

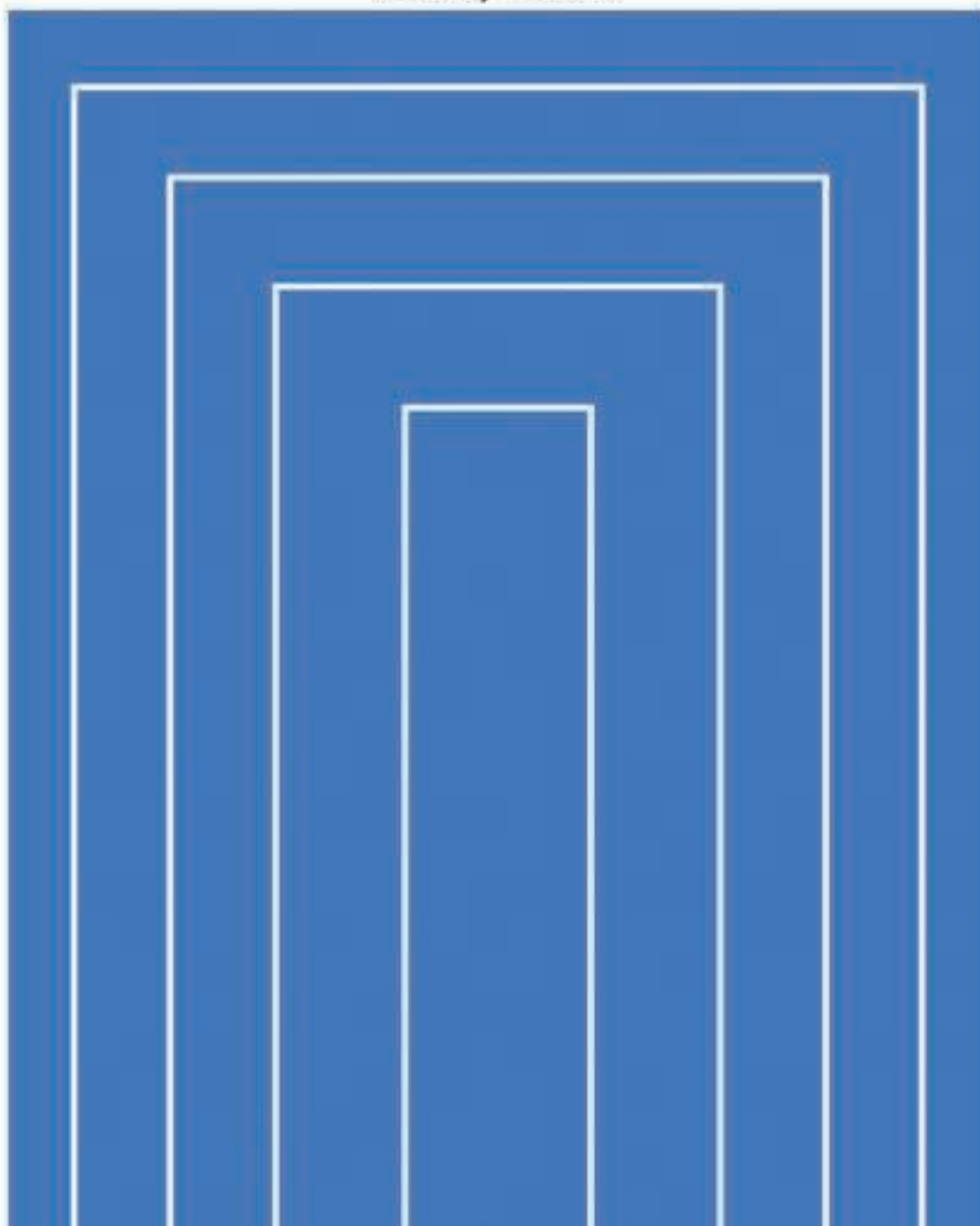
TOYOTA

1E,2E,2E-C

ENGINE

REPAIR MANUAL

Oct., 1984



Pub.No.36259



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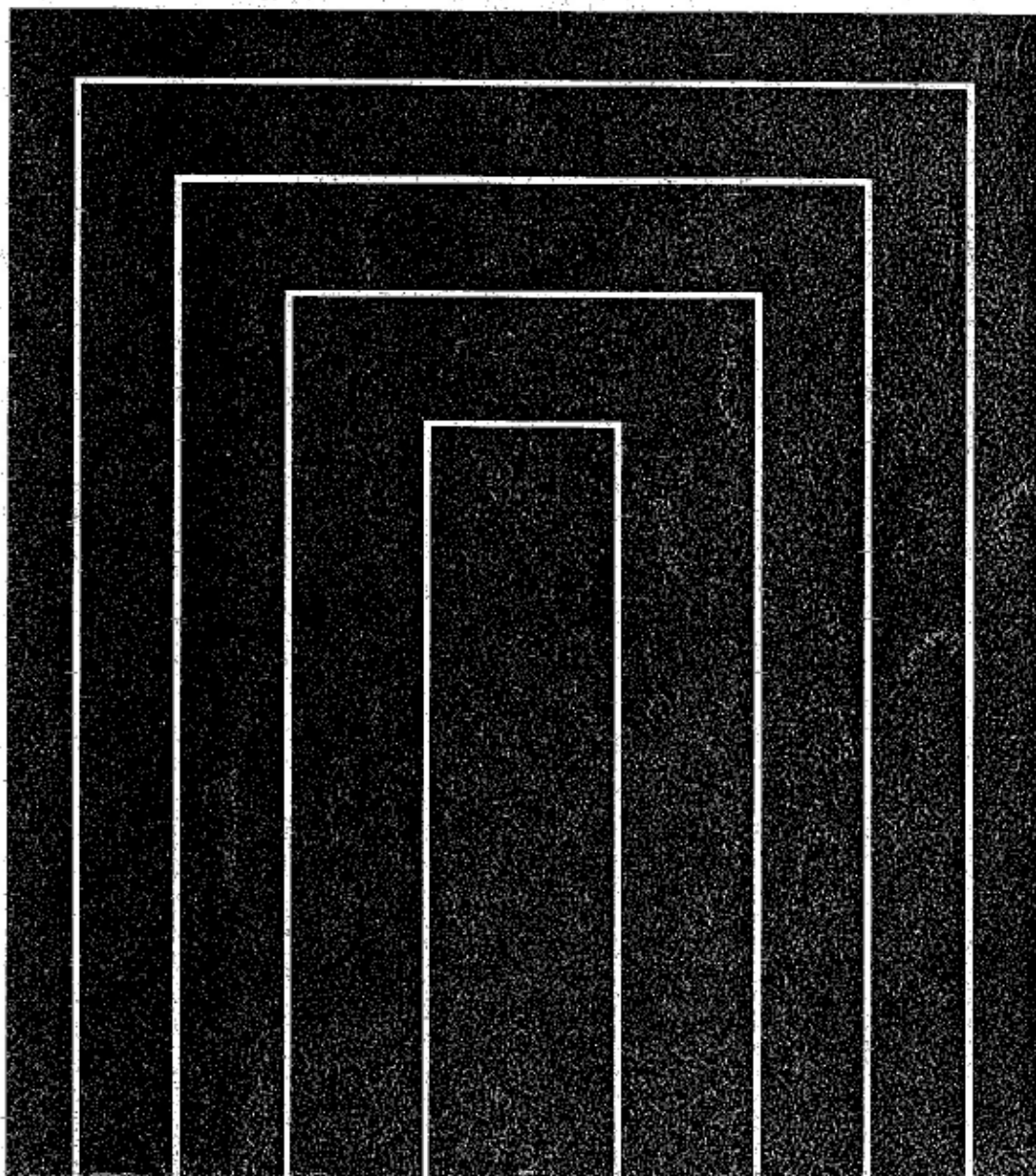
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TOYOTA

1E, 2E, 2E-C ENGINE

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TOYOTA 1E, 2E, 2E-C ENGINE REPAIR MANUAL

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TOYOTA 1E 2E 2E-C ENGINE REPAIR MANUAL

FOREWORD

This repair manual has been prepared to provide information covering general service repairs for the 1E, 2E and 2E-C engines equipped on the TOYOTA STARLET and COROLLA.

Applicable models:

EP70, 71 series

EE80 series

All information contained in this manual is the most up-to-date at the time of publication. However specifications and procedures are subject to change without notice.

TOYOTA MOTOR CORPORATION

INTRODUCTION

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IN

HOW TO USE THIS MANUAL

IDENTIFICATION INFORMATION

GENERAL REPAIR INSTRUCTIONS

ABBREVIATIONS USED IN THIS MANUAL

HOW TO USE THIS MANUAL

To assist in finding your way through this manual, the Section Title and major heading are given at the top of every page.

An **INDEX** is provided on the 1st page of each section to guide you to the item to be repaired.

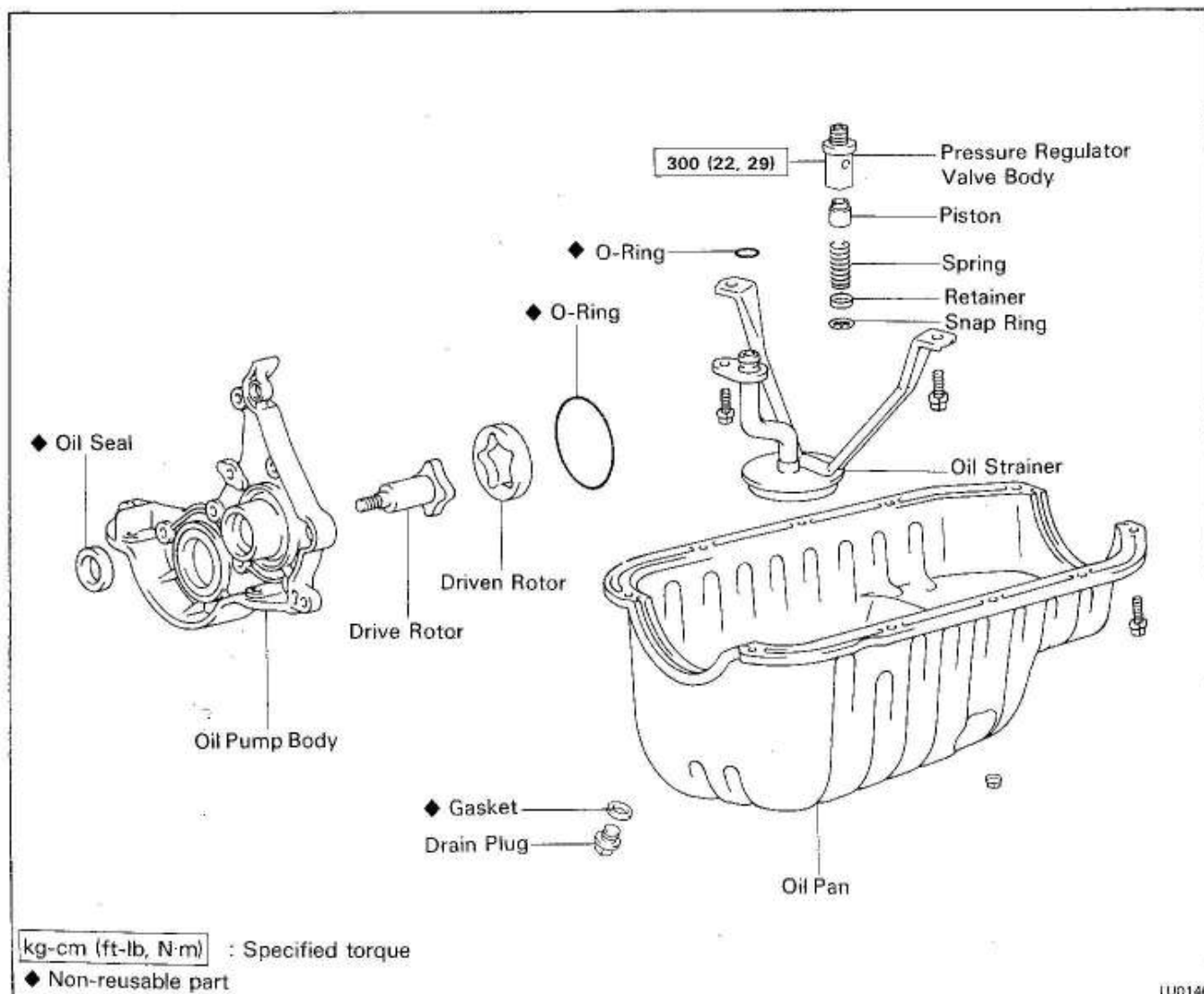
At the beginning of each section, **PRECAUTIONS** are given that pertain to *all* repair operations contained in that section. *Read these precautions before starting any repair task.*

TROUBLESHOOTING tables are included for each system to help you diagnose the system problem and find the cause. The repair for each possible cause is referenced in the remedy column to quickly lead you to the solution.

REPAIR PROCEDURES

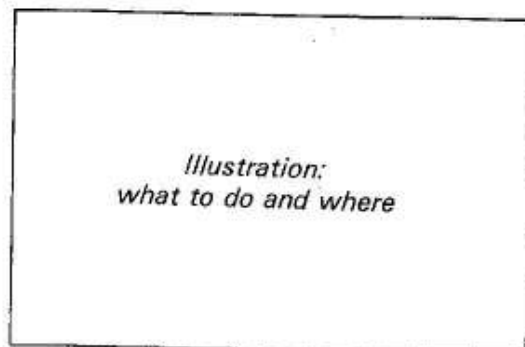
Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.

Example:



The procedures are presented in a step-by-step format:

- The illustration shows *what* to do and *where* to do it.
- The task heading tells *what* to do.
- The detailed text tells *how* to perform the task and gives other information, such as specifications and warnings.



Example:

INSTALL FLYWHEEL

Install the flywheel on the crankshaft with six bolts.

Torque the bolts.

Torque: 750 kg-cm (54 ft-lb, 74 N·m)

Task heading: *what to do*

Detail text:
how to do it

Specification

This format enables the experienced technician to have a FAST TRACK. He can read the task headings and refer to the detailed text only when he needs it. Important specifications and warnings always stand out in bold type.

REFERENCES

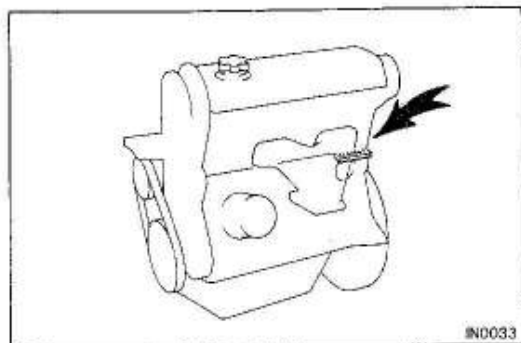
References have been kept to a minimum. However, when they are required you are given the *page* to go to.

SPECIFICATIONS

Specifications are presented in bold type throughout the text in the applicable step. You never have to leave the procedure to look up your specs. All specifications are also found in Appendix A, Specifications, for quick reference.

WARNINGS, CAUTIONS, NOTES:

- **WARNINGS** are presented in bold type and indicate there is a possibility of injury to you or other people.
- **CAUTIONS** are also presented in bold type, and indicate there is a possibility of damage to the components being repaired.
- **NOTES** are separated from the text but do not appear in bold type. They provide additional information to help you perform the repair.



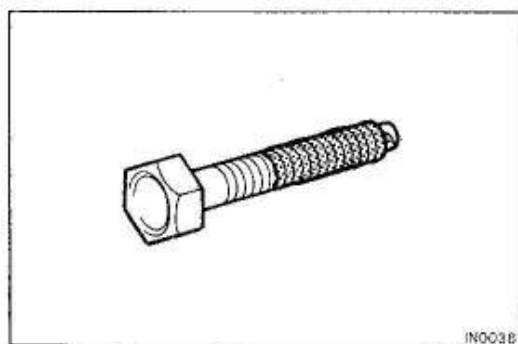
IDENTIFICATION INFORMATION

ENGINE SERIAL NUMBER

The engine serial number is stamped on the left side of the cylinder block.

GENERAL REPAIR INSTRUCTIONS

1. Use fender, seat and floor covers to keep the vehicle clean and prevent damage.
2. During disassembly, keep parts in order to facilitate reassembly.
3. Observe the following:
 - (a) Before performing electrical work, disconnect the cable from the battery terminal.
 - (b) If it is necessary to disconnect the battery for inspection or repair, always disconnect the cable from the negative (-) terminal which is grounded to the vehicle body.
 - (c) To prevent damage to the battery terminal post, loosen the terminal nut and raise the cable straight up without twisting or prying it.
 - (d) Clean the battery terminal posts and cable terminals with a shop rag. Do not scrape them with a file or such.
 - (e) Install the cable terminal to the battery post with the nut loose, and tighten the nut after installation. Do not use a hammer or such to tap the terminal onto the post.
 - (f) Be sure the cover for the positive (+) terminal is properly in place.
4. Check hose and wiring connectors to make sure that they are secure and correct.
5. Non-reusable parts
 - (a) Always replace cotter pins, gaskets, O-rings and oil seals etc. with new ones.
 - (b) Parts which cannot be reused are indicated by the "◆" symbol.



6. Precoated Parts

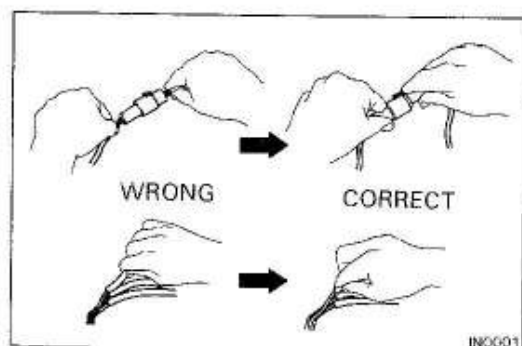
Precoated parts are the bolts, nuts, etc., which are coated with a seal lock adhesive at the factory.

- (a) If a precoated part is retightened loosened or moved in any way, it must be recoated with the specified adhesive.

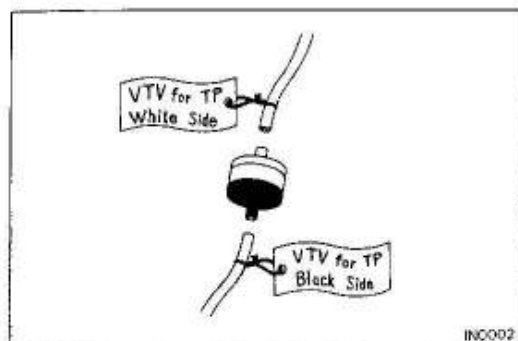
- (b) Recoating of Precoated Parts
 - (1) Clean off the old adhesive from the part's threads.
 - (2) Dry with compressed air.
 - (3) Apply the specified seal lock adhesive to the part's threads.
- (c) Precoated parts are indicated in the component illustrations by the "★" symbol.
- 7. When necessary, use a sealer on gaskets to prevent leaks.
- 8. Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.
- 9. Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found at the back of this manual.
- 10. When replacing fuses, be sure the new fuse is of the correct amperage. DO NOT exceed the fuse amp rating or use one of a lower rating.

Care must be taken when jacking up and supporting the vehicle. Lift and support the vehicle only at the proper locations.

- (a) If the vehicle is to be jacked up at the front or rear end only, be sure to block the wheels in order to ensure safety.
- (b) After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on the vehicle raised on one jack alone, even for a small job that can be finished quickly.



- 11. Observe the following precautions to avoid damage to parts:
 - (a) To disconnect vacuum hoses, pull on the end, not the middle of the hose.
 - (b) To pull apart electrical connectors, pull on the connector itself, not the wires.
 - (c) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.
 - (d) When steam cleaning an engine, protect the distributor, coil, air filter, and VCV from water.
 - (e) Never use an impact wrench to remove or install thermo switches or thermo sensors.
 - (f) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.
 - (g) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step-down adapter instead.



12. Tag hoses before disconnecting them:

- (a) When disconnecting vacuum hoses, use tags to identify how they should be reconnected.
- (b) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.

ABBREVIATIONS USED IN THIS MANUAL

A/C	Air Conditioner
A/T	Automatic Transmission
BTDC	Before Top Dead Center
BVSV	Bimetal Vacuum Switching Valve
DP	Dash Pot
EC	European Country
EGR	Exhaust Gas Recirculation
EX	Exhaust
Ex.	Except
FIPG	Formed in Place Gasket
HAI	Hot Air Intake
HIC	Hot Idle Compensation
IIA	Integrated Ignition Assembly
IN	Intake
K TYPE CARBURETOR	Conventional (Two barrel) Type Carburetor
LLC	Long Life Coolant
MP	Multipurpose
M/T	Manual Transmission
O/S	Oversize
PCV	Positive Crankcase Ventilation
RON	Research Octane Number
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
TDC	Top Dead Center
U/S	Undersize
VCV	Vacuum Control Valve
V TYPE CARBURETOR	Variable Venturi Type Carburetor
w/	With
w/o	Without

ENGINE MECHANICAL

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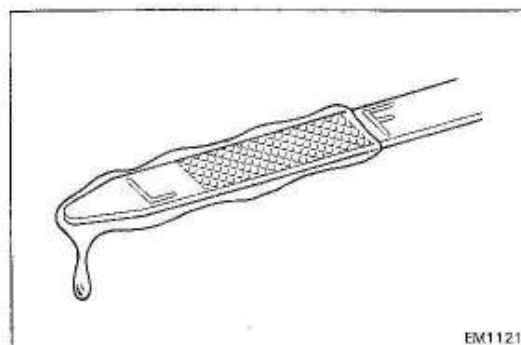


TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Engine overheats	Cooling system faulty Incorrect ignition timing	Troubleshoot cooling system Reset timing	CO-2 EM-6
Engine will not crank or cranks slowly	Starting system faulty	Troubleshoot starting system	ST-2
Engine will not start/ hard to start (cranks ok)	No fuel supply to carburetor Carburetor problems Ignition problems Vacuum leaks • HIC line • PCV line • Intake manifold Compression low	Check fuel line Troubleshoot fuel system Troubleshoot ignition system Repair as necessary Check compression	FU-2, 3 IG-2 EM-15
Rough idle or stalls	Vacuum leaks • HIC line • PCV line • Intake manifold Ignition problems Carburetor problems HAI system faulty Engine overheats Compression low	Repair as necessary Troubleshoot ignition system Troubleshoot fuel system Check HAI system Troubleshoot cooling system Check compression	IG-2 FU-2, 3 CO-2 EM-15
Engine hesitates/ poor acceleration	Ignition problems Vacuum leaks • HIC line • PCV line • Intake manifold • Carburetor hoses Air cleaner clogged Fuel line clogged Carburetor problems Emission control system problem • HAI system always on (hot engine) Engine overheats Compression low	Troubleshoot ignition system Repair as necessary Check air filter Check fuel line Troubleshoot fuel system Check HAI system Troubleshoot cooling system Check compression	IG-2 EM-4 FU-2, 3 CO-2 EM-15

TROUBLESHOOTING (Cont'd)

Problem	Possible cause	Remedy	Page
Engine dieseling (runs after ignition switch is turned off)	Carburetor problems Incorrect ignition timing	Troubleshoot fuel system Reset timing	FU-2, 3 EM-6
Muffler explosion (after fire) on deceleration only	DP system faulty Deceleration fuel cut system always off	Check DP system Check fuel cut system	EM-13
Muffler explosion (after fire) all the time	Air cleaner clogged Choke system faulty (K type carburetor only) Incorrect ignition timing	Check air filter Check choke system Reset timing	EM-4 EM-6
Engine backfires	Choke valve open (cold engine) (K type carburetor only) Carburetor vacuum leak Insufficient fuel flow Incorrect ignition timing	Check choke system Check hoses and repair as necessary Troubleshoot fuel system Reset timing	FU-2, 3 EM-6
Excessive oil consumption	Oil leak PCV line clogged Piston ring worn or damaged Valve stem worn Valve stem oil seal worn or damaged	Repair as necessary Check PCV system Check rings Check valves and guides Check oil seal	EM-32
Poor fuel mileage	Fuel leak Air cleaner clogged Ignition problems Carburetor problems Compression low Tires improperly inflated Clutch slips Brakes drag	Repair as necessary Check air filter Troubleshoot ignition system Troubleshoot fuel system Check compression Inflate tires to proper pressure Troubleshoot clutch Troubleshoot brakes	EM-4 IG-2 FU-2, 3 EM-15

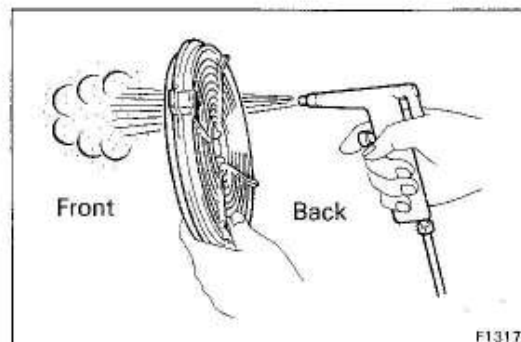


EM1121

ENGINE TUNE-UP

CHECK OIL LEVEL

The oil level should be between the L and F marks on the level gauge. If low, check for leakage and add oil up to the F mark.

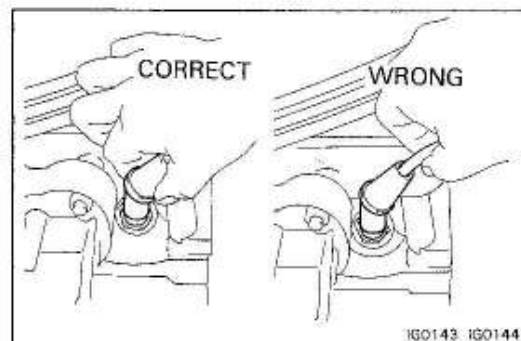


F1317

INSPECT AIR FILTER

- Visually check that the air cleaner element is not excessively dirty, damaged or oily.
- Clean the element with compressed air.

First blow from the back side thoroughly. Then blow off the front side of the element.

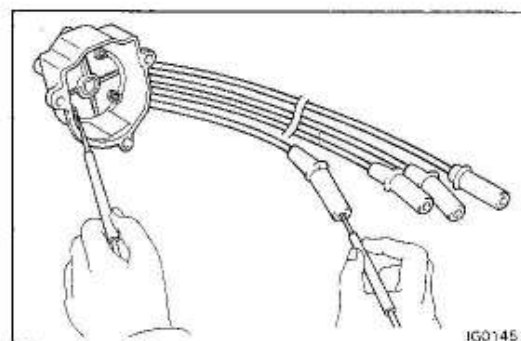


IG0143 IG0144

INSPECTION OF HIGH TENSION CORD

- CAREFULLY REMOVE HIGH TENSION CORD BY RUBBER BOOT FROM SPARK PLUGS

CAUTION: Pulling on or bending the cords may damage the conductor inside.



IG0145

- INSPECT RESISTANCE OF HIGH TENSION CORD WITH DISTRIBUTOR CAP

Using an ohmmeter, check that the resistance does not exceed the maximum.

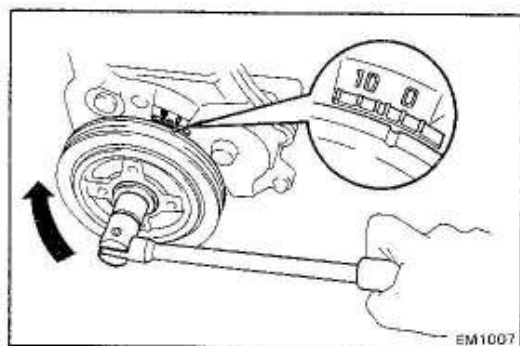
Maximum resistance: Less than 25 k Ω /cord

If more than maximum, check the terminals, and replace the high tension cord and/or distributor cap as required.

INSPECTION AND ADJUSTMENT OF VALVE CLEARANCES

NOTE: Inspect and adjust the valve clearance after engine has reached normal operating temperature.

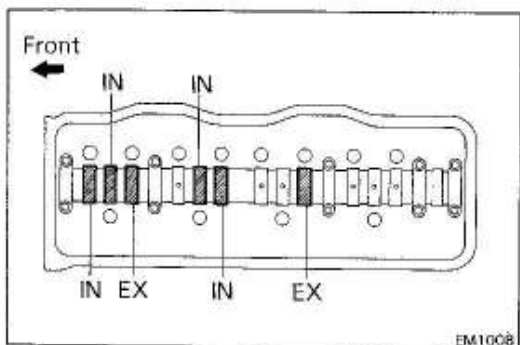
1. REMOVE AIR CLEANER COVER
2. REMOVE CYLINDER HEAD COVER
(See step 3 on page EM-16)



3. SET NO. 1 CYLINDER TO TDC/COMPRESSION

- (a) Turn the crankshaft pulley and align its groove with the "0" mark on the No. 1 timing belt cover.
- (b) Check that the rocker arms on No. 1 cylinder are loose and the rockers on No. 4 are tight.

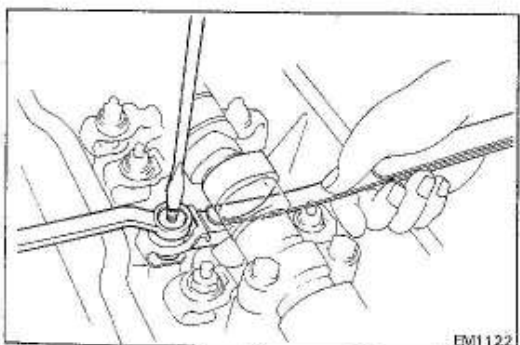
If not, turn the crankshaft one complete revolution and align the marks as above.



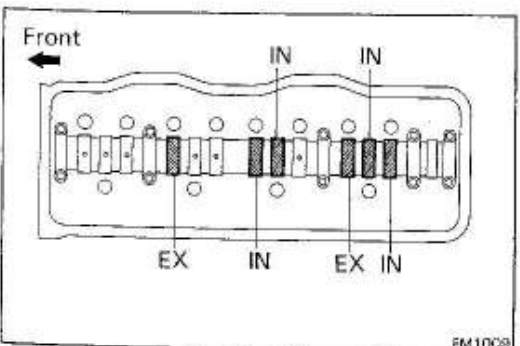
4. INSPECT AND ADJUST VALVE CLEARANCE

- (a) Measure only those valves indicated.

Valve clearance (hot): 0.20 mm (0.008 in.)



- (b) Using a feeler gauge, measure the gap between the cam and rocker arm. Loosen the lock nut and turn the adjusting screw to the specified clearance. Hold the adjusting screw in position and tighten the lock nut.
- (c) Recheck clearance. The feeler gauge should move with a very slight drag.



- (d) Turn the crankshaft one revolution and adjust the other valves.

5. INSTALL CYLINDER HEAD COVER
(See step 10 on page EM-24)
6. INSTALL AIR CLEANER COVER

Spark plug

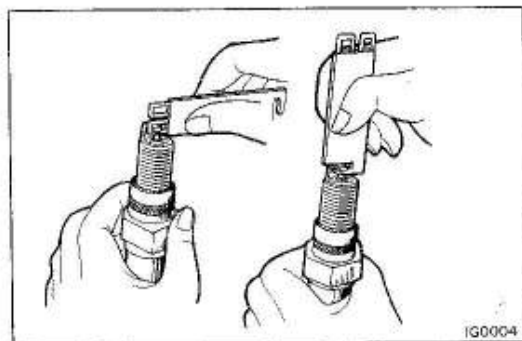
	ND	NGK
1E (EC)	W20EXR-U	BPR6EY
2E (EC)	W20EXR-U11	BPR6EY11
Others	W20EX-U	BP6EY

INSPECTION OF SPARK PLUG

1. CLEAN AND INSPECT SPARK PLUGS

- Clean the spark plugs with a spark plug cleaner or wire brush.
- Inspect the spark plugs for electrode wear, thread damage and insulator damage.

If a problem is found, replace the plugs.

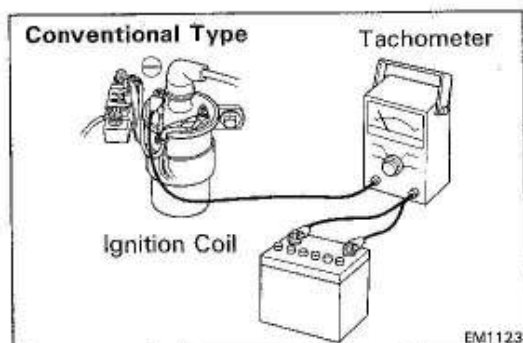


2. ADJUST ELECTRODE GAP

Carefully bend the outer electrode to obtain the correct electrode gap.

Electrode gap:

W20EXR-U	BPR6EY	0.8 mm (0.031 in.)
W20EX-U	BP6EY	0.8 mm (0.031 in.)
W20EXR-U11	BPR6EY11	1.1 mm (0.043 in.)



INSPECTION AND ADJUSTMENT OF IGNITION TIMING

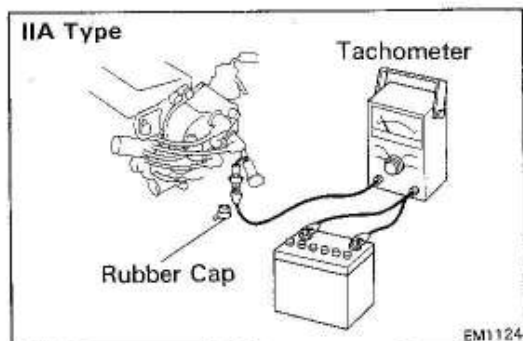
1. CONNECT TACHOMETER AND TIMING LIGHT TO ENGINE

(Conventional Type):

Connect the tachometer positive (+) terminal to the ignition coil negative (-) terminal.

(IIA Type):

Remove the rubber cap and connect the test probe of a tester to the service connector at the distributor.



CAUTION:

- NEVER allow the ignition coil terminals to touch ground as it could result in damage to the igniter and/or ignition coil.
- As some tachometers are not compatible with this ignition system, it is recommended that you consult with the manufacturer.

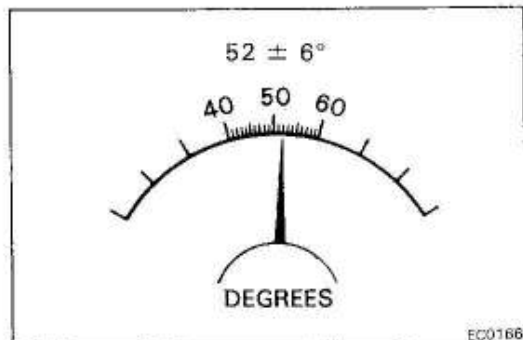
2. WARM UP ENGINE

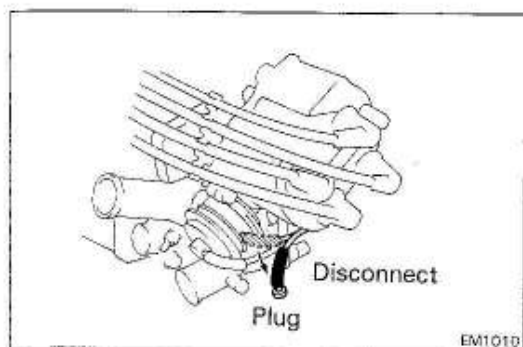
Allow the engine to reach normal operating temperature.

3. CHECK DWELL ANGLE (Conventional Type only)

Dwell angle: $52 \pm 6^\circ$

- With the engine idling make sure the dwell angle is within the specified range.
- If angle is too large, set the rubbing block gap closer. If too small, increase the gap.

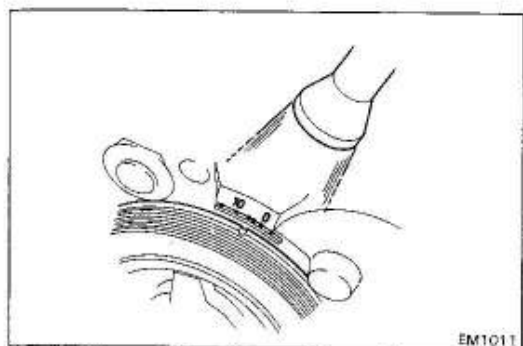




4. CHECK IGNITION TIMING

(EC)

- (a) Disconnect the vacuum hose from the distributor sub-diaphragm and plug the hose end.

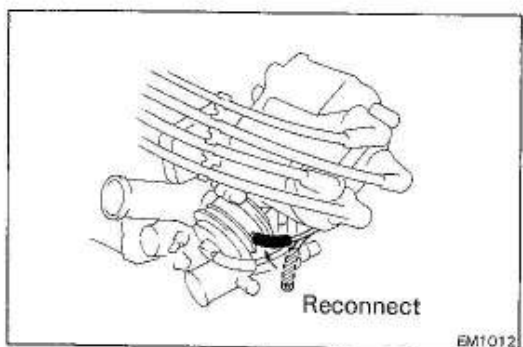


- (b) With the engine idling as specified, use a timing light to check the timing.

Ignition timing: 5° BTDC @ Max. 950 rpm

- (c) If necessary, loosen the distributor bolts and turn the distributor to align the marks. Recheck the timing after tightening the distributor.

Torque: 175 kg-cm (13 ft-lb, 17 N·m)

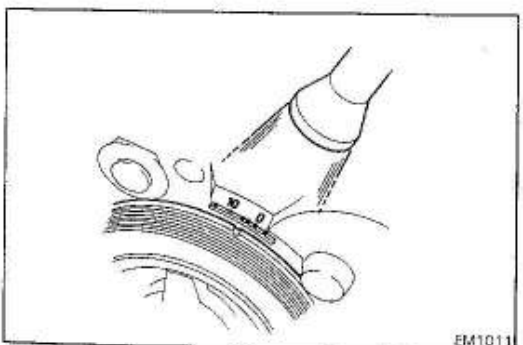


- (d) Reconnect the vacuum hose to the distributor.

- (e) Check the ignition timing.

Ignition timing: 12 – 18° BTDC

NOTE: Check the ignition timing with the electric cooling fan off.



(General)

- (a) With the engine idling as specified, use a timing light to check the timing.

**Ignition timing: 5° BTDC (85 RON version)
10° BTDC (90 RON version)**

Refer to the information label under the engine hood.

NOTE: Check the ignition timing with the electric cooling fan off.

- (b) If necessary, loosen the distributor bolt and turn the distributor to align the marks. Recheck the timing after tightening the distributor.

Torque: 175 kg-cm (13 ft-lb, 17 N·m)

CHECK AND ADJUSTMENT OF IDLE SPEED AND IDLE MIXTURE

NOTE: Check and adjust the idle speed and idle mixture with the electric cooling fan off.

1. CONNECT TACHOMETER TO ENGINE

2. WARM UP ENGINE

Allow the engine to reach normal operating temperature.

3. CHECK IDLE SPEED

Idle speed: M/T 800 rpm
A/T 850 rpm

If not as specified, adjust according to the following procedure:

CAUTION:

- Always use a CO meter when adjusting the idle mixture. It is not necessary to adjust with the idle mixture adjusting screw in most vehicles if they are in good condition.
- If a CO meter is not available and it is absolutely necessary to adjust with the idle mixture adjusting screw, use the alternative method (See page EM-10).

A. METHOD WITH CO METER

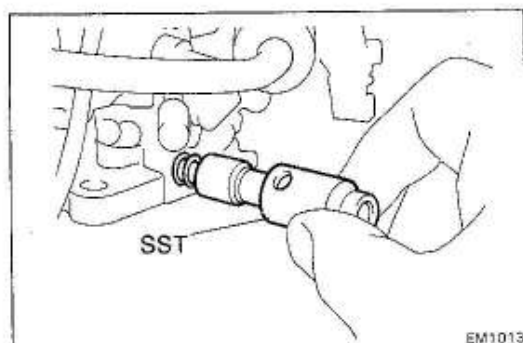
1. VISUALLY INSPECT CARBURETOR

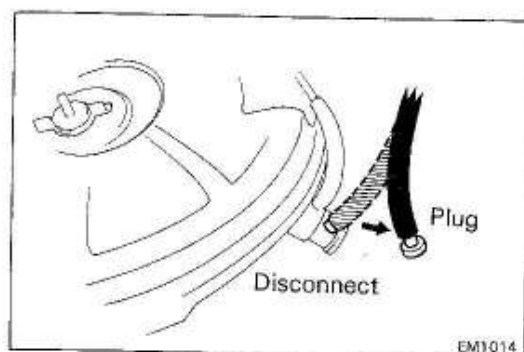
- (a) Check for loose screws or a loose mounting to the manifold.
- (b) Check for wear in the linkage, missing snap rings or excessive looseness in the throttle shaft. Correct any problems found.

2. INITIAL CONDITIONS

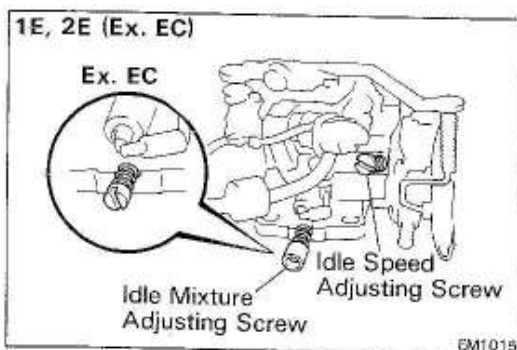
- (a) Initial conditions:
 - Air cleaner installed
 - Normal operating coolant temperature
 - Choke valve fully open (K type carburetor only)
 - All accessories switched off
 - All vacuum lines connected
 - Ignition timing set correctly
 - Transmission in N range
 - CO meter operates normally
 - Use SST if necessary

SST 09243-00020





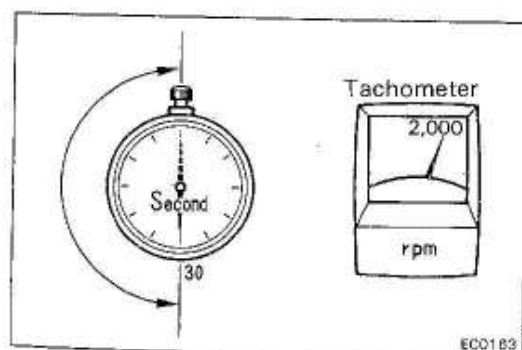
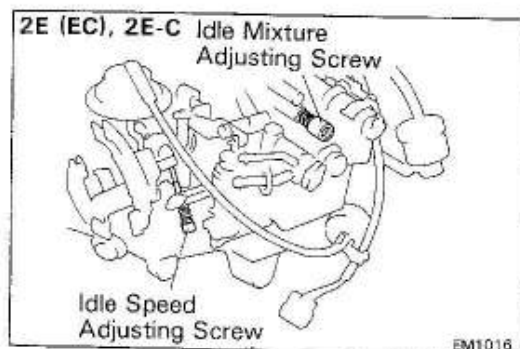
- (b) Disconnect the HIC hose and plug the hose ends.



3. ADJUST IDLE SPEED

- (a) Start the engine.
(b) Turn the idle speed adjusting screw to obtain the specified speed.

Idle speed: M/T 800 rpm
A/T 850 rpm



4. MEASURE CO CONCENTRATION

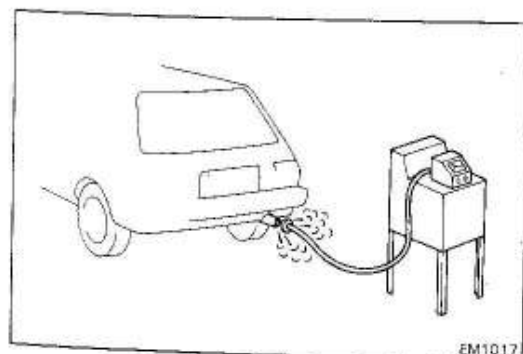
- (a) Make sure the CO meter is properly calibrated.
(b) Race the engine for 30 – 60 seconds at about 2,000 rpm before measuring the concentration.
(c) Wait about 3 minutes after racing the engine to allow the concentration to stabilize.
(d) Insert a testing probe at least 40 cm (1.3 ft) into the tailpipe, and measure the concentration with a short time.

Idle CO concentration:

1E, 2E (Ex. EC) $2.0 \pm 0.5 \%$

2E (EC), 2E-C $1.5 \pm 0.5 \%$

- If the CO concentration is within specification, this adjustment is complete.
- If the CO concentration is not within specification, turn the idle mixture adjusting screw to obtain the specified concentration value.
- If the CO concentration cannot be corrected by idle mixture adjustment, refer to the following table for other possible causes.



TROUBLESHOOTING

CO	Problems	Causes
Normal	Rough idle	1. Faulty ignition: • Incorrect timing • Fouled, shorted or improperly gapped plugs • Open or crossed ignition wires • Cracked distributor cap 2. Incorrect valve clearance 3. Leaky exhaust valves 4. Leaky cylinder
Low	Rough idle Fluctuating HC reading	1. Vacuum leak: • Vacuum hose • Intake manifold • PCV line • Carburetor base
High	Rough idle Black smoke from exhaust	1. Restricted air filter 2. Plugged PCV valve 3. Faulty carburetion: • Faulty choke action • Incorrect float setting • Leaking needle or seat • Leaking power valve

5. RECONNECT HIC HOSE

B. ALTERNATIVE METHOD

To be used only if CO meter is not available.

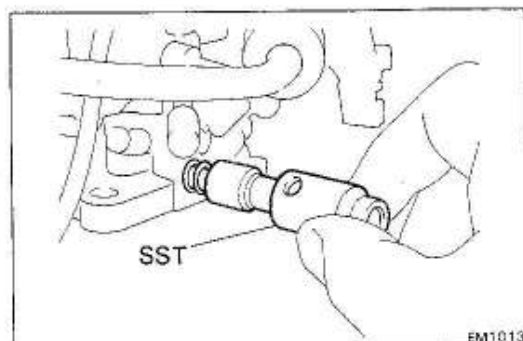
1. VISUALLY INSPECT CARBURETOR

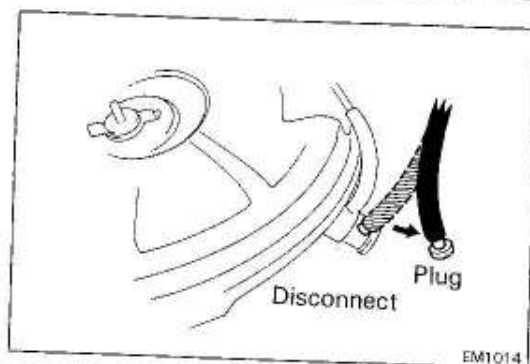
- Check for loose screws or a loose mounting to the manifold.
- Check for wear in the linkage, missing snap rings or excessive looseness in the throttle shaft. Correct any problems found.

2. INITIAL CONDITIONS

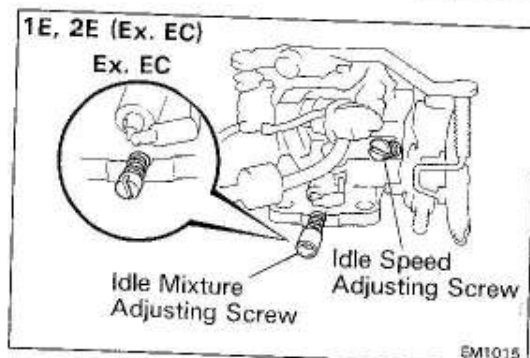
- Initial conditions:
 - Air cleaner installed
 - Normal operating coolant temperature
 - Choke valve fully open (K type carburetor only)
 - All accessories switched off
 - All vacuum lines connected
 - Ignition timing set correctly
 - Transmission in N range
 - Use SST if necessary.

SST 09243-00020





- (b) Disconnect the HIC hose and plug the hose ends.



3. ADJUST IDLE SPEED AND IDLE MIXTURE

- Start the engine.
- Set to the maximum speed by turning the IDLE MIXTURE ADJUSTING SCREW.
- Set to the idle mixture speed by turning the IDLE SPEED ADJUSTING SCREW.

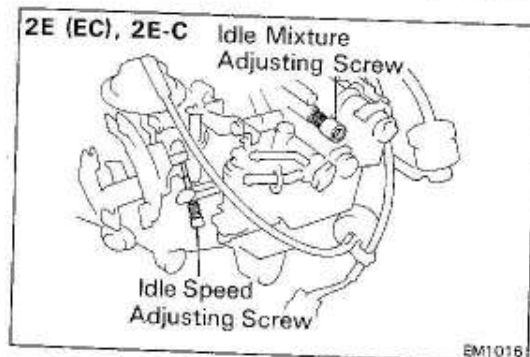
Idle mixture speed:

1E, 2E (Ex. EC)	M/T	850 rpm
	A/T	900 rpm
2E (EC), 2E-C	M/T	860 rpm
	A/T	910 rpm

- Before moving to the next step, continue adjustments (b) and (c) until the maximum speed will not rise any further no matter how much the IDLE MIXTURE ADJUSTING SCREW is adjusted.
- Set to the idle speed by screwing in the IDLE MIXTURE ADJUSTING SCREW.

Idle speed:	M/T	800 rpm
	A/T	850 rpm

- Reconnect the HIC hose.

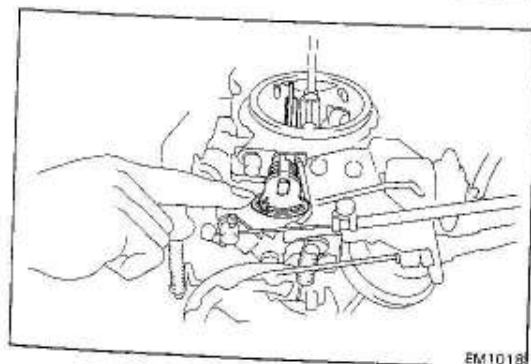
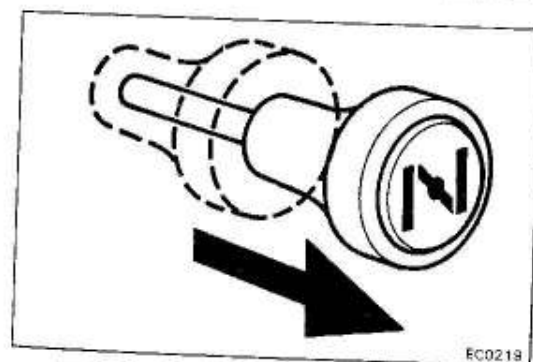


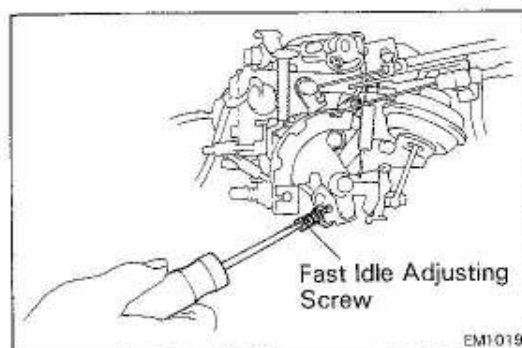
INSPECTION AND ADJUSTMENT OF FAST IDLE SPEED

1E, 2E (Ex. EC)

- WARM UP AND STOP ENGINE
- REMOVE AIR CLEANER
Plug the HIC hose.
- CONNECT TACHOMETER
- FULLY PULL OUT CHOKE KNOB
- INSPECT AND ADJUST FAST IDLE SPEED
 - Start the engine.
 - Fully open the choke valve.
 - Check the fast idle speed.

Fast idle speed:	1E	$4,800 \pm 200$ rpm
	2E	$3,400 \pm 200$ rpm





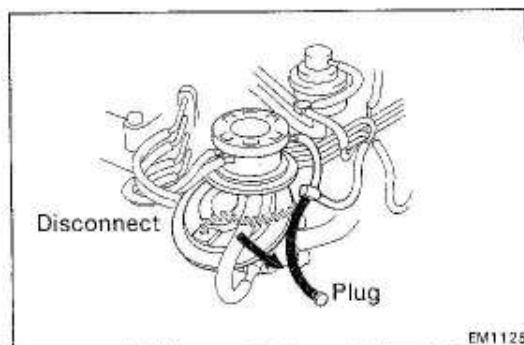
(d) Adjust the fast idle speed by turning the FAST IDLE ADJUSTING SCREW.

(e) Recheck the fast idle speed.

6. INSTALL AIR CLEANER

2E (EC), 2E-C

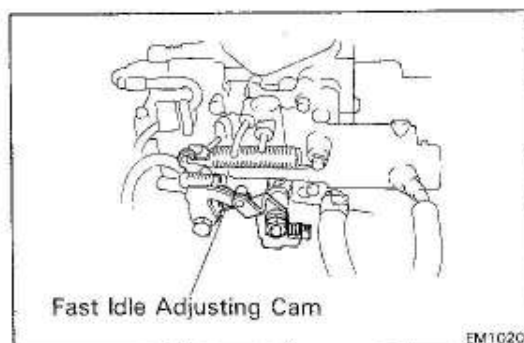
1. WARM UP AND STOP ENGINE



2. CUT OPERATION OF EGR SYSTEM (2E-C only)

Disconnect the vacuum hose from the EGR valve and plug the hose end.

3. CONNECT TACHOMETER



4. INSPECT AND ADJUST FAST IDLE SPEED

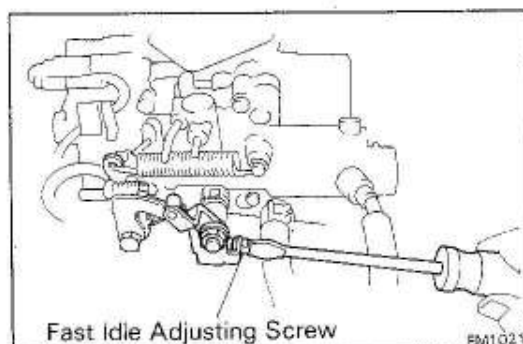
NOTE: Inspect and adjust the fast idle speed with the electric cooling fan off.

(a) Start the engine.

(b) While holding the throttle valve slightly open, set the fast idle adjusting cam, and release the throttle valve.

(c) Check the fast idle speed.

Fast idle speed: $3,600 \pm 200$ rpm



(d) Adjust the fast idle speed by turning the FAST IDLE ADJUSTING SCREW.

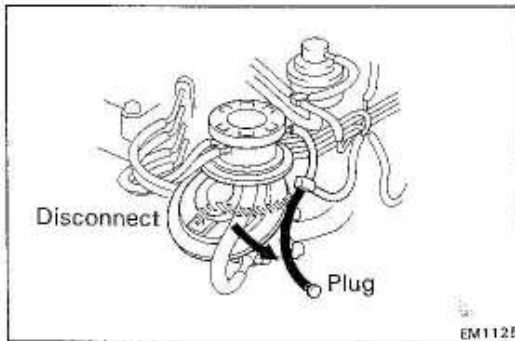
(e) Recheck the fast idle speed.

5. CONNECT EGR SYSTEM (2E-C only)

Connect the vacuum hose to the EGR valve.

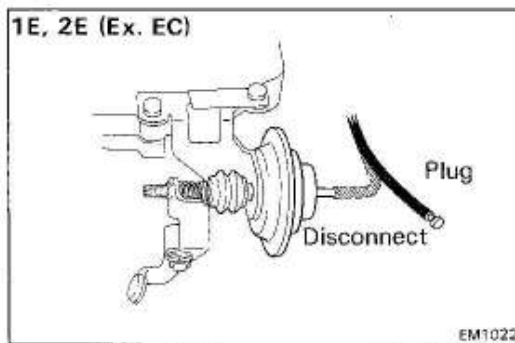
INSPECTION AND ADJUSTMENT OF DASH POT (DP) SYSTEM

1. WARM UP ENGINE
2. CHECK IDLING SPEED AND ADJUST IF NECESSARY
3. CONNECT TACHOMETER



4. CUT OPERATION OF EGR SYSTEM (2E-C only)

Disconnect the vacuum hose from the EGR valve and plug the hose end.

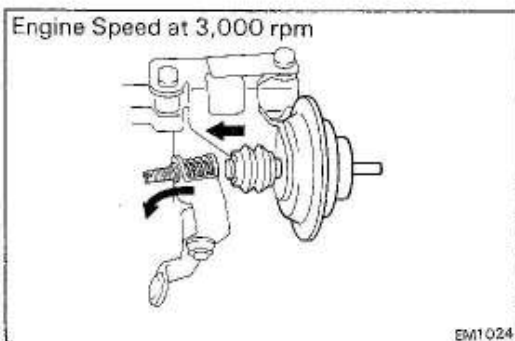


5. INSPECT AND ADJUST DASH POT SETTING SPEED

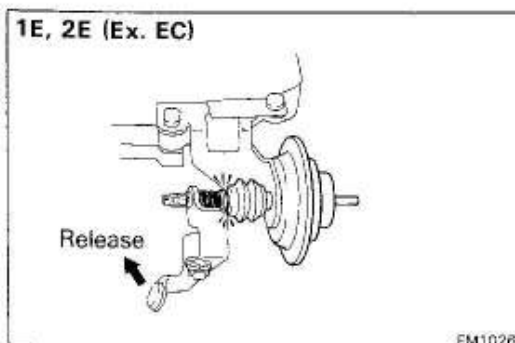
NOTE: Inspect and adjust the dash pot setting speed with the electric cooling fan off.

(1E, 2E (Ex. EC))

- (a) Disconnect the vacuum hose from the dash pot and plug the vacuum hose end.



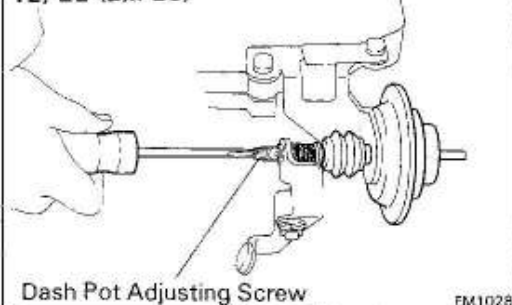
- (b) Maintain the engine speed at 3,000 rpm.



- (c) Release the throttle valve.
- (d) Check the dash pot setting speed.

DP setting speed: 2,000 ± 200 rpm

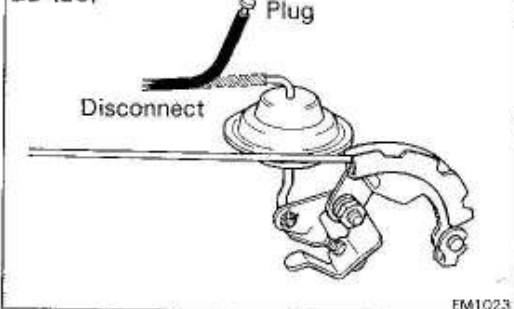
1E, 2E (Ex. EC)



If not at specified speed, adjust with the dash pot adjusting screw.

(e) Reconnect the vacuum hose to the dash pot.

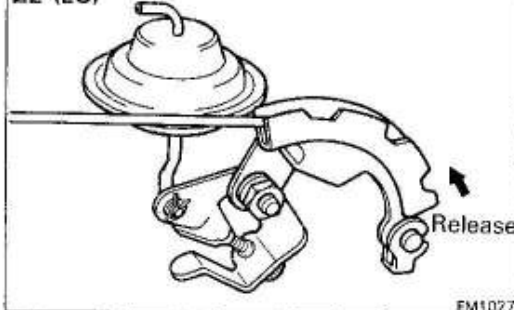
2E (EC)



(2E (EC), 2E-C)

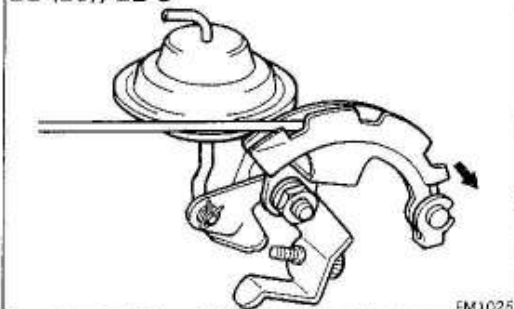
(a) Disconnect the vacuum hose from the dash pot and plug the vacuum hose end.

2E (EC)



(b) Maintain the engine speed at 3,000 rpm.

2E (EC), 2E-C



(c) Release the throttle valve.

(d) Check the dash pot setting speed.

DP setting speed: 2,000 ± 200 rpm

2E (EC)



If not at specified speed, adjust with dash pot adjusting screw.

(e) Reconnect the vacuum hose to the dash pot.

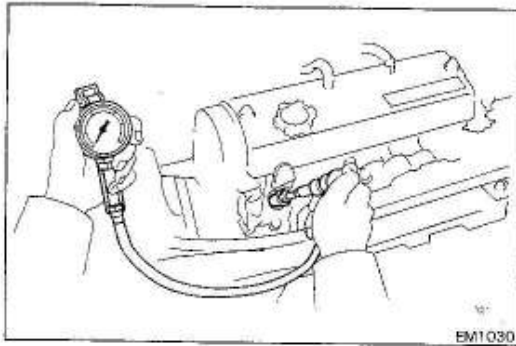
6. CONNECT EGR SYSTEM (2E-C only)

Connect the vacuum hose to the EGR valve.

COMPRESSION CHECK

NOTE: If there is lack of power, excessive oil consumption or poor fuel mileage after engine tune up, measure the cylinder compression pressure.

1. **WARM UP ENGINE**
2. **REMOVE FOUR SPARK PLUGS**
3. **DISCONNECT DISTRIBUTOR CONNECTOR**
4. **MEASURE CYLINDER COMPRESSION PRESSURE**



- (a) Insert a compression gauge into the spark plug hole.
- (b) Fully open the throttle.
- (c) While cranking the engine, measure the compression pressure.

NOTE: Always use a fully charged battery to insure that at least 250 rpm can be attained.

- (d) Repeat steps (a) through (c) for each cylinder.

Compression pressure:

2E (EC), 2E-C 13.0 kg/cm² (184 psi, 1270 kPa)
Others 12.0 kg/cm² (171 psi, 1180 kPa)

Minimum pressure:

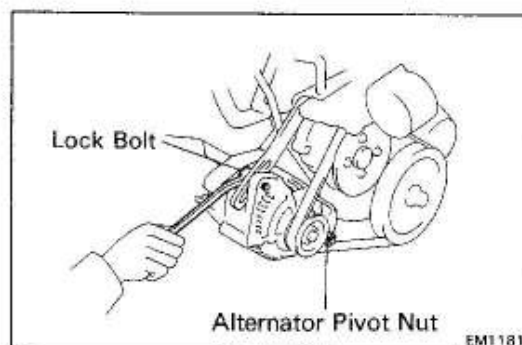
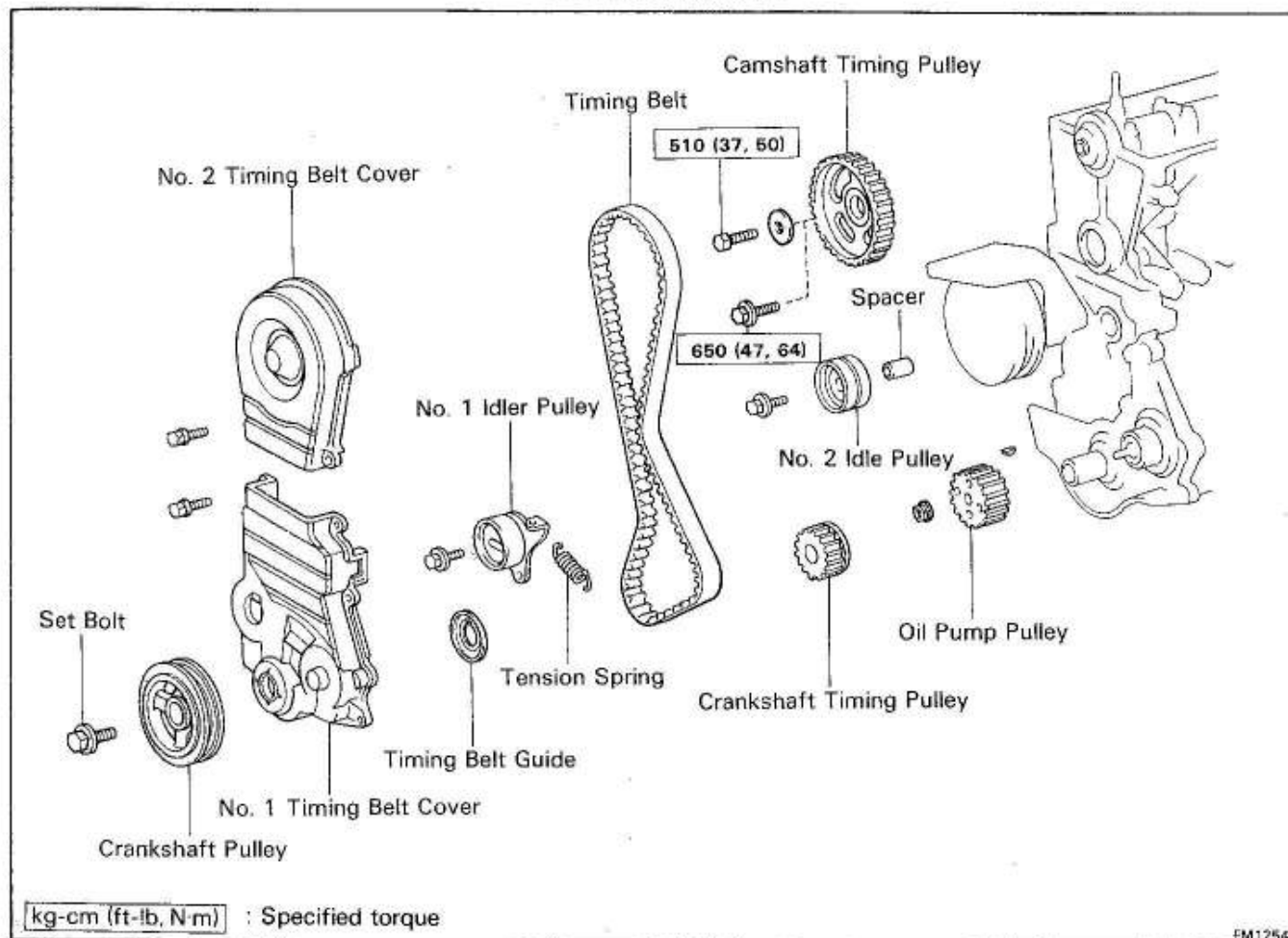
10.0 kg/cm² (142 psi, 981 kPa)

Difference between each cylinder:

Less than 1.0 kg/cm² (14 psi, 98 kPa)

- (e) If compression of one or more cylinder is low, pour a small amount of engine oil into that cylinder through the spark plug hole and repeat steps (a) through (c) for the cylinder with low compression.
 - If adding oil helps the compression, chances are that the piston rings and/or cylinder bore are worn or damaged.
 - If pressure remains low, a valve may be sticking or seated improperly, or there may be leakage past the gasket surface.

TIMING BELT COMPONENTS

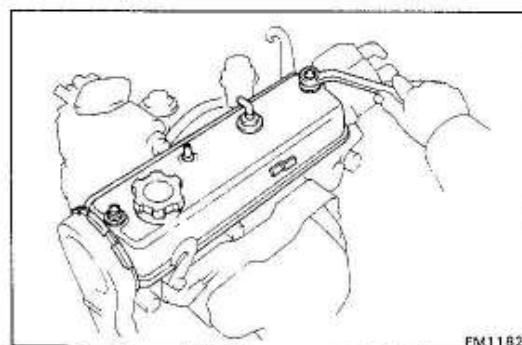


REMOVAL OF TIMING BELT

1. IF VEHICLE HAS AIR CONDITIONING, REMOVE DRIVE BELT

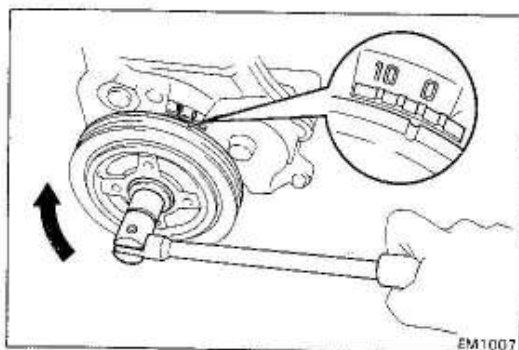
2. REMOVE ALTERNATOR DRIVE BELT

Loosen the alternator pivot nut, lock bolt and remove the alternator drive belt.



3. REMOVE CYLINDER HEAD COVER

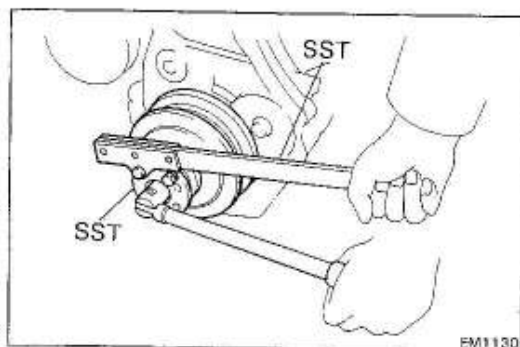
- (a) Disconnect the PCV hose from PCV valve.
- (b) Remove the two nuts and cylinder head cover with gasket.



4. SET NO. 1 CYLINDER TO TDC/COMPRESSION

Turn the crankshaft pulley and align its groove with the "0" mark on the No. 1 timing belt cover.

NOTE: Check that the rocker arms on the No. 1 cylinder are loose. If not, turn the crankshaft pulley one complete revolution.



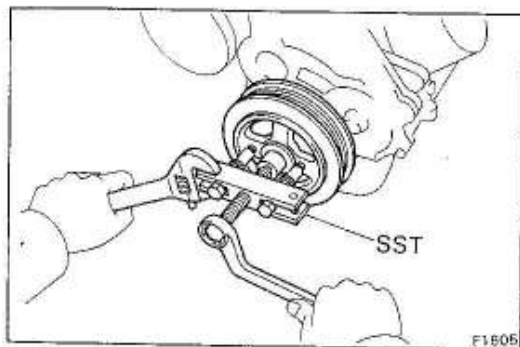
5. REMOVE CRANKSHAFT PULLEY

(a) Install the SST to the crankshaft pulley.

SST 09213-14010

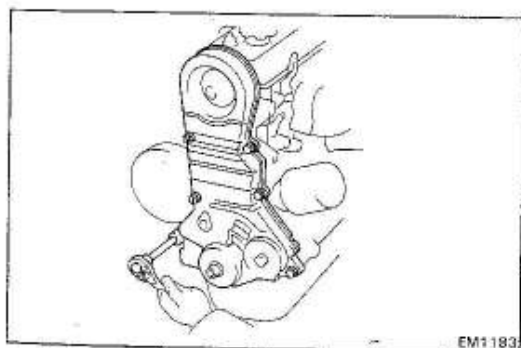
(b) Using SST to hold the crankshaft pulley, remove the pulley bolt.

SST 09330-00020



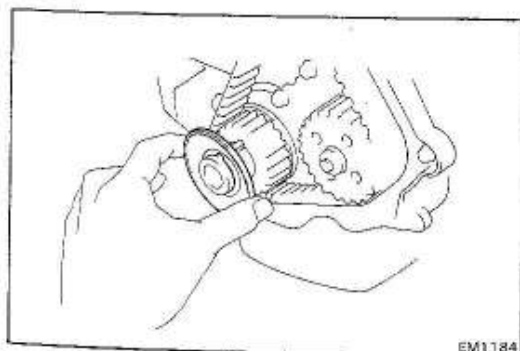
(c) Using SST, remove the pulley.

SST 09213-31021

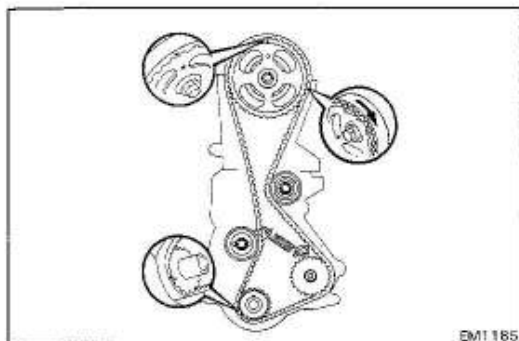


6. REMOVE TIMING BELT COVERS

Remove the six bolts and the No. 1 and No. 2 timing belt covers.



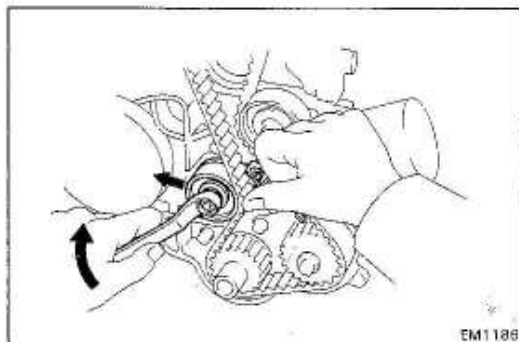
7. REMOVE TIMING BELT GUIDE



8. REMOVE TIMING BELT AND NO. 1 IDLER PULLEY

CAUTION: Do NOT turn the camshaft or crankshaft while the timing belt is removed as this will desynchronize the timing of the piston head with the subintake valve.

NOTE: If reusing the timing belt, draw a direction arrow on the belt (in direction of engine revolution), and place matchmarks on the pulleys and belt as shown in the figure.



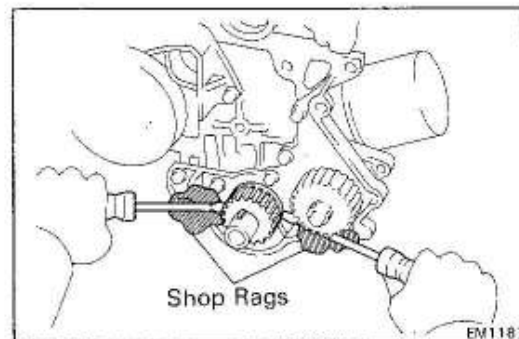
- (a) Loosen the idler pulley bolt and push it left as far as it will go and then temporarily tighten it.
- (b) Remove the belt.
- (c) Remove the idler pulley bolt, pulley and tension spring.

9. REMOVE NO. 2 IDLER PULLEY

10. REMOVE CRANKSHAFT TIMING PULLEY

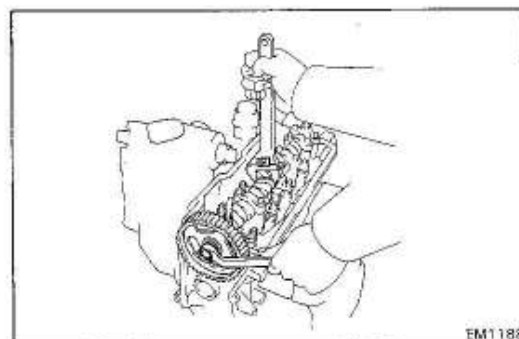
If the timing pulley cannot be removed by hand, use two screwdrivers.

NOTE: Position shop rags as shown to prevent damage.



11. REMOVE CAMSHAFT TIMING PULLEY

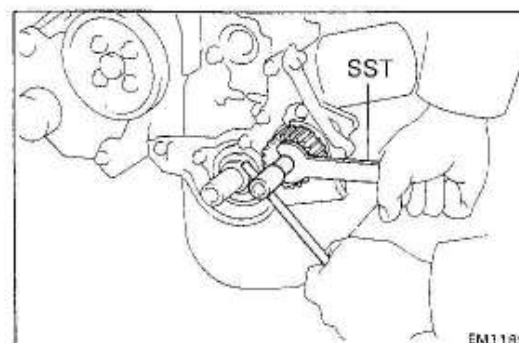
Hold the camshaft with the wrench, and remove the pulley set bolt and timing pulley.

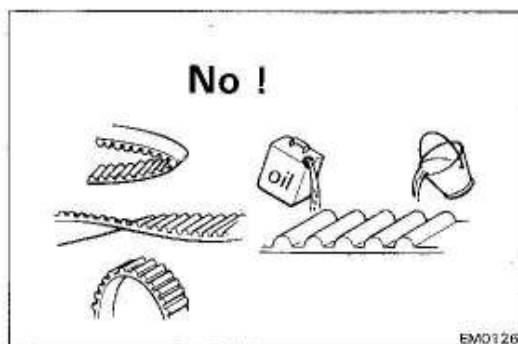


12. REMOVE OIL PUMP PULLEY

Using SST to hold the pulley, remove the pulley nut and pulley.

SST 09612-24012





INSPECTION OF COMPONENTS

1. INSPECT TIMING BELT

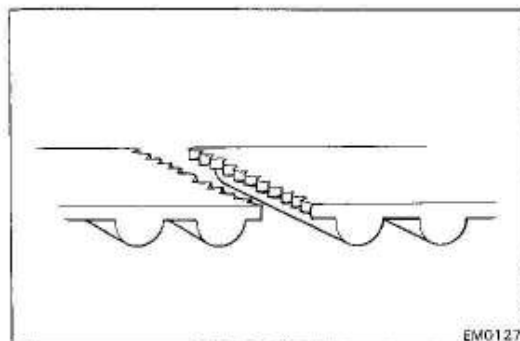
CAUTION:

- Do not bend, twist or turn the belt inside out.
- Do not allow the belt to come into contact with oil, water or steam.
- Do not utilize belt tension when installing or removing the set bolt of the camshaft timing pulley.

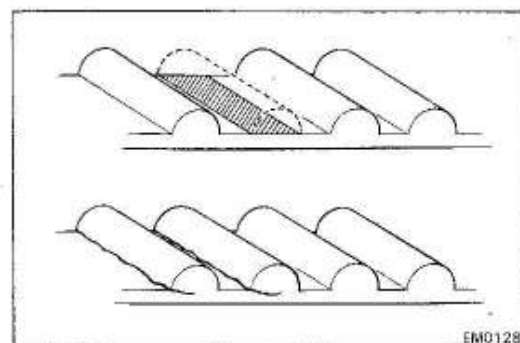
If there are defects as shown in the figures, check the following points and replace the timing belt if necessary.

(a) Premature severance

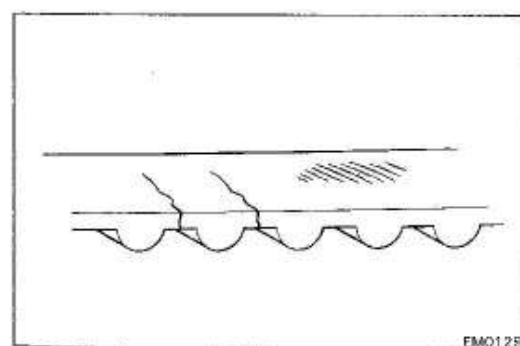
- Check for proper installation.



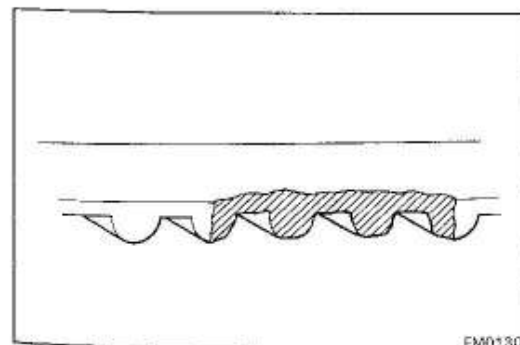
(b) If the belt teeth are cracked or damaged, check to see if the camshaft or oil pump is locked.

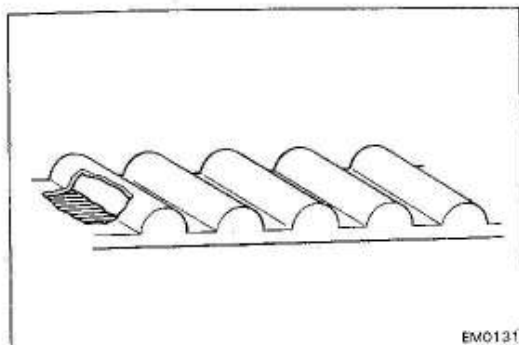


(c) If there is noticeable wear or cracks on the belt face, check to see if there are nicks on one side of the idler pulley lock.

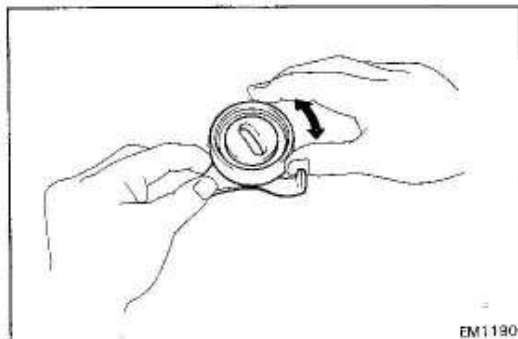


(d) If there is wear or damage on only one side of the belt, check the belt guide and the alignment of each pulley.





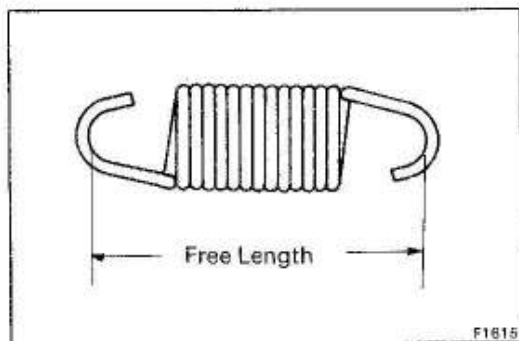
- (e) If there is noticeable wear on the belt teeth, check the timing cover for damage. Check for foreign materials on the pulley teeth.



2. INSPECT NO. 1 IDLER PULLEY

Check the turning smoothness of the timing belt idler pulleys.

If necessary, replace the idler pulley.



3. INSPECT TENSION SPRING

- (a) Check the free length of the spring.

Free length: 38.4 mm (1.512 in.)

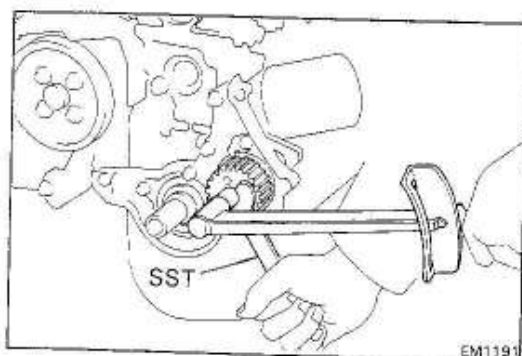
- (b) Check the tension of the spring at the specified installed length.

Installed tension:

1E 4.71 kg (10.4 lb, 46 N) at 50.2 mm (1.976 in.)

2E 5.11 kg (11.3 lb, 50 N) at 51.5 mm (2.028 in.)

If not specified, replace the spring.



INSTALLATION OF TIMING BELT

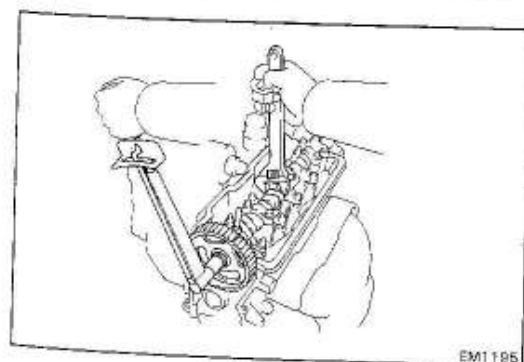
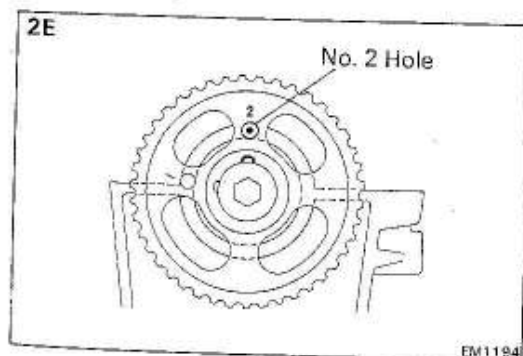
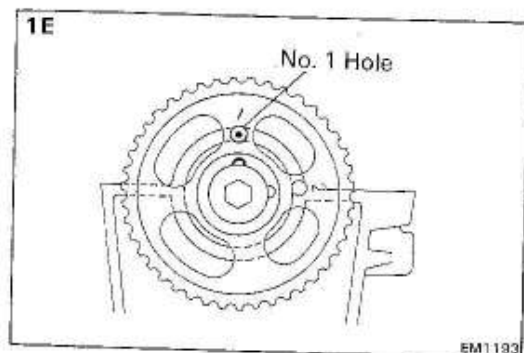
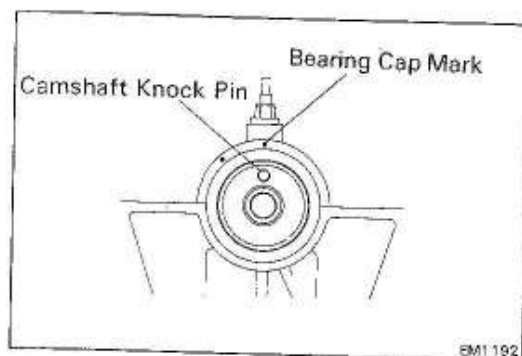
(See page EM-16)

1. INSTALL OIL PUMP PULLEY

Using SST to hold the pulley, tighten the nut.

SST 09612-24012

Torque: 270 kg-cm (20 ft-lb, 26 N·m)



2. INSTALL CAMSHAFT TIMING PULLEY

- (a) Align the camshaft knock pin with the No. 1 camshaft bearing cap mark as shown in the figure.

- (b) Align the camshaft knock pin with the camshaft timing pulley as shown in the figure.

NOTE:

- Check that the No. 1 bearing cap mark and center of the small hole on the camshaft timing pulley align.
- On 1E engine mount the timing pulley with the No. 1 hole over the bearing cap mark, on 2E engine align the No. 2 hole over the mark.

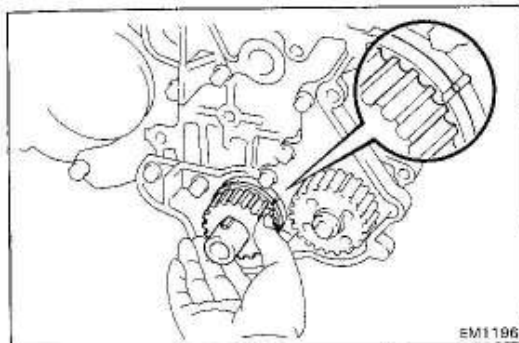
- (c) Hold the camshaft with a wrench, and tighten the pulley set bolt.

Torque:

Bolt w/o washer 510 kg-cm (37 ft-lb, 50 N·m)

Bolt w/ washer 650 kg-cm (47 ft-lb, 64 N·m)

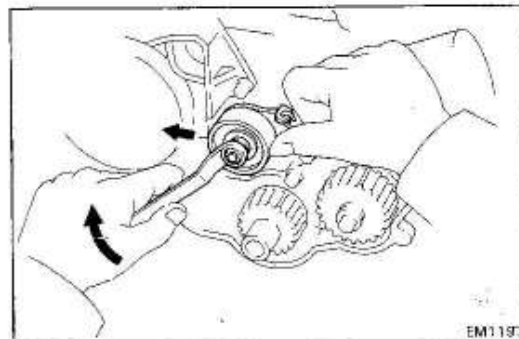
NOTE: Remove any oil or water on the camshaft timing pulley and keep it clean.



3. INSTALL CRANKSHAFT TIMING PULLEY

Install the crankshaft timing pulley and align the TDC marks on the oil pump body and crankshaft timing pulley.

NOTE: Remove any oil or water on the crankshaft timing pulley and keep it clean.



4. INSTALL TIMING BELT IDLER PULLEYS

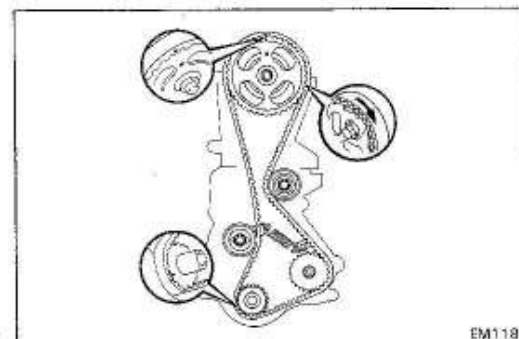
(a) Install the No. 1 idler pulley and tension spring.

(b) Pry the No. 1 idler pulley toward the left as far as it will go and temporarily tighten it.

(c) Install the No. 2 idler pulley.

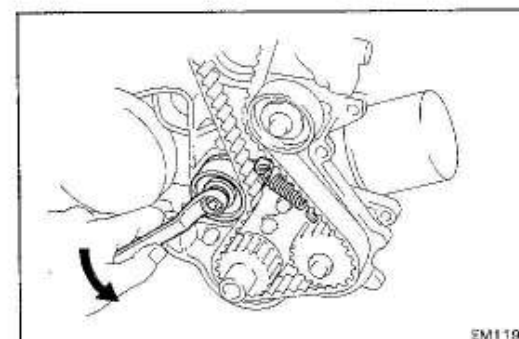
Torque: 200 kg-cm (14 ft-lb, 20 N·m)

NOTE: Remove any oil or water on the idler pulleys and keep them clean.



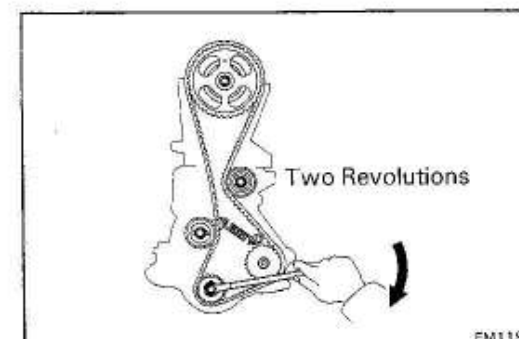
5. INSTALL TIMING BELT

NOTE: If reusing the timing belt, align the points marked during removal and install the belt with the arrow pointing in the direction of engine revolution.



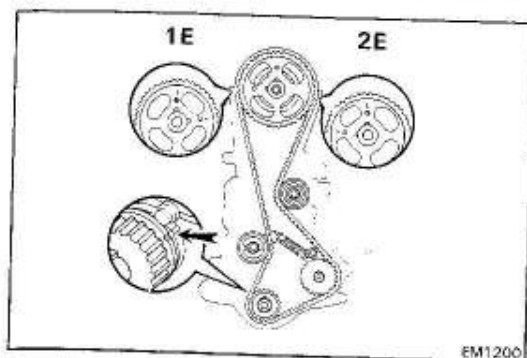
6. INSPECT VALVE TIMING AND TIMING BELT TENSION

(a) Loosen the timing belt No. 1 idler pulley set bolt.

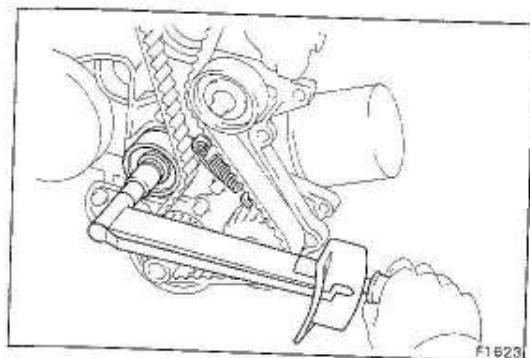


(b) Temporarily install the crankshaft pulley bolt and turn the crankshaft two revolutions from TDC to TDC.

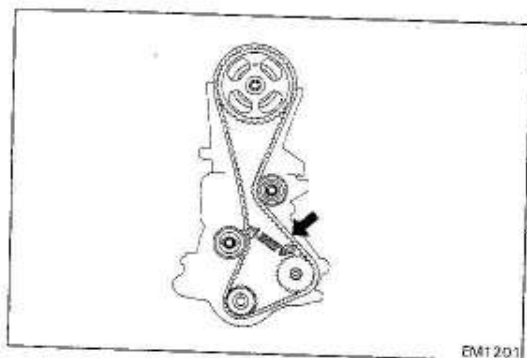
NOTE: Always turn the crankshaft clockwise.



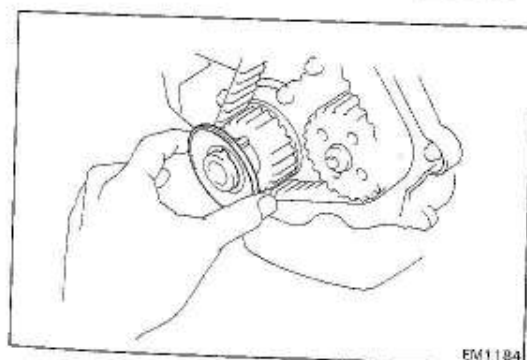
- (c) Check that each pulley aligns with the marks as shown in the figure.



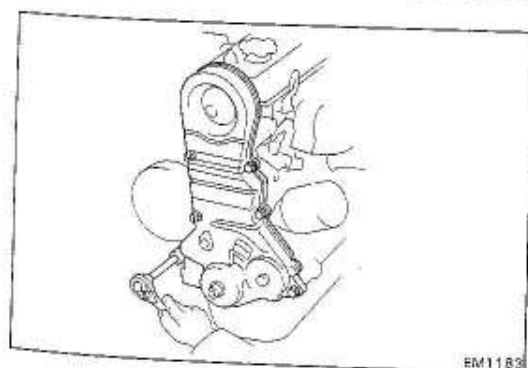
- (d) Tighten the No. 1 idler pulley set bolt.
Torque: 185 kg-cm (13 ft-lb, 18 N·m)



- (e) Make sure that there is belt tension at the position indicated in the figure.

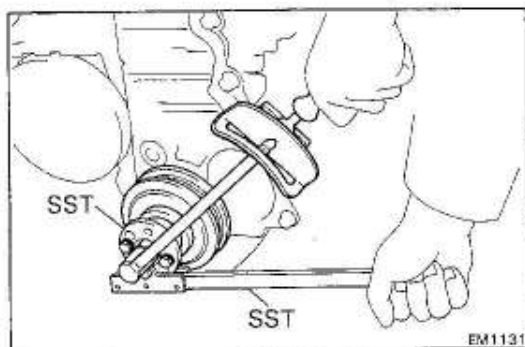


7. INSTALL TIMING BELT GUIDE



8. INSTALL TIMING BELT COVERS

Install the No. 1 and No. 2 timing belt covers with the six bolts.



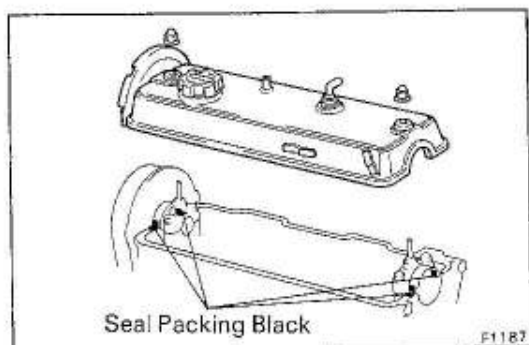
9. INSTALL CRANKSHAFT PULLEY

- (a) Align the pulley set key with the key groove of the pulley.
- (b) Install the SST to the crankshaft pulley.
SST 09213-14010
- (c) Using SST to hold the crankshaft pulley, install and torque the pulley bolt.

SST 09330-00020

Torque: 1,000 – 1,500 kg-cm
(73 – 108 ft-lb, 99 – 147 N·m)

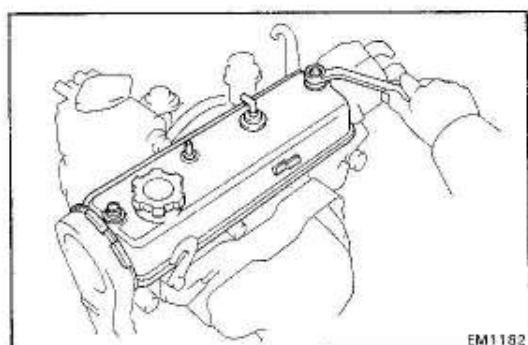
NOTE: Apply a light coating of engine oil on the bolt threads and under the bolt head before installing.



10. INSTALL CYLINDER HEAD COVER

- (a) Apply seal packing black (Part No. 08826-00080) or equivalent to the cylinder head as shown in the figure.

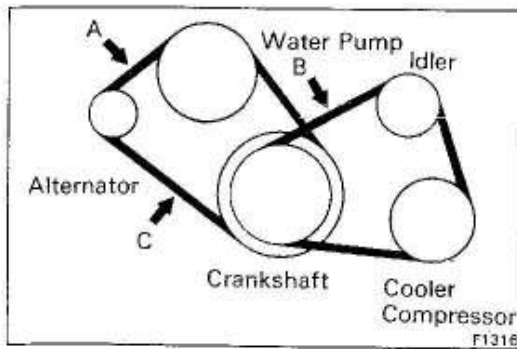
NOTE: Install the head cover as soon as the seal packing is applied.



- (b) Install the gasket and head cover with the two nuts.
- (c) Connect the PCV hose to the PCV valve.

11. INSTALL ALTERNATOR DRIVE BELT

12. IF VEHICLE HAS AIR CONDITIONING, INSTALL DRIVE BELT



13. ADJUST DRIVE BELTS

Drive belt deflection with 10 kg (22.1 lb, 98 N)

New belt	A	3.5 – 4.5 mm
		(0.138 – 0.177 in.)
B		5.5 – 7.0 mm
		(0.217 – 0.276 in.)

Used belt	A	5.0 – 6.0 mm
		(0.197 – 0.236 in.)
B		7.0 – 8.5 mm
		(0.276 – 0.335 in.)

[Reference]

Using SST, check the V-ribbed type drive belt tension.

SST A 09216-00020

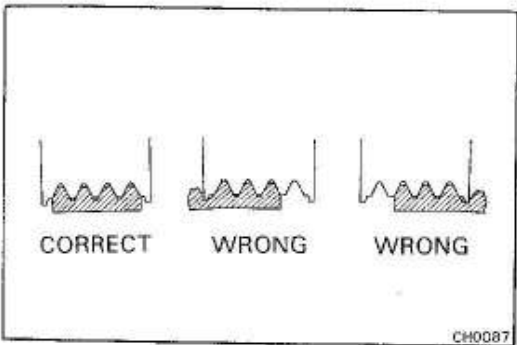
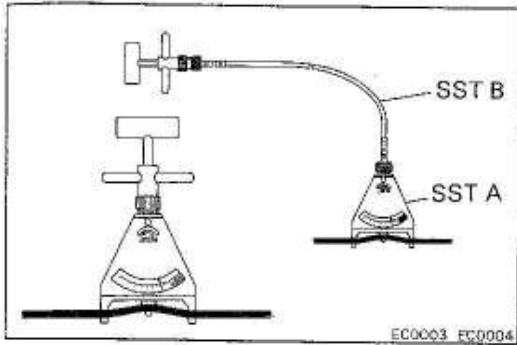
SST B 09216-00030

Drive belt tension:

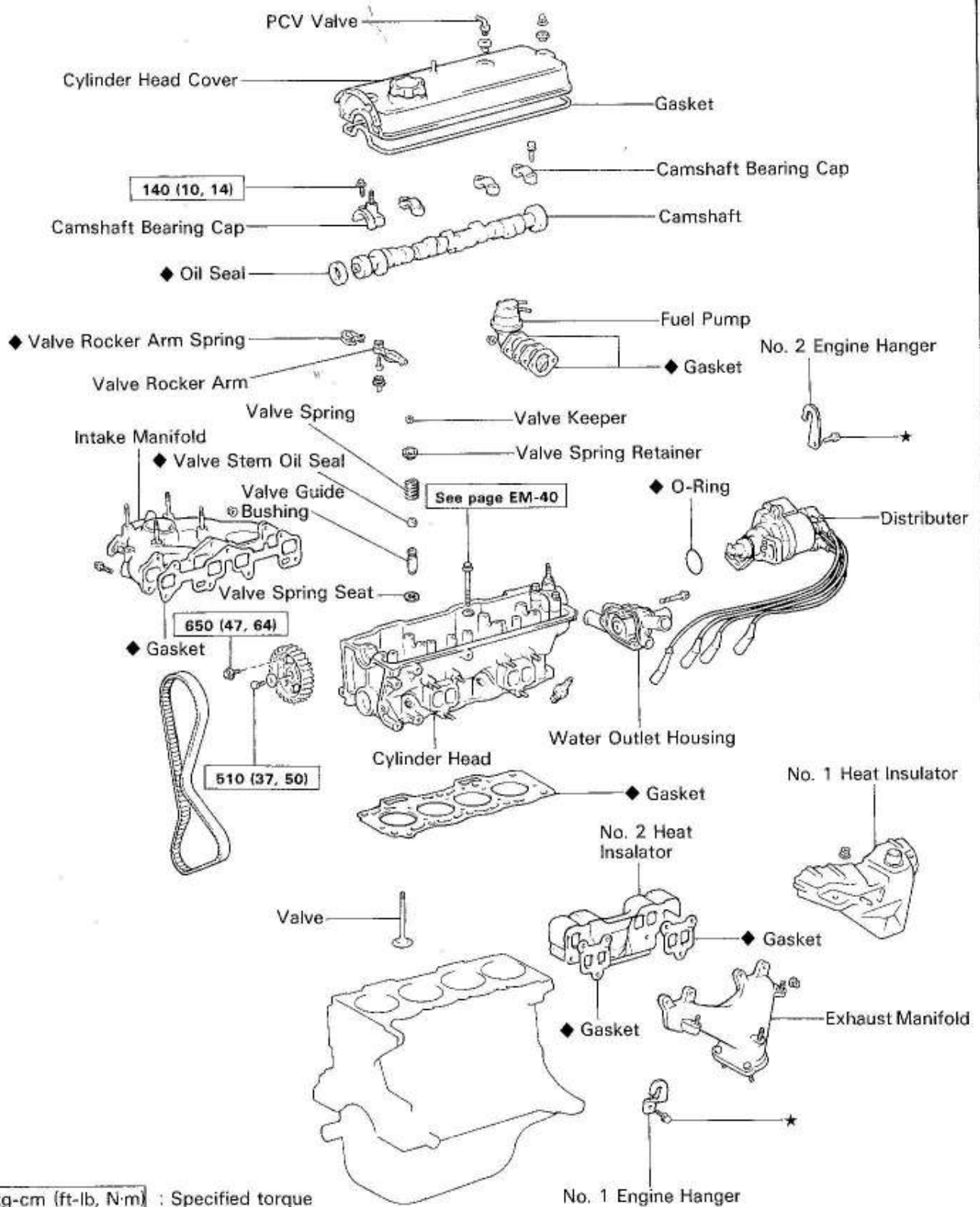
New belt	C	55 – 65 kg
		B 55 – 65 kg
Used belt	C	25 – 40 kg
		B 35 – 45 kg

NOTE

- "New belt" refers to a new belt which has never been used.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing the drive belt, check that it fits properly in the ribbed grooves.
- Check by hand to confirm that the belt has not slipped out of the groove on the bottom of the crankshaft pulley.
- After installing the belt, run the engine for about 5 minutes and then recheck the deflection.

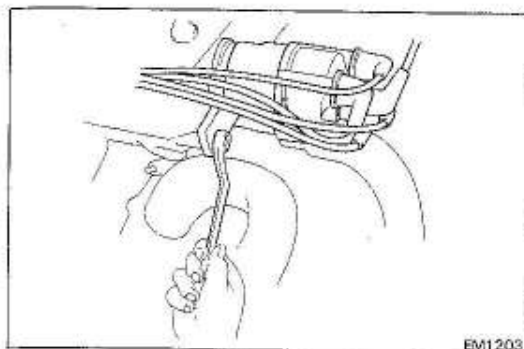


CYLINDER HEAD COMPONENTS



kg-cm (ft-lb, N·m) : Specified torque

◆ : Non-reusable part
 ★ : Precoated part



EM1203

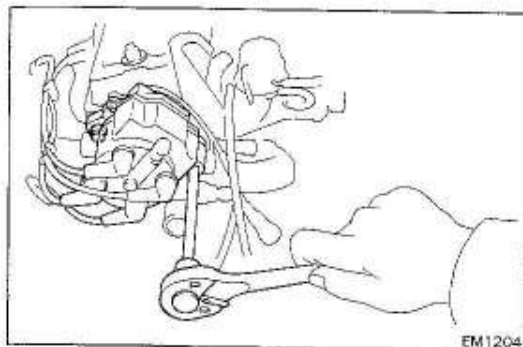
REMOVAL OF CYLINDER HEAD

(See page EM-26)

1. REMOVE DISTRIBUTOR

(Conventional Type)

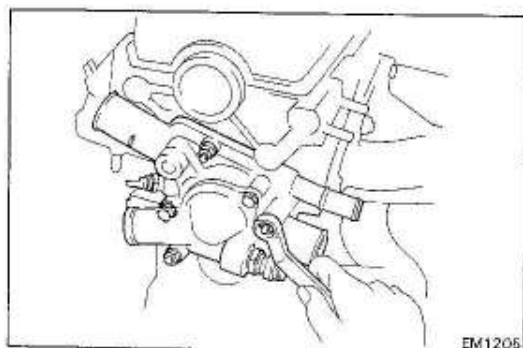
- (a) Disconnect the vacuum hoses.
- (b) Remove the distributor hold-down bolts. Remove the distributor from the cylinder head with the cap and cords attached.



EM1204

(IIA Type)

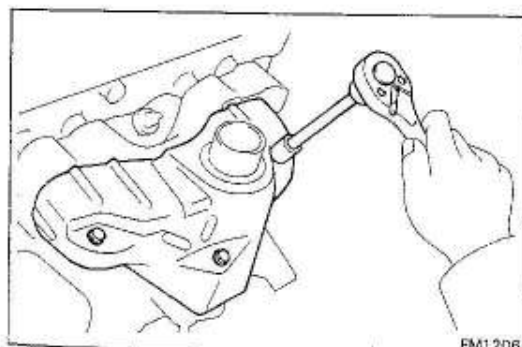
- (a) Disconnect the vacuum hoses.
- (b) Remove the two distributor hold-down bolts. Remove the distributor from the cylinder head with the cap and cords attached.



EM1205

2. REMOVE WATER OUTLET HOUSING

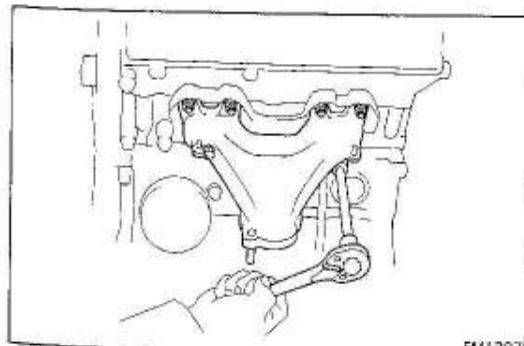
- (a) Disconnect the water hose.
- (b) Remove the bolt, two nuts and water outlet housing from the cylinder head.



EM1206

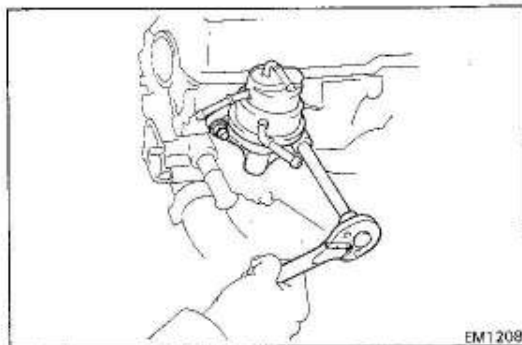
3. REMOVE EXHAUST MANIFOLD

- (a) Remove the three bolts and No. 1 heat insulator.
- (b) Remove the six nuts, exhaust manifold, two gaskets and No. 2 heat insulator.

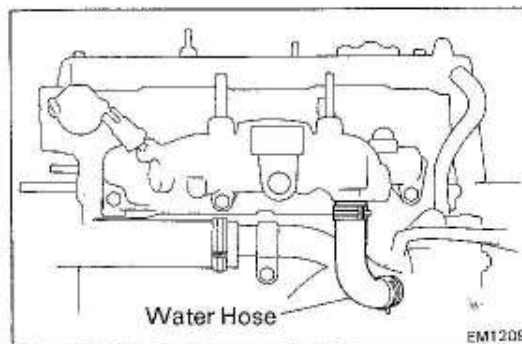


EM1207

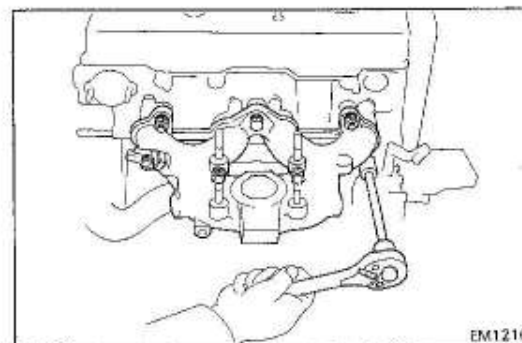
4. REMOVE FOUR SPARK PLUGS

**5. REMOVE FUEL PUMP**

- (a) Disconnect the fuel hoses.
- (b) Remove the two nuts, fuel pump and insulator with the two gaskets.

6. REMOVE CARBURETOR ASSEMBLY
(See page FU-8)**7. REMOVE VACUUM PIPES (EC only)****8. REMOVE INTAKE MANIFOLD**

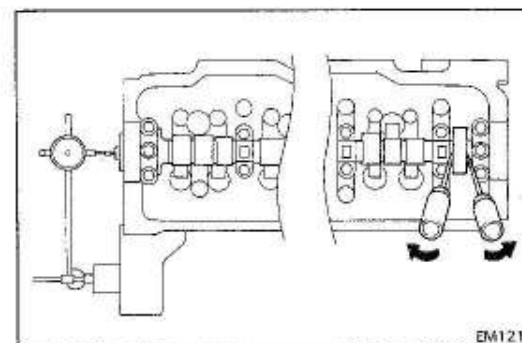
- (a) Disconnect the water hose from the manifold.



- (b) Remove the five bolts, two nuts and manifold with the gasket.

9. REMOVE TIMING BELT AND CAMSHAFT TIMING PULLEY

(See steps 1 to 8 and 11 on pages EM-16 to 18)

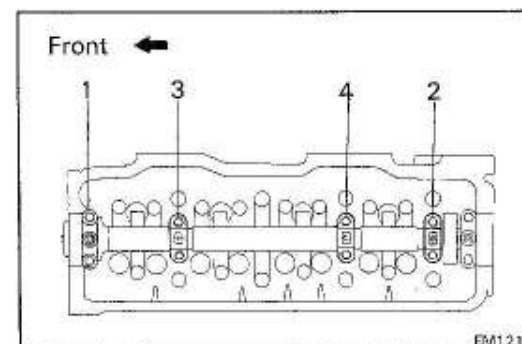
**10. MEASURE CAMSHAFT THRUST CLEARANCE**

Using a dial gauge, measure the thrust clearance while moving the camshaft back and forth.

Standard thrust clearance: 0.08 – 0.18 mm
(0.0031 – 0.0071 in.)

Maximum thrust clearance: 0.25 mm (0.0098 in.)

If clearance is greater than the maximum, replace the head and/or camshaft.

**11. REMOVE BEARING CAPS AND CAMSHAFT**

- (a) Loosen each bearing cap bolts a little at a time and in the sequence shown in the figure.
- (b) Remove the camshaft, oil seal and camshaft bearing caps.