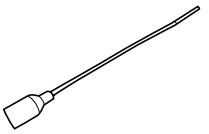
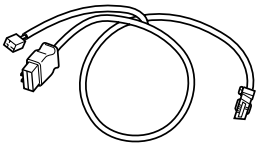
B1 ENGINE

■ 1KR
1 ENGINE
1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09991-87402-000	Wire,tacho-pulse pick up
	09991-87403-000	Wire,diagnosis check
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection

Instrument

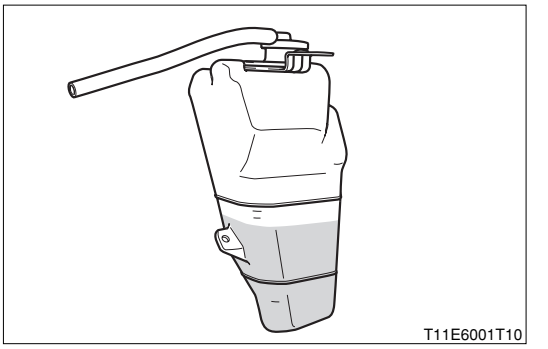
Radiator cap tester,Radiator cap tester adapter,MityVac,Belt tension gauge,Compression gauge,Tachometer,Timing light,Torque wrench,Micrometer,Thickness gauge,Voltage tester,Sound scope,,Plug gap gauge

1-2 BASIC CHECK AND ADJUSTMENT

1-2-1 CHECK OF COOLING WATER LEVEL AND WATER LEAKAGE

(1) Water level

1.Check that the cooling water level is between the upper limit (FULL) and the lower limit (LOW) of the reservoir tank.


T11E6001T10

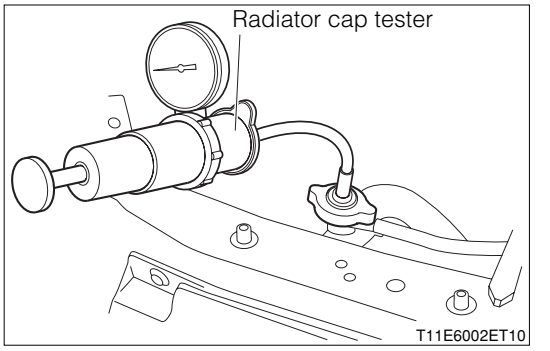
(2) Water leakage

1.With the engine idling, visually check that there is no water leakage from the radiator, radiator hose, water pump, water bypass pipe, water bypass hose, heater hose, etc. Moreover, apply pressure, using a radiator cap tester. Under this condition, check that no water leakage is present.

SPECIFIED VALUE: Specified value for check
122.7kPa {1.25kgf/cm^2}

NOTE

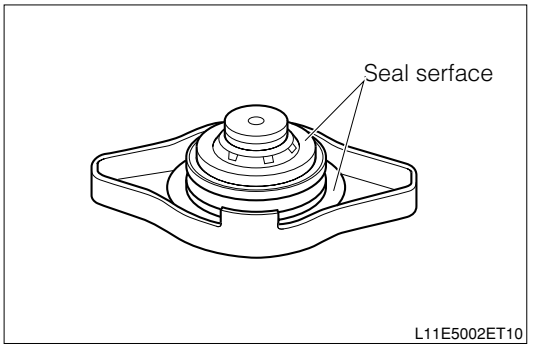
- There may be a small amount of cooling water leaking from the vapor hole and the drain hole of the water pump. However, this is not an abnormality.



T11E6002ET10

(3) Function check of radiator cap

1.Remove the radiator cap. Then, visually check the valve seat surface for smear and damage. Also, move the negative pressure valve by your hand and check that it opens and closes.



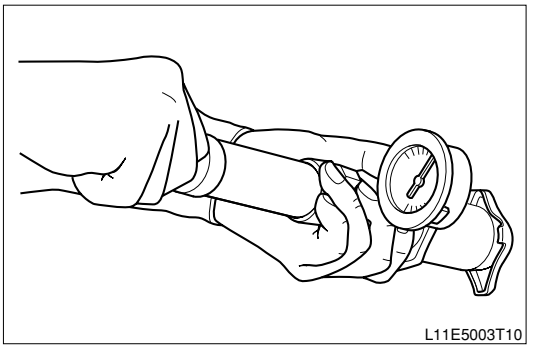
L11E5002ET10

2.Check the valve opening pressure of the cap, using a radiator cap tester.

SPECIFIED VALUE: 108.0±14.7kPa{1.1±0.15kgf/cm^2}

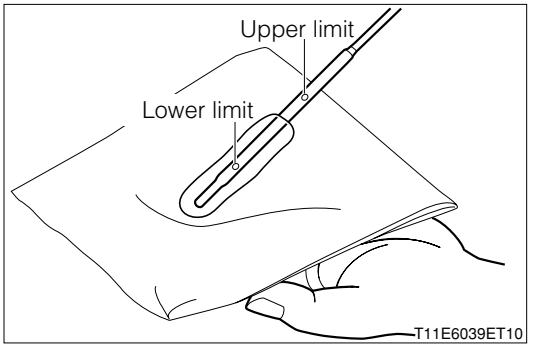
CAUTION

- Liberally apply water to the cap seal surface before the installation to the tester.


L11E5003T10

1-2-2 CHECK OF ENGINE OIL LEVEL

1.Stop the engine. Perform the check on a level place.
2.Pull out the oil level gauge. Wipe out the oil adhered to the gauge and insert it again.
3.Check that the oil level is between the lower limit (L) and the upper limit (F).
4.Check the condition of smear and that there is no white turbidity in the engine oil by observing the oil adhered to the oil level gauge.

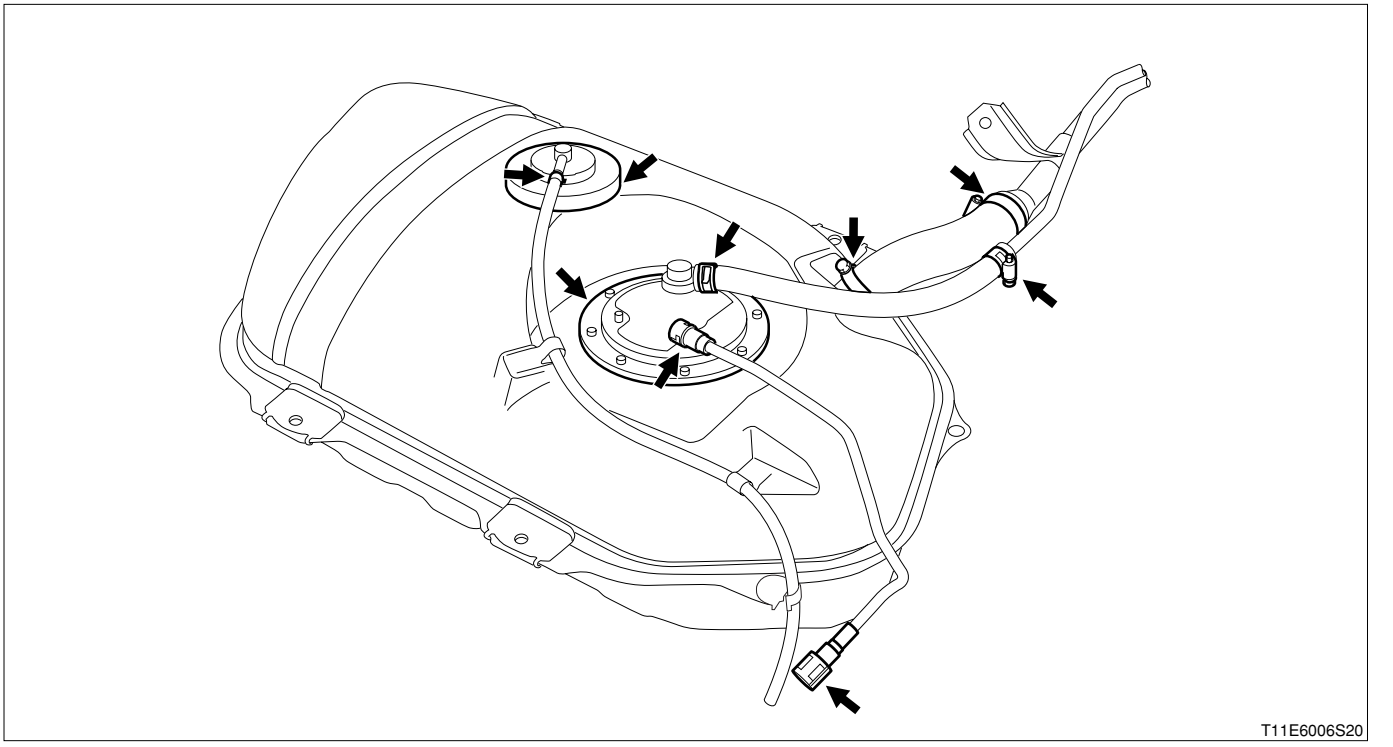


1-2-3 ENGINE OIL LEAKAGE CHECK

1.Visually check that there is no oil leakage from the cylinder head cover, oil pan and drain plug.

1-2-4 FUEL LEAKAGE CHECK

1.Visually check the fuel tank main body, fuel pump, hoses and pipes for fuel leakage.
2.Visually check that there is no crack and damage in the fuel hoses and pipes. Also, check that the installation of the clamp for each hose and pipe is not loosened.



1-2-5 CONDITION OF AIR CLEANER ELEMENT

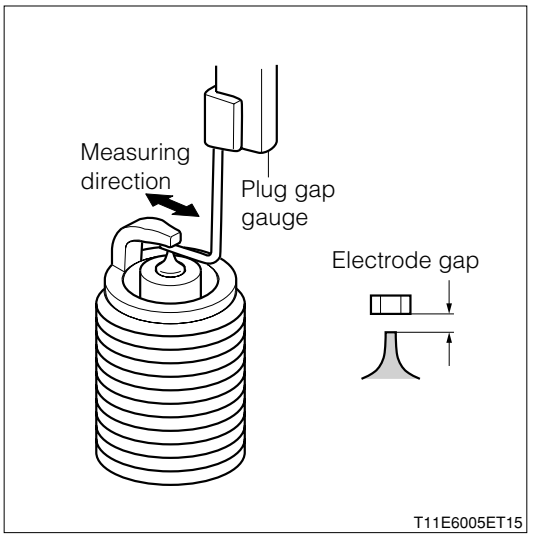
1.Remove the air cleaner element. Then, visually check that there is no smear, clog or damage.
2.In cases where the air cleaner element exhibits smear or clog, clean by blowing compressed air.

1-2-6 CHECK OF SPARK PLUG

1.Ensure that the designated plugs are used. Also, check that the plug exhibits no smoldering and the plug is not burnt excessively. Check to see if the gap between the electrodes is normal.

WARNING

- Be very careful not to get scalded, for the spark plug is very hot.



Spark plug specifications

	Vehicle mounted with Type 1KR-FE engine	
Manufacturer	DENSO	NGK
Type	SK20HR11	ILFR6C11
Kind	Iridium	Iridium
Electrode gap (mm)	1.0 - 1.1	1.0 - 1.1

1-2-7 CHECK AND ADJUSTMENT OF TENSION (DEFLECTION AMOUNT) OF V-BELT FOR ALTERNATOR

(1) Check

1.Check the V-ribbed belt for cracks, deterioration and significant wear.

2.Check the tension of the V-ribbed belt, using a belt tension gauge.

NOTE

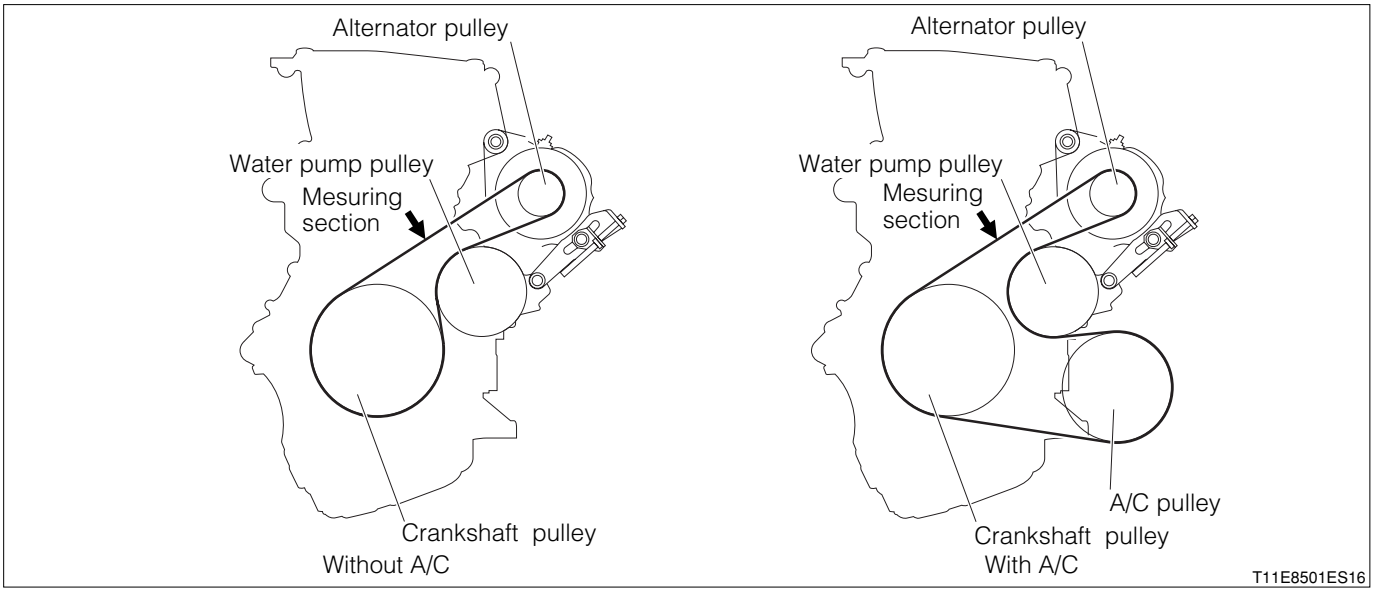
- The check can be performed by measuring the deflection amount of the V-belt.

Specified value

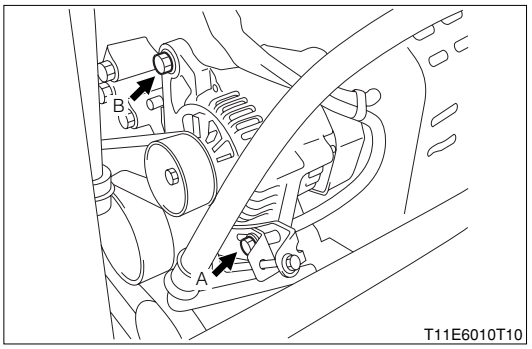
	When a new part is installed	During inspection
Tension value (N{kgf})	780±98{79.6±10.2}	490±100{50±10.2}
Deflection amount (mm) (Pushing force 100N{10.2kgf})	5.8-7.0	8.0-11.0

NOTE

- When checking the deflection amount of the belt, push a point between the alternator pulley and the crankshaft pulley with a force of 100 N (10.2 kgf). Under this condition, measure the deflection amount.
- In cases where the tension is measured after the belt has been assembled, the measurement should be performed after cranking two turns.
- When the belt is replaced with a new one, the belt tension should be adjusted to the mid-value of the specified value for "When a new part is installed."
- If the engine has once started, the belt tension should be adjusted to the mid-value of the specified value for "During inspection."



(2) Adjustment



1.Loosen the bolts (B) for retaining the alternator.
2.Loosen the bolts (A) for retaining the adjusting bar.
3.After loosening, lightly tighten the bolts (A) by hand.
4.Adjust the tension by turning the adjusting bolt of the adjusting bar.
5.Tighten the bolts (A) for retaining the adjusting bar.
6.Tighten the bolts (B) for retaining the alternator
TIGHTENING TORQUE: Bolt A
34.0±6.8N·m
{347±69kgf·cm}
Bolt B
54.0±10.8N·m
{551±110kgf·cm}
7.Confirm the belt tension.

1-2-8 CHECK AND ADJUSTMENT OF VALVE CLEARANCE

(1) Specified value

		Valve clearance (mm)	
Vehicle mounted with Type 1KR-FE engine	IN	During cold period	$0.18^{+0.055}_{-0.035}$
	EX		$0.31^{+0.055}_{-0.035}$

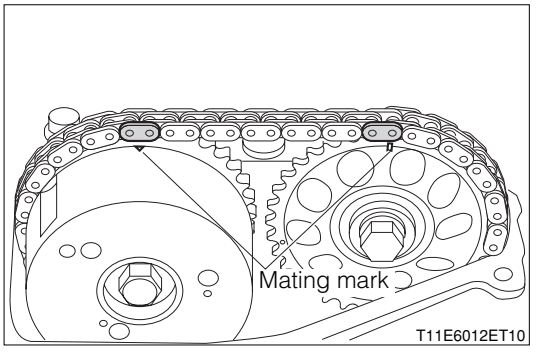
(2) Check

NOTE

- For the removal and installation procedures of each part, refer to the section under "Removal and Installation of Camshaft."

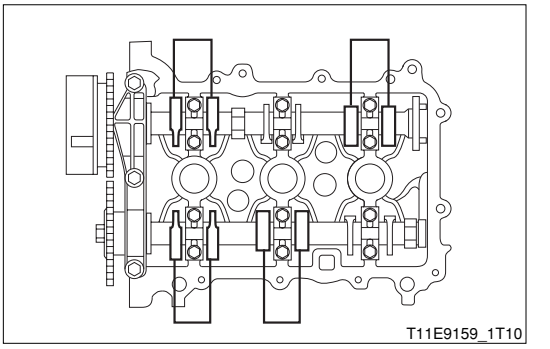
Refer to Page B2-11.

1. Remove the cylinder head cover.
2. Turn the crankshaft in the normal direction, until the timing mark of the crankshaft pulley is aligned with the indicator of the timing chain cover.
3. Ensure that the mating marks at the top of the drive gear and driven gear of the camshaft are aligned with each other. If they are not aligned, make one more turn so that the mating marks are aligned.



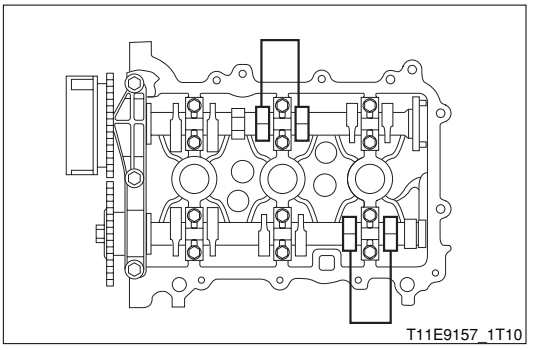
4. Using a thickness gauge, check the valve clearances shown in the right figure.

Cylinder No.1		Cylinder No.2		Cylinder No.3	
IN	EX	IN	EX	IN	EX
○	○	–	○	○	–



5. Turn the crankshaft once so that the cylinder No.1 comes to the exhaust top dead center. Then, check the valve clearance at a position indicated in the figure on the right.

Cylinder No.1		Cylinder No.2		Cylinder No.3	
IN	EX	IN	EX	IN	EX
–	–	○	–	–	○



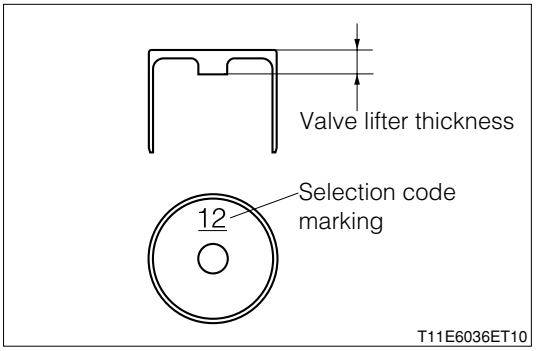
6. If the clearance deviates from the specified value, replace the shim in the following procedure and adjust it to the specified value.

NOTE

- Record the position of the valve where the clearance deviates from the specification, as well as the their measurement results.

(1) Remove the camshafts No.1 and No.2.
Refer to Page B2-11.

(2) Using a micrometer, measure the thickness of the shim that has been removed.
(3) Select the shim, using the following formula given below, so that the valve clearance becomes the specified value.



Intake Valve
(Thickness of shim to be selected)
= (Thickness of removed shim) + [(Measured clearance) − 0.18 mm]
Exhaust Valve
(Thickness of shim to be selected)
= (Thickness of removed shim) + [(Measured clearance) − 0.31 mm]

Shim thickness (mm)

No.	Shim thickness (mm)	No.	Shim thickness (mm)	No.	Shim thickness (mm)	No.	Shim thickness (mm)
12	5.120	28	5.280	44	5.440	60	5.600
14	5.140	30	5.300	46	5.460	62	5.620
16	5.160	32	5.320	48	5.480	64	5.640
18	5.180	34	5.340	50	5.500	66	5.660
20	5.200	36	5.360	52	5.520	68	5.680
22	5.220	38	5.380	54	5.540	—	—
24	5.240	40	5.400	56	5.560	—	—
26	5.260	42	5.420	58	5.580	—	—

(4) Apply engine oil to the circumference of the selected valve lifter. Insert it into the lifter hole.
LUBRICANT: Engine oil

CAUTION
- After insertion, ensure that the valve lifter turns smoothly.

(5) Assemble the camshafts No.1 and No.2.
Refer to Page B2-11.

7.Install the cylinder head cover.

1-2-9 STARTING CONDITION OF THE ENGINE AND ABNORMAL NOISE

1.When starting the engine, check that it starts up immediately without any abnormal noise and rotates smoothly.

1-2-10 COMPRESSION CHECK

1.Warm up the engine.
2.Turn the IG switch to the "LOCK" position.
3.Remove all of the IG coils and spark plugs.
4.Remove the fuel pump relay.
5.Remove all of the connectors of the injector.

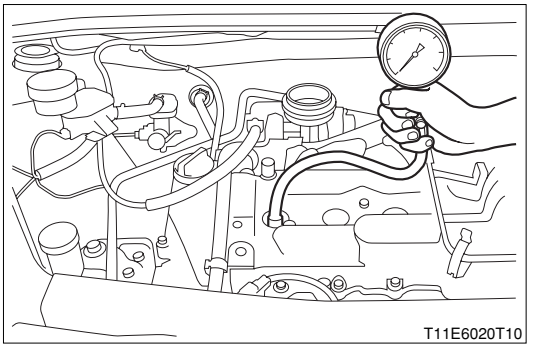
CAUTION
- Shutdown the fuel injection by performing the operations of Steps 4 and 5 above, thus preventing the catalyst from being damaged by unburned gas, etc.

6.Install the compression gauge.

7.Fully open the throttle valve and turn the starter. At this time, measure the compression pressure.

SPECIFIED VALUE: 400 rpm, Difference between cylinders within 147 kPa{1.5kgf/cm²}

	Vehicle mounted with Type 1KR-FE engine
Specified value (kPa{kgf/cm²})	1422{14.5}
Limit value (kPa{kgf/cm²})	1079{11.0}



CAUTION

- Be sure to use a fully-charged battery. The measurement should be carried out in the shortest possible time.

1-2-11 CHECK OF IGNITION TIMING

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.

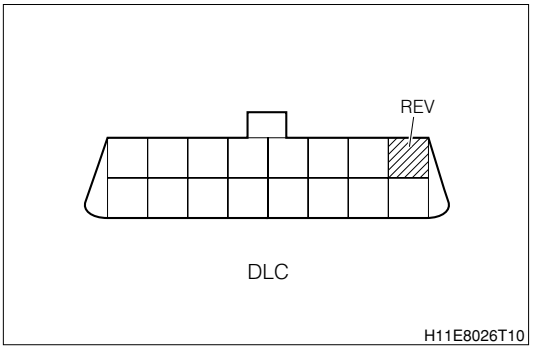
SST: 09991-87402-000
09991-87404-000

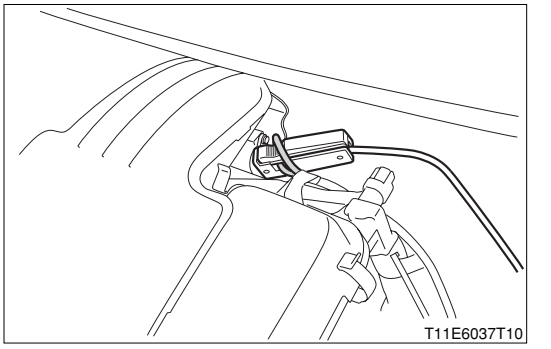
NOTE

- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

2.Warm up the engine (Until the fan motor makes one turn).

3.Install the clip of a timing light at a position indicated in the figure.





4.Short the terminals "EFI-T" and "E" of the DLC, using the SST.

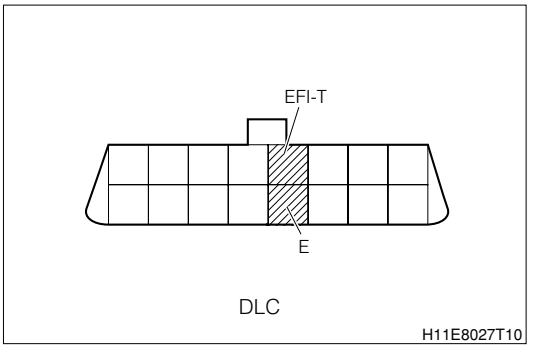
SST: 09991-87403-000
09991-87404-000

CAUTION

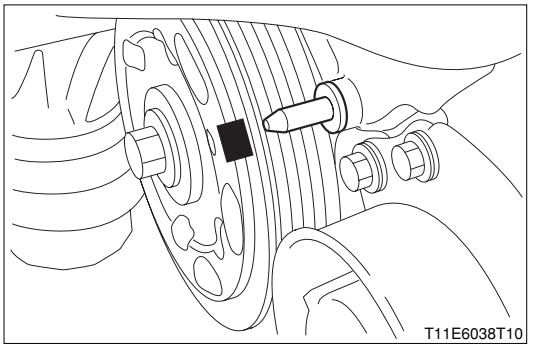
- Be sure to short the correct terminals. If wrong terminals are shorted, it will lead to malfunction.

NOTE

- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.



5.Check the ignition timing.
SPECIFIED VALUE: 10 degrees ± 2 degrees(BTDC)
NOTE
- If the reference pin of the timing chain cover is in the range of the painted section of the crankshaft pulley, then the injection timing is at the specified value.
- The specified value is given as a guide for the inspection. No adjustment is required.
- Engine revolution speed
  800^{+100}_{-50} rpm(M/T)

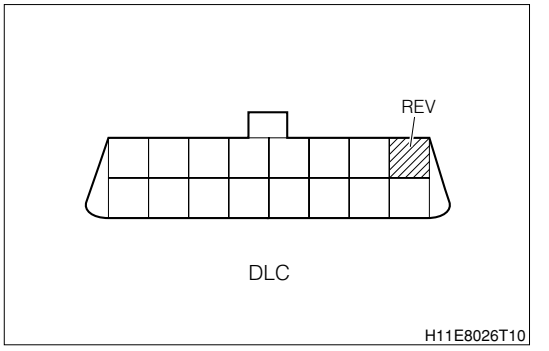

T11E6038T10

6.Release the short of the DLC.
7.Raise the engine revolution speed. At this time, ensure that the ignition timing advances.

1-2-12 CHECK OF IDLE SPEED

CAUTION
- Be sure to mount an air cleaner.
- Warm up the engine.
- Do not apply electric load (Headlamp, etc.).
- Turn "OFF" the air conditioner.(Air conditioner-equipped vehicles)
- Perform the measurement with the shift position in the P or N range.
- The inspection should be carried out under a condition where each vacuum pipe is not disconnected and exhibits no rupture, etc.

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000
NOTE
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.



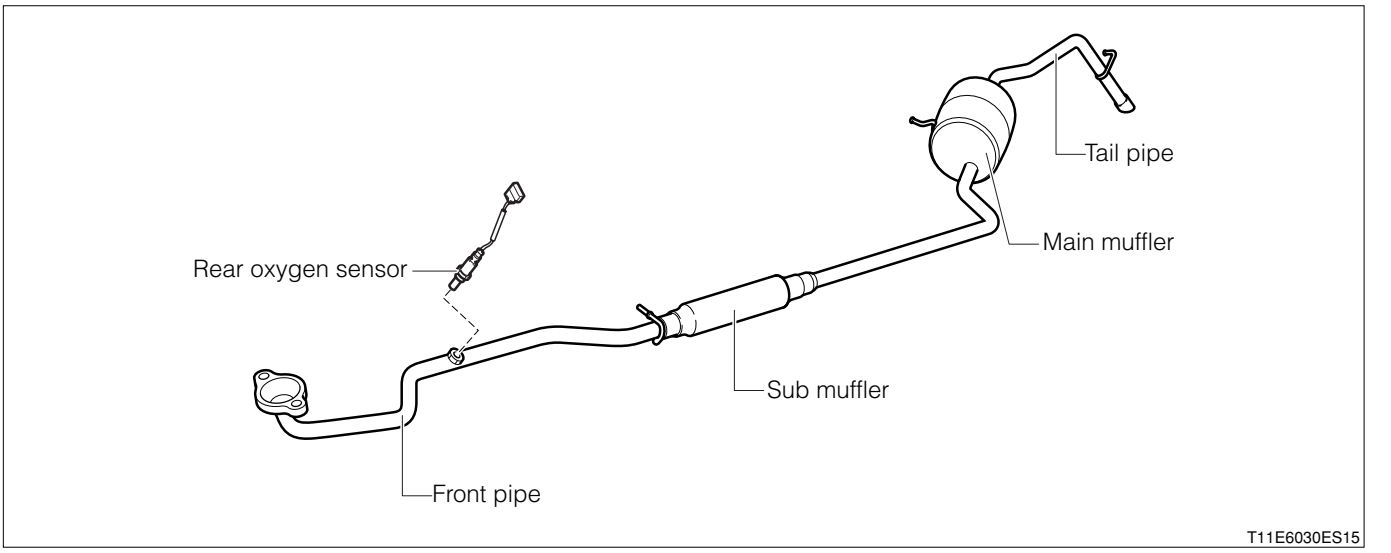
H11E8026T10

2.Check that the idle speed is within the specified value.
SPECIFIED VALUE: 800^{+100}_{-50} rpm(M/T)
NOTE
- It is not necessary to adjust the idle speed because of the ISC.

1-2-13 CONDITION OF LOW SPEED AND ACCELERATION

1.When the engine is accelerated gradually from idling while conducting the running test, check that the revolution rises smoothly without any binding of the accelerator pedal and any abnormality, such as engine stall and knocking.

1-2-14 INSTALLATION CONDITION OF EXHAUST PIPE AND MUFFLER



1.Check that the installation section and the connecting section of the exhaust pipe exhibit no looseness by moving them using a tool or by hand.
2.Check to see if the bolts and nuts securing the exhaust pipe are tightened to the specified torque, using a torque wrench, etc.
3.Check the hanger of the support for deterioration, damage and installation conditions.
4.Check the exhaust pipe for damage and corrosion.
5.Check to see if the exhaust pipe are liable to come in contact with other parts.
6.Start the engine. Check that no exhaust gas is leaking from the connecting section, etc.

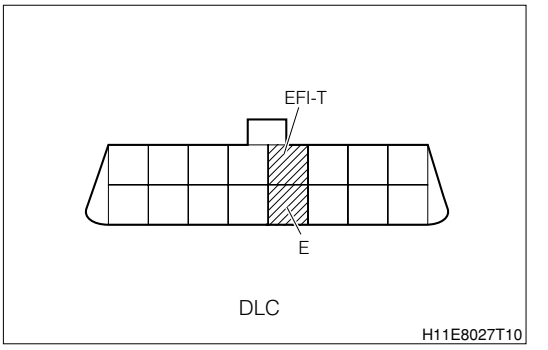
1-2-15 FUNCTION CHECK OF EXHAUST PIPE AND MUFFLER

1.Change the engine speed. At this time, check that there is no abnormality in the noise-reduction function of the muffler.

1-2-16 O_2 SENSOR FEEDBACK CONTROL CHECK

1.Warm up the engine.
2.Keep the engine speed at more than 2500 rpm for two minutes, thus warming up the O_2 sensor.

3.Short the terminals "EFI-T" and "E" of the check connector, using the SST.
SST: 09991-87402-000
09991-87403-000
09991-87404-000



CAUTION
- Be sure to short the correct terminals. If wrong terminals are shorted, it will lead to malfunction.

NOTE
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

4.Maintain the engine speed above 2000 rpm and depress the brake pedal.
5.Check the condition of the engine check lamp.
SPECIFIED VALUE: Flashing
(Confirmation of O_2 sensor feedback)
6.Short the terminals "EFI-T" and "E" of the DLC, using the SST. Then, confirm that the diagnosis codes No.25 and No.26 are not memorized. (Confirmation of learning value A/F)
SST: 09991-87403-000
09991-87404-000

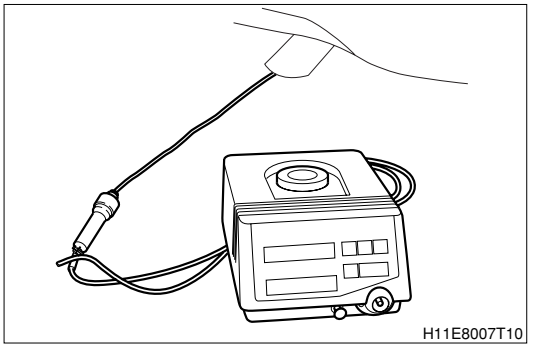
1-2-17 CONDITION OF EXHAUST

1.Warm up the engine.
2.Ensure that the idling speed is at the specified value.
Refer to Page B1-9

3.Visually check that the color of the exhaust gas is not white or black smoke.

1-2-18 CHECK OF CO AND HC CONCENTRATIONS

1.Warm up the engine.
2.Check the CO and HC concentrations during idling, using a measuring instrument.
SPECIFIED VALUE: 0.2% or less (CO concentration)
200 ppm or less (HC concentration)



NOTE
- The specified values above are given as a guide for the inspection. No adjustment is required.

1-2-19 IDLE-UP CHECK

CAUTION
- Be sure to mount an air cleaner.
- Warm up the engine.
- Perform the measurement with the shift position in P or N range.
- The inspection should be carried out under a condition where each vacuum pipe is not disconnected and exhibits no rupture, etc.

(1) Check of air conditioner idle-up

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

NOTE

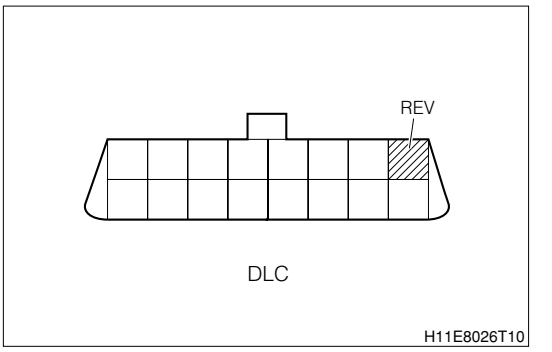
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

2.Warm up the engine.

3.Check whether the engine speed is within the specified value when the air conditioner switch is turned "ON" during idling.
SPECIFIED VALUE: 950^{+100}_{-50} rpm(M/T)

NOTE

- The engine revolution speed above is given as a guide for the inspection. No adjustment is required.



(2) Electric load idle-up check

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

NOTE

- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

2.Warm up the engine.

3.Check whether the engine speed is within the specified value when the defogger switch, blower switch and headlamp switch are turned "ON"
SPECIFIED VALUE: 800±50rpm(M/T)

NOTE

- The engine revolution speed above is given as a guide for the inspection. No adjustment is required.

1-2-20 CHARCOAL CANISTER CHECK

(1) RHD vehicles

1.Check the charcoal canister for damage, such as dents.

2.With a MityVac connected, carry out continuity check and airtightness check for the check valve.

(1) Continuity check of tank port→atmosphere port

Apply a positive pressure of 5.9kPa (0.05 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the tank port and the atmosphere port.

(2) Continuity check of atmosphere port→tank port

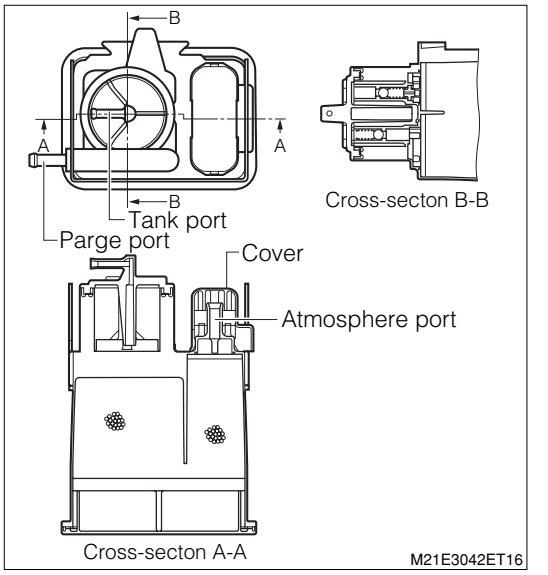
Apply a negative pressure of 2.9kPa (0.03 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the atmosphere port and the tank port.

(3) Continuity check of atmosphere port→purge port

Apply a positive or negative pressure of 1kPa (0.01 kgf/cm^2) to the purge port with the tank port plugged (e.g. with your fingers) to allow air to flow.

SPECIFIED VALUE: There is no rise in the pressure.



(2) LHD vehicles

1.Check the charcoal canister for damage, such as dents.

2.With a MityVac connected, carry out continuity check and airtightness check for the check valve.

(1) Continuity check of tank port→atmosphere port

Apply a positive pressure of 5.9kPa (0.05 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the tank port and the atmosphere port.

(2) Continuity check of atmosphere port→tank port

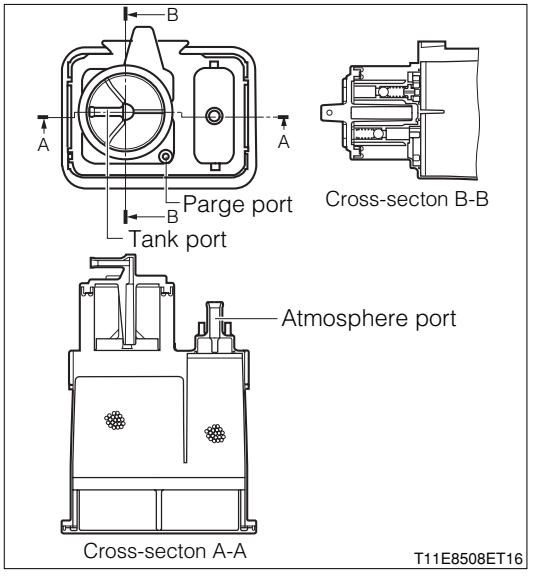
Apply a negative pressure of 2.9kPa (0.03 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the atmosphere port and the tank port.

(3) Continuity check of atmosphere port→purge port

Apply a positive or negative pressure of 1kPa (0.01 kgf/cm^2) to the purge port with the tank port plugged (e.g. with your fingers) to allow air to flow.

SPECIFIED VALUE: There is no rise in the pressure.



1-2-21 DAMAGE CHECK OF PIPINGS OF FUEL EVAPORATIVE EMISSION CONTROL SYSTEM

1.Check the hoses and pipes for damage.

1-2-22 DAMAGE CHECK OF PIPINGS OF BLOW-BY GAS RECIRCULATION SYSTEM

1.Check the ventilation hoses for cracks, damages and clogs.
2.Perform the following checks for the PCV valve.
(1) Start the engine.
(2) With the engine idling, ensure that the operation sound is emitted as the hose on the intake manifold side of the PCV valve is pinched and released.

1-2-23 INSTALLATION CONDITION DAMAGE OF CATALYST DEVICE

1.Check that the installation of the main body of the exhaust emission control device, such as the catalyst, exhibits no looseness, using a wrench or the like.
2.Visually check the catalyst main body for damage. (This check may be omitted if there are no deformation or damage on the heat shield plate.)

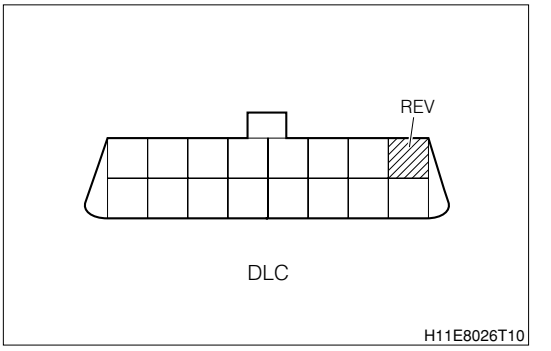
1-2-24 FUNCTION CHECK OF CONTROL SYSTEM DURING DECELERATION

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

CAUTION

- When the SST (Engine control system inspection wire) is not used, the operation should be carried out with the DLC taken off from the bracket. After completion of the operation, be certain to install the DLC to the bracket.

2.Warm up the engine.
3.Confirm the operation sound of the injector with a sound scope or a screwdriver.
4.Raise the engine speed to 3000 rpm.
5.Return the throttle lever. At this time, ensure that the operation sound of the injector stops for a moment and is emitted again.



1-2-25 EXHAUST GAS RECIRCULATION SYSTEM CHECK

1.Short the terminals "EFI-T" and "E" of the DLC, using the SST. Then, confirm that the diagnosis code No.79 is not memorized.
SST: 09991-87403-000
09991-87404-000

NOTE

- The engine control computer judges whether the exhaust gas recirculation system is normal or not under the following conditions.
- After the engine has warmed-up completely, fully close the accelerator pedal from the constant-speed running at 60 km/h to decelerate for 5 seconds or more by engine brake. After the IG switch is turned "OFF" for more than 10 seconds, once again perform the running and decelerating under the same conditions.

2.Ensure that there are no cracks, damages and leakage in the EGR-related pipings.
3.Ensure that there is no looseness or leakage in the installation of the stepper motor for the EGR.
4.Confirm the operation of the stepper motor for the EGR, following the procedure given below.
(1) Release the short of the DLC.
(2) Remove the fuel pump relay.
(3) Disconnect the connector of the injector.

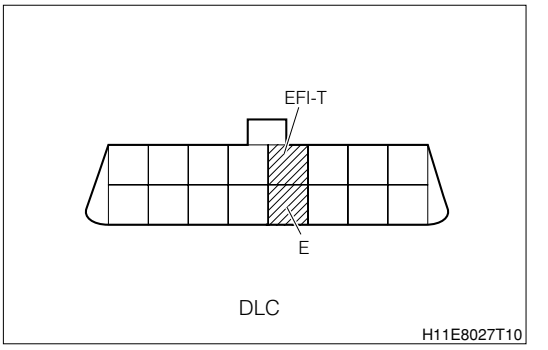
CAUTION

- Shutdown the fuel injection by performing the operations of Steps (2) and (3) above, thus preventing the catalyst from being damaged by unburned gas, etc.

(4) Crank the engine.
(5) Ensure that the stepper motor for the EGR is operating when cranking, using a sound scope or a long screwdriver.

WARNING

- Be very careful not to get scalded, since the temperature of the valve section of the stepper motor for the EGR is very high.



1-2-26 CHECK OF EXHAUST GAS PURIFICATION SYSTEM

(1) Check of onboard type diagnostic tester

① Check of engine check lamp

1.Confirm the engine check lamp condition with the IG switch turned ON.

2.Check the diagnosis code.

Refer to Page B8-33.

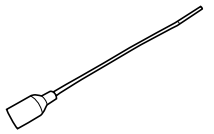
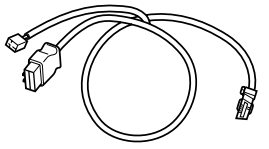
3.If the abnormality code is outputted, perform the trouble shooting for the abnormality code.

NOTE

- If an abnormality code is outputted although the engine check lamp is not presently illuminating, it is assumed that abnormalities, such as poor contact, took place at the harness, connector, etc. but they are functioning properly now. Therefore, as a precautionary measure, perform the trouble shooting for the outputted abnormality code.

■ K3
1 ENGINE
1-1 ARTICLES TO BE PREPARED

SST

Shape	Part No.	Part name
	09991-87402-000	Wire,tacho-pulse pick up
	09991-87403-000	Wire,diagnosis check
	09991-87404-000 (09991-87401-000)	Wire,engine control system inspection

Instrument

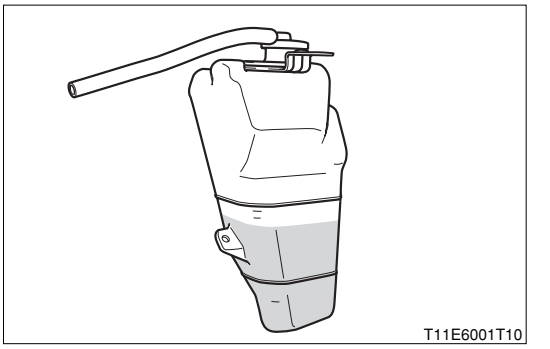
Belt tension gauge,Radiator cap tester,Radiator cap tester adapter,MityVac,Compression gauge,Timing light,Torque wrench,Micrometer,Thickness gauge,Sound scope,Voltage tester,,Plug gap gauge,Tachometer

1-2 BASIC CHECK AND ADJUSTMENT

1-2-1 CHECK OF COOLING WATER LEVEL AND WATER LEAKAGE

(1) Water level

1.Check that the cooling water level is between the upper limit (FULL) and the lower limit (LOW) of the reservoir tank.

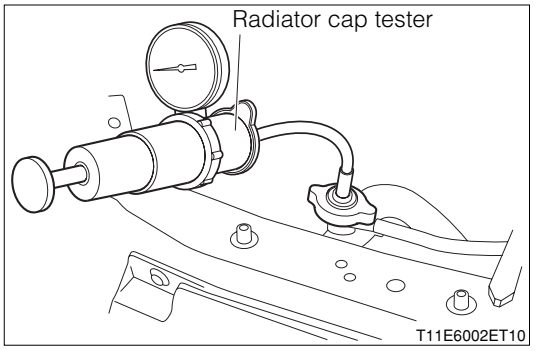

T11E6001T10

(2) Water leakage

1.With the engine idling, visually check that there is no water leakage from the radiator, radiator hose, heater hose, water pump, heater hose, etc.

Moreover, apply pressure, using a radiator cap tester. Under this condition, check that no water leakage is present.

SPECIFIED VALUE: Specified value for check
122.7kPa {1.25kgf/cm²}



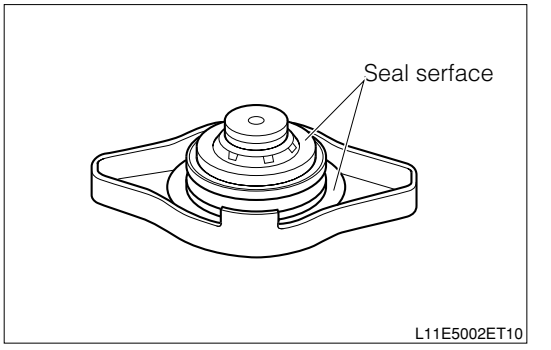
T11E6002ET10

NOTE

- There may be a small amount of water leaking from the vapor hole and the drain hole of the water pump. However, this is not an abnormality.

(3) Function check of radiator cap

1.Remove the radiator cap. Then, visually check the valve seat surface for smear and damage. Also, move the negative pressure valve by your hand and check that it opens and closes.



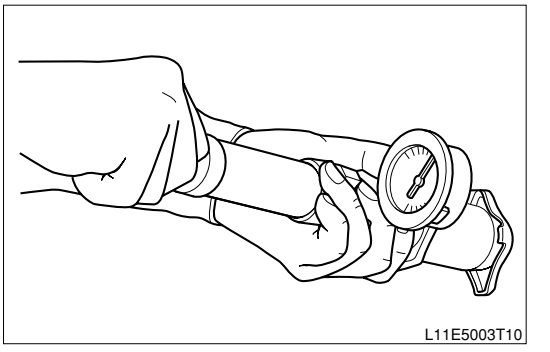
L11E5002ET10

2.Check the valve opening pressure of the cap, using a radiator cap tester.

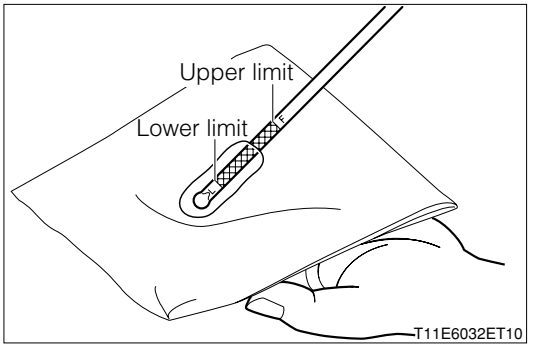
SPECIFIED VALUE: 108.0±14.7kPa{1.1±0.15kgf/cm²}

CAUTION

- Liberally apply water to the cap seal surface before the installation to the tester.


L11E5003T10

1-2-2 CHECK OF ENGINE OIL LEVEL



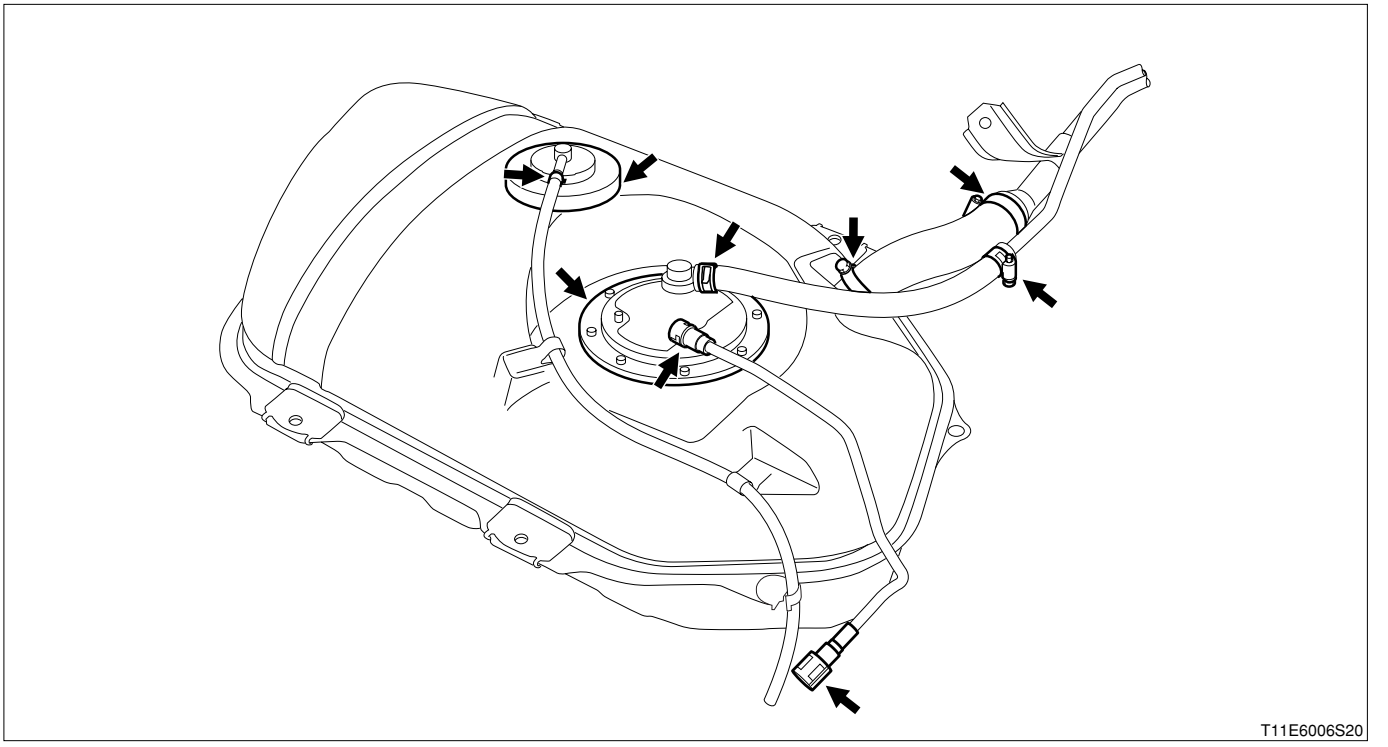
1.Stop the engine. Perform the check on a level place.
2.Pull out the oil level gauge. Wipe out the oil adhered to the gauge and insert it again.
3.Check that the oil level is between the lower limit (L) and the upper limit (F).
4.Check the condition of smear and that there is no white turbidity in the engine oil by observing the oil adhered to the oil level gauge.

1-2-3 ENGINE OIL LEAKAGE CHECK

1.Visually check that there is no oil leakage from the cylinder head cover, oil pan and drain plug.

1-2-4 FUEL LEAKAGE CHECK

1.Visually check the fuel tank main body, fuel pump, hoses and pipes for fuel leakage.
2.Visually check that there is no crack or damage in the fuel hoses and pipes. Also, check that the installation of the clamp for each hose and pipe is not loosened.



1-2-5 CONDITION OF AIR CLEANER ELEMENT

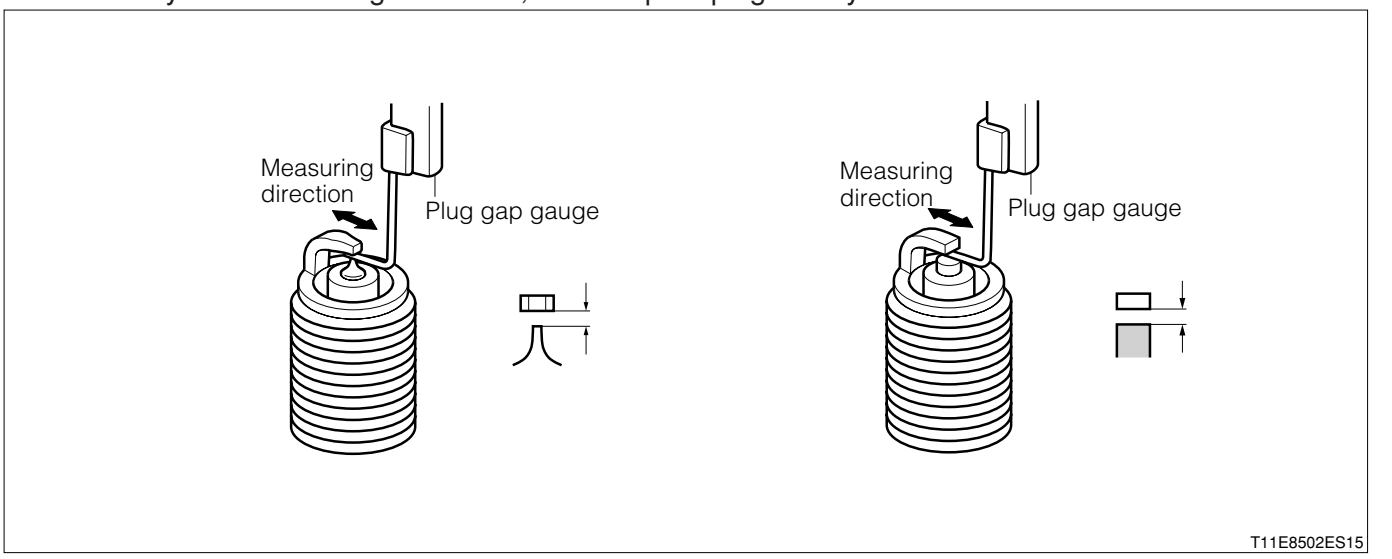
1.Remove the air cleaner element. Then, visually check that there is no smear, clog or damage.
2.In cases where the air cleaner element exhibits smear or clog, clean by blowing compressed air.

1-2-6 CHECK OF SPARK PLUG

1.Ensure that the designated plugs are used. Also, check that the plug exhibits no smoldering and the plug is not burnt excessively. Check to see if the gap between the electrodes is normal.

WARNING

- Be very careful not to get scalded, for the spark plug is very hot.



Spark plug specifications

	GEN SPC		EU,AUS SPC	
Manufacturer	DENSO	NGK	DENSO	NGK
Type	SVK20RZ11	IFR6J11	K20R-U11	BKR6EY-11
Kind	Iridium	Iridium	Standard	Standard
Electrode gap (mm)	1.0 - 1.1	1.0 - 1.1	1.0 - 1.1	1.0 - 1.1

1-2-7 CHECK AND ADJUSTMENT OF TENSION (DEFLECTION AMOUNT) OF V-BELT FOR ALTERNATOR

(1) Check

1.Check the V-ribbed belt for cracks, deterioration and significant wear.

2.Check the tension of the V-ribbed belt, using a belt tension gauge.

NOTE

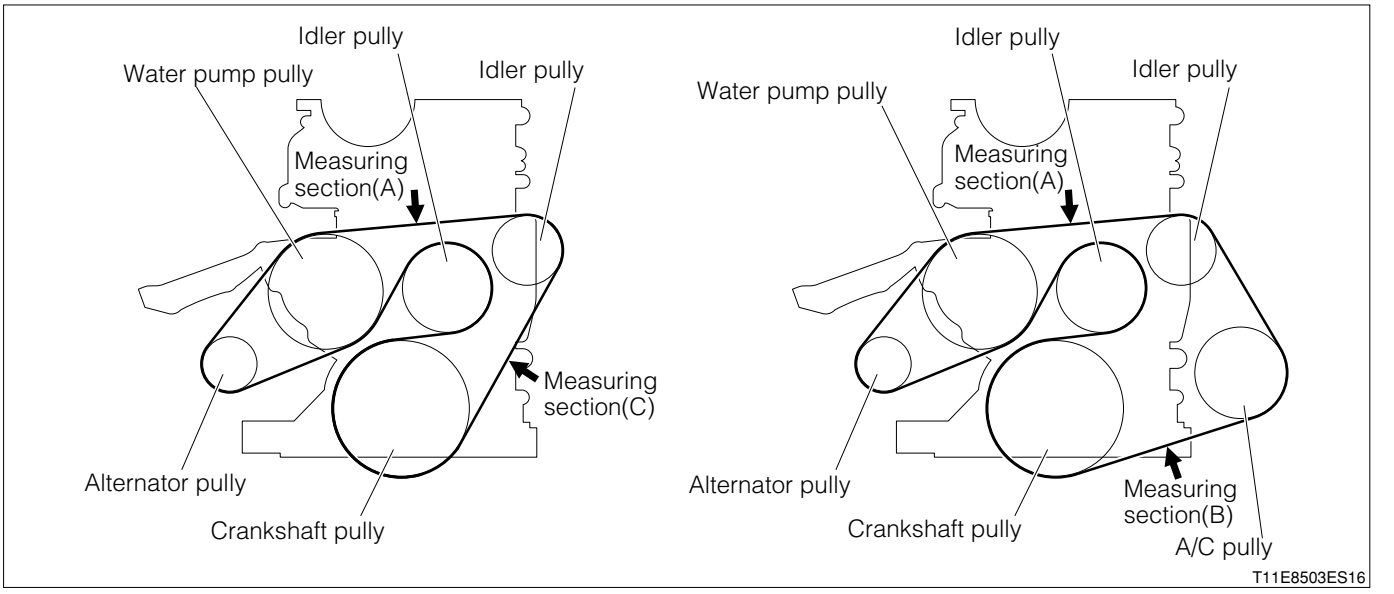
- The check can be performed by measuring the deflection amount of the V-belt.

Specified value

	When a new part is installed	During inspection
Tension value (N{kgf})	590±100{60±10.2}	390±{40±10.2}
Deflection amount (mm) (Pushing force 100N{10.2kgf})	6.5 - 7.5	8.5 - 10.0

NOTE

- When checking the deflection amount of the belt, push a point between the water pump pulley and alternator pulley or crankshaft pulley and A/C pulley with a force of 100 N (10.2 kgf). Under this condition, neasure the deflection amount.
- In cases where the tension is measured after the belt has been assembled, the measurement should be performed after cranking two turns.
- When the belt is replaced with a new one, the belt tension should be adjusted to the mid-value of the specified value for "When a new part is installed."
- As regards the belt that has been used for more than five minutes, ensure that the belt tension conforms to the specified value for "During inspection."
- When the belt that has been used for more than five minutes is assembled, the belt tension should be adjusted to the mid-value of the specified value for "During inspection."

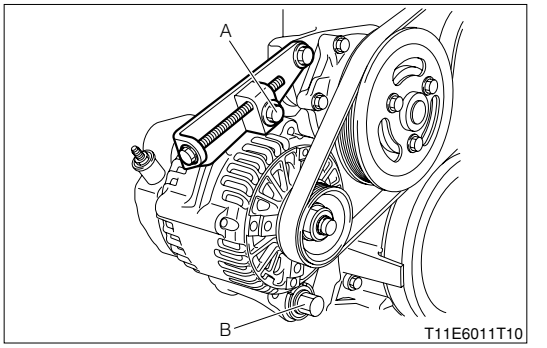


(2) Adjustment

1.Loosen the bolts (B) for retaining the alternator.

2.Loosen the bolts (A) for retaining the adjusting bar.

3.After loosening, lightly tighten the bolts (A) by hand.
4.Adjust the tension by turning the adjusting bolt of the adjusting bar.
5.Tighten the bolts (A) for retaining the adjusting bar.
6.Tighten the bolts (B) for retaining the alternator
TIGHTENING TORQUE: Bolt A
19.0±3.8N·m
{190±38kgf·cm}
Bolt B
44.0±8.8N·m
{450±90kgf·cm}



7.Confirm the belt tension.

1-2-8 CHECK AND ADJUSTMENT OF VALVE CLEARANCE

(1) Specified value

		Valve clearance (mm)	
Vehicle mounted with Type K3-VE engine	IN	During cold period	$0.18^{+0.055}_{-0.035}$
	EX		$0.31^{+0.055}_{-0.035}$

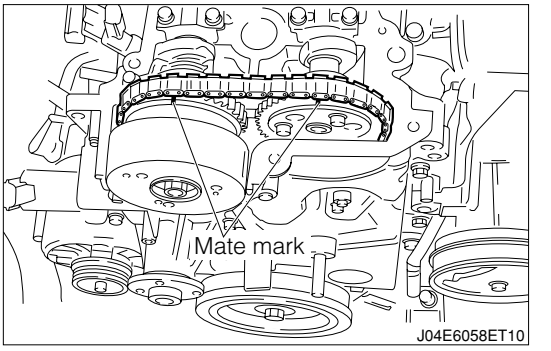
(2) Check

NOTE

- For the removal and installation procedures of each part, refer to the section under "Removal and Installation of Camshaft."

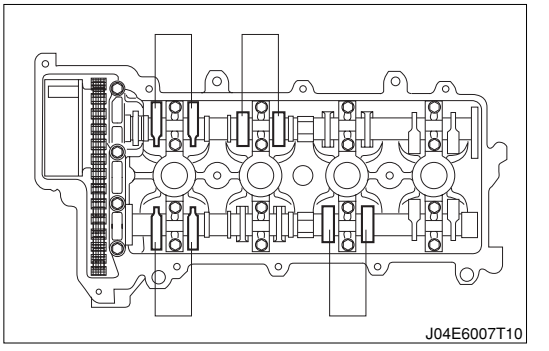
Refer to Page B2-41.

1.Remove the cylinder head cover.
2.Turn the crankshaft in the normal direction, until the timing mark of the crankshaft pulley is aligned with the indicator of the timing chain cover.
3.Ensure that the mating marks at the top of the drive gear and driven gear of the camshaft are aligned with each other. If they are not aligned, make one more turn so that the mating marks are aligned.

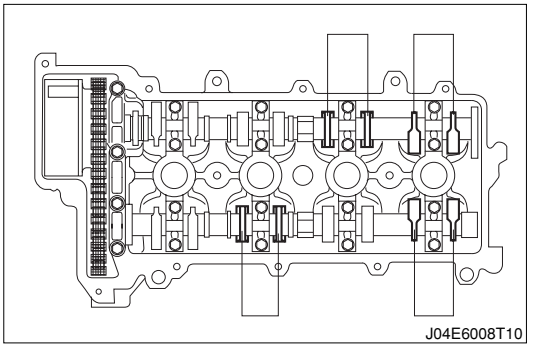


4.Using a thickness gauge, check the valve clearances shown in the right figure.

Cylinder No.1		Cylinder No.2		Cylinder No.3		Cylinder No.4	
IN	EX	IN	EX	IN	EX	IN	EX
○	○	○	–	–	○	–	–



5.Turn the crankshaft once so that the cylinder No.1 comes to the exhaust top dead center. Then, check the valve clearance at a position indicated in the figure on the right.



Cylinder No.1		Cylinder No.2		Cylinder No.3		Cylinder No.4	
IN	EX	IN	EX	IN	EX	IN	EX
–	–	–	○	○	–	○	○

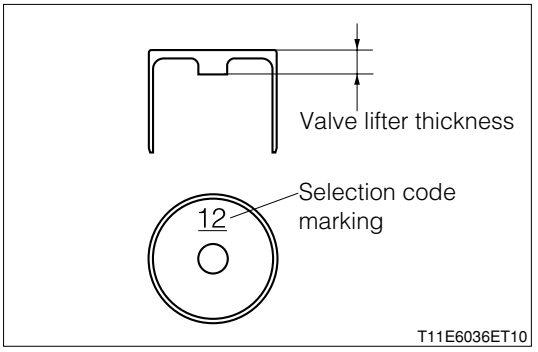
6.If the clearance deviates from the specified value, replace the shim in the following procedure and adjust it to the specified value.

NOTE

- Record the position of the valve where the clearance deviates from the specification, as well as the their measurement results.

(1) Remove the camshafts No.1 and No.2.
Refer to Page B2-41.

(2) Using a micrometer, measure the thickness of the shim that has been removed.



(3) Select the shim, using the following formula given below, so that the valve clearance becomes the specified value.

Intake Valve
(Thickness of shim to be selected)
= (Thickness of removed shim) + [(Measured clearance) − 0.18 mm]
Exhaust Valve
(Thickness of shim to be selected)
= (Thickness of removed shim) + [(Measured clearance) − 0.31 mm]

Shim thickness (mm)

No.	Shim thickness (mm)	No.	Shim thickness (mm)	No.	Shim thickness (mm)	No.	Shim thickness (mm)
12	5.120	28	5.280	44	5.440	60	5.600
14	5.140	30	5.300	46	5.460	62	5.620
16	5.160	32	5.320	48	5.480	64	5.640
18	5.180	34	5.340	50	5.500	66	5.660
20	5.200	36	5.360	52	5.520	68	5.680
22	5.220	38	5.380	54	5.540	–	–
24	5.240	40	5.400	56	5.560	–	–
26	5.260	42	5.420	58	5.580	–	–

(4) Apply engine oil to the circumference of the selected valve lifter. Insert it into the lifter hole.
LUBRICANT: Engine oil

CAUTION

- After insertion, ensure that the valve lifter turns smoothly.

(5) Assemble the camshafts No.1 and No.2.
Refer to Page B2-41

7.Install the cylinder head cover.

1-2-9 STARTING CONDITION OF THE ENGINE AND ABNORMAL NOISE

1.When starting the engine, check that it starts up immediately without any abnormal noise and rotates

smoothly.

1-2-10 COMPRESSION CHECK

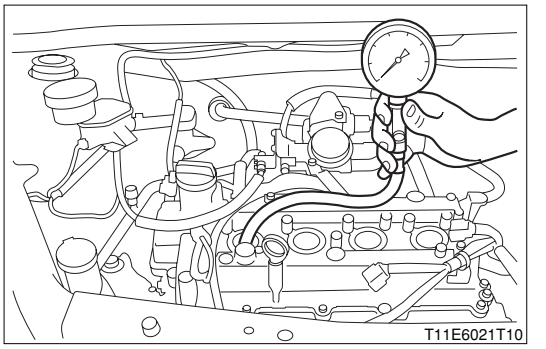
1.Warm up the engine.
2.Turn the IG switch to the "LOCK" position.
3.Remove all of the IG coils and spark plugs.
4.Remove the fuel pump relay.
5.Remove all of the connectors of the injector.

CAUTION

- Shutdown the fuel injection by performing the operations of Steps 4 and 5 above, thus preventing the catalyst from being damaged by unburned gas, etc.

6.Install the compression gauge.
7.Fully open the throttle valve and turn the starter. At this time, measure the compression pressure.
SPECIFIED VALUE: 330 rpm, Difference between cylinders within 147 kPa {1.5kgf/cm²}

	Vehicle mounted with Type K3-VE engine
Specified value (kPa{kgf/cm²})	1470{15.0}
Limit value (kPa{kgf/cm²})	1078{11.0}


T11E6021T10

CAUTION

- Be sure to use a fully-charged battery. The measurement should be carried out in the shortest possible time.

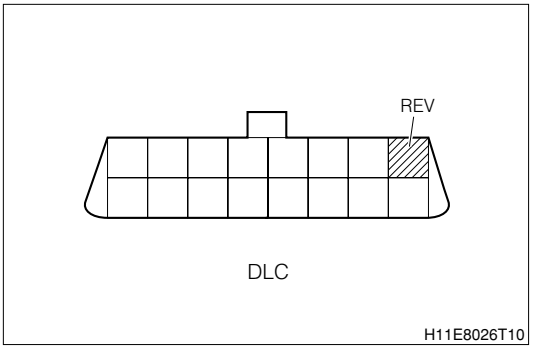
1-2-11 CHECK OF IGNITION TIMING

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

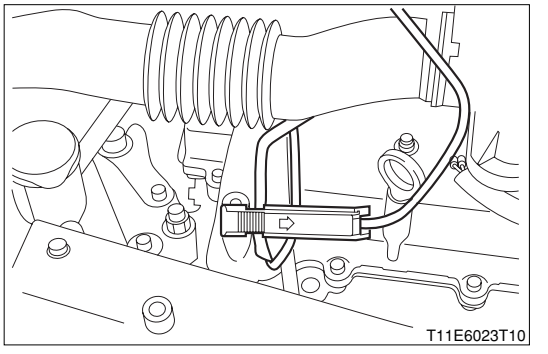
NOTE

- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

2.Warm up the engine (Until the fan motor makes one turn).
3.Install the clip of a timing light at a position indicated in the figure.



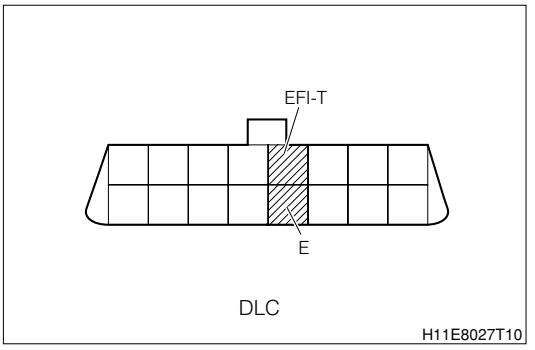
H11E8026T10


T11E6023T10

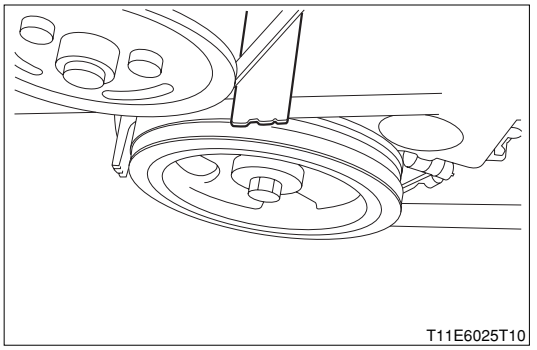
4.Short the terminals "EFI-T" and "E" of the DLC, using the SST.
SST: 09991-87403-000
09991-87404-000

CAUTION
- Be sure to short the correct terminals. If wrong terminals are shorted, it will lead to malfunction.

NOTE
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

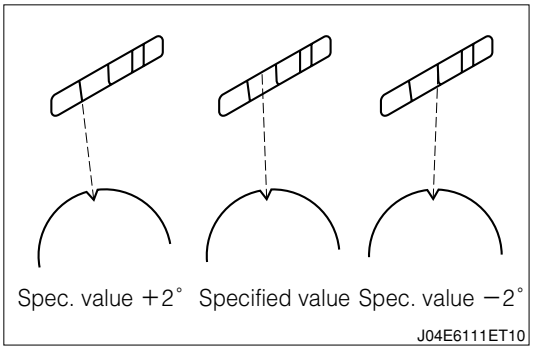


5.Check the ignition timing.
SPECIFIED VALUE: 6 degrees ± 2 degrees(BTDC)



NOTE
- The specified value is given as a guide for the inspection. No adjustment is required.
- Engine revolution speed
  700^{+100}_{-50} rpm(A/T)
  650^{+100}_{-50} rpm(M/T)

6.Release the short of the DLC.
7.Raise the engine revolution speed. At this time, ensure that the ignition timing advances.



1-2-12 CHECK OF IDLE SPEED

CAUTION
- Be sure to mount an air cleaner.
- Warm up the engine.
- Do not apply electric load (Headlamp, etc.).
- Turn "OFF" the air conditioner.(Air conditioner-equipped vehicles)

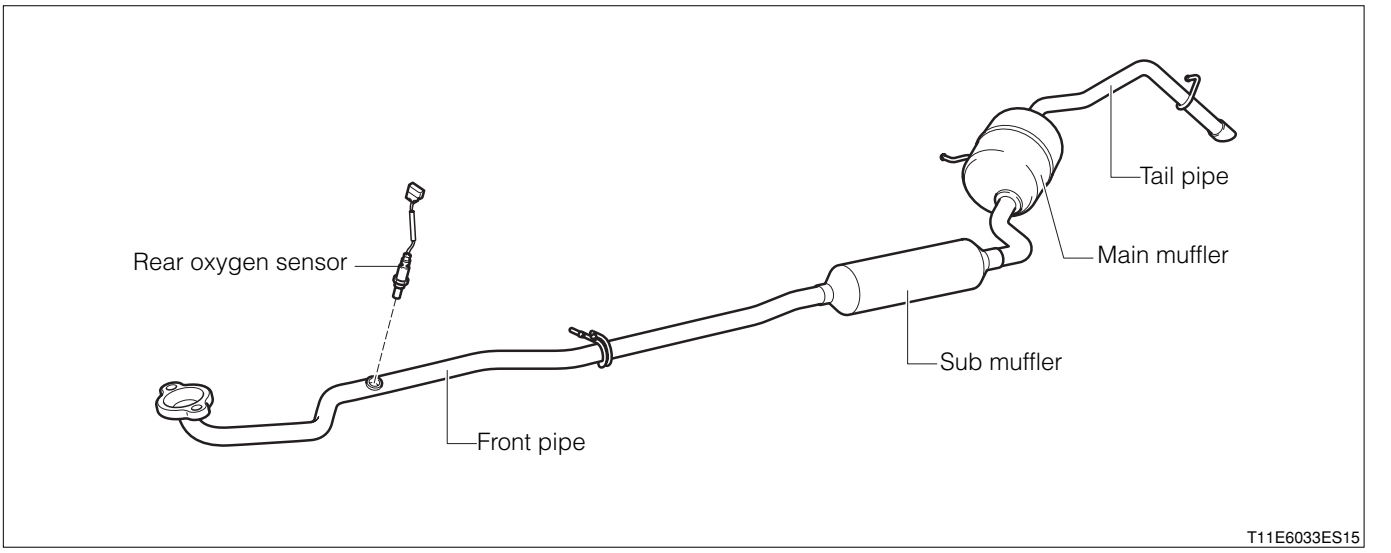
1.Check that the idle speed is within the specified value.
SPECIFIED VALUE: 700^{+100}_{-50} rpm(A/T)
650^{+100}_{-50} rpm(M/T)

NOTE
- It is not necessary to adjust the idle speed because of the ISC.

1-2-13 CONDITION OF LOW SPEED AND ACCELERATION

1.When the engine is accelerated gradually from idling while conducting the running test, check that the revolution rises smoothly without any binding of the accelerator pedal and any abnormality, such as engine stall and knocking.

1-2-14 INSTALLATION CONDITION OF EXHAUST PIPE AND MUFFLER



1.Check that the installation section and the connecting section of the exhaust pipe exhibit no looseness by moving them using a tool or by hand.
2.Check to see if the bolts and nuts securing the exhaust pipe are tightened to the specified torque, using a torque wrench, etc.
3.Check the hanger of the support for deterioration, damage and installation conditions.
4.Check the exhaust pipe for damages and corrosion.
5.Check to see if the exhaust pipe are liable to come in contact with other parts.
6.Start the engine. Check that no exhaust gas is leaking from the connecting section, etc.

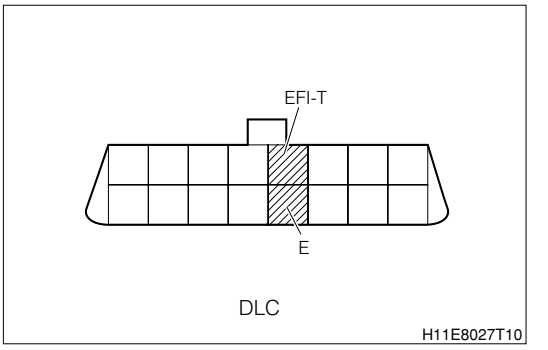
1-2-15 FUNCTION CHECK OF EXHAUST PIPE AND MUFFLER

1.Change the engine speed. At this time, check that there is no abnormality in the noise-reduction function of the muffler.

1-2-16 O_2 SENSOR FEEDBACK CONTROL CHECK

1.Warm up the engine.
2.Keep the engine speed at more than 2500 rpm for two minutes, thus warming up the O_2 sensor.

3.Short the terminals "EFI-T" and "E" of the check connector, using the SST.
SST: 09991-87402-000
09991-87403-000
09991-87404-000



CAUTION
- Be sure to short the correct terminals. If wrong terminals are shorted, it will lead to malfunction.

NOTE
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

4.Maintain the engine speed above 2000 rpm and depress the brake pedal.
5.Check the condition of the engine check lamp.
SPECIFIED VALUE: Flashing
(Confirmation of O_2 sensor feedback)
6.Short the terminals "EFI-T" and "E" of the DLC, using the SST. Then, confirm that the diagnosis codes No.25 and No.26 are not memorized. (Confirmation of learning value A/F)
SST: 09991-87403-000
09991-87404-000

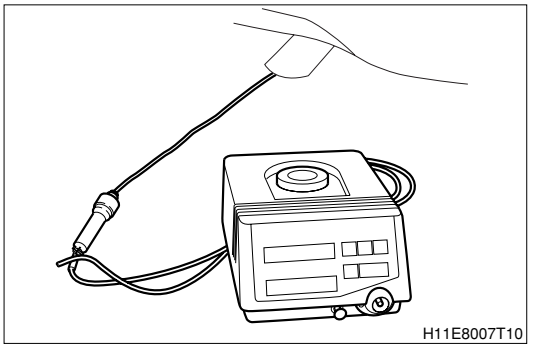
1-2-17 CONDITION OF EXHAUST

1.Warm up the engine.
2.Ensure that the idling speed is at the specified value.
Refer to Page B1-25.

3.Visually check that the color of the exhaust gas is not white or black smoke.

1-2-18 CHECK OF CO AND HC CONCENTRATIONS

1.Warm up the engine.
2.Check the CO and HC concentrations during idling, using a measuring instrument.
SPECIFIED VALUE: 0.2% or less (CO concentration)
200 ppm or less (HC concentration)



NOTE
- The specified values above are given as a guide for the inspection. No adjustment is required.

1-2-19 IDLE-UP CHECK

CAUTION
- Be sure to mount an air cleaner.
- Warm up the engine.
- Perform the measurement with the shift position in P or N range.
- The inspection should be carried out under a condition where each vacuum pipe is not disconnected and exhibits no rupture, etc.

(1) Check of air conditioner idle-up

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

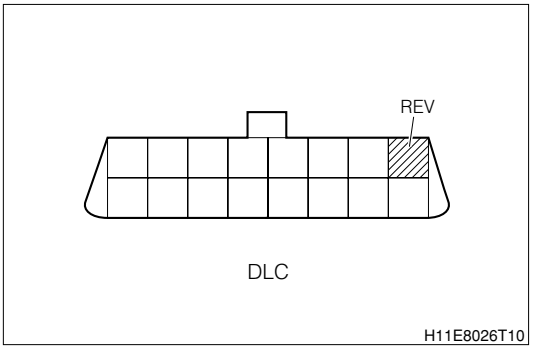
NOTE

- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

2.Warm up the engine.
3.Check whether the engine speed is within the specified value when the air conditioner switch is turned "ON" during idling.
SPECIFIED VALUE: 900^{+100}_{-50} rpm(A/T)
850^{+100}_{-50} rpm(M/T)

NOTE

- The engine revolution speed above is given as a guide for the inspection. No adjustment is required.



(2) Electric load idle-up check

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87402-000
09991-87404-000

NOTE

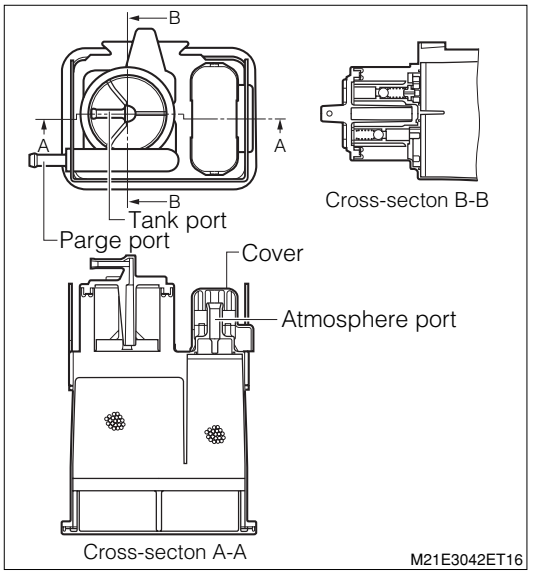
- The SST 09991-87404-000 is a harness for extension use. This does not have to be used.

2.Warm up the engine.
3.Check whether the engine speed is within the specified value when the defogger switch, blower switch and headlamp switch are turned "ON"
SPECIFIED VALUE: 700±50rpm(A/T)
650±50rpm(M/T)
(No significant drop)

NOTE

- The engine revolution speed above is given as a guide for the inspection. No adjustment is required.

1-2-20 CHARCOAL CANISTER CHECK



(1) RHD vehicles

1.Check the charcoal canister for damage, such as dents.

2.With a MityVac connected, carry out continuity check and airtightness check for the check valve.

(1) Continuity check of tank port→atmosphere port

Apply a positive pressure of 5.9kPa (0.05 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the tank port and the atmosphere port.

(2) Continuity check of atmosphere port→tank port

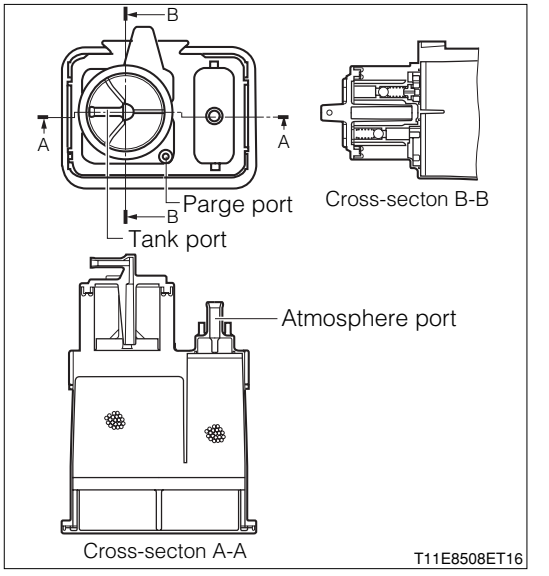
Apply a negative pressure of 2.9kPa (0.03 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the atmosphere port and the tank port.

(3) Continuity check of atmosphere port→purge port

Apply a positive or negative pressure of 1kPa (0.01 kgf/cm^2) to the purge port with the tank port plugged (e.g. with your fingers) to allow air to flow.

SPECIFIED VALUE: There is no rise in the pressure.



(2) LHD vehicles

1.Check the charcoal canister for damage, such as dents.

2.With a MityVac connected, carry out continuity check and airtightness check for the check valve.

(1) Continuity check of tank port→atmosphere port

Apply a positive pressure of 5.9kPa (0.05 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the tank port and the atmosphere port.

(2) Continuity check of atmosphere port→tank port

Apply a negative pressure of 2.9kPa (0.03 kgf/cm^2) to the tank port with the purge port plugged (e.g. with your fingers).

SPECIFIED VALUE: Air continuity exists between the atmosphere port and the tank port.

(3) Continuity check of atmosphere port→purge port

Apply a positive or negative pressure of 1kPa (0.01 kgf/cm^2) to the purge port with the tank port plugged (e.g. with your fingers) to allow air to flow.

SPECIFIED VALUE: There is no rise in the pressure.

1-2-21 DAMAGE CHECK OF PIPINGS OF FUEL EVAPORATIVE EMISSION CONTROL SYSTEM

1.Check the hoses and pipes for damage.

1-2-22 DAMAGE CHECK OF PIPINGS OF BLOW-BY GAS RECIRCULATION SYSTEM

1.Check the ventilation hoses for cracks, damages and clogs.
2.Perform the following checks for the PCV valve.
(1) Start the engine.
(2) With the engine idling, ensure that the operation sound is emitted as the hose on the intake manifold side of the PCV valve is pinched and released.

1-2-23 INSTALLATION CONDITION DAMAGE OF CATALYST DEVICE

1.Check that the installation of the main body of the exhaust emission control device, such as the catalyst, exhibits no looseness, using a wrench or the like.
2.Visually check the catalyst main body for damage. (This check may be omitted if there are no deformation or damage on the heat shield plate.)

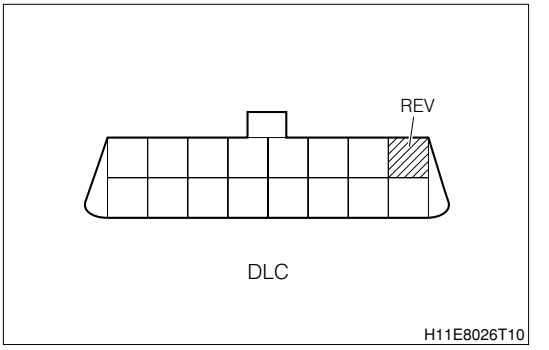
1-2-24 FUNCTION CHECK OF CONTROL SYSTEM DURING DECELERATION

1.Install an engine tachometer to the terminal "REV" of the DLC, using the SST.
SST: 09991-87404-000
09991-87402-000

CAUTION

- When the SST (Engine control system inspection wire) is not used, the operation should be carried out with the DLC taken off from the bracket. After completion of the operation, be certain to install the DLC to the bracket.

2.Warm up the engine.
3.Confirm the operation sound of the injector with a sound scope or a screwdriver.
4.Raise the engine speed to 3000 rpm.
5.Return the throttle lever. At this time, ensure that the operation sound of the injector stops for a moment and is emitted again.



1-2-25 CHECK OF EXHAUST GAS PURIFICATION SYSTEM

(1) Check of onboard type diagnostic tester

① Check of engine check lamp

1.Confirm the engine check lamp condition with the IG switch turned ON.
2.Check the diagnosis code.
Refer to Page B8-33.

3.If the abnormality code is outputted, perform the trouble shooting for the abnormality code.

NOTE

- If an abnormality code is outputted although the engine check lamp is not presently illuminating, it is assumed that abnormalities, such as poor contact, took place at the harness, connector, etc. but they are functioning properly now. Therefore, as a precautionary measure, perform the trouble shooting for the outputted abnormality code.