INTRODUCTION IN
ENGINE EG
IGNITION SYSTEM IG
STARTING SYSTEM ST
CHARGING SYSTEM CH

HOW TO USE THIS MANUAL

INDEX

IN00F-01

An INDEX is provided on the first page of each section to guide you to the item to be repaired. To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page.

IN

GENERAL DESCRIPTION

IN00G-01

At the beginning of each section, a General Description (Precautions) is given that pertains to all repair operations contained in that section.
Read these precautions before starting any repair task.

TROUBLESHOOTING

IN00H-01

TROUBLESHOOTING tables are included for each system to help you diagnose the problem and find the cause.

PREPARATION

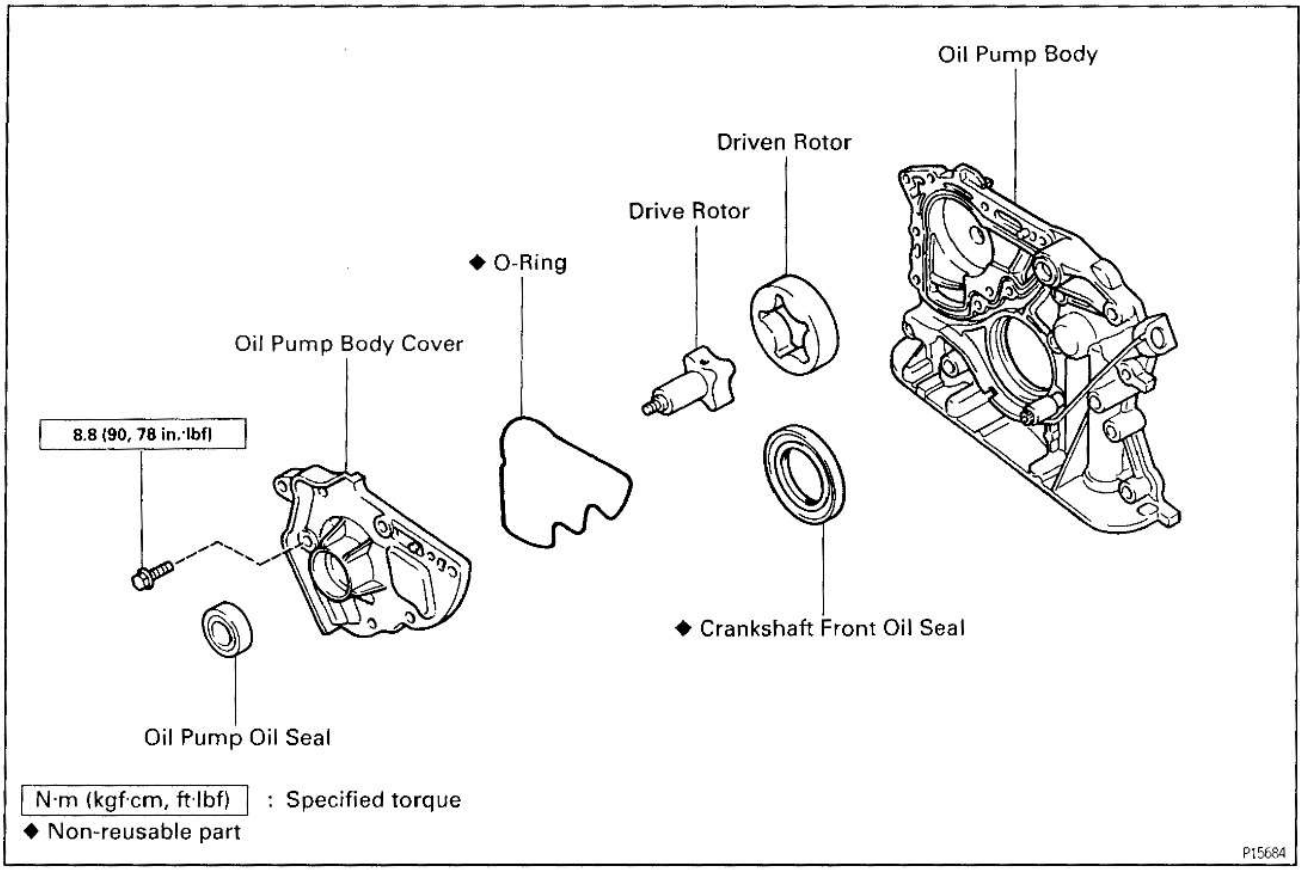
IN00J-01

Preparation lists the SST (Special Service Tools), recommended tools, equipment, lubricant and SSM (Special Service Materials) which should be prepared before beginning the operation and explains the purpose of each one.

REPAIR PROCEDURES

IN00K-06

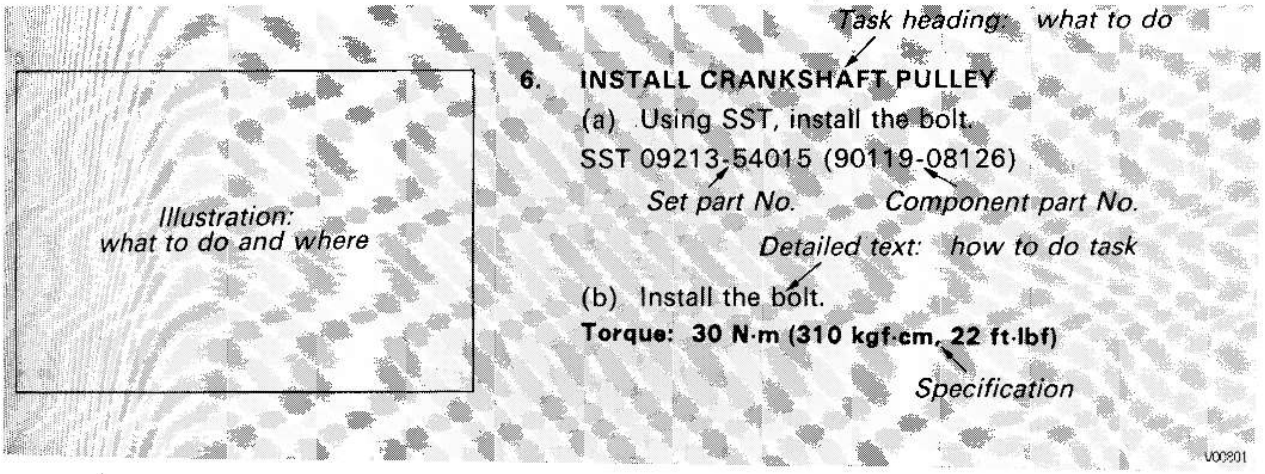
Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.
Example:



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.

Exapmle:



This format provides the experienced technician with a FAST TRACK to the information needed. The upper case task heading can be read at a glance when necessary, and the text below it provides detailed information. Important specifications and warnings always stand out in bold type.

REFERENCES

IN00L–01

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

SPECIFICATIONS

IN00M–01

Specifications are presented in bold type throughout the text where needed. You never have to leave the procedure to look up your specifications. They are also found at the end of each section, for quick reference.

CAUTIONS, NOTICES, HINTS:

IN00M–02

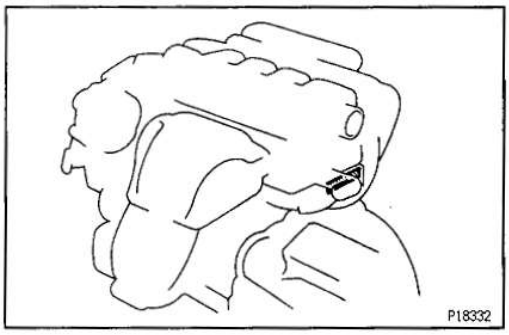
- CAUTIONS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- HINTS are separated from the text but do not appear in bold. They provide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

IN

SI UNIT

IN00P–03

The UNIT given in this manual are primarily expressed with the SI UNIT (International System of Unit), and alternately expressed in the metric system and in the yard/pound system.
Example:
Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)

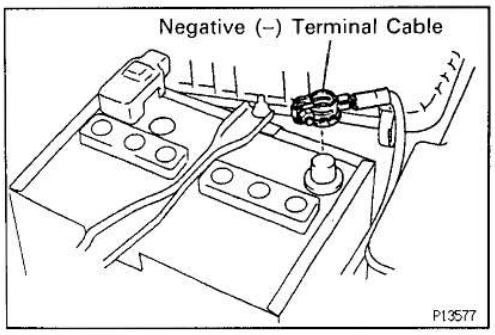


IDENTIFICATION INFORMATION

ENGINE SERIAL NUMBER

IN00Q–06

The engine serial number is stamped on the engine block as shown.



GENERAL REPAIR INSTRUCTIONS

IN04A–01

1. Use fender, seat and floor covers to keep the vehicle clean and prevent damage.
2. During disassembly, keep parts in the appropriate order to facilitate reassembly.
3. Observe the following:

(a) Before performing electrical work, disconnect the negative (–) terminal cable from the battery.

(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 other abrasive objects.

(e) Install the cable terminal to the battery post with the nut loose, and tighten the nut after installation. Do not use a hammer 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) Non–reusable parts are indicated in the component illustrations by the "◆" symbol.

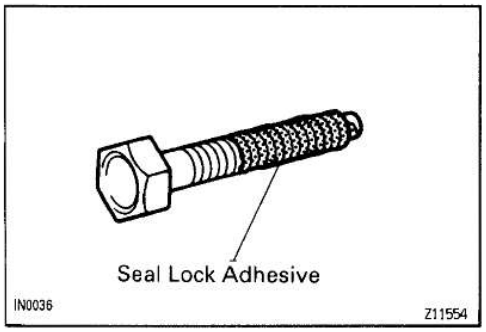
6. Precoated parts.
Precoated parts are bolts and nuts, etc. that are coated with a seal lock adhesive at the factory.

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

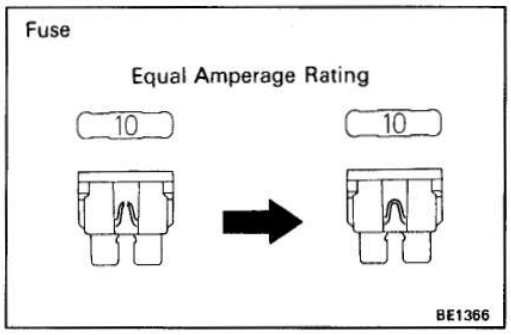
(b) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads.

(c) Precoated parts are indicated in the component illustrations by the "★" symbol.

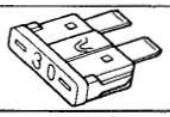
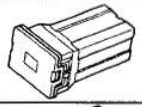
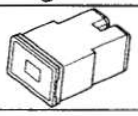
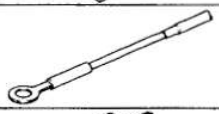
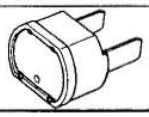
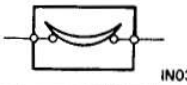
7. When necessary, use a sealer on gaskets to prevent leaks.
8. Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.



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 in the preparation part at the front of each section in this manual.



10. When replacing fuses, be sure the new fuse has the correct amperage rating . DO NOT exceed the rating or use one with a lower rating.

Illustration	Symbol	Part Name	Abbreviation
 BE5594	 IN0365	FUSE	FUSE
 BE5595	 IN0366	MEDIUM CURRENT FUSE	M-FUSE
 BE5596	 IN0367	HIGH CURRENT FUSE	H-FUSE
 BE5597	 IN0367	FUSIBLE LINK	FL
 BE5598	 IN0368	CIRCUIT BREAKER	CB

V00076

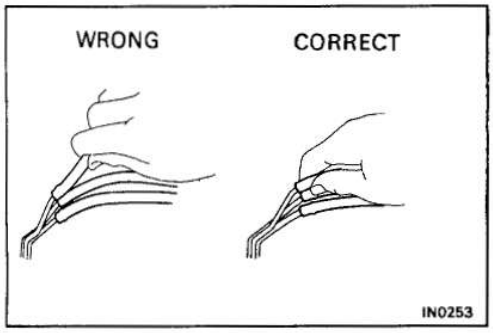
11. Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations.

(a) If the vehicle is to be jacked up only at the front or rear end, be sure to block the wheels at the opposite end 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 a vehicle raised on a jack alone, even for a small job that can be finished quickly.

12. Observe the following precautions to avoid damage to the parts:

(a) Do not open the cover or case of the ECU unless absolutely nnecessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)

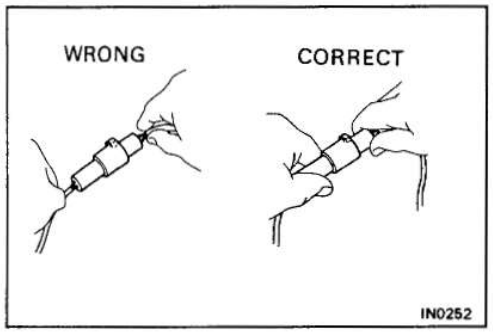


(b) To disconnect vacuum hoses, pull on the end, not the middle of the hose.

(c) To pull apart electrical connectors, pull on the connector itself, not the wires.

(d) 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.

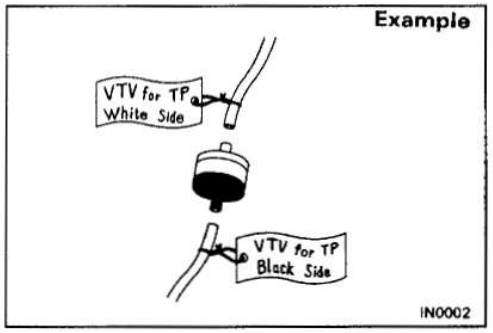
(e) When steam cleaning an engine, protect the distributor, air filter, and VCV from water.



(f) Never use an impact wrench to remove or install temperature switches or temperature sensors.

(g) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.

(h) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step–down adapter instead. Once the hose has been stretched, it may leak.



13. 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.

14. Unless otherwise stated, all resistance is measured at an ambient temperature of 20°C (68°F). Because the resistance may be outside specifications if measured at high temperatures immediately after the vehicle has been running, measurements should be made when the engine has cooled down.

PRECAUTION

FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER

IN00T-02

CAUTION: If large amounts of unburned gasoline flow into the converter, it may overheat and create a fire hazard. To prevent this, observe the following precautions and explain them to your customer.

1. **Use only unleaded gasoline.**

2. **Avoid prolonged idling.**
   Avoid running the engine at idle speed for more than 20 minutes.

3. **Avoid spark jump test.**
(a) Perform spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
(b) While testing, never race the engine.

4. **Avoid prolonged engine compression measurement.**
   Engine compression tests must be done as rapidly as possible.

5. **Do not run engine when fuel tank is nearly empty.**
   This may cause the engine to misfire and create an extra load on the converter.

6. **Avoid coasting with ignition turned off and prolonged braking.**

7. **Do not dispose of used catalyst along with parts contaminated with gasoline or oil.**

IF VEHICLE IS EQUIPPED WITH MOBILE COMMUNICATION SYSTEM

IN02R-08

For vehicles with mobile communication systems such as two—way radios and cellular telephones, observe the following precautions.
(1) Install the antenna as far as possible away from the ECU and sensors of the vehicle's electronic system.
(2) Install the antenna feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle's electronics systems. For details about ECU and sensors locations, refer to the section on the applicable component.
(3) Do not wind the antenna feeder together with the other wiring. As much as possible, also avoid running the antenna feeder parallel with other wire harnesses.
(4) Confirm that the antenna and feeder are correctly adjusted.
(5) Do not install powerful mobile communications system.

ABBREVIATIONS USED IN THIS MANUAL

IN031–05

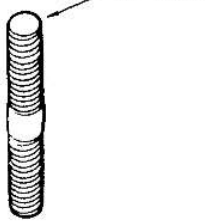
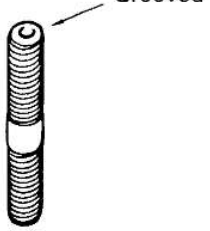
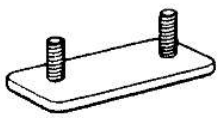
A/C	Air conditioner
ACIS	Acoustic Control Induction System
BTDC	Before Top Dead Center
BVSV	Bimetallic Vacuum Switching Valve
CB	Circuit Breaker
DOHC	Double Over Head Cam
ECU	Electronic Control Unit
EFI	Electronic Fuel Injection
ESA	Electronic Spark Advance
FIPG	Formed in Place Gasket
FL	Fusible Link
H–Fuse	High Current Fuse
IG	Ignition
ISC	Idle Speed Control
LH	Left–Hand
LHD	Left–Hand Drive
M–Fuse	Medium Current Fuse
MP	Multipurpose
O/S	Oversize
PCV	Positive Crankcase Ventilation
PS	Power Steering
RH	Right–Hand
RHD	Right–Hand Drive
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
SW	Switch
TDC	Top Dead Center
TEMP.	Temperature
TWC	Three–Way Catalyst
U/S	Undersize
VSV	Vacuum Switching Valve
w/	With
w/o	Without

STANDARD BOLT TORQUE SPECIFICATIONS

IN006-02

HOW TO DETERMINE BOLT STRENGTH

	Mark	Class
Hexagon head bolt	 Bolt head No. 4– 4T 5– 5T 6– 6T 7– 7T 8– 8T 9– 9T 10– 10T 11– 11T	
	 No mark	4T
Hexagon flange bolt w/ washer hexagon bolt	 No mark	4T
Hexagon head bolt	 2 protruding lines	5T
Hexagon flange bolt w/ washer hexagon bolt	 2 protruding lines	6T
Hexagon head bolt	 3 protruding lines	7T
Hexagon head bolt	 4 protruding lines	8T

	Mark	Class
Stud bolt	 No mark	4T
	 Grooved	6T
Welded bolt		4T

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N·m	kgf·cm	ft·lbf	N·m	kgf·cm	ft·lbf
4T	6	1	5	55	48 in.·lbf	6	60	52 in.·lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	–	–	–
5T	6	1	6.5	65	56 in.·lbf	7.5	75	65 in.·lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	–	–	–
6T	6	1	8	80	69 in.·lbf	9	90	78 in.·lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	–	–	–
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	–	–	–
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

V00079

–MEMO–

ENGINE

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ENGINE MECHANICAL

DESCRIPTION

EG0VX-03

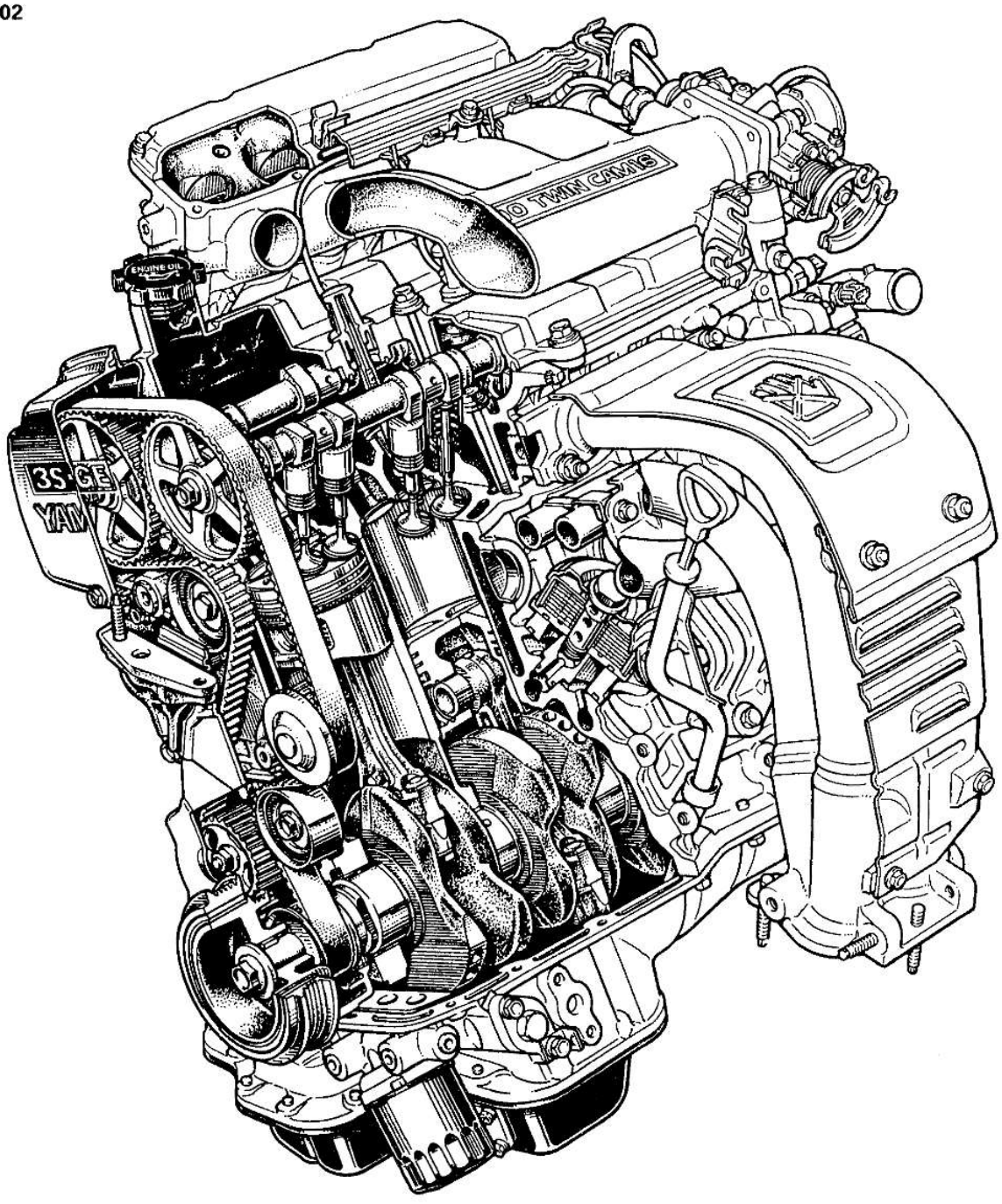
The 3S—GE engine is an in—line, 4 cylinder, 2.0 liter DOHC 16—valve engine.

OPERATION

EG

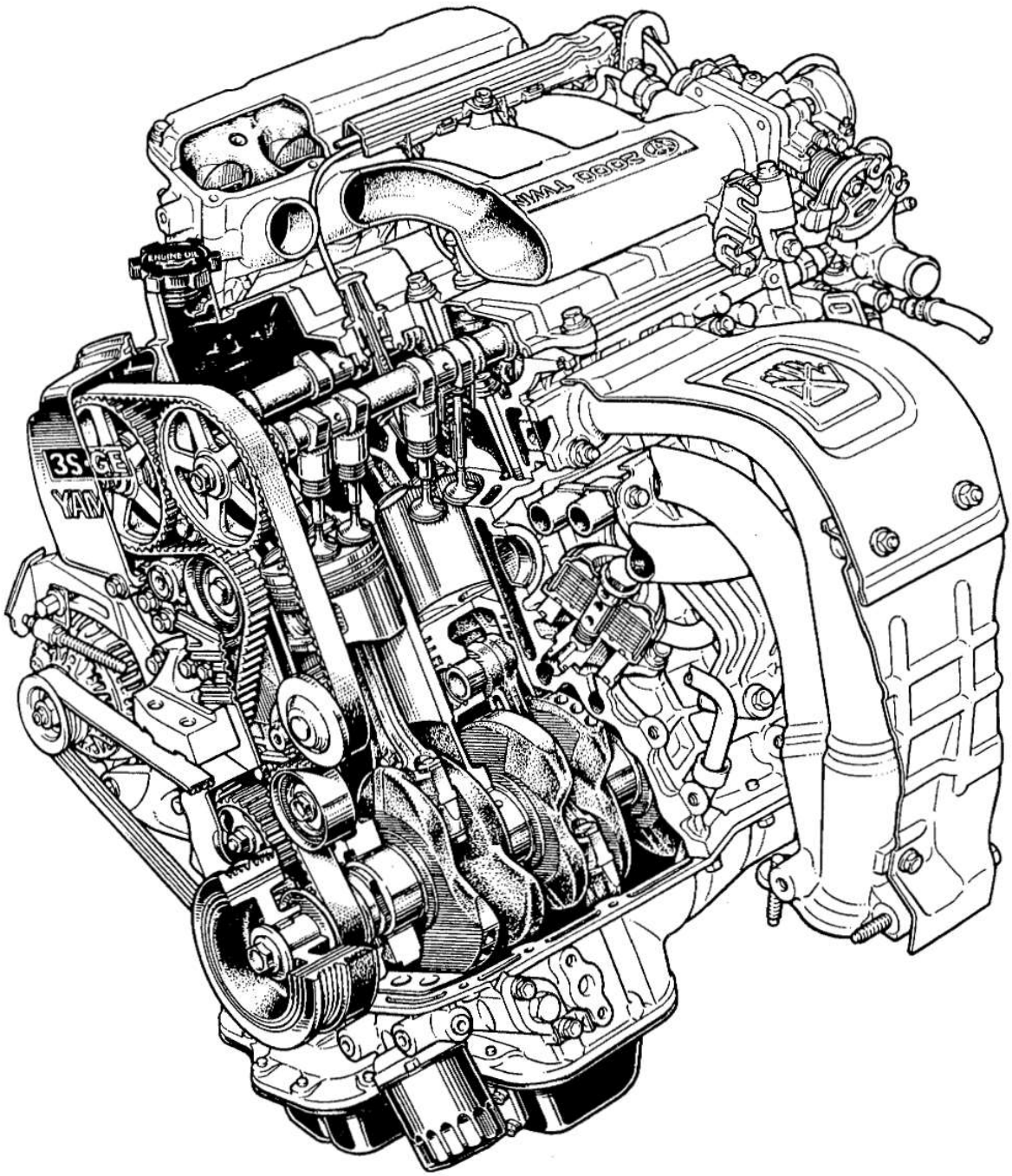
EG42T-01

ST202



P16953

SW20



The 3S–GE engine is an in–line, 4 cylinder engine with the cylinders numbered 1 – 2 – 3 – 4 from the front. The crankshaft is supported by 5 bearings inside the crankcase. These bearings are made of aluminum alloy.

The crankshaft is integrated with 8 weights for balance. Oil holes are placed in the center of the crankshaft to supply oil to the connecting rods, bearing, pistons and other components.

The ignition order is 1 – 3 – 4 – 2. The cylinder head is made of of aluminum alloy, with a cross flow type intake and exhaust layout and with pent–roof type combustion chambers. The spark plugs are located in the center of the combustion chambers.

The intake manifold has 4 independent long ports and utilizes the inertial supercharging effect to improve engine torque at low and medium speeds.

Both the intake camshaft and the exhaust camshaft are driven by a single timing belt. The cam journal is supported at 5 places between the valve lifters of each cylinder and on the front end of the cylinder head. Lubrication of the cam journals and cams is accomplished by oil being supplied through the oiler port in the center of the camshaft.

Adjustment of the valve clearance is done by means of an inner shim type system, in which valve adjusting shims are located below the valve lifters. To replace the shims, the camshafts must be removed.

Pistons are made of high temperature–resistant aluminum alloy, and a depression is built into the piston head to prevent interference with the valves.

Piston pins are the full–floating type, with the pins fastened to neither the piston boss nor the connecting rods. Instead, snap rings are fitted on both ends of the pins, preventing the pins from falling out.

The No.1 compression ring is made of stainless steel and the No.2 compression ring is made of cast iron. The oil ring is made of stainless steel. The outer diameter of each piston ring is slightly larger than the diameter of the piston and the flexibility of the rings allows them to hug the cylinder walls when they are mounted on the piston. Compression rings No.1 and No.2 work to prevent gas leakage from the cylinder and the oil ring works to scrape oil off the cylinder walls to prevent it from entering the combustion chambers.

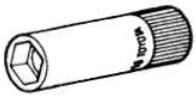
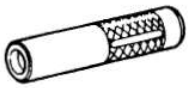
The cast iron cylinder block has 4 cylinders which are approximately twice the length of the piston stroke. The top of each cylinder is closed off by the cylinder head and the lower end of the cylinders becomes crankcase, in which the crankshaft is installed. In addition, the cylinder contains a water jacket, through which coolant is pumped to cool the cylinders.

The No.1 and No.2 oil pans are bolted onto the bottom the cylinder block. The No.1 oil pan is made of alumimum alloy. The No.2 oil pan is an oil reservoir made of pressed sheet steel. The dividing plate also prevents the oil from shifting away from the oil pump suction pipe when the vehicle is stopped suddenly.

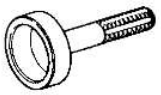
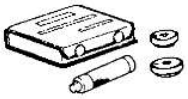
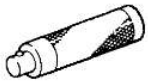
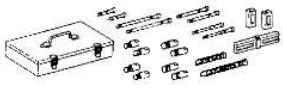
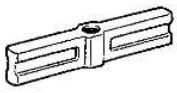
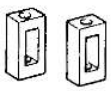
PREPARATION

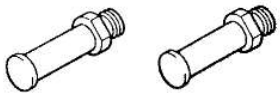
SST (SPECIAL SERVICE TOOLS)

EGGAY-10

	09043–38100	Hexagon 10 mm Wrench	Cylinder head bolt
	09155–16100	Spark Plug Wrench	
	09201–41020	Valve Stem Oil Seal Replacer	
	09201–10000	Valve Guide Bushing Remover & Replacer Set	
	(09201–01060)	Valve Guide Bushing Remover & Replacer 6	
	09202–70010	Valve Spring Compressor	
	09213–54015	Crankshaft Pulley Holding Tool	
	(90119–08216)	Bolt	ST202
	(91651–60855)	Bolt	SW20
	09216–00021	Belt Tension Gauge	
	09216–00030	Belt Tension Gauge Cable	
	09222–30010	Connecting Rod Bushing Remover & Replacer	
	09223–46011	Crankshaft Front Oil Seal Replacer	Camshaft oil seal

EG

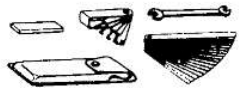
	09223–63010	Crankshaft Rear Oil Seal Replacer	
	09249–63010	Torque Wrench Adaptor	
	09226–10010	Crankshaft Front & Rear Bearing Replacer	
	09330–00021	Companion Flange Holding Tool	Crankshaft pulley
	09608–30022	Front Hub Bearing Replacer Set	
	(09608–05010)	Handle	Valve guide bushing
	09816–30010	Oil Pressure Switch Socket	Knock sensor
	09843–18020	Diagnosis Check Wire	
	09950–50010	Puller C Set	
	(09951–05010)	Hanger 150	Crankshaft pulley
	(09952–05010)	Slide Arm	Crankshaft pulley
	(09953–05010)	Center Bolt 100	Crankshaft pulley
	(09953–05020)	Center Bolt 150	Crankshaft pulley
	(09954–05020)	Claw No.2	Crankshaft pulley

	09960–10010 Variable Pin Wrench Set	
	(09962–01000) Variable Pin Wrench Arm Assy	Camshaft timing pulley Oil pump pulley
	(09963–01000) Pin 10	Camshaft timing pulley
	(09963–00500) Pin 5	Oil pump pulley

EG

RECOMMENDED TOOLS

EG0AZ–0N

	09200–00010 Engine Adjust Kit	
	09904–00010 Expander Set	

EQUIPMENT

EG0B0–0G

Battery specific gravity gauge	
Caliper gauge	
CO/HC meter	
Compression gauge	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Engine tune—up tester	
Heater	
Micrometer	
Piston ring compressor	

Piston ring expander	
Plastigage	
Precision straight edge	
Soft brush	
Spring tester	Valve spring
Steel square	Valve spring
Thermometer	
Torque wrench	
Valve seat cutter	
Vernier calipers	

EG

EG12X-08

COOLANT

Item		Capacity	Classification
Engine coolant (w/ Heater)	ST202	7.0 liters (7.4 US qts, 6.2 Imp. qts)	Ethylene−glycol base
	SW20	13.7 liters (14.4 US qts, 12.1 Imp. qts)	

EG14X-0L

LUBRICANT

Item	Capacity	Classification
Engine oil		API grade SG, SH or ILSC multigrade
Dry fill	5.2 liters (5.5 US qts, 4.6 Imp. qts)	engine oil and recommended viscosity oil
Drain and refill		
w/ Oil filter change	4.5 liters (4.8 US qts, 4.0 Imp. qts)	
w/o Oil filter change	4.0 liters (4.2 US qts, 3.5 Imp. qts)	

EG081-1Q

SSM (SERVICE SPECIAL MATERIALS)

08826−00080	Seal packing or equivalent	Camshaft bearing cap Cylinder head cover Rear oil seal retainer
08833−00070	Adhesive 1324, THREE BOND 1324 or equivalent	Flywheel mounting bolt
08833−00080	Adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent	No.1 idler pulley pivot bolt Oil pressure switch

TROUBLESHOOTING

EG0BZ-0D

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

	See page	IG-5	IG-5	EG-204	EG-199	EG-198	EG-196	EG-194	EG-200	EG-284	–	EG-205 EG-217	EG-234	–	EG-238	EG-259	EG-45
	Suspect area	RPM Signal Circuit	Ignition Circuit	Oxygen Sensor Circuit	Water Temp. Sensor Circuit	Intake Air Temp. Sensor Circuit	Vacuum Sensor Circuit	Throttle Position Sensor Circuit	STA Signal Circuit	Knock Sensor Circuit	A/C Signal Circuit	Fuel Pump	Fuel Pressure Regulator	Fuel Lines	Injectors	Idle Speed Control Valve	Compression
Does not start	Engine does not crank																
	Starter runs – engine does not crank																
	No combustion	12	2				5					6				8	9
	No complete combustion				4		1						3		9	2	5
Difficult to start	Engine cranks slowly										2						
	Engine cranks normally	11	12		4	13						6	5	7	15	3	8
	Cold engine				1	5			2			7	6	8	9	4	
	Hot engine				1	4						6	5	7	8	3	
Poor idling	Incorrect first idle				2											3	
	High engine idle speed				2	4		5			6				7	3	
	Low engine idle speed				1		3								4	2	
	Rough idling		16		2		11					6	5	7	15	8	9
	Misfire		3		5		7								8		6
Poor drivability	Hesitant acceleration			11	9	10	8	7				13	12	14	17		6
	Backfire			5	2	6	4	3				8	7	9	10		
	Muffler explosion (after fire)			8	3	7	5	6					4		9		
	Surging												1		4		
	Knocking									1							
Engine stall	Soon after starting				7		6					3	2	4	8	5	
	After accelerator pedal depressed						1	2					4	5	6		
	After accelerator pedal released						2									1	
	During A/C operation										1					2	
	When shifting N to D															1	
Others	Poor fuel economy			16	12	17	14	13			15				11		8
	Engine overheat									9							
	Engine overcool																
	Excessive oil consumption																3
	Low oil pressure																
	High oil pressure																
	Starter keeps running																
	Battery often discharges																

V05445

EG

	See page	EG-18	EG-63	EG-56	EG-318	EG-92	EG-389	EG-131	EG-134	EG-91	EG-143	-	EG-325 EG-327	EG-323	CH-9	-	-
	Suspect area / Symptom	Valve Clearance	Valve Timing	Timing Belt	Water Pump	Valve Stem Guide Bushing	Oil Pump	Connecting Rod Bearing	Crankshaft Bearing	Cylinder Head	Piston Ring	Flywheel	Radiator and Radiator Cap	Thermostat	Drive Belt	Water Temp. Sender Gauge	Oil Pressure Switch
Does not start	Engine does not crank																
	Starter runs – engine does not crank											2					
	No combustion		10	11													
	No complete combustion		7	8													
Difficult to start	Engine cranks slowly							3	4								
	Engine cranks normally		10								9						
	Cold engine																
	Hot engine																
Poor idling	Incorrect first idle																
	High engine idle speed																
	Low engine idle speed																
	Rough idling	12	13	14						18	10						
	Misfire																
Poor drivability	Hesitant acceleration	15	16														
	Backfire		1														
	Muffler explosion (after fire)		2														
	Surging																
	Knocking		4		8								5	7			
Engine stall	Soon after starting																
	After accelerator pedal depressed																
	After accelerator pedal released																
	During A/C operation																
	When shifting N to D																
Others	Poor fuel economy		10								9						
	Engine overheat		7	5	6		10			11			3	4		13	
	Engine overcool													2		3	
	Excessive oil consumption					2				5	4						
	Low oil pressure						2	3	4								5
	High oil pressure						1										2
	Starter keeps running																
	Battery often discharges														1		

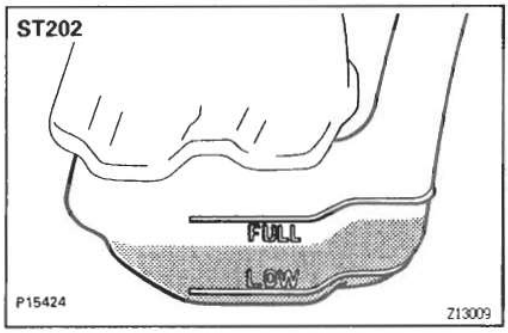
W5446

EG

	See page	CH-19	EG-138	EG-262 EG-263	EG-264	EG-293	EG-289	–	–	–	–	ST-20 ST-21	ST-9	IG-9	IG-12	–	–	EG-329
	Suspect area	Alternator	Cylinder Block	EFI Main Relay	Circuit Opening Relay	Fuel Cut System	ECU	Fuel Quality	Fuel Leakage	Coolant Leakage	Oil Leakage	Starter Relay	Starter	Spark Plug	Distributor	Accelerator Pedal Link	Brakes drag even when released	Cooling Fan System
	Symptom																	
Does not start	Engine does not crank											1	2					
	Starter runs – engine does not crank												1					
	No combustion			3	4		13	7							1			
	No complete combustion						10											
Difficult to start	Engine cranks slowly												1					
	Engine cranks normally						16	1						2	14			
	Cold engine						10	3										
	Hot engine						9	2										
Poor idling	Incorrect first idle						4									1		
	High engine idle speed						8									1		
	Low engine idle speed						5											
	Rough idling						17	1						3	4			
	Misfire						9	1						2	4			
Poor drivability	Hesitant acceleration						18	2						4	5		1	
	Backfire						11											
	Muffler explosion (after fire)					1	10											
	Surging						5							2	3			
	Knocking						9	2						3				6
Engine stall	Soon after starting						9	1										
	After accelerator pedal depressed						7							3				
	After accelerator pedal released						3											
	During A/C operation						2											
	When shifting N to D						3											
Ohters	Poor fuel economy					5	21	2	1					6	7	3	4	
	Engine overheat		12							1				8				2
	Engine overcool																	1
	Excessive oil consumption		6								1							
	Low oil pressure										1							
	High oil pressure																	
	Starter keeps running											1	2					
	Battery often discharges	2																

W5447

EG



TUNE—UP

ENGINE COOLANT INSPECTION

EG42U—01

ST202:

1. **CHECK ENGINE COOLANT LEVEL AT RADIATOR RESERVOIR**

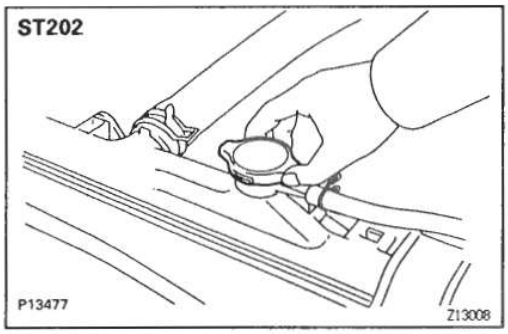
The engine coolant level should be between the "LOW" and "FULL" lines.

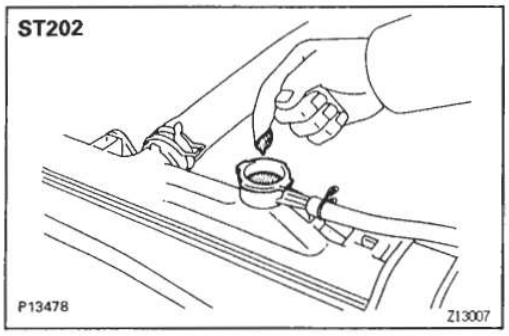
If low, check for leaks and add engine coolant up to the "FULL" line.

2. **CHECK ENGINE COOLANT QUALITY**

(a) Remove the radiator cap.

CAUTION: To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

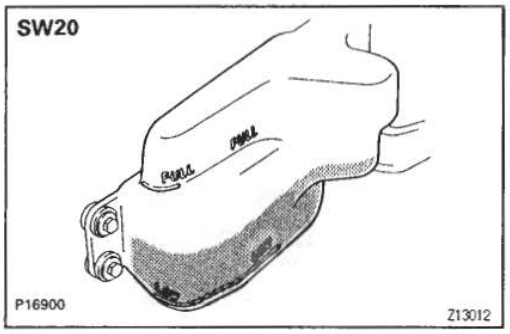




(b) There should not be any excessive deposits of rust or scale around the radiator cap or water filler hole, and the coolant should be free from oil.

If excessively dirty, replace the coolant.

(c) Reinstall the radiator cap.

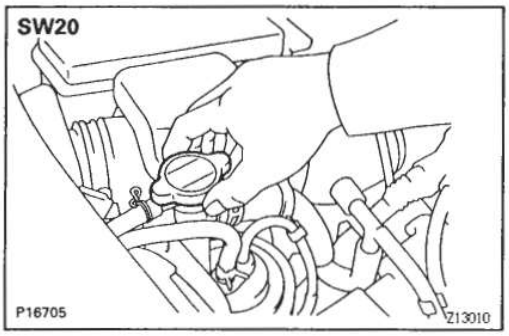


SW20:

1. **CHECK ENGINE COOLANT LEVEL AT RADIATOR RESERVOIR**

The engine coolant level should be between the "LOW" and "FULL" lines.

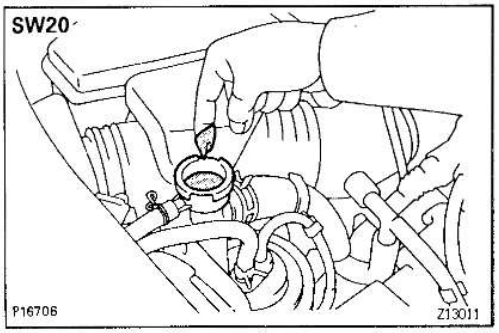
If low, check for leaks and add engine coolant up to the "FULL" line.



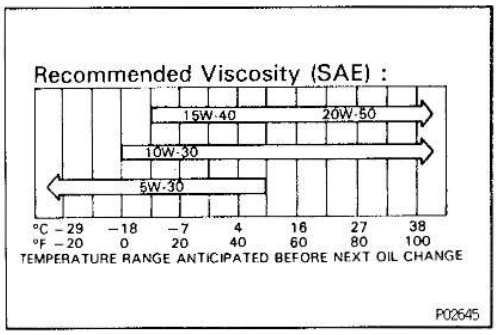
2. **CHECK ENGINE COOLANT QUALITY**

(a) Remove the water filler cap.

CAUTION: To avoid the danger of being burned, do not remove the water filler cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



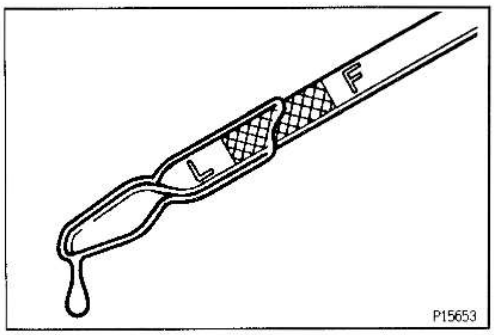
(b) There should not be any excessive deposits of rust or scale around the water filler cap or water filler hole, and the coolant should be free from oil.
If excessively dirty, replace the coolant.
(c) Reinstall the water filler cap.



ENGINE OIL INSPECTION

EG0B4-0W

1. **CHECK ENGINE OIL QUALITY**
Check the oil for deterioration, entry of water, discoloring or thinning.
If the quality is visibly poor, replace the oil.
Oil grade:
API grade SG, SH or ILSAC multigrade engine oil.
Recommended viscosity is as shown in the illustration.

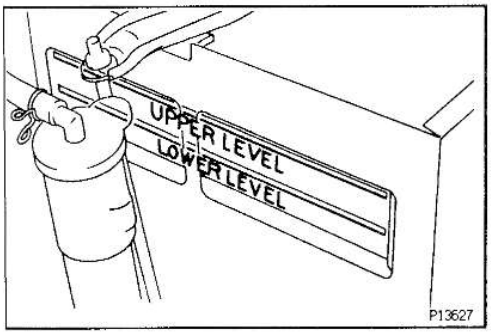


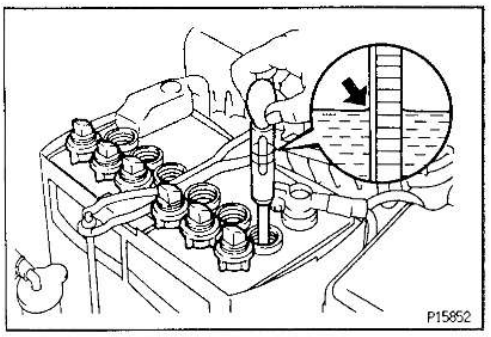
2. **CHECK ENGINE OIL LEVEL**
The oil level should be between the "L" and "F" marks on the dipstick.
If low, check for leakage and add oil up to "F" mark.

BATTERY INSPECTION

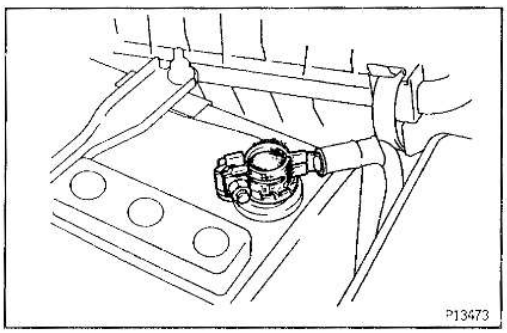
EG0B5-0B

1. **CHECK BATTERY SPECIFIC GRAVITY AND ELECTROLYTE LEVEL**
(a) Check the electrolyte quantity of each cell.
If insufficient, refill with distilled (or purified) water.





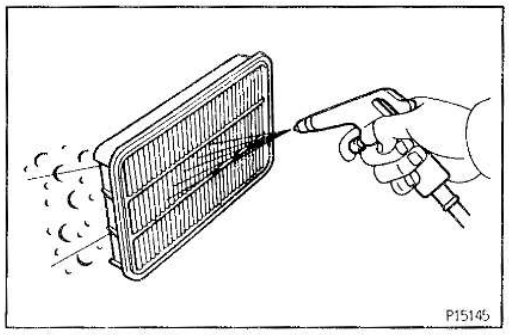
(b) Check the specific gravity of each cell.
Standard specific gravity at 20°C (68°F):
1.25 – 1.27
If the gravity is less than specification, charge the battery.



2. CHECK BATTERY TERMINALS, FUSIBLE LINK AND FUSES

(a) Check that the battery terminals are not loose or corroded.

(b) Check the fusible link and fuses for continuity.



AIR FILTER INSPECTION AND CLEANING EG42V-01

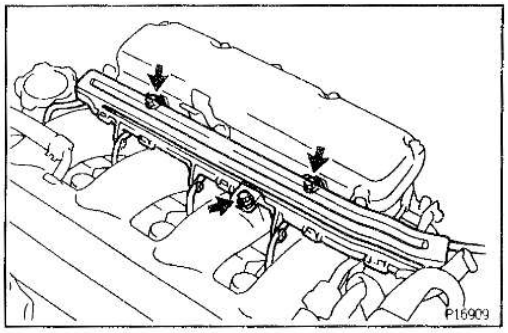
1. REMOVE AIR FILTER

2. INSPECT AND CLEAN AIR FILTER

(a) Visually check that the air filter is not damaged or excessively oily.
If necessary, replace the air filter.

(b) Clean the air filter with compressed air.
First blow from the inside thoroughly, then blow off the outside of the air filter.

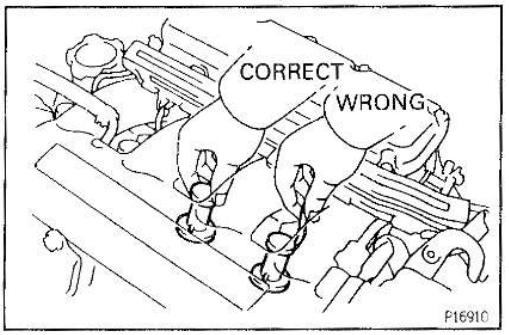
3. REINSTALL AIR FILTER



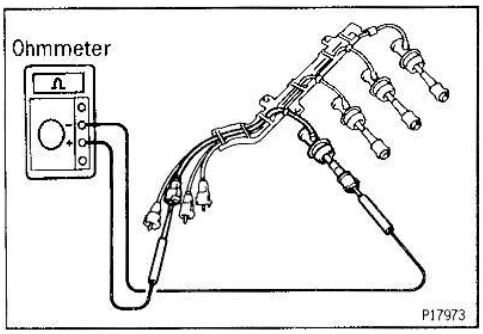
HIGH–TENSION CORDS INSPECTION EG43W-01

1. REMOVE HIGH–TENSION CORDS

(a) Remove the 3 bolts, and disconnect the high–tension cord clamp from the ACIS valve.



(b) Disconnect the high – tension cords at the rubber boot. Do not pull on the high–tension cords.
NOTICE: Pulling on or bending the cords may damage the conductor inside.



2. INSPECT HIGH–TENSION CORD RESISTANCE

Using an ohmmeter, measure the resistance.

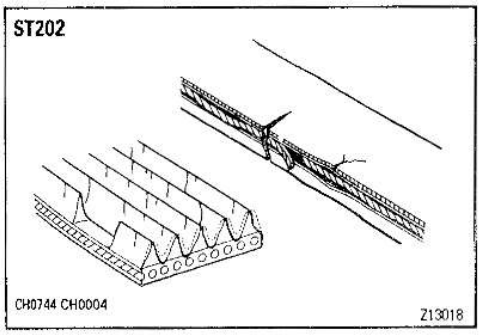
Maximum resistance:

25 kΩ per cord

If the resistance is greater than maximum, replace the high–tension cord.

3. REINSTALL HIGH–TENSION CORDS

EG



ALTERNATOR DRIVE BELT INSPECTION EG41X–01

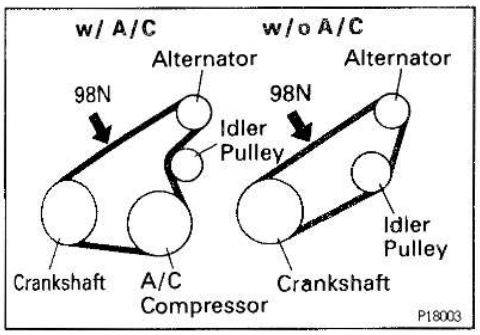
ST202:

INSPECT DRIVE BELT

(a) Visually check the drive belt for excessive wear, frayed cords etc.

If any defect has been found, replace the drive belt.

HINT: Cracks on the rib side of a drive belt are considered acceptable. If the drive belt has chunks missing from the ribs, it should be replaced.



(b) Check the drive belt deflection by pressing on the belt at the points indicated in the illustration with 98 N (10 kgf, 22 lbf) of pressure.

Drive belt deflection:

w/ A/C

New belt

10 – 11 mm (0.39 – 0.43 in.)

Used belt

13 – 16 mm (0.51 – 0.63 in.)

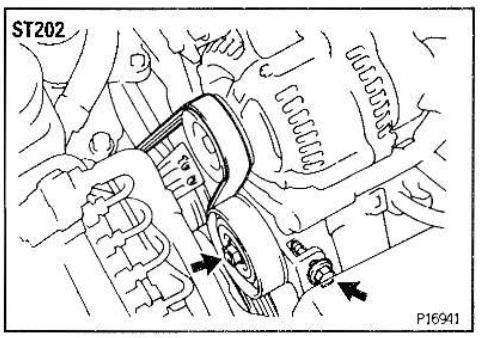
w/o A/C

New belt

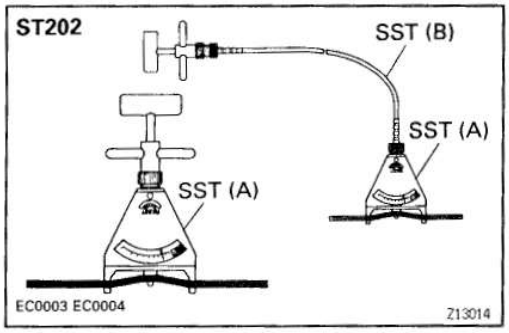
11 – 14 mm (0.43 – 0.55 in.)

Used belt

12 – 18 mm (0.47 – 0.71 in.)



If the belt deflection is not as specified, adjust it.



EG

Reference:

Using SST, check the drive belt tension.

SST 09216–00021 (A),
09216–00030 (B)

Drive belt tension:

w/ A/C

New belt

686 – 785 N (70 – 80 kgf)

Used belt

294 – 441 N (30 – 45 kgf)

w/o A/C

New belt

461 – 706 N (47 – 72 kgf)

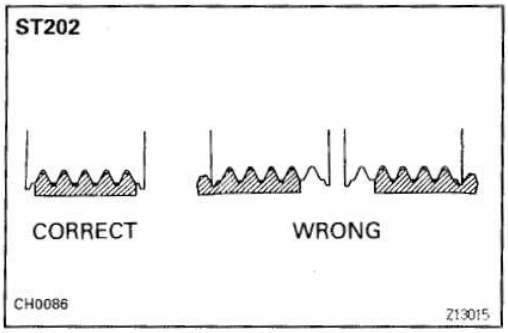
Used belt

353 – 610 N (36 – 62 kgf)

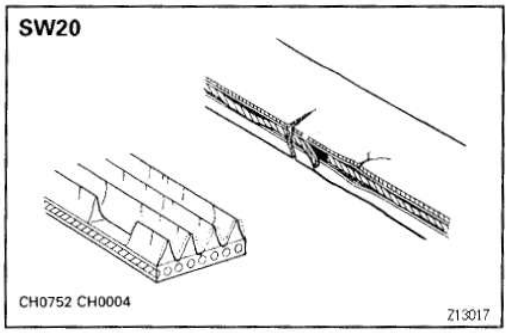
If the belt tension is not as specified, adjust it.

HINT:

- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a belt, check that it fits properly in the ribbed grooves.
- Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.

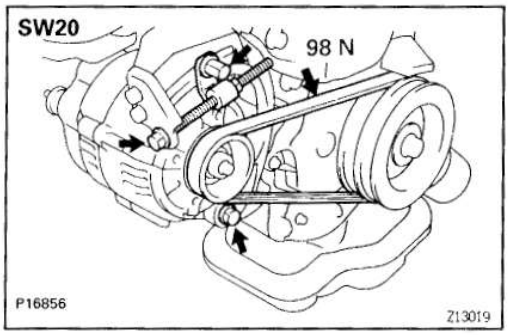


SW20:



INSPECT DRIVE BELT

(a) Visually check the drive belt for excessive wear, frayed cords etc.
If any defect has been found, replace the drive belt.
HINT: Cracks on the rib side of a drive belt are considered acceptable. If the drive belt has chunks missing from the ribs, it should be replaced.



(b) Check the drive belt deflection by pressing on the belt at the points indicated in the illustration with 98 N (10 kgf, 22 lbf) of pressure.

Drive belt deflection:

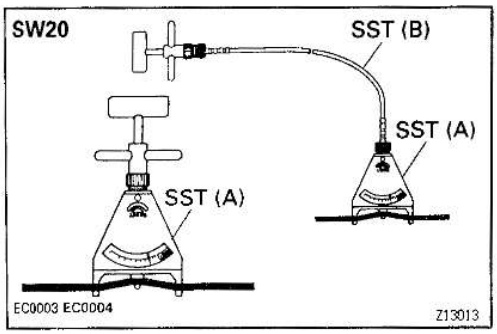
New belt

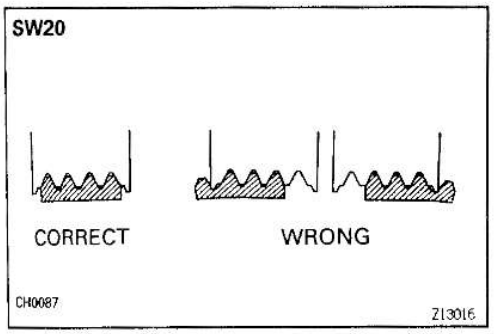
9 – 12 mm (0.35 – 0.47 in.)

Used belt

10 – 15 mm (0.39 – 0.59 in.)

If the belt deflection is not as specified, adjust it.





Reference:

Using SST, check the drive belt tension.

SST 09216–00021 (A),
09216–00030 (B)

Drive belt tension:

New belt

539 – 637 N (55 – 65 kgf)

Used belt

245 – 392 N (25 – 40 kgf)

EG

If the belt tension is not as specified, adjust it.

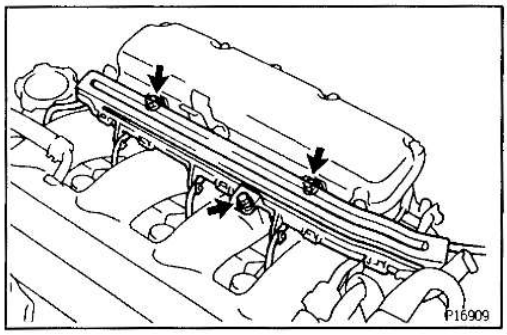
HINT:

- "New belt" refers to a belt which has been used less than 5 minutes on a running engine.
- "Used belt" refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a belt, check that it fits properly in the ribbed grooves.
- Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.

VALVE CLEARANCE INSPECTION AND ADJUSTMENT EG43Y-01

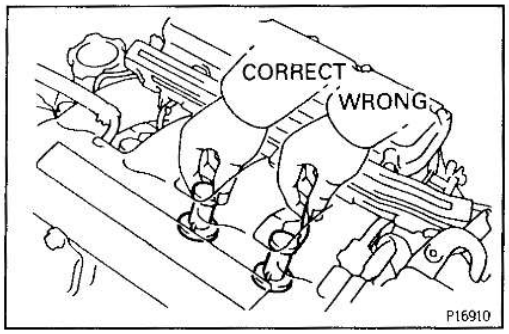
HINT: Inspect and adjust the valve clearance when the engine is cold.

EG

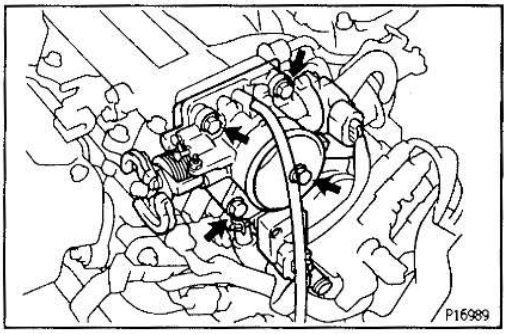


1. DISCONNECT HIGH–TENSION CORDS FROM SPARK PLUGS

(a) Remove the 3 bolts, and disconnect the high–tension cord clamp from the ACIS valve.



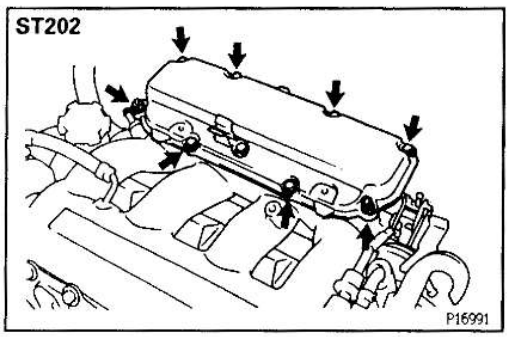
(b) Disconnect the high – tension cords at the rubber boot. Do not pull on the high–tension cords.
NOTICE: Pulling on or bending the cords may damage the conductor inside.



2. DISCONNECT THROTTLE BODY FROM ACIS VALVE

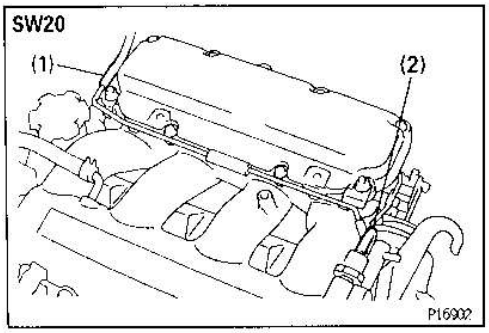
(a) Remove the 4 bolts, and disconnect the throttle body from the ACIS valve.

(b) Remove the throttle body gasket.



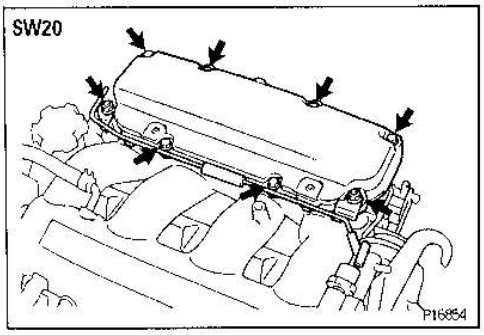
3. ST202:
REMOVE ACIS VALVE COVER

Remove the 6 bolts, 2 nuts and ACIS valve cover.

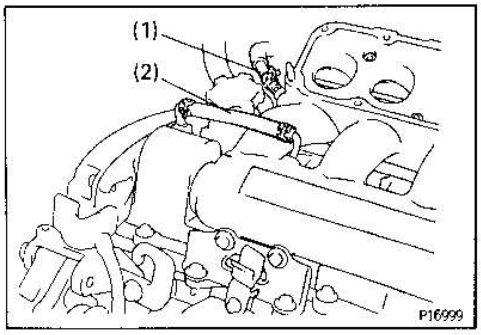


4. SW20:
REMOVE VACUUM PIPE AND ACIS VALVE COVER

(a) Disconnect the following hoses:
(1) Vacuum hose (from vacuum sensor) from vacuum pipe
(2) Vacuum hose from gas filter

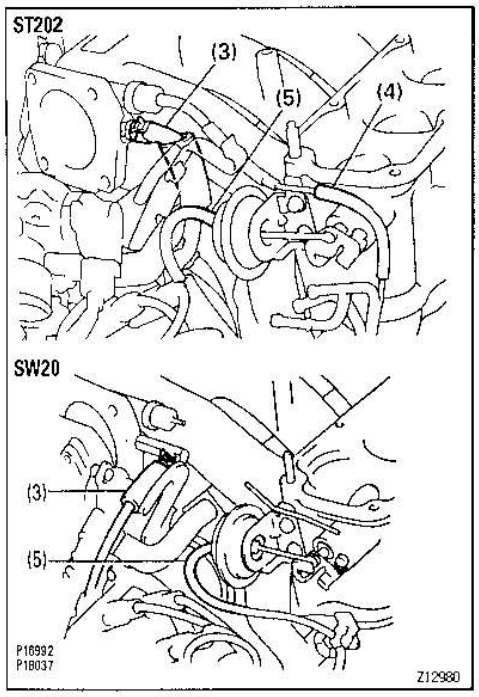


(b) Remove the 6 bolts, 2 nuts, vacuum pipe and ACIS valve cover.

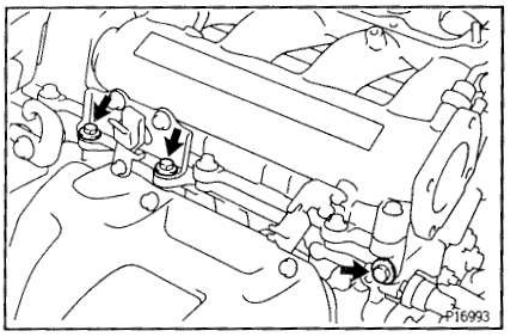


5. REMOVE ACIS VALVE ASSEMBLY

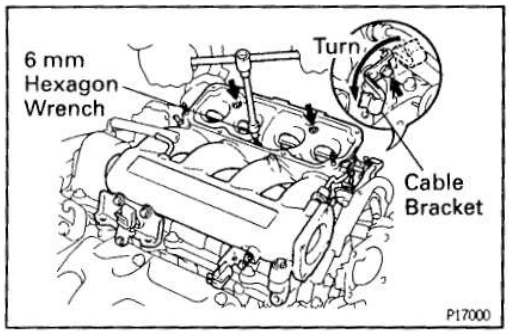
(a) Disconnect the following hoses:
(1) Brake booster vacuum hose from port of ACIS valve
(2) PCV hose from port of ACIS valve



(3) Air hose from port of ACIS valve
(4) ST202:
Vacuum hose (from vacuum sensor) from vacuum pipe on ACIS actuator
(5) Vacuum hose (from VSV for ACIS) from ACIS actuator

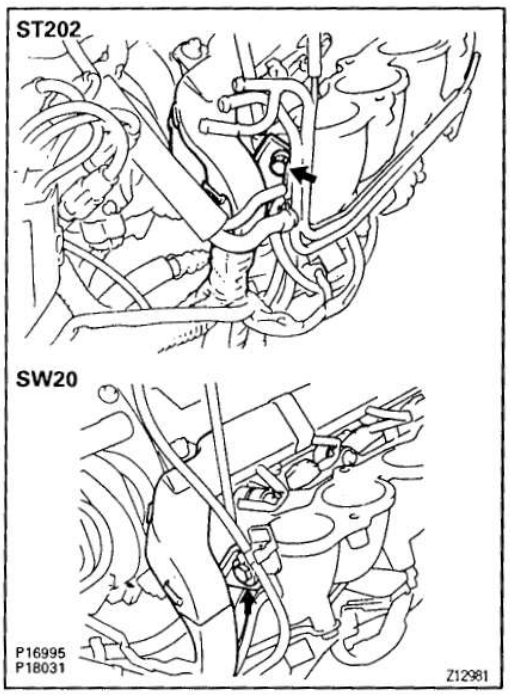


(b) Remove the 3 bolts holding the ACIS valve stays to the cylinder head.



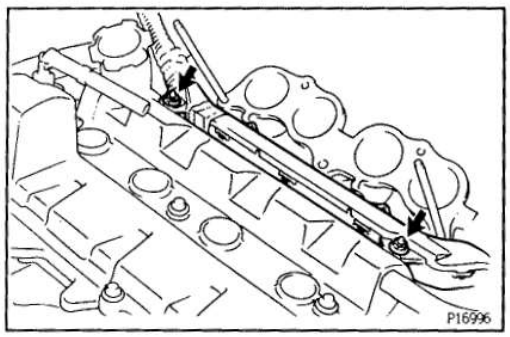
(c) ST202:
Loosen the bolt, and turn the cable bracket on the LH engine hanger.

(d) Using 6 mm hexagon wrench, remove the 3 bolts, the ACIS valve assembly and gasket.

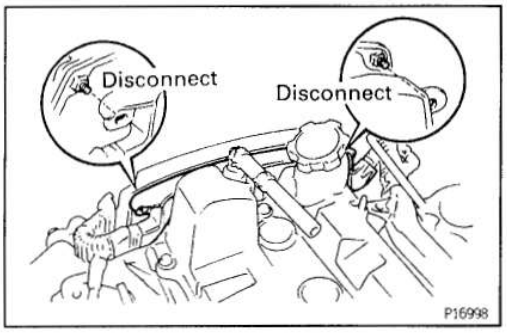


6. REMOVE CYLINDER HEAD COVER

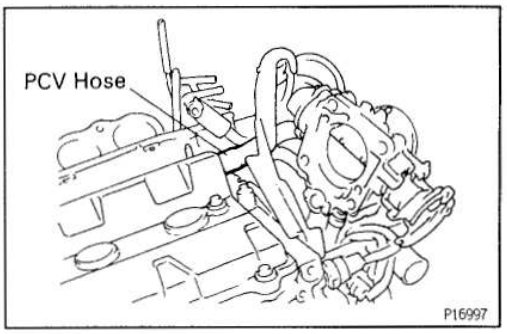
(a) Remove the bolt, and disconnect the engine wire protector from the intake manifold.



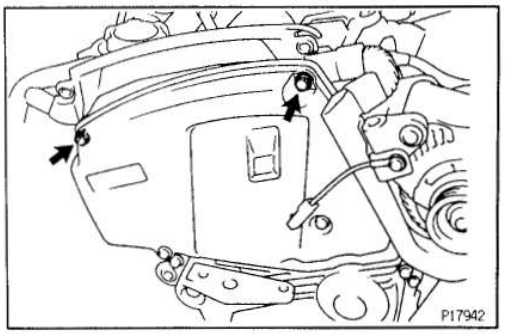
(b) Remove the 2 nuts, and disconnect the the engine wire protector from the cylinder head cover.



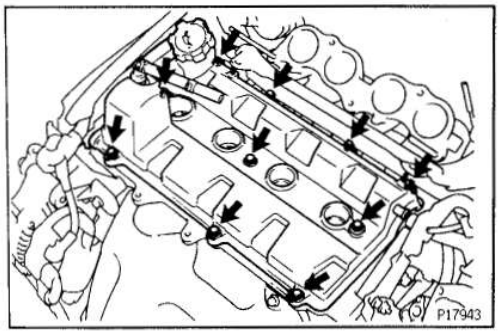
(c) Disconnect the engine wire protector from the 2 mounting bolts of the No.2 timing belt cover.



(d) Disconnect the PCV hose from the cylinder head cover.

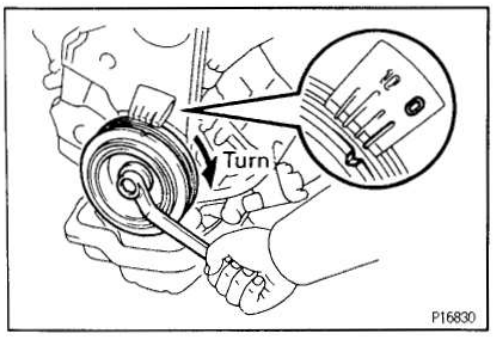


(e) Remove the 2 bolts holding the No.2 timing belt cover to the No.4 timing belt cover.



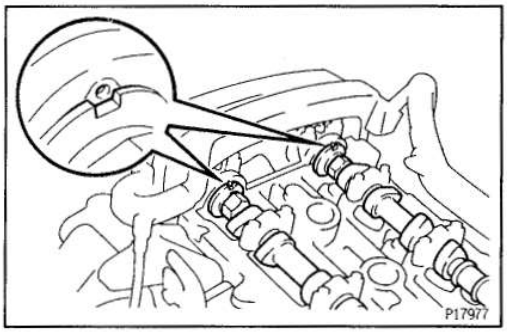
(f) Remove the 10 bolts, seal washers, cylinder head cover and 2 gaskets.

ne

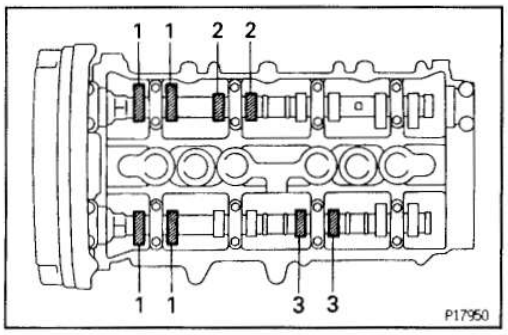


7. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley and align its groove with timing mark "0" of the No.1 timing belt cover.



(b) Check that the grooves of the camshafts are aligned with the dot marks of the No.1 camshaft bearing caps. If not, turn the crankshaft 1 revolution (360°) and align the mark as above.



8. INSPECT VALVE CLEARANCE

(a) Check only the valves indicated.

- Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
- Record the out — of — specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

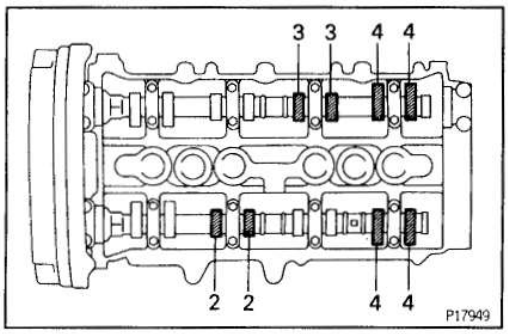
Valve clearance (Cold):

Intake

0.15 — 0.25 mm (0.006 — 0.010 in.)

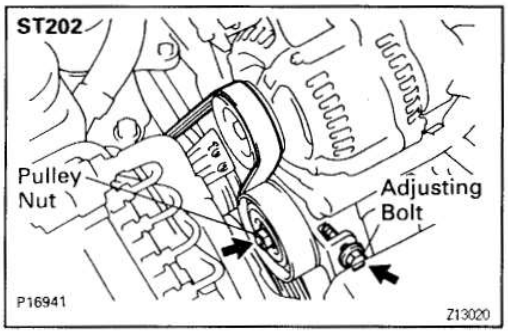
Exhaust

0.28 — 0.38 mm (0.011 — 0.015 in.)



(b) Turn the crankshaft 1 revolution (360°) and align the mark as above. (See procedure in step 8)

(c) Check only the valves indicated as shown. Measure the valve clearance. (See procedure in step (a))



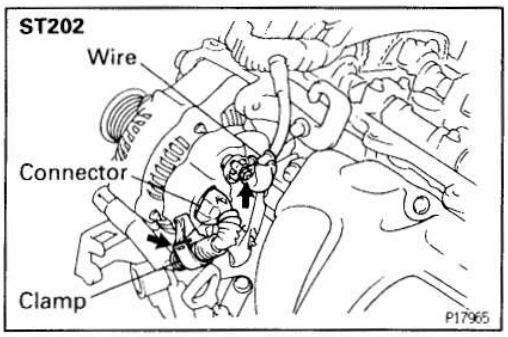
9. ADJUST VALVE CLEARANCE

A. ST202:

Remove alternator

(a) Loosen the pulley nut and adjusting bolt.

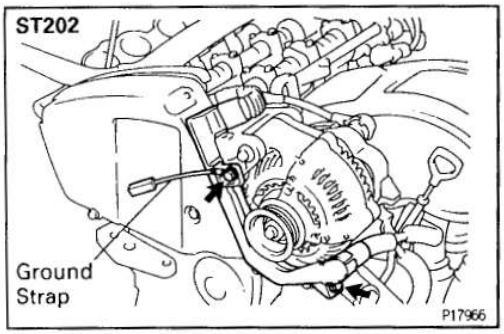
(b) Remove the drive belt.



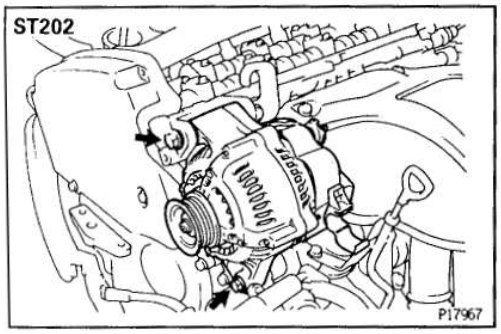
(c) Disconnect the wire from the clamp on the rear end cover.

(d) Disconnect the alternator connector.

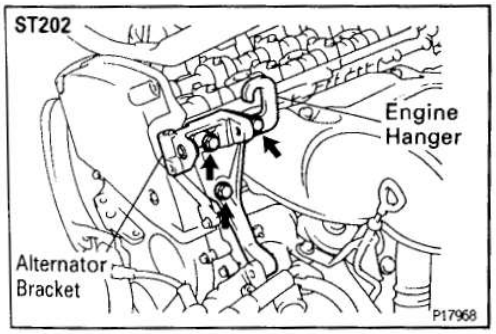
(e) Remove the rubber cap and nut, and disconnect the alternator wire.



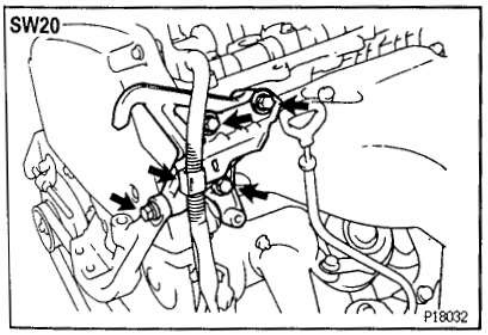
(e) Remove the 2 bolts and ground strap, and disconnect the engine wire protector from the brackets.



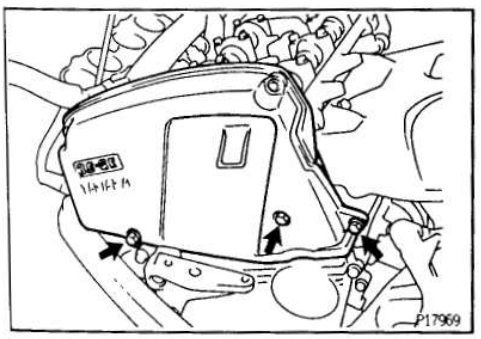
(g) Remove the 2 bolts and alternator.



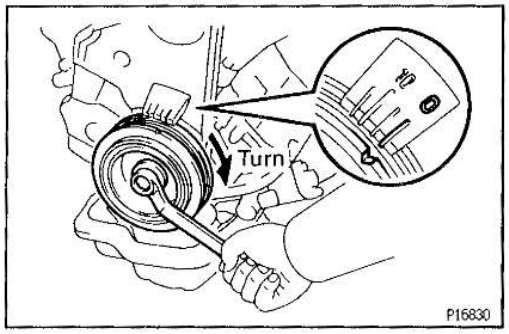
B. ST202:
Remove RH front engine hanger and alternator bracket
Remove the 3 bolts, engine hanger and alternator bracket.



C. SW20:
Remove RH front engine hanger and engine wire bracket
(a) Disconnect the engine wire from the clamp on the wire bracket.
(b) Remove the 4 bolts, wire bracket and engine hanger.

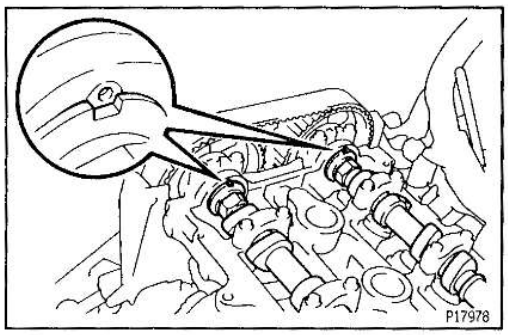


D. Remove No.2 timing belt cover
Remove the 3 bolts, timing belt cover and gasket.

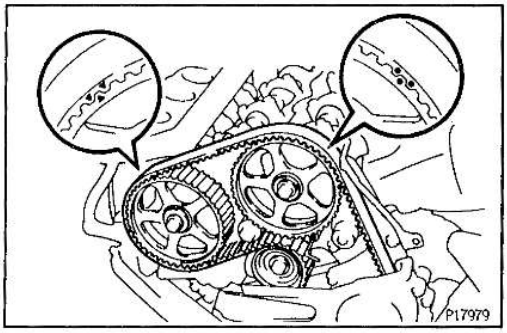


E. Set No.1 cylinder to TDC/compression

(a) Turn the crankshaft pulley, and align its groove with timing mark "0" of the No.1 timing belt cover.

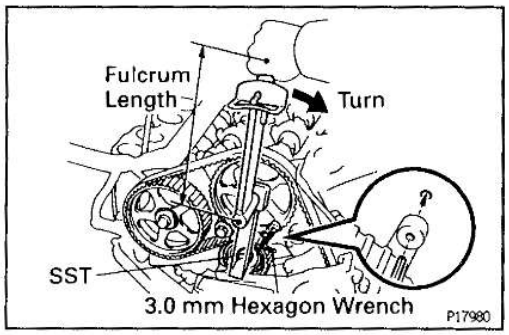


(b) Check that the grooves of the camshafts are aligned with the dot marks of the No.1 camshaft bearing caps. If not, turn the crankshaft 1 revolution (360°).



F. Disconnect timing belt from camshaft timing pulleys

(a) Place matchmarks on the timing belt and camshaft timing pulleys.



(b) Turn the No.1 idler pulley bolt to obtain the specified torque or less, and align the holes of the pulley bracket and cylinder head, pass a 3.0 mm hexagon wrench through the holes to keep the setting position of the pulley bracket.

Torque:

69 N·m (700 kgf·cm, 51 ft·lbf)

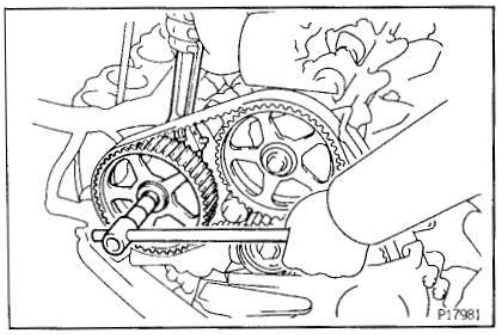
48 N·m (490 kgf·cm, 35 ft·lbf) for SST

HINT (On vehicle):

- Use SST.

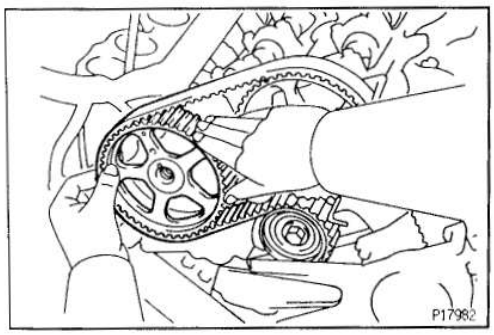
SST 09249–63010

- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

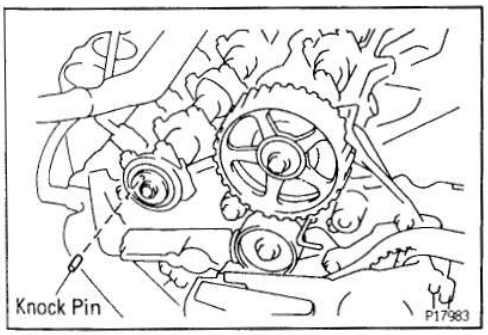


(c) Hold the hexagon wrench head portion of the camshaft with a wrench, and loosen the intake camshaft timing pulley bolt.

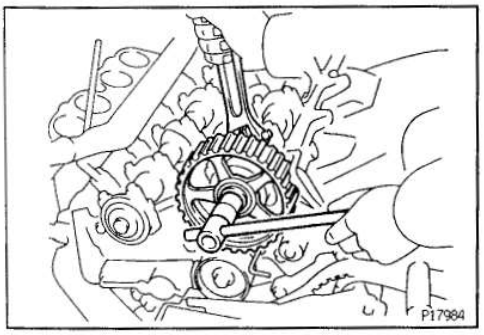
(d) Remove the intake camshaft timing pulley bolt.



(e) Disconnect the intake camshaft timing pulley together with the timing belt from the camshaft, and remove the intake camshaft timing pulley.



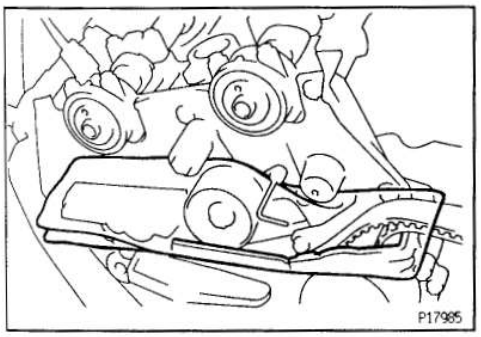
(f) Remove the knock pin from the intake camshaft.



G. Remove exhaust manifold timing pulley

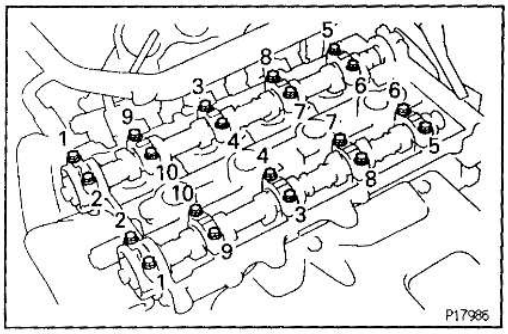
(a) Hold the hexagon wrench head portion of the camshaft with a wrench, and loosen the pulley bolt.

(b) Remove the bolt, timing pulley and knock pin.



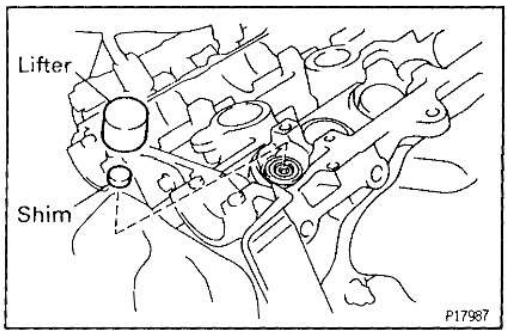
NOTICE:

- **Be careful not to drop anything inside the timing belt cover.**
- **Do not allow the belt to come into contact with oil, water or dust.**



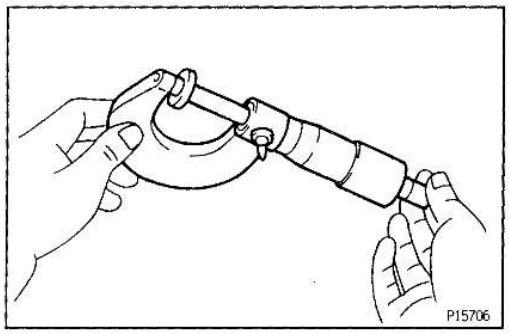
H. Remove camshafts

Uniformly loosen and remove the 10 bearing cap bolts in several passes, in the sequence shown, and remove the 5 bearing caps, oil seal and camshaft. Remove the intake and exhaust camshafts.



I. Remove adjusting shims

Remove the valve lifter and adjusting shim.



J. Replace adjusting shims

Determine the replacement adjusting shim size by following the Formula or Charts:

- Using a micrometer, measure the thickness of the removed shim.
- Calculate the thickness of a new shim so that the valve clearance comes within specified value.

T ..... Thickness of removed shim
A ..... Measured valve clearance
N ..... Thickness of new shim

Intake:

N = T + (A – 0.20 mm (0.008 in.))

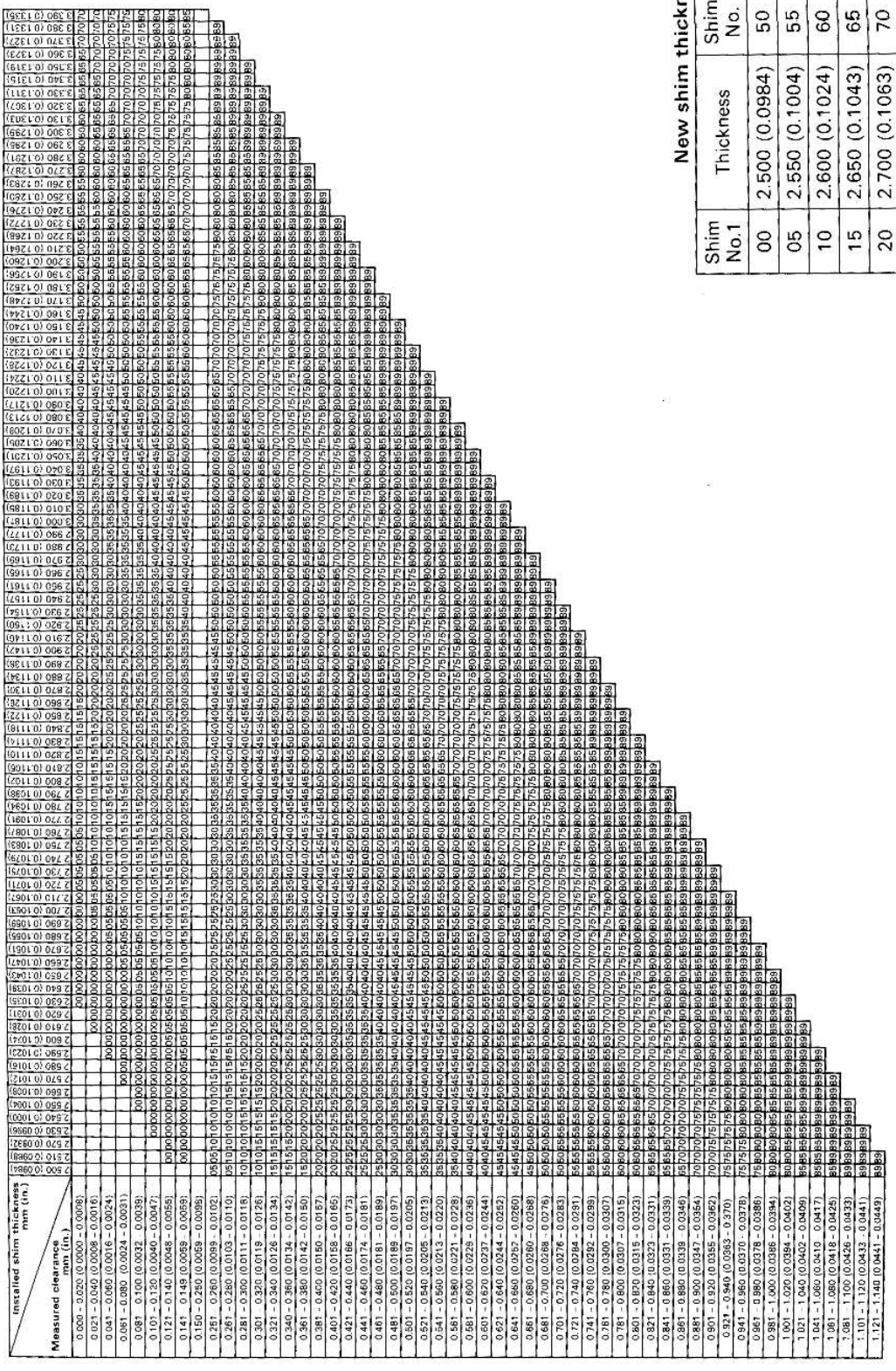
Exhaust:

N = T + (A – 0.33 mm (0.013 in.))

- Select a new shim with a thickness as close as possible to the calculated value.

HINT: Shims are available in 19 sizes. 18 sizes are available in equal increments of 0.05 mm (0.0020 in.), from 2.50 mm (0.0984 in.) to 3.35 mm (0.1319 in.). The largest shim size available is 3.39 mm (0.1335 in.).

Adjusting Shim Selection Chart (Intake)



New shim thickness mm (in.)

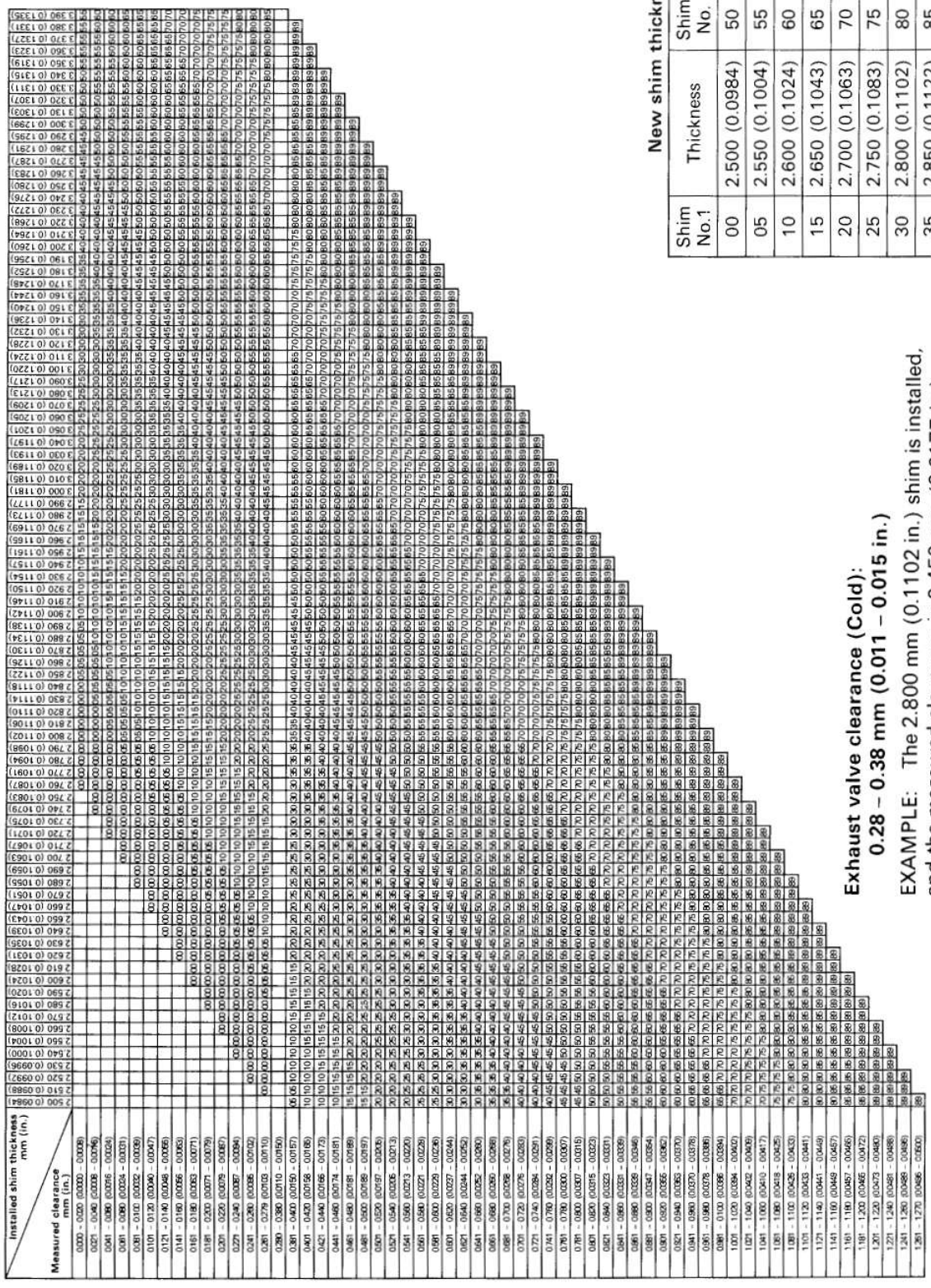
Shim No.1	Thickness	Shim No.	Thickness
00	2.500 (0.0984)	50	3.000 (0.1181)
05	2.550 (0.1004)	55	3.050 (0.1201)
10	2.600 (0.1024)	60	3.100 (0.1220)
15	2.650 (0.1043)	65	3.150 (0.1240)
20	2.700 (0.1063)	70	3.200 (0.1260)
25	2.750 (0.1083)	75	3.250 (0.1280)
30	2.800 (0.1102)	80	3.300 (0.1299)
35	2.850 (0.1122)	85	3.350 (0.1319)
40	2.900 (0.1142)	89	3.390 (0.1335)
45	2.950 (0.1161)		

Intake valve clearance (Cold):
0.15 – 0.25 mm (0.006 – 0.010 in.)

EXAMPLE: The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1102 in.) shim with a new No.55 shim.

EG

Adjusting Shim Selection Chart (Exhaust)

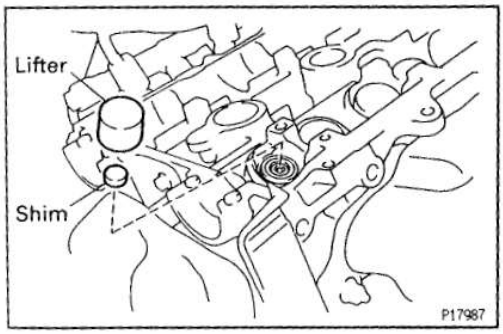


New shim thickness mm (in.)

Shim No.1	Thickness	Shim No.	Thickness
00	2.500 (0.0984)	50	3.000 (0.1181)
05	2.550 (0.1004)	55	3.050 (0.1201)
10	2.600 (0.1024)	60	3.100 (0.1220)
15	2.650 (0.1043)	65	3.150 (0.1240)
20	2.700 (0.1063)	70	3.200 (0.1260)
25	2.750 (0.1083)	75	3.250 (0.1280)
30	2.800 (0.1102)	80	3.300 (0.1299)
35	2.850 (0.1122)	85	3.350 (0.1319)
40	2.900 (0.1142)	89	3.390 (0.1335)
45	2.950 (0.1161)		

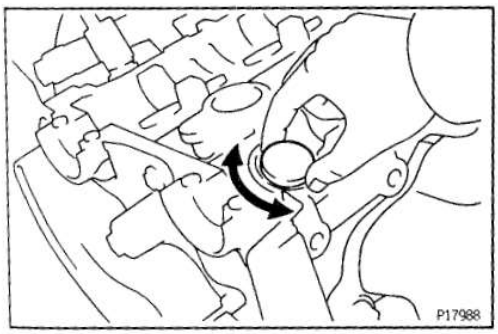
Exhaust valve clearance (Cold):
0.28 – 0.38 mm (0.011 – 0.015 in.)

EXAMPLE: The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1102 in.) shim with a new No.40 shim.

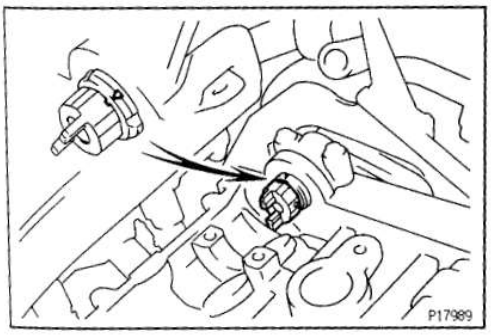


K. Reinstall adjusting shims

(a) Install the adjusting shim and valve lifter.

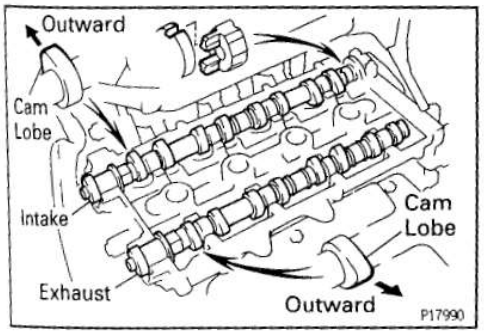


(b) Check that the valve lifter rotates smoothly by hand.



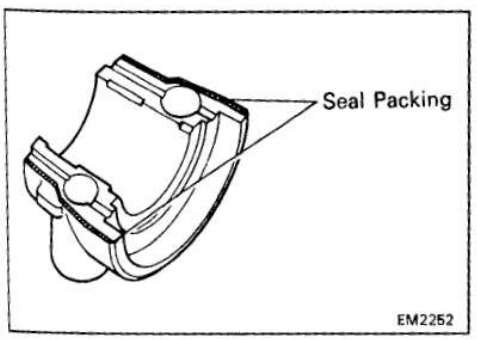
L. Reinstall camshafts

(a) Align the cutout portion of the coupling with the groove of the distributor housing.

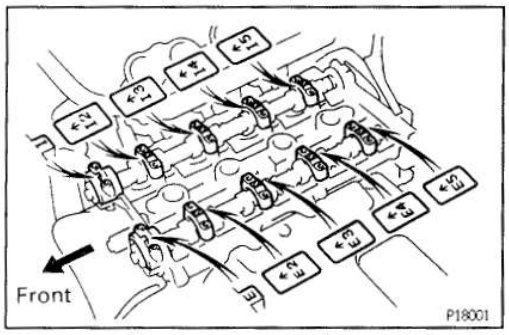


(b) Attach the slit of the intake camshaft to the coupling of the distributor.

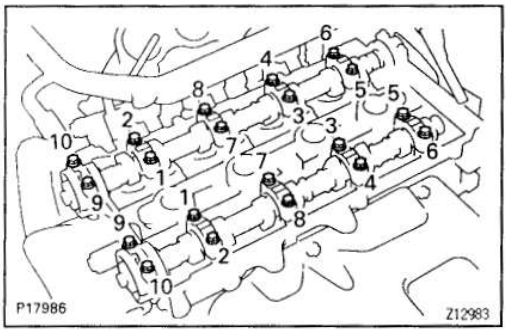
(c) Place the camshafts on the cylinder head with the No. 1 cam lobes facing outward as shown.
HINT: Intake camshaft have an slit; exhaust camshaft do not.



(d) Apply seal packing to the No.1 bearing cap as shown in the illustration.
Seal packing:
Part No. 08826—00080 or equivalent



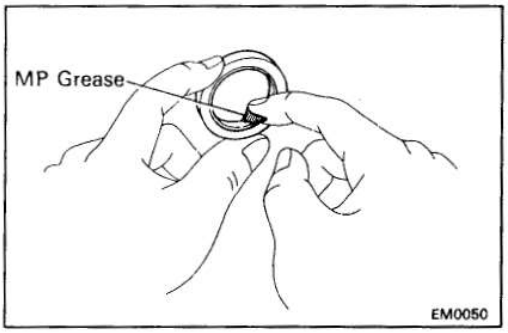
(e) Install the bearing caps in their proper locations.
HINT: Each bearing cap has a number and front mark.



(f) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(g) Install and uniformly tighten the 10 bearing cap bolts on one side in several passes, in the sequence shown.
Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)

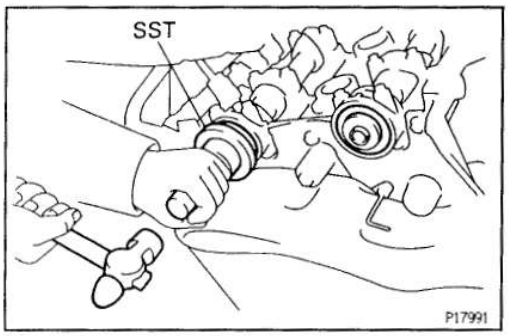
M. Check valve clearance

Turn the camshaft and position the cam lobe upward, and check and adjust the valve clearance.
Valve clearance (Cold):
Intake
0.15 – 0.25 mm (0.006 – 0.010 in.)
Exhaust
0.28 – 0.38 mm (0.011 – 0.015 in.)

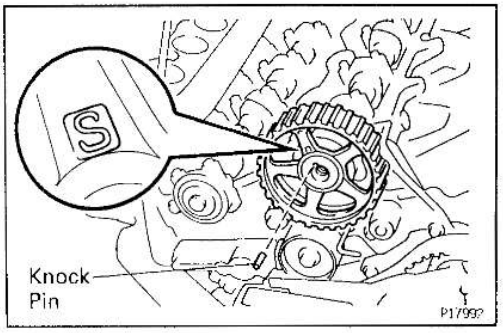


N. Reinstall camshaft oil seals

(a) Apply MP grease to a new oil seal lip.



(b) Using SST, tap in the 2 camshaft oil seals.
SST 09223–46011

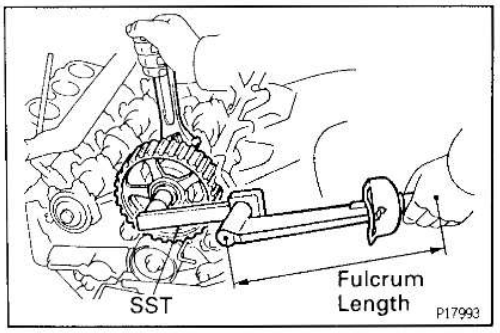


O. Reinstall exhaust camshaft timing pulley

(a) Slide the timing pulley onto the camshaft, facing mark "S" outward.

(b) Align the pin holes of the camshaft and timing pulley, and insert the knock pin.

EG



(c) Hold the hexagon wrench head portion of the camshaft with a wrench, and install the pulley bolt.

Torque:

59 N·m (600 kgf·cm, 43 ft·lbf)

41 N·m (420 kgf·cm, 30 ft·lbf) for SST

HINT (On vehicle):

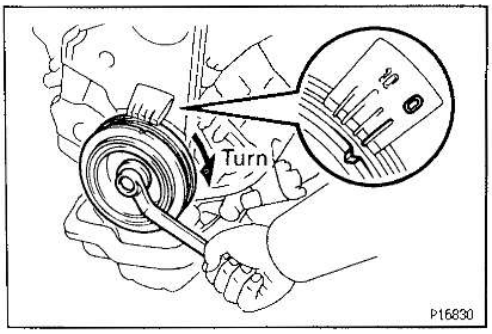
- Use SST.

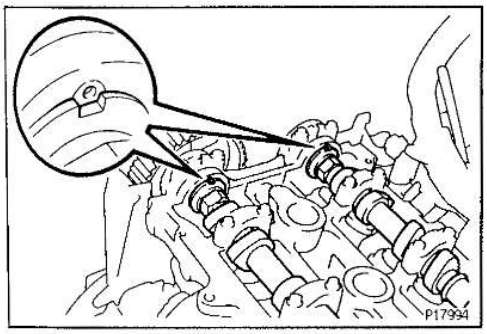
SST 09249–63010

- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

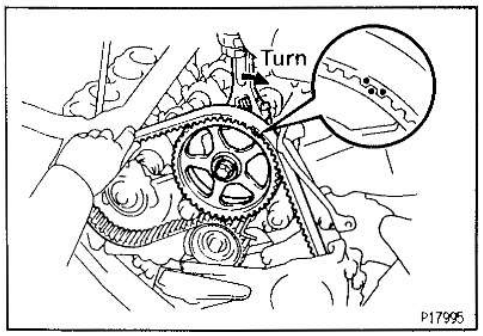
P. Set No.1 cylinder to TDC/compression

(a) Turn the crankshaft pulley, and align its groove with timing mark "0" of the No.1 timing belt cover.





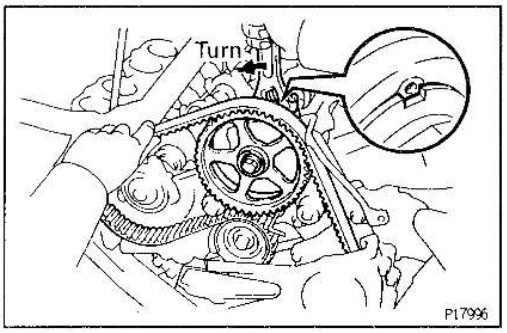
(b) Turn the hexagon head portion of the camshaft, align the groove of the camshaft with the dot mark of the No.1 camshaft bearing cap.



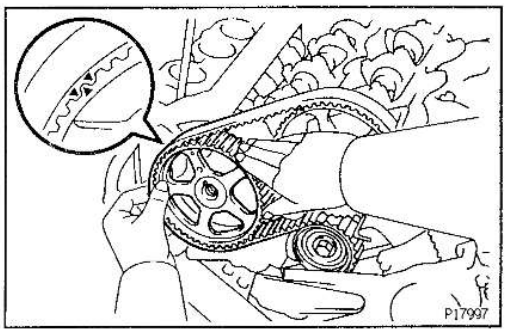
Q. Reconnect timing belt to camshaft timing pulleys

(a) Remove any oil or water on the exhaust camshaft timing pulley, and keep it clean.

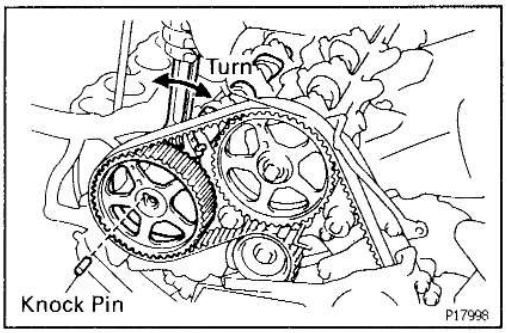
(b) Turn the hexagon wrench head portion of the camshaft with a wrench, and turn the exhaust camshaft timing pulley clockwise. Align the matchmarks of the timing belt and exhaust camshaft timing pulley, and hang the timing belt on the exhaust camshaft timing pulley.



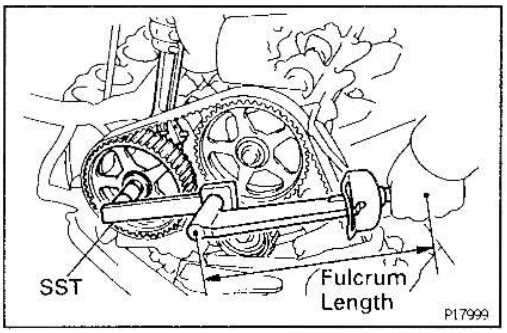
(c) Align the groove of the camshaft with the dot mark of the No.1 camshaft bearing cap.
(d) Check that the timing belt has tension between the crankshaft timing pulley and exhaust camshaft timing pulley.



(e) Remove any oil or water on the intake camshaft timing pulley and No.1 idler pulley, and keep them clean.
(f) Align the matchmarks of the timing belt and intake camshaft timing pulley, and hang the timing belt on the intake camshaft timing pulley, facing mark "S" outward.
(g) Slide the intake camshaft timing pulley on the camshaft.



(h) Turn the hexagon wrench head portion of the camshaft with a wrench, and align the knock pin hole of the camshaft with the knock pin groove of the pulley and install the knock pin.



(i) Hold the hexagon wrench head portion of the camshaft with a wrench, and install the intake camshaft timing pulley bolt.

Torque:

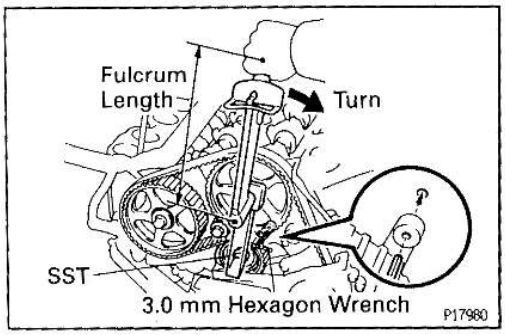
59 N·m (600 kgf·cm, 43 ft·lbf)
41 N·m (420 kgf·cm, 30 ft·lbf) for SST

HINT (On vehicle):

- Use SST.

SST 09249−63010

- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

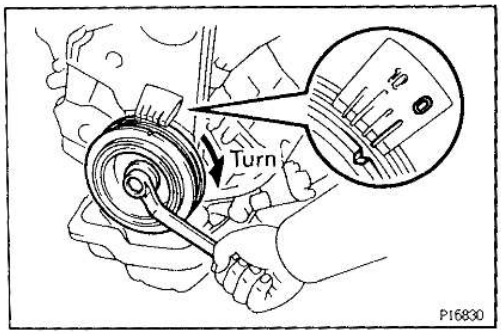


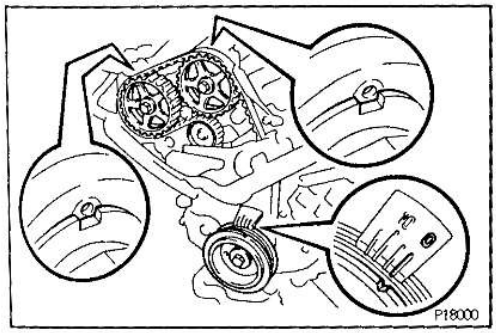
(j) Turn the No.1 idler pulley bolt to obtain the specified torque or less, remove the 3.0 mm hexagon wrench.
Torque:
69 N·m (700 kgf·cm, 51 ft·lbf)
48 N·m (490 kgf·cm, 35 ft·lbf) for SST
HINT (On vehicle):
- Use SST.

SST 09249–63010
- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

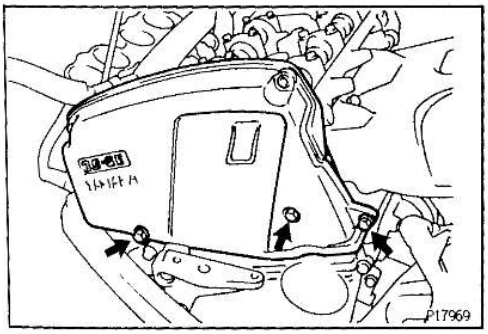
R. Check valve timing

(a) Slowly turn the crankshaft pulley 2 revolutions from TDC to TDC.
NOTICE: Always turn the crankshaft clockwise.



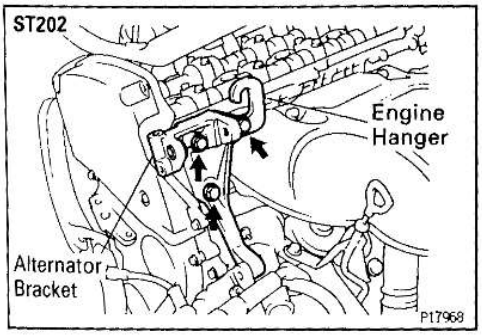


(b) Check that each pulley aligns with the timing marks as shown in the illustration.
If the timing marks do not align, disconnect the timing belt and reconnect it.

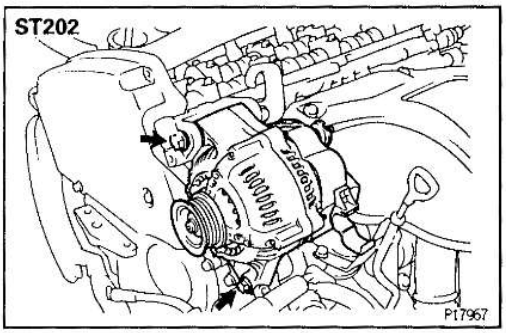


S. Reinstall No.2 timing belt cover

(a) Install the gasket to the timing belt cover.
(b) Install the timing belt cover with the 3 bolts.
HINT: Use the 20 mm (0.79 in.) long bolt.



T. ST202:
Reinstall alternator bracket and RH front engine hanger
Install the alternator bracket and engine hanger with the 3 bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)



U. ST202:

Reinstall alternator

(a) Install the alternator with the 2 bolts.

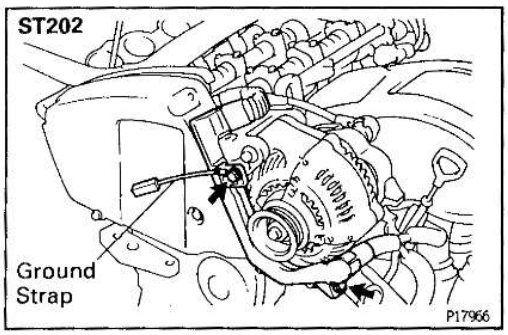
Torque:

12 mm head

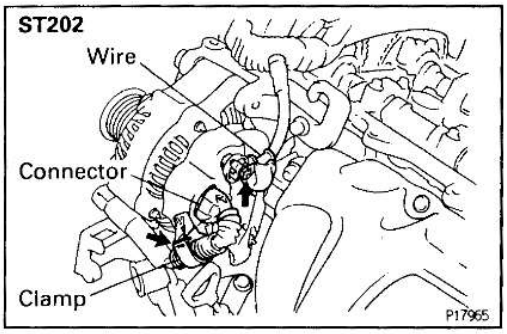
19 N·m (190 kgf·cm, 14 ft·lbf)

14 mm head

52 N·m (530 kgf·cm, 38 ft·lbf)



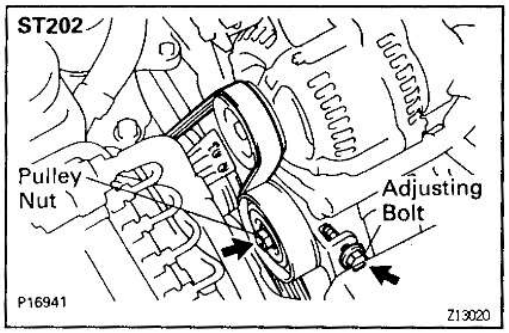
(b) Install the engine wire protector and ground strap with the 2 bolts.



(c) Connect the alternator connector.

(d) Connect the alternator wire with the nut and rubber cap.

(e) Install the wire to the clamp on the rear end cover.



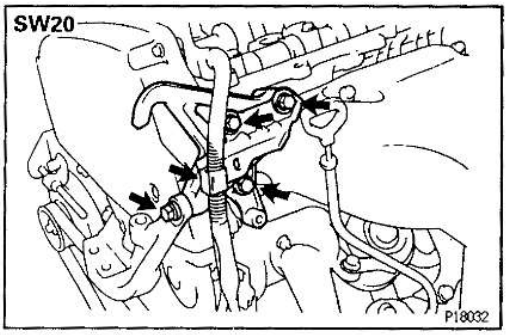
(f) Install the drive belt with the adjusting bolt.

(g) Tighten the pulley nut.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

V. SW20:

Reinstall RH front engine hanger and engine wire bracket



(a) Install the engine hanger and wire bracket with the 4 bolts. Alternately tighten the bolts.

Torque:

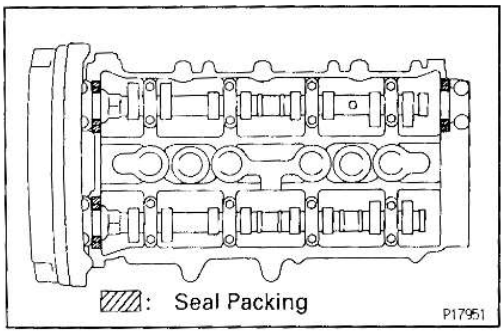
Cylinder head side

39 N·m (400 kgf·cm, 29 ft·lbf)

RH engine mounting bracket side

60 N·m (620 kgf·cm, 45 ft·lbf)

(b) Install the engine wire to the clamp on the wire bracket.

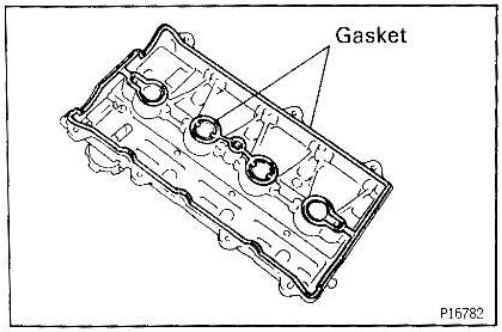


10. REINSTALL CYLINDER HEAD COVER

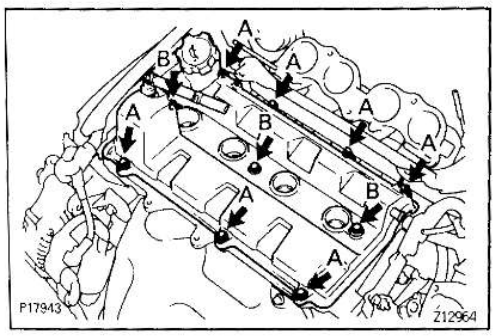
(a) Apply seal packing to the cylinder head as shown in the illustration.

Seal packing:

Part No. 08826–00080 or equivalent



(b) Install the 2 gaskets to the head cover.



(c) Install the head cover with the 10 seal washers and bolts. Uniformly tighten the bolts in several passes.

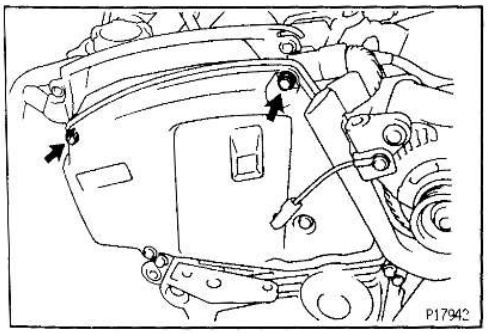
Tourque: 6.0 N·m (61 kgf·cm, 53 in.·lbf)

HINT: Each bolt length is indicated in the illustration.

Bolt length:

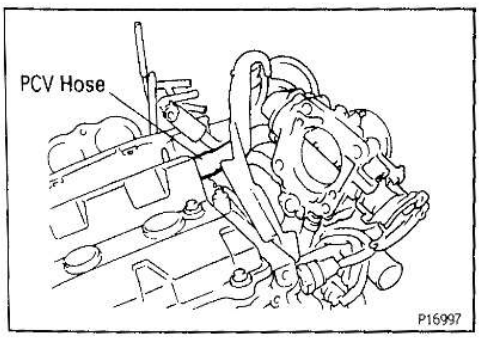
A 25 mm (0.98 in.)

B 50 mm (1.97 in.)

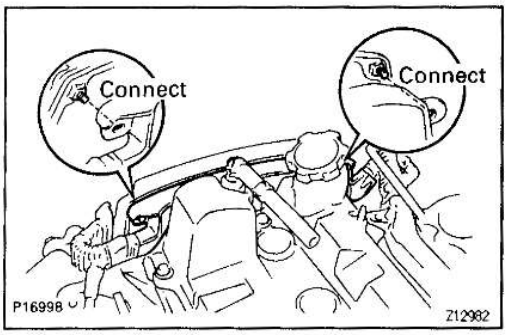


(d) Install the 2 bolts holding the No.2 timing belt cover to the No.4 timing belt cover.

HINT: Use the 25 mm (0.98 in.) long bolt.

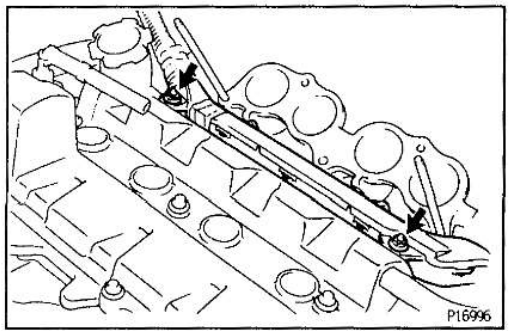


(e) Connect the PCV hose to the cylinder head cover.

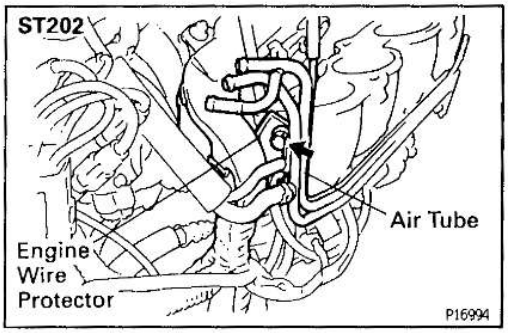


11. REINSTALL ENGINE WIRE

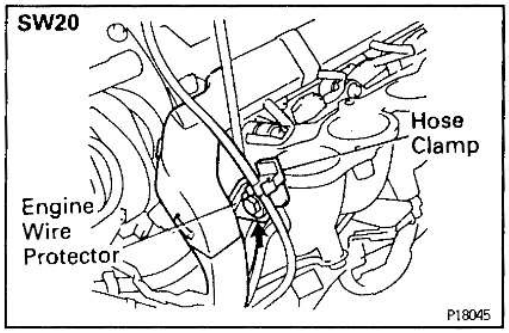
(a) Install the engine wire protector to the 2 mounting bolts of the No.2 timing belt cover.



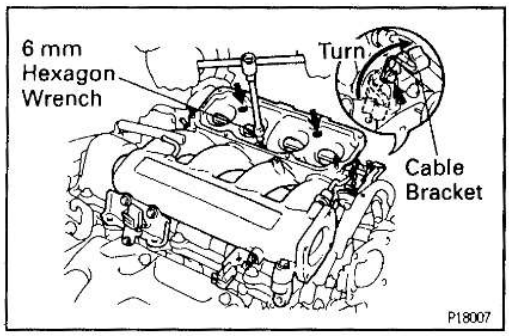
(b) Install the the engine wire protector to the cylinder head cover with the 2 nuts.



(c) ST202:
Install the air tube and engine wire protector with the bolt.



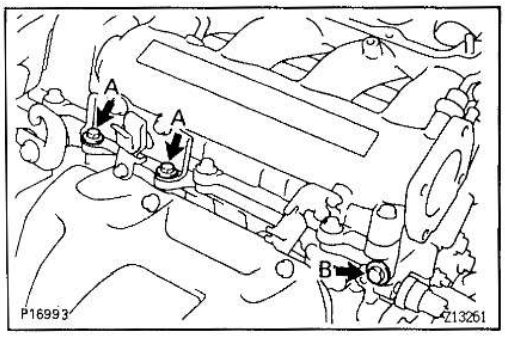
(d) SW20:
Install the hose clamp and engine wire protector with the bolt.



12. REINSTALL ACIS VALVE ASSEMBLY

(a) Using a 6 mm hexagon wrench, install a new gasket and the ACIS valve assembly with the 3 bolts. Uniformly tighten the bolts in several passes.
Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)

(b) ST202:
Install the cable bracket on the LH engine hanger with the bolt.



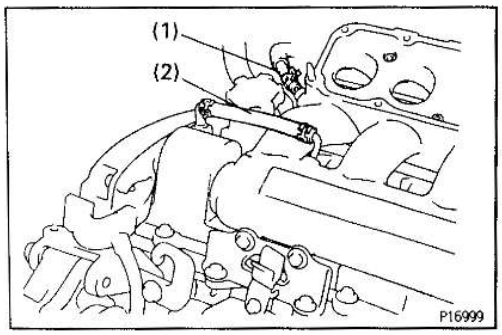
(c) Install the 3 bolts holding the ACIS valve stays to the cylinder head.

Torque:

A 18 N·m (180 kgf·cm, 13 ft·lbf)

B 19 N·m (190 kgf·cm, 14 ft·lbf)

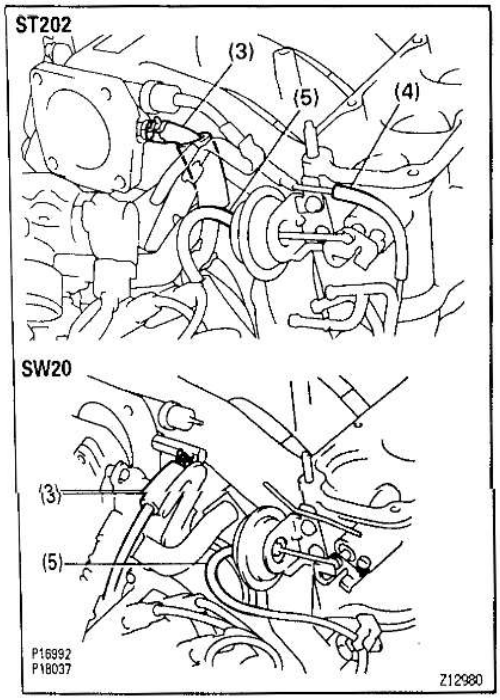
EG



(d) Connect the following hoses:

(1) Brake booster vacuum hose to port of ACIS valve

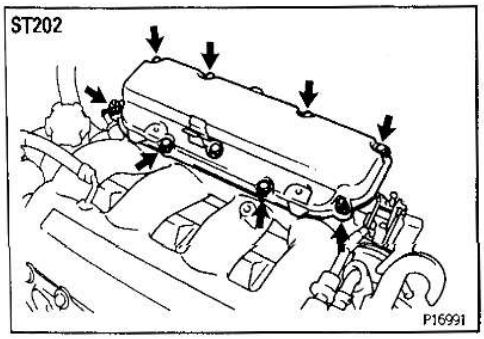
(2) PCV hose to port of ACIS valve



(3) Air hose to port of ACIS valve

(4) ST202:
Vacuum hose (from vacuum sensor) to vacuum pipe on ACIS actuator

(5) Vacuum hose (from VSV for ACIS) to ACIS actuator



13. ST202:

REINSTALL ACIS VALVE COVER

Install a new gasket and the ACIS valve cover with the 6 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.

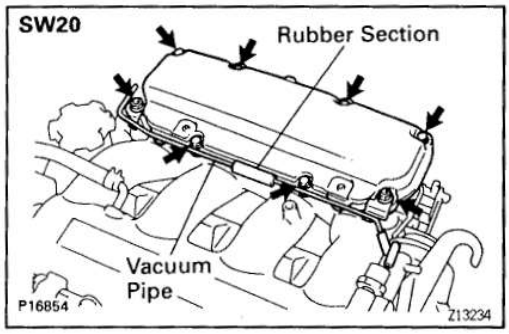
Torque:

Bolt

8.5 N·m (87 kgf·cm, 75 in.·lbf)

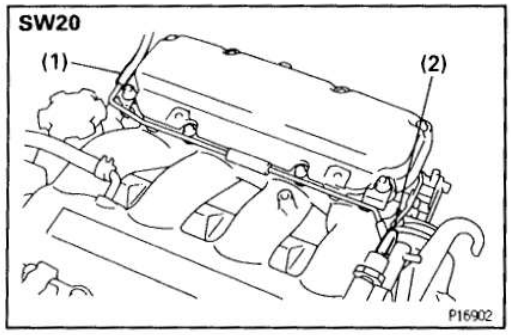
Nut

21 N·m (210 kgf·cm, 15 ft·lbf)

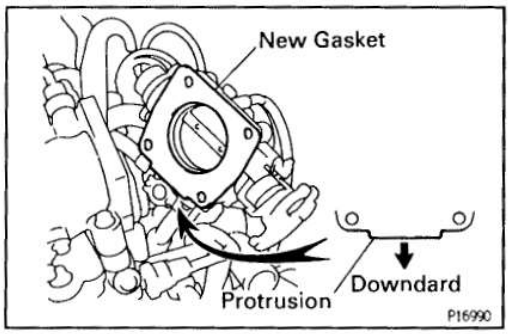


14. SW20:
INSTALL ACIS VALVE COVER AND VACUUM PIPE

(a) Install a new gasket and the ACIS valve cover with the 6 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.
Torque:
Bolt
8.5 N·m (87 kgf·cm, 75 in.·lbf)
Nut
21 N·m (210 kgf·cm, 15 ft·lbf)

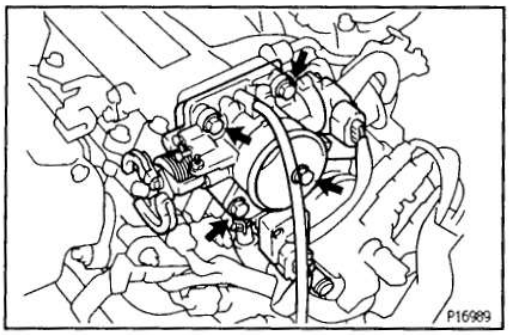


(b) Check that the rubber section at the center of the vacuum pipe is firmly pressed against the ACIS cover.
(c) Connect the following hoses:
(1) Vacuum hose (from vacuum sensor) to vacuum pipe
(2) Vacuum hose to gas filter

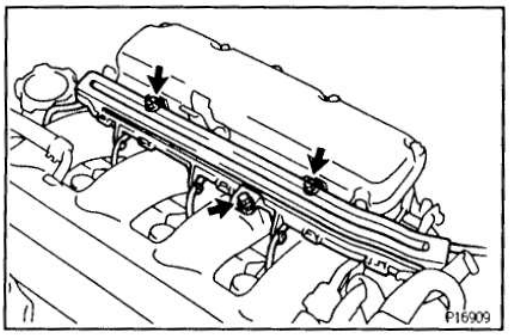


15. REINSTALL THROTTLE BODY

(a) Attach a new gasket to the throttle body, facing the protrusion downward.



(b) Install the gasket and throttle body with the 4 bolts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)
HINT: Different bolt lengths are used for the upper and lower sides.
Bolt length:
Upper side
40 mm (1.77 in.)
Lower side
65 mm (2.17 in.)



16. RECONNECT CONNECT HIGH — TENSION CORDS TO
SPARK PLUGS

(a) Connect the 4 high—tension cords to the spark plugs.
(b) Install the high—tension cord clamp with the 3 bolts.

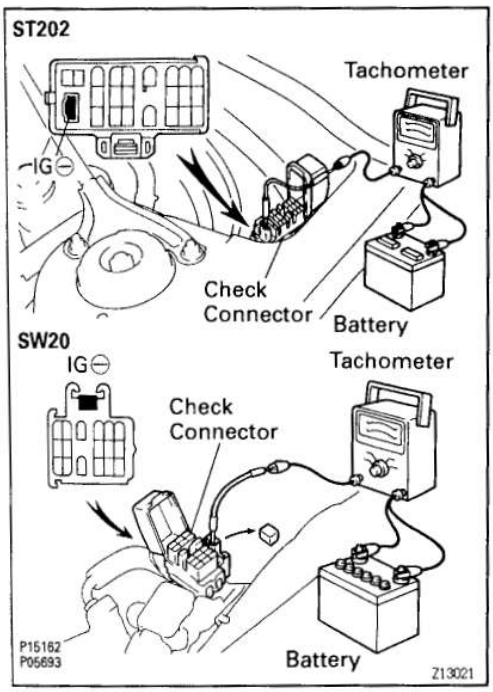
EG42Z-01

IGNITION TIMING INSPECTION AND ADJUSTMENT

1. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

EG

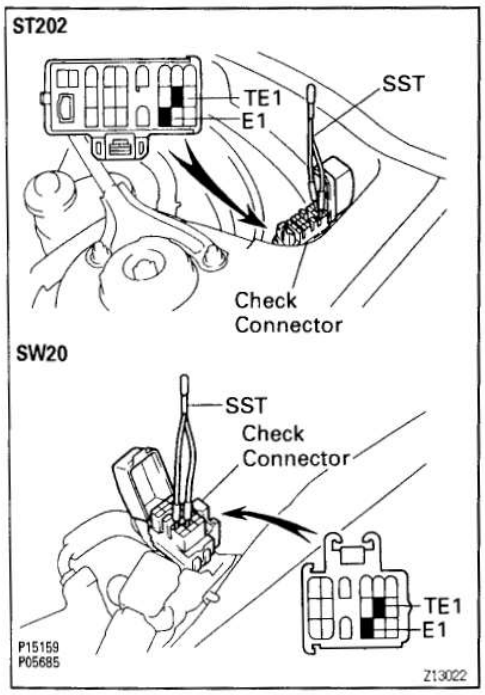


2. CONNECT TACHOMETER AND TIMING LIGHT TO ENGINE

Connect the tester probe of a tachometer to terminal IG⊖ of the check connector.

NOTICE:

- **Never allow the tachometer terminal 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, we recommend that you confirm the compatibility of your unit before use.**

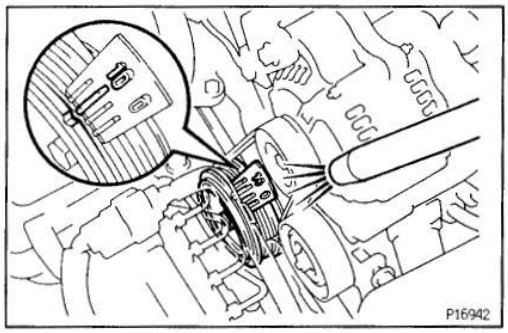


3. ADJUST IGNITION TIMING

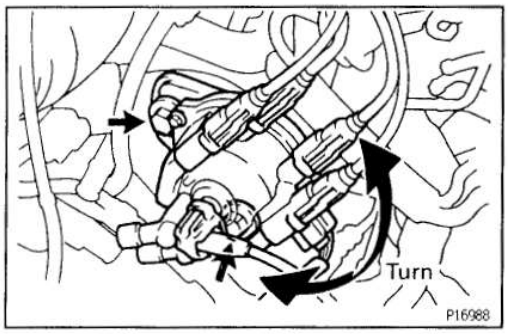
(a) Using SST, connect terminals TE1 and E1 of the check connector.

SST 09843–18020

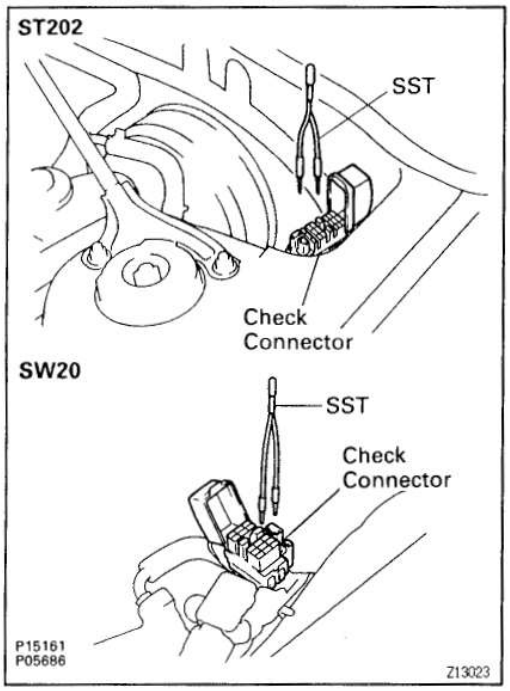
HINT: After engine rpm is kept at 1,000 – 1,300 rpm for 5 seconds, check that it returns to idle speed.



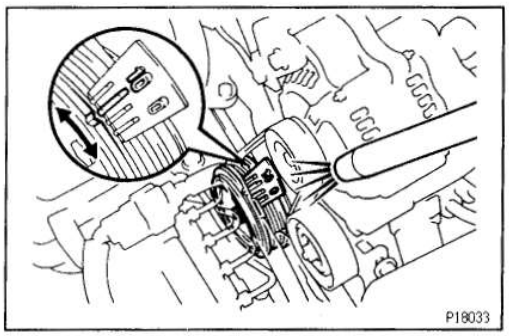
(b) Using a timing light, check the ignition timing.
Ignition timing:
10° BTDC @ idle
(Transmission in neutral position)



(c) Loosen the 2 bolts, and adjust by turning the distributor.
(d) Tighten the 2 bolts, and recheck the ignition timing.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)



(e) Remove the SST from the check connector.
SST 09843—18020



4. FURTHER CHECK IGNITION TIMING
Ignition timing:
9 — 24° BTDC @ idle
(Transmission in neutral position)
HINT: The timing mark moves in a range between 9° and 24°.

5. DISCONNECT TACHOMETER AND TIMING LIGHT FROM ENGINE

EG43C–01

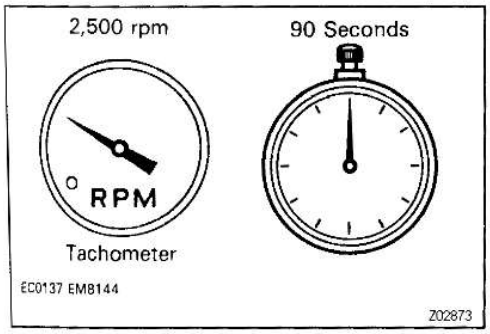
IDLE SPEED INSPECTION

1. INITIAL CONDITIONS

(a) Engine at normal operating temperature
(b) Air cleaner installed
(c) All pipes and hoses of air induction system connected
(d) All accessories switched OFF
(e) All vacuum lines properly connected
(f) EFI system wiring connectors fully plugged
(g) Ignition timing set correctly
(h) Transmission in neutral position

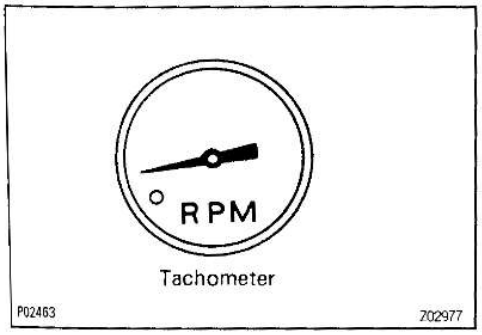
2. CONNECT TACHOMETER

(See step 2 on page EG–39)



3. INSPECT IDLE SPEED

(a) Race the engine speed at 2,500 rpm for approx. 90 seconds.



(b) Check the idle speed.

Idle speed:

ST202

w/ Daytime running light system
750 ± 50 rpm

w/o Daytime running light system
700 ± 50 rpm

SW20

w/ Daytime running light system
850 ± 50 rpm

w/o Daytime running light system
750 ± 50 rpm

If the idle speed is not as specified, check the ISC valve.

4. DISCONNECT TACHOMETER

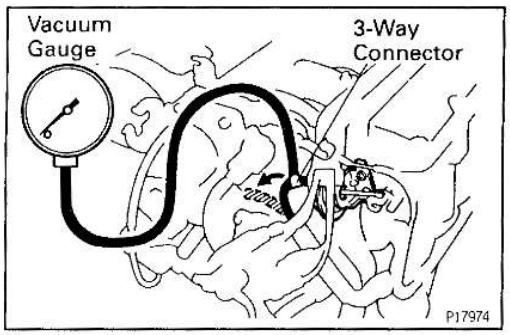
ACOUSTIC CONTROL INDUCTION SYSTEM (ACIS)

EQ0W4-04

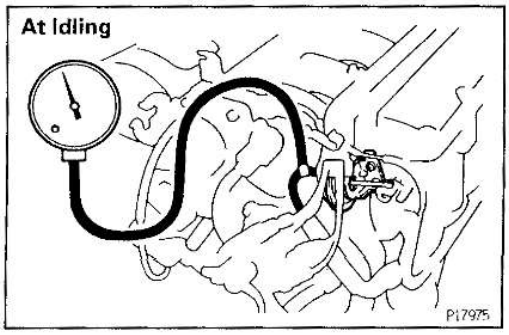
ACIS INSPECTION

EG

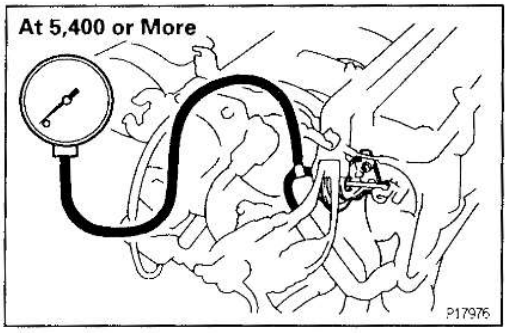
1. **WARM UP AND STOP ENGINE**
   Allow the engine to warm up to normal operating temperature.
2. **CONNECT TACHOMETER**
   (See step 2 on page EG—39)



3. **CONNECT VACUUM GAUGE**
   Using a 3 — way connector, connect the vacuum gauge to the hose between the VSV and actuator.



4. **CHECK VACUUM GAUGE**
   (a) Check that the vacuum gauge indicates vacuum at idling.



   (b) Check that the vacuum gauge indicates zero at 5,400 rpm or more.
   HINT: If regular unleaded gasoline is used, the vacuum gauge also indicates zero below 5,400 rpm.

5. **DISCONNECT TACHOMETER**

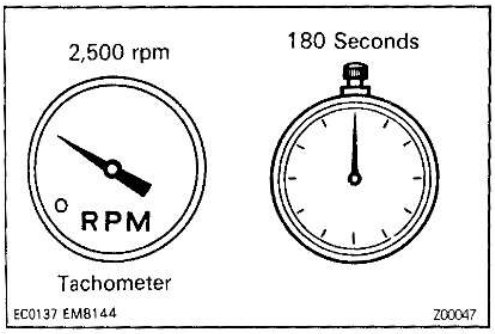
IDLE CO/HC CHECK

EGOW5–04

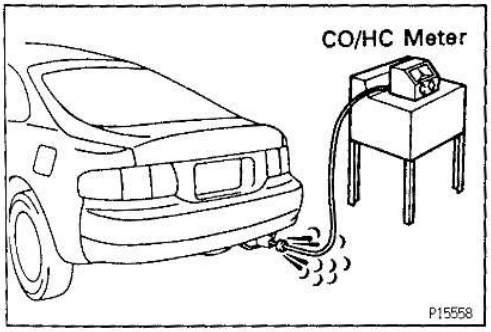
HINT: This check is used only to determine whether or not the idle CO/HC complies with regulations.

1. **INITIAL CONDITIONS**

(a) Engine at normal operating temperature
(b) Air cleaner installed
(c) All pipes and hoses of air induction system connected
(d) All accessories switched OFF
(e) All vacuum lines properly connected
(f) EFI system wiring connectors fully plugged
(g) Ignition timing set correctly
(h) Transmission in neutral position
(i) Tachometer and CO/HC meter calibrated by hand



2. **START ENGINE**
3. **RACE ENGINE AT 2,500 RPM FOR APPROX. 180 SECONDS**



4. **INSERT CO/HC METER TESTING PROBE AT LEAST 40 cm (1.3 ft) INTO TAILPIPE DURING IDLING**
5. **CHECK CO/HC CONCENTRATION AT IDLE**

Idle CO concentration:

0 – 0.5 %

Idle HC concentration:

Applicable local regulation

EG

Troubleshooting

If the CO/HC concentration does not comply with regulations, perform troubleshooting in the order given below.

(a) Check oxygen sensor operation.
(See page EG–286)

(b) See the table below for possible causes, and then inspect and correct the applicable causes if necessary.

HC	CO	Problems	Causes
High	Normal	Rough idle	1. Faulty ignitions: • *Incorrect timing* • Fouled, shorted or improperly gapped plugs • Open or crossed high-tension cords • Cracked distributor cap 2. Incorrect valve clearance 3. Leaky intake and exhaust valves 4. Leaky cylinder
High	Low	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: • PCV hose • Intake manifold • Throttle body • ISC valve • Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Faulty EFI systems: • Faulty pressure regulator • Clogged fuel return line • Defective water temp. sensor • Faulty ECU • Faulty injector • Faulty throttle position sensor • Faulty vacuum sensor

V05444

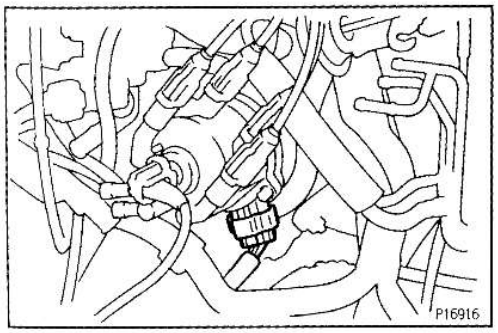
COMPRESSION CHECK

EG42S-01

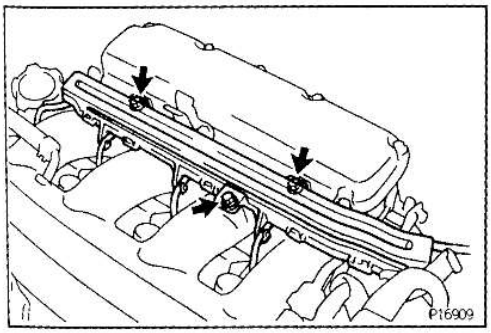
HINT: If there is lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

1. **WARM UP AND STOP ENGINE**
Allow the engine to warm up to normal operating temperature.

EG

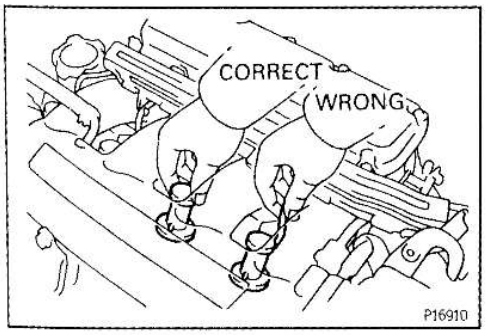


2. **DISCONNECT DISTRIBUTOR CONNECTOR**

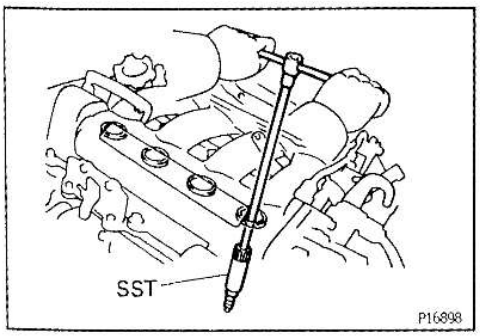


3. **DISCONNECT HIGH–TENSION CORDS FROM SPARK PLUGS**

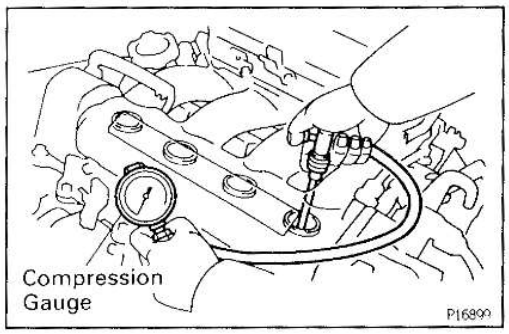
(a) Remove the 3 bolts, and disconnect the high–tension cord clamp from the ACIS valve.



(b) Disconnect the high – tension cords at the rubber boot. Do not pull on the high–tension cords.
NOTICE: Pulling on or bending the cords may damage the conductor inside.



4. **REMOVE SPARK PLUGS**
Using SST, remove the 4 spark plugs.
SST 09155–16100



5. CHECK 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.

HINT: Always use a fully charged battery to obtain engine speed of 250 rpm or more.

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

NOTICE: This measurement must be done in as short a time as possible.

Compression pressure:

1,324 kPa (13.5 kgf/cm², 192 psi) or more

Minimum pressure:

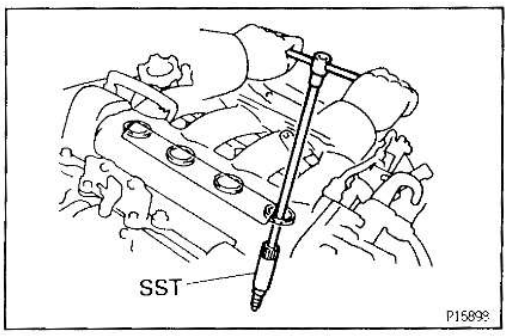
1,079 kPa (11.0 kgf/cm², 156 psi)

Difference between each cylinder:

98 kPa (1.0 kgf/cm², 14 psi) or less

(e) If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) through (c) for cylinders with low compression.

- If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged.
- If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.

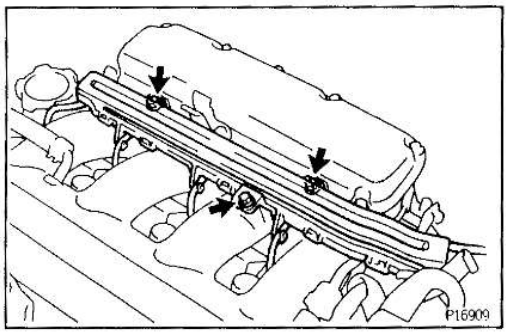


6. REINSTALL SPARK PLUGS

Using SST, install the 4 spark plugs.

SST 09155–16100

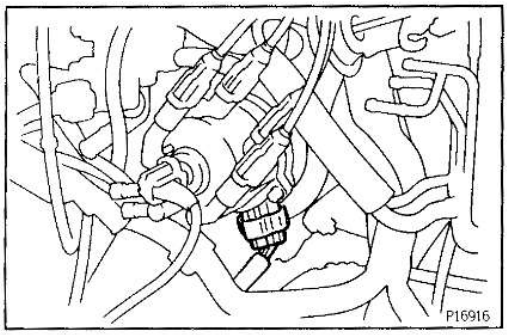
Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)



7. RECONNECT HIGH–TENSION CORDS TO SPARK PLUGS

(a) Connect the 4 high–tension cords to the spark plugs.

(b) Install the high–tension cord clamp with the 3 bolts.

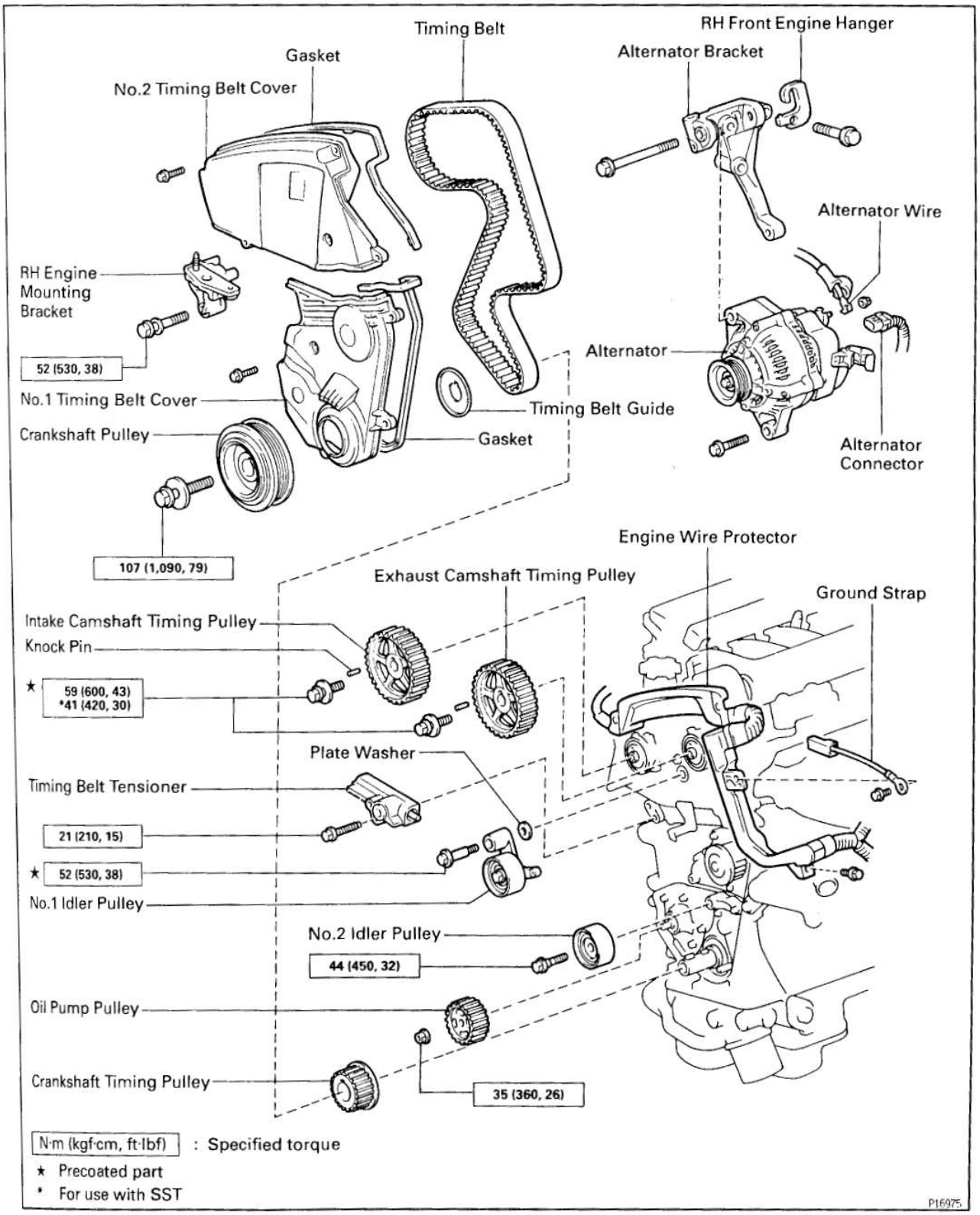


8. RECONNECT DISTRIBUTOR CONNECTOR

TIMING BELT

COMPONENTS FOR REMOVAL AND INSTALLATION (ST202)

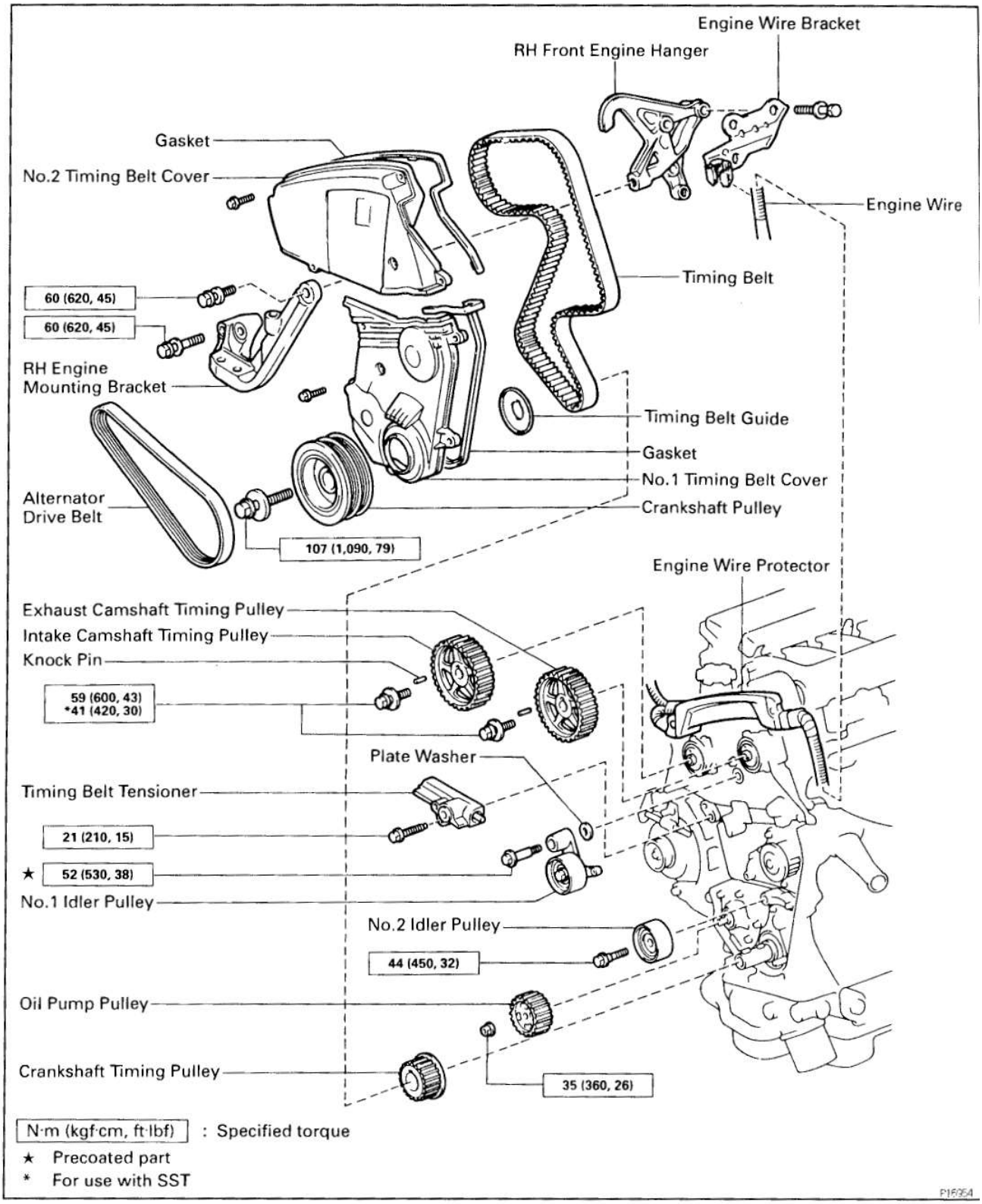
EG42N-01



EG42F-01

COMPONENTS FOR REMOVAL AND INSTALLATION (SW20)

EG



N·m (kgf·cm, ft·lbf) : Specified torque

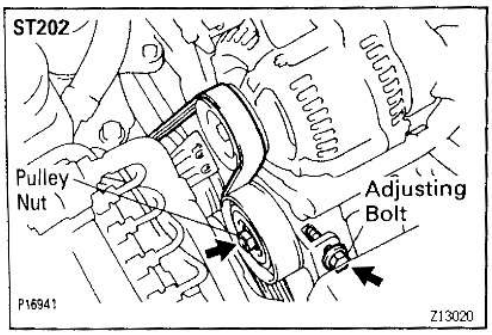
★ Precoated part

* For use with SST

P16264

EG420-01

TIMING BELT REMOVAL



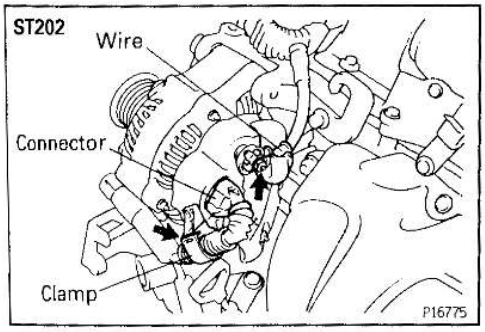
(See Components for Removal and Installation)

1. **ST202:**
   REMOVE ALTERNATOR

(a) Loosen the pulley nut and adjusting bolt.

(b) Remove the drive belt.

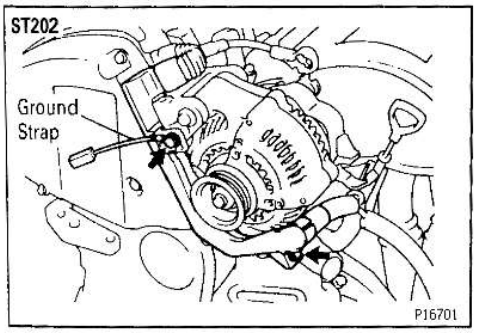
EG



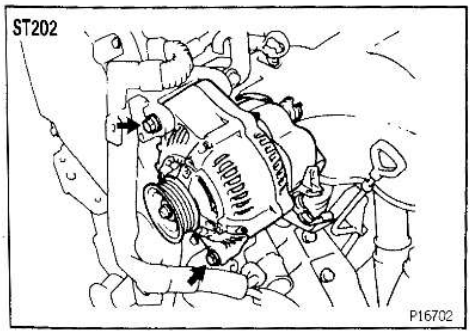
(c) Disconnect the wire from the clamp on the rear end cover.

(d) Disconnect the alternator connector.

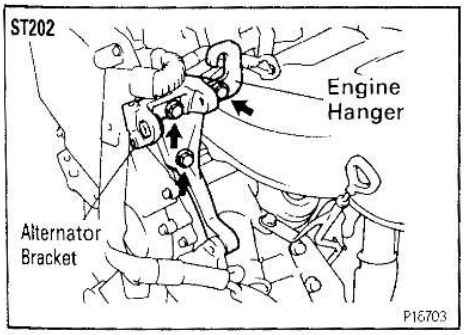
(e) Remove the rubber cap and nut, and disconnect the alternator wire.



(f) Remove the 2 bolts and ground strap, and disconnect the engine wire protector from the brackets.

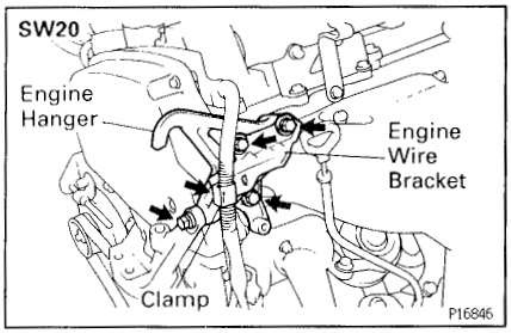


(g) Remove the 2 bolts and alternator.



2. **ST202:**
   REMOVE RH FRONT ENGINE HANGER AND ALTERNATOR BRACKET

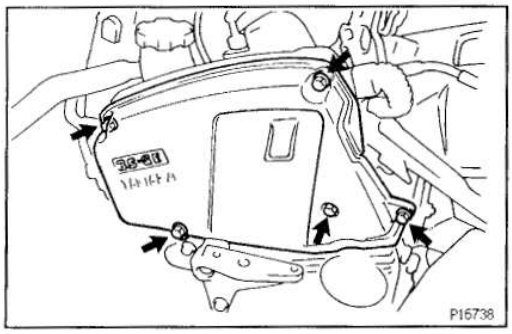
   Remove the 3 bolts, engine hanger and alternator bracket.



3. SW20:
REMOVE RH FRONT ENGINE HANGER AND ENGIN WIRE BRACKET

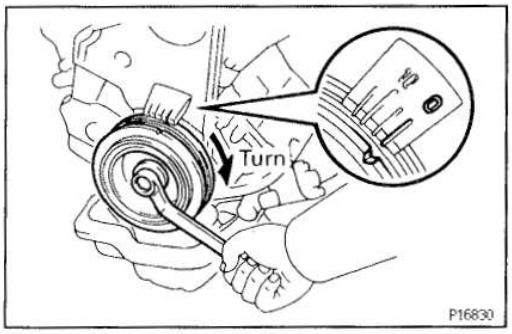
(a) Disconnect the engine wire from the clamp on th wire bracket.

(b) Remove the 4 bolts, wire bracket and engine hange



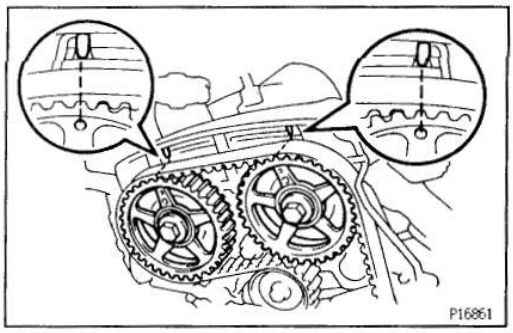
4. REMOVE NO.2 TIMING BELT COVER

Remove the 5 bolts, timing belt cover and gasket.

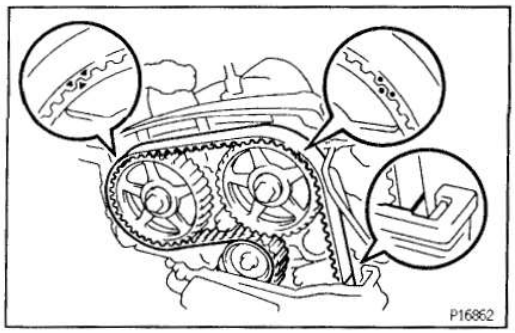


5. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark "0" of the No.1 timing belt cover.

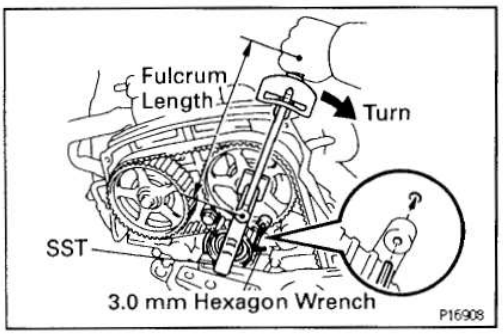


(b) Check that the timing marks of the camshaft timing *pulleys are aligned with the timing* marks of the No.4 timing belt cover.
If not, turn the crankshaft 1 revolution (360°).



6. DISCONNECT TIMING BELT FROM CAMSHAFT TIMING PULLEYS

HINT (Re—using timing belt): Place matchmarks on the timing belt and camshaft timing pulleys, and place a matchmark on the timing belt to match the end of the No.1 timing belt cover.



(a) Turn the No.1 idler pulley bolt to obtain the specified torque or less, and align the holes of the pulley bracket and cylinder head, pass a 3.0 mm hexagon wrench through the holes to keep the setting position of the pulley bracket.

Torque:

69 N·m (700 kgf·cm, 51 ft·lbf)

48 N·m (490 kgf·cm, 35 ft·lbf) for SST

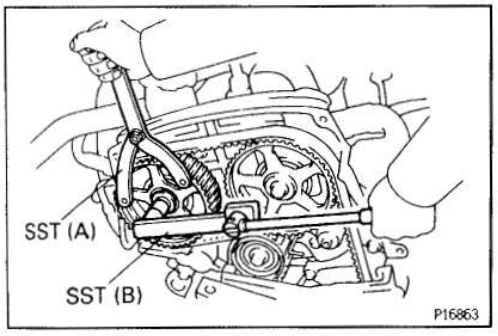
EG

HINT (On vehicle):

- Use SST.

SST 09249–63010

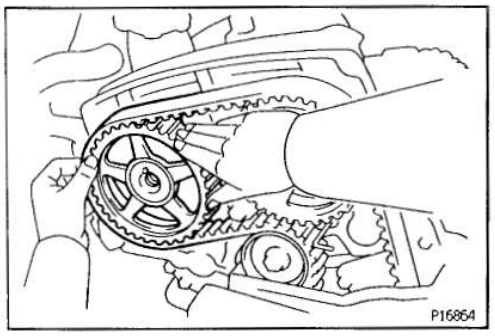
- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).



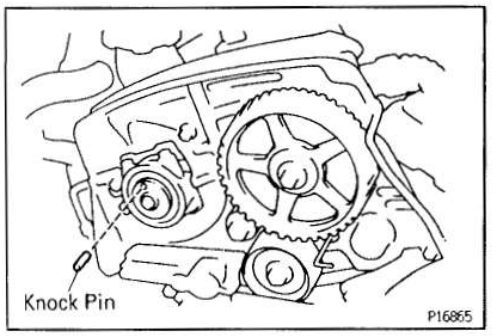
(b) Using SST, loosen the intake camshaft timing pulley bolt.

SST 09960–10010 (09962–01000, 09963–01000)

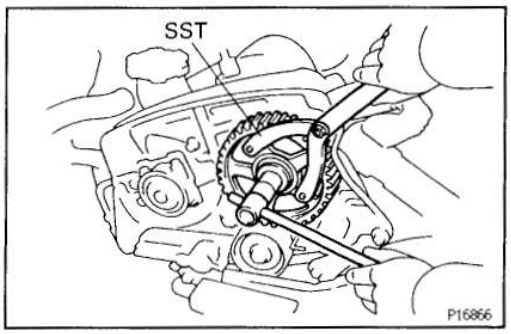
(c) Remove the intake camshaft timing pulley bolt.



(d) Disconnect the intake camshaft timing pulley together with the timing belt from the camshaft, and remove the intake camshaft timing pulley.



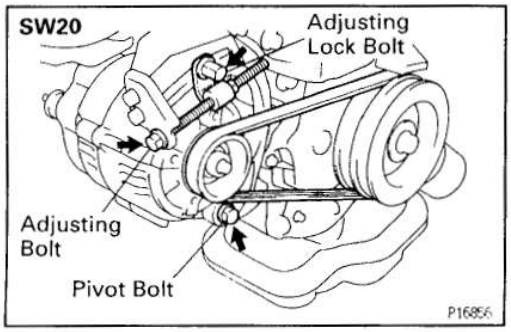
(e) Remove the knock pin from the intake camshaft.



7. REMOVE EXHAUST CAMSHAFT TIMING PULLEY

(a) Using SST, loosen the pulley bolt.
SST 09960—10010 (09962—01000, 09963—01000)

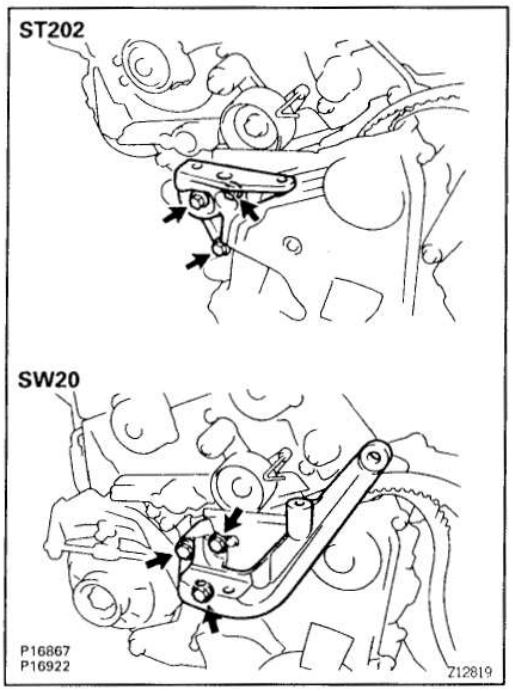
(b) Remove the bolt, timing pulley and knock pin.



8. SW20:
REMOVE ALTERNATOR DRIVE BELT

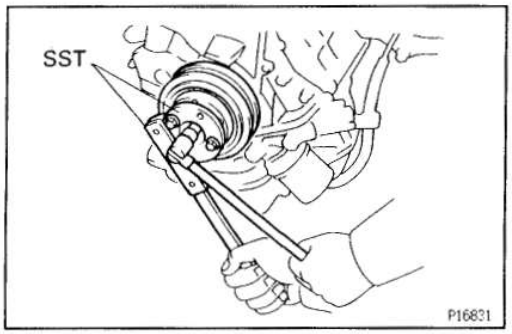
(a) Loosen the adjusting lock bolt and pivot bolt.

(b) Loosen the adjusting bolt, and remove the drive belt.



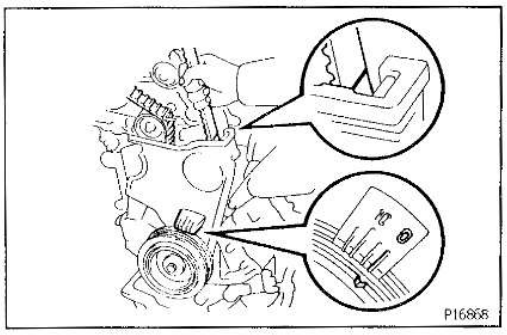
9. REMOVE RH ENGINE MOUNTING BRACKET

Remove the 3 bolts and mounting bracket.



10. REMOVE CRANKSHAFT PULLEY

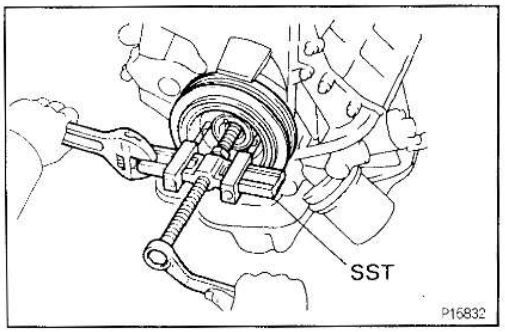
(a) Using SST, loosen the pulley bolt.
SST 09213—54015 (90119—08216 for ST202, 91651—60855 for SW20), 09330—00021



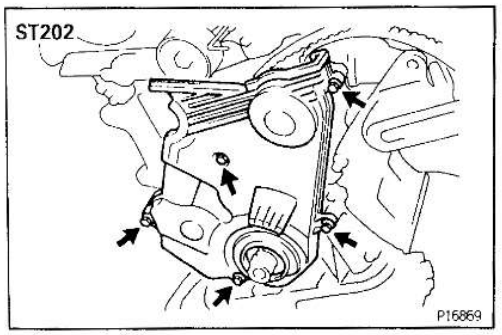
HINT (When re—using timing belt): After loosening the crankshaft pulley bolt, check that the timing belt matchmark aligns with the end of the No.1 timing belt cover when the crankshaft pulley groove is aligned with the timing mark "0" of the No.1 timing belt cover.

(b) Remove the pulley bolt.

EG

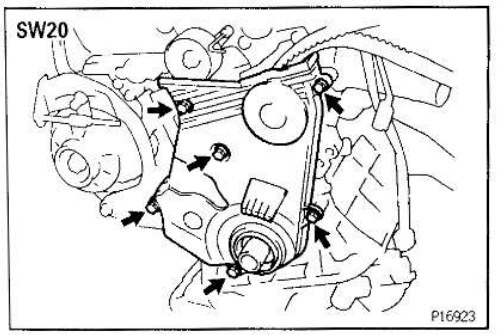


(c) Using SST, remove the pulley.
SST 09950—50010 (09951—05010, 09952—05010, 09953—05010, 09953—05020, 09954—05020)
HINT (When re—using timing belt): Remove the pulley without turning it.

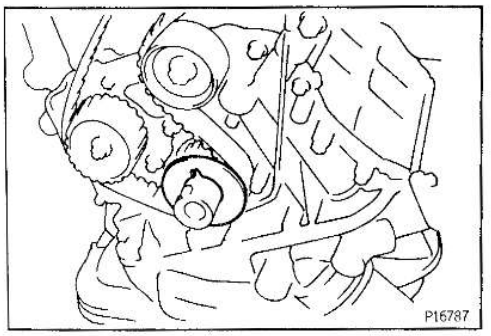


11. REMOVE NO.1 TIMING BELT COVER

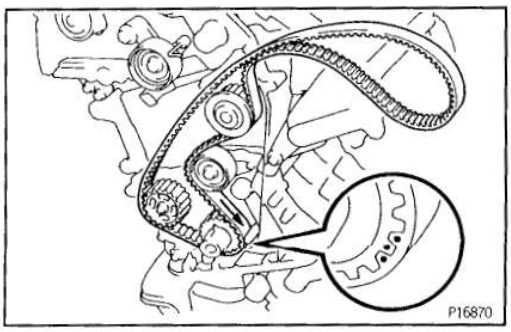
ST202:
Remove the 5 bolts, timing belt cover and gasket.



SW20:
Remove the 6 bolts, timing belt cover and gasket.

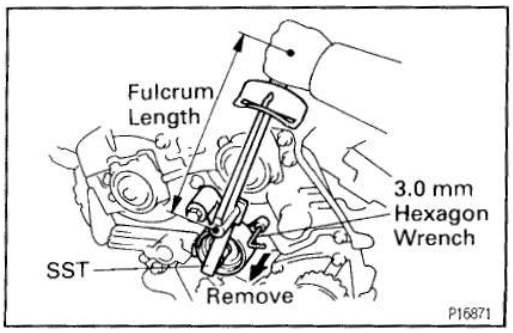


12. REMOVE TIMING BELT GUIDE



13. REMOVE TIMING BELT

HINT (When re–using timing belt): Draw a direction arrow on the timing belt (in the direction of engine revolution), and place matchmarks on the timing belt and crankshaft timing pulley.



14. REMOVE NO.1 IDLER PULLEY

(a) Turn the No.1 idler pulley bolt to obtain the specified torque or less, and remove the 3.0 mm hexagon wrench.

Torque:

69 N·m (700 kgf·cm, 51 ft·lbf)

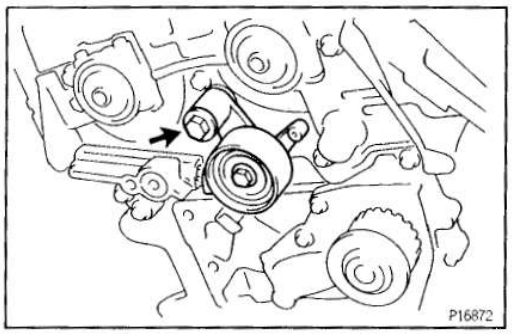
48 N·m (490 kgf·cm, 35 ft·lbf) for SST

HINT (On vehicle):

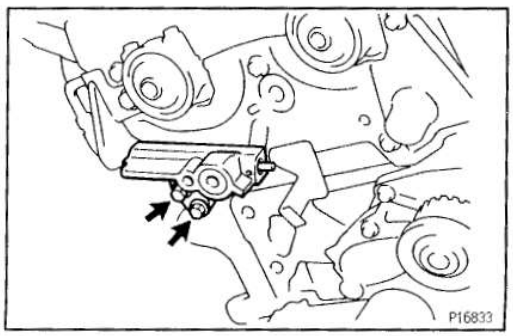
- Use SST.

SST 09249–63010

- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

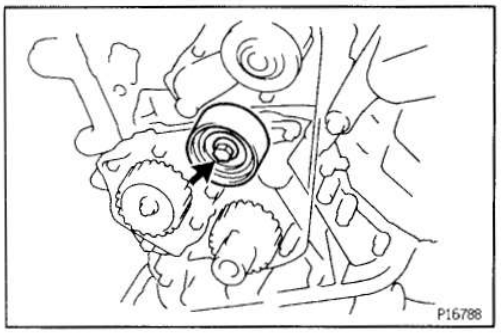


(b) Remove the pivot bolt, pulley and plate washer.



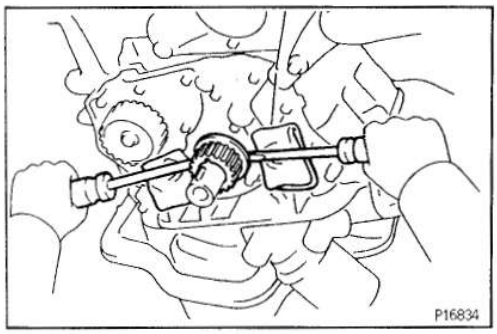
15. REMOVE TIMING BELT TENSIONER

Remove the 2 bolts and tensioner.



16. REMOVE NO.2 IDLER PULLEY

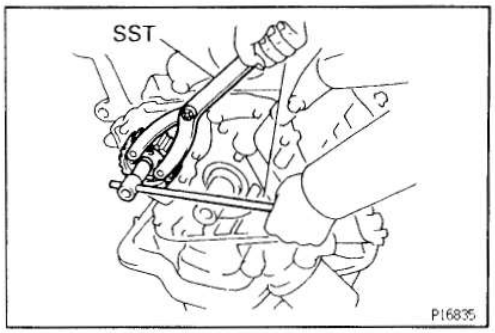
Remove the bolt and pulley.



17. REMOVE CRANKSHAFT TIMING PULLEY

If the pulley cannot be removed by hand, use 2 screwdrivers.

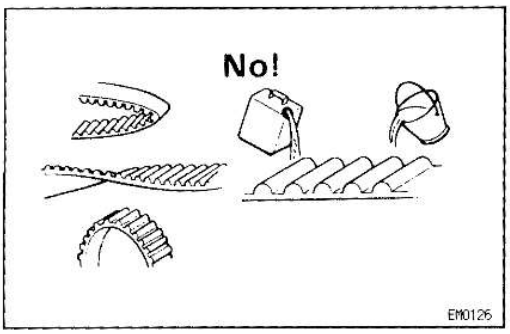
HINT: Position shop rags as shown to prevent damage.



18. REMOVE OIL PUMP PULLEY

(a) Using SST, loosen the pulley nut.
SST 09960—10010 (09962—01000, 09963—00500)

(b) Remove the nut and pulley.



TIMING BELT COMPONENTS INSPECTION

EG0W9–

1. INSPECT TIMING BELT

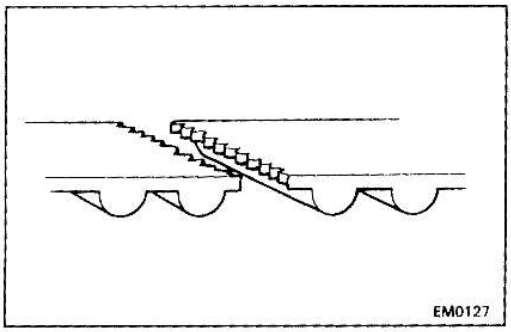
NOTICE:

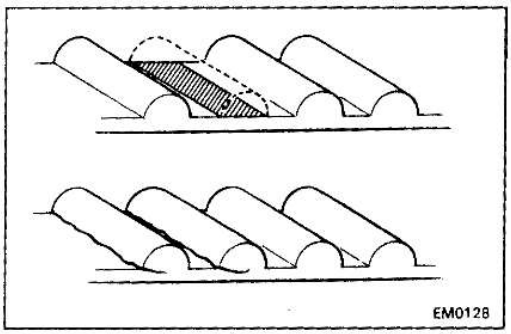
- **Do not bend, twist or turn the timing belt inside out.**
- **Do not allow the timing belt to come into contact with oil, water or steam.**
- **Do not utilize timing belt tension when installing or removing the mounting bolt of the camshaft timing pulley.**

If there are any defects as shown in the illustration, check the following points:

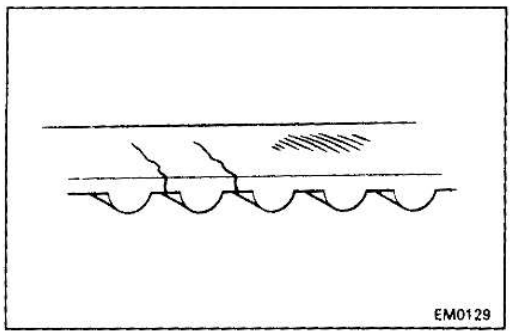
(a) Premature parting

- Check proper installation.
- Check the timing cover gasket for damage and proper installation.

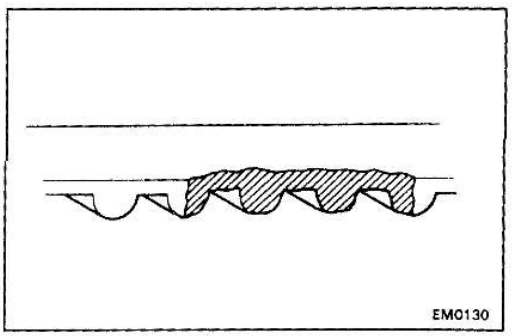




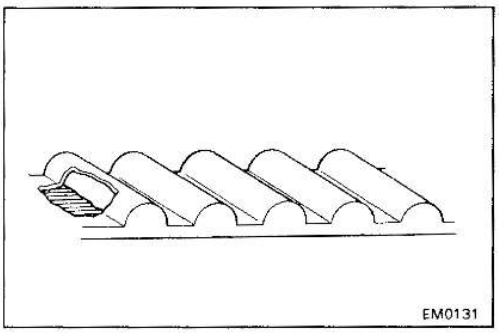
(b) If the belt teeth are cracked or damaged, check to see if either camshaft or water pump is locked.



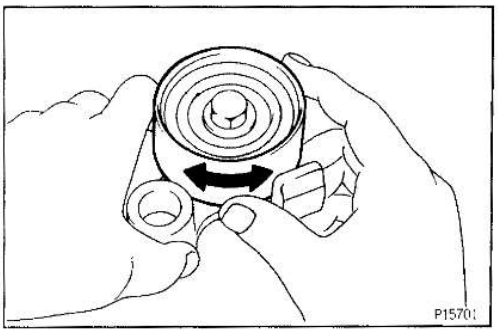
(c) If there is noticeable wear or cracks on the belt face, check to see if there are nicks on the side of the idler pulley lock.



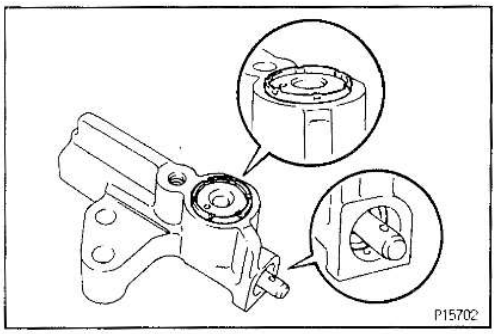
(d) If there is wear or damage on only one side of the belt, check the belt guide and the alignment of each pulley.



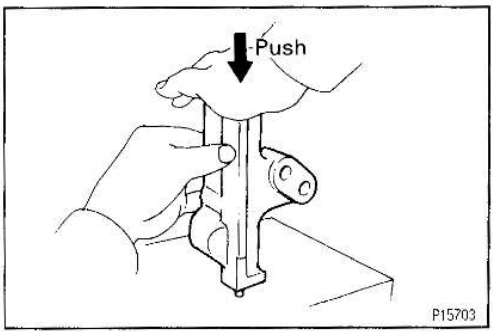
(e) If there is noticeable wear on the belt teeth, check the timing cover for damage and check that the gasket has been installed correctly. Check for foreign material on the pulley teeth.
If necessary, replace the timing belt.



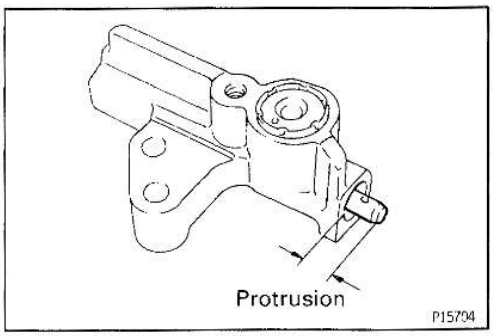
2. INSPECT IDLER PULLEYS
Check that the idler pulley turns smoothly.
If necessary, replace the idler pulley.



3. INSPECT TIMING BELT TENSIONER
(a) Visually check tensioner for leakage.
HINT: A small trace of oil on the push rod seal is permissible.
If leakage is found, replace the tensioner.

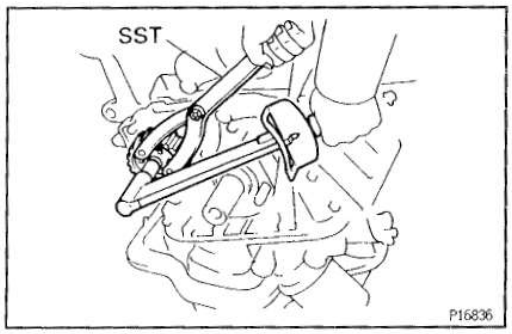


(b) Hold the tensioner with both hands, and push the push rod firmly against the floor or wall to check that it doesn't move.
If push rod moves, replace the tensioner.



(c) Measure the protrusion of the push rod from the housing end.
Protrusion:
10.0 – 11.0 mm (0.394 – 0.433 in.)
If the protrusion is not as specified, replace the tensioner.

EG



EG42R-01

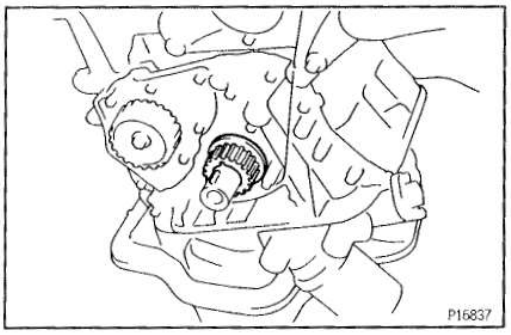
TIMING BELT INSTALLATION

(See Components for Removal and Installation)

1. INSTALL OIL PUMP PULLEY

(a) Align the cutouts of the pulley and shaft, and slide on the pulley.

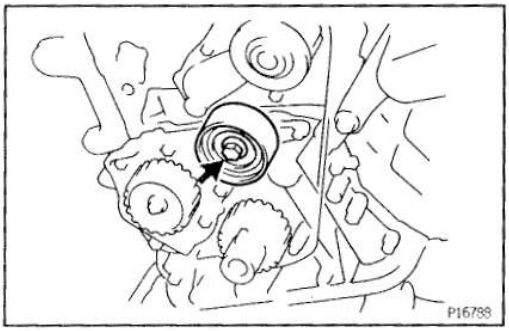
(b) Using SST, install the pulley nut.
SST 09960–10010 (09962–01000, 09963–00500)
Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)



2. INSTALL CRANKSHAFT TIMING PULLEY

(a) Align the timing pulley set key with the key groove of the pulley.

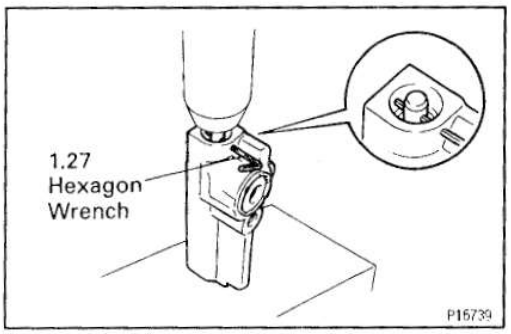
(b) Slide on the timing pulley, facing the flange side inward.



3. INSTALL NO.2 IDLER PULLEY

(a) Install the pulley with the bolt.
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

(b) Check that the idler pulley moves smoothly.

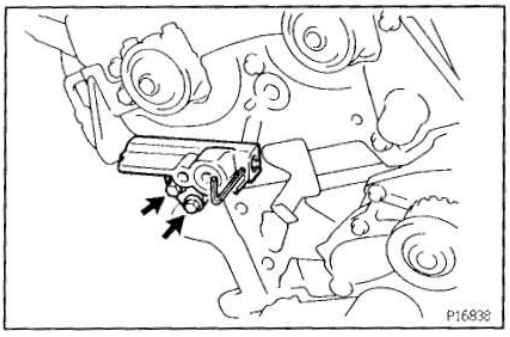


4. SET TIMING BELT TENSIONER

(a) Using a press, slowly press in the push rod using 981 – 9,807 N (100 – 1,000 kgf, 220 – 2,205 lbf) of force.

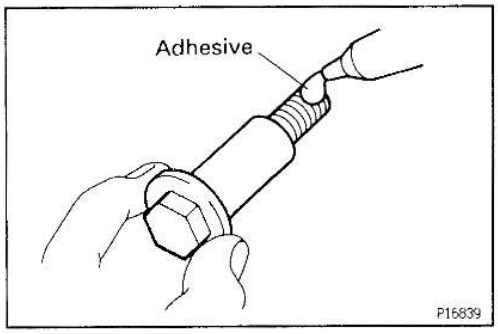
(b) Align the holes of the push rod and housing, pass a 1.27 mm hexagon wrench through the holes to keep the setting position of the push rod.

(c) Release the press.



5. INSTALL TIMING BELT TENSIONER

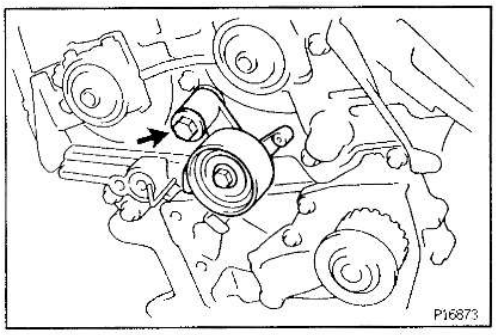
Install the tensioner with the 2 bolts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)



6. INSTALL NO.1 IDLER PULLEY

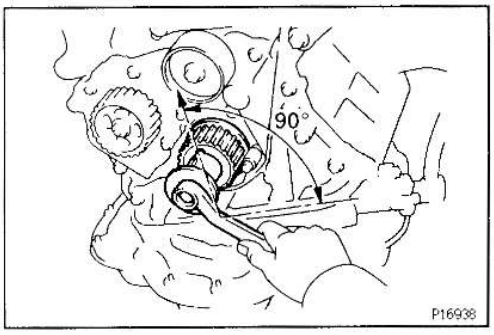
(a) Apply adhesive to 2 or 3 threads of the pivot bolt.
Adhesive:
Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

EG



(b) Install the plate washer and pulley with the pivot bolt.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

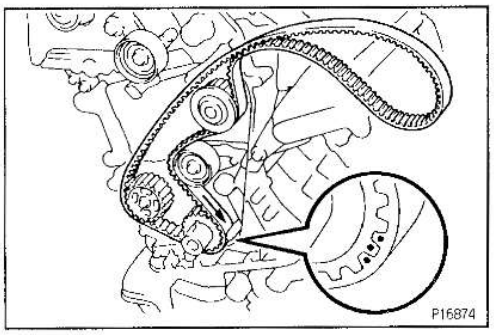
(c) Check that the idler pulley moves smoothly.



7. TEMPORARILY INSTALL TIMING BELT

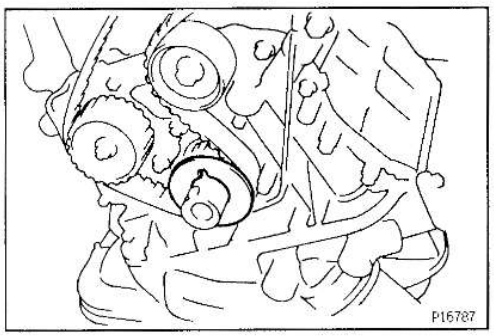
NOTICE: The engine should be cold.

(a) Using the crankshaft pulley bolt, turn the crankshaft and position the key groove of the crankshaft timing pulley as shown in the illustration.



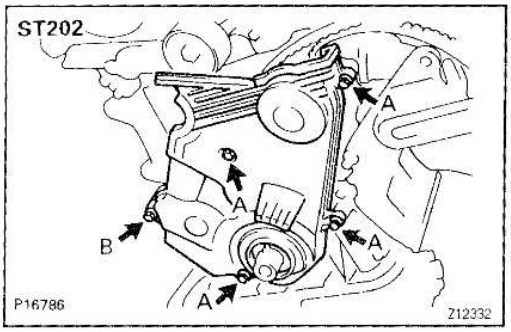
(b) Remove any oil or water on the crankshaft pulley, oil pump pulley, water pump pulley and No.2 idler pulley, and keep them clean.

(c) Install the timing belt on the crankshaft timing pulley, oil pump pulley, No.2 idler pulley and water pump pulley.
HINT (When re–using timing belt): Align the points marked during removal, and install the belt with the arrow pointing in the direction of engine revolution.



8. INSTALL TIMING BELT GUIDE

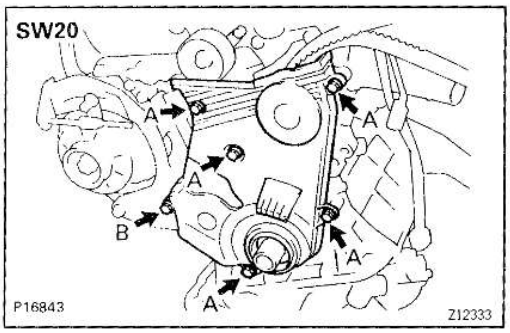
Install the guide, facing the cup side outward.



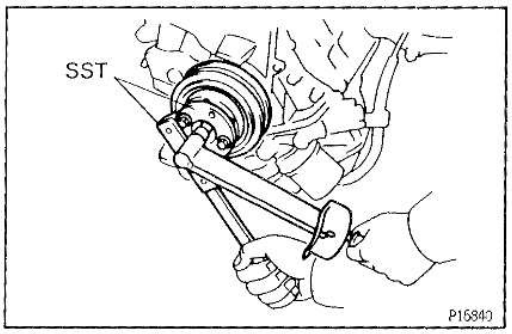
9. INSTALL NO.1 TIMING BELT COVER

(a) Install the gasket to the timing belt cover.

(b) ST202:
Install the timing belt cover with the 5 bolts.
HINT: Each bolt length is indicated in the illustration.
Bolt length:
A 20 mm (0.79 in.)
B 42 mm (1.65 in.)



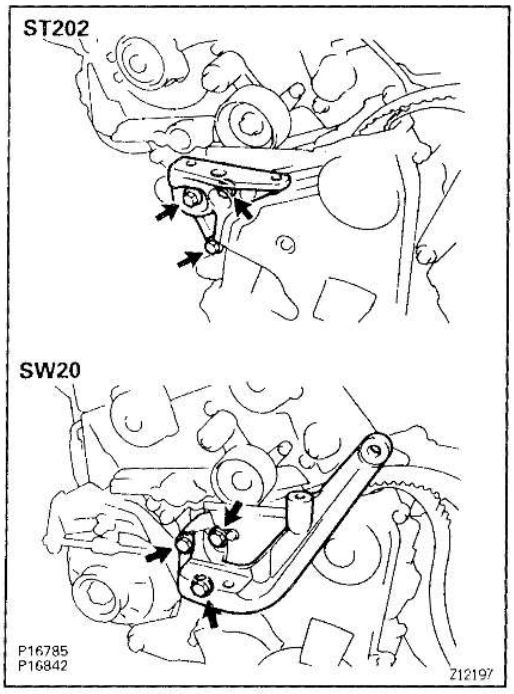
(b) SW20:
Install the timing belt cover with the 6 bolts.
HINT: Each bolt length is indicated in the illustration.
Bolt length:
A 20 mm (0.79 in.)
B 42 mm (1.65 in.)



10. INSTALL CRANKSHAFT PULLEY

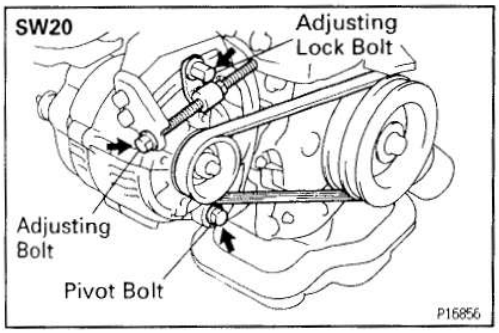
(a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.

(b) Using SST, install the pulley bolt.
SST 09213–54015 (90119–08216 for ST202, 91651–60855 for SW20), 09330–00021
Torque: 107 N·m (1,090 kgf·cm, 79 ft·lbf)



11. INSTALL RH ENGINE MOUNTING BRACKET

Install the mounting bracket with the 3 bolts.
Torque:
ST202
52 N·m (530 kgf·cm, 38 ft·lbf)
SW20
60 N·m (620 kgf·cm, 45 ft·lbf)



12. SW20:
INSTALL ALTERNATOR DRIVE BELT

(a) Install the drive belt with the adjusting bolt.

(b) Tighten the pivot bolt and adjusting lock bolt.

Torque:

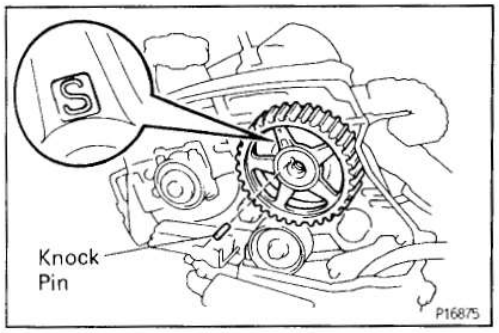
Pivot bolt

52 N·m (530 kgf·cm, 38 ft·lbf)

Adjusting lock bolt

19 N·m (190 kgf·cm, 14 ft·lbf)

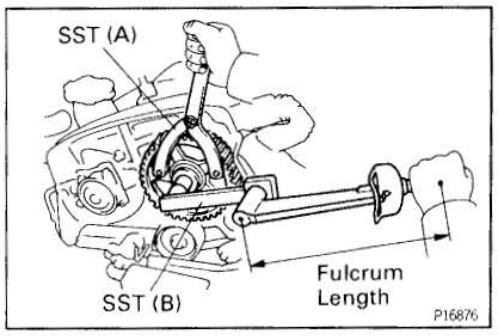
EG



13. INSTALL EXHAUST CAMSHAFT TIMING PULLEY

(a) Slide the timing pulley onto the camshaft, facing mark "S" outward.

(b) Align the pin holes of the camshaft and timing pulley, and insert the knock pin.



(c) Using SST (A), install the pulley bolt.

SST 09960–10010 (09962–01000, 09963–01000)

Torque:

59 N·m (600 kgf·cm, 43 ft·lbf)

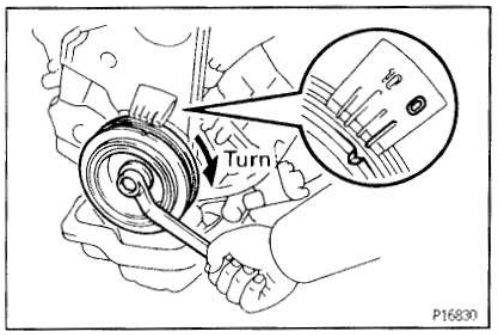
41 N·m (420 kgf·cm, 30 ft·lbf) for SST

HINT (On vehicle):

- Use SST (B).

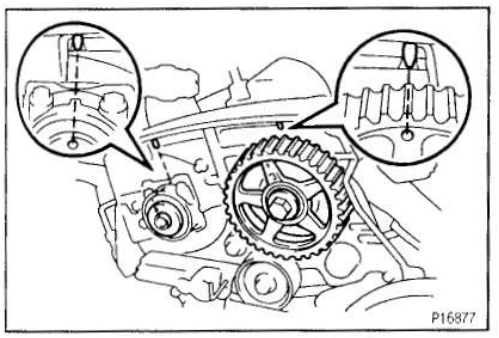
SST 09249–63010

- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).



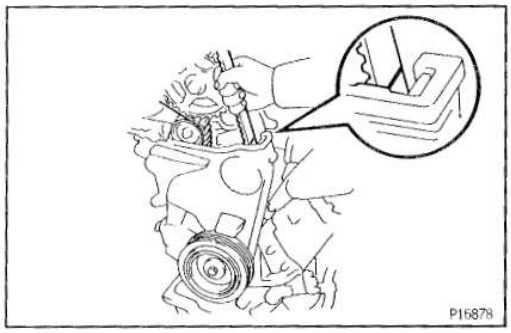
14. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark "0" of the No.1 timing belt cover.



(b) Intake Camshaft Position:
Turn the camshaft, align the knock pin hole of the camshaft with the timing mark of the No.4 timing belt cover.

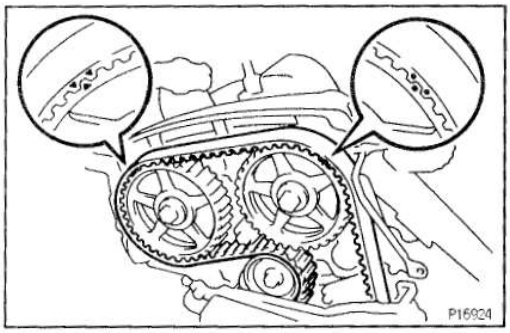
(c) Exhaust Camshaft Timing Pulley Position:
Turn the camshaft timing pulley, align the timing marks of the camshaft timing pulley and No.4 timing belt cover.



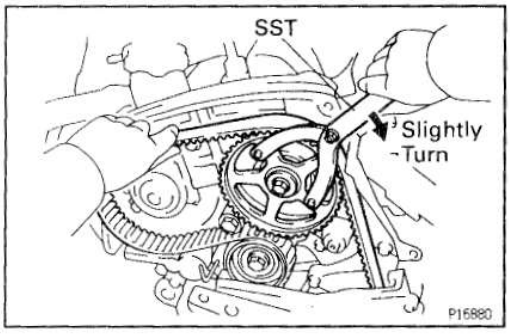
15. CONNECT TIMING BELT TO CAMSHAFT TIMING PULLEYS

HINT (When re–using timing belt):

- Check that the matchmark on the timing belt matches the end of the No.1 timing belt cover.

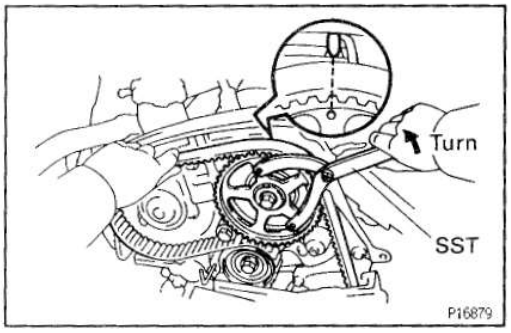


- Align the matchmarks of the timing belt and camshaft timing pulleys.



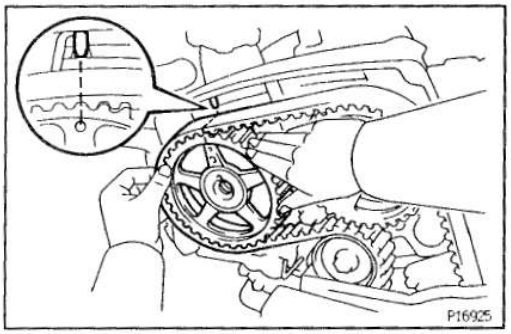
(a) Remove any oil or water on the exhaust camshaft timing pulley, and keep it clean.

(b) Using SST, slightly turn the exhaust camshaft timing pulley clockwise and hang the timing belt on the exhaust camshaft timing pulley.
SST 09960–10010 (09962–01000, 09963–01000)



(c) Using SST, align the timing marks of the exhaust camshaft pulley and No.4 timing belt cover.
SST 09960–10010 (09962–01000, 09963–01000)

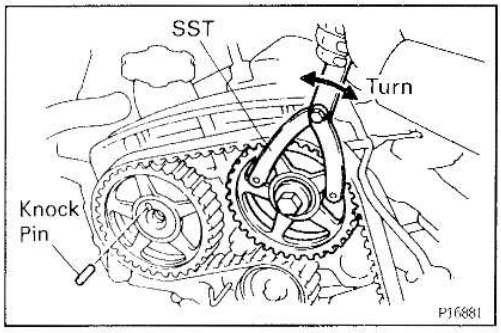
(d) Check that the timing belt has tension between the crankshaft timing pulley and exhaust camshaft timing pulley.



(e) Remove any oil or water on the intake camshaft timing pulley and No.1 idler pulley, and keep them clean.

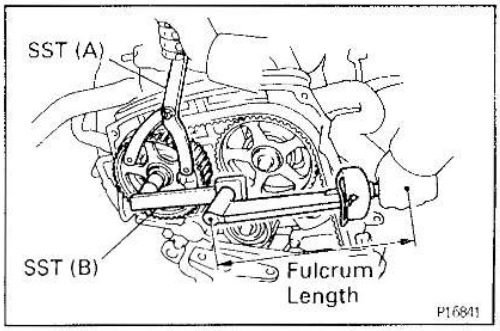
(f) Align the timing marks of the intake camshaft timing pulley and No.4 timing belt cover, and hang the timing belt on the intake camshaft timing pulley, facing mark "S" outward.

(g) Slide the intake camshaft timing pulley on the camshaft.



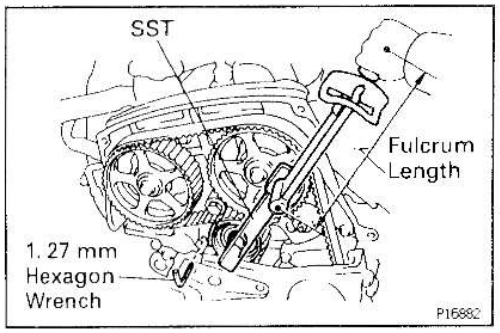
(h) Using SST, turn the exhaust camshaft timing pulley and align the knock pin hole of the camshaft with the knock pin groove of the pulley and install the knock pin.
SST 09960−10010 (09962−01000, 09963−01000)

EG



(i) Using SST (A), install the intake camshaft timing pulley bolt.
SST 09960−10010 (09962−01000, 09963−01000)
Torque:
59 N·m (600 kgf·cm, 43 ft·lbf)
41 N·m (420 kgf·cm, 30 ft·lbf) for SST
HINT (On vehicle):
- Use SST (B).

SST 09249−63010
- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

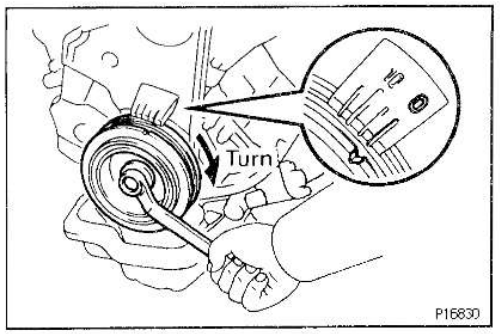


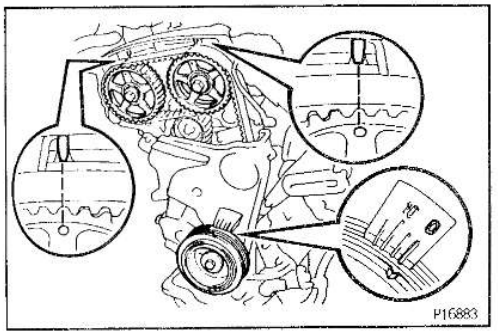
(j) Turn the No.1 idler pulley bolt to obtain the specified torque or less, remove the 1.27 mm hexagon wrench.
Torque:
69 N·m (700 kgf·cm, 51 ft·lbf)
48 N·m (490 kgf·cm, 35 ft·lbf) for SST
HINT (On vehicle):
- Use SST.

SST 09249−63010
- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

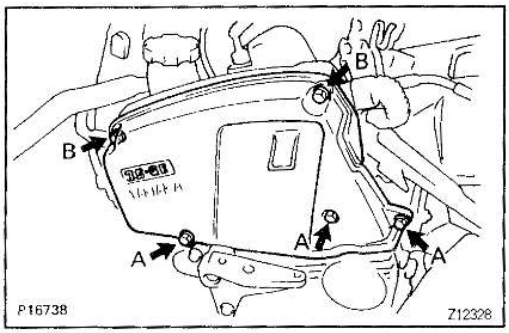
16. CHECK VALVE TIMING

(a) Slowly turn the crankshaft pulley 2 revolutions from TDC to TDC.
NOTICE: Always turn the crankshaft clockwise.





(b) Check that each pulley aligns with the timing marks as shown in the illustration.
If the timing marks do not align, remove the timing belt and reinstall it.



17. INSTALL NO.2 TIMING BELT COVER

(a) Install the gasket to the timing belt cover.

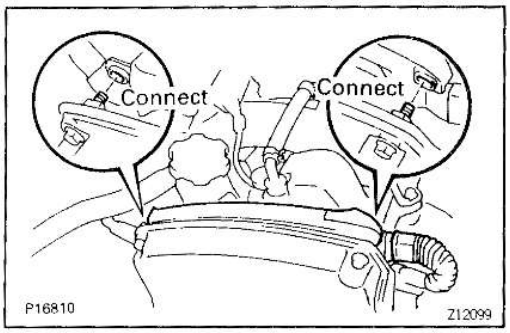
(b) Install the timing belt cover with the 5 bolts.

HINT: Each bolt length is indicated in the illustration.

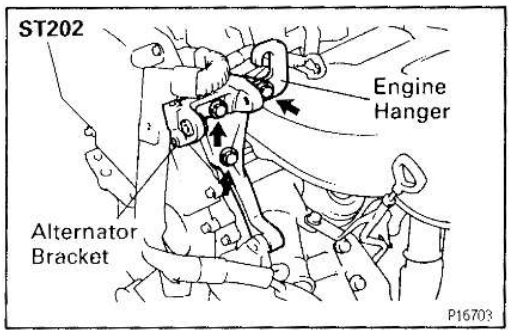
Bolt length:

A 20 mm (0.79 in.)

B 25 mm (0.98 in.)



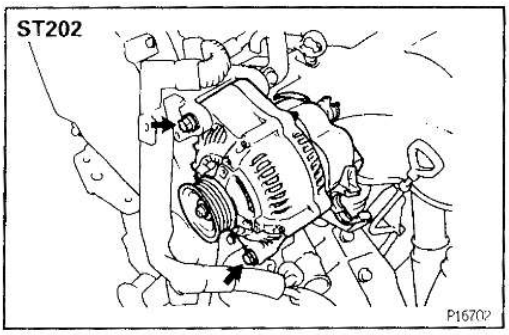
(c) Connect the 2 clamps of the engine wire protector to the 2 mounting bolts of the No.2 timing belt cover.



18. ST202:
INSTALL ALTERNATOR BRACKET AND RH FRONT ENGINE HANGER

Install the alternator bracket and engine hanger with the 3 bolts.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)



19. ST202:
INSTALL ALTERNATOR

(a) Install the alternator with the 2 bolts.

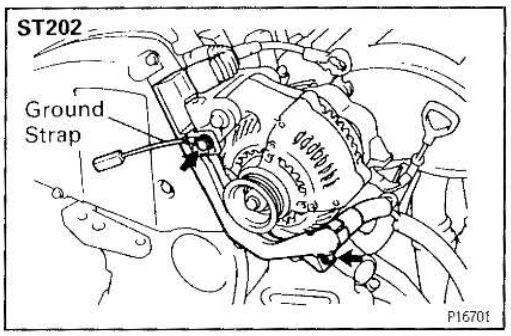
Torque:

12 mm head

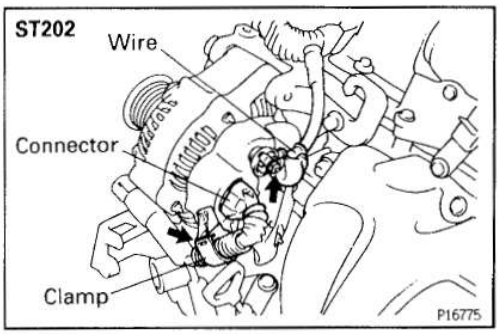
19 N·m (190 kgf·cm, 14 ft·lbf)

14 mm head

52 N·m (530 kgf·cm, 38 ft·lbf)

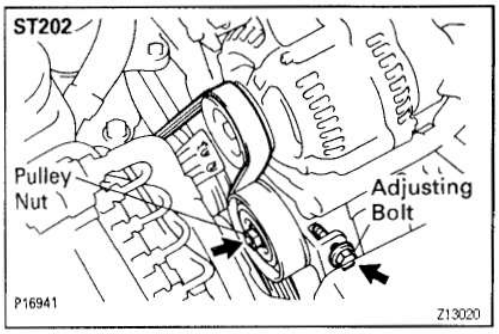


(b) Install the engine wire protector and ground strap with the 2 bolts.

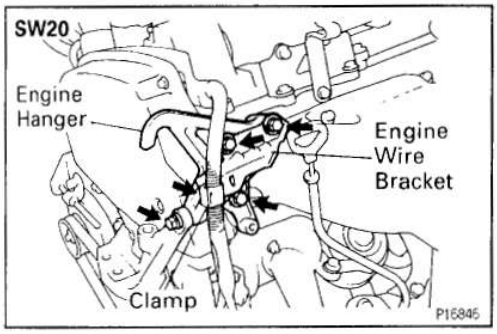


(c) Connect the alternator connector.
(d) Connect the alternator wire with the nut and rubber cap.
(e) Install the wire to the clamp on the rear end cover.

EG



(f) Install the drive belt with the adjusting bolt.
(g) Tighten the pulley nut.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)



20. SW20:
INSTALL RH FRONT ENGINE HANGER AND ENGINE WIRE BRACKET

(a) Install the engine hanger and wire bracket with the 4 bolts. Alternately tighten the bolts.
Torque:
Cylinder head side
39 N·m (400 kgf·cm, 29 ft·lbf)
RH engine mounting bracket side
60 N·m (620 kgf·cm, 45 ft·lbf)

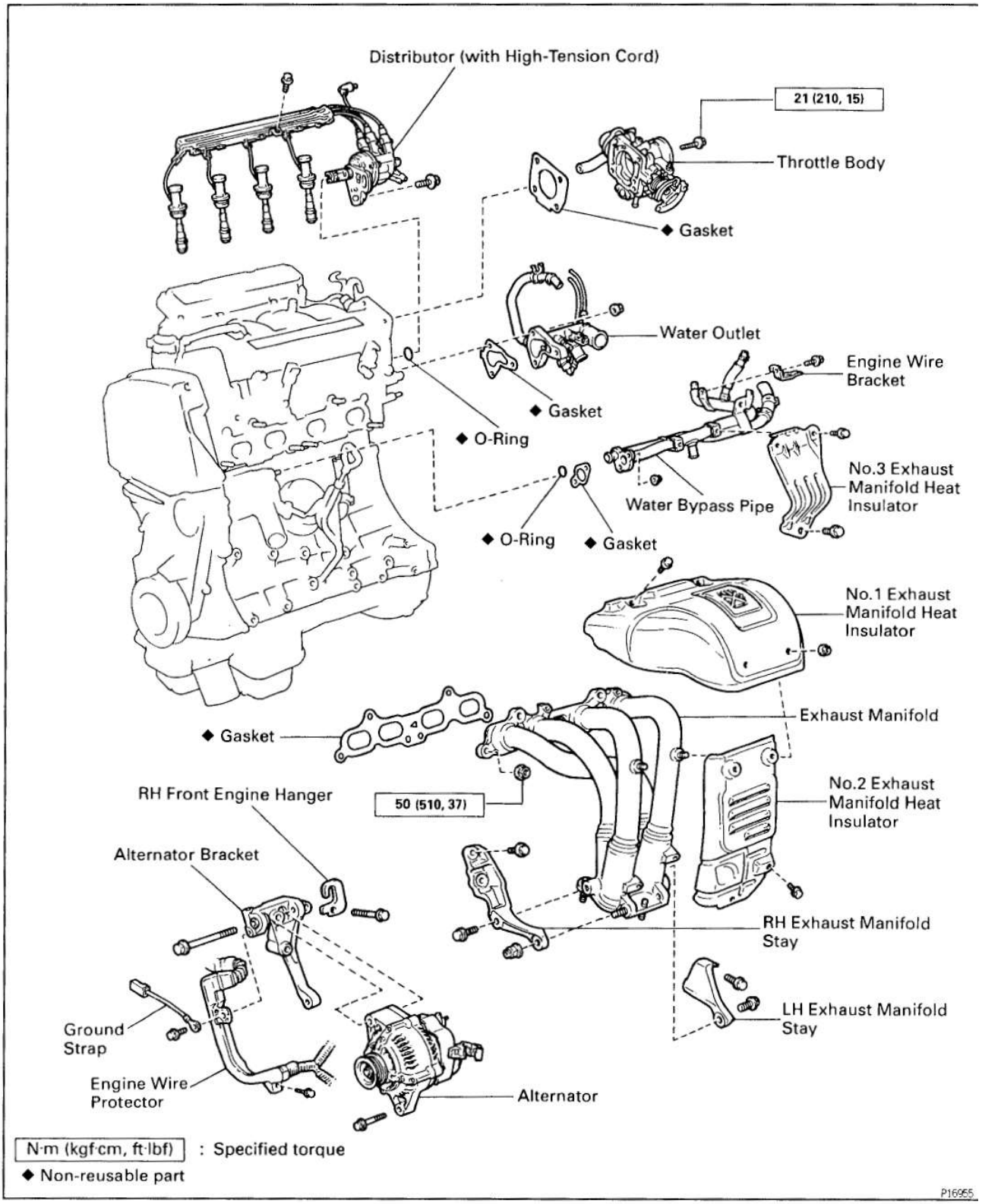
(b) Install the engine wire to the clamp on the wire bracket.

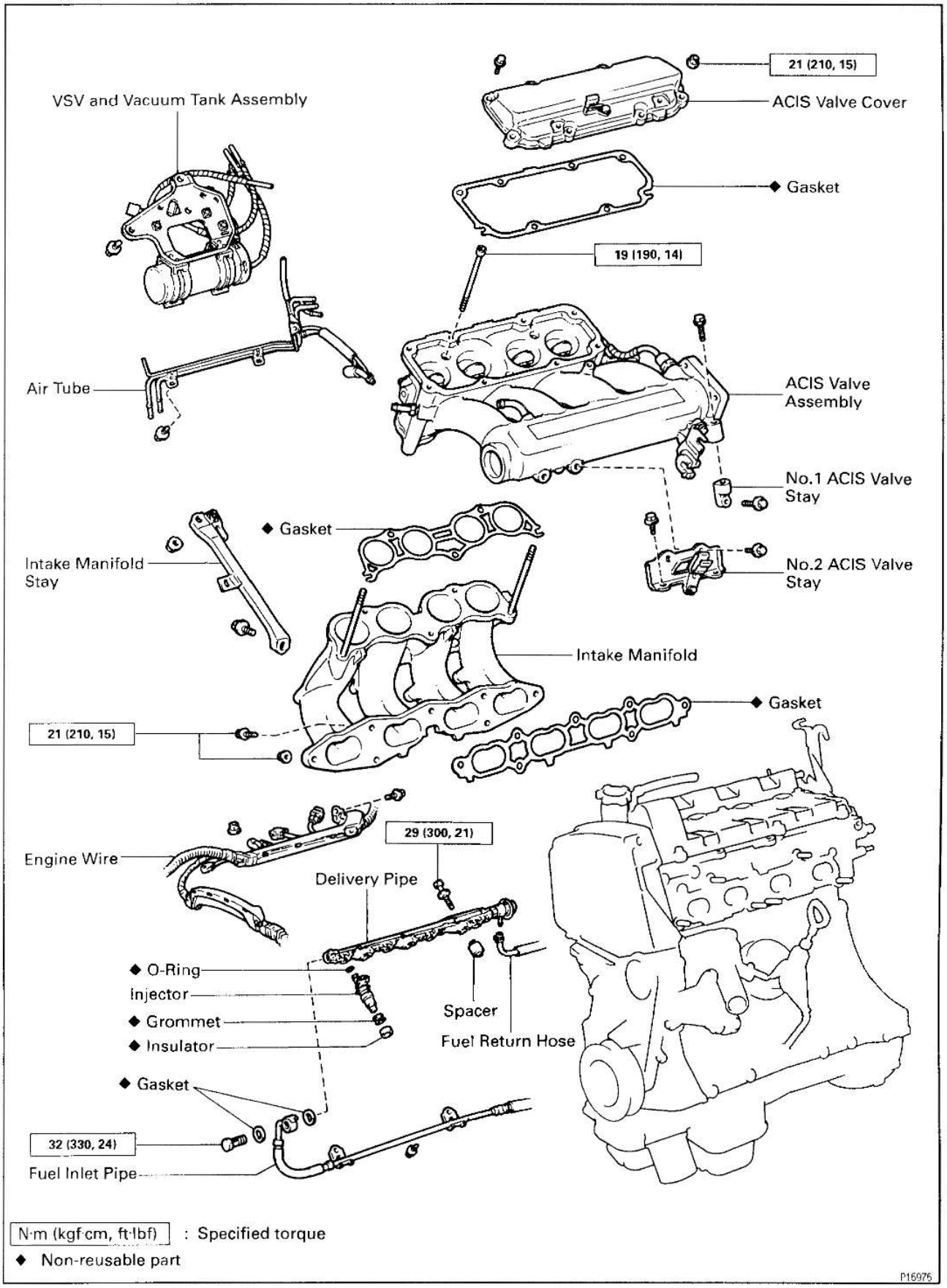
CYLINDER HEAD

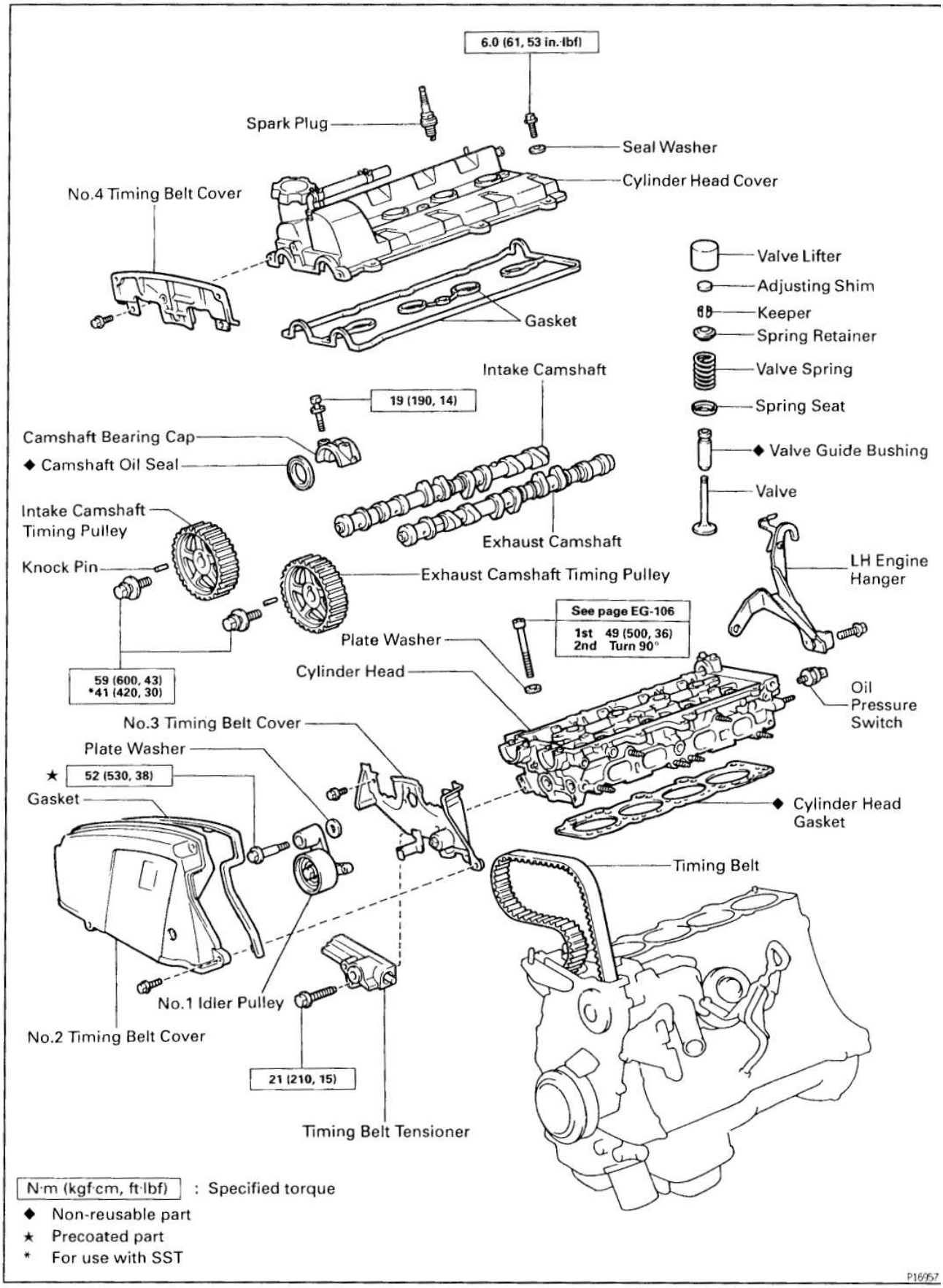
COMPONENTS FOR REMOVAL AND INSTALLATION (ST202)

EG0WC-02

EG

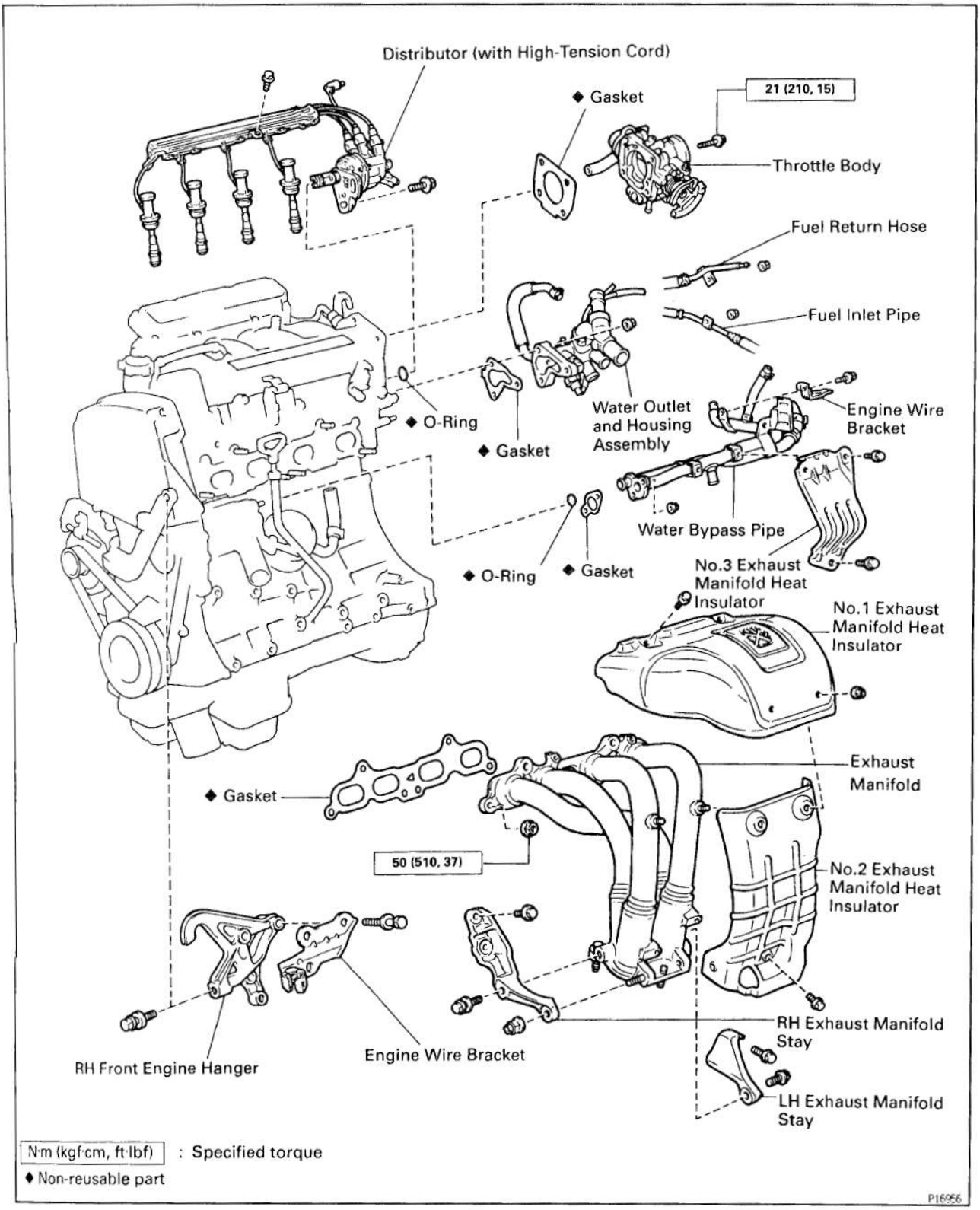


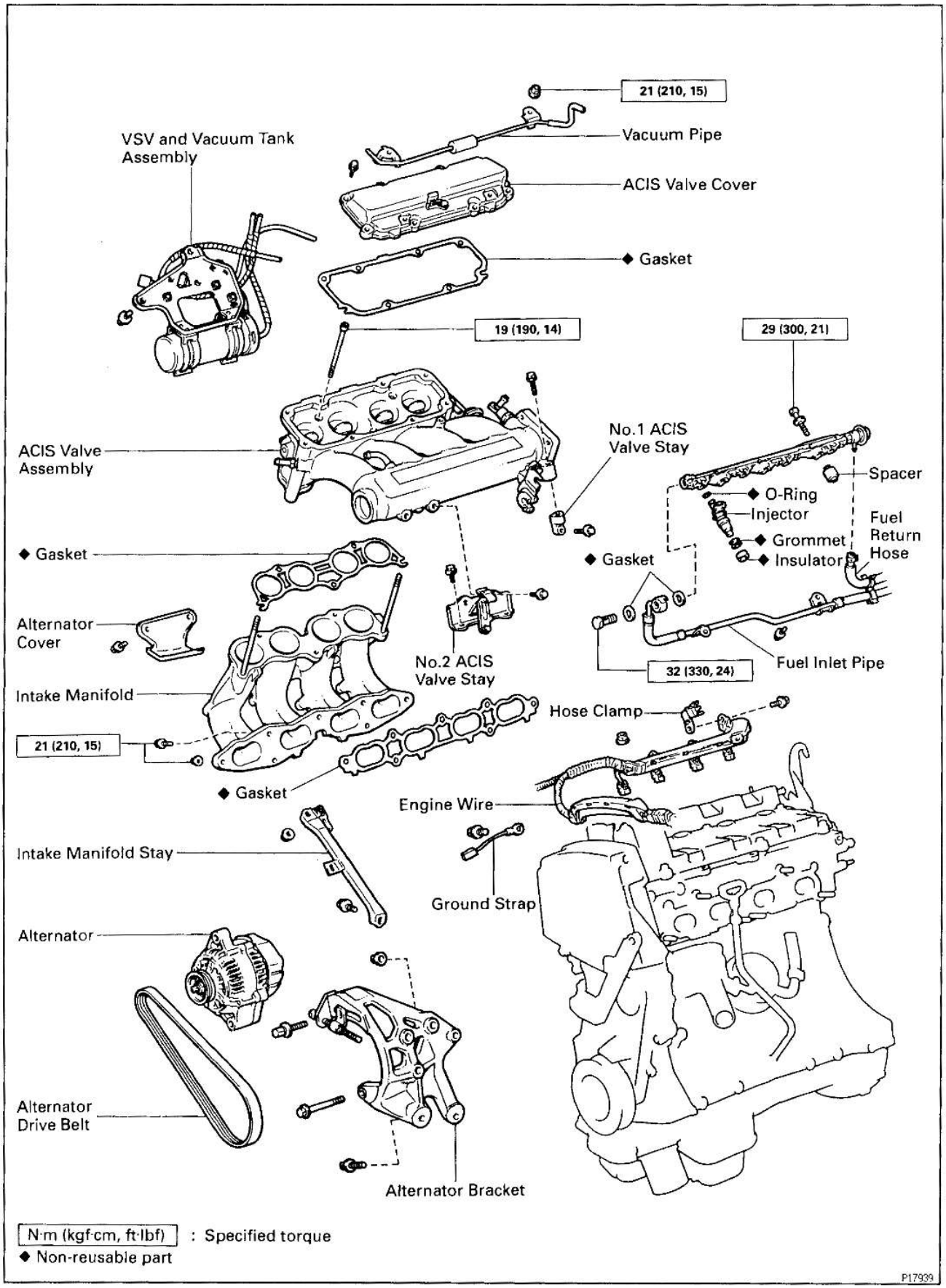

21 (210, 15)
ACIS Valve Cover
VSV and Vacuum Tank Assembly
◆ Gasket
19 (190, 14)
Air Tube
ACIS Valve Assembly
No.1 ACIS Valve Stay
No.2 ACIS Valve Stay
◆ Gasket
Intake Manifold Stay
Intake Manifold
◆ Gasket
21 (210, 15)
29 (300, 21)
Engine Wire
Delivery Pipe
◆ O-Ring
Injector
◆ Grommet
◆ Insulator
Spacer
Fuel Return Hose
◆ Gasket
32 (330, 24)
Fuel Inlet Pipe
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P15076

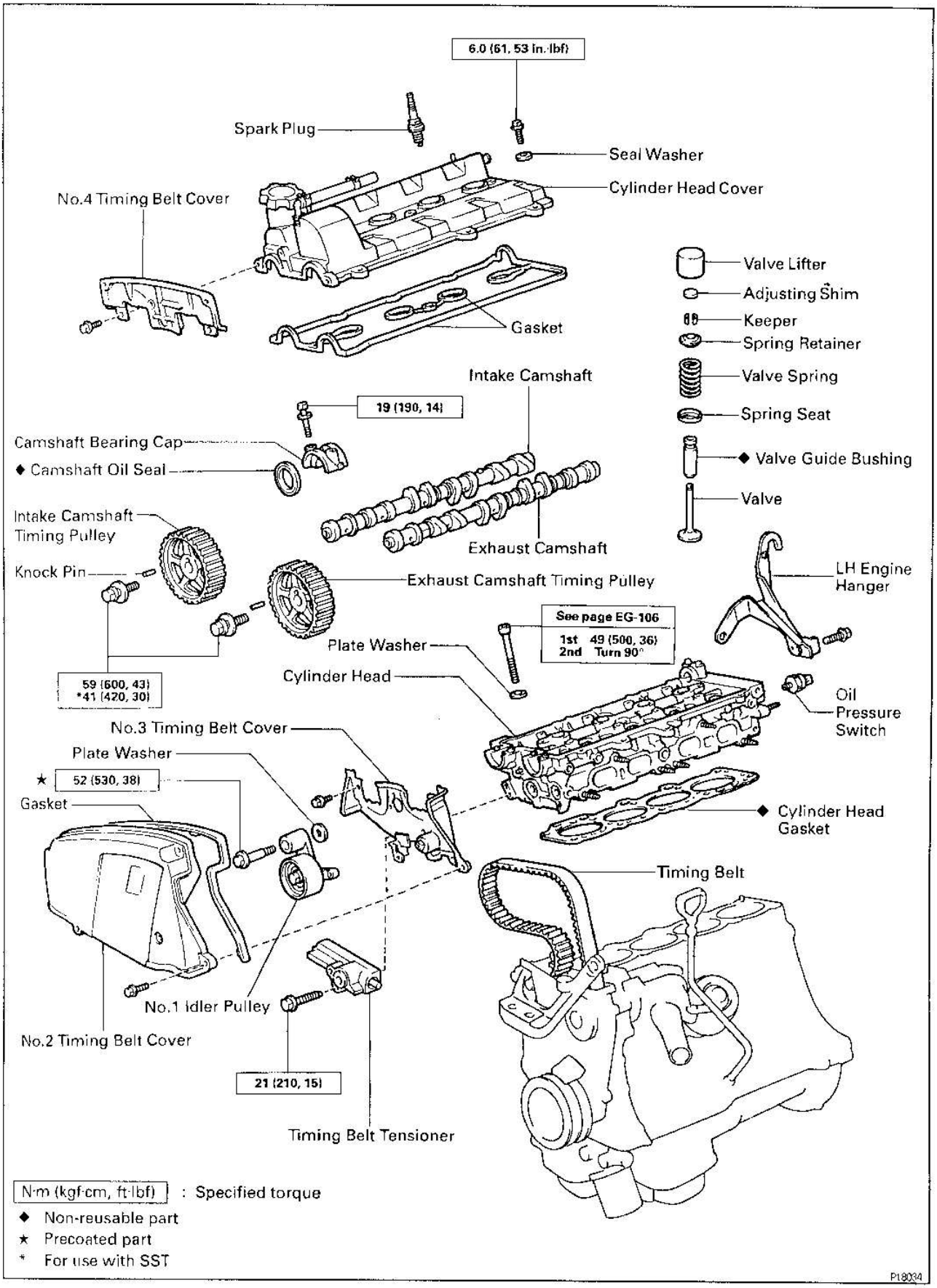

6.0 (61, 53 in.·lbf)
Spark Plug
Seal Washer
Cylinder Head Cover
No.4 Timing Belt Cover
Gasket
Valve Lifter
Adjusting Shim
Keeper
Spring Retainer
Valve Spring
Spring Seat
◆ Valve Guide Bushing
Valve
Intake Camshaft
19 (190, 14)
Camshaft Bearing Cap
◆ Camshaft Oil Seal
Intake Camshaft Timing Pulley
Knock Pin
Exhaust Camshaft
Exhaust Camshaft Timing Pulley
LH Engine Hanger
See page EG-106
1st 49 (500, 36)
2nd Turn 90°
Plate Washer
59 (600, 43)
*41 (420, 30)
Cylinder Head
Oil Pressure Switch
No.3 Timing Belt Cover
Plate Washer
★ 52 (530, 38)
Gasket
◆ Cylinder Head Gasket
Timing Belt
No.1 Idler Pulley
No.2 Timing Belt Cover
21 (210, 15)
Timing Belt Tensioner
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
* For use with SST
P16957

EG11A-02

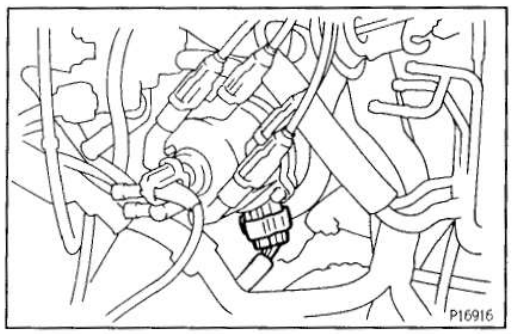
COMPONENTS FOR REMOVAL AND INSTALLATION (SW20)




21 (210, 15)
Vacuum Pipe
VSV and Vacuum Tank Assembly
ACIS Valve Cover
◆ Gasket
19 (190, 14)
29 (300, 21)
ACIS Valve Assembly
No.1 ACIS Valve Stay
Spacer
◆ O-Ring
Injector
◆ Grommet
◆ Insulator
Fuel Return Hose
◆ Gasket
◆ Gasket
Alternator Cover
No.2 ACIS Valve Stay
Fuel Inlet Pipe
32 (330, 24)
Intake Manifold
Hose Clamp
21 (210, 15)
◆ Gasket
Engine Wire
Intake Manifold Stay
Ground Strap
Alternator
Alternator Drive Belt
Alternator Bracket
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P17939


6.0 (61, 53 in.·lbf)
Spark Plug
Seal Washer
Cylinder Head Cover
No.4 Timing Belt Cover
Gasket
Valve Lifter
Adjusting Shim
Keeper
Spring Retainer
Valve Spring
Spring Seat
◆ Valve Guide Bushing
Valve
Intake Camshaft
19 (190, 14)
Camshaft Bearing Cap
◆ Camshaft Oil Seal
Intake Camshaft Timing Pulley
Knock Pin
Exhaust Camshaft
Exhaust Camshaft Timing Pulley
LH Engine Hanger
See page EG-106
1st 49 (500, 36)
2nd Turn 90°
Plate Washer
Cylinder Head
59 (600, 43)
*41 (420, 30)
Oil Pressure Switch
No.3 Timing Belt Cover
Plate Washer
★ 52 (530, 38)
Gasket
◆ Cylinder Head Gasket
Timing Belt
No.1 Idler Pulley
No.2 Timing Belt Cover
21 (210, 15)
Timing Belt Tensioner
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
* For use with SST
P18034

EG



EG433-01

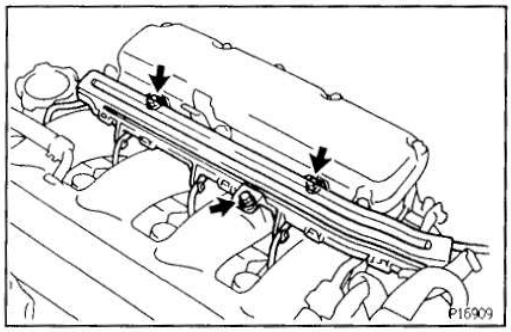
CYLINDER HEAD REMOVAL

(See Components for Removal and Installation)

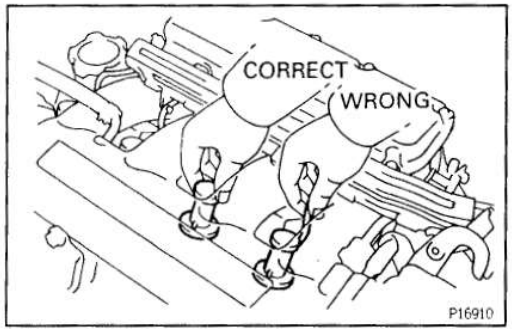
1. DRAIN ENGINE COOLANT

2. REMOVE DISTRIBUTOR

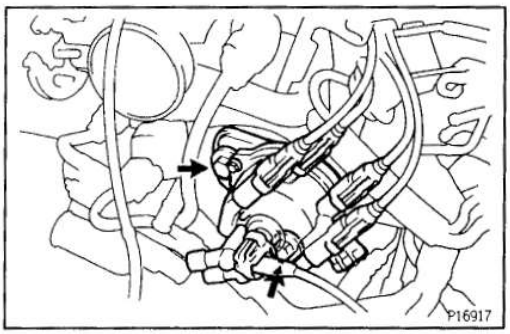
(a) Disconnect the distributor connector.



(b) Remove the 3 bolts, and disconnect the high–tension cord clamp from the ACIS valve.

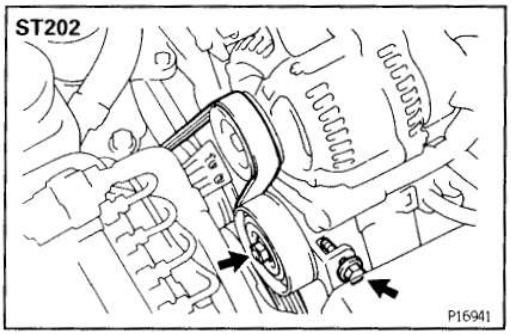


(c) Disconnect the high – tension cords at the rubber boot. Do not pull on the high–tension cords.
NOTICE: Pulling on or bending the cords may damage the conductor inside.



(d) Remove the 2 bolts, and pull out the distributor.

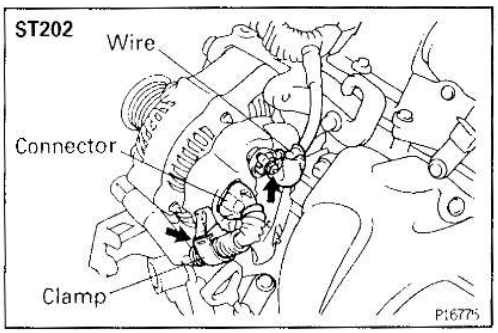
(e) Remove the O–ring from the distributor housing.



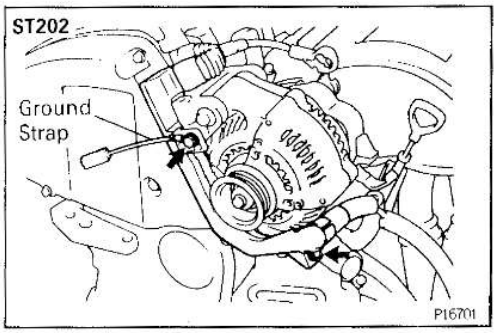
3. ST202:
REMOVE ALTERNATOR

(a) Loosen the pulley nut and adjusting bolt.

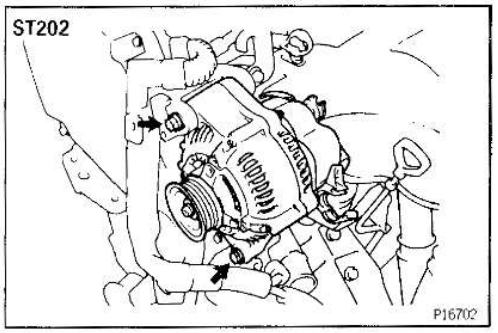
(b) Remove the drive belt.



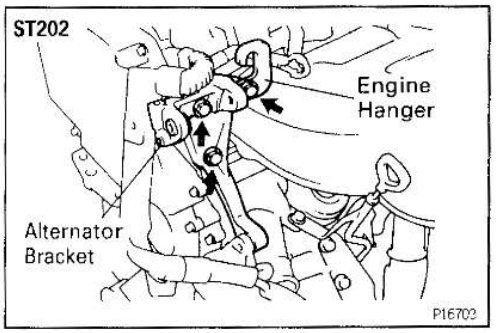
(c) Disconnect the wire from the clamp on the rear end cover.
(d) Disconnect the alternator connector.
(e) Remove the rubber cap and nut, and disconnect the alternator wire.



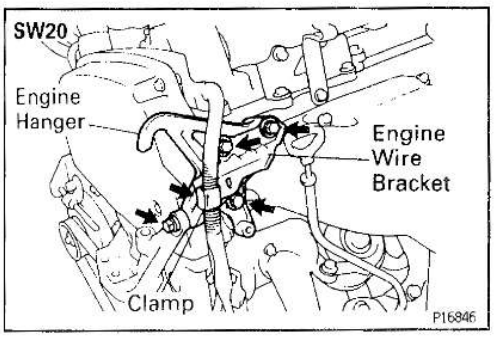
(f) Remove the 2 bolts and ground strap, and disconnect the engine wire protector from the brackets.



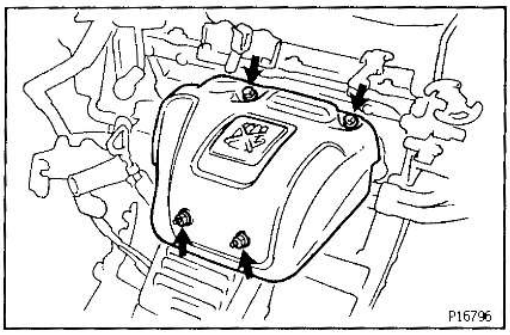
(g) Remove the 2 bolts and alternator.



4. ST202:
REMOVE RH FRONT ENGINE HANGER AND ALTERNATOR BRACKET
Remove the 3 bolts, engine hanger and alternator bracket.

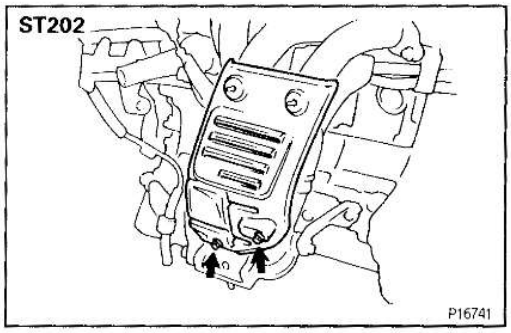


5. SW20:
REMOVE RH FRONT ENGINE HANGER AND ENGINE WIRE BRACKET
(a) Disconnect the engine wire from the clamp on the wire bracket.
(b) Remove the 4 bolts, wire bracket and engine hanger.

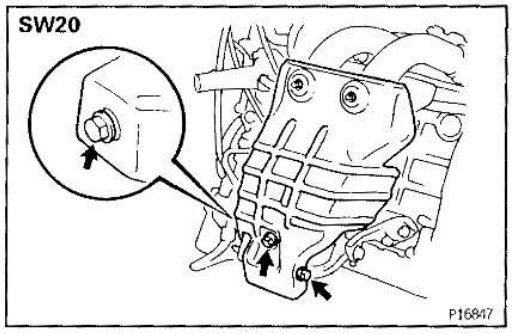


6. REMOVE EXHAUST MANIFOLD

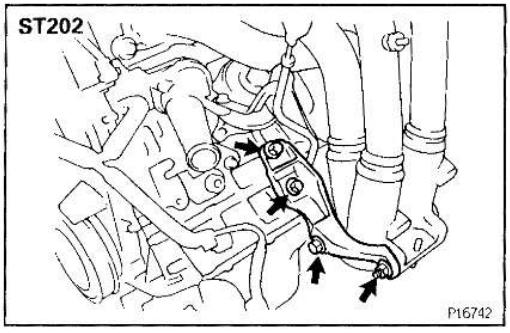
(a) Remove the 2 bolts, 2 nuts and No.1 exhaust manifold heat insulator.



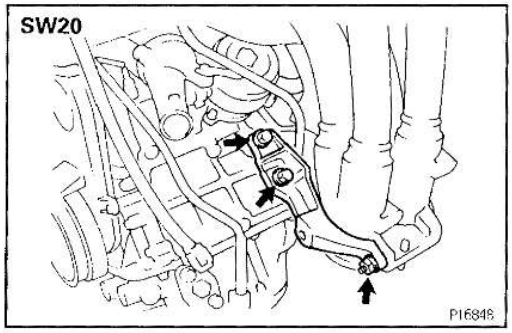
(b) ST202:
Remove the 2 bolts and No.2 exhaust manifold heat insulator.



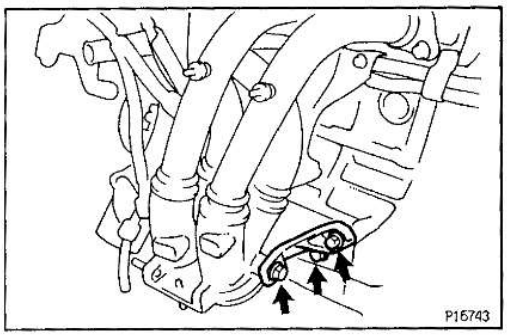
(c) SW20:
Remove the 3 bolts and No.2 exhaust manifold heat insulator.



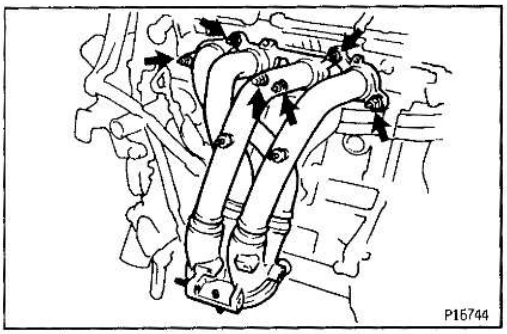
(d) ST202:
Remove the 3 bolts, nut and RH exhaust manifold stay.



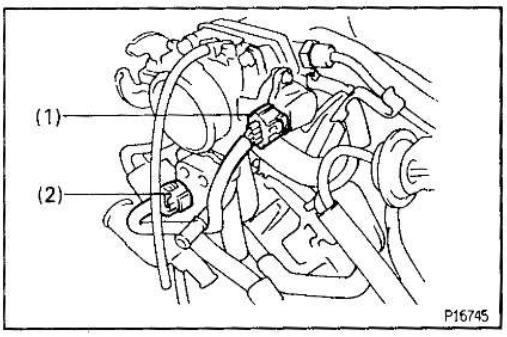
(e) SW20:
Remove the 2 bolts, nut and RH exhaust manifold stay.



(f) Remove the 3 bolts and LH exhaust manifold stay.

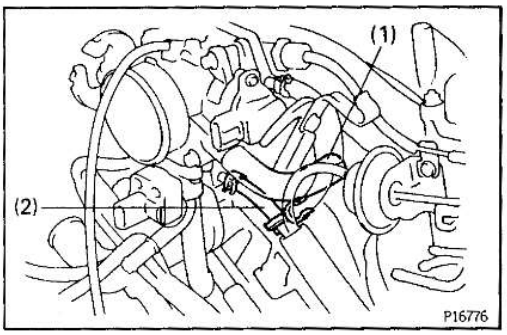


(g) Remove the 6 nuts, exhaust manifold and gasket.

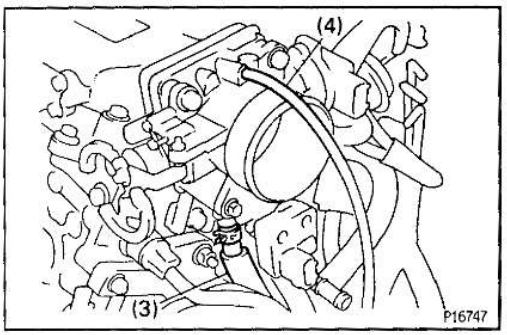


7. REMOVE THROTTLE BODY

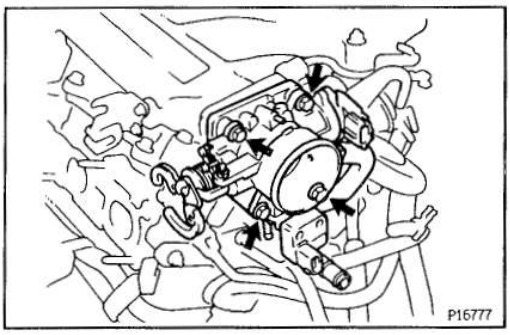
(a) Disconnect the following connectors:
(1) Throttle position sensor connector
(2) ISC valve connector



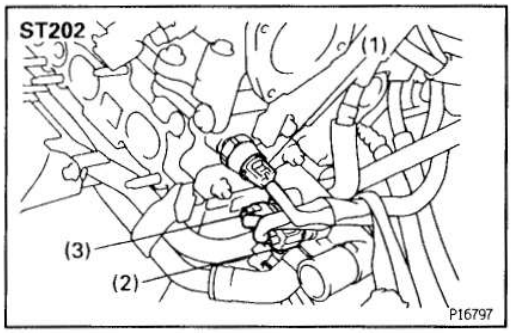
(b) Disconnect the following hoses:
(1) PCV hose from cylinder head cover
(2) Water bypass hose (from water outlet) from throttle body



(3) Water bypass hose (from water bypass pipe) from throttle body
(4) Vacuum hose (from upper port of BVSV) from throttle body

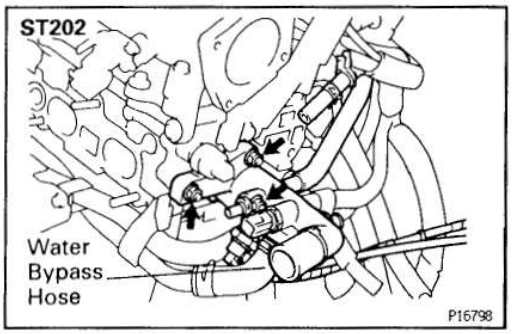


(c) Remove the 4 bolts, throttle body and gasket.

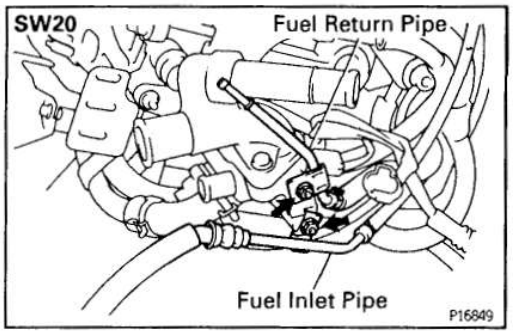


8. ST202:
REMOVE WATER OUTLET

(a) Disconnect the following connectors:
(1) Oil pressure switch connector
(2) Water temperature sensor connector
(3) Water temperature sender gauge connector

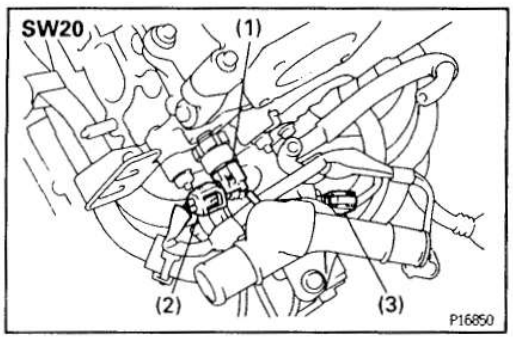


(b) Remove the 3 nuts.
(c) Disconnect the water bypass hose from the water outlet, and remove the water outlet and gasket.

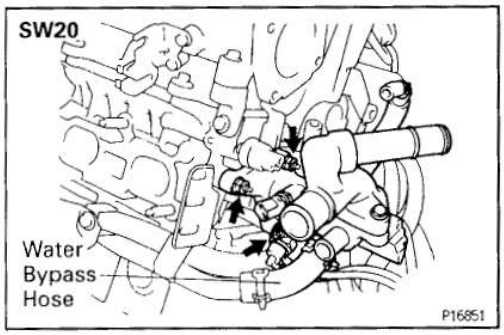


9. SW20:
REMOVE WATER OUTLET AND HOUSING ASSEMBLY

(a) Remove the nut, and disconnect the fuel inlet pipe from the water outlet.
(b) Remove the nut, and disconnect the fuel return pipe from the water outlet.

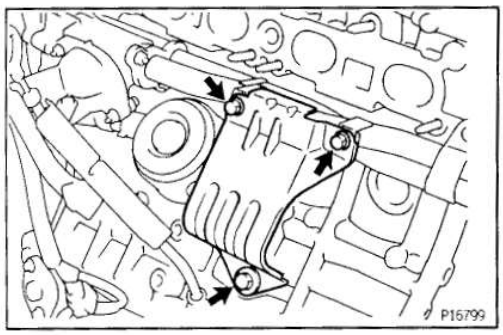


(c) Disconnect the following connectors:
(1) Oil pressure switch connector
(2) Water temperature sensor connector
(3) Water temperature sender gauge connector



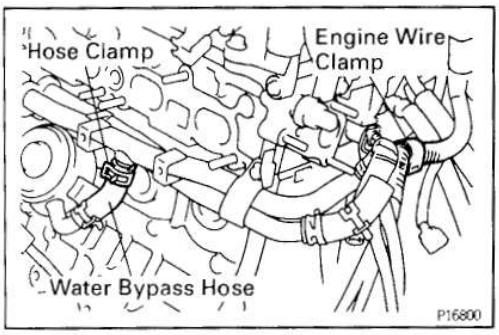
(d) Remove the 3 nuts.
(e) Disconnect the water bypass hose from the water outlet, and remove the water outlet, housing assembly and gasket.

EG

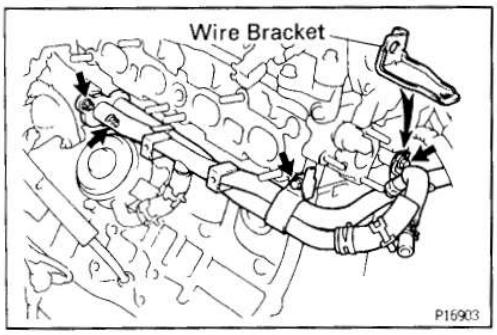


10. REMOVE WATER BYPASS PIPE

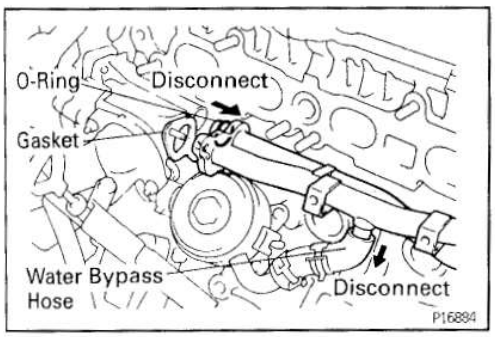
(a) Remove the 3 bolts and No.3 exhaust manifold heat insulator.



(b) Disconnect the engine wire clamp from the wire bracket.
(c) Disconnect the hose clamp on the water bypass hose.

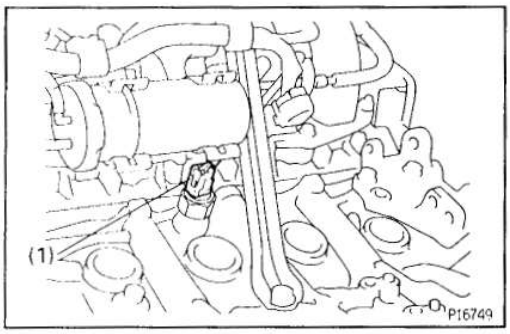


(d) Remove the 2 bolts, 2 nuts and engine wire bracket.



(e) Disconnect the water bypass pipe from the water pump cover and water bypass hose, and remove the water bypass pipe.
(f) Remove the gasket and O–ring.

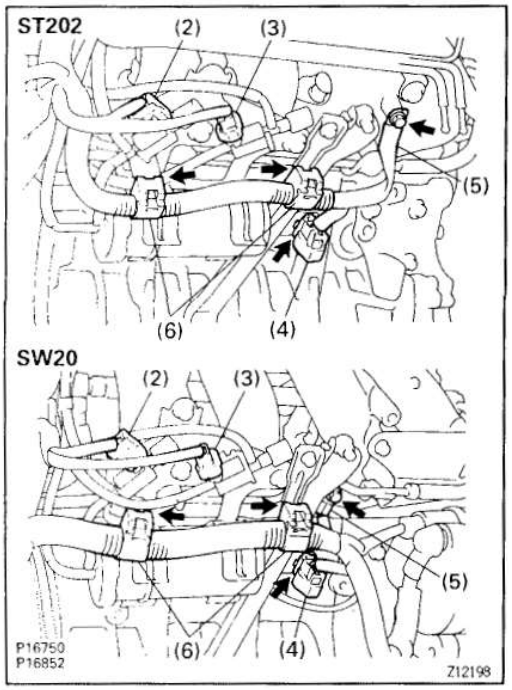
EG



11. DISCONNECT ENGINE WIRE

Disconnect the following connectors, ground cable and clamps:

(1) Knock sensor connector



(2) VSV connector for ACIS

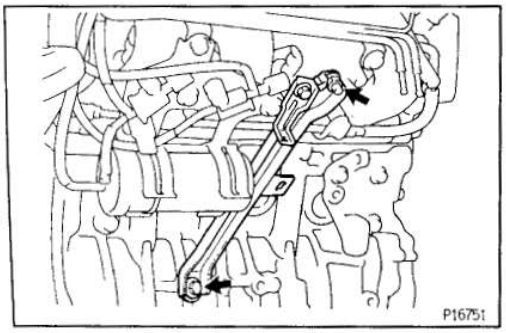
(3) VSV connector for fuel pressure control

NOTICE: When disconnecting the VSV connectors ((2) and (3)), do not apply strong force to the VSV body.

(4) Oxygen sensor connector from bracket

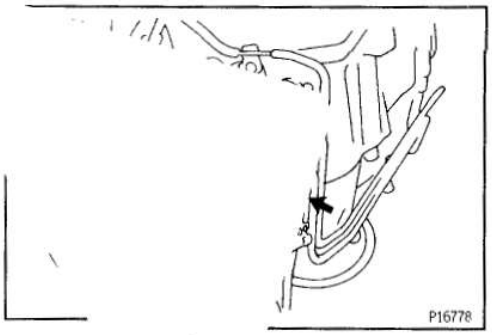
(5) Ground cable

(6) 2 wire clamps from brackets



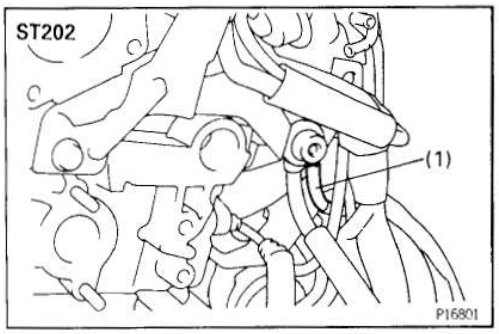
12. REMOVE INTAKE MANIFOLD STAY

Remove the bolt, nut and intake manifold stay.

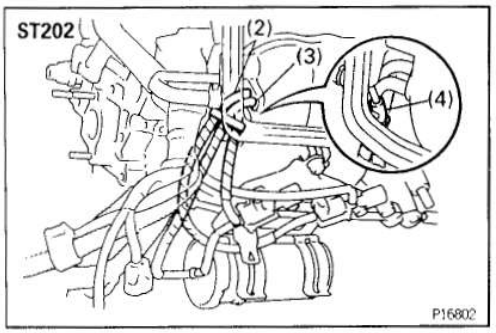


13. ST202:
REMOVE VSV, VACUUM TANK ASSEMBLY AND AIR TUBE

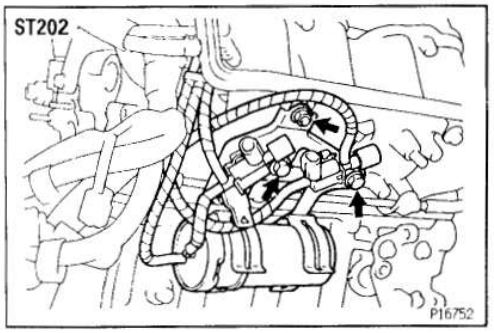
(a) Remove the bolt, and disconnect the engine wire protector from the intake manifold.



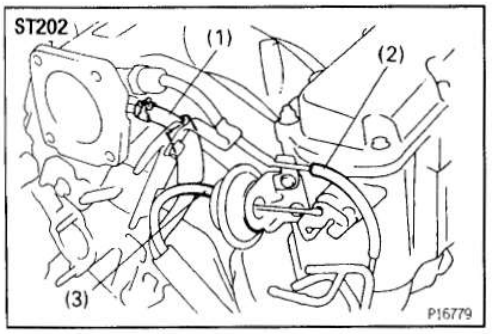
(b) Disconnect the following hoses:
(1) Vacuum hose (from VSV for fuel pressure control) from fuel pressure regulator



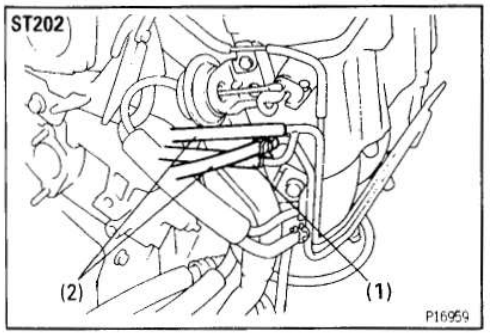
(2) Vacuum hose (from VSV for fuel pressure control) from intake manifold
(3) Vacuum hose (from vacuum tank) from intake manifold
(4) Vacuum hose (from VSV for ACIS) from air tube



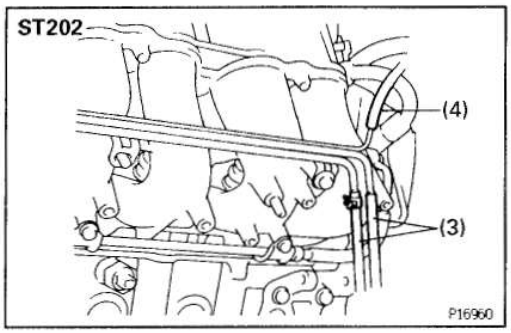
(c) Remove the 2 bolts, nut, the VSV and vacuum tank assembly.
NOTICE: Remove the VSV with the bracket still installed on the VSV. Only remove the VSV from the bracket when replacing the VSV with a new one.



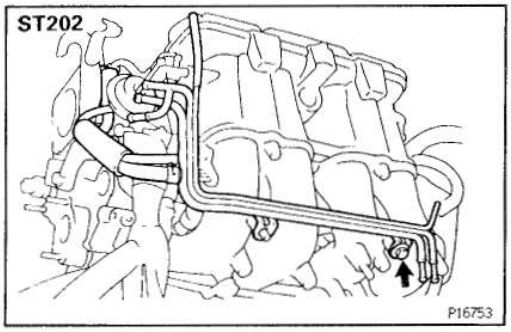
(d) Disconnect the following hoses:
(1) Air hose from port of ACIS valve
(2) Vacuum hose (from vacuum sensor) from vacuum pipe on ACIS actuator
(3) Vacuum hose (from VSV for ACIS) from ACIS actuator



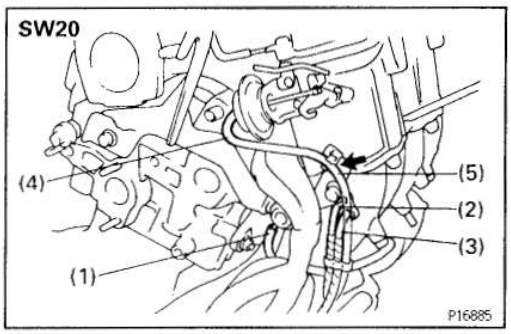
HINT (On vehicle): Disconnect the following hose:
(1) Air hose (from air cleaner hose) from air tube
(2) 2 air hoses (from A/C idle–up valve) from air tube



(3) 2 air hoses (from air control valve on PS pump) from air tube
(4) Vacuum hose (from vacuum sensor) from vacuum pipe on air tube

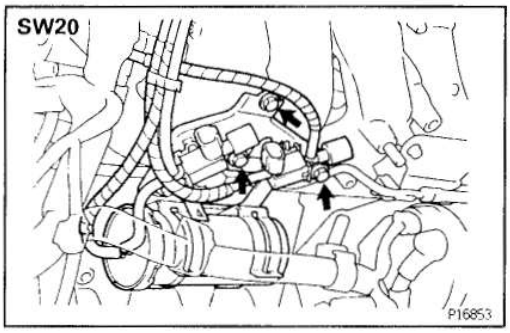


(e) Remove the bolt and air tube.



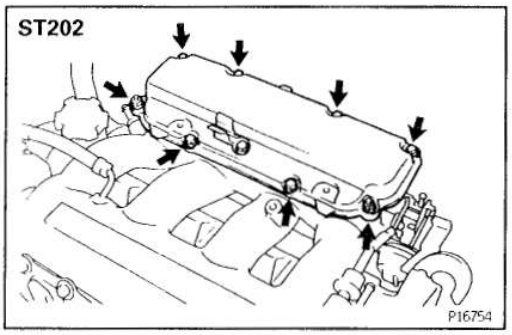
14. SW20:
REMOVE VSV AND VACUUM TANK ASSEMBLY

(a) Disconnect the following hoses:
(1) Vacuum hose (from VSV for fuel pressure control) from fuel pressure regulator
(2) Vacuum hose (from VSV for fuel pressure control) from intake manifold
(3) Vacuum hose (from vacuum tank) from intake manifold
(4) Vacuum hose (from VSV for ACIS) from ACIS actuator
(5) Vacuum hose (between VSV and actuator for ACIS) from clamp on intake manifold



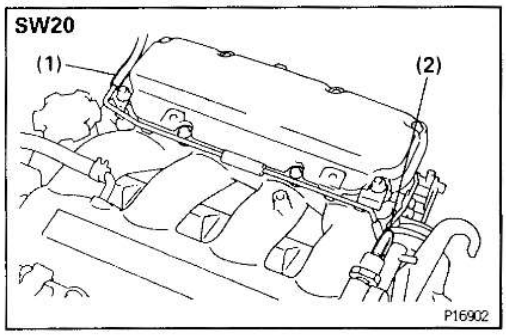
(b) Remove the 3 bolts, the VSV and vacuum tank assembly.

NOTICE: Remove the VSV with the bracket still installed on the VSV. Only remove the VSV from the bracket when replacing the VSV with a new one.



15. ST202:
REMOVE ACIS VALVE COVER

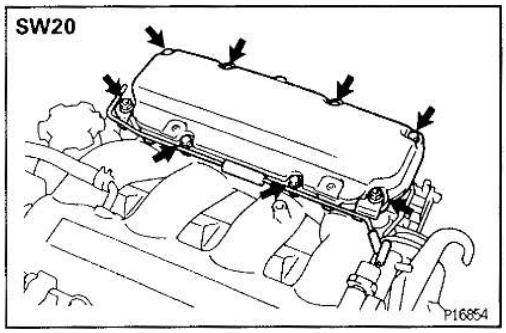
Remove the 6 bolts, 2 nuts and ACIS valve cover.



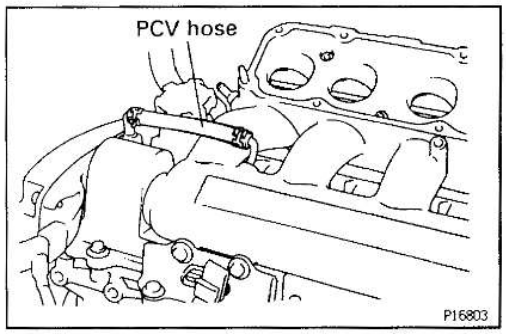
16. SW20:
REMOVE VACUUM PIPE AND ACIS VALVE COVER

(a) Disconnect the following hoses:
(1) Vacuum hose (from vacuum sensor) from vacuum pipe
(2) Vacuum hose from gas filter

EG

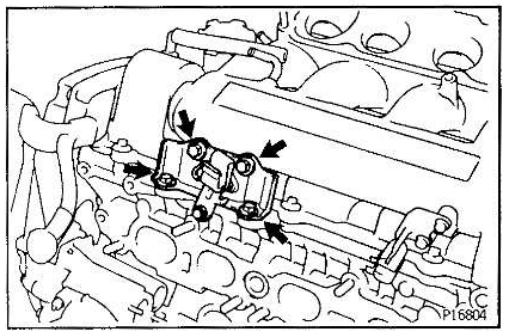


(b) Remove the 6 bolts, 2 nuts, vacuum pipe and ACIS valve cover.

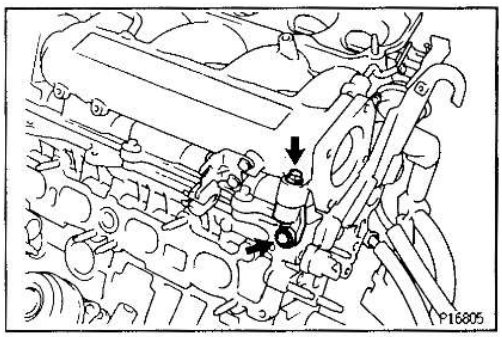


17. REMOVE ACIS VALVE ASSEMBLY

(a) Disconnect the PCV hose from the port of the ACIS valve.

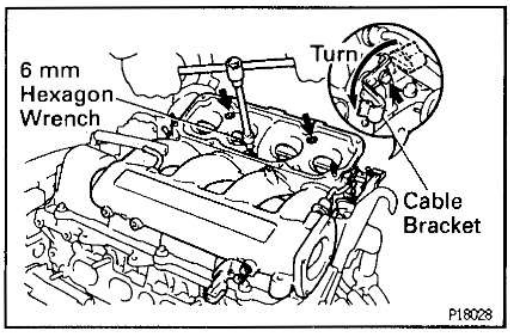


(b) Remove the 4 bolts and No.2 ACIS valve stay.

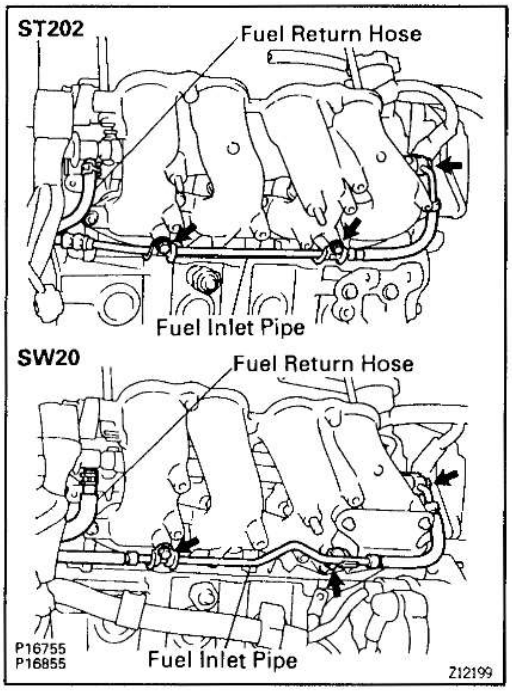


(c) Remove the 2 bolts and No.1 ACIS valve stay.

EG



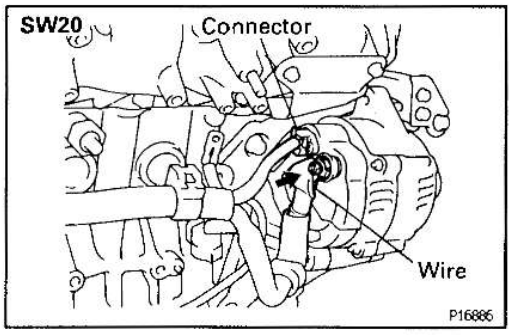
(d) ST202:
Loosen the bolt, and turn the cable bracket on the LH engine hanger.
(e) Using a 6 mm hexagon wrench, remove the 3 bolts, the ACIS valve assembly and gasket.



18. DISCONNECT FUEL INLET PIPE FROM DELIVERY PIPE

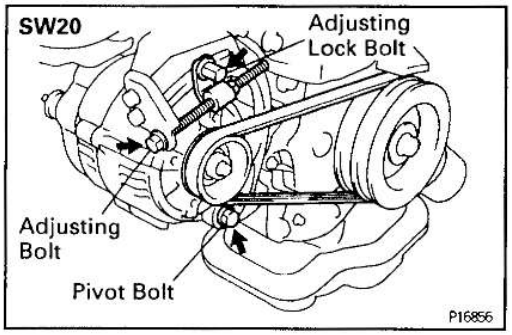
(a) Remove the union bolt and 2 gaskets, and disconnect the fuel inlet pipe from the delivery pipe.
(b) Remove the 2 bolts and fuel inlet pipe.

19. DISCONNECT FUEL RETURN HOSE FROM FUEL PRESSURE REGULATOR

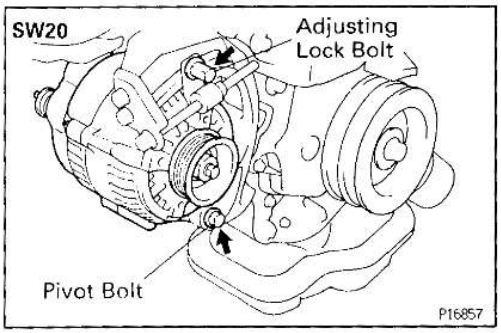


20. SW20:
REMOVE ALTERNATOR

(a) Disconnect the alternator connector.
(b) Remove the rubber cap and nut, and disconnect the alternator wire.

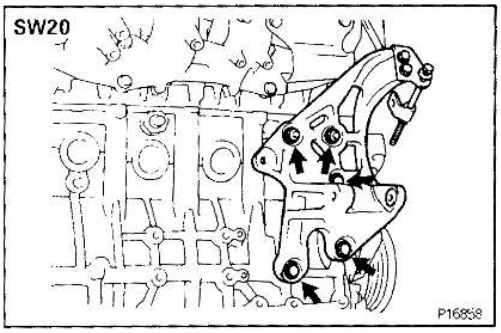


(c) Loosen the adjusting lock bolt and pivot bolt.
(d) Loosen the adjusting bolt, and remove the drive belt.

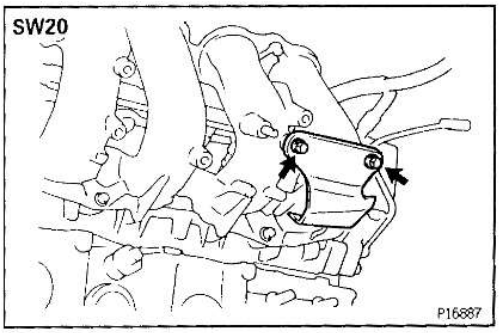


(e) Remove the adjusting lock bolt, pivot bolt and alternator.

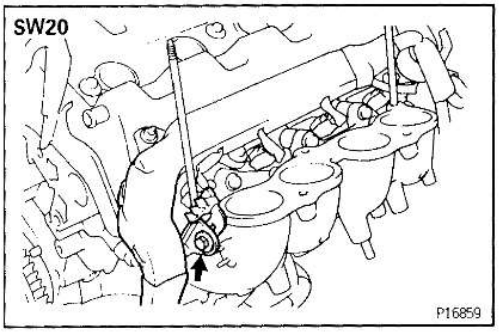
EG



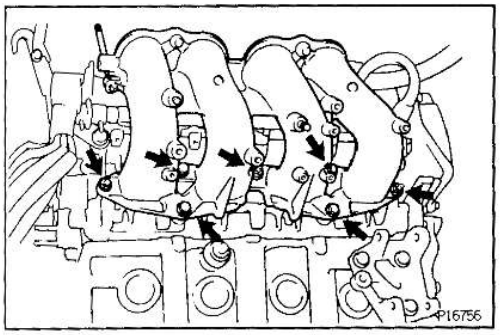
21. SW20:
REMOVE ALTERNATOR BRACKET
Remove the 3 bolts, 2 nuts and alternator bracket.



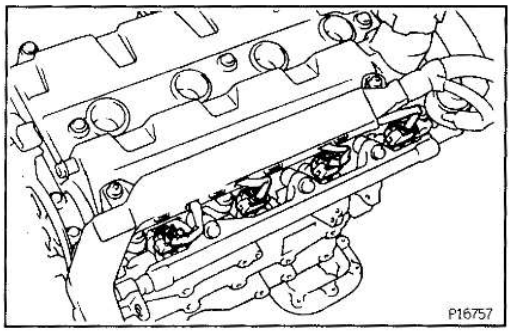
22. SW20:
REMOVE ALTERNATOR COVER
Remove the 2 bolts and alternator cover.



23. REMOVE INTAKE MANIFOLD
(a) SW20:
Remove the bolt and hose clamp, and disconnect the engine wire protector from the intake manifold.

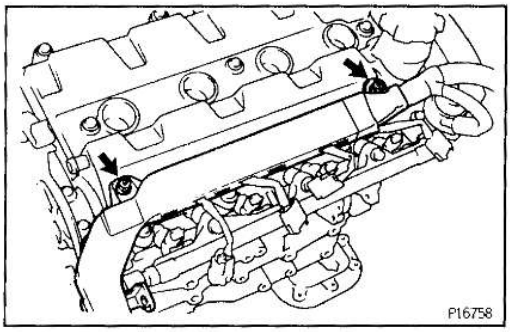


(b) Remove the 4 bolts, 3 nuts, intake manifold and gasket.

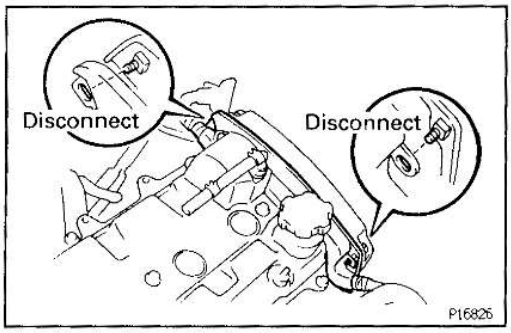


24. DISCONNECT ENGINE WIRE

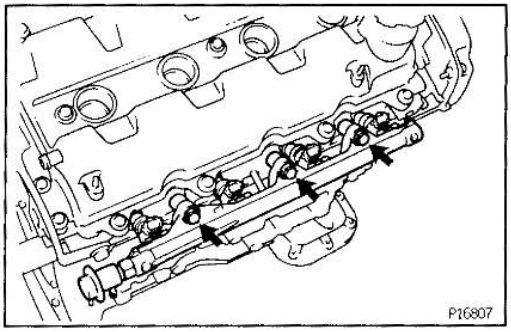
(a) Disconnect the 4 injector connectors.



(b) Remove the 2 nuts, and disconnect the the engine wire protector from the cylinder head cover.



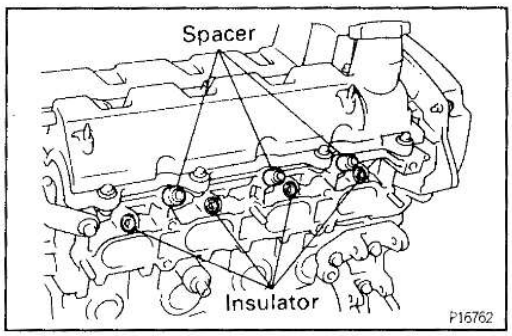
(c) Disconnect the engine wire protector from the 2 mounting bolts of the No.2 timing belt cover.



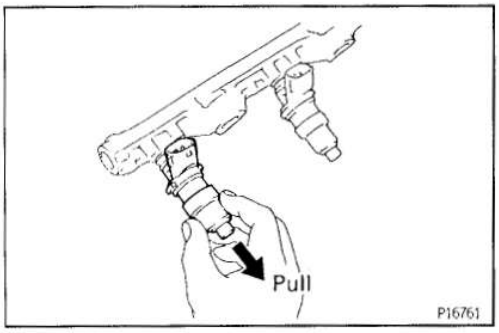
25. REMOVE DELIVERY PIPE AND INJECTORS

(a) Remove the 3 bolts and delivery pipe together with the 4 injectors.

NOTICE: Be careful not to drop the injectors when removing the delivery pipe.

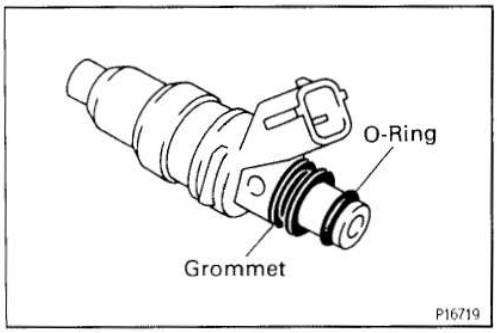


(b) Remove the 4 insulators and 3 spacers from the cylinder head.

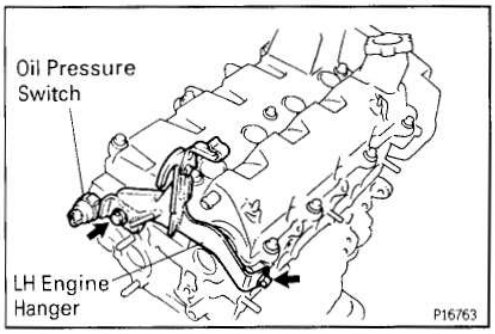


(c) Pull out the 4 injectors from the delivery pipe.

EG

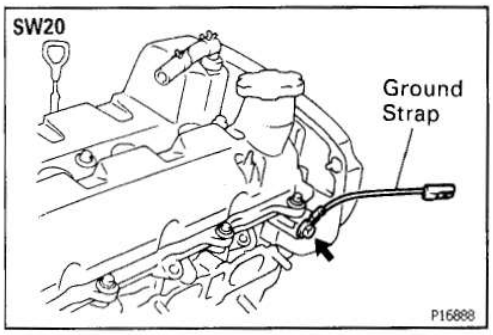


(d) Remove the O–ring and grommet from each injector.

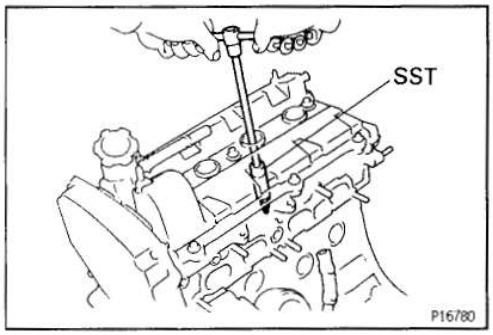


26. REMOVE LH ENGINE HANGER
Remove the 2 bolts and engine hanger.

27. REMOVE OIL PRESSURE SWITCH

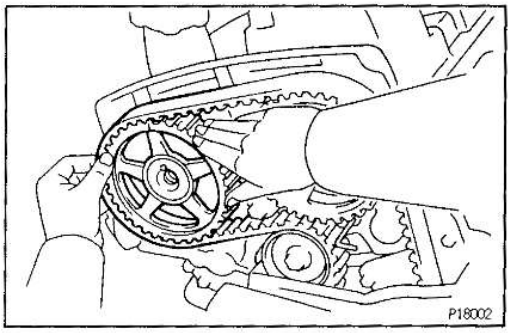


28. SW20:
REMOVE GROUND STRAP
Remove the bolt and ground strap.

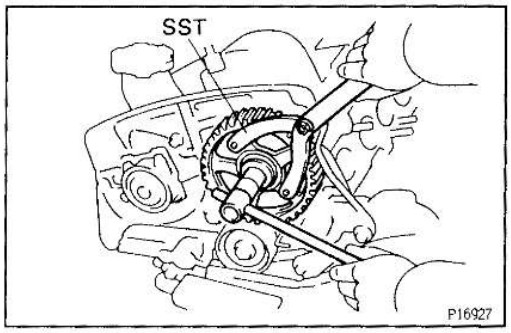


29. REMOVE SPARK PLUGS
Using SST, remove the 4 spark plugs.
SST 09155–16100

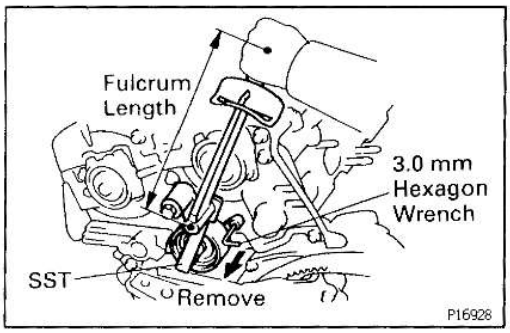
EG



30. DISCONNECT TIMING BELT FROM CAMSHAFT TIMING PULLEYS
(See steps 4 to 6 on pages EG–50 to 51)



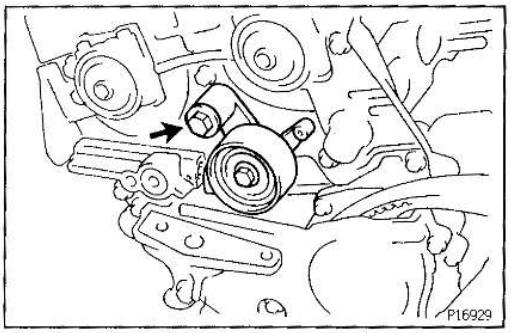
31. REMOVE EXHAUST CAMSHAFT TIMING PULLEY
(a) Using SST, loosen the pulley bolt.
SST 09960–10010 (09962–01000, 09963–01000)
(b) Remove the bolt, timing pulley and knock pin.

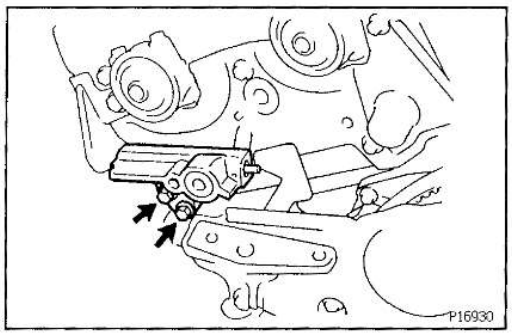


32. REMOVE NO.1 IDLER PULLEY
(a) Turn the No.1 idler pulley bolt to obtain the specified torque or less, and remove the 3.0 mm hexagon wrench.
Torque:
59 N·m (600 kgf·cm, 43 ft·lbf)
41 N·m (420 kgf·cm, 30 ft·lbf) for SST
HINT (On vehicle):
- Use SST.

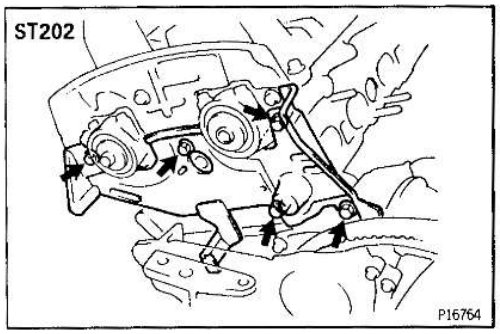
SST 09249–63010
- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

(b) Remove the pivot bolt, pulley and plate washer.





33. REMOVE TIMING BELT TENSIONER
Remove the 2 bolts and tensioner.

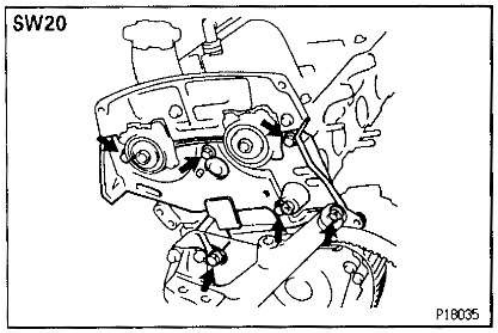


34. REMOVE NO.3 TIMING BELT COVER

ST202:

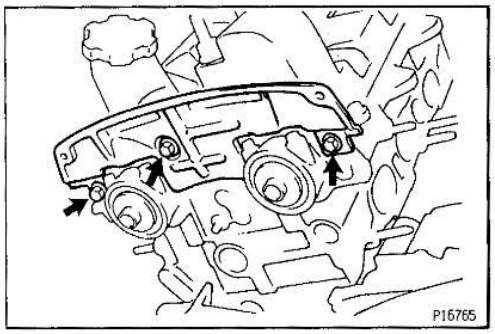
Remove the 5 bolts and timing belt cover.

EG



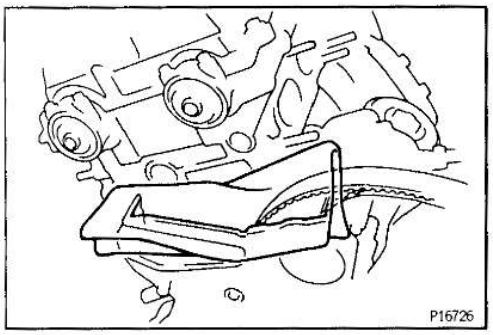
SW20:

Remove the 6 bolts and timing belt cover.



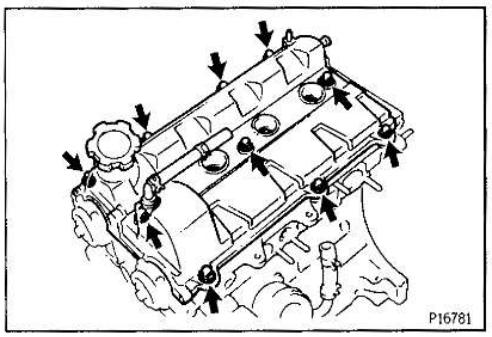
35. REMOVE NO.3 TIMING BELT COVER

Remove the 3 bolts and timing belt cover.



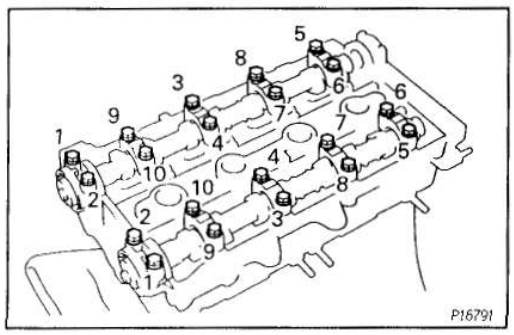
NOTICE:

- **Be careful not to drop anything inside the timing belt cover.**
- **Do not allow the belt to come into contact with oil, water or dust.**



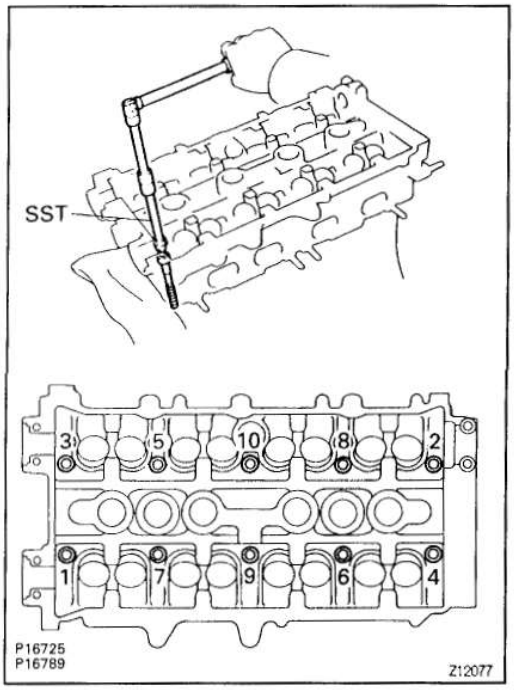
36. REMOVE CYLINDER HEAD COVER

Remove the 10 bolts, seal washers, cylinder head cover and 2 gaskets.



37. REMOVE CAMSHAFTS

Uniformly loosen and remove the 10 bearing cap bolts in several passes, in the sequence shown, and remove the 5 bearing caps, oil seal and camshaft. Remove the intake and exhaust camshafts.

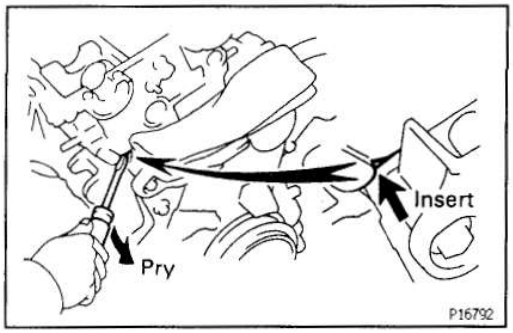


38. REMOVE CYLINDER HEAD

(a) Using SST, uniformly loosen and remove the 10 cylinder head bolts in several passes, in the sequence shown.

SST 09043—38100

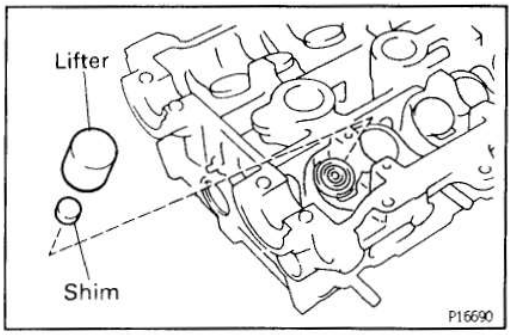
HINT: Cylinder head warpage or cracking could result from removing in the incorrect order.



(b) Lift the cylinder head from the dowels on the cylinder block, and place the cylinder head on wooden blocks on a bench.

HINT: If the cylinder head is off, pry between the cylinder head and cylinder block with a screwdriver.

NOTICE: Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

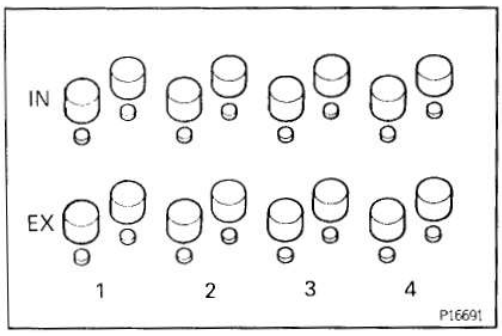


CYLINDER HEAD DISASSEMBLY

EG11C-08

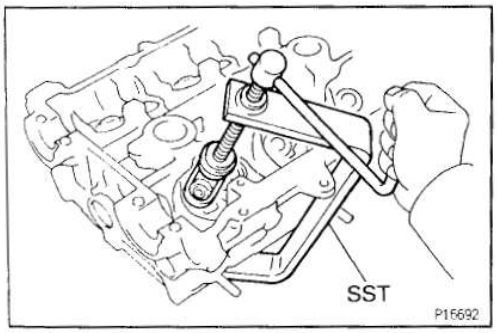
(See Components for Removal and Installation)

1. REMOVE VALVE LIFTERS AND SHIMS



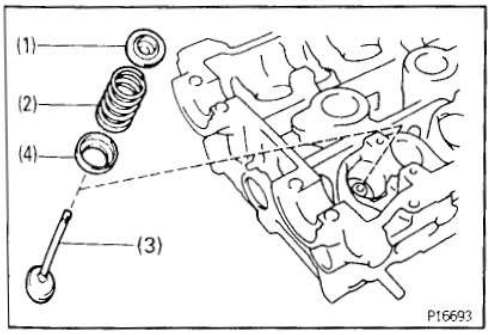
HINT: Arrange the valve lifters and shims in the correct order.

EG

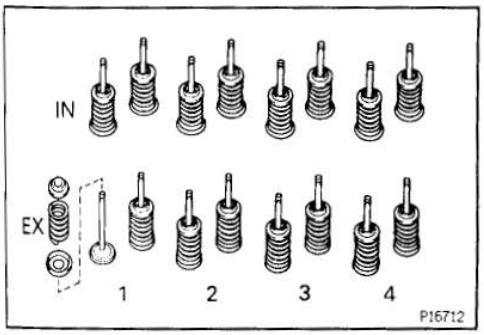


2. REMOVE VALVES

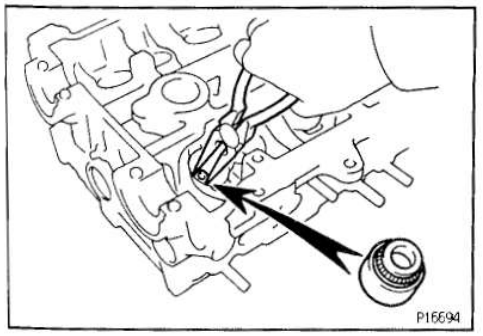
(a) Using SST, compress the valve spring and remove the 2 keepers.
SST 09202–70010



(b) Remove the following parts:
(1) Spring retainer
(2) Valve spring
(3) Valve
(4) Spring seat

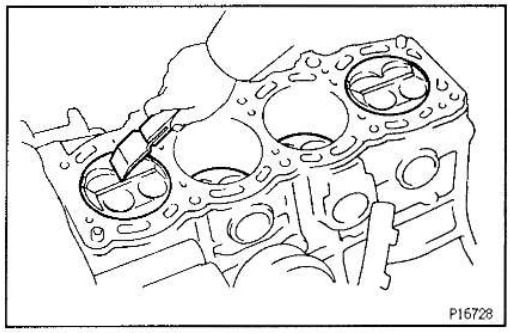


HINT: Arrange the valves, valve springs, spring seats and spring retainers in the correct order.



(c) Using needle–nose pliers, remove the oil seal.

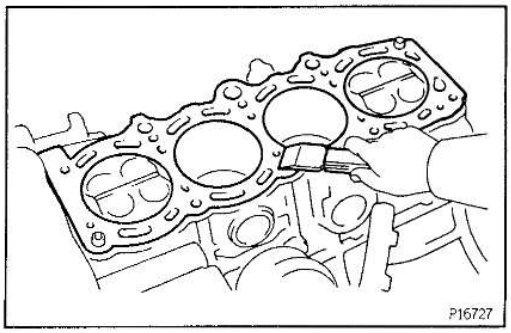
EG



CYLINDER HEAD COMPONENTS INSPECTION AND REPAIR

1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK

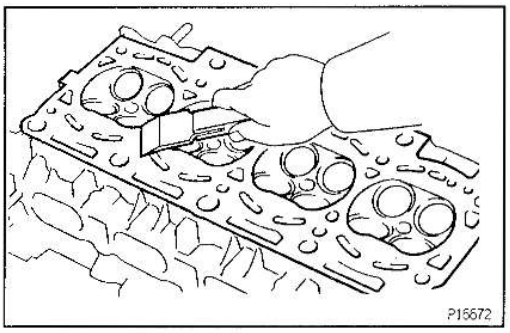
(a) Turn the crankshaft, and bring each piston to top dead center (TDC). Using a gasket scraper, remove all the carbon from the piston top surface.



(b) Using a gasket scraper, remove all the gasket material from the cylinder block surface.

(c) Using compressed air, blow carbon and oil from the bolt holes.

CAUTION: Protect your eyes when using high – pressure compressed air.

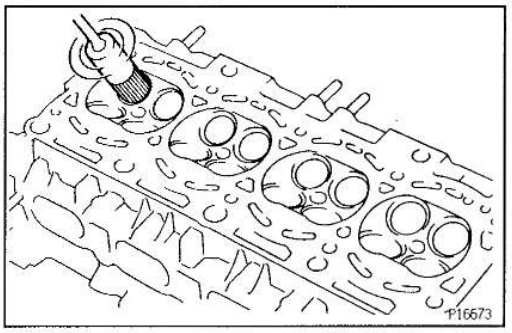


2. CLEAN CYLINDER HEAD

A. Remove gasket material

Using a gasket scraper, remove all the gasket material from the cylinder block contact surface.

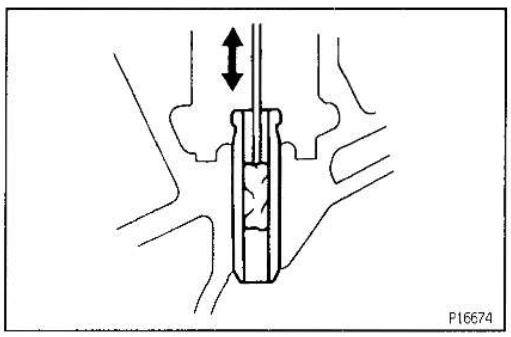
NOTICE: Be careful not to scratch the cylinder block contact surface.



B. Clean combustion chambers

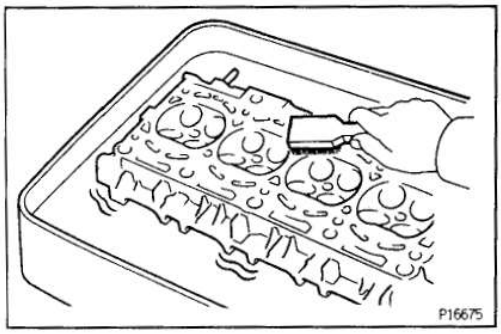
Using a wire brush, remove all the carbon from the combustion chamber.

NOTICE: Be careful not to scratch the cylinder block contact surface.



C. Clean valve guide bushings

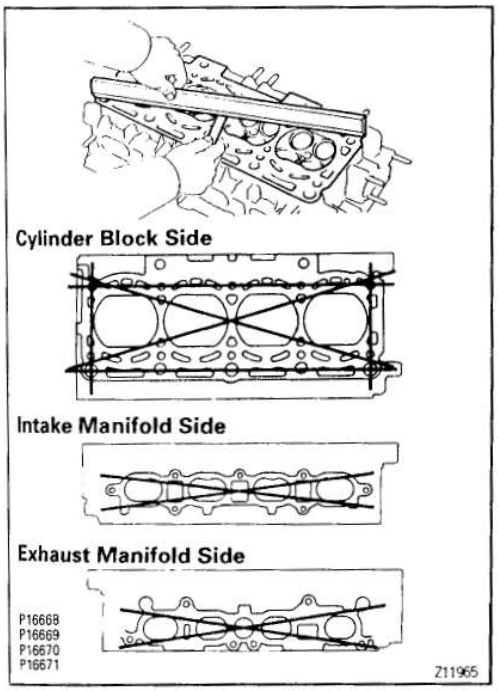
Using a valve guide bushing brush and solvent, clean all the guide bushings.



D. Clean cylinder head

Using a soft brush and solvent, thoroughly clean the cylinder head.

EG



3. INSPECT CYLINDER HEAD

A. Inspect for flatness

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder block and the manifolds for warpage.

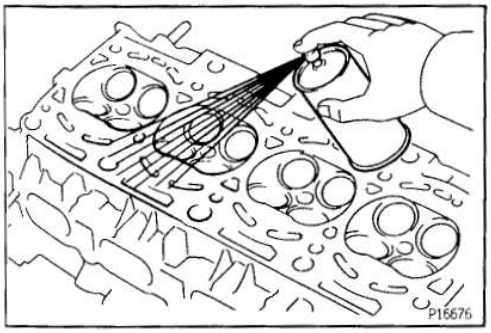
Maximum warpage:

Cylinder block side
0.20 mm (0.0079 in.)

Intake manifold side
0.20 mm (0.0079 in.)

Exhaust manifold side
0.30 mm (0.0118 in.)

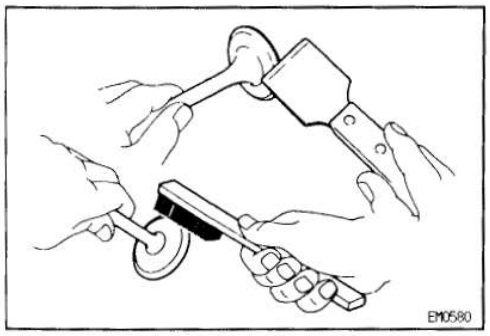
If warpage is greater than maximum, replace the cylinder head.



B. Inspect for cracks

Using a dye penetrant, check the combustion chamber, intake ports, exhaust ports and cylinder block surface for cracks.

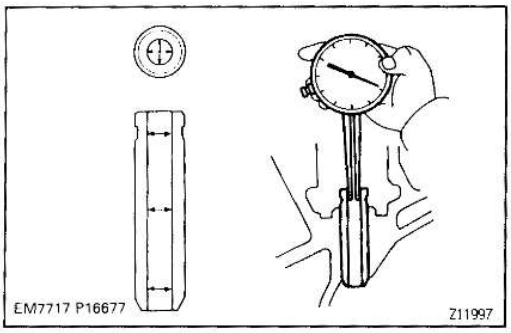
If cracked, replace the cylinder head.



4. CLEAN VALVES

(a) Using a gasket scraper, chip off any carbon from the valve head.

(b) Using a wire brush, thoroughly clean the valve.



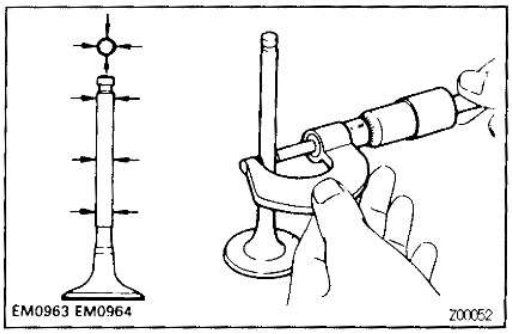
EG

5. INSPECT VALVE STEMS AND GUIDE BUSHINGS

(a) Using a caliper gauge, measure the inside diameter of the guide bushing.

Bushing inside diameter:

6.000 – 6.018 mm (0.2362 – 0.2369 in.)



(b) Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter:

Intake

5.960 – 5.975 mm (0.2346 – 0.2352 in.)

Exhaust

5.955 – 5.970 mm (0.2344 – 0.2350 in.)

(c) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.

Standard oil clearance:

Intake

0.025 – 0.058 mm (0.0010 – 0.0023 in.)

Exhaust

0.030 – 0.063 mm (0.0012 – 0.0025 in.)

Maximum oil clearance:

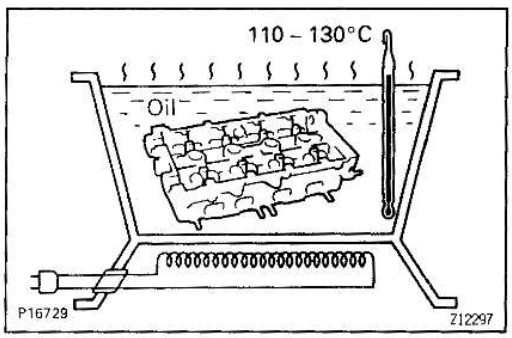
Intake

0.08 mm (0.0031 in.)

Exhaust

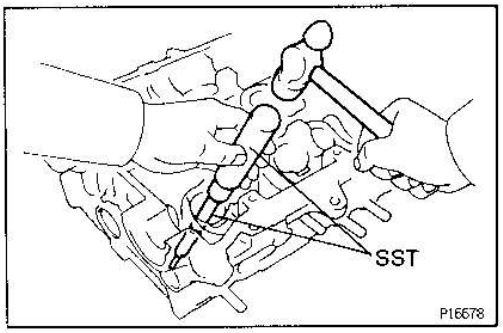
0.10 mm (0.0039 in.)

If the clearance is greater than maximum, replace the valve and guide bushing.



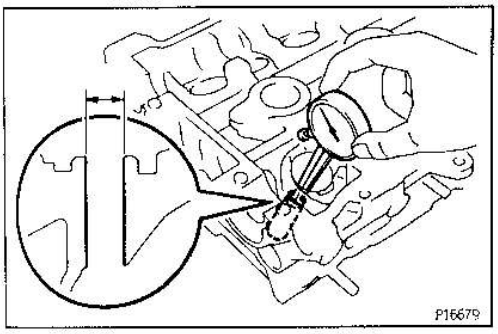
6. IF NECESSARY, REPLACE VALVE GUIDE BUSHINGS

(a) Gradually heat the cylinder head to 110 – 130°C (230 – 266°F).



(b) Using SST and a hammer, tap out the guide bushing.
SST 09201 – 10000 (09201 – 01060),
09608 – 30022 (09608 – 05010)

EG



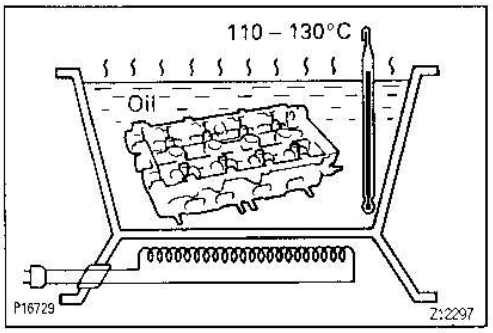
(c) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

Both intake and exhaust

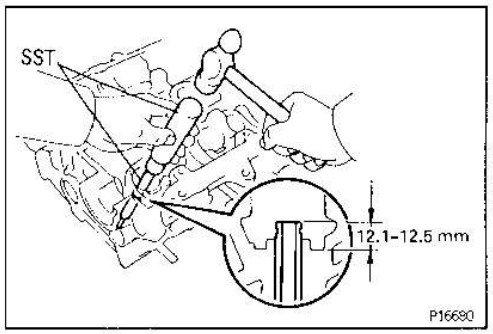
Bushing bore diameter mm (in.)	Bushing size
10.988 – 11.006 (0.4326 – 0.4333)	Use STD
11.038 – 11.056 (0.4346 – 0.4353)	Use O/S 0.05

V00866

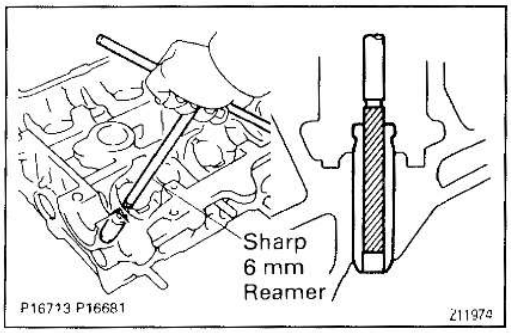
(d) Select a new guide bushing (STD or O/S 0.05).
If the bushing bore diameter of the cylinder head is greater than 11.006 mm (0.4333 in.), machine the bushing bore to the following dimension:
11.038 – 11.056 mm (0.4346 – 0.4353 in.)
If the bushing bore diameter of the cylinder head is greater than 11.056 mm (0.4353 in.), replace the cylinder head.



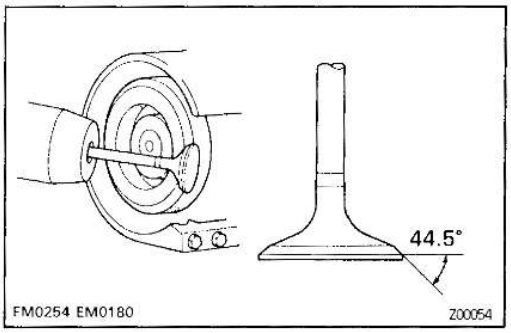
(e) Gradually heat the cylinder head to 110 – 130°C (230 – 266°F).



(f) Using SST and a hammer, tap in a new guide bushing until there is 12.1 – 12.5 mm (0.476 – 0.492 in.) protruding from the cylinder head.
SST 09201 – 10000 (09201 – 01060),
09608 – 30022 (09608 – 05010)



(g) Using a sharp 6 mm reamer, ream the guide bushing to obtain the standard specified clearance (See step 5 above) between the guide bushing and valve stem.



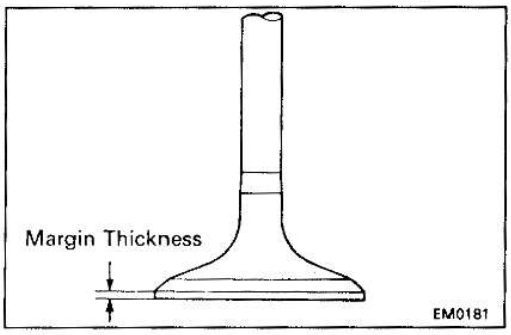
7. INSPECT AND GRIND VALVES

(a) Grind the valve enough to remove pits and carbon.

(b) Check that the valve is ground to the correct valve face angle.

Valve face angle:

44.5°



(c) Check the valve head margin thickness.

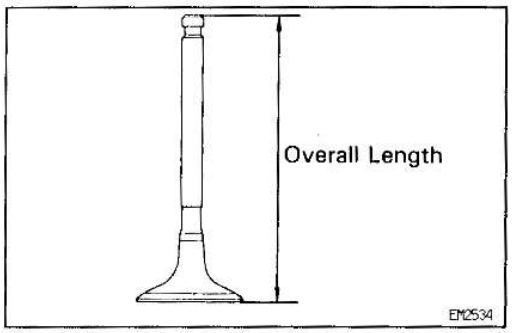
Standard margin thickness:

0.8 – 1.2 mm (0.031 – 0.047 in.)

Minimum margin thickness:

0.5 mm (0.020 in.)

If the margin thickness is less than minimum, replace the valve.



(d) Check the valve overall length.

Standard overall length:

Intake

99.80 – 100.20 mm (3.9291 – 3.9449 in.)

Exhaust

98.85 – 99.25 mm (3.8917 – 3.9075 in.)

Minimum overall length:

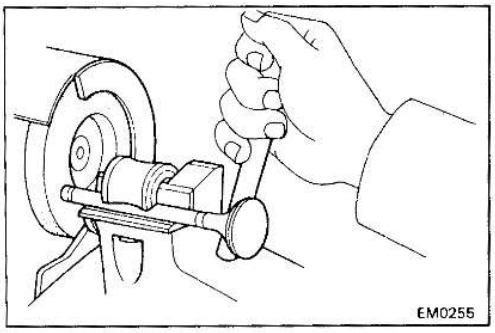
Intake

99.30 mm (3.9094 in.)

Exhaust

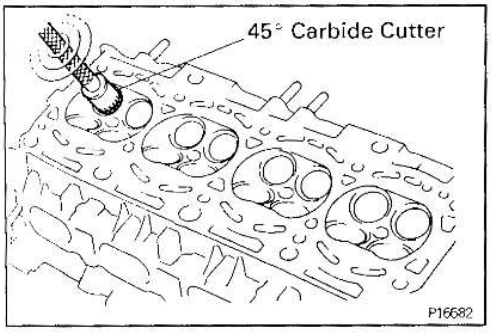
98.35 mm (3.8720 in.)

If the overall length is less than minimum, replace the valve.



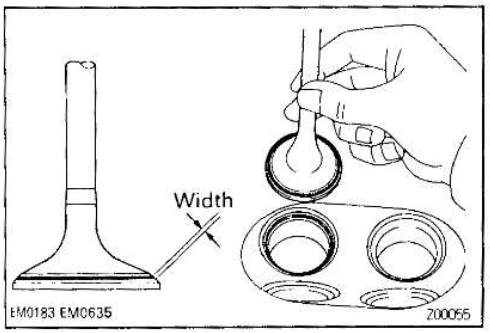
(e) Check the surface of the valve stem tip for wear.
If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.
NOTICE: Do not grind off more than the minimum length.

EG



8. INSPECT AND CLEAN VALVE SEATS

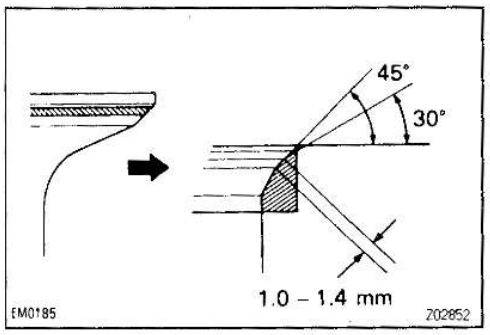
(a) Using a 45° carbide cutter, resurface the valve seats. Remove only enough metal to clean the seats.



(b) Check the valve seating position.
Apply a light coat of prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate valve.

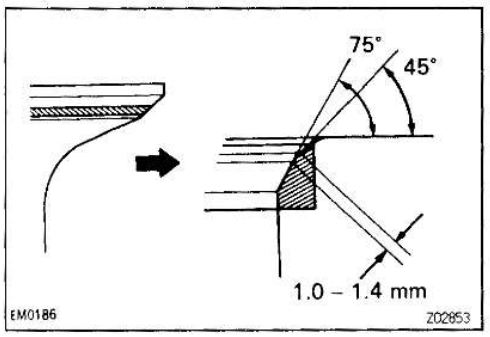
(c) Check the valve face and seat for the following:

- If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
- If blue appears 360° around the valve seat, the guide and face are concentric. If not, resurface the seat.
- Check that the seat contact is in the middle of the valve face with the following width:
  1.0 – 1.4 mm (0.039 – 0.055 in.)

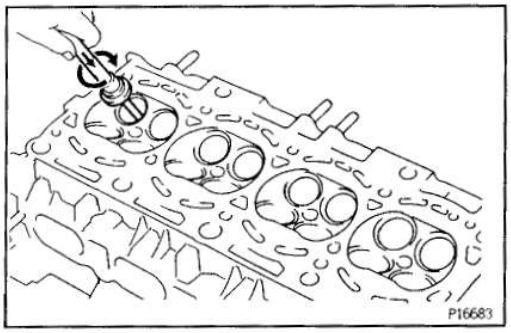


If not, correct the valve seats as follows:

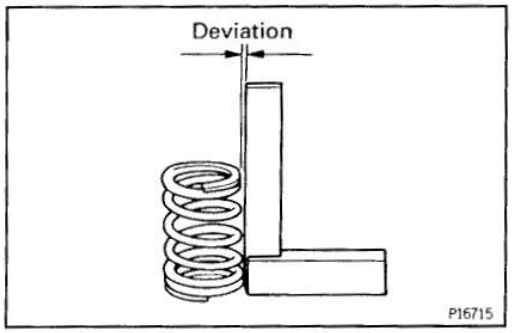
(1) If the seating is too high on the valve face, use 30° and 45° cutters to correct the seat.



(2) If the seating is too low on the valve face, use 75° and 45° cutters to correct the seat.



(d) Hand—lap the valve and valve seat with an abrasive compound.
(e) After hand—lapping, clean the valve and valve seat.



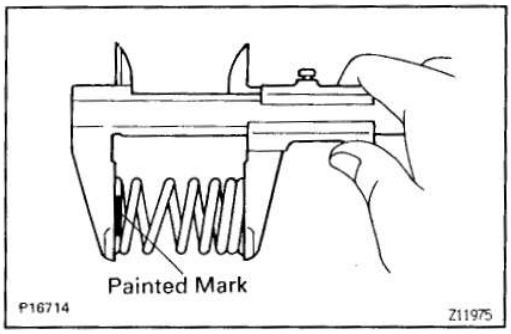
9. INSPECT VALVE SPRINGS

(a) Using a steel square, measure the deviation of the valve spring.

Maximum deviation:

2.0 mm (0.079 in.)

If the deviation is greater than maximum, replace the valve spring.



(b) Using a vernier caliper, measure the free length of the valve spring.

Free length:

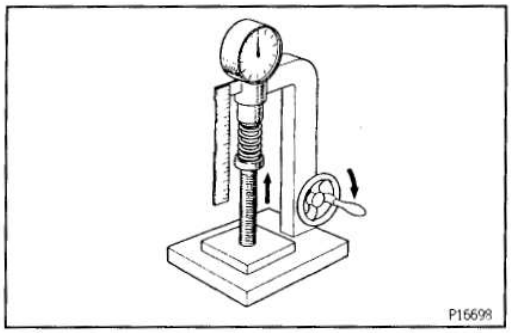
Intake (Red painted mark)

43.18 mm (1.7000 in.)

Exhaust (Green painted mark)

43.34 mm (1.7063 in.)

If the free length is not as specified, replace the valve spring.



(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

Installed tension (at 35.4 mm (1.394 in.):

Intake (Red painted mark)

163 — 190 N

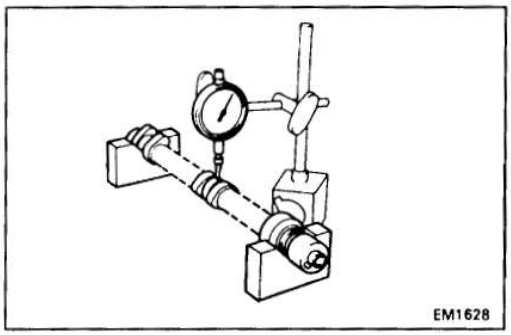
(16.6 — 19.4 kgf, 36.6 — 42.8 lbf)

Exhaust (Green painted mark)

153 — 180 N

(15.6 — 18.4 kgf, 34.4 — 40.6 lbf)

If the installed tension is not as specified, replace the valve spring.



10. INSPECT CAMSHAFTS AND BEARINGS

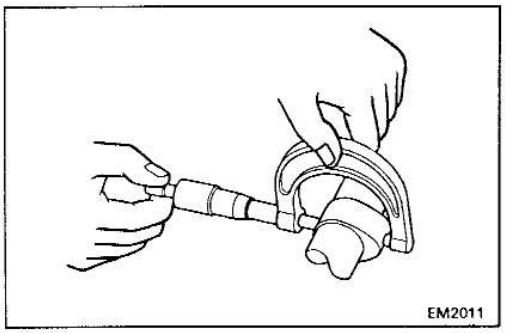
A. Inspect camshaft for runout

(a) Place the camshaft on V—blocks.
(b) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:

0.06 mm (0.0024 in.)

If the circle runout is greater than maximum, replace the camshaft.



B. Inspect cam lobes

Using a micrometer, measure the cam lobe height.

Standard cam lobe height:

Intake

42.610 – 42.710 mm (1.6778 – 1.6815 in.)

Exhaust

41.010 – 41.110 mm (1.6146 – 1.6185 in.)

Minimum cam lobe height:

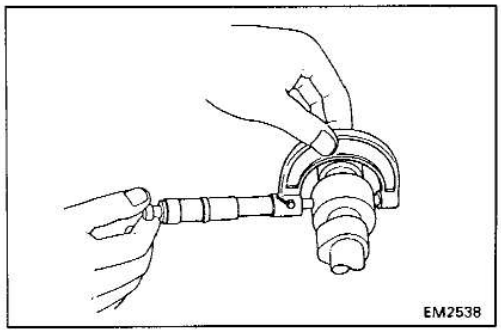
Intake

42.50 mm (1.6732 in.)

Exhaust

39.90 mm (1.5709 in.)

If the cam lobe height is less than minimum, replace the camshaft.



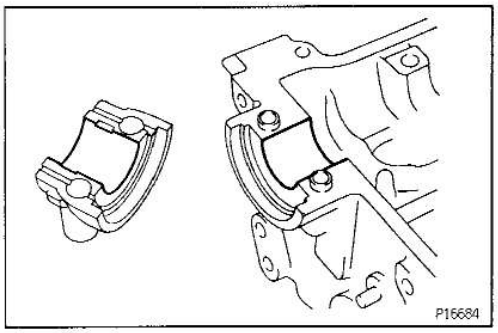
C. Inspect camshaft journals

Using a micrometer, measure the journal diameter.

Journal diameter:

26.959 – 26.975 mm (1.0614 – 1.0620 in.)

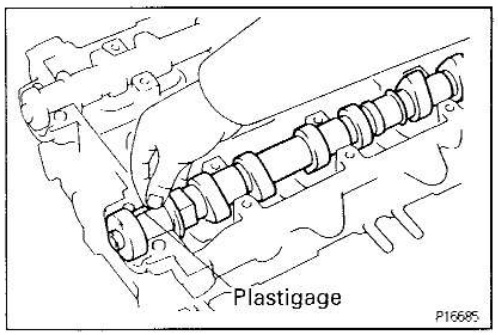
If the journal diameter is not as specified, check the oil clearance.



D. Inspect camshaft bearings

Check that bearings for flaking and scoring.

If the bearings are damaged, replace the bearing caps and cylinder head as a set.



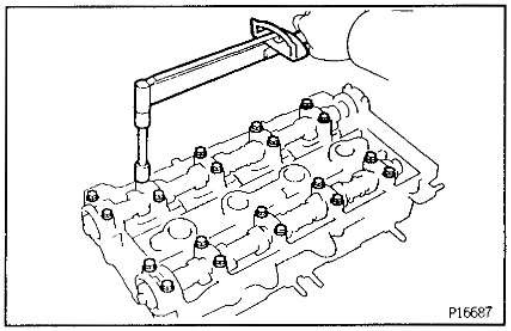
E. Inspect camshaft journal oil clearance

(a) Clean the bearing caps and camshaft journals.

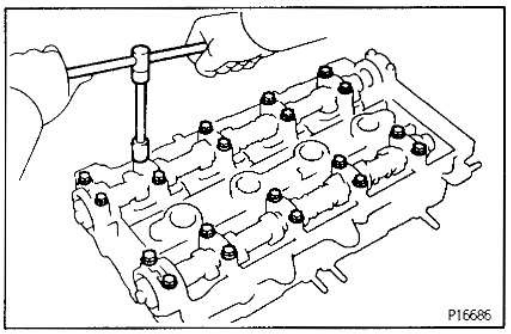
(b) Place the camshafts on the cylinder head.

(c) Lay a strip of Plastigage across each of the camshaft journals.

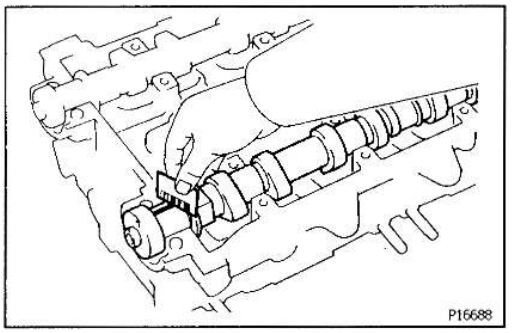
EG



(d) Install the bearing caps.
(See step 2 on page EG–107)
Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)
NOTICE: Do not turn the camshaft.

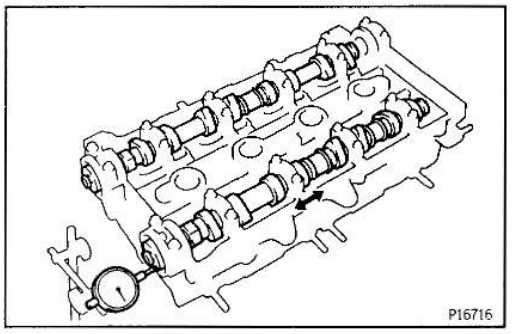


(e) Remove the bearing caps.



(f) Measure the Plastigage at its widest point.
Standard oil clearance:
0.025 – 0.062 mm (0.0010 – 0.0024 in.)
Maximum oil clearance:
0.08 mm (0.0031 in.)
If the oil clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

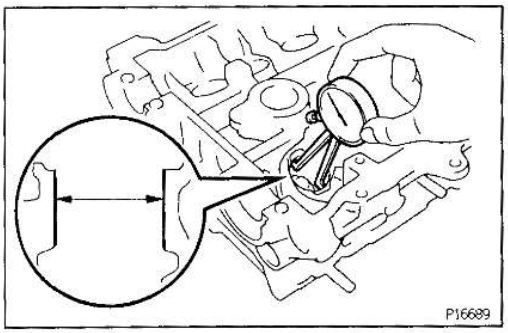
(g) Completely remove the Plastigage.



F. Inspect camshaft thrust clearance

(a) Install the camshaft. (See step 2 on page EG–107)

(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.
Standard thrust clearance:
0.100 – 0.240 mm (0.0039 – 0.0094 in.)
Maximum thrust clearance:
0.30 mm (0.0118 in.)
If the thrust clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

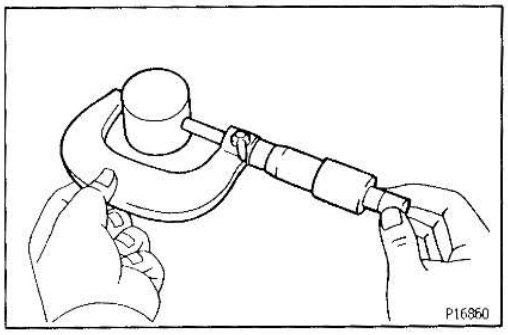


11. INSPECT VALVE LIFTERS AND LIFTER BORES

(a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.

Lifter bore diameter:

31.000 – 31.021 mm (1.2205 – 1.2213 in.)



(b) Using a micrometer, measure the lifter diameter.

Lifter diameter:

30.975 – 30.985 mm (1.2195 – 1.2199 in.)

(c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.

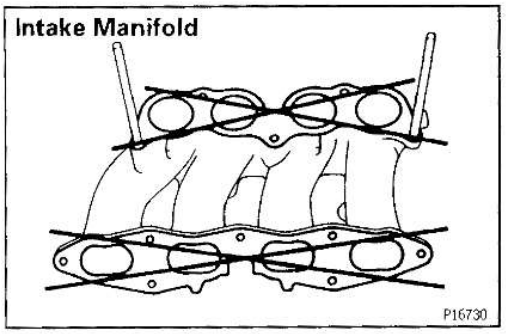
Standard oil clearance:

0.015 – 0.046 mm (0.0006 – 0.0018 in.)

Maximum oil clearance:

0.07 mm (0.0028 in.)

If the oil clearance is greater than maximum, replace the lifter. If necessary, replace the cylinder head.



12. INSPECT MANIFOLDS

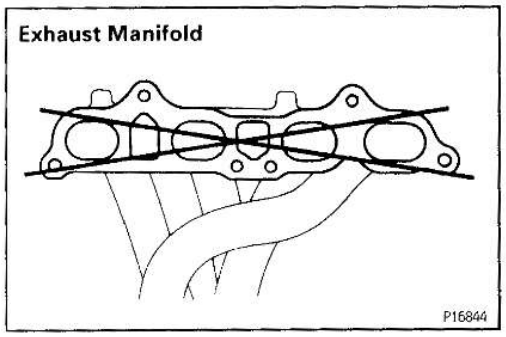
Intake Manifold:

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head and ACIS valve for warpage.

Maximum warpage:

0.30 mm (0.0118 in.)

If warpage is greater than maximum, replace the manifold.



Exhaust Manifold:

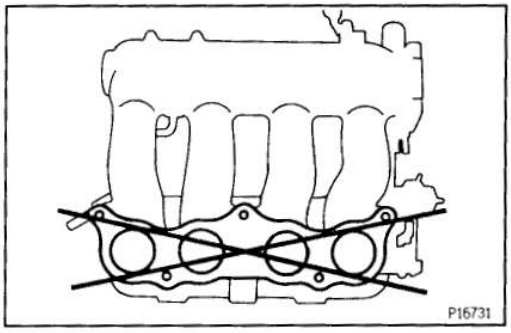
Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage.

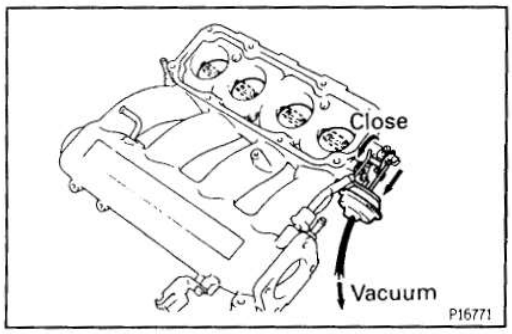
Maximum warpage:

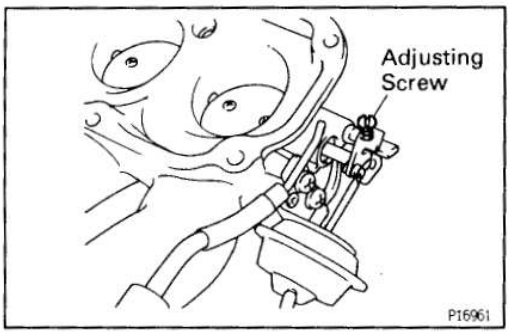
1.00 mm (0.0394 in.)

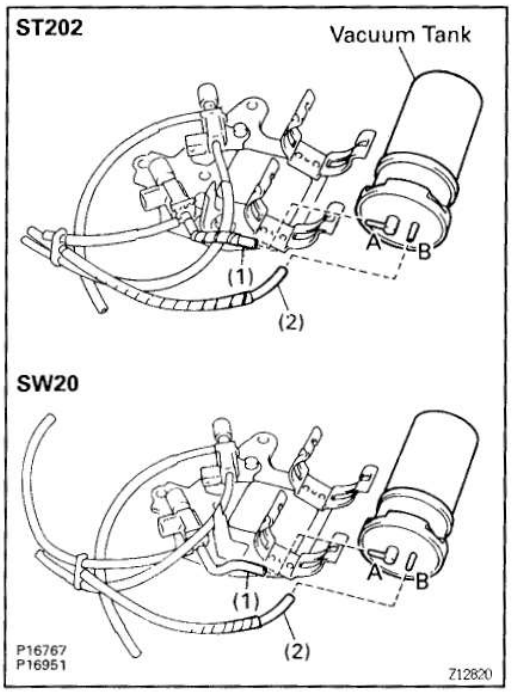
If warpage is greater than maximum, replace the manifold.

EG









ACOUSTIC CONTROL INDUCTION SYSTEM (ACIS) COMPONENTS INSPECTION

EG431-01

1. INSPECT ACIS VALVE

A. Inspect for flantness

Using presision straight edge and feeler gauge, measure the surface contacting the intake manifold for warpage.

Maximum warpage:

0.30 mm (0.0118 in.)

If warpage is greater than maximum, replace the ACIS valve assembly.

B. Inspect for operation

(a) With 53.3 kPa (400 mmHg, 15.75 in.Hg) of vacuum applied to the actuator, check that the valve moves smoothly to the fully closed position.

If operation is not as specified, adjust the adjusting screw.

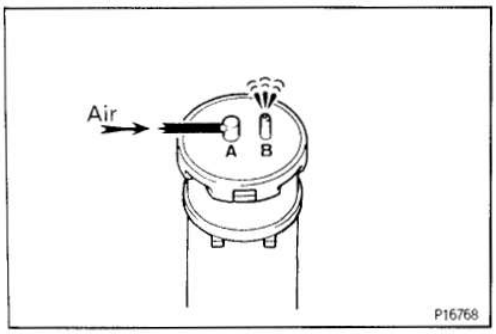
(b) One minute after applying the vacuum in (a), check that the actuator rod does not return.

2. INSPECT VACUUM TANK

A. Remove vacuum tank from bracket

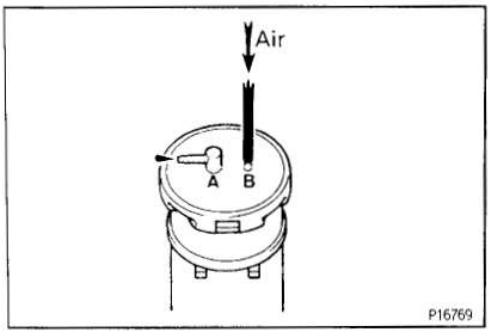
(a) Disconnect the following hoses:
  (1) Vacuum hose from port A of vacuum tank
  (2) Vacuum hose from port B of vacuum tank

(b) Remove the vacuum tank.

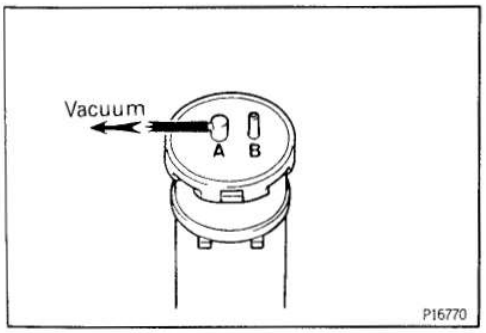


B. Inspect vacuum tank

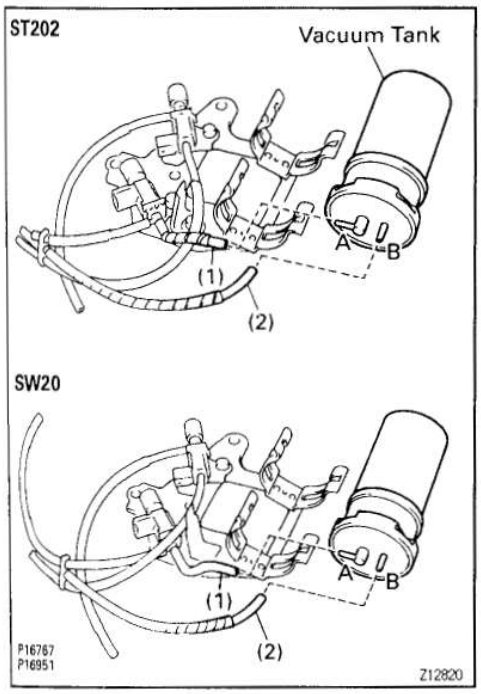
(a) Check that air flows from port A to B.



(b) Check that air does not flow from port B to A.



(c) Apply 67.7 kPa (500 mmHg, 19.69 in.Hg) of vacuum to port A, and check that there is no change in vacuum after one minute.
If operation is not as specified, replace the vacuum tank.



C. Reinstall vacuum tank to bracket

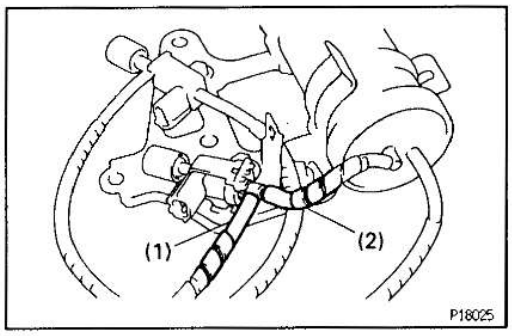
(a) Install the vacuum tank.

(b) Connect the following hoses:

(1) Vacuum hose to port A of vacuum tank

(2) Vacuum hose to port B of vacuum tank

EG



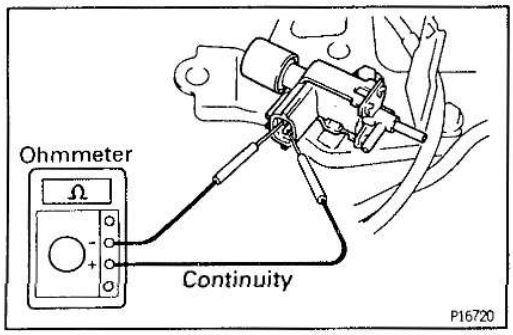
3. INSPECT VSV

A. Disconnect hoses from VSV

Disconnect the following hoses:

(1) Vacuum hose from port E of VSV

(2) Vacuum hose from port F of VSV



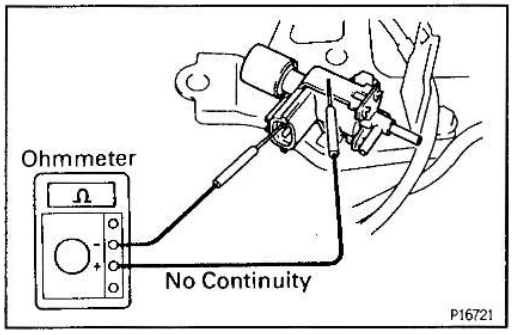
B. Inspect VSV for open circuit

Using an ohmmeter, check that there is continuity between the terminals.

Resistance:

33 – 39 Ω at 20°C (68°F)

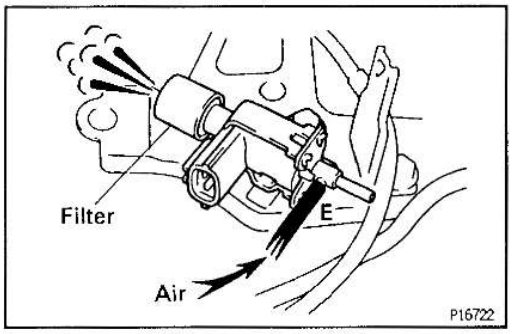
If there is no continuity, replace the VSV.



C. Inspect VSV for ground

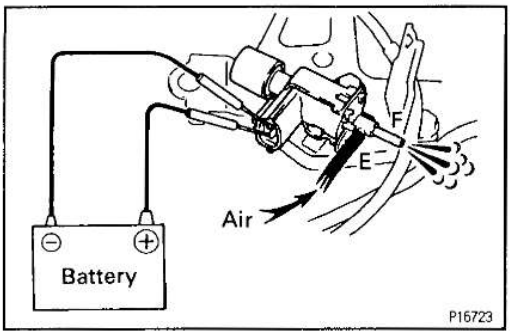
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



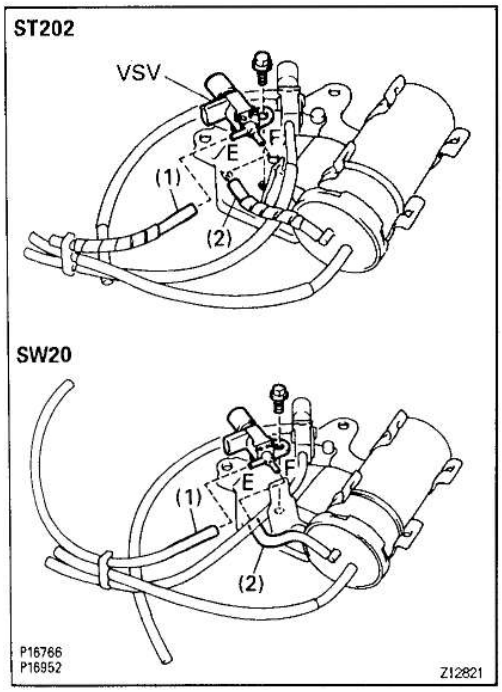
D. Inspect VSV operation

(a) Check that air flows from port E to the filter.



(b) Apply battery voltage across the terminals.

(c) Check that air flows from port E to F.



If operation is not as specified, replace the VSV.

E. Reconnect hoses to VSV

Connect the following hoses:

(1) Vacuum hose to port E of VSV

(2) Vacuum hose to port F of VSV

EG

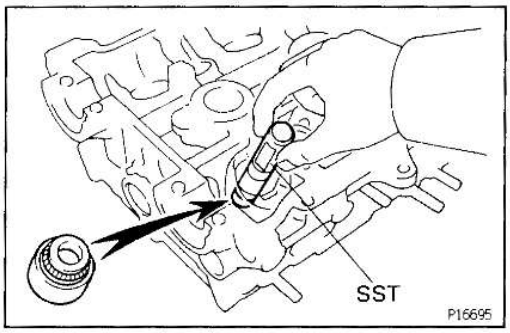
EG3V4-01

CYLINDER HEAD ASSEMBLY

(See Components for Removal and Installation)

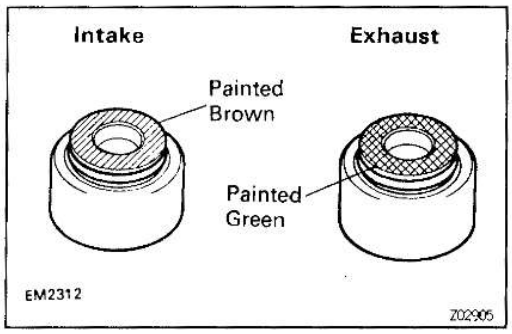
HINT:

- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets and oil seals with new ones.

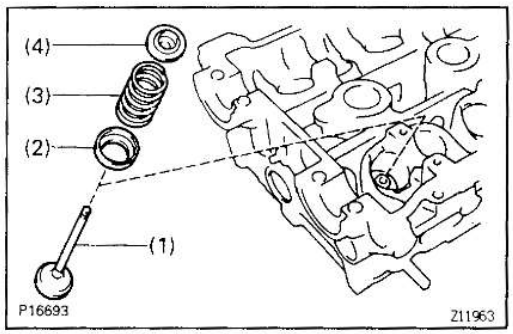


1. INSTALL VALVES

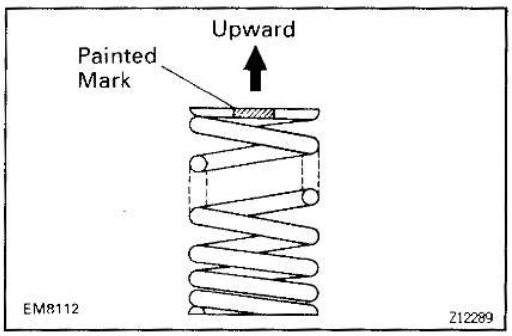
(a) Using SST, push in a new oil seal.
SST 09201—41020



HINT: The intake valve oil seal is brown and the exhaust valve oil seal is green.

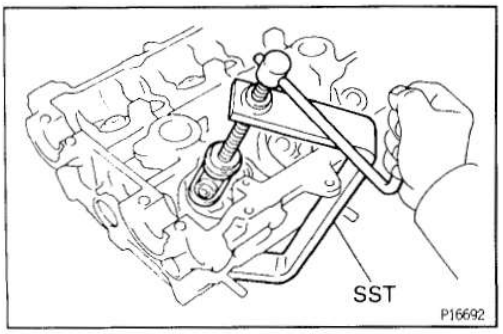


(b) Install the following parts:
(1) Valve
(2) Spring seat
(3) Valve spring
(4) Spring retainer



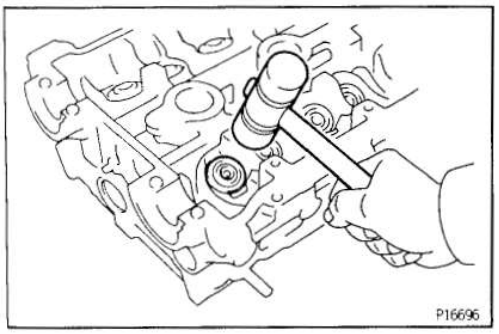
HINT:

- Install the valve spring, facing the painted mark upward.
- The intake valve spring is red and the exhaust valve spring is green.

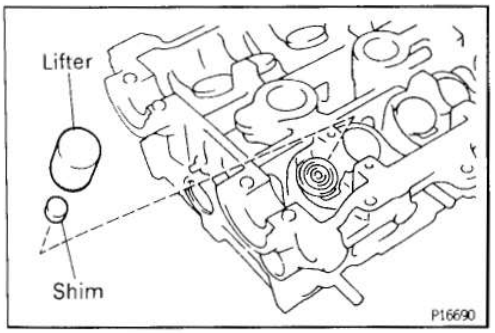


(c) Using SST, compress the valve spring and place the 2 keepers around the valve stem.
SST 09202—70010

EG

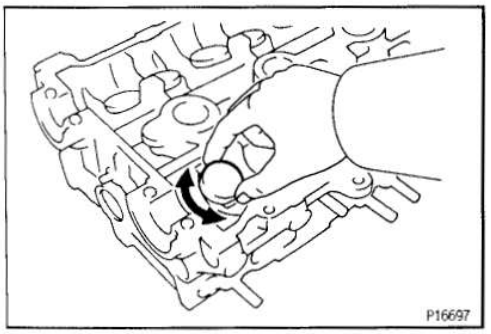


(d) Using a plastic—faced hammer, lightly tap the valve stem tip to assure a proper fit.



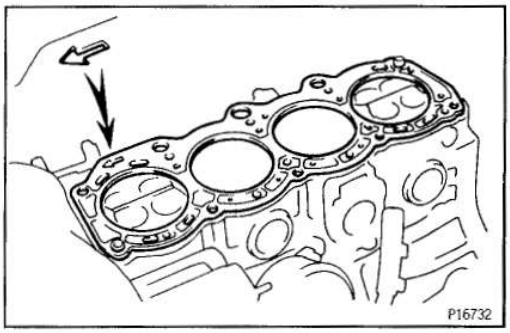
2. INSTALL ADJUSTING SHIMS AND VALVE LIFTERS

(a) Install the adjusting shim and valve lifter.



(b) Check that the valve lifter rotates smoothly by hand.

EG



CYLINDER HEAD INSTALLATION

EG482-01

(See Components for Removal and Installation)

1. INSTALL CYLINDER HEAD

A. Place cylinder head on cylinder block

(a) Place a new cylinder head gasket in position on the cylinder block.

NOTICE: Be careful of the installation direction.

(b) Place the cylinder head in position on the cylinder head gasket.

B. Install cylinder head bolts

HINT:

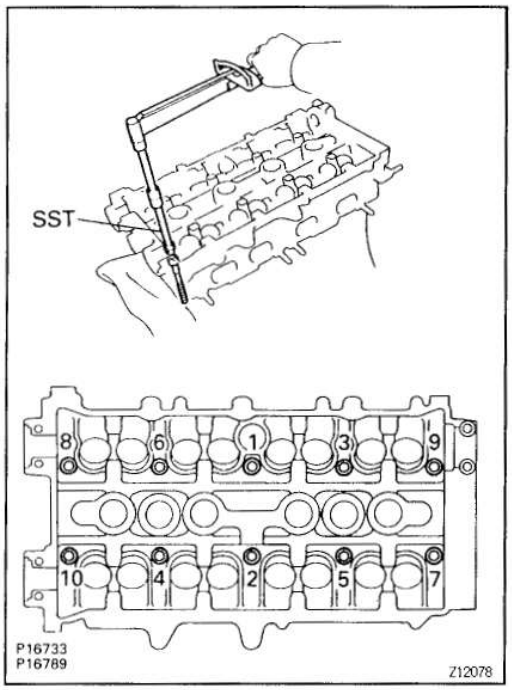
- The cylinder head bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any cylinder head bolt is broken or deformed, replace it.

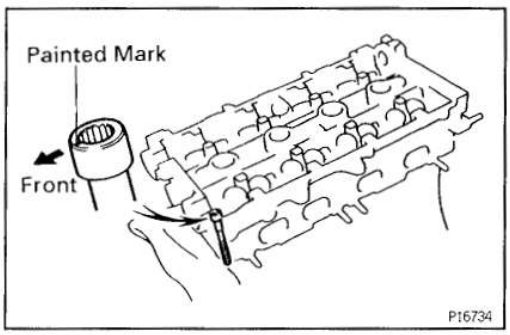
(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(b) Install and uniformly tighten the 10 cylinder head bolts and plate washers in several passes, in the sequence shown.

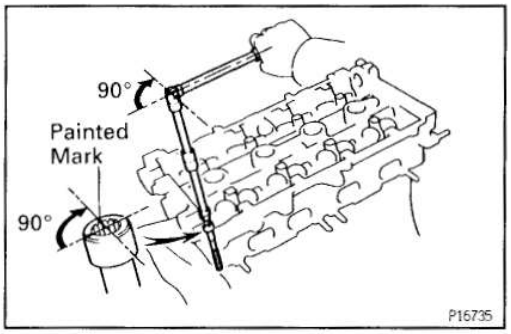
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

If any one of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.



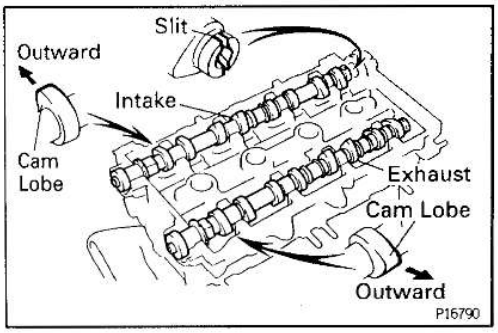


(c) Mark the front of the cylinder head bolt head with paint.



(d) Retighten the cylinder head bolts 90° in the numerical order shown.

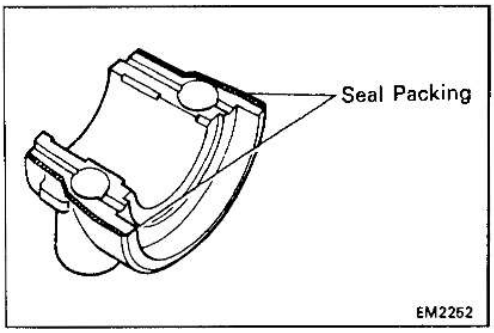
(e) Check that the painted mark is now at a 90° angle to the front.



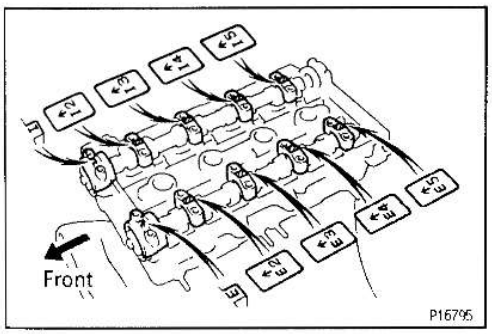
2. INSTALL CAMSHAFTS

(a) Place the 2 camshafts on the cylinder head with the No.1 cam lobes facing outward as shown.
HINT: Intake camshaft has slit; exhaust camshaft does not.

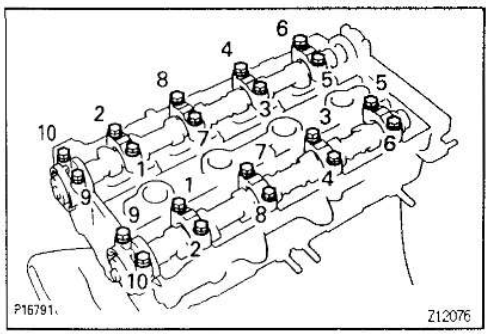
EG



(b) Apply seal packing to the No.1 bearing cap as shown in the illustration.
Seal packing:
Part No. 08826–00080 or equivalent



(c) Install the bearing caps in their proper locations.
HINT: Each bearing cap has a number and front mark.

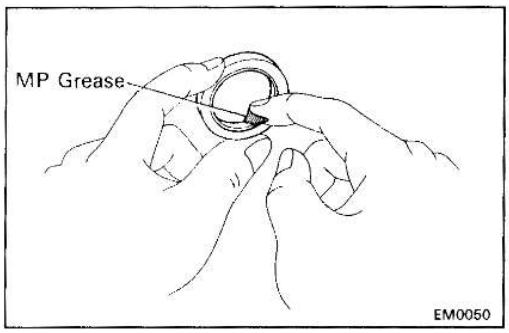


(d) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(e) Install and uniformly tighten the 10 bearing cap bolts on one side in several passes, in the sequence shown.
Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)

3. CHECK AND ADJUST VALVE CLEARANCE

(See page EG–22)

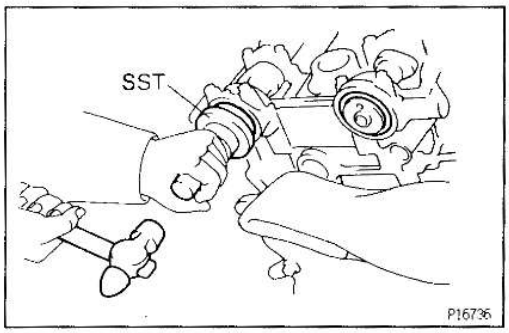
Turn the camshaft and position the cam lobe upward, and check and adjust the valve clearance.
Valve clearance (Cold):
Intake
0.15 – 0.25 mm (0.006 – 0.010 in.)
Exhaust
0.28 – 0.38 mm (0.011 – 0.015 in.)



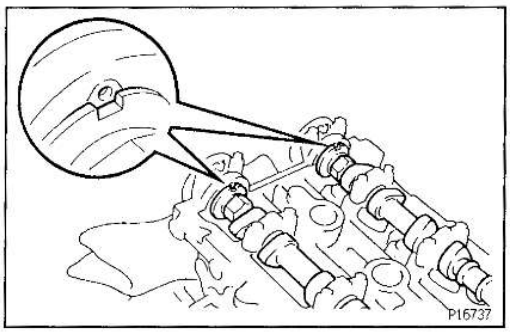
EG

4. INSTALL CAMSHAFT OIL SEALS

(a) Apply MP grease to a new oil seal lip.

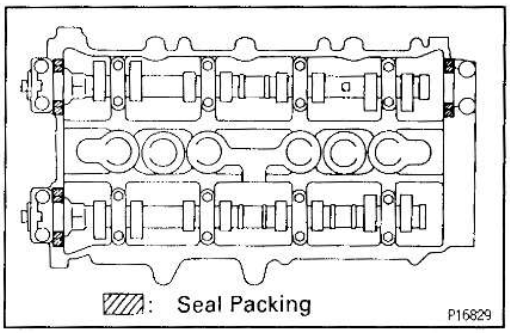


(b) Using SST, tap in the 2 camshaft oil seals.
SST 09223–46011

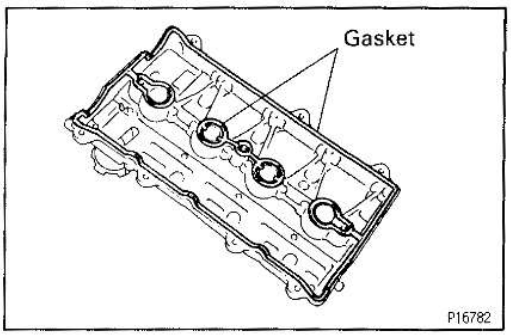


5. INSTALL CYLINDER HEAD COVER

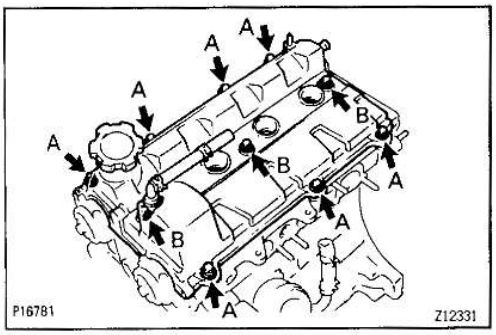
(a) Turn the hexagon head portion of the camshaft, align the groove of the camshaft with the dot mark of the No.1 camshaft bearing cap.



(b) Apply seal packing to the cylinder head as shown in the illustration.
Seal packing:
Part No. 08826–00080 or equivalent

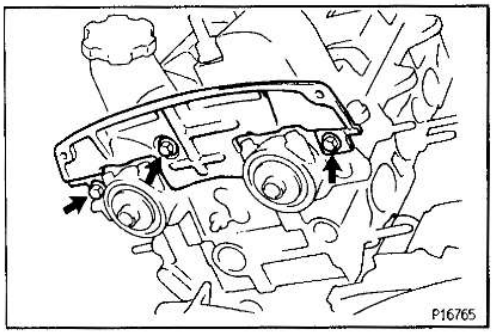


(c) Install the 2 gaskets to the head cover.

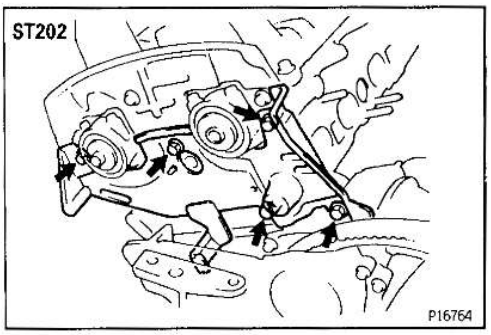


(d) Install the head cover with the 10 seal washers and bolts. Uniformly tighten the bolts in several passes.
Torque: 6.0 N·m (61 kgf·cm, 53 in.·lbf)
HINT: Each bolt length is indicated in the illustration.
Bolt length:
A 25 mm (0.98 in.)
B 50 mm (1.97 in.)

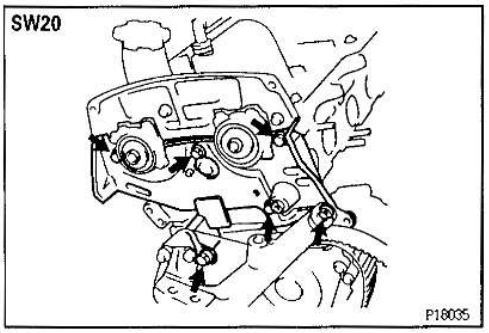
EG



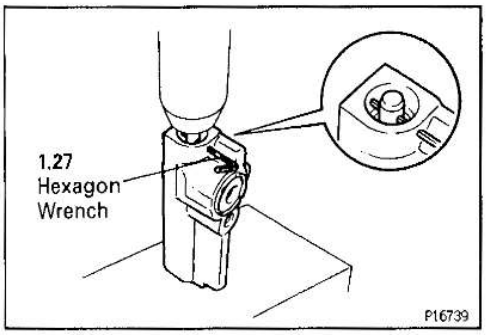
6. INSTALL NO.4 TIMING BELT COVER
Install the timing belt cover with the 3 bolts.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)



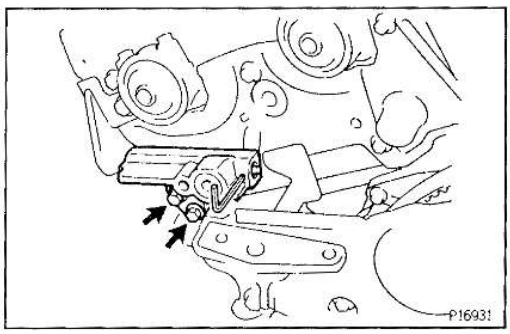
7. INSTALL NO.3 TIMING BELT COVER
ST202:
Install the timing belt cover with the 5 bolts.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)



SW20:
Install the timing belt cover with the 6 bolts.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)



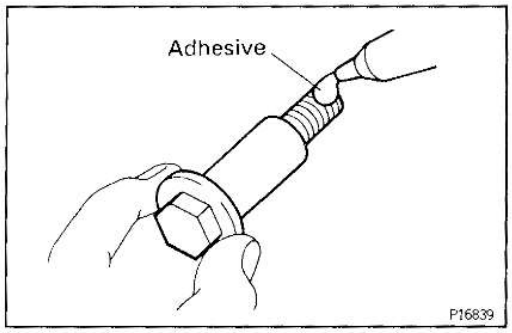
8. SET TIMING BELT TENSIONER
(a) Using a press, slowly press in the push rod using 981 – 9,807 N (100 – 1,000 kgf, 220 – 2,205 lbf) of force.
(b) Align the holes of the push rod and housing, pass a 1.27 mm hexagon wrench through the holes to keep the setting position of the push rod.
(c) Release the press.



9. INSTALL TIMING BELT TENSIONER

Install the tensioner with the 2 bolts.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

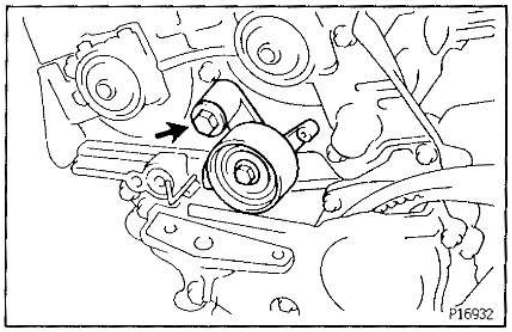


10. INSTALL NO.1 IDLER PULLEY

(a) Apply adhesive to 2 or 3 threads of the pivot bolt.

Adhesive:

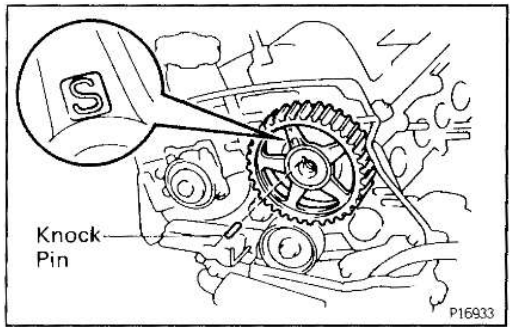
Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent



(b) Install the plate washer and pulley with the pivot bolt.

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

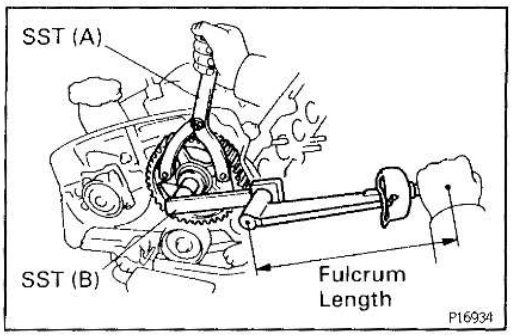
(c) Check that the idler pulley moves smoothly.



11. INSTALL EXHAUST CAMSHAFT TIMING PULLEY

(a) Slide the timing pulley onto the camshaft, facing mark "S" outward.

(b) Align the pin holes of the camshaft and timing pulley, and insert the knock pin.



(c) Using SST (A), install the pulley bolt.

SST 09960–10010 (09962–01000, 09963–01000)

Torque:

59 N·m (600 kgf·cm, 43 ft·lbf)

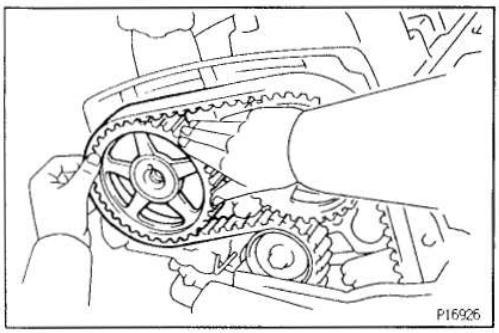
41 N·m (420 kgf·cm, 30 ft·lbf) for SST

HINT (On vehicle):

- Use SST (B).

SST 09249–63010

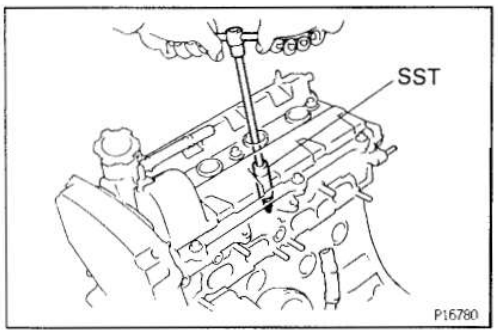
- Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).



12. CONNECT TIMING BELT TO CAMSHAFT TIMING PULLEYS

(See steps 14 to 17 on pages EG–61 to 64)

EG

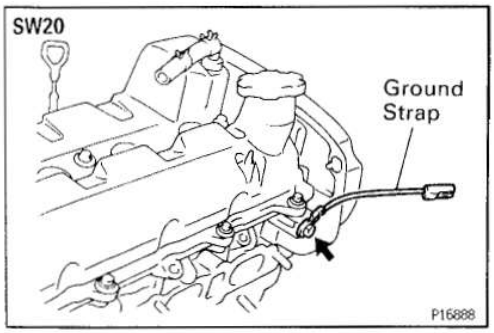


13. INSTALL SPARK PLUGS

Using SST, install the 4 spark plugs.

SST 09155–16100

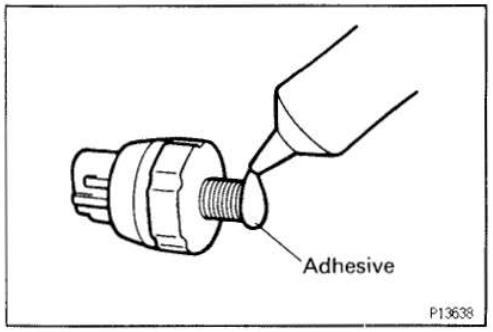
Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)



14. SW20:

INSTALL GROUND STRAP

Install the ground strap with the bolt.

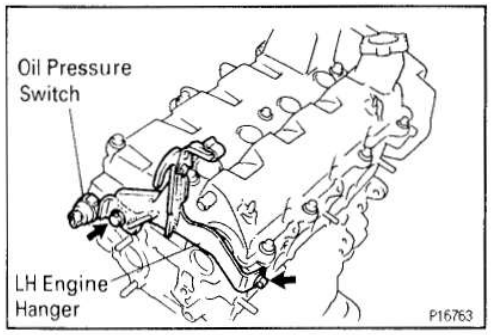


15. INSTALL OIL PRESSURE SWITCH

(a) Apply adhesive to 2 or 3 threads.

Adhesive:

Part No. 08833–00080, THREE BOND 1324 or equivalent



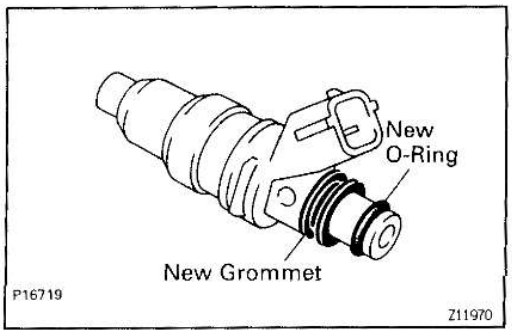
(b) Install the oil pressure switch.

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

16. INSTALL LH ENGINE HANGER

Install the LH engine hanger with the 2 bolts.

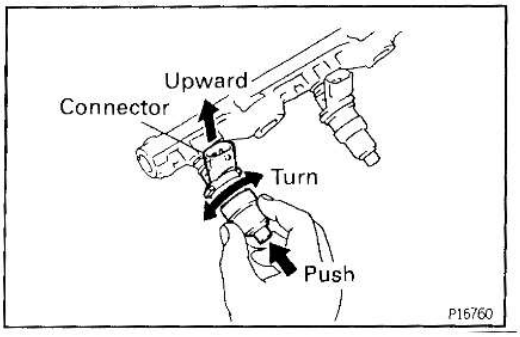
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)



17. INSTALL INJECTORS AND DELIVERY PIPE

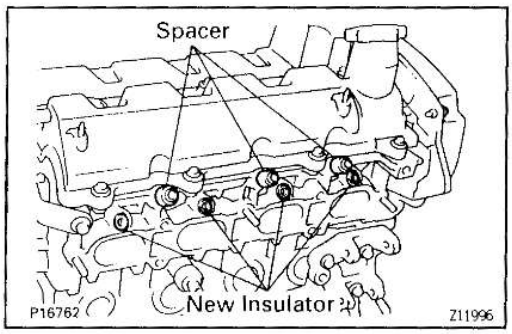
(a) Install a new grommet to each injector.

(b) Apply a light coat of gasoline onto a new O—ring, and install it to each injector.

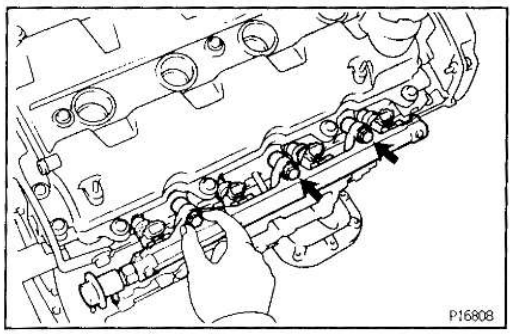


(c) While turning the injector clockwise and counter-clockwise, push it to the delivery pipe. Install the 4 injectors.

(d) Position the injector connector upward.

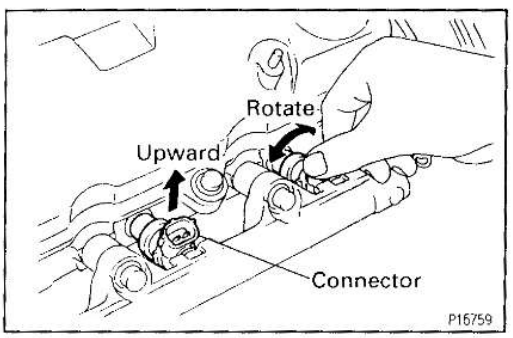


(e) Install the 2 spacers and 4 new insulators to the cylinder head.



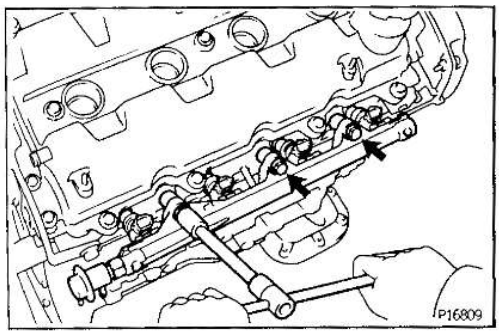
(f) Attach the 4 injectors together with the delivery pipe to the cylinder head.

(g) Temporarily install the 3 bolts holding the delivery pipe to the cylinder head.



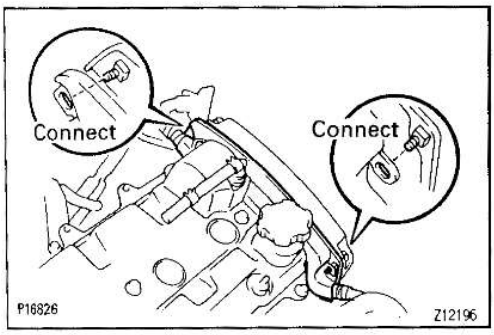
(h) Check that the injectors rotate smoothly.
HINT: If injectors do not rotate smoothly, the probable cause is incorrect installation of O—rings. Replace the O—rings.

(i) Position the injector connector upward.



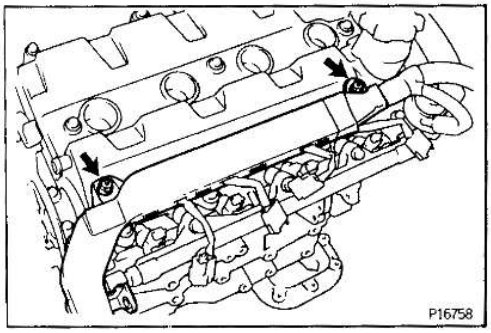
(j) Tighten the 3 bolts holding the delivery pipe to the cylinder head.
Torque: 29 N·m (300 kgf·cm, 21 ft·lbf)

EG

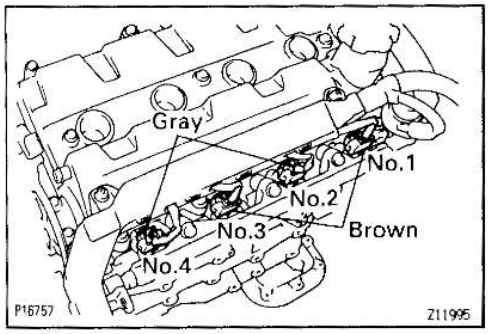


18. INSTALL ENGINE WIRE

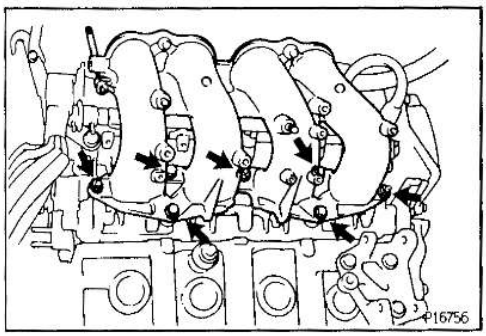
(a) Install the engine wire protector to the 2 mounting bolts of the No.2 timing belt cover.



(b) Install the engine wire protector to the cylinder head cover with the 2 nuts.

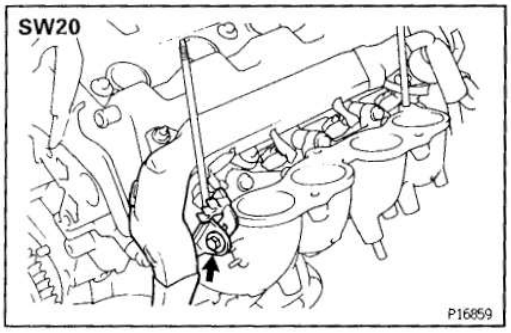


(c) Connect the 4 injector connectors.
HINT: The No.1 and No.3 injector connectors are brown, and the No.2 and No.4 injector connectors are gray.

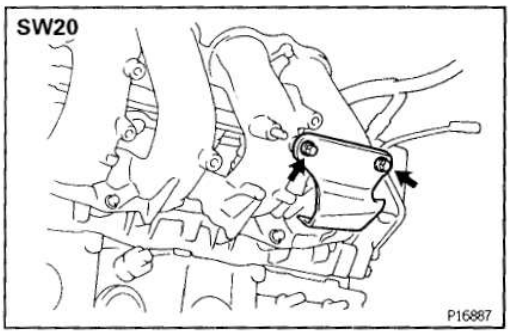


19. INSTALL INTAKE MANIFOLD

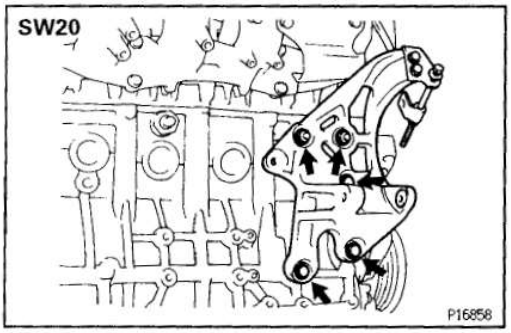
(a) Install a new gasket and the intake manifold with the 4 bolts and 3 nuts. Uniformly tighten the bolts and nuts in several passes.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)



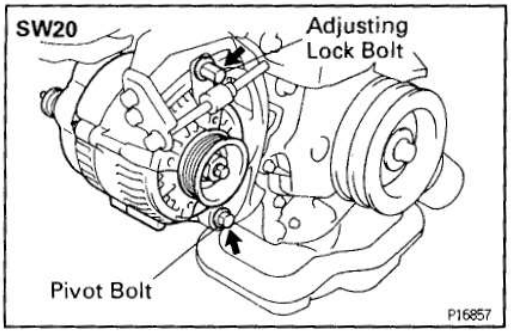
(b) SW20:
Install the hose clamp and engine wire protector with the bolt.



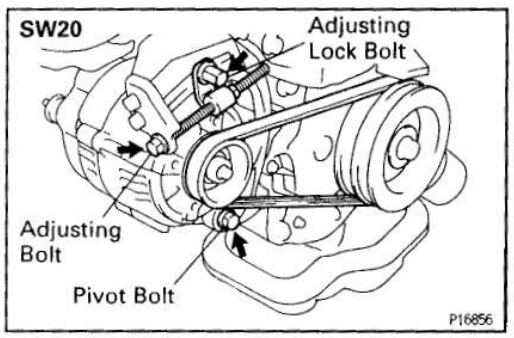
20. SW20:
INSTALL ALTERNATOR COVER
Install the alternator cover with the 2 bolts.



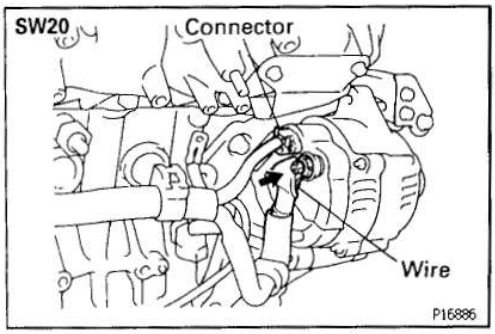
21. SW20:
INSTALL ALTERNATOR BRACKET
Install the alternator bracket with the 3 bolts and 2 nuts.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)



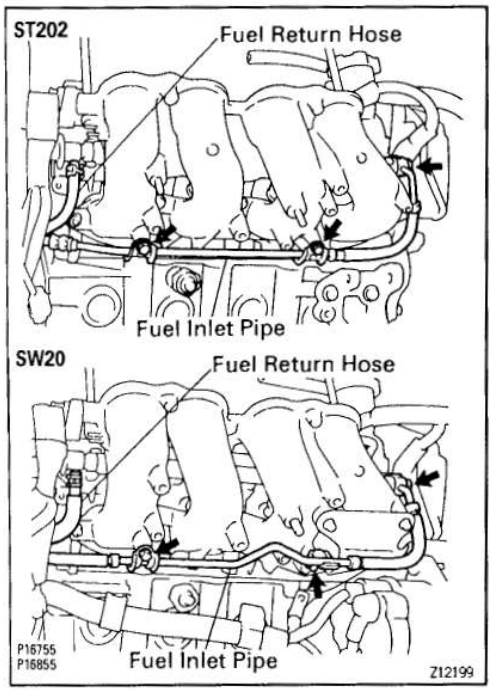
22. SW20:
INSTALL ALTERNATOR
(a) Install the alternator with the pivot bolt and adjusting lock bolt. Do not tighten the bolts yet.



(b) Install the drive belt with the adjusting bolt.
(c) Tighten the pivot bolt and adjusting lock bolt.
Torque:
Pivot bolt
52 N·m (530 kgf·cm, 38 ft·lbf)
Adjusting lock bolt
19 N·m (190 kgf·cm, 14 ft·lbf)



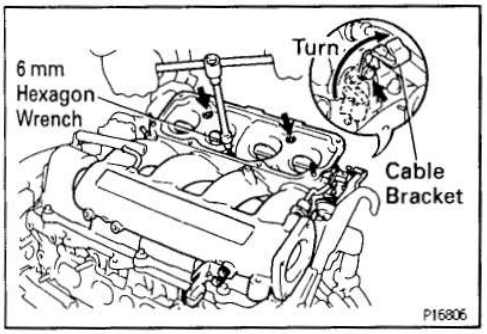
(d) Connect the alternator connector.
(e) Connect the alternator wire with the nut and rubber cap.



23. CONNECT FUEL INLET PIPE TO DELIVERY PIPE

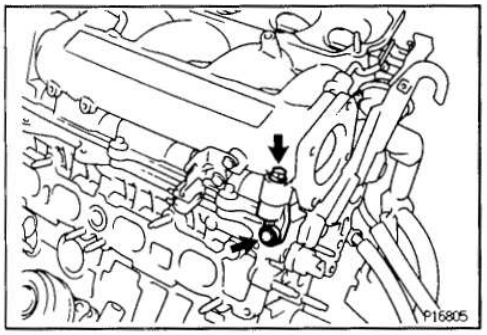
(a) Connect the fuel inlet pipe to the delivery pipe with 2 new gaskets and the union bolt.
Torque: 32 N·m (330 kgf·cm, 24 ft·lbf)
(b) Install the fuel inlet pipe to the cylinder head with the 2 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

24. CONNECT FUEL RETURN HOSE TO FUEL PRESSURE REGULATOR



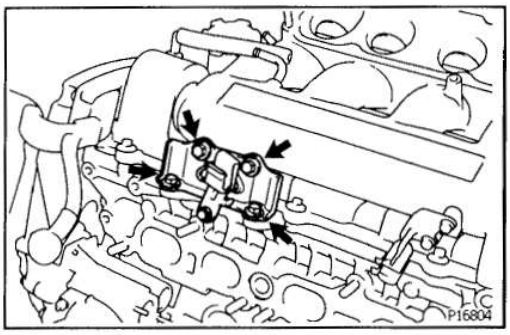
25. INSTALL ACIS VALVE ASSEMBLY

(a) Using a 6 mm hexagon wrench, install a new gasket and the ACIS valve assembly with the 3 bolts. Uniformly tighten the bolts in several passes.
Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)
(b) ST202:
Install the cable bracket on the LH engine hanger with the bolt.

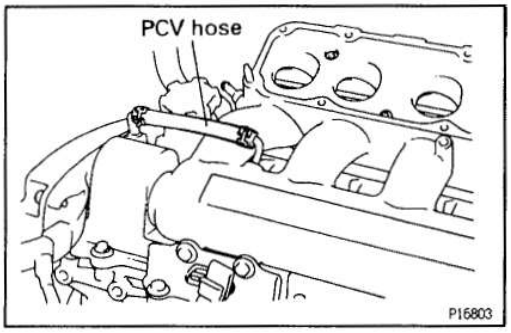


(c) Install the No.1 ACIS valve stay with the 2 bolts. Alternately tighten the bolts.
Torque:
Cylinder head side
19 N·m (190 kgf·cm, 14 ft·lbf)
ACIS valve side
21 N·m (210 kgf·cm, 15 ft·lbf)

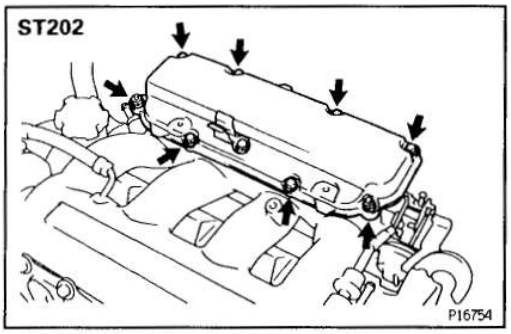
EG



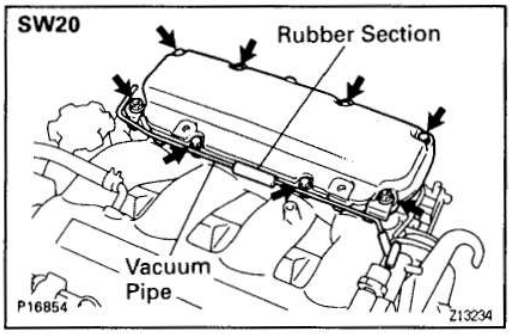
(d) Install the No.2 ACIS valve stay with the 4 bolts. Alternately tighten the bolts.
Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)



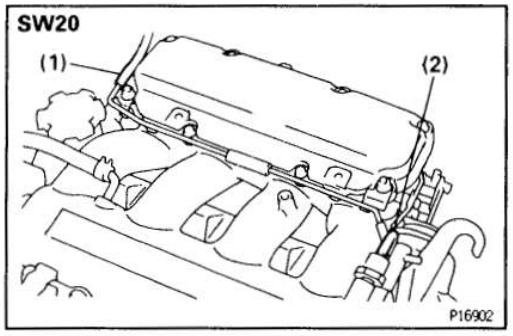
(e) Connect the PCV hose to the port of the ACIS valve assembly.



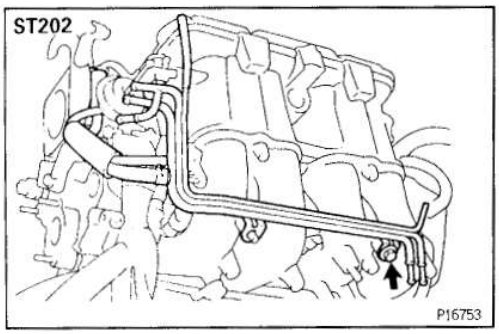
26. ST202:
INSTALL ACIS VALVE COVER
Install a new gasket and the ACIS valve cover with the 6 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.
Torque:
Bolt
8.5 N·m (87 kgf·cm, 75 in.·lbf)
Nut
21 N·m (210 kgf·cm, 15 ft·lbf)



27. SW20:
INSTALL ACIS VALVE COVER AND VACUUM PIPE
(a) Install a new gasket and the ACIS valve cover with the 6 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.
Torque:
Bolt
8.5 N·m (87 kgf·cm, 75 in.·lbf)
Nut
21 N·m (210 kgf·cm, 15 ft·lbf)



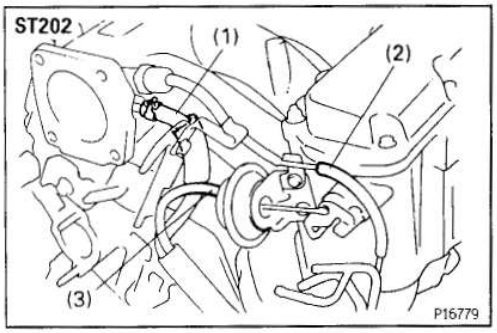
(b) Check that the rubber section at the center of the vacuum pipe is firmly pressed against the ACIS cover.
(c) Connect the following hoses:
(1) Vacuum hose (from vacuum sensor) to vacuum pipe
(2) Vacuum hose to gas filter



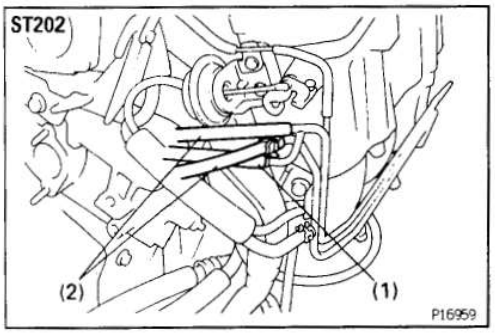
28. ST202:
INSTALL AIR TUBE, VSV AND VACUUM TANK ASSEMBLY

(a) Install the air tube with the bolt.

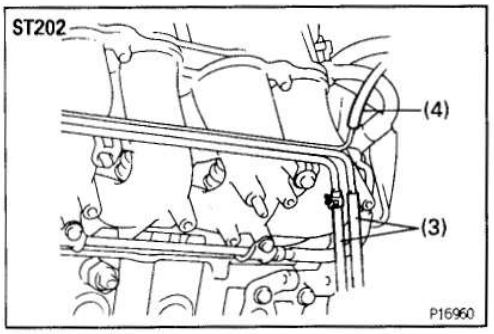
EG



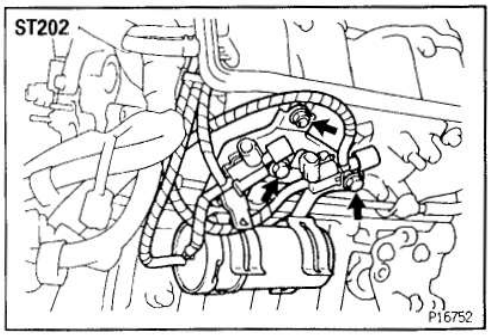
(b) Connect the following hoses:
(1) Air hose to port of ACIS valve
(2) Vacuum hose (from vacuum sensor) to vacuum pipe on ACIS actuator
(3) Vacuum hose (from VSV for ACIS) to ACIS actuator



HINT (On vehicle): Connect the following hose:
(1) Air hose (from air cleaner hose) to air tube
(2) 2 air hoses (from A/C idle–up valve) to air tube

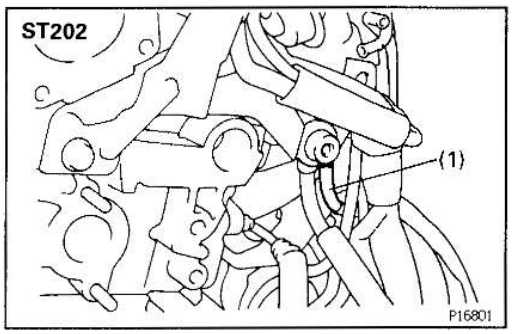


(3) 2 air hoses (from air control valve on PS pump) to air tube
(4) Vacuum hose (from vacuum sensor) to vacuum pipe on air tube

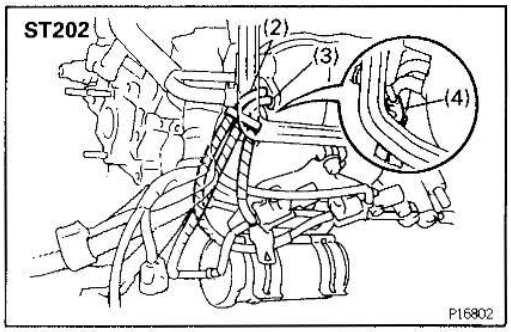


(c) Install the VSV and vacuum tank assembly with the 2 bolts and nut.

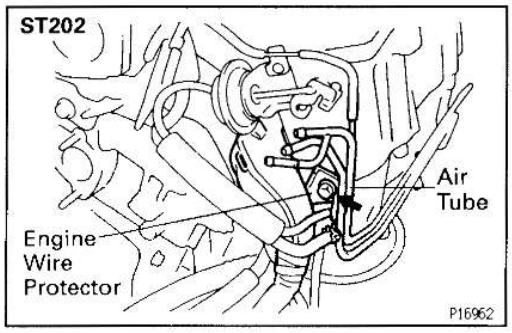
EG



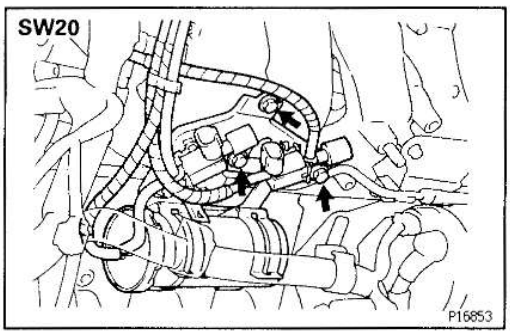
(d) Connect the following hoses:
(1) Vacuum hose (from VSV for fuel pressure control) to fuel pressure regulator



(2) Vacuum hose (from VSV for fuel pressure control) to intake manifold
(3) Vacuum hose (from vacuum tank) to intake manifold
(4) Vacuum hose (from VSV for ACIS) to air tube

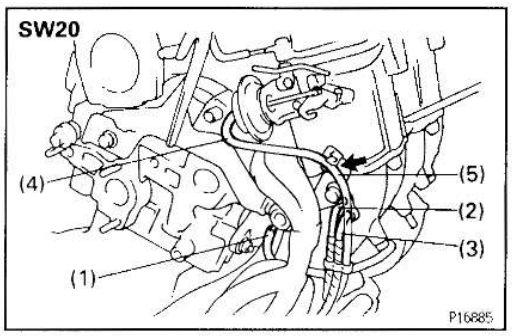


(e) Install the air tube and engine wire protector with the bolt.

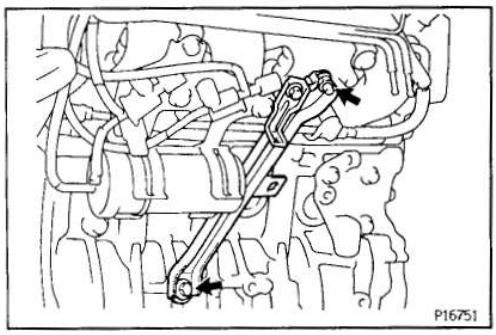


29. SW20: INSTALL VSV AND VACUUM TANK ASSEMBLY

(a) Install the VSV and vacuum tank assembly with the 3 bolts.



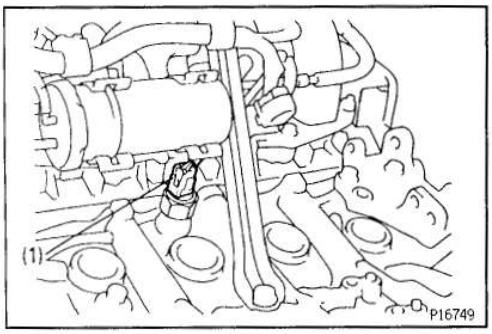
(b) Connect the following hoses:
(1) Vacuum hose (from VSV for fuel pressure control) to fuel pressure regulator
(2) Vacuum hose (from VSV for fuel pressure control) to intake manifold
(3) Vacuum hose (from vacuum tank) to intake manifold
(4) Vacuum hose (from VSV for ACIS) to ACIS actuator
(5) Vacuum hose (between VSV and actuator for ACIS) to clamp on intake manifold



30. REMOVE INTAKE MANIFOLD STAY

Install the intake manifold stay with the bolt and nut.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

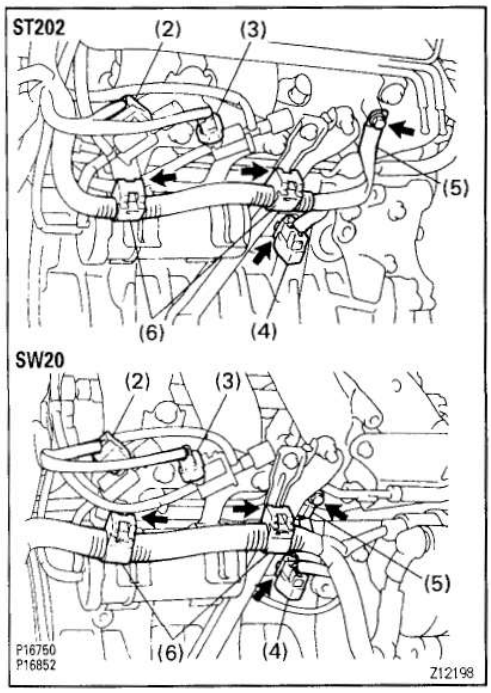
EG



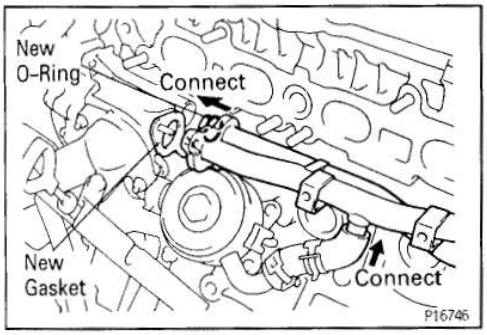
31. CONNECT ENGINE WIRE

Connect the following connectors, ground cable and clamps:

(1) Knock sensor connector

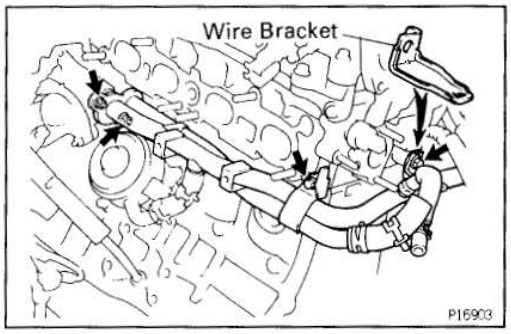


(2) VSV connector for ACIS
(3) VSV connector for fuel pressure control
(4) Oxygen sensor connector to bracket
(5) Ground cable
(6) 2 wire clamps to brackets

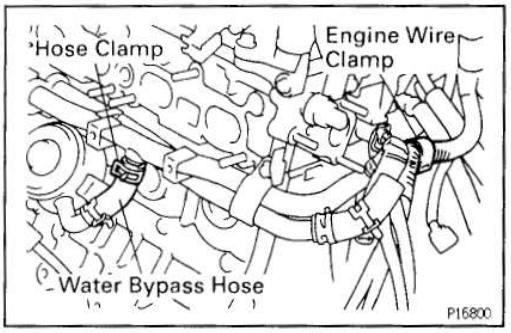


32. INSTALL WATER BYPASS PIPE

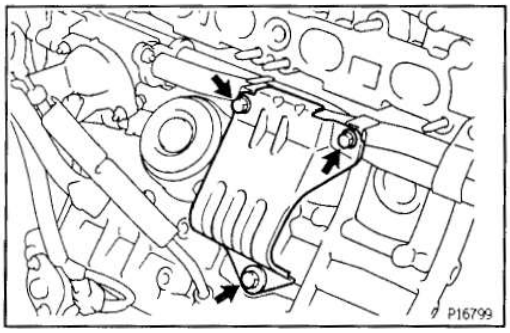
(a) Install a new gasket to the water pump cover.
(b) Install a new O–ring to the bypass pipe.
(c) Apply soapy water on the O–ring.
(d) Connect the water bypass pipe to the water bypass hose and water pump cover.



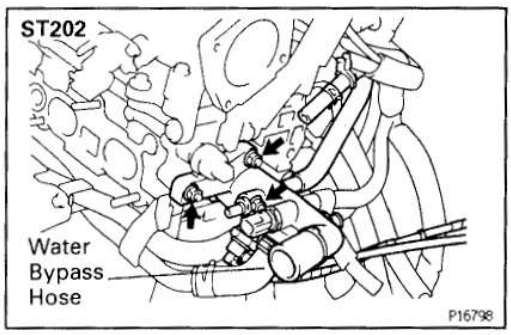
(e) Install the bypass pipe and engine wire bracket with the 2 nuts and 2 bolts.
Torque:
Nut
10 N·m (100 kgf·cm, 7 ft·lbf)
Bolt
24 N·m (240 kgf·cm, 18 ft·lbf)



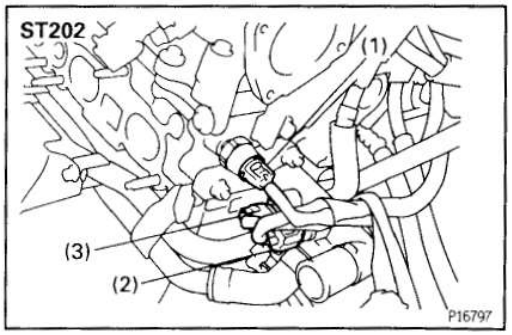
(f) Secure the water bypass hose with the hose clamp.
(g) Install the engine wire clamp to the wire bracket.



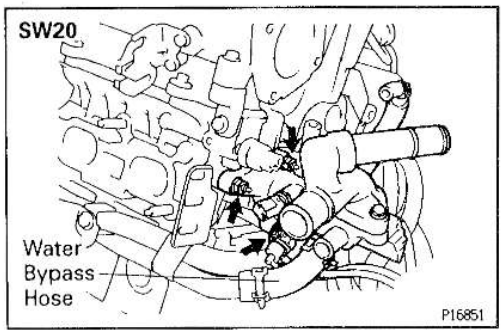
(h) Install the No.3 exhaust manifold heat insulator with the 3 bolts.
Torque:
12 mm bolt head
18 N·m (180 kgf·cm, 13 ft·lbf)
14 mm bolt head
37 N·m (380 kgf·cm, 27 ft·lbf)



33. ST202:
INSTALL WATER OUTLET
(a) Install a new gasket to the cylinder head.
(b) Connect the water bypass hose to the water outlet, and install the water outlet with the 3 nuts.
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)



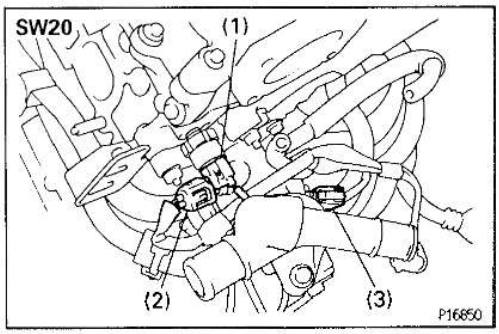
(c) Connect the following connectors:
(1) Oil pressure switch connector
(2) Water temperature sensor connector
(3) Water temperature sender gauge connector



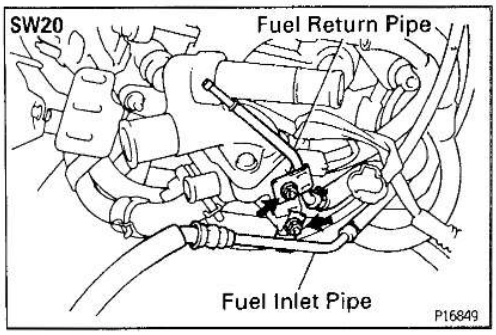
34. SW20:
INSTALL WATER OUTLET AND HOUSING ASSEMBLY

(a) Install a new gasket to the cylinder head.

(b) Connect the water bypass hose to the water outlet, and install the water outlet and housing assembly with the 3 nuts.
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)

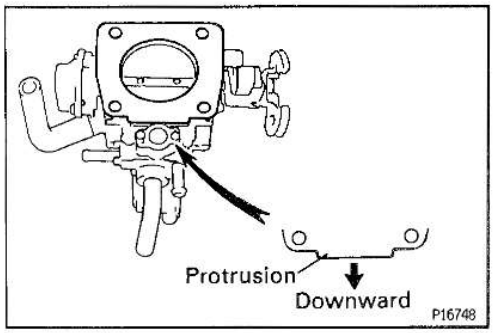


(c) Connect the following connectors:
(1) Oil pressure switch connector
(2) Water temperature sensor connector
(3) Water temperature sender gauge connector



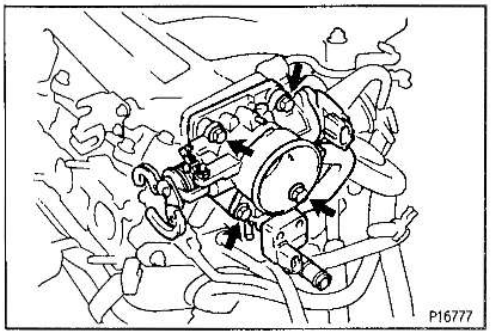
(d) Install the fuel inlet pipe to the water outlet with the nut.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

(e) Install the fuel return pipe to the water outlet with nut.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

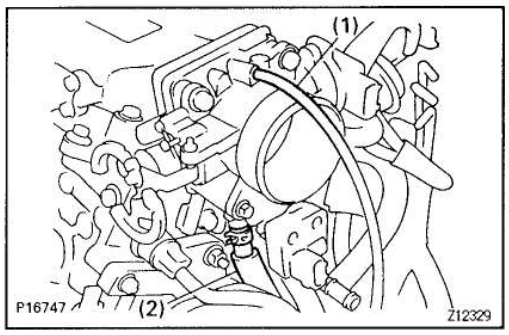


35. INSTALL THROTTLE BODY

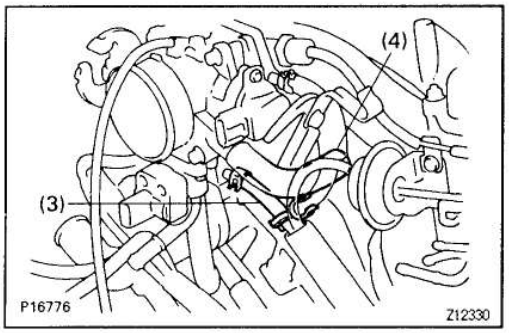
(a) Attach a new gasket to the throttle body, facing the protrusion downward.



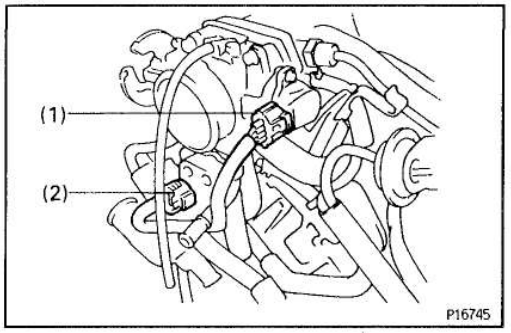
(b) Install the gasket and throttle body with the 4 bolts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)
HINT: Different bolt lengths are used for the upper and lower sides.
Bolt length:
Upper side
40 mm (1.77 in.)
Lower side
65 mm (2.17 in.)



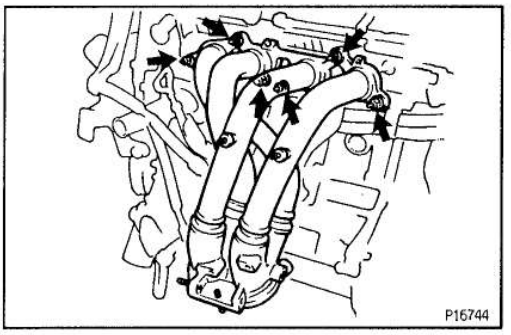
(c) Connect the following hoses:
(1) Vacuum hose (from upper port of BVSV) to throttle body
(2) Water bypass hose (from water bypass pipe) to throttle body



(3) Water bypass hose (from water outlet) to throttle body
(4) PCV hose to cylinder head cover

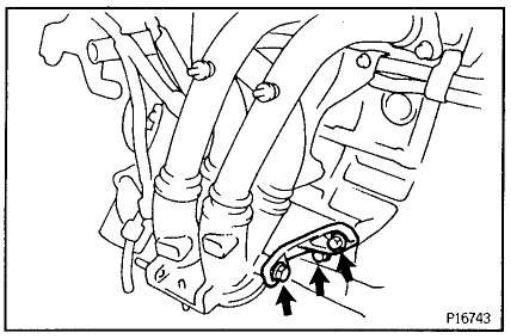


(d) Connect the following connectors:
(1) Throttle position sensor connector
(2) ISC valve connector

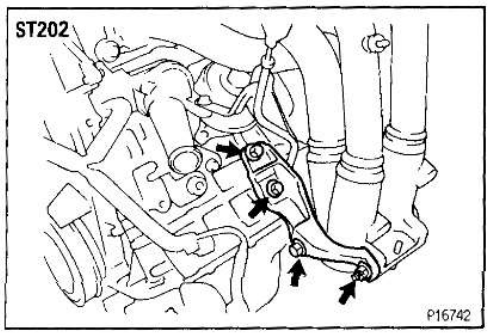


36. INSTALL EXHAUST MANIFOLD

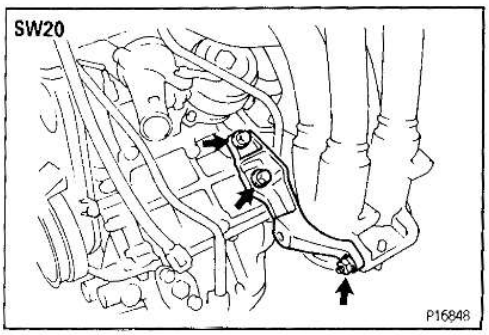
(a) Install a new gasket and the exhaust manifold with the 6 nuts. Uniformly tighten the nuts in several passes.
Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)



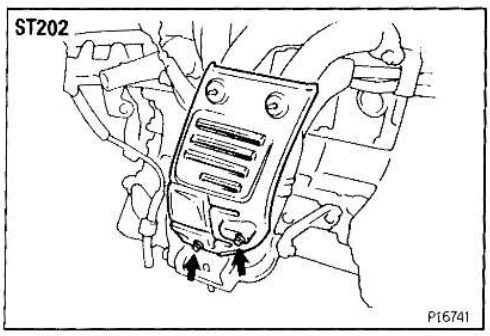
(b) Install the LH exhaust manifold stay with the 3 bolts. Alternately tighten the bolts.
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)



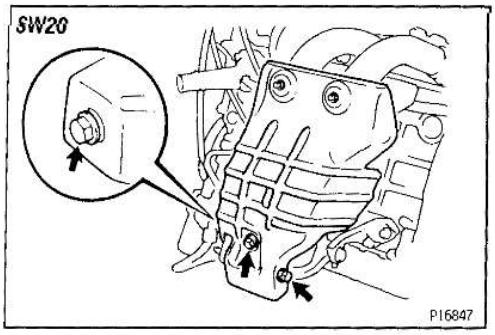
(c) ST202:
Install the RH exhaust manifold stay with the 3 bolts and nut. Alternately tighten the bolts and nut.
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)



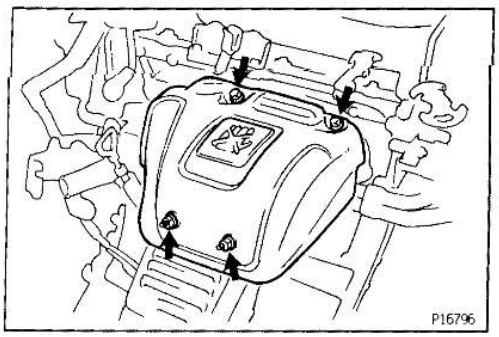
(d) SW20:
Install the RH exhaust manifold stay with the 2 bolts and nut. Alternately tighten the bolts and nut.
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)



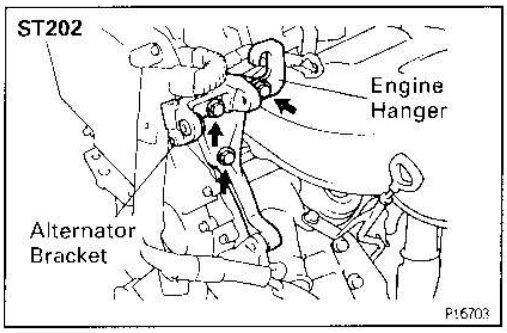
(e) ST202:
Install the No.2 exhaust manifold heat insulator with the 2 bolts.
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)



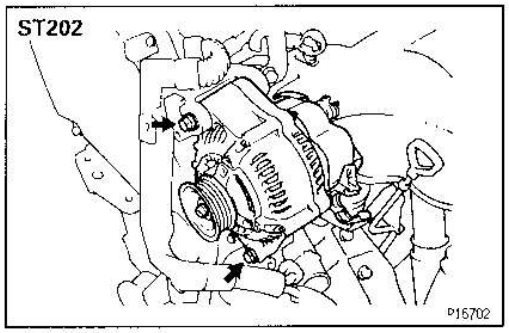
(f) SW20:
Install the No.2 exhaust manifold heat insulator with the 3 bolts.
Torque:
12 mm head
20 N·m (200 kgf·cm, 15 ft·lbf)
14 mm head
37 N·m (380 kgf·cm, 27 ft·lbf)



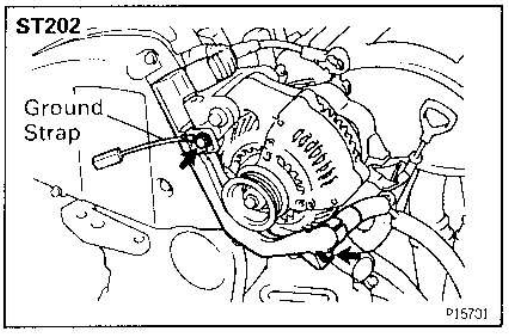
(g) Install the No.1 exhaust manifold heat insulator with *the 2 bolts and 2 nuts.*
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)



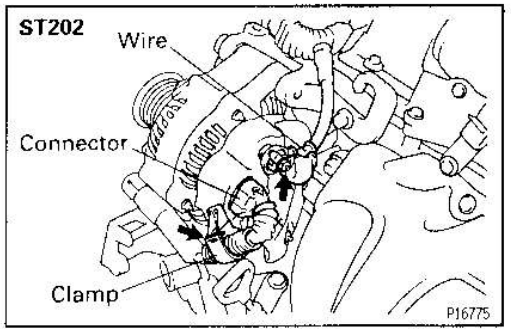
37. **ST202:**
INSTALL ALTERNATOR BRACKET AND RH FRONT ENGINE HANGER
Install the alternator bracket and engine hanger with the 3 bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)



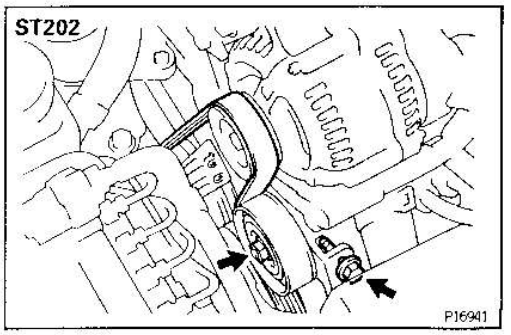
38. **ST202:**
INSTALL ALTERNATOR
(a) Install the alternator with the 2 bolts.
Torque:
12 mm head
19 N·m (190 kgf·cm, 14 ft·lbf)
14 mm head
52 N·m (530 kgf·cm, 38 ft·lbf)



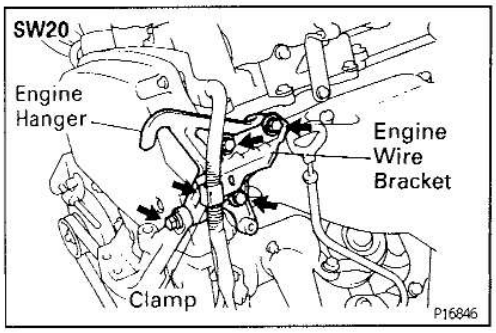
(b) Install the engine wire protector and ground strap with the 2 bolts.



(c) Connect the alternator connector.
(d) Connect the alternator wire with the nut and rubber cap.
(e) Install the wire to the clamp on the rear end cover.



(f) Install the drive belt with the adjusting bolt.
(g) Tighten the pulley nut.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)



39. SW20:
INSTALL RH FRONT ENGINE HANGER AND ENGINE WIRE BRACKET

(a) Install the engine hanger and wire bracket with the 4 bolts. Alternately tighten the bolts.

Torque:

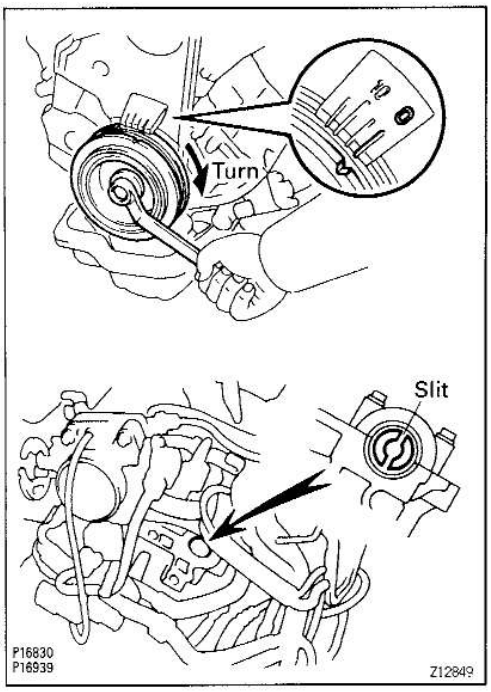
Cylinder head side

39 N·m (400 kgf·cm, 29 ft·lbf)

RH engine mounting bracket side

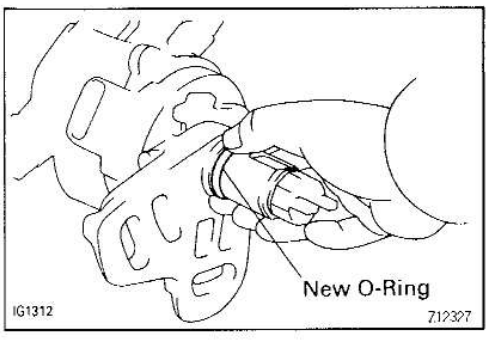
60 N·m (620 kgf·cm, 45 ft·lbf)

(b) Install the engine wire to the clamp on the wire bracket.



40. INSTALL DISTRIBUTOR

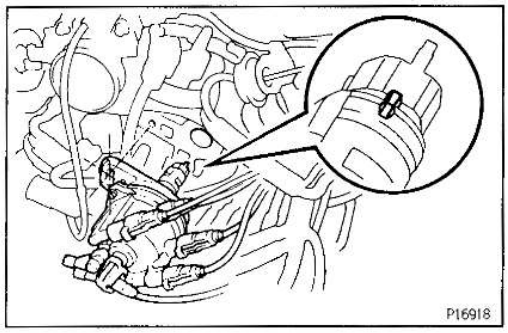
(a) Turn the crankshaft clockwise, and position the slit of the intake camshaft as shown in the illustration.



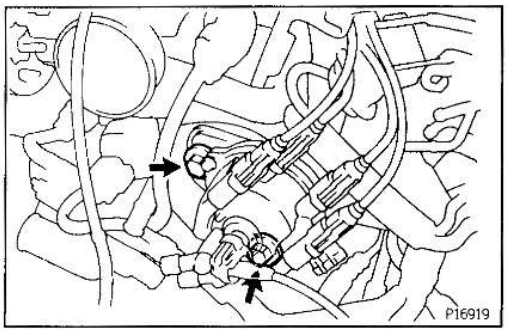
(b) Install a new O–ring to the distributor housing.

(c) Apply a light coat of engine oil on the O–ring.

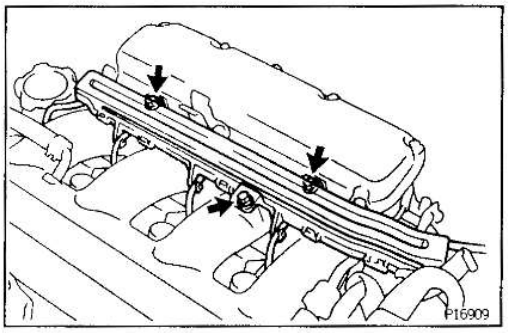
EG



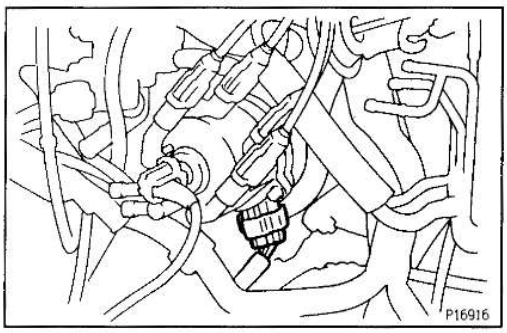
(d) Align the cutout portion of the coupling with the groove of the housing.
(e) Insert the distributor, aligning the center of the flange with that of the bolt hole on the cylinder head.



(f) Lightly tighten the 2 bolts.



(g) Connect the 4 high—tension cords to the spark plugs.
(h) Install the high—tension cord clamp with the 3 bolts.



(i) Connect the distributor connector.

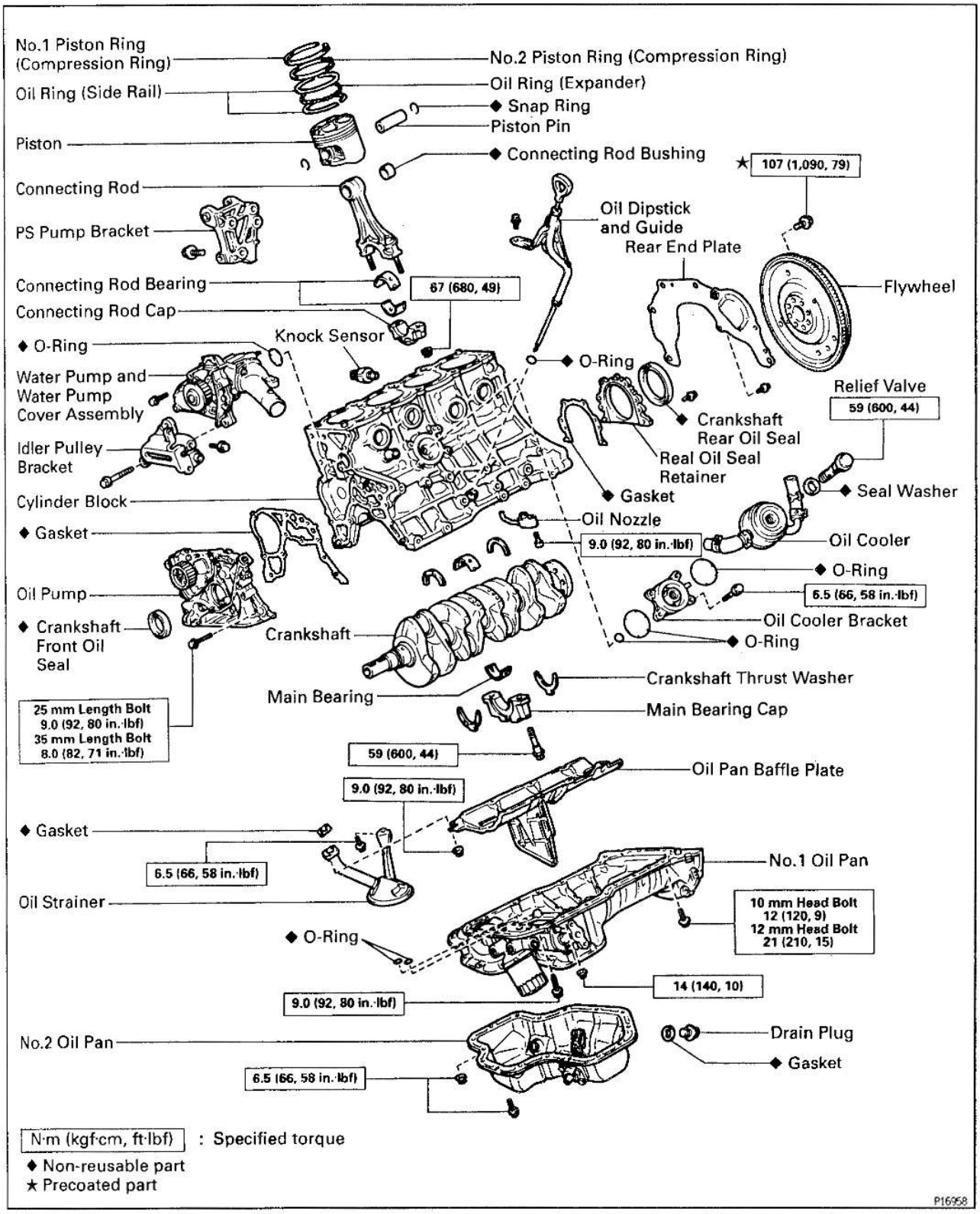
41. FILL WITH ENGINE COOLANT
42. START ENGINE AND CHECK FOR LEAKS
43. PERFORM ENGINE ADJUSTMENT
(See pages EG—12 to 41)
44. RECHECK ENGINE COOLANT LEVEL AND OIL LEVEL

CYLINDER BLOCK

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY (ST202)

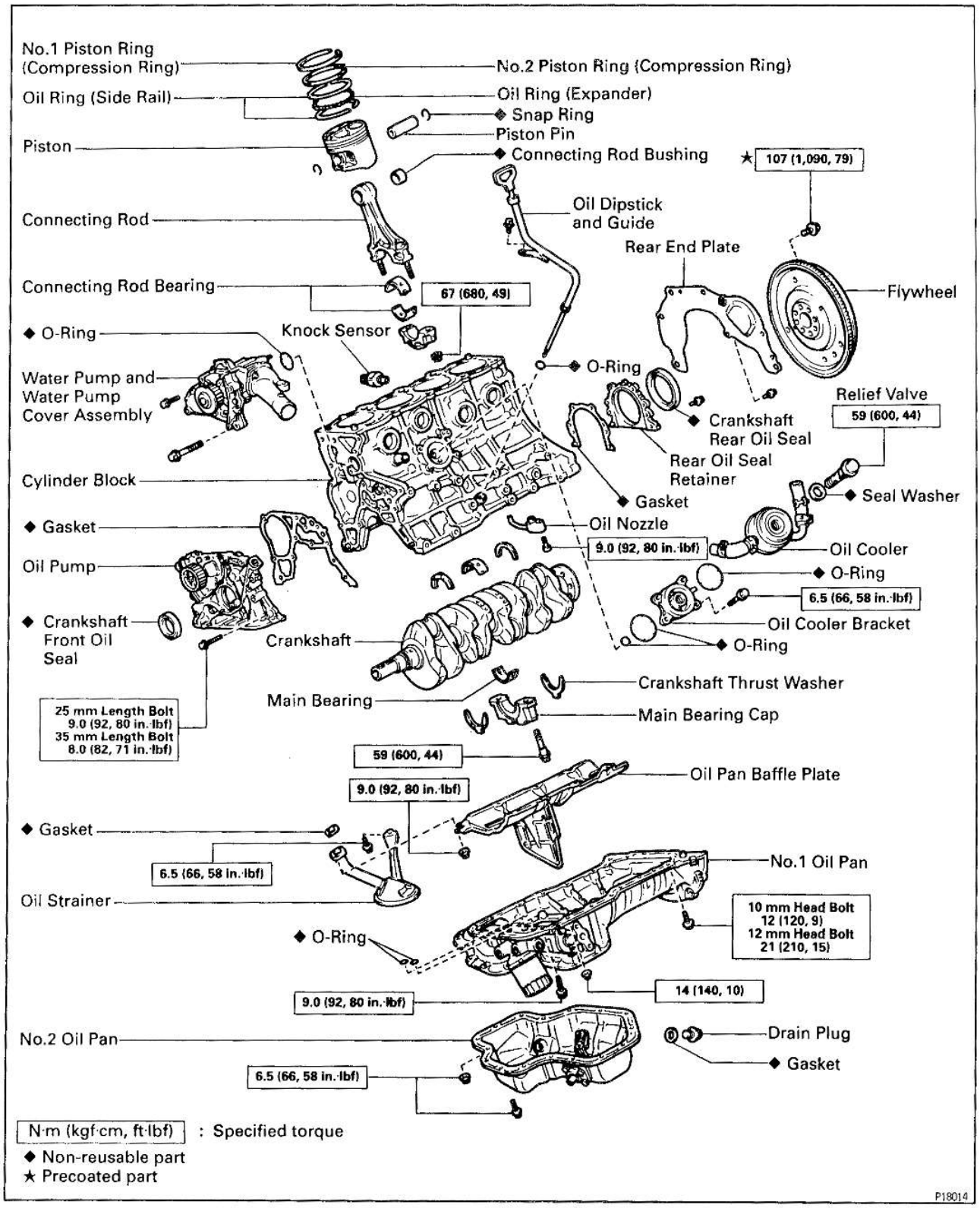
EG0BS–0W

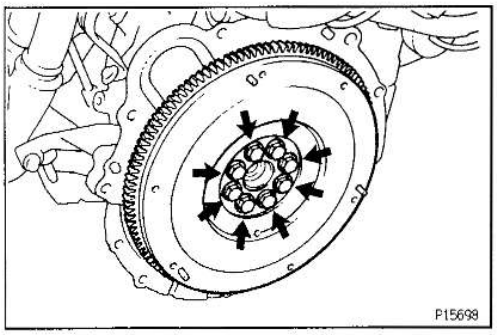
EG



COMPONENTS FOR DISASSEMBLY AND ASSEMBLY (SW20)

EG



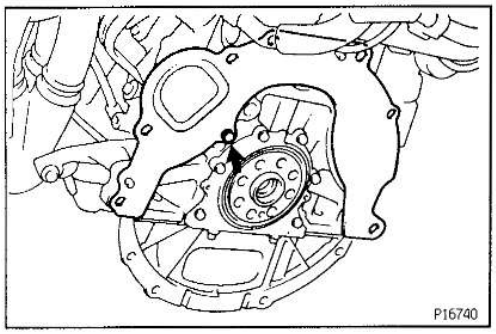


PREPARATION FOR DISASSEMBLY

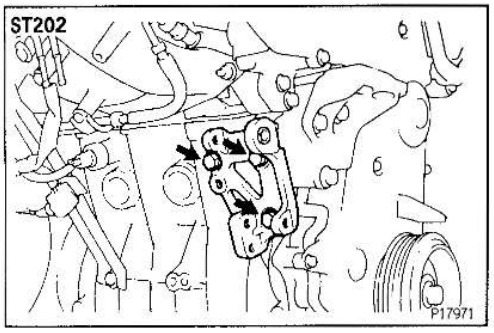
EG42H-01

(See Components for Disassembly and Assembly)

1. **REMOVE FLYWHEEL**
   Remove the 8 bolts and flywheel.

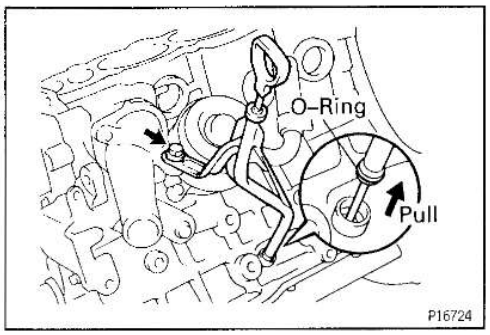


2. **REMOVE REAR END PLATE**
   Remove the bolt and end plate.
3. **INSTALL ENGINE TO ENGINE STANDFOR DISASSEMBLY**



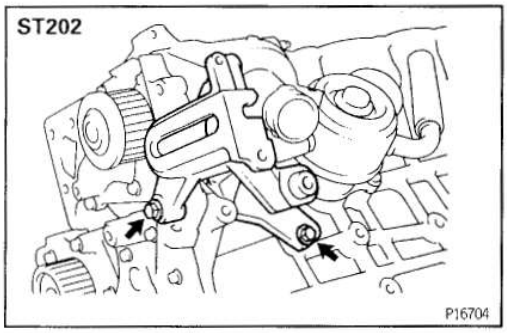
4. **ST202:**
   REMOVE PS PUMP BRACKET
   Remove the 3 bolts and PS pump bracket.

5. **REMOVE TIMING BELT AND PULLEYS**
   (See pages EG–49 to 55)
6. **REMOVE CYLINDER HEAD**
   (See pages EG–72 to 88)
7. **REMOVE OIL PANS AND OIL PUMP**
   (See pages EG–386 and 388)

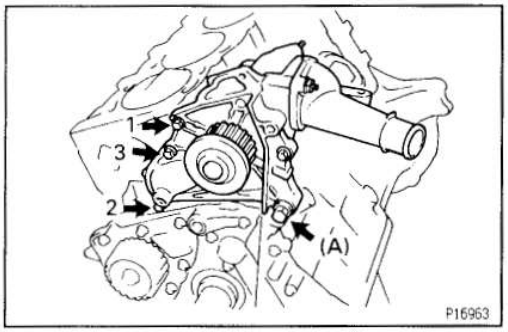


8. **REMOVE OIL DIPSTICK AND GUIDE**
   (a) Remove the bolt.
   (b) Pull out the oil dipstick guide, and remove it and the oil dipstick.
   (c) Remove the O–ring from the oil dipstick guide.

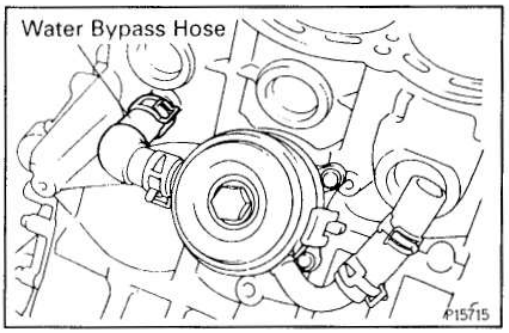
EG



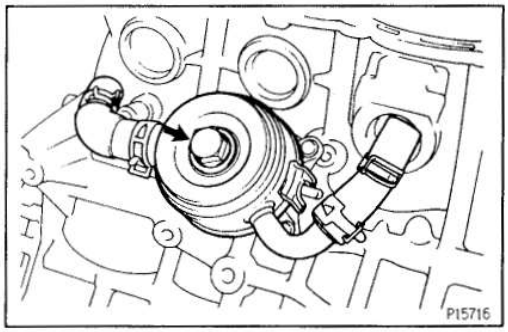
9. ST202:
REMOVE IDLER PULLEY BRACKET FOR ALTERNATOR DRIVE BELT
Remove the 2 bolts and idler pulley bracket.



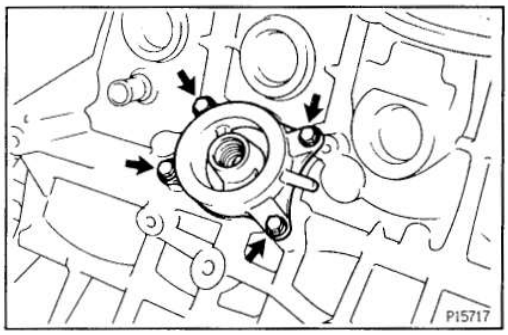
10. REMOVE WATER PUMP AND WATER PUMP COVER ASSEMBLY
(a) SW20 w/o A/C:
Remove the bolt (A).
(b) Loosen and remove the 3 bolts in the sequence shown, and remove the water pump and water pump cover assembly.
(c) Remove the O—ring from the water pump cover.



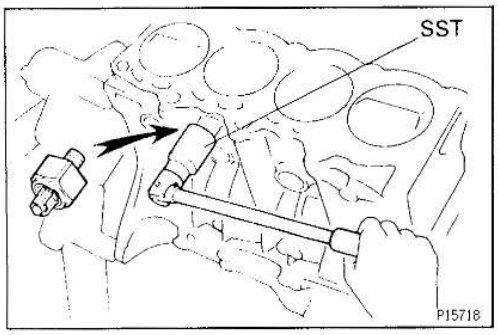
11. REMOVE OIL COOLER
(a) Disconnect the water bypass hose from the cylinder block.



(b) Remove the relief valve, seal washer and oil cooler.
(c) Remove the O—ring from the oil cooler.



12. REMOVE OIL COOLER BRACKET
(a) Remove the 4 bolts and oil cooler bracket.
(b) Remove the 2 O—rings from the oil cooler bracket.



13. REMOVE KNOCK SENSOR

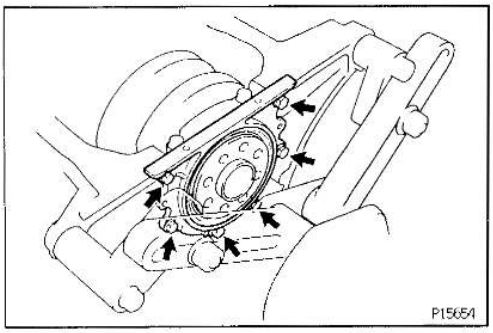
Using SST, remove the knock sensor.

SST 09816–30010

EG

EG42J–01

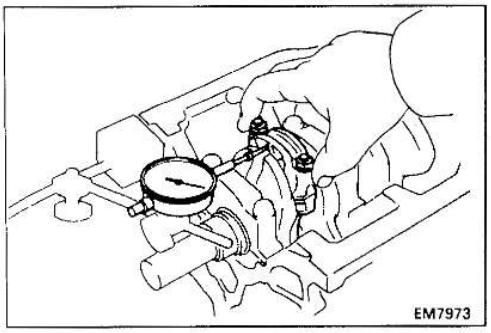
CYLINDER BLOCK DISASSEMBLY



(See Components for Disassembly and Assembly)

1. REMOVE REAR OIL SEAL RETAINER

Remove the 6 bolts, retainer and gasket.



2. CHECK CONNECTING ROD THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

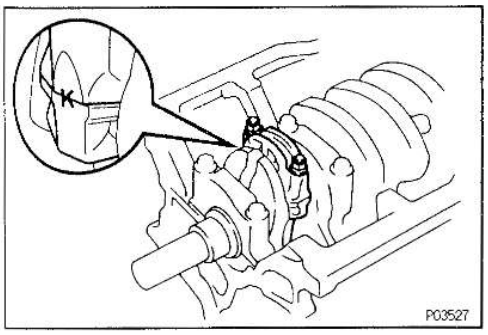
Standard thrust clearance:

0.160 – 0.312 mm (0.0063 – 0.0123 in.)

Maximum thrust clearance:

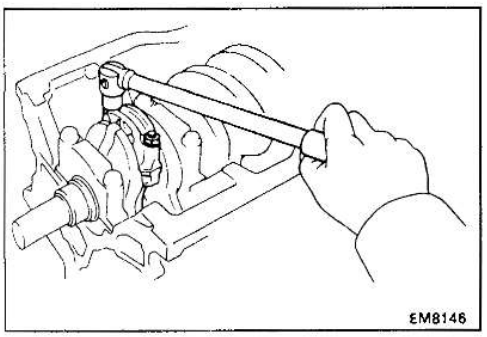
0.35 mm (0.0138 in.)

If the thrust clearance is greater than maximum, replace the connecting rod assembly. If necessary, replace the crankshaft.

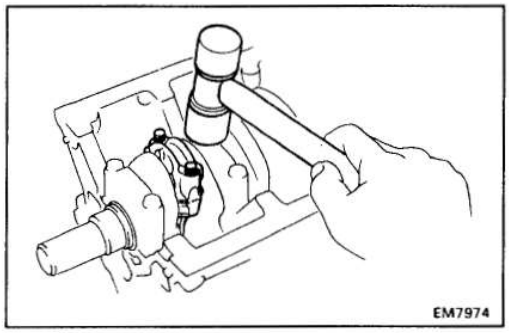


3. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

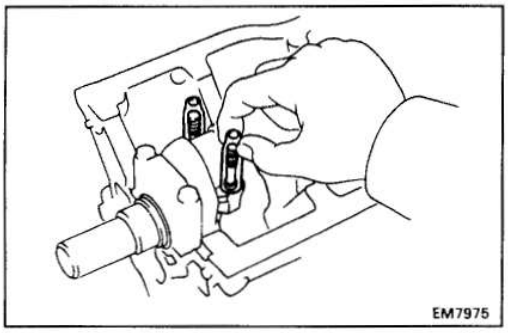
(a) Check the matchmarks on the connecting rod and cap to ensure correct reassembly.



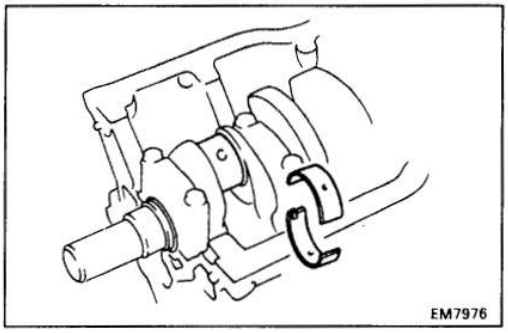
(b) Remove the 2 connecting rod cap nuts.



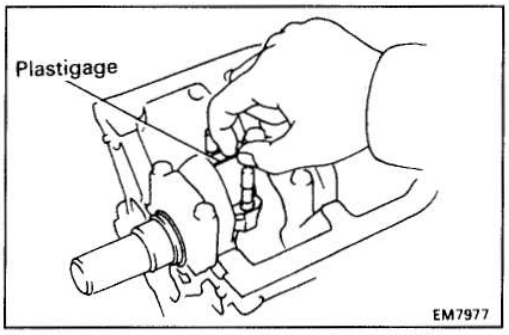
(c) Using a plastic—faced hammer, lightly tap the connecting rod bolts and lift off the connecting rod cap.
HINT: Keep the lower bearing inserted with the connecting rod cap.



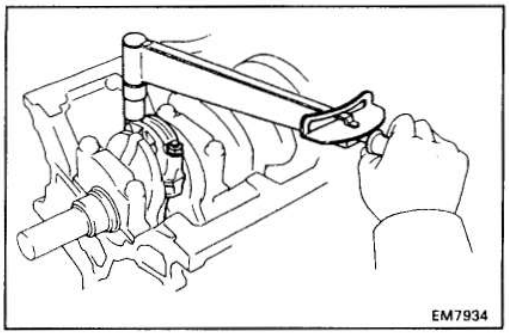
(d) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.



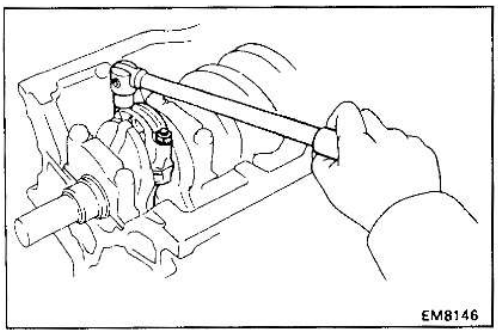
(e) Clean the crank pin and bearing.
(f) Check the crank pin and bearing for pitting and scratches.
If the crank pin or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.



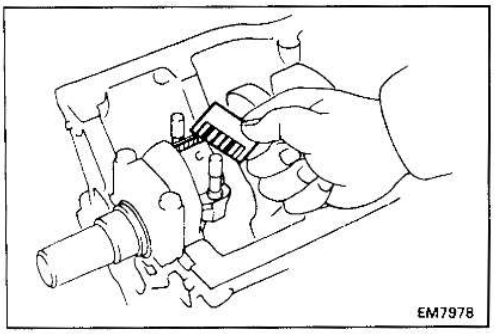
(g) Lay a strip of Plastigage across the crank pin.



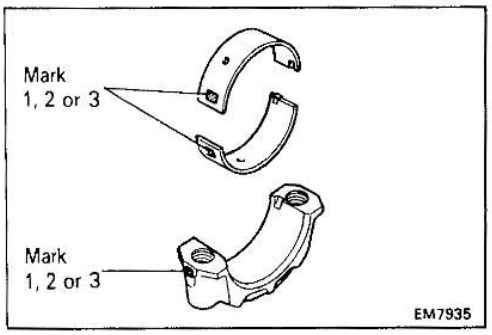
(h) Install the connecting rod cap.
(See step 7 on page EG—153)
Torque: 67 N·m (680 kgf·cm, 49 ft·lbf)
NOTICE: Do not turn the crankshaft.



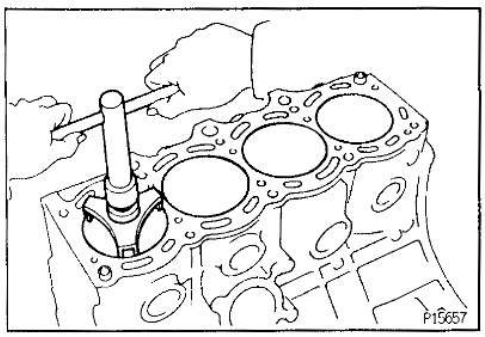
(i) Remove the connecting rod cap.
(See procedure (b) and (c) above)



(j) Measure the Plastigage at its widest point.
Standard oil clearance:
STD
0.024 – 0.055 mm (0.0009 – 0.0022 in.)
U/S 0.25
0.023 – 0.069 mm (0.0009 – 0.0027 in.)
Maximum oil clearance:
0.08 mm (0.0031 in.)
If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.
HINT: If using a standard bearing, replace it with one having the same number marked on the connecting rod cap. There are 3 sizes of standard bearings, marked "1", "2" and "3" accordingly.
Standard sized bearing center wall thickness:
Mark "1"
1.484 – 1.488 mm (0.0584 – 0.0586 in.)
Mark "2"
1.488 – 1.492 mm (0.0586 – 0.0587 in.)
Mark "3"
1.492 – 1.496 mm (0.0587 – 0.0589 in.)

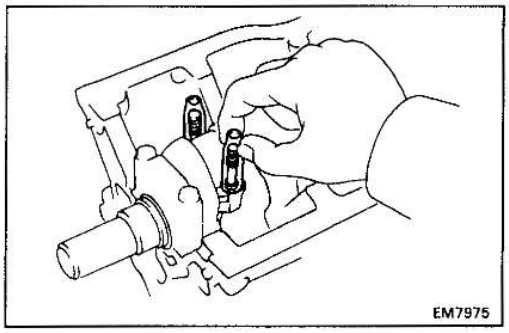


(k) Completely remove the Plastigage.

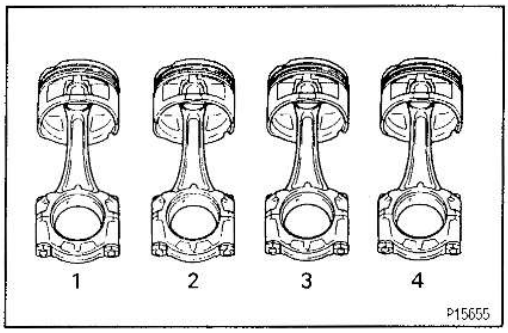


4. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

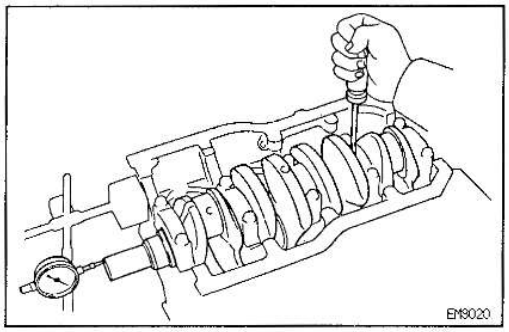
(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.



(b) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.
(c) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.



HINT:
- Keep the bearings, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in the correct order.



5. CHECK CRANKSHAFT THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:

0.020 — 0.220 mm (0.0008 — 0.0087 in.)

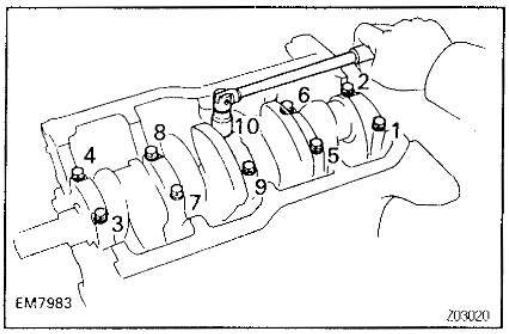
Maximum thrust clearance:

0.30 mm (0.0118 in.)

If the thrust clearance is greater than maximum, replace the thrust washer as a set.

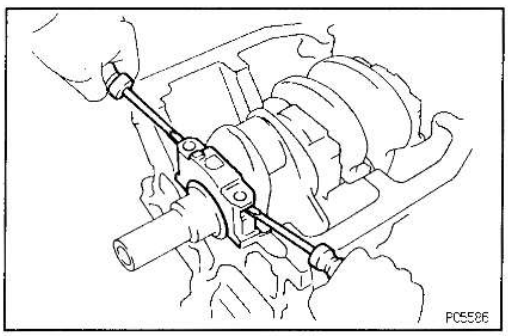
Thrust washer thickness:

2.440 — 2.490 mm (0.0961 — 0.0980 in.)



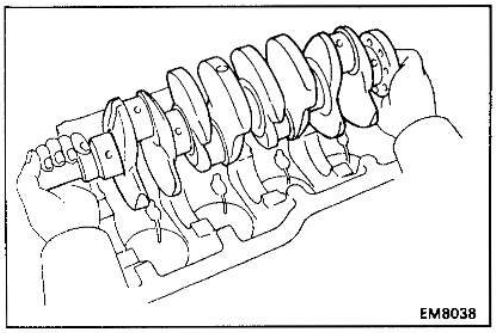
6. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

(a) Uniformly loosen and remove the 10 main bearing cap bolts in several passes, in the sequence shown.



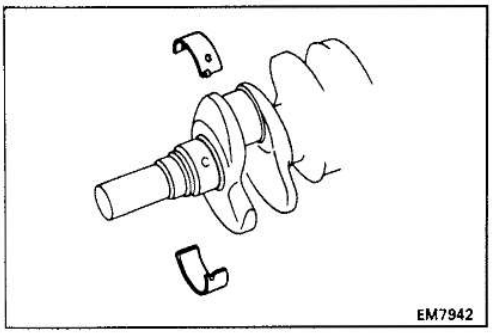
(b) Using 2 screwdrivers, pry out the main bearing cap, and remove the 5 main bearing caps, 5 lower bearings and 2 lower thrust washers (No.3 main bearing cap only).

HINT:
- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps and lower thrust washers in the correct order.

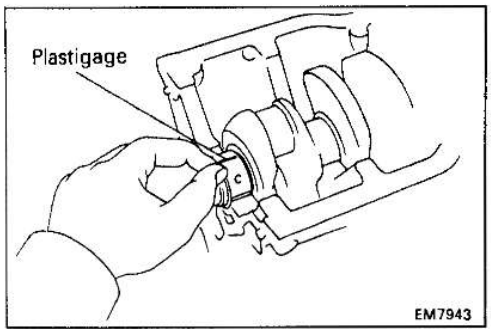


(c) Lift out the crankshaft.
HINT: Keep the upper bearing and upper thrust washers together with the cylinder block.

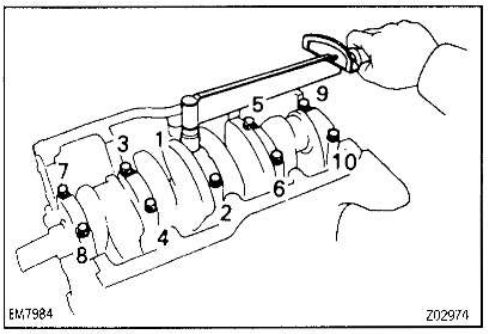
EG



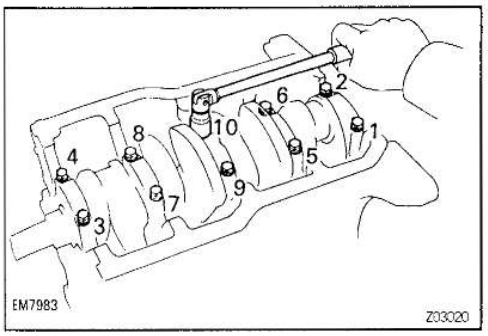
(d) Clean each main journal and bearing.
(e) Check each main journal and bearing for pitting and scratches.
If the journal or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.



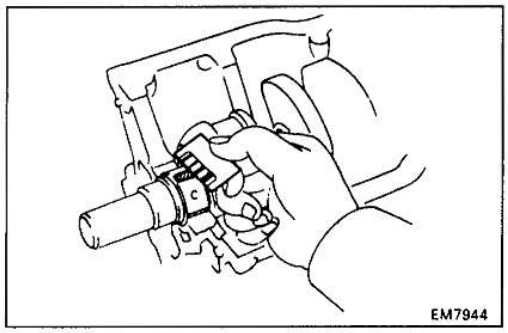
(f) Place the crankshaft on the cylinder block.
(g) Lay a strip of Plastigage across each journal.



(h) Install the main bearing caps.
(See step 5 on page EG–152)
Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)
NOTICE: Do not turn the crankshaft.



(i) Remove the main bearing caps.
(See procedure (a) and (b) above)



(j) Measure the Plastigage at its widest point.

Standard clearance:

No.3

STD

0.028 — 0.047 mm (0.0011 — 0.0019 in.)

U/S 0.25

0.027 — 0.067 mm (0.0011 — 0.0026 in.)

Others

STD

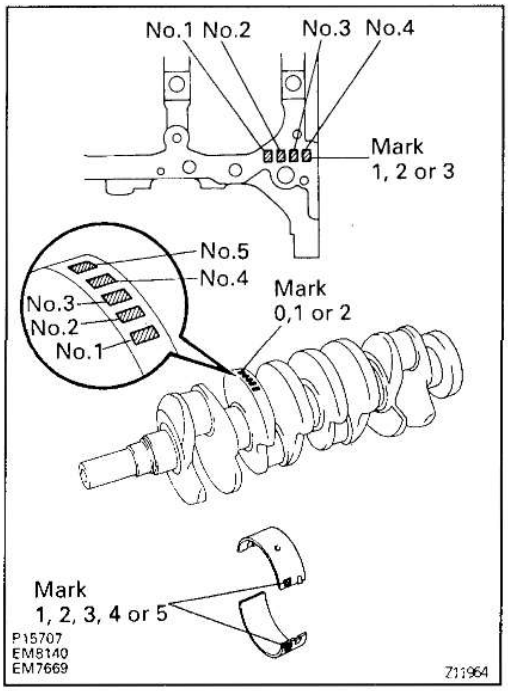
0.018 — 0.037 mm (0.0007 — 0.0015 in.)

U/S 0.25

0.019 — 0.059 mm (0.0007 — 0.0023 in.)

Maximum clearance:

0.08 mm (0.0031 in.)



HINT: If replacing the cylinder block subassembly, the bearing standard clearance will be:

No.3

0.030 — 0.057 mm (0.0012 — 0.0022 in.)

Others

0.020 — 0.047 mm (0.0008 — 0.0019 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.

HINT: If using a standard bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then selecting the bearing with the same number as the total. There are 5 sizes of standard bearings, marked "1", "2", "3", "4" and "5" accordingly.

	Number marked								
Cylinder block	1			2			3		
Crankshaft	0	1	2	0	1	2	0	1	2
Use bearing	1	2	3	2	3	4	3	4	5

EXAMPLE: Cylinder block "2" + Crankshaft "1"
= Total number 3 (Use bearing "3")

V00240

Reference

Cylinder block main journal bore diameter:

Mark "1"

59.020 – 59.026 mm (2.3236 – 2.3239 in.)

Mark "2"

59.026 – 59.032 mm (2.3239 – 2.3241 in.)

Mark "3"

59.032 – 59.038 mm (2.3241 – 2.3243 in.)

Crankshaft journal diameter:

Mark "0"

54.995 – 55.000 mm (2.1652 – 2.1654 in.)

Mark "1"

54.990 – 54.995 mm (2.1650 – 2.1652 in.)

Mark "2"

54.985 – 54.990 mm (2.1648 – 2.1650 in.)

Standard sized bearing center wall thickness:

No.3

Mark "1"

1.992 – 1.995 mm (0.0784 – 0.0785 in.)

Mark "2"

1.995 – 1.998 mm (0.0785 – 0.0787 in.)

Mark "3"

1.998 – 2.001 mm (0.0787 – 0.0788 in.)

Mark "4"

2.001 – 2.004 mm (0.0788 – 0.0789 in.)

Mark "5"

2.004 – 2.007 mm (0.0789 – 0.0790 in.)

Others

Mark "1"

1.997 – 2.000 mm (0.0786 – 0.0787 in.)

Mark "2"

2.000 – 2.003 mm (0.0787 – 0.0789 in.)

Mark "3"

2.003 – 2.006 mm (0.0789 – 0.0790 in.)

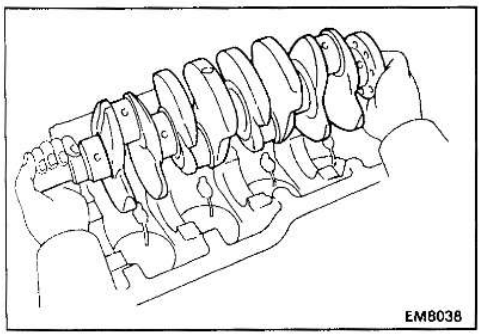
Mark "4"

2.006 – 2.009 mm (0.0790 – 0.0791 in.)

Mark "5"

2.009 – 2.012 mm (0.0791 – 0.0792 in.)

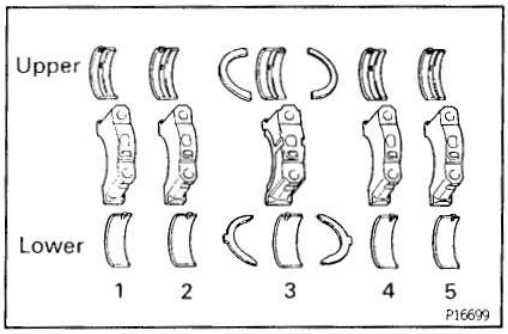
(k) Completely remove the Plastigage.



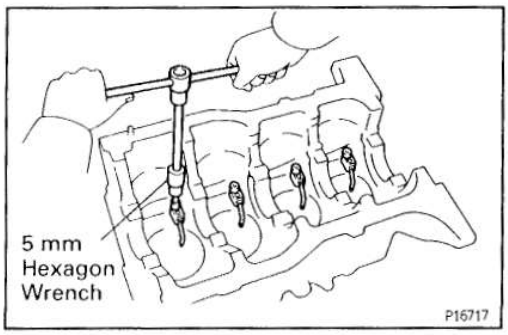
7. REMOVE CRANKSHAFT

(a) Lift out the crankshaft.

(b) Remove the 5 upper bearings and 2 upper thrust washers from the cylinder block.

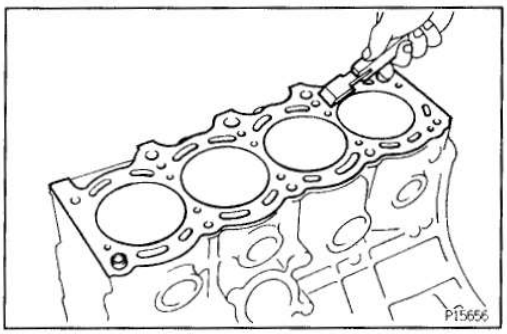


HINT: Arrange the main bearing caps, bearings and thrust washers in the correct order.



8. REMOVE OIL NOZZLES

Using a 5 mm hexagon wrench, remove the bolt and oil nozzle. Remove the 4 oil nozzles.



CYLINDER BLOCK INSPECTION

EG0BU-06

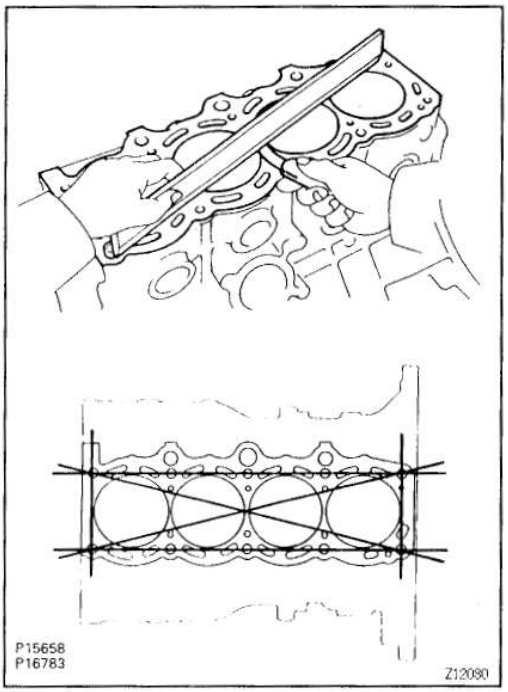
1. CLEAN CYLINDER BLOCK

A. Remove gasket material

Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.

B. Clean cylinder block

Using a soft brush and solvent, thoroughly clean the cylinder block.



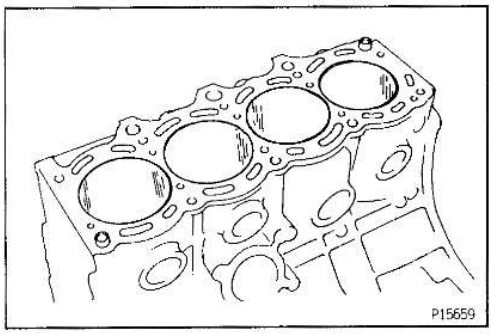
2. INSPECT TOP SURFACE OF CYLINDER BLOCK FOR FLATNESS

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head gasket for warpage.

Maximum warpage:

0.05 mm (0.0020 in.)

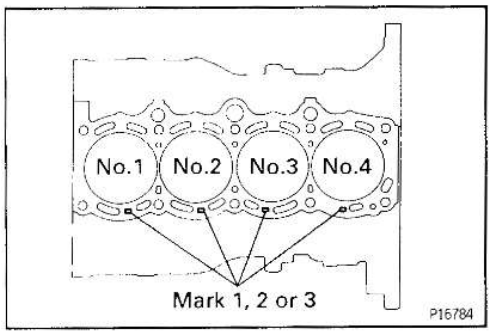
If warpage is greater than maximum, replace the cylinder block.



3. INSPECT CYLINDER FOR VERTICAL SCRATCHES

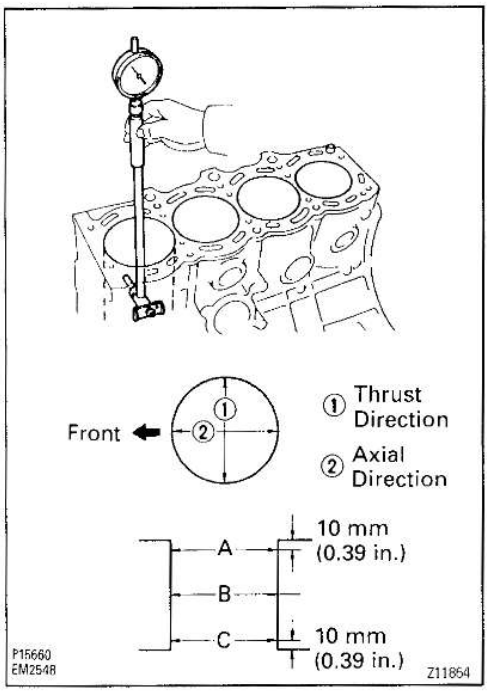
Visually check the cylinder for vertical scratches.

If deep scratches are present, replace the cylinder block.



4. INSPECT CYLINDER BORE DIAMETER

HINT: There are 3 sizes of the standard cylinder bore diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the top of the cylinder block.



Using a cylinder gauge, measure the cylinder bore diameter at positions A, B and C in the thrust and axial directions.

Standard diameter:

Mark "1"

86.000 — 86.010 mm (3.3858 — 3.3862 in.)

Mark "2"

86.010 — 86.020 mm (3.3862 — 3.3866 in.)

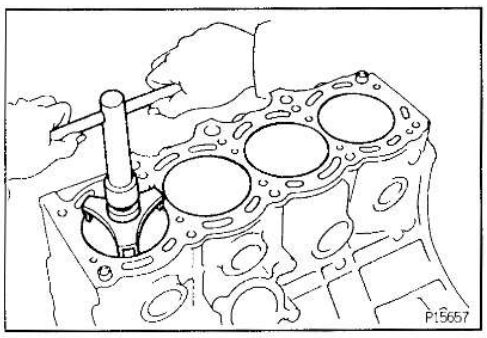
Mark "3"

86.020 — 86.030 mm (3.3866 — 3.3870 in.)

Maximum diameter:

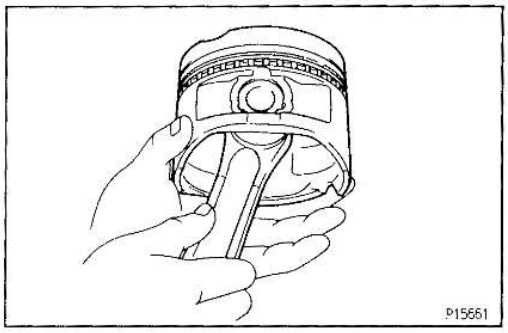
86.23 mm (3.3949 in.)

If the diameter is greater than maximum, replace the cylinder block.



5. REMOVE CYLINDER RIDGE

If the wear is less than 0.2 mm (0.008 in.), using a ridge reamer, grind the top of the cylinder.



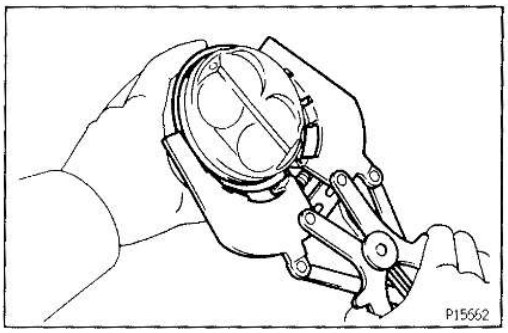
PISTON AND CONNECTING ROD DISASSEMBLY

EG08V-01

1. CHECK FIT BETWEEN PISTON AND PISTON PIN

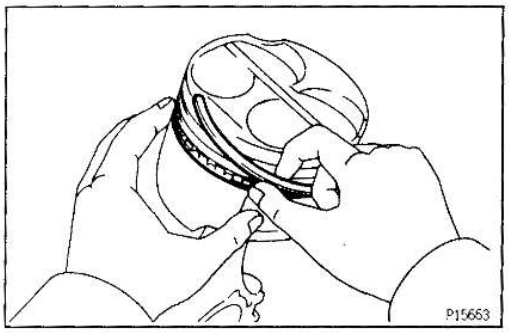
Try to move the piston back and forth on the piston pin.

If any movement is felt, replace the piston and pin as a set.

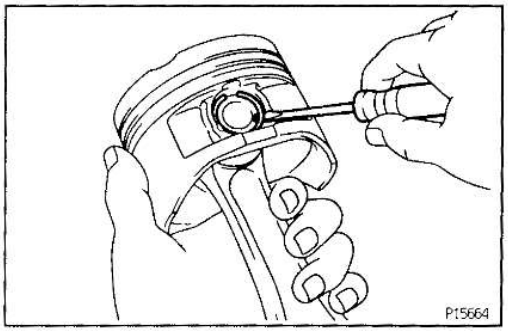


2. REMOVE PISTON RINGS

(a) Using a piston ring expander, remove the 2 compression rings.

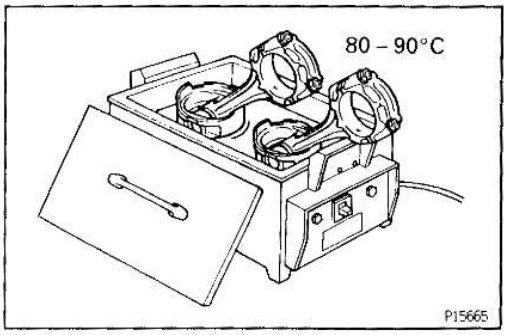


(b) Remove the 2 side rails and oil ring expander by hand.
HINT: Arrange the piston rings in correct order only.

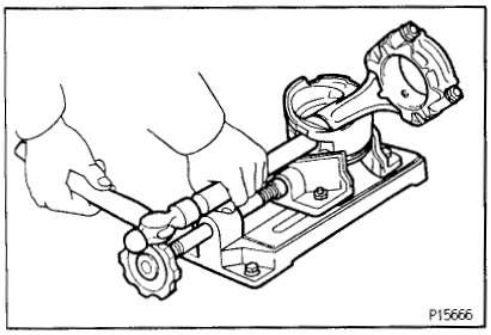


3. DISCONNECT CONNECTING ROD FROM PISTON

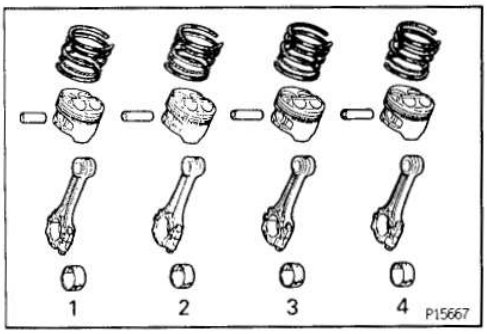
(a) Using a small screwdriver, pry out the 2 snap rings.



(b) Gradually heat the piston to 80 – 90°C (176 – 194°F).



(c) Using a plastic–faced hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.



HINT:

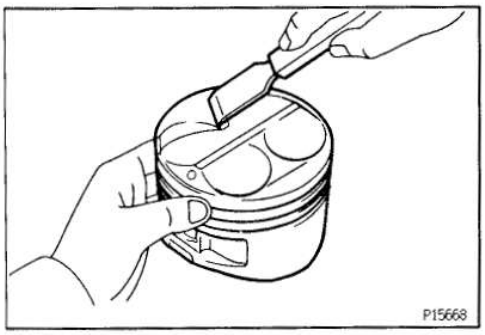
- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in the correct order.

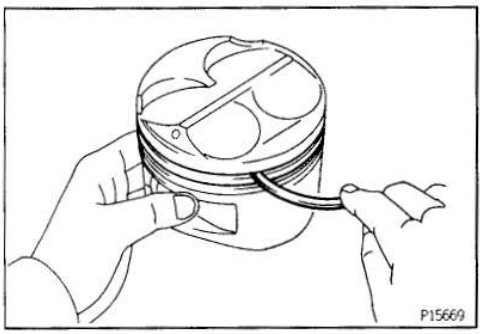
EG42K–01

PISTON AND CONNECTING ROD INSPECTION

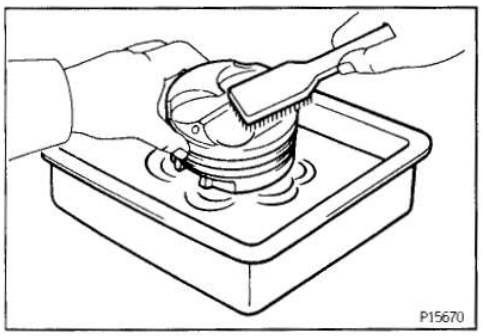
1. CLEAN PISTON

(a) Using a gasket scraper, remove the carbon from the piston top.



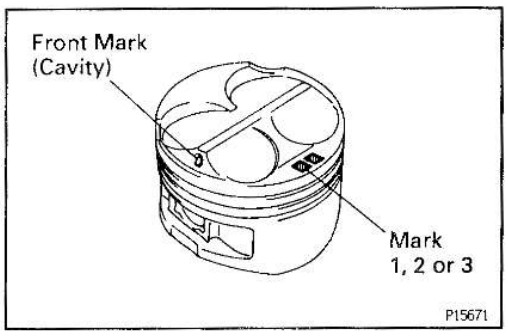


(b) Using a groove cleaning tool or broken ring, clean the piston ring grooves.



(c) Using solvent and a brush, thoroughly clean the piston.

NOTICE: Do not use a wire brush.

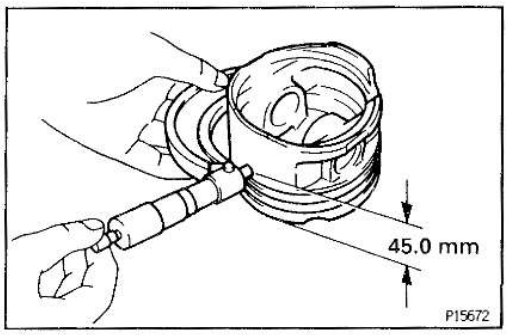


EG

2. INSPECT PISTON

A. Inspect piston oil clearance

HINT: There are 3 sizes of the standard piston diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the piston top.



(a) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 45.0 mm (1.772 in.) from the piston head.

Piston diameter:

Mark "1"

85.970 – 85.980 mm (3.3846 – 3.3850 in.)

Mark "2"

85.980 – 85.990 mm (3.3850 – 3.3854 in.)

Mark "3"

85.990 – 86.000 mm (3.3854 – 3.3858 in.)

(b) Measure the cylinder bore diameter in the thrust directions. (See step 4 on page EG–139)

(c) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance:

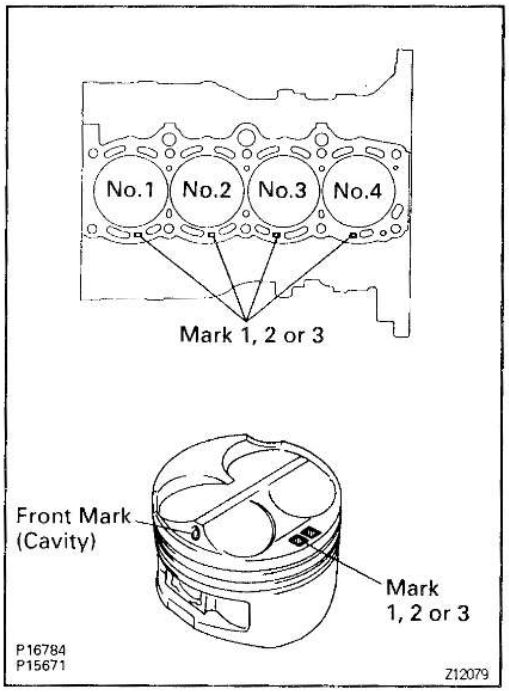
0.020 – 0.040 mm (0.0008 – 0.0016 in.)

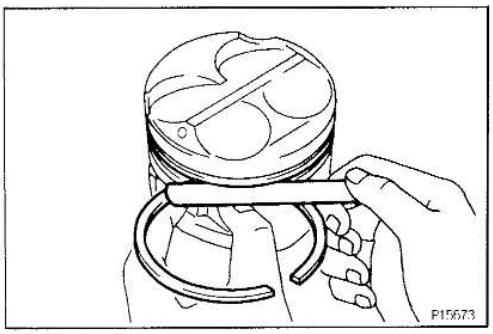
Maximum oil clearance:

0.06 mm (0.0024 in.)

If the oil clearance is greater than maximum, replace all the 4 pistons. If necessary, replace the cylinder block.

HINT (Use new cylinder block): Use a piston with the same number mark as the cylinder bore diameter marked on the cylinder block.





B. Inspect piston ring groove clearance

Using a feeler gauge, measure the clearance between new piston ring and the wall of the ring groove.

Ring groove clearance:

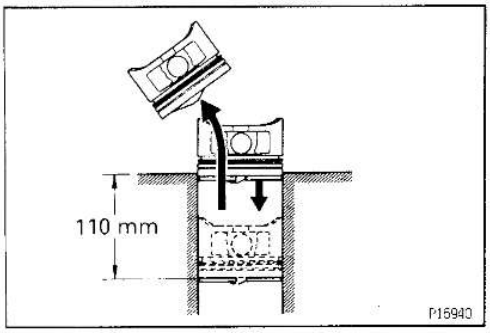
No.1

0.040 – 0.080 mm (0.0016 – 0.0031 in.)

No.2

0.030 – 0.070 mm (0.0012 – 0.0028 in.)

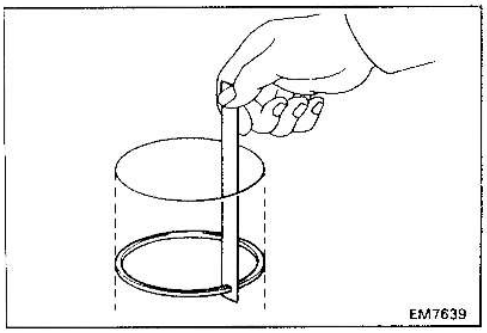
If the clearance is greater than maximum, replace the piston.



C. Inspect piston ring end gap

(a) Insert the piston ring into the cylinder bore.

(b) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 110 mm (4.33 in.) from the top of the cylinder block.



(c) Using a feeler gauge, measure the end gap.

Standard end gap:

No.1

0.330 – 0.550 mm (0.0130 – 0.0217 in.)

No.2

0.450 – 0.670 mm (0.0177 – 0.0264 in.)

Oil (Side rail)

0.150 – 0.500 mm (0.0059 – 0.0197 in.)

Maximum end gap:

No.1

0.85 mm (0.0335 in.)

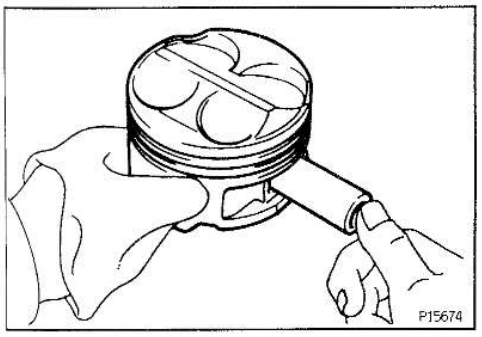
No.2

0.97 mm (0.0382 in.)

Oil (Side rail)

0.80 mm (0.0315 in.)

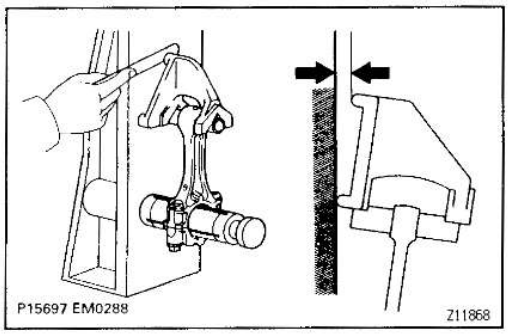
If the end gap is greater than maximum, replace the piston ring. If the end gap is greater than maximum, even with a new piston ring, replace the cylinder block.



D. Inspect piston pin fit

At 60°C (140°F), you should be able to push the piston pin into the piston pin hole with your thumb.

EG



3. INSPECT CONNECTING ROD

A. Inspect connecting rod alignment

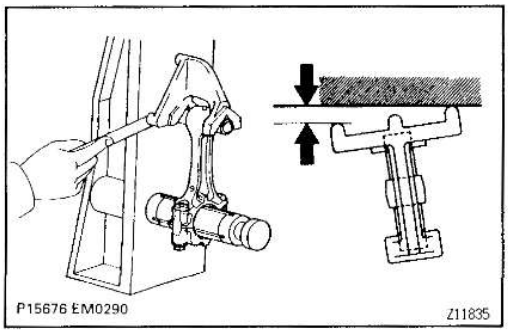
Using a rod aligner and feeler gauge, check the connecting rod alignment.

- Check for bend.

Maximum bend:

0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If bend is greater than maximum, replace the connecting rod assembly.

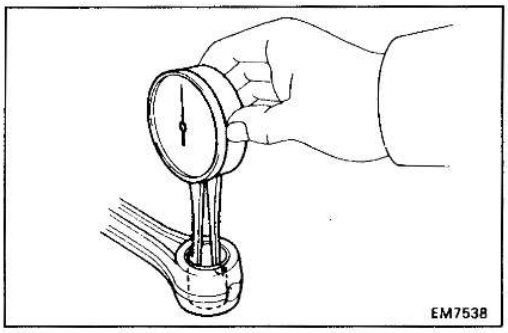


- Check for twist

Maximum twist:

0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

If twist is greater than maximum, replace the connecting rod assembly.

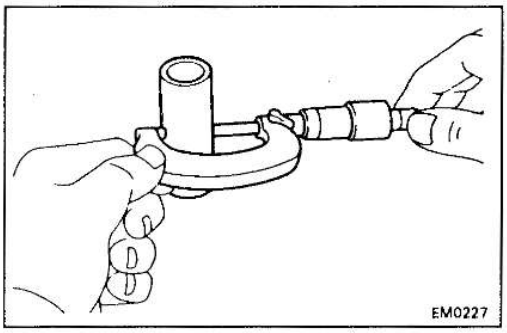


B. Inspect piston pin oil clearance

(a) Using a caliper gauge, measure the inside diameter of the connecting rod bushing.

Bushing inside diameter:

22.005 — 22.017 mm (0.8663 — 0.8668 in.)



(b) Using a micrometer, measure the piston pin diameter.

Piston pin diameter:

21.997 — 22.009 mm (0.8660 — 0.8665 in.)

(c) Subtract the piston pin diameter measurement from the bushing inside diameter measurement.

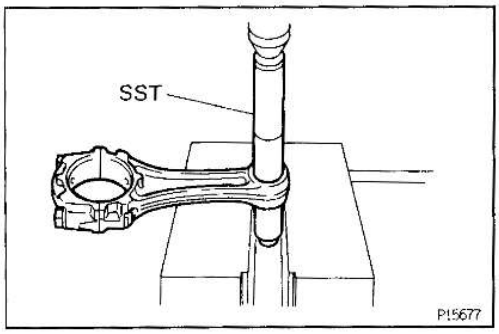
Standard oil clearance:

0.005 — 0.011 mm (0.0002 — 0.0004 in.)

Maximum oil clearance:

0.05 mm (0.0020 in.)

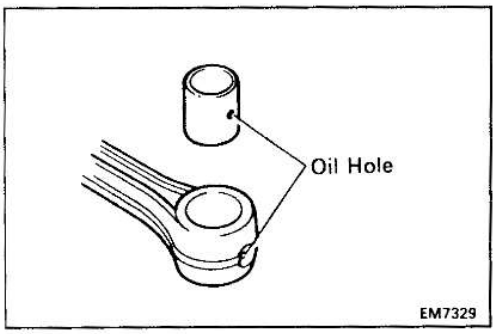
If the oil clearance is greater than maximum, replace the bushing. If necessary, replace the piston and piston pin as a set.



C. If necessary, replace connecting rod bushing

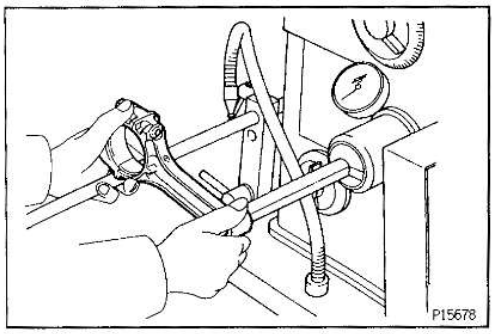
(a) Using SST and a press, press out the bushing.
SST 09222–30010

EG

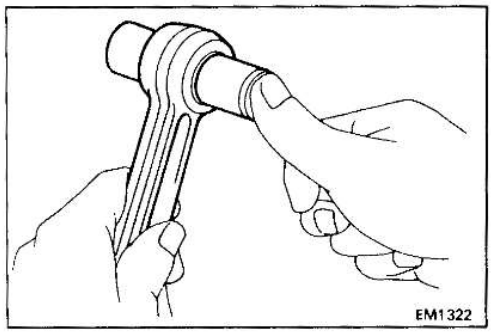


(b) Align the oil holes of a new bushing and the connecting rod.

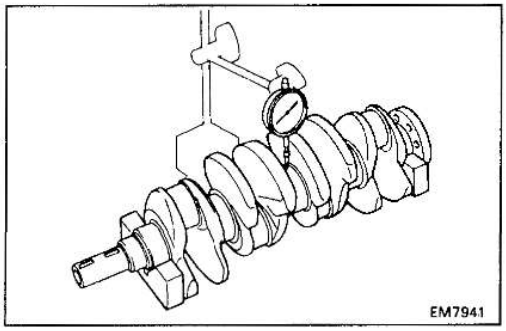
(c) Using SST and a press, press in the bushing.
SST 09222–30010

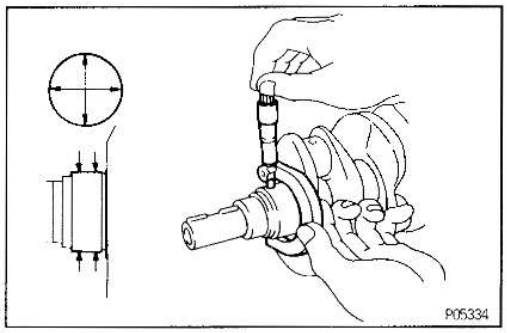


(d) Using a pin hole grinder, hone the bushing to obtain the standard specified clearance (see step B above) between the bushing and piston pin.



(e) Check the piston pin fit at normal room temperature. Coat the piston pin with engine oil, and push it into the connecting rod with your thumb.





CRANKSHAFT INSPECTION AND REPAIR

EG0BY-0W

1. INSPECT CRANKSHAFT FOR CIRCLE RUNOUT

(a) Place the crankshaft on V–blocks.

(b) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:

0.06 mm (0.0024 in.)

If the circle runout is greater than maximum, replace the crankshaft.

2. INSPECT MAIN JOURNALS AND CRANK PINS

(a) Using a micrometer, measure the diameter of each main journal and crank pin.

Main journal diameter:

STD

54.985 – 55.000 mm (2.1648 – 2.1654 in.)

U/S 0.25

54.745 – 54.755 mm (2.1553 – 2.1557 in.)

Crank pin diameter:

STD

47.985 – 48.000 mm (1.8892 –1.8898 in.)

U/S 0.25

47.745 – 47.755 mm (1.8797 – 1.8801 in.)

If the diameter is not as specified, check the oil clearance (See steps 3 and 6 on pages EG–131 to 134). If necessary, grind or replace the crankshaft.

(b) Check each main journal and crank pin for taper and out–of–round as shown.

Maximum taper and out–of–round:

0.02 mm (0.0008 in.)

If the taper and out–of–round is greater than maximum, replace the crankshaft.

3. IF NECESSARY, GRIND AND HONE MAIN JOURNALS AND/OR CRANK PINS

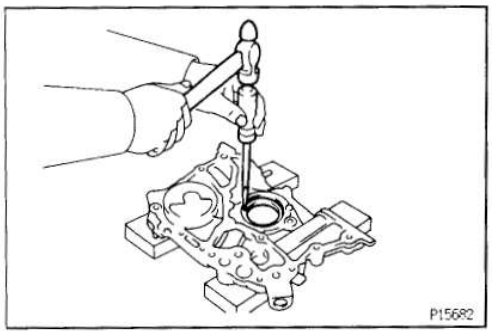
Grind and hone the main journals and/or crank pins to the finished undersized diameter (See procedure in step 2).

Install new main journal and/or crankshaft pin undersized bearings.

CRANKSHAFT OIL SEALS REPLACEMENT EGOCG-01

HINT: There are 2 methods (A and B) to replace the oil seal which are as follows:

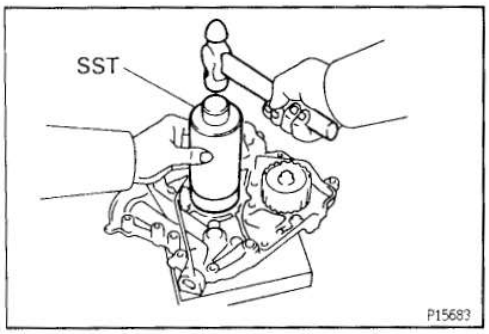
EG



1. REPLACE CRANKSHAFT FRONT OIL SEAL

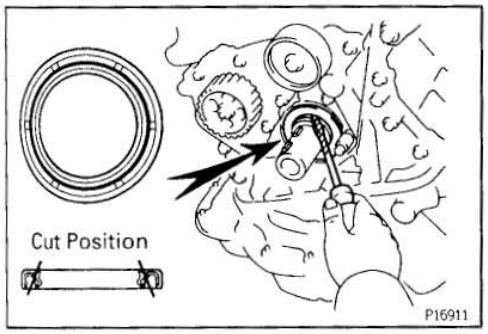
A. If oil pump is removed from cylinder block:

(a) Using a screwdriver and hammer, tap out the oil seal.



(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.
SST 09226–10010

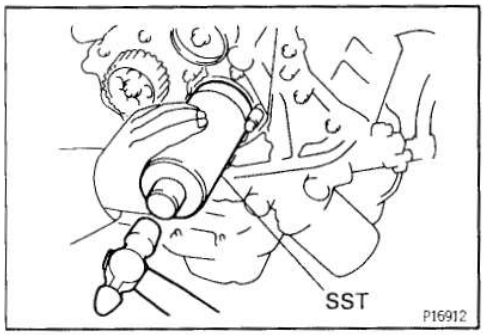
(c) Apply MP grease to the oil seal lip.



B. If oil pump is installed to the cylinder block:

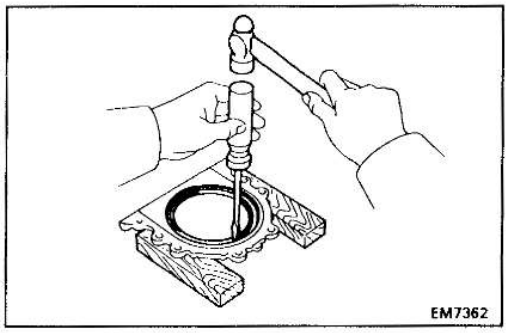
(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver, pry out the oil seal.
NOTICE: Be careful not to damage the crankshaft. Tape the screwdriver tip.



(c) Apply MP grease to a new oil seal lip.

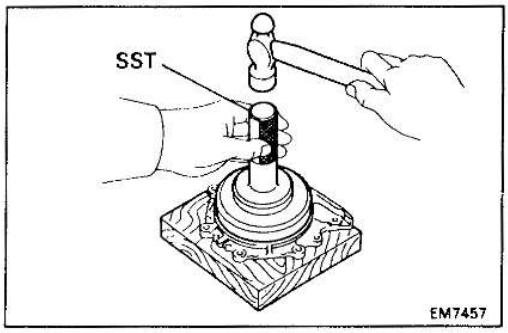
(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump body edge.
SST 09226–10010



2. REPLACE CRANKSHAFT REAR OIL SEAL

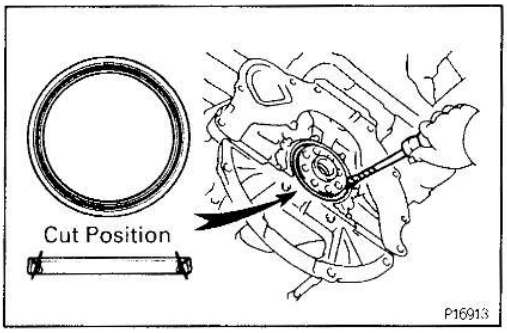
A. If rear oil seal retainer is removed from cylinder block:

(a) Using a screwdriver and hammer, tap out the oil seal.



(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223–63010

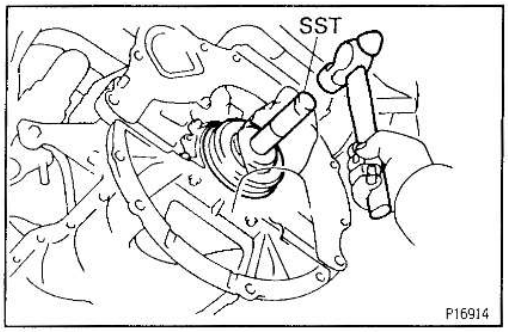
(c) Apply MP grease to the oil seal lip.



B. If rear oil seal retainer is installed to cylinder block:

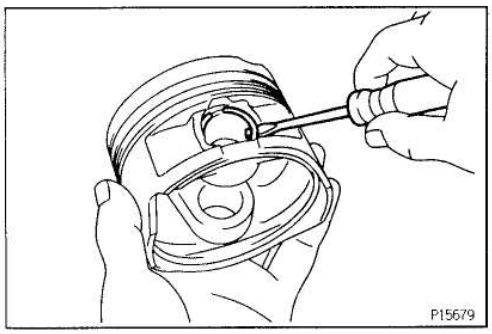
(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver, pry out the oil seal.
NOTICE: Be careful not to damage the crankshaft. Tape the screwdriver tip.



(c) Apply MP grease to a new oil seal lip.

(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223–63010



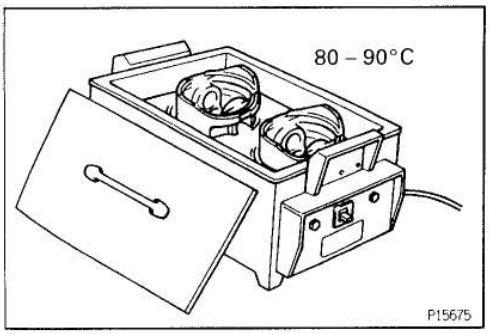
EG0C1-ON

PISTON AND CONNECTING ROD ASSEMBLY

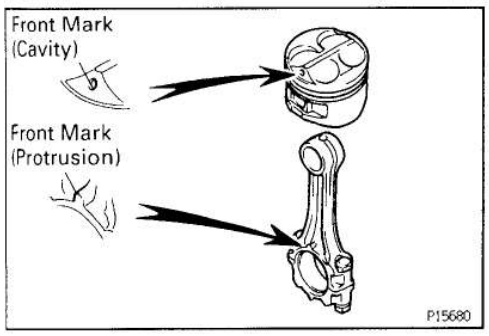
1. ASSEMBLE PISTON AND CONNECTING ROD

(a) Using a small screwdriver, install a new snap ring on one side of the piston pin hole.

EG

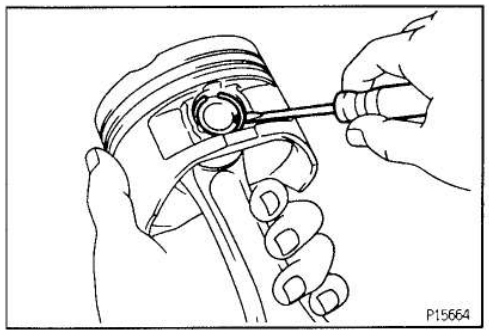


(b) Gradually heat the piston to 80 – 90°C (176 – 194°F).

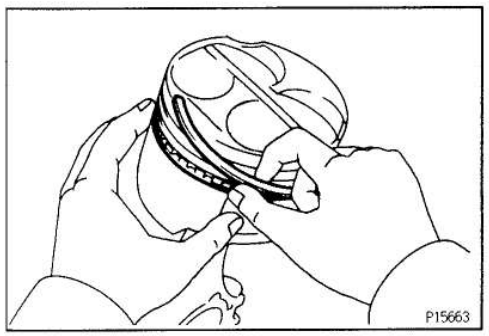


(c) Coat the piston pin with engine oil.

(d) Align the front marks of the piston and connecting rod, and push in the piston pin with your thumb.

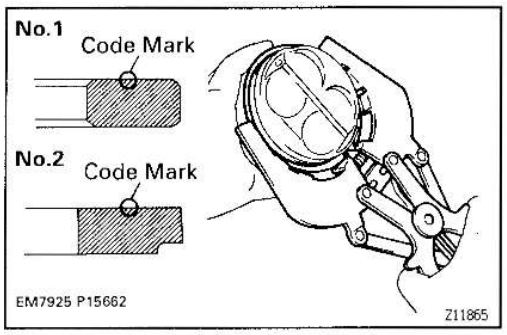


(e) Using a small screwdriver, install a new snap ring on the other side of the piston pin hole.

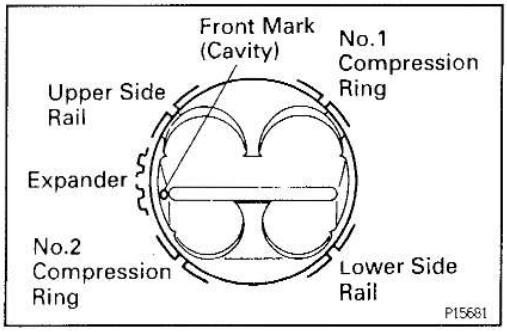


2. INSTALL PISTON RINGS

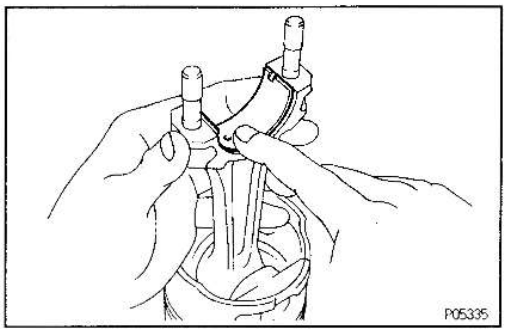
(a) Install the oil ring expander and 2 side rails by hand.



(b) Using a piston ring expander, install the 2 compression rings with the code mark facing upward.
Code mark:
R



(c) Position the piston rings so that the ring ends are as shown.
NOTICE: Do not align the ring ends.



3. INSTALL BEARINGS

(a) Align the bearing claw with the groove of the connecting rod or connecting cap.

(b) Install the bearings in the connecting rod and connecting rod cap.

EG42L-01

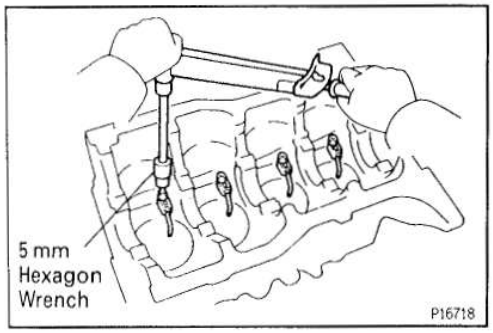
CYLINDER BLOCK ASSEMBLY

(See Components for Disassembly and Assembly)

HINT:

- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets, O–rings and oil seals with new parts.

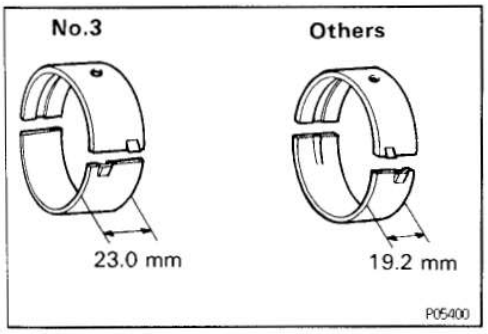
EG



1. INSTALL OIL NOZZLES

Using a 5 mm hexagon wrench, install the oil nozzle with the bolt. Install the 4 oil nozzles.

Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

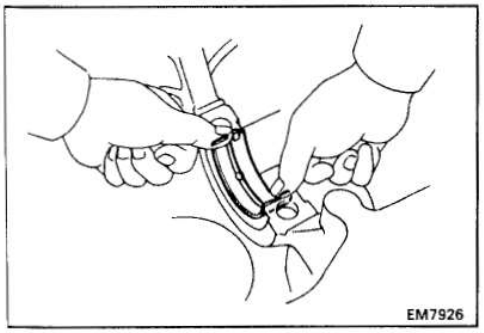


2. INSTALL MAIN BEARINGS

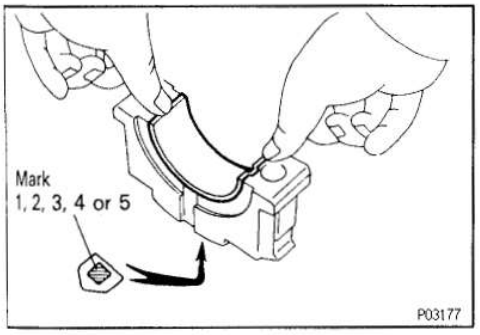
HINT:

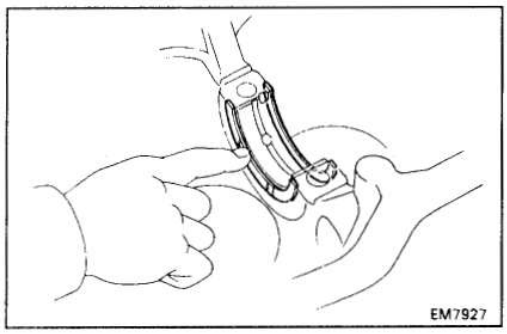
- Main bearings come in widths of 19.2 mm (0.756 in.) and 23.0 mm (0.906 in.). Install the 23.0 mm (0.906 in.) bearings in the No.3 cylinder block journal position with the main bearing cap. Install the 19.2 mm (0.756 in.) bearings in the other positions.
- Upper bearings have an oil groove and oil holes; lower bearings do not.

(a) Align the bearing claw with the claw groove of the cylinder block, and push in the 5 upper bearings.



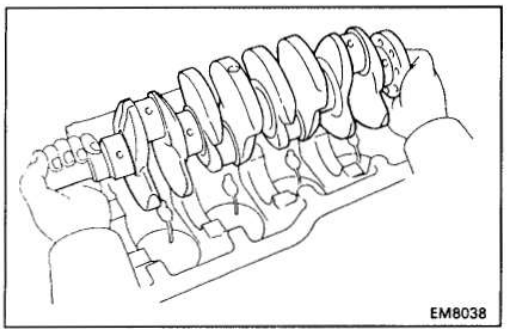
(b) Align the bearing claw with the claw groove of the main bearing cap, and push in the 5 lower bearings.
HINT: A number is marked on each main bearing cap to indicate the installation position.



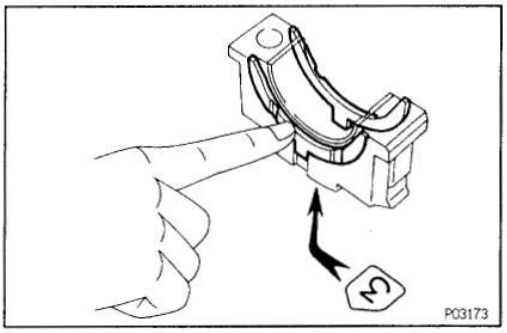


3. INSTALL UPPER THRUST WASHERS

Install the 2 thrust washers under the No.3 journal position of the cylinder block with the oil grooves facing outward.

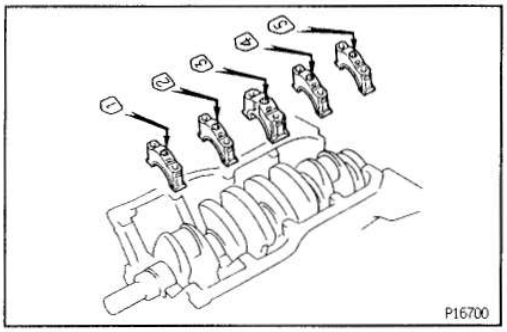


4. PLACE CRANKSHAFT ON CYLINDER BLOCK

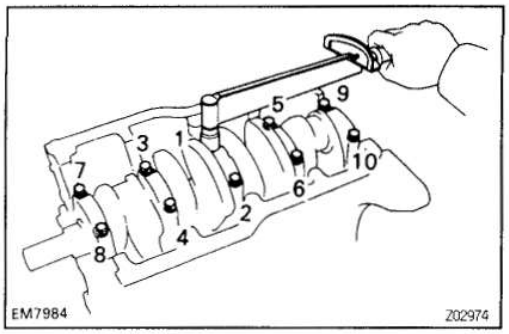


5. INSTALL MAIN BEARING CAPS AND LOWER THRUST WASHERS

(a) Install the 2 thrust washers on the No.3 bearing cap with the grooves facing outward.



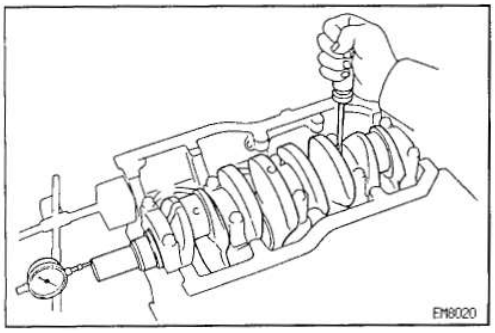
(b) Install the 5 main bearing caps in their proper locations.
HINT: Each bearing cap has a number and front mark.



(c) Apply a light coat of engine oil on the threads and under the heads of the main bearing cap bolts.

(d) Install and uniformly tighten the 10 bolts of the main bearing cap in several passes, in the sequence shown.
Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)

(e) Check that the crankshaft turns smoothly.

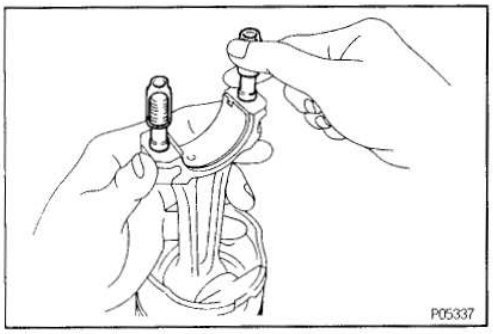


(f) Check the crankshaft thrust clearance.
- Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:
0.020 – 0.220 mm (0.0008 – 0.0087 in.)
Maximum thrust clearance:
0.30 mm (0.0118 in.)

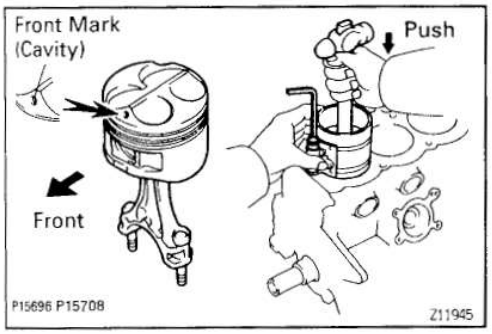
If the thrust clearance is greater than maximum, replace the thrust washers as a set.

EG

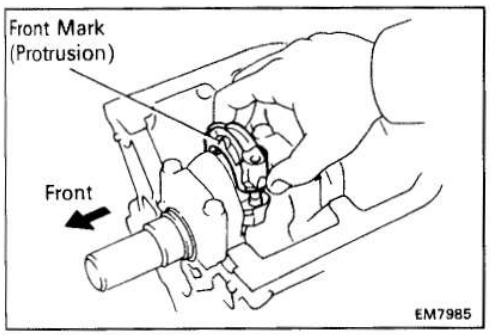


6. INSTALL PISTON AND CONNECTING ROD ASSEMBLES

(a) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.



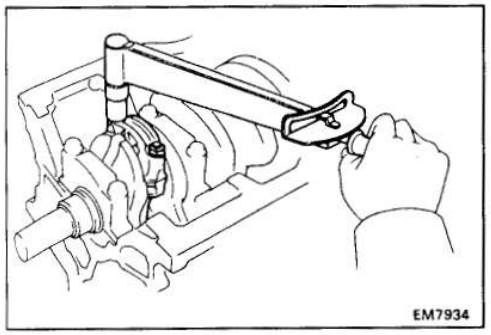
(b) Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.



7. INSTALL CONNECTING ROD CAPS

(a) Match the numbered connecting rod cap with the connecting rod.

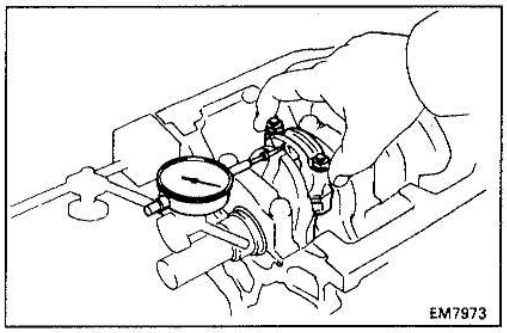
(b) Install the connecting rod cap with the front mark facing forward.



(c) Apply a light coat of engine oil on the threads and under the nuts of the connecting rod cap.

(d) Install and alternately tighten the 2 cap nuts in several passes.
Torque: 67 N·m (680 kgf·cm, 49 ft·lbf)

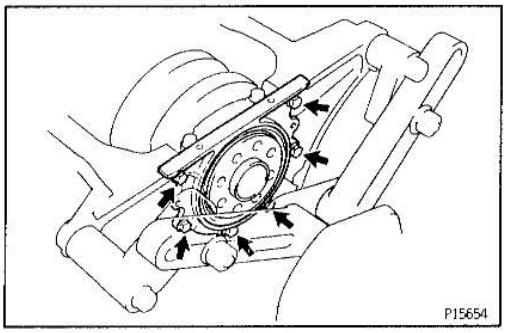
(e) Check that the crankshaft turns smoothly.



(f) Check the connecting rod thrust clearance.
- Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

Standard thrust clearance:
0.160 – 0.312 mm (0.0063 – 0.0123 in.)
Maximum thrust clearance:
0.35 mm (0.0138 in.)

If the thrust clearance is greater than maximum, replace the connecting rod assembly. If necessary, replace the crankshaft.



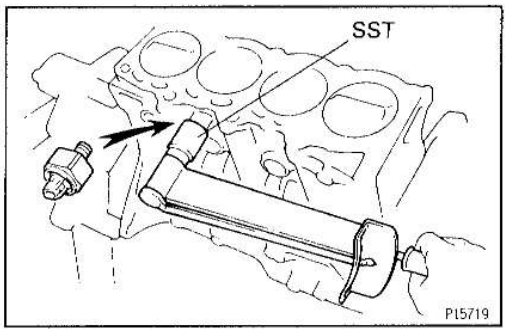
8. INSTALL REAR OIL SEAL RETAINER

Install a new gasket and the retainer with the 6 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

EG42M-01

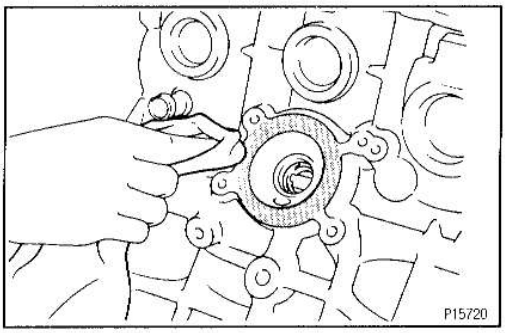
POST ASSEMBLY

(See Components for Disassembly and Assembly)



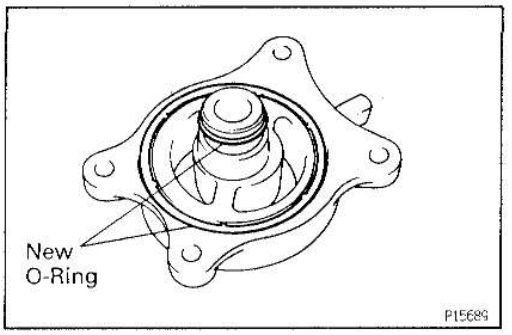
1. INSTALL KNOCK SENSOR

Using SST, install the knock sensor.
SST 09816–30010
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

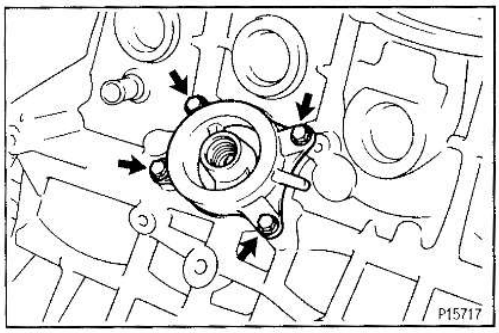


2. INSTALL OIL COOLER BRACKET

(a) Clean the oil cooler bracket contact surface on the cylinder block.

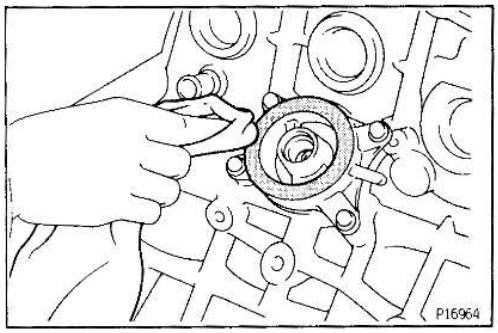


(b) Install 2 new O–rings to the oil cooler bracket.
(c) Apply a light coat of engine oil on the small O–ring.



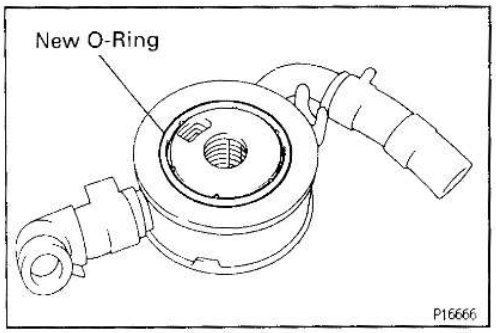
(d) Install the oil cooler bracket with the 4 bolts.
Torque: 6.5 N·m (66 kgf·cm, 58 in.·lbf)

EG

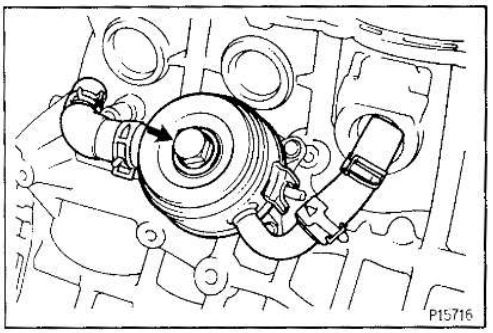


3. INSTALL OIL COOLER

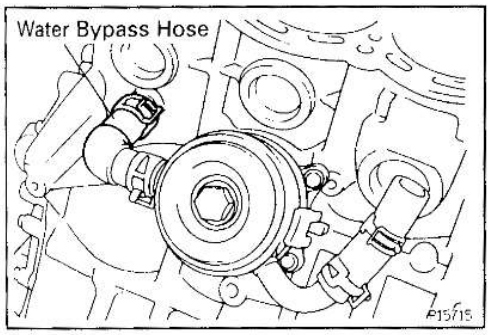
(a) Clean the oil cooler contact surface on the oil cooler bracket.



(b) Install a new O–ring to the oil cooler.

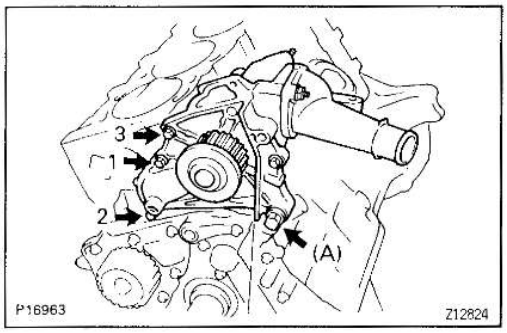


(c) Apply a light coat of engine oil on the threads and under the head of the relief valve.
(d) Install the oil cooler with a new seal washer and the relief valve.
Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)



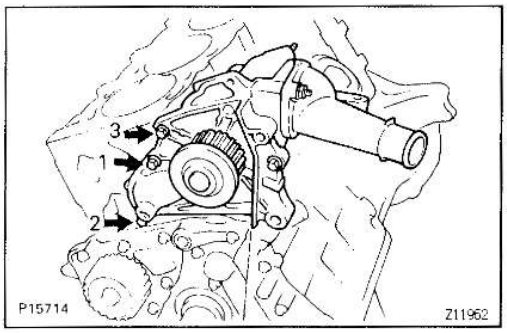
(e) Connect the water bypass hose to the cylinder block.

EG



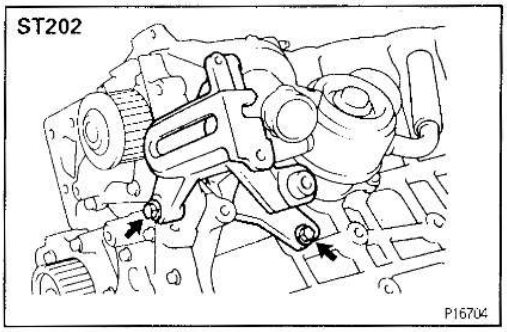
4. INSTALL WATER PUMP AND WATER PUMP COVER ASSEMBLY

(a) Install a new O—ring to the water pump cover.



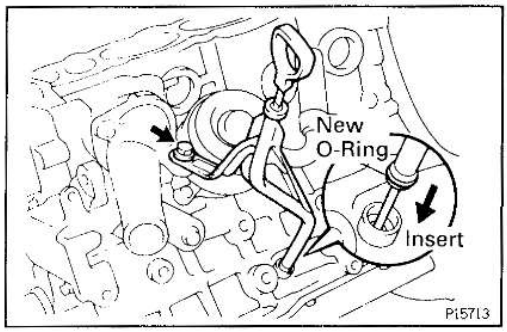
(b) Install the water pump and water pump cover assembly with the 3 bolts. Tighten the bolts in the sequence shown.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

(c) SW20 w/o A/C:
Install the bolt (A).
Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)



5. ST202:
INSTALL IDLER PULLEY BRACKET FOR ALTERNATOR DRIVE BELT

Install the idler pulley bracket with the 2 bolts.
Torque:
Water pump side
19 N·m (190 kgf·cm, 14 ft·lbf)
Cylinder block side
23 N·m (230 kgf·cm, 17 ft·lbf)



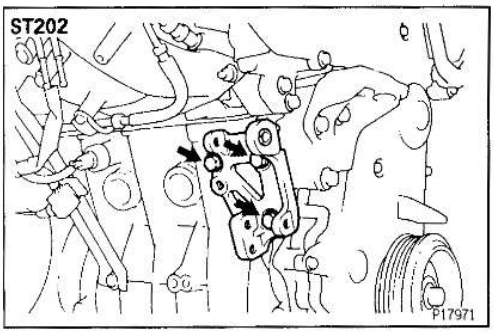
6. INSTALL OIL DIPSTICK AND GUIDE

(a) Install a new O—ring to the oil dipstick guide.
(b) Apply soapy water to the O—ring.
(c) Insert the oil dipstick guide into the guide hole of the cylinder block.
(d) Install the oil dipstick and guide with the bolt.

7. INSTALL OIL PUMP AND AND OIL PAN
(See pages EG—391 to 394)

8. INSTALL CYLINDER HEAD
(See pages EG—106 to 126)

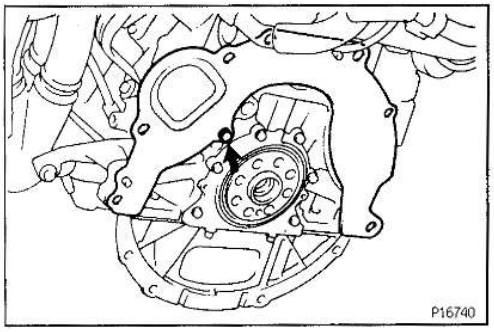
9. INSTALL TIMING BELT AND PULLEYS
(See pages EG—58 to 65)



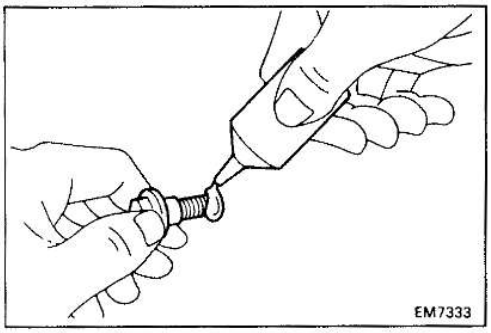
10. ST202:
INSTALL PS PUMP BRACKET
Install the PS pump bracket with the 3 bolts.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

11. DISCONNECT ENGINE FROM ENGINE STAND

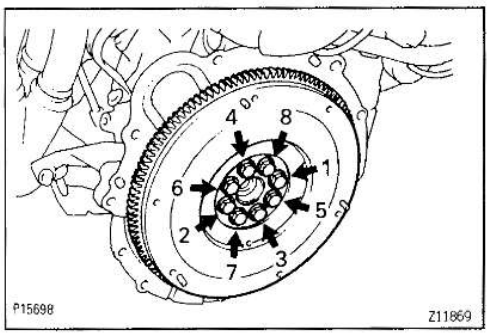
EG



12. INSTALL REAR END PLATE
Install the rear end plate with the bolt.
Torque: 9.3 N·m (95 kgf·cm, 82 in.·lbf)



13. INSTALL FLYWHEEL
(a) Apply adhesive to 2 or 3 threads of the bolt end.
Adhesive:
Part No. 08833–00070, THREE BOND 1324
or equivalent



(b) Install the flywheel on the crankshaft.
(c) Install and uniformly tighten the 6 bolts in several passes, in the sequence shown.
Torque: 107 N·m (1,090 kgf·cm, 79 ft·lbf)

SERVICE SPECIFICATIONS

SERVICE DATA

EG0C5-01

EG

Tune—up	Battery specific gravity		at 20°C (68°F))	1.25 — 1.27
	High—tension cord resistance		Limit	25 kΩ per cord
	Alternator drive belt deflection			
	ST202	w/ A/C	New belt	10 — 11 mm (0.39 — 0.43 in.)
			Used belt	13 — 16 mm (0.51 — 0.63 in.)
		w/o A/C	New belt	11 — 14 mm (0.43 — 0.55 in.)
			Used belt	12 — 18 mm (0.47 — 0.71 in.)
	SW20		New belt	9 — 12 mm (0.35 — 0.47 in.)
			Used belt	10 — 15 mm (0.39 — 0.59 in.)
	Alternator drive belt tension (Reference)			
	ST202	w/ A/C	New belt	686 — 785 N (70 — 80 kgf)
			Used belt	294 — 441 N (30 — 45 kgf)
		w/o A/C	New belt	461 — 706 N (47 — 72 kgf)
			Used belt	353 — 610 N (36 — 62 kgf)
	SW20		New belt	539 — 637 N (55 — 65 kgf)
			Used belt	245 — 392 N (25 — 40 kgf)
	Valve clearance (Cold)		Intake	0.15 — 0.25 mm (0.006 — 0.010 in.)
			Exhaust	0.28 — 0.38 mm (0.011 — 0.015 in.)
	Valve clearance adjusting shim (for repair part)			
			No.00	2.500 mm (0.0984 in.)
			No.53	2.550 mm (0.1004 in.)
			No.10	2.600 mm (0.1024 in.)
			No.15	2.650 mm (0.1043 in.)
			No.20	2.700 mm (0.1063 in.)
			No.25	2.750 mm (0.1083 in.)
			No.30	2.800 mm (0.1102 in.)
			No.35	2.850 mm (0.1122 in.)
			No.40	2.900 mm (0.1142 in.)
			No.45	2.950 mm (0.1161 in.)
			No.50	3.000 mm (0.1181 in.)
			No.55	3.050 mm (0.1201 in.)
			No.60	3.100 mm (0.1220 in.)
			No.65	3.150 mm (0.1240 in.)
			No.70	3.200 mm (0.1260 in.)
			No.75	3.250 mm (0.1280 in.)
			No.80	3.300 mm (0.1299 in.)
			No.85	3.350 mm (0.1319 in.)
			No.89	3.390 mm (0.1335 in.)
	Ignition timing			10° BTDC @ idle (w/ Terminals TE1 and E1 of check connector connected)
	Idle speed			
	ST202	w/ Daytime running light system		750 ± 50 rpm
		w/o Daytime running light system		700 ± 50 rpm
	SW20	w/ Daytime running light system		850 ± 50 rpm
		w/o Daytime running light system		750 ± 50 rpm
Idle CO	Concentration			0 — 0.5 %

Intake manifold vacuum	at idle speed		60 kPa (450 mmHg, 17.7 in.Hg)
Compression pressure	at 250 rpm	STD	1,226 kPa (12.5 kgf/cm², 178 psi) or more
		Limit	981 kPa (10.0 kgf/cm², 142 psi)
	Difference of pressure between each cylinder		98 kPa (1.0 kgfcm², 14 psi) or less
Timing belt tensioner	Protrusion		10.0 – 11.0 mm (0.394 – 0.433 in.)
Cylinder head	Warpage		
	Cylinder block side	Limit	0.20 mm (0.0079 in.)
	Intake manifold side	Limit	0.20 mm (0.0079 in.)
	Exhaust manifold side	Limit	0.30 mm (0.0118 in.)
	Valve seat		
	Refacing angle		30°, 45°, 75°
	Contacting angle		45°
	Contacting width		1.0 – 1.4 mm (0.039 – 0.055 in.)
Valve guide bushing	Inside diameter		6.000 – 6.018 mm (0.2362 – 0.2369 in.)
	Outside diameter (for repair part)	STD	11.033 – 11.044 mm (0.4344 – 0.4348 in.)
		O/S 0.05	11.088 – 11.099 mm (0.4365 – 0.4370 in.)
Valve	Valve overall length	STD Intake	99.80 – 100.20 mm (3.9291 – 3.9449 in.)
		Exhaust	98.55 – 99.25 mm (3.8917 – 3.9075 in.)
		Limit Intake	99.30 mm (3.9094 in.)
		Exhaust	98.35 mm (3.8720 in.)
	Vale face angle		44.5°
	Stem diameter	Intake	5.960 – 5.975 mm (0.2346 – 0.2352 in.)
		Exhaust	5.955 – 5.970 mm (0.2344 – 0.2350 in.)
	Stem oil clearance	STD Intake	0.025 – 0.058 mm (0.0010 – 0.0023 in.)
		Exhaust	0.030 – 0.063 mm (0.0012 – 0.0025 in.)
		Limit Intake	0.08 mm (0.0031 in.)
		Exhaust	0.10 mm (0.0039 in.)
	Margin thickness	STD	0.8 – 1.2 mm (0.031 – 0.047 in.)
		Limit	0.5 mm (0.020 in.)
Valve spring	Squareness	Limit	2.0 mm (0.079 in.)
	Free length	Intake	43.18 mm (1.7000 in.)
		Exhaust	43.34 mm (1.7063 in.)
	Installed tension at 35.4 mm (1.394 in.)	Intake	163 – 190 N (16.6 – 19.4 kgf, 36.6 – 42.8 lbf)
		Exhaust	153 – 180 N (15.6 – 18.4 kgf, 34.4 – 40.6 lbf)
Valve lifter	Lifter diameter		30.975 – 30.985 mm (1.2195 – 1.2199 in.)
	Lifter bore diameter		31.000 – 31.021 mm (1.2205 – 1.2213 in.)
	Oil clearance	STD	0.015 – 0.046 mm (0.0006 – 0.0018 in.)
		Limit	0.07 mm (0.0028 in.)
Manifold	Warpage	Limit Intake	0.30 mm (0.0118 in.)
		Exhaust	1.00 mm (0.0394 in.)
ACIS valve	Warpage	Limit	0.20 mm (0.0079 in.)
VSV for ACIS	Resistance	at 20°C (68°F)	33 – 39 Ω

EG

EG

Camshaft	Thrust clearance	STD	0.100 – 0.240 mm (0.0039 – 0.0094 in.)
		Limit	0.30 mm (0.0118 in.)
	Journal oil clearance	STD	0.0025 – 0.062 mm (0.0010 – 0.0024 in.)
		Limit	0.08 mm (0.0031 in.)
	Journal diameter		26.959 – 26.975 mm (1.0614 – 1.0620 in.)
	Circle runout	Limit	0.06 mm (0.0024 in.)
	Cam lobe height	STD Intake	42.610 – 42.710 mm (1.6778 – 1.6815 in.)
		Exhaust	41.010 – 41.110 mm (1.6146 – 1.6185 in.)
		Limit Intake	42.50 mm (1.6732 in.)
		Exhaust	39.90 mm (1.5709 in.)
Cylinder block	Cylinder head surface warpage	Limit	0.05 mm (0.0020 in.)
	Cylinder bore diameter	STD Mark 1	86.000 – 86.010 mm (3.3858 – 3.3862 in.)
		Mark 2	86.010 – 86.020 mm (3.3862 – 3.3866 in.)
		Mark 3	86.020 – 86.030 mm (3.3866 – 3.3870 in.)
		Limit	86.23 mm (3.3949 in.)
Piston and piston ring	Piston diameter	STD Mark 1	85.970 – 85.980 mm (3.3846 – 3.3850 in.)
		Mark 2	85.980 – 85.990 mm (3.3850 – 3.3854 in.)
		Mark 3	85.990 – 86.000 mm (3.3854 – 3.3858 in.)
	Piston oil clearance	STD	0.020 – 0.040 mm (0.0008 – 0.0016 in.)
		Limit	0.06 mm (0.0024 in.)
	Piston ring groove clearance	No.1	0.040 – 0.080 mm (0.0016 – 0.0031 in.)
		No.2	0.030 – 0.070 mm (0.0012 – 0.0028 in.)
	Piston ring end gap	STD No.1	0.330 – 0.550 mm (0.0130 – 0.0217 in.)
		No.2	0.450 – 0.670 mm (0.0177 – 0.0264 in.)
		Oil	0.150 – 0.500 mm (0.0059 – 0.0197 in.)
		Limit No.1	0.85 mm (0.0335 in.)
		No.2	0.97 mm (0.0382 in.)
		Oil	0.80 mm (0.0315 in.)
Connecting rod	Thrust clearance	STD	0.160 – 0.312 mm (0.0063 – 0.0123 in.)
		Limit	0.35 mm (0.0138 in.)
	Connecting rod bearing center wall thickness		
	(Reference)	STD Mark 1	1.484 – 1.488 mm (0.0584 – 0.0586 in.)
		Mark 2	1.488 – 1.492 mm (0.0586 – 0.0587 in.)
		Mark 3	1.492 – 1.496 mm (0.0587 – 0.0589 in.)
	Connecting rod oil clearance	STD STD	0.024 – 0.055 mm (0.0009 – 0.0022 in.)
		U/S 0.25	0.023 – 0.069 mm (0.0009 – 0.0027 in.)
		Limit	0.08 mm (0.0031 in.)
	Rod bend	Limit per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist	Limit per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)
	Bushing inside diameter		22.005 – 22.017 mm (0.8663 – 0.8668 in.)
	Piston pin diameter		21.997 – 22.009 mm (0.8660 – 0.8665 in.)
	Piston pin oil clearance	STD	0.005 – 0.011 mm (0.0002 – 0.0004 in.)
		Limit	0.05 mm (0.0020 in.)
Crankshaft	Thrust clearance	STD	0.020 – 0.220 mm (0.0008 – 0.0087 in.)
		Limit	0.30 mm (0.0118 in.)
	Thrust washer thickness		2.440 – 2.490 mm (0.0961 – 0.0980 in.)

Crankshaft (cont'd)	Main journal oil clearance	STD No.3 STD	0.028 – 0.047 mm (0.0011 – 0.0019 in.)
		No.3 U/S 0.25	0.027 – 0.067 mm (0.0011 – 0.0026 in.)
		Others STD	0.018 – 0.037 mm (0.0007 – 0.0015 in.)
		Others U/S 0.25	0.019 – 0.059 mm (0.0007 – 0.0023 in.)
		Limit	0.08 mm (0.0031 in.)
	Main journal diameter	STD	54.985 – 55.000 mm (2.1648 – 2.1654 in.)
		U/S 0.25	54.745 – 54.755 mm (2.1553 – 2.1557 in.)
	Main bearing center wall thickness (Reference)		
		STD No.3 Mark 1	1.992 – 1.995 mm (0.0784 – 0.0785 in.)
		Mark 2	1.995 – 1.998 mm (0.0785 – 0.0787 in.)
		Mark 3	1.998 – 2.001 mm (0.0787 – 0.0788 in.)
		Mark 4	2.001 – 2.004 mm (0.0788 – 0.0789 in.)
		Mark 5	2.004 – 2.007 mm (0.0789 – 0.0790 in.)
		Others Mark 1	1.997 – 2.000 mm (0.0786 – 0.0787 in.)
		Mark 2	2.000 – 2.003 mm (0.0787 – 0.0789 in.)
		Mark 3	2.003 – 2.006 mm (0.0789 – 0.0790 in.)
		Mark 4	2.006 – 2.009 mm (0.0790 – 0.0791 in.)
		Mark 5	2.009 – 2.012 mm (0.0791 – 0.0792 in.)
	Crank pin diameter	STD	47.985 – 48.000 mm (1.8892 – 1.8898 in.)
		U/S 0.25	47.745 – 47.755 mm (1.8797 – 1.8801 in.)
	Circle runout	Limit	0.06 mm (0.0024 in.)
	Main journal taper and out–of–round	Limit	0.02 mm (0.0008 in.)
	Crank pin taper and out–of–round	Limit	0.02 mm (0.0008 in.)

EG

TORQUE SPECIFICATION

EG0C6–0X

Part tightened		N·m	kgf·cm	ft·lbf
Distributor x Cylinder head		39	400	29
Spark plug x Cylinder head		18	180	13
Oil pump pulley x Oil pump drive shaft		35	360	26
No.2 idler pulley x Oil pump		44	450	32
Timing belt tensioner x Cylinder head		21	210	15
No.1 idler pulley x Cylinder head		52	530	38
Crankshaft pulley x Crankshaft		107	1,090	79
RH engine mounting bracket x Cylinder block	ST202	52	530	38
	SW20	60	620	45
Alternator x Alternator bracket (SW20)	Pivot bolt	52	530	38
	Adjusting lock bolt	19	190	14
Camshaft timing pulley x Camshaft		59	600	43
	for SST	41	420	30
Alternator bracket x Cylinder head (ST202)		39	400	29
Alternator x Alternator bracket (ST202)	12 mm head	19	190	14
	14 mm head	52	530	38
Idler pulley for alternator drive belt x Idler pulley bracket (ST202)		39	400	29
RH front engine hanger x Cylinder head		39	400	29
RH engine mounting bracket x Engine hanger (SW20)		60	620	45
Cylinder head x Cylinder block	1st	49	500	36
	2nd	Turn 90°		
Camshaft bearing cap x Cylinder head		19	190	14

Cylinder head cover x Cylinder head	6.0	61	53 in.·lbf
No.4 timing belt cover x Cylinder head cover	8.0	82	71 in.·lbf
No.3 timing belt cover x Cylinder head	8.0	82	71 in.·lbf
LH engine hanger x Cylinder head	44	450	32
Delivery pipe x Cylinder head	29	300	21
Intake manifold x Cylinder head	21	210	15
Alternator bracket x Cylinder block (SW20)	43	440	32
Fuel inlet pipe x Delivery pipe	32	330	24
Fuel inlet pipe x Cylinder head	9.0	92	80 in.·lbf
ACIS valve x Intake manifold	19	195	14
No.1 ACIS valve stay x Cylinder head	19	195	14
No.1 ACIS valve stay x ACIS valve	21	210	15
No.2 ACIS valve stay x Cylinder head	18	180	13
No.2 ACIS valve stay x ACIS valve	18	180	13
ACIS valve cover x ACIS cover Bolt	8.5	87	75 in.·lbf
Nut	21	210	15
Intake manifold stay x Intake manifold	39	400	29
Intake manifold stay x Cylinder block	39	400	29
Water bypass pipe x Water pump cover	10	100	7
Water bypass pipe x Cylinder head	24	240	18
No.3 exhaust manifold heat insulator x Water bypass pipe	18	180	13
No.3 exhaust manifold heat insulator x Cylinder block	37	380	27
Water outlet x Cylinder head	20	200	15
Fuel inlet pipe x Water outlet	9.0	92	80 in.·lbf
Fuel return pipe x Water outlet	9.0	92	80 in.·lbf
Throttle body x ACIS valve	21	210	15
Exhaust manifold x Cylinder head	50	510	37
Exhaust manifold stay x Exhaust manifold	58	590	43
Exhaust manifold stay x Cylinder block	58	590	43
No.2 exhaust manifold heat insulator x Exhaust manifold			
12 mm head	20	200	15
14 mm head	37	380	27
No.1 exhaust manifold heat insulator x Exhaust manifold	20	200	15
Oil nozzle x Cylinder block	9.0	92	80 in.·lbf
Main bearing cap x Cylinder block	59	600	44
Connecting rod cap x Connecting rod	67	680	49
Rear oil seal retainer x Cylinder block	9.0	92	80 in.·lbf
Knock sensor x Cylinder block	37	380	27
Oil cooler bracket x Cylinder block	6.5	66	58 in.·lbf
Oil cooler x Oil cooler bracket (Relief valve)	59	600	44
Water pump x Cylinder block 10 mm head	7.5	76	66 in.·lbf
12 mm head (SW20 w/o A/C)	19	190	14
Idler pulley bracket for alternator drive belt x Cylinder block (ST202)			
Water pump side	23	230	17
Cylinder block side	19	190	14
PS pump bracket x Cylinder block	43	440	32
Rear end plate x Cylinder block	9.3	95	82 in.·lbf
Flywheel x Crankshaft	107	1,090	79