 1.0 V
76	Oxygen sensor (front)	Engine: Running at 2,500 r/min after warmed up (Check using a digital type voltmeter)		0 ↔ 0.8V (Changes repeatedly)
80	Backup power supply	Ignition switch: OFF		System voltage
81	Sensor impressed voltage	Ignition switch: ON		4.5–5.5V
82	Ignition switch – IG	Ignition switch: ON		System voltage

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Terminal No.	Check item			Normal condition
83	Engine coolant temperature sensor	emperature sensor temperat When er	When engine coolant temperature is 0°C	3.2–3.8V
			When engine coolant temperature is 20°C	2.3–2.9V
			When engine coolant temperature is 40°C	1.3–1.9V
			When engine coolant temperature is 80°C	0.3–0.9V
84 Throttle position sensor		Ignition switch: ON	Set throttle valve to idle position	0.3–1.0V
				4.55.5V
85	Vacuum sensor	Ignition switch: ON (when altitude is 0 m)		3.7 − 4.3 V
	(Manifold absolute pressure sensor)	Ignition switch: ON (when altitude is 1,200 m)		3.2 - 3.8 V
		Engine: Idle speed		0.9 – 1.5 V
		While engine is idling after having warmed up, suddenly depress the accelerator pedal		From 0.9 – 1.5 V, momen- tarily increases
86	Vehicle speed sensor	 Ignition switch: Of Move the vehicle 	N slowly forward	0 ↔ 5V (Changes repeatedly)
87	Idle position switch	Ignition switch: ON	Set throttle valve to idle position	0–1V
			Slightly open throttle valve	4V or more
89	Crank angle sensor	Engine: Cranking		0.4-4.0V
		Engine: Idle speed	· · · · · · · · · · · · · · · · · · ·	1.52,5V
91	Inhibitor switch 	Ignition switch: ON	Set selector lever to P or N	0–3V
			Set selector lever to Other than P or N	8-14V

CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

- 1. Turn the ignition switch to OFF.
- 2. Disconnect the engine-ECU connector.
- 3. Measure the resistance and check for continuity between the terminals of the engine-ECU harness-side connector while referring to the check chart.

NOTE

- 1. When measuring resistance and checking continuity, a harness for checking contact pin pressure should be used instead of inserting a test probe.
- 2. Checking need not be carried out in the order given in the chart.

Caution

If the terminals that should be checked are mistaken, or if connector terminals are not correctly shorted to earth, damage may be caused to the vehicle wiring, sensors, engine-ECU and/or ohmmeter. Be careful to prevent this!

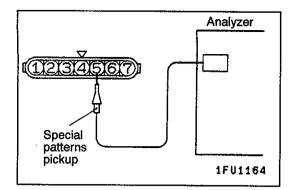
- 4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and then repair or replace.
- 5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

Engine-ECU Harness Side Connector Terminal Arrangement

9FU0392

Terminal No.	Inspection item	Normal condition (Check condition)
1–12	No. 1 injector	13–16 Ω (At 20°C)
14-12	No. 2 injector	
2–12	No. 3 injector	
15-12	No. 4 injector	

Terminal No.	Inspection item	Normal condition (Check condition)
4–12	Stepper motor coil (A1)	28–33 Ω (At 20°C)
17–12	Stepper motor coil (A2)	
5–12	Stepper motor coil (B1)	
18-12	Stepper motor coil (B2)	
6-12	EGR control solenoid valve	36–44 Ω (At 20°C)
9–12	Purge control solenoid valve	36-44 Ω (At 20°C)
13-Body earth	ENGINE-ECU earth	Continuity (0Ω)
26-Body earth	ENGINE-ECU earth	
54-12	Oxygen sensor heater (rear)	7 – 40 Ω (At 20°C)
60–12	Oxygen sensor heater (front)	7 – 40 Ω (At 20°C)
72-92	Intake air temperature sensor	5.3–6.7 k Ω (When intake air temperature is 0°C)
	·	2.3–3.0 k Ω (When intake air temperature is 20°C)
		1.0–1.5 k Ω (When intake air temperature is 40°C)
		$0.30-0.42 k\Omega$ (When intake air temperature is 80° C)
83-92	Engine coolant temperature sensor	5.1–6.5 k Ω (When coolant temperature is 0°C)
		2.1–2.7 k Ω (When coolant temperature is 20°C)
		0.9-1.3 kΩ (When coolant temperature is 40°C)
		0.26–0.36 k Ω (When coolant temperature is 80°C)
87–92	Idle position switch	Continuity (when throttle valve is at idle position)
		No continuity (when throttle valve is slightly open)
91-Body earth	Inhibitor switch 	Continuity (when select lever is at P or N)
		No continuity (when select lever is at D, 2, L or R)



INSPECTION PROCEDURE USING AN ANALYZER

13100930097

CRANK ANGLE SENSOR

Measurement Method

- 1. Disconnect the distributor (crank angle sensor) connector and connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)
- 2. Connect the analyzer special patterns pickup to distributor connector terminal 5.

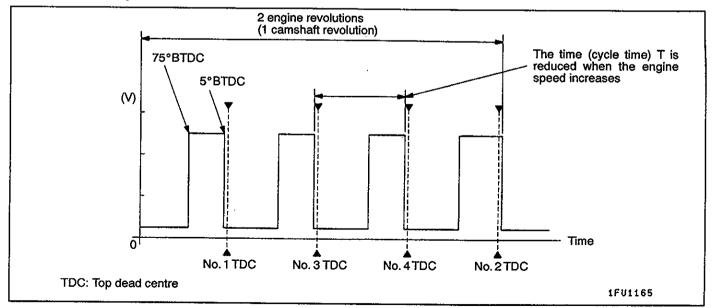
Alternate Method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal 89.

Standard Wave Pattern Observation conditions

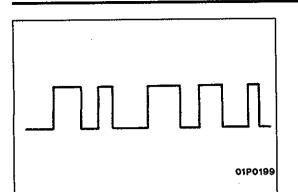
Function	Special patterns	
Pattern height	Low	
Pattern selector	Display	
Engine r/min	Idle speed	

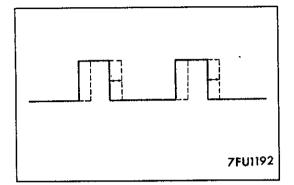
Standard wave pattern

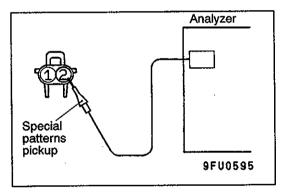


Wave Pattern Observation Points

Check that cycle time T becomes shorter when the engine speed increases.







Examples of Abnormal Wave Patterns

• Example 1

Cause of problem

Sensor interface malfunction

Wave pattern characteristics

Rectangular wave pattern is output even when the engine is not started.

Example 2

Cause of problem

Loose timing belt Abnormality in sensor disk

Wave pattern characteristics

Wave pattern is displaced to the left or right.

INJECTOR

Measurement Method

- Disconnect the injector connector, and then connect the special tool (test harness: MB991348) in between. (Both the power supply side and engine-ECU side should be connected.)
- 2. Connect the analyzer special patterns pickup to terminal 2 of the injector connector.

Alternate Method (Test harness not available)

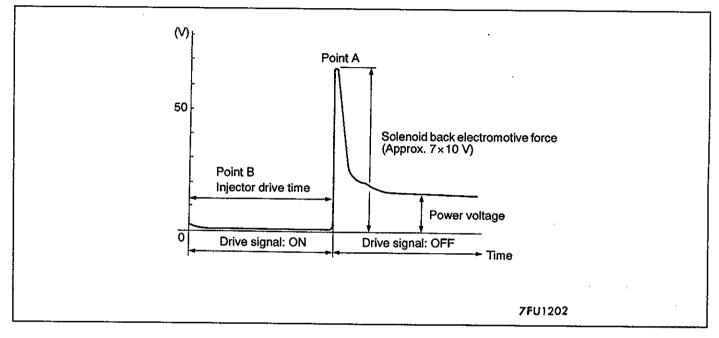
- 1. Connect the analyzer special patterns pickup to engine-ECU terminal 1. (When checking the No. 1 cylinder.)
- 2. Connect the analyzer special patterns pickup to engine-ECU terminal 14. (When checking the No. 2 cylinder.)
- 3. Connect the analyzer special patterns pickup to engine-ECU terminal 2. (When checking the No. 3 cylinder.)
- 4. Connect the analyzer special patterns pickup to engine-ECU terminal 15. (When checking the No. 4 cylinder.)

Standard Wave Pattern

Observation conditions

Function	Special patterns
Pattern height	Variable
Variable knob	Adjust while viewing the wave pattern
Pattern selector	Display
Engine r/min	Idle speed

Standard wave pattern

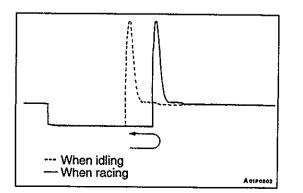


Wave Pattern Observation Points

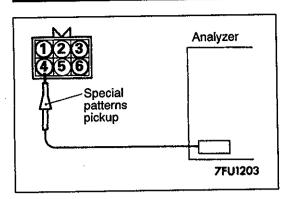
Point A: Height of solenoid back electromotive force

Contrast with standard wave pattern	Probable cause
Solenoid coil back electromotive force is low or doesn't appear at all.	Short in the injector solenoid

Point B: Injector drive time



- The injector drive time will be synchronized with the MUT-II tester display.
- When the engine is suddenly raced, the drive time will be greatly extended at first, but the drive time will soon match the engine speed.



STEPPER MOTOR

Measurement Method

- 1. Disconnect the stepper motor connector, and connect the special tool (test harness: MD998463) in between.
- 2. Connect the analyzer special patterns pickup to the stepper motor-side connector terminal 1 (red clip of special tool), terminal 3 (blue clip), terminal 4 (black clip) and terminal 6 (yellow clip) respectively.

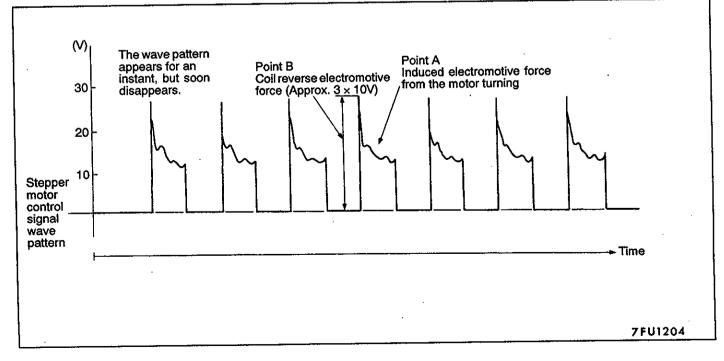
Alternate Method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal 4, connection terminal 5, connection terminal 17, and connection terminal 18 respectively.

Standard Wave Pattern Observation conditions

Function	Special patterns
Pattern height	High
Pattern selector	Display
Engine condition	When the engine coolant temperature is 20°C or below, turn the ignition switch from OFF to ON (without starting the engine).
	While the engine is idling, turn the A/C switch to ON.
	Immediately after starting the warm engine

Standard wave pattern



13A-72

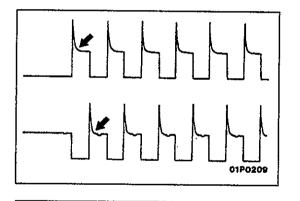
Wave Pattern Observation Points

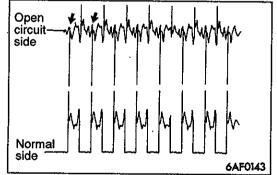
Check that the standard wave pattern appears when the stepper motor is operating. Point A: Presence or absence of induced electromotive force from the motor turning. (Refer to the abnormal wave pattern.)

Contrast with standard wave pattern	Probable cause
Induced electromotive force does not appear or is extremely small.	Motor is malfunctioning

Point B: Height of coil reverse electromotive force

Contrast with standard wave pattern	Probable cause
Coil reverse electromotive force does not appear or is extremely small.	Short in the coil





Examples of Abnormal Wave Pattern

Example 1

Cause of problem

Motor is malfunctioning. (Motor is not operating.)

Wave pattern characteristics

Induced electromotive force from the motor turning does not appear.

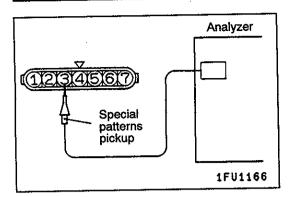
• Example 2

Cause of problem

Open circuit in the line between the stepper motor and the engine-ECU.

Wave pattern characteristics

Current is not supplied to the motor coil on the open circuit side. (Voltage does not drop to 0 V.) Furthermore, the induced electromotive force waveform at the normal side is slightly different from the normal waveform.



IGNITION COIL AND POWER TRANSISTOR

- Ignition coil primary signal Refer to GROUP 16 – Ignition System.
- Power transistor control signal

Measurement Method

- 1. Disconnect the distributor connector, and connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)
- 2. Connect the analyzer special patterns pickup to distributor connector terminal 3.

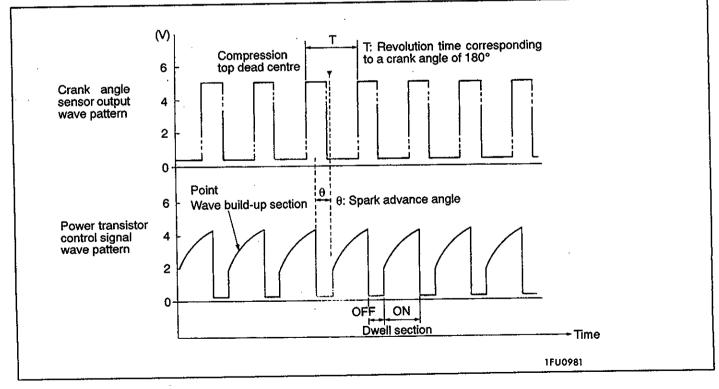
Alternate Method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal 10.

Standard Wave Pattern Observation condition

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine r/min	Approx. 1,200 r/min

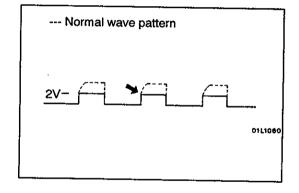
Standard wave pattern

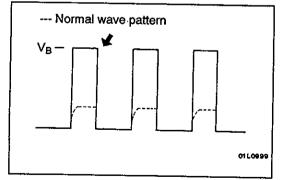


Wave Pattern Observation Points

Point: Condition of wave pattern build-up section and maximum voltage (Refer to abnormal wave pattern examples 1 and 2.)

Condition of wave pattern build-up section and maximum voltage	Probable cause
Rises from approx. 2V to approx. 4.5V at the top-right	Normal
2V rectangular wave	Open-circuit in ignition primary circuit
Rectangular wave at power voltage	Power transistor malfunction





Examples of Abnormal Wave Patterns

Example 1 Wave pattern during engine cranking **Cause of problem** Open-circuit in ignition primary circuit

Wave pattern characteristics

Top-right part of the build-up section cannot be seen, and voltage value is approximately 2V too low.

• Example 2

Wave pattern during engine cranking

Cause of problem

Malfunction in power transistor

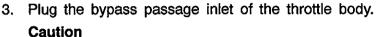
Wave pattern characteristics

Power voltage results when the power transistor is ON.

ON-VEHICLE SERVICE

THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

- 1. Start the engine and warm it up until the coolant is heated to 80°C or higher and then stop the engine.
- 2. Remove the air intake hose from the throttle body.



Do not allow cleaning solvent to enter the bypass passage.

- 4. Spray cleaning solvent into the valve through the throttle body intake port and leave it for about 5 minutes.
- 5. Start the engine, race it several times and idle it for about 1 minute. If the idling speed becomes unstable (or if the engine stalls) due to the bypass passage being plugged, slightly open the throttle valve to keep the engine running.
- 6. If the throttle valve deposits are not removed, repeat steps 4 and 5.
- 7. Unplug the bypass passage inlet.
- 8. Attach the air intake hose.
- 9. Use the MUT-II to erase the self-diagnosis code.
- 10. Adjust the basic idle speed. (Refer to P.13A-76.)

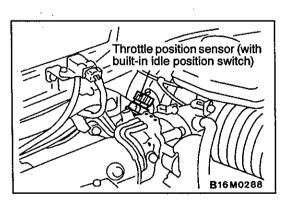
NOTE

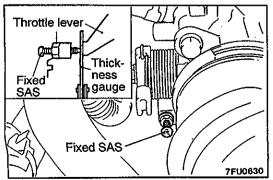
If the engine hunts while idling after adjustment of the basic idle speed, disconnect the (-) cable from the battery for 10 seconds or more, and then reconnect it and run the engine at idle for about 10 minutes.

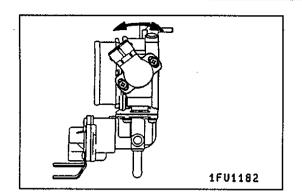
IDLE POSITION SWITCH AND THROTTLE POSITION SENSOR ADJUSTMENT 13100130107

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

- 2. Insert a thickness gauge with a thickness of 0.45 mm between the fixed SAS and the throttle lever.
- 3. Turn the ignition switch to ON (but do not start the engine).



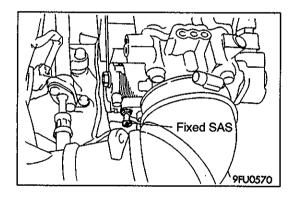




- 4. Loosen the throttle position sensor mounting bolt, and then turn the throttle position sensor anti-clockwise as far as it will go.
- 5. Check that the idle position switch is on at this position.
- 6. Slowly turn the throttle position sensor clockwise and find the point where the idle position switch turns off. Securely tighten the throttle position sensor mounting bolt at this point.
- 7. Check the throttle position sensor output voltage.

Standard value: 400-1,000 mV

- 8. If there is a deviation from the standard value, check the throttle position sensor and the related harness.
- 9. Remove the thickness gauge.
- 10. Turn the ignition switch to OFF.
- 11. Disconnect the MUT-II.



FIXED SAS ADJUSTMENT

13100150110

NOTE

- 1. The fixed SAS should not be moved unnecessarily; it has been precisely adjusted by the manufacturer.
- 2. If the adjustment is disturbed for any reason, readjust as follows.
- 1. Loosen the tension of the accelerator cable sufficiently.
- 2. Back out the fixed SAS lock nut.
- 3. Turn the fixed SAS counterclockwise until it is sufficiently backed out, and fully close the throttle valve.
- 4. Tighten the fixed SAS until the point where the throttle lever is touched (i.e., the point at which the throttle valve begins to open) is found.
 - From that point, tighten the fixed SAS 1-1/4 turn.
- 5. While holding the fixed SAS so that it doesn't move, tighten the lock nut securely.
- 6. Adjust the tension of the accelerator cable.
- 7. Adjust the basic idling speed.
- 8. Adjust the idle position switch and the throttle position sensor (P.13A-75).

BASIC IDLE SPEED ADJUSTMENT

13100180119

NOTE

- 1. The standard idling speed has been adjusted, by the speed adjusting screw (SAS), by the manufacturer, and there should usually be no need for readjustment.
- If the adjustment has been changed by mistake, the idle speed may become too high or the idle speed may drop too low when loads from components such as the A/C are placed on the engine. If this occurs, adjust by the following procedure.

- 3. The adjustment, if made, should be made after first confirming that the spark plugs, the injectors, the idle speed control servo, the compression pressure, etc., are all normal.
- 1. Before inspection and adjustment, set the vehicle to the pre-inspection condition.
- 2. Connect the MUT-II to the diagnosis connector (16-pin). NOTE

When the MUT-II is connected, the diagnosis control terminal should be earthed.

- 3. Remove the waterproof female connector from the ignition timing adjustment connector.
- 4. Use a jumper wire to earth the ignition timing adjustment terminal.

- 5. Start the engine and run at idle.
- 6. Check the idle speed.

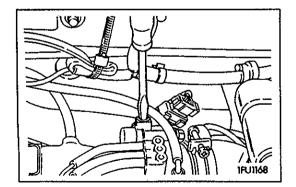
Standard value: 750 ± 50 r/min

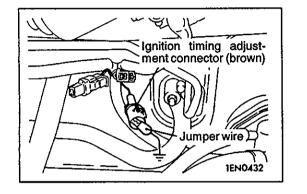
NOTE

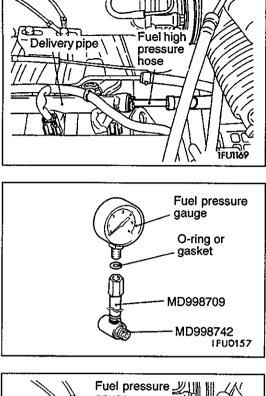
- 1. The engine speed may be 20 to 100 r/min lower than indicated above for a new vehicle [driven approximately 500 km or less], but no adjustment is necessary.
- 2. If the engine stalls or the engine speed is low even though the vehicle has been driven approximately 500 km or more, it is probable that deposits are adhered to the throttle valve, so clean it. (Refer to P.13A-75.)
- If not within the standard value range, turn the speed adjusting screw (SAS) to make the necessary adjustment. NOTE

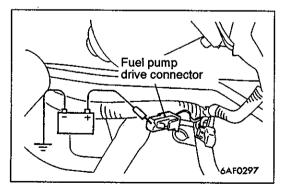
If the idling speed is higher than the standard value range even when the SAS is fully closed, check whether or not there is any indication that the fixed SAS has been moved. If there is an indication that it has been moved, adjust the fixed SAS.

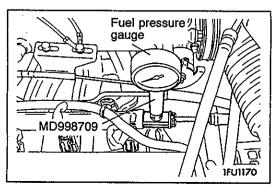
- 8. Switch OFF the ignition switch.
- 9. Disconnect the jumper wire from the ignition timing adjustment terminal and return the connector to its original condition.
- 10. Disconnect the MUT-II.
- 11. Start the engine again and let it run at idle speed for about 10 minutes; check that the idling condition is normal.











FUEL PRESSURE TEST

13100190112

- 1. Release residual pressure from the fuel pipe line to prevent fuel gush out. (Refer to P.13A-81.)
- 2. Disconnect the fuel high pressure hose at the delivery pipe side.

Caution

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

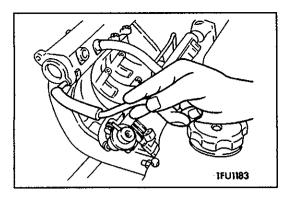
- 3. Remove the union joint and bolt from the special tool (adapter hose MD998709) and instead attach the special tool (hose adapter MD998742) to the adapter hose.
- 4. Install a fuel pressure gauge on the adapter hose that was set up in step 3.

Use a suitable O-ring or gasket between the fuel pressure gauge and the special tool so as to seal in order to prevent fuel leakage at this time.

5. Install the special tool, which was set in place in steps 3 and 4 between the delivery pipe and the high pressure hose.

- 6. Connect the fuel pump drive connector with the battery (+) terminal using a jumper wire and drive the fuel pump. Under fuel pressure, check the fuel pressure gauge and special tool connections for leaks.
- 7. Disconnect the jumper wire from the fuel pump drive terminal to stop the fuel pump.
- 8. Start the engine and run at idle.
- 9. Measure fuel pressure while the engine is running at idle.

Standard value: Approx. 265 kPa at curb idle



10. Disconnect the vacuum hose from the fuel pressure regulator and measure fuel pressure with the hose end closed by a finger.

Standard value: 324–343 kPa at kerb idle

- 11. Check to see that fuel pressure at idle does not drop even after the engine has been raced several times.
- 12. Racing the engine repeatedly, hold the fuel return hose lightly with fingers to feel that fuel pressure is present in the return hose.

NOTE

If the fuel flow rate is low, there will be no fuel pressure in the return hose.

13. If any of fuel pressure measured in steps 9 to 12 is out of specification, troubleshoot and repair according to the table below.

Syı	nptom	Probable cause	Remedy	
 Fuel pressure too low Fuel pressure drops after racing No fuel pressure in fuel return hose 		Clogged fuel filter	Replace fuel filter	
		Fuel leaking to return side due to poor fuel regulator valve seating or settled spring	Replace fuel pressure regulator	
		Low fuel pump delivery pressure	Replace fuel pump	
Fuel pressure too high		Binding valve in fuel pressure regulator	Replace fuel pressure regulator	
		Clogged fuel return hose or pipe Clean or replace		
Same fuel pressure when vacuum hose is connected and when disconnected		Damaged vacuum hose or clogged nipple	Replace vacuum hose or clean nipple	

14. Stop the engine and check change of fuel pressure gauge reading. Normal if the reading does not drop within 2 minutes. If it does, observe the rate of drop and troubleshoot and repair according to the table below.

Symptom	Probable cause	Remedy
Fuel pressure drops gradually after	Leaky injector	Replace injector
engine is stopped	Leaky fuel regulator valve seat	Replace fuel pressure regulator
Fuel pressure drops sharply immediately after engine is stopped	Check valve in fuel pump is held open	Replace fuel pump

- 15. Release residual pressure from the fuel pipe line. (Refer to P.13A-81.)
- 16. Remove the fuel pressure gauge and special tool from the delivery pipe.

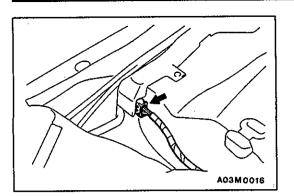
Caution

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

- 17. Replace the O-ring at the end of the fuel high pressure hose with a new one. Furthermore, apply engine oil to the new O-ring before replacement.
- 18. Fit the fuel high pressure hose over the delivery pipe and tighten the bolt to specified torque.

Tightening torque: 5 Nm

- 19. Check for fuel leaks.
 - (1) Apply the battery voltage to the fuel pump drive terminal to drive the fuel pump.
 - (2) Under fuel pressure, check the fuel line for leaks.

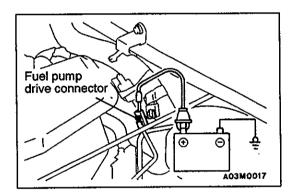


FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE THE FUEL PRESSURE)

13100090148

When removing the fuel pipe, hose, etc., since fuel pressure in the fuel pipe line is high, do the following operation so as to release fuel pressure in the line and prevent fuel from running out.

- (1) Raise the rear seat cushion.
- (2) Disconnect the body wiring harness and fuel wiring harness under the floor carpet.
- (3) After starting the engine and letting it run until it stops naturally, turn the ignition switch to OFF.
- (4) Connect the fuel wiring harness and body wiring harness.
- (5) Install the rear seat cushion.



FUEL PUMP OPERATION CHECK

13100200105

- 1. Check the operation of the fuel pump by using the MUT-II to force-drive the fuel pump.
- 2. If the fuel pump will not operate, check by using the following procedure, and if it is normal, check the drive circuit.
 - (1) Turn the ignition switch to OFF.
 - (2) When the fuel pump drive connector (black) is attached directly to the battery, check if the sound of the fuel pump operation can be heard.

NOTE

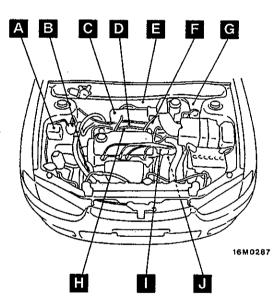
As the fuel pump is an in-tank type, the fuel pump sound is hard to hear, so remove the fuel filler cap and check from the tank inlet.

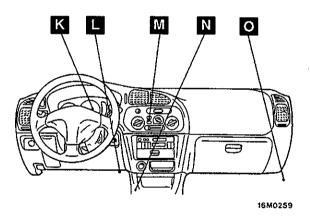
(3) Check the fuel pressure by pinching the fuel hose with the fingertips.

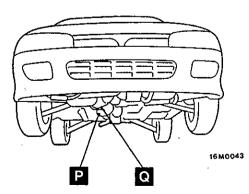
COMPONENT LOCATION

13100210153

Name	Symbol	Name	Symbol
A/C relay	А	Ignition timing adjustment terminal	G
A/C switch	М	Inhibitor switch 	J
Control relay and fuel pump relay	N	Injectors	Н
Diagnosis connector	L	Intake air temperature sensor	С
Distributor (with ignition coil and crank angle	1	Oxygen sensor (front)	Q
sensor)		Oxygen sensor (rear)	Р
EGR control solenoid valve	D	Power steering fluid pressure switch	В
Engine coolant temperature sensor	I	Purge control solenoid valve	D
Engine-ECU	0	Throttle position sensor (with idle position	F
Engine warning lamp (check engine lamp)	к	switch)	
Fuel pump check terminal	G	Vacuum sensor	E
Idle speed control servo	F	Vehicle speed sensor	J

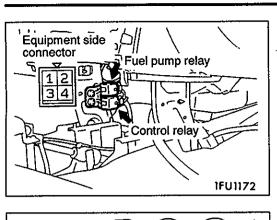


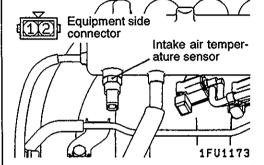


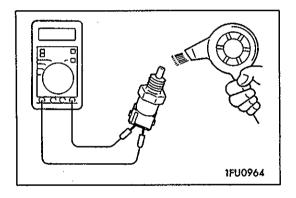


1FU1171

L







CONTROL RELAY AND FUEL PUMP RELAY CONTINUITY CHECK

13100990057

134-83

Battery voltage	Terminal No.			
	1	2	3	4
Not supplied		0		<u> </u>
Supplied	0		-0	
		9		

INTAKE AIR TEMPERATURE SENSOR CHECK

13100280109

- Disconnect the intake air temperature sensor connector. 1.
- 2. Measure resistance between terminals 1 and 2.

Standard value: 2.3 - 3.0 kΩ (at 20°C) 0.30 - 0.42 kΩ (at 80°C)

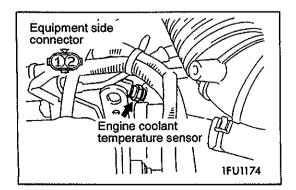
- 3. Remove the intake air temperature sensor.
- Measure resistance while heating the sensor using a hair 4. drier.

Normal condition:

Temperature (°C)	Resistance (kΩ)
Higher	Smaller

- 5. If the value deviates from the standard value or the resistance remains unchanged, replace the intake air temperature sensor.
- 6. Install the intake air temperature sensor and tighten it to the specified torque.

Tightening torque: 12 - 15 Nm

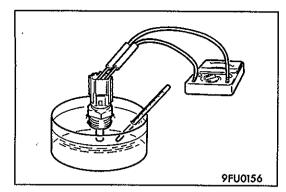


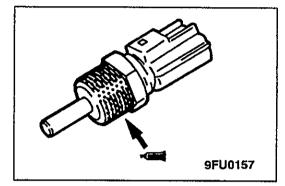
ENGINE COOLANT TEMPERATURE SENSOR CHECK 13100310105

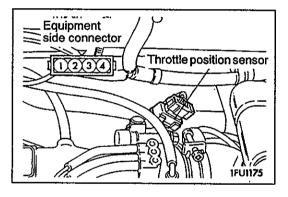
Caution

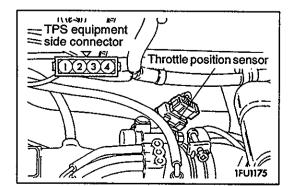
Be careful not to touch the connector (resin section) with the tool when removing and installing.

1. Remove the engine coolant temperature sensor.









2. With temperature sensing portion of engine coolant temperature sensor immersed in hot water, check resistance.

Standard value: 2.1 - 2.7 kΩ (at 20°C) 0.26 - 0.36 kΩ (at 80°C)

- 3. If the resistance deviates from the standard value greatly, replace the sensor.
- 4. Apply sealant to threaded portion.

Specified sealant: 3M NUT Locking Part No.4171 or equivalent

5. Install the engine coolant temperature sensor and tighten it to the specified torque.

Tightening torque: 29 Nm

THROTTLE POSITION SENSOR CHECK 13100320108

- 1. Disconnect the throttle position sensor connector.
- 2. Measure the resistance between the throttle position sensor side connector terminal 1 and terminal 4.

Standard value: 3.5–6.5 k Ω

3. Measure the resistance between the throttle position sensor side connector terminal 2 and terminal 4.

Normal condition:

Throttle valve slowly open	Changes smoothly in
until fully open from the idle	proportion to the opening
position	angle of the throttle valve

4. If the resistance is outside the standard value, or if it doesn't change smoothly, replace the throttle position sensor.

NOTE

For the throttle position sensor adjustment procedure, refer to P.13A-75.

IDLE POSITION SWITCH CHECK

13100330118

- 1. Disconnect the throttle position sensor connector.
- 2. Check the continuity between the throttle position sensor connector side terminal 3 and terminal 4.

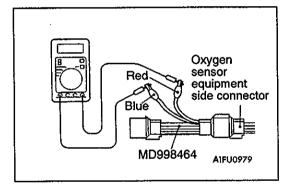
Normal condition:

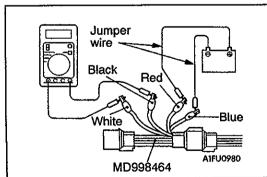
Accelerator pedal	Continuity
Depressed	Non-conductive ($\infty \Omega$)
Released	Conductive (0 Ω)

If out of specification, replace the throttle position sensor.
 NOTE

After replacement, the idle position switch and throttle position sensor should be adjusted. (Refer to P.13A-75.)

Equipment side connector





OXYGEN SENSOR CHECK

13100510048

<Oxygen sensor (front)>

- 1. Disconnect the oxygen sensor connector and connect the special tool (test harness) to the connector on the oxygen sensor side.
- 2. Make sure that there is continuity $(7 40 \Omega \text{ at } 20^{\circ}\text{C})$ between terminal 1 (red clip of special tool) and terminal 3 (blue clip of special tool) on the oxygen sensor connector.
- 3. If there is no continuity, replace the oxygen sensor.
- 4. Warm up the engine until engine coolant is 80°C or higher.

5. Use the jumper wire to connect terminal 1 (red clip) of the oxygen sensor connector to the battery (+) terminal and terminal 3 (blue clip) to the battery (-) terminal.

Caution

Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.

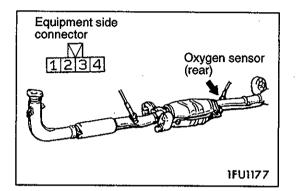
- 6. Connect a digital voltage meter between terminal 2 (black clip) and terminal 4 (white clip).
- 7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

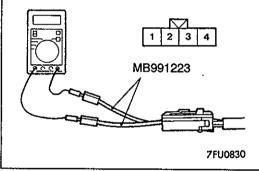
Standard value:

Engine	Oxygen sensor output voltage	Remarks
When racing the engine	0.6 – 1.0 V	If you make the air/fuel ratio rich by racing the engine repeatedly, a normal oxy- gen sensor will output a voltage of 0.6 – 1.0 V.

8. If the sensor is defective, replace the oxygen sensor. NOTE

For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Pipe and Main Muffler.







- 1. Disconnect the oxygen sensor connector and connect the special tool (test harness set) to the connector on the oxygen sensor side.
- 2. Make sure that there is continuity $(7 40 \Omega \text{ at } 20^{\circ}\text{C})$ between terminal 3 and terminal 4 on the oxygen sensor connector.
- 3. If there is no continuity, replace the oxygen sensor. NOTE
 - 1. If the MUT-II does not display the standard value although no abnormality is found by the above mentioned continuity test and harness check, replace the oxygen sensor (rear).
 - 2. For removal and installation of the oxygen sensor, refer to GROUP 15 Exhaust Pipe and Main Muffler.

INJECTOR CHECK

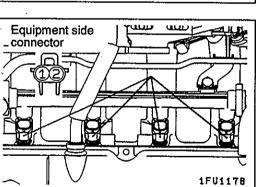
13100520102

Measurement of Resistance between Terminals

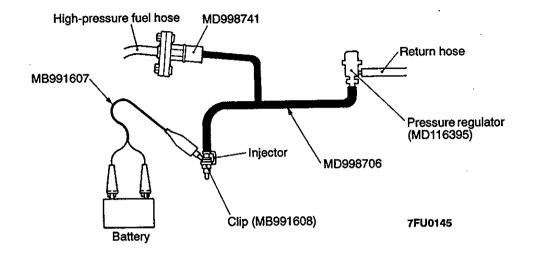
- 1. Remove the injector connector.
- 2. Measure the resistance between terminals. Standard value: $13-16 \Omega$ (at 20°C)
- 3. Install the injector connector.

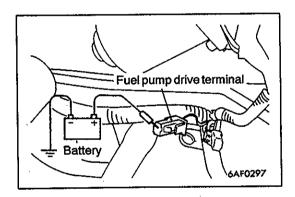
Checking the Injection Condition

- 1. Following the steps below, bleed out the residual pressure within the fuel pipe line to prevent flow of the fuel. (Refer to P.13-81.)
- 2. Remove the injector.



3. Arrange the special tool (injector test set), adaptor, fuel pressure regulator and clips as shown in the illustration below.





Return hose

6FU0628

Main hose

Batter

4. Apply battery voltage to the fuel pump drive terminal (black) and activate the fuel pump.

5. Activate the injector and check the atomized spray condition of the fuel.

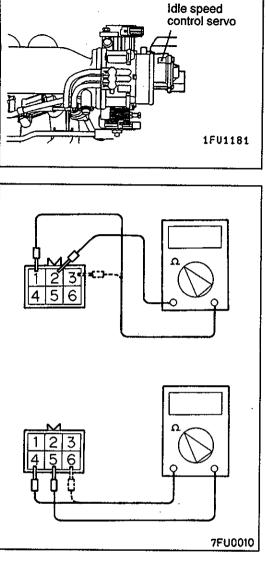
The condition can be considered satisfactory unless it is extremely poor.

Injector

6. Stop the actuation of the injector, and check for leakage from the injector's nozzle.

Standard value: 1 drop or less per minute

7. Activate the injector without activating the fuel pump; then, when the spray emission of fuel from the injector stops, disconnect the special tool and restore it to its original condition.



ТЕ ИО295

IDLE SPEED CONTROL (ISC) SERVO (STEPPER MOTOR) CHECK

13100540146

Checking the Operation Sound

1. Check that the engine coolant temperature is 20°C or below.

NOTE

Disconnecting the engine coolant temperature sensor connector and connecting the harness-side of the connector to another engine coolant temperature sensor that is at 20°C or below is also okay.

- 2. Check that the operation sound of the stepper motor can be heard after the ignition is switched ON. (but without starting the motor.)
- 3. If the operation sound cannot be heard, check the stepper motor's activation circuit.

If the circuit is normal, it is probable that there is a malfunction of the stepper motor or of the engine control unit.

Checking the Coil Resistance

- 1. Disconnect the idle speed control servo connector and connect the special tool (test harness).
- 2. Measure the resistance between terminal 2 (white clip of the special tool) and either terminal 1 (red clip) or terminal 3 (blue clip) of the connector at the idle speed control servo side.

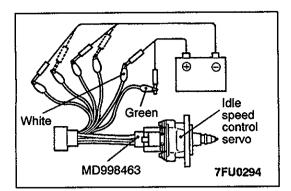
Standard value: 28–33 Ω (at 20°C)

3. Measure the resistance between terminal 5 (green clip of the special tool) and either terminal 6 (yellow clip) or terminal 4 (black clip) of the connector at the idle speed control servo side.

Standard value: 28–33 Ω (at 20°C)

Operation Check

- 1. Remove the throttle body.
- 2. Remove the stepper motor.



- 3. Connect the special tool (test harness) to the idle speed control servo connector.
- 4. Connect the positive (+) terminal of a power supply (approx. 6 V) to the white clip and the green clip.
- 5. With the idle speed control servo as shown in the illustration, connect the negative (--) terminal of the power supply to each clip as described in the following steps, and check whether or not a vibrating feeling (a feeling of very slight vibration of the stepper motor) is generated as a result of the activation of the stepper motor.
 - (1) Connect the negative (-) terminal of the power supply to the red and black clip.
 - (2) Connect the negative (--) terminal of the power supply to the blue and black clip.
 - (3) Connect the negative (-) terminal of the power supply to the blue and yellow clip.
 - (4) Connect the negative (-) terminal of the power supply to the red and yellow clip.
 - (5) Connect the negative (-) terminal of the power supply to the red and black clip.
 - (6) Repeat the tests in sequence from (5) to (1).
- 6. If, as a result of these tests, vibration is detected, the stepper motor can be considered to be normal.

PURGE CONTROL SOLENOID VALVE CHECK

13100560111

Refer to GROUP 17 - Emission Control System.

EGR CONTROL SOLENOID VALVE CHECK

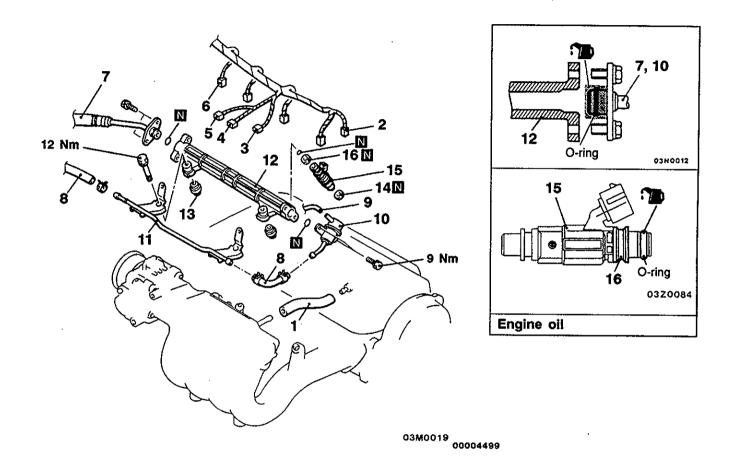
Refer to GROUP 17 - Emission Control System.

INJECTOR

13100710141

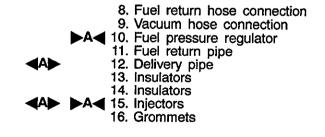
REMOVAL AND INSTALLATION

Pre-removal Operation
Fuel Discharge Prevention (Refer to P.13A-81.)



Removal steps

- 1. PCV hose
- 2. Oxygen sensor connector
- 3. Intake air temperature sensor connector
- 4. Purge control solenoid valve connector
- 5. EGR solenoid valve connector
- 6. Injector connector
- A 7. High-pressure fuel hose connection



REMOVAL SERVICE POINT

AD DELIVERY PIPE/INJECTOR REMOVAL

Remove the delivery pipe (with the injectors attached to it).

Caution

Care must be taken, when removing the delivery pipe, not to drop the injector.

INSTALLATION SERVICE POINT

►A INJECTOR/FUEL PRESSURE REGULATOR/ HIGH-PRESSURE FUEL HOSE INSTALLATION

(1) Apply a drop of new engine oil to the O-ring. Caution

Be sure not to let engine oil enter the delivery pipe.

- (2) While turning the injector, high-pressure fuel hose and fuel pressure regulator to the right and left, install the delivery pipe, while being careful not to damage the O-ring. After installing, check that the hose turns smoothly.
- (3) If it does not turn smoothly, the O-ring may be trapped, remove the fuel pressure regulator and then re-insert it into the delivery pipe and check once again.
- (4) Tighten the high-pressure fuel hose to the standard torque, and tighten the fuel pressure regulator to the specified torque.

Tightening torque: 9 Nm (Fuel pressure regulator)

THROTTLE BODY

13100770125

REMOVAL AND INSTALLATION

Pre-removal Operation

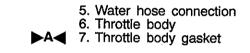
- Engine Coolant Draining (Refer to GROUP 14 On-vehicle Service.)
- Air Cleaner Removal

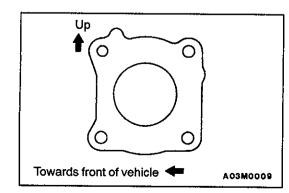
Post-Installation Operation

- Air Cleaner Installation
- Engine Coolant Supplying (Refer to GROUP 14
- On-vehicle Service.)
 Accelerator Cable Adjustment (Refer to GROUP 17 – On-vehicle Service.)

Removal steps

- 1. Accelerator cable connection
- 2. Throttle position sensor connector
- 3. Idle speed control servo connector
- 4. Vacuum hose connection





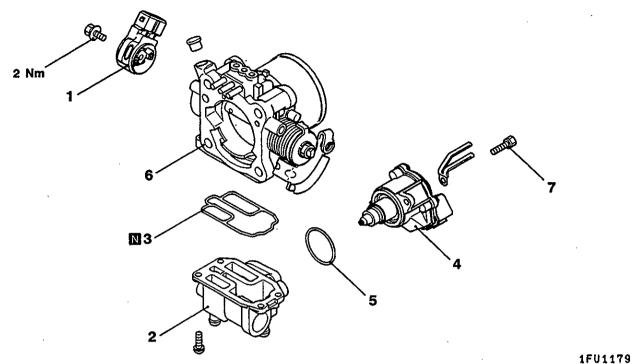
INSTALLATION SERVICE POINT

A THROTTLE BODY GASKET INSTALLATION

Place the gasket so that the projecting part is positioned as shown in the illustration, and then install it between the intake manifold and the throttle body.

DISASSEMBLY AND REASSEMBLY

13100970105



Disassembly steps

- A 1. Throttle position sensor
 - 2. Idle speed control body assembly 3. O-ring
 - 4. Idle speed control servo
 - 5. O-ring
 - 6. Throttle body
 - 7. Fixed SAS

NOTE

- 1. The fixed SAS is correctly adjusted at the factory and should not be removed.
- If the fixed SAS should happen to have been removed, carry out fixed SAS adjustment. (Refer to page 13A-76.)

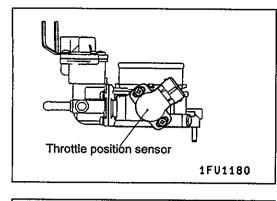
CLEANING THROTTLE BODY PARTS

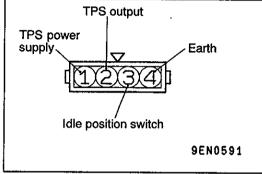
- 1. Clean all throttle body parts.
 - Do not use solvent to clean the following parts:
 - Throttle position sensor
 - Accelerator pedal position sensor
 - Idle speed control body assembly

If these parts are immersed in solvent, their insulation will deteriorate.

Wipe them with cloth only.

2. Check if the vacuum port or passage is clogged. Use compressed air to clean the vacuum passage.





REASSEMBLY SERVICE POINT

►A THROTTLE POSITION SENSOR (TPS) INSTALLATION

- 1. Install the TPS so that it faces as shown in the illustration, and then tighten it with the screw.
- 2. Connect a multimeter between terminal (1) (TPS power supply) and terminal (2) (TPS output) of the TPS connector, and check that the resistance increases gradually as the throttle valve is opened slowly to the fully-open position.
- 3. Check the continuity between terminal (3) (idle position switch) and terminal (4) (earth) of the TPS connector when the throttle valve is fully closed and fully open.

Normal condition:

Throttle valve condition	Continuity
Fully closed	Continuity
Fully open	No continuity

If there is no continuity when the throttle valve is fully closed, turn the TPS body anti-clockwise and then check again.

(4) If there is an abnormality, replace the TPS.

MULTIPOINT FUEL INJECTION (MPI) <4G9>

13100010159

GENERAL INFORMATION

The Multipoint Fuel Injection System consists of sensors which detect the engine conditions, the engine-ECU which controls the system based on signals from these sensors, and actuators which operate under the control of the engine-ECU. The engine-ECU carries out

FUEL INJECTION CONTROL

The injector drive times and injector timing are controlled so that the optimum air/fuel mixture is supplied to the engine to correspond to the continually-changing engine operation conditions.

A single injector is mounted at the intake port of each cylinder. Fuel is sent under pressure from the fuel tank by the fuel pump, with the pressure being regulated by the fuel pressure regulator. The fuel thus regulated is distributed to each of the injectors.

Fuel injection is normally carried out once for each cylinder for every two rotations of the crankshaft. The firing order is 1-3-4-2. This is called sequential fuel injection.

<Except MVV>

The engine-ECU provides a richer air/fuel mixture by carrying out "open-loop" control when the engine is cold or operating under high load conditions in order to maintain engine performance. In addition, when the engine is warm or operating under normal conditions,

IDLE AIR CONTROL

The idle speed is kept at the optimum speed by controlling the amount of air that bypasses the throttle valve in accordance with changes in idling conditions and engine load during idling. The engine-ECU drives the idle speed control (ISC) motor to keep the engine running at the pre-set idle target speed in accordance with the engine coolant temperature and air

IGNITION TIMING CONTROL

The power transistor located in the ignition primary circuit turns ON and OFF to control the primary current flow to the ignition coil. This controls the ignition timing in order to provide the optimum ignition timing with respect to the activities such as fuel injection control, idle speed control and ignition timing control. In addition, the engine-ECU is equipped with several diagnosis modes which simplify troubleshooting when a problem develops.

the engine-ECU controls the air/fuel mixture by using the oxygen sensor signal to carry out "closed-loop" control in order to obtain the theoretical air/fuel mixture ratio that provides the maximum cleaning performance from the three way catalyst.

<MVV>

The engine-ECU provides a richer air/fuel mixture by carrying out "open-loop" control when the engine is cold or operating under high load conditions in order to maintain engine performance.

In addition, engine-ECU makes an air/fuel mixture most efficient in fuel consumption by carrying out a lean air/fuel mixture ratio compensation (closed-loop control) when the engine is operating under normal conditions. The engine-ECU carries out a theoretical air/fuel mixture ratio compensation (closed-loop control) when the engine is being warmed up or under other conditions.

conditioner load. In addition, when the air conditioner switch is turned off and on while the engine is idling, the ISC motor operates to adjust the throttle valve bypass air amount in accordance with the engine load conditions in order to avoid fluctuations in the engine speed.

engine operating conditions. The ignition timing is determined by the engine-ECU from the engine speed, intake air volume, engine coolant temperature and atmospheric pressure.

SELF-DIAGNOSIS FUNCTION

- When an abnormality is detected in one of the sensors or actuators related to emission control, the engine warning lamp (check engine lamp) illuminates as a warning to the driver.
- When an abnormality is detected in one of the sensors or actuators, a diagnosis

OTHER CONTROL FUNCTIONS

- 1. Fuel Pump Control Turns the fuel pump relay ON so that current is supplied to the fuel pump while the engine is cranking or running.
- A/C Relay Control Turns the compressor clutch of the A/C ON and OFF.
- 3. Fan Relay Control The revolutions of the radiator fan and condenser fan are controlled in response to the engine coolant temperature and vehicle speed.

GENERAL SPECIFICATIONS

code corresponding to the abnormality is output.

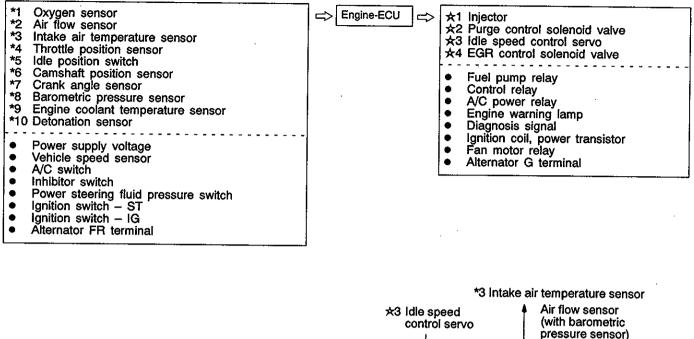
- The RAM data inside the engine-ECU that is related to the sensors and actuators can be read by means of the MUT-II. In addition, the actuators can be force-driven under certain circumstances.
- Air By-pass Control Solenoid Valve Control <MVV>
 - Supplies air without passing through the throttle valve, based on signal from the engine-ECU, when the engine is operating under a lean mixture.
- 5. Purge Control Solenoid Valve Control Refer to GROUP 17.
- 6. EGR Control Solenoid Valve Control Refer to GROUP 17.

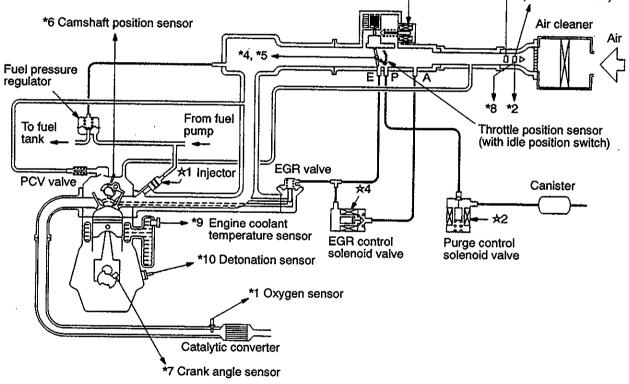
Items		Specifications
Throttle body	Throttle bore mm	46 <mvv> 50 <except mvv=""></except></mvv>
	Throttle position sensor	Variable resistor type
	Idle speed control servo	Stepper motor type (Stepper motor type by-pass air control system with the air volume limiter)
	Idle position switch	Rotary contact type, within throttle position sensor

Items		Specifications
Engine-ECU	Identification model No.	E2T65679 <mvv (vehicles="" immobilizer="" system)="" without=""> E2T65681 <mvv (vehicles="" immobilizer="" system)="" with=""> E2T65678 <except (vehicles="" immobilizer<br="" mvv="" without="">system)> E2T65680 <except (vehicles="" immobilizer<br="" mvv="" with="">system)></except></except></mvv></mvv>
Sensors	Air flow sensor	Karman vortex type
	Barometric pressure sensor	Semiconductor type
Ì	Intake air temperature sensor	Thermistor type
	Engine coolant temperature sensor	Thermistor type
	Oxygen sensor	Zirconia type
	Vehicle speed sensor	Magnetic resistive element type
	Inhibitor switch	Contact switch type
	Camshaft position sensor	Hall element type
	Crank angle sensor	Hall element type
	Detonation sensor	Piezoelectric type
	Power steering fluid pressure switch	Contact switch type
Actuators	Control relay type	Contact switch type
	Fuel pump relay type	Contact switch type
	Injector type and number	Electromagnetic type, 4
	Injector identification mark	CDH210 <except mvv=""> CDH210N <mvv></mvv></except>
	EGR control solenoid valve	Duty cycle type solenoid valve
	Purge control solenoid valve	ON/OFF type solenoid valve
	Air by-pass control solenoid valve	ON/OFF type solenoid valve
Fuel pressure regulator	Regulator pressure kPa	329

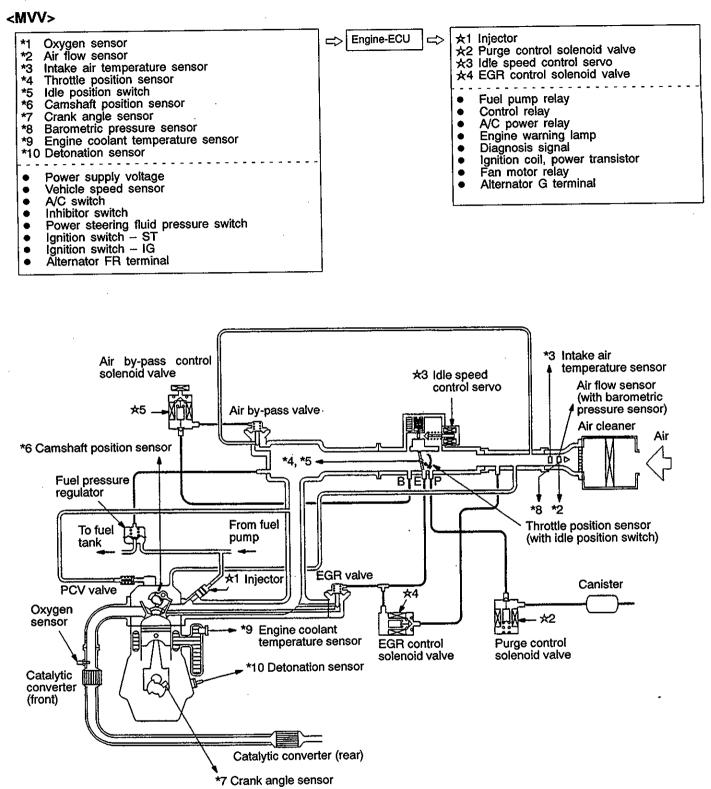
MULTIPOINT FUEL INJECTION SYSTEM DIAGRAM

<Except MVV>





9FU0635



9FU0636

SERVICE SPECIFICATIONS

13100030148

Items		Specifications
Basic idle speed r/min	Except MVV	750±50
	MVV	700±50
Idle speed when A/C is ON r/min		850 at neutral position
Throttle position sensor adjusting voltage mV		400-1,000
Throttle position sensor resistance $k\Omega$		3.5-6.5
Idle speed control servo coil resistance Ω		28–33 (at 20°C)
Intake air temperature sensor resistance $k\Omega$	20°C	2.3-3.0
	80°C	0.30-0.42
Engine coolant temperature sensor resistance $k\Omega$	20°C	2.1–2.7
	80°C	0.260.36
Oxygen sensor output voltage V		0.6–1.0
Fuel pressure kPa	Vacuum hose disconnection	324–343 at curb idle
	Vacuum hose connection	Approx. 265 at curb idle
Injector coil resistance Ω		13-16 (at 20°C)
Air by-pass control solenoid valve coil resistance <mvv> Ω</mvv>		36-44 (at 20°C)

SEALANT

13100050038

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Item	Specified sealant	Remark
Engine coolant temperature sensor threaded portion	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

SPECIAL TOOLS

13100060130

13A-101

Tool	Number	Name	Use
A B	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe	 Fuel gauge simple inspection A: Connector pin contact pressure inspection B, C: Power circuit inspection D: Commercial tester connection
		•	
	MB991502	MUT-II sub assembly	 Reading diagnosis code MPI system inspection
	MB991348	Test harness set	Inspection using an analyzer
- A	MB991519	Alternator harness connector	Measurement of voltage during troubleshooting
	MD998463	Test harness (6-pin, square)	 Inspection of idle speed control servo Inspection using an analyzer
	MD998464	Test harness (4-pin, square)	Inspection of oxygen sensor
S	MD998478	Test harness (3-pin, triangle)	Inspection using an analyzer

13A-102

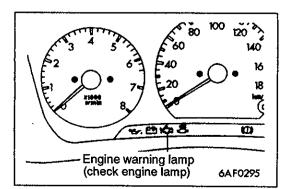
Tool	Number	Name	Use
	MD998709	Adaptor hose	Measurement of fuel pressure
E	MD998742	Hose adaptor	
	MD998706	Injector test set	Checking the spray condition of injectors
мв991607	MB991607	Injector test harness	
MD928741	MD998741	Injector test adaptor	
	MB991608	Clip	

TROUBLESHOOTING

13100850034

DIAGNOSIS TROUBLESHOOTING FLOW

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



DIAGNOSIS FUNCTION

13100860136

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

If an abnormality occurs in any of the following items related to the Multipoint Fuel Injection (MPI) system, the engine warning lamp will illuminate.

If the lamp remains illuminated or if the lamp illuminates while the engine is running, check the diagnosis code output.

Engine warning lamp inspection items

Engine-ECU
Oxygen sensor
Air flow sensor
Intake air temperature sensor
Throttle position sensor
Engine coolant temperature sensor
Crank angle sensor
Camshaft position sensor
Barometric pressure sensor
Detonation sensor
Injector
Ignition coil, power transister
Immobilizer system

METHOD OF READING AND ERASING DIAGNOSIS CODES

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

INSPECTION USING MUT-II DATA LIST AND ACTUATOR TESTING

Refer to P.13A-9.

FAIL-SAFE FUNCTION REFERENCE TABLE

13100910138

1

When the main sensor malfunctions are detected by the diagnosis function, the vehicle is controlled by means of the pre-set control logic to maintain safe conditions for driving.

Malfunctioning item	Control contents during malfunction		
Air flow sensor	 Uses the throttle position sensor signal and engine speed signal (crank angle sensor signal) to take reading of the basic injector drive time and basic ignition timing from the pre-set mapping. Fixes the ISC servo in the appointed position so idle control is not performed. 		
Intake air temperature sensor	Controls as if the intake air temperature is 25°C.		
Throttle position sensor (TPS)	No increase in fuel injection amount during acceleration due to the throttle position sensor signal.		
Engine coolant temperature sensor	Controls as if the engine coolant temperature is 80°C.		
Camshaft position sensor	Cuts off the fuel supply 4 seconds after a problem is detected. (However, after the ignition switch is turned to ON, the No. 1 cylinder top dead centre is detected at all.)		
Barometric pressure sensor	Controls as if the barometric pressure is 101 kPa.		
Detonation sensor	Switches the ignition timing from ignition timing for super petrol to ignition timing for standard petrol.		
Ignition coil, power transistor	Cuts off the fuel supply to cylinders with an abnormal ignition.		
Oxygen sensor	or Air/fuel ratio feedback control (closed loop control) is not performed.		
Communication wire with transmission control unit 	Ignition timing is not retarded during transmission gear shifting (overall engine and transmission control).		
Alternator FR terminal	FR terminal Does not control the output of the alternator according to an electrical load. (works as normal alternator)		

INSPECTION CHART FOR DIAGNOSIS CODES

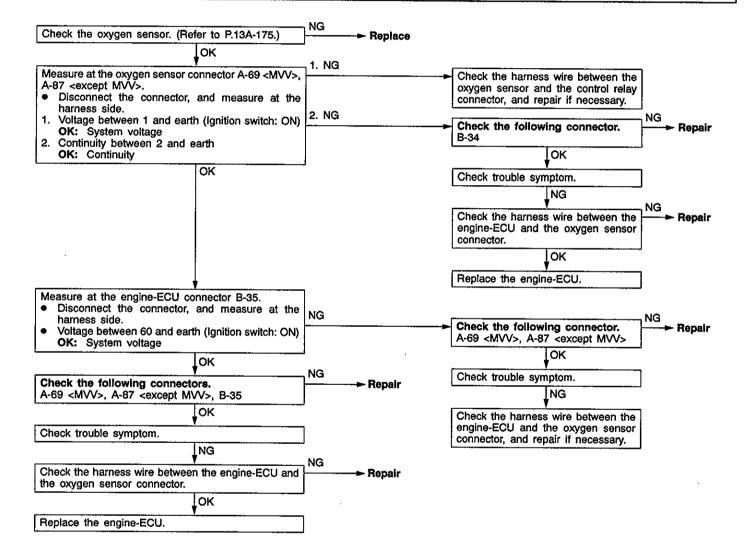
13100870139

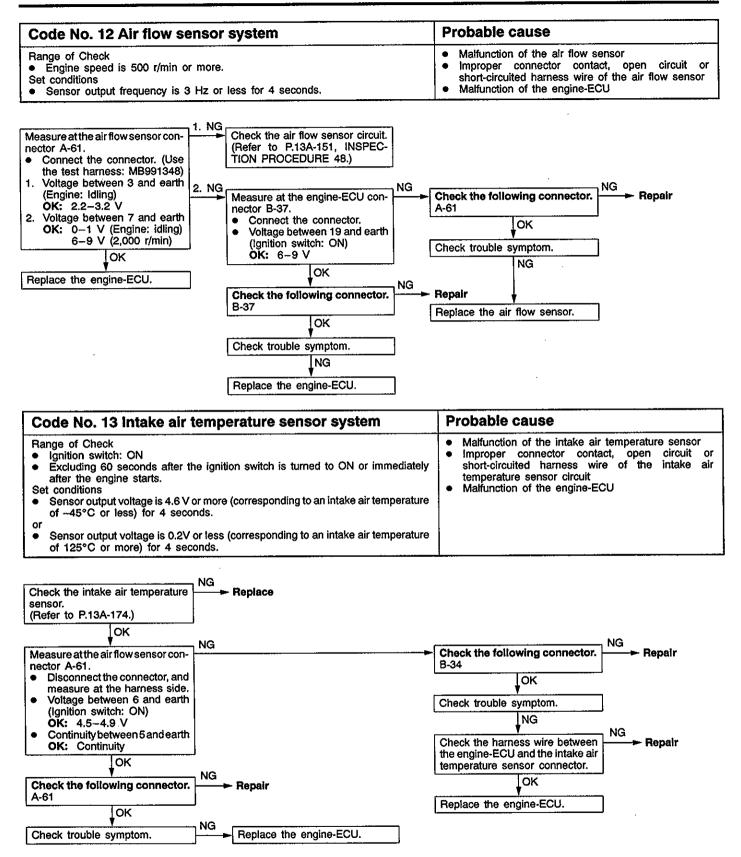
Code No.	Diagnosis item	Reference page
11	Oxygen sensor system	13A-106
12	Air flow sensor system	13A-107
13	Intake air temperature sensor system	13A-107
14	Throttle position sensor system	13A-108
21	Engine coolant temperature sensor system	13A-109
22	Crank angle sensor system	13A-110
23	Camshaft position sensor	13A-111
24	Vehicle speed sensor system	13A-112
25	Barometric pressure sensor system	13A-113
31	Detonation sensor system	13A-114
41	Injector system	13A-114
44	Ignition coil and power transistor unit system	13A-115
54	Immobilizer system	13A-116
61	Communication wire with A/T-ECU system 	13A-116
64	Alternator FR terminal system	13A-117

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INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. 11 Oxygen sensor system	Probable cause
 Range of Check 3 minutes have passed after engine was started. Engine coolant temperature is approx. 80°C or more. Intake air temperature is 20-50°C. Engine speed is approx. 2,000-3,000 r/min Vehicle is moving at constant speed on a flat, level road surface Set conditions The oxygen sensor output voltage is around 0.6 V for 30 seconds (does not cross 0.6 V for 30 seconds). When the range of check operations given above which accompany starting of the engine are carried out four time in succession, a problem is detected after each operation. 	 Malfunction of the oxygen sensor Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU

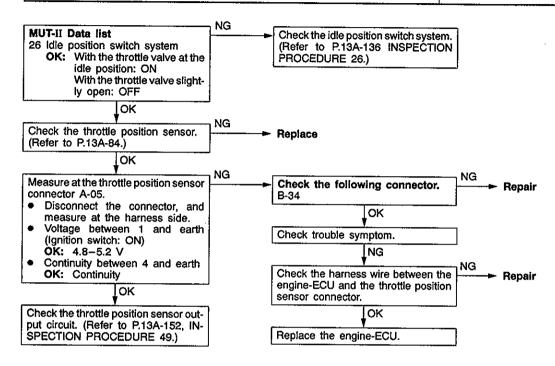




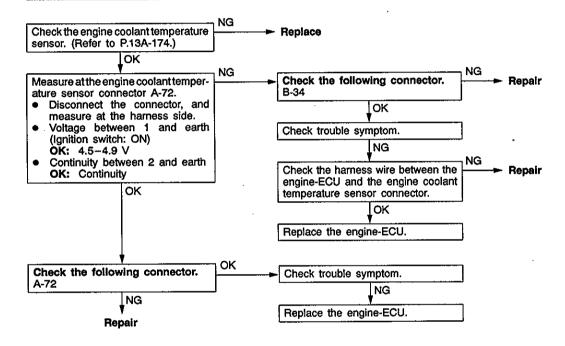
13A-108

MPI <4G9> - Troubleshooting

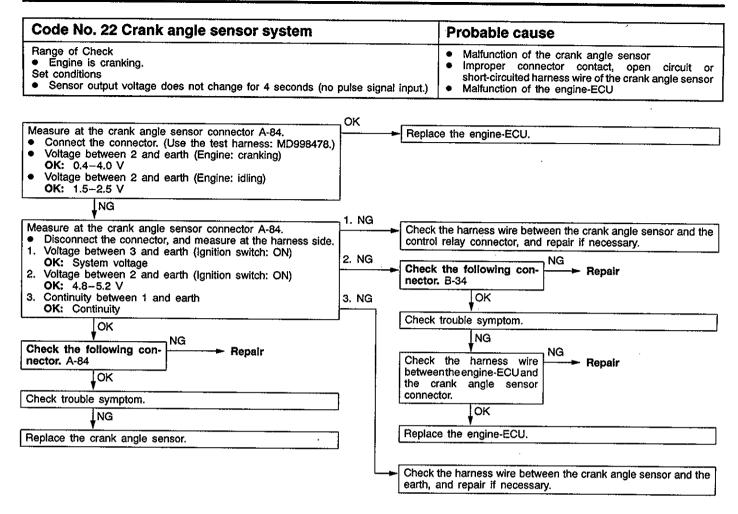
Code No. 14 Throttle position sensor system	Probable cause
 Range of Check Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions When the idle position switch is ON, the sensor output voltage is 2 V or more for 4 seconds. or The sensor output voltage is 0.2 V or less for 4 seconds. 	 Malfunction of the throttle position sensor or maladjustment Improper connector contact, open circuit or short-circuited harness wire of the throttle position sensor circuit Improper "ON" state of idle position switch Short circuit of the idle position switch signal line Malfunction of the engine-ECU

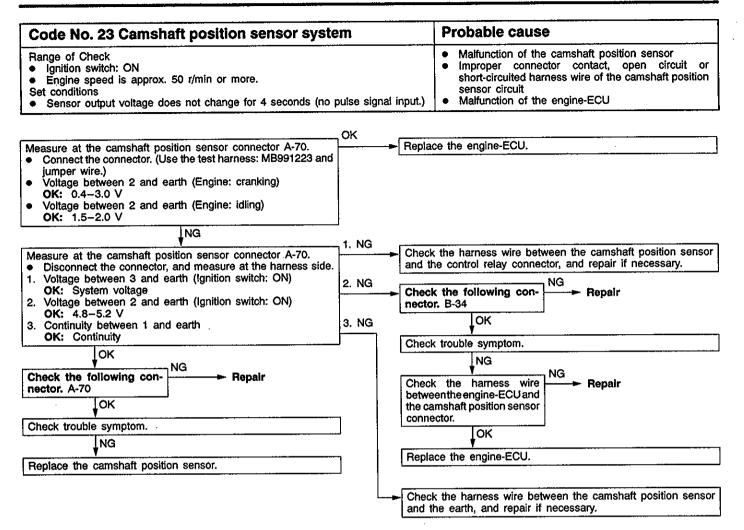


Code No. 21 Engine coolant temperature sensor system	Probable cause
 Range of Check Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions Sensor output voltage is 4.6 V or more (corresponding to an engine coolant temperature of -45°C or less) for 4 seconds. or Sensor output voltage is 0.1 V or less (corresponding to an engine coolant temperature of 140°C or more) for 4 seconds. 	 Malfunction of the engine coolant temperature sensor Improper connector contact, open circuit or short-circuited harness wire of the engine coolant temperature sensor circuit Malfunction of the engine-ECU
 Range of Check Ignition switch: ON Engine speed is approx. 50 r/min or more Set conditions The sensor output voltage increases from 1.6 V or less (corresponding to an engine coolant temperature of 40°C or more) to 1.6 V or more (corresponding to an engine coolant temperature of 40°C or less). After this, the sensor output voltage is 1.6 V or more for 5 minutes. 	



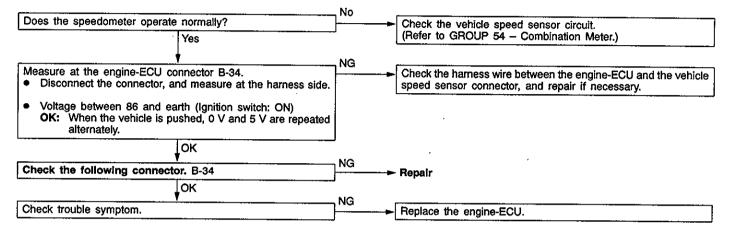
13A-110





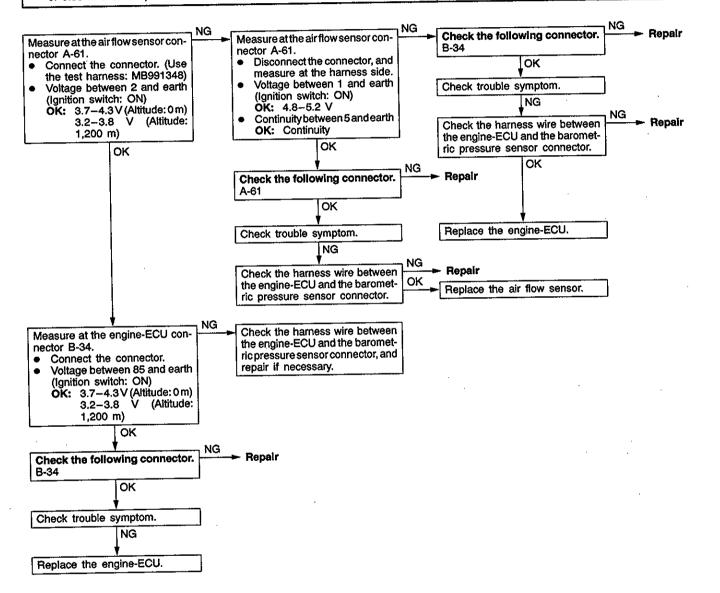
13A-112

Code No. 24 Vehicles speed sensor system	Probable cause	
 Range of check Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Idle position switch: OFF Engine speed is 3,000 r/min or more. Driving under high engine load conditions. Set conditions Sensor output voltage does not change for 4 seconds (no pulse signal input). 	 Malfunction of the vehicle speed sensor Improper connector contact, open circuit or short-circuited harness wire of the vehicle speed sensor circuit Malfunction of the engine-ECU 	



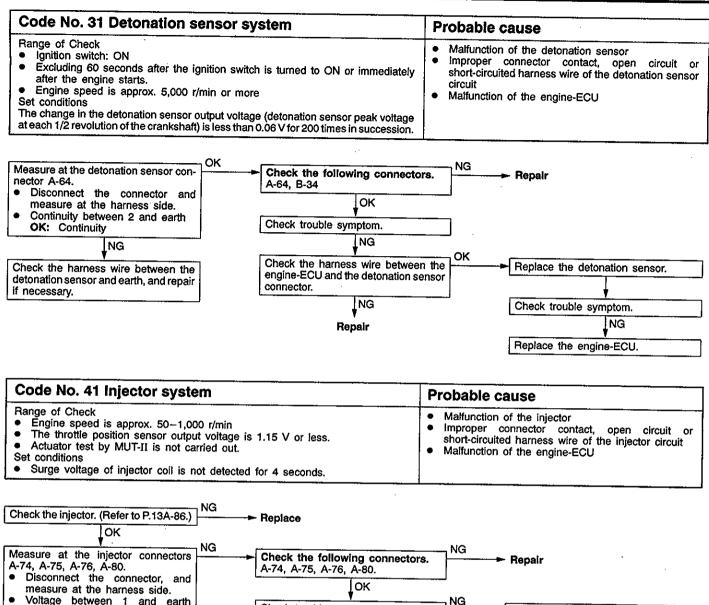
1

Code No. 25 Barometric pressure sensor system	Probable cause
 Range of Check Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Battery voltage is 8 V or more. Set conditions Sensor output voltage is 4.5 V or more (corresponding to a barometric pressure of 114 kPa or more) for 4 seconds. or Sensor output voltage is 0.2 V or less (corresponding to a barometric pressure of 5.33 kPa or less) for 4 seconds. 	Malfunction of the engine-ECU



13A-114

MPI <4G9> - Troubleshooting



Check trouble symptom.

 Voltage between 1 and earth (Ignition switch: ON)
 OK: System voltage

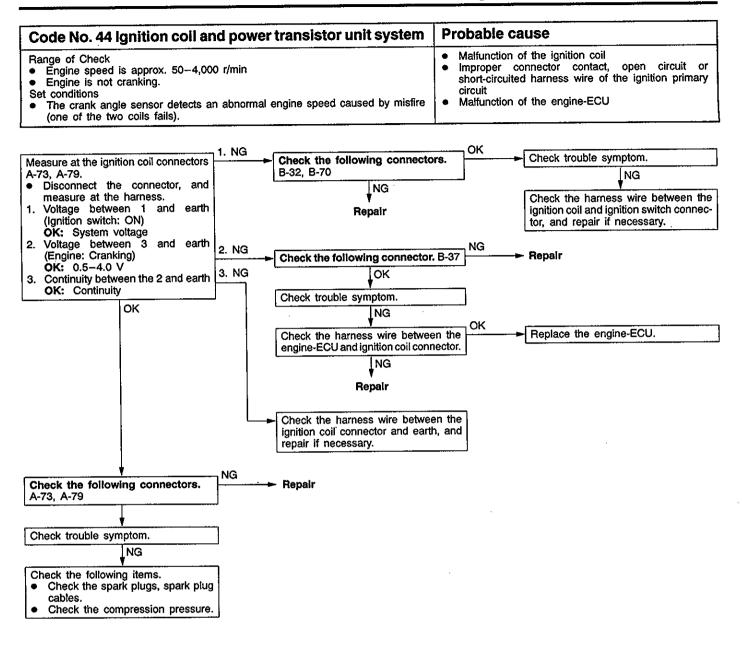
OK Check the injector control circuit. (Refer to P.13A-152, INSPECTION PROCEDURE 50.)

Check the harness wire between the

engine-ECU and the injector connector,

and repair if necessary.

6



Code No.54 Immobilizer system	Probable cause
Range of Check Ignition switch: ON Set Conditions Improper communication between the engine-ECU and immobilizer-ECU 	 Radio interference of ID codes Incorrect ID code Malfunction of harness or connector Malfunction of immobilizer-ECU Malfunction of engine-ECU

NOTE

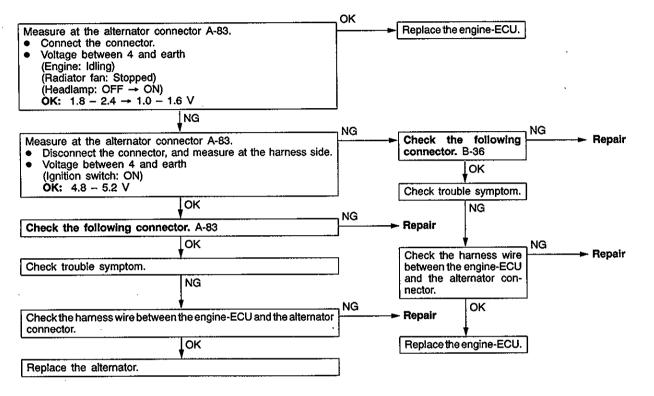
- (1) If the ignition switches are close each other when starting the engine, radio interference may cause (1) If the ignition of the bed splayed.(2) This code may be displayed when registering the key ID code.

	_ Yes			
Is there another ignition key near the ignition key that is inserted in the ignition switch?			Remove the extra ignition key.	
	_J	NG	Check trouble symptom.	
No	Vaa	Ĺ		
Is a diagnosis code output from the immobilizer-ECU?	Yes		Check the immobilizer system. (Refer to GROUP 54 - Ignition Switch and Immobilizer System.)	
Check the following connectors. B-24, B-32, B-35	NG		Repair	
ок 				
Check trouble symptom.]			
NG	_ _ ок			
Check the harness wire between the engine-ECU and the immobiliz- er-ECU.	<u></u>	►[Replace the immobilizer-ECU.	
NG	L	-	NG	
Repair		ŀ	Check trouble symptom.	
			NG	
		Γ	Replace the engine ECU.	

Code No. 61 Communication wire with A/T-ECU system 	Probable cause
 Range of Check 60 seconds or more have passed immediately after engine was started. Engine speed is approx. 50 r/min or more Set conditions The voltage of the torque reduction request signal from the A/T-ECU is LOW for 1.5 seconds or more. 	 Malfunction of the harness wire and the connector Malfunction of the engine-ECU Malfunction of the A/T-ECU

Check the following connec B-35, B-37, B-39	tors.		Repair	
	ок	1		
Check trouble symptom.		1		
	NG			
Check the harness wire between connector.	the engine-ECU and the A/T-ECU		Replace the engine-ECU.	
	ING	J		.
. Repair		Check trouble symptom.		
			NG	
			Replace the A/T-ECU.	

Code No. 64 Alternator FR Terminal System Probable cause Range of Check, Set Conditions • Open circuit in alternator FR terminal signal voltage remains high for approximately 20 seconds while the engine is running. • Open circuit in alternator FR terminal circuit



INSPECTION CHART FOR TROUBLE SYMPTOMS

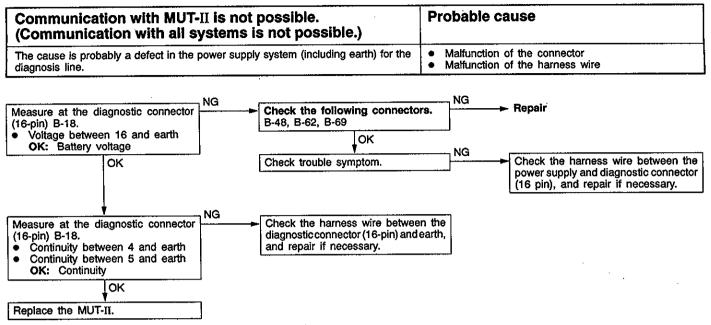
13100880132

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is	Communication with all systems is not possible.	1	13A-119
impossible.	Communication with engine-ECU only is not possible.	2	13A-120
Engine warning lamp and related parts	The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position.	3	13A-121
	The engine warning lamp remains illuminating and never goes out.	4	13A-121
Starting	No initial combustion (starting impossible)	5	13A-122
	Initial combustion but no complete combustion (starting impossible)	6	13A-123
	Long time to start (improper starting)	7	13A-124
Idling stability (Improper idling)	Unstable idling (Rough idling, hunting)	8	13A-125
(improper using)	Idling speed is high. (Improper idling speed)	9	13A-126
	Idling speed is low. (Improper idling speed)	10	13A-127
Idling stability (Engine stalls)	When the engine is cold, it stalls at idling. (Die out)	11	13A-128
	When the engine becomes hot, it stalls at idling. (Die out)	12	13A-129
	The engine stalls when starting the car. (Pass out)	13	13A-130
	The engine stalls when decelerating.	14	13A-130
Driving	Hesitation, sag or stumble	15	13A-131
	The feeling of impact or vibration when accelerating	16	13A-131
	The feeling of impact or vibration when decelerating	17	13A-132
	Poor acceleration	18	13A-132
	Surge	19	13A-133
	Knocking	20	13A-133
Dieseling		21	13A-133
Too high CO and	HC concentration when idling	22	13A-134
Low alternator ou	tput voltage (approx. 12.3 V)	23	13A-135

PROBLEM SYMPTOMS TABLE (FOR YOUR INFORMATION)

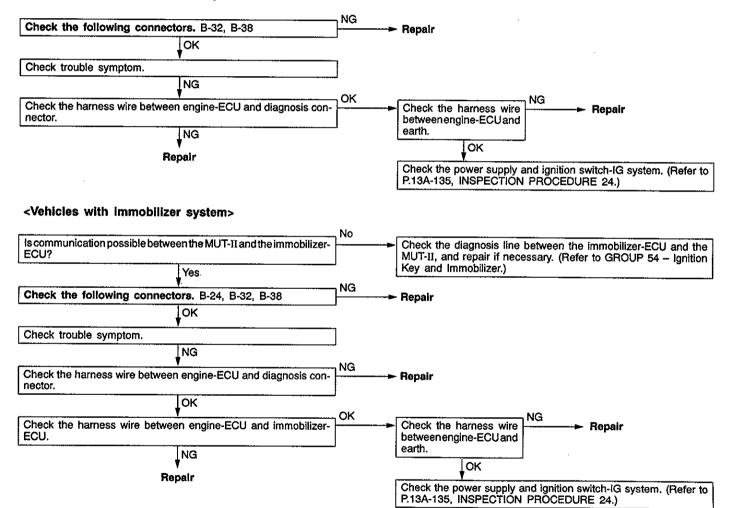
Refer to P.13A-24.

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

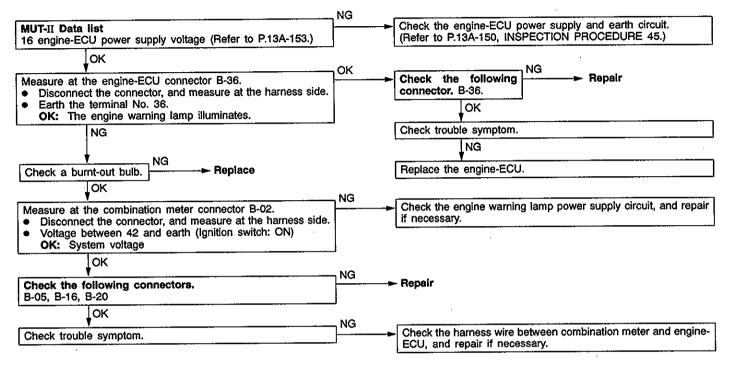


MUT-II communication with engine-ECU is impossible.	Probable cause		
 One of the following causes may be suspected. No power supply to engine-ECU. Defective earth circuit of engine-ECU. Defective engine-ECU. Improper communication line between engine-ECU and MUT-II 	 <vehicles immobilizer="" system="" without=""></vehicles> Malfunction of engine-ECU power supply circuit Malfunction of engine-ECU Open circuit between engine-ECU and diagnosis connector <vehicles immobilizer="" system="" with=""></vehicles> Malfunction of engine-ECU power supply circuit Malfunction of engine-ECU Malfunction of engine-ECU Malfunction of engine-ECU Malfunction of immobilizer-ECU Open circuit between immobilizer-ECU and diagnosis connector Open circuit between engine-ECU and mobilizer-ECU 		

<Vehicles without immobilizer system>



The engine warning lamp does not illuminate right after
the ignition switch is turned to the ON position.Probable causeBecause there is a burnt-out bulb, the engine-ECU causes the engine warning lamp
to illuminate for five seconds immediately after the ignition switch is turned to ON.
If the engine warning lamp does not illuminate immediately after the ignition switch
is turned to ON, one of the malfunctions listed at right has probably occurred. Burnt-out bulbDefective warning lamp circuitMalfunction of the engine-ECU



The engine warning lamp remains illuminating and never goes out. In cases such as the above, the cause is probably that the engine-ECU is detecting a problem in a sensor or actuator, or that one of the malfunctions listed at right has occurred.		 Probable cause Short-circuit between the engine warning lamp and engine-ECU Malfunction of the engine-ECU 	
No Measure at the combination meter connector B-02. Disconnect the connector, and measure at the harness side. Disconnect the engine-ECU connector Continuity between 53 and earth OK: No continuity	1 1 1 1 1 1 1 1	k the harness wire between combination meter and engine- connector, and repair if necessary.	
OK Replace the engine-ECU.	- 7		

No initial combustion (starting impossible) In cases such as the above, the cause is probably that a spark plug is defective, or that the supply of fuel to the combustion chamber is defective. In addition, foreign materials (water, kerosene, etc.) may be mixed with the fuel.		 Malfunction of the fuel nump evotom 	
Check battery voltage when cranking. OK: 8 V or higher	Chec	k the battery. (Refer to GROUP 54 - Battery.)	
Įок			
Is immobilizer-ECU diagnosis code displayed? <only immobilizer="" system="" vehicles="" with=""></only>		k the immobilizer. r to GROUP 54 - Ignition Key and Immobilizer.)	
No	-		
MUT-II: Inspection of no initial combustion. (Refer to P.13A-144, INSPECTION PROCEDURE 37.)]		
ОК			
Can any sound be heard from the injectors when cranking?		kthe injector system. (Refer to P.13A-114, INSPECTION PRO-	
ОК	CEDU	JRE FOR DIAGNOSIS CODE 41.)	
Ignition system: Inspection of no initial combustion. (Refer to P.13A-144, INSPECTION PROCEDURE 38.)			
OK	-		
 Check the following items. Check the ignition coil, spark plugs, spark plug cables. (Re Check if the injectors are clogged. Check if foreign materials (water, alcohol, etc.) got into fuel Check the compression pressure 		- On-vehicle service.)	

Check the immobilizer system. (Refer to GROUP 54 – Ignition Key and Immobilizer.) <only vehicles with immobilizer system>

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Initial combustion but no complete combustion (starting impossible)		Probable cause	
In such cases as the above, the cause is probably that the spark plugs are generating sparks but the sparks are weak, or the initial mixture for starting is not appropriate.		 Malfunction of the ignition system Malfunction of the injector system Foreign materials in fuel Poor compression Malfunction of the engine-ECU 	
Check battery voltage when cranking. OK: 8 V or higher	NG	the battery. (Refer to GROUP	54 - Battery.)
OK MUT-II: Check if uncompleted combustion occurs. (Refer to P.13A-145, INSPECTION PROCEDURE 39.) OK Can any sound be heard from the injectors when cranking? OK Is starting good if the engine is cranked with the accelerator pedal slightly depressed? No	Yes Check eratio (Refe	ktheinjectorsystem, (Referto P.13/ JRE FOR DIAGNOSIS CODE 4 k ISC servo for op- on sound. r to P.13A-175.) OK lean the throttle valve area. (Ref theck and adjust the fixed SAS.	i.) Check the ISC servo sys- tem. (Refer to P.13A-141, INSPECTION PROCE- DURE 33.) fer to P.13A-75.)
Check the ignition timing when cranking. OK: Approx. 5°BTDC OK Check the following items. • Check the ignition coil, spark plugs, spark plug cables. (Re • Check if the injectors are clogged. • Check the compression pressure. (Refer to GROUP 11B –	Pefer to GROUP 16	k that the crank angle sensor is - On-vehicle Service.)	

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Check if foreign materials (water, alcohol, etc.) got into fuel.

I.

Malfunction of the ignition system Malfunction of the injector system Inappropriate gasoline use Poor compression
e battery. (Refer to GROUP 54 - Battery.)
einjectorsystem. (Referto P.13A-114, INSPECTION PRO- FOR DIAGNOSIS CODE 41.)
at the crank angle sensor is installed properly.

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Check the compression pressure. (Refer to GROUP 11B – On-vehicle Service.)
 Check if foreign materials (water, alcohol, etc.) got into fuel.

Unstable idling (Rough idling, hunting)		Probable cause	
In cases as the above, the cause is probably that the ignition system, air/fuel mixture, idle speed control (ISC) or compression pressure is defective. Because the range of possible causes is broad, inspection is narrowed down to simple items.		 Manunction of air-fuel ratio control system 	
	Yes	After warming-up, let the engine run at idling for 10 minutes.	
Were the battery terminals disconnected?		Alter washing-up, let the engine full at taking for to mintereor	
No	Yes		
MUT-II Self-Diag code	}►	Refer to P.13A-105, INSPECTION CHART FOR DIAGNOSIS	
Are diagnosis codes displayed?		CODES.	
↓No	Yes		
Does idling speed fluctuate excessively?	>	Check if hunting occurs.	
No	J	(Refer to P.13A-145, INSPECTION PROCEDURE 40.)	
		Check the ISC servo system.	
Check the ISC servo for operation sound. (Refer to P.13A-175.)	J <u></u>	(Refer to P.13A-141, INSPECTION PROCEDURE 33.)	
OK	_ NG		
Check the injector for operation sound.		Checktheinjectorsystem. (Refer to P.13A-114, INSPECTION PRO- CEDURE FOR DIAGNOSIS CODE 41.)	
ОК	_	CEDURE FOR DIAGNOSIS CODE 41.9	
MUT-II: Check if idling speed is unstable. (Refer to P.13A-146, INSPECTION PROCEDURE 41.)			
ок			
Check the ignition timing. (Refer to GROUP 11B – On-vehicle Service.)	¬NG	Check that the crank angle sensor is installed properly.	
, ок			
 Check the following items. Check the ignition coil, spark plugs, spark plug cables. (Refer to GROUP 16 – On-vehicle Service.) Check the purge control system. (Refer to GROUP 17 – Emission Control System.) Check the EGR control system. (Refer to GROUP 17 – Emission Control System.) Check the compression pressure. (Refer to GROUP 11B – On-vehicle Service.) Check if foreign materials (water, alcohol, etc.) got into fuel. 			

Check if foreign materials (water, alcohol, etc.) got into fuel.

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Idling speed is high. (Improper idling speed	i)	Probable cause
In such cases as the above, the cause is probably that the intake air volume during idling is too great.		 Malfunction of the ISC servo system Malfunction of the throttle body
MUT-II Self-Diag code Are diagnosis codes displayed?	Yes Refu COI	er to P.13A-105, INSPECTION CHART FOR DIAGNOSIS DES.
Check the ISC servo for operation sound. (Refer to P.13A-175.) OK	Che (Ref	ck the ISC servo system. er to P.13A-141, INSPECTION PROCEDURE 33.)
MUT-II Data list 26 Idle position switch (Refer to P.13A-153.)	NG Che (Ref	ck the idle position switch system. er to P.13A-136, INSPECTION PROCEDURE 26.)
OK MUT-II Data list 21 Engine coolant temperature sensor (Refer to P.13A-153.) OK	(Ref	ck the engine coolant temperature sensor system. er to P.13A-109, INSPECTION PROCEDURE FOR DIAGNO- CODE 21.)
MUT-II Data list 28 A/C switch (Refer to P.13A-153.)	NG Che (Ref	ck the A/C switch and A/C relay system. er to P.13A-139, INSPECTION PROCEDURE 30.)
Basic idle adjustment (Refer to P.13A-171.)		n the throttle valve area. (Refer to P.13A-75.)
		k and adjust the fixed SAS. (Refer to P.13A-76.)

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Idling speed is low. (Improper idling speed)			Probable cause	
In cases such as the above, the cause is probably that the intake air volume during idling is too small.		during	 Malfunction of the ISC servo system Malfunction of the throttle body 	
	Yes			
MUT-II Self-Diag code Are diagnosis codes displayed?	Refer to P.13, CODES.		to P.13A-105, INSPECTION CHART FOR DIAGNOSIS 3.	
No	NG			
Check the ISC servo for operation sound. (Refer to P.13A-175.)	} 		the ISC servo system. to P.13A-141, INSPECTION PROCEDURE 33.)	
MUT-II Data list 26 Idle position switch (Refer to P.13A-153.)	NG		the idle position switch system. to P.13A-136, INSPECTION PROCEDURE 26.)	
ок	_ NG			
MUT-II Data list 21 Engine coolant temperature sensor (Refer to P.13A-153.)	Check (Refer		the engine coolant temperature sensor system. to P.13A-109, INSPECTION PROCEDURE FOR DIAGNO- DDE 21.)	
OK	- NG		·	
MUT-II Data list 29 Inhibitor switch (Refer to P.13A-153.)	>		the ignition switch ST and inhibitor switch system . to P.13A-138, INSPECTION PROCEDURE 28.)	
ок	_			
Basic idle adjustment (Refer to P.13A-171.)]			
Check trouble symptom.	NG	Clean	the throttle valve area. (Refer to P.13A-75.)	
		Check	and adjust the fixed SAS. (Refer to P.13A-76.)	

When the engine is cold, it stalls at idling. (Die out)		Probable cause	
In such cases as the above, the cause is probably that the air/fuel mixture is inappropriate when the engine is cold, or that the intake air volume is insufficient.		 Malfunction of the ISC servo system Malfunction of the throttle body Malfunction of the injector system Malfunction of the ignition system 	
	_ Yes		
Were the battery terminals disconnected?	_ 185	After v	varming-up, let the engine run at idling for 10 minutes.
No			
MUT-II Self-Dlag code Are diagnosis codes displayed?	- Yes	Refer	to P.13A-105, INSPECTION CHART FOR DIAGNOSIS S.
No	J	L	
Does the engine stall right after the accelerator pedal is released?]		the throttle valve Refer to P.13A-75.) Check and adjust the fixed SAS. (Refer to P.13A-76.)
In ongine idline stable after the warming up0	No ر	Oheel	
Is engine-idling stable after the warming-up? Yes	•	Refer	if the unstable idling (Rough idling, hunting). to P.13A-125, INSPECTION PROCEDURE 8.)
	, NG		
Check the ISC servo for operation sound. (Refer to P.13A-175.) OK	} •		the ISC servo system. to P.13A-141, INSPECTION PROCEDURE 33.)
	_n NG		
Check the injector for operation sound. OK	<u> </u>	CEDU	the injectorsystem. (Refer to P.13A-114, INSPECTION PRO- RE FOR DIAGNOSIS CODE 41.)
	¬ NG		
MUT-II Data list 26 Idle position switch (Refer to P.13A-153.)	•		the idle position switch system. to P.13A-136, INSPECTION PROCEDURE 26.)
OK			
MUT-II Data list 21 Engine coolant temperature sensor (Refer to P.13A-153.)	NG 	(Refer	the engine coolant temperature sensor system. to P.13A-109, INSPECTION PROCEDURE FOR DIAGNO- DDE 21.)
ок			50C 21.)
MUT-II Actuator test 10 EGR control solenoid valve (Refer to P.13A-158.)	NG		the EGR control solenoid valve system. (Refer to P.13A-142, CTION PROCEDURE 35.)
	J	INGPE	
MUT-II Actuator test	ר NG		
18 Air by-pass control solenoid valve <mvv> (Refer to P.13A-158.)</mvv>	•	P.13A-1	the air by-pass control solenoid valve system. (Refer to 143, INSPECTION PROCEDURE 36.)
OK			
Check the fuel pressure. (Refer to P.13A-78.)]		
ок			
Check the ignition timing. (Refer to GROUP 11B – On-vehicle Service.)	NG	Check	that the crank angle sensor is installed properly.
ОК	-		
 Check the following items. Check the ignition coil, spark plugs, spark plug cables. (Re Check the compression pressure. (Refer to GROUP 11B – 	fer to GRO	UP 16 -	On-vehicle Service.)

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Check the compression pressure. (Refer to GROUP 11B
 Check the engine oil viscosity.

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INSPECTION PROCEDURE 12

When the engine is hot, it stalls at idling. (Die out)		Probable cause	
In such cases as the above, the cause is probably that ignition system, air/fuel mixture, idle speed control (ISC) or compression pressure is defective. In addition, if the engine suddenly stalls, the cause may also be a defective connector contact.		 Malfunction of the ignition system Malfunction of air-fuel ratio control system Malfunction of the ISC system Drawing air into intake system Improper connector contact 	
	Yes		
Were the battery terminals disconnected?	<u>}</u> ►	After v	warming-up, let the engine run at idling for 10 minutes.
No	- _ Yes		· · · · · · · · · · · · · · · · · · ·
MUT-II Self-Diag code Are diagnosis codes displayed?		Refer CODE	to P.13A-105, INSPECTION CHART FOR DIAGNOSIS
No	NG	Chaok	the ISC servo system.
Check the ISC servo for operation sound. (Refer to P.13A-175.) OK	}	(Refer	to P.13A-141, INSPECTION PROCEDURE 33.)
Check the injector for operation sound.	_NG }►	Check	the injector system. (Refer to P.13A-114, INSPECTION PRO- IRE FOR DIAGNOSIS CODE 41.)
ок	- Yes		
Does the engine stall right after the accelerator pedal is released? No	>		the throttle valve Check and adjust the fixed SAS. (Refer to P.13A-75.) (Refer to P.13A-76.)
Does the engine stall easily again?	No	While	carrying out an intermittent malfunction simulation test (Refer
Yes	٢	to GR for su	OUP 00-Points to Note for Intermittent Malfunctions.), check udden changes in the signals shown below.
MUT-II: Engine stalling inspection when the engine is warm and idling. (Refer to P.13A-147, INSPECTION PROCEDURE 42.) OK]	Ai	 Primary and secondary ignition signal Fuel pump drive signal Engine-ECUpowersupply voltage
	NG		
Check the ignition timing. (Refer to GROUP 11B – On-vehicle Service.)		- Checi	k that the crank angle sensor is installed properly.
ок	-		
Check the following items. • Check the ignition coil, spark plugs, spark plug cables. (Re • Check if the injectors are clogged.			

Check the compression pressure. (Refer to GROUP 11B – On-vehicle Service.)
 Check if foreign materials (water, alcohol, etc.) got into fuel.

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The engine stalls when starting the car. (Pass out)		Probable cause	
In cases such as the above, the cause is probably misfiring due to a weak spark, or an inappropriate air/fuel mixture when the accelerator pedal is depressed.		spark, d.	 Drawing air into intake system Malfunction of the ignition system
MUT-II Self-Diag code Are diagnosis codes displayed?	Yes	Refer CODE	to P.13A-105, INSPECTION CHART FOR DIAGNOSIS S.
MUT-II Actuator test 10 EGR control solenoid valve (Refer to P.13A-158.) OK	NG		the EGR control solenoid valve system. (Refer to P.13A-142, CTION PROCEDURE 35.)
MUT-II Actuator test 18 Air by-pass control solenoid valve <mvv> (Refer to P.13A-158.)</mvv>	NG		the air by-pass control solenoid valve system. (Refer to 143, INSPECTION PROCEDURE 36.)
OK Check the following items. • Check the ignition coil, spark plugs, spark plug cables. (Re • Check if air was drawn into the intake system. Broken intake manifold gasket Broken or disconnected vacuum hose Improper operation of the PCV valve Broken air intake hose	fer to GROU	P 16 –	On-vehicle Service.)

INSPECTION PROCEDURE 14

The engine stalls when decelerating.	Probable cause
In cases such as the above, the cause is probably that the intake air volume is insufficient due to a defective idle speed control (ISC) servo system.	Malfunction of the ISC system

	_ Yes	
Were the battery terminals disconnected?		After warming-up, let the engine run at idling for 10 minutes.
No	- Yes	
MUT-II Self-Diag code Are diagnosis codes displayed?		Refer to P.13A-105, INSPECTION CHART FOR DIAGNOSIS CODES.
No	-	
MUT-II Data list 26 Idle position switch (Refer to P.13A-153.)		Check the idle position switch system. (Refer to P.13A-136, INSPECTION PROCEDURE 26.)
ок		
MUT-II Data list 14 Throttle position sensor (Refer to P.13A-153.)	} <mark>NG</mark>	Check the throttle position sensor system. (Refer to P.13A-108, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 14.)
ок		
 MUT-II Data list 45 ISC servo position Is the idle speed control (ISC) servo position drops to 0-2 steps when decelerating (engine r/min less than 1,000)? 	- Yes	Check the vehicle speed sensor system. (Refer to P.13A-112, IN- SPECTION PROCEDURE FOR DIAGNOSIS CODE 24.)
No	NO	
MUT-II Actuator test 10 EGR control solenoid valve (Refer to P.13A-158.)	_NG ┣	Check the EGR control solenoid valve system. (Refer to P.13A-142, INSPECTION PROCEDURE 35.)
Іок		
MUT-II Actuator test 18 Air by-pass control solenoid valve <mvv> (Refer to P.13A-158.)</mvv>	_NG	Check the air by-pass control solenoid valve system. (Refer to P.13A-143, INSPECTION PROCEDURE 36.)
ОК	-	
Check the following items. Check the ignition coil, spark plugs, spark plug cables. (Re	fer to GROL	JP 16 - On-vehicle Service.)

Clean the throtile valve area.
 Check and adjust the fixed SAS.

Hesitation, sag or stumble In cases such as the above, the cause is probably that ignition system, air/fuel mixture or compression pressure is defective.		Probable cause
		ture Malfunction of the ignition system Malfunction of air-fuel ratio control system Malfunction of the fuel supply system Malfunction of the EGR control solenoid valve system Poor compression
MUT-II Self-Dlag code Are diagnosis codes displayed?		Refer to P.13A-105, INSPECTION CHART FOR DIAGNOSIS CODES.
No		
Check the injectors for operation sound.] <mark>NG</mark> ►	Check the injector system. (Refer to P.13A-114, INSPECTION PRO- CEDURE FOR DIAGNOSIS CODE 41.)
ок	NG	
Check the ignition timing. (Refer to GROUP 11B – On-vehicle Service.)	} [Check that the crank angle sensor is installed properly.
OK		
MUT-II: Check if hesitation, sag, stumble or poor acceleration occur. (Refer to P.13A-148, INSPECTION PROCEDURE 43.)	·]	
ОК	-	
Check the fuel pressure. (Refer to P.13A-78.)]	
ок	- 	
Check the following items. • Check the ignition coil, spark plugs, spark plug cables. (Re • Check the EGB control system. (Befer to GBOUP 17 – E	efer to GROU!	P 16 – On-vehicle Service.) ol System)

- Check the EGR control system. (Refer to GROUP 17 Emission Control System.) Check the compression pressure. (Refer to GROUP 11B On-vehicle Service.) Check the fuel filter or fuel line for clogging.
- •

INSPECTION PROCEDURE 16

The feeling of impact or vibration when accelerating	Probable cause
In cases such as the above, the cause is probably that there is an ignition leak accompanying the increase in the spark plug demand voltage during acceleration.	 Malfunction of the ignition system

	S	TION OUNDE FOR RIADUODIA		
MUT-II Self-Diag code Are diagnosis codes displayed?	CODES.	TION CHART FOR DIAGNOSIS		
No				
Check the following items. Check the ignition coil, spark plugs, spark plug cables. (Refer to GROUP 16 – On-vehicle Service.)				

Check for occurrence of ignition leak.

The feeling of impact or vibration when decelerating.			Probable cause
Malfunction of the ISC system is suspected.			Malfunction of the ISC system
MUT-II Self-Diag code Are diagnosis codes displayed?		Refer CODE	to P.13A-105, INSPECTION CHART FOR DIAGNOSIS S.
No			
Check the ISC servo for operation sound. (Refer to P.13A-175.)	_ NG ►		the ISC servo system.
ок		(Refer	to P.13A-141, INSPECTION PROCEDURE 33.)
MUT-II Data list 14 Throttle position sensor (Refer to P.13A-153.)	NG	Check INSPE	the throttle position sensor system. (Refer to P.13A-108, CTION PROCEDURE FOR DIAGNOSIS CODE 14.)
ок			
MUT-II Data list 26 Idle position switch (Refer to P.13A-153.)			the idle position switch system. to P.13A-136, INSPECTION PROCEDURE 26.)
ОК	-		
Clean the throttle valve area. (Refer to P.13A-75.)	7		
INSPECTION PROCEDURE 18			
Poor acceleration			Probable cause
Defective ignition system, abnormal air-fuel ratio, poor compres are suspected.	ssion pressur	e, etc.	 Malfunction of the ignition system Malfunction of air-fuel ratio control system Malfunction of the fuel supply system Poor compression pressure Clogged exhaust system
MUT-II Self-Diag code Are diagnosis codes displayed?	} }	Refer CODES	O P.13A-105, INSPECTION CHART FOR DIAGNOSIS
No		L	
Check the injectors for operation sound.	NG ►	Checkt	heinjector system. (Refer to P.13A-114, INSPECTION PRO-
OK	-	CEDU	RE FOR DIAGNOSIS CODE 41.)
Check the ignition timing.	NG	Charle	
(Refer to GROUP 11B - On-vehicle Service.)		CHECK	that the crank angle sensor is installed properly.
ок	-		
MUT-II: Check if hesitation, sag, stumble or poor acceleration occur. (Refer to P.13A-148, INSPECTION PROCEDURE 43.)			
OK	-		
Check the fuel pressure. (Refer to P.13A-78.)]		
OK	-		
Check the following items. • Check the ignition coil, spark plugs, spark plug cables. (Re • Check the compression pressure. (Refer to GROUP 11B – • Check the fuel filter or fuel line for clogging. • Broken air intake hose • Clogged air cleaner	fer to GROU On-vehicle S	P 16 – Service.)	On-vehicle Service.)

L

Clogged air cleaner

Surge		Probable cause
Defective ignition system, abnormal air-fuel ratio, etc. are	suspected.	 Malfunction of the Ignition system Malfunction of air-fuel ratio control system Malfunction of the EGR control solenoid valve system
MUT-II Self-Diag code Are diagnosis codes displayed?	Yes Refer CODE	to P.13A-105, INSPECTION CHART FOR DIAGNOSIS
Check the injectors for operation sound.		ktheinjectorsystem. (Referto P.13A-114, INSPECTION PRO- JRE FOR DIAGNOSIS CODE 41.)
Check the ignition timing. (Refer to GROUP 11B – On-vehicle Service.)	NG Checl	k that the crank angle sensor is installed properly.
MUT-II: Check if surge occurs. (Refer to P.13-149, INSPECTION PROCEDURE 44.)		
Check the fuel pressure. (Refer to P.13A-78.)		
Check the following items.		
 Check the ignition coil, spark plugs, spark plug cables. Check the EGR control system. (Refer to GROUP 17 - 	(Refer to GROUP 16 - - Emission Control System	- On-vehicle Service.) tem.)

INSPECTION PROCEDURE 20

Knocking	Probable cause	
In cases as the above, the cause is probably that the detonation control is defective or the heat value of the spark plug is inappropriate.	 Defective detonation sensor Inappropriate heat value of the spark plug 	

MUT-II Self-Diag code Are diagnosis codes displayed?		Refer to P.13A-105, INSPECTION CHART FOR DIAGNOSIS CODES.
No	No -	
Does knocking occur when driving with the sensor disconnected? At this time, use the MUT-II to check if the timing is retarded compared to when the detonation sensor connector is connected.		Check the detonation sensor system. (Refer to P.13A-114, INSPEC- TION PROCEDURE FOR DIAGNOSIS CODE 31.)
Yes		
Check the following items. • Spark plugs • Check if foreign materials (water, alcohol, etc.) got into fuel	• • • • • •	

INSPECTION PROCEDURE 21

Dieseling	Probable cause
Fuel leakage from injectors is suspected.	Fuel leakage from injectors

Check the injectors for fuel leakage.

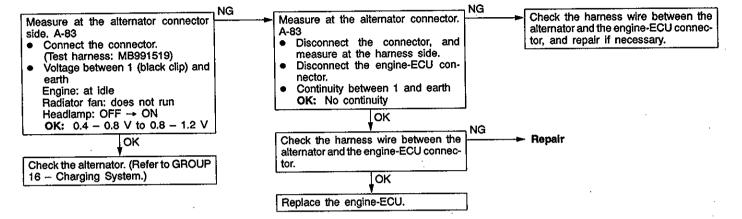
Too high CO and HC concentration when id	ling		Probable cause
Abnormal air-fuel ratio is suspected.			 Malfunction of the air-fuel ratio control system Deteriorated catalyst
MUT-II Self-Diag code Are diagnosis codes displayed?	Yes	Refer	to P.13A-105, INSPECTION CHART FOR DIAGNOSIS S.
Check the ignition timing. (Refer to GROUP 11B – On-vehicle Service.)	NG ▶	Check	that the crank angle sensor is installed properly.
MUT-II Data list 21 Engine coolant temperature sensor. (Refer to P.13A-153.) OK	NG	(Refer 1	the engine coolant temperature sensor system. to P.13A-109, INSPECTION PROCEDURE FOR DIAGNO- DDE 21.)
MUT-II Data list 13 Intake air temperature sensor (Refer to P.13A-153.) OK	NG	Check P.13A- 13.)	the intake air temperature sensor system. (Refer to 107, INSPECTION PROCEDURE FOR DIAGNOSIS CODE
MUT-II Data list 25 Barometric pressure sensor (Refer to P.13A-153.) OK	NG	Check1 INSPE	the barometric pressure sensor system. (Refer to P.13A-113, CTION PROCEDURE FOR DIAGNOSIS CODE 25.)
MUT-II Data list 11 Oxygen sensor OK: 600-1,000 mV when racing suddenly (Refer to P.13A-153.)	NG		the oxygen sensor system. (Refer to P.13A-106, INSPEC- PROCEDURE FOR DIAGNOSIS CODE 11.)
OK MUT-II Data list 11 Oxygen sensor OK	- ОК	Replac	e the oxygen sensor.
OK: Repeat 0-400 mV and 600-1,000 mV alternately when idling. (Refer to P.13A-153.)]	Check	trouble symptom.
Check the fuel pressure. (Refer to P.13A-78.)]		I
 Check the following items. Check the injectors for operation sound. Check the injectors for fuel leakage. Check the ignition coil, spark plugs, spark plug cables. (Re Check the compression pressure. (Refer to GROUP 11B – Check the positive crankcase ventilation system. (Refer to Check the purge control system. (Refer to GROUP 17 – E Check the EGR control system. (Refer to GROUP 17 – E 	On-vehicle S GROUP 17 - mission Cont	Service.) - Emissi trol Syste	on Control System.) em.)
Check the trauble summter	 T		······································
Check the trouble symptom.]		
Replace the catalytic converter.]		

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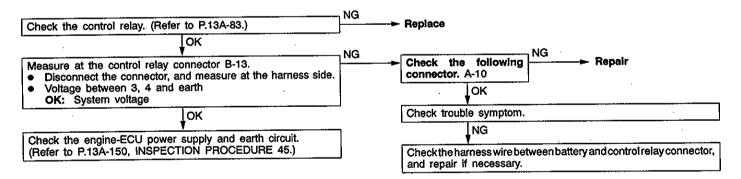
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Low alternator output voltage (approx. 12.3 V)	Probable cause
The alternator may be defective, or malfunctions, which are listed in the right column, may be suspected.	 Malfunction of charging system (Refer to GROUP 16 — Charging System.) Short circuit in harness between alternator G terminal and engine-ECU Malfunction of engine-ECU



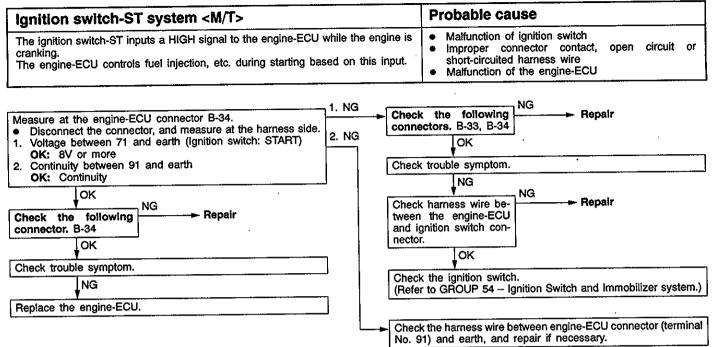
Power supply system and ignition switch-IG system	Probable cause
When an ignition switch ON signal is input to the engine-ECU, the engine-ECU turns the control relay ON. This causes battery voltage to be supplied to the engine-ECU, injectors and air flow sensor.	 Malfunction of the ignition switch Malfunction of the control relay Improper connector contact, open circuit or short-circuited harness wire Disconnected engine-ECU earth wire Malfunction of the engine-ECU



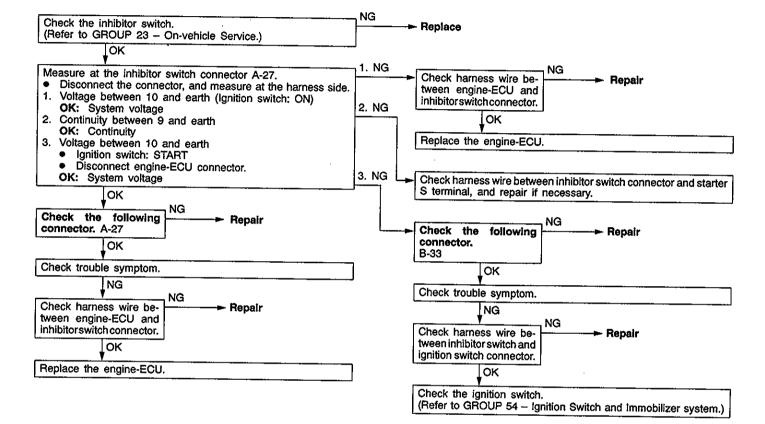
Fuel pump system	Probable cau	JSe
The engine-ECU turns the control relay ON when the engine is and this supplies power to drive the fuel pump.	 Malfunction of Improper conshort-circuited 	
Check the fuel pump operation. (Refer to P.13A-81.) OK Check the fuel pump relay. (Refer to P.13A-83.) OK Measure at the fuel pump relay connector B-12. • Connect the connector. • Voltage between 1 and earth • MUT-II Actuator test: Fuel pump drive OK: System voltage OK Check the harness wire between fuel pump relay connector and fuel pump drive terminal, and repair if necessary.	NG Replace	ECTION PROCEDURE 46.)
INSPECTION PROCEDURE 26		
Idle position switch system	Probable cau	ISE

Idle position switch system	Probable cause
The idle position switch inputs the condition of the accelerator pedal, i.e. whether it is depressed or released (HIGH/LOW), to the engine-ECU. The engine-ECU controls the idle speed control servo based on this input.	 Maladjustment of the accelerator pedal Maladjustment of the fixed SAS Maladjustment of the idle position switch and throttle position sensor Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU

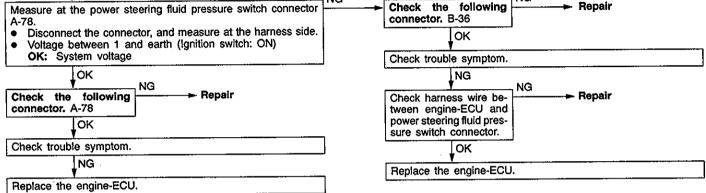
NG		
	Replace the throttle position sensor.	
├ ─── ▶	heck the following Repair	
	ок	
i [Check trouble symptom.	
] –	NG	
	Check the harness wire between engine-ECU and throttle sensor connector.	position
	OK NG	
ן [Replace the engine-ECU. Repair	
I		
-		NG Check the following connector. B-34 OK OK Check the harness wire between engine-ECU and throttle sensor connector. OK NG



Ignition switch-ST and inhibitor switch system 	Probable cause
 The ignition switch-ST inputs a HIGH signal to the engine-ECU while the engine is cranking. The engine-ECU controls fuel injection, etc. during starting based on this input. The inhibitor switch inputs the condition of the select lever, i.e. whether it is in P or N range or in some other range, to the engine-ECU. The engine-ECU controls the idle speed control (ISC) servo based on this input. 	 Malfunction of inhibitor switch Improper connector contact, open circuit or short-circuited harness wire



Power steering fluid pressure switch system	Probable cause	
The presence or absence of power steering load is input to the engine-ECU. The engine-ECU controls the idle speed control (ISC) servo based on this input.	 Malfunction of power steering fluid pressure switch Improper connector contact, open circuit of short-circuited harness wire Malfunction of the engine-ECU 	
Check the power steering fluid pressure switch.	ce	
OK NG	NG	



F	A/C switch and A/C relay system	Probable cause
	When an A/C ON signal is input to the engine-ECU, the engine-ECU carries out control of the idle speed control (ISC) servo, and also operates the A/C compressor magnetic clutch.	 Malfunction of A/C control system Malfunction of A/C switch Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU

	- NG	
Check the A/C compressor relay. (Refer to GROUP 55 – On-vehicle Service.)		- Replace
ОК	– – NG	
Measure at the engine-ECU connectors B-36, B-37.	<u>}</u>	Check the A/C system. (Refer to GROUP 55 – On-vehicle Service.)
 Disconnect the connector, and measure at the harness side. <vehicles immobilizer="" system="" without=""></vehicles> Voltage between 22 and earth, and 45 and earth (Ignition switch: ON, A/C switch: ON) OK: System voltage Short circuit between 22 and earth (Ignition switch: ON, A/C switch: ON) OK: A/C compressor clutch turns on. 	ок	Check the following NG Replace connectors. B-36, B-37
<vehicles immobilizer="" system="" with=""></vehicles>		Check trouble symptom.
 Voltage between 8 and earth, and 45 and earth (Ignition switch: ON, A/C switch: ON) OK: System voltage Short circuit between 8 and earth (Ignition switch: ON, A/C switch: ON) OK: A/C compressor clutch turns on. 		NG
		Replace the engine-ECU.

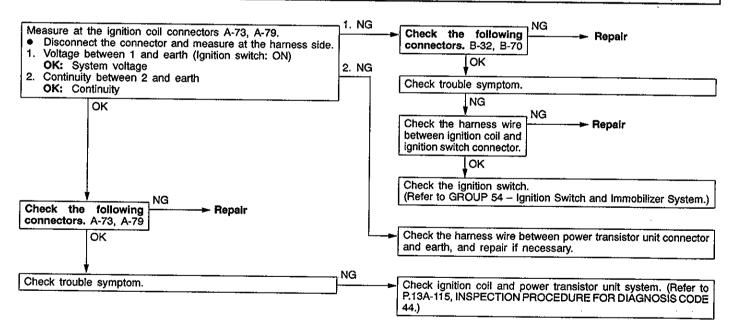
Fan motor relay system (Radiator fan, A/C co	ondenser fan)	Probable cause
The power transistor inside the engine-ECU turns the fan moto	or relay on and off.	 Malfunction of fan motor relay Malfunction of fan motor Improper connector contact, open circuit or short-circuited harness wire Malfunction of engine-ECU
 Measure at the engine-ECU connector B-37. Disconnect the connector, and measure at the harness side. Voltage between 20 and earth, and 21 and earth (Ignition switch: ON) OK: System voltage Short circuit between 20 and earth (Ignition switch: ON) OK: Condenser fan runs Short circuit between 21 and earth (Ignition switch: ON) OK: Radiator fan runs 	Check	k the following Sector. B-37 OK trouble symptom. NG Ce the engine-ECU.

NG

• Check the radiator fan circuit.

Check the A/C condenser fan circuit. (Refer to Electrical Wiring.)

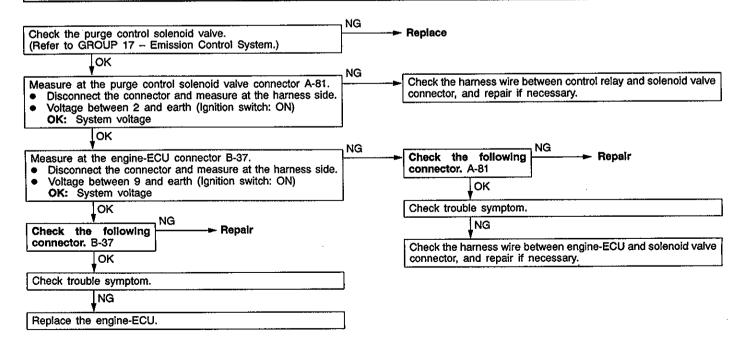
Ignition circuit system	Probable cause
The engine-ECU interrupts the ignition coil primary current by turning the power transistor inside the engine-ECU ON and OFF.	 Malfunction of ignition switch. Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU



Idle speed control (ISC) servo (Stepper motor) system	Probable cause
The engine-ECU controls the intake air volume during idling by opening and closing the servo valve located in the bypass air passage.	 Malfunction of ISC servo Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU

Check the ISC servo (Refer to P.13A-175.)	NO	
Measure at the ISC servo connector A-56. • Disconnect the connector and measure at the harness side. • Voltage between 2 and earth, and 5 and earth (Ignition switch: ON) OK: System voltage	NG	Check the harness wire between control relay and ISC servo con- nector, and repair if necessary.
OK Measure at the engine-ECU connector B-37. Disconnect the connector, measure at the harness side. Voltage between each of 4, 5, 17, 18 and earth (Ignition switch: ON)	NG	Check the following connector. A-56
OK: System voltage]	Check trouble symptom.
NG		NG
Check the following Repair		Checkhamess wire between engine-ECU and ISC servo connector, and repair if necessary.
lok	NG	
Check trouble symptom.] >	Replace the engine-ECU.

Purge control solenoid valve system	Probable cause
The purge control solenoid valve controls the purging of air from the canister located inside the intake manifold.	 Malfunction of solenoid valve Improper connector contact, open circuit or short-circuited harness wire. Malfunction of the engine-ECU



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EGR control solenoid valve system		Probable cause
The EGR control solenoid valve is controlled by the negative pres EGR operation leaking to port "A" of the throttle body.	ssure resulting fr	 Malfunction of solenoid valve Improper connector contact, open circuit or short-circuited harness wire. Malfunction of the engine-ECU
Check the EGR control solenoid valve. (Refer to GROUP 17 – Emission Control System.)	j	place
Measure at the EGR control solenoid valve connector A-88 <except MVV>, A-89 <mvv>. • Disconnect the connector and measure at the harness side. • Voltage between 1 and earth (Ignition switch: ON) OK: System voltage</mvv></except 		neck the harness wire between control relay and solenoid valve nnector, and repair if necessary.
OK Measure at the engine-ECU connector B-37. • Disconnect the connector and measure at the harness side. • Voltage between 6 and earth (Ignition switch: ON) OK: System voltage OK Check the following Check the following OK Check trouble symptom.		NG NG Repair NG OK NG NG NG NG NG NG NG NG NG NG
Replace the engine-ECU.		

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NSPECTION PROCEDURE 36	. <u> </u>	, , , , , , , , , , , , , , , , , , ,
Air by-pass control solenoid valve system		Probable cause
The engine-ECU controls the air by-pass control solenoid valve to vacuum.	control its ope	 Malfunction of solenoid valve Improper connector contact, open circuit or short-circuited harness wire. Malfunction of the engine-ECU
Check the air by-pass control solenoid valve. (Refer to P.13A-176.)		- Replace
OK	_ NG	
 Measure at the air by-pass control solenoid valve connector A-55. Disconnect the connector and measure at the harness side. Voltage between 1 and earth (Ignition switch: ON) OK: System voltage 		Check the harness wire between control relay and solenoid valve connector, and repair if necessary.
ок		
Measure at the engine-ECU connector B-36. • Disconnect the connector and measure at the harness side. • Voltage between 39 and earth (Ignition switch: ON) OK: System voltage	¬ NG	Check the following connector. A-55
	_ _	Check trouble symptom.
Check the following Connector. B-36		NG Check the harness wire between engine-ECU and solenoid valv
OK		connector, and repair if necessary.
Check trouble symptom.]	
NG	—	
Replace the engine-ECU.]	

Check the ignition timing when cranking.

OK: Approx. 5°BTDC

MUT-II: Inspection of no initial combustion NG **MUT-II Data list** Check the power supply and ignition switch-IG system. 16 Voltage of engine-ECU power source (Refer to P.13A-153.) (Refer to P.13A-135, INSPECTION PROCEDURE 24.) OK No Does the camshaft rotate at the engine cranking? Check timing belt for breakage. (When oil filler cap is removed.) Yes Yes MUT-II Self-Diag code Refer to P.13A-105, INSPECTION CHART FOR DIAGNOSIS Are diagnosis codes displayed? CODES. No No **MUT-II Data list** Check the crank angle sensor system. 22 Crank angle sensor (Refer to P.13A-110, INSPECTION PROCEDURE FOR DIAGNO OK: Cranking speed is displayed. SIS CODE 22.) OK NG **MUT-II** Actuator test Check the fuel pump system. (Refer to P.13A-136, INSPECTION PROCEDURE 25.) 07 Fuel pump (Refer to P.13A-158.) OK NG MUT-II Data list Check the engine coolant temperature sensor system. 21 Engine coolant temperature sensor (Refer to P.13A-153.) (Refer to P.13A-109, INSPECTION PROCEDURE FOR DIAGNO-SIS CODE 21.) **INSPECTION PROCEDURE 38** Ignition system: Inspection of no initial combustion. NG Measure at the ignition coil connectors A-73, A-79. Check ignition circuit system. Connect the connector. (Use test harness: MB991348) (Refer to P.13A-140, INSPECTION PROCEDURE 32.) ٠ Connecta primary voltage detection-type tachometer to terminal

(1) of each connector in turn. OK: Each terminal displays a speed on the engine tachometer that is 1/2 of the cranking speed. OK NG

Check that the crank angle sensor is installed properly.

MUT-II: Check if uncomplete combustion occurs. Yes Refer to P.13A-105, INSPECTION CHART FOR DIAGNOSIS MUT-II Self-Diag code CODE Are diagnosis codes displayed? No NG Check the fuel pump system. (Refer to P.13A-136, INSPECTION PROCEDURE 25.) **MUT-II** Actuator test 07 Fuel pump (Refer to P.13A-158.) OK Check the engine coolant temperature sensor system. (Referto P.13A-109, INSPECTION PROCEDURES FOR DIAGNO-SIS CODE 21.) NG MUT-II Data list 21 Engine coolant temperature sensor (Refer to P.13A-153.) OК Check the ignition switch-ST system <M/T>. (Refer to P.13A-137, INSPECTION PROCEDURE 27.) Check the ignition switch-ST and inhibitor switch system <A/T>. (Refer to P.13A-138, INSPECTION PROCEDURE 28.) NG

INSPECTION PROCEDURE 40

Positive crankcase ventilation valve does not operate.

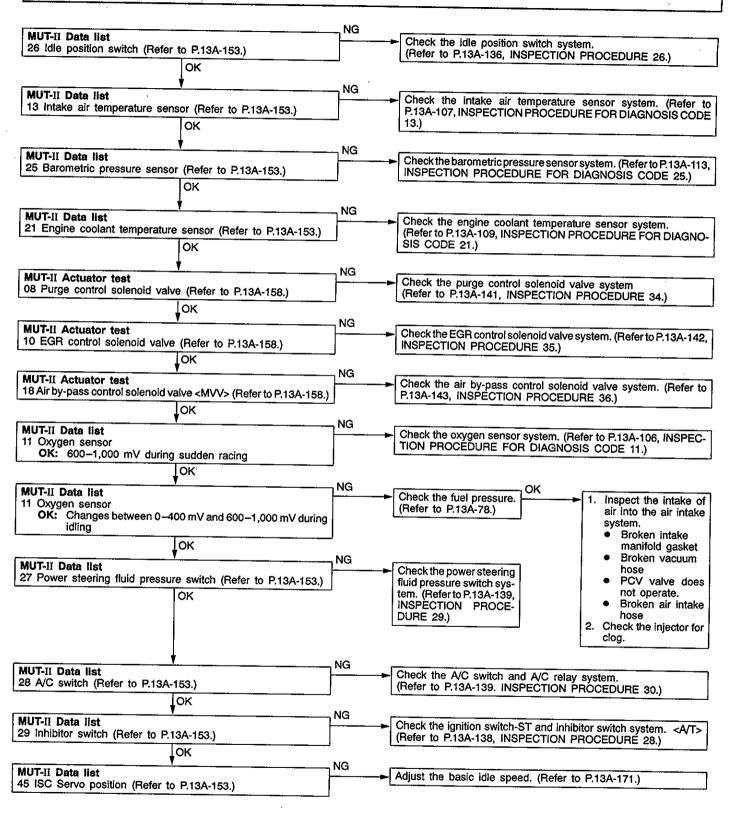
18 Ignition switch-ST (Refer to P.13A-153.)

MUT-II Data list

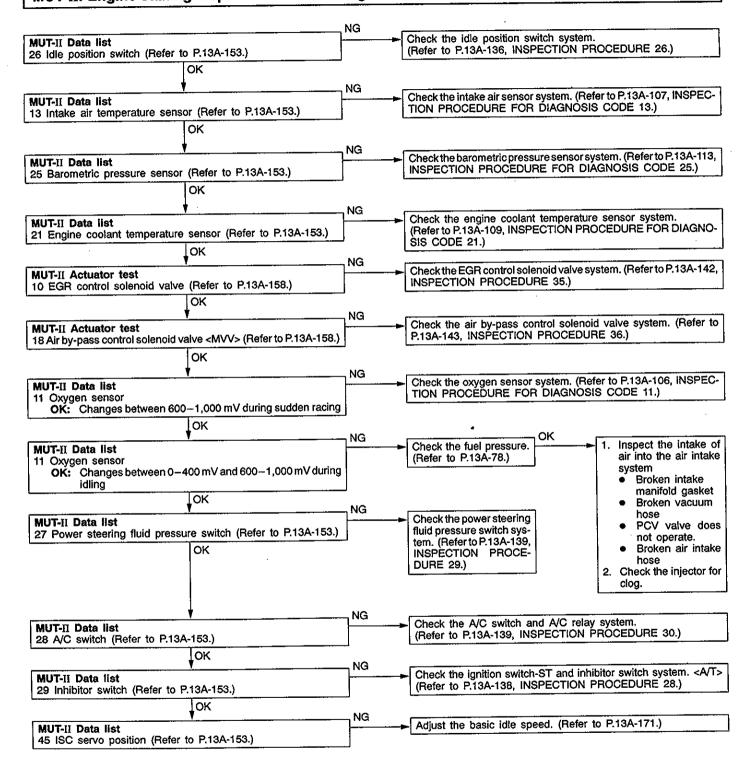
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Clean the throttle boo	ly. (Refer to P.13A-75.)
Check and adjust the	fixed SAS. (Refer to P.13A-76.)
Check trouble sympton	om.
	ING

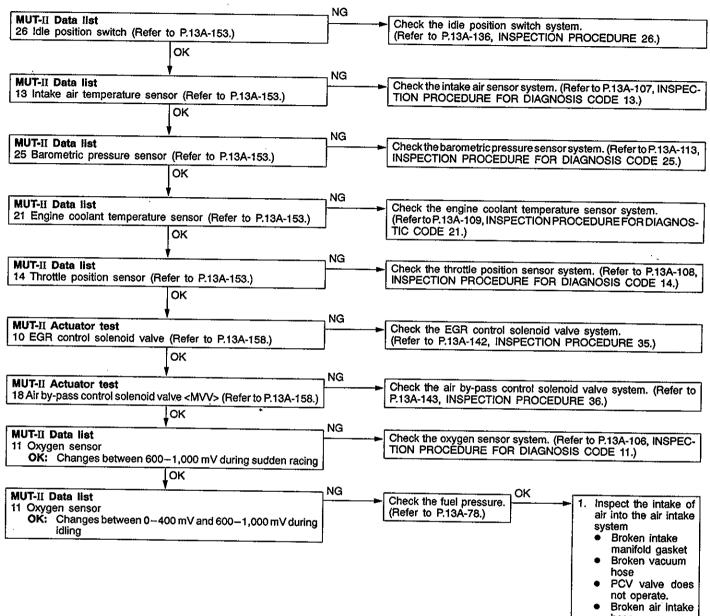
MUT-II: Check if idling speed is unstable.



MUT-II: Engine stalling inspection when the engine is warmed up and idling.

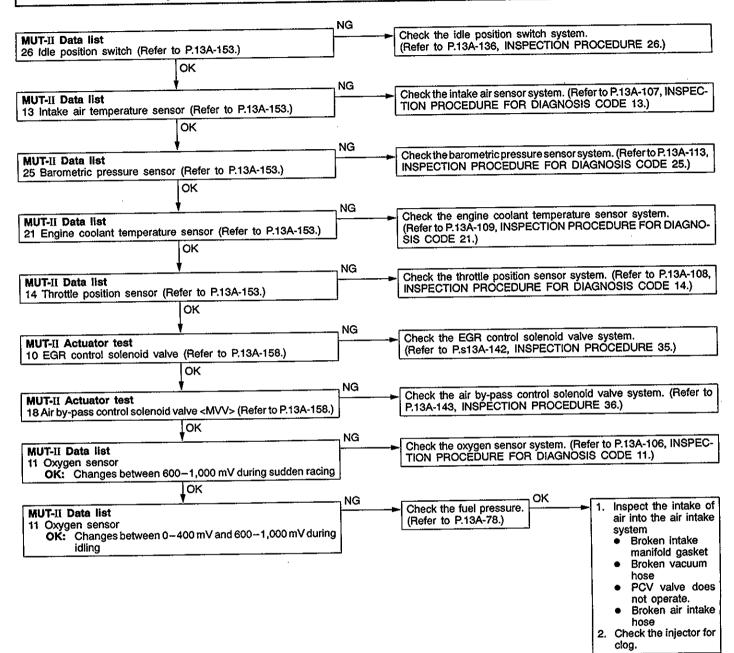


MUT-II: Check if hesitation, sug, stumble or poor acceleration occurs.

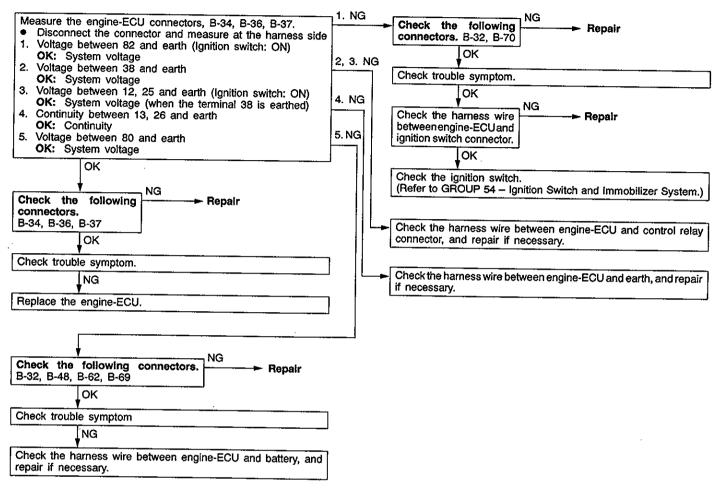


hose 2. Check the injector for clog.

MUT-II: Check if surge occurs.



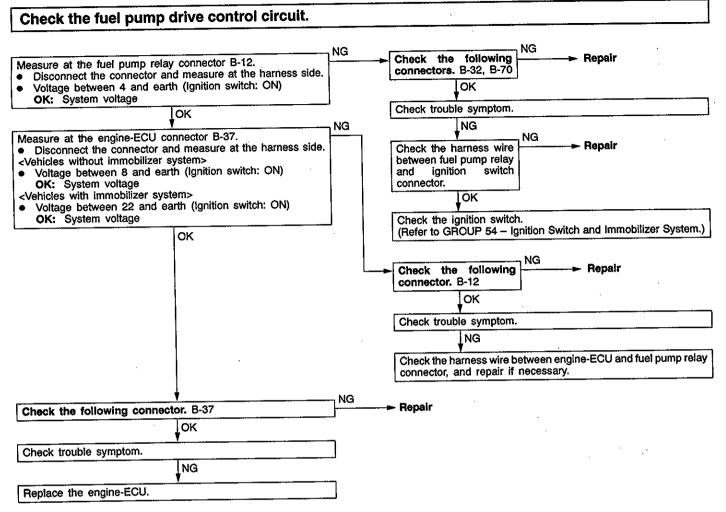
Check the engine-ECU power supply and earth circuit.



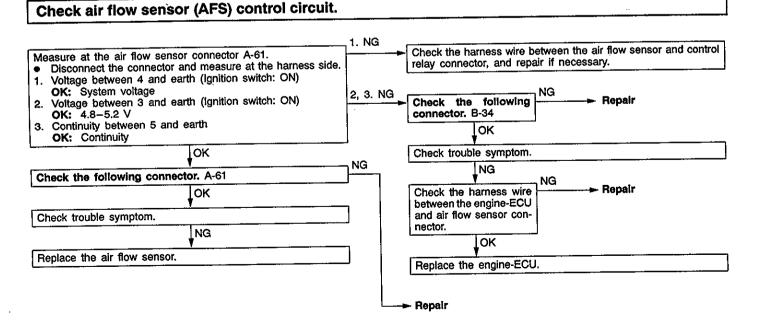
INSPECTION PROCEDURE 46

Check fuel pump circuit.

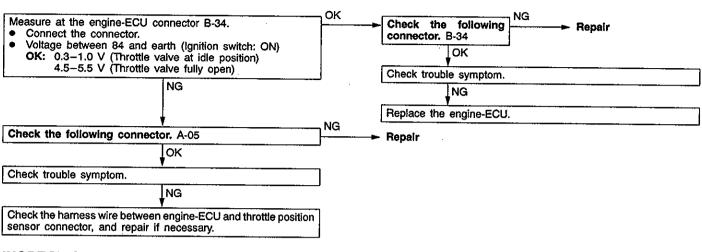
Measure at the fuel pump connector Disconnect the connector and me Continuity between 2 and earth OK: Continuity	D-14. asure at the harness side.	NG	Check the 1 D-04, D-14	following connectors.	NG Repair
Check the following connectors. B	1-12, B-33, D-04, D-14] <u>NG</u>	Check troub Check the ha if necessary.	NG arness wire between fuel r	pump and earth, and repair
Check trouble symptom.]	Repair		
Check the harness wire between termi fuel pump connector.	nal for fuel pump drive and	NG	Repair		
ок		_			
Replace the fuel pump.]			



INSPECTION PROCEDURE 48

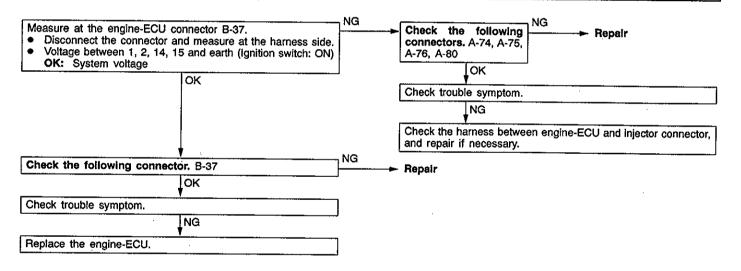


Check throttle position sensor (TPS) output circuit.



INSPECTION PROCEDURE 50

Check injector control circuit



DATA LIST REFERENCE TABLE

Caution

When shifting the select lever to D range, the brakes should be applied so that the vehicle does not move forward.

NOTE

- *1. In a new vehicle [driven approximately 500 km or less], the air flow sensor output frequency is sometimes 10% higher than the standard frequency.
- *2. The idle position switch normally turns off when the voltage of the throttle position sensor is 50-100 mV higher than the voltage at the idle position. If the throttle position switch turns back on after the throttle position sensor voltage has risen by 100 mV and the throttle valve has opened, the idle position switch and the throttle position sensor need to be adjusted.
- *3. The injector drive time represents the time when the cranking speed is at 250 r/min or below when the power supply voltage is 11 V.
- *4. In a new vehicle [driven approximately 500 km or less], the injector drive time is sometimes 10% longer than the standard time.
- *5. In a new vehicle [driven approximately 500 km or less], the step of the stepper motor is sometimes 30 steps greater than the standard value.

ltem No.	Inspection item	Inspection contents	<u> </u>	Normal condition	Inspection procedure No.	Reference page
11	Oxygen sensor	Engine:After having warmed up Air/fuel mixture is	When at 4,000 r/min, engine is suddenly decelerated	200 mV or less	Code No. 11	13A-106
		made leaner when de- celerating, and is made When engine is 600–1,000 m richer when racing. suddenly raced	600-1,000 mV			
		Engine:After having warmed up The oxygen sensor signal is used to check	Engine is idling	400 mV or less (Changes)		
		the air/fuel mixture ratio, and control condition is also checked by the ECU.	2,500 r/min	600–1,000 mV		
12	Air flow sensor*1	Engine coolant temperature:	Engine is idling	25–51 Hz	-	-
	Sensor	80-95°C • Lamps, electric	2,500 r/min	80–120 Hz		
		 cooling fan and all accessories: OFF Transmission: Neutral (A/T: P range) 	Engine is raced	Frequency increases in response to racing		

13100890104

ltem No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
13	Intake air temperature sensor	Ignition switch: ON or with engine running	When intake air temperature is -20°C	–20°C	Code No. 13	13A-107
			When intake air temperature is 0°C	0°C		
			When intake air temperature is 20°C	20°C	, ,	
			When intake air temperature is 40°C	40°C		
			When intake air temperature is 80°C	80°C		
14	Throttie position	Ignition switch: ON	Set to idle position	300−1,000 mV	Code No.	13A-108
	sensor		Gradually open	Increases in proportion to throttle opening angle	14	
			Open fully	4,500–5,500 mV		
16	Power supply voltage	Ignition switch: ON		System voltage	Procedure No. 24	13A-135
18	Cranking signal (ignition	gnal gnition	Engine: Stopped	OFF	Procedure No. 27 <m t=""></m>	13A-137 <m t=""> 13A-138 <m t=""></m></m>
	switch-ST)		Engine: Cranking	ON .	Procedure No. 28 	
21	Engine coolant temperature sensor	Ignition switch: ON or with engine running	When engine coolant temperature is20°C	20°C	Code No. 21	13A-109
	001001		When engine coolant temperature is 0°C	0°C		
			When engine coolant temperature is 20°C	20°C		
			When engine coolant temperature is 40°C	40°C		
			When engine coolant temperature is 80°C	80°C		

item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
22	Crank angle sensor	 Engine: Cranking Tachometer: Connected 	Compare the engine speed readings on the tachometer and the MUT-II.	Accord	Code No. 22	13A-110
		 Engine: Idling Idle position switch: ON 	When engine coolant temperature is –20°C	1,400–1,600 rpm <except mvv=""> 1,500–1,700 rpm <mvv></mvv></except>		
			When engine coolant temperature is 0°C	1,350–1,550 rpm		
			When engine coolant temperature is 20°C	1,300–1,500 rpm		
			When engine coolant temperature is 40°C	1,100–1,300 rpm		
			When engine coolant temperature is 80°C	650-850 rpm <except mvv=""> 600-800 rpm <mvv></mvv></except>		
25	Barometric	Ignition switch: ON	At altitude of 0 m	101 kPa	Code No.	13A-113
	pressure sensor		At altitude of 600 m	95 kPa	_ 25	
			At altitude of 1,200 m	88 kPa		
			At altitude of 1,800 m	81 kPa		
26	Idle position switch	Ignition switch: ON Check by operating	Throttle valve: Set to idle position	ON	Procedure No. 26	13A-136
		accelerator pedal repeatedly	Throttle valve: Slightly open	OFF*2		
27	Power steering fluid	Engine: Idling	Steering wheel stationary	OFF	Procedure No. 29	13A-139
	pressure switch		Steering wheel turning	ON		

ltem No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
28	A/C switch	Engine: Idling (when A/C switch is	A/C switch: OFF	OFF	Procedure No. 30	13A-139
		ON, A/C compressor should be operating.)	A/C switch: ON	ON		
29	Inhibitor switch	Ignition switch: ON	P or N	P or N	Procedure	13A-138
			D, 2, L or R	D, 2, L or R	No. 28	
41	Injectors * ³	Engine: Cranking	When engine coolant temperature is 0°C (injection is carried out for all cylinders simultaneously)	1319 ms <except mvv=""> 15-23 ms <mvv></mvv></except>	-	
			When engine coolant temperature is 20°C	27–40 ms <except mvv=""> 30–44 ms <mvv></mvv></except>		
			When engine coolant temperature is 80°C	5.9-8.9 ms <except mvv=""> 7.0-10.6 ms <mvv></mvv></except>		
	Injectors* ⁴	 Engine coolant temperature: 80–95°C Lamps, electric cooling fan and all 	Engine is idling	1.7–2.9 ms <except mvv=""> 1.6–2.8 ms <mvv></mvv></except>		
		 accessories: OFF Transmission: 	2,500 r/min	1.4–2.6 ms		
		Neutral (A/T : P range)	When engine is suddenly raced	Increases		
44	4 Ignition coils and power transistors	ower having warmed up	Engine is idling	2–18°BTDC <except mvv=""> 4–20°BTDC <mvv></mvv></except>	-	-
		check actual ignition timing.)	2,500 r/min	30–50°BTDC <except mvv=""> 25–45°BTDC <mvv></mvv></except>		

1

ltem No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
45	ISC (stepper) motor position * ⁵ • Lamps, electr		A/C switch: OFF	2-25 STEP	_	_
	politon		A/C switch: OFF → ON	Increases by 10-70 steps		
		 Idle position switch: ON Engine: Idling When A/C switch is ON, A/C compressor should be operating 	range	Increases by 5–50 steps		
49	A/C relay	Engine: After having warmed up/Engine is idling	A/C switch: OFF	OFF (Compressor clutch is not operating)	Proce- dure No. 30	13A-139
			A/C switch: ON	ON (Compressor clutch is operating)		

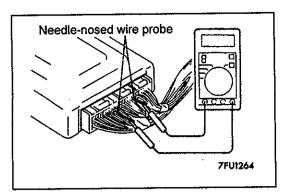
ACTUATOR TEST REFERENCE TABLE

13100900135

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							131009001
ltem No.	Inspection item	Drive contents	Inspection cor	ntents	Normal condition	Inspection procedure No.	Reference page
01	Injectors	Cut fuel to No. 1 injector	Engine: After having v	varmed up/En-		Code No. 41	13A-114
02		Cut fuel to No. 2 injector	injector in turn				
03		Cut fuel to No. 3 injector	idling.)	ch don't affect			
04		Cut fuel to No. 4 injector					
07	Fuel pump	Fuel pump operates and fuel is recircu- lated.	 Engine: Cranking Fuel pump: Forced driving Inspect accord- 	Pinch the return hose with fingers to feel the pulse of the fuel being recirculated.	Pulse is felt.	Procedure No. 25	13A-136
			ing to both the above condi- tions.	Listen near the fuel tank for the sound of fuel pump operation.	Sound of operation is heard.		
08	Purge control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON		Sound of operation can be heard when solenoid valve is driven.	Procedure No. 34	13A-141
10	EGR control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON		Sound of operation can be heard when solenoid valve is driven.	Procedure No. 35	13A-142
17	Basic igni- tion timing	Set to ignition timing adjust- ment mode	Engine: Idling Timing light is s	set	5°BTDC	-	
18	Air by-pass control so- lenoid valve <mvv></mvv>	Solenoid valve turns from OFF to ON.	Ignition switch: ON		Sound of operation can be heard when solenoid valve is driven.	Procedure No. 36	13A-143
20	Condenser fan	Drive the fan motors (condenser)	 Ignition switch: ON A/C switch: ON 		Fan motor oper- ates	Procedure No. 31	13A-140
21	Radiator fan	Drive the fan motors (radia- tor)	Ignition sw	<i>i</i> itch: ON	Fan motor oper- ates	Procedure No. 31	13A-140



CHECK AT THE ENGINE-ECU TERMINALS

13100920100

TERMINAL VOLTAGE CHECK CHART

- 1. Connect a needle-nosed wire probe (test harness: MB991223 or paper clip) to a voltmeter probe.
- 2. Insert the needle-nosed wire probe into each of the engine-ECU connector terminals from the wire side, and measure the voltage while referring to the check chart.

NOTE

- 1. Make the voltage measurement with the engine-ECU connectors connected.
- 2. You may find it convenient to pull out the engine-ECU to make it easier to reach the connector terminals.
- 3. The checks can be carried out off the order given in the chart.

Caution

Short-circuiting the positive (+) probe between a connector terminal and earth could damage the vehicle wiring, the sensor, engine-ECU or all of them. Be careful to prevent this!

- 3. If voltmeter shows any division from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
- 4. After repair or replacement, recheck with the voltmeter to confirm that the repair has corrected the problem.

Engine-ECU Connector Terminal Arrangement

NOTE

9FU0393

*:	Vehicles	with	immobilizer	system
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Terminal No.	Check item	Check condition (Engine condition)	Normal condition	
1	No. 1 injector	While engine is idling after having	From 11-14 V, momentarily	
14	No. 2 injector	warmed up, suddenly depress the accelerator pedal.	drops slightly	
2	No. 3 injector			
15	No. 4 injector			
4	Stepper motor coil <a1></a1>	Engine: Soon after the warmed up	System voltage ++ 0 V	
17	Stepper motor coil <a2></a2>	engine is started	(Changes repeatedly)	
5	Stepper motor coil <b1></b1>			
18	Stepper motor coil <b2></b2>			
6	EGR control solenoid valve	Ignition switch: ON	System Voltage	
		While engine is idling, suddenly depress the accelerator pedal.	From system voltage, momentarily drops	
8 or 22*	Fuel pump relay	Ignition switch: ON	System voltage	
		Engine: Idle speed	0-3V	
9	Purge control solenoid valve	Ignition switch: ON	System voltage	
		Running at 3,000r/min while engine is warming up after having been started.	0–3V	
10	Ignition coil – No. 1, No. 4 (power transistor)	Engine r/min: 3,000 r/min	0.3–3.0V	
23	Ignition coil – No. 2, No. 3 (power transistor)			
12	Power supply	Ignition switch: ON	System voltage	
25				
19	Air flow sensor reset signal	Engine: Idle speed	0–1V	
	Signal	Engine r/min: 3,000 r/min	6-9V	
20	Condenser fan motor relay	Condenser fan is not operating (Engine coolant temperature is 90°C or less)	System voltage	
		Condenser fan is operating (Engine coolant temperature is 105°C or more)	0-3V	

MPI <4G9> - Troubleshooting

Terminal No.	Check item	Check condition (Engi	ne condition)	Normal condition		
21	Radiator fan motor relay	Radiator fan is not ope coolant temperature is	erating (Engine 90°C or less)	System voltage		
		Radiator fan is operati coolant temperature is	ing (Engine s 90 – 105°C)	0-3V		
22 or 8*	A/C relay	 Engine: Idle spe A/C switch: OFF (A/C compressor 	^r → ON	System voltage or momentarily 6V or more → 0-3V		
33	Alternator G terminal	OFF) • Headlamp: OFF	idle (radiator fan: to ON witch: OFF to ON	0.4 – 0.8 V to 0.8 – 1.2 V		
41	Alternator FR terminal	OFF) • Headlamp: OFF	 Engine: Warm, idle (radiator fan: OFF) Headlamp: OFF to ON 		OFF)	
36	Engine warning lamp	Ignition switch: OFF	Ignition switch: OFF \rightarrow ON			
37	Power steering fluid pressure switch	Engine: Idling after warming up	When steering wheel is stationary	System voltage		
			When steering wheel is turned	03V		
38	Control relay	Ignition switch: OFF	· · · · · · · · · · · · · · · · · · ·	System voltage		
	(Power supply)	Ignition switch: ON		0–3V		
39	Air by-pass control	Engine: Idling after v	warming up	0-3V		
	solenoid valve <mvv></mvv>	Engine r/min: 1,000	r/min	System voltage		
45	A/C switch	Engine: Idle speed	Turn the A/C switch OFF	0–3V		
			Turn the A/C switch ON (A/C compressor is operating)	System voltage		
58	Tachometer signal	Engine r/min: 3,000	r/min	0.3–3.0V		
60	Oxygen sensor heater	Engine: Idling after	warming up	0-3V		
		Engine r/min: 5,000	pr/min.	System voltage		
71	Ignition switch – ST	Engine: Cranking		8V or more		

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MPI <4G9> - Troubleshooting

Terminal No.	Check item	Check condition (E	Engine condition)	Normal condition
72	Intake air temperature sensor	Ignition switch: ON	When intake air temperature is 0°C	3.2-3.8V
			When intake air temperature is 20°C	2.3–2.9V
			When intake air temperature is 40°C	1.5–2.1V
			When intake air temperature is 80°C	0.4–1.0V
76	Oxygen sensor	Engine: Running at 2,500 r/min after warmed up (Check using a digital type voltmeter)		0 ↔ 0.8V (Changes repeatedly)
80	Backup power supply	Ignition switch: OFF		System voltage
81	Sensor impressed voltage	Ignition switch: ON		4.5–5.5V
82	Ignition switch – IG	Ignition switch: ON		System voltage
83	Engine coolant temperature sensor	Ignition switch: ON	When engine coolant tempera- ture is 0°C	3.2–3.8V
			When engine coolant tempera- ture is 20°C	2.3–2.9V
			When engine coolant tempera- ture is 40°C	1.3–1.9V
			When engine coolant tempera- ture is 80°C	0.3-0.9V

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
84	Throttle position sensor	Ignition switch: ON	Set throttle valve to idle position	0.31.0V
			Fully open throttle valve	4.5–5.5V
85	Barometric pressure sensor	Ignition switch: ON	When altitude is 0m	3.7-4.3V
			When altitude is 1,200m	3.2–3.8V
86	Vehicle speed sensor	 Ignition switch: ON Move the vehicle slowly forward 		0 ↔ 5V (Changes repeatedly)
87	Idle position switch	vitch Ignition switch: ON	Set throttle valve to idle position	01V
			Slightly open throttle valve	4V or more
88	Camshaft position	Engine: Cranking		0.4-3.0V
sensor	sensor	Engine: Idle speed		0.5–2.0V
89	Crank angle sensor	Engine: Cranking		0.4-4.0V
		Engine: Idle speed		1.5–2.5V
90	Air flow sensor	Engine: Idle speed		2.2–3.2V
		Engine r/min: 2,500r/min		
91	Inhibitor switch 	Ignition switch: ON	Set selector lever to P or N	0–3V
			Set selector lever to Other than P or N	8–14V

CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

- 1. Turn the ignition switch to OFF.
- 2. Disconnect the engine-ECU connector.
- 3. Measure the resistance and check for continuity between the terminals of the engine-ECU harness-side connector while referring to the check chart.

NOTE

- 1. When measuring resistance and checking continuity, a harness for checking contact pin pressure should be used instead of inserting a test probe.
- 2. Checking need not be carried out in the order given in the chart.

Caution

If the terminals that should be checked are mistaken, or if connector terminals are not correctly shorted to earth, damage may be caused to the vehicle wiring, sensors, engine-ECU and/or ohmmeter. Be careful to prevent this!

- 4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and then repair or replace.
- 5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

Engine-ECU Harness Side Connector Terminal Arrangement

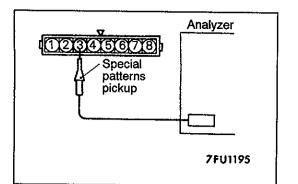
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9FU0392

Terminal No.	Inspection item	Normal condition (Check condition)
1–12	No. 1 injector	
14-12	No. 2 injector	
2–12	No. 3 injector	1316 Ω (At 20°C)
15-12	No. 4 injector	

13A-16	5
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Terminal No.	Inspection item	Normal condition (Check condition)	
4-12	Stepper motor coil (A1)		
17-12	Stepper motor coil (A2)	28–33 Ω (At 20°C)	
5–12	Stepper motor coil (B1)		
18–12	Stepper motor coil (B2)		
6–12	EGR control solenoid valve	36–44 Ω (At 20°C)	
9–12	Purge control solenoid valve	36–44 Ω (At 20°C)	
13-Body earth	ENGINE-ECU earth	Continuity (00)	
26-Body earth	ENGINE-ECU earth	Continuity (0Ω)	
39–12	Air by-pass control solenoid valve	36 – 44 Ω (At 20°C)	
60–12	Oxygen sensor heater	7–40 Ω (At 20°C)	
	Intake air temperature sensor	5.3–6.7 k Ω (When intake air temperature is 0°C)	
		2.3–3.0 k Ω (When intake air temperature is 20°C)	
7292		1.0–1.5 k Ω (When intake air temperature is 40°C)	
		$0.30-0.42 k\Omega$ (When intake air temperature is 80°C)	
		5.1–6.5 k Ω (When coolant temperature is 0°C)	
		2.1-2.7 kΩ (When coolant temperature is 20°C)	
83–92	Engine coolant temperature sensor	$0.9-1.3 \text{ k}\Omega$ (When coolant temperature is 40°C)	
		$0.26-0.36 \text{ k}\Omega$ (When coolant temperature is 80°C)	
		Continuity (when throttle valve is at idle position)	
87–92	Idle position switch	No continuity (when throttle valve is slightly open)	
		Continuity (when select lever is at P or N)	
91-Body earth	Inhibitor switch 	No continuity (when select lever is at D, 2, L or R)	



INSPECTION PROCEDURE USING AN ANALYZER

13100930103

AIR FLOW SENSOR (AFS)

Measurement Method

- 1. Disconnect the air flow sensor connector, and connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)
- 2. Connect the analyzer special patterns pickup to air flow sensor connector terminal 3.

Alternate Method (Test harness not available)

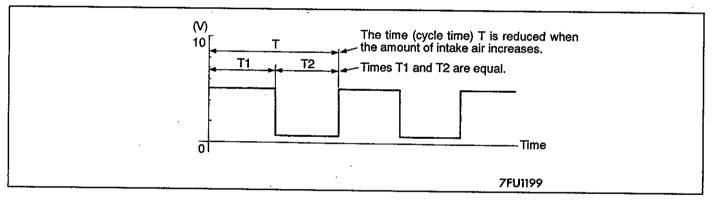
1. Connect the analyzer special patterns pickup to engine-ECU terminal 90.

Standard Wave Pattern

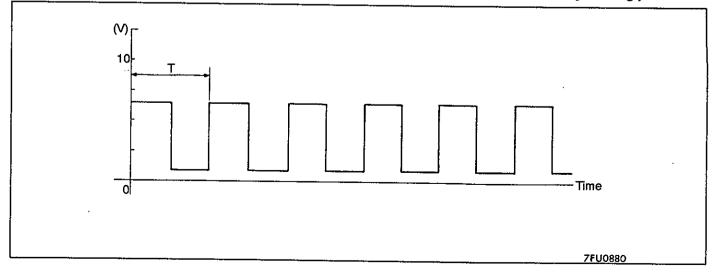
Observation conditions

Function	Special patterns	
Pattern height	Low	
Pattern selector	Display	
Engine r/min	Idle speed	

Standard wave pattern

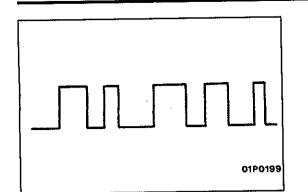


Observation conditions (from conditions above engine speed is increased by racing.)



Wave Pattern Observation Points

Check that cycle time T becomes shorter and the frequency increases when the engine speed is increased.



Examples of Abnormal Wave Patterns

• Example 1

Cause of problem

Sensor interface malfunction

Wave pattern characteristics

Rectangular wave pattern is output even when the engine is not started.

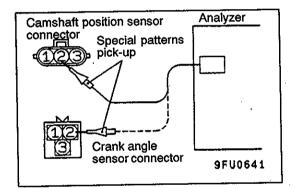
Example 2

Cause of problem

Damaged rectifier or vortex generation column

Wave pattern characteristics

Unstable wave pattern with non-uniform frequency. However, when an ignition leak occurs during acceleration, the wave pattern will be distorted temporarily, even if the air flow sensor is normal.



CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR

Measurement Method

- 1. Disconnect the camshaft position sensor connector and connect the special tool (test harness: MB991223) and jumper wire in between. (All terminals should be connected.)
- 2. Connect the analyzer special patterns pickup to camshaft position sensor terminal 2.
- 3. Disconnect the crank angle sensor connector and connect the special tool (test harness: MD998478) in between.
- 4. Connect the analyzer special patterns pickup to crank angle sensor terminal 2.

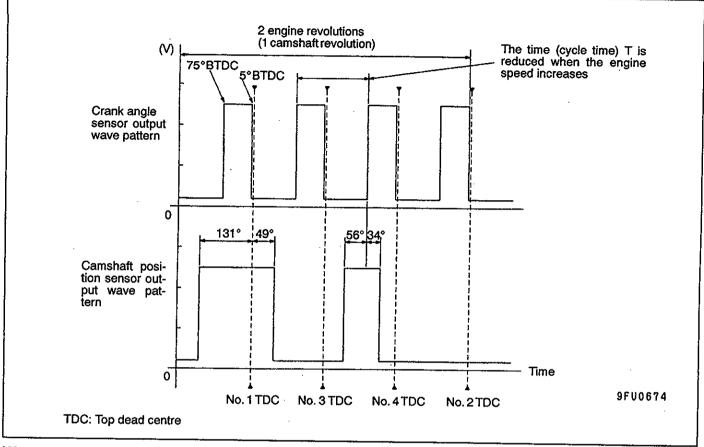
Alternate Method (Test harness not available)

- 1. Connect the analyzer special patterns pickup to engine-ECU terminal 88. (When checking the camshaft position sensor signal wave pattern.)
- 2. Connect the analyzer special patterns pickup to engine-ECU terminal 89. (When checking the crank angle sensor signal wave pattern.)

Standard	Wave	Pattern
Observati	on co	nditions

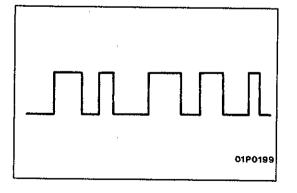
Function	Special patterns	
Pattern height	Low	
Pattern selector	Display	
Engine r/min	Idle speed	

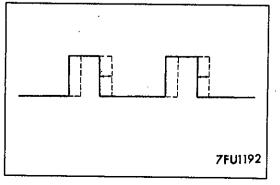
Standard wave pattern



Wave Pattern Observation Points

Check that cycle time T becomes shorter when the engine speed increases.





Examples of Abnormal Wave Patterns

Example 1
 Cause of problem

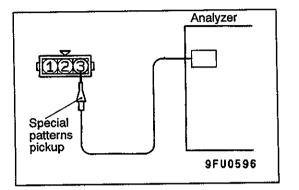
Sensor interface malfunction

Wave pattern characteristics

- Rectangular wave pattern is output even when the engine is not started.
- Example 2 Cause of problem Loose timing belt Abnormality in sensor disk Wave pattern characteristics Wave pattern is displaced to the left or right.

INJECTOR

Refer to P.13A-69. STEPPER MOTOR Refer to P.13A-71.



IGNITION COIL AND POWER TRANSISTOR

Power transistor control signal

Measurement Method

- 1. Disconnect the ignition coil connector, and connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)
- 2. Connect the analyzer special patterns pickup to terminal 3 of each ignition coil connector in turn.

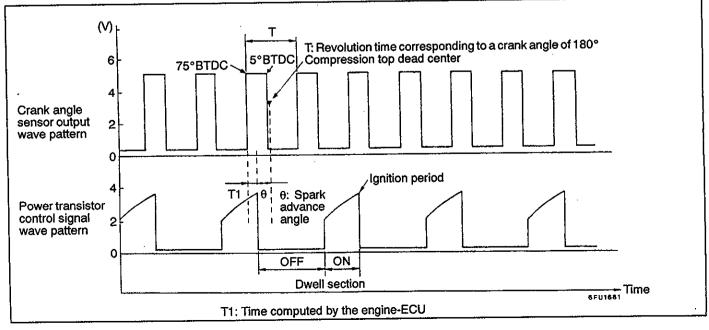
Alternate Method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal 10 (No. 1 – No. 4), terminal 23 (No. 2 – No. 3) respectively.

Standard Wave Pattern Observation condition

Function	Special patterns	
Pattern height	Low	
Pattern selector	Display	
Engine r/min	Approx. 1,200 r/min	

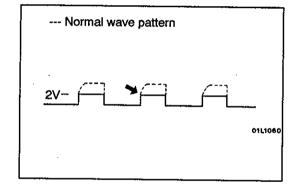
Standard wave pattern

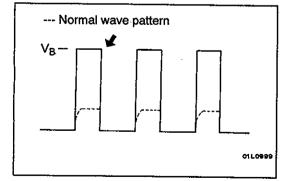


Wave Pattern Observation Points

Point: Condition of wave pattern build-up section and maximum voltage (Refer to abnormal wave pattern examples 1 and 2.)

Condition of wave pattern build-up section and maximum voltage	Probable cause
Rises from approx. 2V to approx. 4.5V at the top-right	Normal
2V rectangular wave	Open-circuit in ignition primary circuit
Rectangular wave at power voltage	Power transistor malfunction





Examples of Abnormal Wave Patterns

Example 1 Wave pattern during engine cranking Cause of problem

Open-circuit in ignition primary circuit

Wave pattern characteristics

Top-right part of the build-up section cannot be seen, and voltage value is approximately 2V too low.

• Example 2

Wave pattern during engine cranking

Cause of problem

Malfunction in power transistor

Wave pattern characteristics

Power voltage results when the power transistor is ON.

ON-VEHICLE SERVICE

13100100122

THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

Refer to P.13A-75.

IDLE POSITION SWITCH AND THROTTLE POSITION SENSOR ADJUSTMENT 13100130114

Refer to P.13A-75.

FIXED SAS ADJUSTMENT

13100150127

Refer to P.13A-76.

BASIC IDLE SPEED ADJUSTMENT

13100180126

NOTE

- 1. The standard idling speed has been adjusted, by the speed adjusting screw (SAS), by the manufacturer, and there should usually be no need for readjustment.
- 2. If the adjustment has been changed by mistake, the idle speed may become too high or the idle speed may drop too low when loads from components such as the A/C are placed on the engine. If this occurs, adjust by the following procedure.
- 3. The adjustment, if made, should be made after first confirming that the spark plugs, the injectors, the idle speed control servo, the compression pressure, etc., are all normal.
- 1. Before inspection and adjustment, set the vehicle to the pre-inspection condition.
- 2. Connect the MUT-II to the diagnosis connector (16-pin). NOTE

When the MUT-II is connected, the diagnosis control terminal should be earthed.

- 3. Start the engine and run at idle.
- 4. Select the item No.30 of the MUT-II ACTUATOR TEST. NOTE

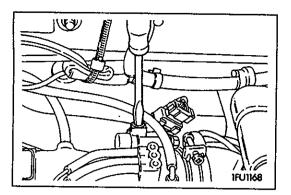
This holds the ISC servo at the basic step to adjust the basic idle speed.

5. Check the idle speed.

Standard value: 750 ± 50 r/min <except MVV> 700 ± 50 r/min <MVV>

NOTE

- 1. The engine speed may be 20 to 100 r/min lower than indicated above for a new vehicle [driven approximately 500 km or less], but no adjustment is necessary.
- 2. If the engine stalls or the engine speed is low even though the vehicle has been driven approximately 500 km or more, it is probable that deposits are adhered to the throttle valve, so clean it. (Refer to P.13A-75.)



6. If not within the standard value range, turn the speed adjusting screw (SAS) to make the necessary adjustment. NOTE

If the idling speed is higher than the standard value range even when the SAS is fully closed, check whether or not there is any indication that the fixed SAS has been moved. If there is an indication that it has been moved, adjust the fixed SAS.

7. Press the MUT-II clear key, and release the ISC servo from the ACTUATOR TEST mode.

NOTE

Unless the ISC servo is released, the ACTUATOR TEST mode will continue 27 minutes.

- 8. Switch OFF the ignition switch.
- 9. Disconnect the MUT-II.
- 10. Start the engine again and let it run at idle speed for about 10 minutes; check that the idling condition is normal.

FUEL PRESSURE TEST

13100190129

Refer to P.13A-78.

FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE THE FUEL PRESSURE)

13100090153

Refer to P.13A-81.

FUEL PUMP OPERATION CHECK

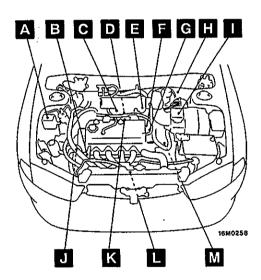
Refer to P.13A-81.

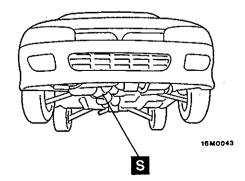
13100200112

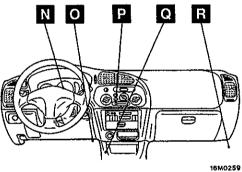
COMPONENT LOCATION

131	0021	0160
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Name	Symbol	Name	Symbol
A/C relay	А	Engine warning lamp (check engine lamp)	N
A/C switch	P [.]	Fuel pump check terminal	н
Air by-pass control solenoid valve <mvv></mvv>	С	Idle speed control servo	Е
Air flow sensor (with intake air temperature sensor and barometric pressure sensor)	1	Ignition coil	к
		Inhibitor switch 	м
Camshaft position sensor	F	Injectors	к
Control relay and fuel pump relay	Q	Oxygen sensor <except mvv=""></except>	S
Crank angle sensor	J	Oxygen sensor <mvv></mvv>	L
Detonation sensor	D	Power steering fluid pressure switch	В
Diagnosis connector	0	Purge control solenoid valve	С
EGR control solenoid valve	С	Throttle position sensor (with idle position	E
Engine coolant temperature sensor	G	– switch)	
Engine-ECU	R	Vehicle speed sensor	М





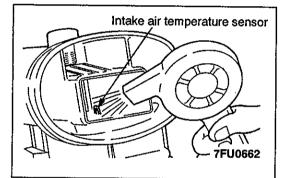


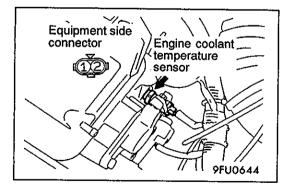
9FU0642

CONTROL RELAY AND FUEL PUMP RELAY CONTINUITY CHECK 13100990064

Refer to P.13A-83.

Equipment side connector





INTAKE AIR TEMPERATURE SENSOR CHECK

13100280116

- 1. Disconnect the air flow sensor connectors.
- 2. Measure resistance between terminals 5 and 6. Standard value:

2.3–3.0 kΩ (at 20°C) 0.30–0.42 kΩ (at 80°C)

3. Measure resistance while heating the sensor using a hair drier.

Normal condition:

Temperature (°C)	Resistance (kΩ)
Higher	Smaller

4. If the value deviates from the standard value or the resistance remains unchanged, replace the air flow sensor assembly.

ENGINE COOLANT TEMPERATURE SENSOR CHECK 13100310112

Refer to P.13A-83.

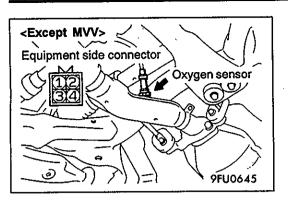
THROTTLE POSITION SENSOR CHECK 13100320115

Refer to P.13A-84.

IDLE POSITION SWITCH CHECK

Refer to P.13A-84.

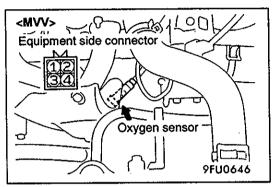
13100330125



OXYGEN SENSOR CHECK

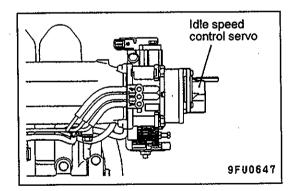
13100510055

Refer to P.13A-85. (Oxygen sensor <front>)



INJECTOR CHECK Refer to P.13A-86.

13100520119



IDLE SPEED CONTROL (ISC) SERVO (STEPPER MOTOR) CHECK

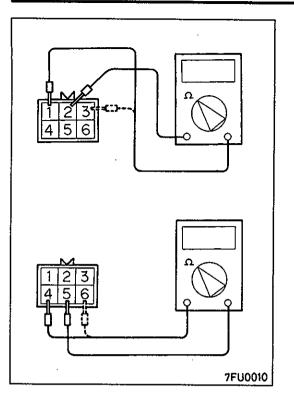
13100540153

Checking the Operation Sound

1. Check that the engine coolant temperature is 20°C or below.

NOTE

Disconnecting the engine coolant temperature sensor connector and connecting the harness-side of the connector to another engine coolant temperature sensor that is at 20°C or below is also okay.



- 2. Check that the operation sound of the stepper motor can be heard after the ignition is switched ON. (but without starting the motor.)
- 3. If the operation sound cannot be heard, check the stepper motor's activation circuit.

If the circuit is normal, it is probable that there is a malfunction of the stepper motor or of the engine control unit.

Checking the Coil Resistance

- 1. Disconnect the idle speed control servo connector and connect the special tool (test harness).
- 2. Measure the resistance between terminal 2 (white clip of the special tool) and either terminal 1 (red clip) or terminal 3 (blue clip) of the connector at the idle speed control servo side.

Standard value: 28–33 Ω (at 20°C)

3. Measure the resistance between terminal 5 (green clip of the special tool) and either terminal 6 (yellow clip) or terminal 4 (black clip) of the connector at the idle speed control servo side.

Standard value: 28–33 Ω (at 20°C)

PURGE CONTROL SOLENOID VALVE CHECK

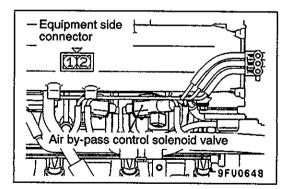
13100560128

Refer to GROUP 17 - Emission Control System.

EGR CONTROL SOLENOID VALVE CHECK

13100570114

Refer to GROUP 17 - Emission Control System.



AIR BY-PASS CONTROL SOLENOID VALVE CHECK < MVV> 13101

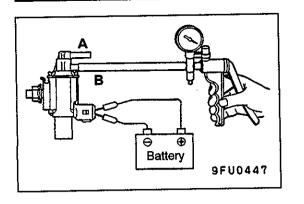
13101080012

NOTE

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

- 1. Disconnect the vacuum hose (white stripe, yellow stripe) from the solenoid valve.
- 2. Disconnect the harness connector.





- 3. Connect a hand vacuum pump to nipple B of the solenoid valve.
- 4. Use jumper wires to connect the terminals of the solenoid valve and the battery.
- 5. Check the air-tightness when negative pressure is applied while the jumper wire is connected to the battery (--) terminal and while it is disconnected.

Normal condition:

Jumper wire	Nipple A condition	Normal condition
Connected	Open	Negative pressure leaks
	Closed	Negative pressure is maintained
Discon- nected	Open	Negative pressure leaks

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

Standard value: 36–44 Ω (at 20°C)

AIR BY-PASS VALVE CHECK <MVV>

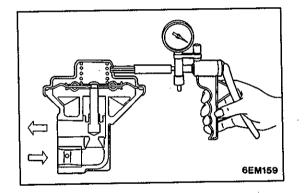
13101090015

- 1. Remove the air by-pass valve.
- 2. Connect a hand vacuum pump to the air by-pass valve.
- 3. Apply 67 kPa of vacuum, and check that the vacuum is maintained.
- Apply a vacuum and check the passage of air by blowing through one side of the air by-pass valve.

Normal condition:

Vacuum	Passage of air
2.0 kPa or less	Air is not blown out
11 kPa or more	Air is blown out

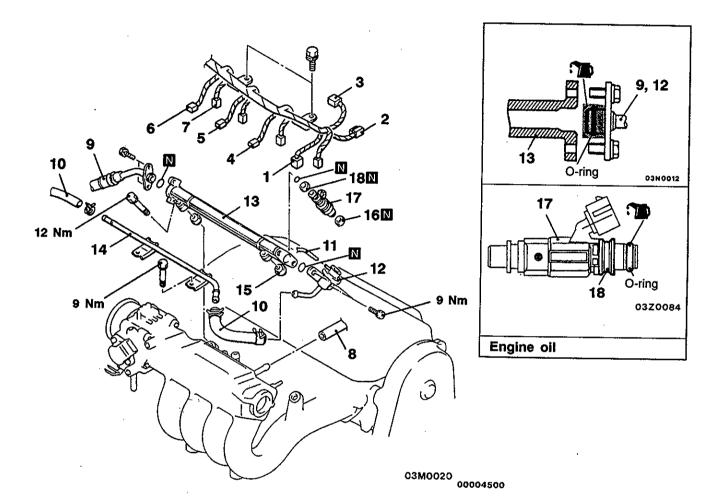
5. Replace the gasket, and tighten to the specified torque. Tightening torque: 22 Nm



INJECTOR

REMOVAL AND INSTALLATION

Pre-removal Operation
 Fuel Discharge Prevention (Refer to P.13A-172.)



Removal steps

- 1. Oxygen sensor connector <except MVV>
- 2. Crank angle sensor connector
- 3. Ignition coil connector
- Purge control solenoid valve connector
- 5. EGR solenoid valve connector
- Air by-pass solenoid valve connector <MVV>
- 7. Injector connector
- 8. PCV hose

 High-pressure fuel hose connection 10. Fuel return hose connection 11. Vacuum hose connection
 Vacuum hose connec

REMOVAL SERVICE POINT

AD DELIVERY PIPE/INJECTOR REMOVAL

Remove the delivery pipe (with the injectors attached to it).

Caution

Care must be taken, when removing the delivery pipe, not to drop the injector.

INSTALLATION SERVICE POINT

►A INJECTOR/FUEL PRESSURE REGULATOR/ HIGH-PRESSURE FUEL HOSE INSTALLATION

(1) Apply a drop of new engine oil to the O-ring. Caution

Be sure not to let engine oil in the delivery pipe.

- (2) While turning the injector, high-pressure fuel hose and fuel pressure regulator to the right and left, install the delivery pipe, while being careful not to damage the O-ring. After installing, check that the hose turns smoothly.
- (3) If it does not turn smoothly, the O-ring may be trapped, remove the fuel pressure regulator and then re-insert it into the delivery pipe and check once again.
- (4) Tighten the high-pressure fuel hose to the standard torque, and tighten the fuel pressure regulator to the specified torque.

Tightening torque: 9 Nm (Fuel pressure regulator)

THROTTLE BODY

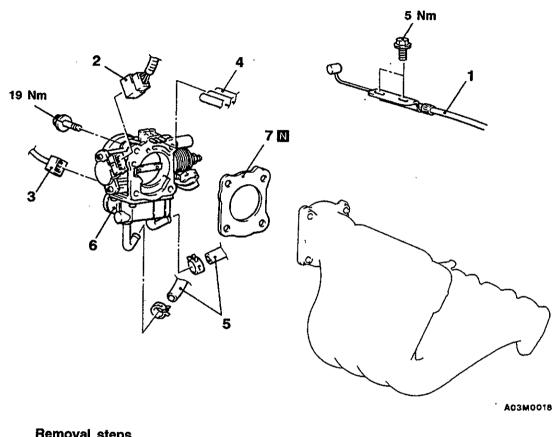
REMOVAL AND INSTALLATION

Pre-removal Operation

- Engine Coolant Draining (Refer to GROUP 14 -On-vehicle Service.)
- Air Cleaner Removal

Post-installation Operation

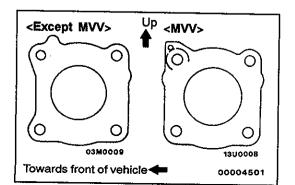
- Air Cleaner Installation
- Engine Coolant Supplying (Refer to GROUP 14
- On-vehicle Service.) Accelerator Cable Adjustment (Refer to GROUP 17 - On-vehicle Service.)



Removal steps

- 1. Accelerator cable connection
- 2. Throttle position sensor connector
- 3. Idle speed control servo connector
- 4. Vacuum hose connection

5. Water hose connection 6. Throttle body 7. Throttle body gasket

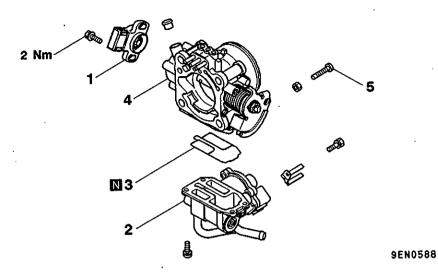


INSTALLATION SERVICE POINT ►A THROTTLE BODY GASKET INSTALLATION

Place the gasket so that the projecting part is positioned as shown in the illustration, and then install it between the intake manifold and the throttle body.

13100770132

13100970112



Disassembly steps

- 1. Throttle position sensor
- 2. Idle speed control body assembly
- 3. O-ring

-A-

- 4. Throttle body
- 5. Fixed SAS

NOTE

- 1. The fixed SAS is correctly adjusted at the factory and should not be removed.
- If the fixed SAS should happen to have been removed, carry out fixed SAS adjustment. (Refer to page 13A-76.)

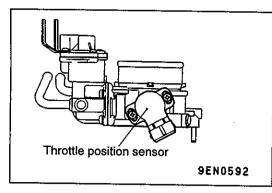
CLEANING THROTTLE BODY PARTS

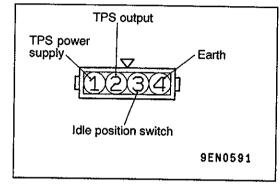
- 1. Clean all throttle body parts.
 - Do not use solvent to clean the following parts:
 - Throttle position sensor
 - Accelerator pedal position sensor
 - Idle speed control body assembly

If these parts are immersed in solvent, their insulation will deteriorate.

Wipe them with cloth only.

2. Check if the vacuum port or passage is clogged. Use compressed air to clean the vacuum passage.





REASSEMBLY SERVICE POINT

►A THROTTLE POSITION SENSOR (TPS) INSTALLATION

- 1. Install the TPS so that it faces as shown in the illustration, and then tighten it with the screw.
- 2. Connect a multimeter between terminal (1) (TPS power supply) and terminal (2) (TPS output) of the TPS connector, and check that the resistance increases gradually as the throttle valve is opened slowly to the fully-open position.
- 3. Check the continuity between terminal (3) (idle position switch) and terminal (4) (earth) of the TPS connector when the throttle valve is fully closed and fully open.

Normal condition:

Throttle valve condition	Continuity
Fully closed	Continuity
Fully open	No continuity

If there is no continuity when the throttle valve is fully closed, turn the TPS body anti-clockwise and then check again.

4. If there is an abnormality, replace the TPS.

FUEL SUPPLY

CONTENTS

GENERAL	2
SEALANT	 2

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13509000098

FUEL TANK 3

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GENERAL INFORMATION

- (1) The fuel tank is located under the floor of the rear seats to provide increased safety and a wider luggage space.
- (2) A fuel cut-off valve has been adopted to prevent fuel from leaking out in the event of a collision.

SEALANT

13500010038

(3) A plastic fuel tank has been adopted to reduce weight, and improve anti-corrossion effectiveness.

13500050023

Item	Specified sealant
Plug and floor pan	3M 8513 Grommeted windshield sealer (Black)

FUEL TANK

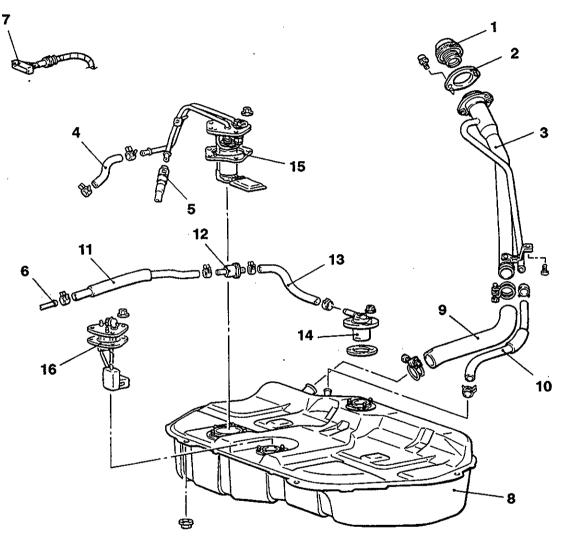
REMOVAL AND INSTALLATION

Pre-removal Operation

- **Draining Fuel** (1) (2) Reduce the Inner Pressure of Fuel Line and Hose
 - (Refer to GROUP 13A On-vehicle Service.)

Post-installation Operation

- Refilling Fuel. Checking for Fuel Leaks (1) (2)

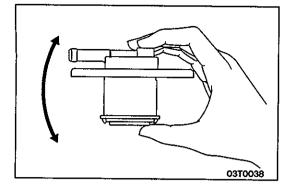


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Removal steps

- 1. Fuel filler cap
- 2. Packing
- 3. Fuel filler neck assembly
- 4. Return hose
- 5. High-pressure fuel hose
- 6. Hose connection
 Rear seat cushion (Refer to GROUP 52A Rear Seat).
- 7. Harness connector
- 8. Fuel tank

- 9. Filler hose
- 10. Leveling hose 11. Vapour hose
- 12. Tow-way valve(Refer to GROUP17 Canister And Two-way Valve.)
- 13. Vapour hose
 - 14. Fuel cut-off valve
- 15. Fuel pump
- 16. Fuel gauge unit assembly



INSPECTION

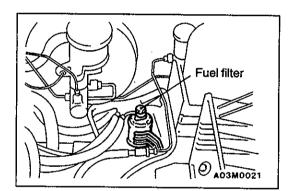
FUEL CUT-OFF VALVE CHECK

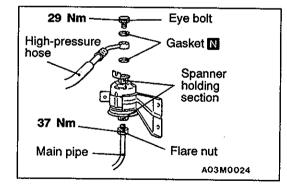
13500300067

If the sound of the float valve moving (knocking sound) can be heard when the valve assembly is gently shaken up and down, then the valve is okay.

FUEL GAUGE UNIT CHECK

Refer to GROUP 54 - Combination Meter.





FUEL FILTER REPLACEMENT

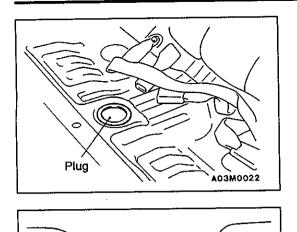
13500130055

- 1. Bleed the residual pressure from inside the fuel line. (Refer to GROUP 13A – On-vehicle Service.)
- 2. Remove the air intake hose and canister.
- 3. Hold the fuel filter with a spanner and remove the eye bolt. Then remove the high-pressure hose.

Caution

As there will be some pressure remaining in the fuel pipe line, cover it with a rag to prevent fuel from spraying out.

- 4. Hold the fuel filter with a spanner and loosen the flare nut. Then disconnect the main pipe connection.
- 5. Remove the fuel filter.
- 6. When installing the fuel filter, use a new gasket, and tighten the flare nut of the high-pressure hose and the main pipe to the specified torque.
- 7 After installation, check that there are no fuel leaks.
 - (1) Apply battery voltage to the fuel pump drive terminal to operate the fuel pump. (Refer to GROUP 13A – On-vehicle Service.)
 - (2) Check for leaks when fuel pressure is applied.



FUEL GAUGE UNIT REPLACEMENT

13500160092

- 1. Remove the rear seat cushion. (Refer to GROUP 52A – Rear Seat.)
- 2. Remove the plug.

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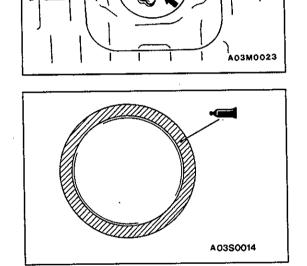
3. Disconnect the fuel gauge unit connector and remove the fuel gauge unit.

4. Apply the specified sealant to the contact surfaces of the plug and the floor pan, and install the plug.

Specified sealant:

3M 8513 Grommeted Windshield Sealer (Black) 5. Install the rear seat cushion

(Refer to GROUP 52A – Rear Seat).



NOTES