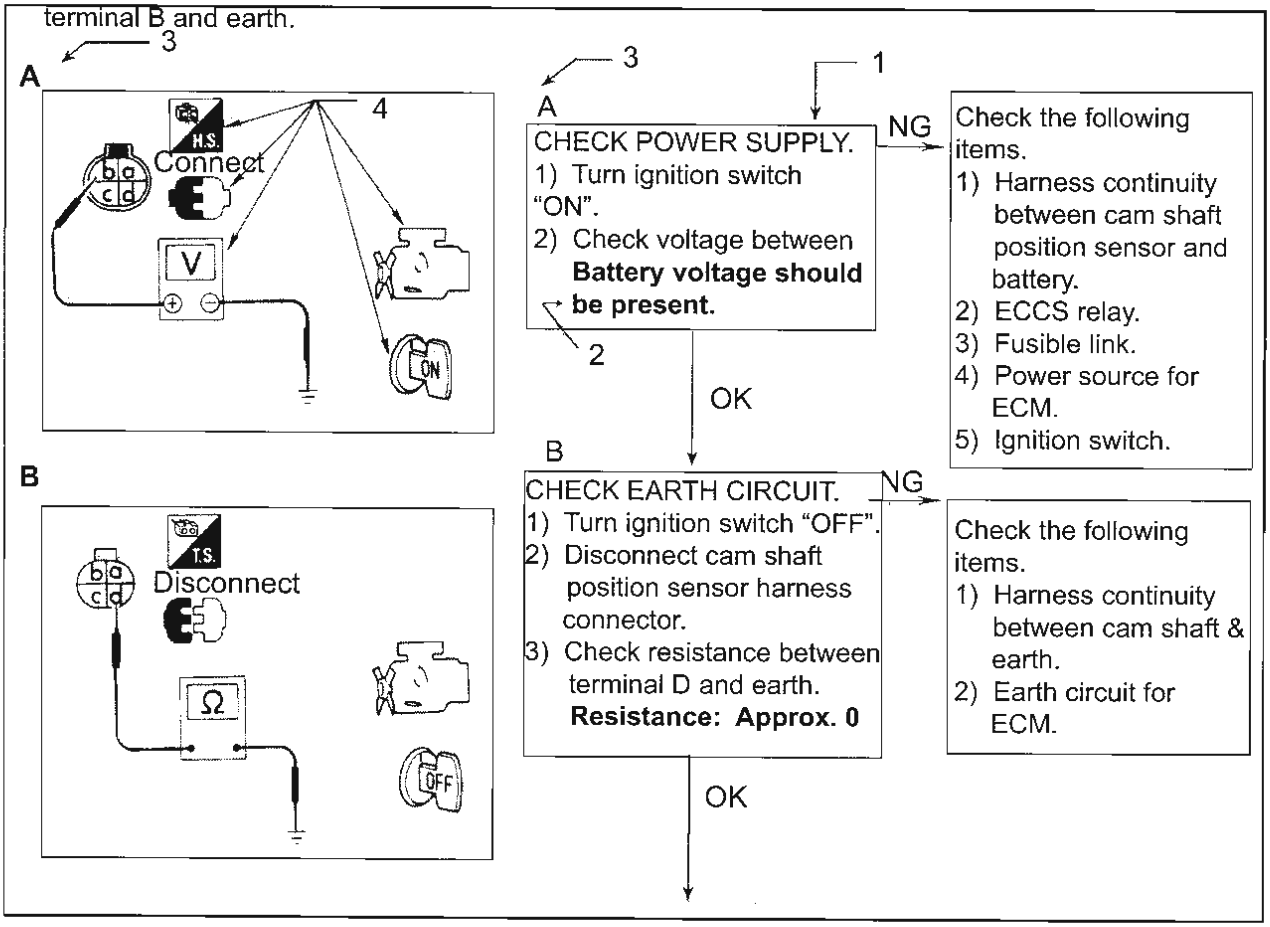
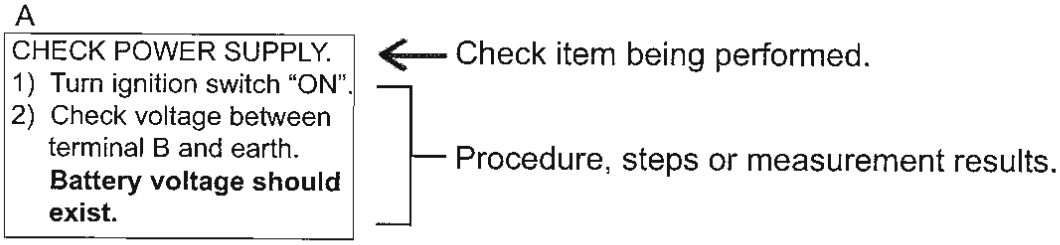
Example 2: Fault diagnosis flow chart



HOW TO FOLLOW THIS FLOW CHART

1. **Work and diagnostic procedure**
   Start to diagnose a problem using procedures indicated in enclosed blocks, as shown in the following example.



2. **Measurement results**
   Required results are indicated in bold type in the corresponding block, as shown below.
   These have the following meanings:
   Battery voltage; 11 - 14V or approximately 12V
   Voltage; Approximately 0V - Less than 1V

3. **Cross reference of work symbols in the text and illustrations**
   Illustrations are provided as visual aids for work procedures.

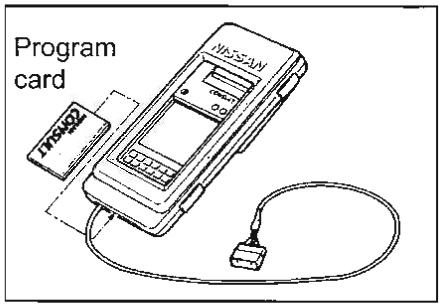
4. **Symbols used in illustrations**
   Symbols included in illustrations refer to measurements or procedures. Before diagnosing a problem, familiarize yourself with each symbol.

CONSULT

Consult is a hand-held compact type tester. It transmits signals to the vehicle loading control units when the diagnoses connector is connected and can perform all types of diagnosis and tests.

Note:

Refer to the CONSULT operation manual for further details.

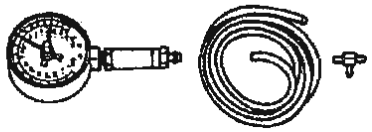
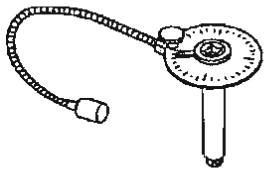
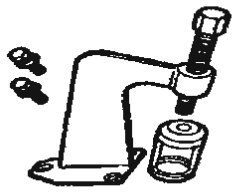
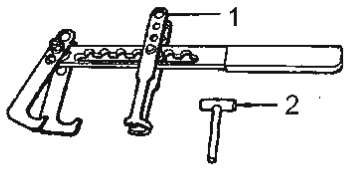
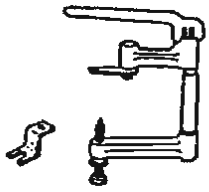
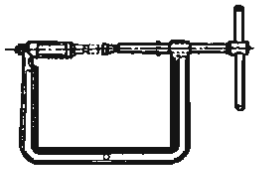
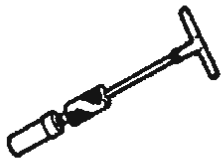


FUNCTION

Operation support	Transmits commands to the electrical control unit for setting the status suitable for required operation.
Function test	Diagnose the ECCS standard checks
Self-diagnosis	Receives the self-diagnosis results from the electrical control unit and displays malfunctioning system names and the number of times a malfunction occurs.
Data monitor	Receives input and output signals from the control unit, displays and records data used to easily determine cause of malfunction.
Active test	Sends commands to the control unit and performs the operation inspection and verification of the output system according to output signal changes.
ECU part unit	Displays the part number of the electrical control unit.

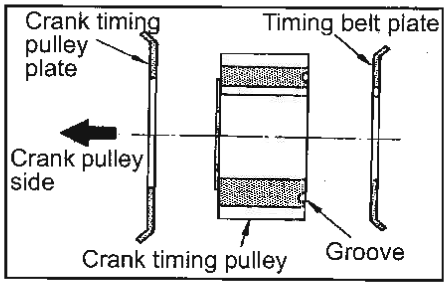
APPLICATION

	Engine (ECCS)	A / T	HICAS	ABS	ABS (with A-LSD)	SRS air bag
Operation support	○				○	
Function test	○					
Self-diagnosis	○	○	○	○	○	○
Data monitor	○	○	○	○	○	
Active test	○		○	○	○	
ECU part number	○	○	○	○	○	

TOOLS		USE
Compound gauge EG1508 0001		Turbo charger pressure inspection (RB25DET)
Pressure gauge (For LPG vaporizer inspection) ST1957 2000		Turbocharger swing valve controller inspection (B25DET)
Angle wrench KV101 12100		Installation angle check
Valve spring compressor KV101 10601		Valve collet installation & removal (RB20E)
1. **Valve spring compressor** KV101 09210 2. **Adapter** KV101 11200		Valve collet installation & removal (RB20E)
Valve sprint compressor ST1207 0000		Valve collet installation & removal (RB20E)
Valve spring compressor KV101 089S0		Valve collet installation & removal (RB25DE / DET)
Valve oil seal puller KV101 07900		Valve oil seal removal
Valve guide drift KV101 11000 (intake) ST1103 3000 (exhaust)		Valve guide installation & removal (RB20E)
Valve guide drift KV101 11800		Valve guide installation & removal (RB25DE / DET)

Installation

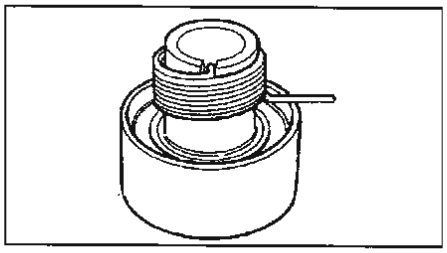
1. Install the timing belt plate (rear).
- Compared to front side, the rear timing pulley plate has smaller external diameter.
- When installing make sure the external diameter R is facing the direction shown in the diagram on the right.



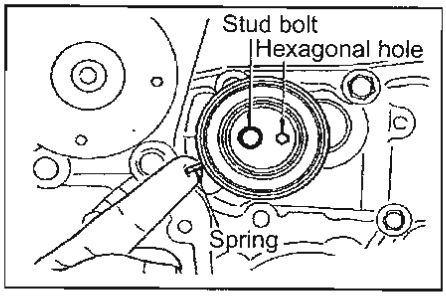
2. Install the crank timing pulley.
- Make sure the crankshaft key is facing the top.

3. Install the tensioner pulley.

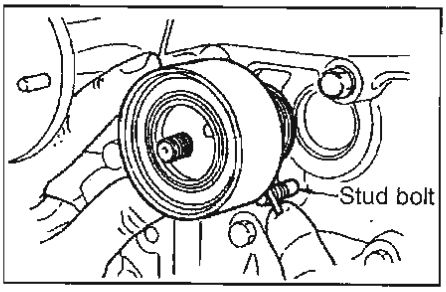
(1) Fit the spring claw to the tensioner pulley groove securely.



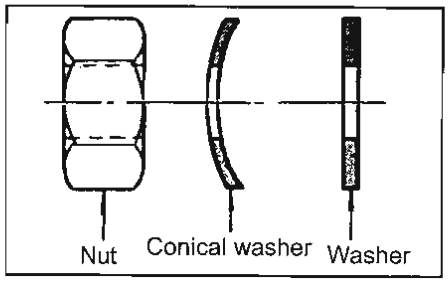
(2) Install it in a way so the tensioner pulley hexagonal hole and the spring claw is positioned as shown in the diagram on the right.



(3) Hold the tensioner pulley with your finger. Hook the spring on top of the stud bolt by rotating the spring anti-clockwise.



(4) Temporarily install the tensioner pulley by installing in the order of washer, conical washer and installation nut.
- Make sure the conical washer is facing the direction shown in the diagram on the right.



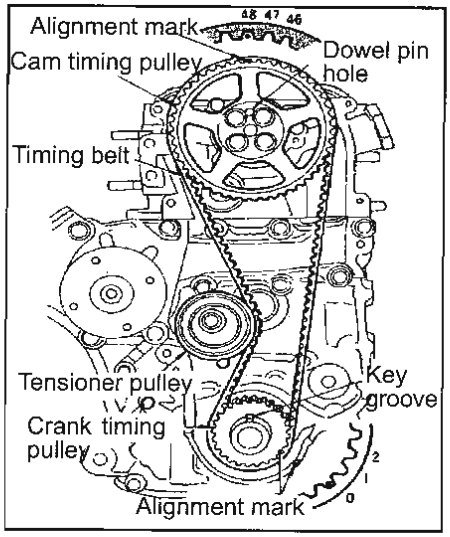
4. Install the timing belt.

(1) Check that the crank timing pulley key groove is facing up.

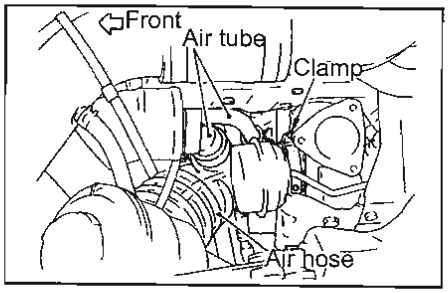
(2) Check that the cam timing pulley alignment mark is facing up.

(3) Insert wrench to the tensioner pulley hexagonal hole and turn it clockwise to temporarily tighten the installation nut to fix the tensioner pulley.

(4) Install the timing belt by aligning the crank timing pulley and cam timing pulley alignment mark to the timing belt reverse side alignment mark.
- After installing make sure each pulley and the belt alignment mark is as shown in the diagram on the right.



(3) Remove air tube from the air hose.
(4) Remove air hose clamp to take out the air hose.



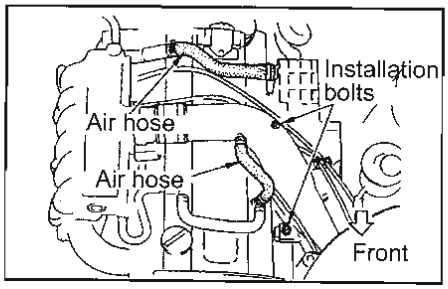
Inspection

- Make sure the air cleaner element is clean.
  Periodic replacement period: Every 60,000km

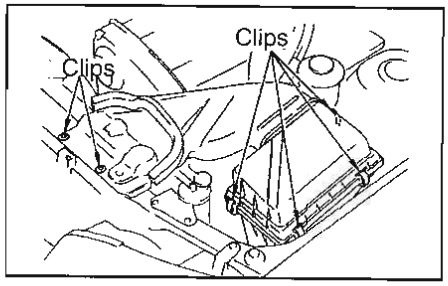
Installation

1. Install the air hose (RB25DET).
- Make sure the clamp is facing correct direction when installing.

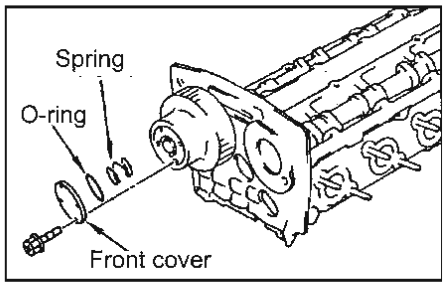
2. Install the air duct and resonator ASSY (RB25DE).
- Tighten 2 installation bolts.
  Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}
- Install 2 air hoses.
3. Install the lower air cleaner case.
   Tightening torque (N-m{kg-m}) 3.8~4.5{0.39~0.46}



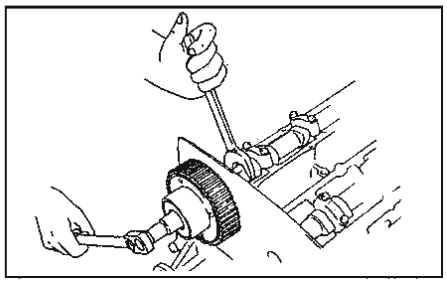
4. Install the air cleaner element, air cleaner case (upper) and the air duct.
- Place 4 air cleaner case (upper) clips and 2 air duct clips.
5. Install the rest in reverse order to the removal procedure.
- When the air flow meter is removed, replace the o-ring at installation.



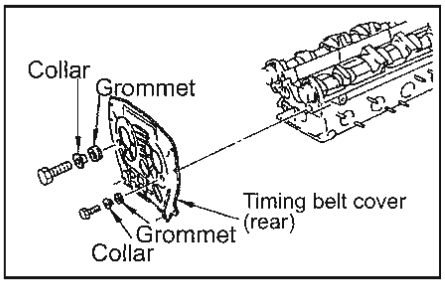
13.Remove cam timing pulley (intake side).
(1) Remove the front cover, o-ring and the spring.



(2) Remove the cam timing pulley installation bolt by holding the cam shaft hexagonal part using the spanner.
(3) Remove cam timing pulley from the cam shaft.
Caution:
Do not use pulley holder etc. to fix when removing the intake side cam timing pulley as it could damage innards.

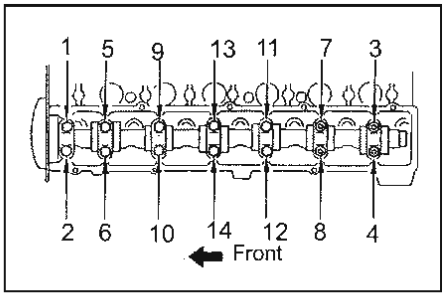


14.Remove the timing belt cover (rear).

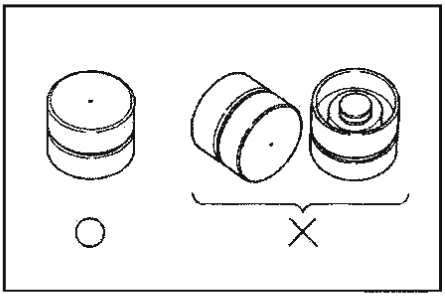


15.Remove the baffle plate from No.6 and No.7 cam shaft bracket.
16.Remove the cam bracket.
- Loosen the cam bracket installation bolts in the order shown in several stages in the figure on right.

Caution:
Before removal make sure to mark the installation position of the cam bracket.
- Inspect the cam shaft end play before loosening the cam bracket installation bolts.

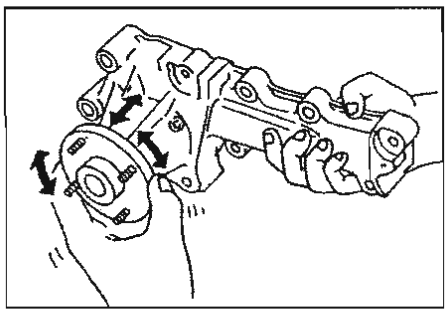


17.Remove the cam shaft.
18.Pull out the cam shaft oil seal from the cam shaft.
19.Remove the hydraulic valve lifter.
- Check the installation position and store it to avoid confusion.
- Store the hydraulic valve lifter in stand up position. If stored for a longer period of time, store it in clean engine oil.
- Do not disassemble the hydraulic valve lifter.



Inspection

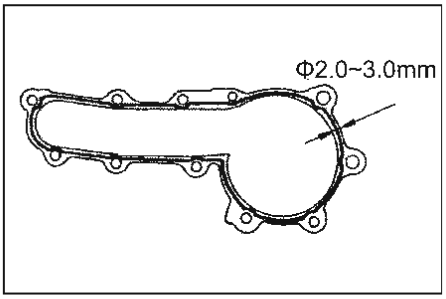
- Check the water pump main body and the vane for rust or foreign objects.
- Make sure the water pump is not warby.
- Replace the water pump if there are any abnormalities.



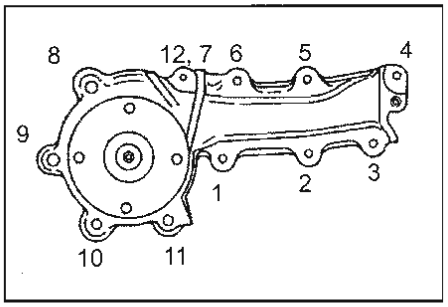
Installation

1. Install the water pump.

- Use a scraper to remove old gasket from the water pump and the cylinder block installation surface.
- Clean the installation surface with white gasoline.
- Apply sealing agent (KP710 00150) to the position shown in approx. Φ2.0~3.0mm.

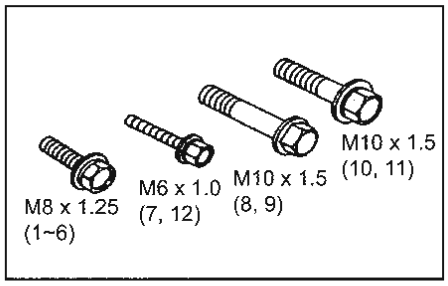


- Tighten the installation bolts in the order shown.
- Tighten the installation bolts 8 and 9 together with the alternator adjust bar.



- There are four types of installation bolts.
  Tightening torque (N-m{kg-m})

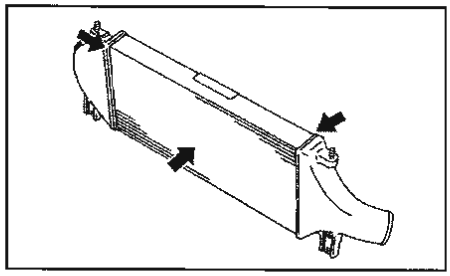
M6	6.3~8.3{0.64~0.85}
M8	16~21{1.6~2.1}
M10	31.4~42.1{3.2~4.3}



2. Install the rest in reverse order to the removal procedure.

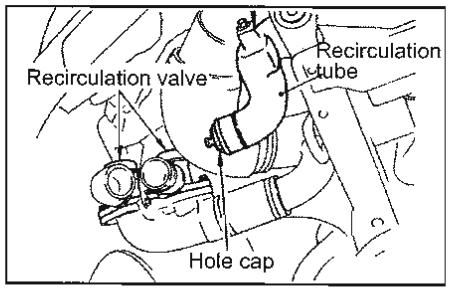
Inspection

Inter-cooler visual inspection



- Check to make sure inter-cooler core is not clogged with foreign objects.
- Check if there is any damage or faults at joints on the inter-cooler core and pipings.
- Clean if there are any blockages.
- Replace the inter-cooler if there is any damage or faults.

Recirculation valve function inspection



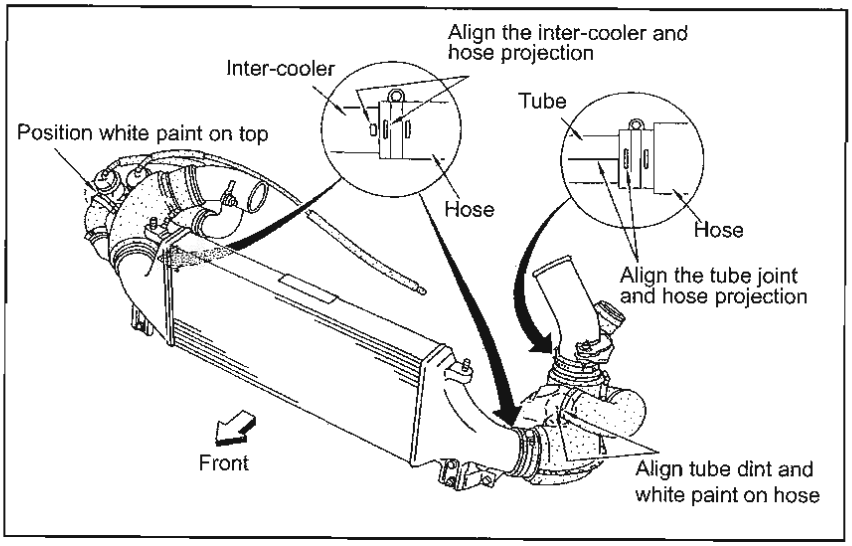
1. Remove the air hose and the air tube on recirculation valve output side.
2. Place a hole cap on the recirculation side opening.
3. Start the engine.
4. Check the air blowout from the recirculation valve when the throttle is closed. It is normal if there is blowout.

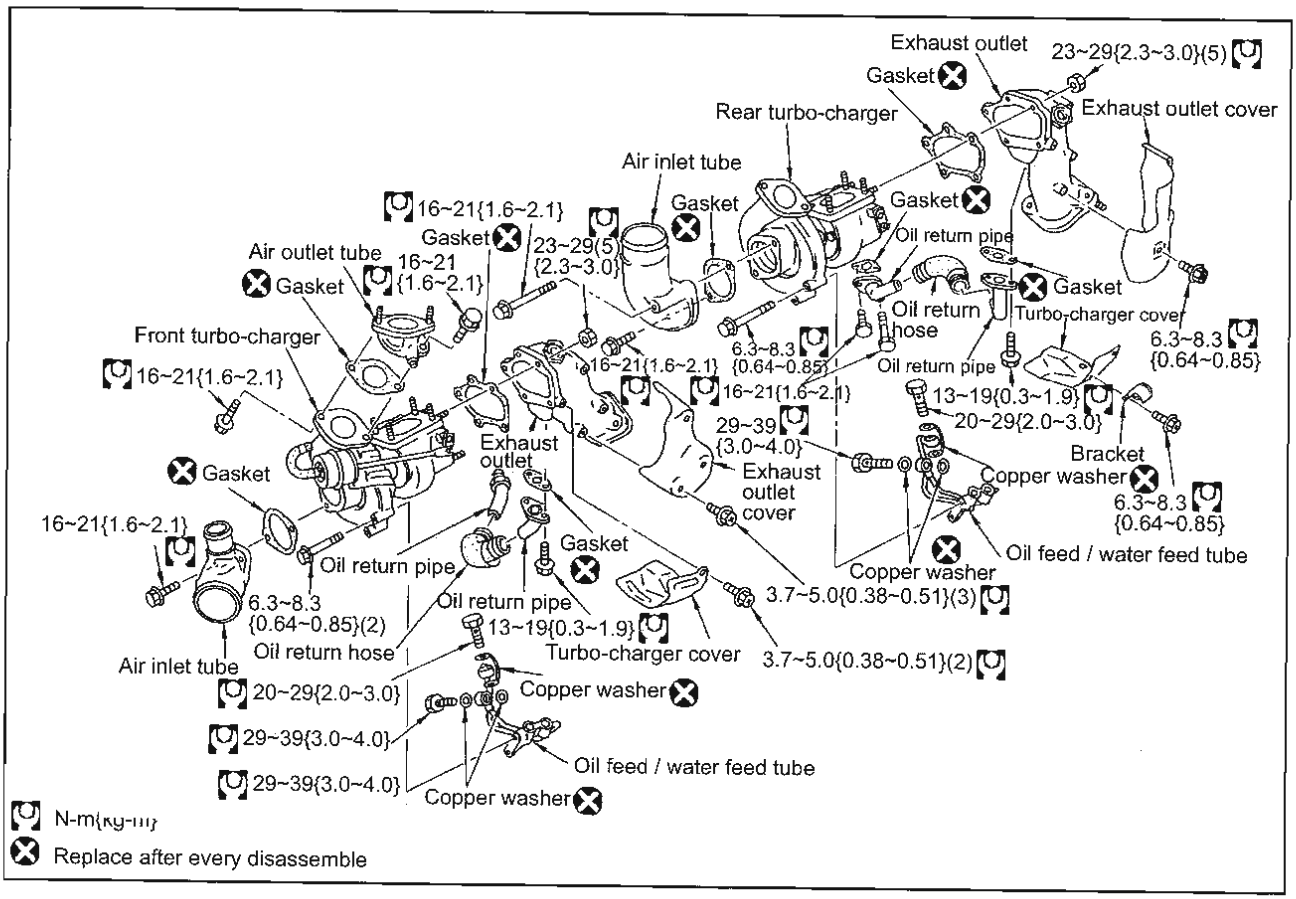
- Check the vacuum hose for any disconnection or cut.
- If there is no fault with the vacuum hose, carry out the recirculation valve operation check.

Recirculation valve operation inspection

- Use a vacuum hand pump to create negative pressure. Check if the valve will lift up to retain negative pressure.
  Standard value (kPa{mmHg} -16~-24{-120~-180}
- Replace the recirculation valve if there is any abnormality.

Installation





Disassembly

Turbo-charger

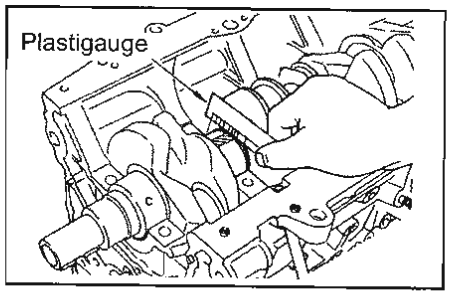
Caution:

Do not disassemble turbo-charger main body.

1. Remove the exhaust outlet cover and the turbo-charger cover.
2. Remove the exhaust outlet.
3. Remove the air inlet tube.
4. Remove the air outlet tube (front turbo-charger only).
5. Remove the oil feed and water feed tube.
6. Remove the oil return pipe and the oil return hose.

Method B (using the plastigauge)

- Remove all dust and foreign objects from the crankshaft journal and the bearing surface.
- Cut off a piece of plastigauge slightly shorter than the bearing width. Place the plastigauge on the crankshaft axle direction avoiding the oil hole.
- Tighten the main bearing to the specified tightening torque.



Caution:

Do not turn the crankshaft.

- Remove the bearing cap and the bearing to measure the plastigauge width using the plastigauge scale.

Main bearing selection

- Select the main bearing from the selection chart below.

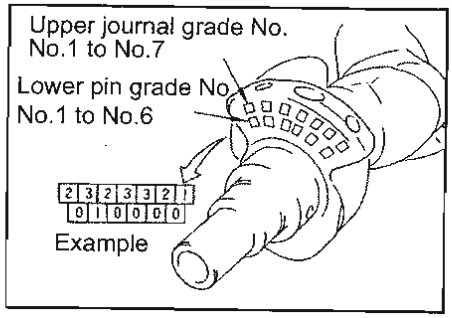
(mm)

Cylinder block bearing housing inner diameter			58.651 58.645	58.657 58.651	58.663 58.657	58.670 58.663
Crank journal diameter	Grade No. (Engraved)		0	1	2	3
54.975 54.969	0	Bearing grade No. Bearing thickness (mm) Oil clearance (mm) Identification colour	STD 0 1.818~1.821 0.028 / 0.046 Black	STD 1 1.821~1.824 0.028 / 0.046 Brown	STD 2 1.824~1.827 0.028 / 0.046 None	STD 3 1.827~1.830 0.028 / 0.047 Yellow
54.969 54.963	1	Bearing grade No. Bearing thickness (mm) Oil clearance (mm) Identification colour	STD 1 1.821~1.824 0.028 / 0.046 Brown	STD 2 1.824~1.827 0.028 / 0.046 None	STD 3 1.827~1.830 0.028 / 0.046 Yellow	STD 4 1.830~1.833 0.028 / 0.047 Blue
54.963 54.957	2	Bearing grade No. Bearing thickness (mm) Oil clearance (mm) Identification colour	STD 2 1.824~1.827 0.028 / 0.046 None	STD 3 1.827~1.830 0.028 / 0.046 Yellow	STD 4 1.830~1.833 0.028 / 0.046 Blue	STD 5 1.833~1.836 0.028 / 0.047 Green
54.957 54.951	3	Bearing grade No. Bearing thickness (mm) Oil clearance (mm) Identification colour	STD 3 1.827~1.830 0.028 / 0.046 Yellow	STD 4 1.830~1.833 0.028 / 0.046 Blue	STD 5 1.833~1.836 0.028 / 0.046 Green	STD 6 1.836~1.839 0.028 / 0.047 Pink

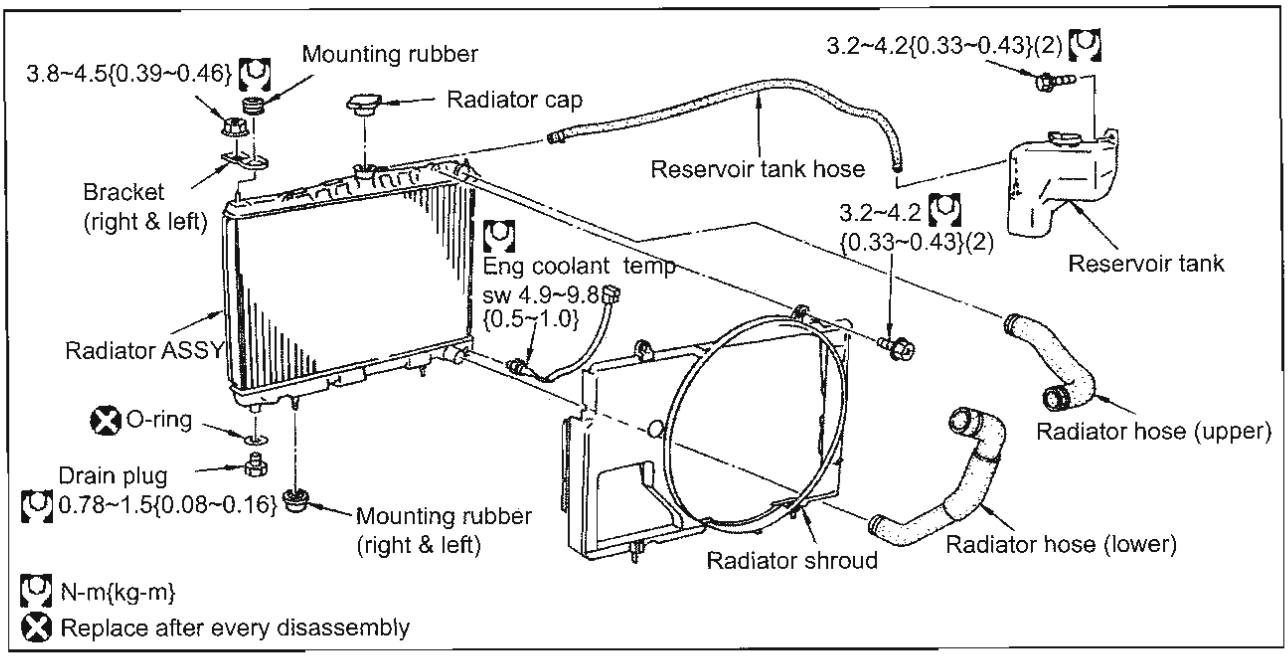
Reference:

Depending on the installation position the measurement and the feature size will be different.
No.1 ~ No.3, No.5 ~ No.7 upper side (with groove)
No.1 ~ No.3, No.5 ~ No.7 lower side (without groove)
No.4 upper side (Thrust bearing, with groove)
No.4 lower side (Thrust bearing, without groove)

- If the crank shaft is new, check the crank shaft front surface journal grade No. engravings with the selection chart.



17. RADIATOR



Removal

1. Remove the battery negative terminal inside the boot.
2. Drain coolant from the radiator drain plug.
3. Remove the air duct.
4. Remove the reservoir tank hose at radiator side.
5. Remove the radiator upper hose and lower hose.

Caution:
Care must be taken not to get coolant on the alternator electrical components.

6. Remove the engine coolant temperature switch harness connector.
7. Remove right and left radiator upper mount bracket.
8. Remove the fan shroud installation bolts and move the fan shroud towards the cooling fan.
9. Remove the radiator ASSY.

• Care must be taken not to damage the radiator core.

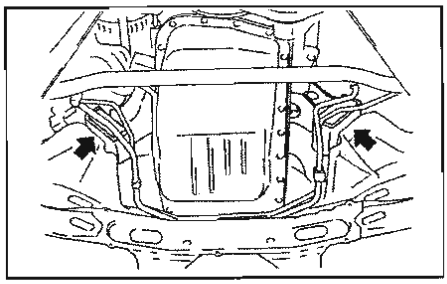
10. Remove the fan shroud.
11. Remove the engine coolant temperature switch from the radiator.

Installation

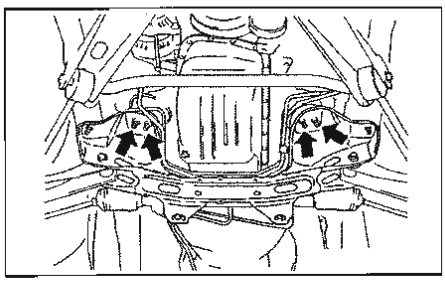
1. Install the engine coolant temperature switch to the radiator.
   Tightening torque (N-m{kg-m}) 4.9~9.8{0.5~1.0}
2. Place the shroud on the cooling fan temporarily.
3. Install the radiator ASSY.

• Care must be taken not to damage the radiator core.

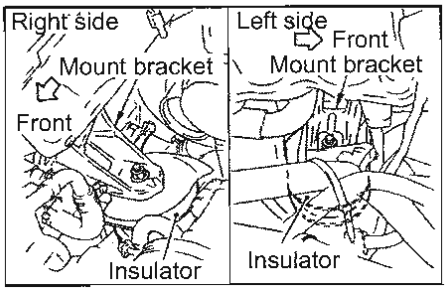
45. Remove the front side right and left engine mount installation nuts. (RB25DE)



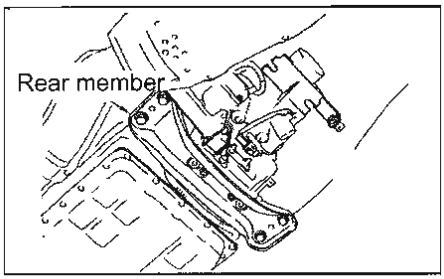
(RB25DET)



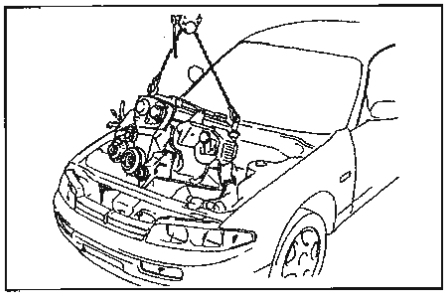
46. Lift up the engine until there is no load to insulator and remove the mount bracket and the insulator (RB25DET).



47. Remove the engine rear member and the insulator.



48. Lift up the engine and the transmission ASSY carefully by changing the angle of the engine and the transmission frequently.
- Check to make sure you have not forgotten to remove or disconnect any pipes or wiring.
- Extra caution must be taken not to allow any parts to come in contact with the vehicle exterior especially the front tip of the transmission and the oil tubes around the steering cylinder, crank pulley and the air conditioner condenser.



(17) Engine stall when decelerating or immediately after stopping.

[Analysis]

Reduced engine rpm when releasing accelerator pedal can lead to engine stall. Another cause is misfiring.

- Incorrect adjustment of idling control.
- Incorrect air-fuel ratio.
- Ignition error.

[Chart]

IDLE CONTROL

Idling speed	Is idling speed normal? Is idle adjustment correct?
	Check if AAC valve is fully closed.
Control	Check if AAC valve control signal is output.
	Check if AAC valve operation is normal (CONSULT active test).
	Check if AAC valve is OK.
	Check if idle judgement is ON.
	Check by disconnecting AAC valve connector (AAC fully closed).

AIR-FUEL RATIO

Stop feedback	Perform CONSULT active test. OR Disconnect exhaust gas sensor connector.
Feedback	Check if exhaust gas temperature lamp (control unit red lamp) will flash more than five times in ten seconds when engine is running at 2,000 rpm, or check by CONSULT data monitor.
Enrich mixture	CONSULT active test or disconnect regulator vacuum hose.
Lean mixture	CONSULT active test or apply vacuum greater than -500mmHg with hand vacuum pump to pressure regulator.

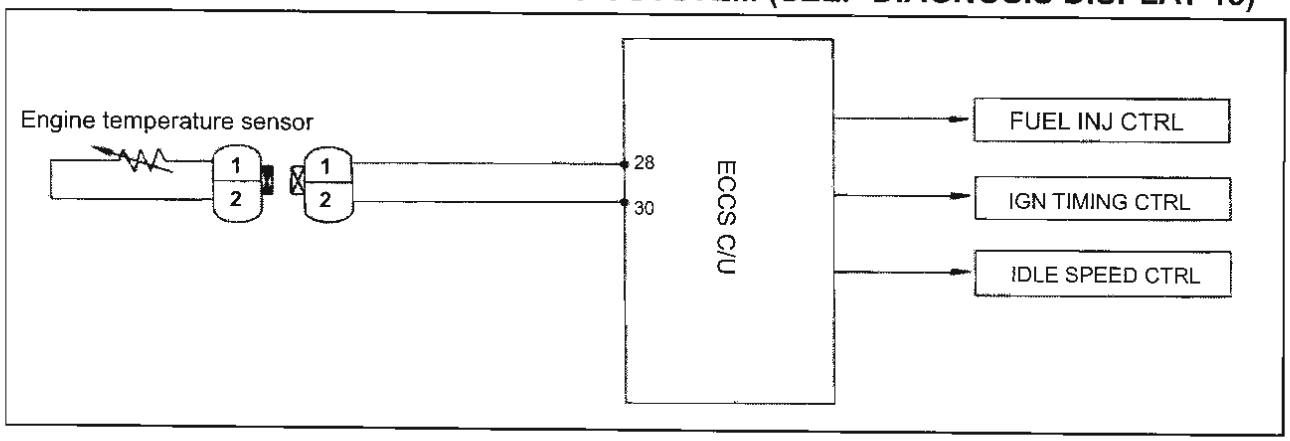
IGNITION

Ignition misfiring	Check ignition signal, crank angle sensor signal for missing pulses in CONSULT data monitor.

ENGINE . A/T FUSION CONTROL

Control	Carry out self-diagnosis.

4. WATER TEMPERATURE SENSOR SYSTEM (SELF-DIAGNOSIS DISPLAY 13)



A

Power supply inspection
- Place ignition switch in the OFF position.
- Remove engine temperature sensor harness connector.
- Place ignition switch in the ON position.
- Use tester to measure power voltage between terminal 1 and body earth.
  Voltage: Approx. 5V

NG → Repair faulty harness or connector.

OK

B

Earth circuit inspection
- Place ignition switch in the OFF position.
- Check for continuity between terminal 2 and body earth.

NG → Repair faulty harness or connector.

OK

C

Input signal inspection
- Use "ENG TEMP SENSOR" in data monitor mode to check engine coolant temperature.
- Check the power voltage between ECCS C/U terminal 28 and earth.

Ignition switch in ON position
Eng temp Approx. 20°C: 3V
Approx. 80°C: 1V

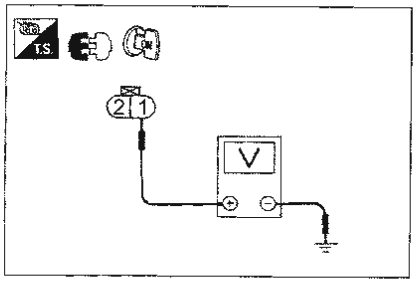
NG → **Component parts inspection**
- Check water temperature sensor.

If NG replace crank angle sensor.

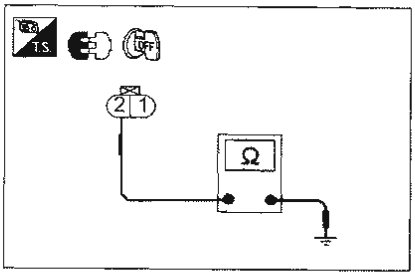
OK

Inspect ECCS C/U terminal for any damage and ECCS C/U connector connections.

A



B



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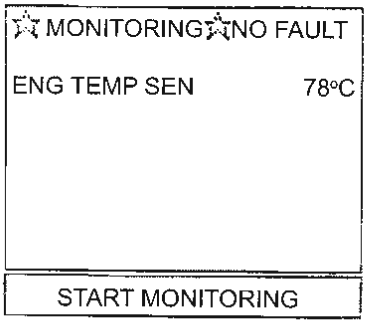

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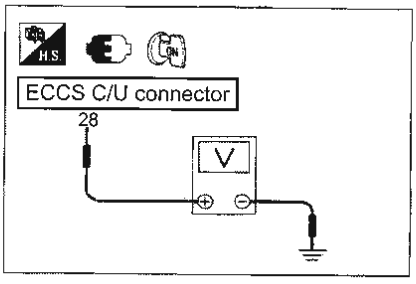
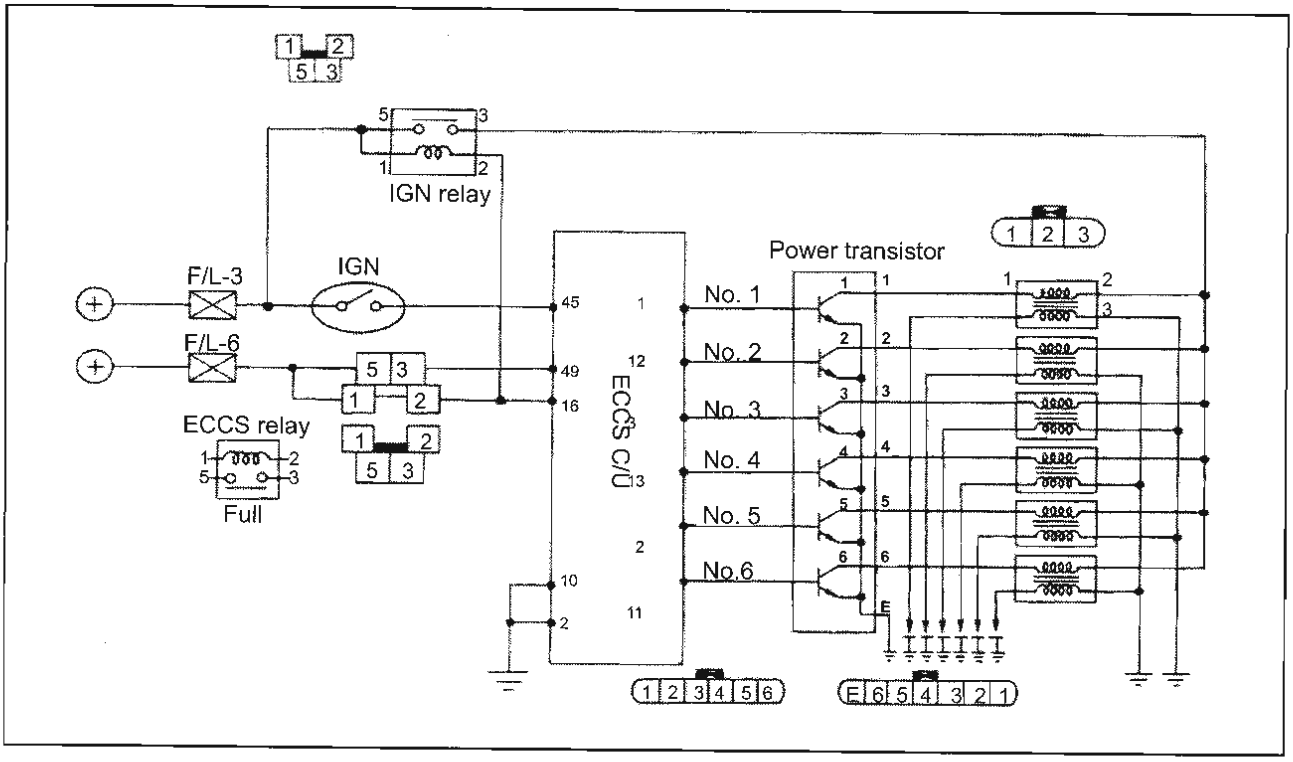


2. IGNITION SIGNAL - 1

CONTROL CIRCUIT DIAGRAM RB25DE / RB25DET ENGINE



A

Circuit function inspection

- Inspect using "POWER BALANCE" in function test mode. OR power balance in "ACTIVE TEST".
- Check if engine rev will decrease momentarily.

OK → FINISH

NG

B

Power supply inspection

- Place ignition switch in the OFF position.
- Remove ignition coil harness connector.
- Place ignition switch in the ON position.
- Use CONSULT or the tester to measure power voltage between each coil terminal 1 and earth.

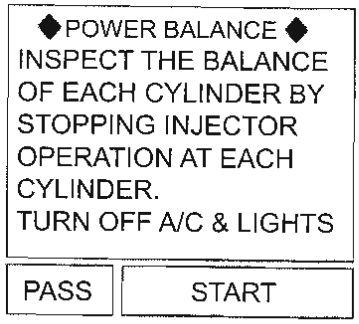
NG

Inspect the following:
Ignition relay
Ignition switch
Continuity between each coil Harness terminal 2 and ignition relay terminal 5.

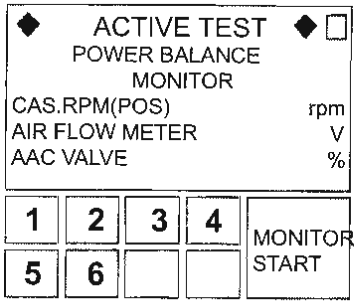
OK

TO C

A



A



B