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2009 MAZDA 6/Atenza Hatchback OEM Service and Repair Workshop Manual

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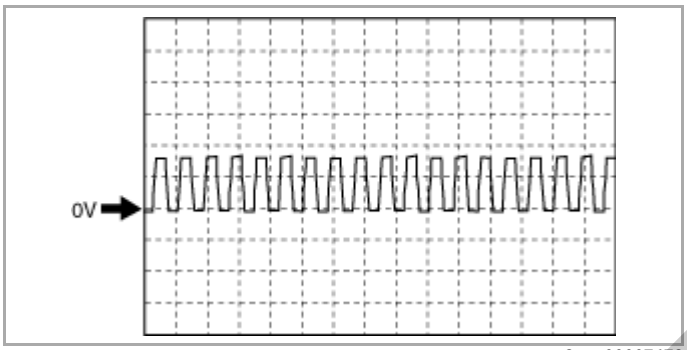
Oscilloscope setting

• 2 V/DIV (Y), 2 ms/DIV (X), DC range

Vehicle condition

• Idle after warm up

Generator output voltage



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PCM terminals

• 1AT(+)−body ground(−)

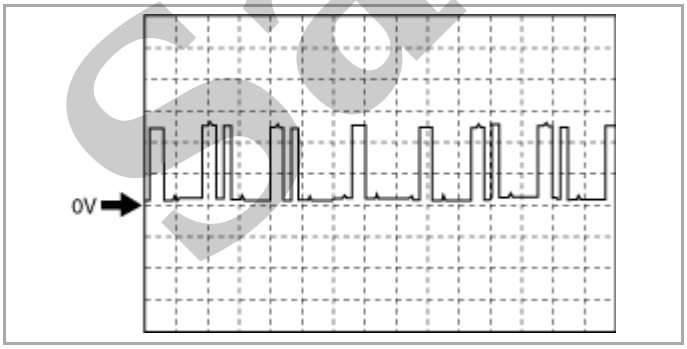
Oscilloscope setting

• 5 V/DIV (Y), 5 ms/DIV (X), DC range

Vehicle condition

• Idle after warm up

Intake CMP signal



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PCM terminals

• 1V(+)−body ground(−)

Oscilloscope setting

• 2 V/DIV (Y), 20 ms/DIV (X), DC range

Vehicle condition

• Idle (after warm up)

Item (definition)	Unit/Condition	Definition	Value type	Condition/Specification (Reference)	PCM terminal
AAT *1	°C, °F	Ambient air temperature	–	• Displays ambient air temperature	2Q
ABV_OIL_P	Off/On	Air bypass valve operation status	Output	• Air bypass valve fully closed: Off • Air bypass valve fully open: On	1BC
AC_PRES	KPa {MPA}, mBar {BAR}, psi, in H20	Refrigerant pressure input from refrigerant pressure sensor	Calculation	• Displays refrigerant pressure	2W
	V	Refrigerant pressure sensor voltage	Input	• Refrigerant pressure is 449 kPa {4.58 kgf/cm ^{2}, 65.1 psi}: Approx. 0.76 V • Refrigerant pressure is 729 kPa {7.43 kgf/cm ^{2}, 106 psi}: Approx. 1.18 V	
AC_REQ	Off/On	A/C switch status received by PCM via CAN	Input	• A/C switch off: Off • A/C switch on: On	CAN (2AK, 2AL)
ACCS	Off/On	A/C relay status input from A/C relay	Input	• A/C relay off: Off • A/C relay on: On	2BB
ALTF_ACT	%	Actually measured value of field coil current signal input from generator	Calculation	• Displays actual generator field current control duty value	–
ALTT V	V	Generator output voltage	Input	• Idle (no E/L): Approx. 14 V (This is internal calculation value and differs from terminal voltage)	1AT
AMB_TEMP	°C, °F	Actually measured ambient temperature input from ambient temperature sensor	Calculation	• Displays ambient air temperature	2Q
APP	%	Accelerator pedal opening angle (relative value) with the fully released status as 0% and fully depressed status as 100%	Calculation	• Accelerator pedal released: Approx. 0% • Accelerator pedal fully depressed: Approx. 100%	–
APP1	%	Accelerator pedal opening angle (absolute value) input from APP sensor No.1	Calculation	• Accelerator pedal released: Approx. 16% • Accelerator pedal fully depressed: Approx. 91%	2AN
	V	APP sensor No.1 voltage	Input	• Accelerator pedal released: Approx. 0.78 V • Accelerator pedal fully depressed: Approx. 4.54 V	
APP2	%	Accelerator pedal opening angle (absolute value) input from APP sensor No.2	Calculation	• Accelerator pedal released: Approx. 7.84% • Accelerator pedal fully depressed: Approx. 45.49%	2AR
	V	APP sensor No.2 voltage	Input	• Accelerator pedal released: Approx. 0.39 V • Accelerator pedal fully depressed: Approx. 2.27 V	
ARPMDES	RPM	Target engine speed	Calculation	• Displays target engine speed	–
BARO	KPa {MPA}, mBar {BAR}, psi, in H20	Actually measured barometric pressure input from barometric pressure sensor built into PCM	Calculation	• Displays BARO	–
BOO	High/Low	Brake switch (No.1 signal) input status	Calculation	• Brake pedal released: Low • Brake pedal fully depressed: High	2G
BPA	High/Low	Brake switch (No.2 signal) input status	Calculation	• Brake pedal released: Low • Brake pedal fully depressed: High	2R

Item (definition)	Unit/Condition	Definition	Value type	Condition/Specification (Reference)	PCM terminal
FP_DUTY	%	Fuel pump control module control duty value	Calculation	• Ignition switched ON (engine off): Approx. 55.74% • Cranking: Approx. 95% • Idle (after warm up): Approx. 55.74%	2AP
FTP *1	Pa {KPA}, mBar {BAR}, psi, in H20	Fuel tank pressure	Calculation	• Displays fuel tank pressure	2M
	V	Fuel tank pressure sensor voltage	Input	• Fuel tank pressure is equal to barometric pressure: Approx. 2.6 V	
FUEL_LO_P	V	Low fuel pressure sensor voltage	Input	• Displays low fuel pressure sensor voltage	1M
FUEL_LO_T	°C, °F	Fuel temperature inside the fuel supply line	Converted value	• Displays the fuel temperature inside the fuel supply line	1AH
	V	Fuel temperature sensor voltage	Input	• Displays fuel temperature sensor voltage	
FUEL_P_DSD	KPa {MPA}, mBar {BAR}, psi, in H20	Target fuel pressure (high pressure fuel pump)	Calculation	• Displays target fuel pressure (high pressure fuel pump) **Ignition switched ON (engine off)** — Fuel pressure: Approx. 12 MPa {122 kgf/cm ^{2}, 1740 psi} **Idle (after warm up)** — ECT is 91 °C {196 °F}: Fuel pressure is 3.3–3.8 MPa {34–38 kgf/cm ^{2}, 479–551 psi}	–
FUEL_PRES	KPa {MPA}, mBar {BAR}, psi, in H20	Fuel pressure input from high fuel pressure sensor	Calculation	• Displays fuel pressure	1BO
	V	High fuel pressure sensor voltage	Input	**Idle (after warm up)** • Fuel pressure is 3.44–3.95 MPa {35.1–40.2 kgf/cm ^{2}, 499–572 psi}: 0.98–1.05 V (ECT is 90 °C {194 °F})	
FUELPW	Sec	Fuel injection pulse width (fuel injector energization time) output to fuel injector	Calculation	• Idle (after warm up): Approx. 1.71 ms • Racing (engine speed is 2,000 rpm): Approx. 1.35 ms • Racing (engine speed is 4,000 rpm): Approx. 1.21 ms	No.1: 1DO/1DP No.2: 1DW/1DX No.3: 1EA/1EB No.4: 1DS/1DT

Item (definition)	Unit/Condition	Definition	Value type	Condition/Specification (Reference)	PCM terminal
MAF	g/Sec	Mass air flow input from MAF sensor	Calculation	• Displays MAF	2BC
	V	MAF sensor voltage	Input	• Ignition switched ON (engine off) (MAF: 0.65 g/s {0.086 lb/min}): Approx. 0.72 V • Idle (after warm up) (MAF: 2.78 g/s {0.368 lb/min}): Approx. 0.86 V • Racing (engine speed is 2,000 rpm) (MAF: 7.74 g/s {1.02 lb/min}): Approx. 1.14 V	
MAP	KPa {MPA}, mBar {BAR}, psi, in H20	Manifold absolute pressure input from MAP sensor	Calculation	• Displays MAP	1BD
MAP_V	V	MAP sensor voltage	Input	• Ignition switched ON (engine off) (no load) (MAP: 102 kPa {1.04 kgf/cm ^{2}, 14.8 psi}): Approx. 1.75 V • Idle (after warm up) (no load) (MAP: 30 kPa {0.31 kgf/cm ^{2}, 4.4 psi}): Approx. 0.68 V • Racing (engine speed is 2,000 rpm) (no load) (MAP: 27 kPa {0.28 kgf/cm ^{2}, 3.9 psi}): Approx. 0.61 V	
MF_CAT1	–	Number of misfires in No.1 cylinder leading to catalytic converter temperature increase (catalytic converter temperature increases due to fuel combustion around catalytic converter after misfire)	Calculation	• Displays number of misfires corresponding to possible catalytic converter damage (No.1 cylinder)	–
MF_CAT_2	–	Number of misfires in No.2 cylinder leading to catalytic converter temperature increase (catalytic converter temperature increases due to fuel combustion around catalytic converter after misfire)	Calculation	• Displays number of misfires corresponding to possible catalytic converter damage (No.2 cylinder)	–
MF_CAT_3	–	Number of misfires in No.3 cylinder leading to catalytic converter temperature increase (catalytic converter temperature increases due to fuel combustion around catalytic converter after misfire)	Calculation	• Displays number of misfires corresponding to possible catalytic converter damage (No.3 cylinder)	–
MF_CAT_4	–	Number of misfires in No.4 cylinder leading to catalytic converter temperature increase (catalytic converter temperature increases due to fuel combustion around catalytic converter after misfire)	Calculation	• Displays number of misfires corresponding to possible catalytic converter damage (No.4 cylinder)	–
MF_CAT_FCC	–	Threshold of malfunction determination for number of misfires (total number in all cylinders) leading to catalytic converter temperature increase	Calculation	• Displays number of misfire determinations (for catalytic converter)	–

Item (definition)	Unit/Condition	Definition	Value type	Condition/Specification (Reference)	PCM terminal
TH_M_MIN *1	–	Thermostat monitor min	Calculation	• Indicates lower limit of heat radiation ratio (heat radiation when thermostat is malfunctioning/heat radiation when thermostat is normal) for thermostat monitoring execution	–
	°C, °F	Lower limit of engine coolant temperature for thermostat monitoring execution	Calculation	• Indicates lower limit of engine coolant temperature for thermostat monitoring execution	
TP_REL	%	Throttle valve opening angle (relative value) with value at throttle valve fully close timing as the start point	Calculation	• Accelerator pedal released: Approx. 12% • Accelerator pedal fully depressed: Approx. 82%	–
TP_UP_DSD_P	KPa {MPA}, mBar {BAR}, psi, in H20	Desired turbocharger boost pressure	Calculation	• Displays turbocharger boost pressure	2AS
TP_UP_TEMP	V	Throttle upstream temperature sensor voltage	Input	• TP_UP_TEMP is 20 °C {68 °F}: Approx. 3.57 V • TP_UP_TEMP is 40 °C {104 °F}: Approx. 2.70 V • TP_UP_TEMP is 60 °C {140 °F}: Approx. 1.87 V	2U
TP1	%	Throttle valve position No.1	Calculation	• Accelerator pedal released: Approx. 22% • Accelerator pedal fully depressed: Approx. 75%	1AZ
	V	TP sensor No.1 voltage	Input	• Accelerator pedal released: Approx. 1.11 V • Accelerator pedal fully depressed: Approx. 4.59 V	
TP2	%	Throttle valve position No.2	Calculation	• Accelerator pedal released: Approx. 22% • Accelerator pedal fully depressed: Approx. 75%	1BE
	V	TP sensor No.2 voltage	Input	• Accelerator pedal released: Approx. 3.92 V • Accelerator pedal fully depressed: Approx. 0.41 V	
TPCT	V	TP sensor No.1 minimum voltage at CTP	Calculation	• Ignition switched ON (engine off): Approx. 0.5 V	1AZ
TPCT2	V	TP sensor No.2 minimum voltage at CTP	Calculation	• Ignition switched ON (engine off): Approx. 4.5 V	1BE
VEV_OIL_P	Off/On	Three way solenoid valve operation status	Output	• Three way solenoid valve fully closed: Off • Three way solenoid valve fully open: On	1BH
VPWR	V	Battery positive voltage	Input	• Displays battery voltage	2O
VSS	KPH, MPH	Vehicle speed	Calculation	• Displays vehicle speed	CAN (2AK, 2AL)
VT_EX_ACT	° (deg)	Actual exhaust variable valve timing control • Retard amount from max advance position	Calculation	• Displays actual exhaust valve timing	1Q
VT_EX_DES	° (deg)	Target exhaust variable valve timing control • Retard amount from max advance position	Calculation	• Displays desired exhaust valve timing	–

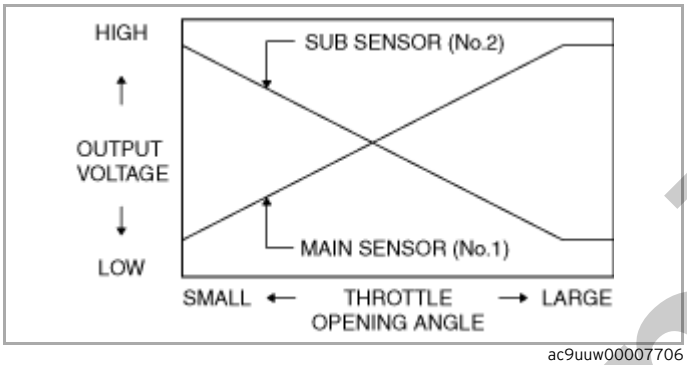
3.Verify that the TP sensor output voltage (PID: TP1, TP2) varies according to the accelerator opening angle when the accelerator opening angle is gradually increased. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].)

- If verified, go to the next step.
- If not as verified, replace the throttle body. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)

4.Verify that the TP sensor output voltage (PID: TP1, TP2) is within the specification when the accelerator pedal is depressed and not depressed. (See ON-BOARD DIAGNOSTIC TEST [PCM (SKYACTIV-G 2.5T)].) (See PCM INSPECTION [SKYACTIV-G 2.5T].)

- If not as specified, replace the throttle body. (See INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [SKYACTIV-G 2.5T].)

Specification (Reference)



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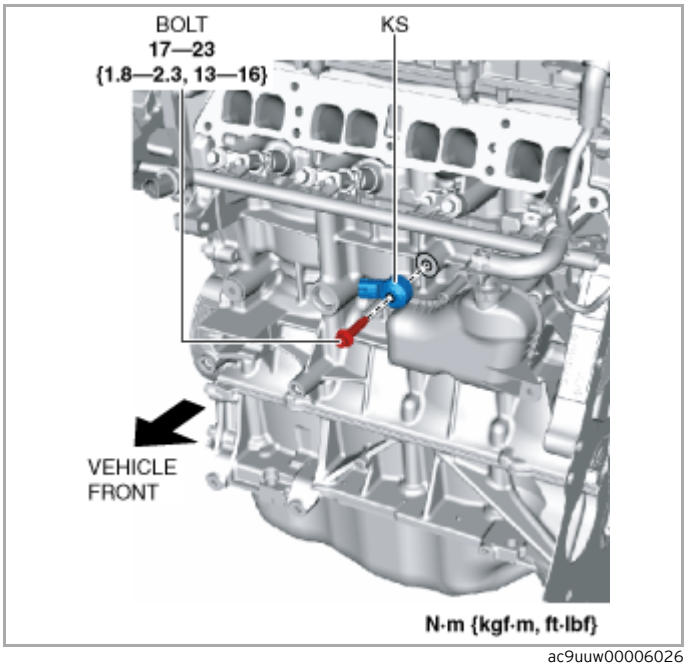

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8.Remove the KS. (See KS Installation Note.)

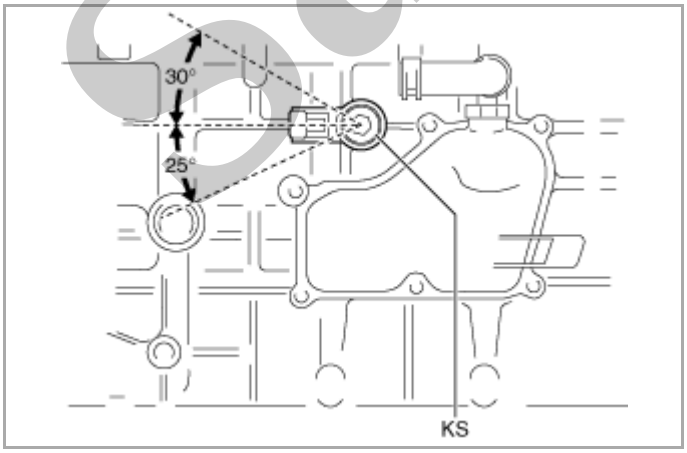
9.Install in the reverse order of removal.

KS Installation Note

Caution

• Verify that there is no foreign matter caught between the KS unit and cylinder block as it will cause the sensor to operate incorrectly.

1.Install the KS so that the KS connector direction is within the range shown in the figure.



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HEATED OXYGEN SENSOR (HO2S) REMOVAL/INSTALLATION [SKYACTIV-G 2.5T]

SM2897732

id0140h080400

Special Service Tool (SST)

49 L018 001 O2 sensor wrench	

Warning

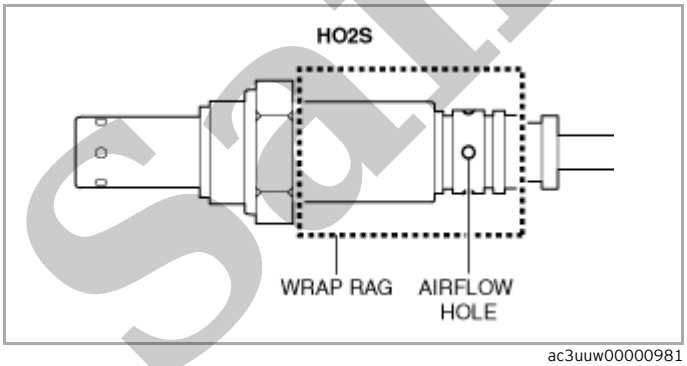
• A hot engine and exhaust system can cause severe burns. Turn off the engine and wait until they are cool before removing the exhaust system.

Caution

• Do not allow flammable objects such as the taping for bundling the wiring harness to come into contact with the exhaust system such as the exhaust manifold and silencer which reach high temperatures. Otherwise, it could cause fire damage.

Note

• If penetrant lubricating spray penetrates the airflow hole of the HO2S, it could cause interference with the HO2S function.
• When removing the HO2S, wrap a rag around the lower position so that penetrant lubricating spray does not get sprayed into the airflow hole.



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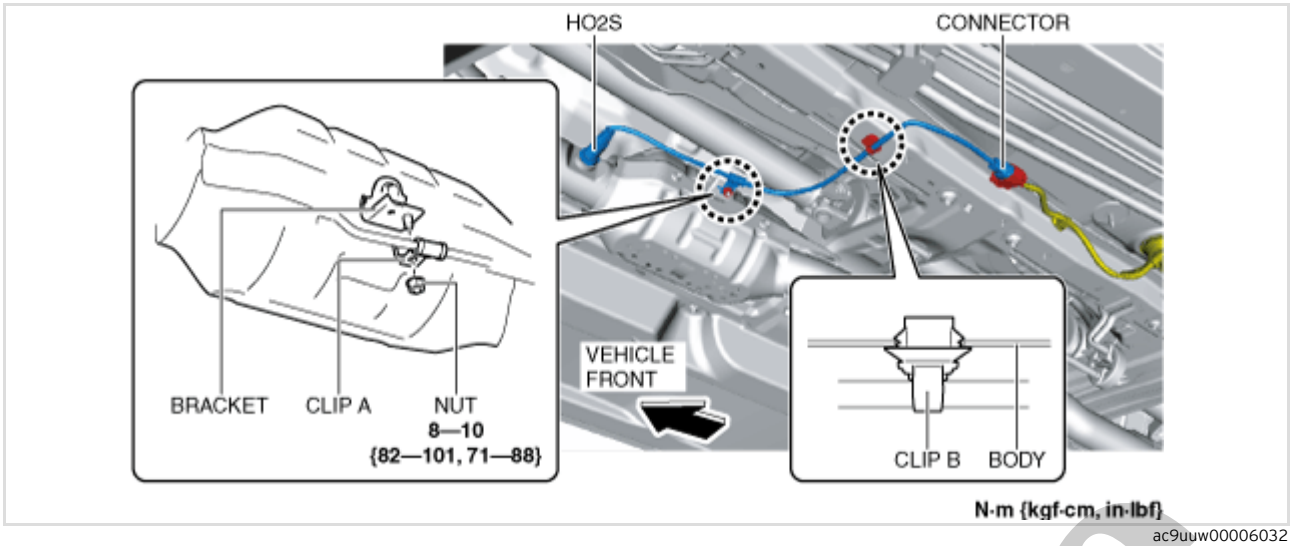
2WD

4.Disconnect the HO2S connector.



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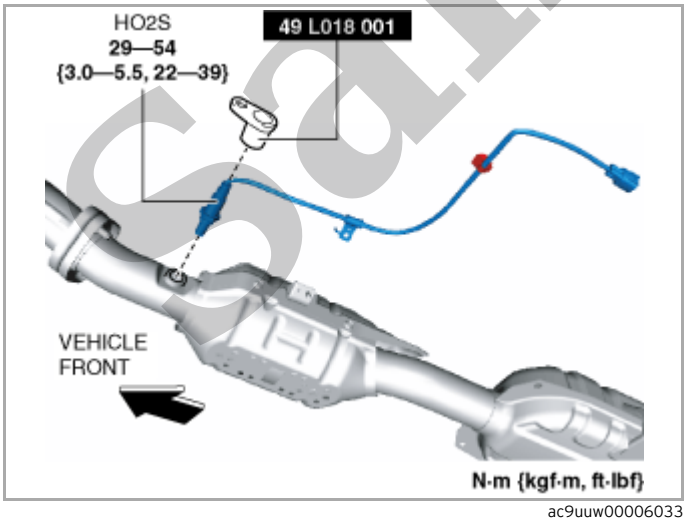
5.Remove the nut.

6.Remove the clip A from the bracket.

7.Remove the clip B from the body.

8.Remove the HO2S using the SST.



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9.Install in the reverse order of removal.