

TOYOTA

T SERIES **ENGINE**

REPAIR MANUAL

Jun., 1978

INCLUDES

2T, 2T-B, 2T-C, 2T-G, 3T & 3T-C

TOYOTA MOTOR CORPORATION

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FOREWORD

This repair manual has been prepared to provide information covering general service repair for the 2T, 2T-B, 2T-C, 2T-G, 3T & 3T-C engine equipped on the TOYOTA COROLLA, TRUENO, COROLLA LIFTBACK, T-18, CARINA, CELICA and CORONA.

Applicable models:

TE31, 37, 38, 47, 51, 71, 72 series

TA14, 23, 28, 40, 47 series

TT132, 133 series

For instructions on how to use this manual, please refer to page 1—4.

Specifications contained herein are based on the June, 1978 production model.

For specifications on other models, please refer to the respective Specification Manual.

Also for vehicles equipped with an emission control device, please refer to the Emission Control Repair Manual.

TOYOTA MOTOR CORPORATION

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GENERAL

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GENERAL REPAIR INSTRUCTIONS

1. Use fender, seat and floor covers to keep the car clean and prevent damage.
2. During disassembly, keep parts in order for reassembly.
3. Before performing electrical work, disconnect the cable from the battery terminal.
4. Always replace cotter pins, gaskets and O rings with new ones.
5. When necessary, use a sealer on gaskets to prevent leaks.
6. Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.
7. Use genuine Toyota parts.
8. When replacing fuses, be sure the new fuse is the correct amperage rating. DO NOT exceed the fuse amp rating or use one of a lower rating.
9. If the vehicle is to be jacked up only at the front or rear end, be sure to block the wheels in order to ensure safety.
10. After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on the vehicle raised on a jack alone, even for a small job that can be finished quickly.
11. Use of a special service tool (SST) may be required, depending on the nature of the repair. Be sure to use SST where specified and follow the proper work procedure. A list of SST can be found at the back of this manual.

ABBREVIATIONS USED IN TOYOTA REPAIR MANUALS

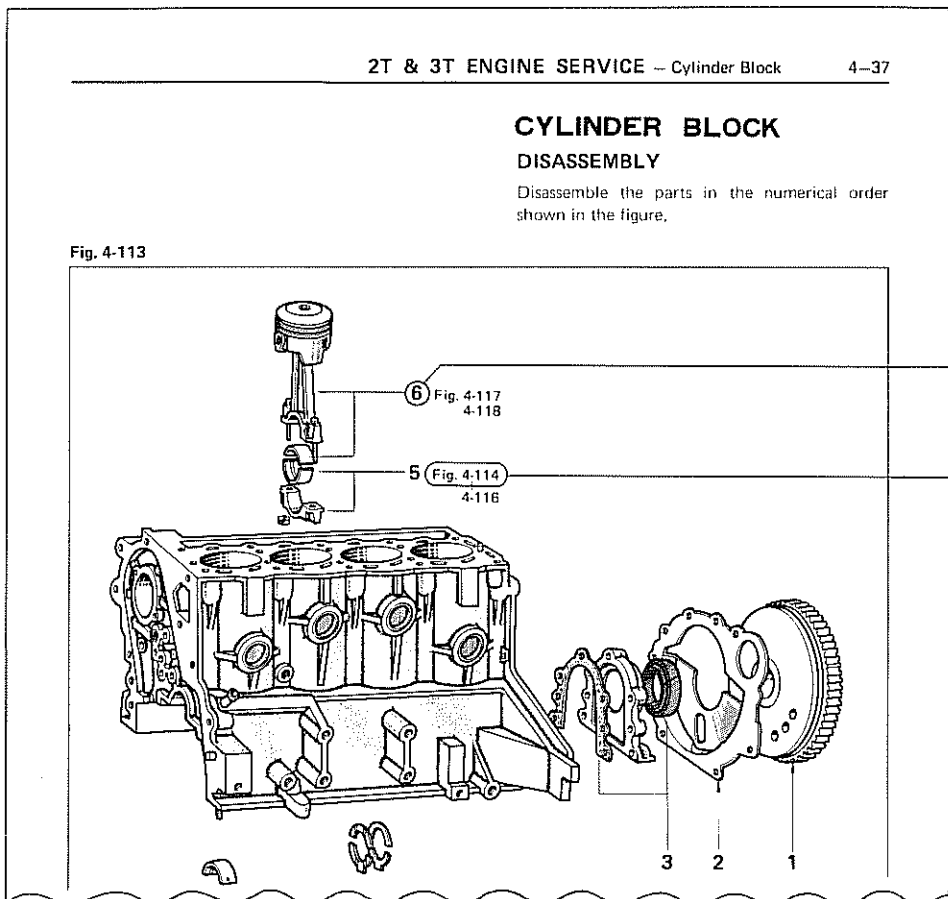
For convenience, the following abbreviations are used in Toyota repair manuals.

Abbreviation	Term	Abbreviation	Term
A/T	Automatic Transmission	RH	Right-hand
BDC	Bottom Dead Center	RHD	Right-hand Drive
BTDC	Before Top Dead Center	SST	Special Service Tool
EX	Exhaust	STD	Standard
IN	Intake	T	Tightening Torque
LH	Left-hand	TDC	Top Dead Center
LHD	Left-hand Drive	U/S	Undersize
MP	Multipurpose	W/	With
M/T	Manual Transmission	W/O	Without
OPT	Option	TVSV	Thermostatic Vacuum Switching Valve
O/S	Oversize	HAC	High Altitude Compensation
BVSV	Bi-metal Vacuum Switching Valve		

HOW TO USE THIS MANUAL

1. OVERVIEW ILLUSTRATION

Many service operations begin with an overview illustration as a general guide.



- A** : The bold numbers indicate the order in which the work is to be done.
- B** : The figure numbers refer you to more detailed instructions and specifications.

2. ILLUSTRATED INSTRUCTIONS

All important steps in every service job are illustrated. Obvious steps are omitted to save space. Experienced technicians may only need to glance at the overview illustration and/or specifications.

4-38
2T & 3T ENGINE SERVICE — Cylinder Block

Fig. 4-114

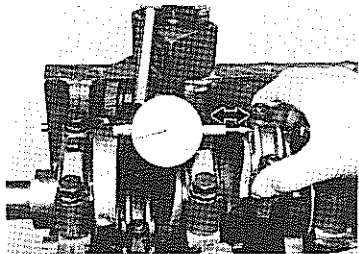
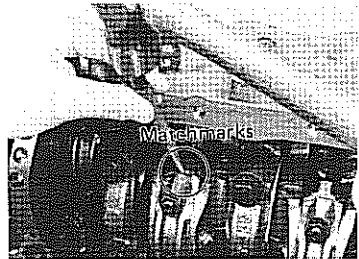


Fig. 4-115



 Measure the connecting rod thrust clearance. If it exceeds the limit, replace the connecting rod.

Thrust clearance:

STD	0.16 – 0.26 mm (0.006 – 0.010 in.)
Limit	0.3 mm (0.012 in.)

 Mark the connecting rod and cap for correct reassembly.

(E)

(F)

(D)

(C)

- (C) : The bold numbers indicate the order in which the work is to be done.
- (D) : A symbol is often used to explain the action required.
- (E) : The text explains how to perform the step.
- (F) : Specifications, Notes and Cautions are given in bold type so you won't miss them.

SYMBOLS

The following symbols have been adopted for simplicity and for easy comprehension.



REMOVE or DISASSEMBLE



INSTALL or ASSEMBLE



INSPECT



MEASURE



TIGHTEN



CLEAN



IMPORTANT

2T & 3T ENGINE TUNE-UP

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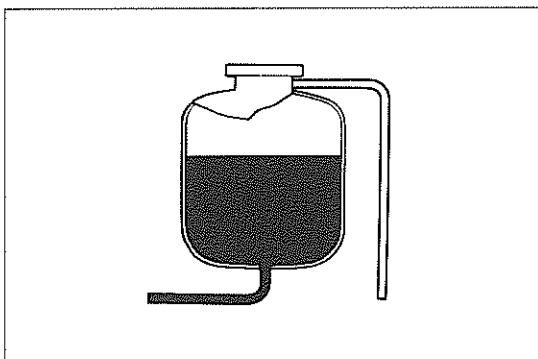
2T & 3T ENGINE TUNE-UP ITEM

ITEM			REMARK
1	COOLING SYSTEM	Coolant level check	Full line
		Quality check	
		Coolant capacity (w/Heater)	8.0 liters 8.5 US qt 7.0 Imp. qt
2	DRIVE BELT	Tension Fan – Alternator	8 – 12 mm 0.3 – 0.5 in.
		A/C Compressor – Crankshaft	11 – 14 mm 0.4 – 0.6 in.
3	AIR CLEANER	Element cleaning	
4	BATTERY	Specific gravity	1.25 – 1.27 at 20°C (68°F)
		Electrolyte level	
5	SPARK PLUG	Visual check	
		Cleaning	
		Plug gap	0.7 – 0.8 mm 0.028 – 0.031 in.
6	HIGH TENSION CORD	Resistance	Less than 25 kΩ per cord
7	DISTRIBUTOR	Distributor cap	
		Rubbing block gap	0.4 – 0.5 mm 0.016 – 0.020 in.
		Damping spring gap	0.1 – 0.4 mm 0.004 – 0.016 in.
8	ENGINE OIL	Oil level check	Full line
		Oil replenishment	API services SE classification
		Oil capacity	
		Dry refill w/Oil filter	4.2 liters 4.4 US qt 3.7 Imp. qt
		Drain & refill w/Oil filter	3.8 liters 4.0 US qt 3.3 Imp. qt
		w/o Oil filter	3.3 liters 3.5 US qt 2.9 Imp. qt
		Quality check	
		Oil filter replacement	SST [09228-44010]
	[COLD CONDITION]		
9	CARBURETOR	Automatic choke	
		Check the accelerating pump	
		Float level	
		Throttle valve full open	
		Choke breaker	
		Choke opener	
10	DWELL ANGLE (Except USA & Canada)		52°
		Variation	within 3° (at idling to 2,000 rpm)

ITEM			REMARK
	WARM UP ENGINE [HOT CONDITION]		
11	CARBURETOR	Automatic choke Choke opener	
12	IGNITION TIMING		10° BTDC/idle speed
13	DISTRIBUTOR	(Iraq, Chile and Peru only) Governor advancer Vacuum advancer	(3.5° BTDC/idle speed)
14	VALVE CLEARANCE	IN EX	0.20 mm 0.008 in. 0.33 mm 0.013 in.
15	IDLE SPEED & IDLE MIXTURE ADJUSTMENT		SST[09243-00010] or [09243-00020]
	Idle mixture speed	at Neutral	
	3T	M/T	700 rpm
		A/T	800 rpm
	3T-C	M/T	760 rpm
		A/T	810 rpm
	Idle speed 2T	M/T	650 rpm
		A/T	750 rpm
	2T-B	M/T	800 rpm
	3T	M/T	650 rpm
		A/T	750 rpm
	3T-C	M/T	700 rpm
		A/T	750 rpm
	Intake manifold vacuum (at idle speed)		
	2T & 2T-B	M/T	More than 430 mmHg (16.9 in.Hg)
	2T	A/T (N Range)	More than 400 mmHg (15.7 in.Hg)
	3T & 3T-C	M/T (N Range)	More than 450 mmHg (17.7 in.Hg)
		A/T (N Range)	More than 400 mmHg (15.7 in.Hg)

ITEM				REMARK	
16	FAST IDLE SPEED ADJUSTMENT	2T & 3T		New vehicle	2,300 rpm
				After 1,000 km	2,700 rpm
		2T-B		New vehicle	2,200 rpm
				After 1,000 km	2,500 rpm
		3T-C	M/T	3,200 rpm	
			A/T	3,000 rpm	
17	COMPRESSION PRESSURE	at 250 rpm			
		2T, 3T & 3T-C	STD	11.5 kg/cm ²	163 psi
			Limit	9.0 kg/cm ²	128 psi
		2T-B	STD	12.0 kg/cm ²	170 psi
			Limit	10.0 kg/cm ²	142 psi
		Difference between each cylinder		Less than 1.0 kg/cm ² (14 psi)	

Fig. 2-1



COOLING SYSTEM

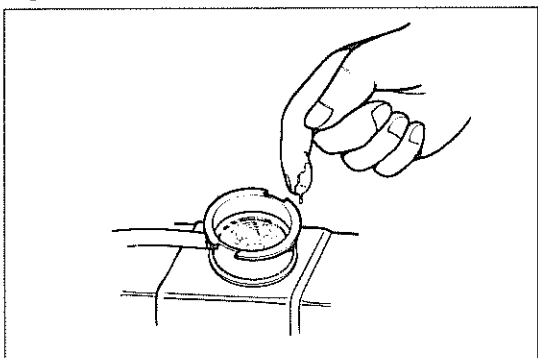
CHECK COOLANT LEVEL

If low, fill reservoir to FULL line.

— Note —

To maintain freeze protection, use a recommended anti-freeze.

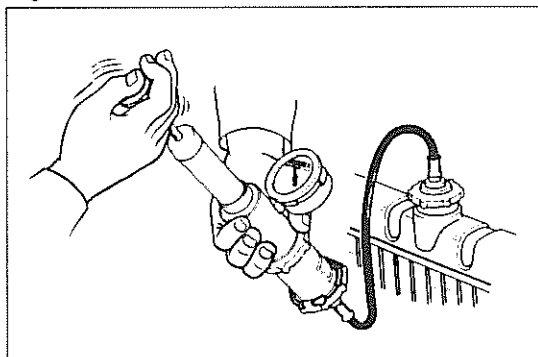
Fig. 2-2



CHECK COOLANT QUALITY

1. Check coolant cleanliness.
2. Check for rust or scale deposits around radiator cap and filler neck.
3. Check to see that there is no oil in the coolant.

Fig. 2-3

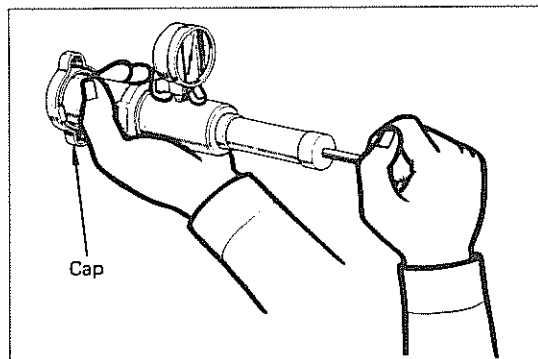


CHECK COOLING SYSTEM

Check for:

1. Damaged or deteriorated radiator and water hoses.
2. Loose hose clamps.
3. Damage or corrosion in the radiator core.
4. Leakage from the water pump, radiator core or a loose water drain cock.

Fig. 2-4



INSPECT RADIATOR CAP OPERATION

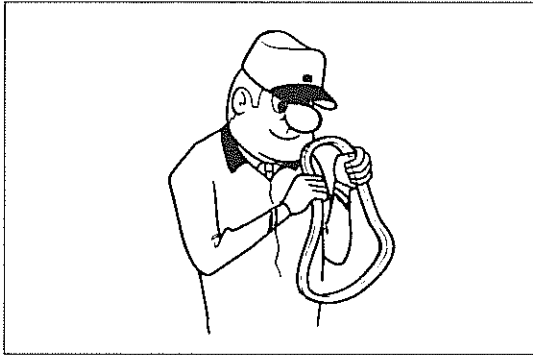
Inspect the spring tension and seating condition of the radiator cap vacuum valves.

Replace the cap if the valve opens at a pressure below the specified or is otherwise defective.

Valve opening pressure:

STD	0.9 kg/cm ² (12.8 psi)
Limit	0.6 kg/cm ² (8.5 psi)

Fig. 2-5



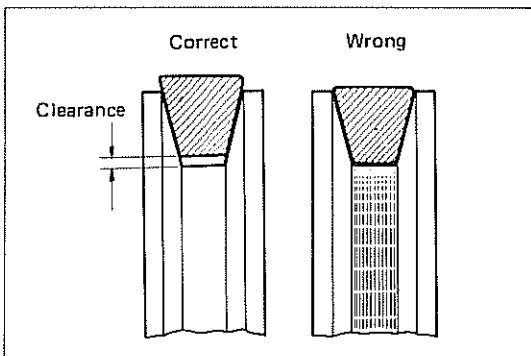
DRIVE BELT

VISUAL CHECK

Check the drive belt for:

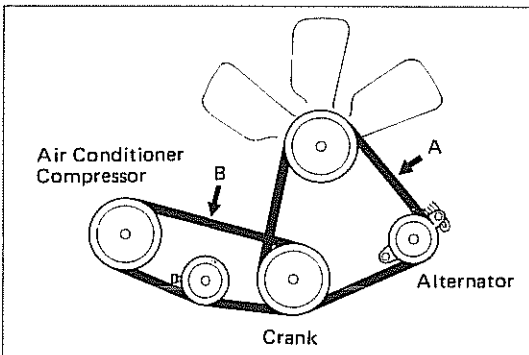
1. Cracks, deterioration, stretching or wear.
2. Adherence of oil or grease.

Fig. 2-6



3. Improper belt-to-pulley contact.

Fig. 2-7



CHECK & ADJUST BELT TENSION

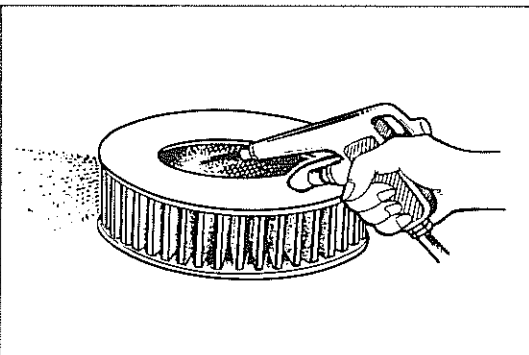
With 10 kg (22 lb) of force, press on the belts at the points indicated in the figure. The belts should deflect the amount specified.

Except USA

Drive belt tension:

- A 8 – 12 mm
(0.3 – 0.5 in.)
- B 11 – 14 mm
(0.4 – 0.6 in.)

Fig. 2-8



AIR CLEANER

CLEAN ELEMENT

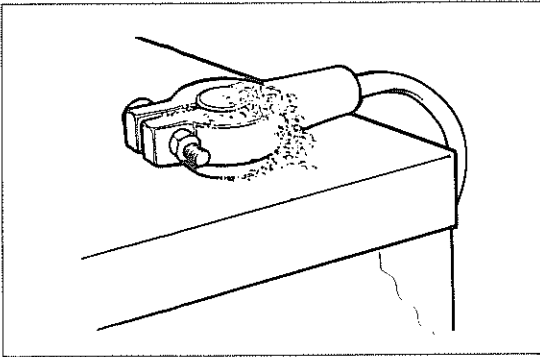
1. Remove the air cleaner element.

— Note —

Use care to prevent dirt or other foreign matter from entering into the carburetor.

2. To clean the element, blow compressed air from inside.
3. If element is torn or excessively dirty, replace it with a new one.

Fig. 2-9



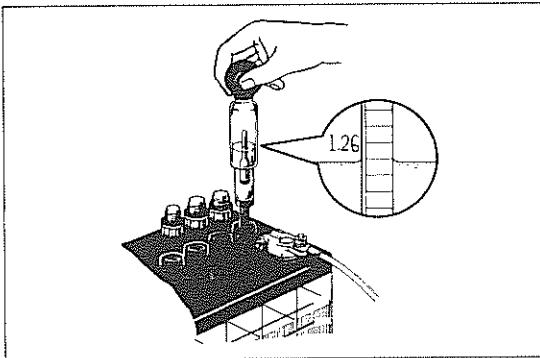
BATTERY

VISUAL CHECK

Check the battery for the following:

1. Rusted battery support.
2. Loose terminal connections.
3. Rusted or deteriorated terminals.
4. Damaged or leaking battery.

Fig. 2-10

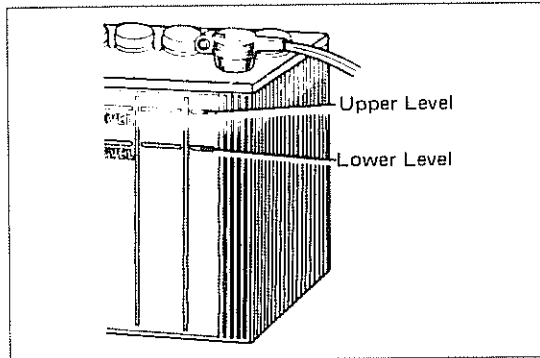


MEASURE SPECIFIC GRAVITY

1. Insert the hydrometer into the cell and hold it so that the float does not touch the cylinder wall.
2. Draw in sufficient water so that the float is suspended free from both the top and bottom of the cylinder.
3. Read the graduation.

Specific gravity: 1.25 – 1.27 at 20°C (68°F)

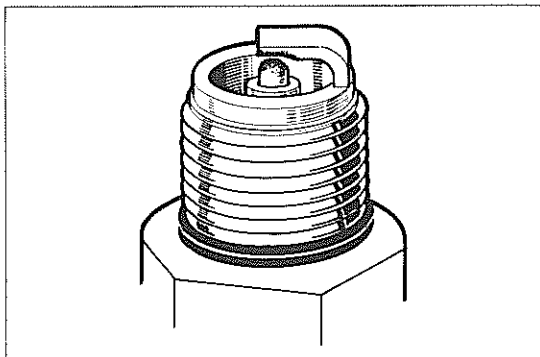
Fig. 2-11



CHECK ELECTROLYTE LEVEL

The water should be up to the upper electrolyte level. If low, add distilled or purified water.

Fig. 2-12



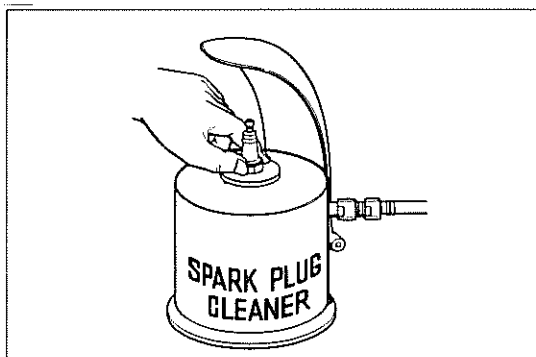
SPARK PLUG

VISUAL CHECK

The spark plugs for the following:

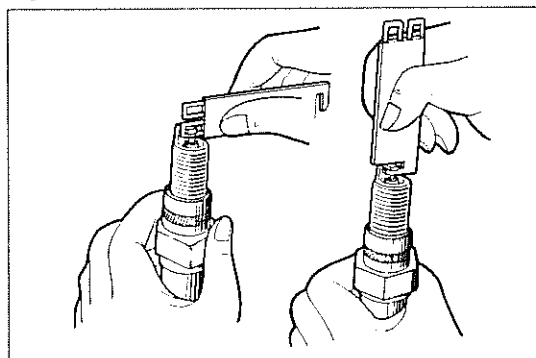
1. Cracks or other damage on the threads and insulator.
2. Electrode wear.
3. Damaged or deteriorated gaskets.
4. Burnt electrode or excess carbon deposits.

Fig. 2-13

**CLEAN SPARK PLUG**

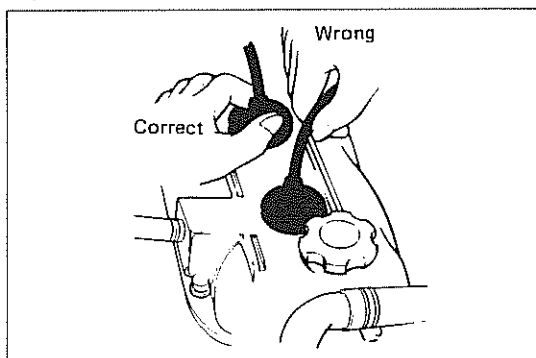
1. Do not use the spark plug cleaner longer than necessary.
2. Thoroughly blow off the cleaning compound and carbon with compressed air.
3. Clean the threads and outer insulator surface.

Fig. 2-14

**ADJUST GAP**

Check each plug gap with a spark plug gap gauge. If necessary, adjust by bending the protruding (outer) electrode.

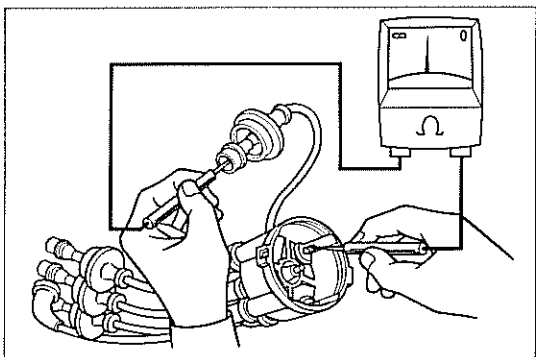
Fig. 2-15

**HIGH TENSION CORD****CHECK RESISTANCE**

— Note —

To pull the cord from the spark plug, always pull on the end of the cord.

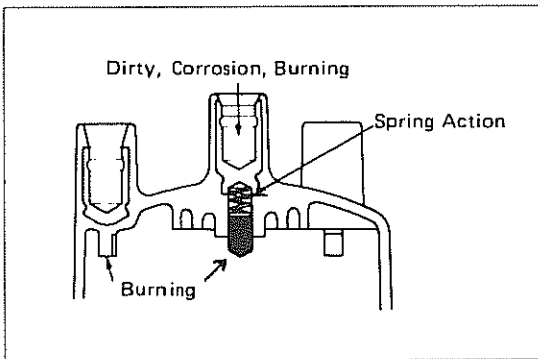
Fig. 2-16



Check the cord resistance.

Resistance: Less than 25 k Ω per cord

Fig. 2-17



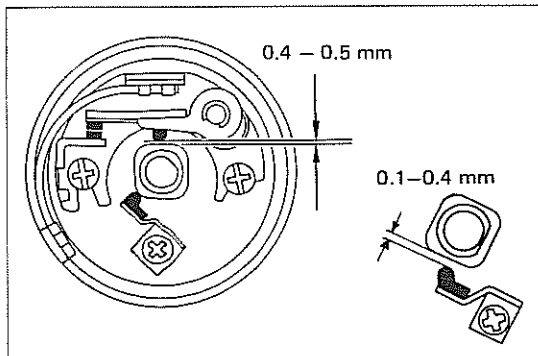
DISTRIBUTOR

CHECK DISTRIBUTOR CAP

Check the cap and rotor.

1. Cracks, damage, corrosion, burning and dirty cord hole.
2. Burnt electrode terminal.
3. Weak center piece spring action.

Fig. 2-18



ADJUST POINT GAP

1. Replace the breaker points if excessively burnt or pitted.
2. Adjust the rubbing block gap and damping spring.

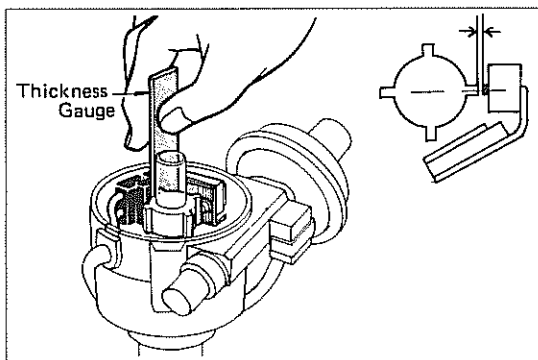
Rubbing block gap:

0.4 – 0.5 mm
(0.016 – 0.020 in.)

Damping spring gap:

0.1 – 0.4 mm
(0.004 – 0.016 in.)

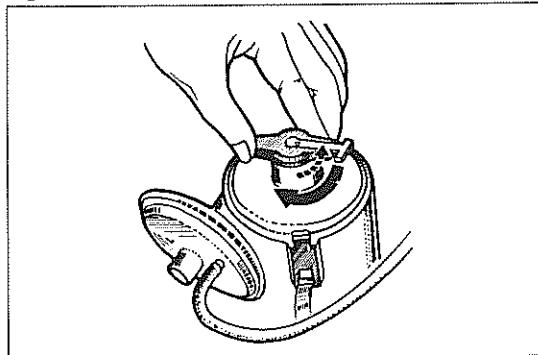
Fig. 2-19



ADJUST AIR GAP

Check the air gap between the rotor and pick up coil projection.

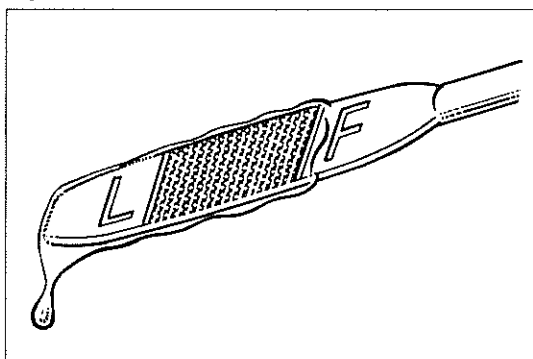
Fig. 2-20



GOVERNOR CHECK OPERATION

1. Turn the rotor clockwise and release. The rotor should return quickly.
2. Check the rotor for looseness.

Fig. 2-21

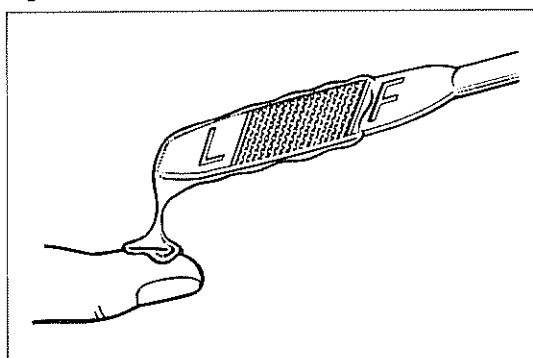


ENGINE OIL

CHECK OIL LEVEL

The oil level should be between the L and F marks. If low, check for leakage and add oil up to the F mark. Use API service SE classification oil.

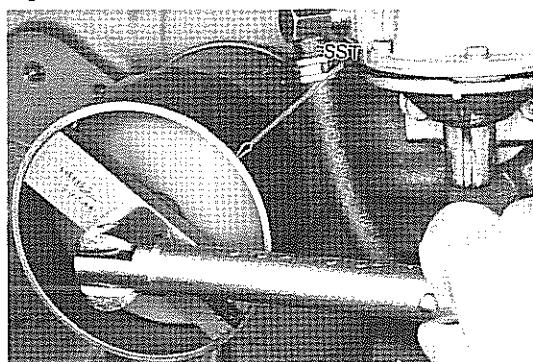
Fig. 2-22



CHECK OIL QUALITY

Check the oil for deterioration, entry of water, discoloring or thinning.

Fig. 2-23



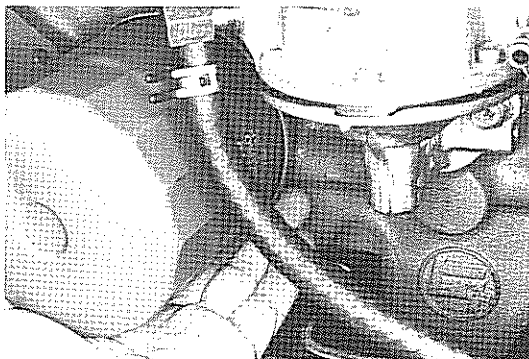
REPLACE OIL FILTER

1. Remove the oil filter with SST.
SST[09228-44010]
2. To install new filter, tighten firmly by hand.

— Note —

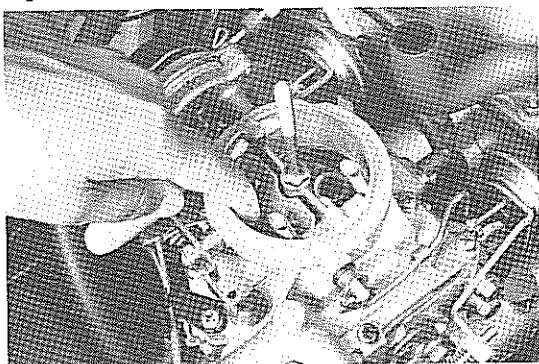
Do not tighten with SST or wrench.

Fig. 2-24



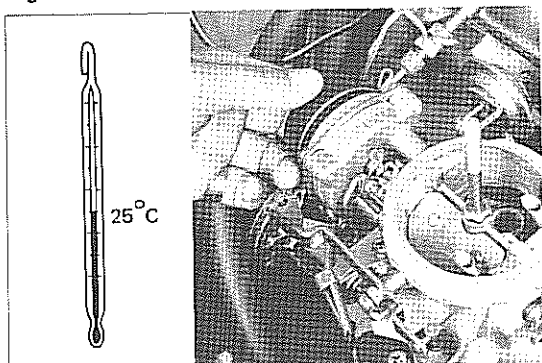
3. Start the engine and check for oil leakage.
4. Stop the engine and recheck the oil level.

Fig. 2-25

**(COLD CONDITION)****CARBURETOR****AUTOMATIC CHOKE**

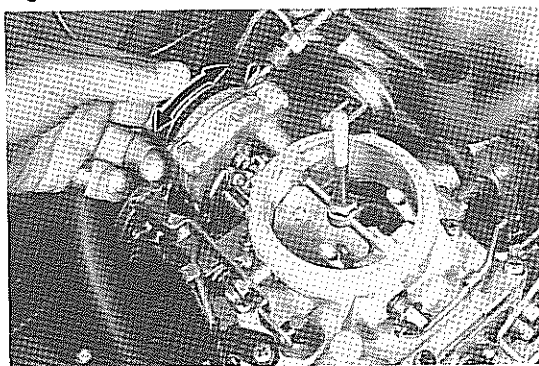
1. Check the choke valve operation by pushing down the valve with your finger and releasing it. The valve should return quickly and smoothly.

Fig. 2-26



2. Check to see that the choke valve just closes exactly when the atmospheric temperature reaches 25°C (77°F). If it doesn't, loosen the three screws and adjust by turning the coil housing.

Fig. 2-27



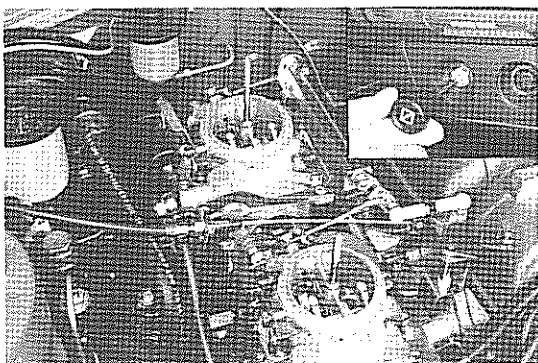
3. Check the engine starting and running condition. If necessary, readjust the automatic choke setting by turning the coil housing.

— Note —

If mixture is too rich . . . Turn clockwise.

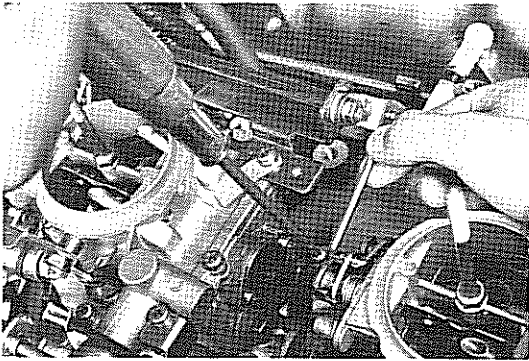
If too lean Turn counterclockwise.

Fig. 2-28

**MANUAL CHOKE**

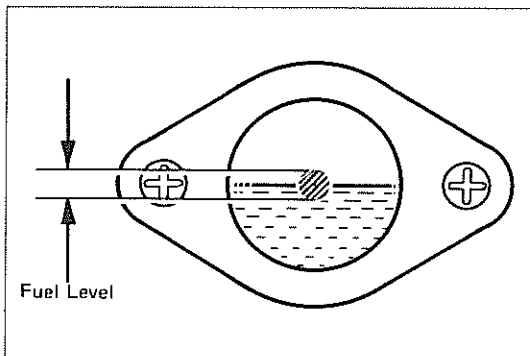
1. Pull out the choke knob all the way and check to see that the choke valve is fully closed.

Fig. 2-29



2. Adjust the link so that the front and rear carburetor choke valves open at the same time.

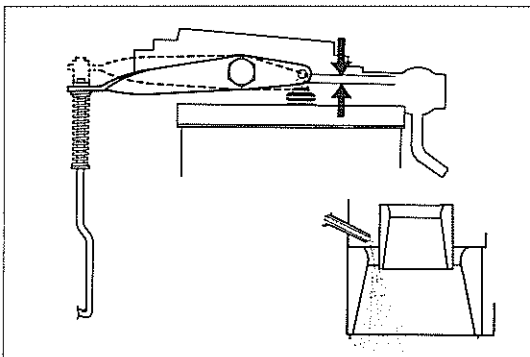
Fig. 2-30



CHECK THE FLOAT LEVEL

Check the float level while the engine is idling.

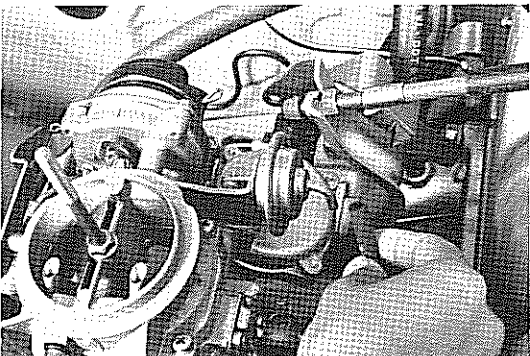
Fig. 2-31



CHECK THE ACCELERATION PUMP

1. Check the acceleration pump operation. Gasoline should shoot out with force from the jet when the throttle valve is opened.
2. Check the throttle valve opening. The throttle valve should be fully open when the accelerator pedal is depressed all the way.

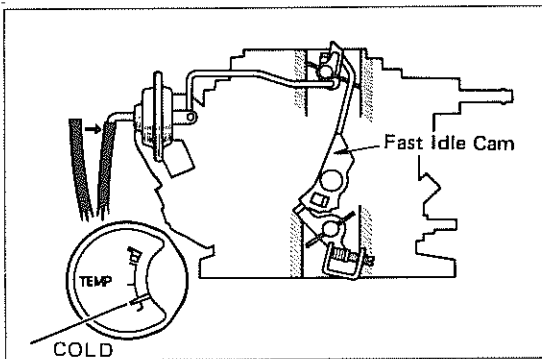
Fig. 2-32



CHOKE BREAKER

1. With the engine idling, disconnect the hose from the intake manifold. Check to see that the choke breaker link has returned.
2. Reconnect the hose and check to see that the choke breaker link is pulled in by the diaphragm.
If defective, replace the diaphragm.

Fig. 2-33

**CHOKE OPENER**

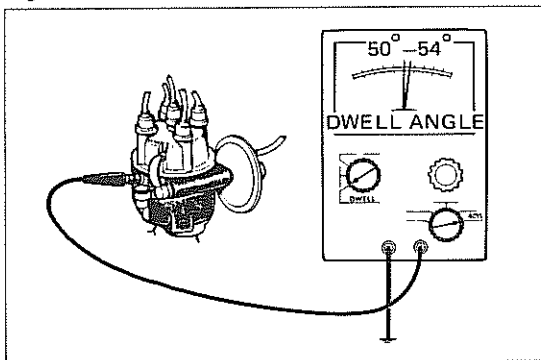
1. Inspect the linkage movement at cold engine.

— Note —

Coolant temperature below 35°C (95°F).

2. Start the engine.
3. Disconnect and connect the hose. Check to see that the linkage does not move.

Fig. 2-34

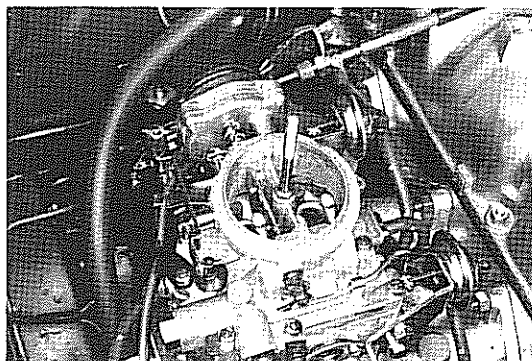
**DWELL ANGLE**

Inspect the dwell angle with a dwell angle tester.

Dwell angle: 52°

Variation: within 3°
(at idling to 2,000 rpm)

Fig. 2-35



[HOT CONDITION]

CARBURETOR AUTOMATIC CHOKE

When the engine is warmed up the choke valve should be fully opened.

Fig. 2-36

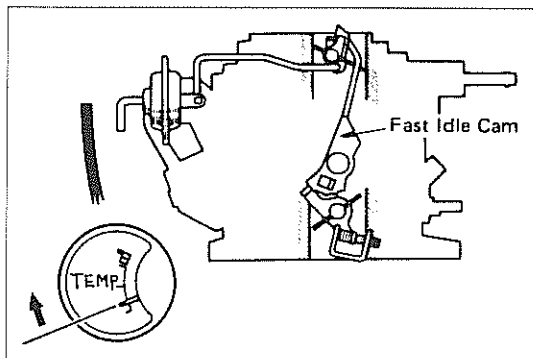


Fig. 2-37

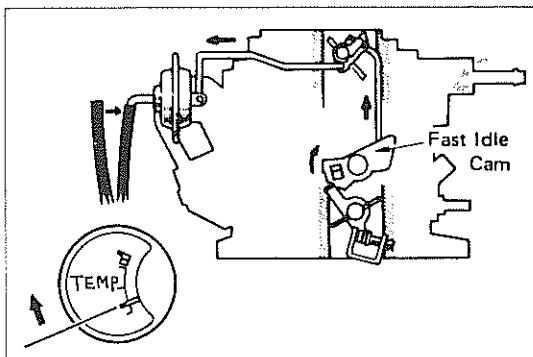
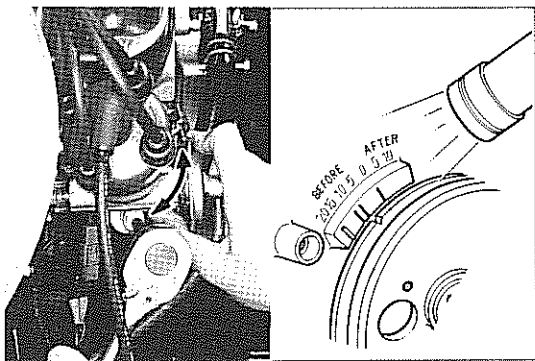


Fig. 2-38



CHOKE OPENER

1. Inspect the system operation at hot engine.
2. Disconnect the hose from the diaphragm and step down the accelerator pedal once. Start the engine.

3. Reconnect the hose.
4. Choke valve should open with force. Fast idle cam should be released to third step.
5. If a problem is found, check the diaphragm, linkage and the TVSV.

IGNITION TIMING

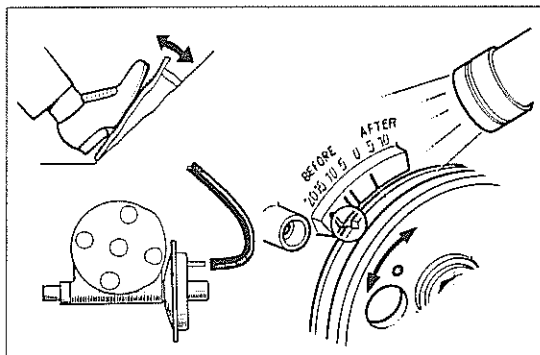
Turn the distributor body to align the timing marks.

Ignition timing: 10° BTDC/idle speed
[For Iraq, Chile and Peru]
3.5° BTDC/idle speed

— Note —

Do not make this adjustment with the octane selector.

Fig. 2-39

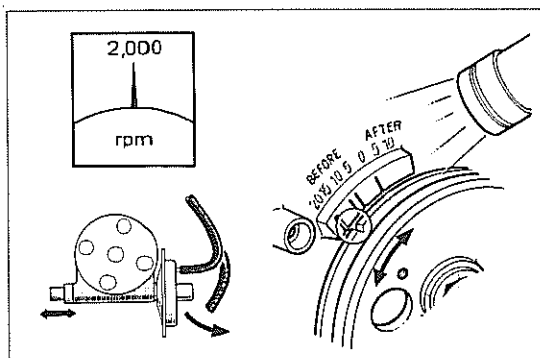


DISTRIBUTOR

GOVERNOR ADVANCER
OPERATIONAL INSPECTION

Start the engine and disconnect the vacuum hose from the distributor. The timing mark should vary in accordance with the engine rpm.

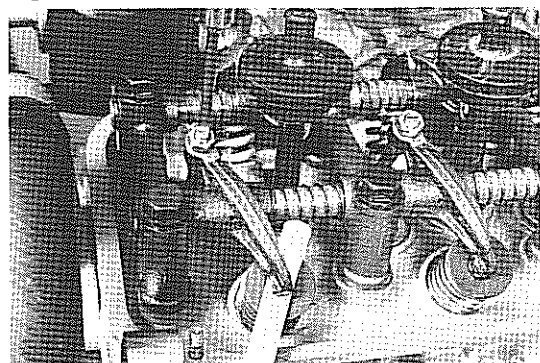
Fig. 2-40



VACUUM ADVANCE OPERATIONAL INSPECTION

With the engine running at about 2,000 rpm, disconnect and connect the vacuum hose and insure that the timing mark moves.

Fig. 2-41

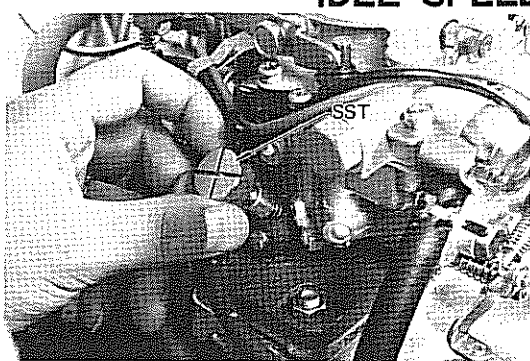


VALVE CLEARANCE

With the engine hot, run at idle rpm. Valve clearance is measured between valve stem and rocker arm.

Valve clearance: IN 0.20 mm
(0.008 in.)
EX 0.33 mm
(0.013 in.)

Fig. 2-42



IDLE SPEED & IDLE MIXTURE ADJUSTMENT



2T & 3T ENGINE

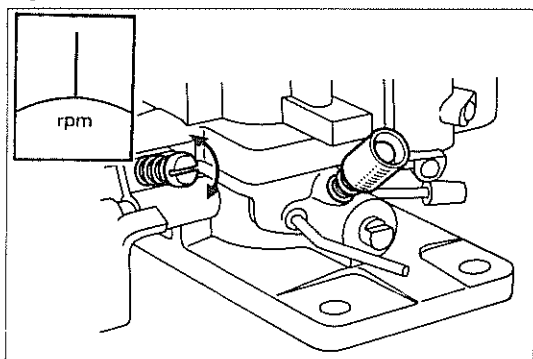
Except USA, Canada & Sweden

If necessary, adjust the idle mixture adjusting screw with SST.

SST [09243-00010] or
[09243-00020]

1. Check the following items beforehand.
 - (1) Air cleaner installed
 - (2) Normal operating coolant temperature
 - (3) Choke fully open
 - (4) All accessories switched off
 - (5) All vacuum lines connected
 - (6) Ignition timing set
 - (7) Transmission in N range

Fig. 2-43

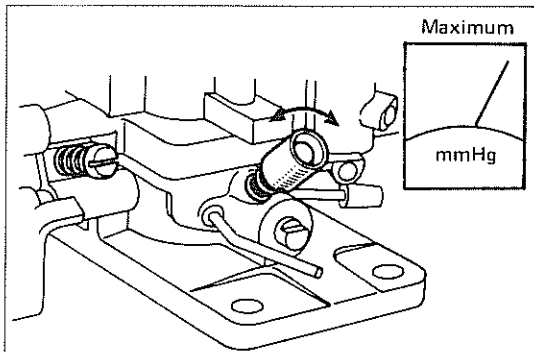


2. Set the idle with the idle speed adjusting screw.

Idle speed:

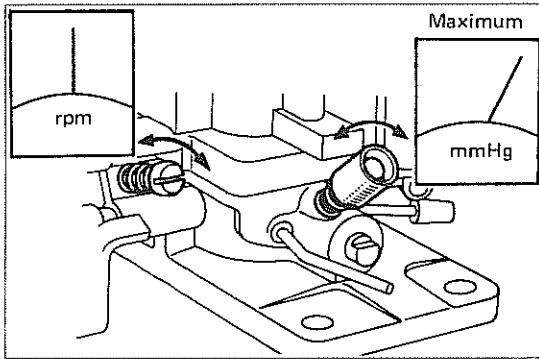
2T	M/T	650 rpm
	A/T	750 rpm
3T	M/T	650 rpm
	A/T	750 rpm
3T-C	M/T	700 rpm
	A/T	750 rpm

Fig. 2-44



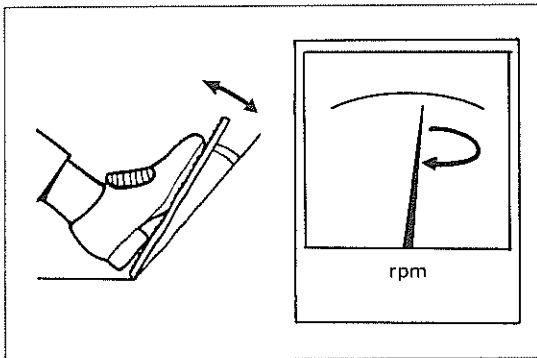
3. Set to maximum vacuum with the idle mixture adjusting screw.

Fig. 2-45



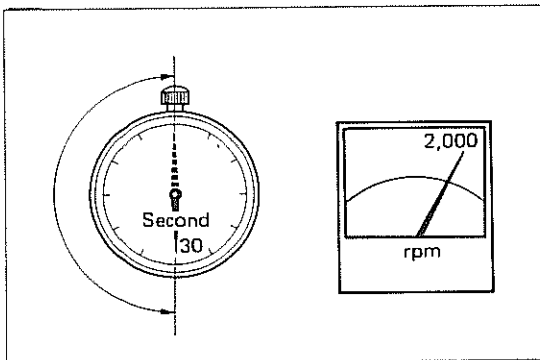
4. Repeat the above adjustments until the maximum vacuum and specified rpm is obtained.

Fig. 2-46



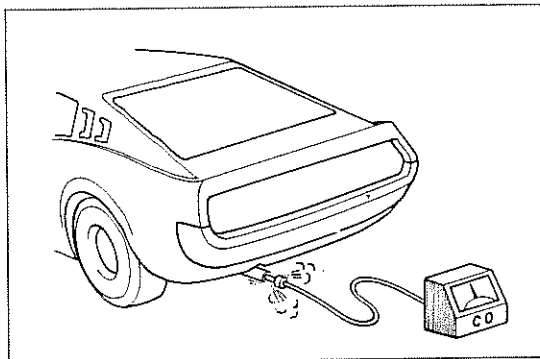
5. Race the engine momentarily by manipulating the accelerator link to verify that the engine will return to specified rpm when released.

Fig. 2-47



6. Measure the CO concentration.
 - (1) Race the engine about 2,000 rpm for 30 — 60 seconds.

Fig. 2-48



- (2) Before measuring, wait 1 — 3 minutes after racing the engine to allow the concentration to stabilize.

CO concentration: 1.0 — 2.0 %

— Note —

Calibrate the CO meter beforehand.

Fig. 2-49

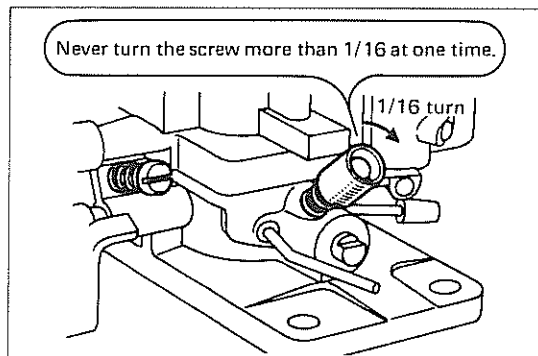


Fig. 2-50

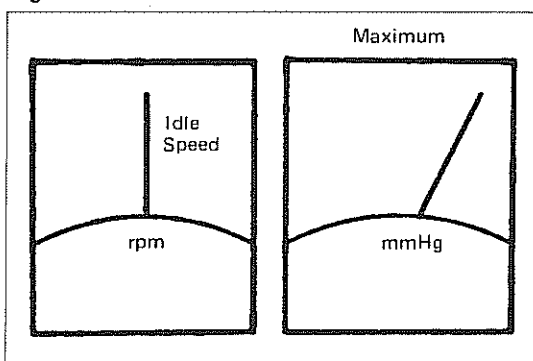
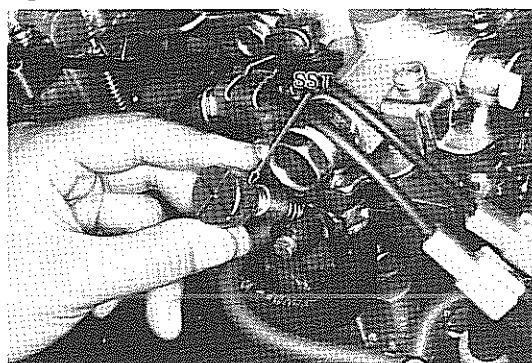


Fig. 2-51



- (3) If the concentration exceeds the specified value, tighten the idle mixture adjusting screw little by little until the concentration is within the specified value.

7. Recheck the intake manifold vacuum and idle speed.

— Note —

1. When the idle mixture adjusting screw is tightened, there will be a point where the engine speed drops rapidly. Further adjustment must not be attempted by screwing in beyond this point.
2. Allowable engine idle speed is ± 50 rpm of the specified speed.

2T-B ENGINE

Use SST when adjusting the idle mixture adjusting screw.

SST [09243-00010] or
[09243-00020]



1. The adjusting and measuring conditions should be as follows:
 - (1) Air cleaner installed
 - (2) Normal operating coolant temperature
 - (3) Choke fully open
 - (4) All accessories switched off
 - (5) All vacuum lines connected
 - (6) Transmission in N range
 - (7) Ignition timing set
 - (8) Tachometer and vacuum gauge attached
 - (9) Zero setting of CO meter warmed up

Fig. 2-52

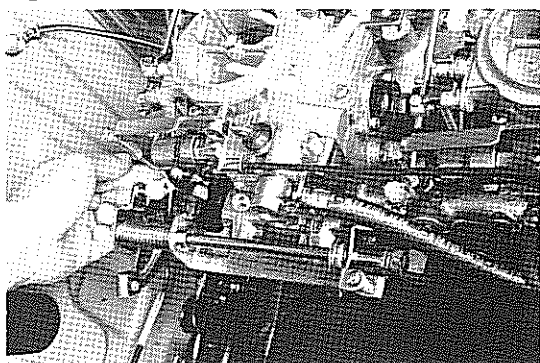


Fig. 2-53

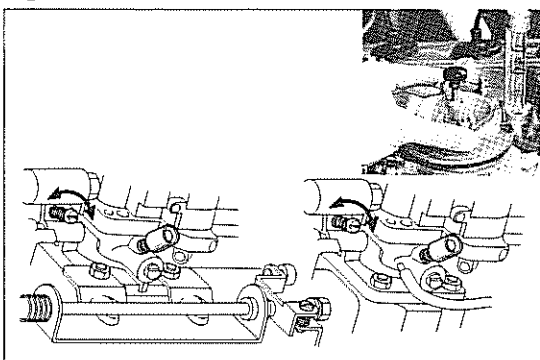


Fig. 2-54

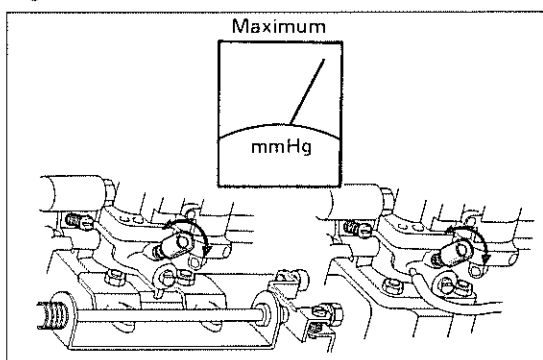
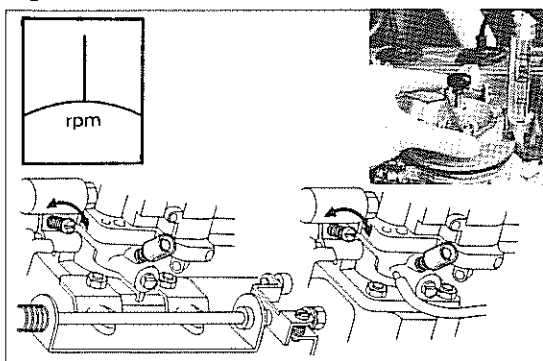


Fig. 2-55



2. Disconnect front and rear carburetor the connecting rods.

3. Using a carburetor balancer, adjust by turning each idle speed adjusting screw so that the intake air volume at the front and rear carburetors will be the same at specified idling speed.

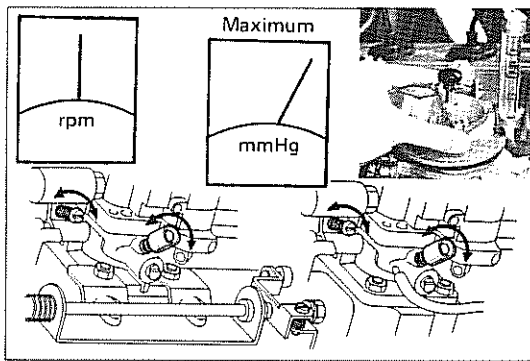
Idle speed: M/T 800 rpm

4. Adjust by turning each idle mixture adjusting screw so that intake manifold vacuum at the front and rear carburetors will be the maximum vacuum.

5. Using a carburetor balancer, adjust by turning each idle speed adjusting screw so that the intake air volume at the front and rear carburetors will be the same at specified idling speed.

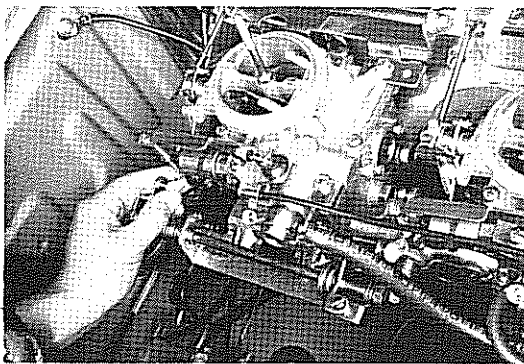
Idle speed: M/T 800 rpm

Fig. 2-56



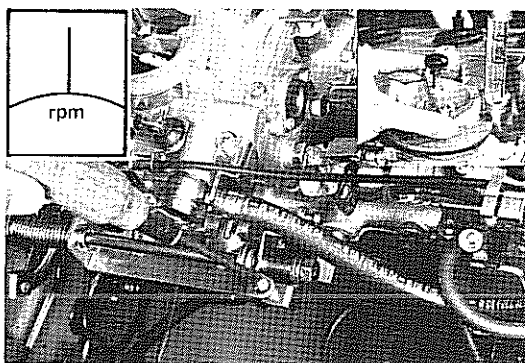
6. Repeat the above adjustments until the maximum vacuum, and intake air volume at the front and rear carburetors will be the same at specified idling speed.

Fig. 2-57



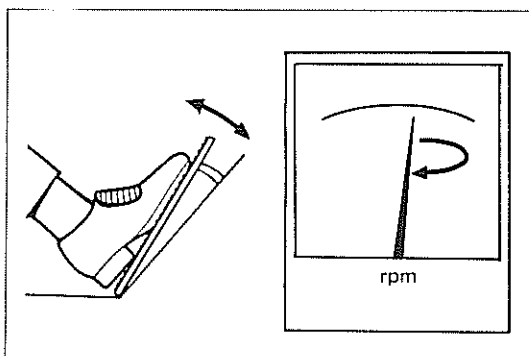
7. Connect the connecting rod so the idling rpm does not change. If it changes, adjust the rod length.

Fig. 2-58



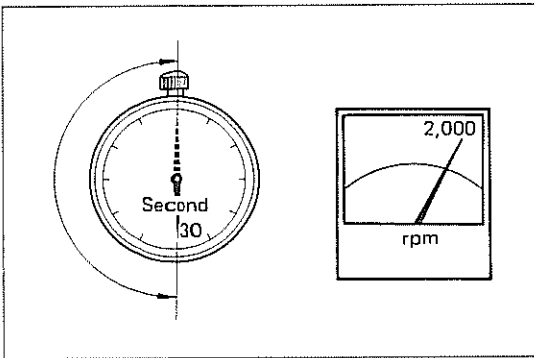
8. Using a carburetor balancer, adjust by turning the synchronizing screw so that the intake air volume at the front and rear carburetors will be the same when the engine revolution has risen to about 1,200 rpm.

Fig. 2-59



9. Race the engine momentarily by manipulating the accelerator link to verify that the engine will return to specified rpm when released.

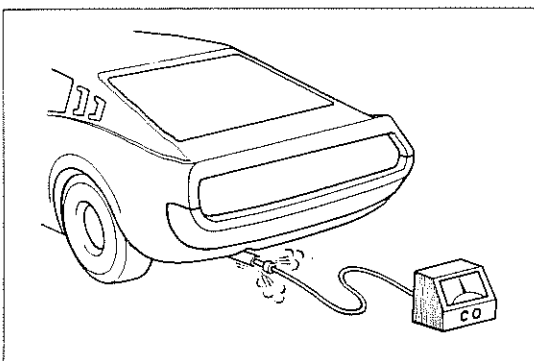
Fig. 2-60



10. Measure the CO concentration.

- (1) Race the engine about 2,000 rpm for 30 – 60 seconds.

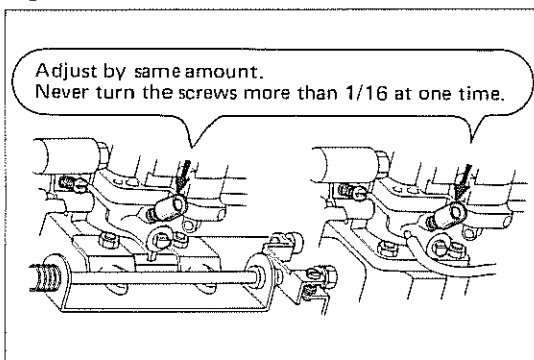
Fig. 2-61



- (2) Before measuring, wait 1 – 3 minutes after racing the engine to allow the concentration to stabilize.

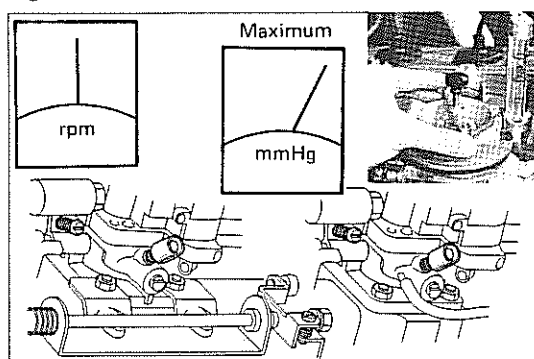
CO concentration: 1.0 – 2.0 %

Fig. 2-62



11. If the concentration exceeds the specified value, tighten the idle mixture adjusting screws by equal amount little by little until the concentration is within the specified value.
12. Remeasure the CO concentration in the exhaust gases with a CO meter.

Fig. 2-63

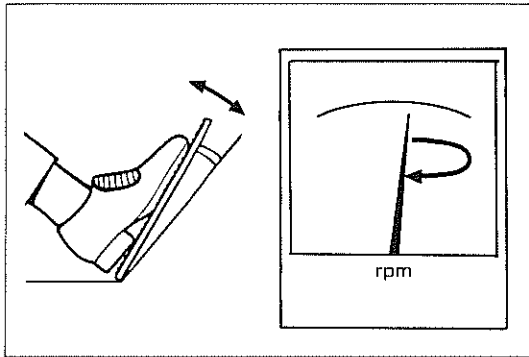


13. Recheck the intake manifold vacuum and intake air volume at the front and rear carburetors.

— Note —

1. When the idle mixture adjusting screws are tightened, there will be a point where the engine speed drops rapidly. Further adjustment must not be attempted by screwing in beyond this point.
2. Allowable engine idle speed is ± 50 rpm of the specified speed.

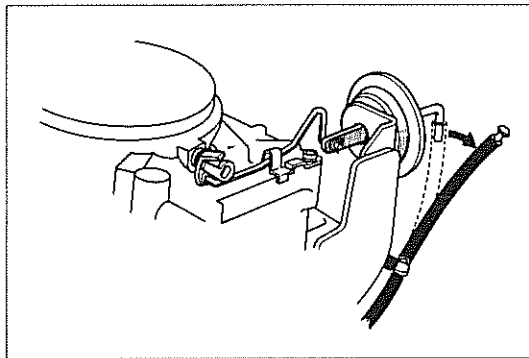
Fig. 2-64



14. Check to see that the engine returns to idle when the accelerator pedal is released both suddenly and slowly.

Check to see that the engine rpm rises smoothly in relation with the throttle valve opening.

Fig. 2-65

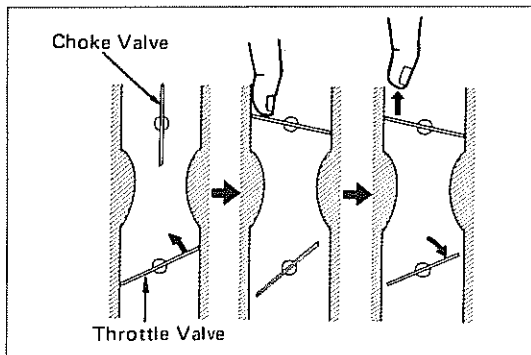


FAST IDLE SPEED ADJUSTMENT

AUTOMATIC CHOKE

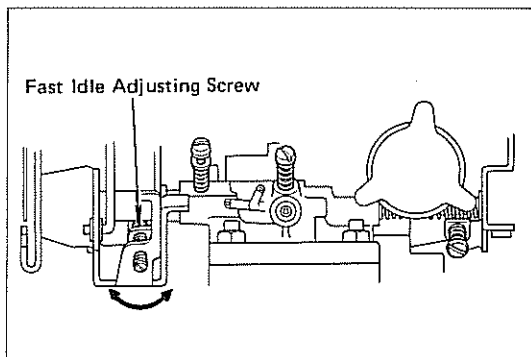
1. Stop the engine.
2. With the throttle valve slightly open, close the choke valve with your finger and then close the throttle valve.
3. Start the engine without depressing the accelerator pedal.

Fig. 2-66



4. Close choke valve. While holding the throttle slightly open, (1) push the choke valve closed (2), and hold it closed as you release the throttle valve (3).

Fig. 2-67



5. Insure that the engine is running at the specified rpm. If not, adjust with the fast idle adjusting screw.

Fast idle speed:

2T & 3T

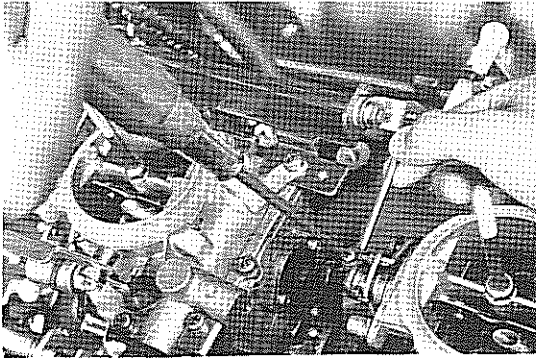
New vehicle 2,300 rpm

After 1,000 km 2,700 rpm

3T-C M/T 3,200 rpm

A/T 3,000 rpm

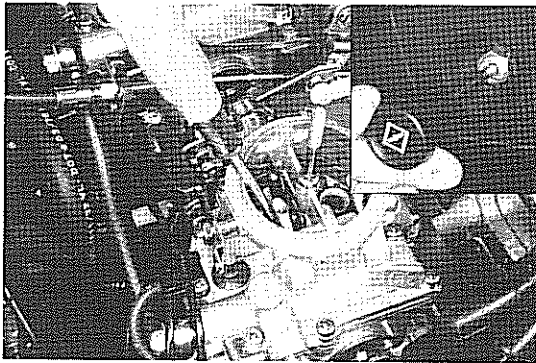
Fig. 2-68



2T-B

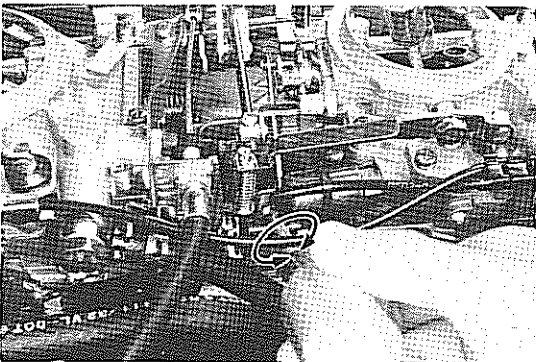
1. Adjust so that both the front and rear carburetor choke valves open at the same time.

Fig. 2-69



2. Stop the engine and open the choke valve.

Fig. 2-70

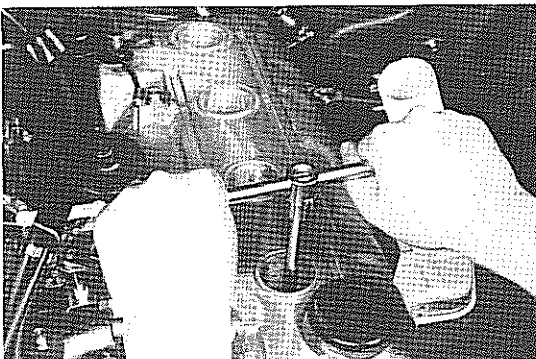


3. Start the engine.
4. To adjust, turn the fast idle adjusting screw.

Fast idle speed:

New vehicle	2,200 rpm
After 1,000 km	2,500 rpm

Fig. 2-71

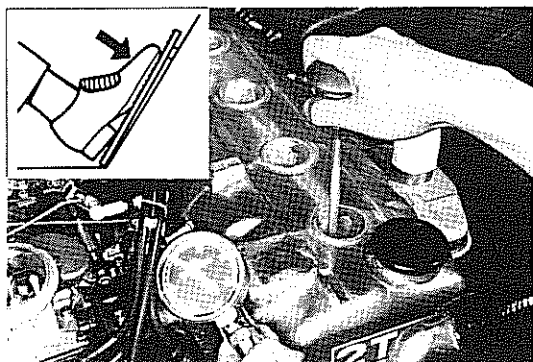


COMPRESSION PRESSURE



1. Warm up the engine.
2. Remove all the spark plugs.
3. Disconnect the high tension cord from the ignition coil to cut off the secondary circuit.

Fig. 2-72



4. Place a compression gauge into the spark plug hole and fully open the throttle valve. While cranking the engine, measure the compression pressure.

Compression pressure (at 250 rpm):

2T, 3T & 3T-C

STD	11.5 kg/cm² (163 psi)
Limit	9.0 kg/cm² (128 psi)

2T-B

STD	12.0 kg/cm² (170 psi)
Limit	10.0 kg/cm² (142 psi)

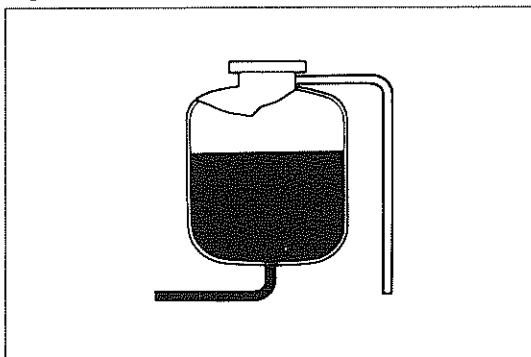
2T-G ENGINE TUNE-UP

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ITEM			REMARK
1	COOLING SYSTEM	Coolant level check	Full line
		Quality check	
		Coolant capacity (w/heater)	8.7 liters 9.2 US qt 7.7 Imp. qt
2	DRIVE BELT	Tension Fan – Alternator	
		New	6 – 8 mm 0.2 – 0.3 in.
		Used	8 – 12 mm 0.3 – 0.5 in.
		A/C Compressor—	
		Crankshaft	11 – 14 mm 0.4 – 0.6 in.
3	AIR CLEANER	Element cleaning	
4	BATTERY	Specific gravity	1.25 – 1.27 at 20°C (68°F)
		Electrolyte level	
5	SPARK PLUG	Visual check	
		Cleaning	
		Plug gap	0.7 – 0.8 mm 0.028 – 0.031 in.
6	HIGH TENSION CORD	Resistance	Less than 25 kΩ per cord
7	DISTRIBUTOR	Distributor cap	
		Rubbing block gap	0.4 – 0.5 mm 0.016 – 0.020 in.
		Damping spring gap	0.1 – 0.4 mm 0.004 – 0.016 in.
8	ENGINE OIL	Oil level check	Full line
		Oil replenishment	API services SE classification
		Oil capacity	
		Dry refill w/Oil filter	4.5 liters 4.8 US qt 4.0 Imp. qt
		Drain & refill w/Oil filter	3.8 liters 4.0 US qt 3.3 Imp. qt
		w/o Oil filter	3.2 liters 3.4 US qt 2.8 Imp. qt
		Quality check	
		Oil filter replacement	SST[09228-44010]
9	DWELL ANGLE		52°
		Variation	within 3° (at idling to 2,000 rpm)
	[COLD CONDITION]		
10	IGNITION TIMING		12° BTDC (Reference)
11	NO.2 CHAIN TENSIONER	Back stroke	0.5 – 1.0 mm at 3 – 5 kg
			0.02 – 0.04 in. at 6.6 – 11.0 lb
12	VALVE TIMING		SST[09248-27010]

ITEM			REMARK
13	VALVE CLEARANCE	IN	0.29 ± 0.05 mm (0.011 ± 0.002 in.)
		EX	0.34 ± 0.05 mm (0.013 ± 0.002 in.)
	WARM UP ENGINE [HOT CONDITION]		
14	IGNITION TIMING	at Engine stop	12° BTDC/1,000 rpm
15	DISTRIBUTOR	Governor advancer	
		Vacuum advancer	
16	CARBURETOR	Float level	SST[09240-27010] or [09240-27020] 20 – 21 mm 0.79 – 0.83 in.
17	ACCELERATION PUMP	Fuel discharging time	1.1 – 1.7 second
		Fuel injection direction	
		Starter wire	50° (at rotary disc)
		Throttle valve full open	
18	IDLE SPEED & IDLE MIXTURE ADJUSTMENT		SST[09240-27010] or [09240-27020]
		Idle speed	$1,000 \pm 50$ rpm
		Manifold vacuum (at Idle speed)	More than 385 mmHg (15.2 in.Hg)
		Front and rear difference (Idle to 2,000 rpm)	Below 10 mmHg (0.4 in.Hg)
		Idle mixture adjusting screw preset position	Screw out 1-1/2 turn
		CO Concentration (at Idle speed)	1.0 – 1.5 %
19	COMPRESSION PRESSURE		
		STD	11.6 kg/cm^2 165 psi
		Limit	10.0 kg/cm^2 142 psi
		Difference between each cylinder	Less than 1.0 kg/cm^2 (14 psi)

Fig. 3-1



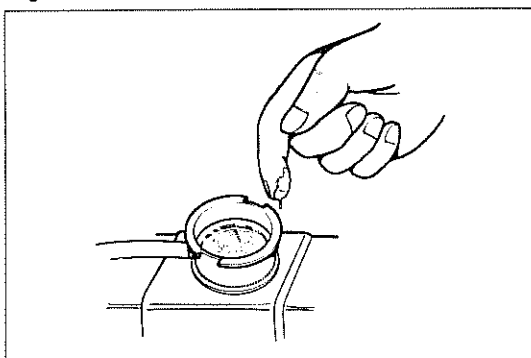
COOLING SYSTEM



COOLANT LEVEL CHECK & REPLENISHMENT

If coolant is low, fill reservoir tank up to Full line.

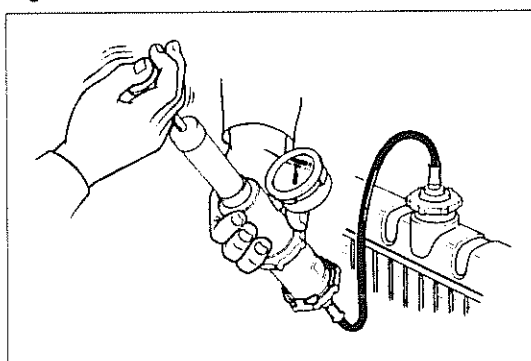
Fig. 3-2



COOLANT QUALITY CHECK

There should not be any excessive deposit of rust or scales around the radiator cap or radiator filler hole, and the coolant should also be free from oil. Replace the coolant if excessively dirty.

Fig. 3-3

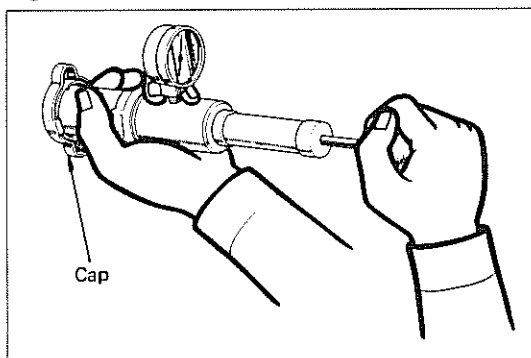


INSPECTION OF COOLING SYSTEM PARTS

There should be no defects such as listed below:

1. Damage, deterioration, or loose clamps in radiator hoses, water hoses.
2. Leakage due to corrosion or damage in radiator core.
3. Leakage due to loose water drain cock.
4. Leakage from water pump.

Fig. 3-4



5. Faulty operation of radiator cap. Inspect the radiator cap pressure regulating and vacuum valves for spring tension and seating condition. If the valve opens at a pressure level below the specified value or is otherwise defective, replace the radiator cap.

Valve opening pressure:

STD	0.9 kg/cm ² (12.8 psi)
Limit	0.6 kg/cm ² (8.5 psi)

Fig. 3-5

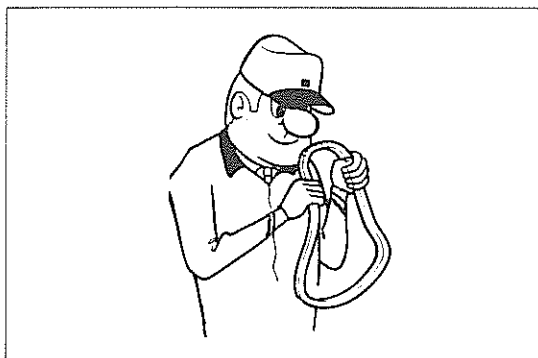


Fig. 3-6

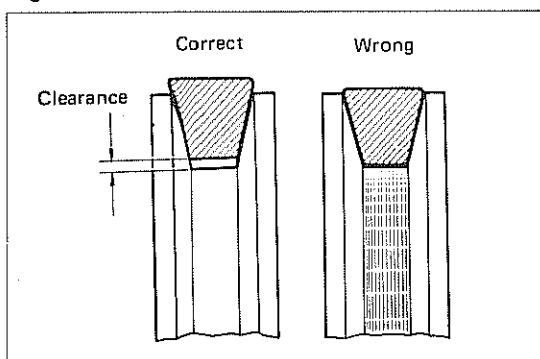


Fig. 3-7

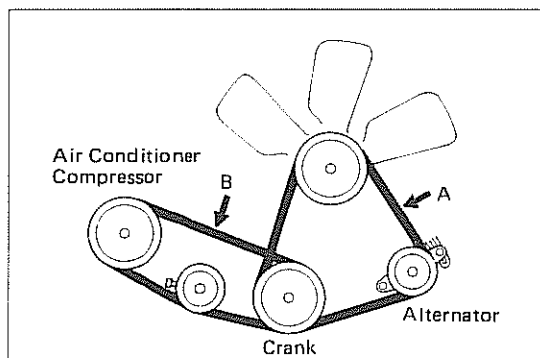
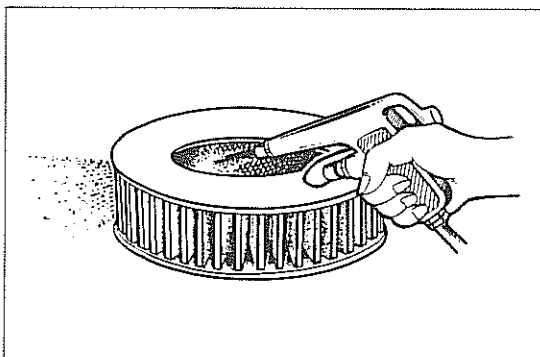


Fig. 3-8



DRIVE BELT

VISUAL CHECK

There should be no defects such as listed below:

1. Cracked, deteriorated, stretched, or worn belt.
2. Adherence of oil or grease.

3. Improper contacting of belt against the pulley.

TENSION CHECK & ADJUSTMENT

When the belt is pressed down with 10 kg (22 lb) force, the belt should deflect the specified amount.

Drive belt tension:

- | | |
|---|-----------------------------------|
| A | New 6 – 8 mm
(0.2 – 0.3 in.) |
| | Used 8 – 12 mm
(0.3 – 0.5 in.) |
| B | 11 – 14 mm
(0.4 – 0.6 in.) |

AIR CLEANER

ELEMENT CLEANING

1. In removing the air cleaner or element, and after removal, use care not to drop dirt and dust down into the carburetor.
2. In cleaning the element, blow air from the inner side.
3. In case the element is torn or excessively dirty, replace with new one.

Fig. 3-9

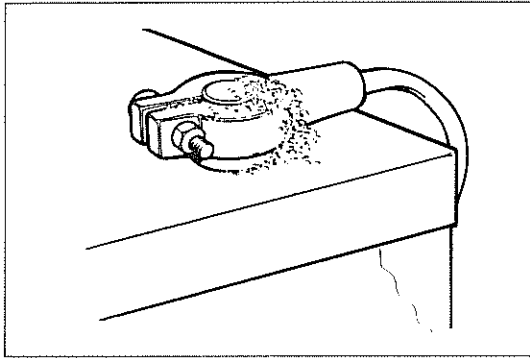


Fig. 3-10

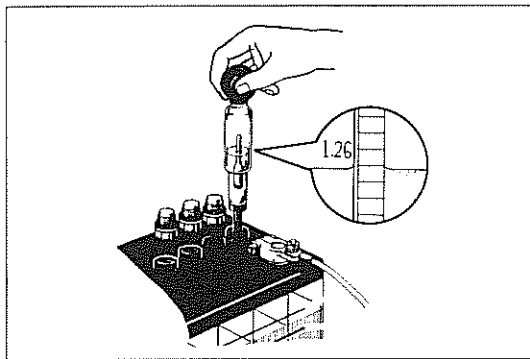


Fig. 3-11

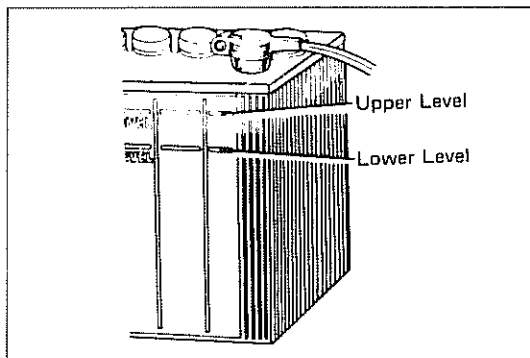
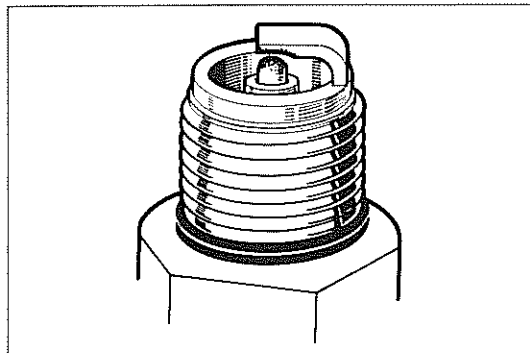


Fig. 3-12



BATTERY



VISUAL CHECK

If very dirty, remove and clean before checking. There should be no defects such as listed below:

1. Rusted battery mounting hardware.
2. Damage or leakage in battery.
3. Loose connection, rusting, deterioration or corrosion of battery terminals.

SPECIFIC GRAVITY MEASUREMENT



Hold the hydrometer so that the float will not contact against the cylinder wall and read the graduation.

Specific gravity: 1.25 – 1.27 at 20°C
(68°F)

ELECTROLYTE LEVEL CHECK & REPLENISHMENT



The electrolyte level should be up to the upper level. If low, add distilled water (or purified water).

SPARK PLUG

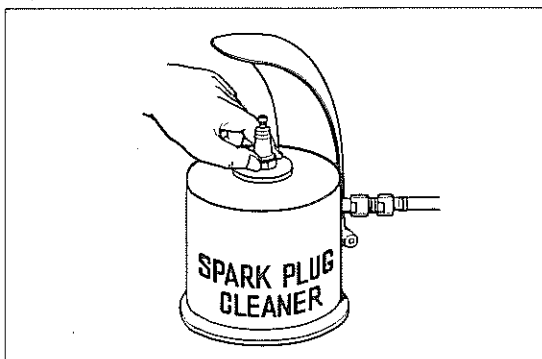


VISUAL CHECK

Condition is good if none of the following defects are present:

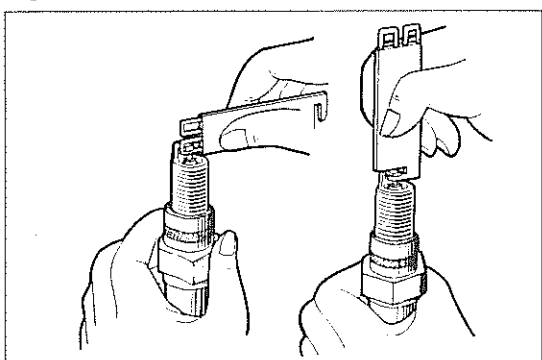
1. Cracks or damages in the threads or insulator.
2. Wear on the electrodes.
3. Damaged or deteriorated gaskets.
4. Burnt condition of electrode and undesirable carbon deposit.

Fig. 3-13

**CLEANING**

1. Do not use spark plug cleaner longer than necessary.
2. Blow off cleaning compound and carbon on the threads thoroughly with air.
3. Clean off dirt from the outer surface of insulator and threads.

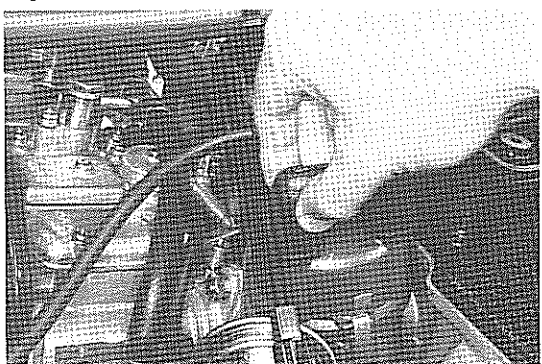
Fig. 3-14

**GAP ADJUSTMENT**

Check the plug gap with plug gap gauge. If not to specified value, adjust by bending the ground (outer) electrode.

Plug gap: 0.7 – 0.8 mm
(0.028 – 0.031 in.)

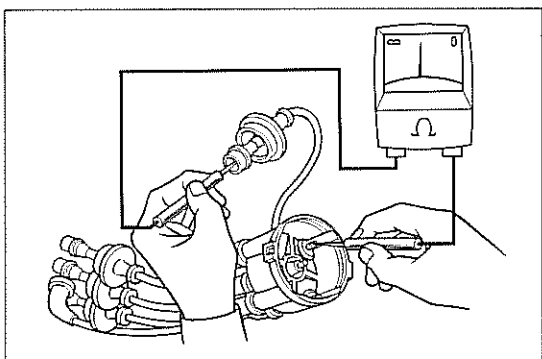
Fig. 3-15

**HIGH TENSION CORD**

— Note —

When pulling out the spark plug cord from the plug, always grip the end of plug cord.

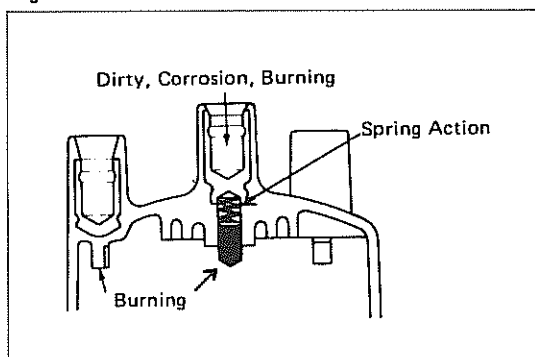
Fig. 3-16



Check the resistance of resistivity cord.

Resistance: Less than 25 k Ω per cord

Fig. 3-17



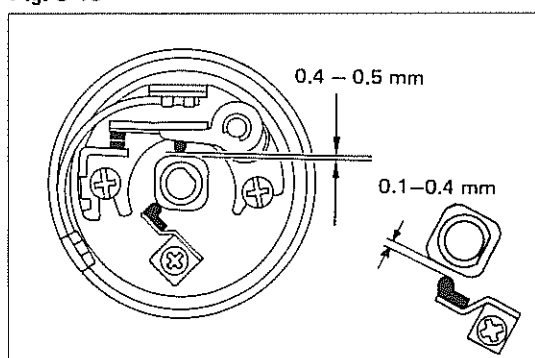
DISTRIBUTOR

CAP INSPECTION

Clean the distributor cap and inspect the cap and rotor for:

1. Cracks, damage, dirty cord hole, corrosion, burning.
2. Center piece spring action.
3. Burnt electrode terminal.

Fig. 3-18



POINT GAP ADJUSTMENT

1. If the points are excessively burnt or pitted, replace the breaker points.
2. Adjust rubbing block gap and damping spring.

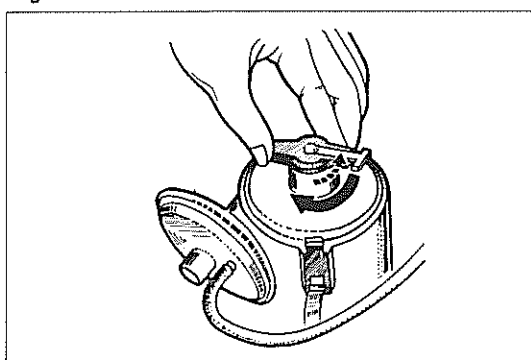
Rubbing block gap:

0.4 - 0.5 mm
(0.016 - 0.020 in.)

Damping spring gap:

0.1 - 0.4 mm
(0.004 - 0.016 in.)

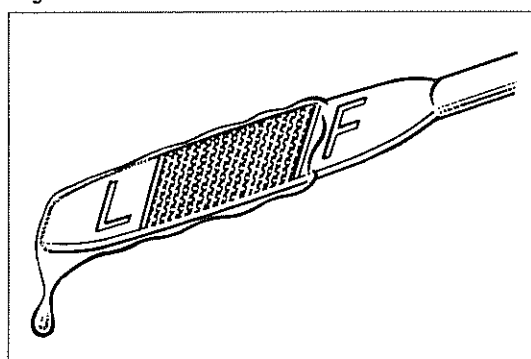
Fig. 3-19



GOVERNOR OPERATIONAL INSPECTION

1. Rotor should return quickly when turned clockwise by hand and released.
2. Rotor should not be excessively loose.

Fig. 3-20



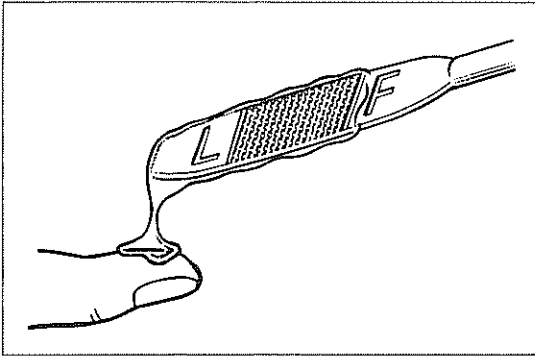
ENGINE OIL

LEVEL CHECK & REPLENISHMENT

Oil level should be up to the F line on the level gauge. If low, add oil up to the F line.

Use API service SE classification engine oil.

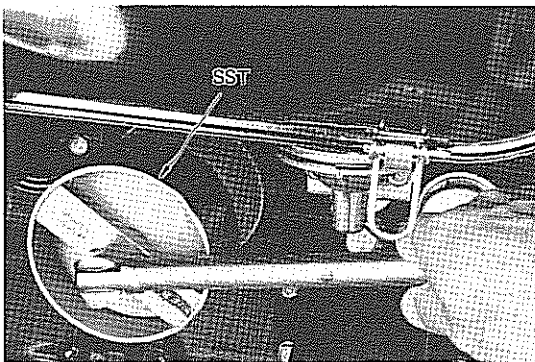
Fig. 3-21



QUALITY CHECK

Pull out the oil level gauge and examine the oil adhering on the graduated part. The oil should not be discolored or thin.

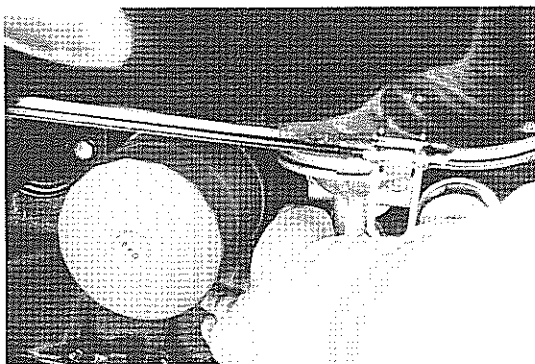
Fig. 3-22



OIL FILTER REPLACEMENT

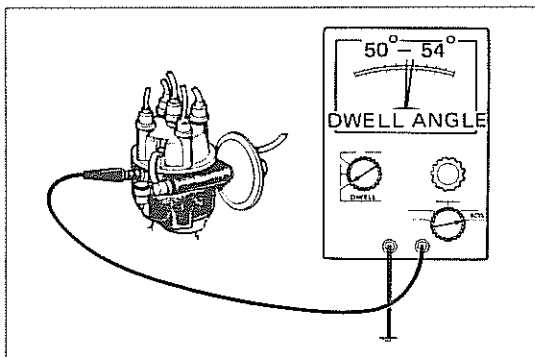
1. Remove the oil filter by using SST.
SST[09228-44010]
2. For installation, tighten firmly the oil filter by hand.

Fig. 3-23



3. After starting the engine, check for oil leak and recheck the oil level.

Fig. 3-24



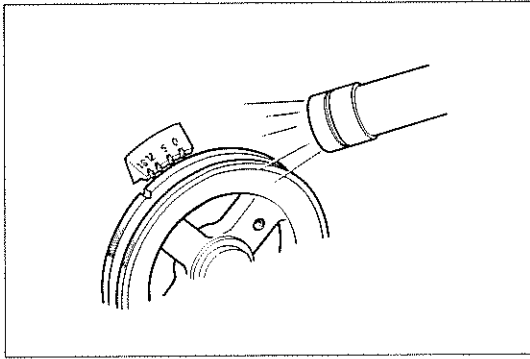
DWELL ANGLE

Check if dwell angle is within the specified value.

Dwell angle: 52°

Variation: Within 3°
(at idling to 2,000 rpm)

Fig. 3-25



[COLD CONDITION] IGNITION TIMING



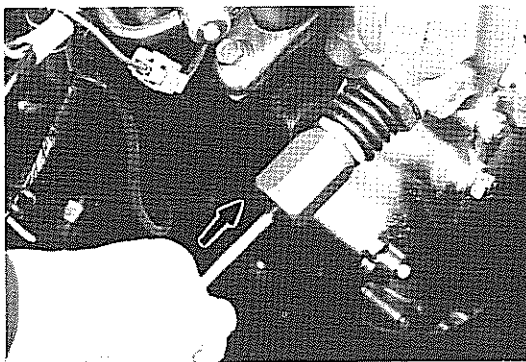
INSPECTION

Set the engine revolution at idle speed, the octane selector must be set at standard position.

Ignition timing:

12° BTDC (Reference)

Fig. 3-26



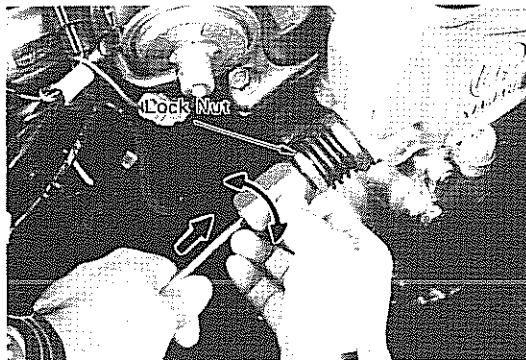
NO.2 CHAIN TENSIONER

CHECK THE BACK STROKE

With a screwdriver, press in the plunger with 3 – 5 kg (6.6 – 11.0 lb) of force and measure the stroke length.

**Back stroke: 0.5 – 1.0 mm
(0.02 – 0.04 in.)**

Fig. 3-27

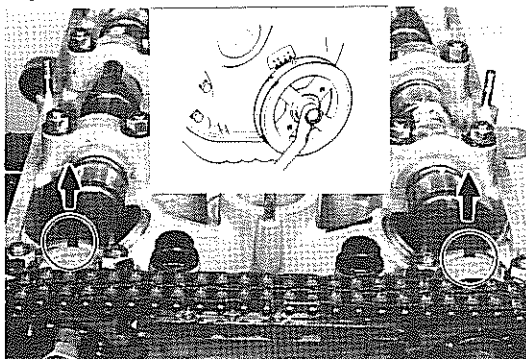


ADJUSTMENT

Adjust the back stroke by the following procedure:

1. Loosen the lock nut.
2. Press in the plunger with 3 – 5 kg (6.6 – 11.0 lb) of force, and screw in the adjust nut until it rests on the plunger.
3. Unscrew the adjust nut 1/3 – 2/3 turns and secure it with the lock nut.
4. Check the stroke again to see that it is within the specified value.

Fig. 3-28

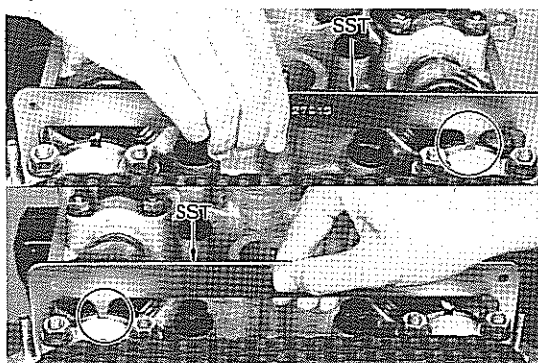


VALVE TIMING

INSPECTION

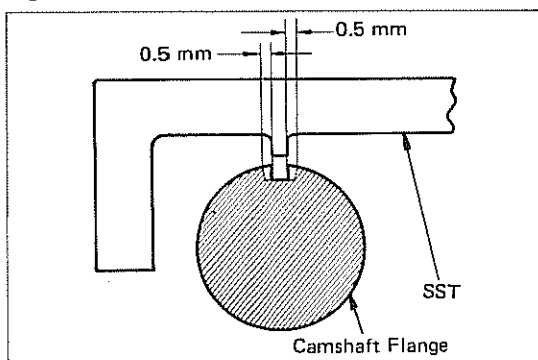
1. Remove the engine cylinder head cover.
2. Set the No.1 cylinder to TDC/compression. In this position, the timing slits in the flange of the camshaft are positioned upward.

Fig. 3-29



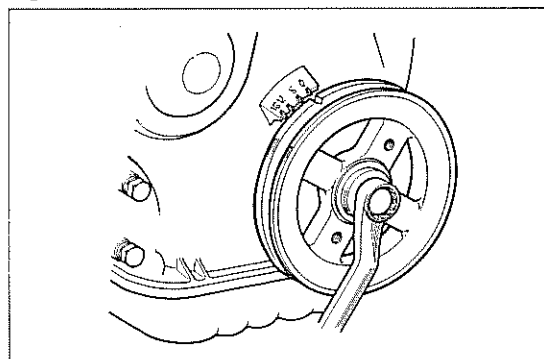
3. Check the positions of camshaft No.1 and No.2 with SST.
SST[09248-27010]

Fig. 3-30



4. Valve timing permissible error: (on the camshaft outer flange):
 $\pm 2^{\circ}$ Camshaft rotation angle
 ± 0.5 mm Camshaft flange outer perimeter.
 (0.02 in.) meter.

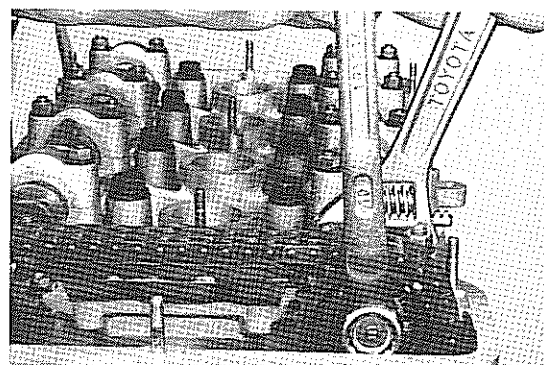
Fig. 3-31



ADJUSTMENT

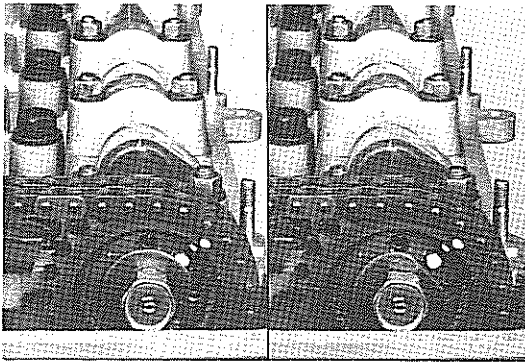
1. Reset No.1 cylinder TDC/compression.

Fig. 3-32



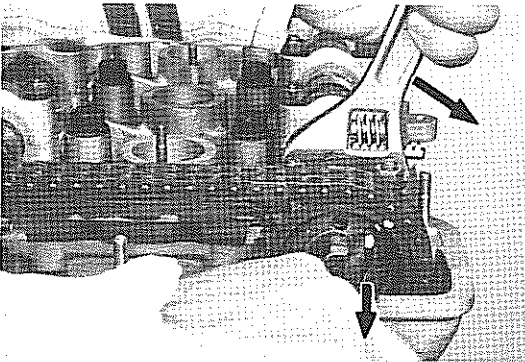
2. Loosen the camshaft mounting bolt.

Fig. 3-33



3. Rotate the washer until the pin head is completely exposed.

Fig. 3-34

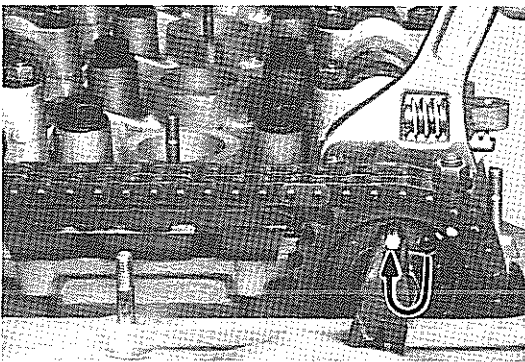


4. Pull out the pin.

— Note —

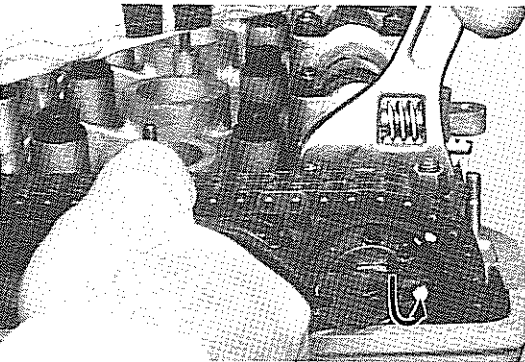
This will be easier if the camshaft is turned slightly forward to provide some play.

Fig. 3-35



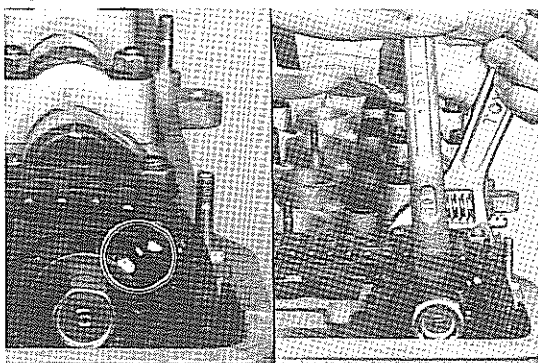
5. When valve timing is advanced,
 - (1) Align with the pin hole in counter-clockwise direction.
 - (2) Turn the camshaft so that the slit is aligned with the adjust gauge and insert the pin.

Fig. 3-36



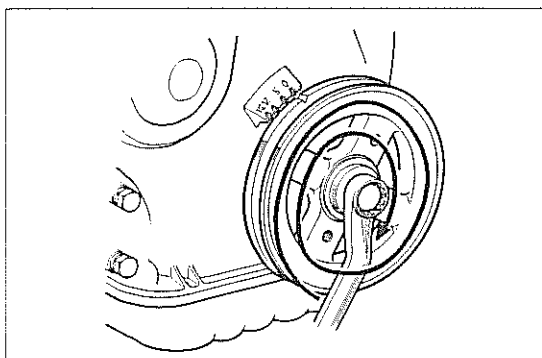
6. When valve timing is retarded,
 - (1) Align the pin hole in the clockwise direction.
 - (2) Turn the camshaft so that the slit is aligned with the adjust gauge and insert the pin.

Fig. 3-37



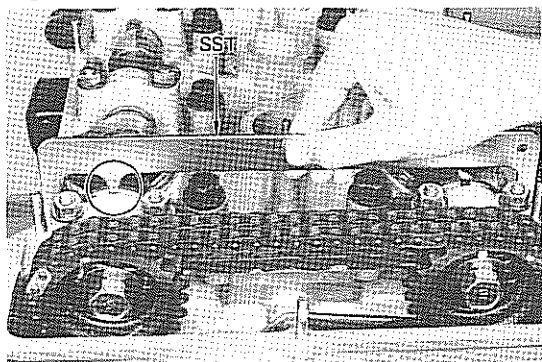
7. Support the pin with the washer and temporarily tighten the camshaft mounting bolt.

Fig. 3-38



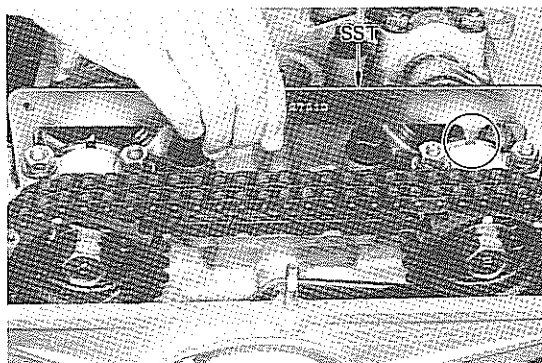
8. Rotate the crankshaft in the clockwise direction until No.1 cylinder is at TDC/compression.

Fig. 3-39



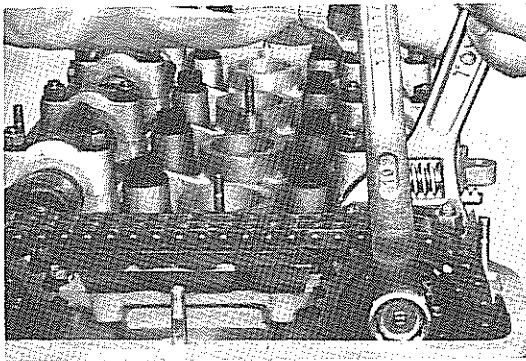
9. Recheck the No.1 camshaft valve timing. The camshaft and SST protrusion should line up.
SST [09248-27010]

Fig. 3-40



10. Recheck the No.2 camshaft valve timing. The camshaft slit and SST protrusion should line up.
SST [09248-27010]

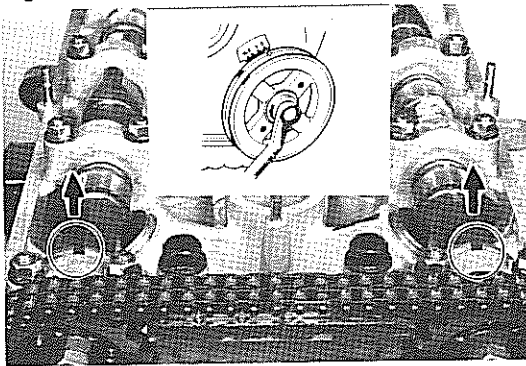
Fig. 3-41



11. Hold the camshaft with a wrench and tighten the camshaft mounting bolt.

**Tightening torque: 7.0 – 8.0 kg-m
(51 – 57 ft-lb)**

Fig. 3-42



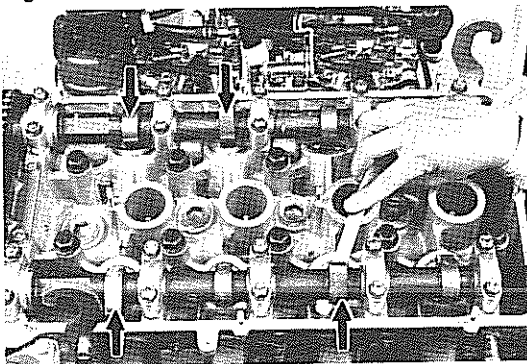
VALVE CLEARANCE



INSPECTION

1. Set the No.1 cylinder to TDC/compression. In this position, the timing check slits in the camshaft flange are facing upward.

Fig. 3-43



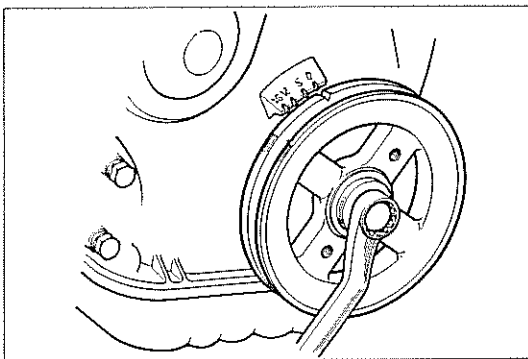
2. Measure and keep a record of the clearances of only the valves indicated by arrows in the figure. (indicated by arrows in the figure)

Valve clearance:

IN 0.29 ± 0.05 mm
(0.011 ± 0.002 in.)

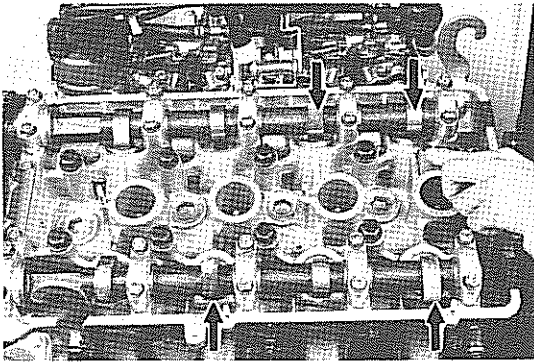
EX 0.34 ± 0.05 mm
(0.013 ± 0.002 in.)

Fig. 3-44



3. Turn the crankshaft 360° forward to No.4 cylinder is TDC/compression.

Fig. 3-45



4. Check the remaining valve clearances of the remaining valves (indicated by arrows in the figure).

Fig. 3-46

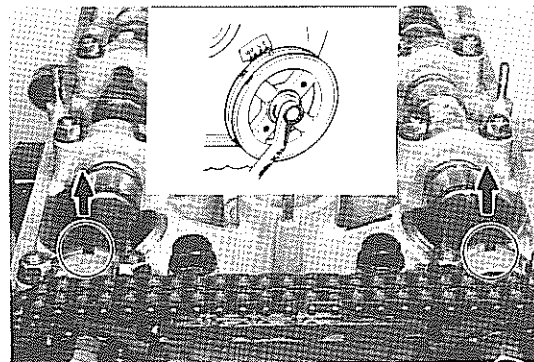


ADJUSTMENT

Adjust the clearance of any valve not within specification.

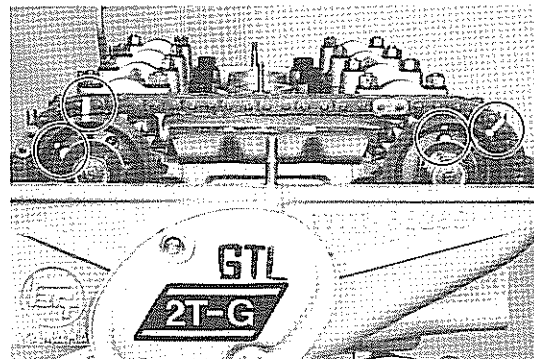
1. Remove the No.2 chain tensioner.

Fig. 3-47



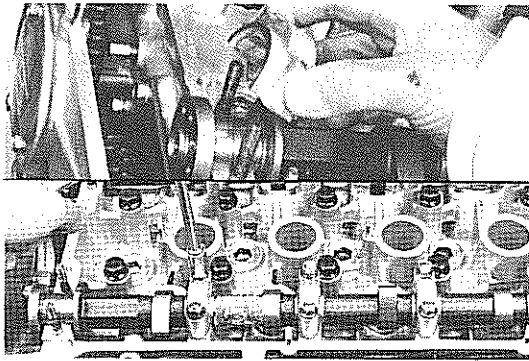
2. Set No.1 cylinder to TDC/compression.

Fig. 3-48



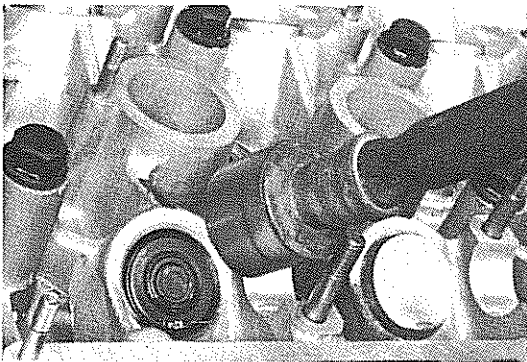
3. Place aligning marks between No.2 chain and gears and between the respective gears and pin holes for correct reassembly.
4. Remove parts as follows.
 - (1) No.2 chain damper.
 - (2) Camshaft timing gear.

Fig. 3-49



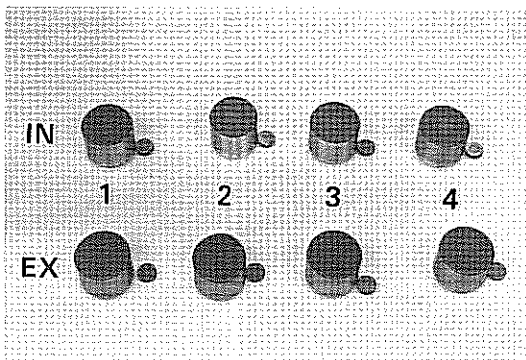
- (3) Camshaft No.1 bearing cap.
- (4) Gradually loosen No.2 to No.5 bearing cap nuts in 2 to 3 stages.
- (5) Camshaft.

Fig. 3-50



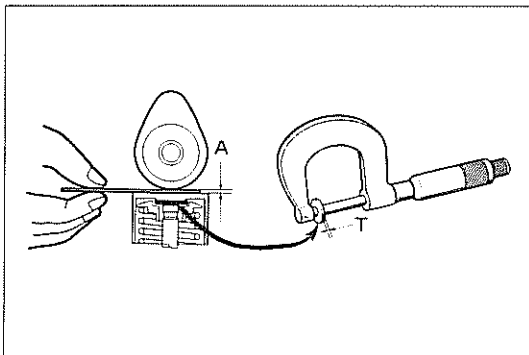
- 5. Remove valve lifter when valve clearance is not within specified valve.

Fig. 3-51



- 6. Keep the valves and adjusting pads in order.

Fig. 3-52



- 7. Select a new pad that will give the specified valve clearance as follows.
 - (1) Measure the pad that was off with a micrometer.

- (2) Calculate thickness of new pad so valve clearance comes within specified valve.

T Thickness of pad used

A Valve clearance measured

Intake side

New pad thickness

$$= T + (A - 0.29 \text{ mm})$$

(0.011 in.)

Exhaust side

New pad thickness

$$= T + (A - 0.34 \text{ mm})$$

(0.013 in.)

- (3) Select a pad with a thickness as close as possible to the valve calculated. Pads are available in 41 sizes, in increments of 0.05 mm (0.002 in.), from 1.00 mm (0.039 in.) to 3.00 mm (0.118 in.).

Fig. 3-53

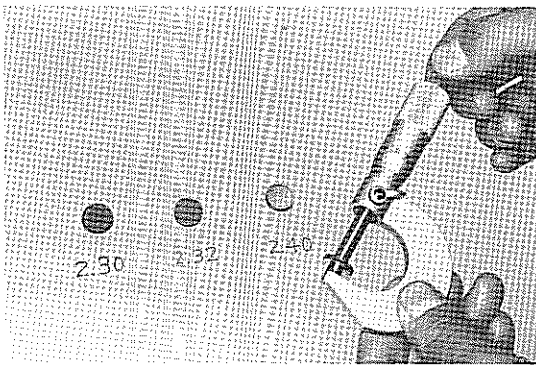
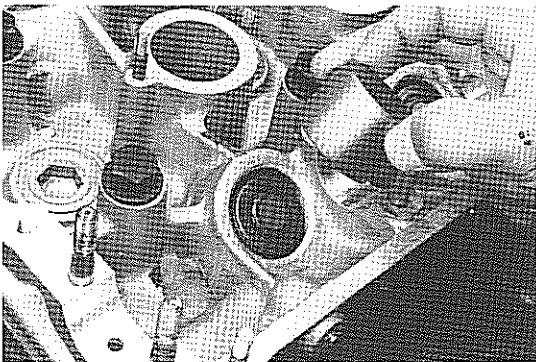
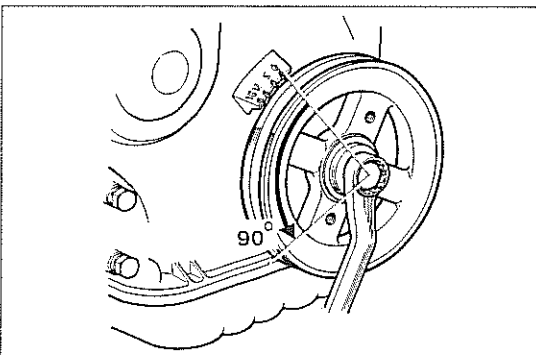


Fig. 3-54



8. Install the pad and valve lifter.

Fig. 3-55



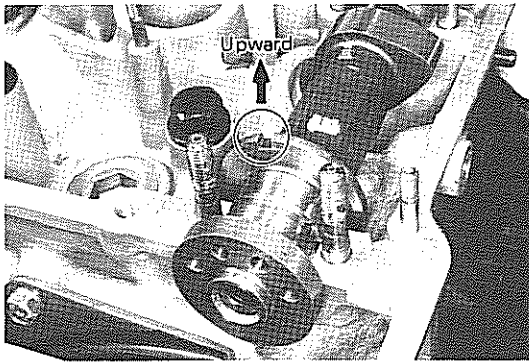
9. Install the camshaft.

- (1) Rotate the crankshaft about 90° the reverse direction.

– Caution –

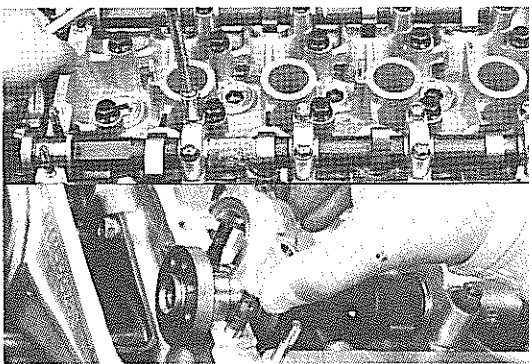
Lower piston to prevent interference of piston head and valve.

Fig. 3-56



- (2) Position slit of camshaft upward as shown in the figure.

Fig. 3-57

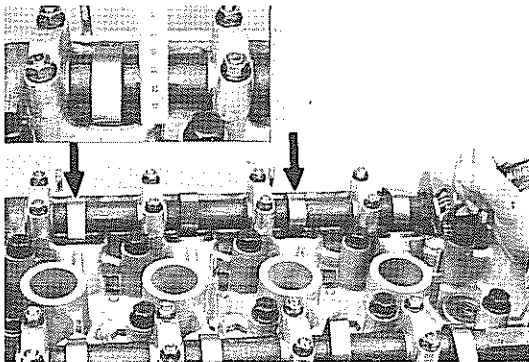


- (3) Install the No.2 to No.5 camshaft bearing caps.
Face the arrow mark toward front.
(4) Gradually tighten bearing cap nuts in 3 to 4 stages.
(5) Then tighten No.1 bearing cap.

Tightening torque:

**1.2 – 1.8 kg-m
(9 – 13 ft-lb)**

Fig. 3-58

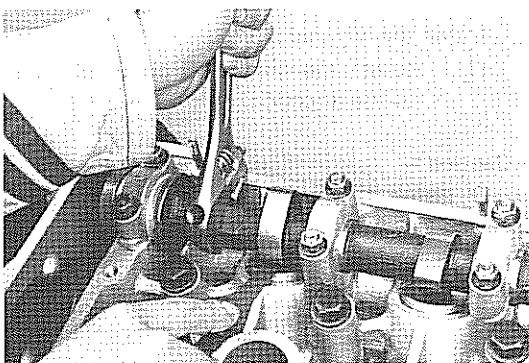


10. Recheck intake side valve clearance.

- (1) Exhaust side valve lifter No.2 and No.4 should protrude the same amount.

**Approx. 1.6 mm
(0.06 in.)**

Fig. 3-59



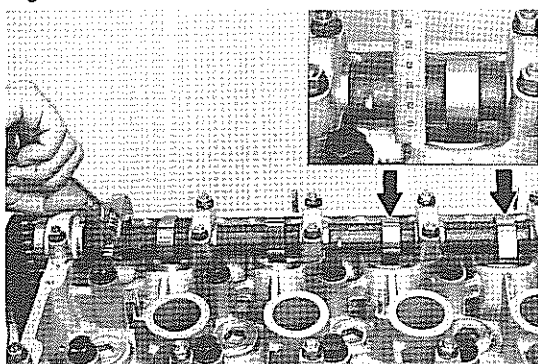
- (2) Measure intake side valve clearance.
If outside the specified valve, choose another pad.

Valve clearance:

**IN 0.29 ± 0.05 mm
(0.011 ± 0.002 in.)**

**EX 0.34 ± 0.05 mm
(0.013 ± 0.002 in.)**

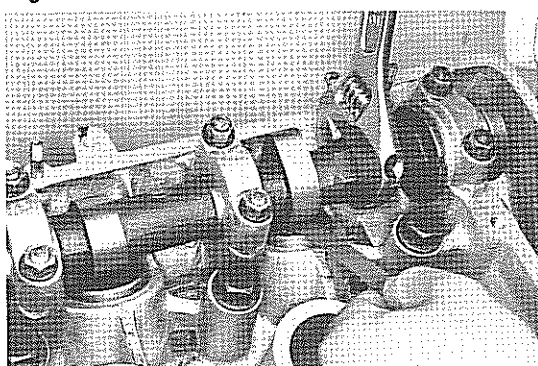
Fig. 3-60



11. Recheck exhaust side valve clearance.
- (1) Intake side valve lifter No.3 and No.4 should protrude the same amount.

**Approx. 1.6 mm
(0.06 in.)**

Fig. 3-61



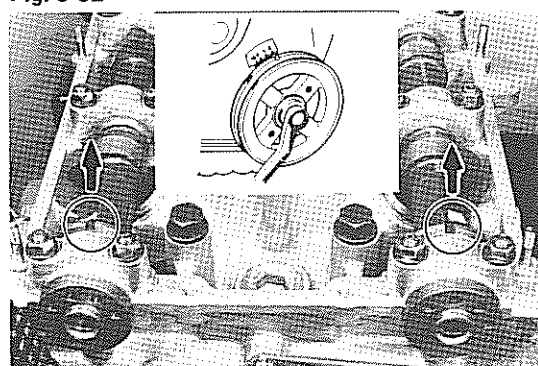
- (2) Measure exhaust side valve clearance. If outside the specified value, choose another pad.

Valve clearance:

IN 0.29 ± 0.05 mm
(0.011 ± 0.002 in.)

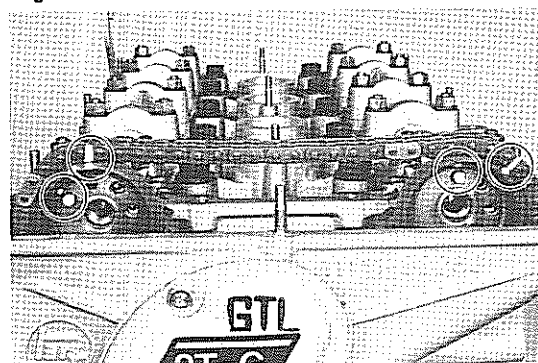
EX 0.34 ± 0.05 mm
(0.013 ± 0.002 in.)

Fig. 3-62



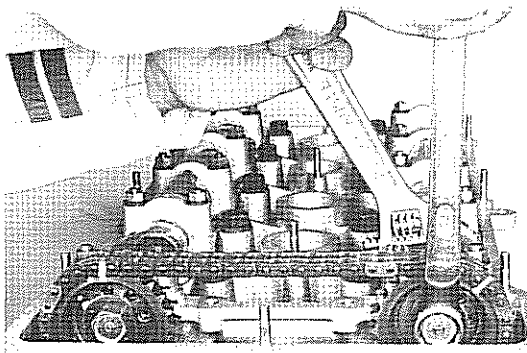
12. Install the No.2 chain and camshaft gears.
- (1) Position the No.1 and No.2 camshaft slit vertically upward with SST.
SST [09248-27010]
- (2) Set the No.1 cylinder to TDC/compression.

Fig. 3-63



- (3) Align the chain and gear with marking made before disassembly.
- (4) Align the camshaft and gear pin hole to position before disassembly and insert pin.
- (5) Hold the pin with the washer.

Fig. 3-64

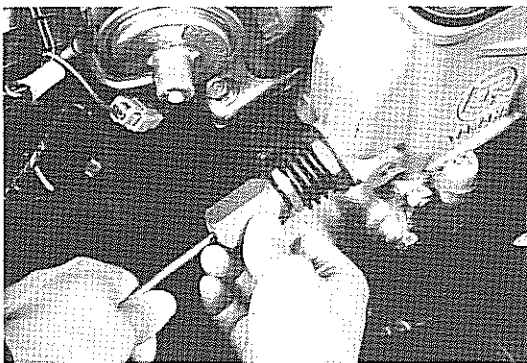


- (6) Turn the crankshaft slightly in normal direction, until there is no slack in the pins, gears, and camshafts, and then tighten the bolts to specified torques.

Tightening torque:

7.0 — 8.0 kg-m
(51 — 57 ft-lb)

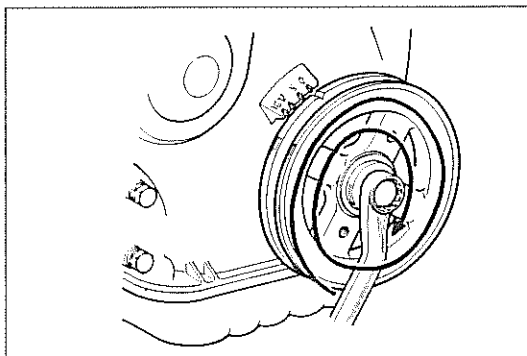
Fig. 3-65



- (7) Adjust the No.2 chain tensioner.

Back stroke: 0.5 — 1.0 mm
(0.02 — 0.04 in.)
at 3 — 5 kg
(6.6 — 11.0 lb)

Fig. 3-66



13. Recheck valve timing.

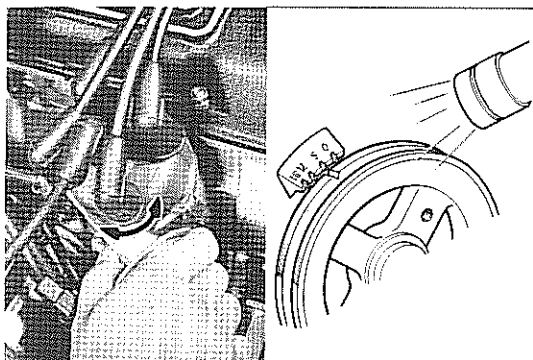
- (1) Rotate the crankshaft two turns in the normal direction until No.1 cylinder is TDC/compression.

Fig. 3-67



- (2) Recheck valve timing with SST.
SST [09248-27010]

Fig. 3-68



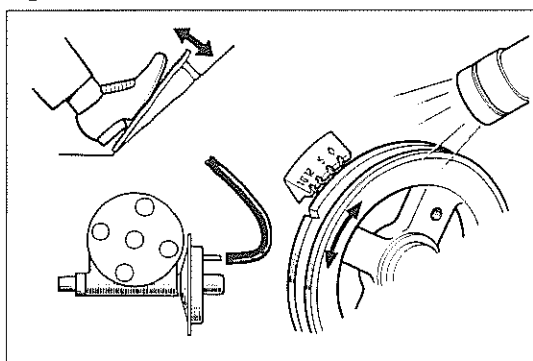
[HOT CONDITION] IGNITION TIMING

INSPECTION

Align the timing marks by turning the distributor body.

Ignition timing:
12° BTDC/1,000 rpm

Fig. 3-69

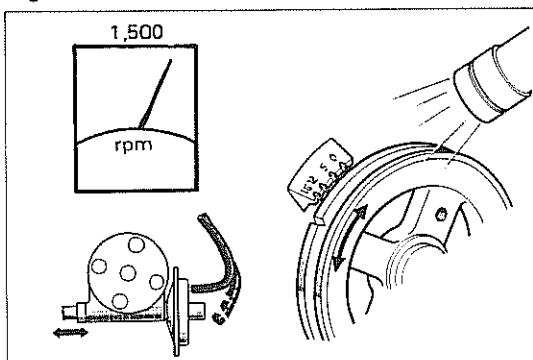


DISTRIBUTOR

GOVERNOR ADVANCER OPERATION

Start the engine and disconnect the vacuum hose from the distributor. The timing mark should vary in accordance with the engine rpm.

Fig. 3-70



VACUUM ADVANCE OPERATION

While running the engine at about 1,500 rpm, disconnect and connect the octane selector hose and insure that the timing mark moves.

CARBURETOR

CARBURETOR ADJUSTMENT PROCEDURES

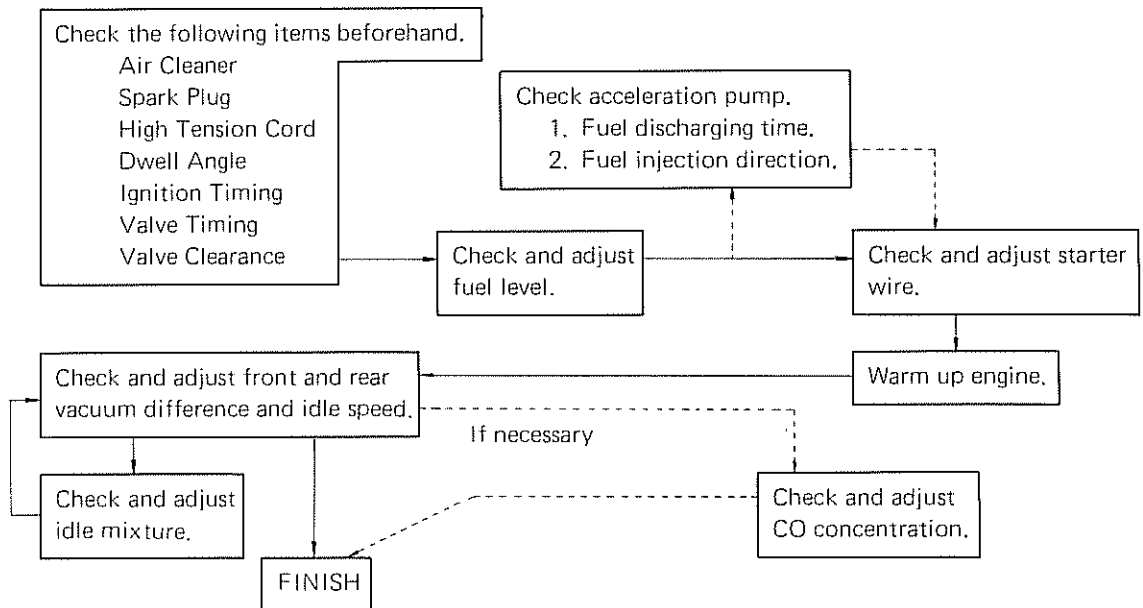
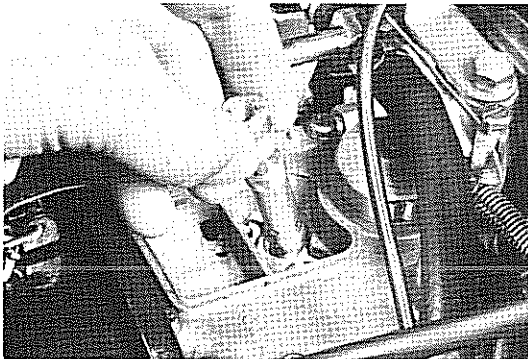


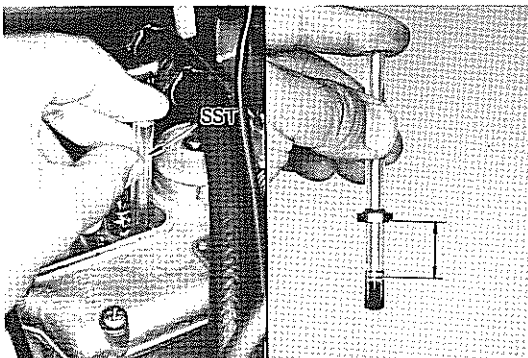
Fig. 3-71



FLOAT LEVEL INSPECTION

1. Start the engine and idle.
About 1,000 rpm
2. Take out one of the main jet holders in assembled form.

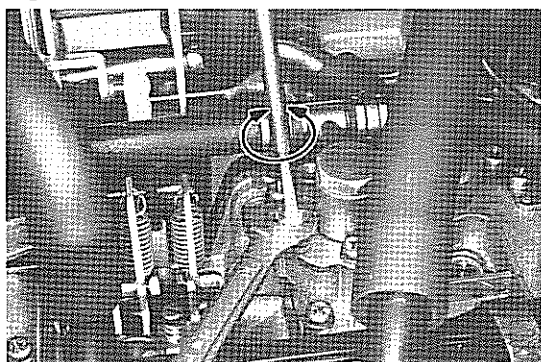
Fig. 3-72



3. Insert SST in the hole from which the main jet holder was removed.
SST [09240-27010] or [09240-27020]
4. Check the gasoline level inside the gauge to see if within the limit.

**Float level: 20 – 21 mm
(0.79 – 0.83 in.)**

Fig. 3-73



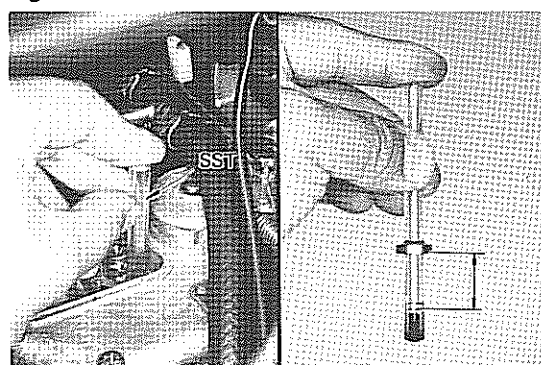
ADJUSTMENT

1. Adjust by turning the float level adjusting screw.

One turn:

Float level change to 1.8 mm
(0.07 in.)

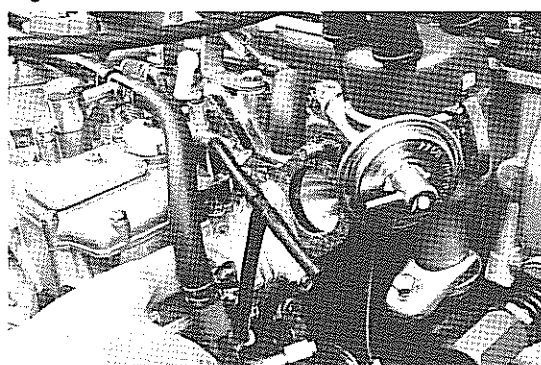
Fig. 3-74



2. Recheck the float level.
Condition where the fuel pump is operating and applying fuel pressure.

Float level: 20 – 21 mm
(0.79 – 0.83 in.)

Fig. 3-75



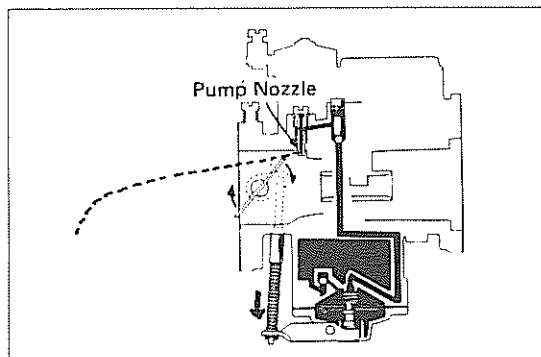
ACCELERATION PUMP



INSPECTION

1. Remove the carburetor.
2. Check the fuel in the float chamber.

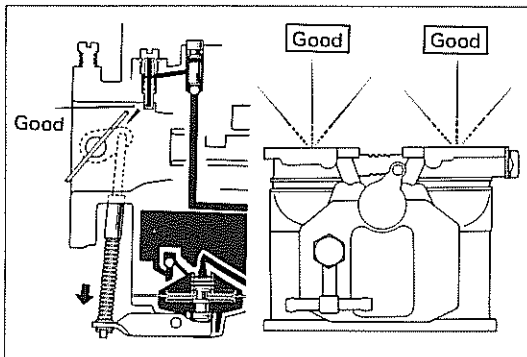
Fig. 3-76



3. Check the fuel discharging time.

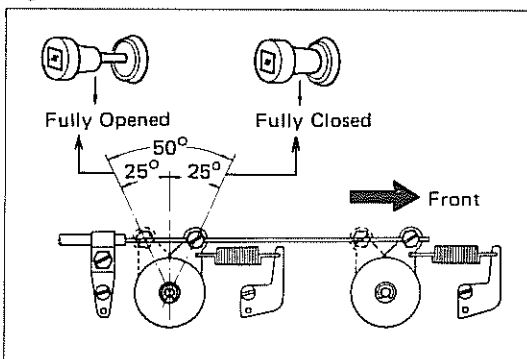
Discharging time: 1.1 – 1.7 second

Fig. 3-77



4. Check the fuel injection direction.

Fig. 3-78



STARTER WIRE

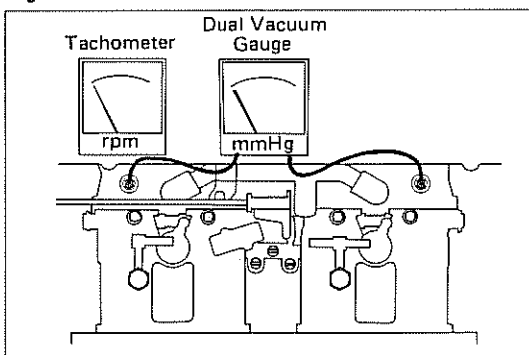
Insure that the carburetor discs are in the fully open position when the starter knob is pulled completely out and fully closed position when it is returned.

IDLE SPEED & IDLE MIXTURE ADJUSTMENT

INSPECTION

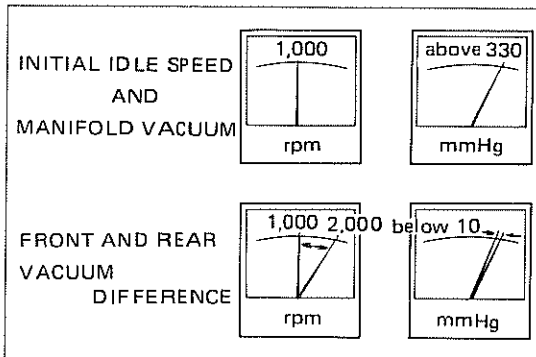
1. The adjusting and measuring conditions should be as follows:
 - (1) Air cleaner installed
 - (2) Normal operating coolant temperature
 - (3) All accessories switched off
 - (4) All vacuum lines connected
 - (5) Transmission in N range
 - (6) Ignition timing set
 - (7) Zero setting of CO meter warmed up

Fig. 3-79



2. Mount the tachometer and the dual vacuum gauge to the vacuum take off connection on the No.1 and No.4 intake manifolds.

Fig. 3-80



3. Check the idle speed and the difference between front and rear manifold vacuum.

Idle speed: $1,000 \pm 50$ rpm

Manifold vacuum:

(at Idle speed)

More than 385 mmHg

(15.2 in.Hg)

Front and rear vacuum difference:

(idle to 2,000 rpm)

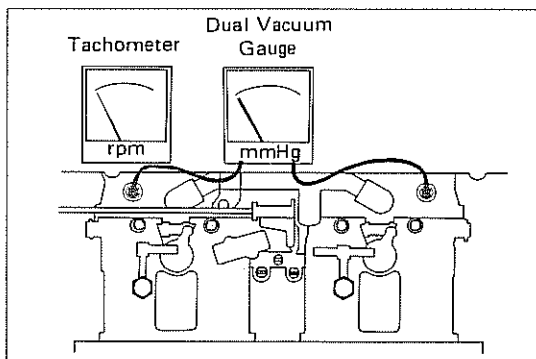
Below 10 mmHg

(0.4 in.Hg)

ADJUSTMENT

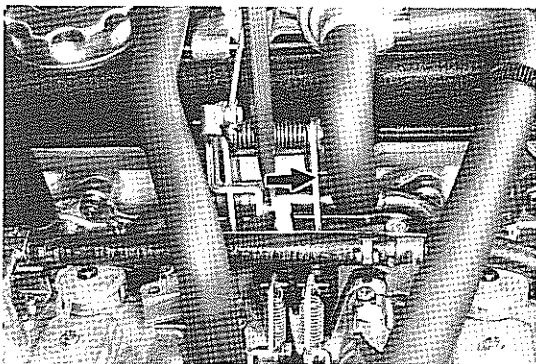
1. The adjusting and measuring conditions should be as follows:
 - (1) Air cleaner installed
 - (2) Normal operating coolant temperature
 - (3) All accessories switched off
 - (4) All vacuum lines connected
 - (5) Transmission in N range
 - (6) Ignition timing set
 - (7) Zero setting of CO meter warmed up

Fig. 3-81



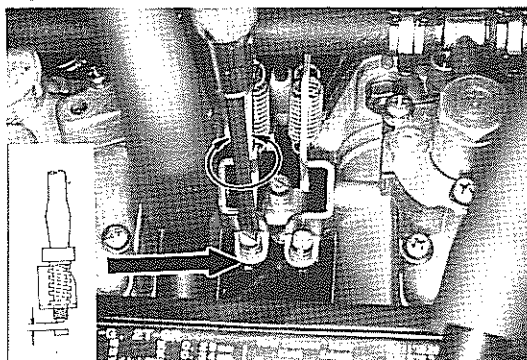
2. Mount the tachometer and the dual vacuum gauge to the vacuum take off connection on the No.1 and No.4 intake manifolds.

Fig. 3-82



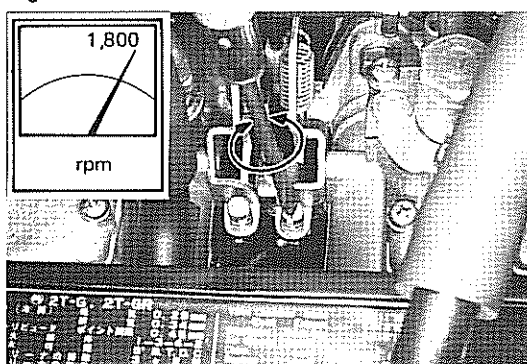
3. Disconnect the connecting rod at the body.

Fig. 3-83



4. Loosen the rear idle speed adjusting screw until it is free from the lever.

Fig. 3-84

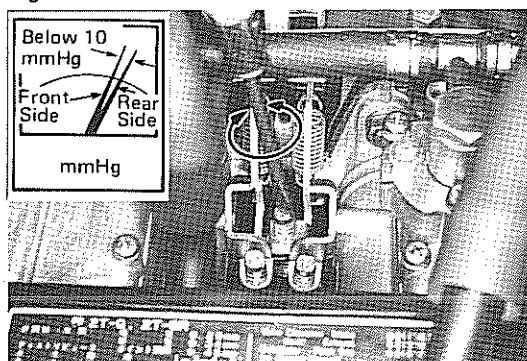


5. Set to 1,800 rpm by turning the front idle speed adjusting screw.

Engine speed: 1,800 rpm

Check the engine speed after raising the engine speed.

Fig. 3-85



6. Set to front and rear vacuum difference to within 10 mmHg (0.4 in.Hg) by turning the synchronizing screw.

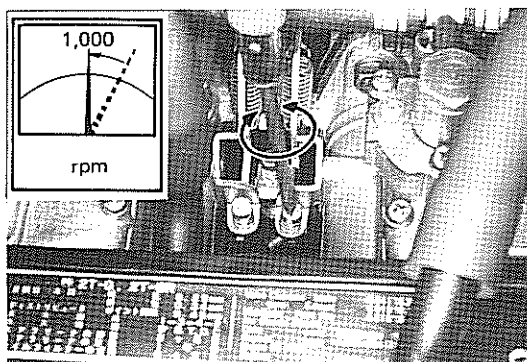
Front and rear vacuum difference:

Below 10 mmHg

(0.4 in.Hg)

Check the vacuum difference after raising the engine speed.

Fig. 3-86

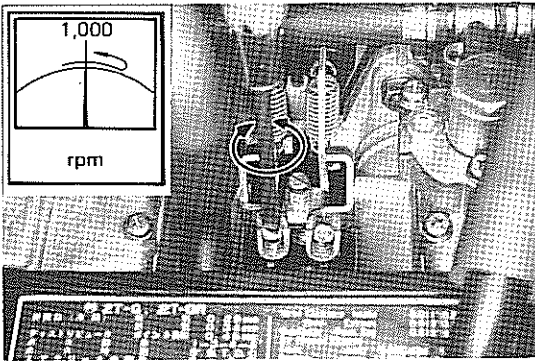


7. Loosen the front idle speed adjusting screw and lower the engine speed to 950 – 1,050 rpm.

Engine speed: 1,000 ± 50 rpm

Check the engine speed after raising the engine speed.

Fig. 3-87



8. Slightly screw in the rear idle speed adjusting screw and raise the engine speed, then adjust the engine speed to 950 — 1,050 rpm.

Engine speed: 1,000 ± 50 rpm

Check the engine speed after raising the engine speed.

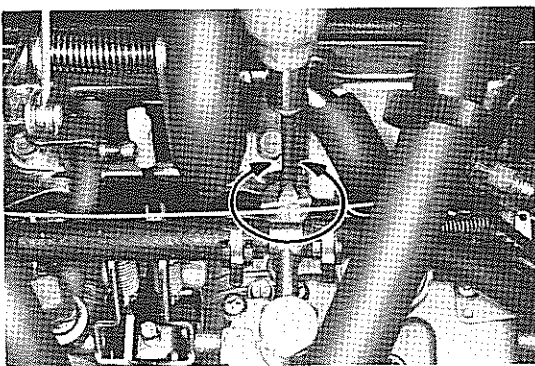
9. Readjust front and rear vacuum difference.

Front and rear vacuum difference:

Below 10 mmHg

(0.4 in.Hg)

Fig. 3-88



10. Adjust the idle mixture adjusting screw with SST.

SST[09243-00010] or

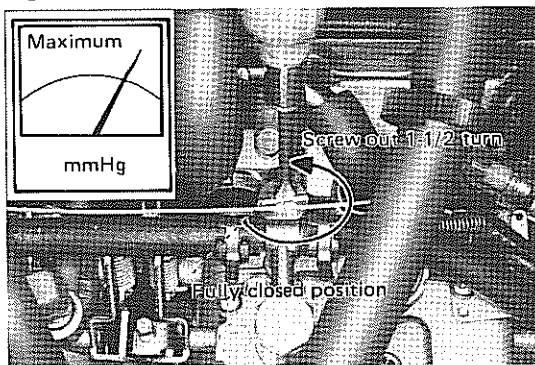
[09243-00020]

Screw out all of the idle mixture adjusting screws 1-1/2 turn from fully closed position.

— Note —

Screw in gently until fully closed, taking care not to damage the carburetor idle port or the screw tapered point.

Fig. 3-89



11. Set to the maximum vacuum reading by turning each idle mixture adjusting screw.

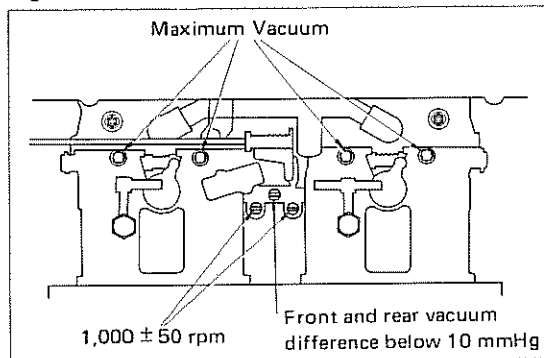
— Caution —

Repeat the adjustment 2 or 3 times to obtain maximum vacuum setting.

Idle speed: 1,000 rpm

**Manifold vacuum: More than 385 mmHg
(15.2 in.Hg)**

Fig. 3-90



12. Readjust the following 2 or 3 times:

(1) Idle speed adjusting screw

Idle speed: 1,000 ± 50 rpm

(2) Synchronizing screw (Idle to 2,000 rpm)

Front and rear vacuum difference:

Below 10 mmHg

(0.4 in.Hg)

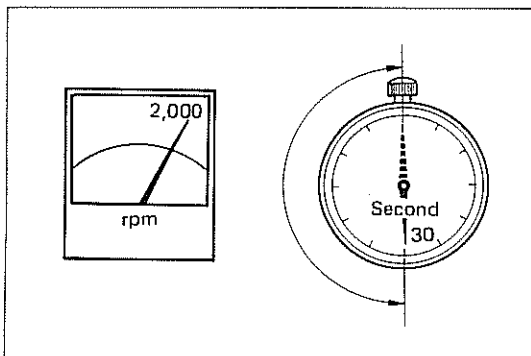
(3) Idle mixture adjusting screw

Manifold vacuum:

More than 385 mmHg

(15.2 in.Hg)

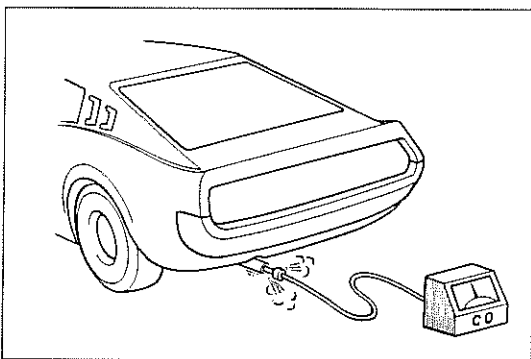
Fig. 3-91



13. Measure the CO concentration.

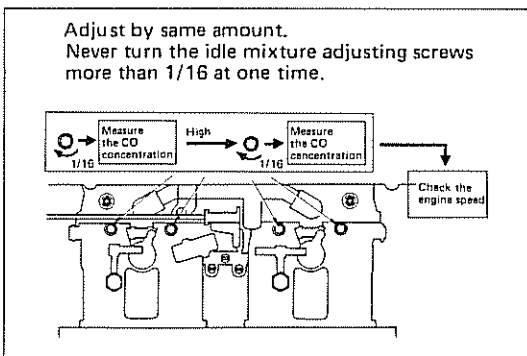
- (1) Before measuring, race the engine at about 2,000 rpm for 30 – 60 seconds.

Fig. 3-92



- (2) To allow the concentration to stabilize, wait one minute after racing the engine but take the measurement within 3 minutes.

Fig. 3-93



14. Adjust the CO concentration.

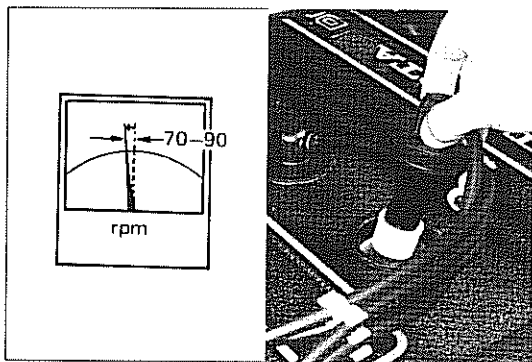
When the concentration is high.

- (1) 4 idle mixture adjusting screws 1/16 turn.
- (2) Measure the CO concentration again.
- (3) If still high, 4 idle mixture adjusting screws another 1/16 turn.
- (4) Check the engine speed.

— Note —

Do not allow rpm to be below idle speed.

Fig. 3-94

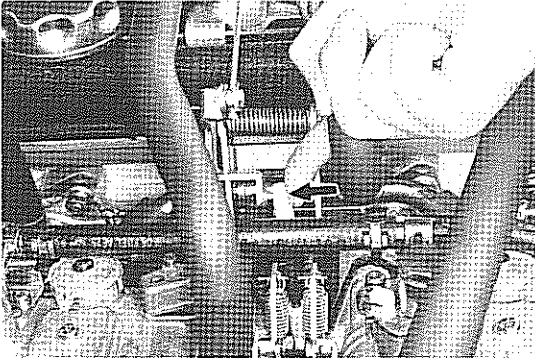


15. Check rpm of each cylinder when if misfires.

Decrease in rpm approximately 70 – 90 rpm. All four cylinders should show same decrease.

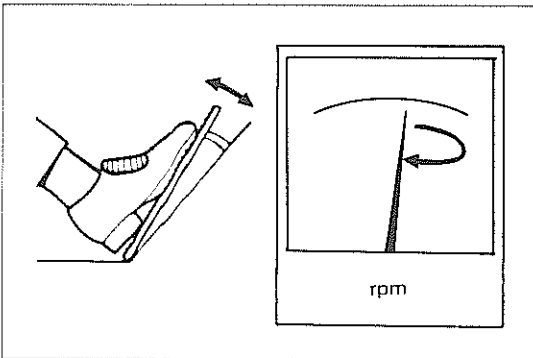
- (1) When one plug misfires, raise rpm and clean.
- (2) When decrease in rpm is not uniform, adjust with the idle mixture adjusting screw.

Fig. 3-95



16. Connect the connecting rod.

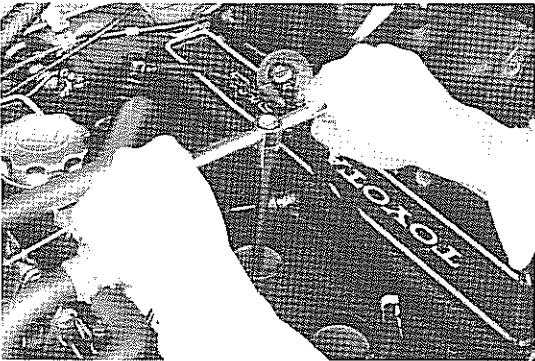
Fig. 3-96



17. Check to see that the engine returns to idle speed when both suddenly and slowly accelerated.

Opening throttle valve gradually should cause the engine to speed up smoothly in relation to amount of the valve opening.

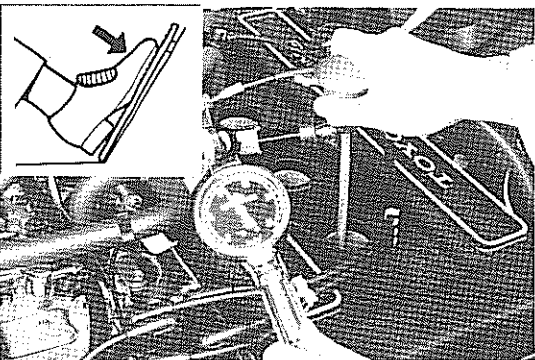
Fig. 3-97



COMPRESSION PRESSURE

1. Warm up the engine.
2. Remove all spark plugs.
3. Disconnect the high tension cord from ignition coil to cutoff the secondary circuit.

Fig. 3-98



4. Insert a compression gauge into the spark plug hole, open the throttle valve fully, and measure the compression pressure while cranking the engine with starter motor.

Compression pressure (at 200 rpm):

STD 11.6 kg/cm²
 (165 psi)

Limit 10.0 kg/cm²
 (142 psi)

Difference between each cylinder:

Less than 1.0 kg/cm²
 (14 psi)

MEMO

2T & 3T ENGINE SERVICE

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CYLINDER HEAD	4-4
TIMING CHAIN	4-22
CYLINDER BLOCK	4-37

CUTAWAY VIEW

Fig. 4-1

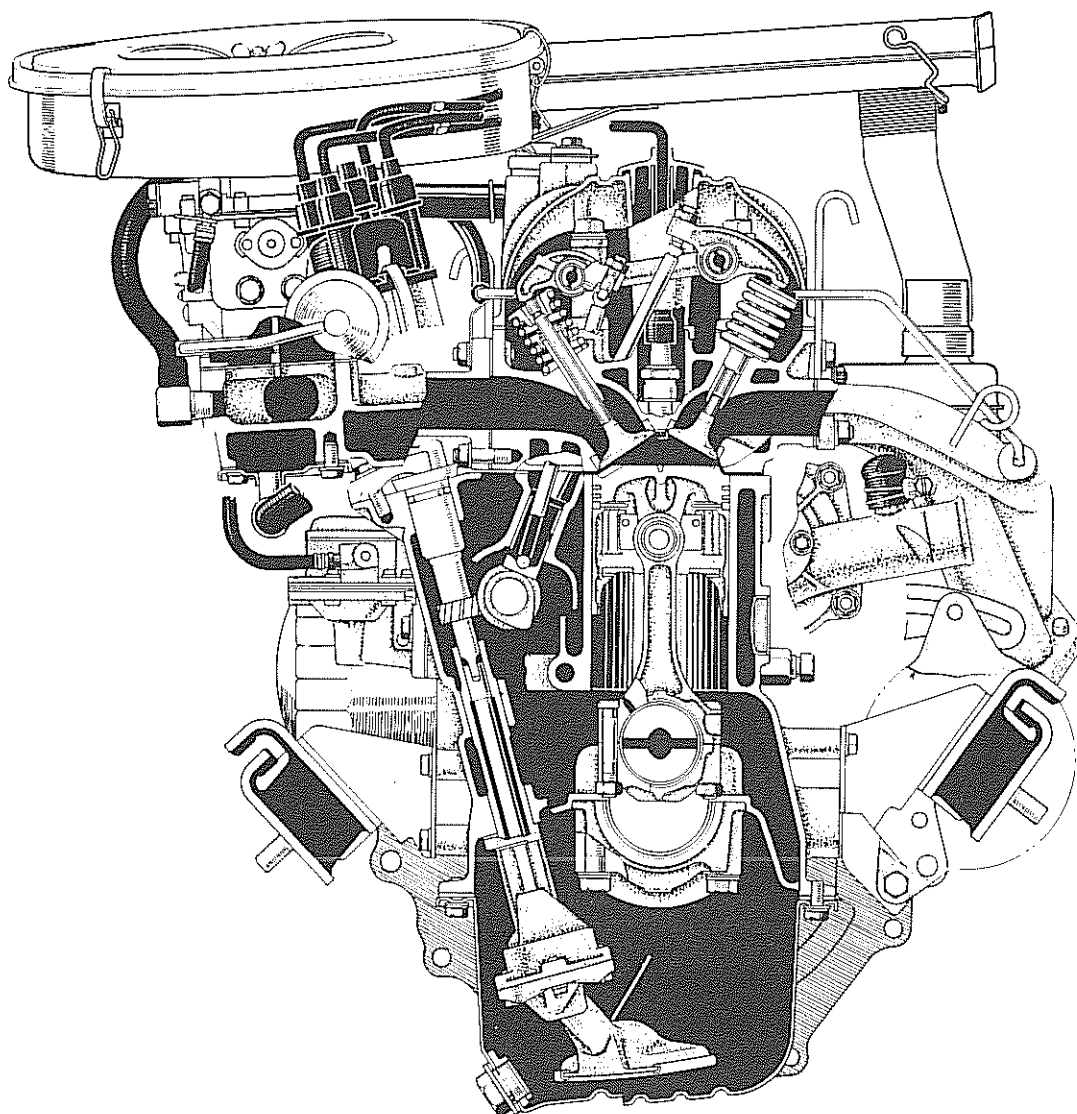
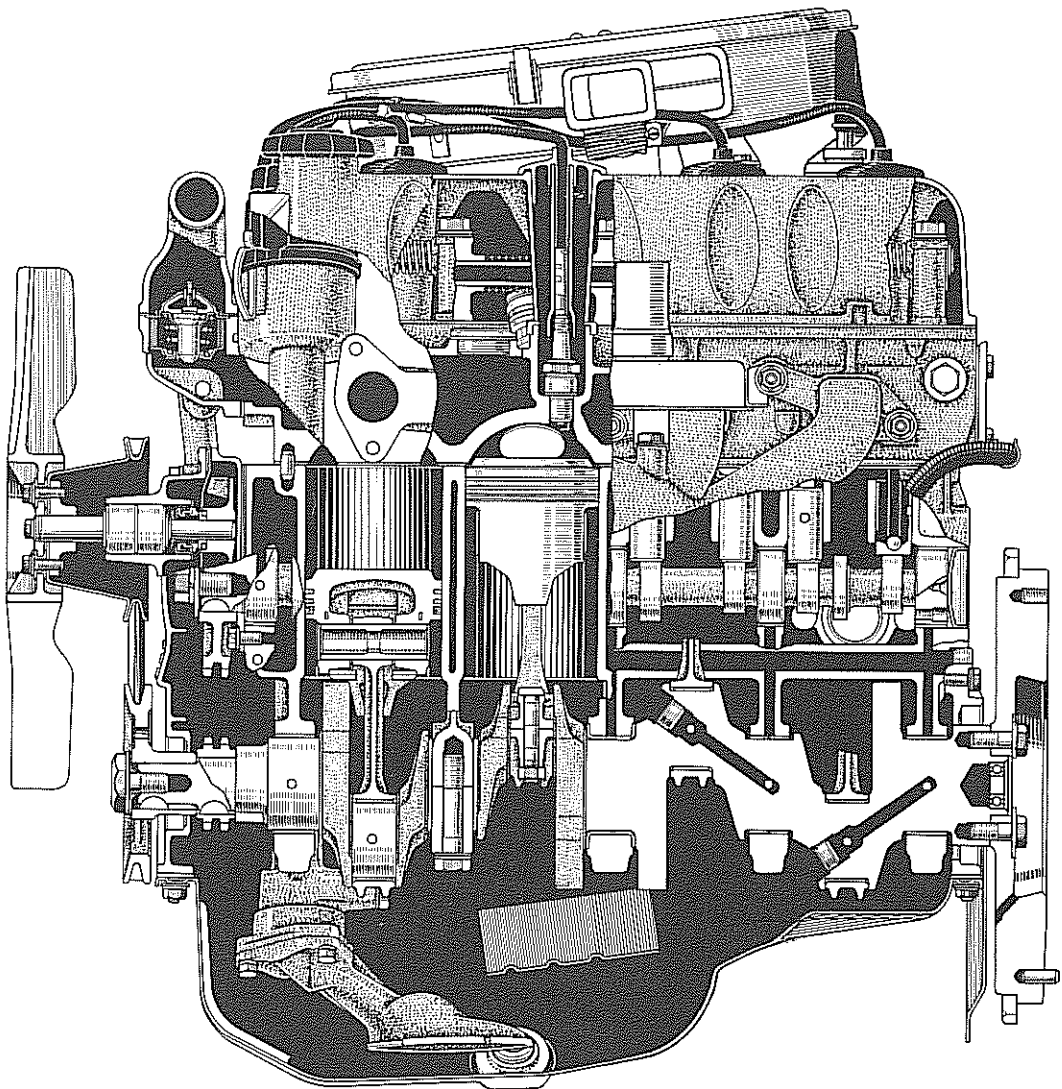


Fig. 4-2



CYLINDER HEAD

DISASSEMBLY

Disassemble the parts in the numerical order shown in the figure.

Fig. 4-3

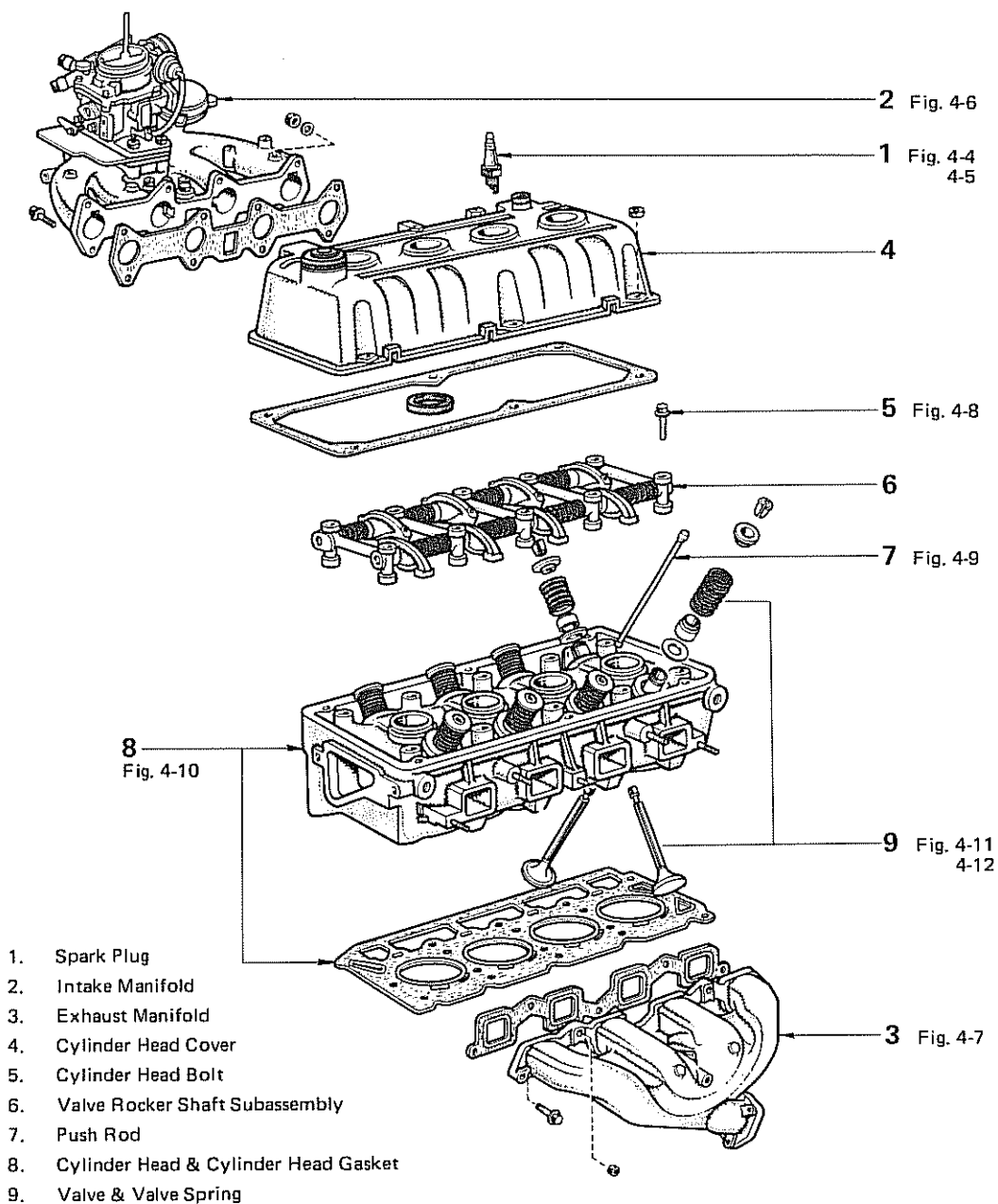
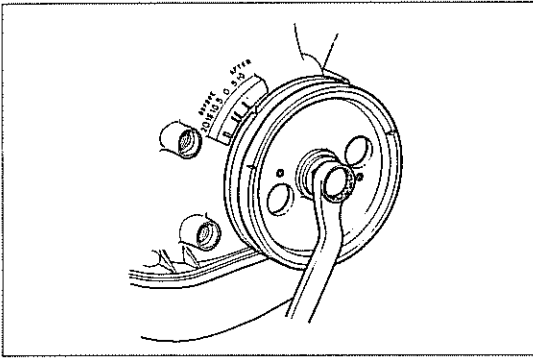
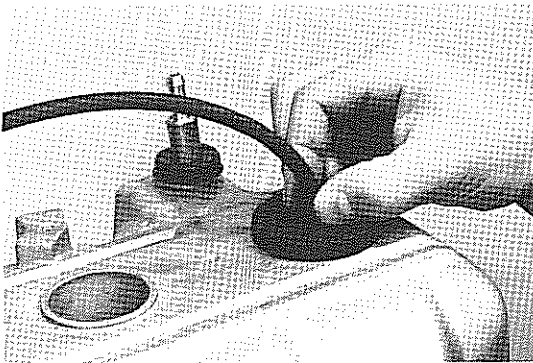


Fig. 4-4



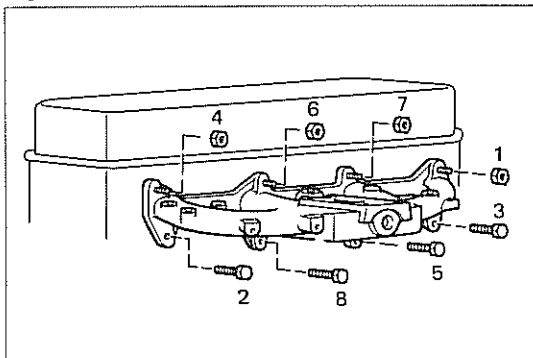
Set the No.1 cylinder to TDC/compression.

Fig. 4-5



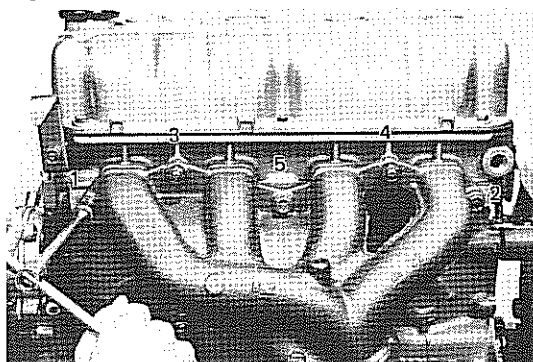
Remove the plug cords by carefully pulling on the rubber boots.

Fig. 4-6



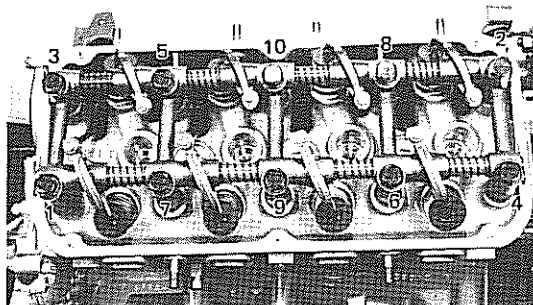
Loosen the each intake manifold bolt and nut a little at a time, and in the sequence shown in the figure.

Fig. 4-7



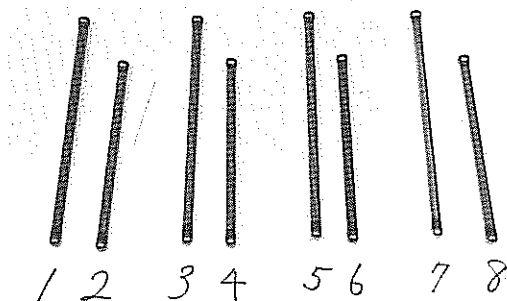
Loosen the each exhaust manifold bolt and nut a little at a time, and in the sequence shown in the figure.

Fig. 4-8



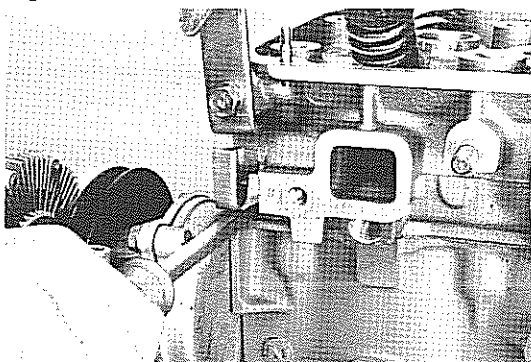
Loosen each cylinder head bolt a little at a time and in the sequence shown in the figure.

Fig. 4-9



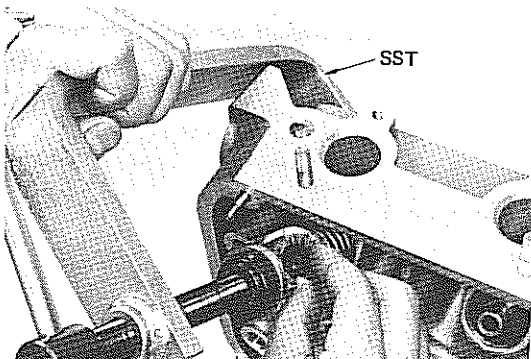
Arrange the push rods in order.

Fig. 4-10



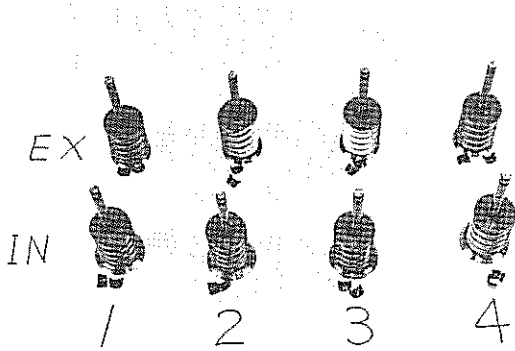
If the cylinder head is difficult to lift off, pry with a screwdriver between the head and block as shown in the figure.

Fig. 4-11



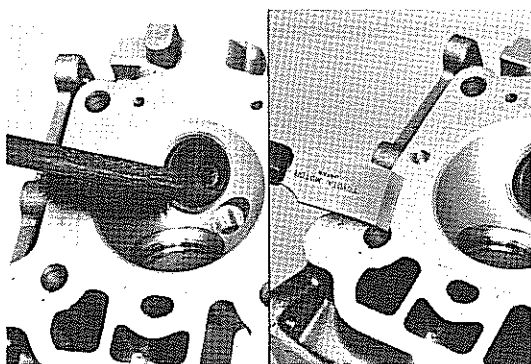
Remove the valve spring with SST.
SST[09202-43012]

Fig. 4-12



Arrange the disassembled parts in order.

Fig. 4-13

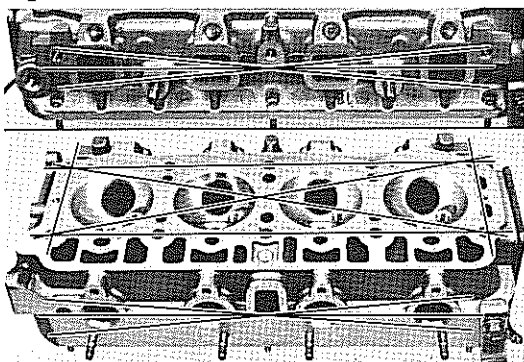


INSPECTION & REPAIR

Cylinder Head

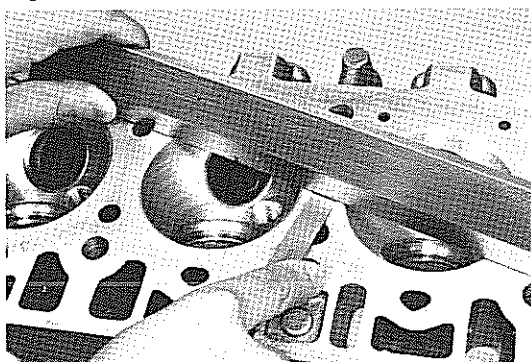
1. Clean the combustion chamber and remove any gasket material from the manifold and head surface.
Check the cylinder head for cracks or excessively burnt valve surfaces.

Fig. 4-14



2. Check the cylinder head surface flatness with a precision straight edge.

Fig. 4-15



3. If warpage exceeds the limit, correct it by machining, or replace the head.

Cylinder head surface warpage:

Limit 0.05 mm
(0.002 in.)

Maximum reface:

Limit 0.2 mm
(0.01 in.)

Manifold mounting surface warpage:

Limit 0.10 mm
(0.004 in.)

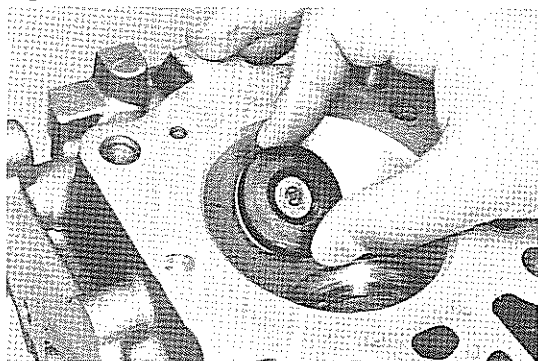
Fig. 4-16



Valve, Guide & Seat

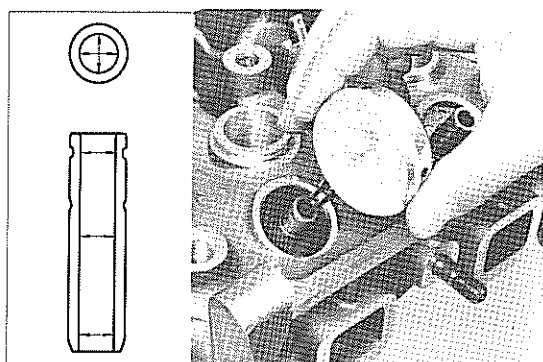
1. Clean the valves.

Fig. 4-17



2. Check the valve stem to valve guide clearance of each valve by inserting the valve stem into the guide and moving back and forth as shown in the figure.

Fig. 4-18



3. Measure the valve stem oil clearance.
 - (1) Measure the inside diameter of the valve guide at several places with an inside dial gauge.
 - (2) Measure the valve stem diameter.
 - (3) Calculate the clearance between the valve stem and valve guide by subtracting the difference where the clearance is the largest.

Stem oil clearance:

Limit	IN	0.08 mm (0.003 in.)
	EX	0.10 mm (0.004 in.)

If the clearance exceeds the limit, replace both valve and guide.



Fig. 4-19

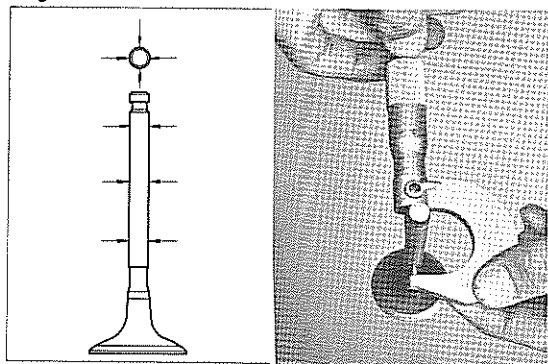
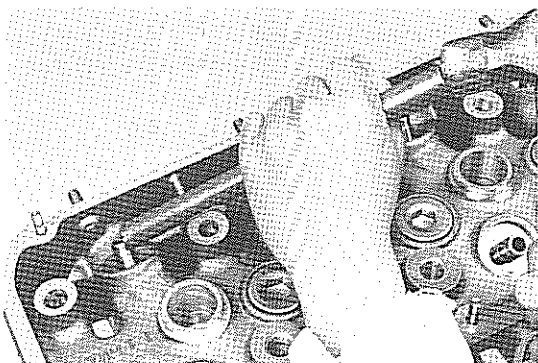


Fig. 4-20

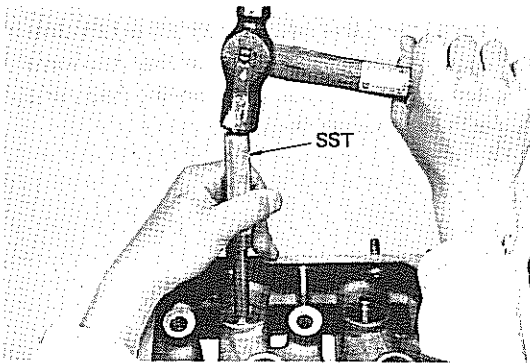


4. Replace the valve guide.
 - (1) Bend the bushing.

—Note —

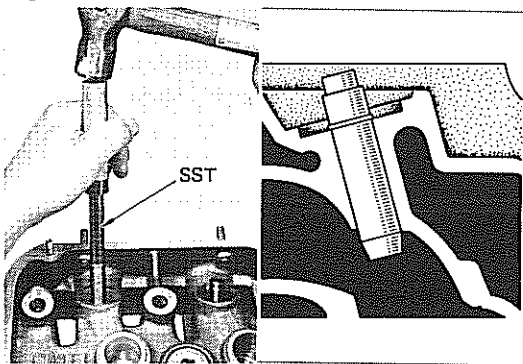
Measure at several places and use the maximum wear for calculation.

Fig. 4-21



- (2) Heat the cylinder head to $80 - 100^{\circ}\text{C}$ ($176 - 212^{\circ}\text{F}$).
- (3) From the top, drive out the guide toward the combustion chamber with SST.
SST[09201-60011]

Fig. 4-22

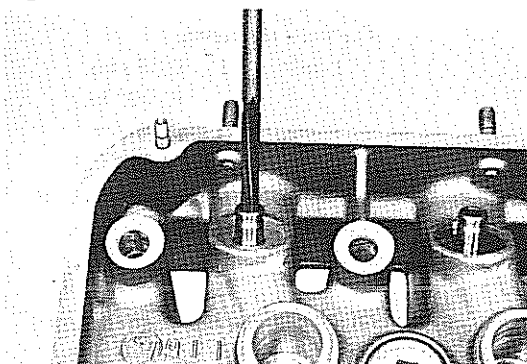


- (4) Heat the cylinder head to $80 - 100^{\circ}\text{C}$ ($176 - 212^{\circ}\text{F}$).
- (5) With SST drive in the guide until the snap ring makes contact.
SST[09201-60011]

— Note —

1. Insure that the hole is clean.
2. Before inserting the guide apply a thin coat of oil to it and the guide hole.

Fig. 4-23



- (6) Ream the guide to the specified clearance with an 8 mm (0.3 in.) reamer.

Stem oil clearance:

IN	0.025 – 0.060 mm (0.0010 – 0.0024 in.)
EX	0.030 – 0.065 mm (0.0012 – 0.0026 in.)

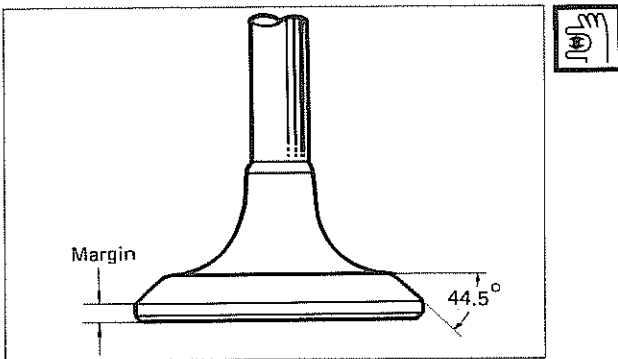
Fig. 4-24



5. Grinding valves and seats
 - (1) Grind all valves to remove the pits and carbon.

Valve face angle: 44.5°

Fig. 4-25

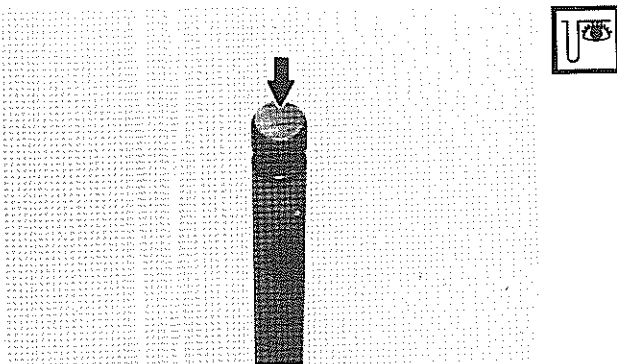


- (2) Check the valve head margin and replace if less than specified.

Head edge thickness:

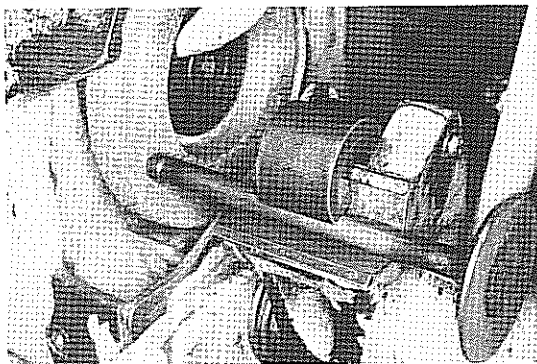
Limit	IN	0.5 mm (0.02 in.)
	EX	0.7 mm (0.03 in.)

Fig. 4-26



- (3) Inspect the valve stem tip.

Fig. 4-27

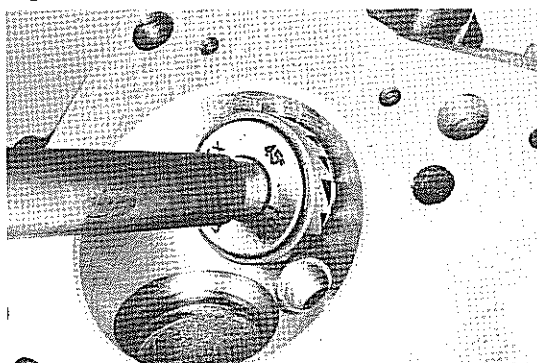


- (4) If the valve stem tip is worn, resurface with a valve grinder, but do not grind off more than 0.5 mm (0.02 in.).

Overall length:

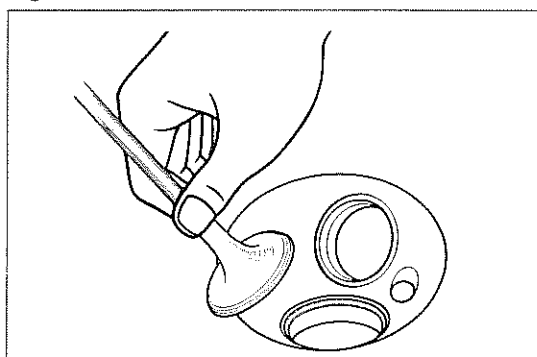
Limit	108.5 mm (4.27 in.)
-------	------------------------

Fig. 4-28



- (5) Resurface the valve seats with a 45° carbide cutter. Remove only enough metal to clean the seat.

Fig. 4-29



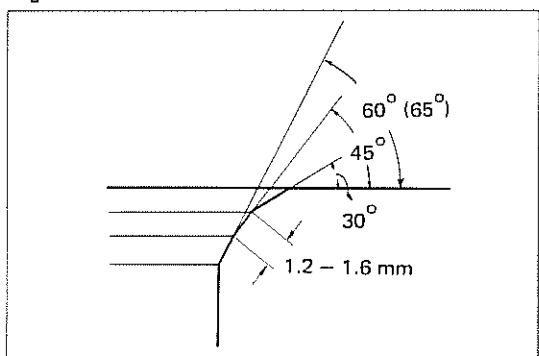
- (6) Coat the valve face with prussian blue or white lead. Locate the contact point on the valve by rotating the valve against seat.

— Note —

Seat contact should be in middle of valve face with the following width:

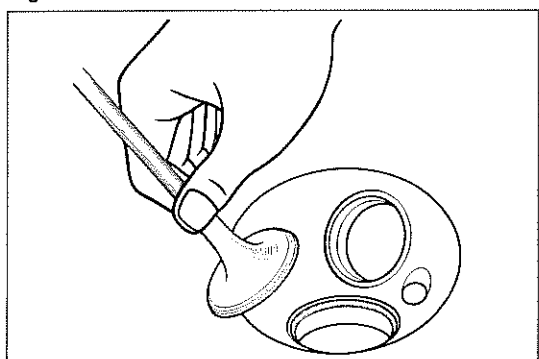
- | | |
|----|-----------------------------------|
| IN | 1.2 – 1.6 mm
(0.05 – 0.06 in.) |
| EX | 1.2 – 1.6 mm
(0.05 – 0.06 in.) |

Fig. 4-30



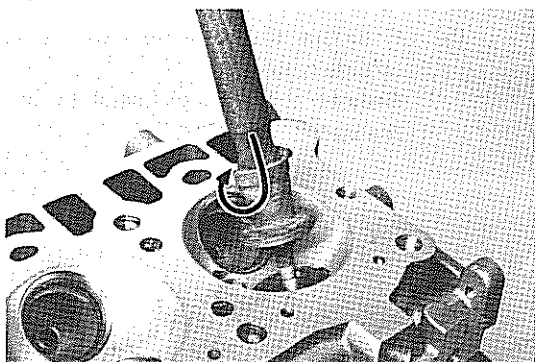
- (7) Correct the seat position.
To correct seating that is too high, use 30° and 45° cutters. If seating is too low, use 60° (IN) or 65° (EX) and 45° cutters.

Fig. 4-31



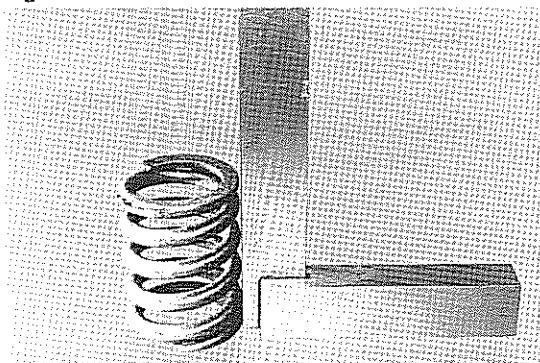
- (8) Check valve concentricity.
Lightly coat seat with prussian blue. Install valve and rotate. If blue appears 360° around face, valve stem and face are concentric. If not, replace the valve.

Fig. 4-32



- (9) Valve seat grinding
Turn the stem slightly with each light tap on the valve seat.

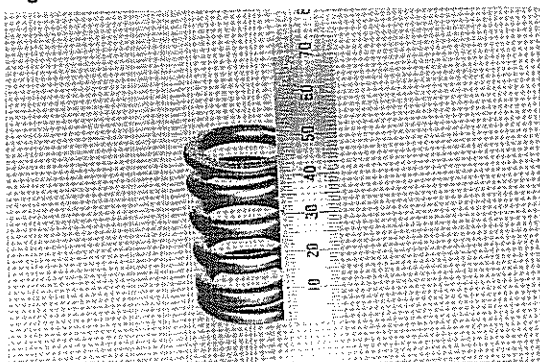
Fig. 4-33

**Valve Spring**

1. Check the squareness of the valve springs with a steel square and surface plate. Turn the spring around slowly and observe the space between the top of the spring and the square. Replace the spring if it is out of square more than the specified limit.

Squareness limit: 1.9 mm
(0.08 in.)

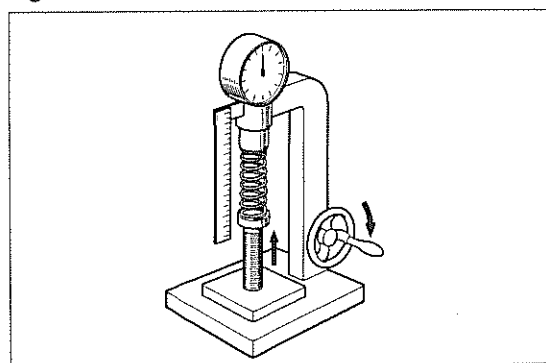
Fig. 4-34



2. Measure the spring free height. Replace springs that do not meet specification.

Free length: 42.1 mm
(1.66 in.)

Fig. 4-35

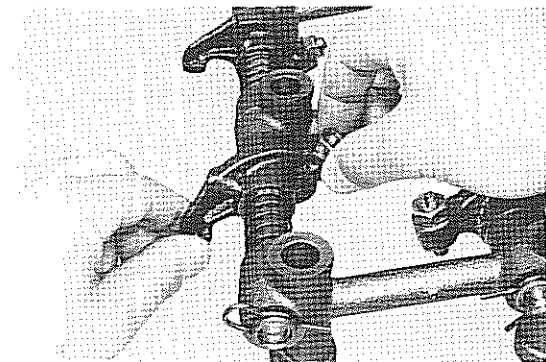


3. Using a spring tester, measure the tension of each spring at the specified installed height. Replace any spring that does not meet specification.

Installed length: 37.7 mm
(1.48 in.)

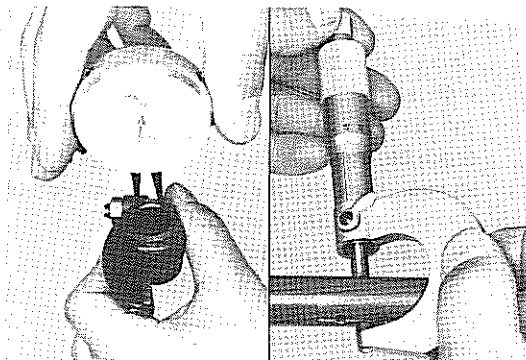
Installed load:
STD 26.3 kg
(58.0 lb)
Limit 23.7 kg
(52.3 lb)

Fig. 4-36

**Rocker Arm & Shaft**

1. Check the rocker arm to shaft clearance. If worn excessively, disassemble and inspect.

Fig. 4-37



2. Measure the clearance with a dial indicator and outside micrometer. If clearance exceeds the limit, replace the rocker arm bushings and/or shaft.

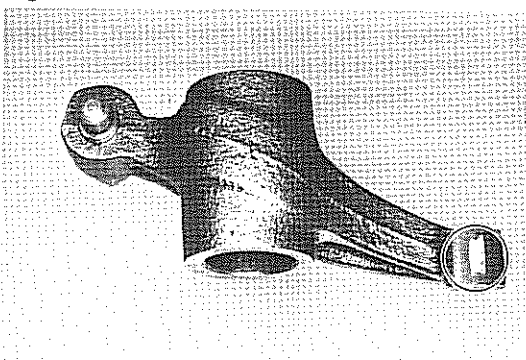
Oil clearance:

STD	0.01 – 0.05 mm (0.0004 – 0.0020 in.)
Limit	0.06 mm (0.0024 in.)

— Note —

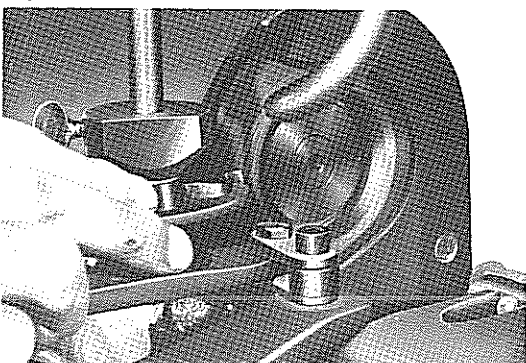
Measure at the maximum wear point on the rocker arm installation part.

Fig. 4-38



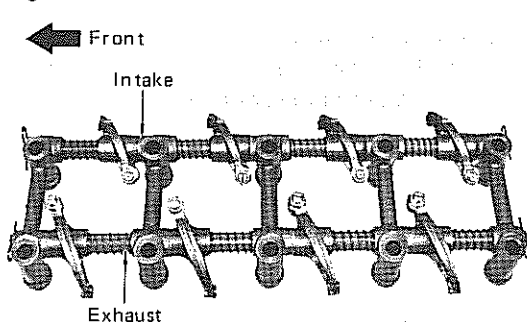
3. Check the contact surface of the valve rocker arm stem end.

Fig. 4-39



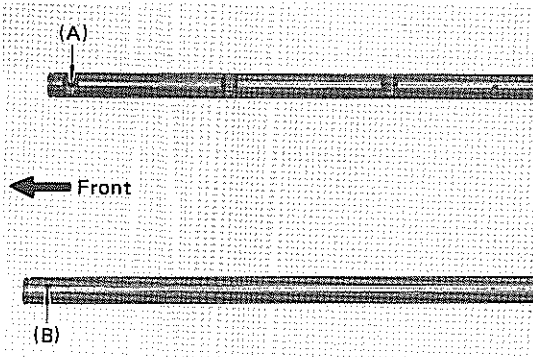
4. If the valve rocker arm surface contacting the valve stem end is worn excessively, either grind or replace the rocker arm.

Fig. 4-40



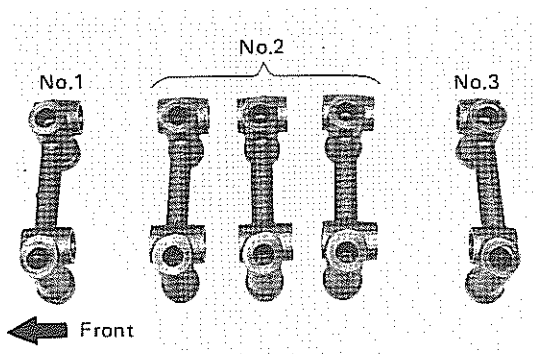
5. Assemble the rocker arm and shaft.
 - (1) Assemble the rocker arm, springs and supports as shown in the figure.

Fig. 4-41



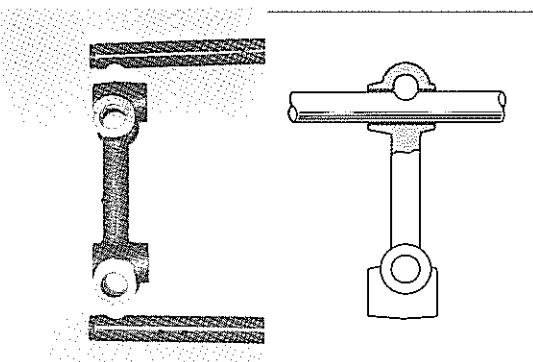
- (2) Face the hole of intake rocker shaft (A) and exhaust rocker shaft (B) towards the front.

Fig. 4-42



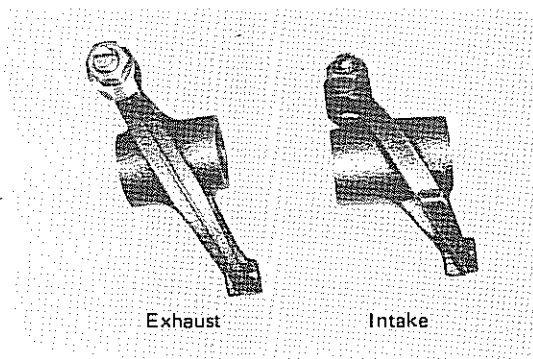
- (3) As there are 3 types of rocker supports, install No.1 to the front side and No.3 to the rear side.
 (4) Face the side of the rocker support with an F mark toward the front.
 (5) The short rocker arm is for intake side.

Fig. 4-43



- (6) Align the hole of the rocker support with the rocker shaft groove and install to the cylinder head bolt.

Fig. 4-44



- (7) The short rocker arms are for intake and the long for exhaust.

Fig. 4-45



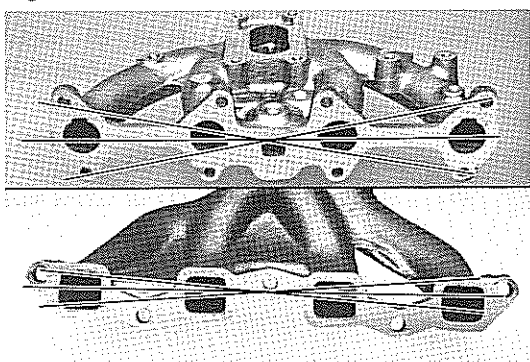
Manifold

1. Inspect the cylinder head contacting surfaces for warpage and replace the manifold if it exceeds the limit.

Installing surface warpage:

Limit 0.3 mm
 (0.01 in.)

Fig. 4-46



2. Check the manifold surface for flatness with a precision straight edge.

ASSEMBLY

Assemble the parts in the numerical order shown in the figure.

Fig. 4-47

- Thoroughly clean the parts to be assembled.
- Apply clean engine oil on the sliding and rotating surfaces of the parts before assembly.

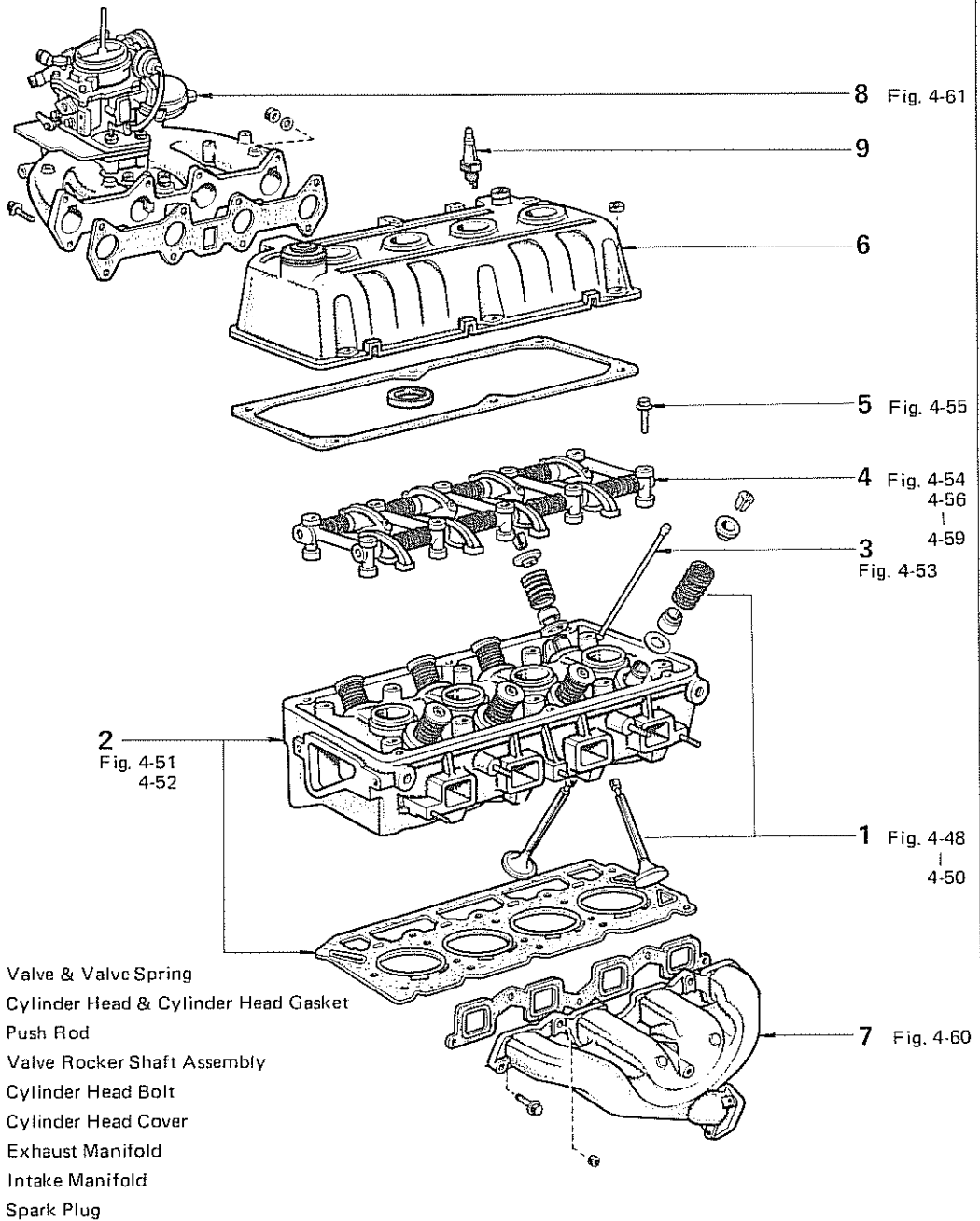
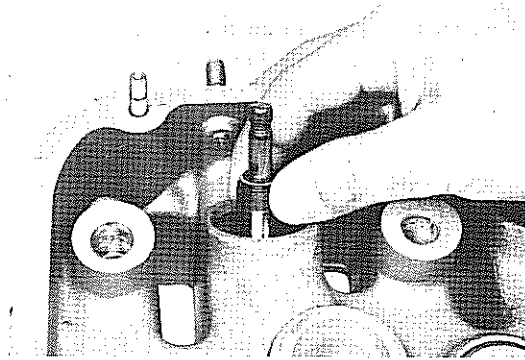
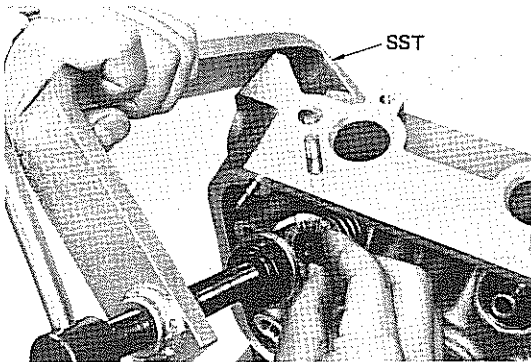


Fig. 4-48



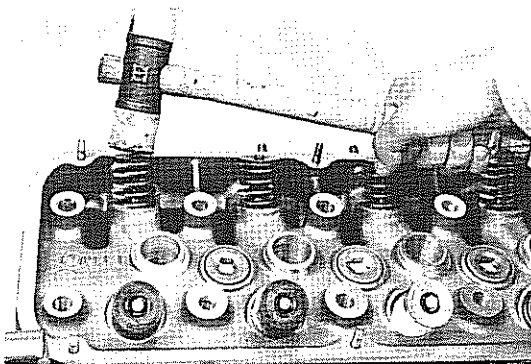
Install the spring seat and oil seal as shown in the figure. The head must be clean and the oil seal inserted to where the end contacts the spring seat top.

Fig. 4-49



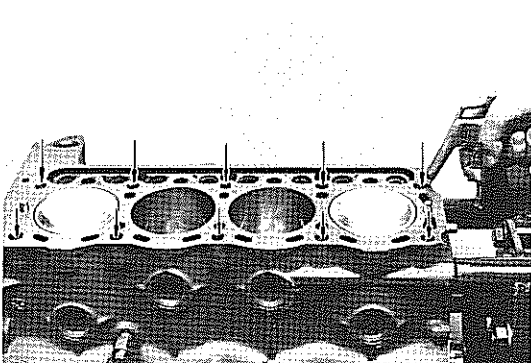
Assemble the valve spring and install the retainer locks with SST.
SST [09202-43012]

Fig. 4-50



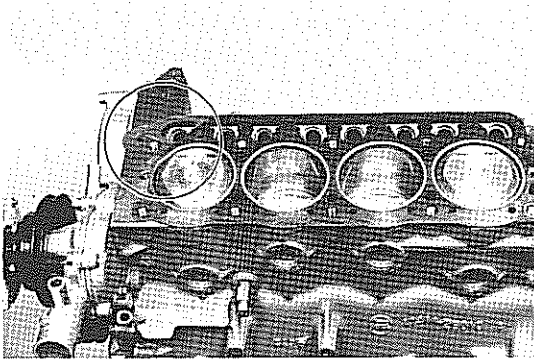
Tap the valve stems lightly to assure proper fit.

Fig. 4-51



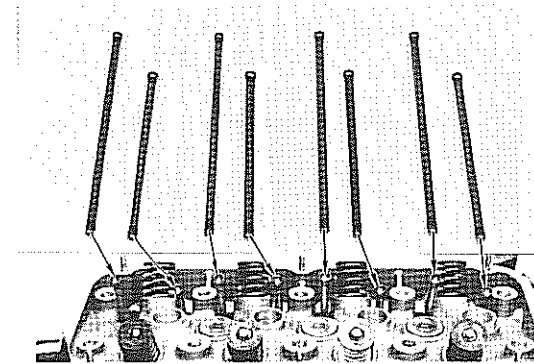
Clean the bolt hole with compressed air.

Fig. 4-52



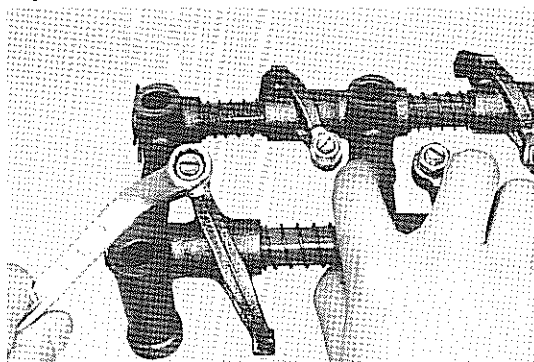
Install a new gasket as shown in the figure.

Fig. 4-53



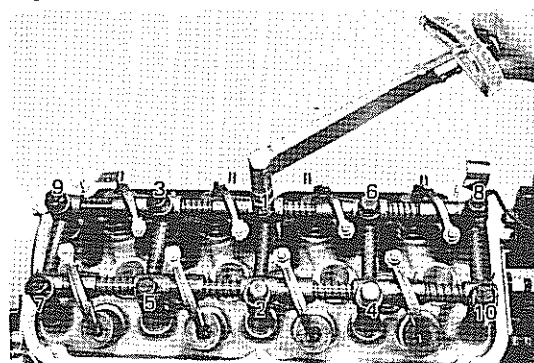
The short push rods are for intake and the long for exhaust.

Fig. 4-54



Loosen the adjusting screw lock nut before installing.

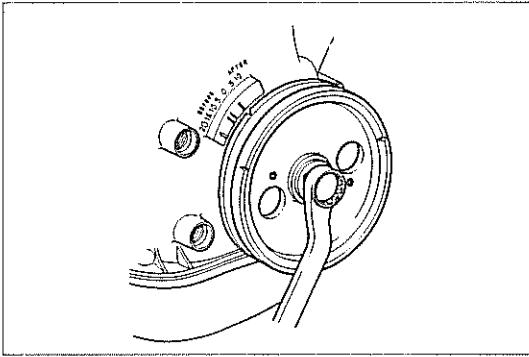
Fig. 4-55



Tighten each cylinder head bolt a little at a time to the specified torque in the sequence shown in the figure.

Tightening torque: 8.5 – 9.5 kg-m
(61 – 69 ft-lb)

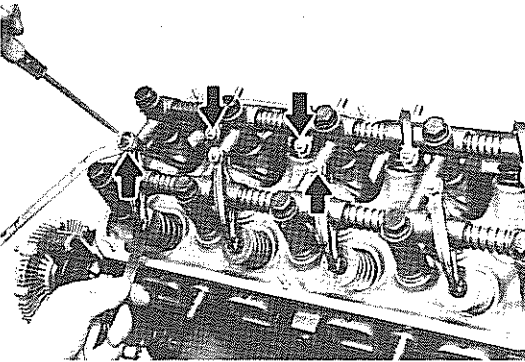
Fig. 4-56



Adjust the valve clearance.

1. Set No.1 cylinder TDC/compression.

Fig. 4-57

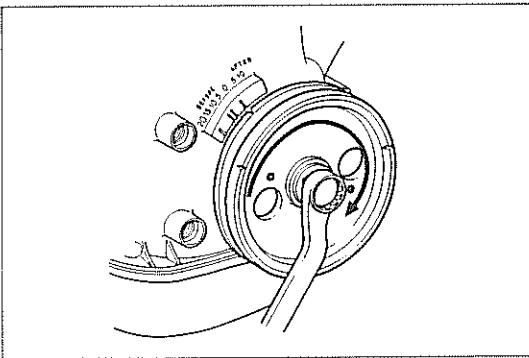


2. First, adjust the valve clearance of only the valves indicated by arrows in the figure.

Valve clearance:

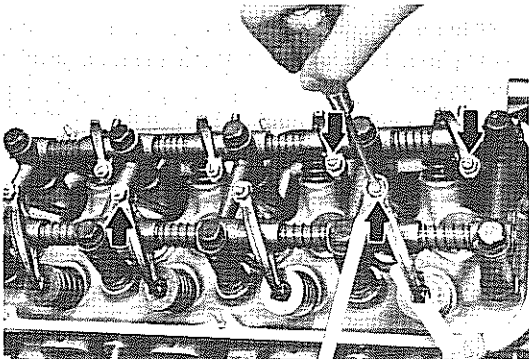
IN	0.18 mm (0.007 in.)
EX	0.30 mm (0.012 in.)

Fig. 4-58



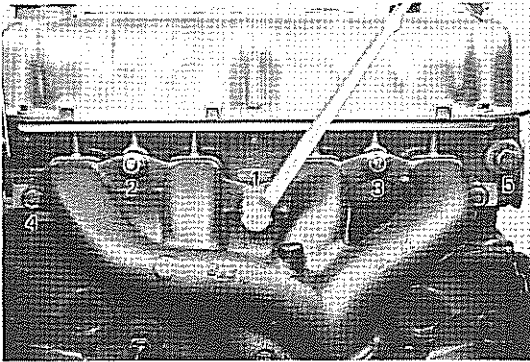
3. Turn the crankshaft 360° and align the mark.

Fig. 4-59



4. Next, adjust the clearances of the remaining valves (indicated by arrows).

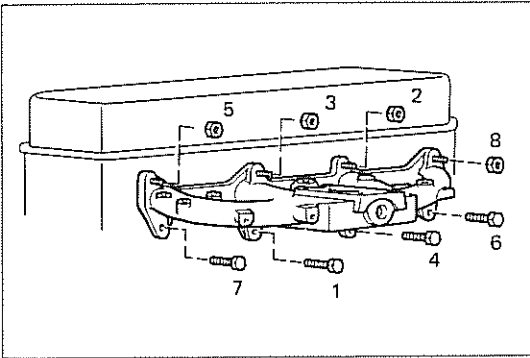
Fig. 4-60



5. Tighten the each exhaust manifold bolt and nut a little at a time to the specified torque in the sequence shown in the figure.

Tightening torque: 3.0 – 4.5 kg-m
(22 – 32 ft-lb)

Fig. 4-61



6. Tighten the each intake manifold bolt and nut a little at a time to the specified torque in the sequence shown in the figure.

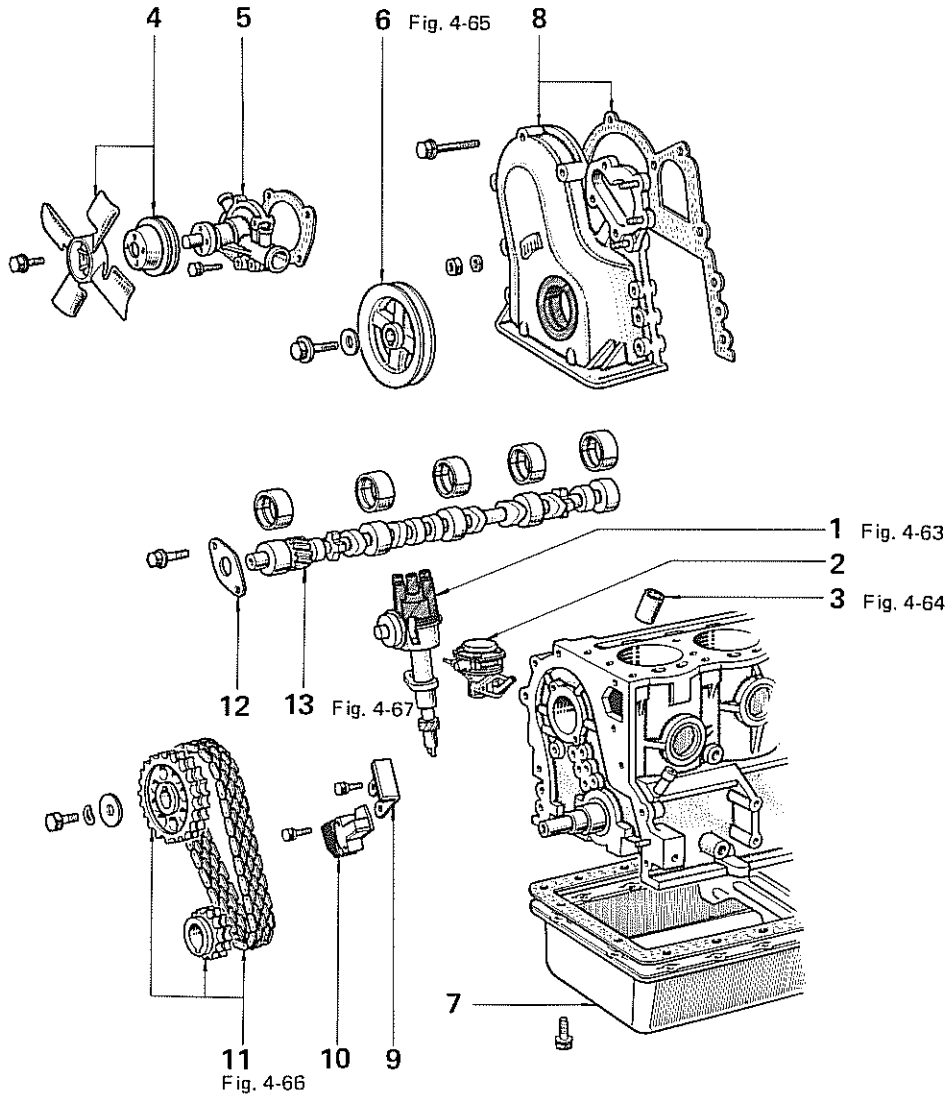
Tightening torque: 1.8 – 2.5 kg-m
(13 – 18 ft-lb)

TIMING CHAIN

DISASSEMBLY

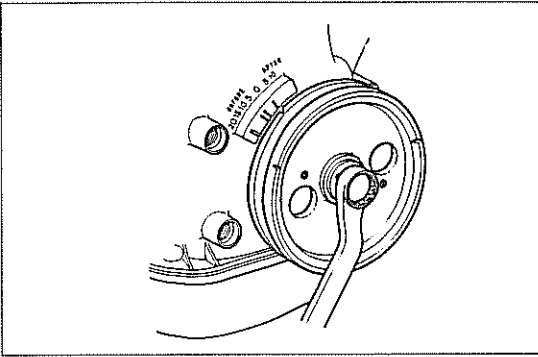
Disassemble the parts in the numerical order shown in the figure.

Fig. 4-62



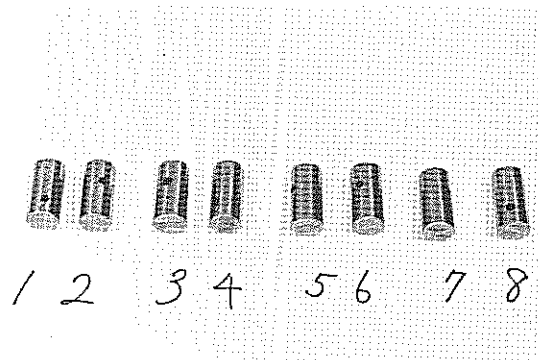
- | | |
|--------------------------|--------------------------------|
| 1. Distributor | 8. Timing Chain Cover & Gasket |
| 2. Fuel Pump & Insulator | 9. Chain Damper |
| 3. Valve Lifter | 10. Chain Tensioner |
| 4. Fan & Fan Pulley | 11. Timing Chain & Timing Gear |
| 5. Water Pump | 12. Camshaft Thrust Plate |
| 6. Crankshaft Pulley | 13. Camshaft |
| 7. Oil Pan | |

Fig. 4-63



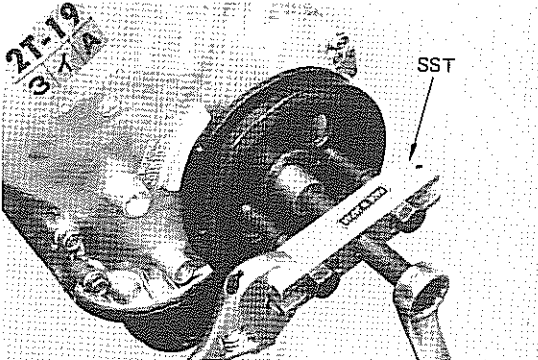
Set the No.1 cylinder to TDC/compression.

Fig. 4-64



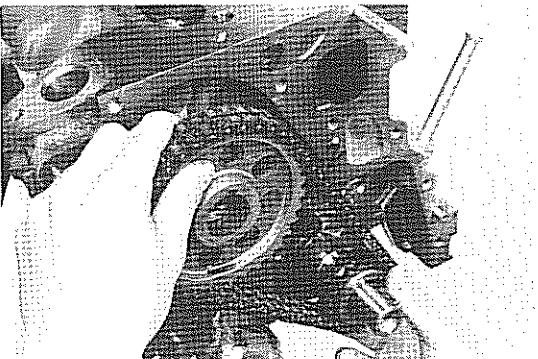
Arrange the valve lifters in order.

Fig. 4-65

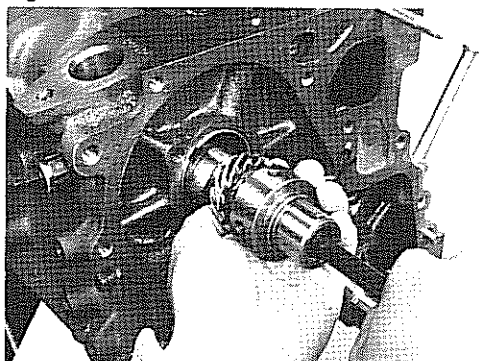


Remove the crankshaft pulley with SST.
SST[09213-31021]

Fig. 4-66

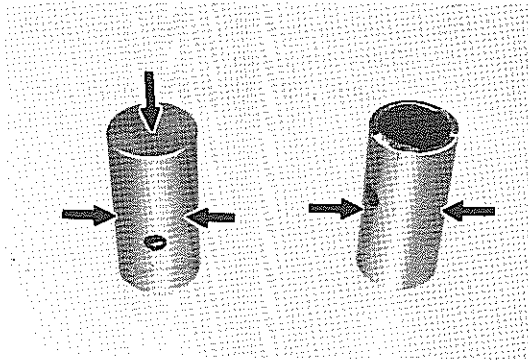


Remove the both gears by pulling them out uniformly.

Fig. 4-67

While turning the camshaft, slowly pull out so as not to damage the camshaft bearing.

Fig. 4-68

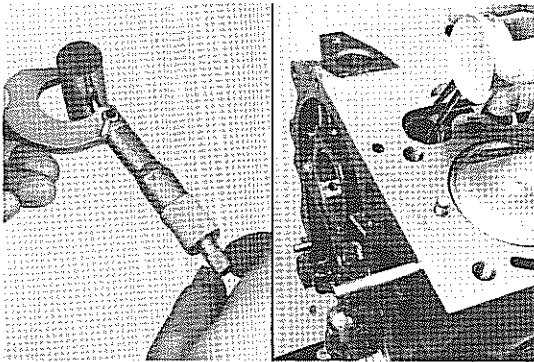


INSPECTION & REPAIR

Valve Lifter

Check the valve lifter for wear or damage.

Fig. 4-69

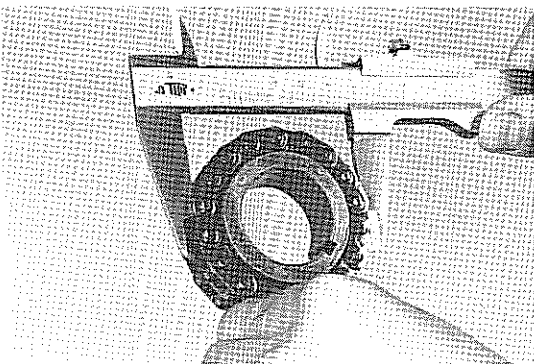


Inspect the lifters and lifter bores for wear.

Oil clearance:

STD	0.02 – 0.03 mm (0.0008 – 0.0012 in.)
Limit	0.1 mm (0.004 in.)

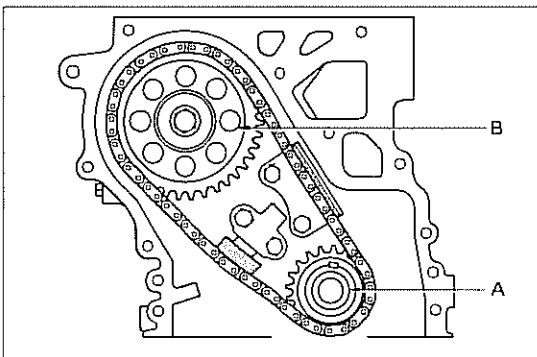
Fig. 4-70



Timing Gear & Chain

1. Inspect gears and chains for cracks, wear or chipped teeth.
If damaged, replace gears and chain.
2. Measure the gear for wear in the method shown in the figure.

Fig. 4-71

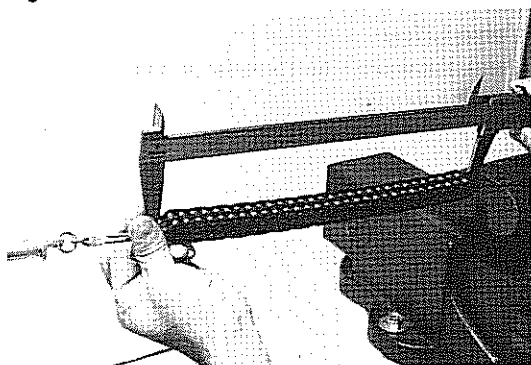


3. If measurement is below limit, replace gears and chains.

Wear limit:

A	Crankshaft sprocket
	59.4 mm (2.34 in.)
B	Camshaft sprocket
	113.8 mm (4.48 in.)

Fig. 4-72

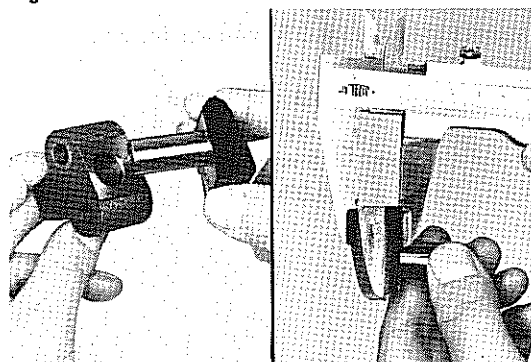


4. Measure the elongation of the timing chain.

Chain elongation:

Limit 291.4 mm tension at 5 kg
(11.47 in.) (11 lb)

Fig. 4-73

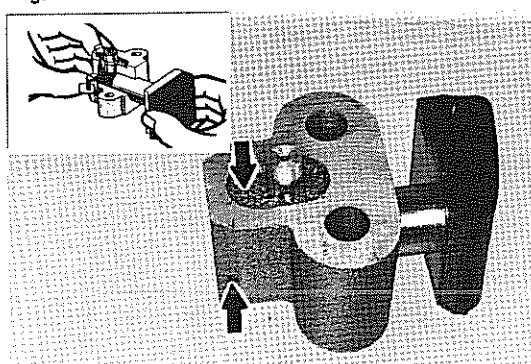
**Chain Tensioner**

1. Check the body and plunger for wear and measure the tensioner head as shown in the figure. If worn down over the limit, replace as a unit.

Plunger head thickness:

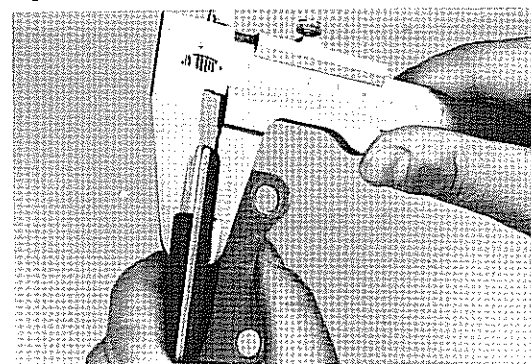
Limit 12.5 mm
(0.49 in.)

Fig. 4-74



2. Tensioner plunger and body cylinder air tightness test.
Take out the plunger spring. Coat the plunger with engine oil, close off the 2 oil orifices on the tensioner body and pull the plunger. If there is a return pulling force on the plunger, it is air tight.

Fig. 4-75

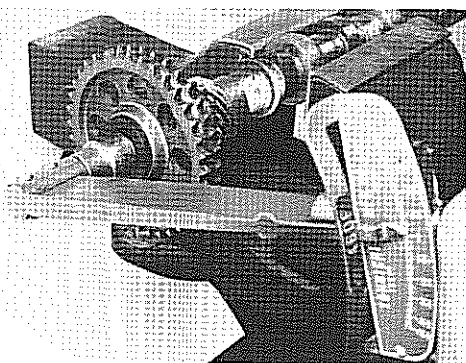
**Chain Damper**

Inspect the chain damper for wear.

Measure chain damper and check for wear.

Damper thickness: Limit 5.0 mm
(0.20 in.)

Fig. 4-76

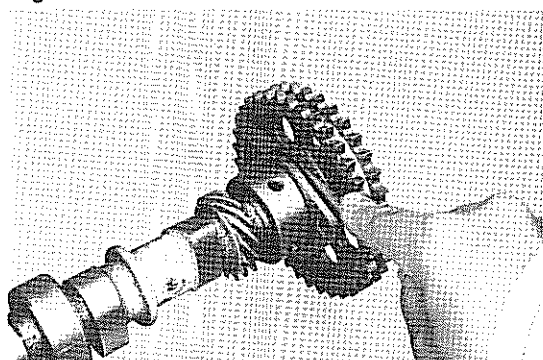
**Timing Gear & Thrust Plate**

1. Install the thrust plate and timing gear to the camshaft.

Tighten the camshaft timing gear set bolt.

**Tightening torque: 7.0 – 11.0 kg-m
(51 – 79 ft-lb)**

Fig. 4-77



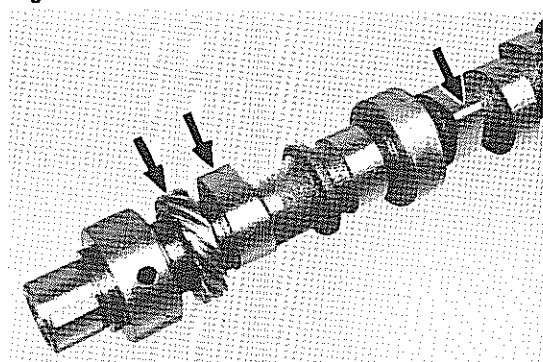
2. Measure the thrust clearance.
If it exceeds limit, replace the thrust plate.

Thrust clearance:

**STD 0.07 – 0.15 mm
(0.003 – 0.006 in.)**

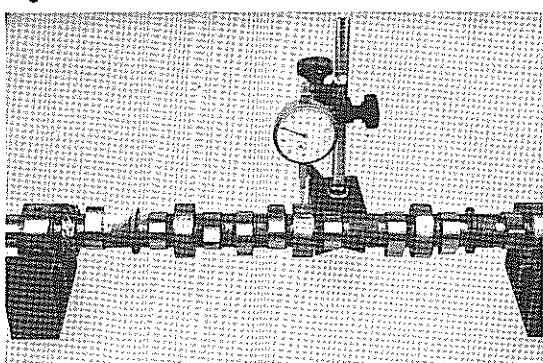
**Limit 0.3 mm
(0.01 in.)**

Fig. 4-78

**Camshaft**

1. Inspect the gear and cam for cracks, wear or chipped teeth.
If damaged, replace the camshaft.

Fig. 4-79



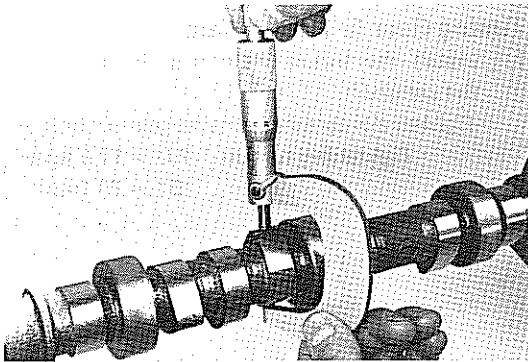
2. Check the camshaft for runout. Replace camshaft if it exceeds the limit.

**Runout limit: 0.06 mm
(0.002 in.)**

— Note —

Rotate the camshaft one turn, and divide the maximum gauge difference by 2.

Fig. 4-80

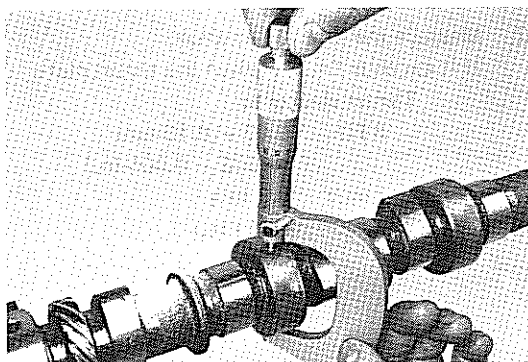


3. Measure the cam lobe height. If wear exceeds the limit, replace the camshaft.

Cam height:

Limit	IN	38.29 mm (1.507 in.)
	EX	38.19 mm (1.504 in.)

Fig. 4-81

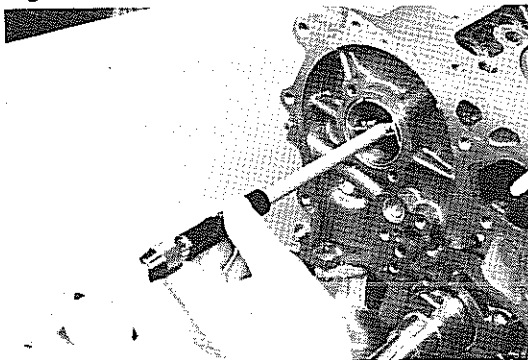


4. Measure the oil clearance.
(1) Measure the camshaft journal.

Journal diameter:

No.1	46.459 – 46.475 mm (1.8291 – 1.8297 in.)
No.2	46.209 – 46.225 mm (1.8192 – 1.8199 in.)
No.3	45.959 – 45.975 mm (1.8094 – 1.8100 in.)
No.4	45.709 – 45.725 mm (1.7996 – 1.8002 in.)
No.5	45.459 – 45.475 mm (1.7897 – 1.7904 in.)

Fig. 4-82

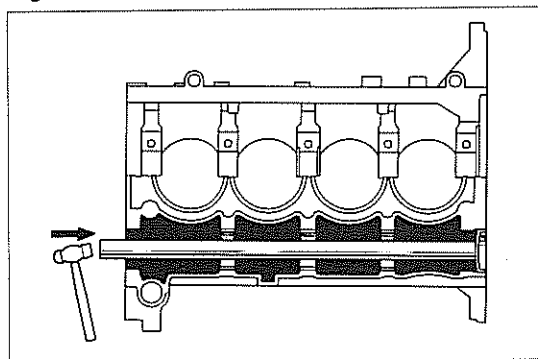


- (2) Measure the inner diameter of the bearing.

Oil clearance:

STD	0.025 – 0.066 mm (0.0010 – 0.0026 in.)
Limit	0.1 mm (0.004 in.)

Fig. 4-83

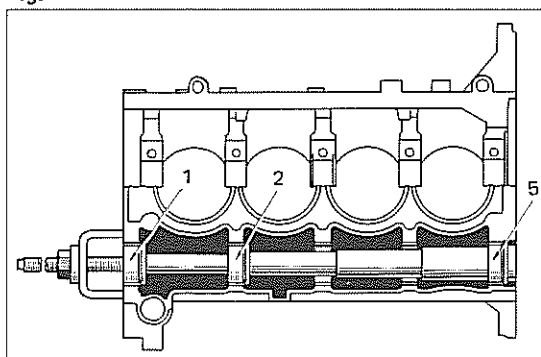
**Replace The Camshaft Bearing**

When replacing, use SST and remove parts in the following order:

SST[09215-25010]

1. Tight plug

Fig. 4-84



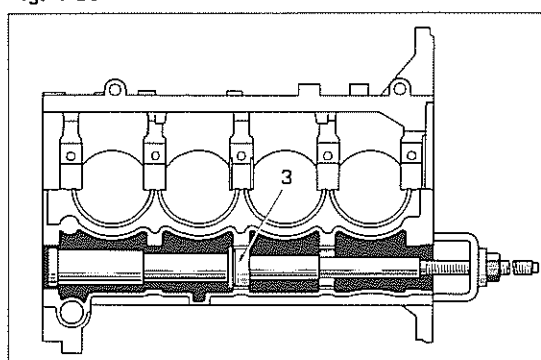
2. Remove the No.1, No.2 and No.5 bearings.

– Note –

The numbers 1 through 5 imprinted on the SST refer to the bearing number.

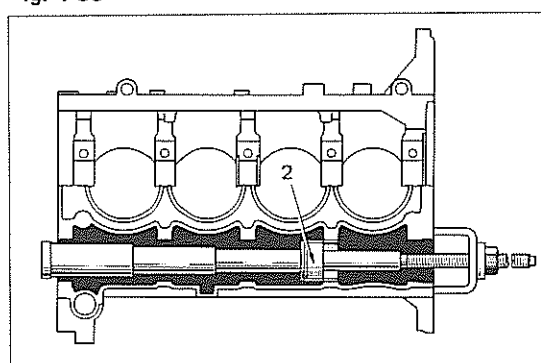
SST [09215-25010]

Fig. 4-85



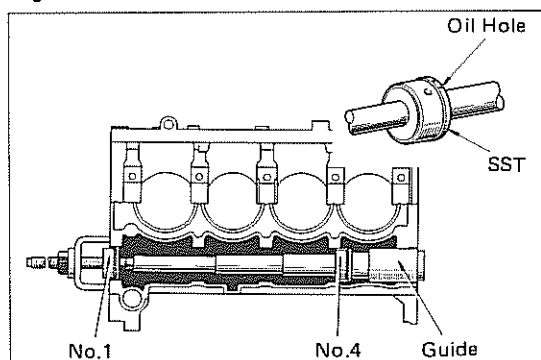
3. Remove the No.3 bearing.
Pull the No.3 bearing rearward and leave it in the cylinder block.

Fig. 4-86



4. Remove the No.3 and No.4 bearings.
Insert No.2 piece into the No.3 bearing in the block and remove both No.3 and No.4 bearings together.

Fig. 4-87

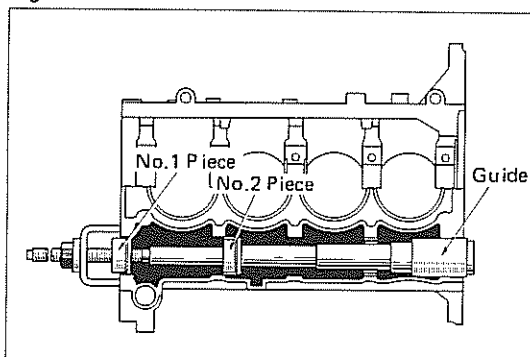


5. Install the No.4 bearing.
Use No.1 bearing as a guide.

– Note –

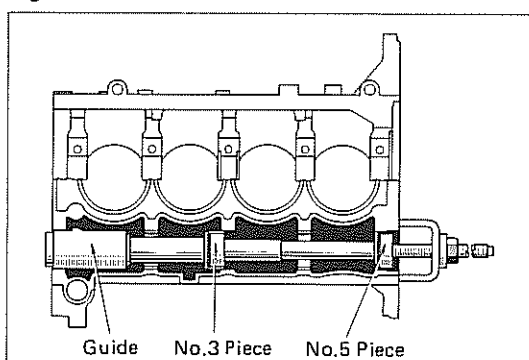
When inserting the bearings, align each oil hole with those on each piece.

Fig. 4-88



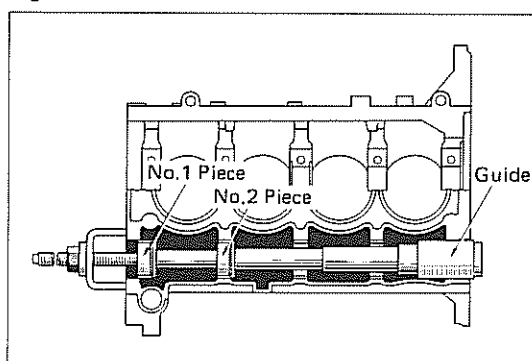
6. Install the No.2 bearing.
Use No.1 piece as a guide.

Fig. 4-89



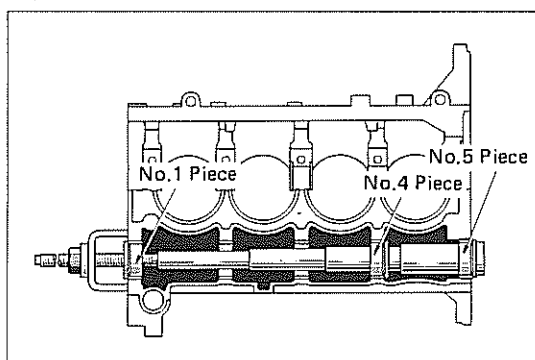
7. Install the No.3 bearing.
Use No.5 piece as a guide.

Fig. 4-90



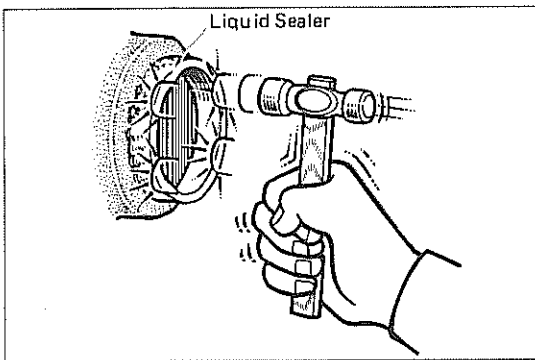
8. Install the No.1 bearing.
Use No.2 piece as a guide.

Fig. 4-91



9. Install the No.5 bearing.
Use No.1 and No.4 pieces as guides.

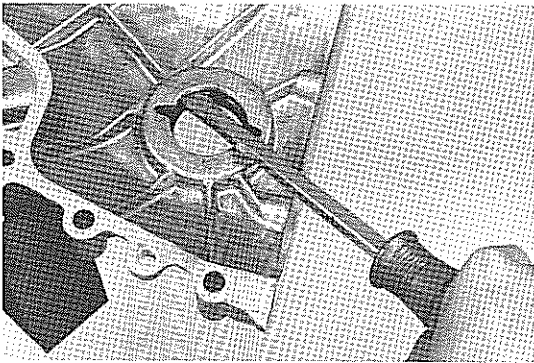
Fig. 4-92



10. Tight plug

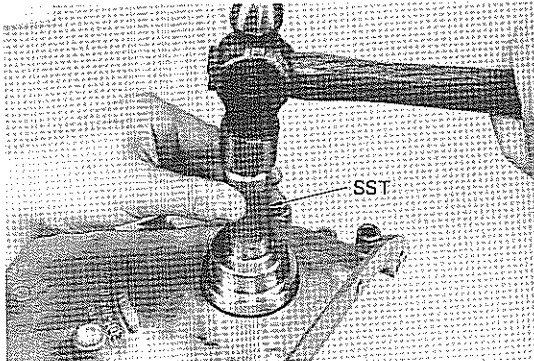
Use a new tight plug coated with liquid sealer.

Fig. 4-93

**Replace The Crankshaft Front Oil Seal**

1. Remove the oil seal with a screwdriver.

Fig. 4-94

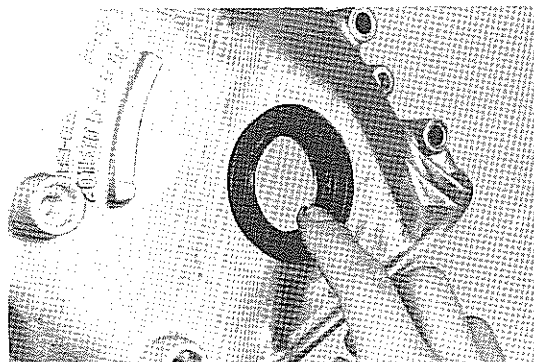


2. Install a new oil seal with SST.
SST[09223-22010]

– Note –

1. Drive in the oil seal until it is about even with the timing gear cover.
2. Be careful not to drive it in slant wise.

Fig. 4-95



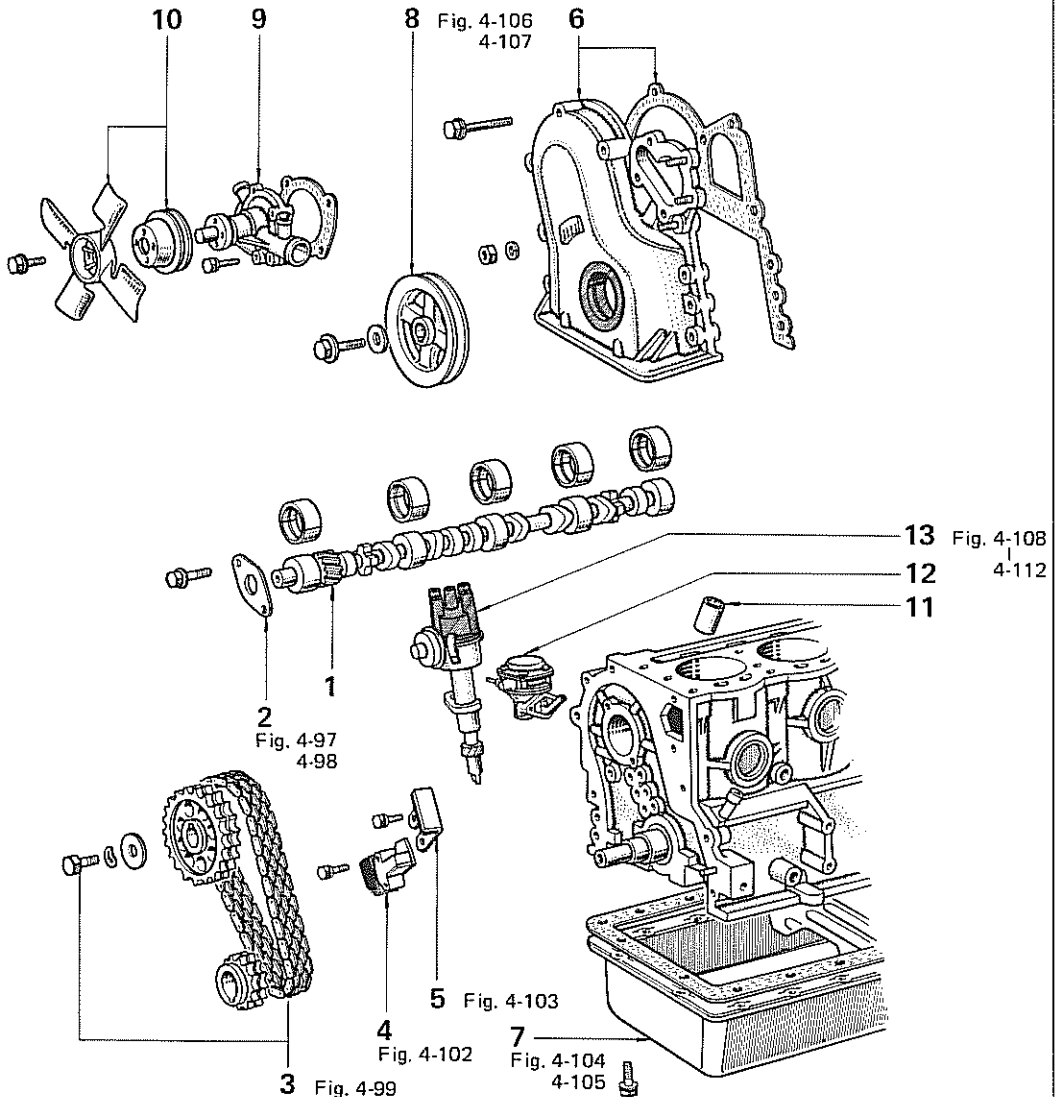
3. After driving in the seal, coat the seal lip lightly with MP grease.

ASSEMBLY

Assemble the parts in the numerical order shown in the figure.

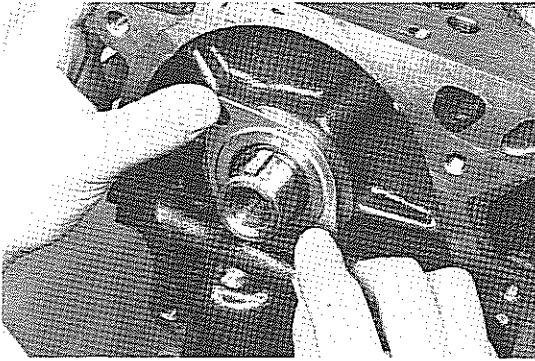
Fig. 4-96

- Thoroughly clean the parts to be assembled.
- Apply clean engine oil on the sliding and rotating surfaces of the parts before assembly.



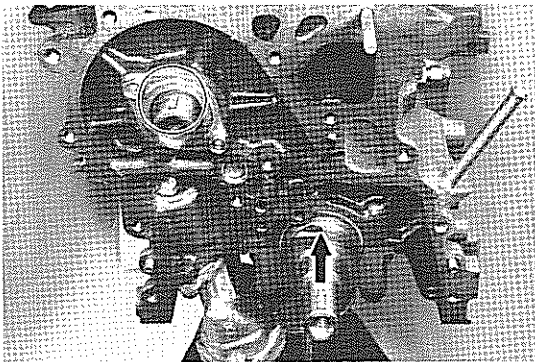
- | | |
|--------------------------------|---------------------------|
| 1. Camshaft | 8. Crankshaft Pulley |
| 2. Camshaft Thrust Plate | 9. Water Pump |
| 3. Timing Chain & Timing Gear | 10. Fan & Fan Pulley |
| 4. Chain Tensioner | 11. Valve Lifter |
| 5. Chain Damper | 12. Fuel Pump & Insulator |
| 6. Timing Chain Cover & Gasket | 13. Distributor |
| 7. Oil Pan | |

Fig. 4-97



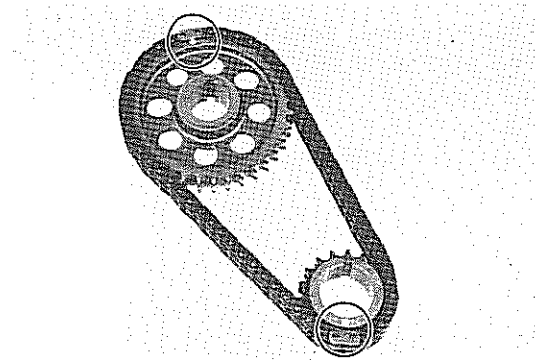
Place the camshaft thrust plate with the marked side outward.

Fig. 4-98



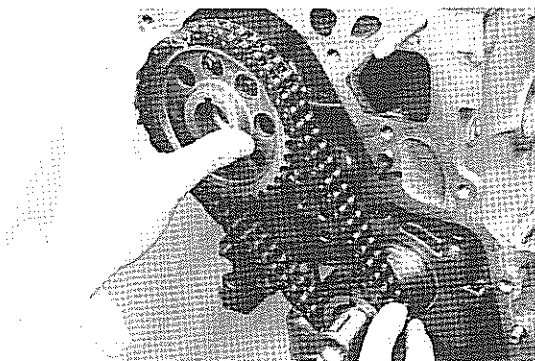
Align the camshaft key with the thrust plate mark.
Face the crankshaft key straight up.

Fig. 4-99



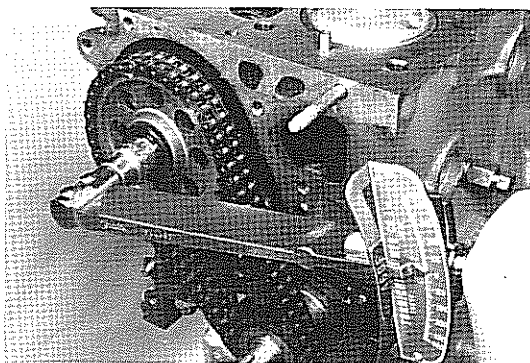
Align the chain and gear timing marks.

Fig. 4-100



Install the chain and gear together.

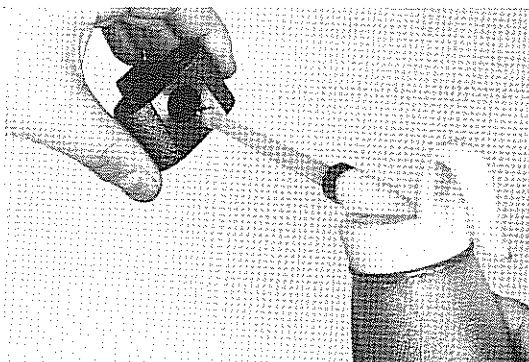
Fig. 4-101



Tighten the camshaft timing gear set bolt.

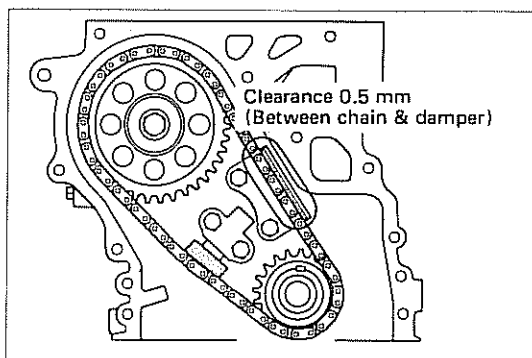
**Tightening torque: 7.0 – 11.0 kg-m
(51 – 79 ft-lb)**

Fig. 4-102



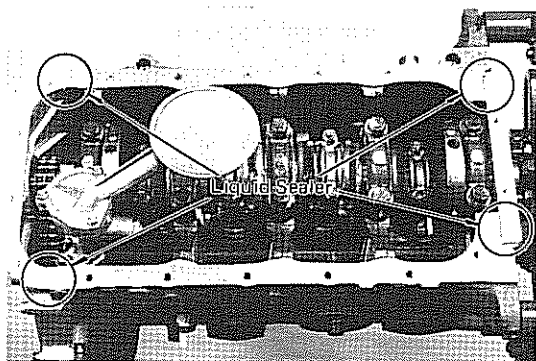
Insert oil into the chain tensioner cylinder.

Fig. 4-103



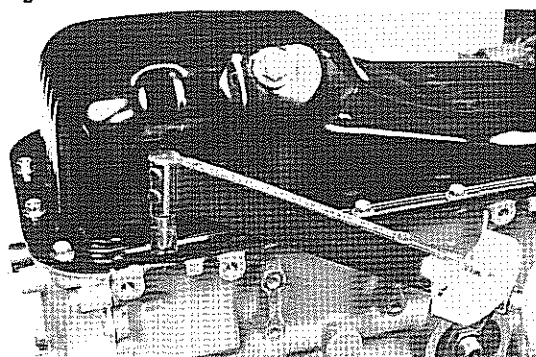
Install the chain damper parallel with the chain with a 0.5 mm (0.02 in.) space between.

Fig. 4-104



Apply sealer to the areas indicated in the figure.

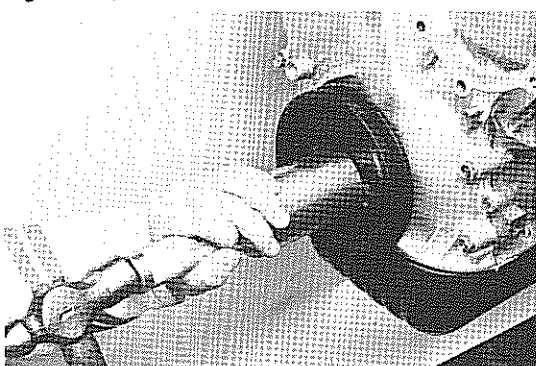
Fig. 4-105



Install the oil pan.

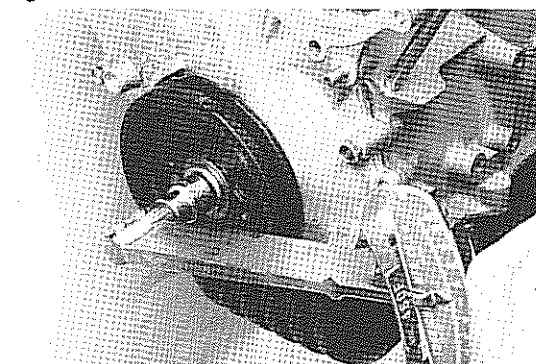
Tightening torque: 0.5 – 0.8 kg-m
(4 – 5 ft-lb)

Fig. 4-106



Drive in the crankshaft pulley with SST.
SST[09214-60010]

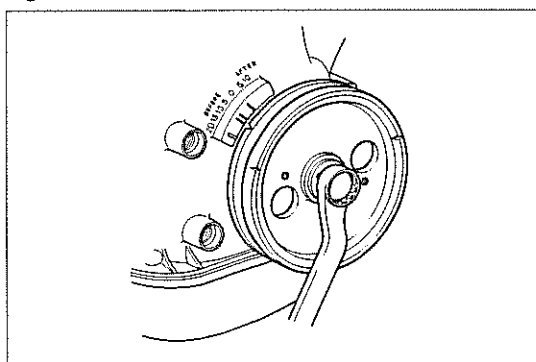
Fig. 4-107



Tighten the claw nut.

Tightening torque: 4.0 – 6.0 kg-m
(29 – 43 ft-lb)

Fig. 4-108

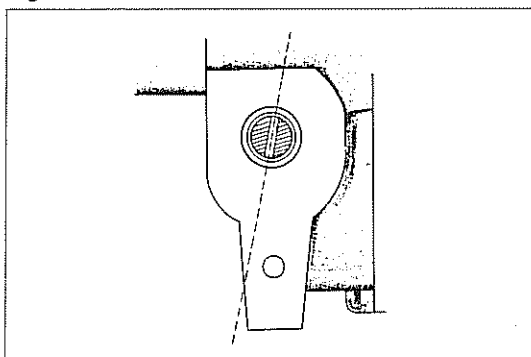


Insert the distributor.

1. Set the No.1 ignition timing.

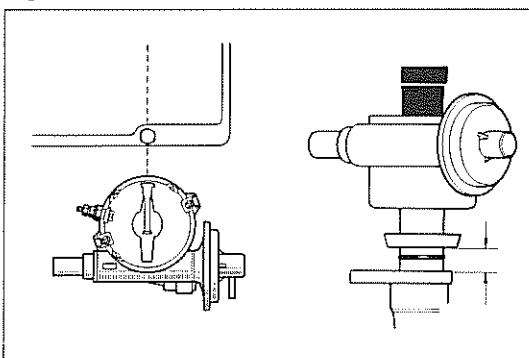
BTDC 10°

Fig. 4-109



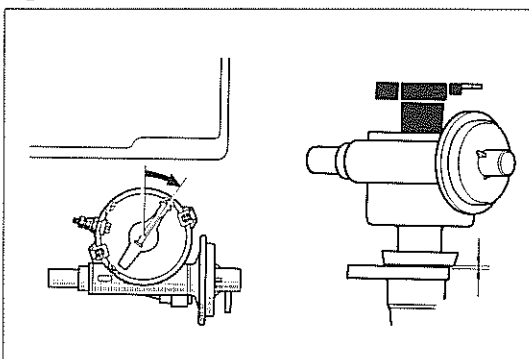
2. Set the oil pump shaft slot in the direction shown in the figure.

Fig. 4-110



3. Before inserting the distributor, position the rotor and diaphragm as shown in the figure.

Fig. 4-111



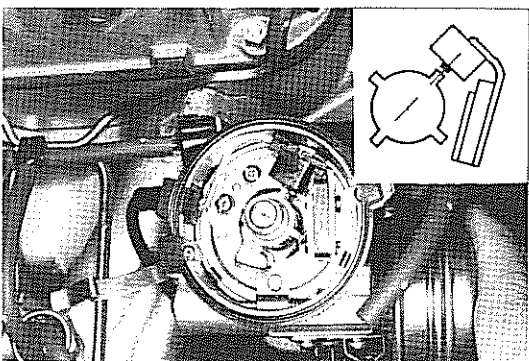
4. When fully installed, rotor should point in the direction shown in the figure.



— Note —

Turn the distributor housing and adjust to the position just before the points open.

Fig. 4-112



For USA

— Note —

Turn the distributor housing so that the signal rotor will just begin to cut the lines of flux and tighten the set bolt.

CYLINDER BLOCK

DISASSEMBLY

Disassemble the parts in the numerical order shown in the figure.

Fig. 4-113

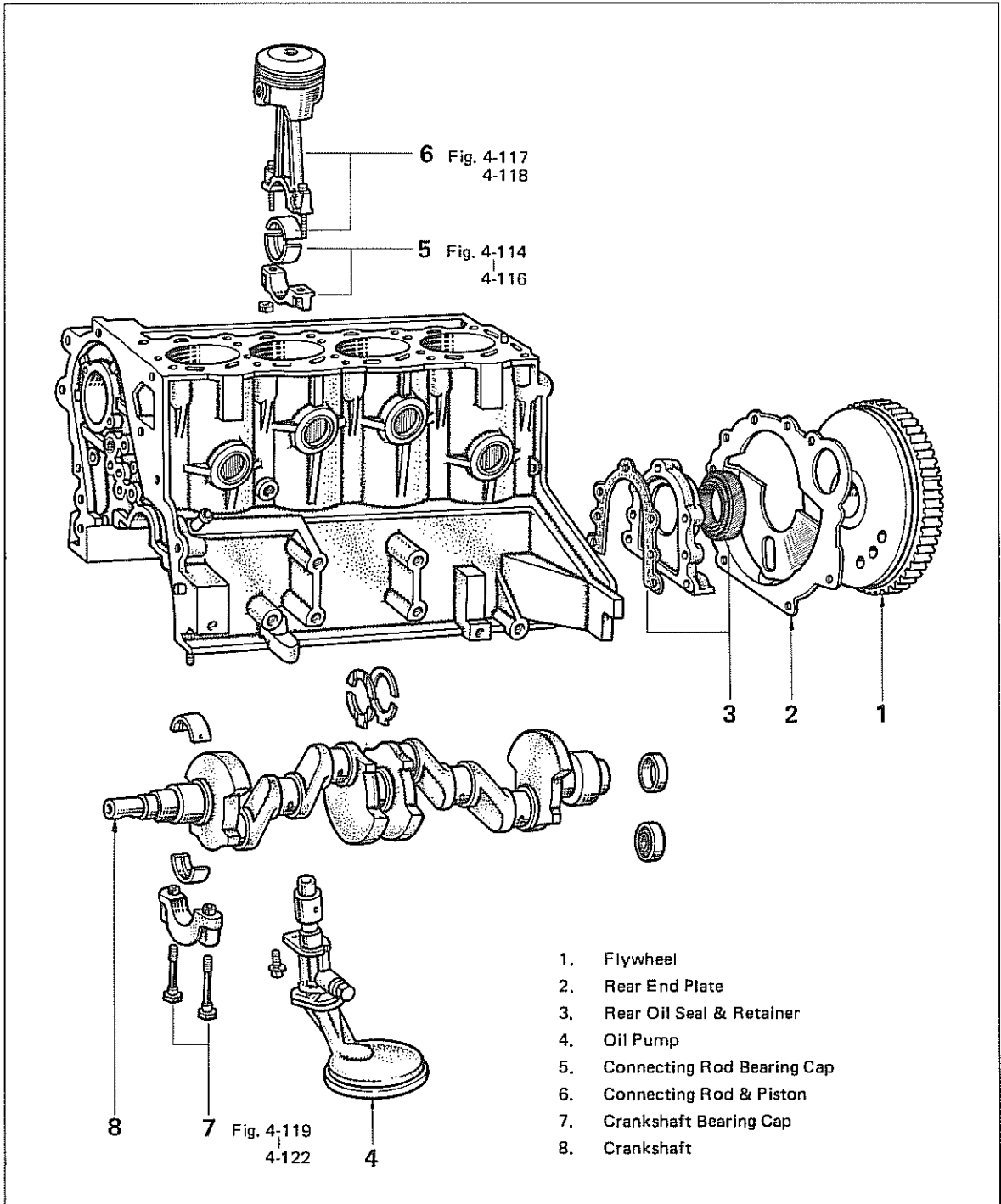
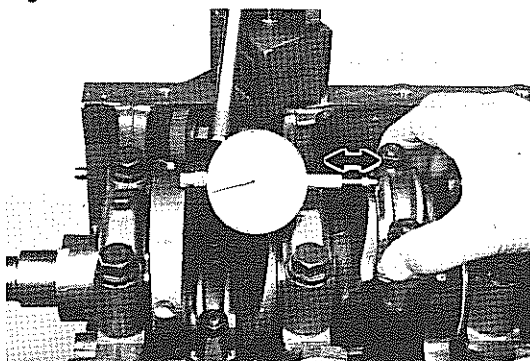


Fig. 4-114



Measure the connecting rod thrust clearance. If it exceeds the limit, replace the connecting rod.

Thrust clearance:

STD 0.16 – 0.26 mm
(0.006 – 0.010 in.)

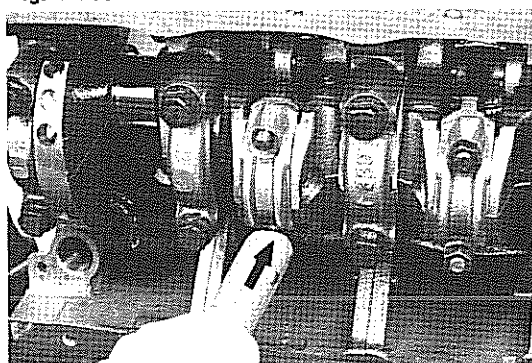
Limit 0.3 mm
(0.012 in.)

Fig. 4-115



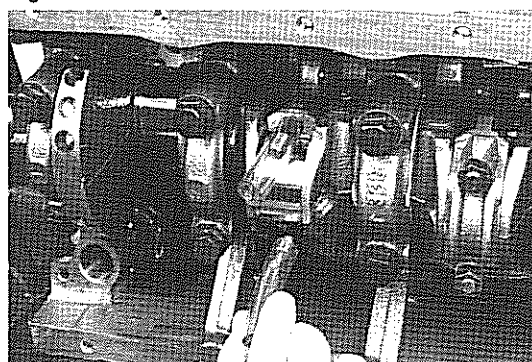
Mark the connecting rod and cap for correct reassembly.

Fig. 4-116



If the connecting rod cap is tight, lightly tap the stud bolt.

Fig. 4-117

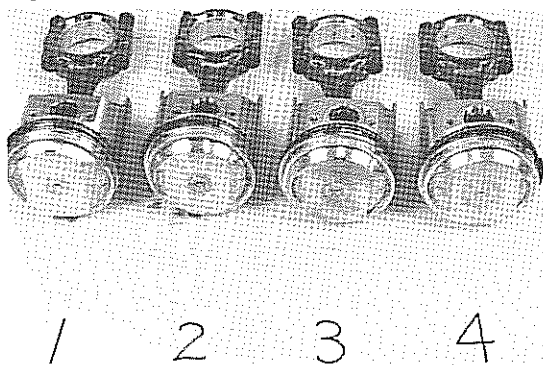


Cover the rod bolts with a short pieces of hoses to protect the crankshaft from damage.

— Note —

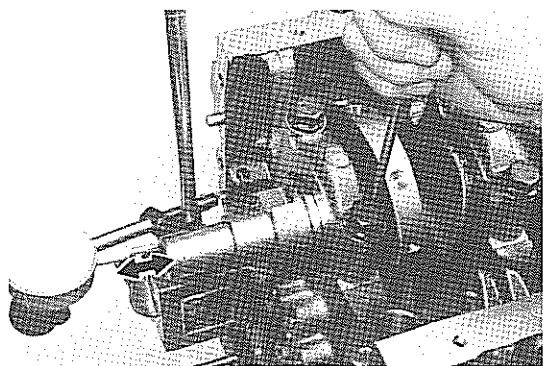
If this step is not performed prior to removing the pistons, the piston ring lands will be damaged.

Fig. 4-118



Arrange the connecting rods and bearings in order.

Fig. 4-119



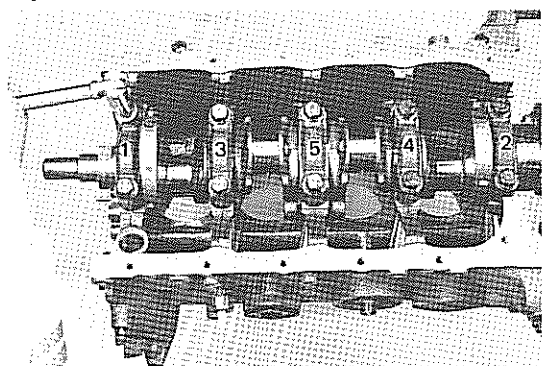
Measure the crankshaft thrust clearance.
If the clearance exceeds the limit, replace the thrust bearing as a set.

Thrust clearance:

STD 0.02 – 0.22 mm
 (0.0008 – 0.0087 in.)

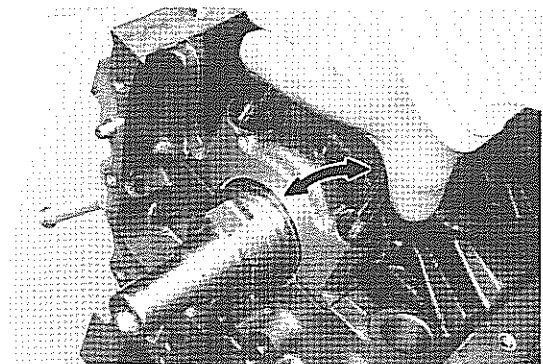
Limit 0.3 mm
 (0.012 in.)

Fig. 4-120



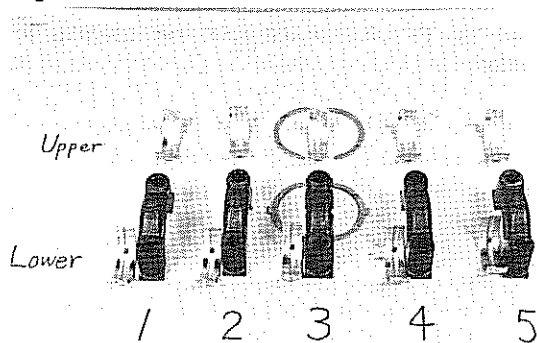
Loosen each crankshaft bearing bolts a little at a time and in the sequence shown in the figure.

Fig. 4-121



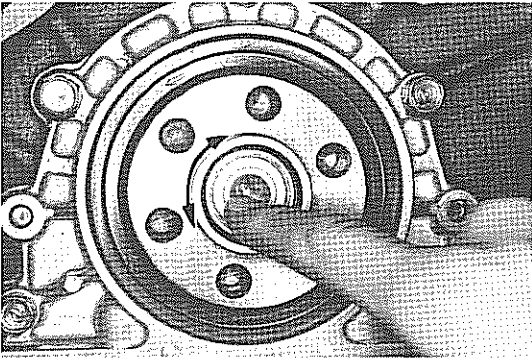
If the crankshaft bearing cap will not come off, remove by raising the bolts and pry fore and aft.

Fig. 4-122



Arrange the crankshaft bearings and caps in correct order.

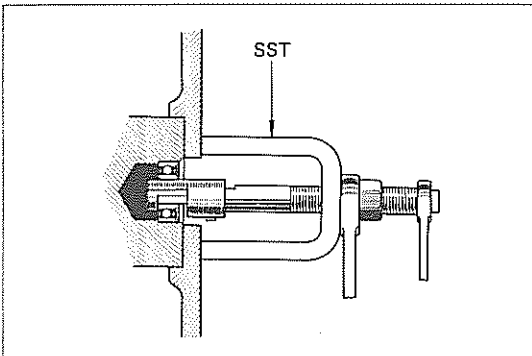
Fig. 4-123

**INSPECTION & REPAIR****Input Shaft Bearing (for M/T)**

Inspect the bearing for wear.

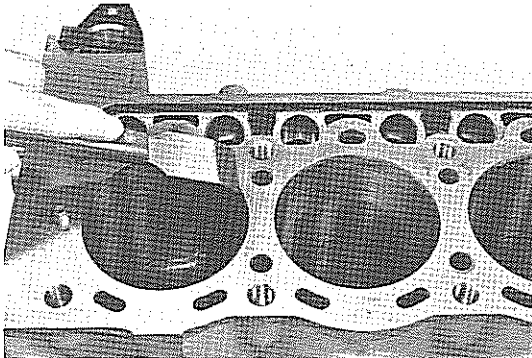
Check to see that there is no drag on the bearing when it is turned under pressure.

Fig. 4-124



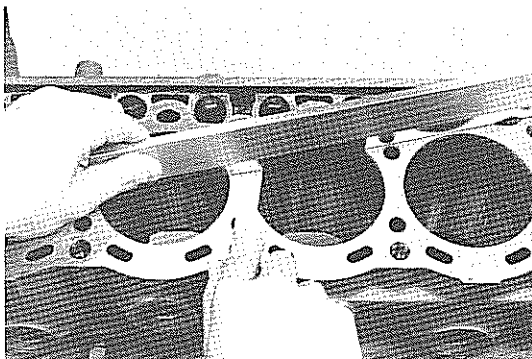
With SST, remove the input shaft bearing.
SST [09303-35010]

Fig. 4-125

**Cylinder Block**

1. Clean and check the cylinder block for cracks or scoring.

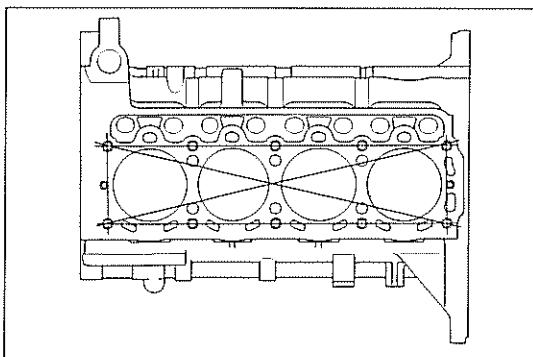
Fig. 4-126



2. Check the block gasket surface for warpage. If warpage exceeds the specified limit, either machine the block or replace.

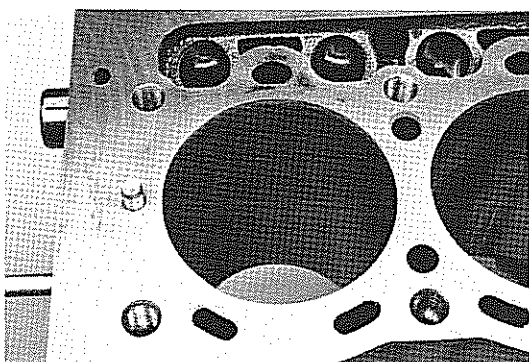
**Warpage limit: 0.05 mm
(0.002 in.)**

Fig. 4-127



3. Inspect for warpage along the lines indicated at left.

Fig. 4-128



4. Visually inspect the cylinders for vertical scratches. If deep scratches are present, the cylinder must be rebored.

5. Measure the cylinder bore at the position as shown in the figure.

Cylinder bore:

- A Thrust Direction
- B Axial Direction
- C 10 mm (0.4 in.)
- D 80 mm (3.1 in.)
- E 10 mm (0.4 in.)

If the bore exceeds specification, it must be rebored.

Cylinder bore:

STD 85.00 – 85.05 mm
(3.346 – 3.348 in.)

Wear limit: 0.2 mm
(0.008 in.)

Fig. 4-129

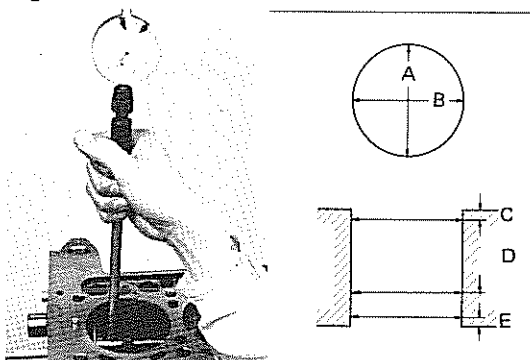
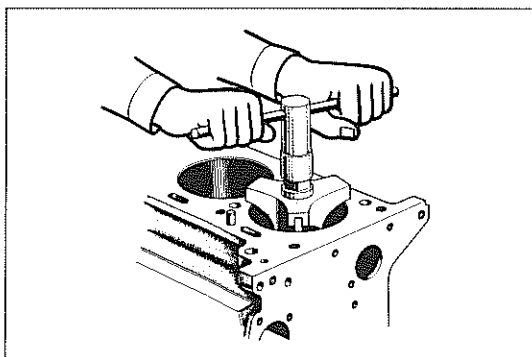
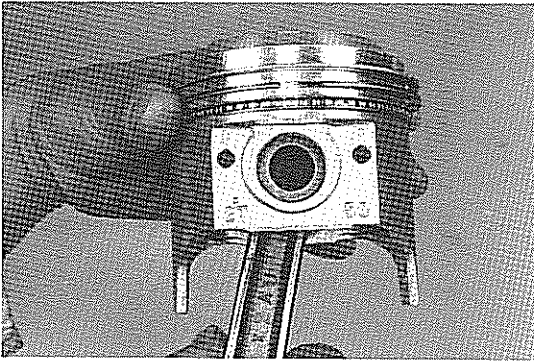


Fig. 4-130



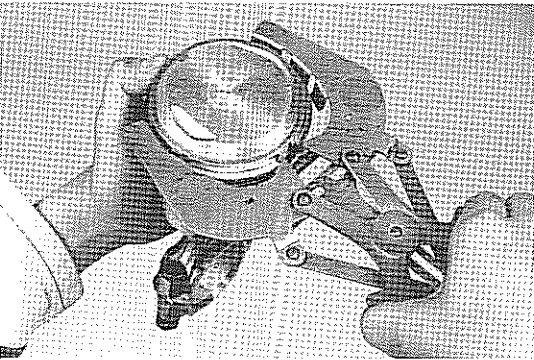
6. If the wear is less than 0.2 mm (0.008 in.), machine the piston ring ridge at the top of the cylinder with a ridge reamer.

Fig. 4-131

**Piston & Connecting Rod**

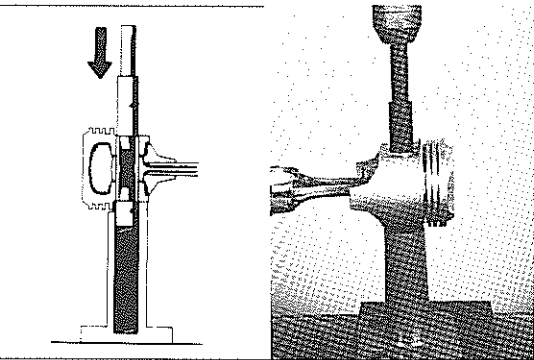
1. Check pin fit by trying to rock the piston at right angle to the pin. If any movement is felt, the piston with pin must be replaced.

Fig. 4-132



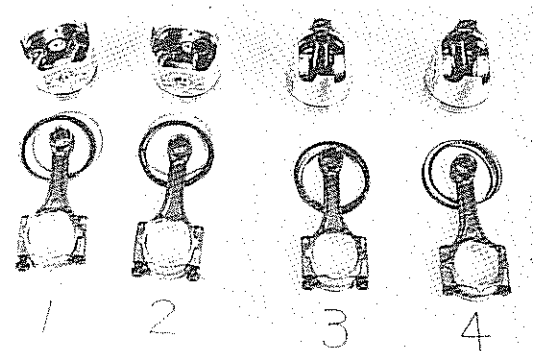
2. Remove the piston ring with a piston ring expander.

Fig. 4-133



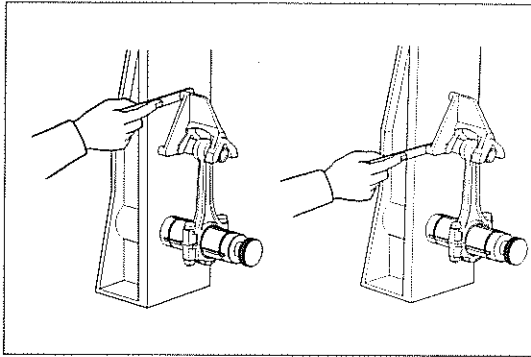
3. Press out the piston pin with SST. SST[09221-25014]

Fig. 4-134



4. After disassembly, arrange the pistons, pins, rings and rods in order.

Fig. 4-135

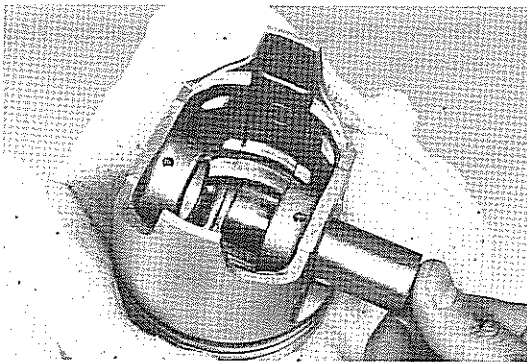


5. Inspect the connecting rod for bend or twisting.

Bend limit: 0.05 mm
(0.002 in.)

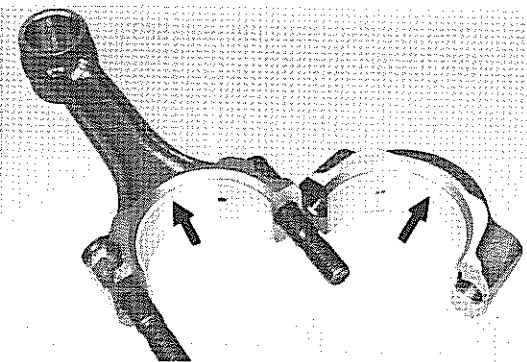
Twist limit: 0.05 mm
(0.002 in.)

Fig. 4-136



6. Coat pin with engine oil.
The pin should be able to be pushed into piston hole with thumb pressure.

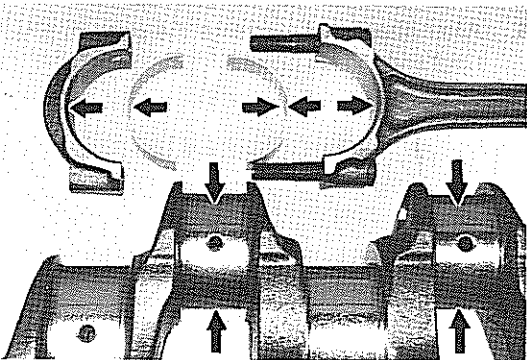
Fig. 4-137



Crank Pin & Bearing

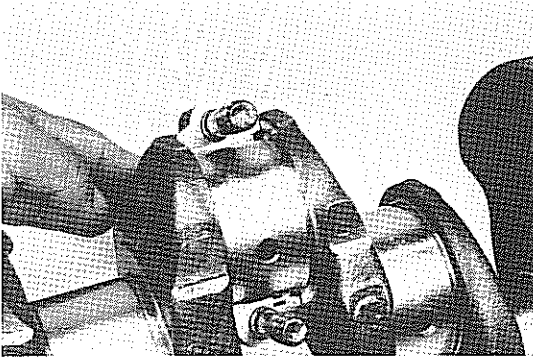
1. Inspect the bearings for flaking or scoring. If bearings are damaged, replace.

Fig. 4-138



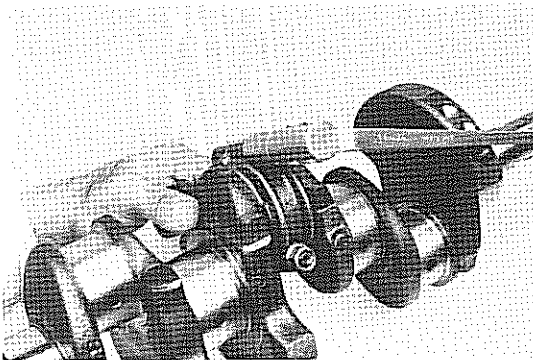
2. Measure the crank pin oil clearance.
(1) Clean the crankshaft pin, rod, cap and bearing.

Fig. 4-139



- (2) Lay a strip of plastigage across the pin.

Fig. 4-140



- (3) Tighten the cap nuts to specified torque.

Tightening torque:

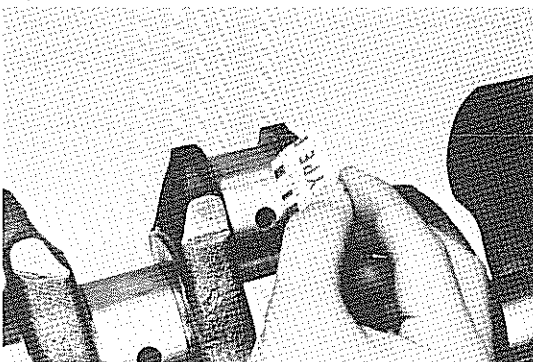
4.0 — 5.0 kg-m

(29 — 36 ft-lb)

— Note —

Do not turn the connecting rod.

Fig. 4-141



- (4) Measure the plastigage at its widest point.

If clearance is not within specification, replace the bearings.

Bearing oil clearance:

STD 0.024 — 0.048 mm

(0.0009 — 0.0019 in.)

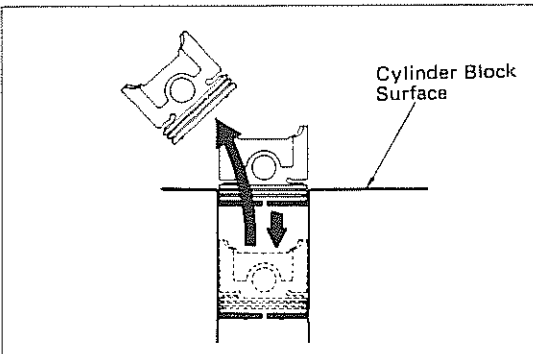
Limit 0.07 mm

(0.003 in.)

U/S bearing sizes:

U/S 0.05, 0.25, 0.50

Fig. 4-142

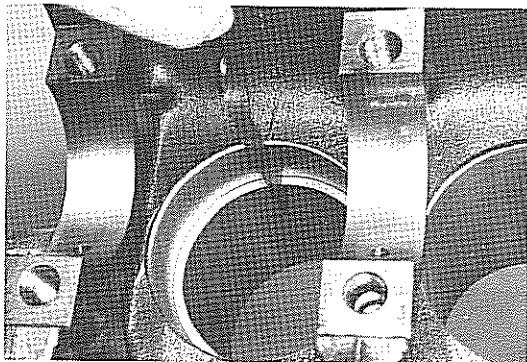


Piston Ring

1. Measure the ring end gap.

- (1) Insert the ring into the cylinder using a piston. With the ring at the lower part of the cylinder bore, measure the end gap.

Fig. 4-143

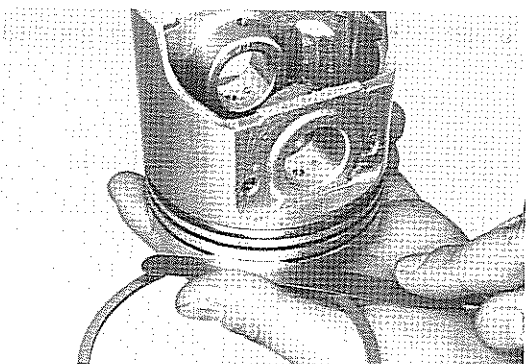


- (2) Measure the end gap. If it exceeds specification, the ring must be replaced.

End gap:

No.1	0.25 – 0.56 mm (0.010 – 0.022 in.)
No.2	0.20 – 0.51 mm (0.008 – 0.020 in.)
Oil	0.30 – 0.78 mm (0.012 – 0.030 in.)

Fig. 4-144

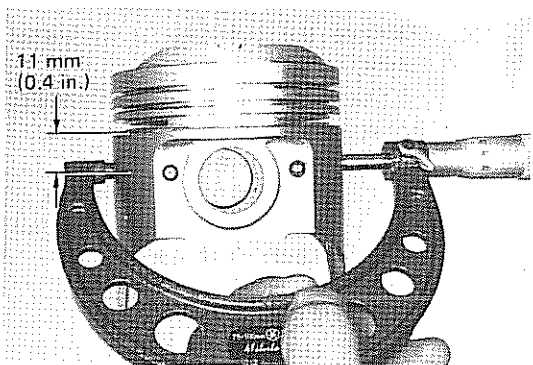


2. Measure the ring groove clearance. If it exceeds specification, replace ring and/or piston.

Ring groove clearance:

No.1	0.020 – 0.060 mm (0.0008 – 0.0024 in.)
No.2	0.015 – 0.055 mm (0.0006 – 0.0022 in.)
Oil	0.015 – 0.060 mm (0.0006 – 0.0024 in.)

Fig. 4-145

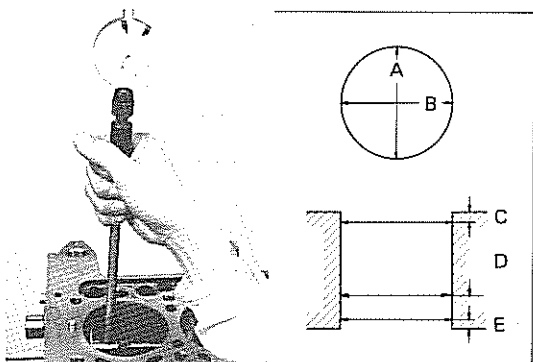
**Piston Clearance**

1. Measure the piston diameter at right angle to the piston pin center line.
Measurement must be made at normal temperature (20°C or 68°F).

Piston diameter:

STD	84.94 – 84.99 mm (3.344 – 3.346 in.)
-----	---

Fig. 4-146



2. Measure cylinder bore and subtract piston measurement. If clearance exceeds specification, replace piston.

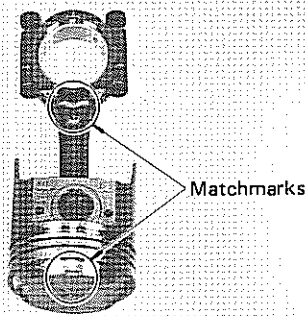
Piston oil clearance:

0.05 – 0.07 mm (0.002 – 0.003 in.)

— Note —

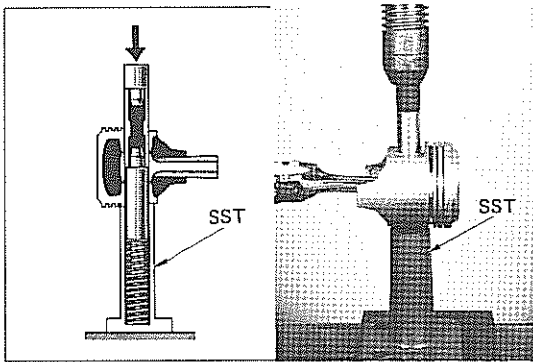
Use the measurement where wear is at maximum.

Fig. 4-147

**Assemble The Piston & Connecting Rod.**

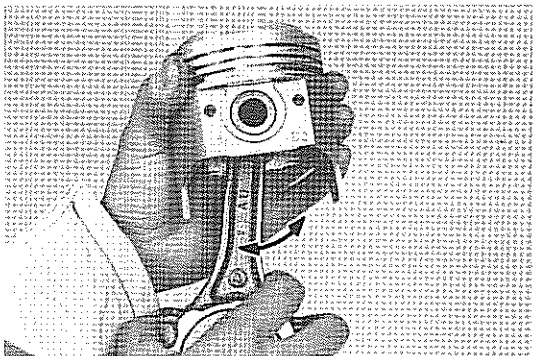
1. Align the notch on the piston with the  mark on the connector.

Fig. 4-148



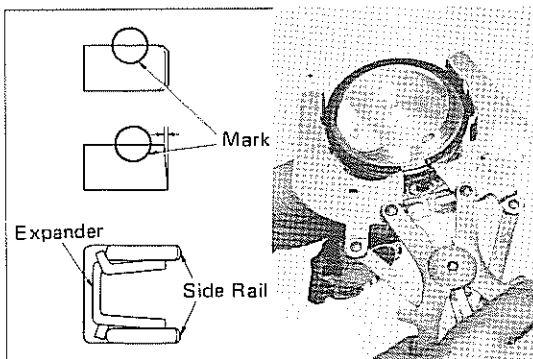
2. Press in the piston pin with SST, SST [09221-25014]

Fig. 4-149



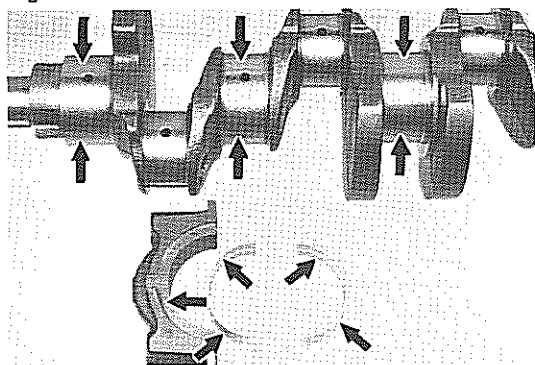
3. Check the pin fit by trying to rock piston at right angle to the pin.
If any movement is felt, the piston with pin must be replaced.

Fig. 4-150



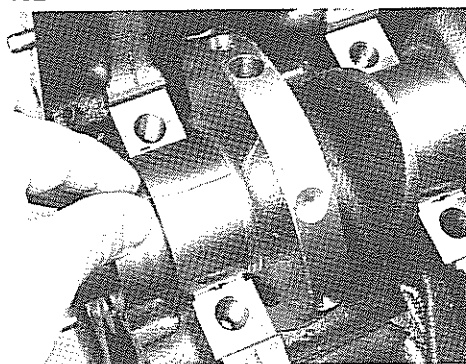
4. Install the piston ring with a piston ring expander.
Install the two compression rings with the code marks facing up.

Fig. 4-151

**Crankshaft & Bearing**

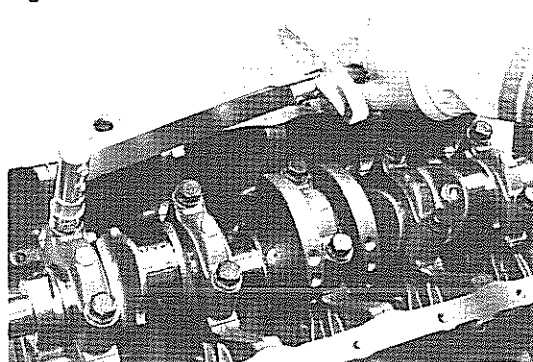
1. Measure the crankshaft oil clearance.
 - (1) Clean the journal, cap and bearing.

Fig. 4-152



- (2) Lay a strip of plastigage across the journal.

Fig. 4-153



- (3) Tighten the cap nuts to specified torque.

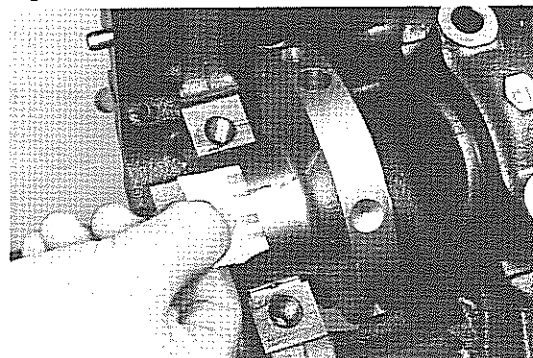
Tightening torque:

7.2 – 8.8 kg-m
(53 – 63 ft-lb)

— Note —

Do not turn the crankshaft.

Fig. 4-154



- (4) Measure the plastigage at its widest point. If clearance is not within specification, replace the bearing.

Bearing oil clearance:

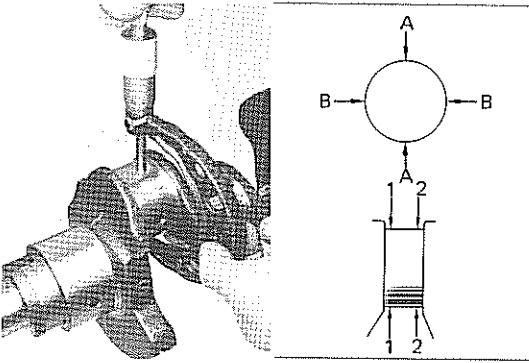
STD 0.024 – 0.048 mm
(0.0009 – 0.0019 in.)

Limit 0.07 mm
(0.003 in.)

U/S bearing sizes:

U/S 0.05, 0.25, 0.50

Fig. 4-155



2. Measure the crank pin journal.
If wear is excessive, the crankshaft must be reground or replaced.

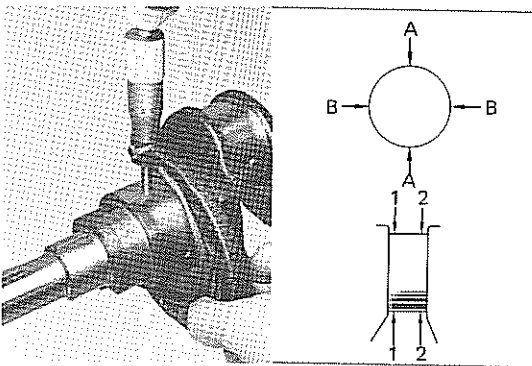
— Note —

Measure the A — B direction in two places.

Crank pin journal diameter:

STD	47.976 — 48.000 mm (1.8888 — 1.8898 in.)
U/S 0.05	47.93 — 47.95 mm (1.887 — 1.888 in.)
U/S 0.25	47.73 — 47.75 mm (1.879 — 1.880 in.)
U/S 0.50	47.48 — 47.50 mm (1.869 — 1.870 in.)

Fig. 4-156



3. Measure the crankshaft main journal.
If wear is excessive, the crankshaft must be reground or replaced.

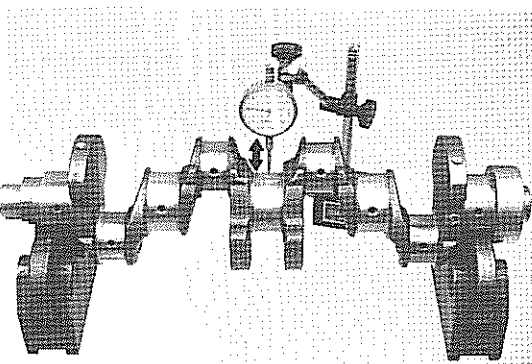
— Note —

Measure the A — B direction in two places.

Crankshaft main journal diameter:

STD	57.976 — 58.000 mm (2.2825 — 2.2835 in.)
U/S 0.05	57.93 — 57.95 mm (2.2807 — 2.2814 in.)
U/S 0.25	57.73 — 57.75 mm (2.2728 — 2.2736 in.)
U/S 0.50	57.48 — 57.50 mm (2.2630 — 2.2637 in.)

Fig. 4-157



4. Check the crankshaft for bend and if it exceeds the limit, replace.

**Runout limit: 0.06 mm
(0.002 in.)**

5. Check the journal and pin for streaks or burns.

Crankshaft Rear Oil Seal

1. Inspect the oil seal lip for wear or deformation. Also inspect crankshaft.
2. Remove the oil seal with a screwdriver.

Fig. 4-158

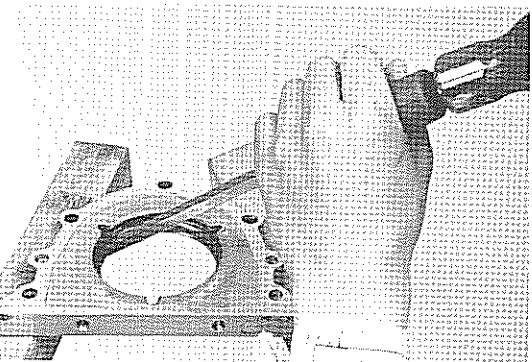
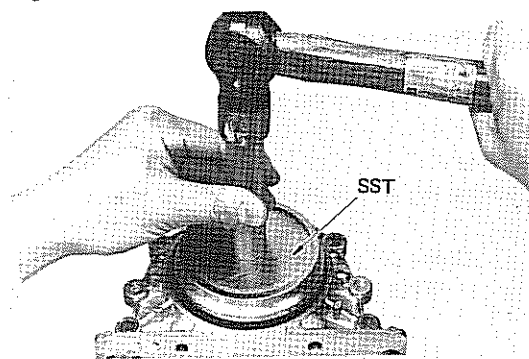


Fig. 4-159

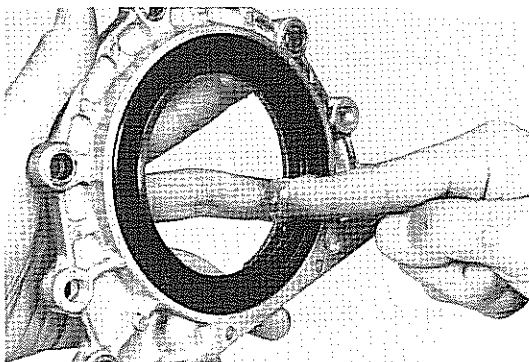


3. Install a new oil seal with SST.
SST[09250-10011]

— Note —

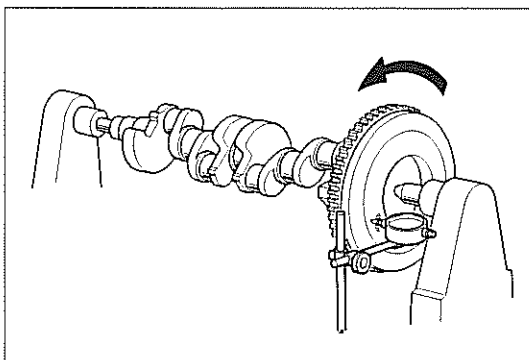
Be careful not to install the oil seal slantwise.

Fig. 4-160



4. After driving in the seal, lightly coat the seal lip with MP grease.

Fig. 4-161



Flywheel

1. Inspect the surface contacting the clutch disc.
2. Measure the runout of the surface contacting the clutch disc.
Runout limit: 0.1 mm (0.004 in.)
3. Inspect the ring gear.

ASSEMBLY

Assemble the parts in the numerical order shown in the figure.

Fig. 4-162

- Thoroughly clean the parts to be assembled.
- Apply clean engine oil on the sliding and rotating surfaces of the parts before assembly.

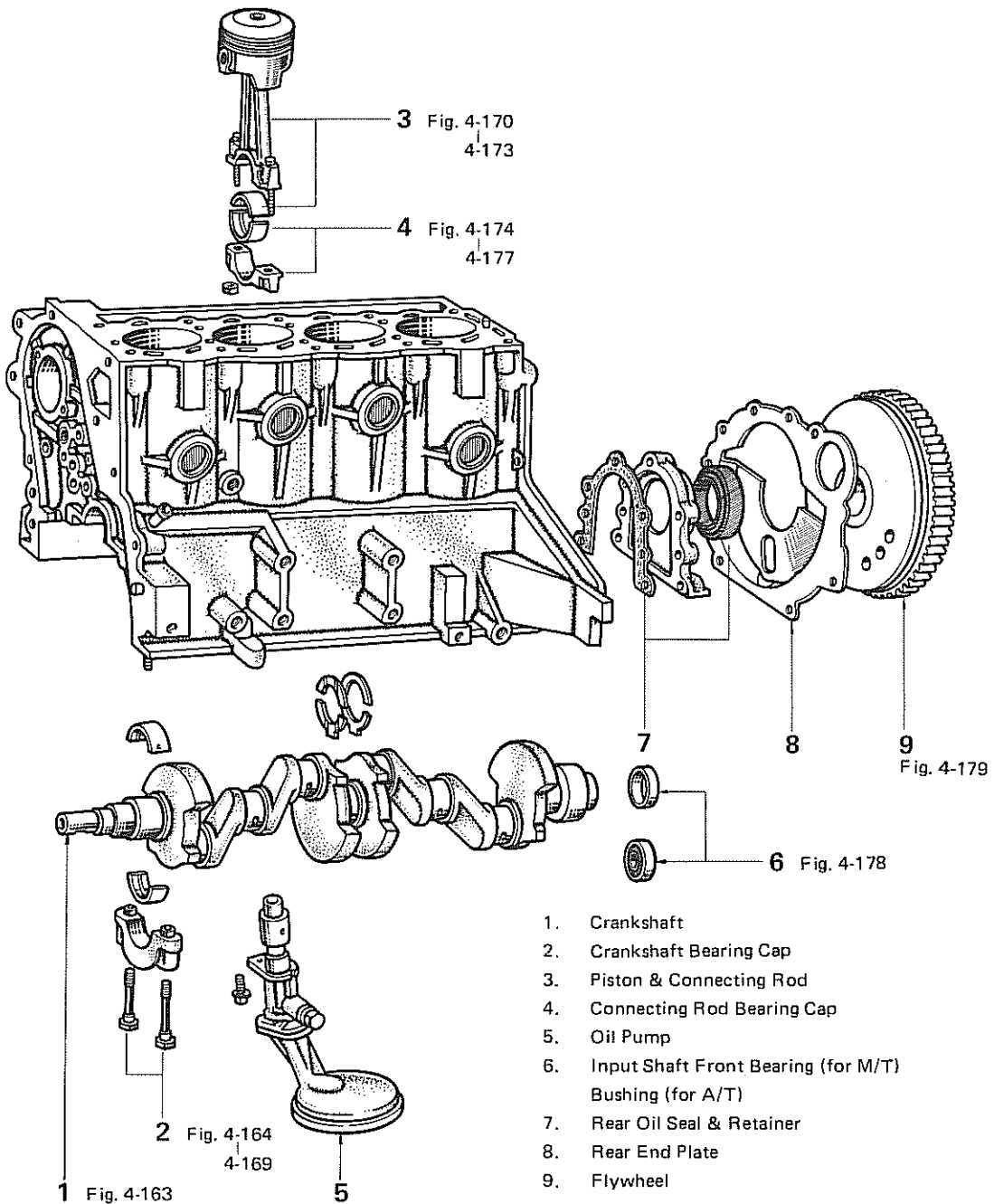
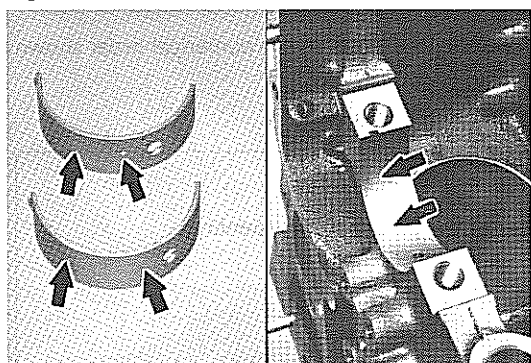
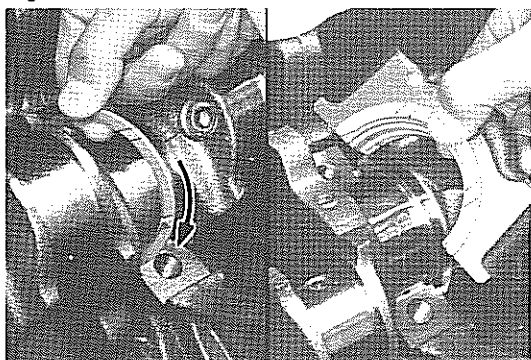


Fig. 4-163



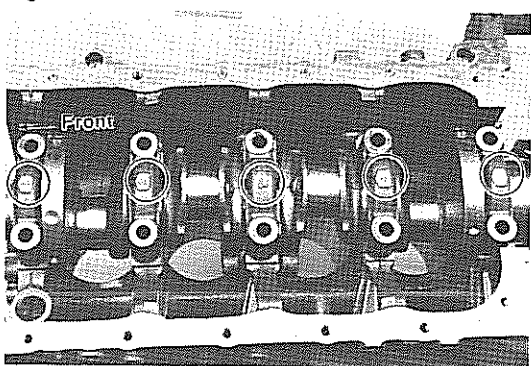
Do not allow oil to get on the back side of the bearing.

Fig. 4-164



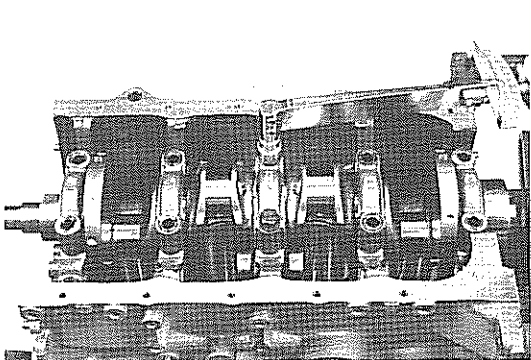
Face the oil groove of the thrust washer towards the outside.

Fig. 4-165



Face the arrows toward the front.

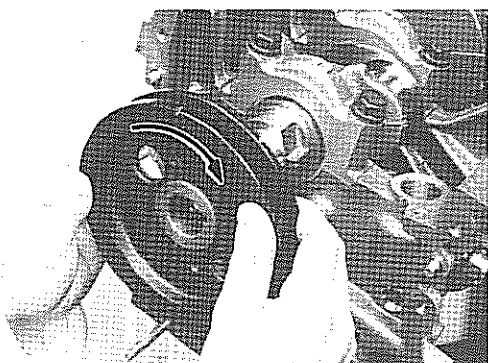
Fig. 4-166



Tighten the bearing caps to specified torque.

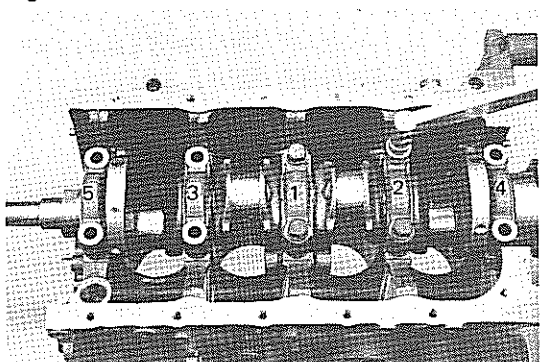
**Tightening torque: 7.2 – 8.8 kg-m
(53 – 63 ft-lb)**

Fig. 4-167



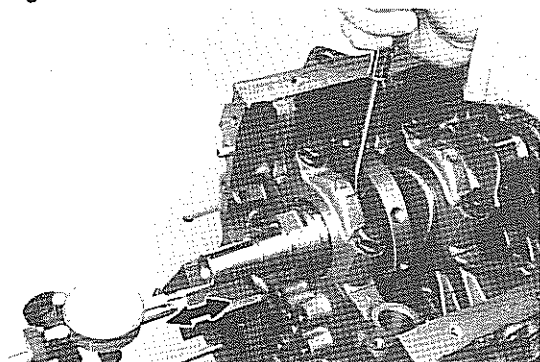
After tightening each bolt, check the rotation condition.

Fig. 4-168



Tighten the bearing caps in the order shown in the figure.

Fig. 4-169



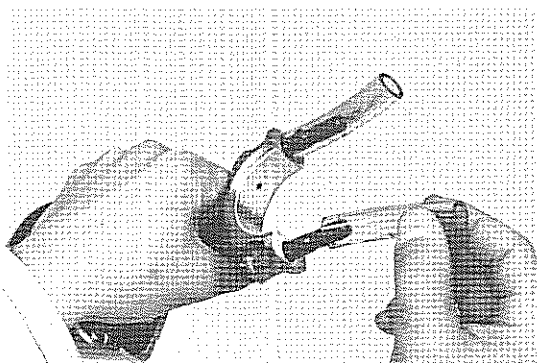
Measure the crankshaft thrust clearance.

Thrust clearance:

STD 0.02 – 0.22 mm
 (0.001 – 0.009 in.)

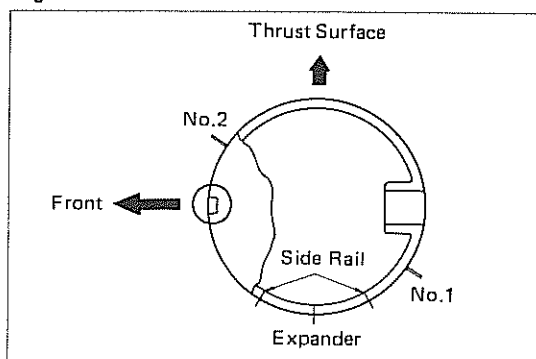
Limit 0.3 mm
 (0.01 in.)

Fig. 4-170



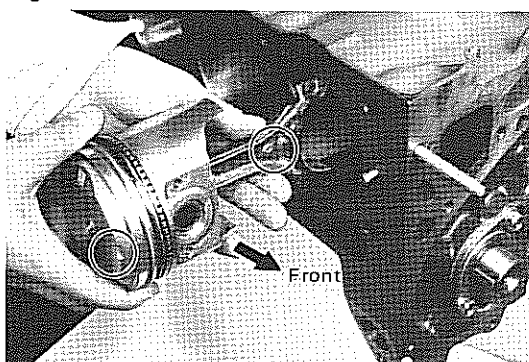
Cover the rod bolts with a hose to protect the crank pin from damage.

Fig. 4-171



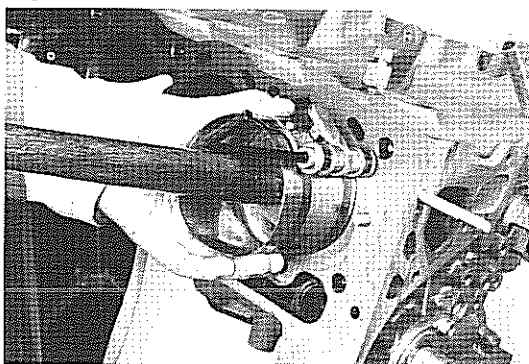
Position the ring gap in direction shown in the figure.

Fig. 4-172



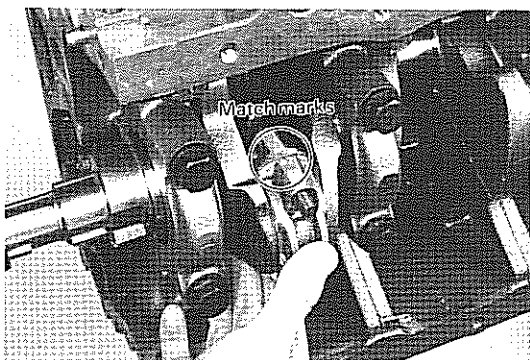
Push in each correctly numbered piston/rod assembly with the notch forward. The mark on the connecting rod should face toward the front.

Fig. 4-173



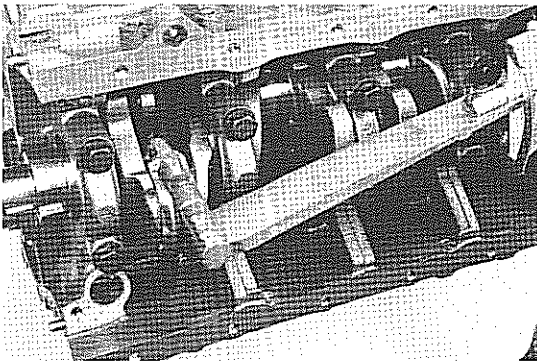
Insert pistons into the cylinder while compressing the rings with a piston ring compressor.

Fig. 4-174



Align the rod and cap marks and fit on the cap.

Fig. 4-175



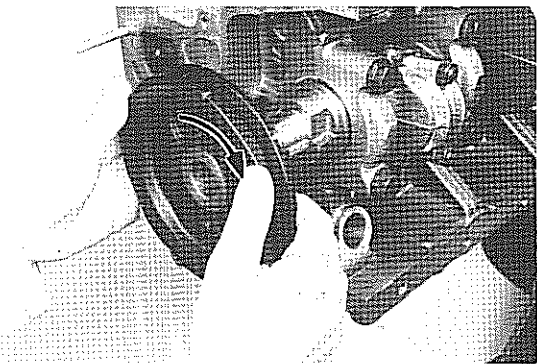
Tighten the rod cap to specified torque.

Tightening torque: 4.0 – 5.0 kg-m
(29 – 36 ft-lb)

– Note –

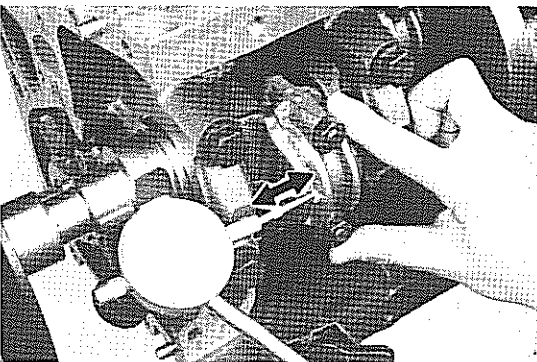
Check the rotation condition after tightening each cap.

Fig. 4-176



Insure that the crankshaft rotates smoothly.

Fig. 4-177



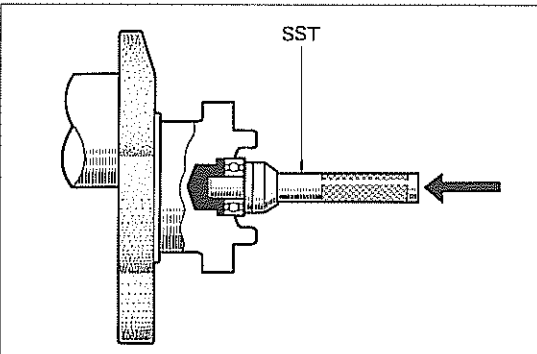
Check the connecting rod thrust clearance.

Thrust clearance:

STD 0.16 – 0.26 mm
(0.006 – 0.010 in.)

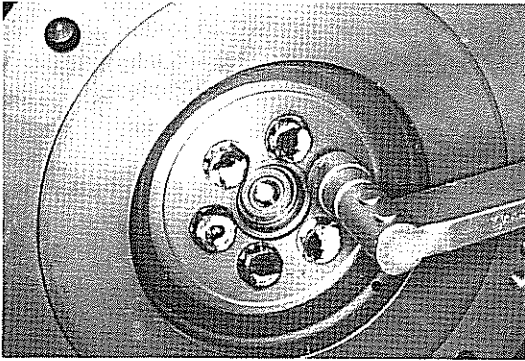
Limit 0.3 mm
(0.012 in.)

Fig. 4-178



Drive in the input shaft bearing with SST.
SST[09304-12012]

Fig. 4-179



Tighten the flywheel to specified torque.

Tightening torque: 5.8 — 6.6 kg-m
(42 — 47 ft-lb)

MEMO

2T-G ENGINE SERVICE

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CUTAWAY VIEW	5-2
CYLINDER HEAD	5-4
TIMING CHAIN	5-38
CYLINDER BLOCK	
SEE TO CYLINDER BLOCK OF 2T•3T ENGINE	
SERVICE SECTION	

CUTAWAY VIEW

Fig. 5-1

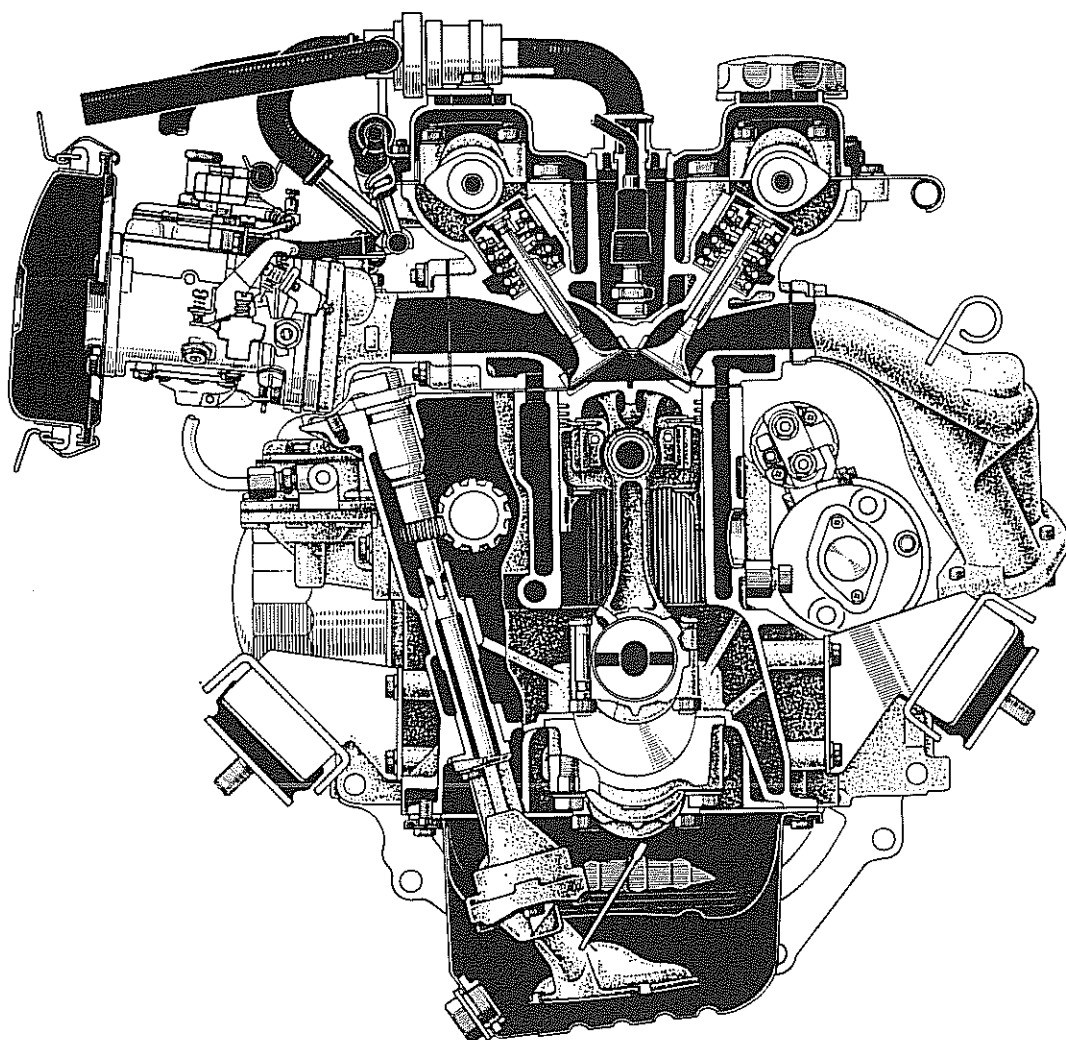
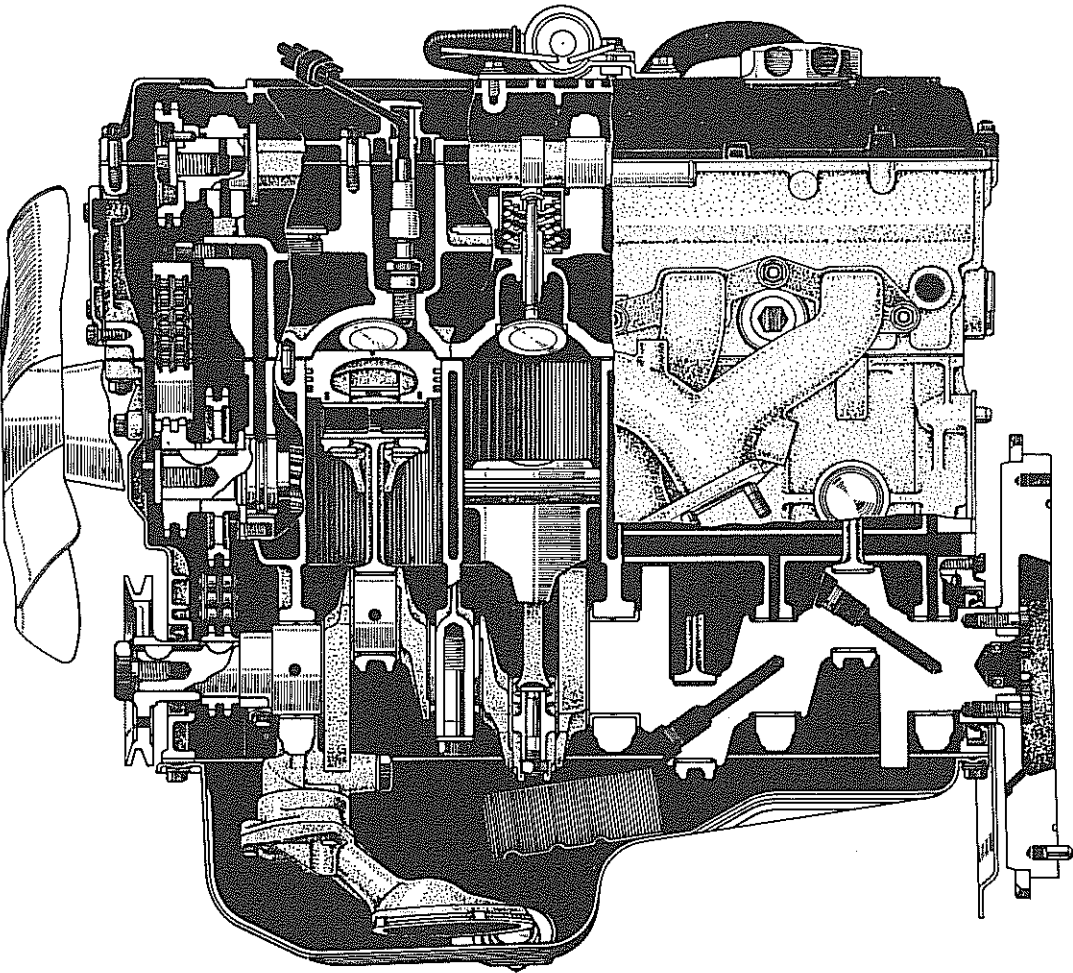


Fig. 5-2



CYLINDER HEAD

DISASSEMBLY

Disassemble the parts in the numerical order shown in the figure.

Fig. 5-3

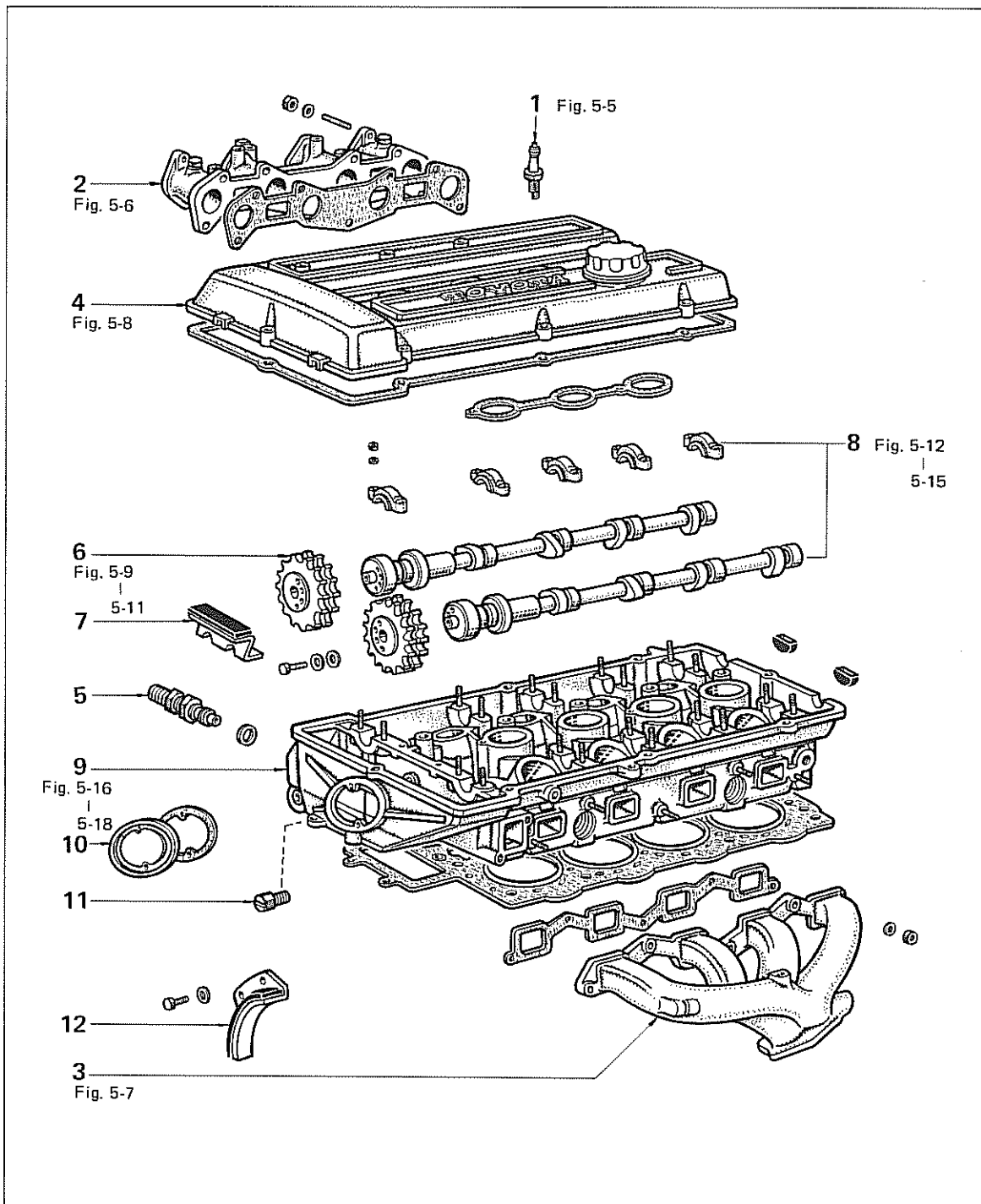
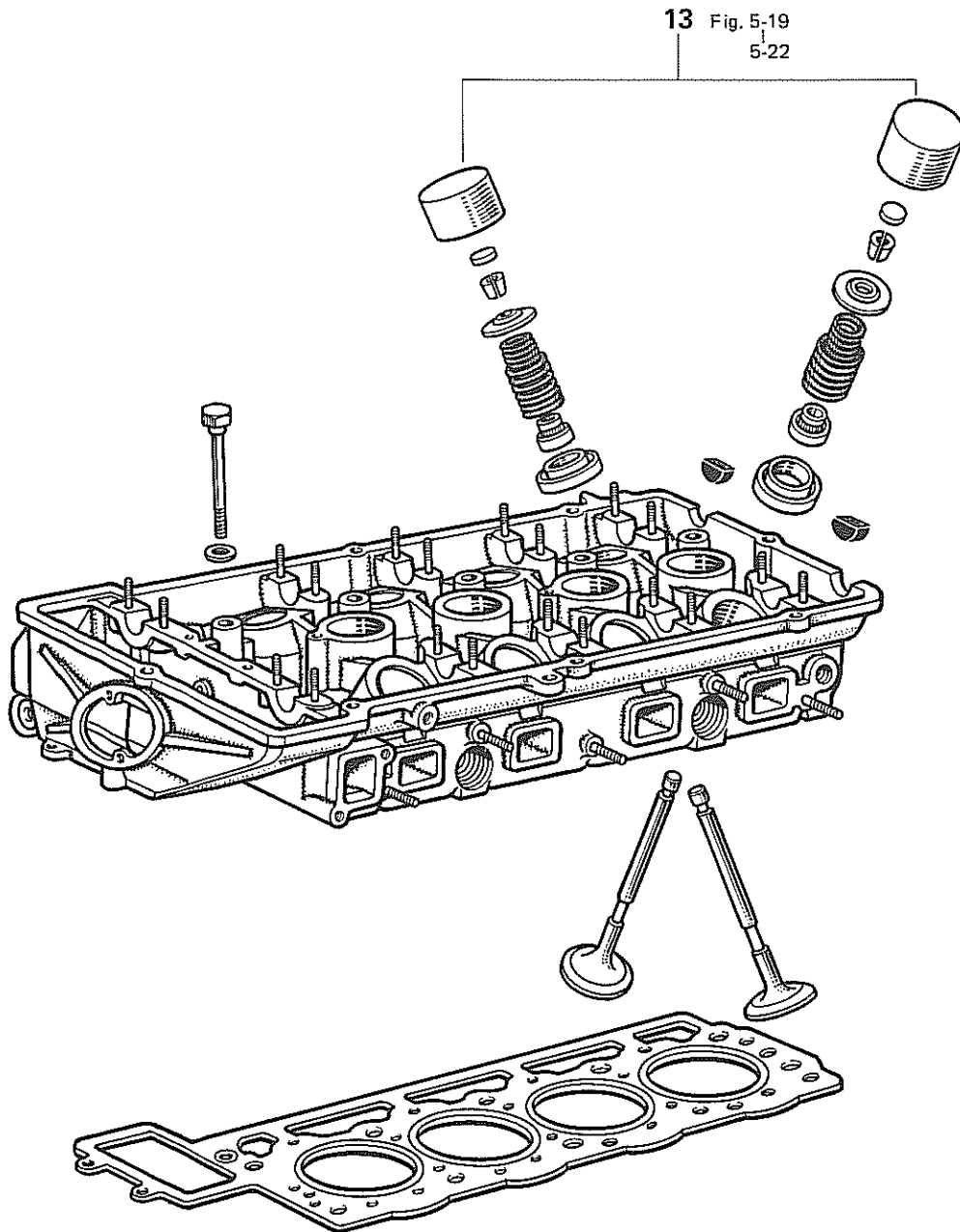
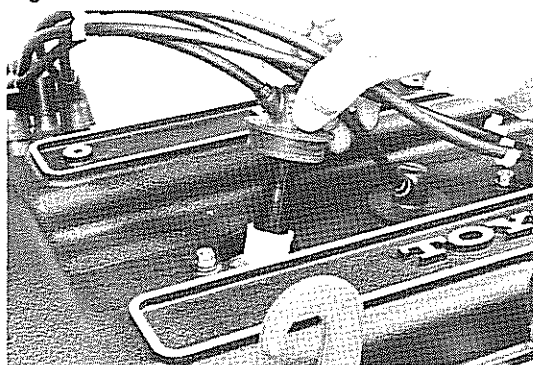


Fig. 5-4



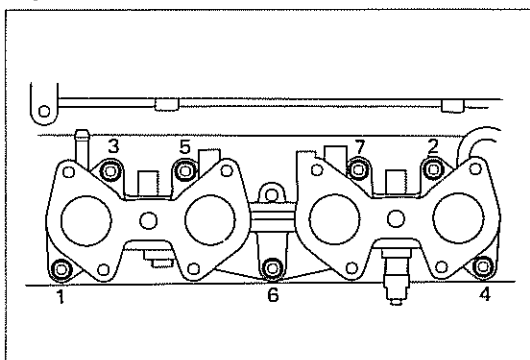
- | | |
|---------------------------------|---------------------------|
| 1. Spark Plug | 8. Camshaft & Bearing Cap |
| 2. Intake Manifold | 9. Cylinder Head |
| 3. Exhaust Manifold | 10. Front Cover |
| 4. Cylinder Head Cover & Gasket | 11. Oil Nozzle |
| 5. No.2 Chain Tensioner | 12. No.3 Vibration Damper |
| 6. Camshaft Timing Gear | 13. Valve & Spring |
| 7. No.2 Vibration Damper | |

Fig. 5-5



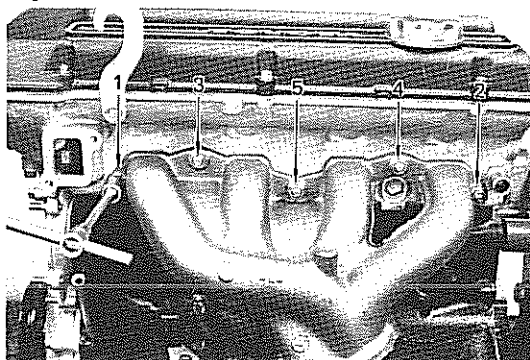
Remove the plug cords by carefully pulling on the rubber boots.

Fig. 5-6



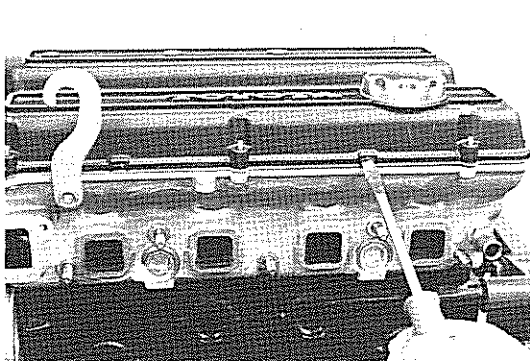
Loosen the intake manifold nut a little at a time and in the sequence shown in the figure.

Fig. 5-7



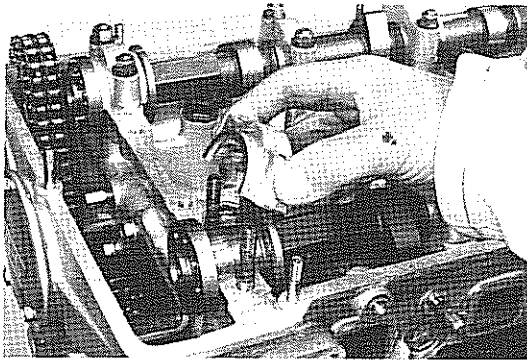
Loosen the exhaust manifold nut a little at a time and in the sequence shown in the figure.

Fig. 5-8



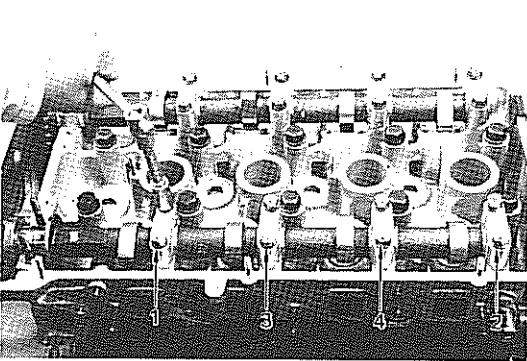
If the cylinder head cover is difficult to lift off, pry with a screwdriver between the head cover and head as shown in the figure.

Fig. 5-13



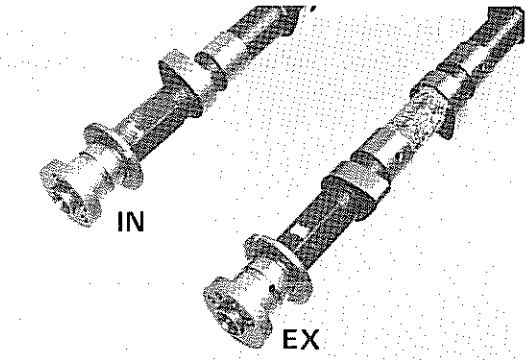
Remove the No.1 bearing cap.

Fig. 5-14



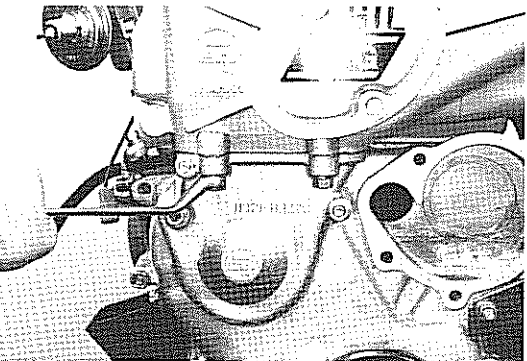
Loosen the other cap nuts a little at a time, in the sequence shown in the figure.

Fig. 5-15



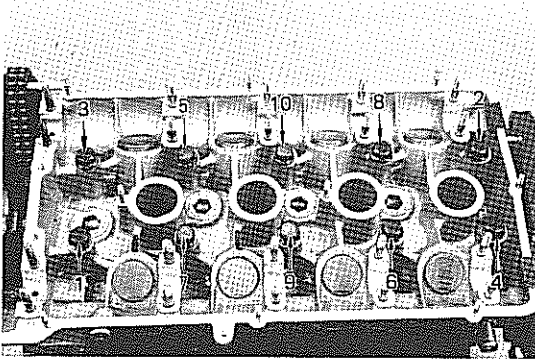
Separate the intake and exhaust camshafts.

Fig. 5-16



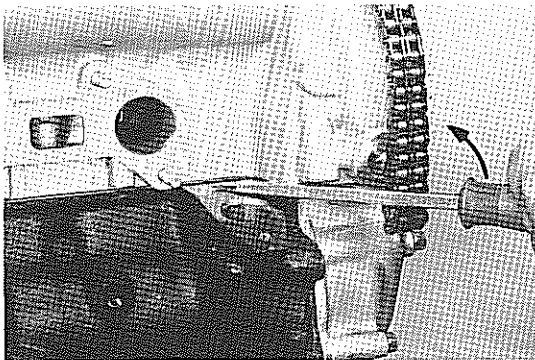
Remove the cylinder head front nuts.

Fig. 5-17



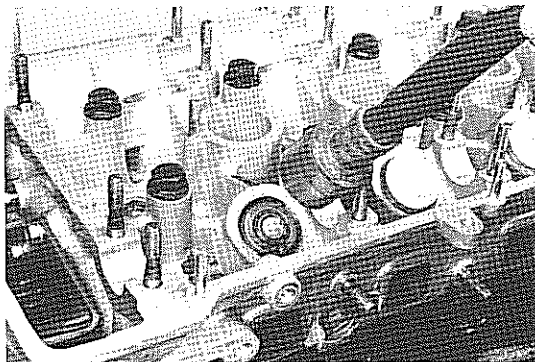
Loosen the cylinder head bolt a little at a time and in the sequence shown in the figure.

Fig. 5-18



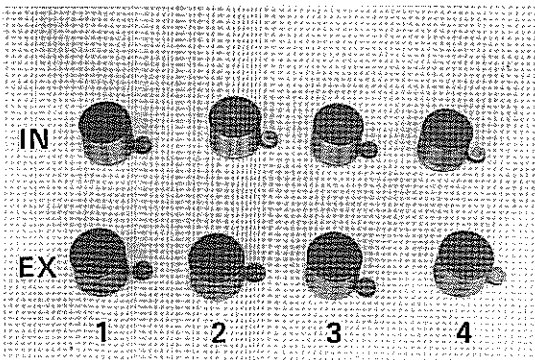
If the cylinder head is difficult to lift off, pry with a screwdriver between the head and block as shown in the figure.

Fig. 5-19



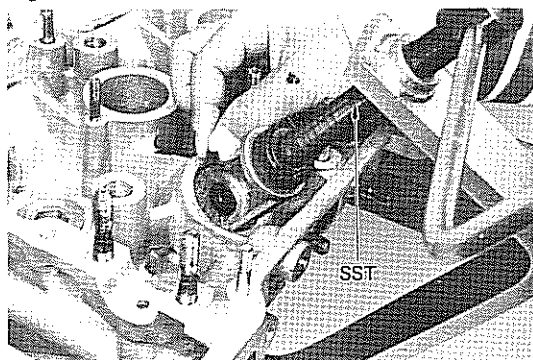
Removal is easier by holding the lifter with suction rubber and lifting it out of the hole as shown in the figure.

Fig. 5-20



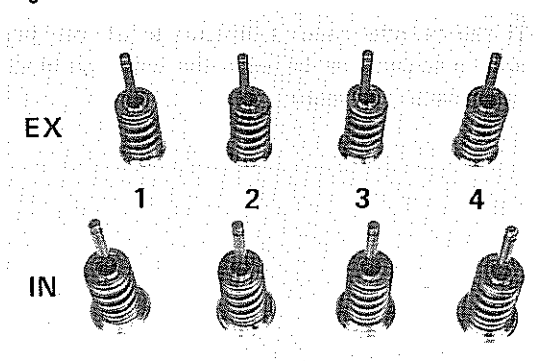
Arrange the lifters and pads in order.

Fig. 5-21



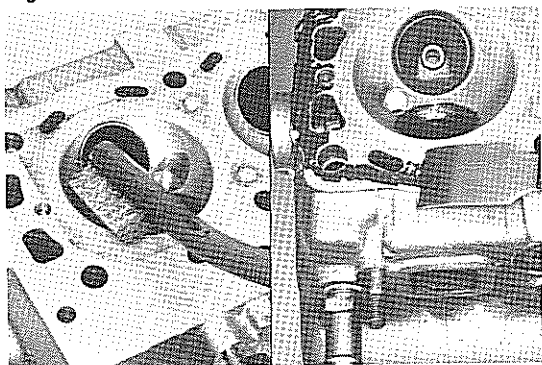
Remove the valve spring with SST.
SST [09202-43012]

Fig. 5-22



Arrange the disassembled parts in order.

Fig. 5-23



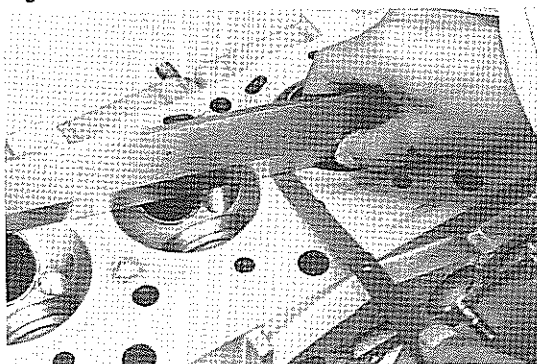
INSPECTION & REPAIR

Cylinder Head

1. Clean the combustion chamber and remove any gasket material from the manifold and head surface.

Check the cylinder head for cracks or excessively burnt valve surfaces.

Fig. 5-24



2. If warpage exceeds the limit, correct it by machining, or replace the head.

Cylinder head surface warpage:

Limit 0.05 mm
(0.002 in.)

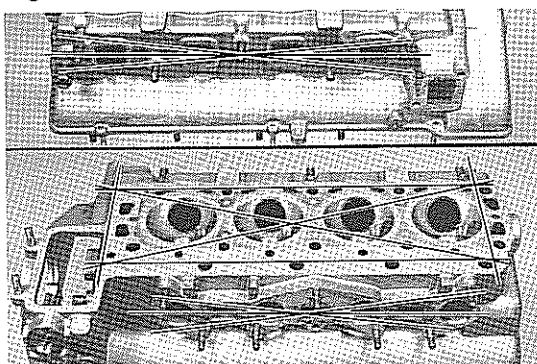
Maximum reface:

Limit 0.2 mm
(0.01 in.)

Manifold mounting surface warpage:

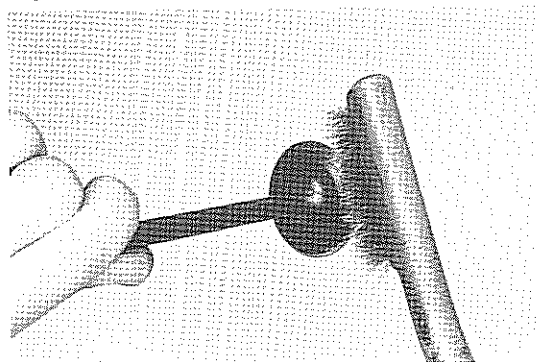
Limit 0.1 mm
(0.004 in.)

Fig. 5-25



3. Check the cylinder head surface flatness with a precision straight edge.

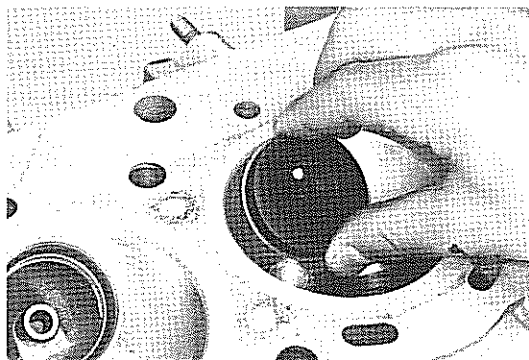
Fig. 5-26



Valve, Guide & Seat

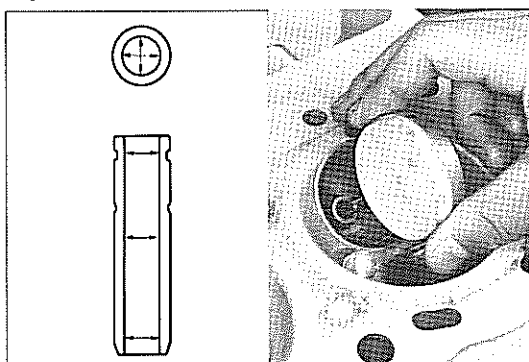
1. Clean the valves.

Fig 5-27



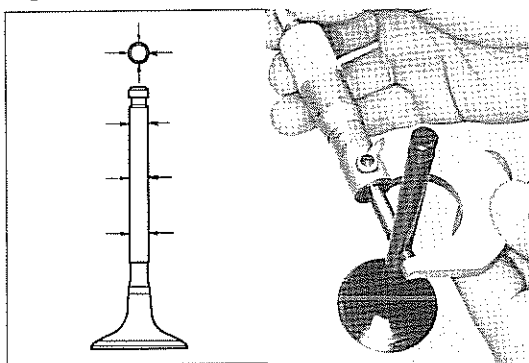
2. Check the valve stem to valve guide clearance of each valve by inserting the valve stem into the guide and moving back and forth as shown in the figure.

Fig. 5-28



3. Measure the valve stem oil clearance.
 - (1) Measure the inside diameter of the valve guide at several places with an inside dial gauge.

Fig. 5-29



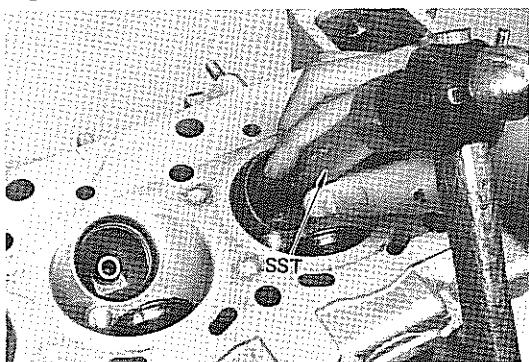
- (2) Measure the valve stem diameter.
- (3) Calculate the clearance between the valve stem and valve guide by subtracting the difference where the clearance is the largest.

Stem oil clearance:

Limit	IN	0.08 mm (0.003 in.)
	EX	0.10 mm (0.004 in.)

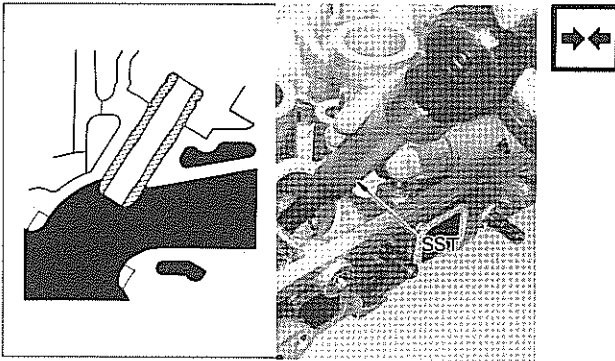
If the clearance exceeds the limit, replace both valve and guide.

Fig. 5-30



4. Replacing valve guide.
 - (1) Heat the cylinder head to about 80 – 100°C (176 – 212°F).
 - (2) From the top, drive out the guide toward the combustion chamber with SST.
SST[09201-60011]

Fig. 5-31

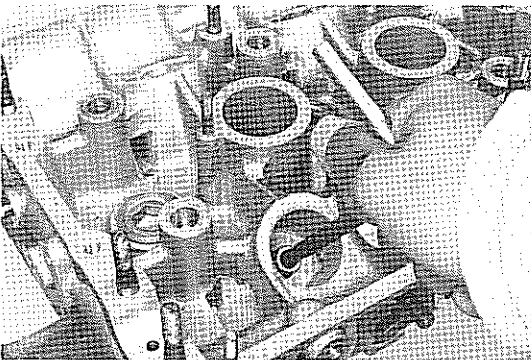


- (3) Drive in a new guide with SST until the snap ring contacts the cylinder head.
SST[09201-60011]

— Note —

1. Insure that the hole is clean.
2. Before inserting the guide apply a thin coat of oil to it and the guide hole.

Fig. 5-32



- (4) Ream the guide to the specified clearance with an 8 mm (0.3 in.) reamer.

Stem oil clearance:

STD

IN 0.025 – 0.055 mm
(0.0010 – 0.0022 in.)

EX 0.030 – 0.060 mm
(0.0012 – 0.0024 in.)

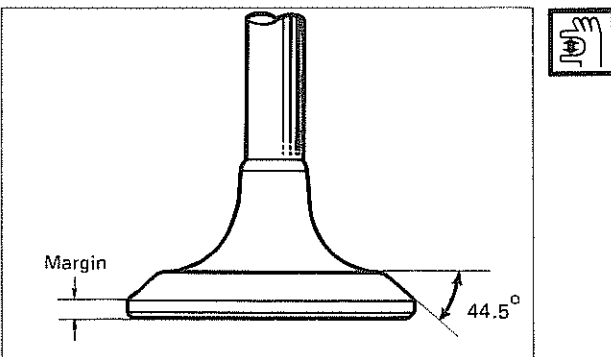
Fig. 5-33



5. Grinding valves and seats.
- (1) Grind all valves to remove the pits and carbon.

Valve face angle: 44.5°

Fig. 5-34



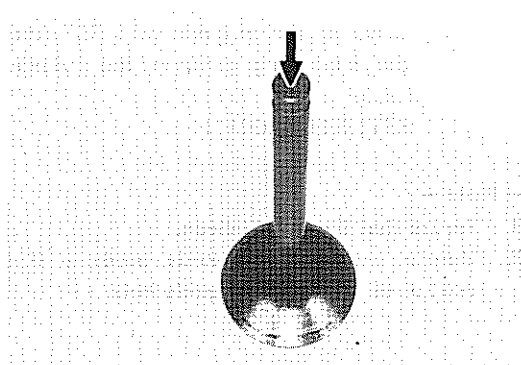
- (2) Check the valve head margin and replace if less than specified.

Head edge thickness:

Limit IN 0.8 mm
(0.03 in.)

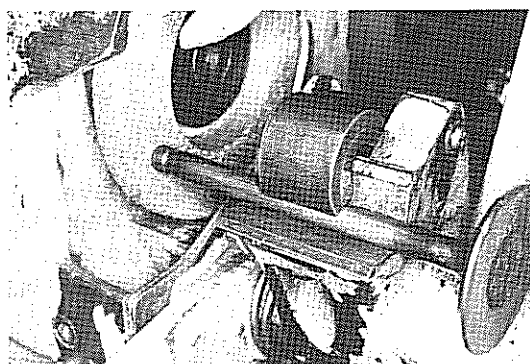
EX 1.2 mm
(0.05 in.)

Fig. 5-35



- (3) Inspect the valve stem tip.

Fig. 5-36

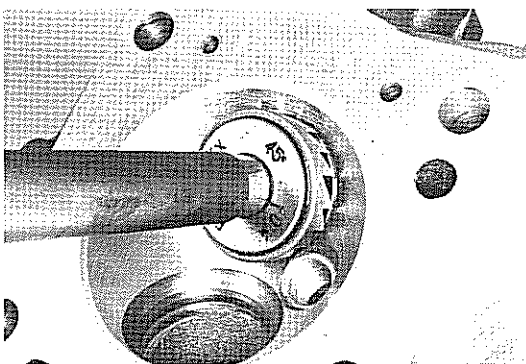


- (4) If the valve stem end is worn, resurface with a valve grinder, but do not grind off more than 0.5 mm (0.02 in.).

Overall length:

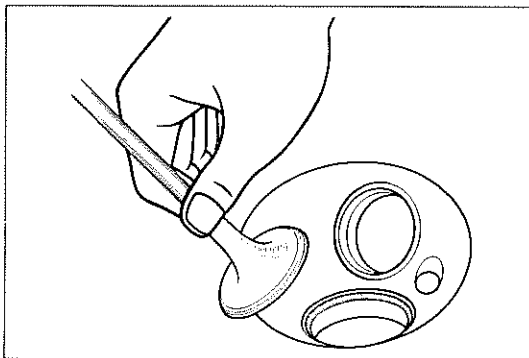
Limit	IN	105.7 mm (4.16 in.)
	EX	104.6 mm (4.12 in.)

Fig. 5-37



- (5) Resurface the valve seats with a 45° carbide cutter. Remove only enough metal to clean the seat.

Fig. 5-38



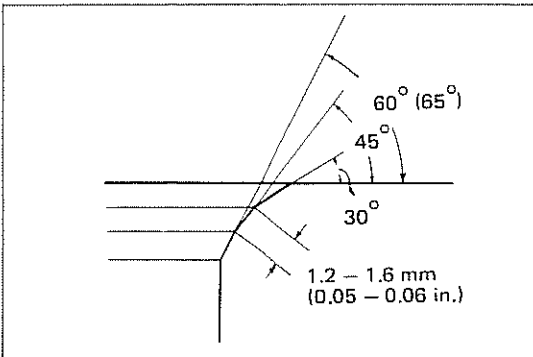
- (6) Coat the valve face with prussion blue or white lead. Locate the contact point on the valve by rotating the valve against seat.

— Note —

Seat contact should be in middle of the valve face with the following width:

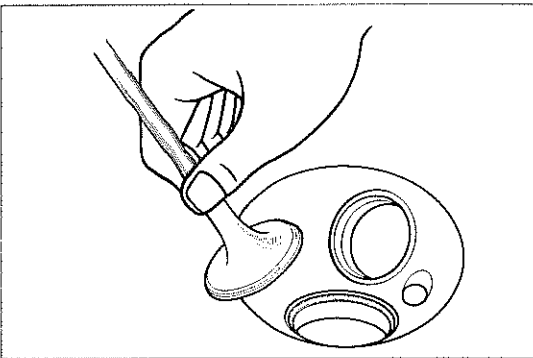
IN	1.2 – 1.6 mm (0.05 – 0.06 in.)
EX	1.2 – 1.6 mm (0.05 – 0.06 in.)

Fig. 5-39



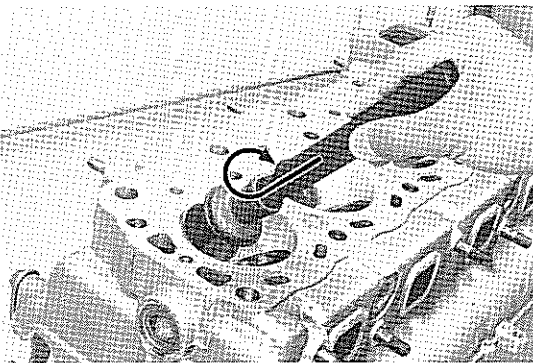
- (7) Correct the seat position.
To correct seating that is too high, use 30° and 45° cutters. If seating is too low, use 60° and 45° cutters.

Fig. 5-40



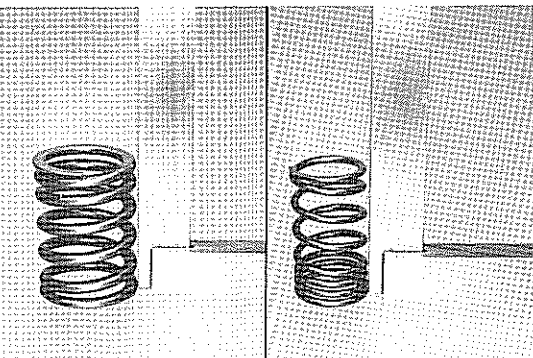
- (8) Check valve concentricity.
Lightly coat seat with prussian blue. Install valve and rotate. If blue appears 360° around face, valve stem and face are concentric. If not, replace the valve.

Fig. 5-41



- (9) Grind the valves.
Slightly turn the valve with each tap to the seat surface.

Fig. 5-42



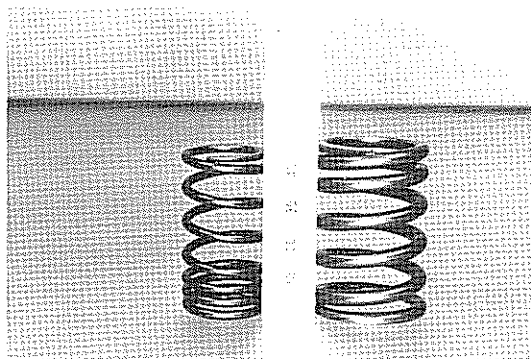
Valve Spring

1. Check the squareness of the valve springs with a steel square and surface plate. Turn the spring around slowly and observe the space between the top of the spring and the square. Replace the spring if it is out of square more than the specified limit.

Squareness limit:

Inner	1.6 mm (0.06 in.)
Outer	1.6 mm (0.06 in.)

Fig. 5-43



2. Measure the spring free height. Replace springs that do not meet specification.

Free length:	Inner	45.9 mm (1.81 in.)
	Outer	47.4 mm (1.87 in.)

3. Using a spring tester, measure the tension of each spring at the specified installed height. Replace any spring that does not meet specification.

Installed length:	Inner	36.5 mm (1.44 in.)
	Outer	39.0 mm (1.54 in.)

Installed load:

STD	Inner	7.3 kg (16.1 lb)
	Outer	23.7 kg (52.3 lb)
Limit	Inner	6.7 kg (14.8 lb)
	Outer	21.8 kg (48.1 lb)

Fig. 5-44

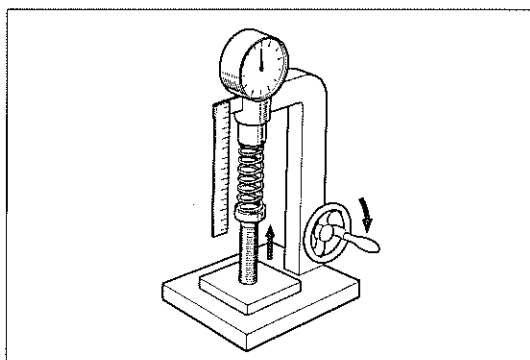
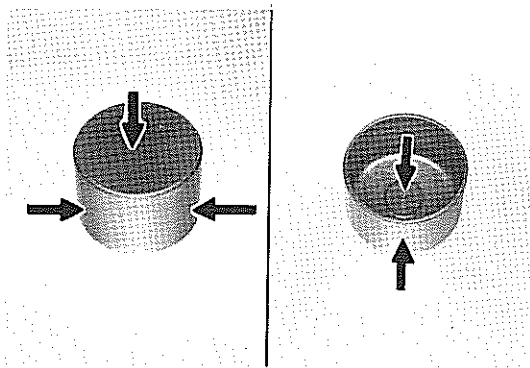
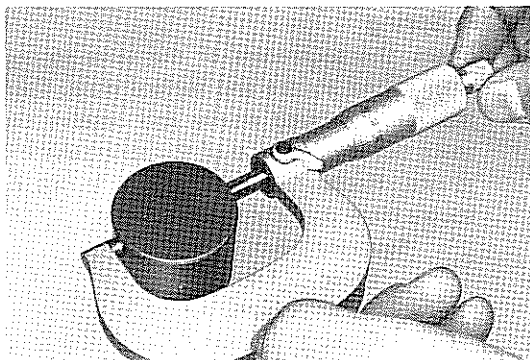


Fig. 5-45

**Valve Lifter**

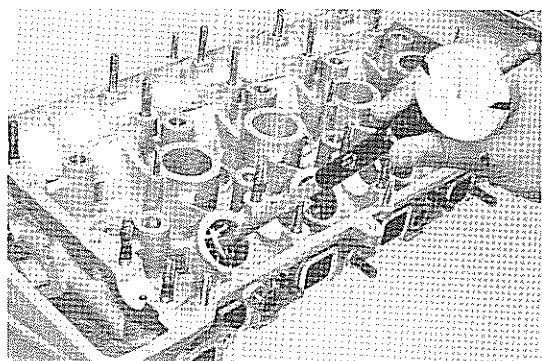
1. Inspect for wear or damage.

Fig. 5-46



2. Measure the valve lifter oil clearance.
 - (1) Measure the outside diameter of the lifters.

Fig. 5-47

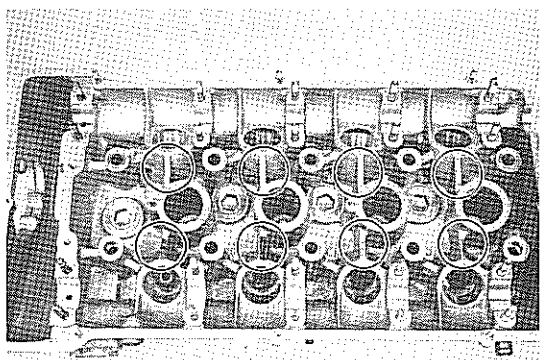


- (2) Measure the inside diameter of cylinder head.

Oil clearance:

STD	0.02 – 0.03 mm (0.0008 – 0.0012 in.)
Limit	0.1 mm (0.004 in.)

Fig. 5-48

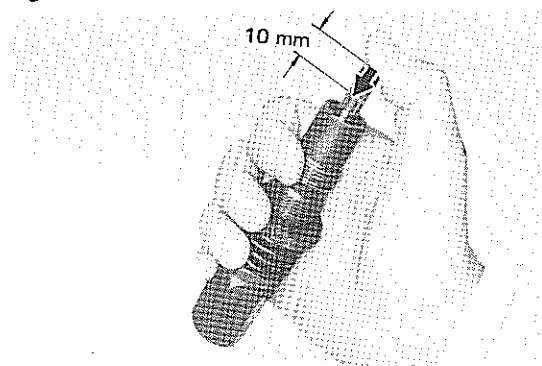


3. Valve lifter selective fits.

mm (in.)

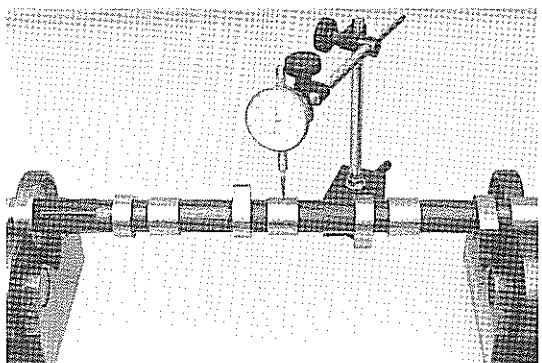
Fit code (Paint)	Cylinder head valve lifter bore	Valve lifter outer diameter
Black	37.951–37.957 (1.4941–1.4944)	37.925–37.931 (1.4931–1.4933)
Blue	37.957–37.963 (1.4944–1.4946)	37.931–37.937 (1.4933–1.4936)
Yellow	37.963–37.969 (1.4946–1.4948)	37.937–37.943 (1.4936–1.4938)
Red	37.969–37.975 (1.4948–1.4951)	37.943–37.949 (1.4938–1.4941)

Fig. 5-49

**No.2 Chain Tensioner****Air Seal Test**

1. Immerse the plunger in engine oil and bleed the air.
2. Press plunger with thumb a 10 mm (0.4 in.) stroke should take 3 seconds or more.

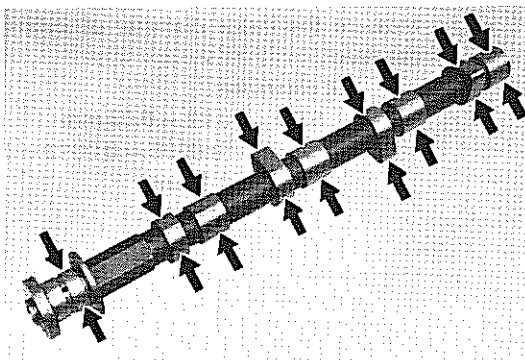
Fig. 5-50

**Camshaft & Bearing**

1. Check the camshaft for runout. Replace camshaft if it exceeds limit.

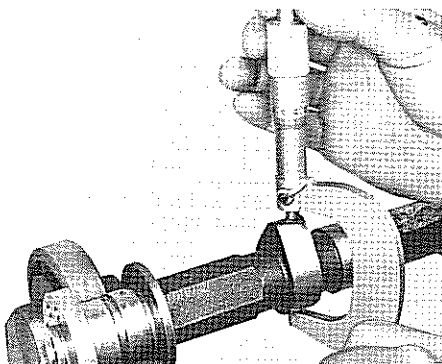
Runout limit: **0.04 mm**
(0.0016 in.)

Fig. 5-51



2. Inspect the cam lobe and journal for cracks, wear or chipped teeth. If damaged, replace the camshaft.

Fig. 5-52

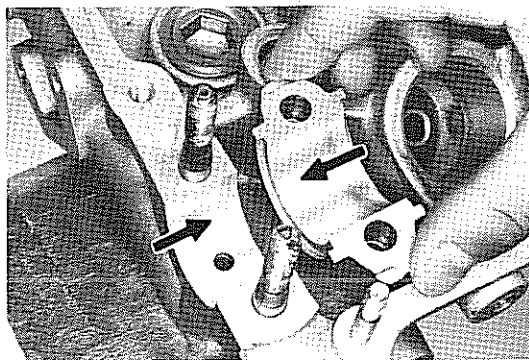


3. Measure the cam lobe height and check for wear. If wear exceeds the limit, replace the camshaft.

Cam height:

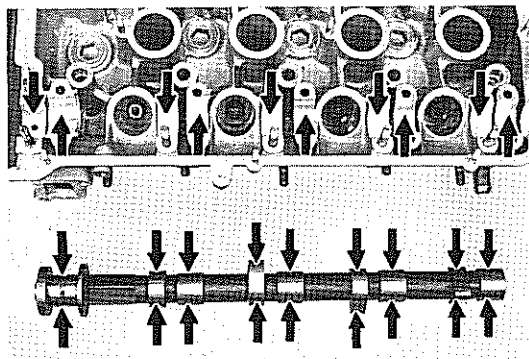
STD	46.37 – 46.47 mm (1.826 – 1.830 in.)
Limit	46.0 mm (1.81 in.)

Fig. 5-53



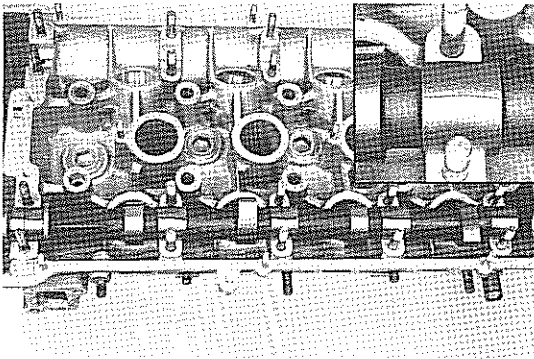
4. Check the bearing for flaking or scoring.

Fig. 5-54



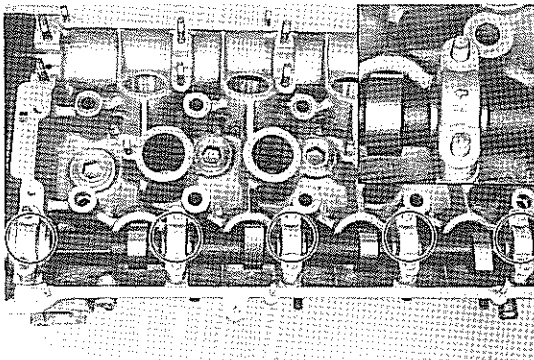
5. Measure the camshaft oil clearance.
 - (1) Clean the bearing, cap and camshaft journal.

Fig. 5-55



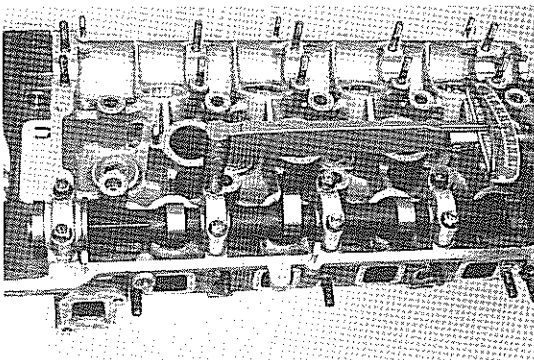
- (2) Place a piece of plastigage across the full width of the journal surface.

Fig. 5-56



- (3) When installing the bearing caps, insure that the front marks and imprinted numbers match.

Fig. 5-57



- (4) Install the bearing cap and tighten bolts to specified torque.

Tightening torque:

1.2 – 1.8 kg-m

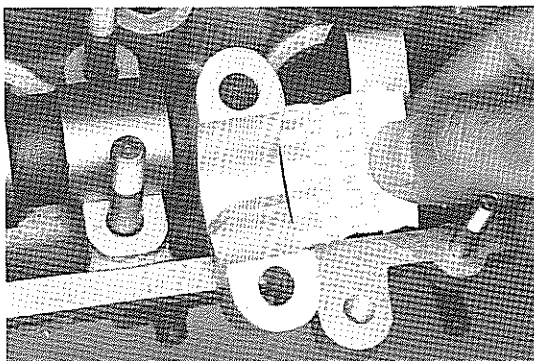
(9 – 13 ft-lb)

— Note —

Do not turn camshaft while plastigage is in place.

- (5) Remove the bearing caps.

Fig. 5-58



- (6) With the plastigage scale, measure the width of the plastigage at its widest point. If clearance exceeds the specification limit, adjust with a suitable bearing size.

Oil clearance:

STD 0.025 – 0.062 mm
(0.0010 – 0.0024 in.)

Limit 0.15 mm
(0.006 in.)

Fig. 5-59

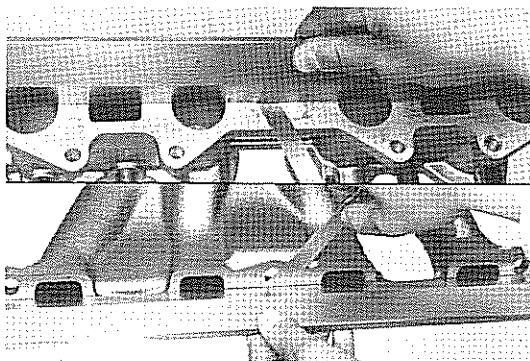
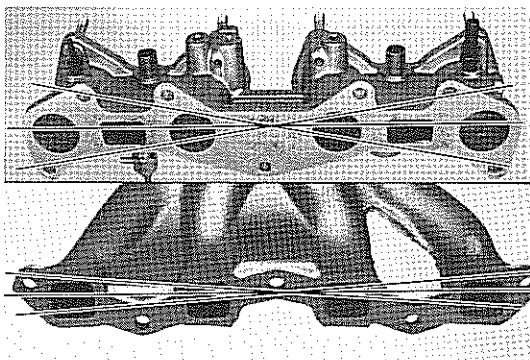


Fig. 5-60

**Manifold**

1. Inspect the cylinder head contacting surfaces for warpage and replace the manifold if it exceeds the limit.

Installing surface warpage:

**Limit 0.1 mm
 (0.004 in.)**



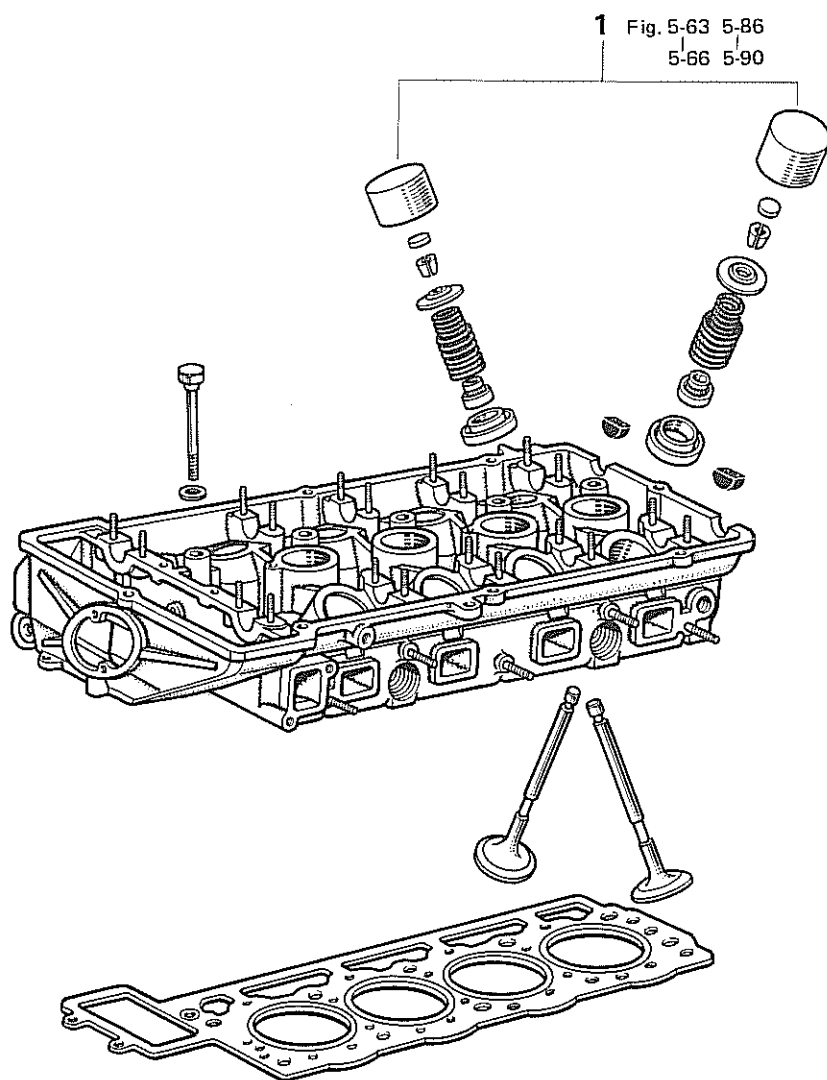
2. Check manifold surface for flatness with a precision straight edge.

ASSEMBLY

Assemble the parts in the numerical order shown in the figure.

Fig. 5-61

- Thoroughly clean the parts to be assembled.
- Apply clean engine oil on the sliding and rotating surfaces of the parts before assembly.



- | | |
|---------------------------|--------------------------|
| 1. Valve & Spring | 8. No.2 Chain Tensioner |
| 2. Cylinder Head | 9. No.2 Vibration Damper |
| 3. No.3 Vibration Damper | 10. Cylinder Head Cover |
| 4. Oil Nozzle | 11. Exhaust Manifold |
| 5. Front Cover | 12. Intake Manifold |
| 6. Camshaft & Bearing Cap | 13. Spark Plug |
| 7. Camshaft Timing Gear | |

Fig. 5-62

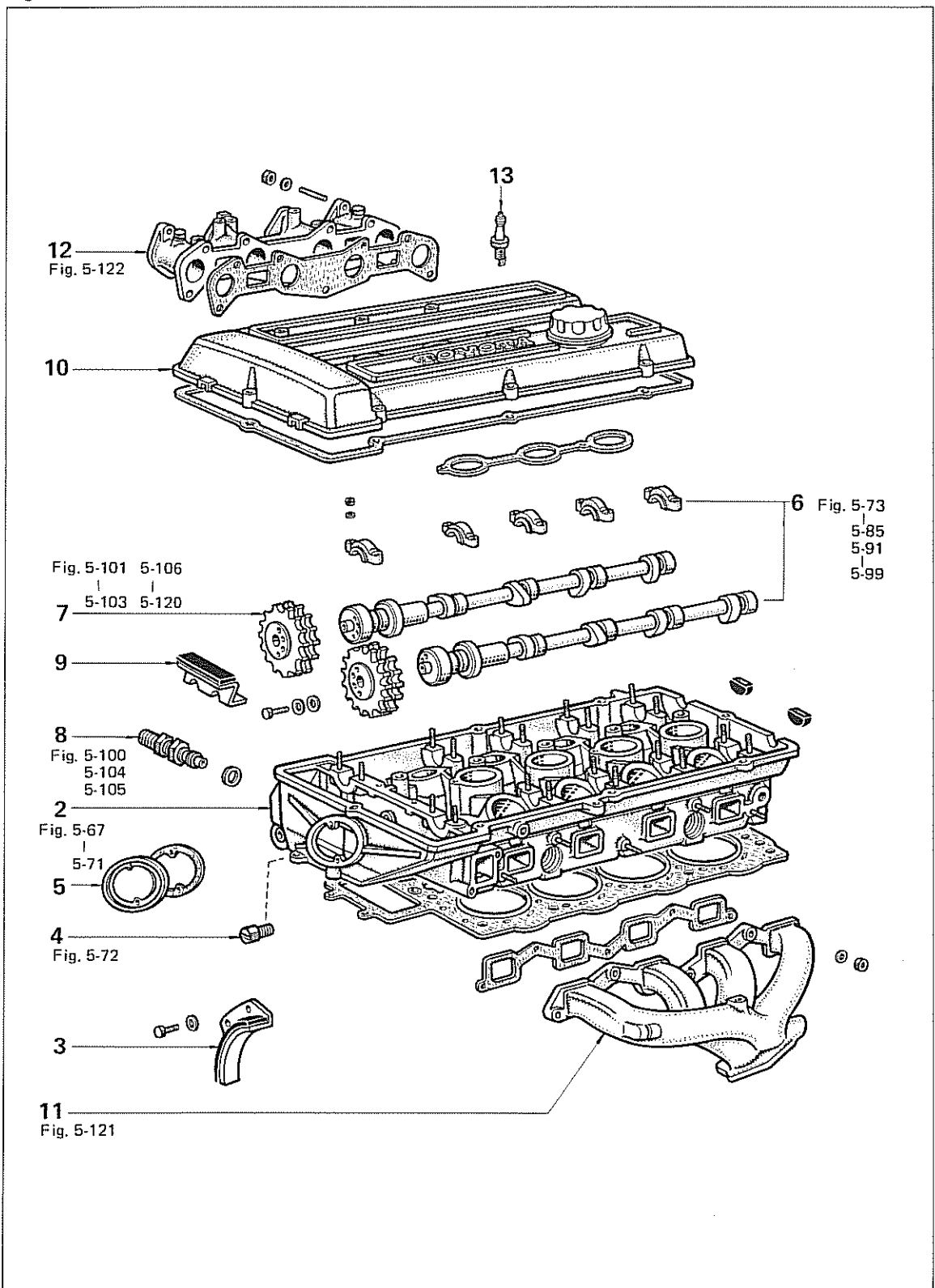
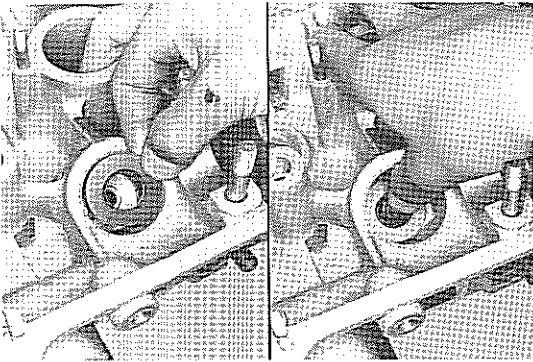
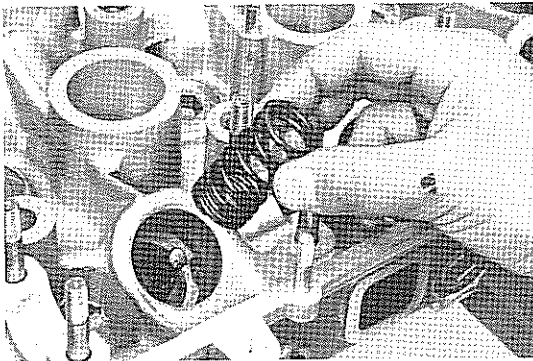


Fig. 5-63



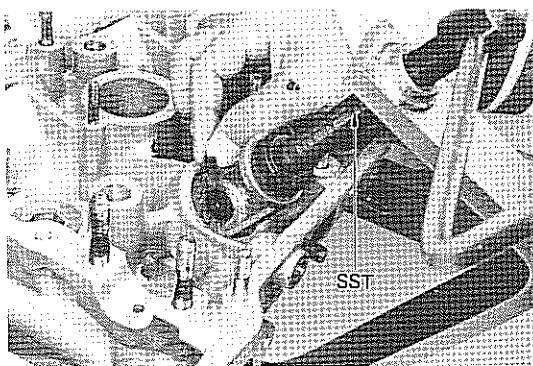
Install the spring seat and oil seal as shown in the figure. The head must be clean and the oil seal inserted to where the end contacts the spring seat top.

Fig. 5-64



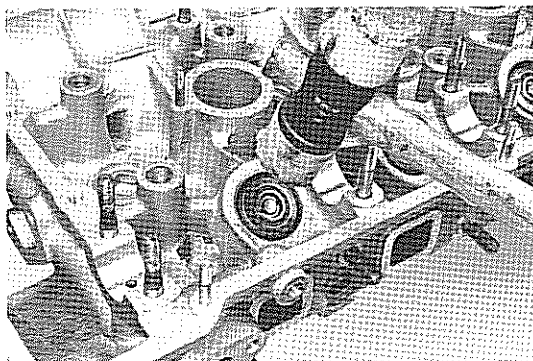
Install the inner spring as shown in the figure.

Fig. 5-65



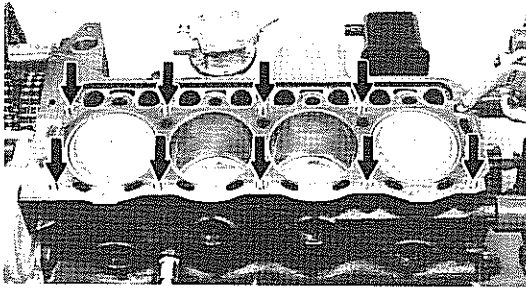
Assemble the valve spring and install the retainer locks with SST.
SST [09202-43012]

Fig. 5-66



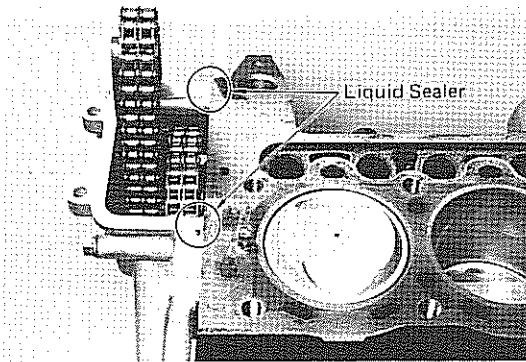
Tap the valve stems lightly to assure proper fit.

Fig. 5-67



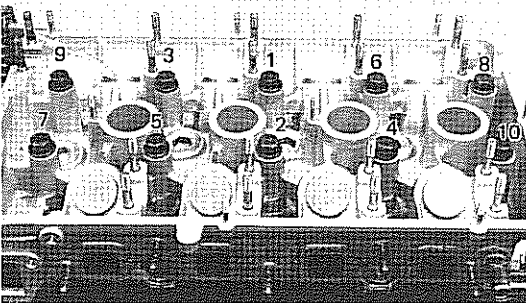
Clean the bolt holes with compressed air.

Fig. 5-68



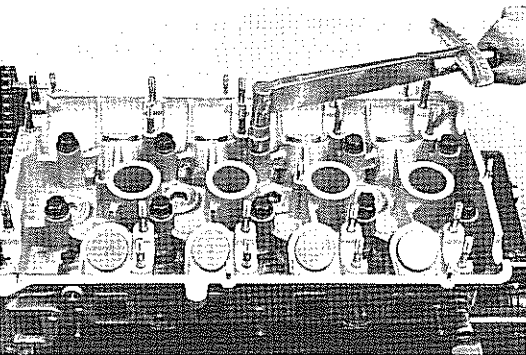
Apply a coat of sealer to the cylinder head, around the holes in the block, and in the vicinity of the timing chain cover and cylinder block.

Fig. 5-69



Tighten the each cylinder head bolt a little at a time in the sequence shown in the figure.

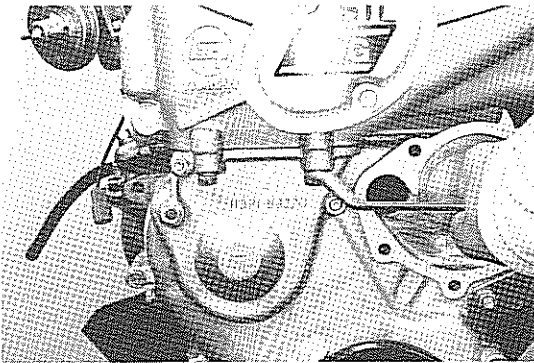
Fig. 5-70



Tighten the cylinder head bolts to specified torque.

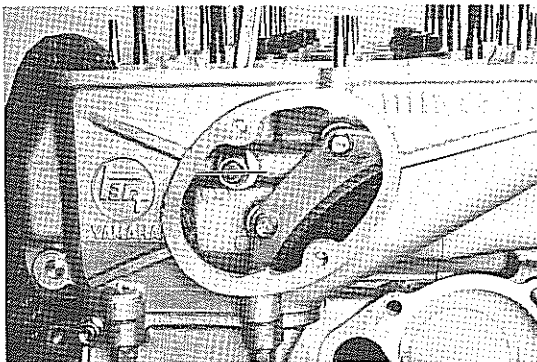
**Tightening torque: 7.2 – 8.8 kg-m
(53 – 63 ft-lb)**

Fig. 5-71



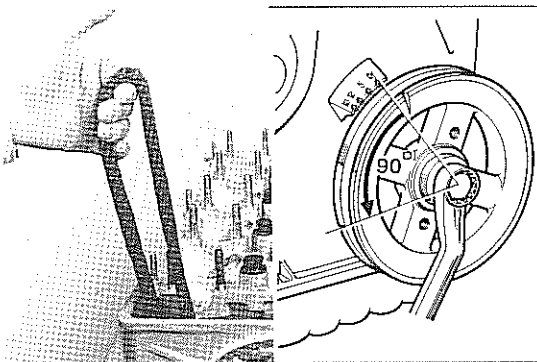
Install the cylinder head front nuts.

Fig. 5-72



Install the oil nozzle with its slot positioned horizontally.

Fig. 5-73

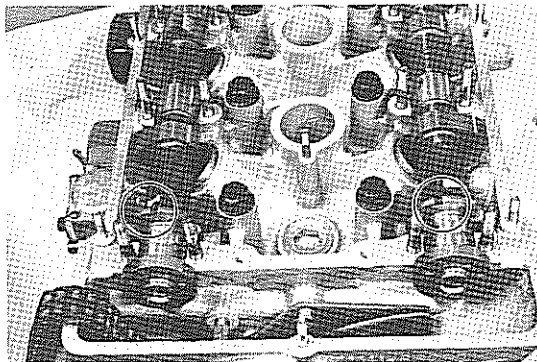


Rotate the crankshaft about 90° in the reverse direction.

— Note —

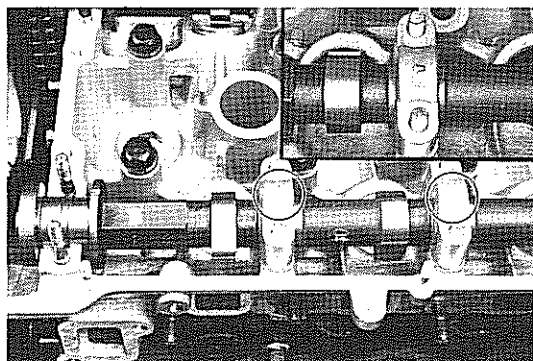
1. Lower the piston to prevent interference of piston head and valve.
2. When rotating the crankshaft in the reverse direction, hold the chain.

Fig. 5-74



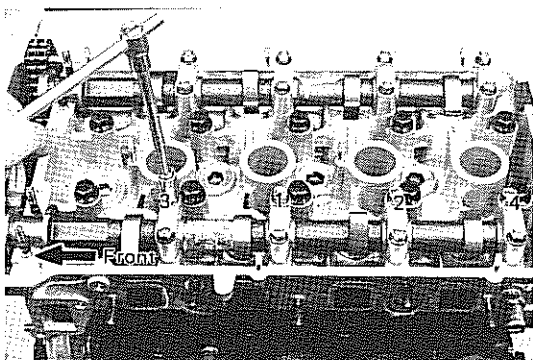
Position the camshaft so that the slit in the front end will point upward.

Fig. 5-75



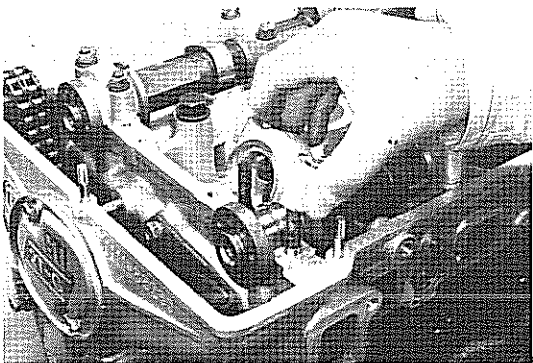
Face the arrow mark of bearing cap toward the front.

Fig. 5-76



Tighten the No.2 – No.5 bearing cap bolts a little at a time, in the sequence shown in the figure.

Fig. 5-77

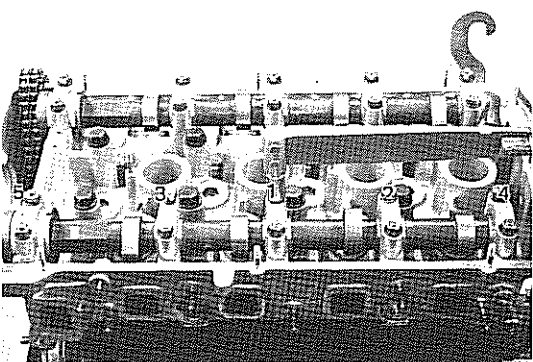


Then, install the No.1 bearing cap.

— Note —

If the No.1 bearing cap will not go in, move the camshaft back and forth until the cap goes in smoothly.

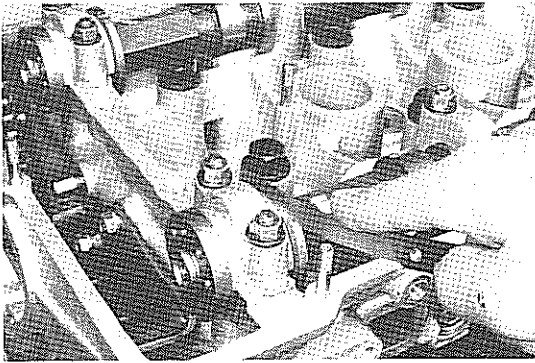
Fig. 5-78



Tighten the cap nuts to specified torque.

Tightening torque: 1.6 – 2.2 kg-m
(12 – 15 ft-lb)

Fig. 5-79



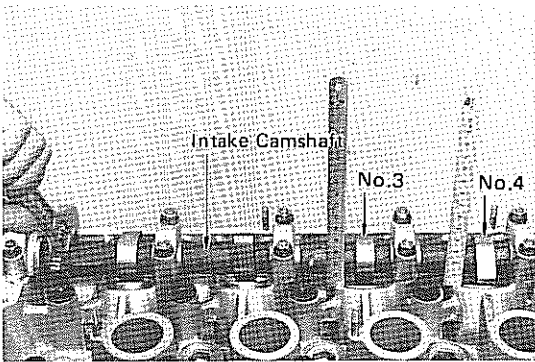
Check the camshaft thrust clearance.

Thrust clearance:

STD 0.15 – 0.35 mm
(0.006 – 0.014 in.)

Limit 0.4 mm
(0.02 in.)

Fig. 5-80

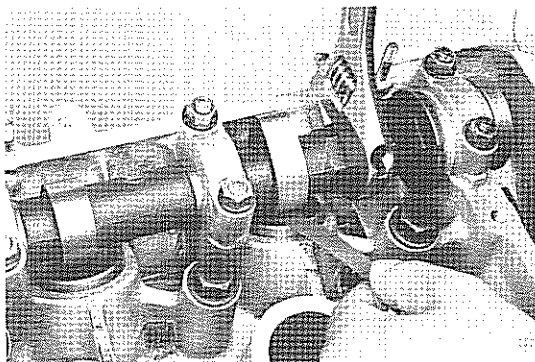


Adjust The Valve Clearance

1. Measure the valve clearance.

- (1) Intake side valve lifters No.3 and No.4 should protrude the same amount.

Fig. 5-81



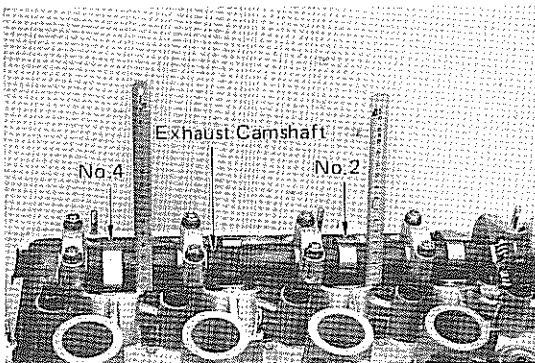
- (2) Measure the exhaust side valve clearance while turning the camshaft with a tool.

Exhaust valve clearance:

0.29 – 0.39 mm
(0.011 – 0.015 in.)

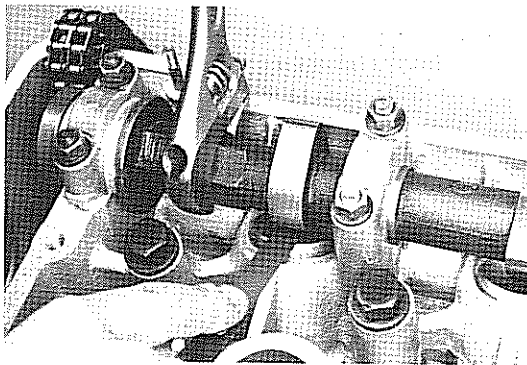
If outside the specified value, record the amount.

Fig. 5-82



- (3) Exhaust side valve lifters No.2 and No.4 should protrude the same amount.

Fig. 5-83



- (4) Measure the intake side valve clearance while turning the camshaft with a tool.

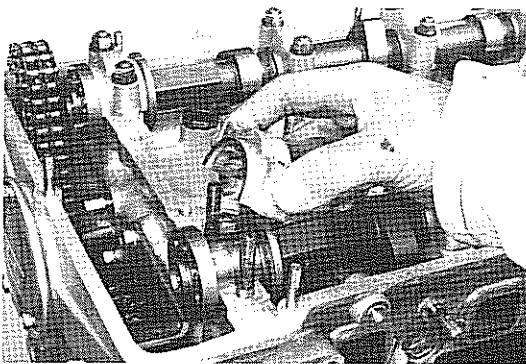
Intake valve clearance:

0.24 – 0.34 mm

(0.009 – 0.013 in.)

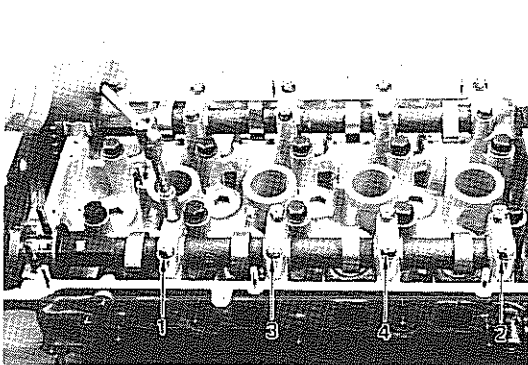
If outside the specified value, record the amount.

Fig. 5-84



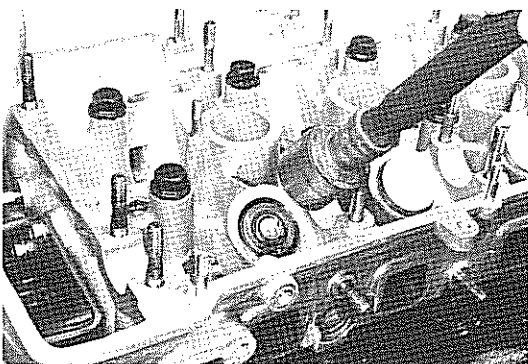
2. Remove the No.1 bearing cap.

Fig. 5-85



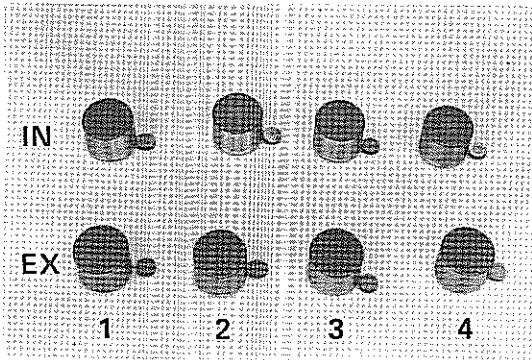
3. Loosen the other cap nuts a little at a time, in the sequence shown in the figure.
4. Remove the camshaft.

Fig. 5-86



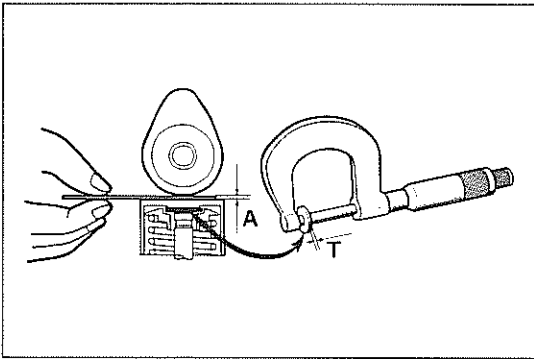
5. Remove the valve lifter when the valve clearance is not within specified value.

Fig. 5-87



6. Arrange the valves and adjusting pads in order.

Fig. 5-88



7. Select a new pad that will give the specified valve clearance as follows.

- (1) Measure the pad that was off with a micrometer.

- (2) Calculate thickness of the new pad so the valve clearance comes within specified value.

T Thickness of pad used.

A Valve clearance measured.

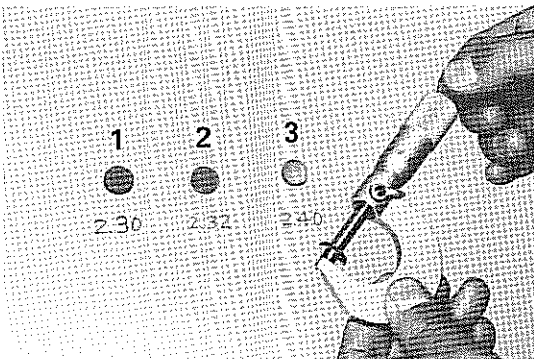
Intake Side

New Pad Thickness
 $= T + (A - 0.29 \text{ mm})$
 (0.011 in.)

Exhaust Side

New Pad Thickness
 $= T + (A - 0.34 \text{ mm})$
 (0.014 in.)

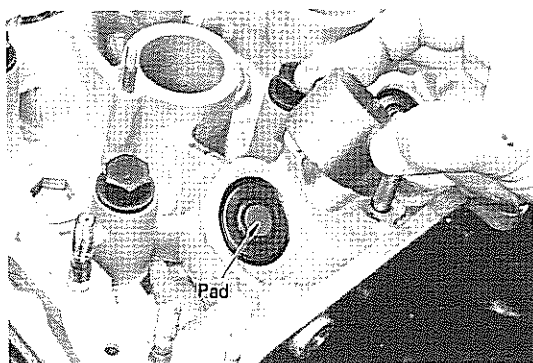
Fig. 5-89



- (3) Select a pad with a thickness as close as possible to the valve calculated.

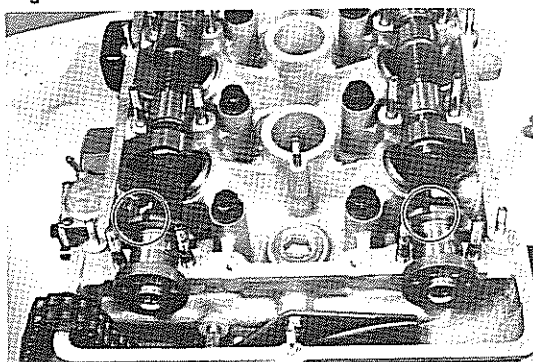
Pads are available in 41 sizes, in increments of 0.05 mm (0.002 in.), from 1.00 mm (0.039 in.) to 3.00 mm (0.118 in.).

Fig. 5-90



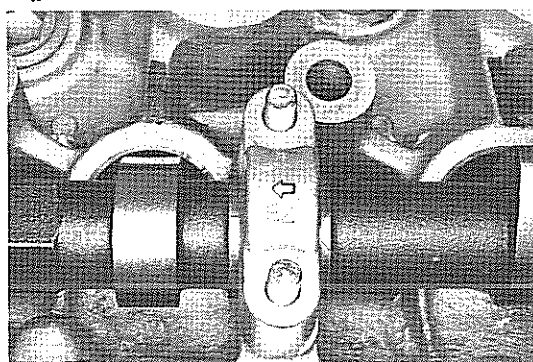
8. Install the parts and valve lifters.

Fig. 5-91



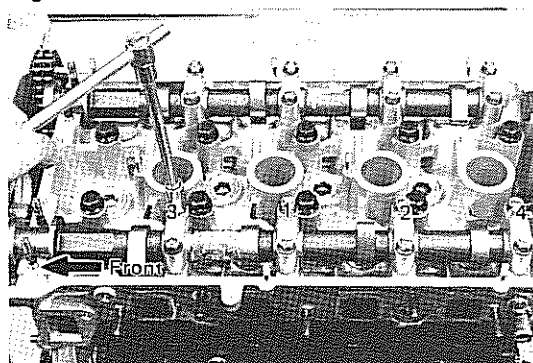
Position the camshaft so that the slit in the front end will point upward.

Fig. 5-92



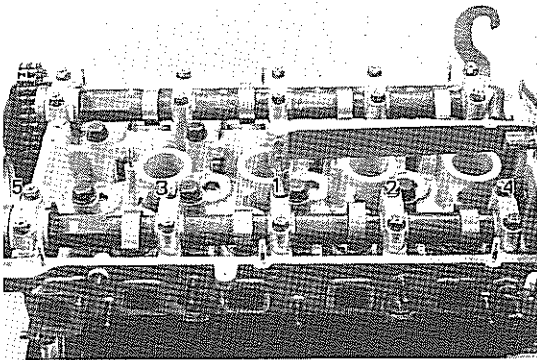
Face the arrow mark of bearing cap toward front.

Fig. 5-93



Temporarily tighten the No.2 – No.5 bearing cap bolts a little at a time, in the sequence shown in the figure.

Fig. 5-94



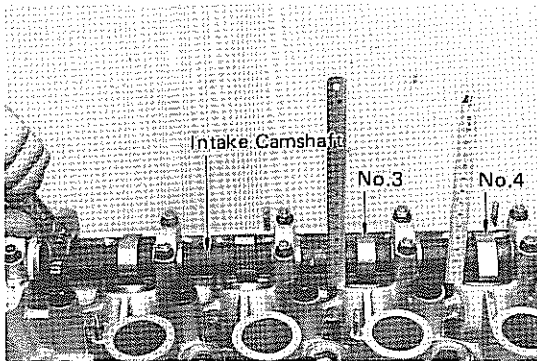
Then install the No.1 bearing cap.
Tighten the cap nuts to specified torque.

Tightening torque: 1.6 – 2.2 kg-m
(12 – 15 ft-lb)

— Note —

If the No.1 bearing cap will not go in, move the camshaft back and forth until the cap goes in smoothly.

Fig. 5-95

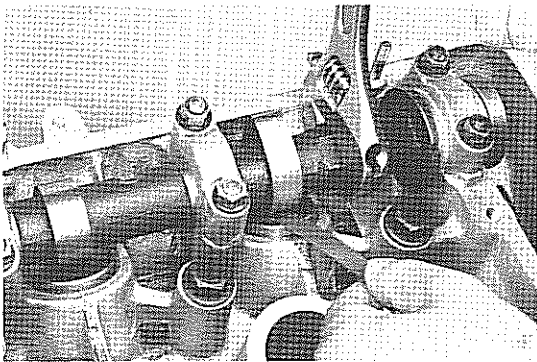


Recheck The Valve Clearance

Measure the valve clearance.

1. Intake valve lifter No.3 and No.4 should protrude the same amount.

Fig. 5-96



2. Measure the exhaust side valve clearance while turning the camshaft with a tool.

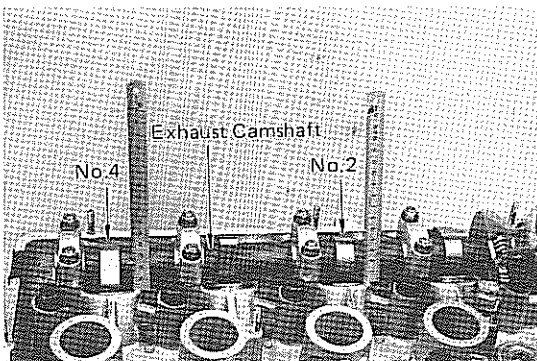
Exhaust valve clearance:

0.29 – 0.39 mm

(0.011 – 0.015 in.)

If outside the specified value, choose another pad.

Fig. 5-97

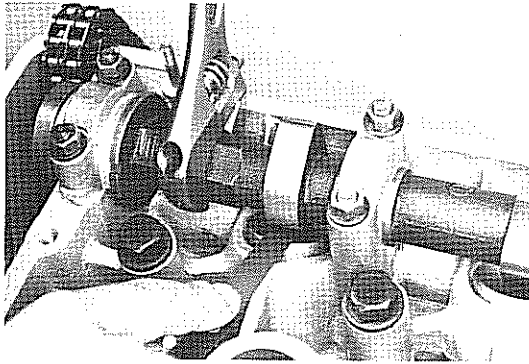


3. Exhaust valve lifter No.2 and No.4 should protrude the same amount.

Approx: 1.6 mm

(0.06 in.)

Fig. 5-98



4. Measure the intake valve clearance while turning the camshaft with a tool.

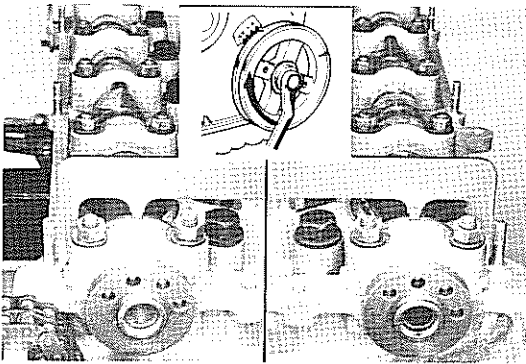
Intake valve clearance:

0.24 – 0.34 mm

(0.009 – 0.013 in.)

If outside the specified value, choose another pad.

Fig. 5-99



Position the No.1 and No.2 camshaft slit upward with SST.

Set the No.1 cylinder to TDC/compression.
SST[09248-27010]

Fig. 5-100

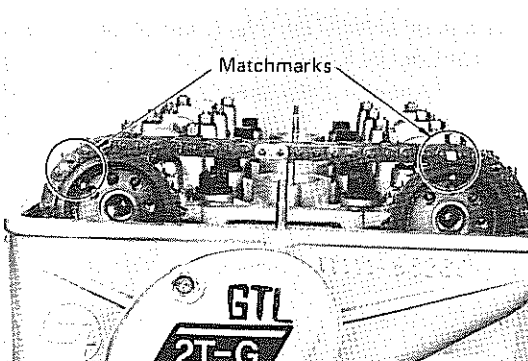


Install the chain tensioner No.2.

— Note —

Insert oil into the cylinder before installing.

Fig. 5-101



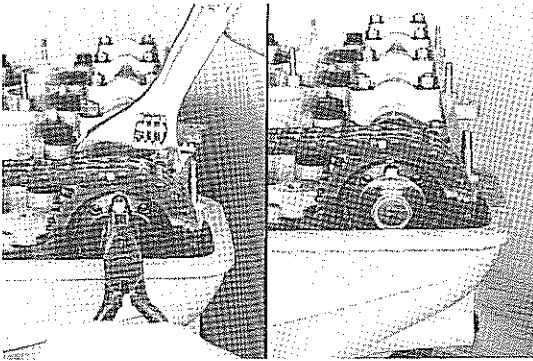
Install the No.2 chain with its mark aligned with the gear mark.

Align the camshaft pin hole and gear pin hole to position before disassembly and insert the pin.

— Note —

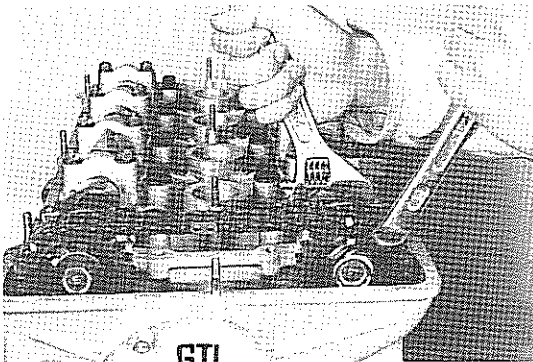
If the pin holes do not line up, turn the camshaft and make the nearest holes line up, but do not turn more than 45°.

Fig. 5-102



Hold the pin with the washer.

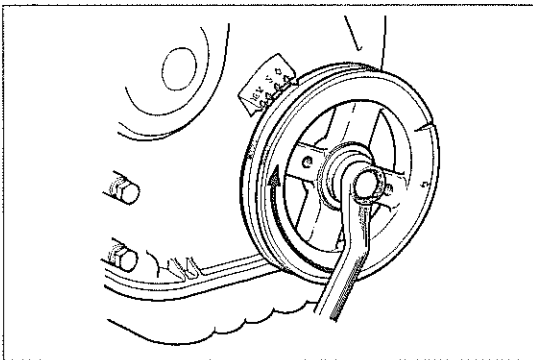
Fig. 5-103



Turn the crankshaft slightly in normal direction, until there is no slack in the pins, gears, and camshafts, and then tighten the bolts to specified torques.

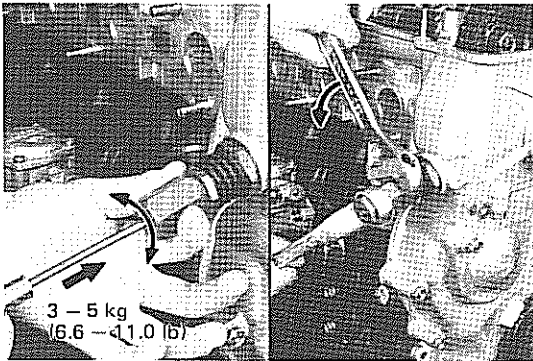
Tightening torque: 7.0 – 8.0 kg-m
(51 – 57 ft-lb)

Fig. 5-104



Rotate the crankshaft 360° in normal direction until No.1 cylinder is at TDC/compression.

Fig. 5-105



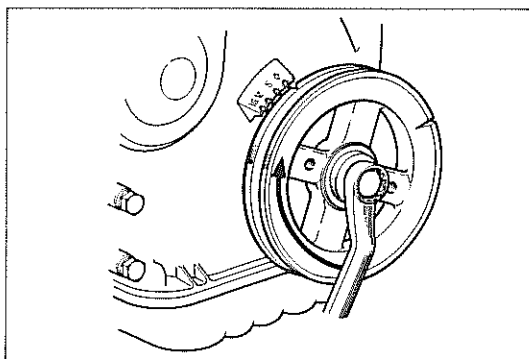
Adjust the No.2 chain tensioner.

Back stroke: 0.5 – 1.0 mm
(0.02 – 0.04 in.)

— Note —

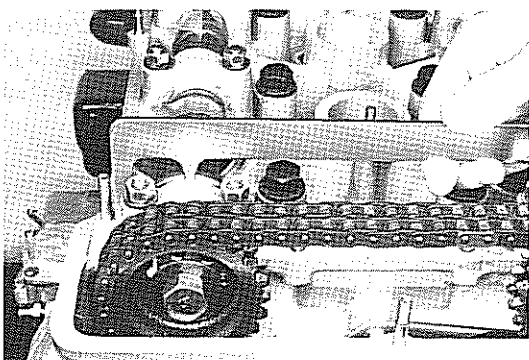
Return the nut 1/3 to 2/3 turn back from where it contacts the No.2 plunger.

Fig. 5-106

**Adjust The Valve Timing**

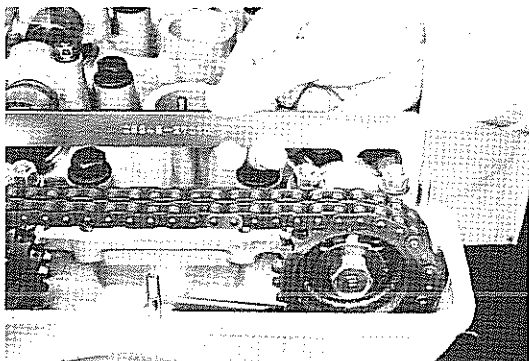
1. Rotate the crankshaft 360° in normal direction until No.1 cylinder is at TDC/compression.

Fig. 5-107



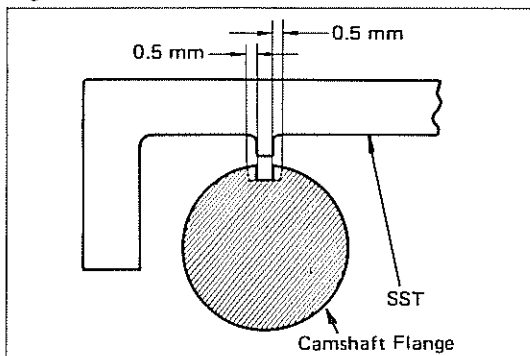
2. Check the No.1 camshaft valve timing with SST.
SST[09248-27010]

Fig. 5-108



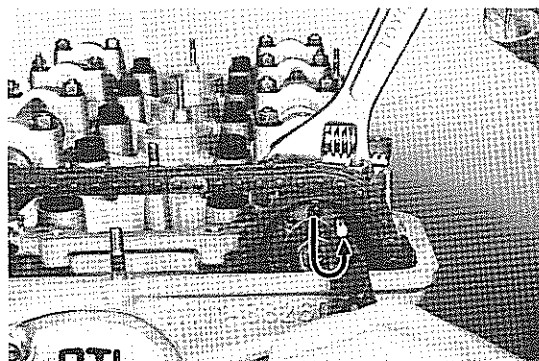
3. Check the No.2 camshaft valve timing with SST.
SST[09248-27010]

Fig. 5-109



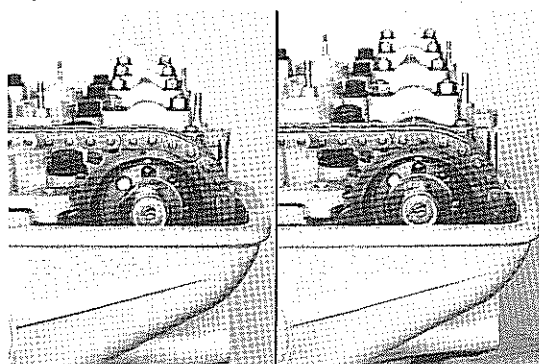
4. Valve timing permissible error,
 $\pm 2^\circ$ Camshaft rotation angle.
 ± 0.5 mm Camshaft flange outer
 (0.02 in.) perimeter.
 Adjust the valve timing if it is off.

Fig. 5-114



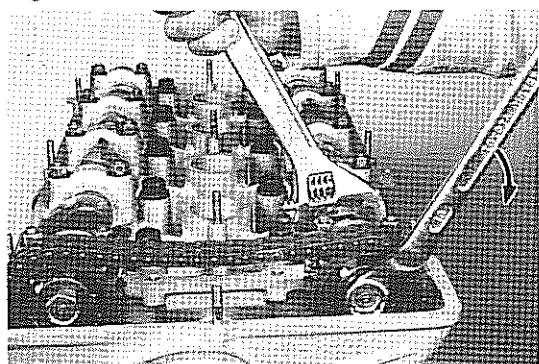
9. When the valve timing is retarded.
- (1) Align with hole pin in clockwise direction.
 - (2) Turn the camshaft so that its slit will be lined up with the adjust gauge and reinsert the pin.

Fig. 5-115



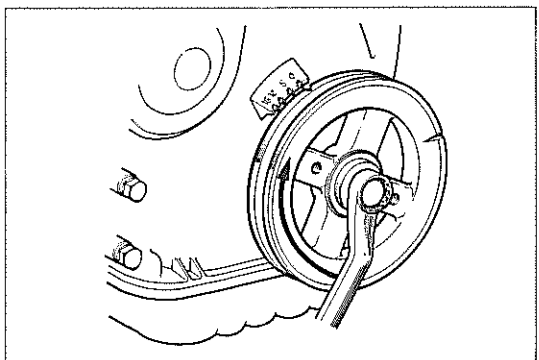
10. Hold the pin with the washer.

Fig. 5-116



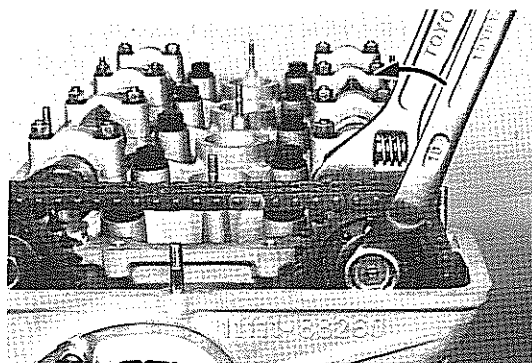
11. Tentatively tighten the camshaft timing gear set bolt.

Fig. 5-117



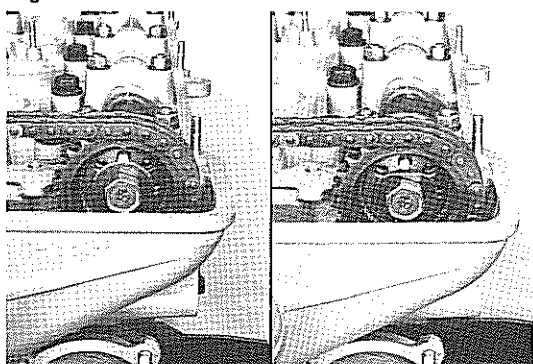
12. Rotate the crankshaft in the normal direction until No.1 cylinder is at TDC/compression.

Fig. 5-110



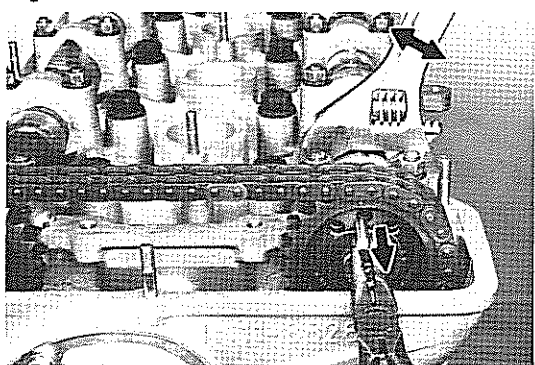
5. Loosen the camshaft mounting bolt.

Fig. 5-111



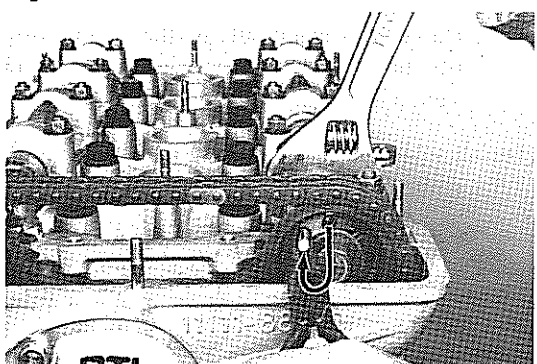
6. Shift the washer.

Fig. 5-112



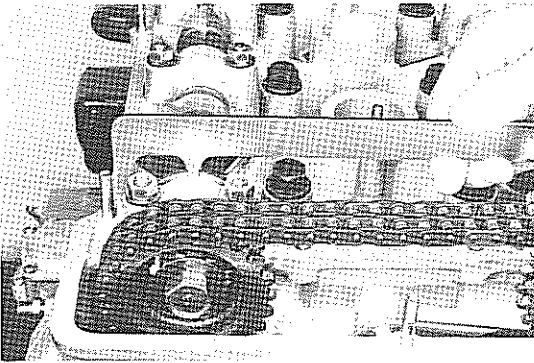
7. It will be easier to pull out the pin if the camshaft is turned slightly in the forward direction so as to provide play.

Fig. 5-113



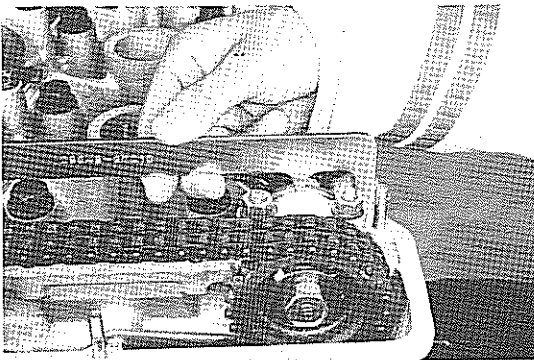
8. When the valve timing is advanced.
 - (1) Align with pin hole in counterclockwise direction.
 - (2) Turn the camshaft so that its slit will be lined up with the adjust gauge and reinsert the pin.

Fig. 5-118



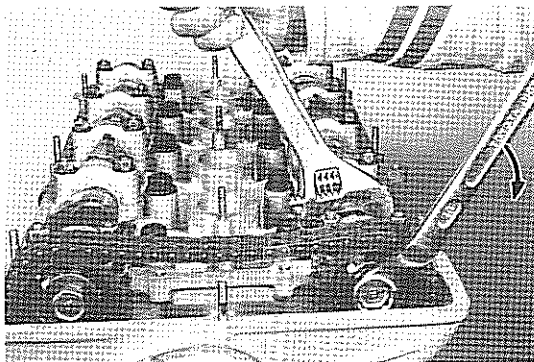
13. Recheck the No.1 camshaft valve timing with SST.
The camshaft slit and SST protrusion should align.
SST [09248-27010]

Fig. 5-119



14. Recheck the No.2 camshaft valve timing with SST.
The camshaft slit and SST protrusion should align.
SST [09248-27010]

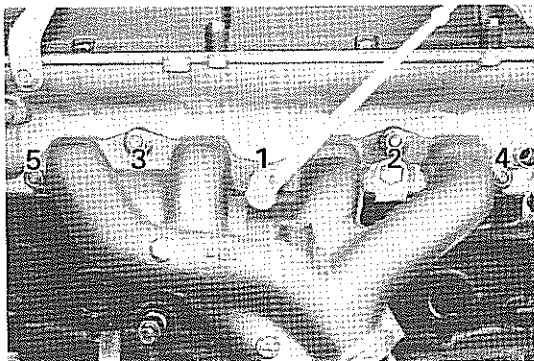
Fig. 5-120



15. Tighten the camshaft timing gear set bolt.
Tightening torque:

7.0 – 8.0 kg-m
(51 – 57 ft-lb)

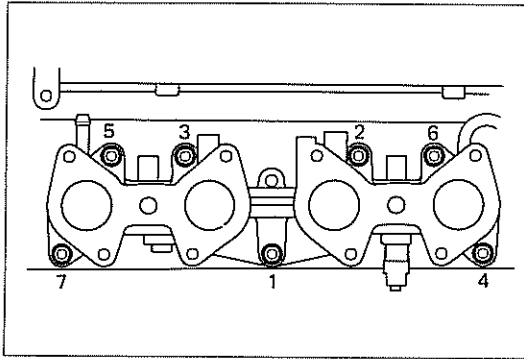
Fig. 5-121



- Tighten each exhaust manifold nut a little at a time to the specified torque in the sequence shown in the figure.

Tightening torque: 3.5 – 4.5 kg-m
(26 – 32 ft-lb)

Fig. 5-122



Tighten each intake manifold nut a little at a time to the specified torque in the sequence shown in the figure.

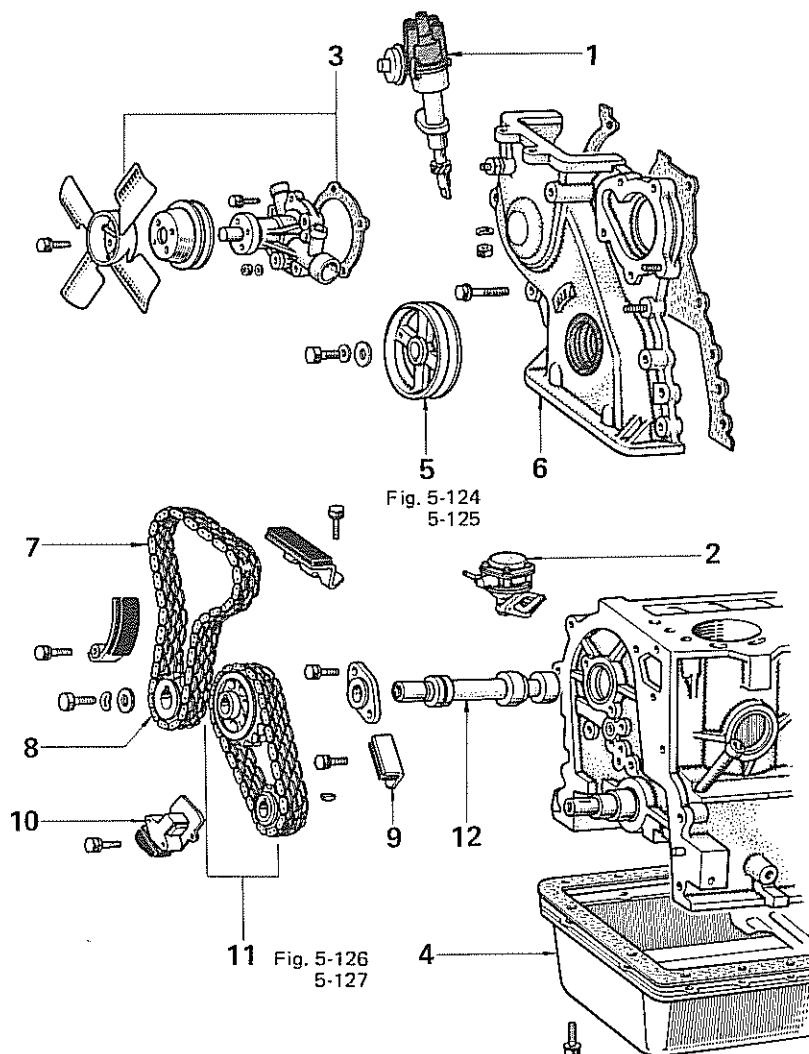
Tightening torque: 1.6 – 2.2 kg-m
(12 – 15 ft-lb)

TIMING CHAIN

DISASSEMBLY

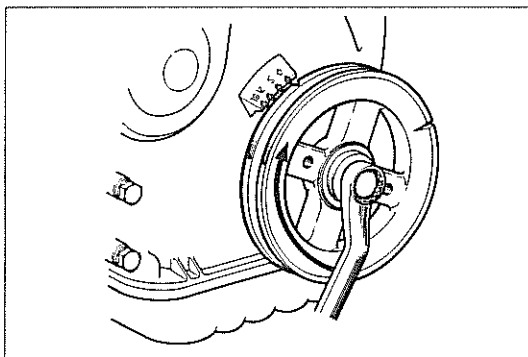
Disassemble the parts in the numerical order shown in the figure.

Fig. 5-123



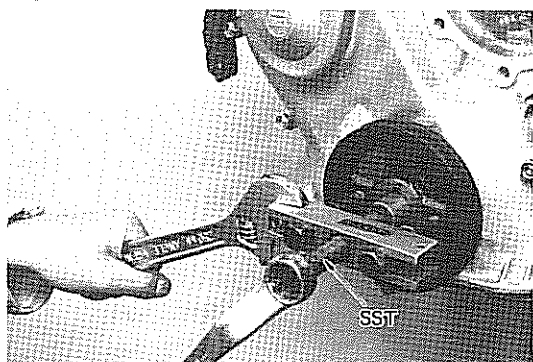
- | | | |
|---------------------|------------------------|------------------------------|
| 1. Distributor | 5. Crankshaft Pulley | 9. No.1 Chain Damper |
| 2. Fuel Pump | 6. Timing Chain Cover | 10. No.1 Chain Tensioner |
| 3. Fan & Water Pump | 7. No.2 Timing Chain | 11. No.1 Timing Chain & Gear |
| 4. Oil Pan | 8. Camshaft Drive Gear | 12. Pump Drive Shaft |

Fig. 5-124



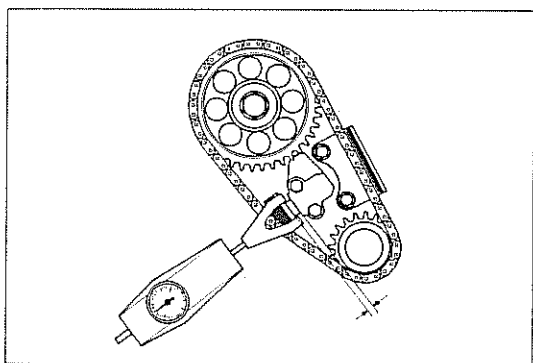
Set the No.1 cylinder to TDC/compression.

Fig. 5-125



Remove the crankshaft pulley with SST.
SST[09213-31021]

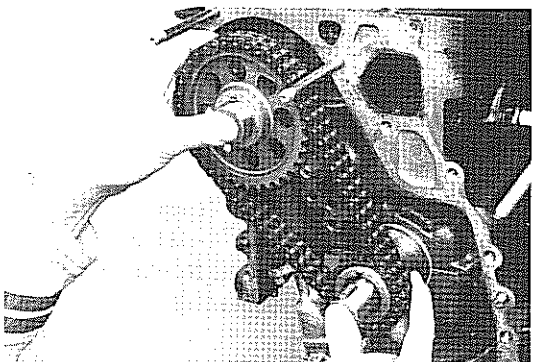
Fig. 5-126



Check the chain slack.

Slack limit: 13.5 mm at 10 kg
(0.53 in.) (22 lb)

Fig. 5-127



Pull out the two gears uniformly.

Fig. 5-128

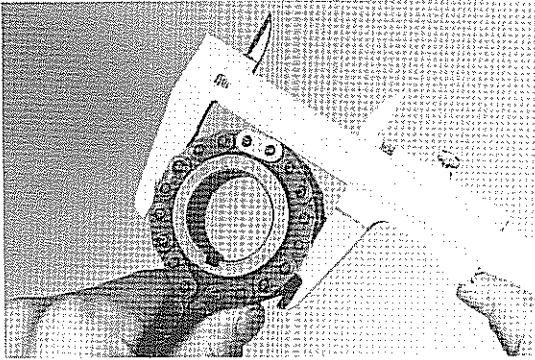


Fig. 5-129

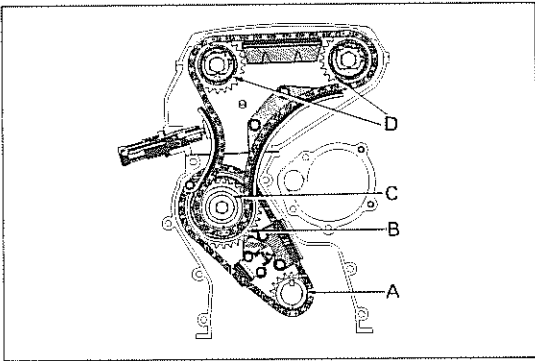


Fig. 5-130

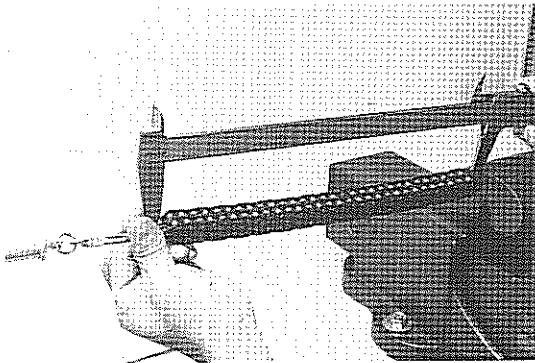
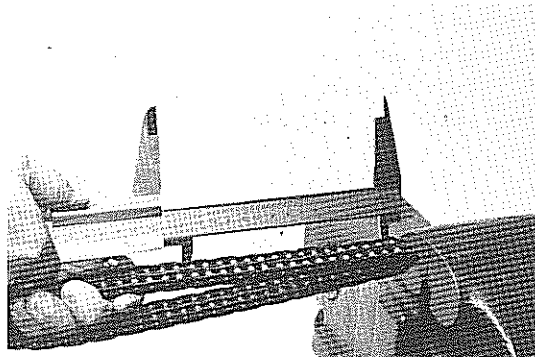


Fig. 5-131



INSPECTION & REPAIR

Timing Gear & Chain

1. Inspect the gears and chains for cracks, wear or chipped teeth.
2. Measure the gear for wear in the method shown in the figure.

3. If measurement is below limit, replace the gears and chain.

Wear limit:

- | | | |
|----------|----------------------------------|----------------------------|
| A | Crankshaft sprocket | 60.0 mm (2.36 in.) |
| B | Pump drive shaft sprocket | 114.5 mm (4.51 in.) |
| C | Camshaft drive sprocket | 78.2 mm (3.08 in.) |
| D | Camshaft timing sprocket | 78.2 mm (3.08 in.) |

4. Measure the elongation of the No.1 timing chain.

Chain elongation:

- | | |
|--------------|---------------------------------|
| Limit | 291.4 mm tension at 5 kg |
| | (11.47 in.) (11 lb) |

5. Measure the 17-link elongation of the No.2 timing chain. Replace the chain if over the elongation limit.

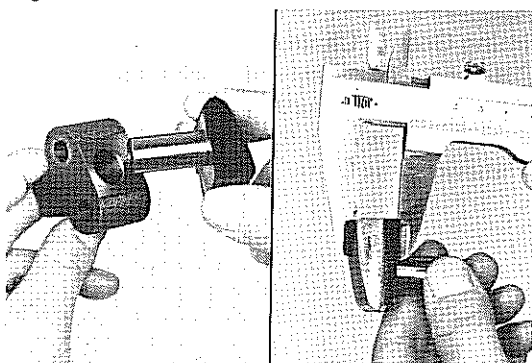
— Note —

Measure at 3 places and use the maximum measurement.

Chain elongation:

- | | |
|--------------|-------------------------------------|
| Limit | 147.0 mm tension at 17-links |
| | (5.79 in.) |

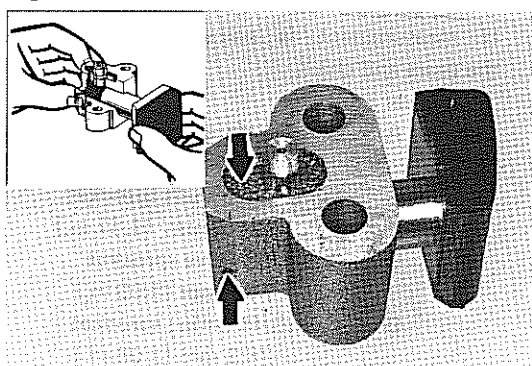
Fig. 5-132

**No.1 Chain Tensioner**

Check the body and plunger for wear and measure the tensioner head as shown in the figure. If worn down over the limit, replace as a unit.

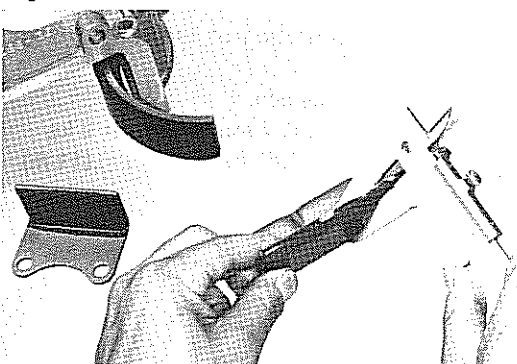
Thickness limit: 12.5 mm
(0.49 in.)

Fig. 5-133



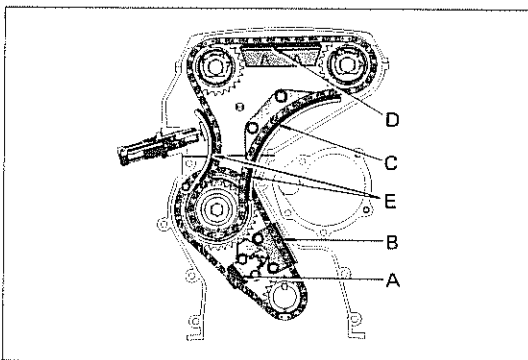
Inspect the chain tensioner No.1 for air tightness.

Fig. 5-134

**Chain Damper & Slipper**

Measure each chain damper and check for wear. Take out the plunger spring. Coat the plunger with engine oil, close off the 2 oil orifices on the tensioner body and pull the plunger. If there is a return pulling force on the plunger, it is air tight.

Fig. 5-135

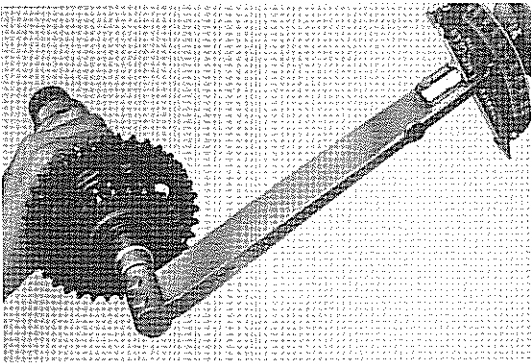


If either is visibly worn or measures less than limit, replace units.

Thickness limit:

A	No.1 chain tensioner	12.5 mm (0.49 in.)
B	No.1 chain damper	5.0 mm (0.20 in.)
C	No.3 chain damper	6.5 mm (0.26 in.)
D	No.2 chain damper	5.5 mm (0.22 in.)
E	Chain tensioner slipper	7.5 mm (0.30 in.)

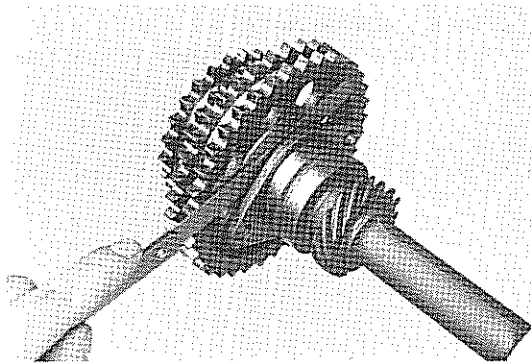
Fig. 5-136

**Timing Gear & Thrust Plate**

Install the thrust plate, pump drive shaft gear and camshaft drive gear to the pump drive shaft. Tighten the camshaft drive gear set bolt.

Tightening torque: 7.0 – 8.0 kg-m
(51 – 57 ft-lb)

Fig. 5-137



Measure the thrust clearance.

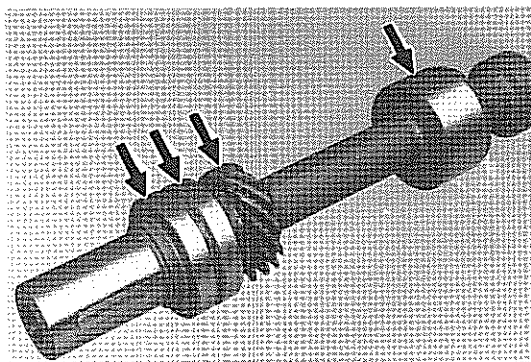
If it exceeds limit, replace thrust plate.

Thrust clearance:

STD 0.07 – 0.15 mm
(0.003 – 0.006 in.)

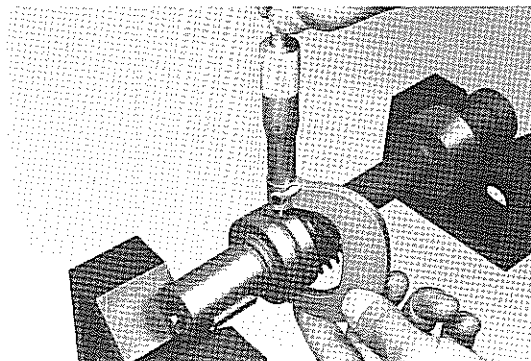
Limit 0.3 mm
(0.01 in.)

Fig. 5-138

**Pump Drive Shaft & Bearing**

1. Inspect the gear and journal for cracks, wear or chipped teeth. If damaged, replace. Also inspect the distributor gear.

Fig. 5-139



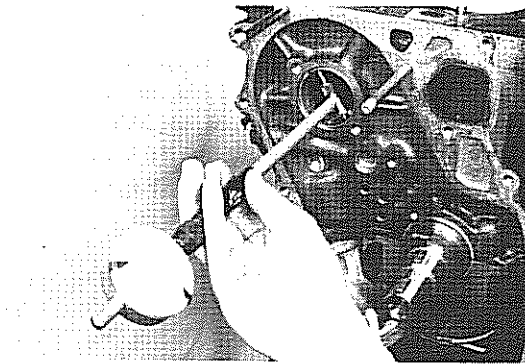
2. Measure oil clearance.
(1) Measure pump drive shaft journal.

Journal outer diameter:

No.1 46.459 – 46.475 mm
(1.8291 – 1.8297 in.)

No.2 46.209 – 46.225 mm
(1.8192 – 1.8199 in.)

Fig. 5-140



- (2) Measure the inner diameter of bearing.

Journal inner diameter:

No.1 46.500 – 46.525 mm
(1.8307 – 1.8317 in.)

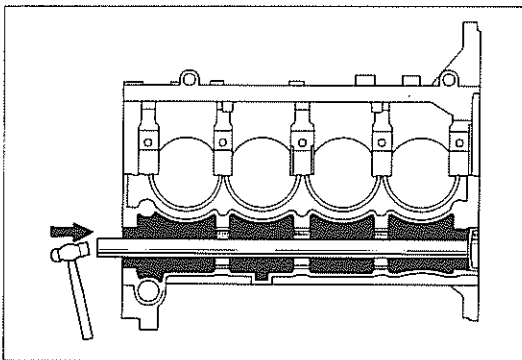
No.2 46.250 – 46.275 mm
(1.8209 – 1.8218 in.)

Oil clearance:

STD 0.025 – 0.066 mm
(0.0010 – 0.0026 in.)

Limit 0.08 mm
(0.003 in.)

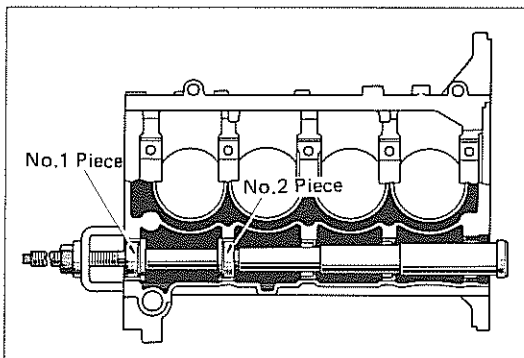
Fig. 5-141



3. Bearing replacement.

- (1) Drive out the plug from the cylinder block.

Fig. 5-142

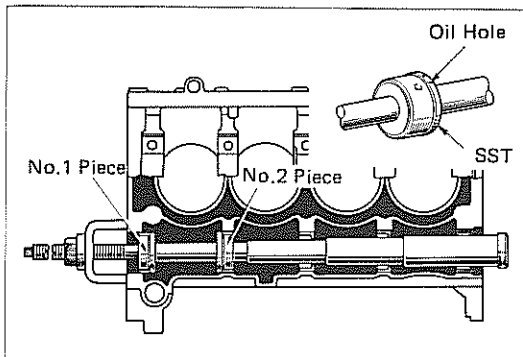


- (2) Remove the No.1 bearing with SST.
SST[09215-25010]

— Note —

Use the No.2 piece as a guide.

Fig. 5-143

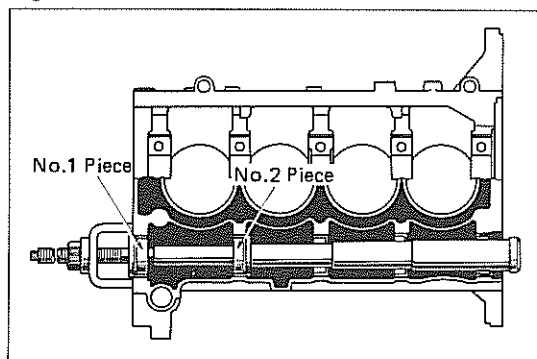


- (3) Install the No.1 bearing.

— Note —

1. Use the No.2 piece as a guide.
2. Align the bearing oil hole.

Fig. 5-144

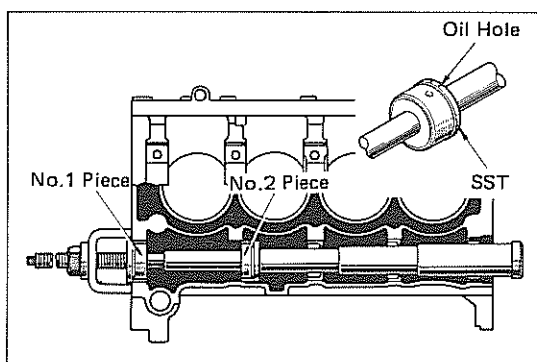


(4) Remove the No.2 bearing.

— Note —

Use the No.1 piece as a guide.

Fig. 5-145

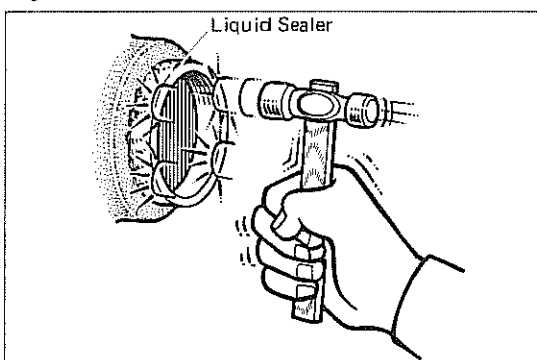


(5) Install the No.2 bearing.

— Note —

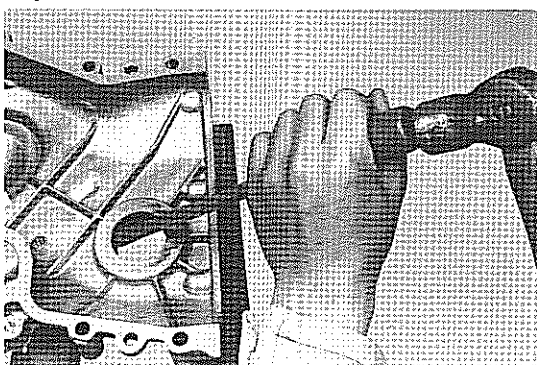
1. Use the No.1 piece as a guide.
2. Align the bearing oil hole.

Fig. 5-146



(6) Apply sealer to the new plug and install.

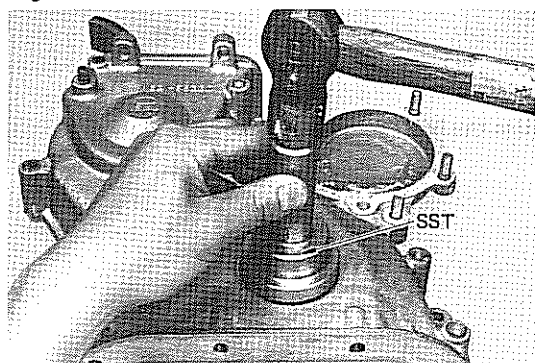
Fig. 5-147



Crankshaft Front Oil Seal

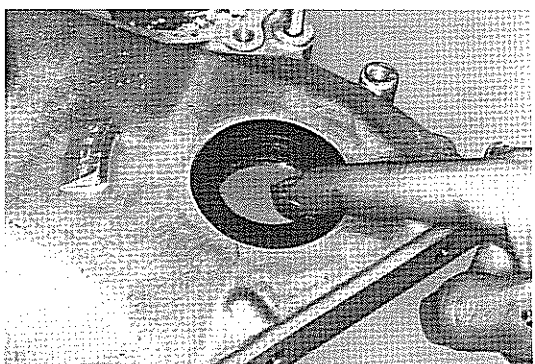
1. Inspect the oil seal lip for wear or deformation. Also inspect the crankshaft.
2. Oil seal replacement.
 - (1) Remove oil seal with a screwdriver.

Fig. 5-148



- (2) Install a new oil seal as shown in the figure.
SST[09223-22010]

Fig. 5-149



- (3) After driving in the seal, coat the seal lip lightly with MP grease.

ASSEMBLY

Assemble the parts in the numerical order shown in the figure.

Fig. 5-150

- Thoroughly clean the parts to be assembled.
- Apply clean engine oil on the sliding and rotating surfaces of the parts before assembly.

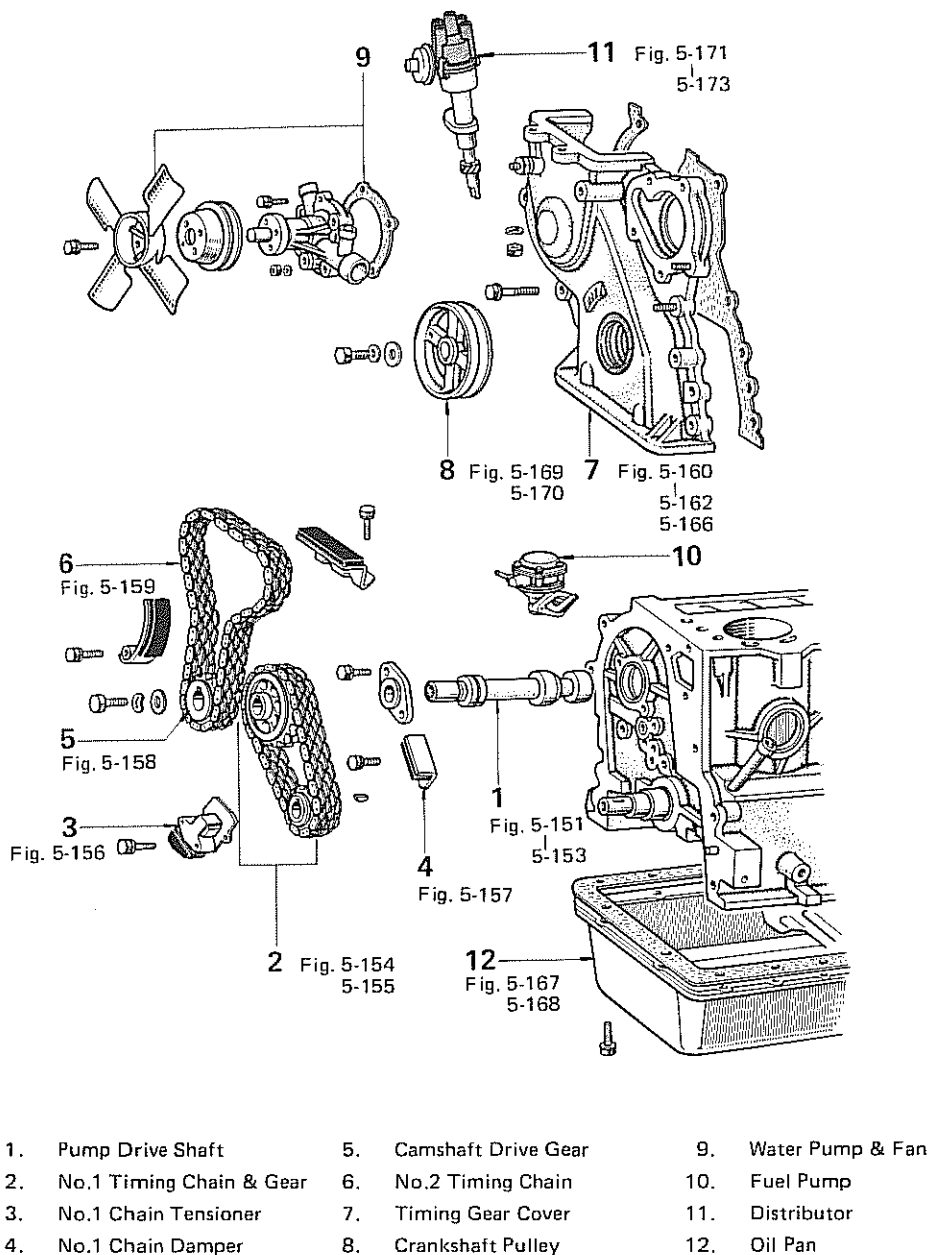
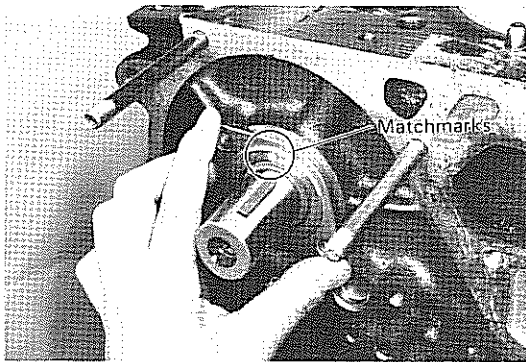


Fig. 5-151



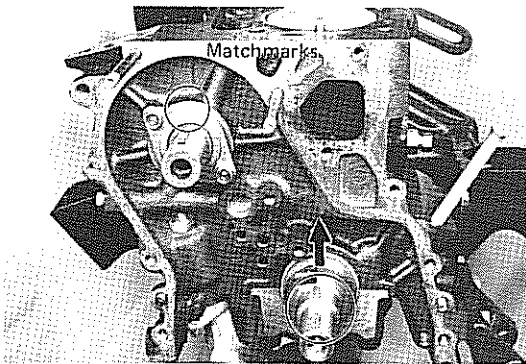
Install the pump drive shaft thrust plate.

Tightening torque: 1.5 – 2.1 kg-m
(11 – 15 ft-lb)

— Note —

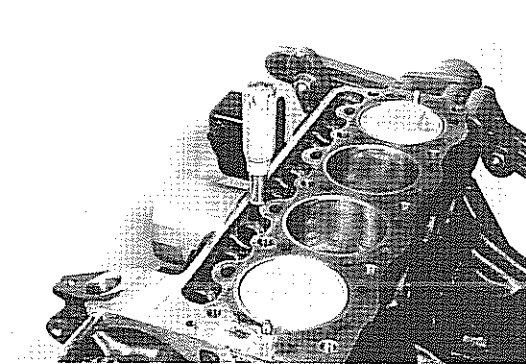
Face the side of the thrust plate with the mark outwards.

Fig. 5-152



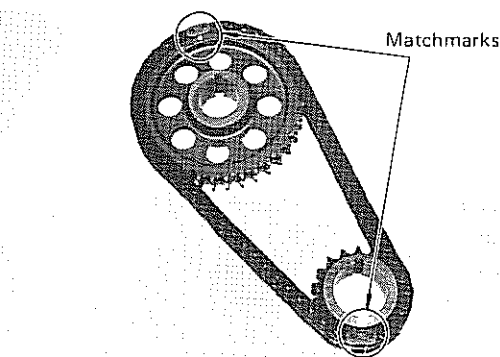
Set the crankshaft keyway upwards. Align the pump drive shaft key with the thrust plate mark.

Fig. 5-153



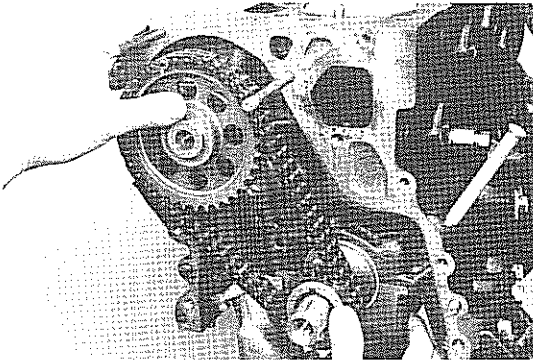
Insert a screwdriver in back of the pump drive shaft so that it will not completely enter.

Fig. 5-154



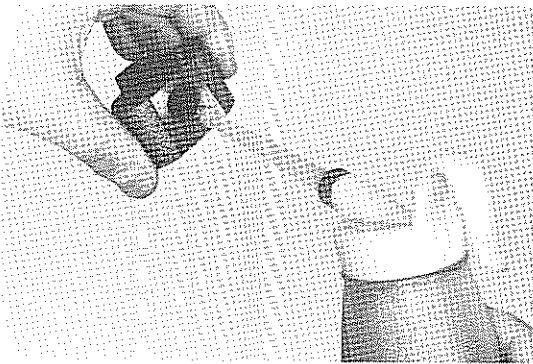
Assemble the crankshaft gear and pump drive shaft gear to the No.1 chain so that their respective matchmarks are aligned.

Fig. 5-155



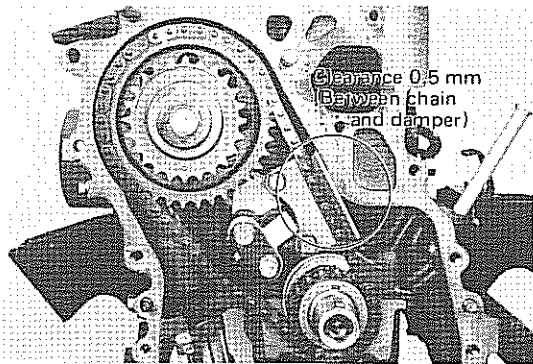
Drive in the two gears simultaneously to the shafts.

Fig. 5-156



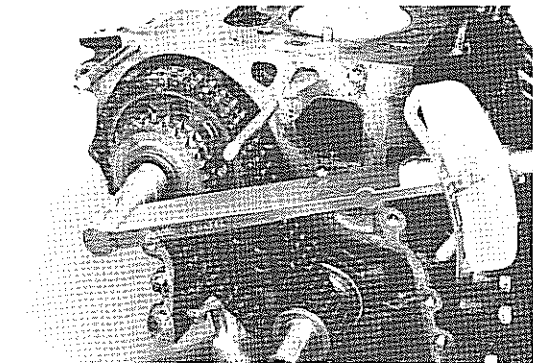
Insert oil into the No.1 chain tensioner cylinder.

Fig. 5-157



Install the chain damper parallel with the chain at a 0.5 mm (0.02 in.) space between them.

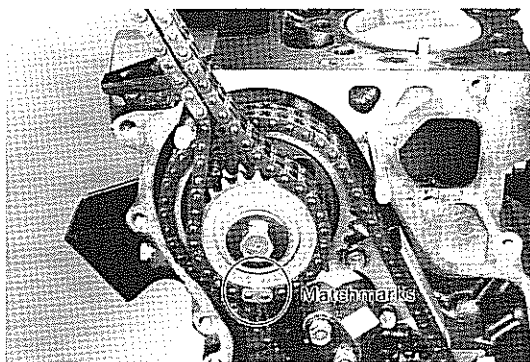
Fig. 5-158



Tighten the camshaft drive gear set bolt.

Tightening torque: 6.0 – 7.0 kg-m
(44 – 50 ft-lb)

Fig. 5-159



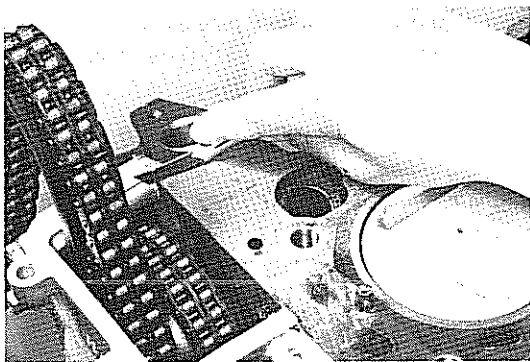
Align the No.2 chain and gear matchmarks and install.

Fig. 5-160



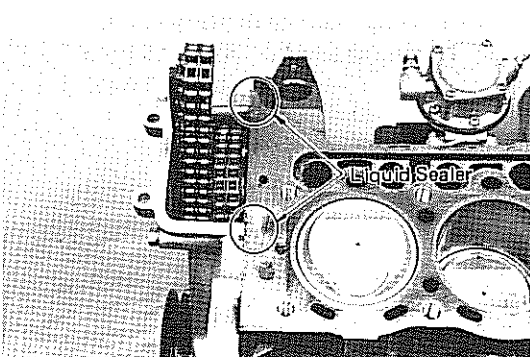
Pull No.2 chain and install the chain cover.

Fig. 5-161



Cutoff any portion of the gasket protruding from the cylinder block upper surface.

Fig. 5-162



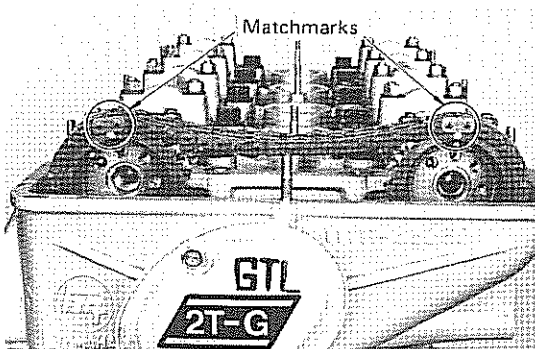
Apply liquid sealer as shown in the figure.

Fig. 5-163

SEE
CYLINDER HEAD
ASSEMBLY SECTION
Fig. 5-67 to 5-79

Install the cylinder head.

Fig. 5-164



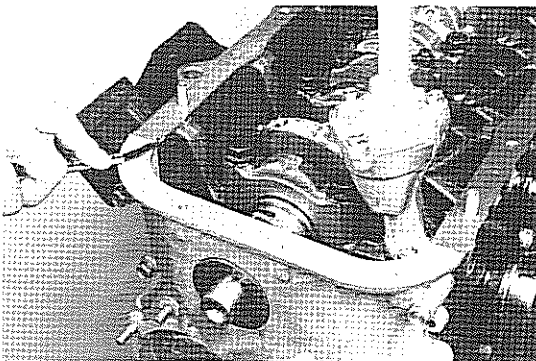
Install the sprocket and chain aligned with the chain and gear marks.

Fig. 5-165

SEE
CYLINDER HEAD
ASSEMBLY SECTION
Fig. 5-106 to 5-120

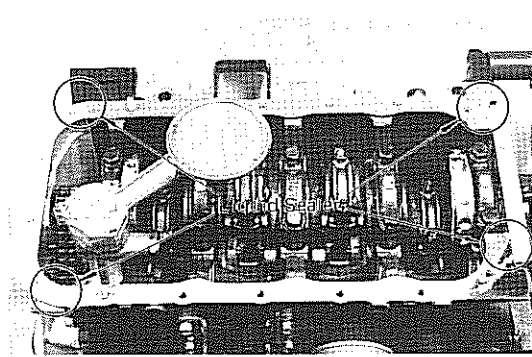
Adjust the valve timing.

Fig. 5-166



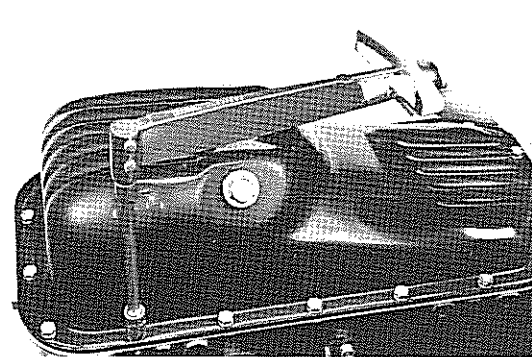
Cutoff any portion of the gasket protruding from the cylinder block lower surface.

Fig. 5-167



Apply sealer to the areas indicated in the figure.

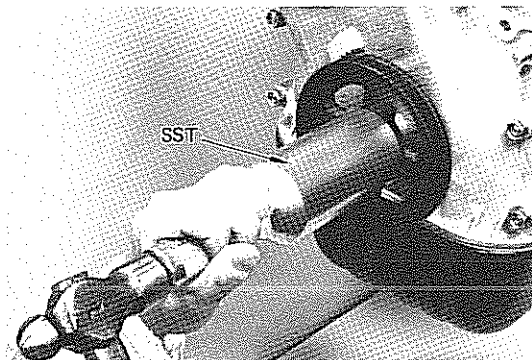
Fig. 5-168



Install the oil pan.

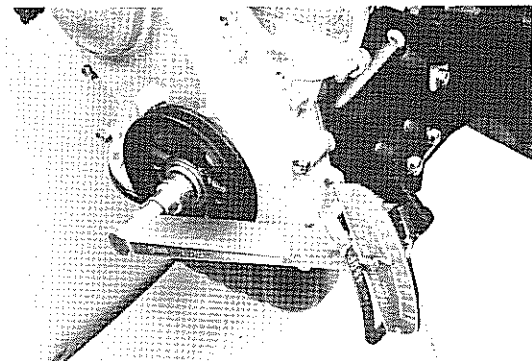
Tightening torque: 0.4 – 0.8 kg-m
(3 – 5 ft-lb)

Fig. 5-169



Drive in the crankshaft pulley with SST.
SST[09214-60010]

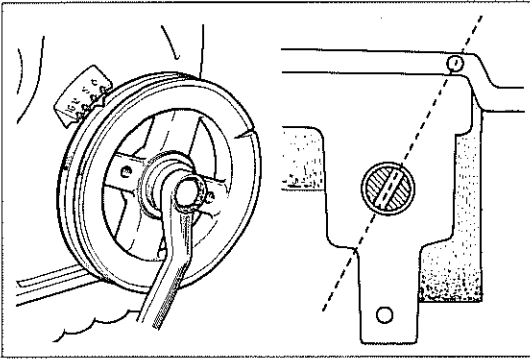
Fig. 5-170



Tighten the claw nut.

Tightening torque: 6.0 – 7.0 kg-m
(44 – 50 ft-lb)

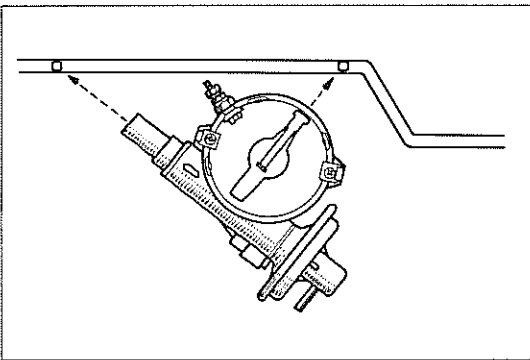
Fig. 5-171



Install the distributor as follow.

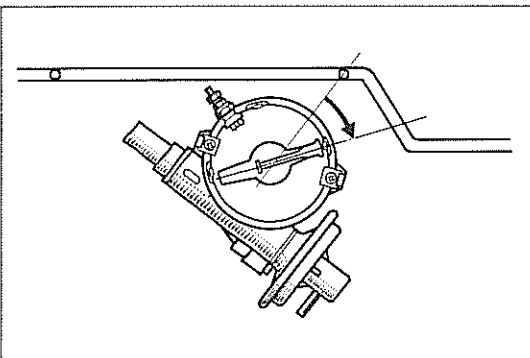
1. Set the No.1 cylinder to 5° BTDC/compression.
2. Set the oil pump shaft slit as shown in the figure.

Fig. 5-172



3. Before inserting the distributor, position the rotor and diaphragm as shown in the figure.

Fig. 5-173



4. When fully installed, the rotor should point in the direction shown in the figure.



— Note —

Turn the distributor housing and adjust to the position just before the points open.

MEMO

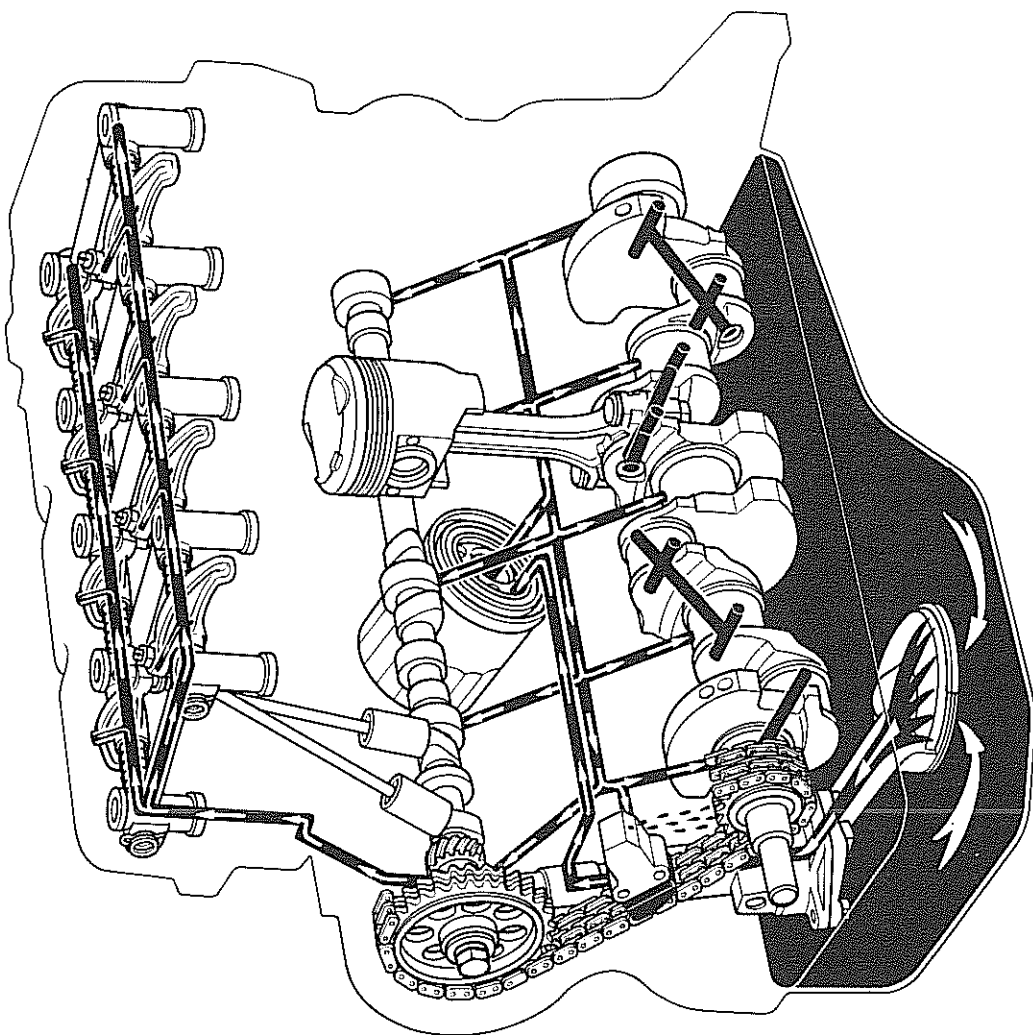
LUBRICATION SYSTEM

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LUBRICATION SYSTEM CIRCUIT

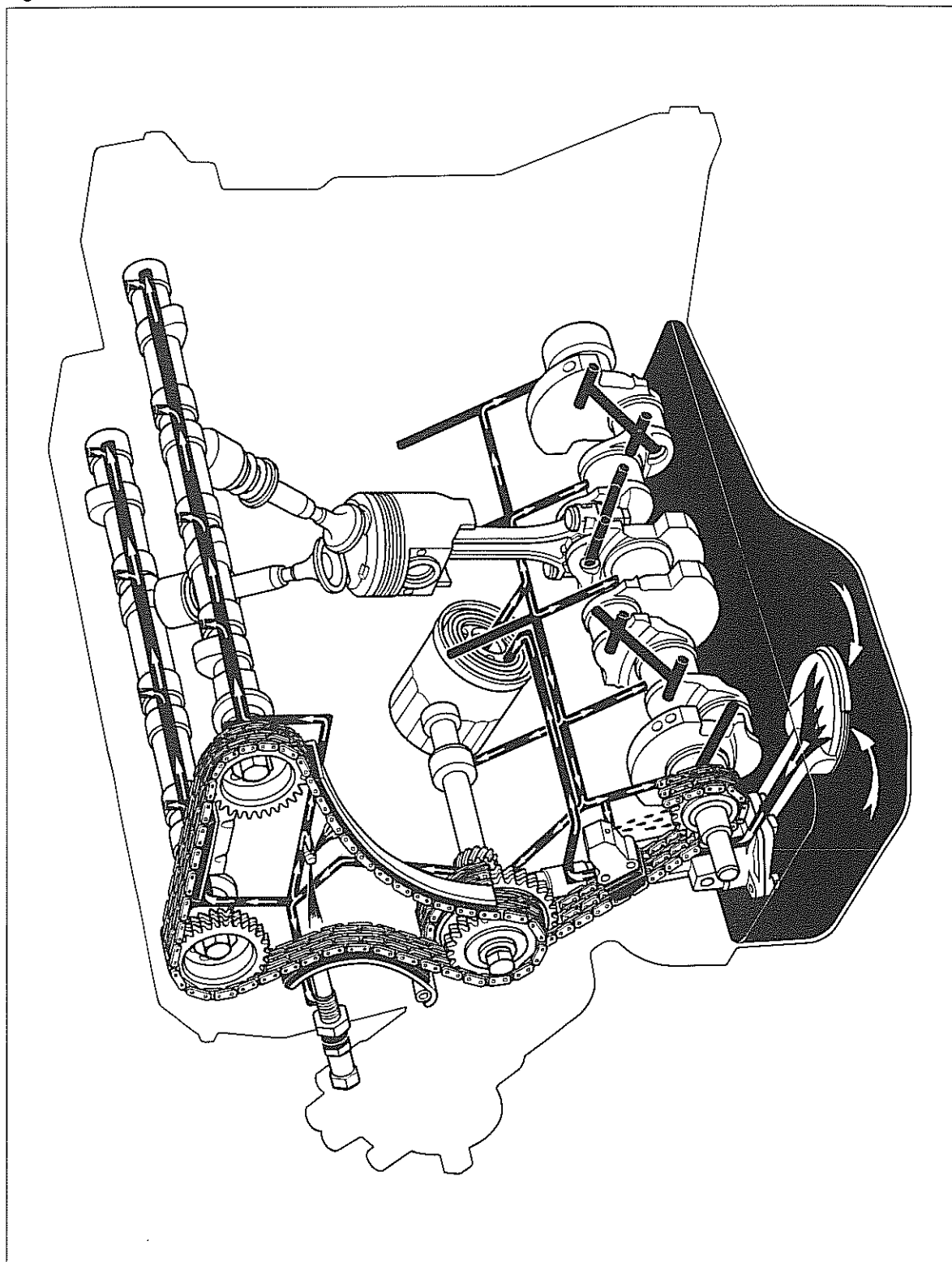
2T, 3T ENGINE

Fig. 6-1



2T-G ENGINE

Fig. 6-2



OIL PUMP

DISASSEMBLY

Disassemble the parts in the numerical order shown in the figure.

Fig. 6-3

1. Oil Strainer
2. Drive Shaft & Rotor
3. Relief Valve Subassembly

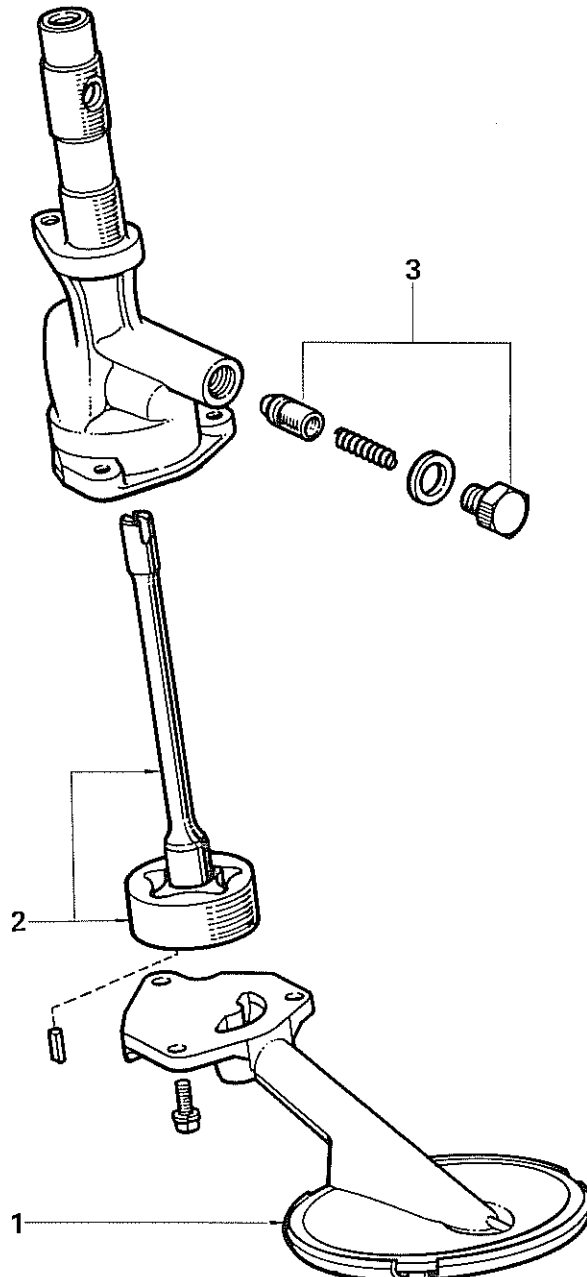


Fig. 6-4

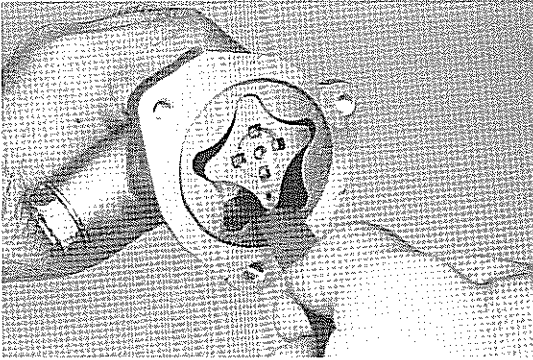


Fig. 6-5

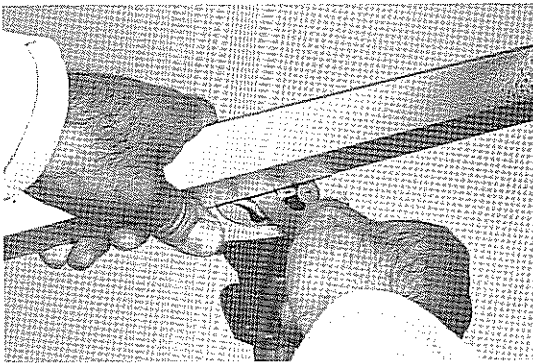


Fig. 6-6

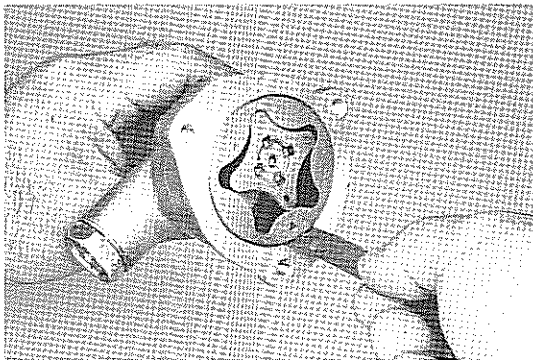
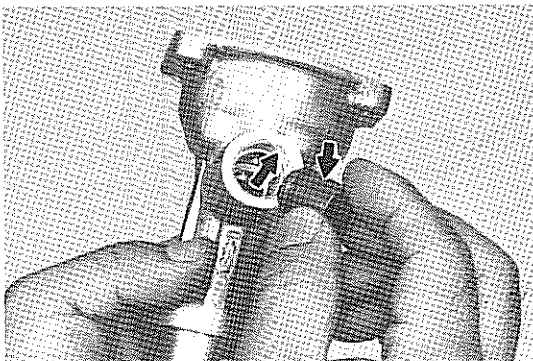


Fig. 6-7



INSPECTION



1. Measure the tip clearance. If it exceeds limit, replace the oil pump drive rotor set.

Tip clearance:

STD	0.04 – 0.16 mm (0.002 – 0.006 in.)
Limit	0.25 mm (0.010 in.)



2. Measure the side clearance (between rotor and cover). If it exceeds limit, replace either rotor or pump body.

Side clearance:

STD	0.03 – 0.09 mm (0.001 – 0.004 in.)
Limit	0.15 mm (0.006 in.)



3. Measure the body clearance (between driven rotor and pump body). If it exceeds limit, replace either rotor or pump body.

Body clearance:

STD	0.10 – 0.16 mm (0.004 – 0.006 in.)
Limit	0.25 mm (0.010 in.)



4. Inspect relief valve for scoring or wear. If damaged, replace valve or pump assembly.

ASSEMBLY

Assemble the parts in the numerical order shown in the figure.

Fig. 6-8

1. Relief Valve Subassembly
2. Drive Shaft & Rotor
3. Oil Strainer

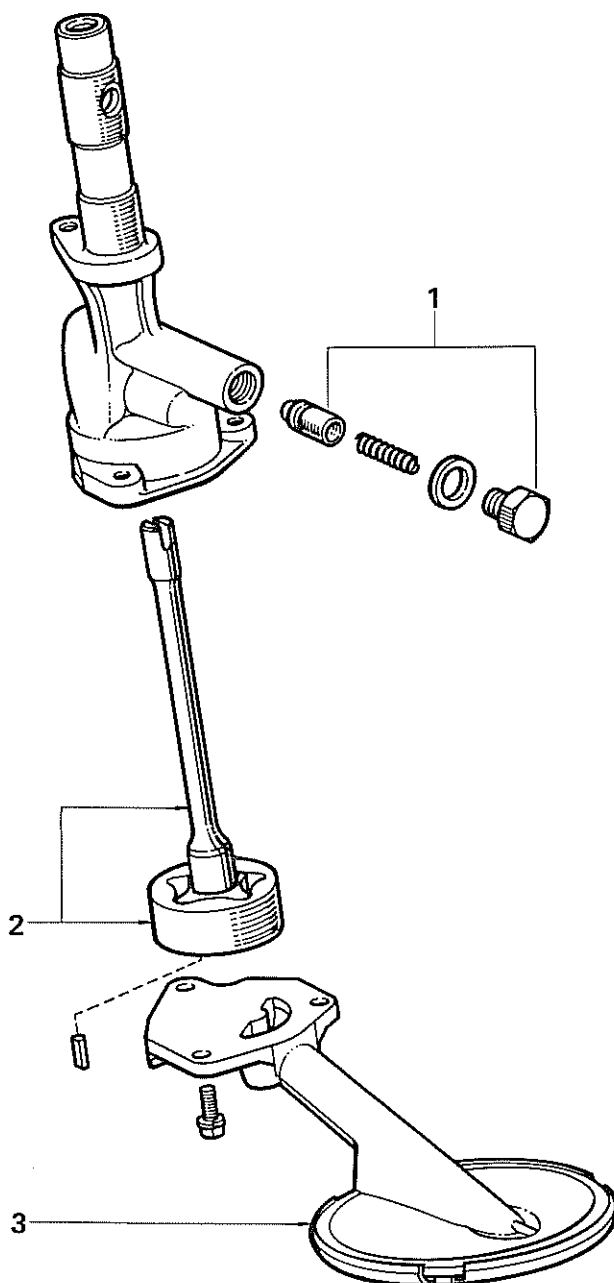
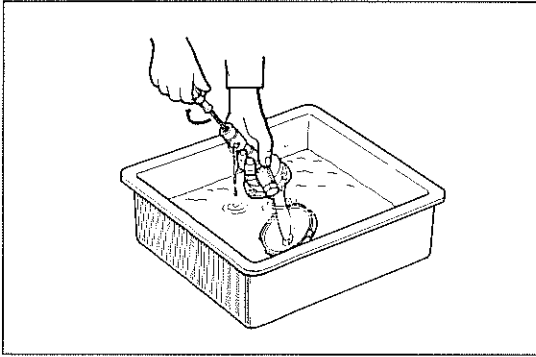
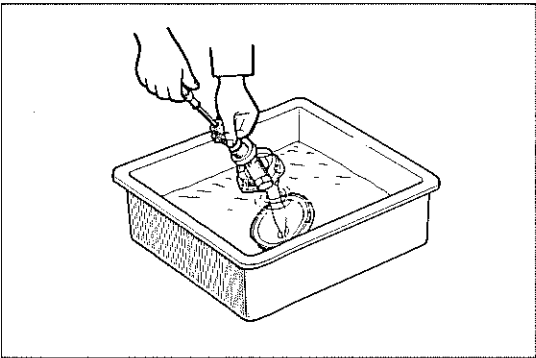


Fig. 6-9

**Check Pump Operation**

1. Immerse the suction end of the pump into clean engine oil and turn the shaft clockwise with a screwdriver. Oil should come out of the discharge hole.

Fig. 6-10



2. Close the discharge hole with your thumb, and turn the shaft as before. The shaft should be difficult to turn.

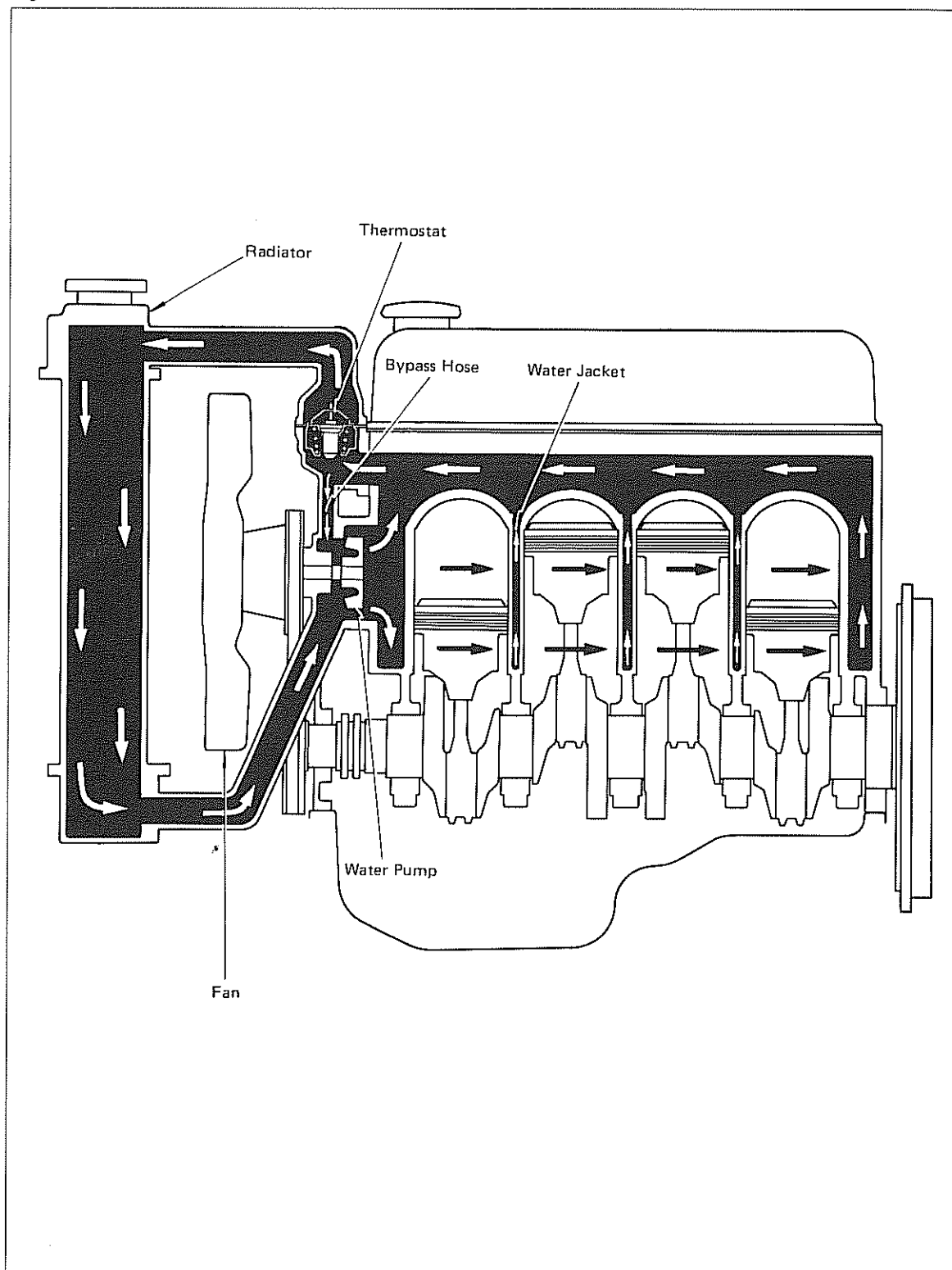
MEMO

COOLING SYSTEM

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WATER PUMP	7-4
WATER PUMP (With Temperature Controlled Coupling)..	7-9
RADIATOR	7-14
THERMOSTAT	7-14

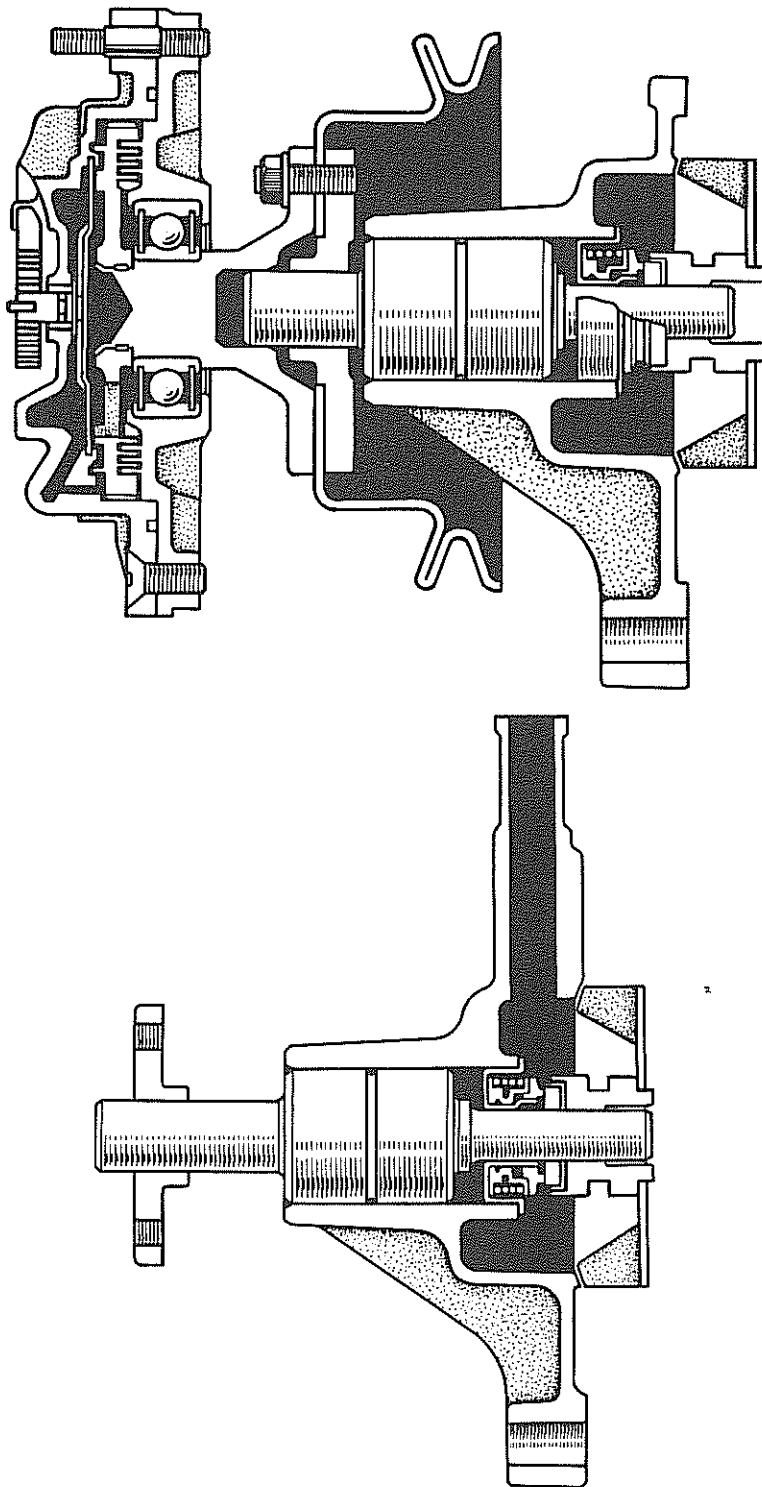
COOLING SYSTEM CIRCUIT

Fig. 7-1



WATER PUMP CUTAWAY VIEW

Fig. 7-2



WATER PUMP

DISASSEMBLY

Disassemble the parts in the numerical order shown in the figure.

Fig. 7-3

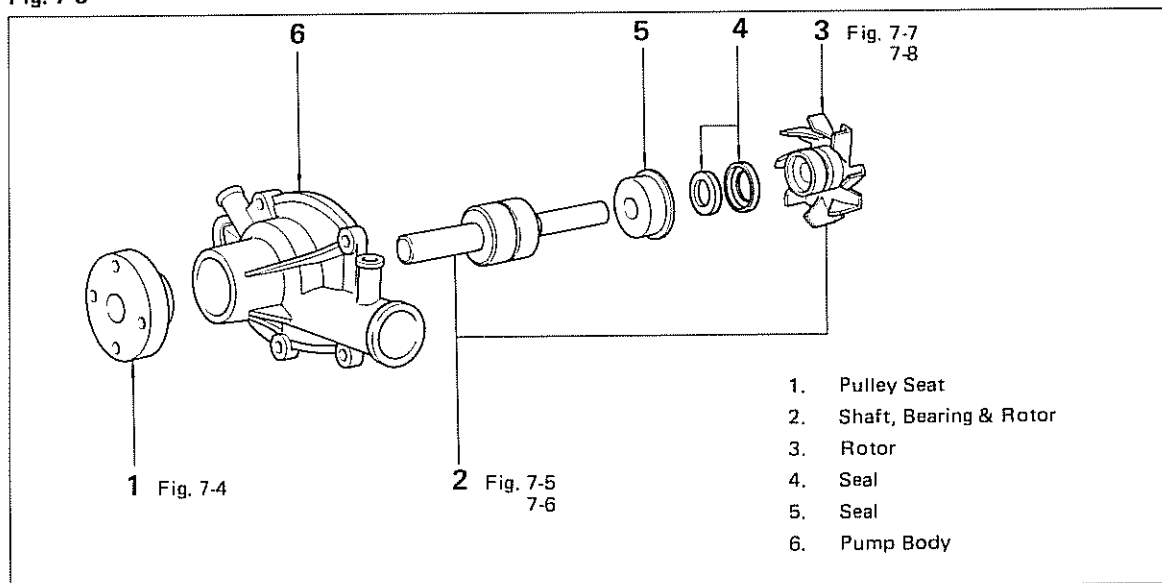
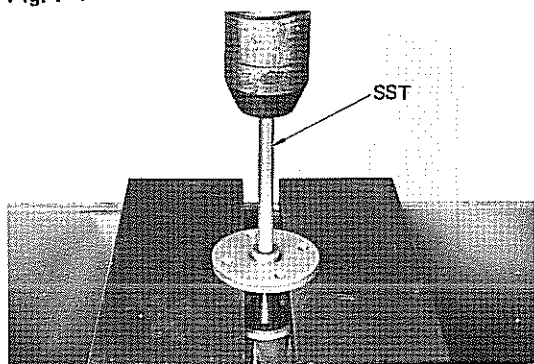


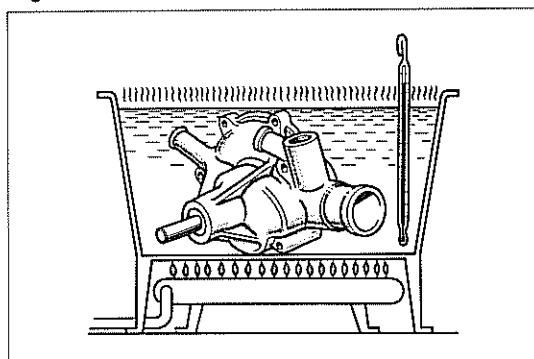
Fig. 7-4



While supporting the pulley seat, press out the shaft with SST.

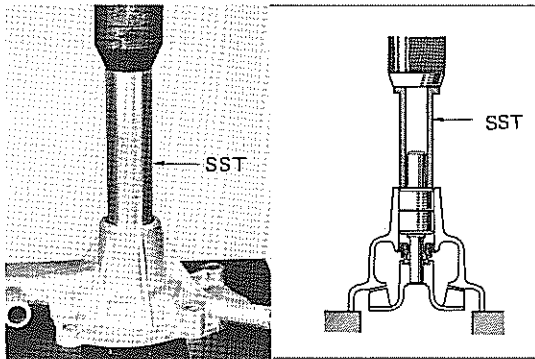
SST[09236-36010]

Fig. 7-5



Heat the water pump body to about 80°C (176°F).

Fig. 7-6



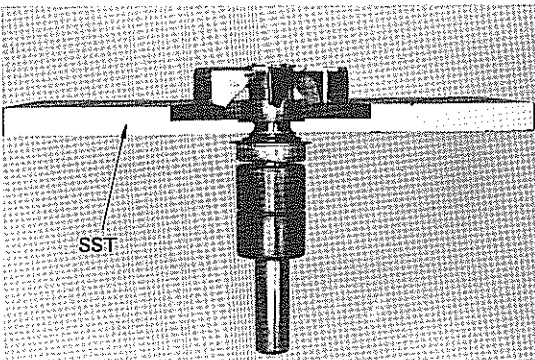
Press out the bearing together with the rotor using SST.

SST[09236-28011]

— Note —

Always replace the seal set when assembling.

Fig. 7-7

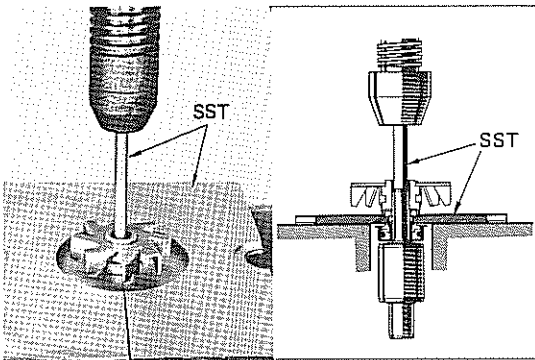


Support the rotor with SST as shown in the figure.

SST[09236-28011]



Fig. 7-8

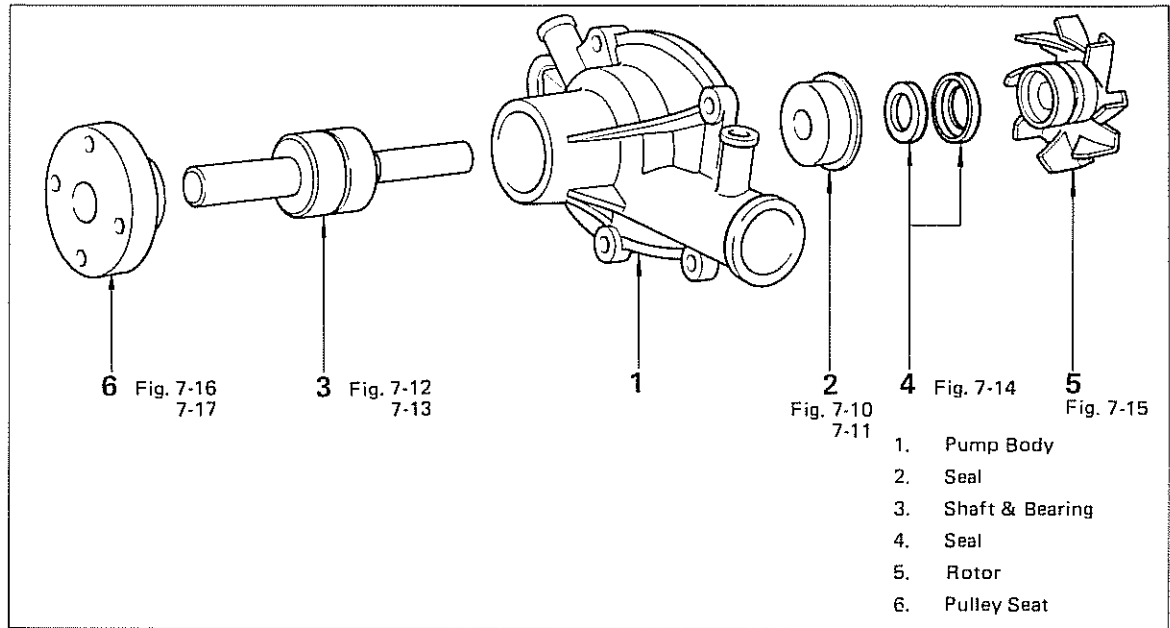
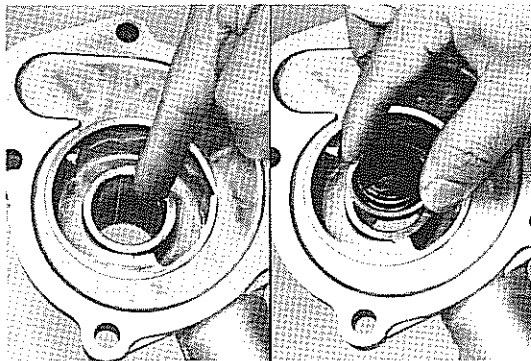


Press out the shaft with SST.

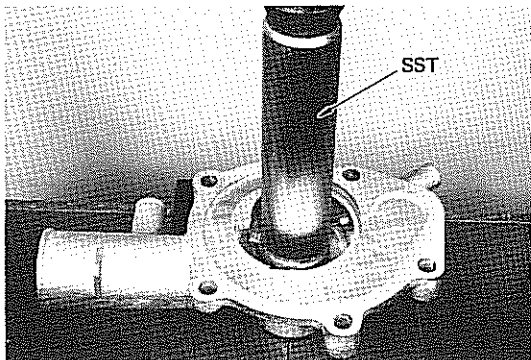
SST[09236-36010]

ASSEMBLY

Assemble the parts in the numerical order shown in the figure.

Fig. 7-9**Fig. 7-10**

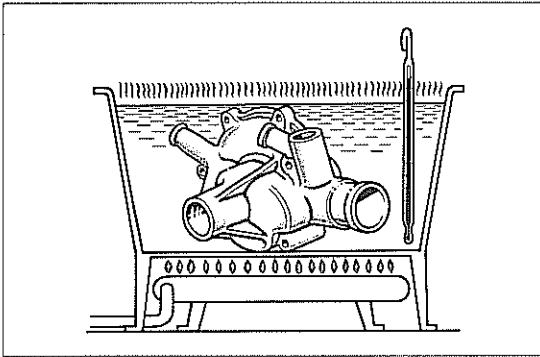
Apply liquid sealer on the pump body.

Fig. 7-11

Press in the seal set into the pump body with SST.

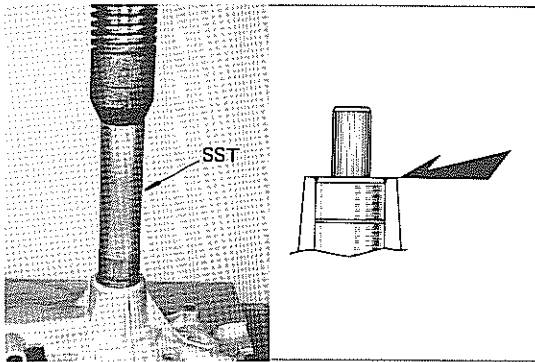
SST[09236-36010]

Fig. 7-12



Heat the pump body to about 80°C (176°F).

Fig. 7-13

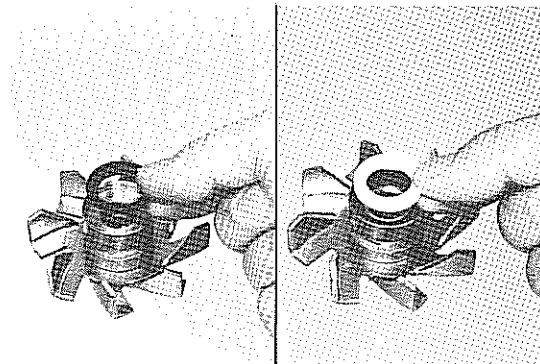


Press in the bearing with SST.
SST[09236-36010]

— Note —

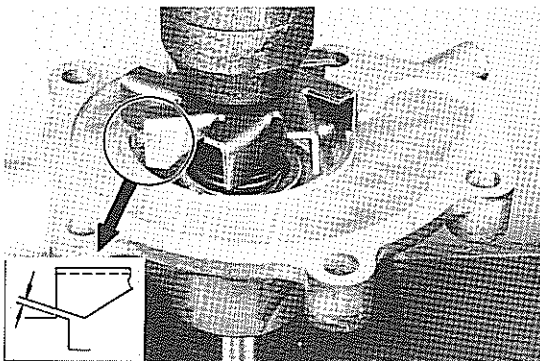
Bearing end face should be flush with the body top surface.

Fig. 7-14



Install the seal set into the rotor:

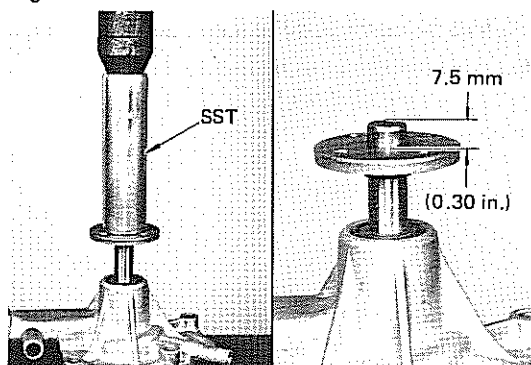
Fig. 7-15



Press in the rotor.

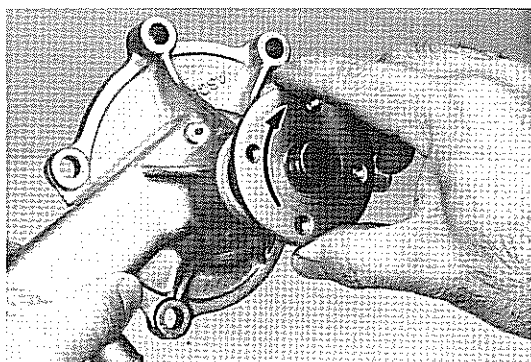
Rotor body clearance: 1 mm
(0.04 in.)

Fig. 7-16



Press in the pulley seat with SST as shown in the figure.
SST[09236-36010]

Fig. 7-17



After assembly make sure the rotor rotates smoothly.

WATER PUMP (With Temperature Controlled Coupling)

DISASSEMBLY

Disassemble the parts in the numerical order shown in the figure.

Fig. 7-18

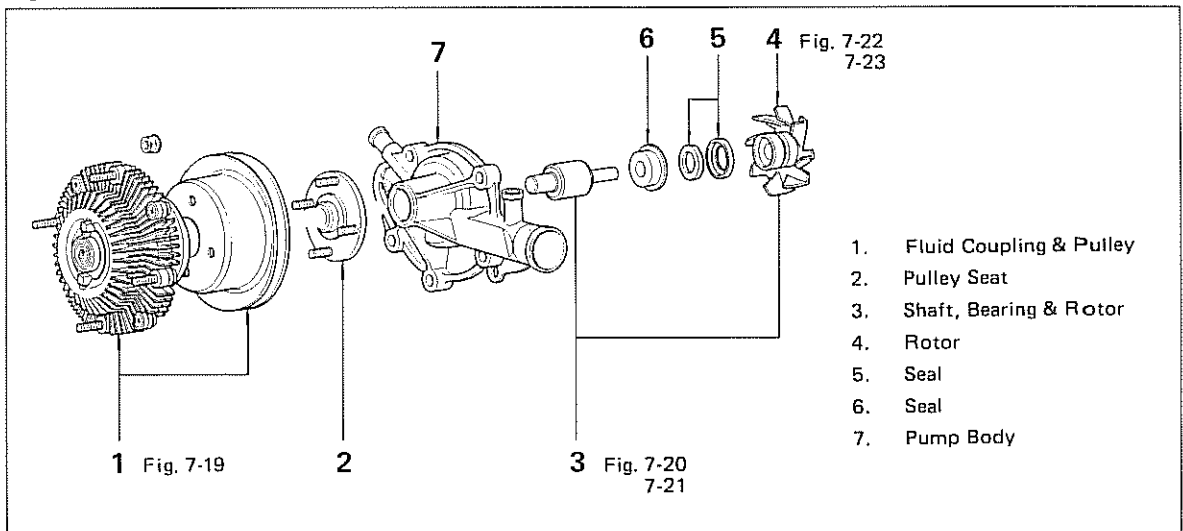
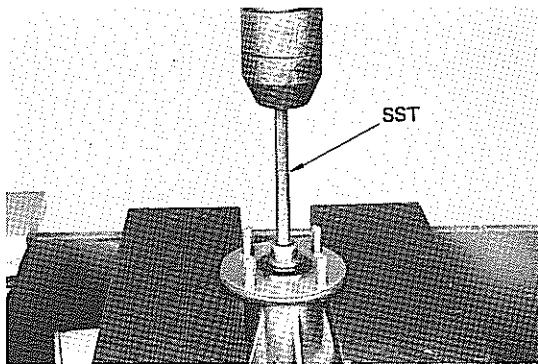
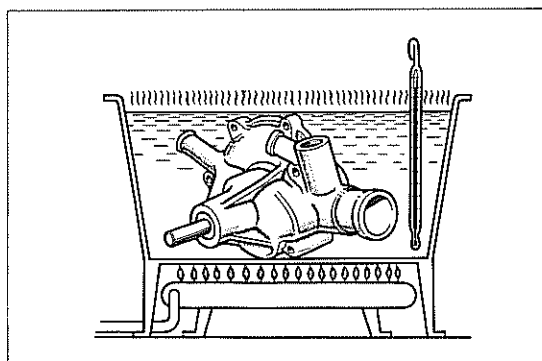


Fig. 7-19



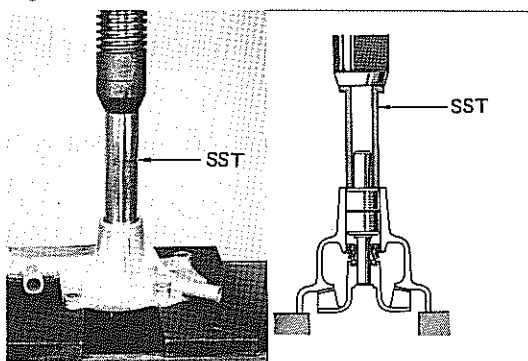
While supporting the pulley seat, press out the shaft with SST.
SST[09236-36010]

Fig. 7-20



Heat the water pump body to about 80°C (176°F).

Fig. 7-21



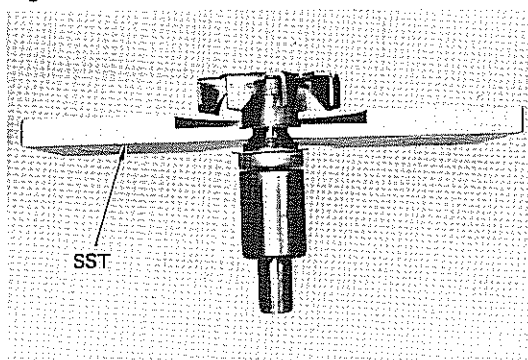
Press out the bearing together with rotor with SST.

SST[09236-28011]

— Note —

Always replace the seal set upon assembly.

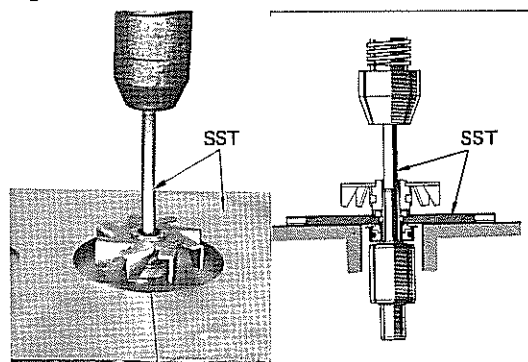
Fig. 7-22



Support the rotor with SST as shown in the figure.

SST[09236-28011]

Fig. 7-23

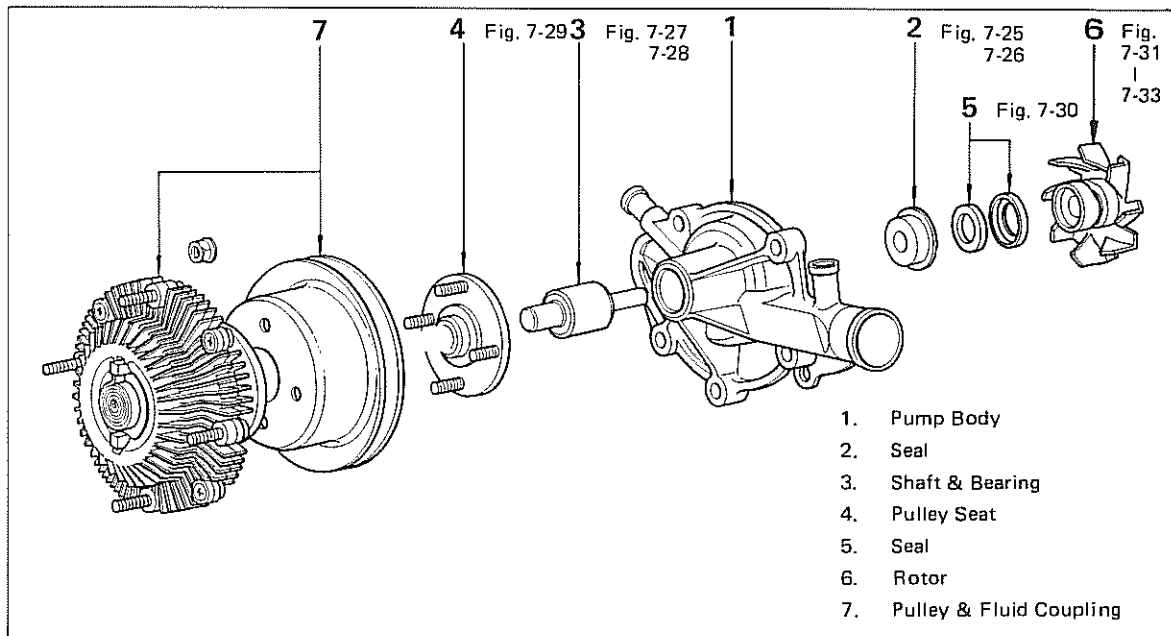
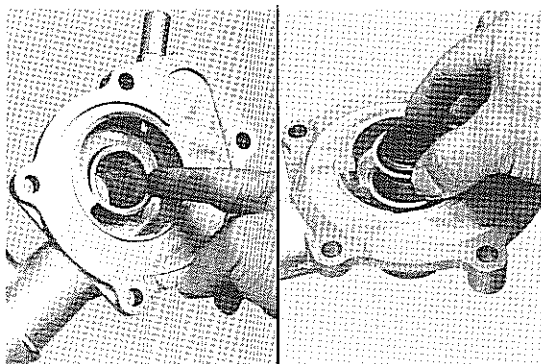


Press out the shaft with SST.

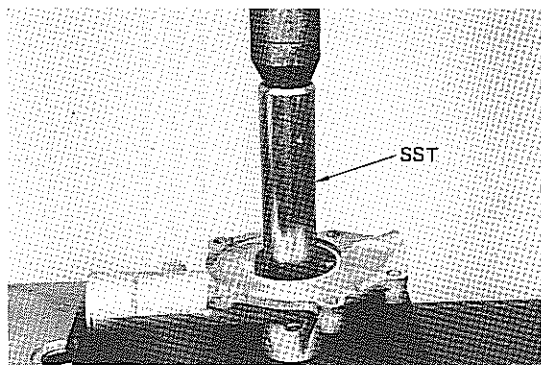
SST[09236-36010]

ASSEMBLY

Assemble the parts in the numerical order shown in the figure.

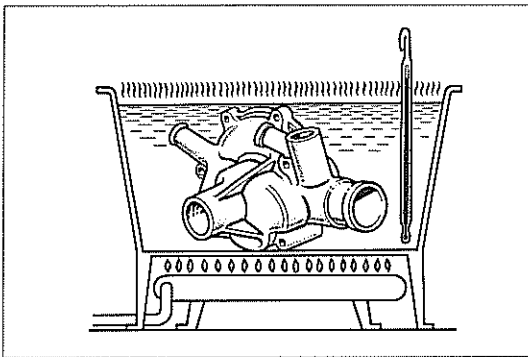
Fig. 7-24**Fig. 7-25**

Apply liquid sealer on the pump body.

Fig. 7-26

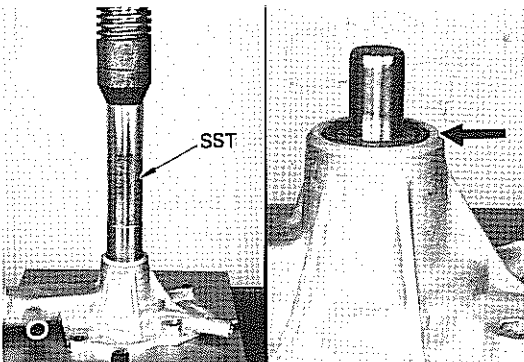
Press in the seal set into the pump body.

Fig. 7-27



Heat the pump body to about 80°C (176°F).

Fig. 7-28

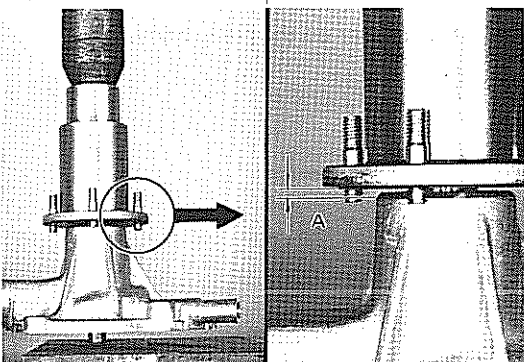


Press in the bearing with SST.
SST[09236-28011]

– Note –

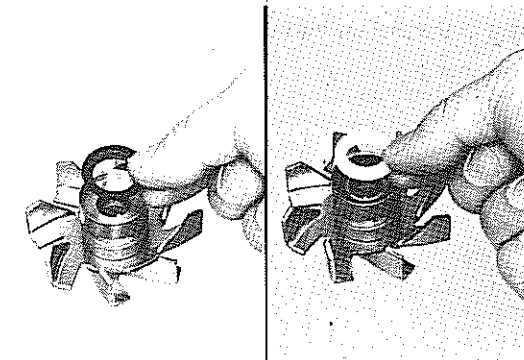
Bearing end face should be flush with the body top surface.

Fig. 7-29



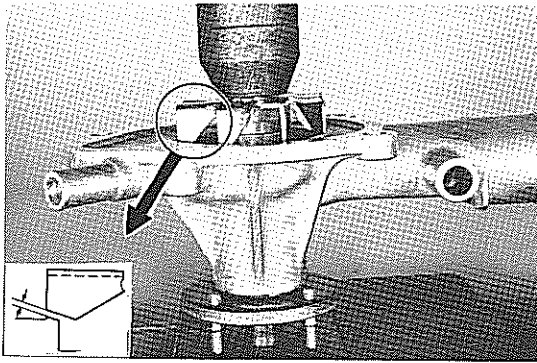
Press in the pulley seat until the A clearance
about 2.0 mm (0.08 in.).

Fig. 7-30



Install the seal set into the rotor.

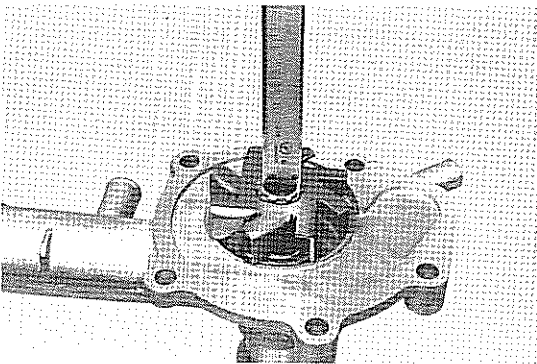
Fig. 7-31



Press in the rotor.

Rotor body clearance: 1.0 mm
(0.04 in.)

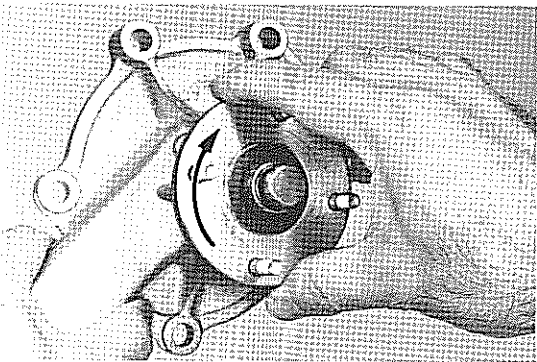
Fig. 7-32



After assembly check the shaft depth.

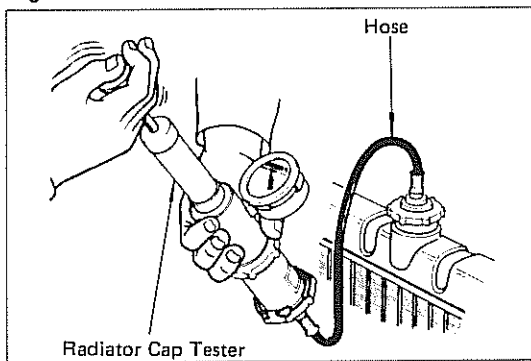
Shaft depth: 13 mm
(0.5 in.)

Fig. 7-33



After assembly make sure the rotor rotates smoothly.

Fig. 7-34

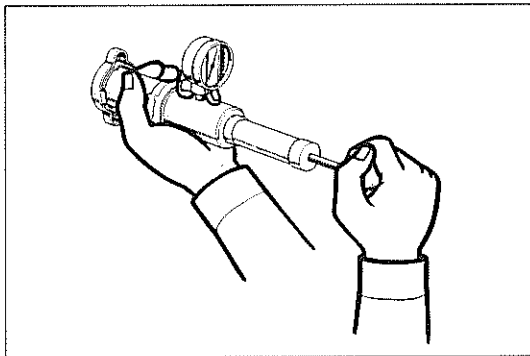


RADIATOR INSPECTION

1. Install the radiator cap tester to the radiator, apply pressure and check for leakage in the cooling system under normal operating temperature.

**Applicable pressure: 1.2 kg/cm²
(17 psi)**

Fig. 7-35



2. Check pressure sealing and vacuum relief valve operation.

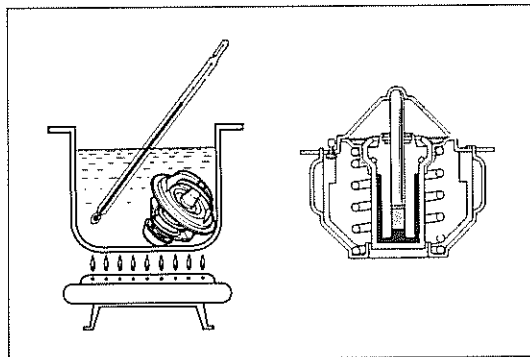
Valve opening pressure:

**STD 0.75 – 1.05 kg/cm²
(10.7 – 14.9 psi)**

**Limit 0.6 kg/cm²
(8.5 psi)**

3. If readings are not within acceptable limits, replace radiator cap.

Fig. 7-36

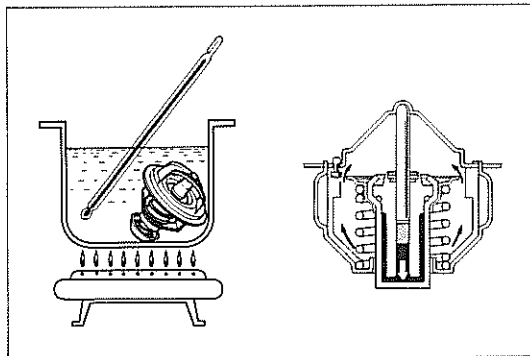


THERMOSTAT INSPECTION

1. Immerse the thermostat in water, and check the valve opening temperatures by heating the water gradually.
2. Replace the thermostat if the valve remains open at normal temperature or is not very tight when fully closed.

**Valve starts to open at 80.5 – 83.5°C
(177 – 182°F).**

Fig. 7-37



**Valve opens by more than 10 mm
(0.4 in.) at 100°C (212°F).**

FUEL SYSTEM

	Page
FUEL PUMP.....	8-2
CARBURETOR	8-4
SOLEX CARBURETOR.....	8-42

FUEL PUMP

DISASSEMBLY

Disassemble the parts in the numerical order shown in the figure.

Fig. 8-1

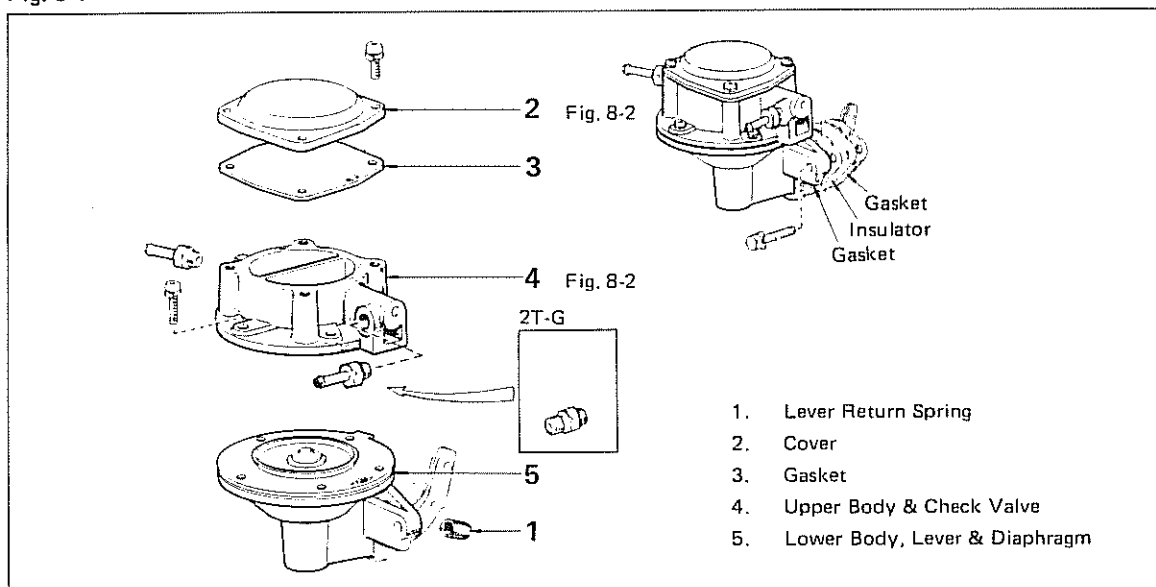
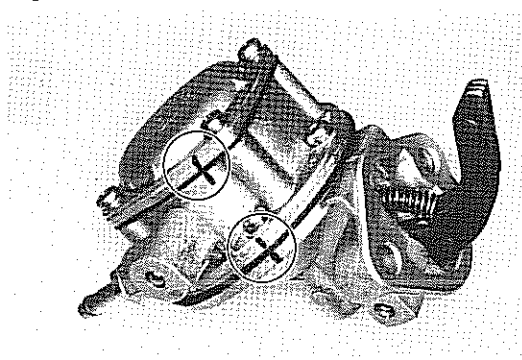
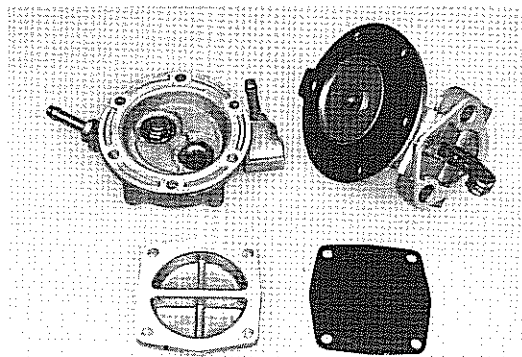


Fig. 8-2



Mark the position of the pump cover and upper body.

Fig. 8-3



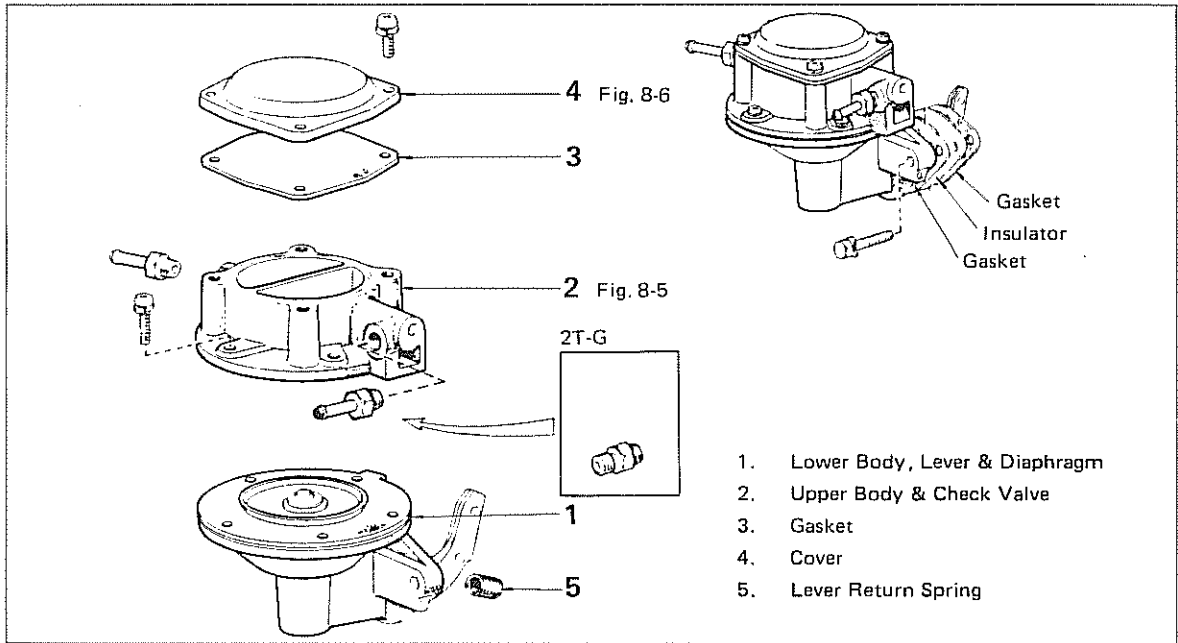
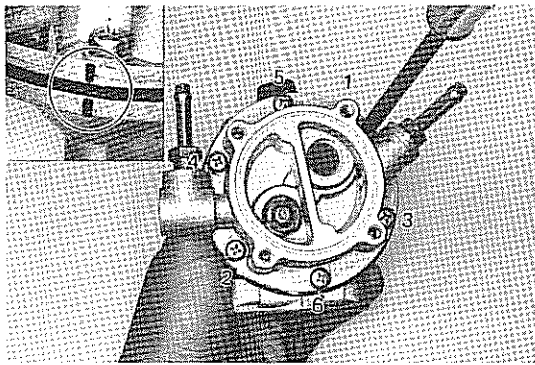
INSPECTION



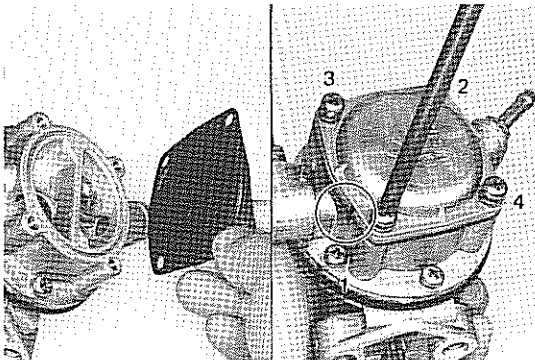
Inspect the diaphragms for tear and check valves for defective operation. Replace if damaged.

ASSEMBLY

Assemble the parts in the numerical order shown in the figure.

Fig. 8-4**Fig. 8-5**

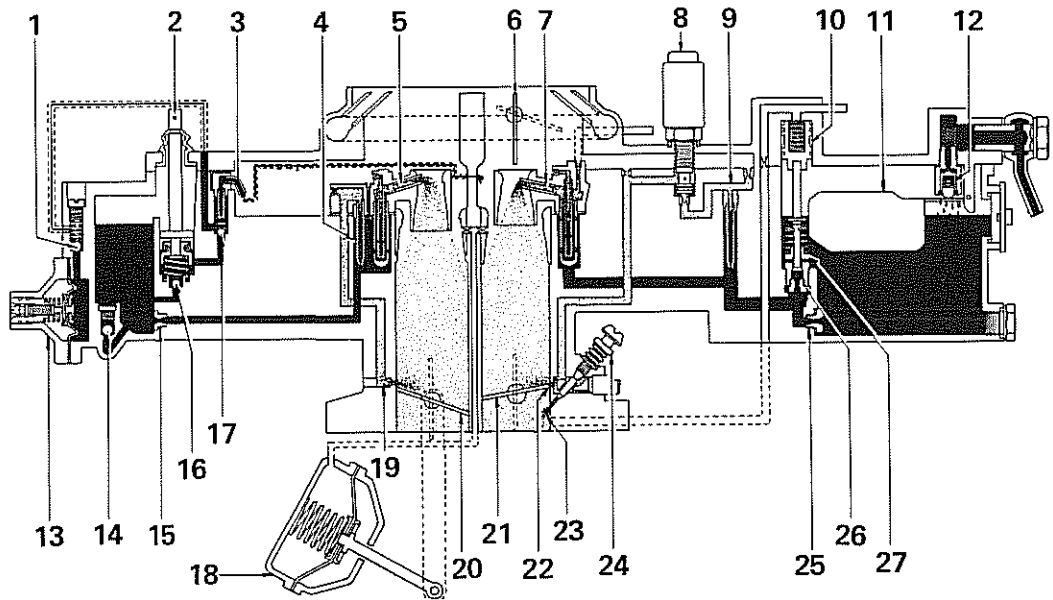
Assemble the lower and upper body in the direction shown in the figure.

Fig. 8-6

Assemble the upper body and cover over the diaphragm. Inlet and outlet chamber separating walls should be aligned.

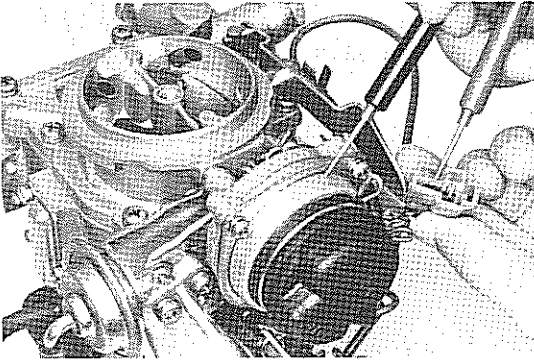
CARBURETOR**CARBURETOR CIRCUIT**

Fig. 8-7



- | | |
|----------------------------|-------------------------------------|
| 1. AAP Outlet Check Valve | 15. Second Main Jet |
| 2. Pump Plunger | 16. Pump Inlet Valve |
| 3. Pump Jet | 17. Pump Outlet Valve |
| 4. Second Slow Jet | 18. Second Throttle Valve Diaphragm |
| 5. Second Main Jet | 19. Second Slow Port |
| 6. Choke Valve | 20. Second Throttle Valve |
| 7. First Main Jet | 21. First Throttle Valve |
| 8. Fuel Cut Solenoid Valve | 22. First Slow Port |
| 9. First Slow Jet | 23. Idle Port |
| 10. Power Piston | 24. Idle Mixture Adjusting Screw |
| 11. Float | 25. First Main Jet |
| 12. Needle Valve | 26. Power Jet |
| 13. AAP Diaphragm | 27. Power Valve |
| 14. AAP Inlet Check Valve | |

Fig. 8-8

**DISASSEMBLY****Air Horn**

Before disassembling, check following items.

1. Measure the heating coil resistance with an ohmmeter.

Resistance: 7.5 — 10.0 Ω

Fig. 8-9

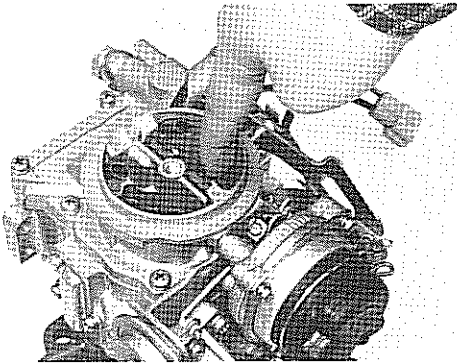


Fig. 8-10

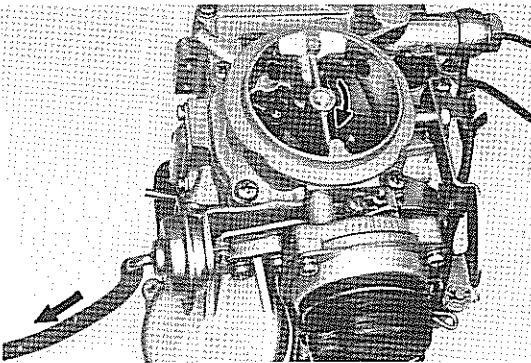
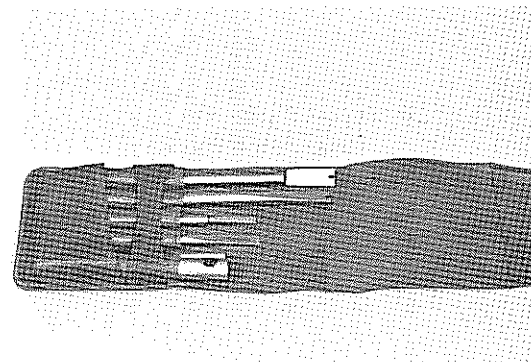


Fig. 8-11



2. Check the choke valve action.

3. Check the choke breaker diaphragm action.
Automatic choke.

Use SST for carburetor servicing.
SST[09860-11011]

Disassemble the parts in the numerical order shown in the figure.

Fig. 8-12

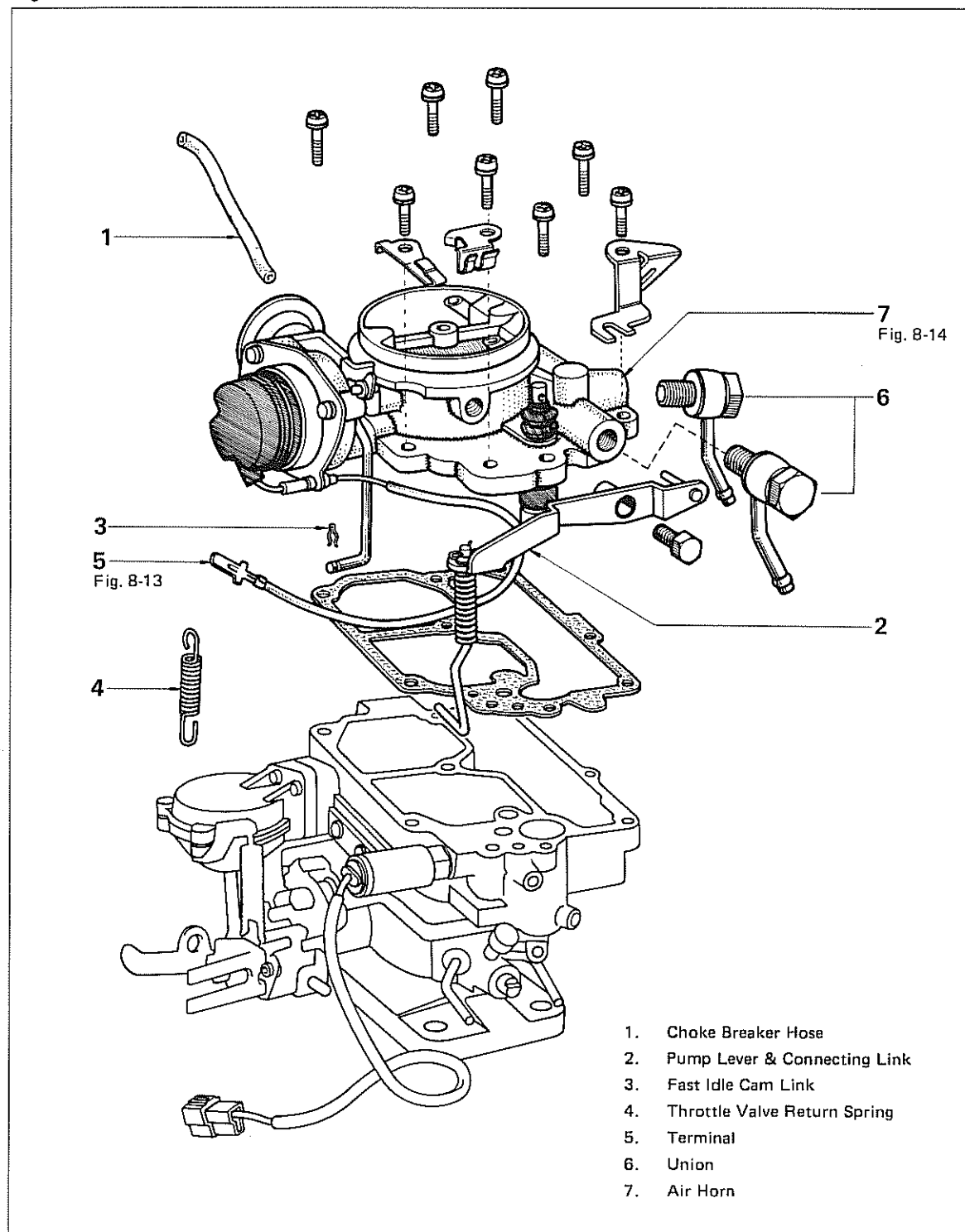
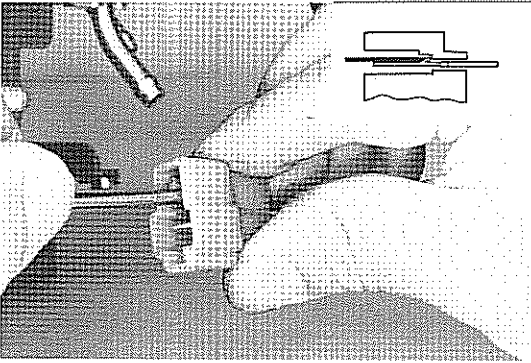
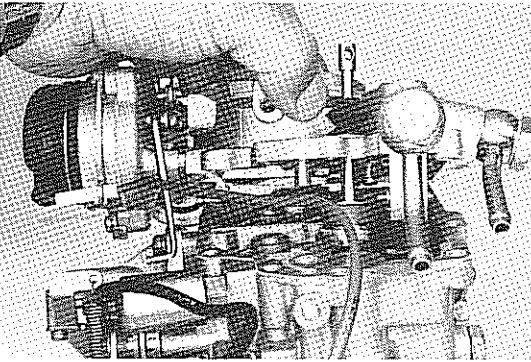


Fig. 8-13



Remove the terminal from the connector.

Fig. 8-14



Lift out the air horn.

Float

Disassemble the parts in the numerical order shown in the figure.

Fig. 8-15

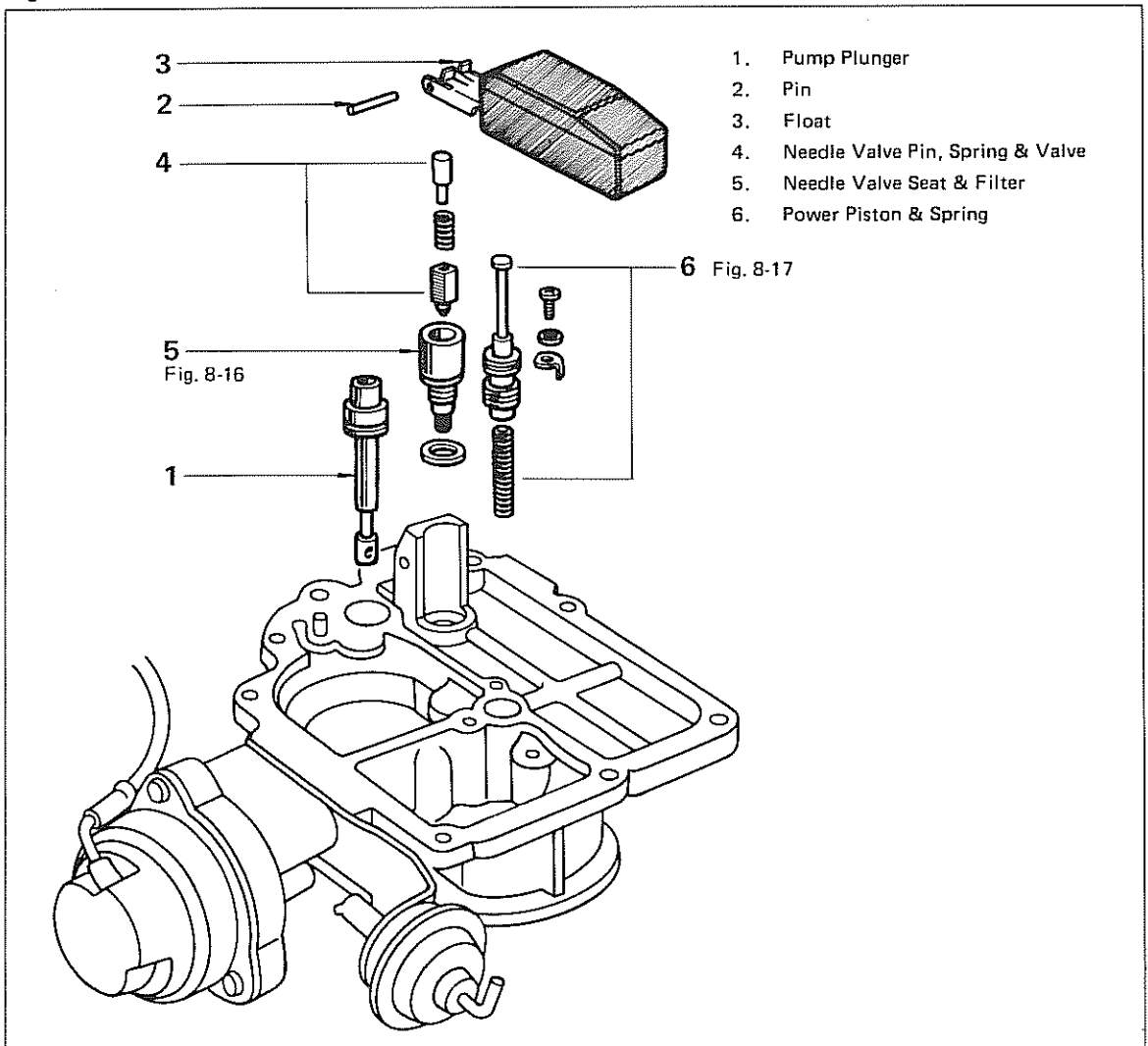
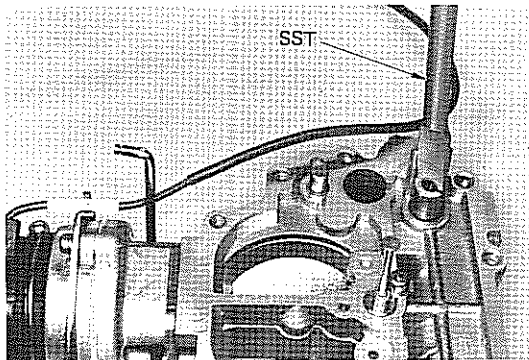
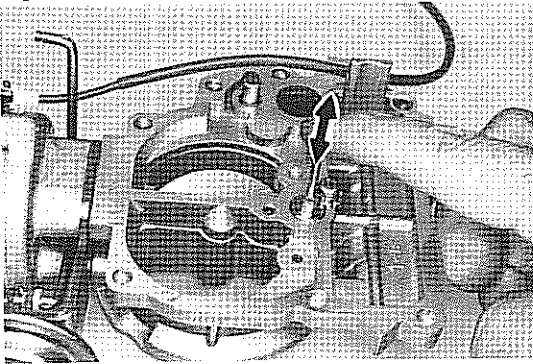


Fig. 8-16



Remove the needle valve seat with SST.
SST[09860-11011]

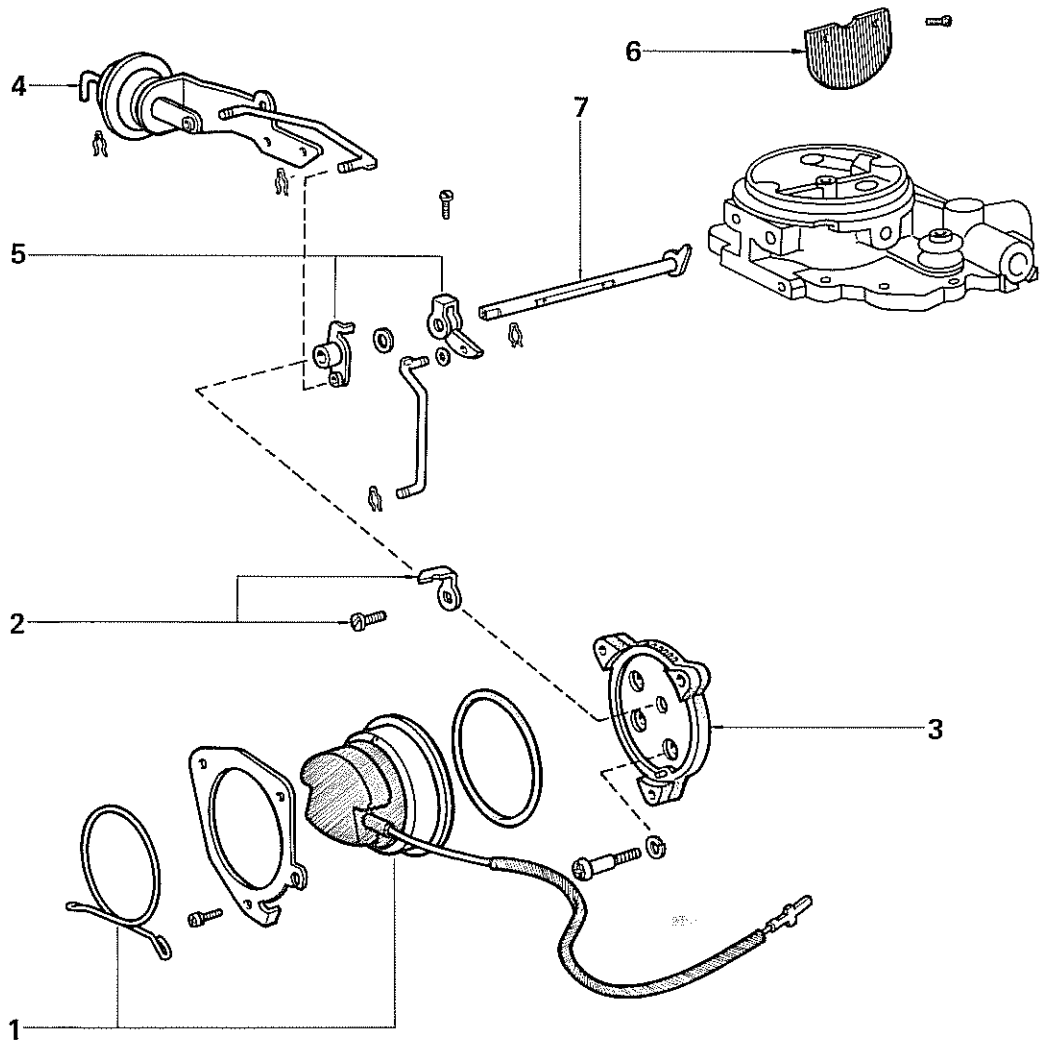
Fig. 8-17



Check the power piston movement.

Choke System

Disassemble the parts in the numerical order shown in the figure.

Fig. 8-18**AUTOMATIC CHOKE**

1. Coil Housing
2. Choke Lever
3. Thermostat Case & Gasket
4. Choke Breaker

5. Relief Lever
6. Choke Valve
7. Choke Valve Shaft

Body

Disassemble the parts in the numerical order shown in the figure.

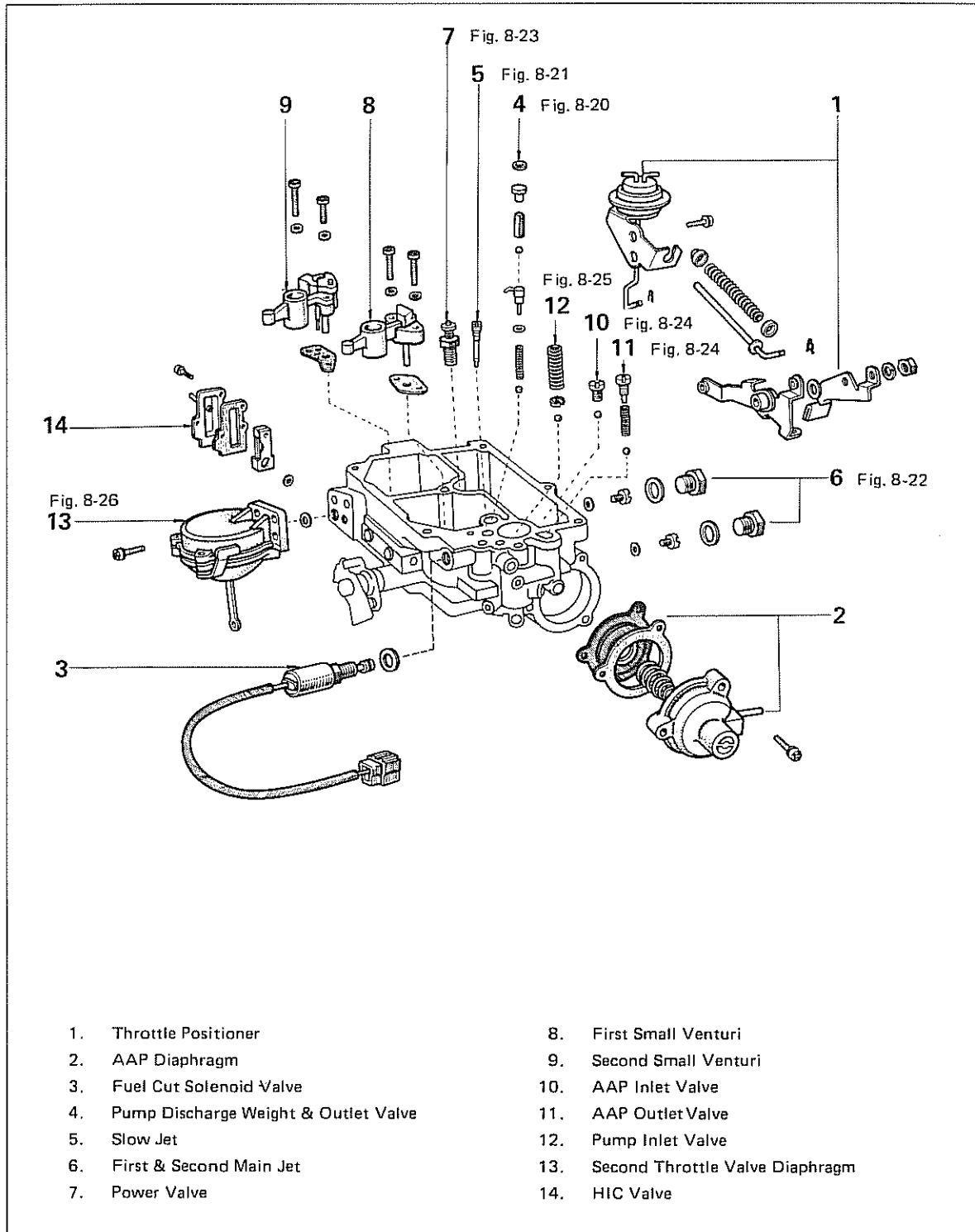
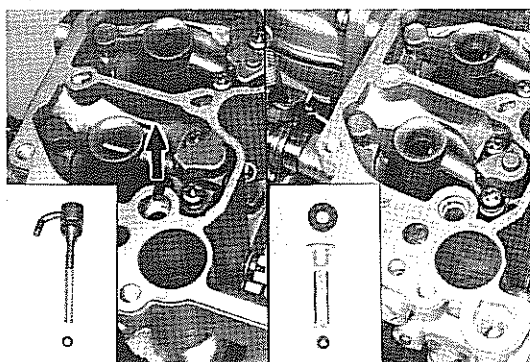
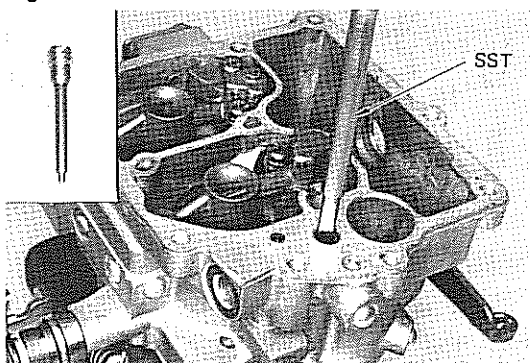
Fig. 8-19

Fig. 8-20



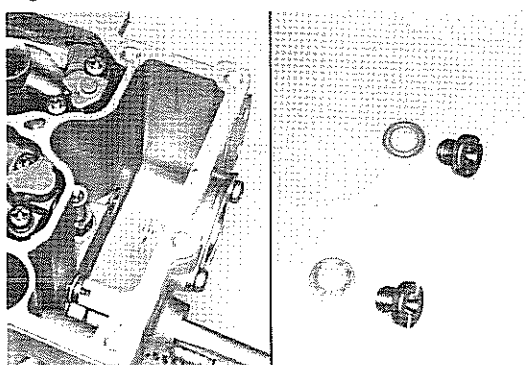
Arrange the acceleration pump nozzle, spring and pump discharge weight.

Fig. 8-21



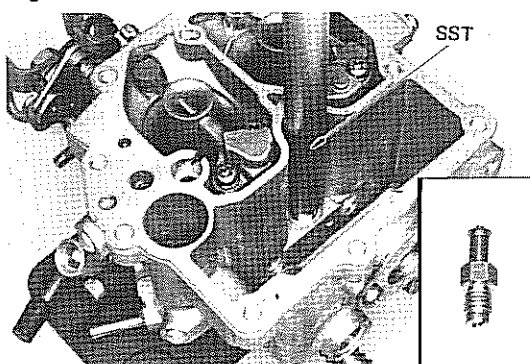
Remove the slow jet with SST.
SST[09860-11011]

Fig. 8-22



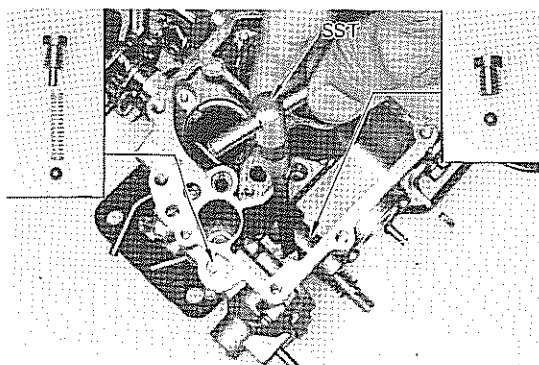
Remove the first and second main jets and gaskets.

Fig. 8-23



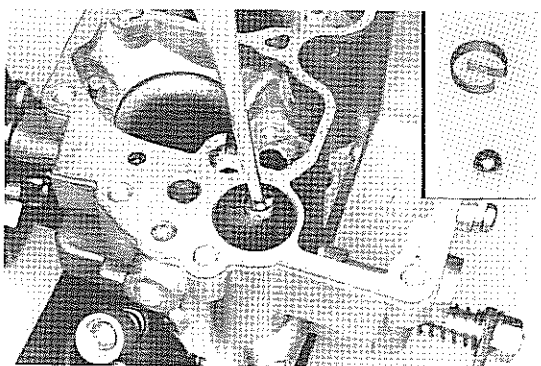
Remove the power valve with SST.
SST[09860-11011]

Fig. 8-24



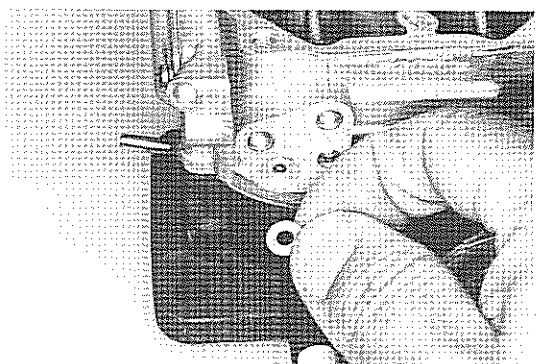
Remove the AAP outlet valve plug with SST. Then remove the spring and outlet check valve. SST[09860-11011]

Fig. 8-25



Remove the retainer with a tweezers and then remove the inlet check ball.

Fig. 8-26



After removing the diaphragm housing, arrange the gasket.

Flange

Disassemble the parts in the numerical order shown in the figure.

Fig. 8-27

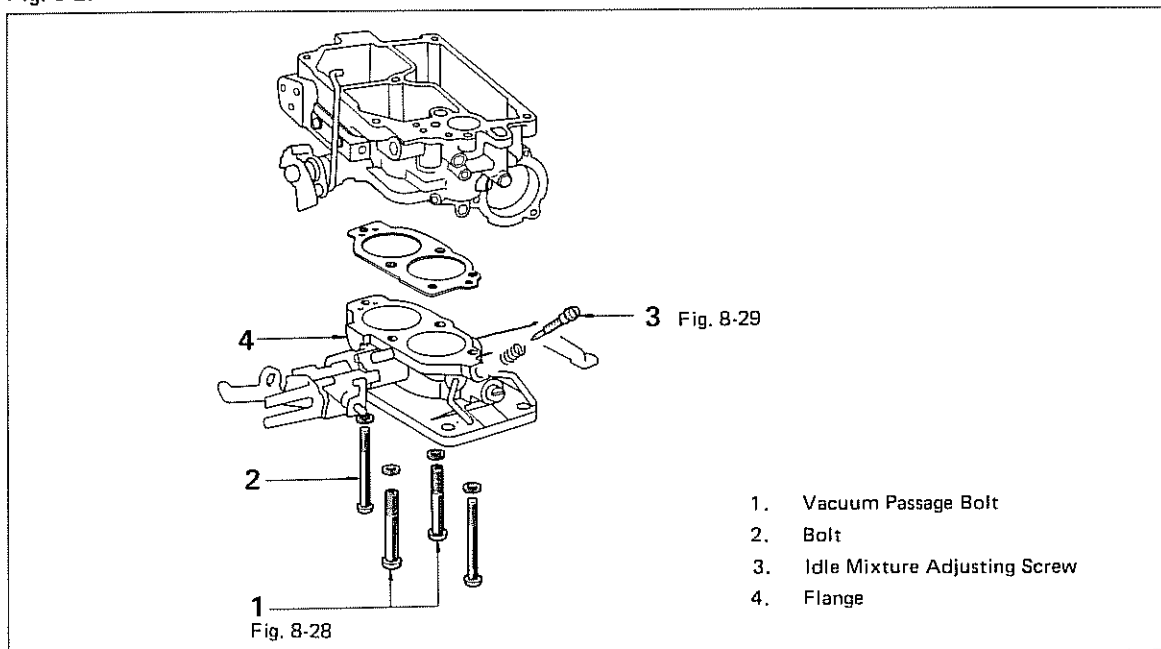
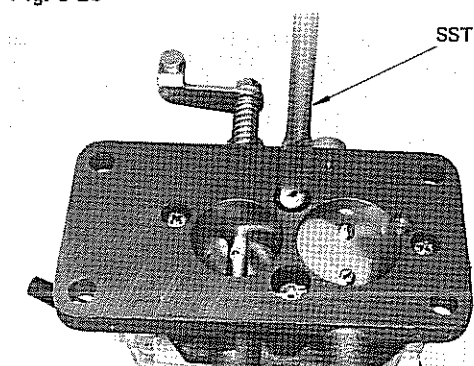
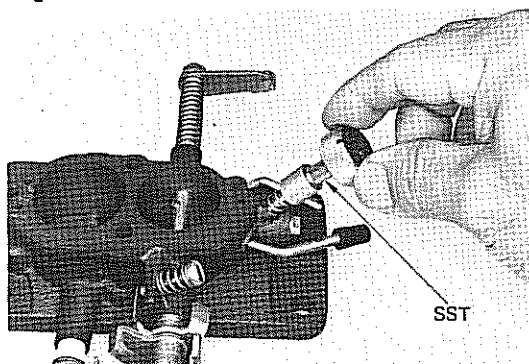


Fig. 8-28



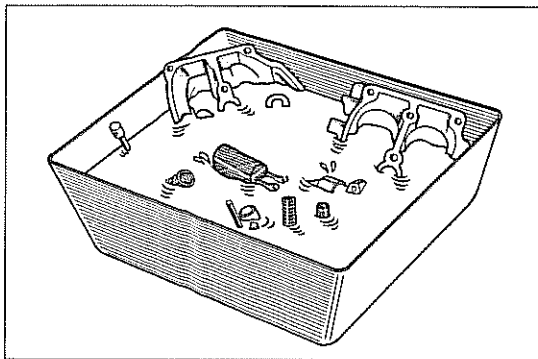
Remove the two bolts with SST.
SST [09860-11011]

Fig. 8-29



Remove the idle mixture adjusting screw with SST.
SST [09243-00010] or
[09243-00020]

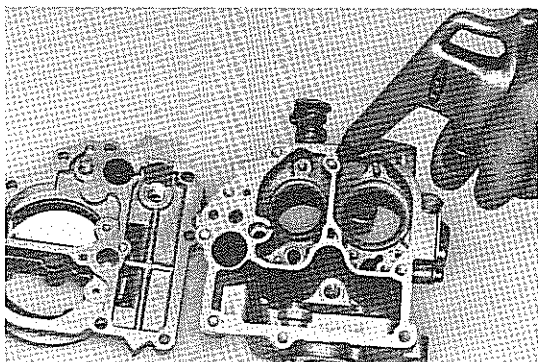
Fig. 8-30

**INSPECTION**

— Precaution —

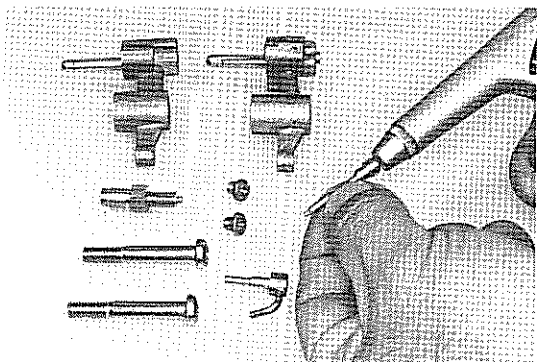
1. Before inspecting the parts, wash them thoroughly in gasoline.

Fig. 8-31



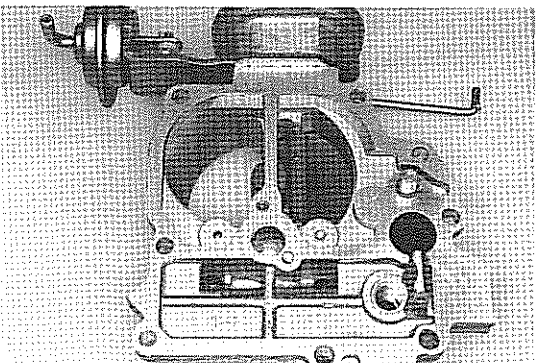
2. Using compressed air, blow all dirt and other foreign matter from the jets and similar parts, and from the fuel passages and apertures in the body.

Fig. 8-32



3. Never clean the jets or orifices with wire or a drill. This could enlarge the openings and result in excessive fuel consumption.

Fig. 8-33

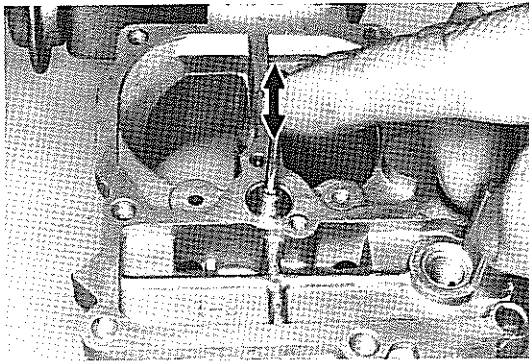


Inspect the following parts and replace any part damaged.

Air Horn Parts

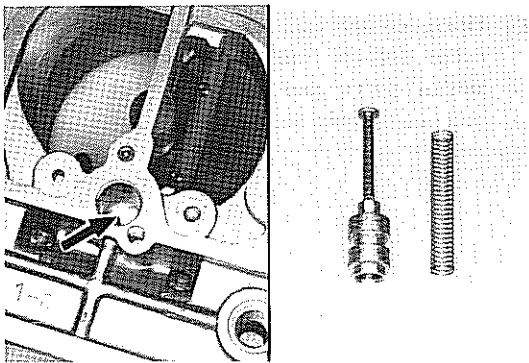
1. Air horn: Cracks, damaged threads, and wear on choke shaft bores.

Fig. 8-34



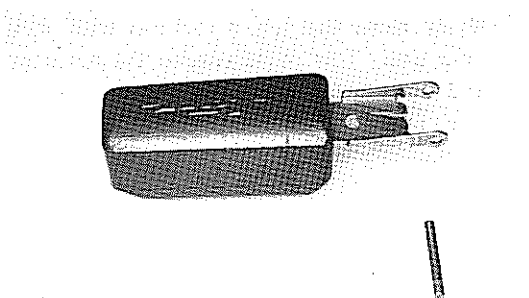
2. Make sure that power piston moves smoothly.

Fig. 8-35



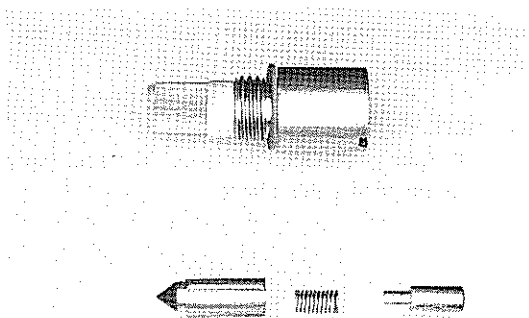
3. Power piston: Damaged.
Spring: Deformation and rust.

Fig. 8-36



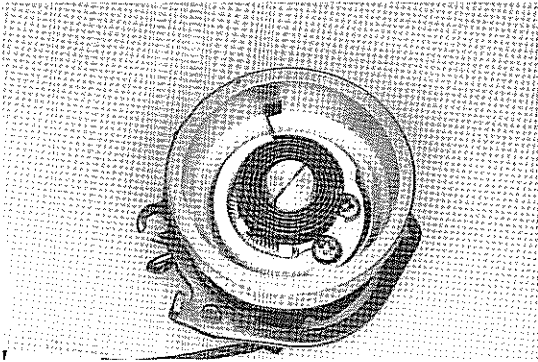
4. Check float and pivot pin for wear or breaks.

Fig. 8-37



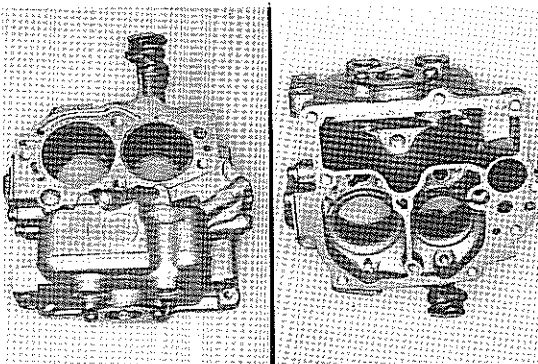
5. Strainer: Rust, breaks.
6. Needle valve surface.
7. Needle valve seat.

Fig. 8-38



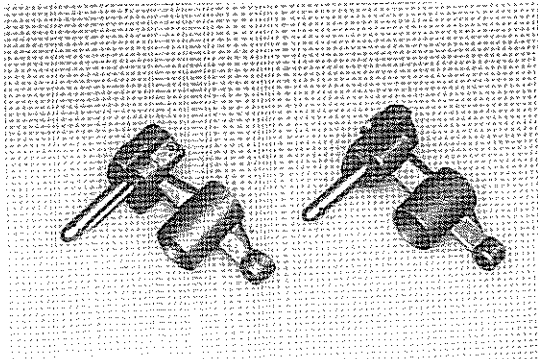
8. Choke valve: Deformation. Choke shaft worn, bent, or not fitting properly into the housing.
9. Coil housing: Cracks, thermostatic bimetal coil deformed.

Fig. 8-39

**Body Parts**

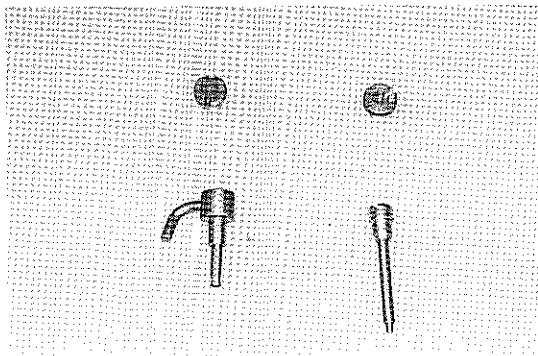
1. Body
Cracks, scored mounting surfaces, damaged threads.

Fig. 8-40



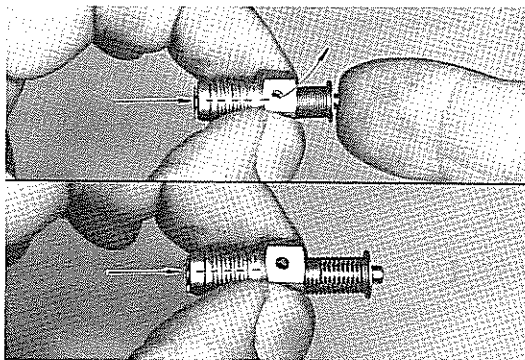
2. Venturi
Damaged or clogged.

Fig. 8-41



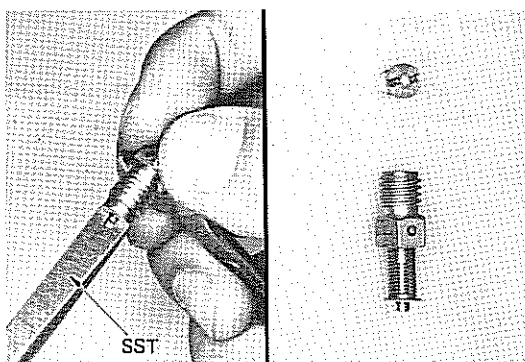
3. Jets
Damaged or clogged.
Damaged contact surface or threads.
Screwdriver slots.

Fig. 8-42



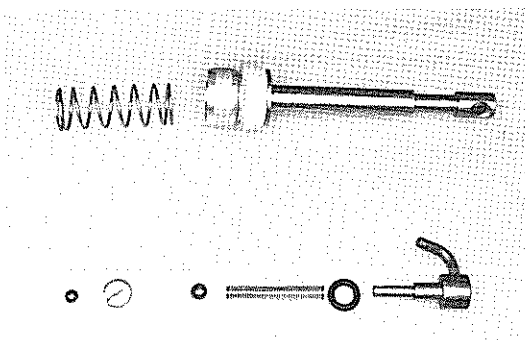
4. Power valve
 Faulty opening and closing action.
 Clogged.
 Damaged contact surface or threads.

Fig. 8-43



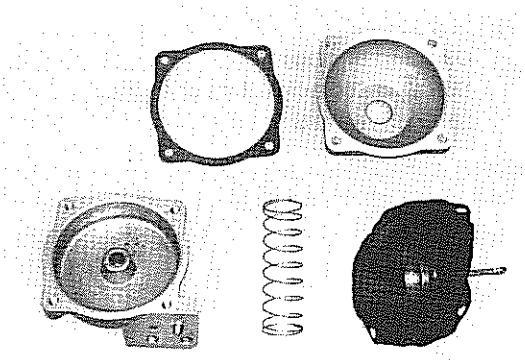
5. Use a spanner wrench and SST to remove the jet.
 SST[09860-11011]

Fig. 8-44



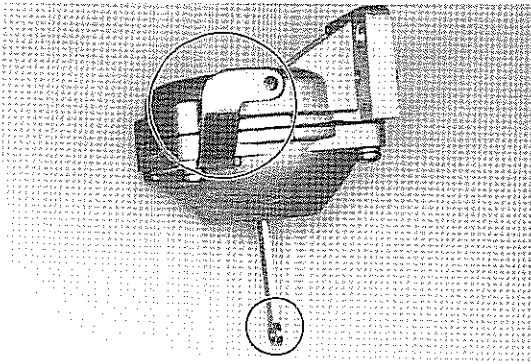
6. Acceleration pump
 Pump damping spring: Deformation, rust.
 Pump check ball: Damaged, rusted.
 Pump plunger: Wear on sliding surface, deformed or damaged leather.

Fig. 8-45



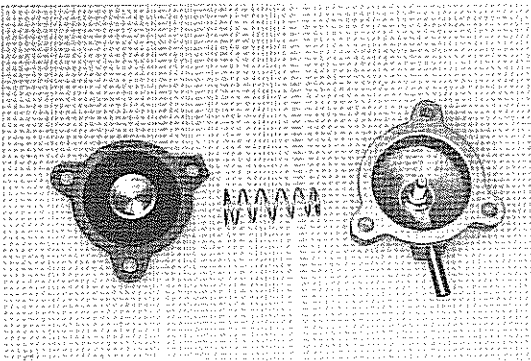
7. Secondary diaphragm
 Damaged

Fig. 8-46



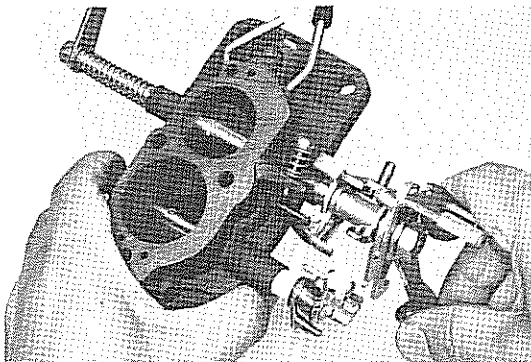
8. Install the diaphragm as shown in the figure.

Fig. 8-47



9. Auxiliary acceleration pump
Diaphragm damaged

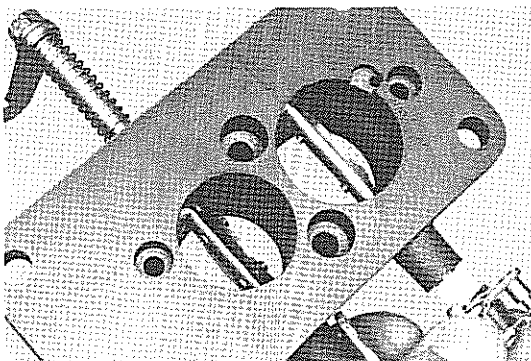
Fig. 8-48



Flange Parts

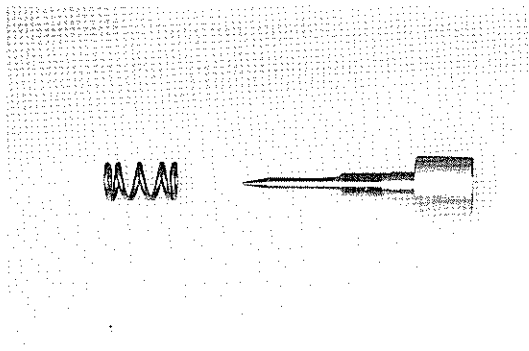
1. Flange: Cracks, injured mounting surfaces, damaged threads, wear at throttle shaft bearings.

Fig. 8-49



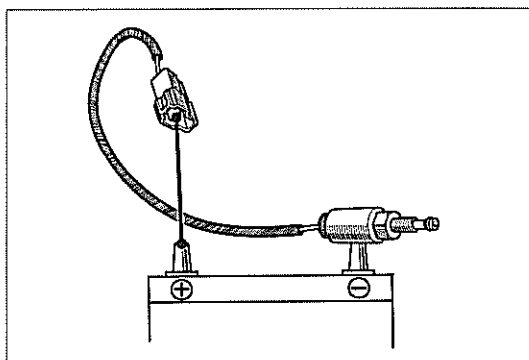
2. Throttle valves: Worn or deformed valves. Wear, bending, twisting, or faulty movement inside housing of shaft.

Fig. 8-50



3. Idle mixture adjusting screw: Damage tapered tip or threads.

Fig. 8-51

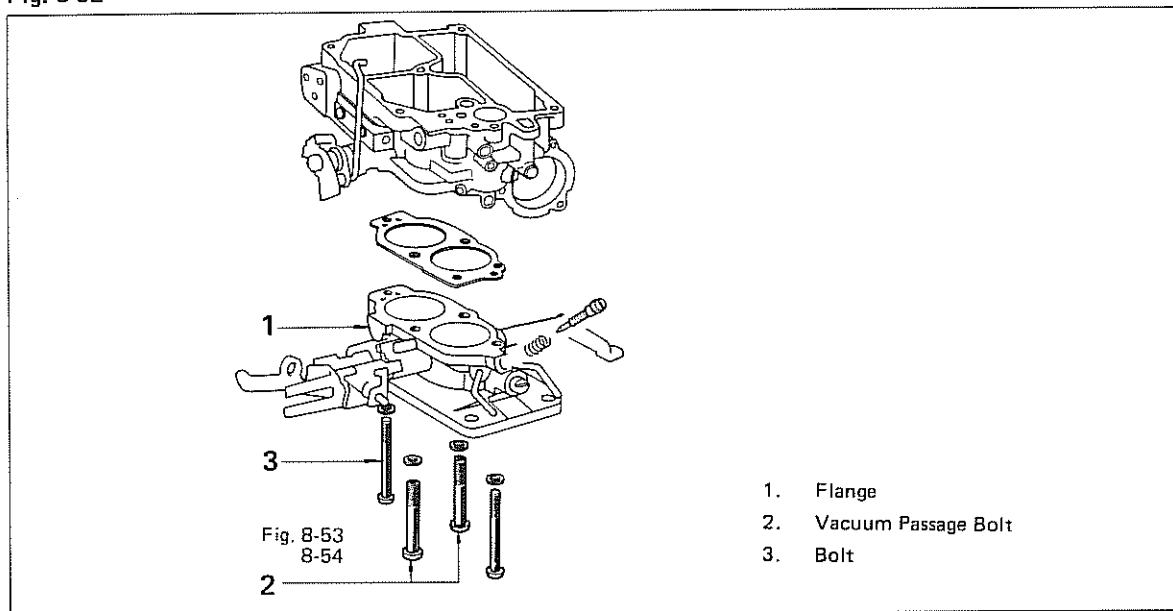
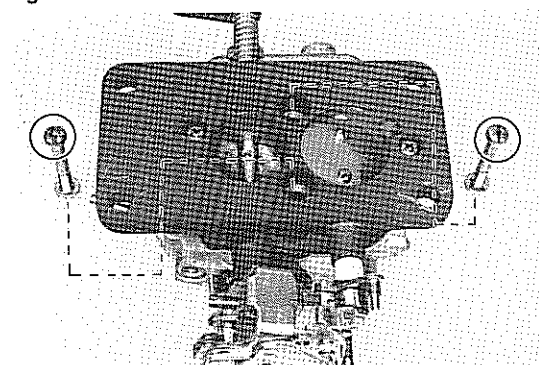


Solenoid Valve

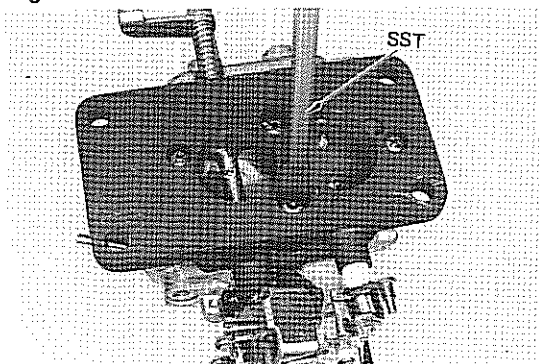
Check operation of the solenoid valve. Connect wiring to the battery positive terminal and ground the body. The needle valve should be pulled in.

ASSEMBLY**Flange**

Assemble the parts in the numerical order shown in the figure.

Fig. 8-52**Fig. 8-53**

Assemble the vacuum passage bolt in the position shown in the figure.

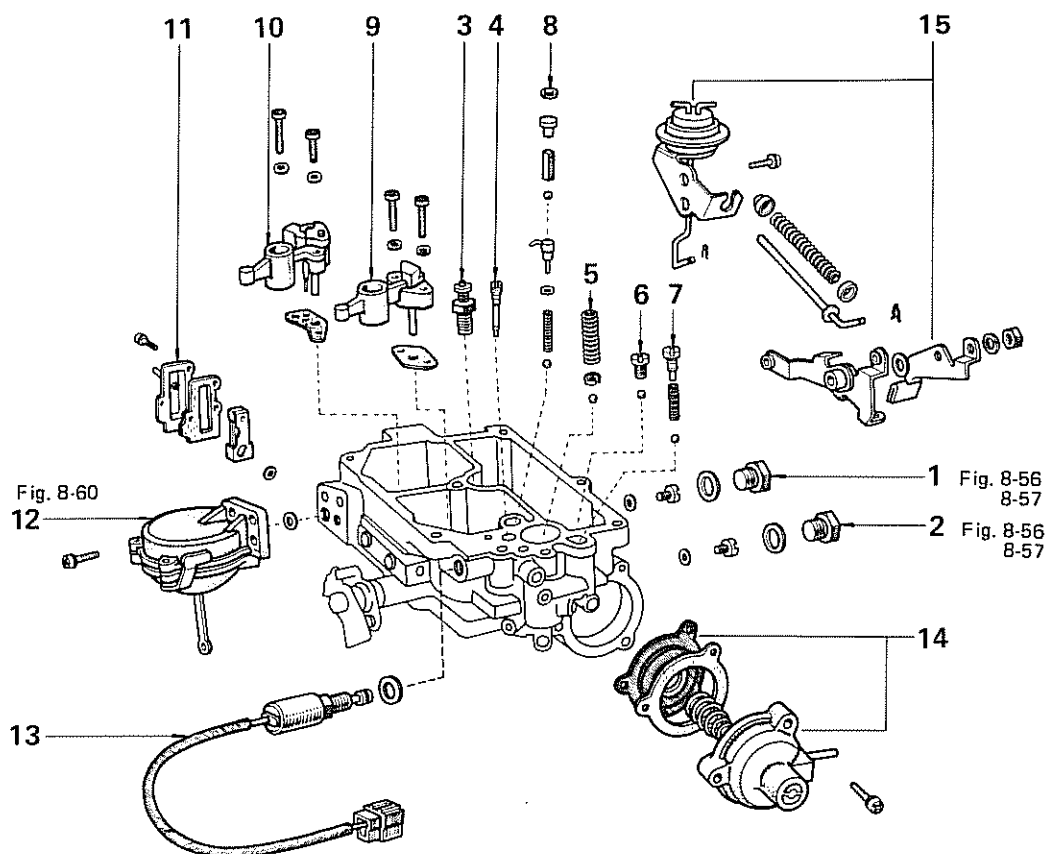
Fig. 8-54

First finger tighten all bolts and then tighten them down.

Body

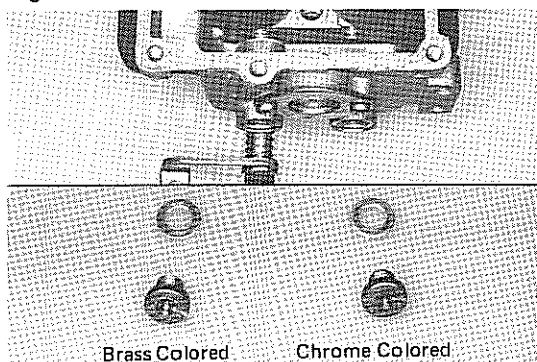
Assemble the parts in the numerical order shown in the figure.

Fig. 8-55



- | | |
|---|-------------------------------------|
| 1. Second Main Jet | 9. First Small Venturi |
| 2. First Main Jet | 10. Second Small Venturi |
| 3. Power Valve | 11. HIC Valve |
| 4. Slow Jet | 12. Second Throttle Valve Diaphragm |
| 5. Pump Inlet Valve & Plunger Return Spring | 13. Fuel Cut Solenoid Valve |
| 6. AAP Inlet Valve | 14. AAP Diaphragm |
| 7. APP Outlet Valve | 15. Throttle Positioner |
| 8. Pump Discharge Weight & Outlet Valve | |

Fig. 8-56

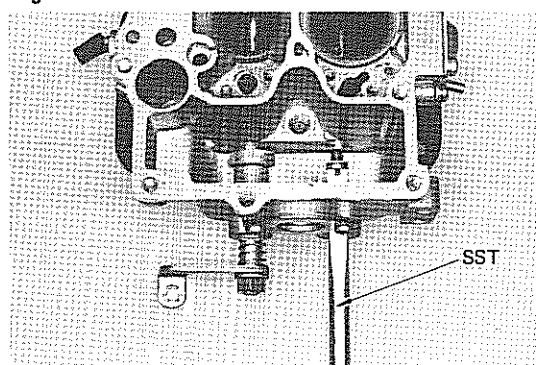


Install the main jets over gaskets.

First jet: Brass colored

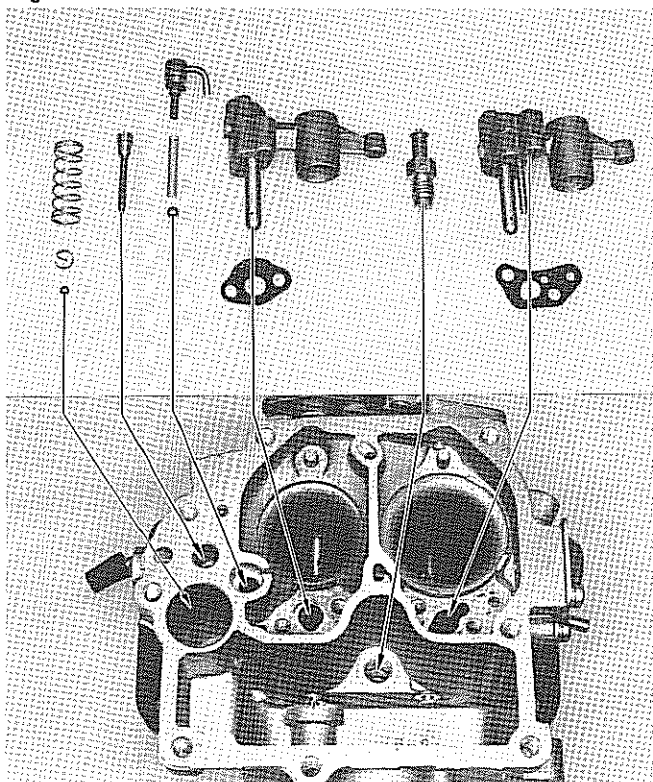
Second jet: Chrome colored

Fig. 8-57



Tighten the first and second main jets with SST.
SST[09860-11011]

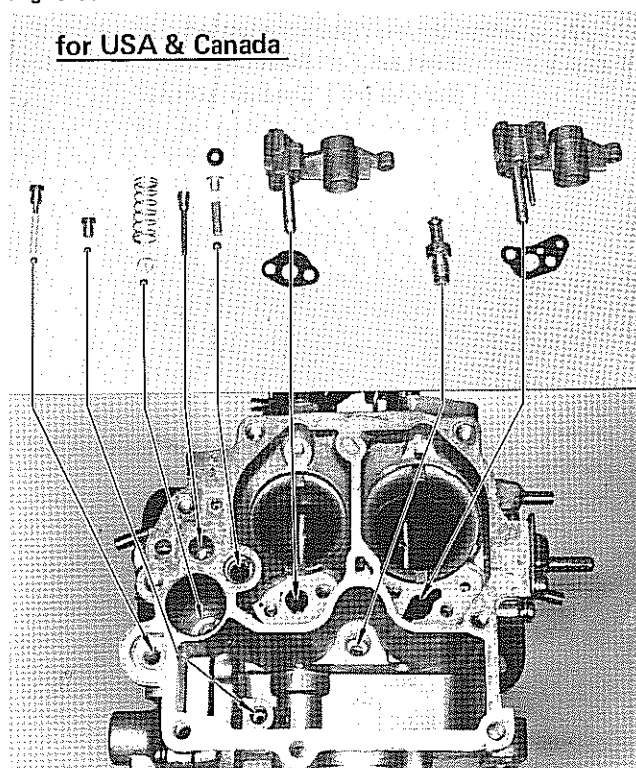
Fig. 8-58



Install the jets, air bleed, valve and plugs as shown in the figure.

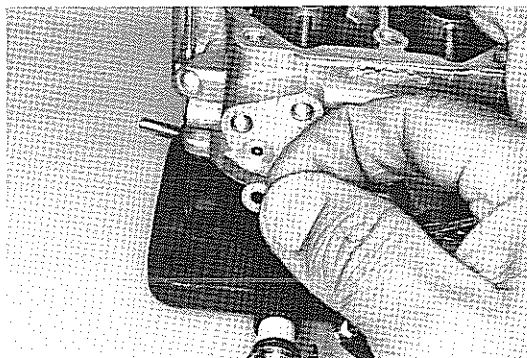


Fig. 8-59



Install the jets, bleed, valve, venturi and plugs as shown in the figure.

Fig. 8-60



Install the gasket and diaphragm housing.

Choke System

Assemble the parts in the numerical order shown in the figure.

Fig. 8-61

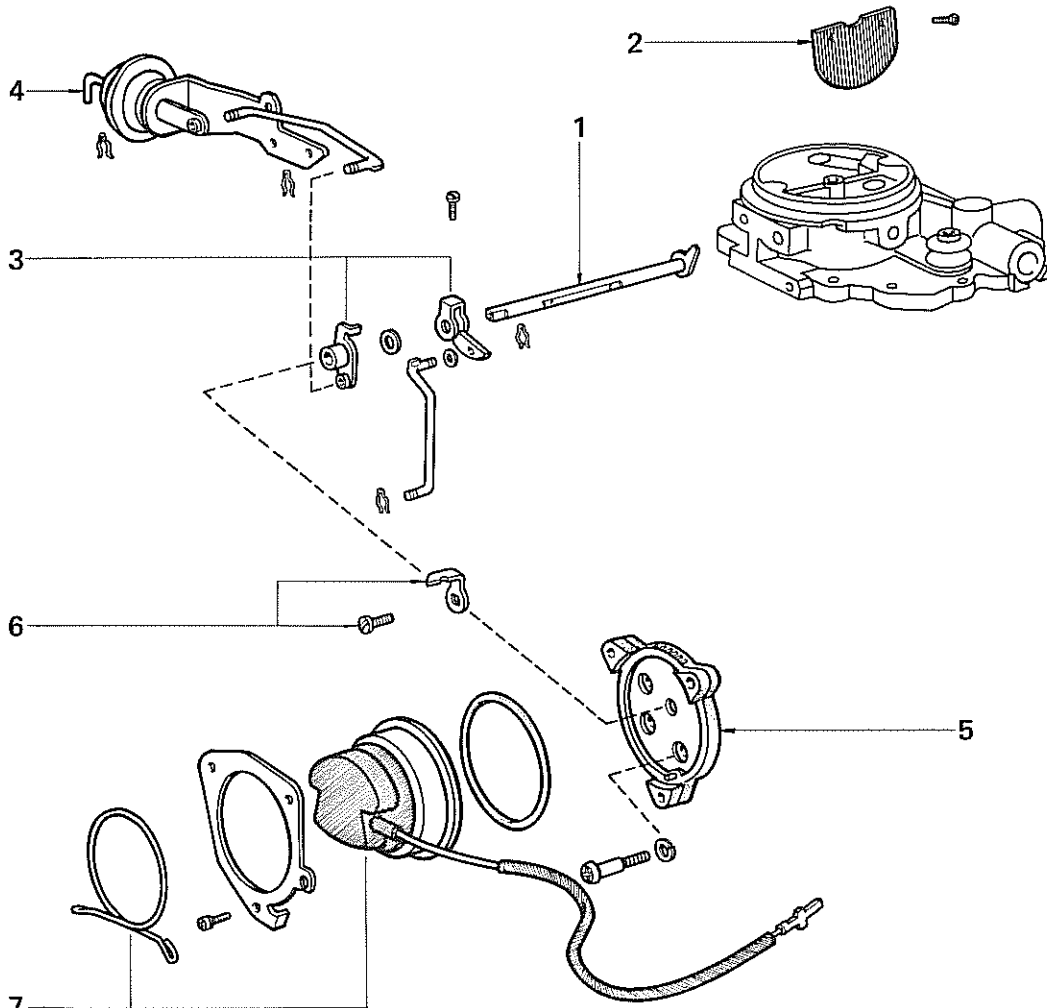
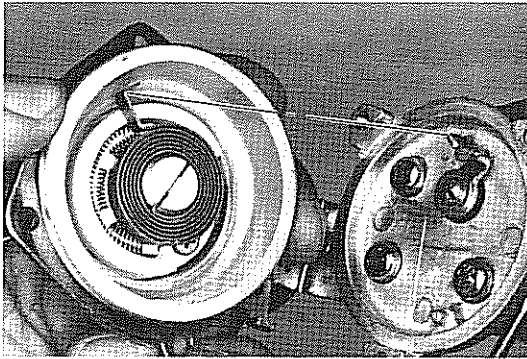


Fig. 8-62
8-64

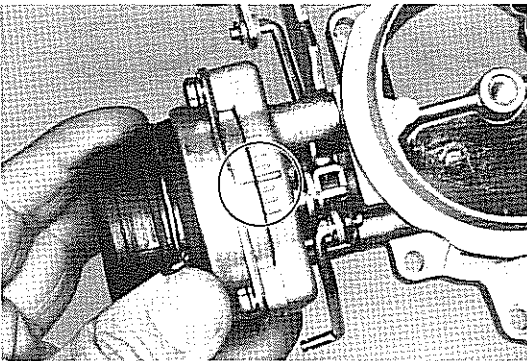
- | | |
|----------------------|-----------------------------|
| 1. Choke Valve Shaft | 5. Thermostat Case & Gasket |
| 2. Choke Valve | 6. Choke Lever |
| 3. Relief Lever | 7. Coil Housing |
| 4. Choke Breaker | |

Fig. 8-62



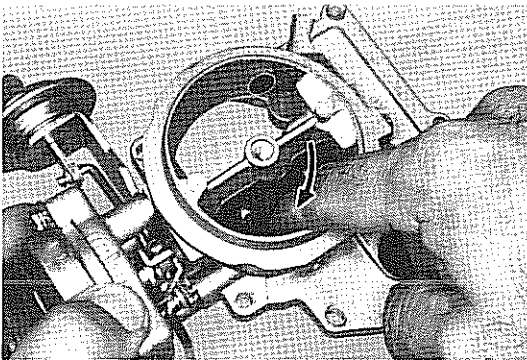
Hook the lever to the bimetal spring.

Fig. 8-63



Align the case scale standard line against the housing scale line.

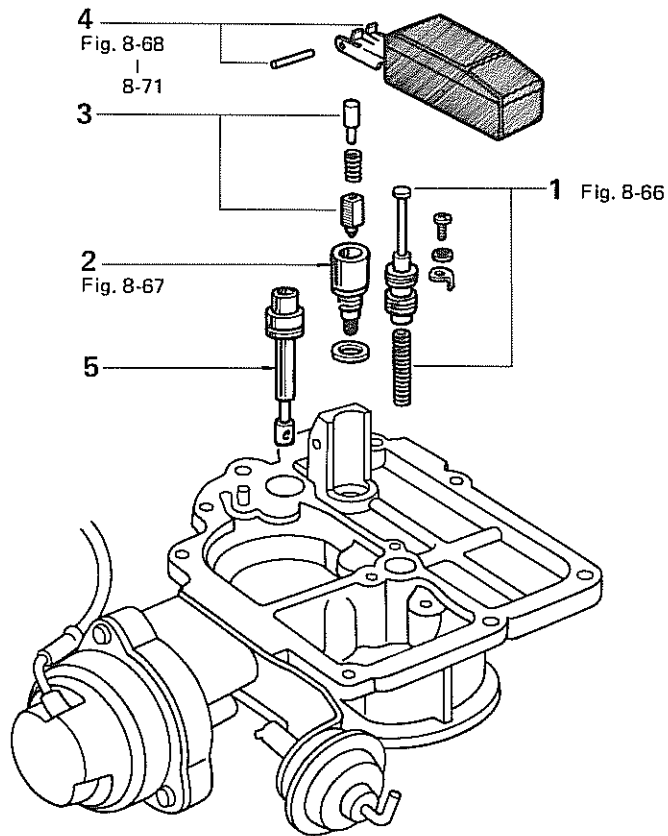
Fig. 8-64



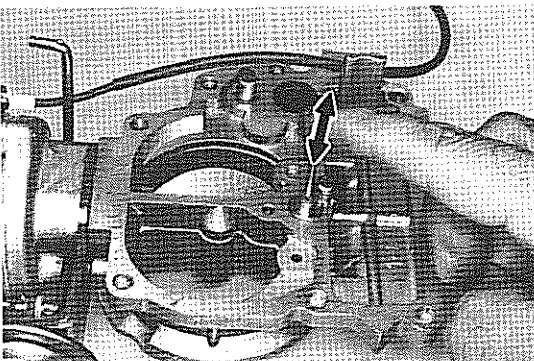
Check the choke valve action.

Float

Assemble the parts in the numerical order shown in the figure.

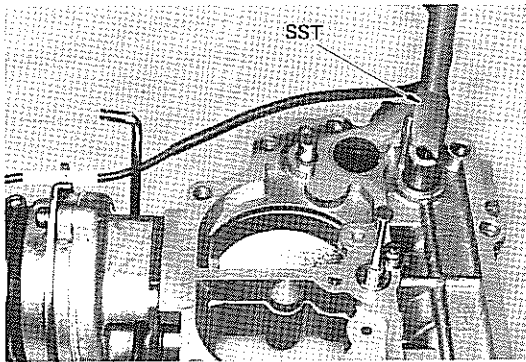
Fig. 8-65

1. Power Piston
2. Needle Valve Seat
3. Needle Valve, Spring & Pin
4. Float & Pin
5. Pump Plunger

Fig. 8-66

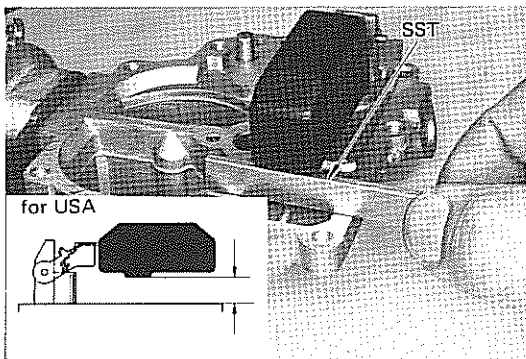
After installing, insure that power piston moves smoothly.

Fig. 8-67



Install the needle valve seat with SST.
SST[09860-11011]

Fig. 8-68



Adjust float level.
Allow the float to hang down by its own weight.
Then check the clearance between the float
and air horn with SST.
SST[09240-00014]

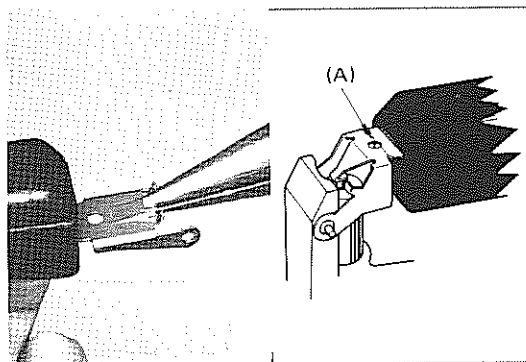
Float upper level:

STD	3T	6.5 mm (0.26 in.)
	3T-C	4.5 mm (0.18 in.)
	2T & 2T-B	4.0 mm (0.16 in.)

— Note —

This measurement is always made without any
gasket on the air horn.

Fig. 8-69

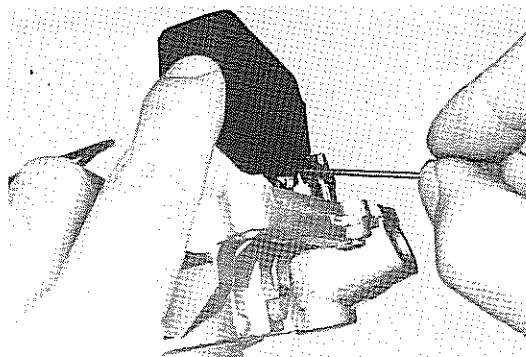


Adjust by bending float lip as shown in the
figure.

[for USA]

Adjust the clearance by bending at point (A)
of the float as shown in the figure.

Fig. 8-70



Adjust lowered position.

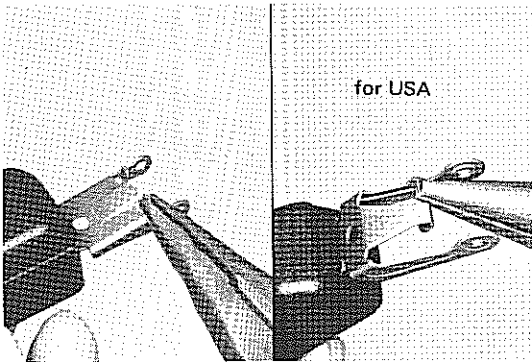
Lift up the float and check the clearance be-
tween the needle valve plunger and float lip
with SST.

SST[09240-00020]

Float lower level:

STD	1.0 – 1.2 mm (0.04 – 0.05 in.)
-----	-----------------------------------

Fig. 8-71



Adjust by bending the float lip as shown in the figure.

Body & Air Horn

Assemble the parts in the numerical order shown in the figure.

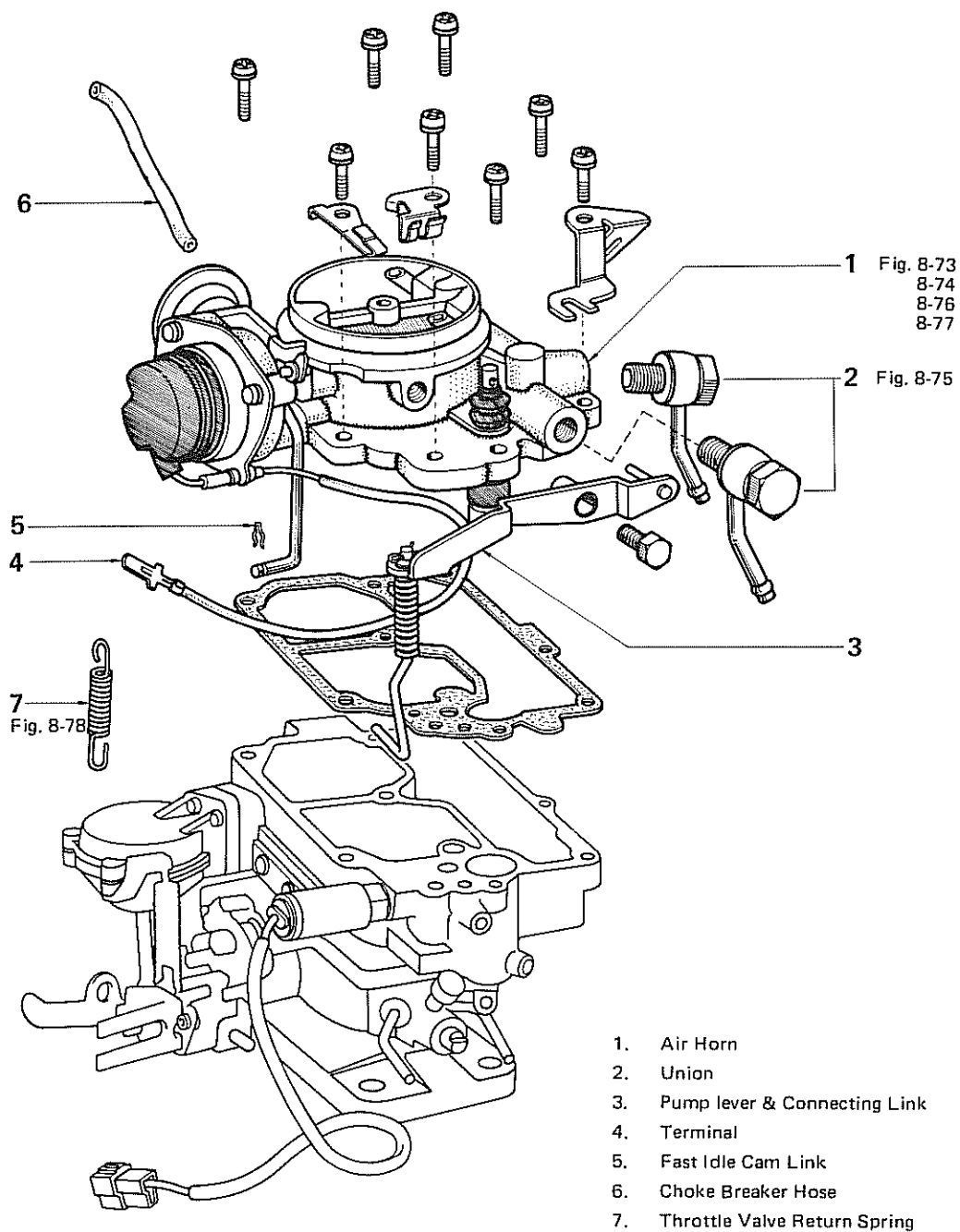
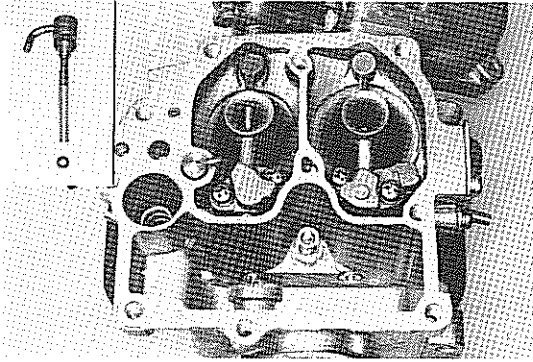
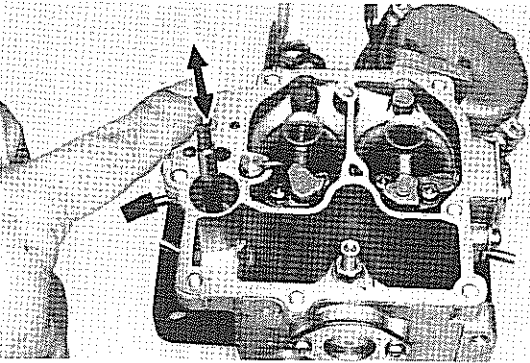
Fig. 8-72

Fig. 8-73



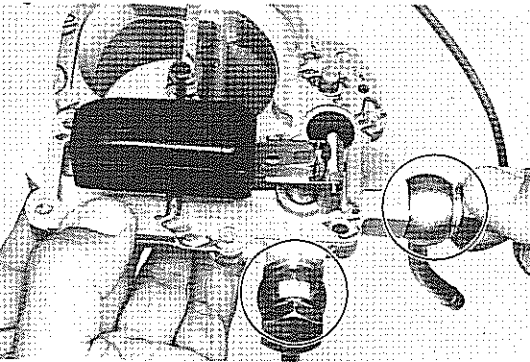
Before assembling the air horn, insure that the pump jet is properly assembled.

Fig. 8-74



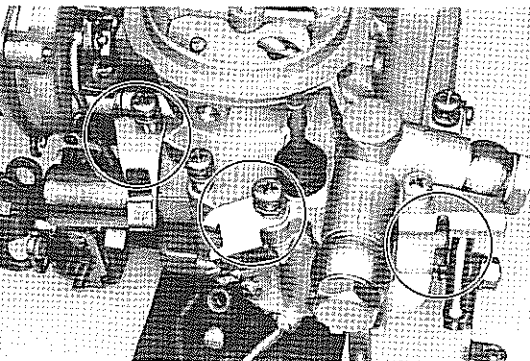
Before assembling the air horn, insure that pump plunger moves smoothly.

Fig. 8-75



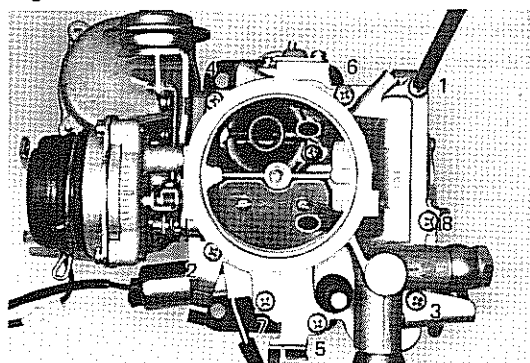
Temporarily install the fuel unions.

Fig. 8-76



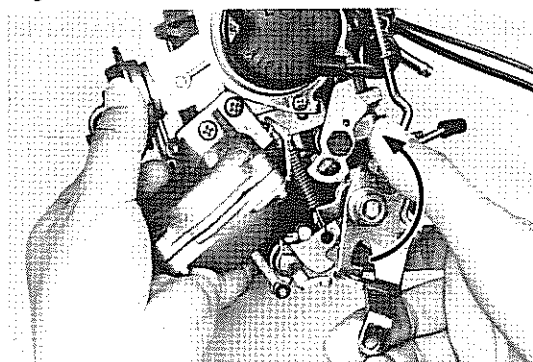
Install the clamps in the position shown in the figure.

Fig. 8-77



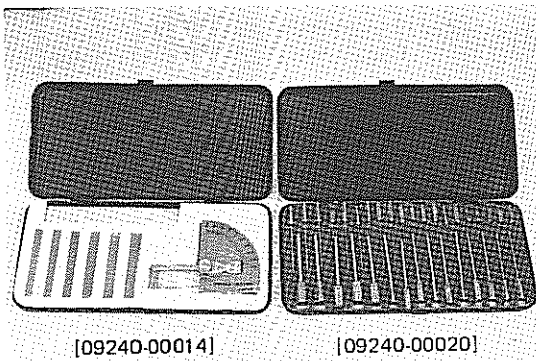
Tighten the air horn set screws at little at a time in diagonal order.

Fig. 8-78



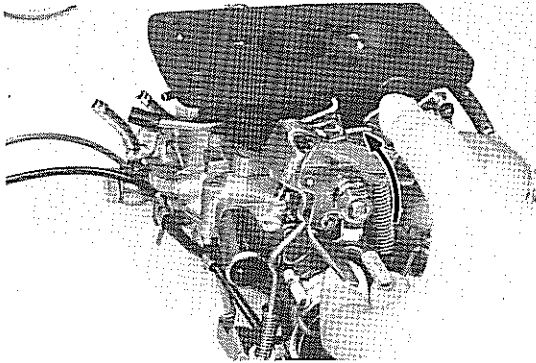
After assembling, make sure that each link moves smoothly.

Fig. 8-79

**ADJUSTMENT**

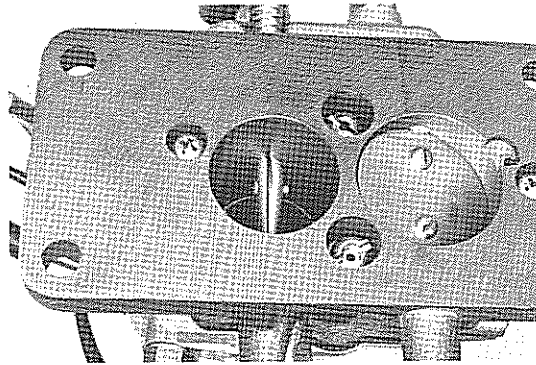
Make adjustments with SST.
 SST [09240-00014]
 [09240-00020]

Fig. 8-80



1. First throttle valve opening.
 (1) Fully open the first throttle valve.

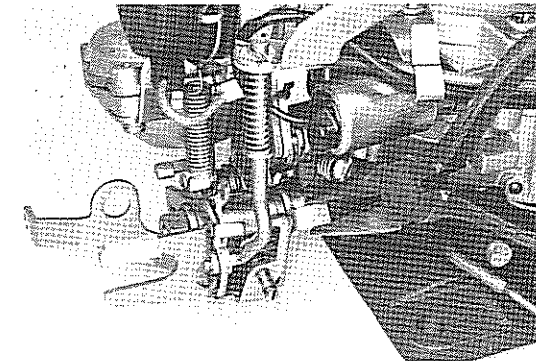
Fig. 8-81



- (2) Check the first throttle valve opening angle.

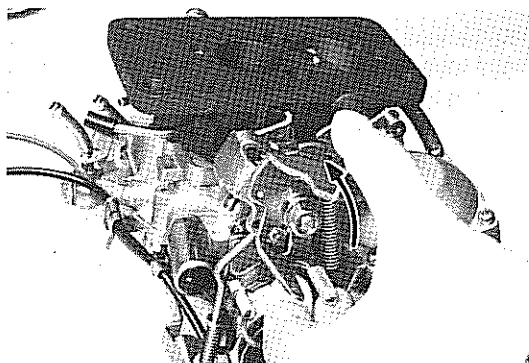
Opening angle: 90°

Fig. 8-82



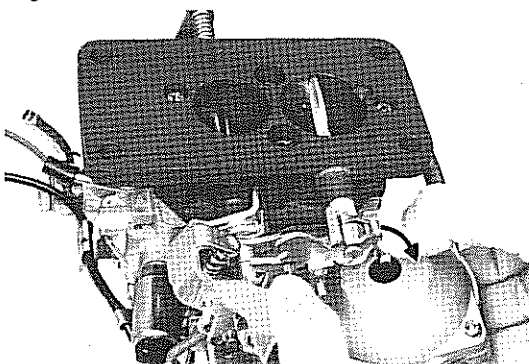
- (3) Adjust by bending the throttle lever stopper.

Fig. 8-83



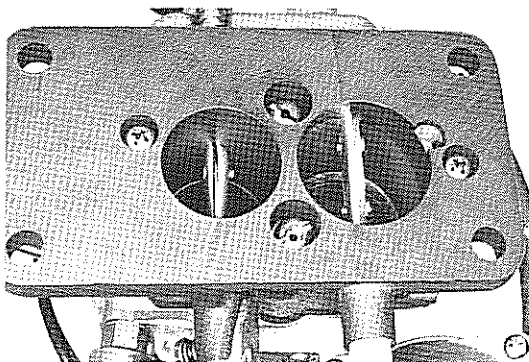
2. Second throttle valve opening.
 - (1) Fully open the first throttle valve.

Fig. 8-84



- (2) Fully open the second throttle valve lever.

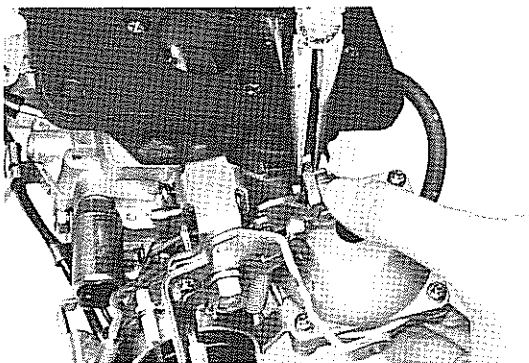
Fig. 8-85



- (3) Check the throttle valve opening angle.

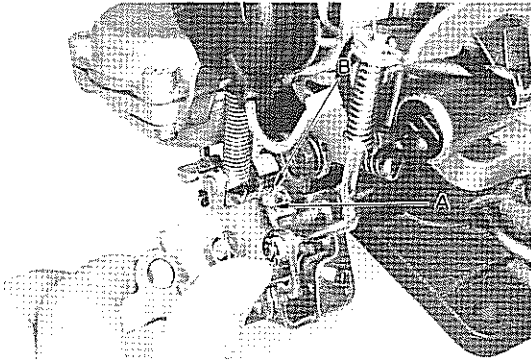
Opening angle: 80°

Fig. 8-86



- (4) Adjust by bending the throttle lever stopper.

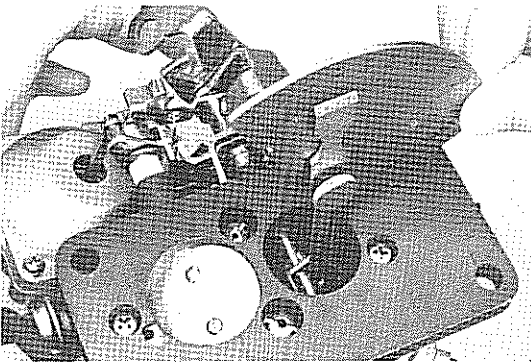
Fig. 8-87



3. Secondary touch angle.

- (1) Open the first throttle valve until the throttle valve lever (A) part touch (B) part.

Fig. 8-88

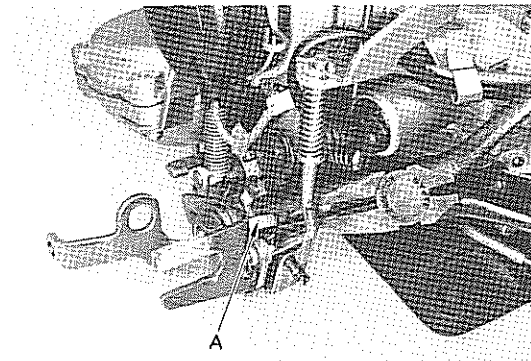


- (2) At this time, check the first throttle valve opening angle.

Secondary touch angle:

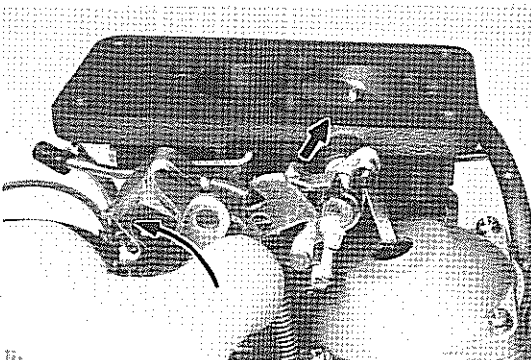
57° – 61°

Fig. 8-89



- (3) Adjust by bending (A) part.

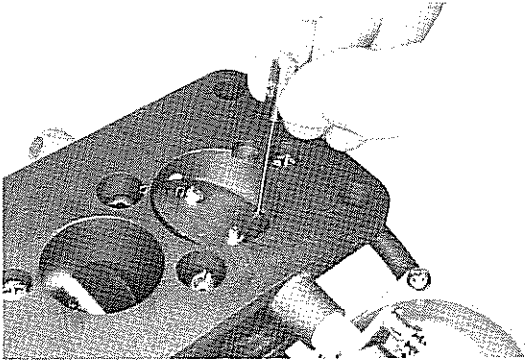
Fig. 8-90



4. Kick up

- (1) Open the first throttle valve until the kick arm slightly opens the second throttle valve.

Fig. 8-91



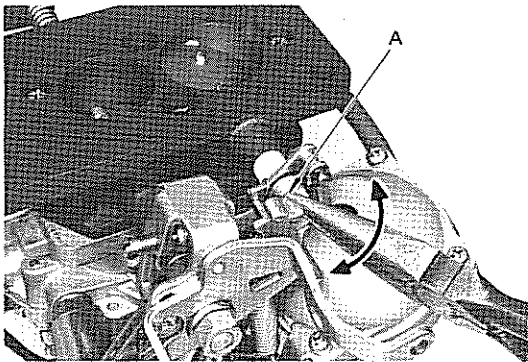
- (2) Check the clearance between the second throttle valve and body.

Kick up clearance:

0.2 mm

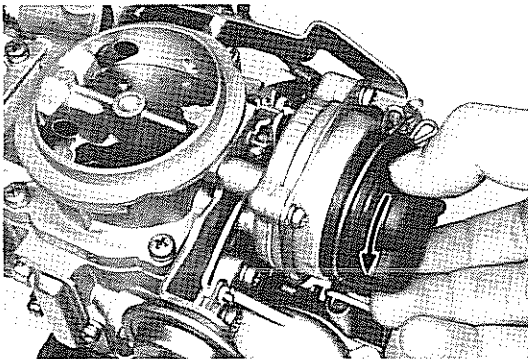
(0.008 in.)

Fig. 8-92



- (3) Adjust by bending (A) part.

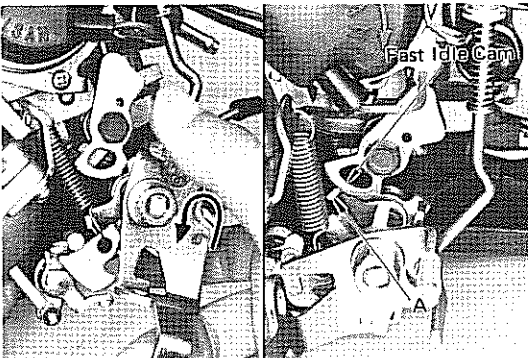
Fig. 8-93



5-1. Fast idle (automatic choke only)

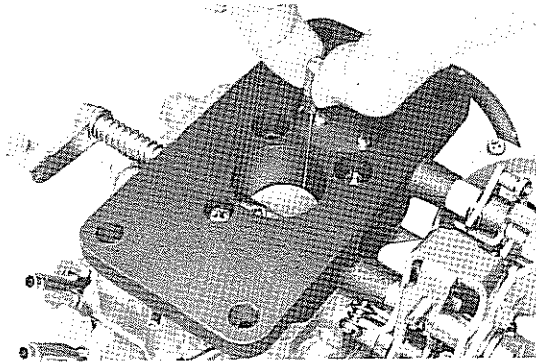
- (1) Fully close the choke valve by turning the coil housing.

Fig. 8-94



- (2) Slightly open the first throttle valve and then close it. Insure that the throttle lever (A) part hooks to the fast idle cam.

Fig. 8-95

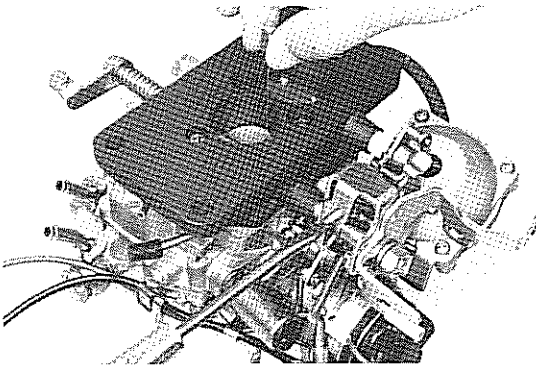


- (3) Check the clearance between the first throttle valve and bore.

Fast idle clearance:

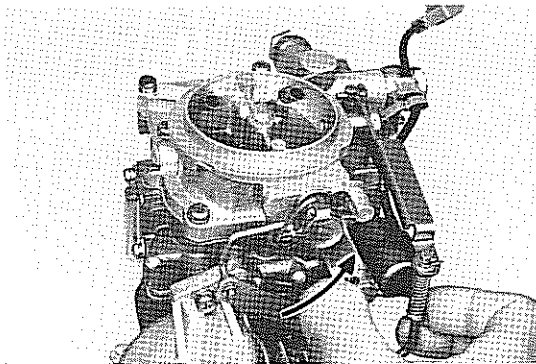
**0.81 mm
(0.032 in.)**

Fig. 8-96



- (4) Adjust by turning the fast idle adjusting screw.

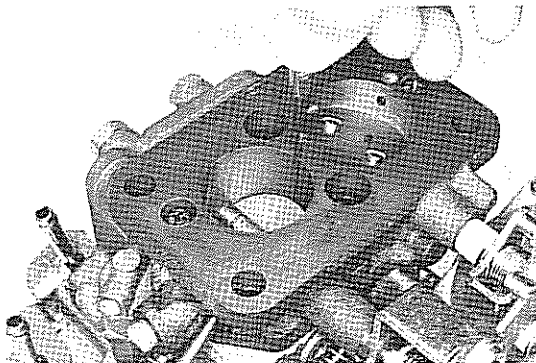
Fig. 8-97



5-2. Fast idle (manual choke only)

- (1) Fully close the choke valve by turning the choke shaft lever.

Fig. 8-98

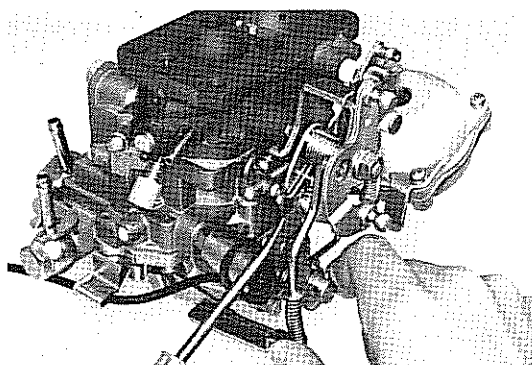


- (2) Check the clearance between the first throttle valve and bore.

Fast idle clearance:

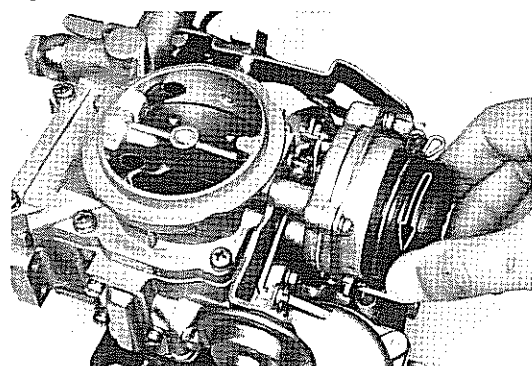
**1.01 mm
(0.040 in.)**

Fig. 8-99



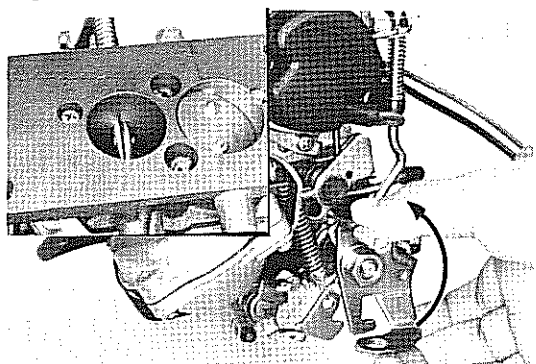
- (3) Adjust by turning the fast idle adjusting screw.

Fig. 8-100



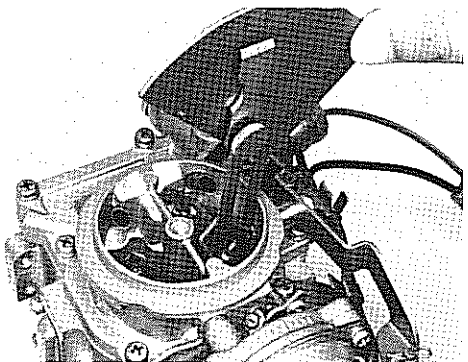
6. Unloader (only automatic choke)
 (1) Fully close the choke valve by turning the coil housing.

Fig. 8-101



- (2) Fully open the first throttle valve.

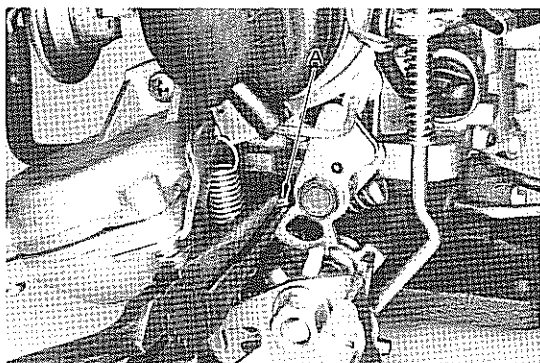
Fig. 8-102



- (3) At this time, check the choke valve opening angle.

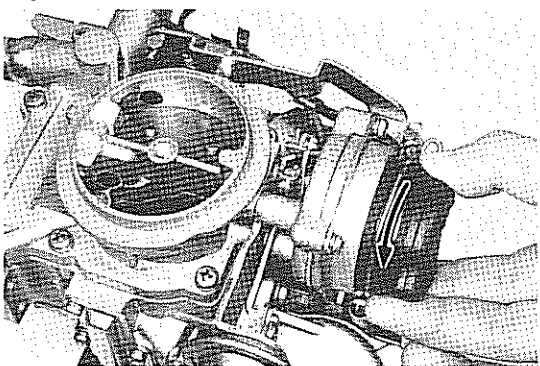
Unloader angle: 47°

Fig. 8-103



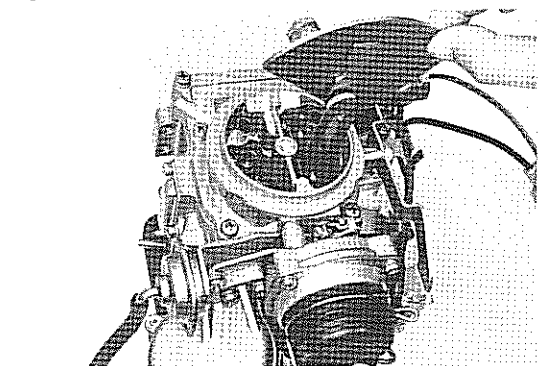
- (4) Adjust by bending (A) part.

Fig. 8-104



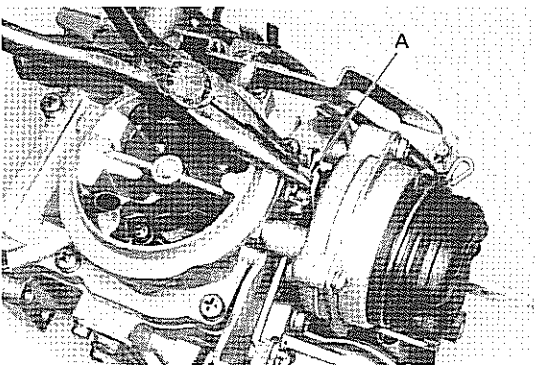
7. Choke breaker (automatic choke only)
- (1) Fully close the choke valve by turning the coil housing.

Fig. 8-105



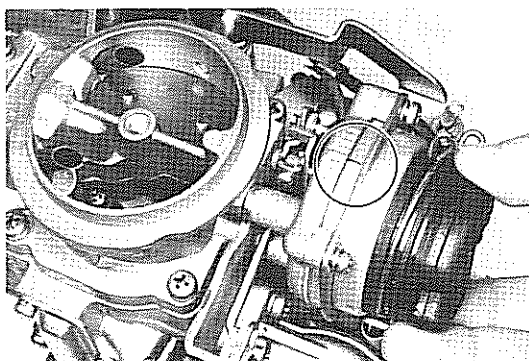
- (2) Connect a hose to the diaphragm and suck on the hose with your mouth.
- (3) At this time, check the clearance between the choke valve and bore.

Fig. 8-106



- (4) Adjust by bending (A) part.

Fig. 8-107



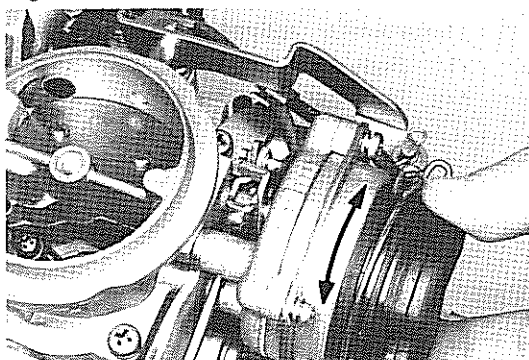
8. Automatic choke

- (1) Set the coil housing scale mark so that it will be aligned with the center line of the thermostat case.

– Note –

The choke valve becomes fully closed when the atmospheric temperature reaches 25°C (77°F).

Fig. 8-108

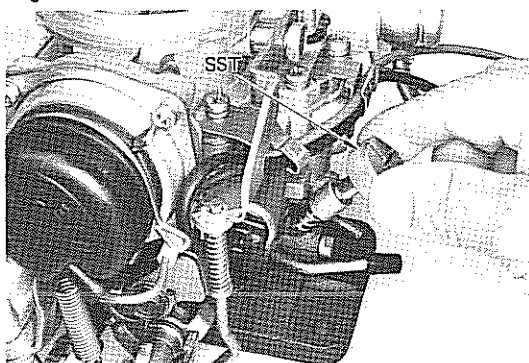


- (2) Depending on vehicle operating conditions, turn the coil housing and adjust the engine starting mixture.

If too rich Turn clockwise.

If too lean Turn counter-clockwise.

Fig. 8-109



9. Idle mixture adjusting screw

- Tighten the idle mixture adjusting screw and then unscrew it about three turns.

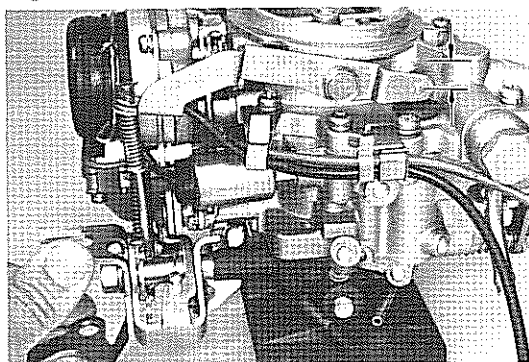
STD (Reference only):

Returned about 3 turns from full closed.

– Note –

Be careful not to damage the screw tip by tightening the screw too tightly.

Fig. 8-110



10. Accelerating pump

- Adjust the pump stroke by vending part (A).

STD: 2T, 3T & 3T-C	5.0 mm (0.20 in.)
2T-B	3.0 mm (0.12 in.)

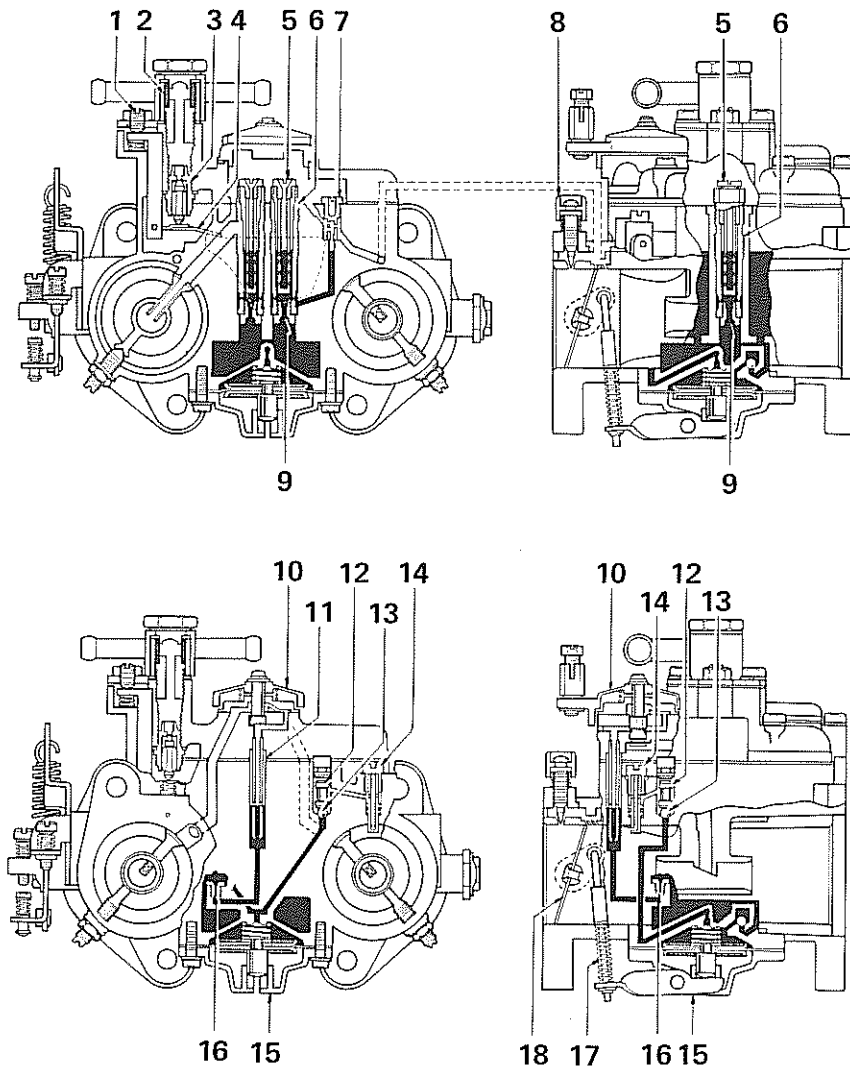
– Note –

After adjustment, be sure to check the linkage to see that it operates smoothly.

SOLEX CARBURETOR

CARBURETOR CIRCUIT

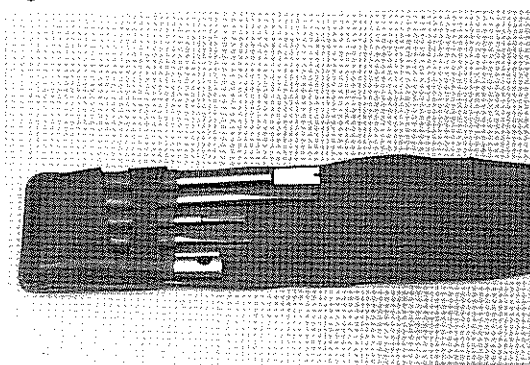
Fig 8-114



1. Float Level Adjusting Screw
2. Fuel Strainer
3. Needle Valve
4. Float
5. Main Air Bleet Jet
6. Main Jet Holder
7. Slow Jet
8. Idle Mixture Adjusting Screw
9. Main Jet

10. Starter Disc
11. Air Bleed Tube
12. Pump Discharge Weight
13. Pump Outlet Valve
14. Pump Jet
15. Accelerating Pump Diaphragm
16. Starter Jet
17. Pump Connecting Rod
18. Throttle Valve

Fig. 8-115



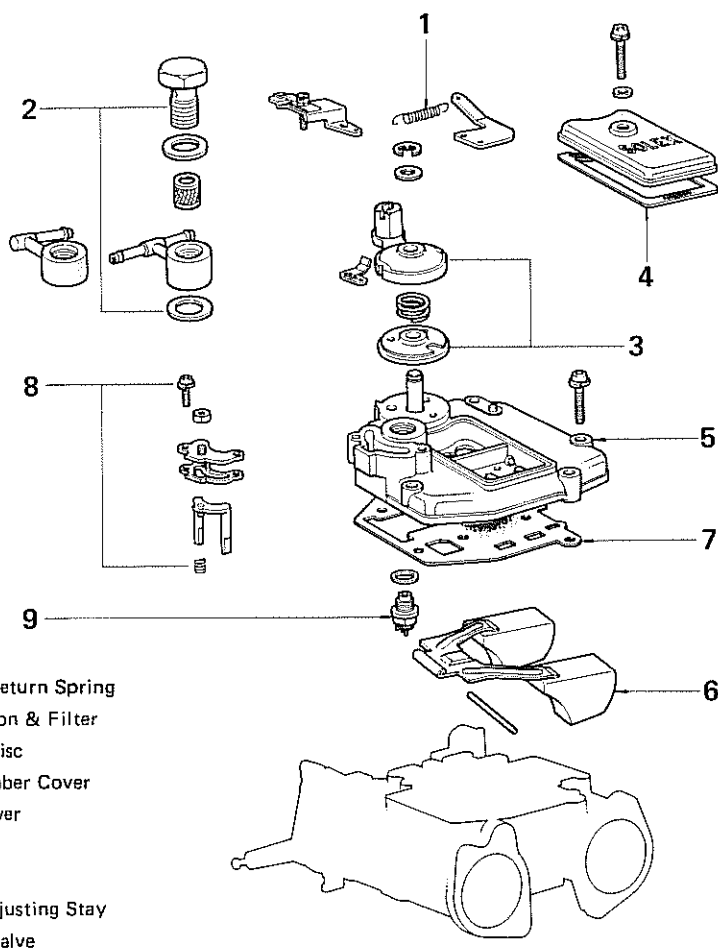
Use SST for carburetor servicing.
SST [09860-11011]

DISASSEMBLY

Bowl Cover

Disassemble the parts in the numerical order shown in the figure.

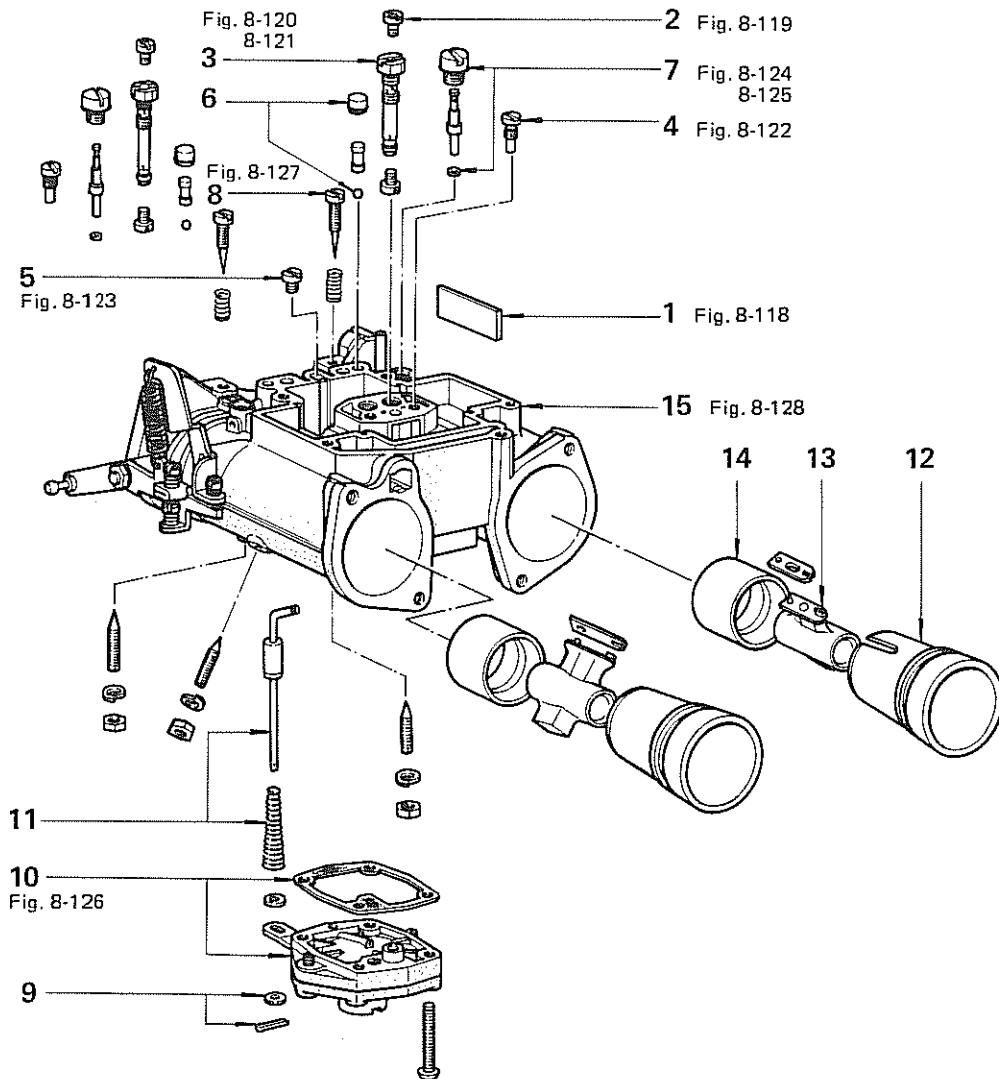
Fig. 8-116



1. Starter Return Spring
2. Fuel Union & Filter
3. Starter Disc
4. Jet Chamber Cover
5. Bowl Cover
6. Float
7. Gasket
8. Float Adjusting Stay
9. Needle Valve

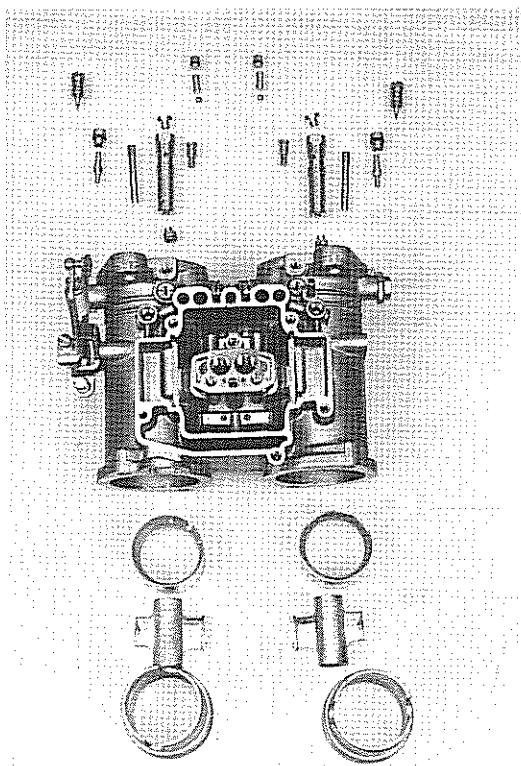
Body

Disassemble the parts in the numerical order shown in the figure.

Fig. 8-117

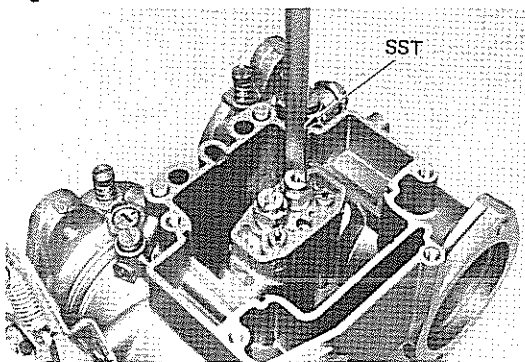
- | | |
|--|------------------------|
| 1. Float Chamber Plate | 9. Cotter Pin & Washer |
| 2. Main Air Bleed Jet | 10. Accelerating Pump |
| 3. Main Jet Holder | 11. Spring & Pump Rod |
| 4. Slow Jet | 12. Sleeve |
| 5. Starter Jet | 13. Small Venturi |
| 6. Pump Discharge Weight & Check Valve | 14. Large Venturi |
| 7. Pump Nozzle | 15. Body |
| 8. Idle Mixture Screw | |

Fig. 8-118



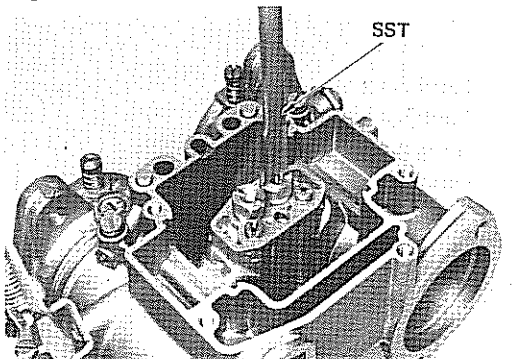
Arrange the parts for the right and left sides in respective order.

Fig. 8-119



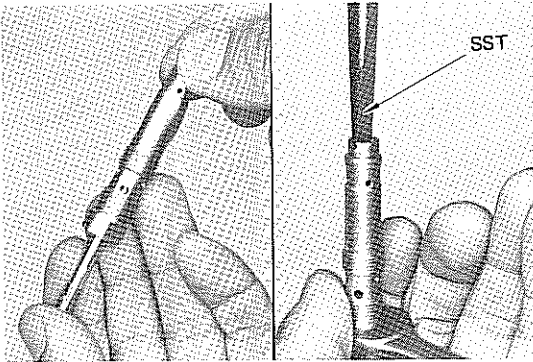
Remove the main air bleed jet with SST.
SST[09860-11011]

Fig. 8-120



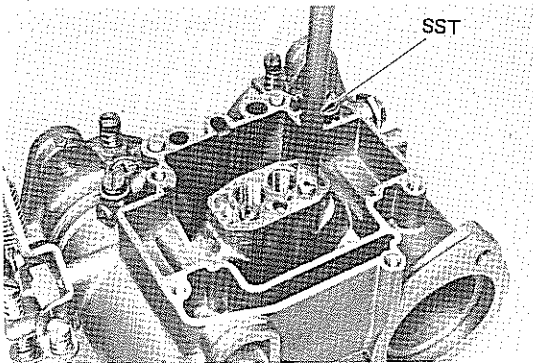
Remove the main jet holder with SST.
SST[09860-11011]

Fig. 8-121



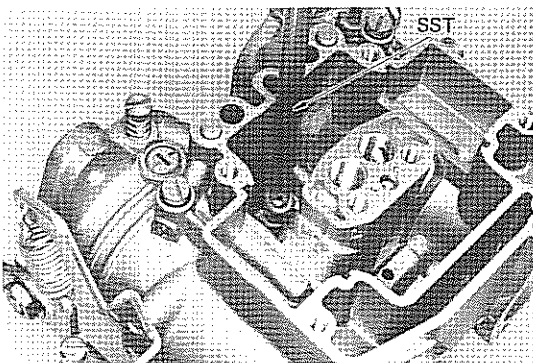
Remove the tube from the main jet holder.
Remove the main jet with SST.
SST[09860-11011]

Fig. 8-122



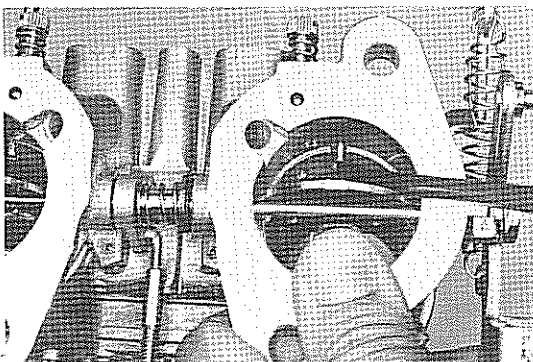
Remove the slow jet with SST.
SST[09860-11011]

Fig. 8-123



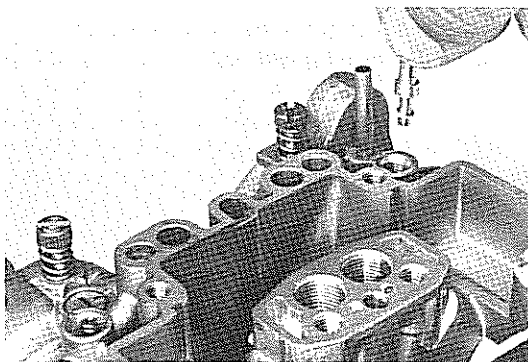
Remove the starter jet with SST.
SST[09860-11011]

Fig. 8-124



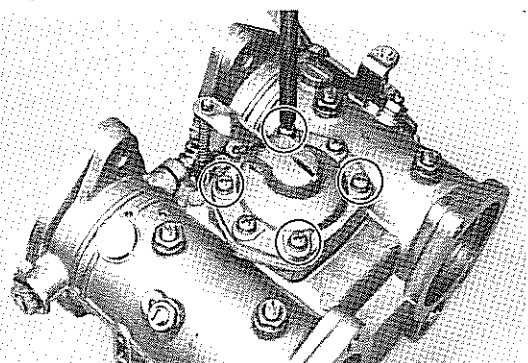
If the starter jet is difficult to remove, push up from the bottom with a screw driver.

Fig. 8-125



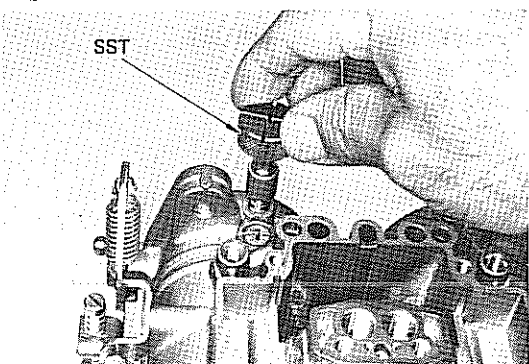
Remove the jet and gasket.

Fig. 8-126



After removing 4 screws, remove the accelerating pump.

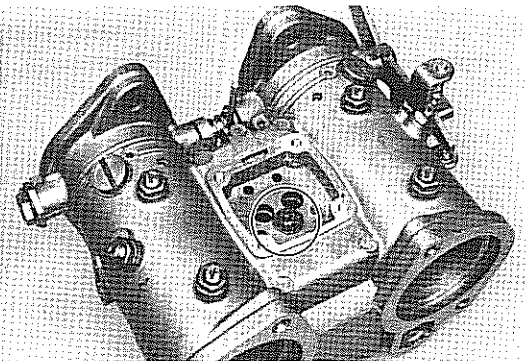
Fig. 8-127



Remove the idle mixture adjusting screw with SST.

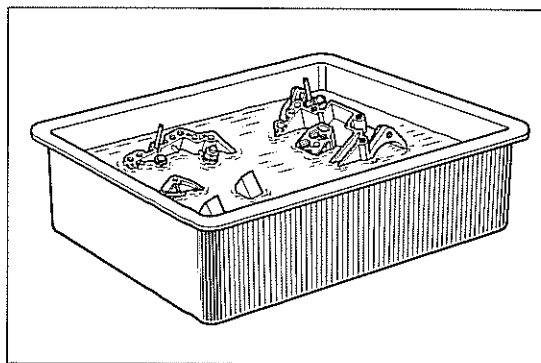
SST [09243-00010] or
[09243-00020]

Fig. 8-128



Do not remove the screw.

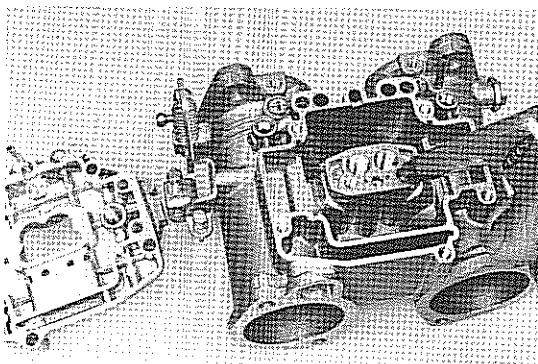
Fig. 8-129

**INSPECTION**

— Precaution —

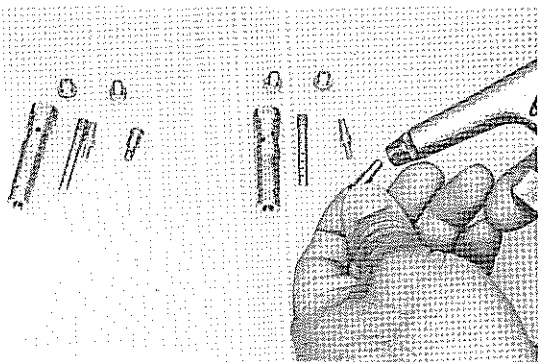
1. Before inspecting the parts, wash them thoroughly in gasoline.

Fig. 8-130



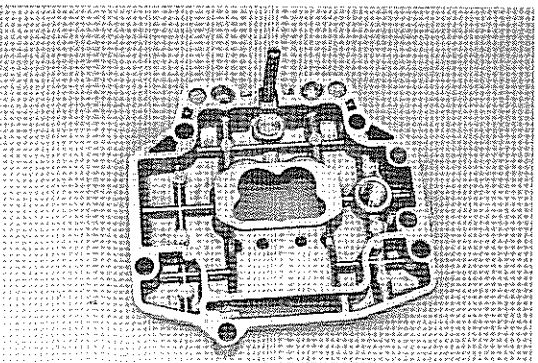
2. Using compressed air, blow all dirt and other foreign matter from the jets and similar parts, and from the fuel passages and apertures in the body.

Fig. 8-131



3. Never clean the jets or orifices with wire or a drill. This could enlarge the openings and result in excessive fuel consumption.

Fig. 8-132

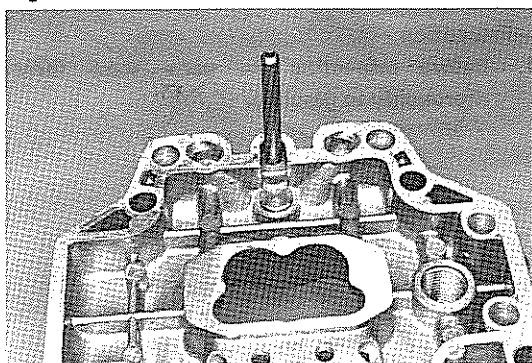


Inspect the following parts and replace any part damaged.

Bowl Cover Parts

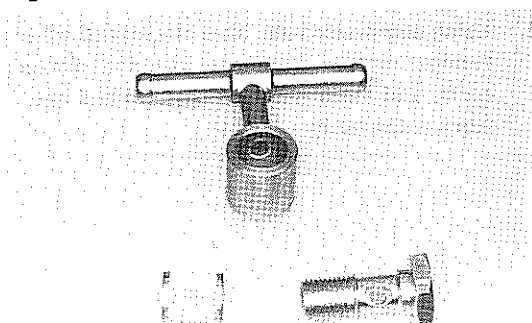
1. Bowl cover: Cracks, damaged threads.

Fig. 8-133



2. Starter pipe: Damaged and/or clogged.

Fig. 8-134

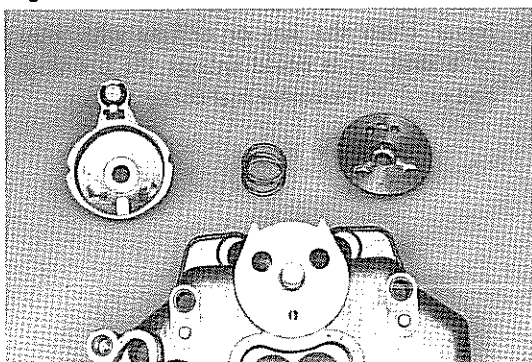


3. Filter: Clogged, rusted, or damaged.

— Note —

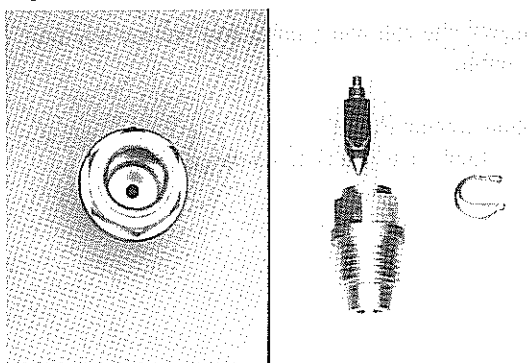
New gasket must always be used whenever the union is removed.

Fig. 8-135



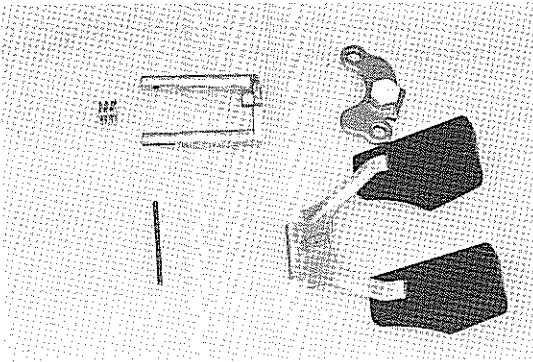
4. Starter disc: Damaged or worn sliding surface.

Fig. 8-136



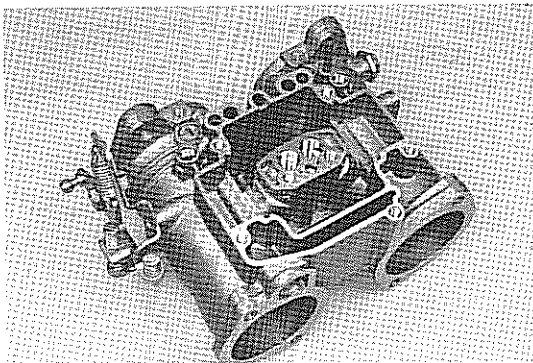
5. Needle valve: Contacting valve seat.

Fig. 8-137



6. Float: Deformed, wear in float lever pin holes, bent float arms.

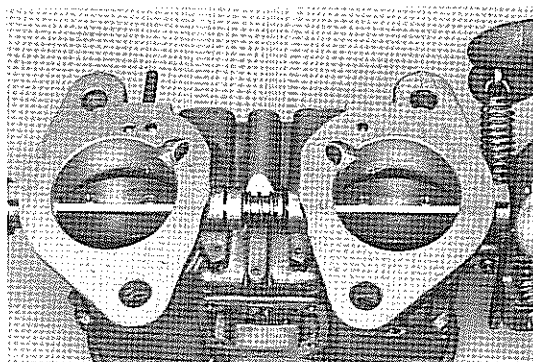
Fig. 8-138



Body Parts

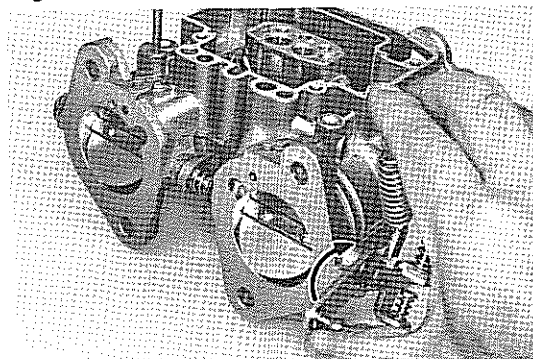
1. Body: Cracks, damaged mounting surfaces and threads, wear on throttle shaft bearings, and carbon adherence.

Fig. 8-139



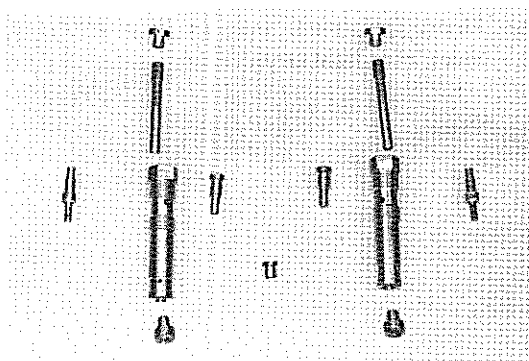
2. Bore: Wear on the throttle valve contacting surface.

Fig. 8-140



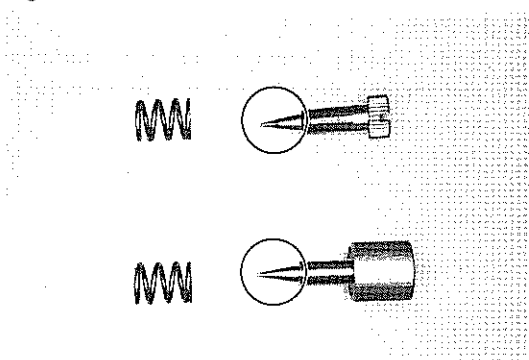
3. Throttle valve movement.

Fig. 8-141



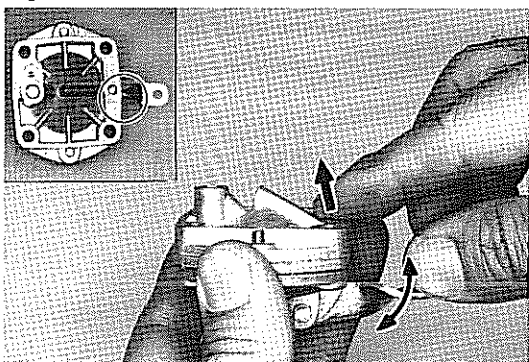
4. Jet: Clogging, damage to contacting surface, threads and screwdriver slots.

Fig. 8-142



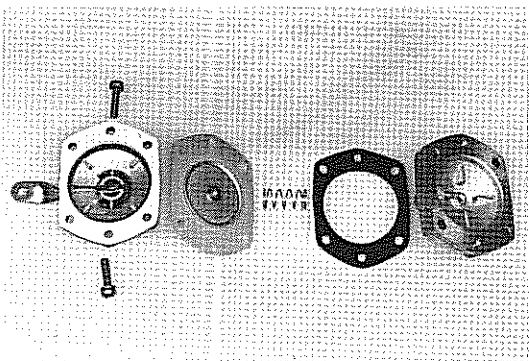
5. Idle mixture adjusting screw: Damage to tapered tip or threads.
6. Pump nozzle: Clogged and/or damaged.

Fig. 8-143



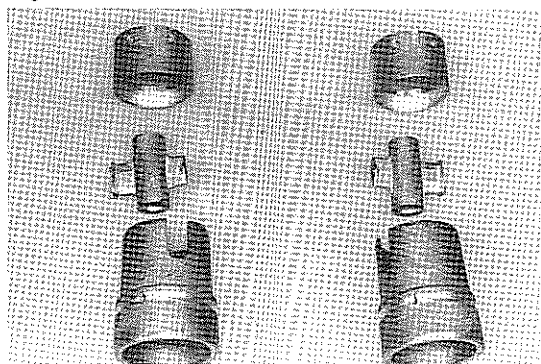
7. With the pump level, work the lever and insure that air is forced through the outlet hole.

Fig. 8-144



8. Pump diaphragm: Damaged.
9. Pump body: Cracks, damaged mounting surfaces.

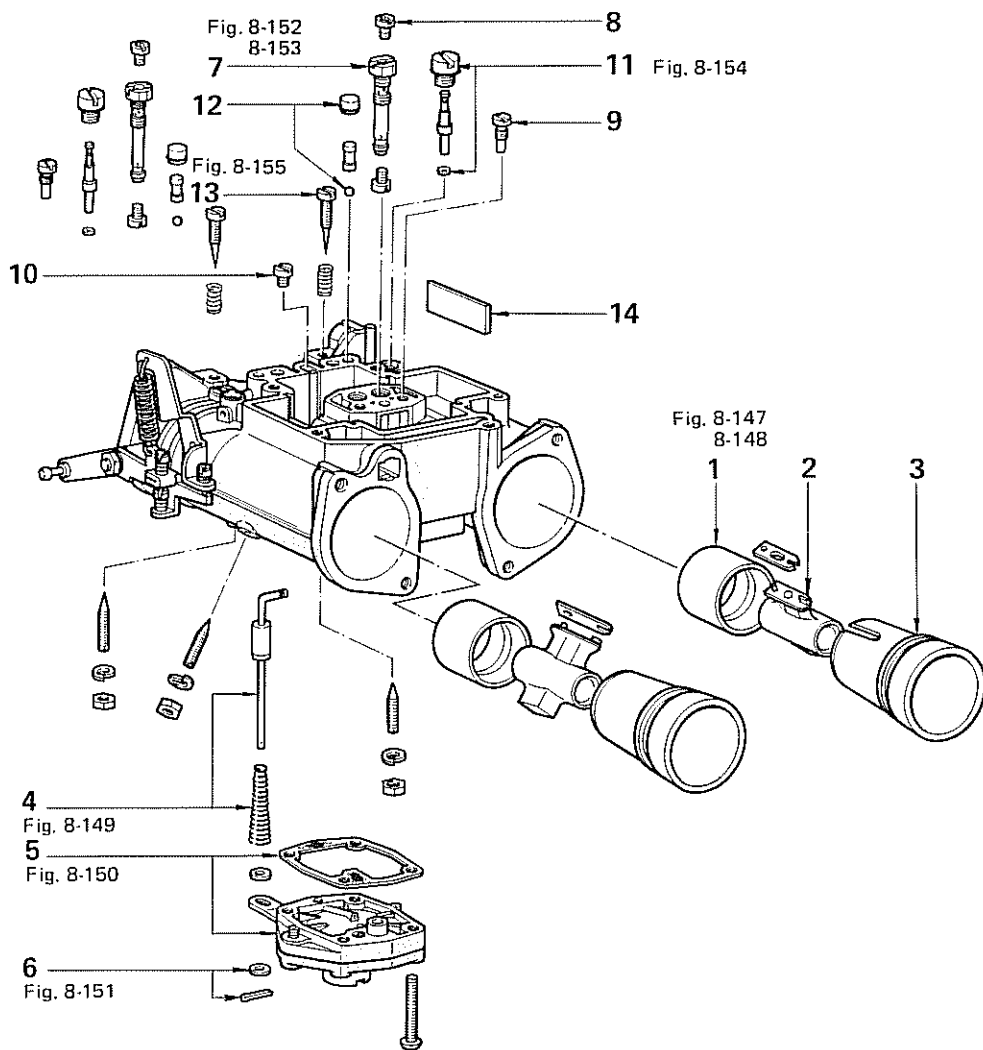
Fig. 8-145



10. Venturi
Damaged
Small venturi
Damaged or clogged

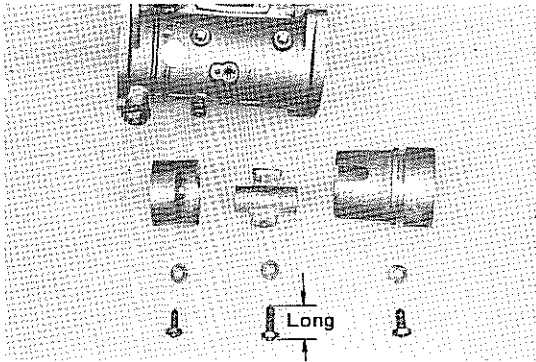
Body

Assemble the parts in the numerical order shown in the figure.

Fig. 8-146

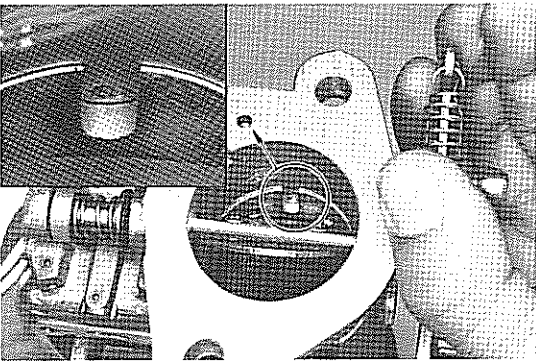
- | | |
|---------------------------------|---|
| 1. Large Venturi | 8. Main Air Bleed Jet |
| 2. Small Venturi | 9. Slow Jet |
| 3. Sleeve | 10. Starter Jet |
| 4. Pump Connecting Rod & Spring | 11. Pump Nozzle |
| 5. Accelerating Pump Diaphragm | 12. Pump Discharge Weight & Check Valve |
| 6. Cotter Pin & Washer | 13. Mixture Adjusting Screw |
| 7. Main Jet Holder | 14. Float Chamber Plate |

Fig. 8-147



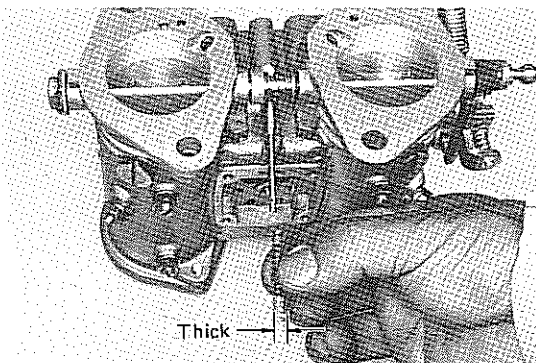
Assemble the small venturi with the long screw.

Fig. 8-148



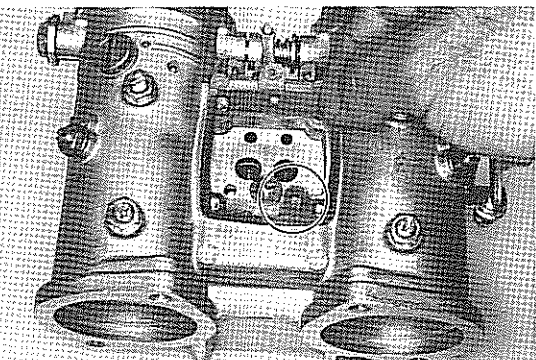
Install the venturi with the accelerator pump nozzle hole in the center of the venturi slit.

Fig. 8-149



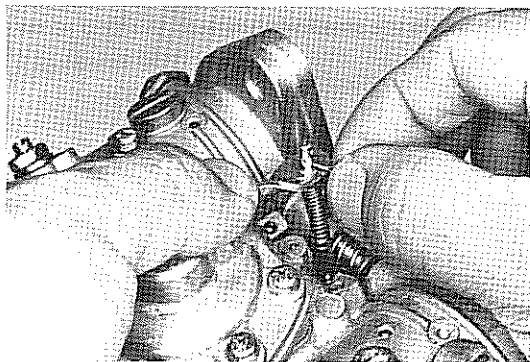
Install the spring in the direction shown in the figure.

Fig. 8-150



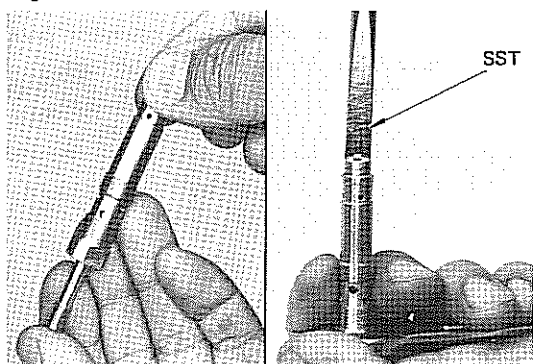
Install the gasket as shown in the figure.

Fig. 8-151



Install the cotter pin in the third hole from the tip of the pump rod.

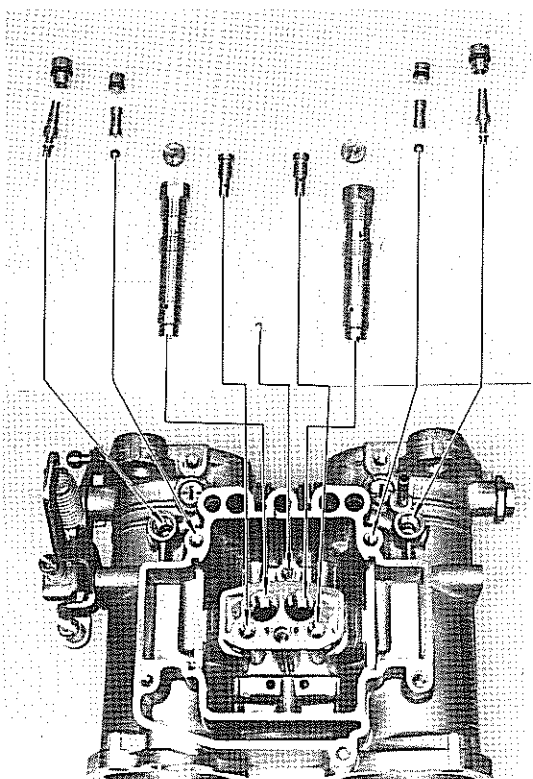
Fig. 8-152



Before installing the main jet holder, assemble the sleeve and main jet into the holder with SST.

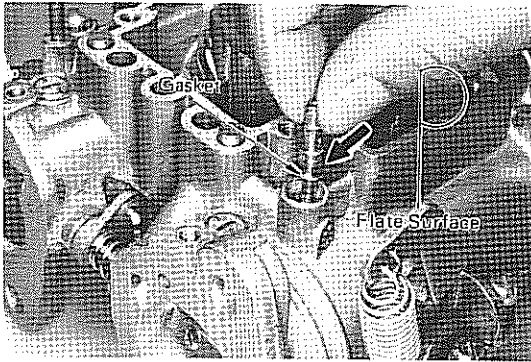
SST[09860-11011]

Fig. 8-153



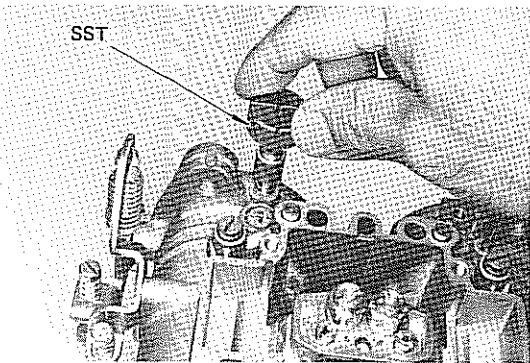
Install the jets, air bleeds, valves and plugs as shown in the figure.

Fig. 8-154



Install the accelerator nozzle with the flat surface facing the intake manifold and with a gasket.

Fig. 8-155



Screw out 1-1/2 turns from the fully closed position.

— Note —

Take care not to mistake the left and right sides.

Bowl Cover

Assemble the parts in the numerical order shown in the figure.

Fig. 8-156

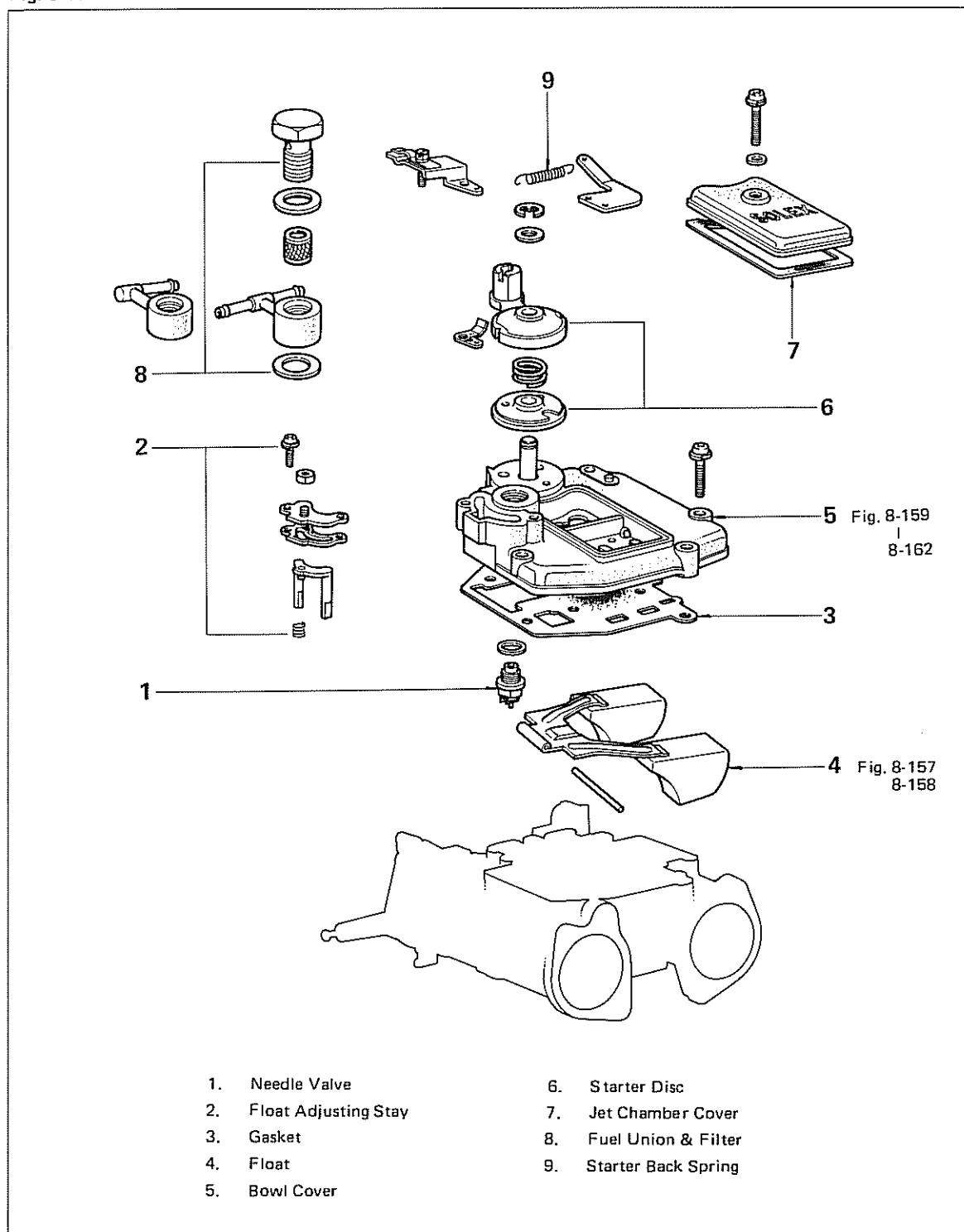
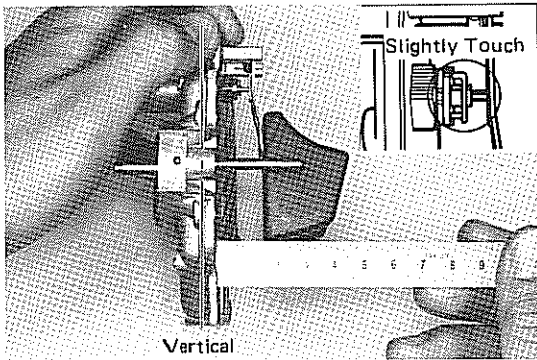


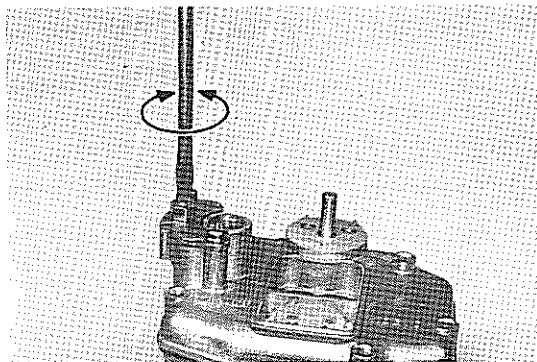
Fig. 8-157



Measure the float position.

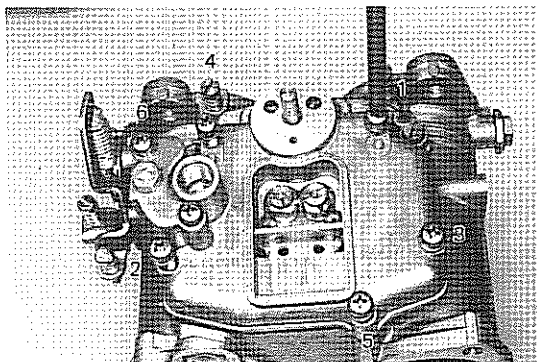
It should be about 16 mm (0.6 in.) from bowl cover lower surface.

Fig. 8-158



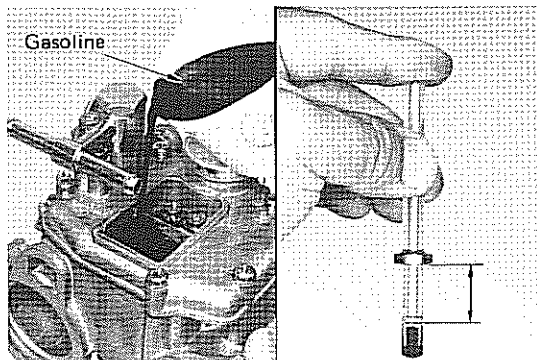
Adjust the float position as shown in the figure, if necessary.

Fig. 8-159



Tighten the screws a little at a time and in diagonal order.

Fig. 8-160

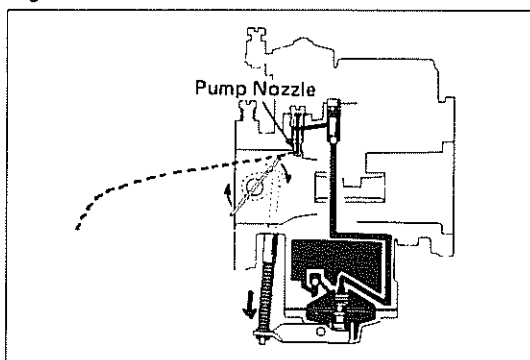


After assembling, check the acceleration pump

1. Remove the bowl cover.
2. Pour gasoline into the carburetor up to the correct level.

**Fuel level: 20 – 21 mm
(0.79 – 0.83 in.)**

Fig. 8-161

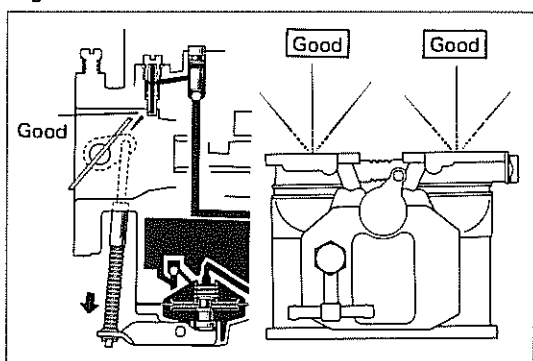


3. Check the fuel discharging time.

Discharging time:

1.1 – 1.7 second

Fig. 8-162



4. Check the fuel injection direction.

STARTING SYSTEM

	Page
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STARTER	9-7
REDUCTION TYPE STARTING SYSTEM CIRCUIT	9-22
PERFORMANCE TEST	9-23
CUTAWAY VIEW	9-25
REDUCTION TYPE STARTER	9-26

STARTING SYSTEM CIRCUIT (Conventional Type)

Fig. 9-1

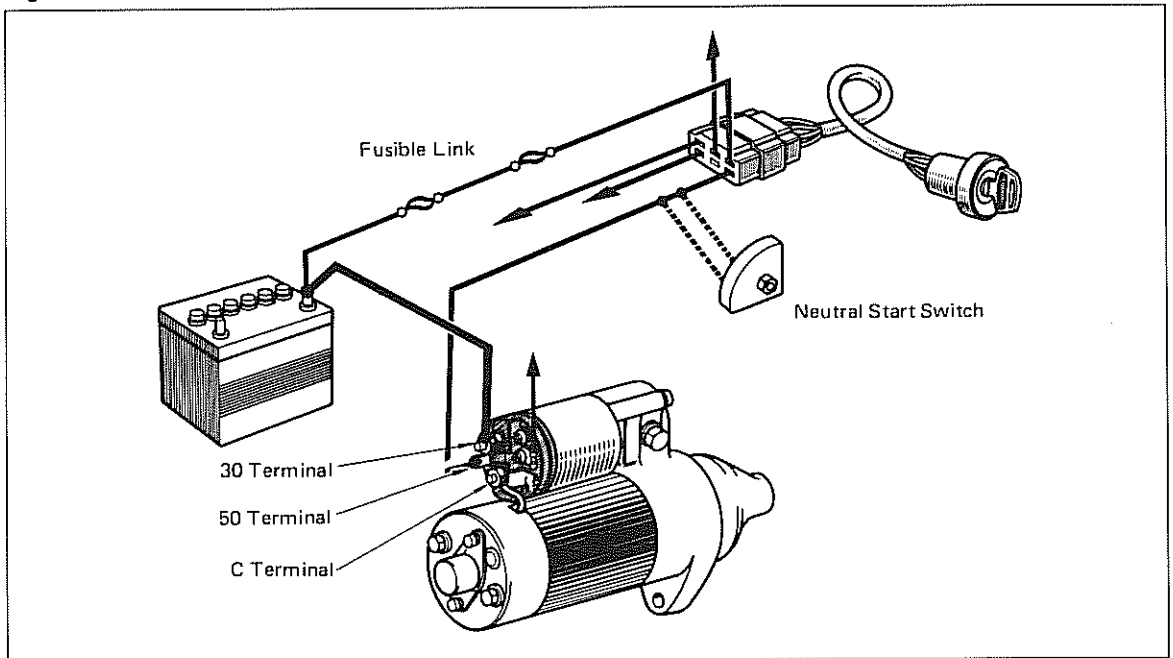


Fig. 9-2

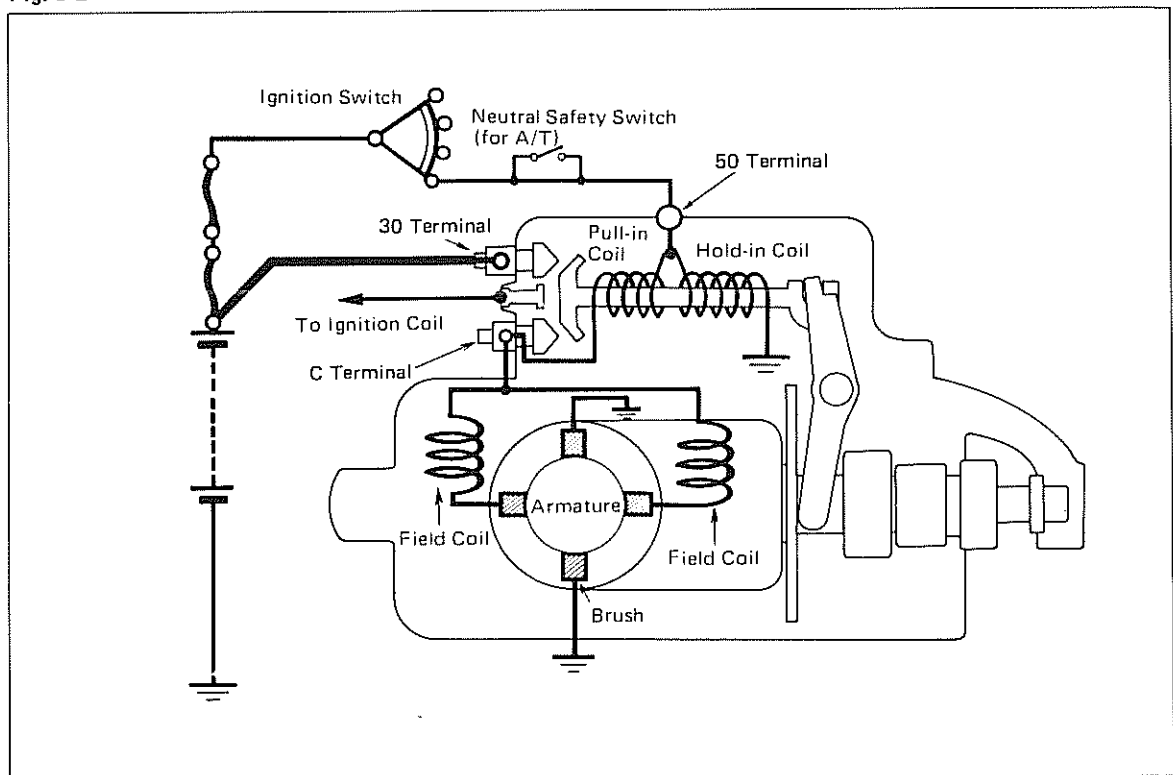
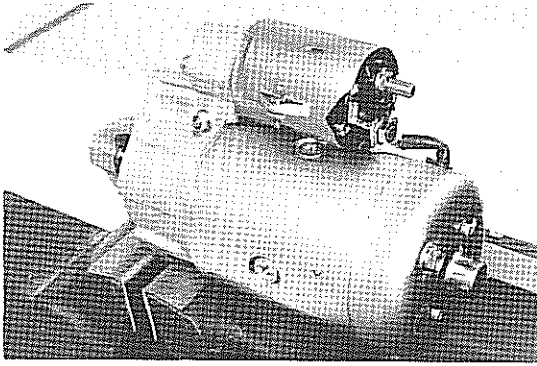


Fig. 9-3

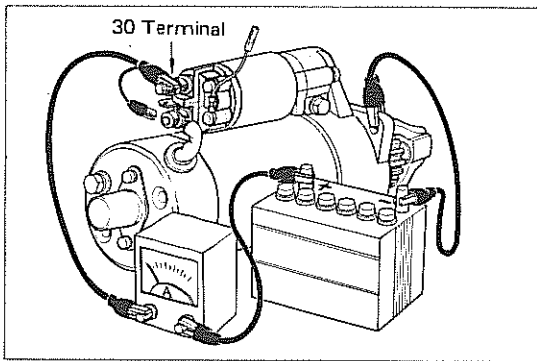


PERFORMANCE TEST

NO-LOAD PERFORMANCE TEST

Secure the starter in a vise to prevent an accident.

Fig. 9-4



1. Connect the starter to a battery as shown in the figure.

Positive side

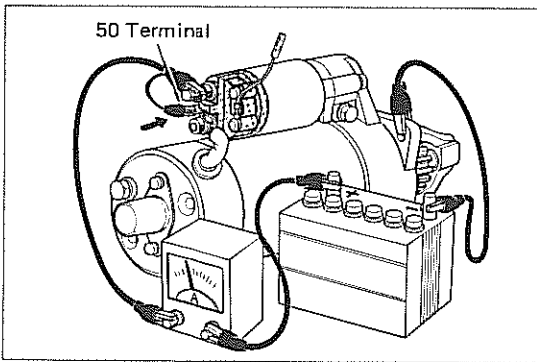
Battery (+) ——— Ammeter (+)

Ammeter (-) ——— 30 terminal

Negative side

Battery (-) ——— Starter body

Fig. 9-5

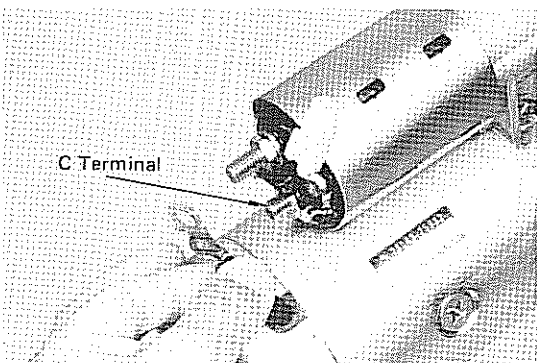


2. Connect 50 terminal.

If the starter shows smooth and steady rotation with the pinion jumping out and draws less than specified current, it is satisfactory.

Specified current: Less than 50A

Fig. 9-6



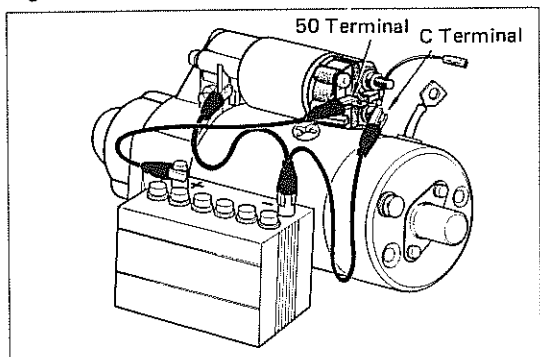
TEST MAGNETIC SWITCH

— Caution —

Each test must be performed within a short time (3 — 5 seconds) to prevent the coil from burning out.

1. Disconnect C terminal.

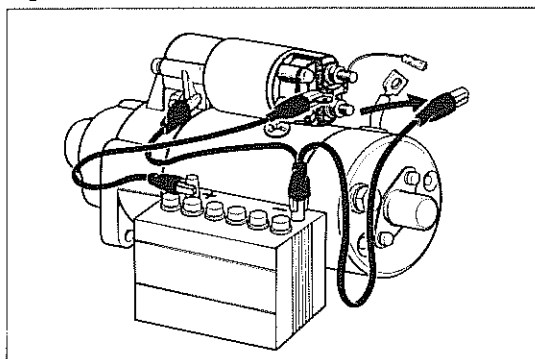
Fig. 9-7



2. Pull-in test
Connect the magnetic switch to a battery as shown in the figure.
Negative side
Battery (–) —→ Starter body and C terminal

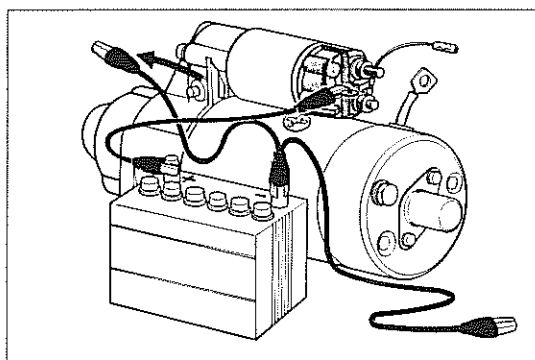
Positive side
Battery (+) —→ 50 terminal
If the pinion has definitely jumped out, the pull-in coil is satisfactory.

Fig. 9-8



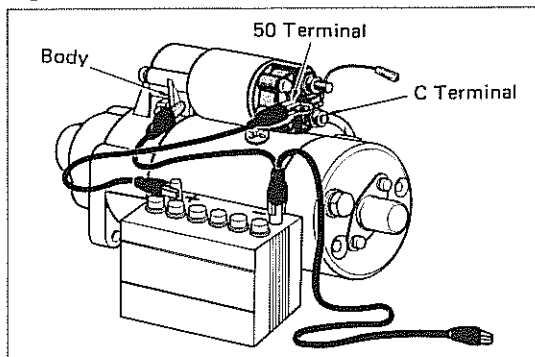
3. Hold-in test
Disconnect the C terminal. The pinion should remain projected.

Fig. 9-9



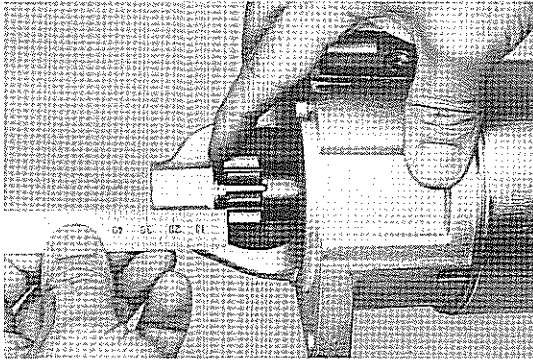
4. Check the plunger return.
When disconnecting the switch body, the pinion should return quickly.

Fig. 9-10



5. Check pinion clearance.
 - (1) Connect the field coil lead to C terminal.
 - (2) Connect the magnetic switch to a battery as shown in the figure.
Positive side
Battery (+) —→ 50 terminal
Battery (–) —→ Starter body

Fig. 9-11



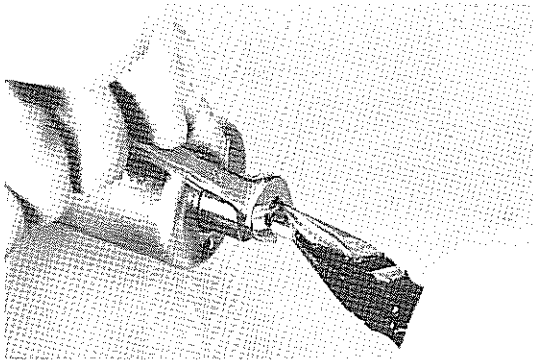
- (3) Move the pinion to the armature side to eliminate slack, and check the clearance between the pinion end and stop collar.

Standard clearance:

0.1 – 6.0 mm

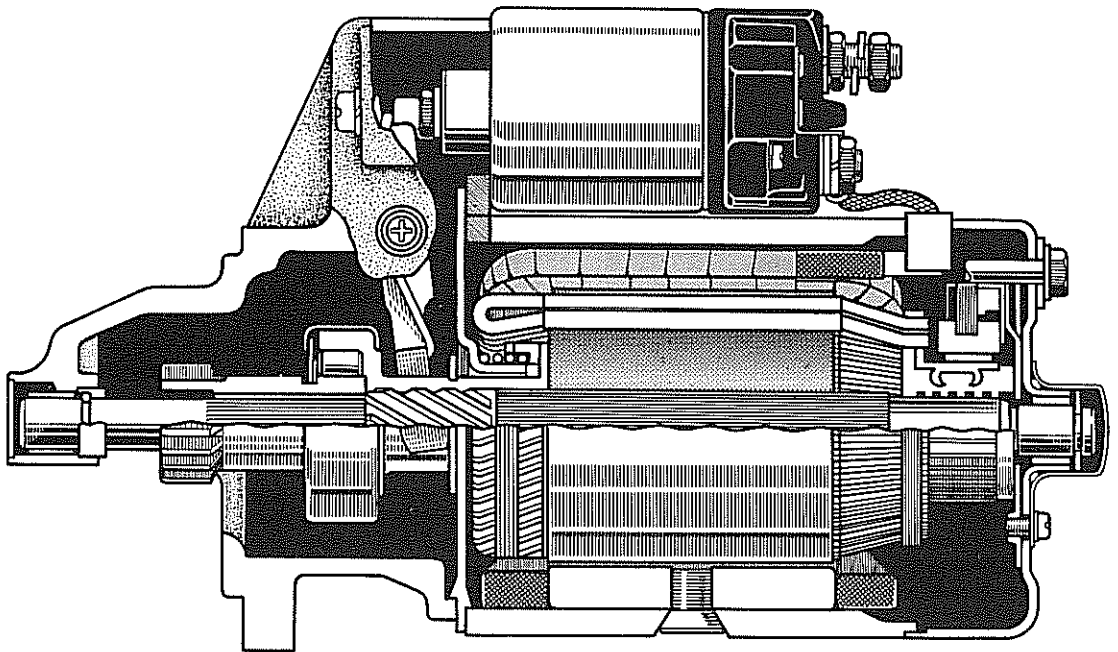
(0.004 – 0.236 in.)

Fig. 9-12



- (4) Adjust if necessary after loosening the lock nut.

<u>Clearance</u>		<u>Stud</u>
Too large	————→	Screw in
Too small	————→	Screw out

CUTAWAY VIEW**Fig. 9-13**

STARTER**DISASSEMBLY**

Disassemble the parts in the numerical order shown in the figure.

Fig. 9-14

1. Insulator
2. Magnetic Switch
3. Bearing Cover & Lock Plate
4. Bolt
5. Commutator End Frame
6. Brush Holder
7. Yoke
8. Drive Lever Bolt
9. Armature & Drive Lever
10. Snap Ring
11. Stop Collar
12. Clutch with Pinion Gear
13. Center Bearing

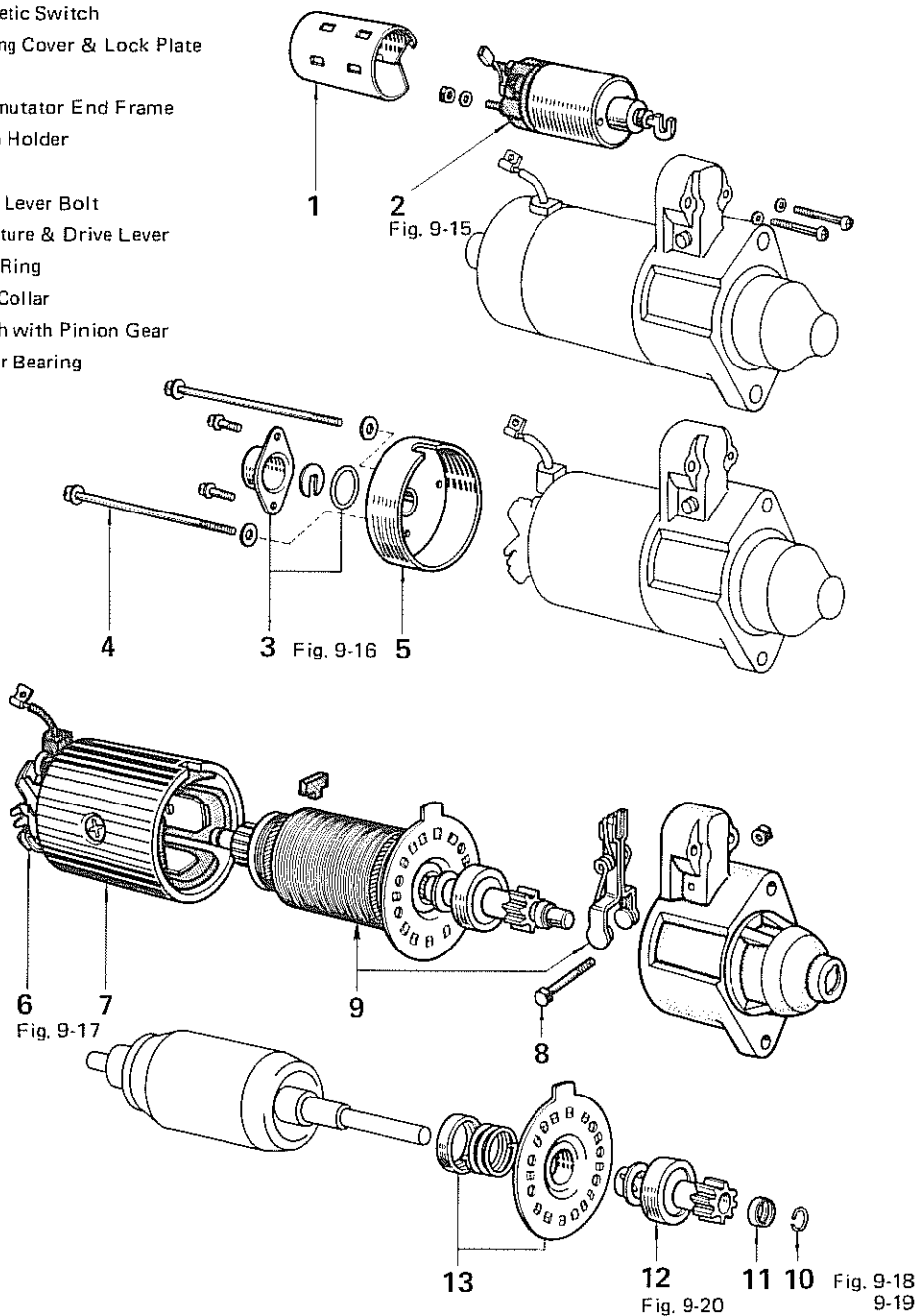
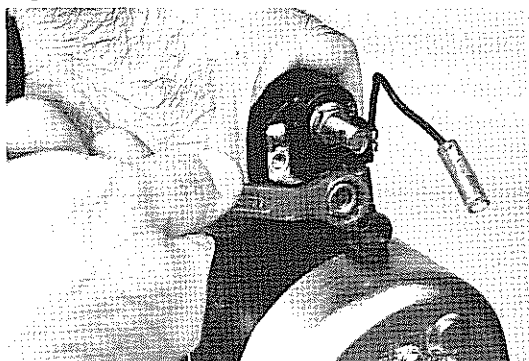
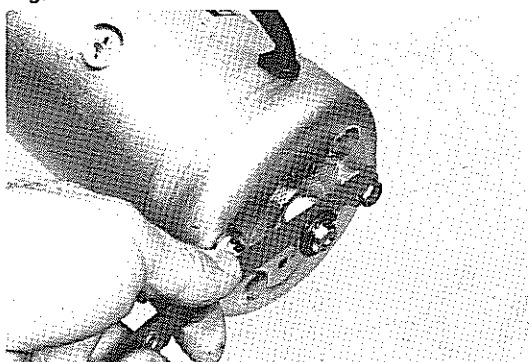


Fig. 9-15



Disconnect the lead wire before removing the magnetic switch.

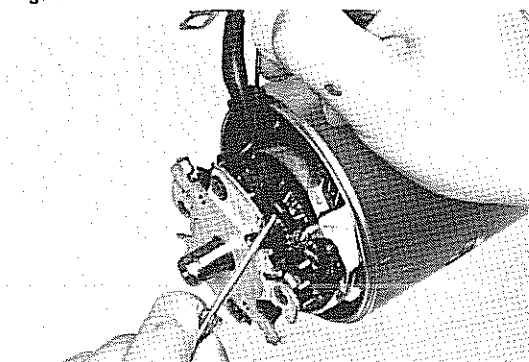
Fig. 9-16



Check the armature shaft thrust clearance.

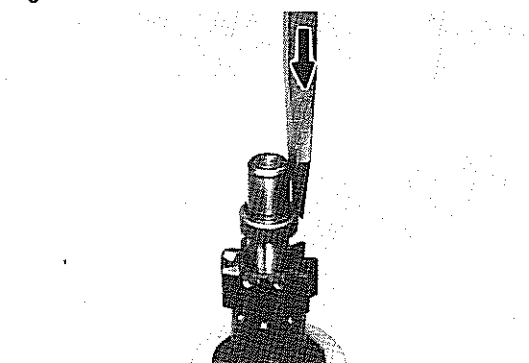
**Thrust clearance limit: 0.1 mm
(0.004 in.)**

Fig. 9-17



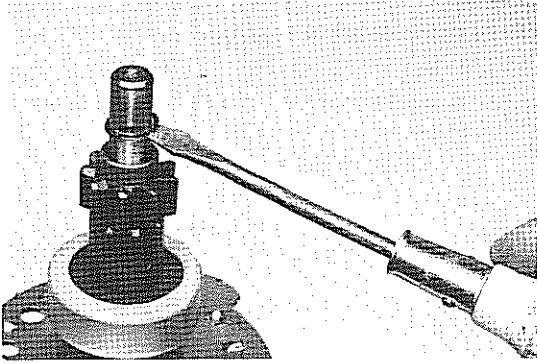
Take off the brushes and remove the brush holder.

Fig. 9-18



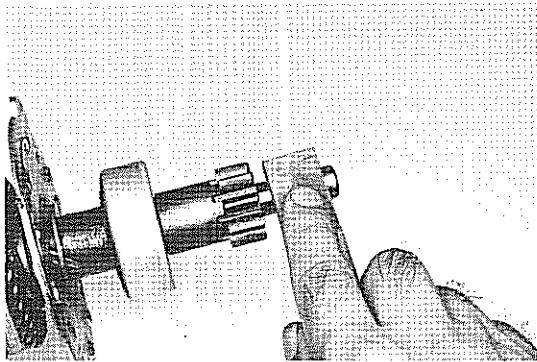
Tap in the stop collar with a screwdriver.

Fig. 9-19



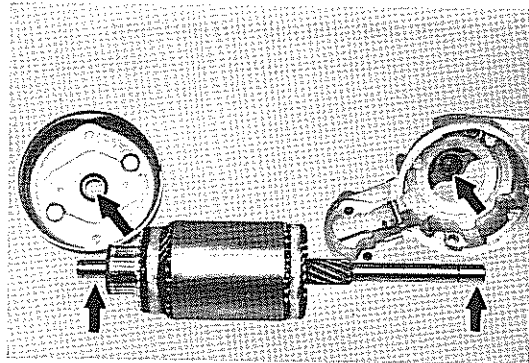
Pry off the snap ring with a screwdriver.

Fig. 9-20



If the pinion was difficult to pull out, smoothen it with an oil stone.

Fig. 9-21

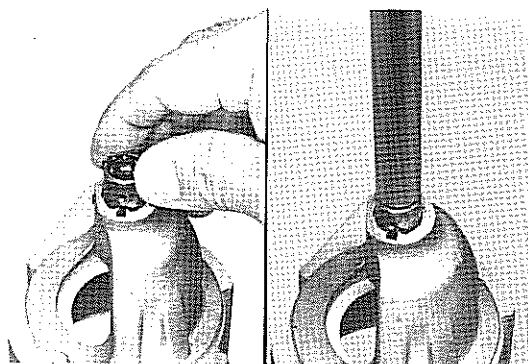
**INSPECTION & REPAIR****Armature Shaft & Bearing**

1. Inspect the armature shaft end, drive housing bushing and end frame bushing for wear or damage.

Oil clearance:

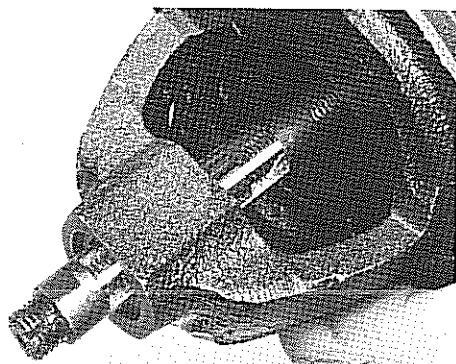
Limit 0.2 mm
(0.01 in.)

Fig. 9-22



2. Bushing replacement.
 - (1) Pry out the bushing cover and press out the bushing.
 - (2) Align the bushing hole with the housing groove and press in a new bushing.

Fig. 9-23

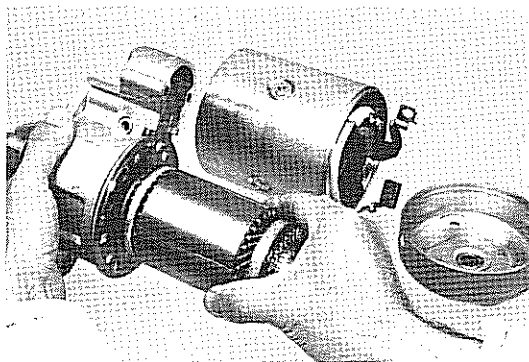


- (3) Ream the bushing to obtain the specified clearance.

Oil clearance:

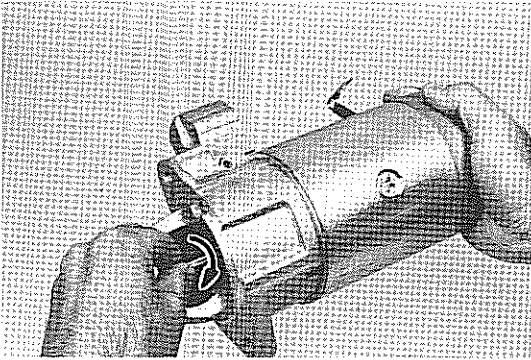
STD 0.035 – 0.077 mm
(0.0014 – 0.0030 in.)

Fig. 9-24



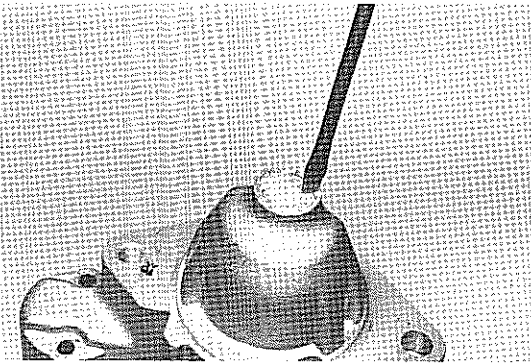
- (4) Temporarily install the center bearing, armature shaft and end housing.

Fig. 9-25



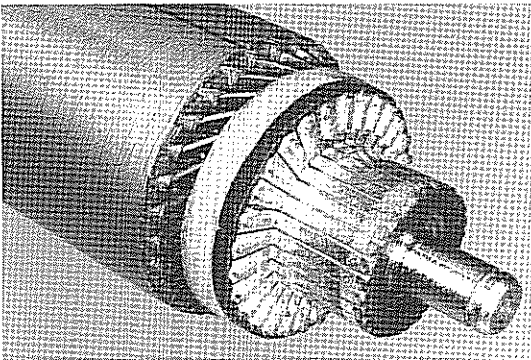
- (5) Make sure the armature shaft rotates smoothly.

Fig. 9-26



- (6) Clean the bore, and install a new bushing cover.

Fig. 9-27

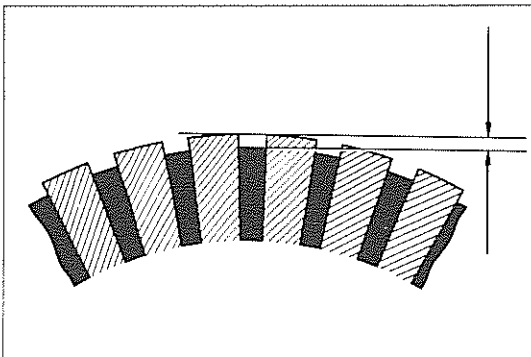


Commutator

Inspect for following items and repair or replace.

1. Dirty or burnt surface.
Correct by sandpaper or lathe if necessary.

Fig. 9-28

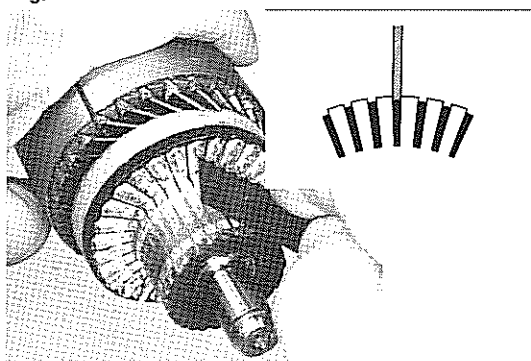


2. Depth of segment mica.

Mica depth:

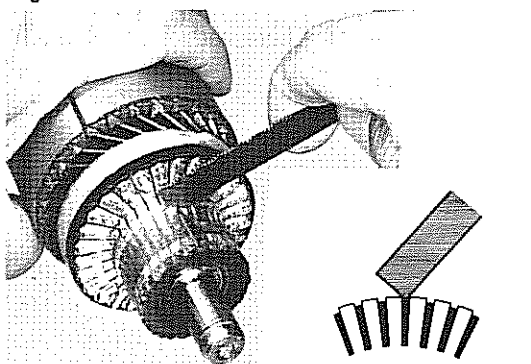
STD	0.4 – 0.8 mm (0.02 – 0.03 in.)
Limit	0.2 mm (0.008 in.)

Fig. 9-29



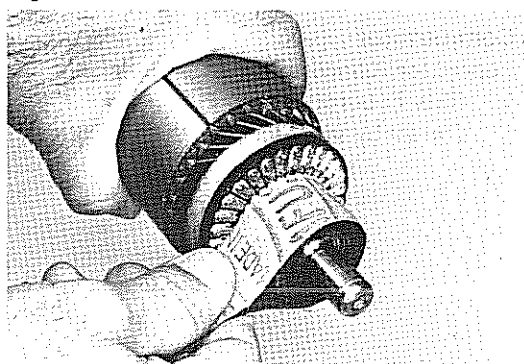
3. If the mica depth is below the limit, correct with a hacksaw blade.

Fig. 9-30



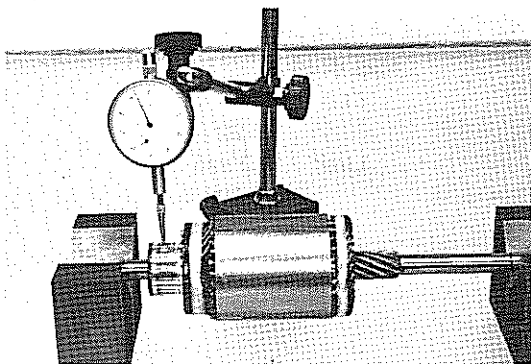
4. Smooth out the edge with a hacksaw blade.

Fig. 9-31



5. Use # 400 sandpaper.

Fig. 9-32



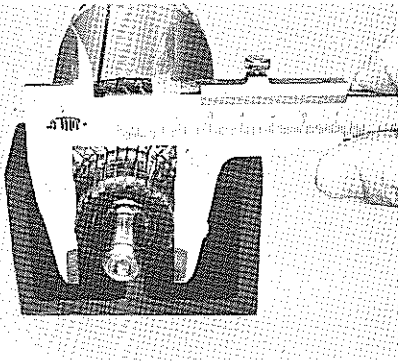
6. Runout: Correct on a lathe if it exceeds the limit.

Runout:

STD 0.05 mm
(0.002 in.)

Limit 0.3 mm
(0.012 in.)

Fig. 9-33

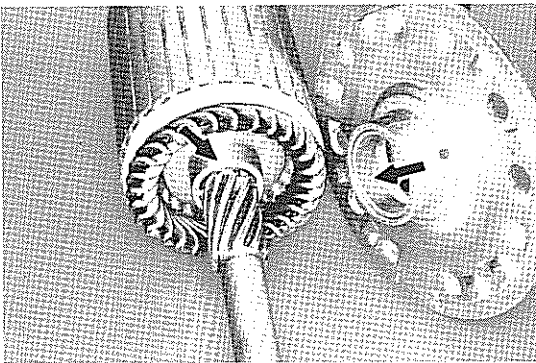


7. Surface wear: If below the limit, replace armature.

Commutator outer diameter:

STD	32.7 mm (1.29 in.)
Limit	31 mm (1.2 in.)

Fig. 9-34

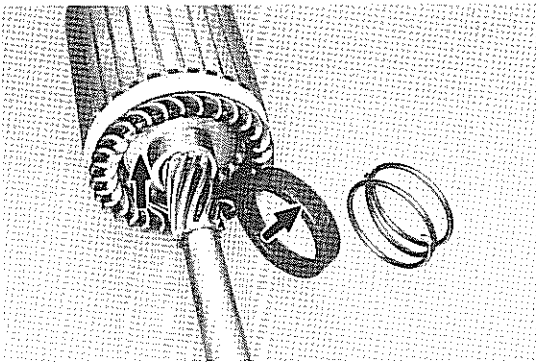


Center Bearing

1. Inspect center bearing for wear or damage.

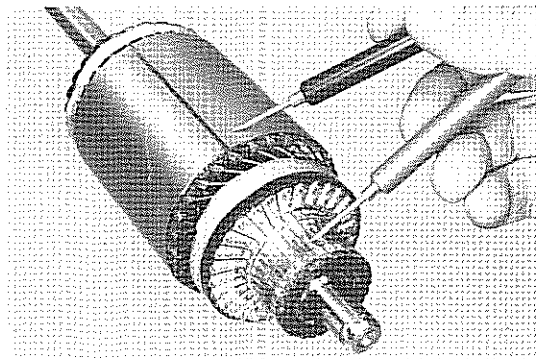
Clearance limit:	0.2 mm (0.01 in.)
-------------------------	------------------------------------

Fig. 9-35



2. Inspect the holder for wear or damage.

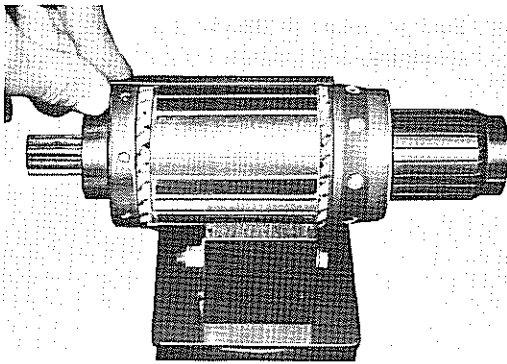
Fig. 9-36



Armature Coil

1. Ground test
Check the commutator and armature coil core. If there is continuity, armature is grounded and must be replaced.

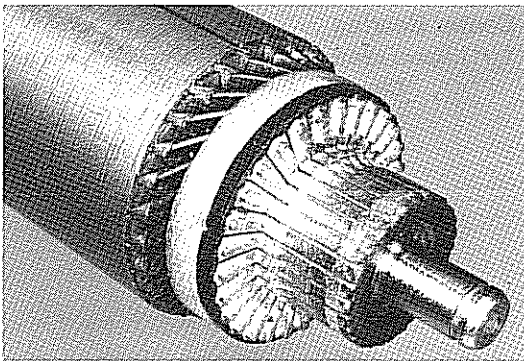
Fig. 9-37



2. Short circuit test

Place the armature on the armature tester and hold a hacksaw blade against the armature core while turning the armature. If the hacksaw blade is attracted or vibrates, the armature is shorted and must be replaced.

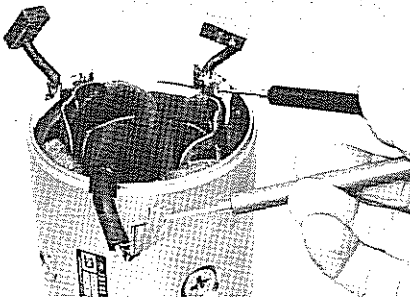
Fig. 9-38



3. Solder condition

Check for continuity between the commutator and armature coil.

Fig. 9-39

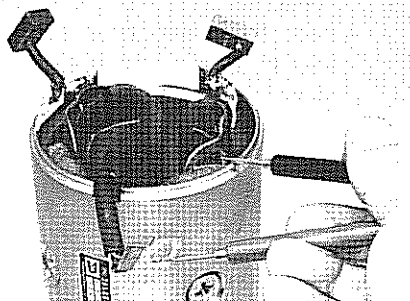


Field Coil

1. Open circuit test

Check for continuity between the lead wire and field coil brush soldered connection. If there is no continuity, there is an open circuit in field coil, and it should be replaced.

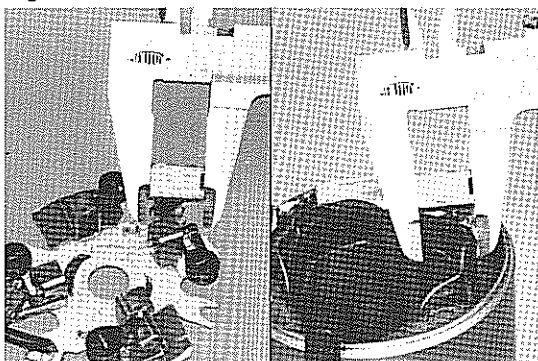
Fig. 9-40



2. Ground test

Check for continuity between field coil end and field frame. If there is continuity, repair or replace field coil.

Fig. 9-41

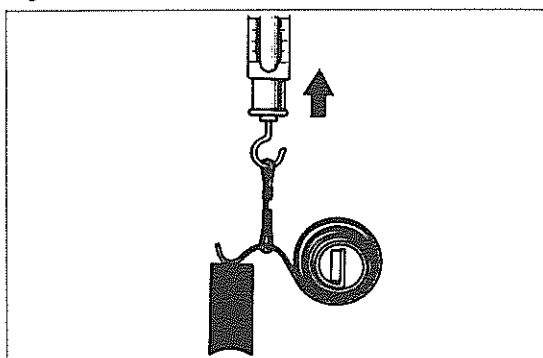
**Brush**

Measure the brush length and replace if below limit.

Brush length:

1.0 kw	STD	19 mm (0.7 in.)
	Limit	10 mm (0.4 in.)
0.8 kw	STD	16 mm (0.6 in.)
	Limit	10 mm (0.4 in.)

Fig. 9-42

**Brush Spring**

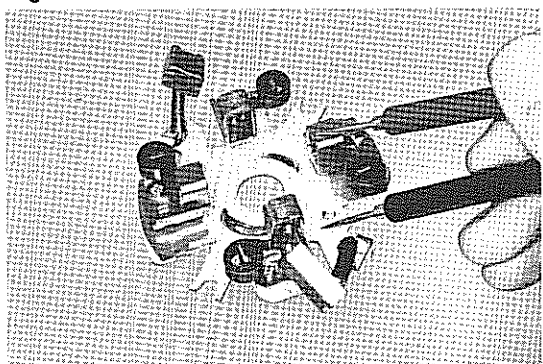
Measure the brush spring load with a pull scale. If the reading is below standard, replace the spring.

Tension: 3.2 – 4.0 kg
(7.1 – 8.8 lb)

— Note —

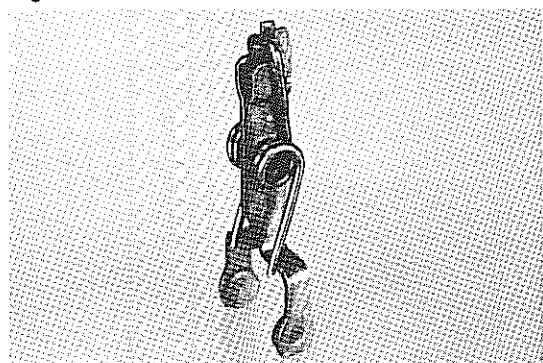
Take the pull scale reading at the very instant the brush spring separates from the brush.

Fig. 9-43

**Brush Holder**

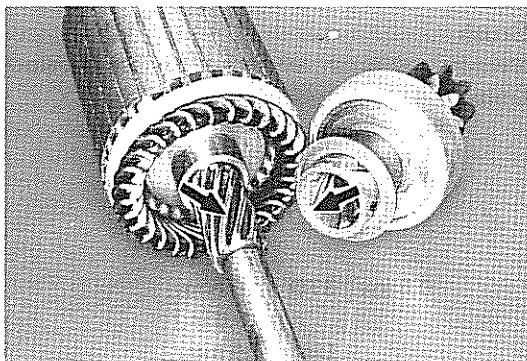
Check insulation between the (–) brush holder and (+) brush holder. Repair or replace if continuity is indicated.

Fig. 9-44

**Drive Lever**

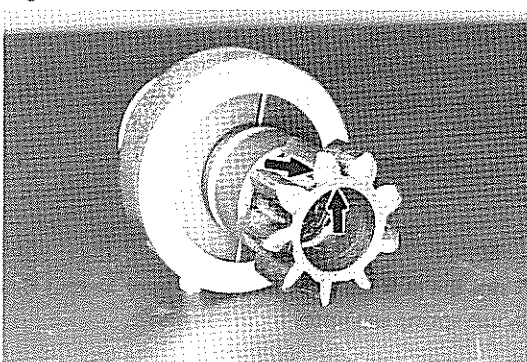
Inspect the drive lever and spring for wear. Replace if necessary.

Fig. 9-45

**Starter Clutch & Pinion Gear**

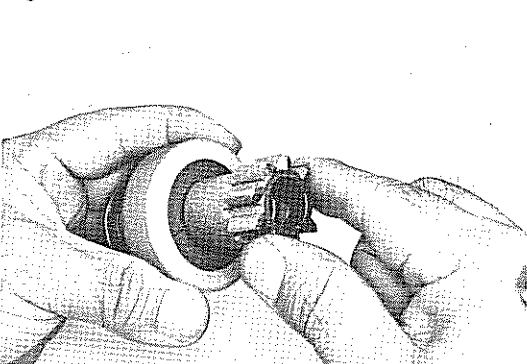
1. Inspect spline teeth for wear or damage. Replace if necessary.
2. Inspect pinion for smooth movement.

Fig. 9-46



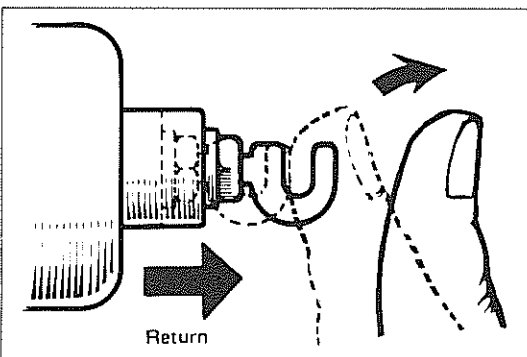
3. Inspect the pinion gear teeth and chamfer if worn or damaged.

Fig. 9-47



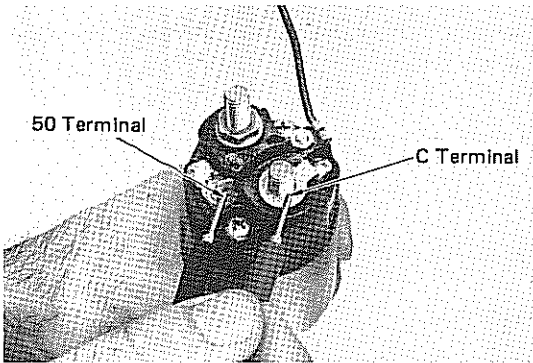
4. Rotate pinion. It should turn free in clockwise direction and lock when turned counterclockwise.

Fig. 9-48

**Magnetic Switch**

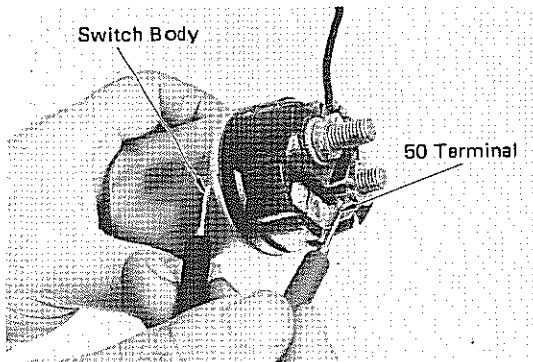
1. Push in the plunger and release it. The plunger should return quickly to its original position.

Fig. 9-49



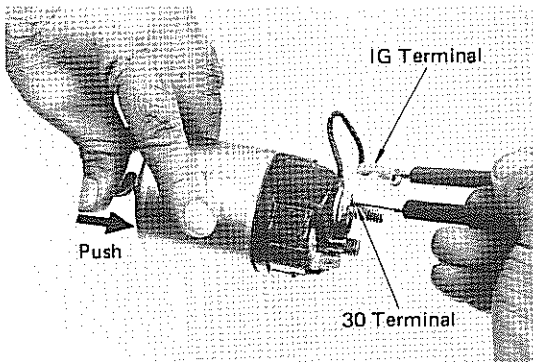
2. Pull-in coil open circuit test
Check for continuity between the 50 terminal and C terminal.

Fig. 9-50



3. Hold-in coil open circuit test
Check for continuity between the 50 terminal and switch body.

Fig. 9-51



4. I.G. terminal continuity test
Push in the plunger until it stops. Check for continuity between 30 terminal and lead wire.

– Note –

Perform the switch operation test after assembling it to the motor.

ASSEMBLY

Assemble the parts in the numerical order shown in the figure.

Fig. 9-52

1. Center Bearing (for 1.0 kw)
2. Clutch with Pinion Gear
3. Stop Collar
4. Snap Ring
5. Drive Lever & Housing
6. Drive Lever Bolt
7. Armature
8. Yoke
9. Brush Holder
10. Commutator End Frame
11. Bolt
12. Lock Plate & Cover
13. Magnetic Switch
14. Insulator

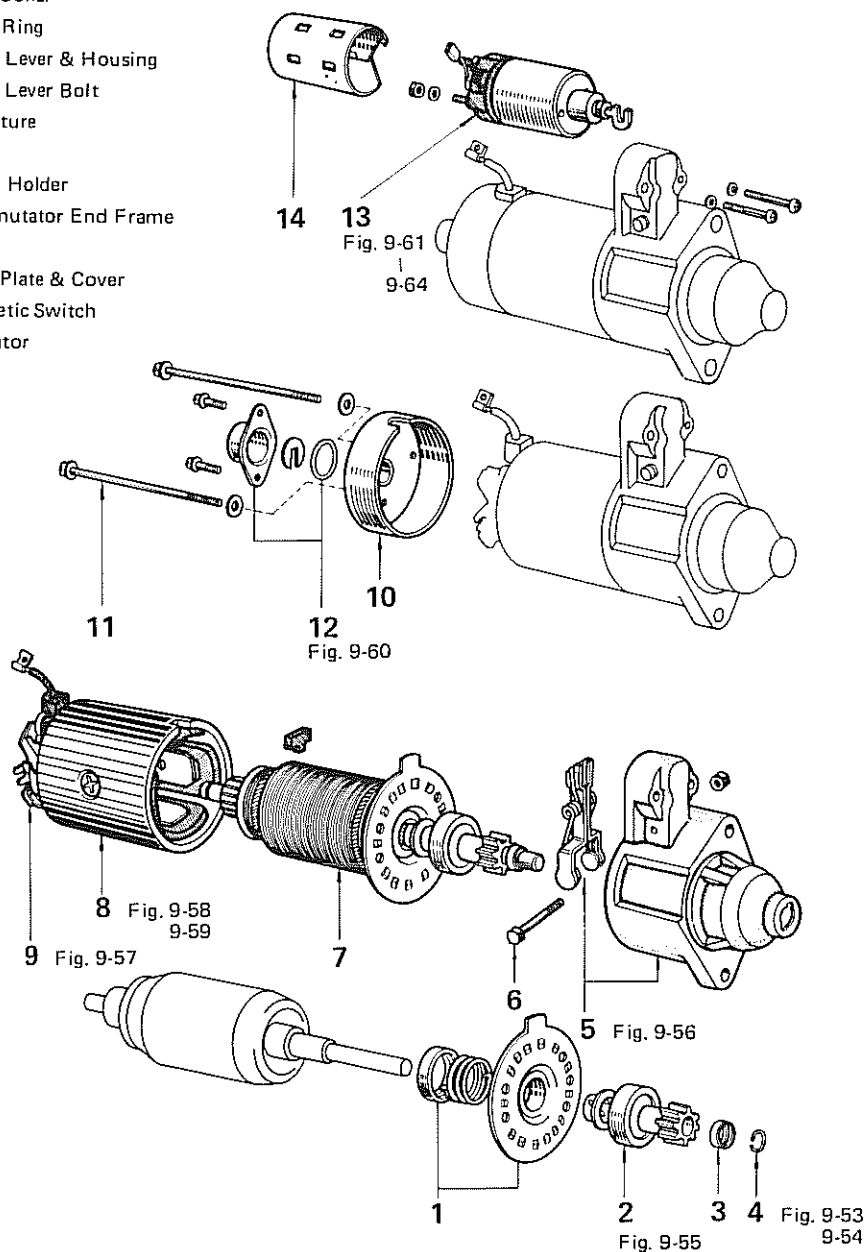
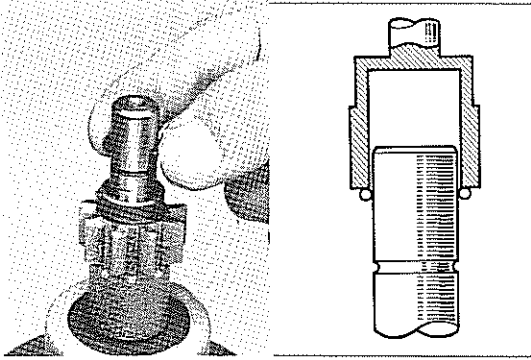
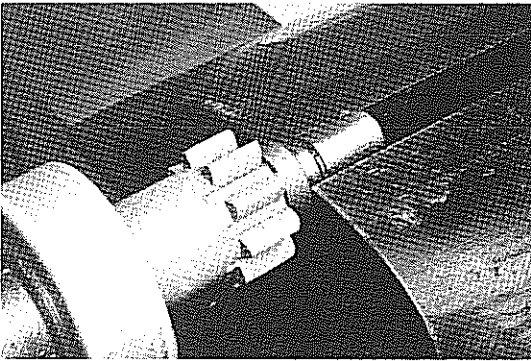


Fig. 9-53



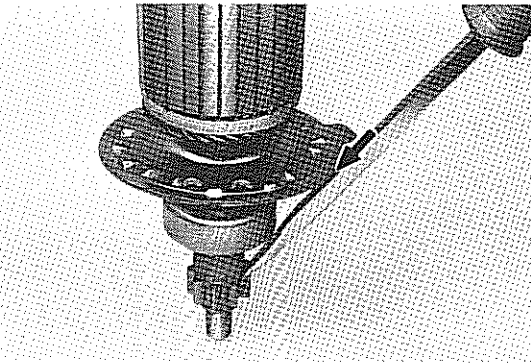
Drive in the snap ring with 14 mm socket wrench, then fit it into shaft groove.

Fig. 9-54



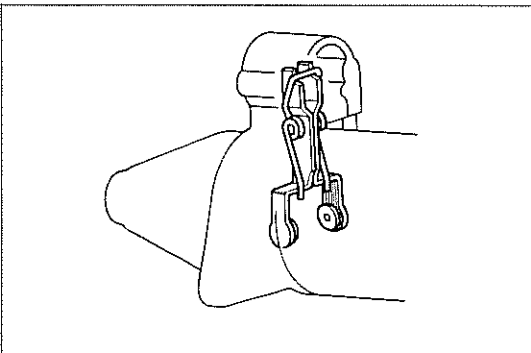
Compress the snap ring with a vise. Make sure that the snap ring fits correctly.

Fig. 9-55



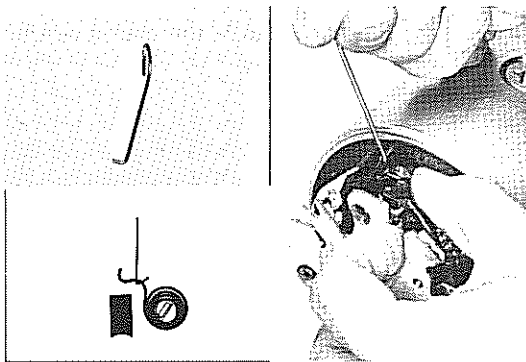
Tap the pinion to slide the stop collar onto the snap ring.

Fig. 9-56



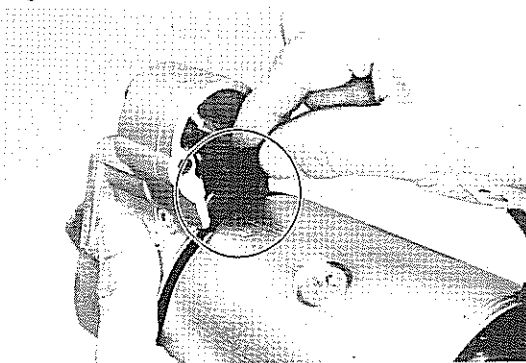
Assemble the drive lever in the direction as shown in the figure.

Fig. 9-57



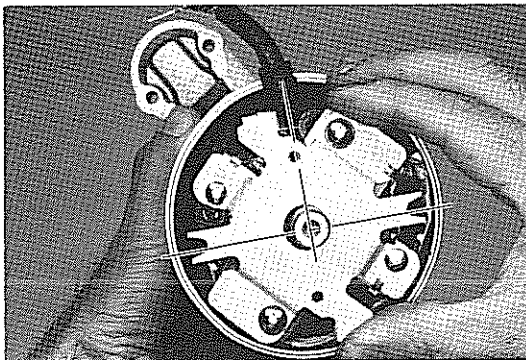
Assemble the brushes, being careful not to damage them.

Fig. 9-58



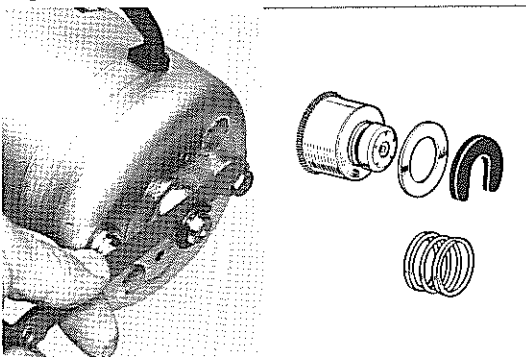
Match the notch in the yoke with the tab on the rubber plate and assemble the yoke with the drive housing.

Fig. 9-59



After installation, position the holder as shown in the figure.

Fig. 9-60

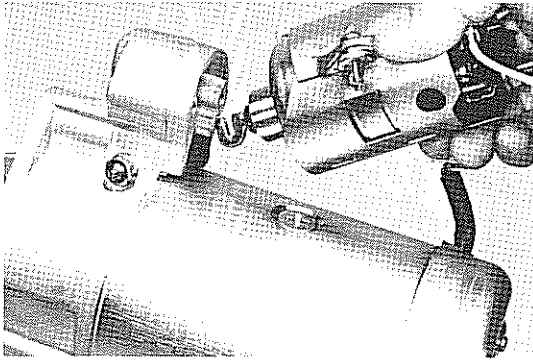


Install the lock plate and measure the armature shaft thrust clearance. If clearance exceeds the specified value, correct by increasing the number of shims.

Thrust clearance: 0.035 – 0.077 mm
(0.0014 – 0.0030 in.)

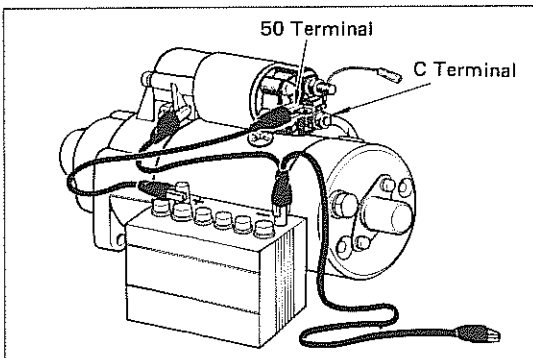
Adjusting shim thickness:
0.5 mm
(0.02 in.)

Fig. 9-61



Hook the magnetic switch onto the drive lever spring from underneath.

Fig. 9-62

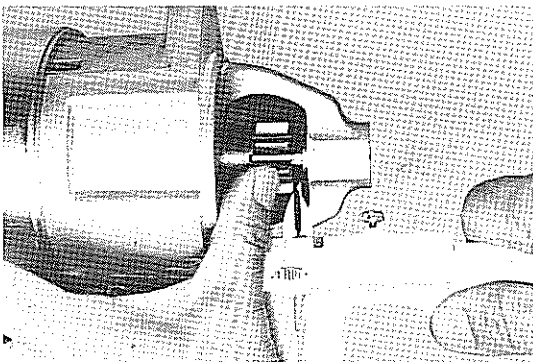


Check the pinion clearance.
Connect the field coil lead to C terminal.
Connect the magnetic switch to a battery as shown in the figure.
positive side

Battery (+) ——— 50 terminal

Battery (–) ——— Starter body

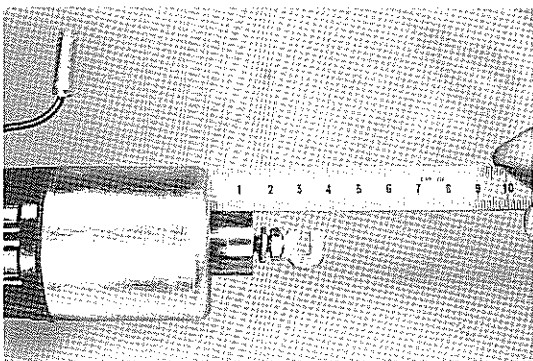
Fig. 9-63



Move the pinion to the armature side to eliminate the slack, and check the clearance between the pinion end and stop collar.

Standard clearance: 0.1 – 4.0 mm
(0.004 – 0.157 in.)

Fig. 9-64



Measure the distance from the switch mounting surface to the stud end.

Stud length:

STD approx. 34 mm
(1.3 in.)

To adjust, loosen the lock nut and screw the stud in or out.

REDUCTION TYPE STARTING SYSTEM CIRCUIT

Fig. 9-65

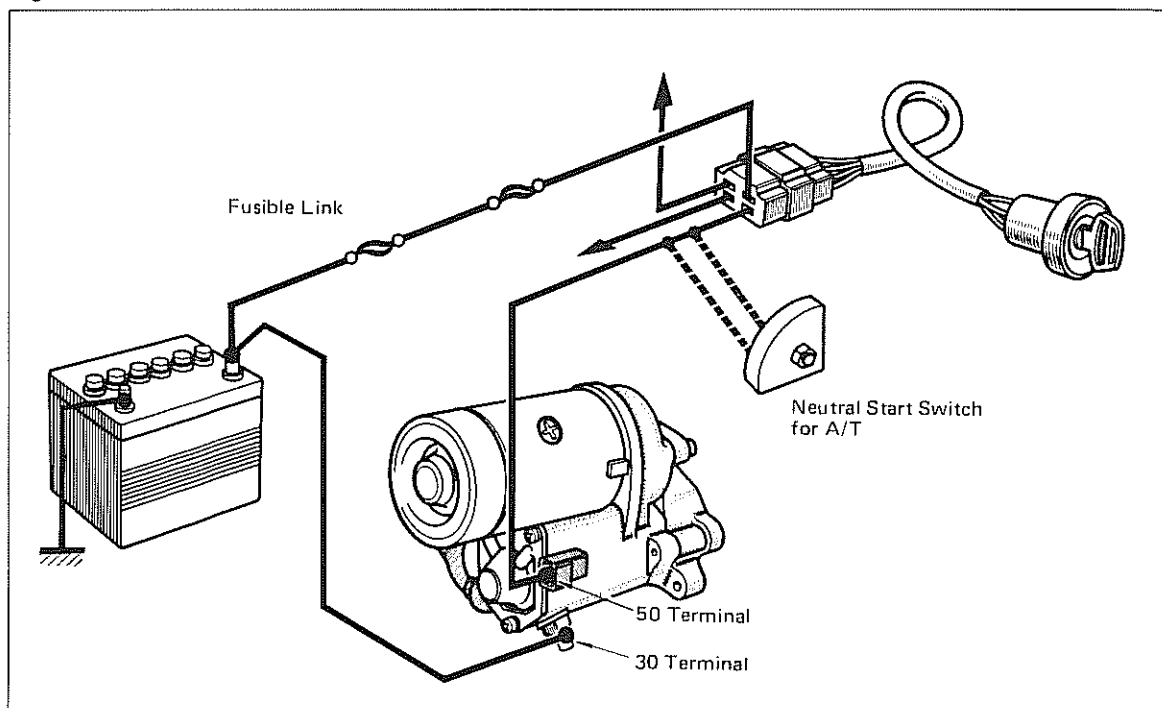


Fig. 9-66

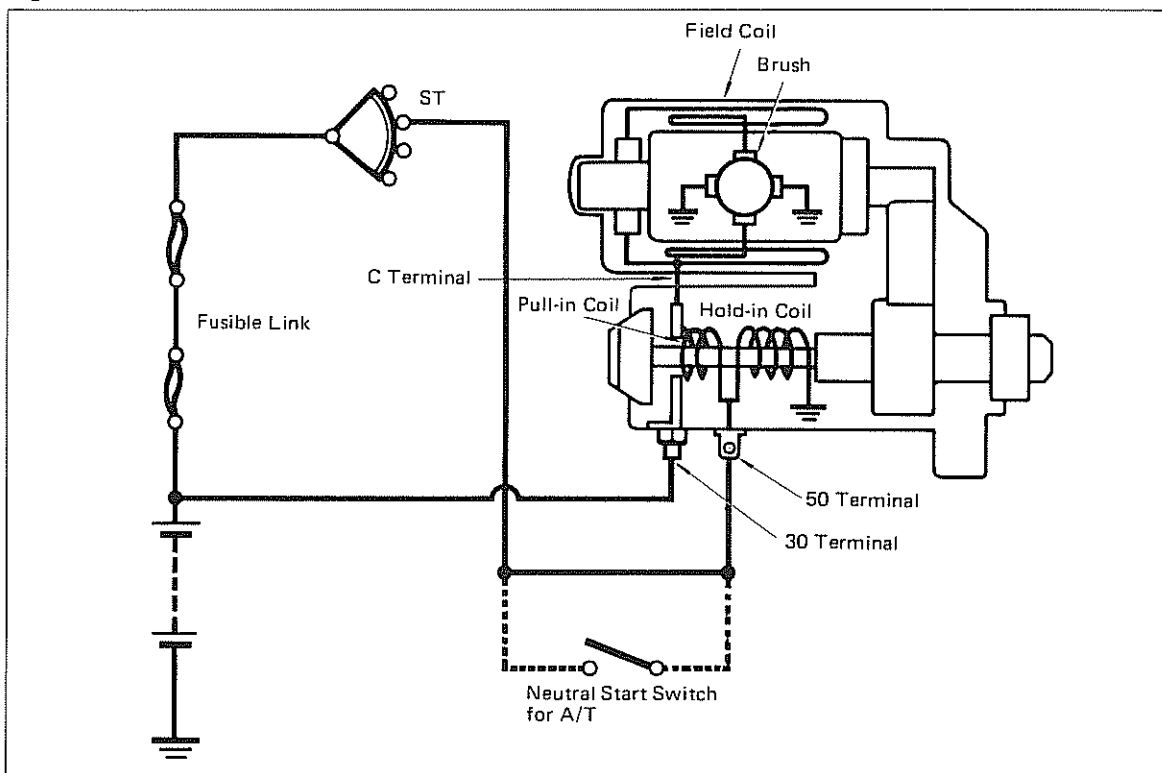
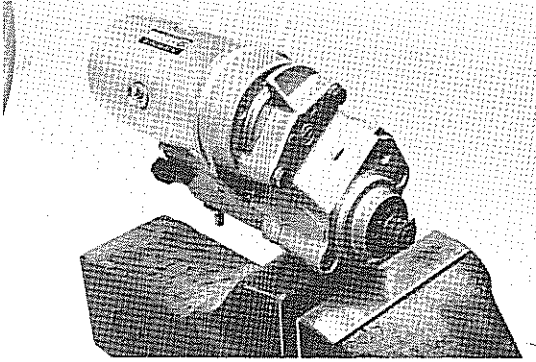


Fig. 9-67

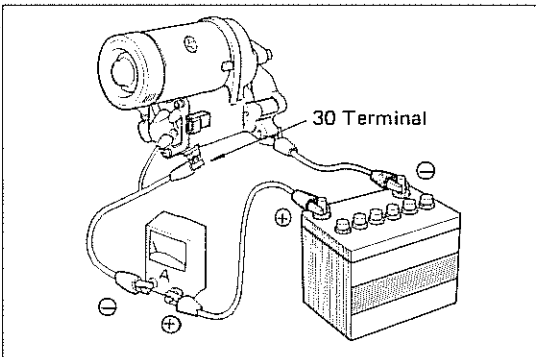


PERFORMANCE TEST

NO-LOAD PERFORMANCE TEST

1. Secure the starter in a vise to prevent an accident.

Fig. 9-68



2. Connect the starter to a battery as shown in the figure.

Positive side

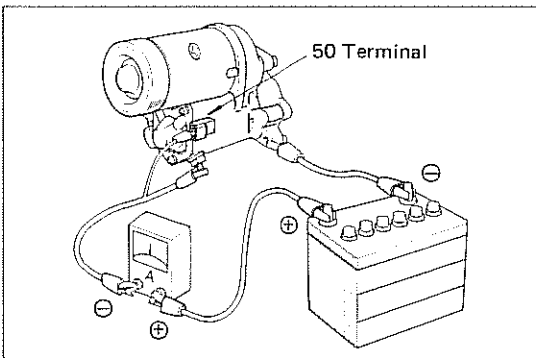
Battery (+) ——— Ammeter (+)

Ammeter (–) ——— 30 terminal

Negative side

Battery (–) ——— Starter housing

Fig. 9-69

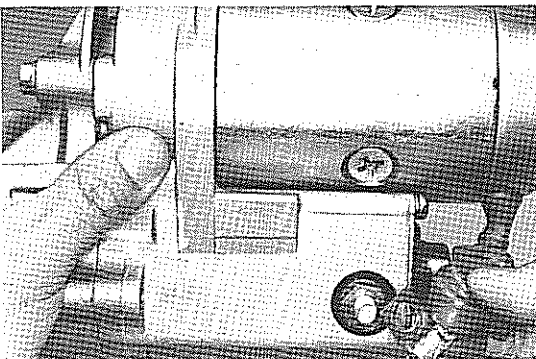


3. Connect the positive wire to the 50 terminal.

If the starter shows smooth and steady rotation with the pinion jumping out and draws less than specified current, it is satisfactory.

Specified current: Less than 90A

Fig. 9-70



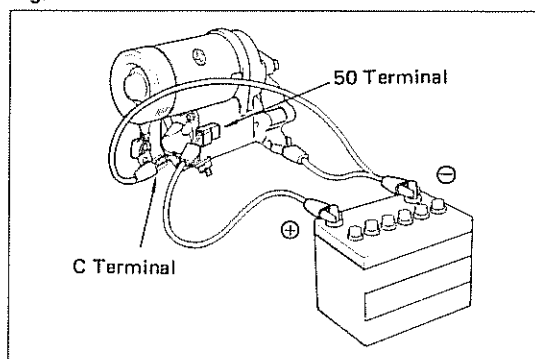
TEST MAGNETIC SWITCH

— Caution —

Each test must be performed within a short time (3 – 5 seconds) to prevent the coil from burning out.

1. Disconnect the C terminal.

Fig. 9-71



2. Test the pull-in coil.
Connect the magnetic switch to a battery as shown in the figure. The pinion should jump out.

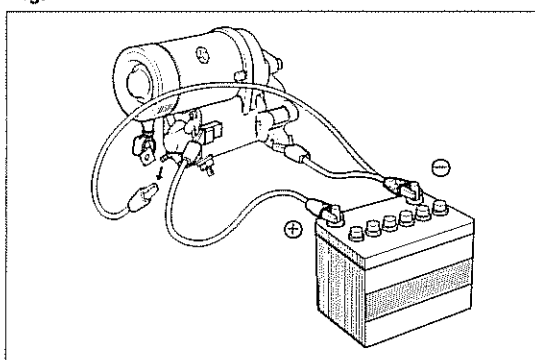
Negative side

Battery (-) —————> Starter housing and C terminal

Positive side

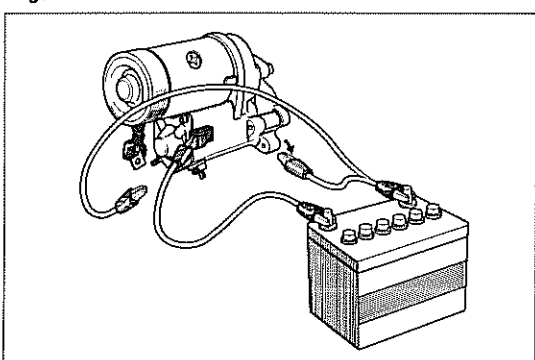
Battery (+) —————> 50 terminal

Fig. 9-72



3. Test the hold-in coil.
With the same connections as in the Pull-in coil test, disconnect the C terminal. At this time, the pinion should remain projected.

Fig. 9-73

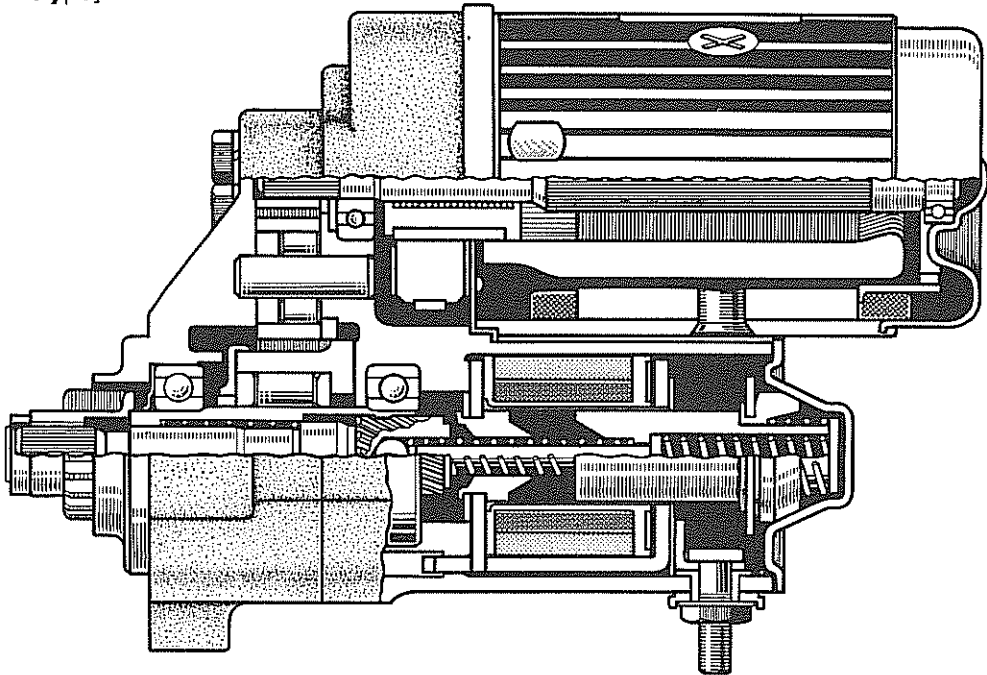


4. Check pinion return.
When disconnecting the cable from starter housing, the jumped-out pinion should return quickly.

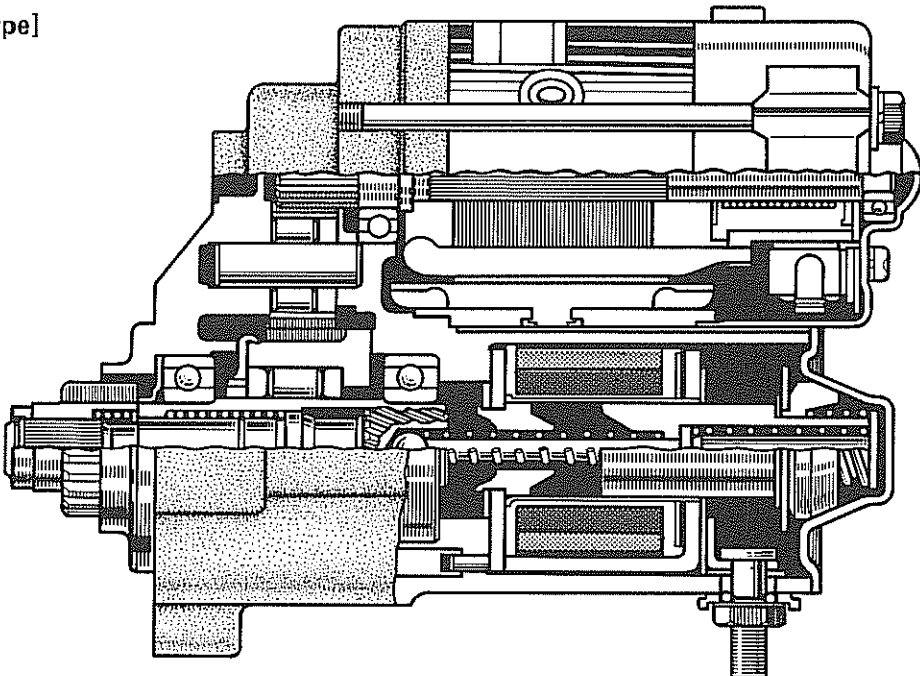
CUTAWAY VIEW

Fig. 9-74

[1.4 kw Type]



[0.9 kw Type]

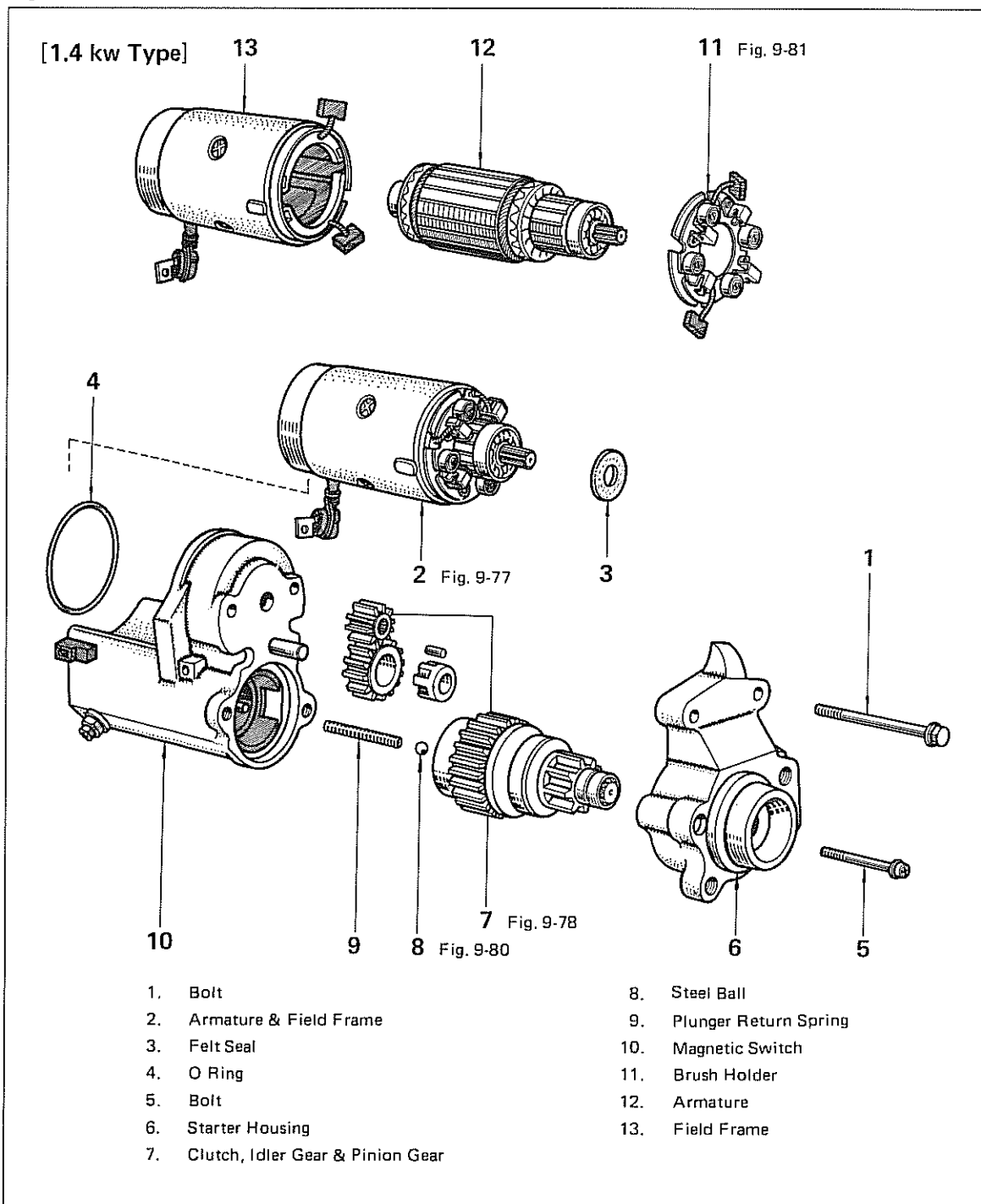


REDUCTION TYPE STARTER

DISASSEMBLY

Disassemble the parts in the numerical order shown in the figure.

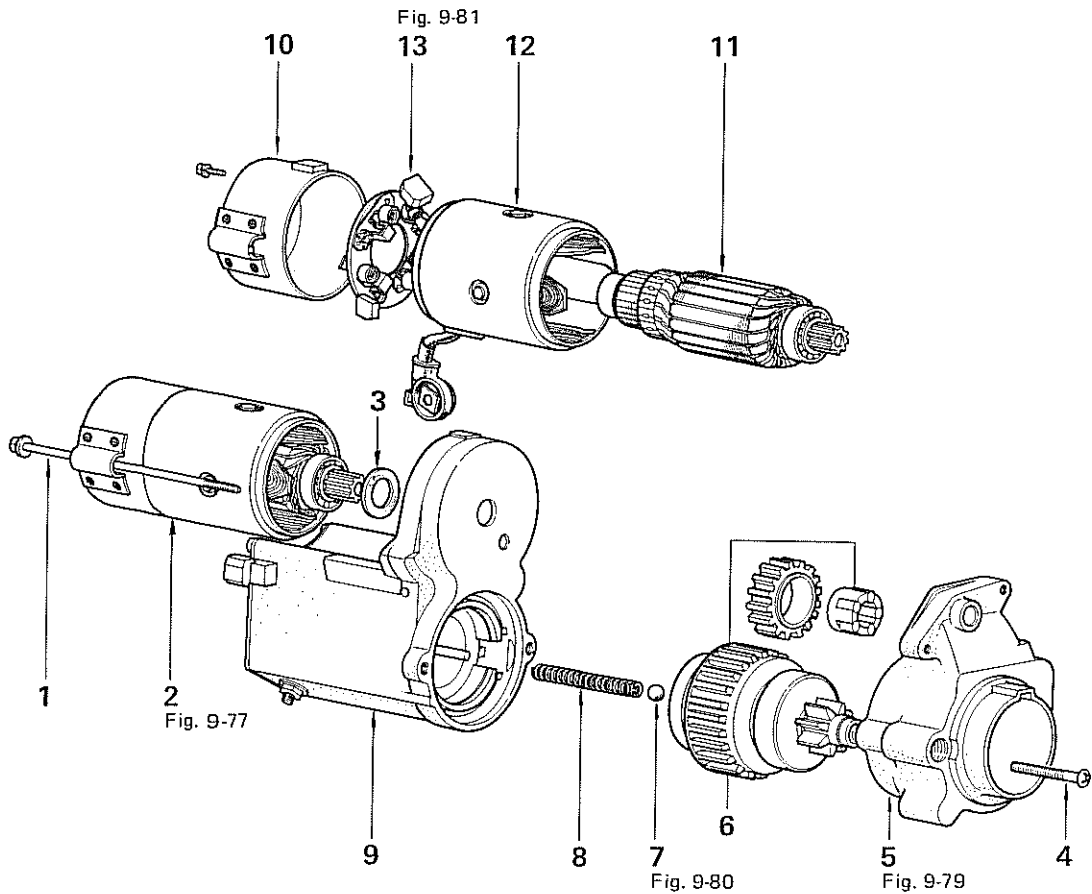
Fig. 9-75



Disassemble the parts in the numerical order shown in the figure.

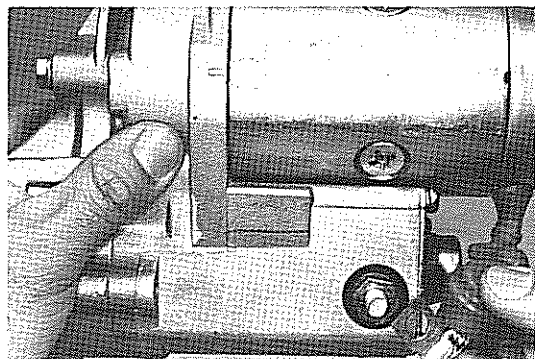
Fig. 9-76

[0.9 kw Type]



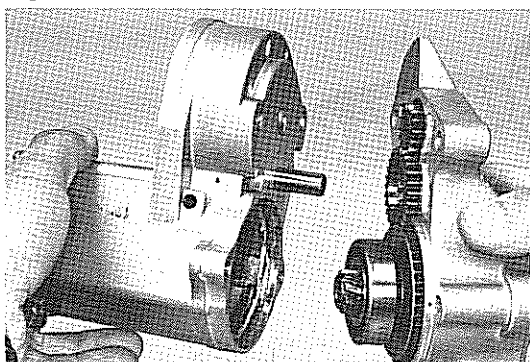
- | | |
|------------------------|--------------------------|
| 1. Through Bolt | 8. Plunger Return Spring |
| 2. Field Frame | 9. Magnetic Switch |
| 3. Felt Seal | 10. End Cover |
| 4. Bolt | 11. Armature |
| 5. Starter Housing | 12. Field Frame |
| 6. Clutch & Idler Gear | 13. Brush Holder |
| 7. Steel Ball | |

Fig. 9-77



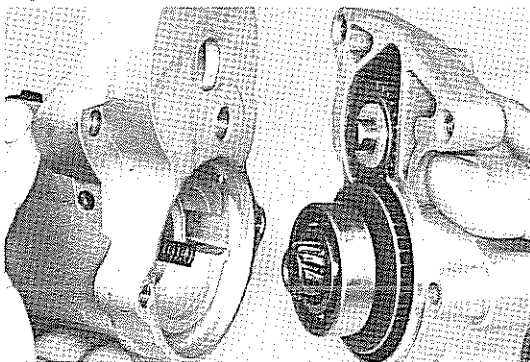
Disconnect the lead wires from the magnetic switch.

Fig. 9-78



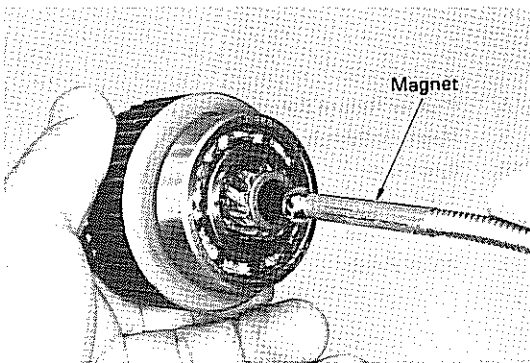
[In case of 1.4 kw type]
Remove the starter housing together with the pinion gear, idler gear and clutch.

Fig. 9-79



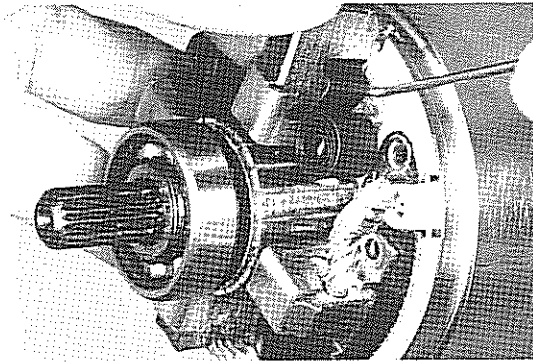
[In case of 0.9 kw type]
Remove the starter housing together with the idler gear and clutch.

Fig. 9-80



Remove the steel ball from the clutch shaft hole with a magnet.

Fig. 9-81

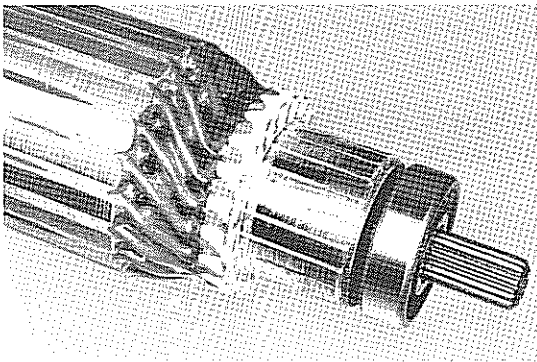


Lift up the brush spring and pull out the brush from the brush holder.

— Caution —

Use care not to damage the brush and commutator. Also avoid getting oil or grease on them.

Fig. 9-82



Wipe off dirt and gease from the disassembled parts.

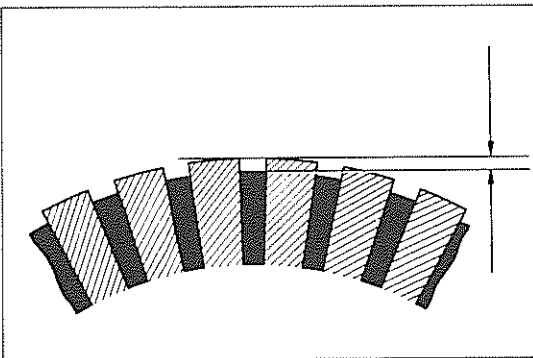
INSPECTION & REPAIR

Commutator

Inspect for the following items and repair or replace as necessary.

1. Dirty or burnt surface:
Correct with sandpaper or a lathe if necessary.

Fig. 9-83



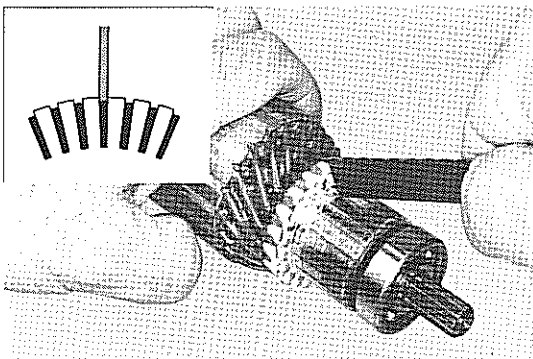
2. Depth of segment (Mica depth):

Mica depth:

STD 0.45 – 0.75 mm
(0.018 – 0.030 in.)

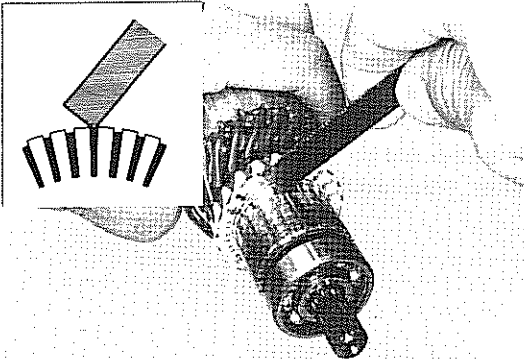
Limit 0.2 mm
(0.01 in.)

Fig. 9-84



3. If the mica depth is below the limit, correct with a hacksaw blade.

Fig. 9-85



4. Smooth out the edge with a hacksaw blade.

Fig. 9-86

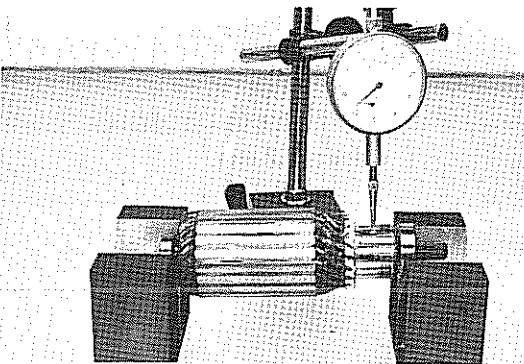


5. After correcting, eliminate chips with sandpaper.

— Note —

Use # 400 sandpaper.

Fig. 9-87



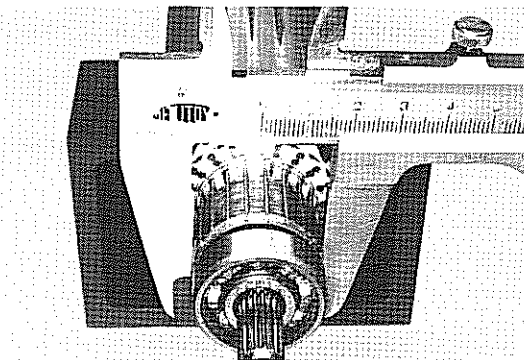
6. Runout: Correct on a lathe if it exceeds the limit.

Runout:

STD Less than 0.02 mm
(0.001 in.)

Limit 0.05 mm
(0.002 in.)

Fig. 9-88



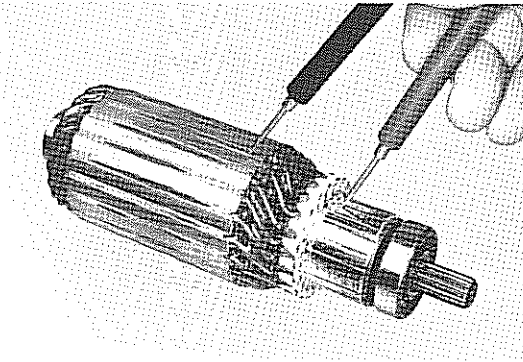
7. Surface wear: If below the limit, replace armature.

Diameter:

STD 30 mm
(1.2 in.)

Limit 29 mm
(1.1 in.)

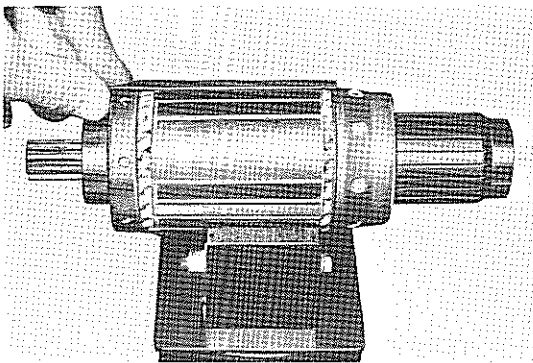
Fig. 9-89

**Armature Coil**

1. Ground test

Using an armature tester or a circuit tester, check the commutator and armature coil core. If there is continuity, the armature is grounded and must be replaced.

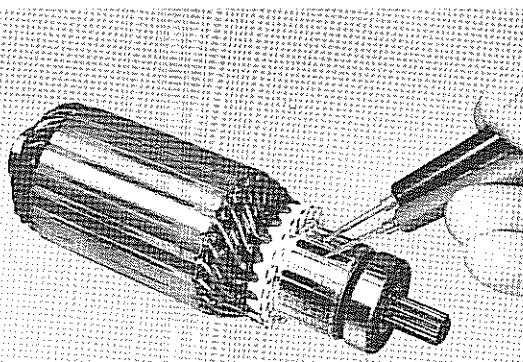
Fig. 9-90



2. Short circuit test

Place the armature on the armature tester and hold a hacksaw blade against the armature core while turning the armature. If the hacksaw blade is attracted or vibrates, the armature is shorted and must be replaced.

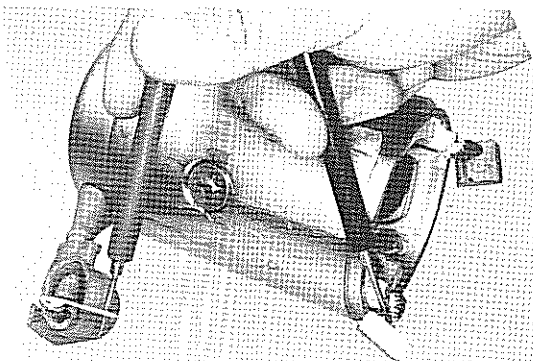
Fig. 9-91



3. Open circuit test

Using the armature tester or a circuit tester, check for continuity between the segments. If there is no continuity at any test point, there is an open circuit and armature must be replaced.

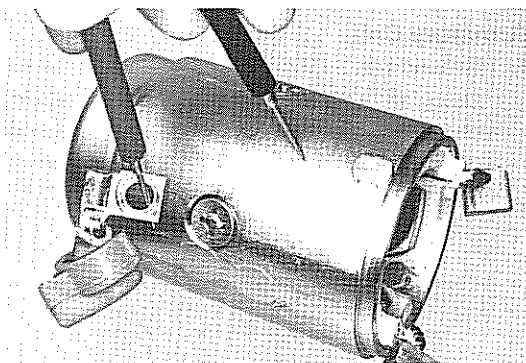
Fig. 9-92

**Field Coil**

1. Open circuit test

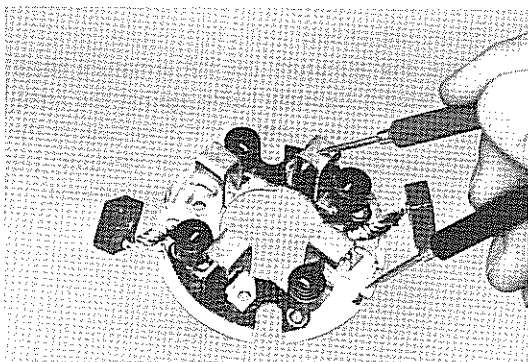
Check for continuity between the lead wire and field coil brush lead. If there is no continuity, there is an open circuit in the field coil, and it should be replaced.

Fig. 9-93



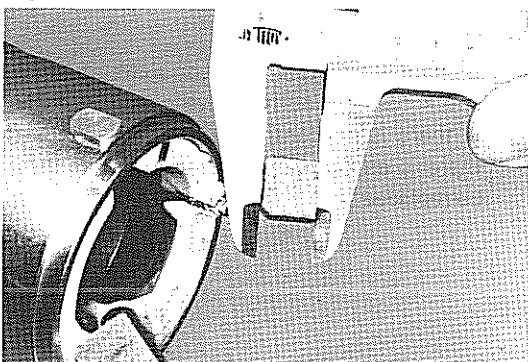
2. **Ground test**
Check for continuity between the field coil end and field frame.
If there is continuity, repair or replace the field coil.

Fig. 9-94

**Brush Holder**

Check insulation between the (+) and (–) brush holders. Repair or replace if continuity is indicated.

Fig. 9-95

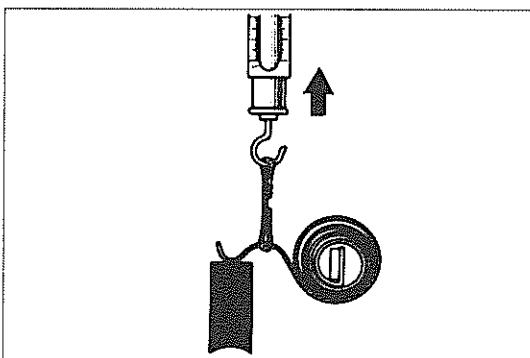
**Brush**

Measure the brush length. Replace if below the limit.

Brush length:

STD	13.5 mm (0.53 in.)
Limit	10 mm (0.4 in.)

Fig. 9-96

**Brush Spring**

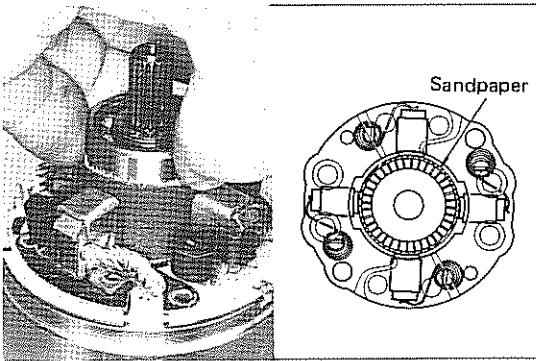
1. Measure the brush spring load with a pull scale. If the reading is below standard, replace the spring.

Tension: **3.2 – 4.0 kg**
 (7.1 – 8.8 lb)

– Note –

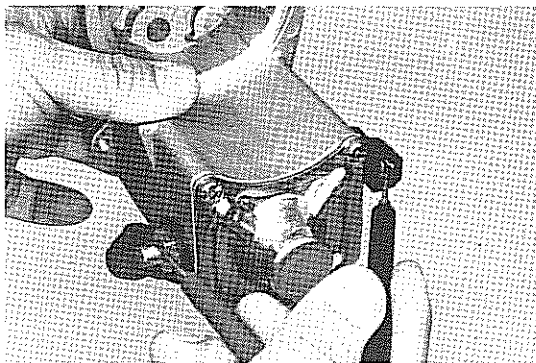
Take the pull scale reading at the very instant the brush spring separates from the brush.

Fig. 9-97



2. Using # 400 sandpaper, clean or fit the brushes to make proper contact with the commutator.

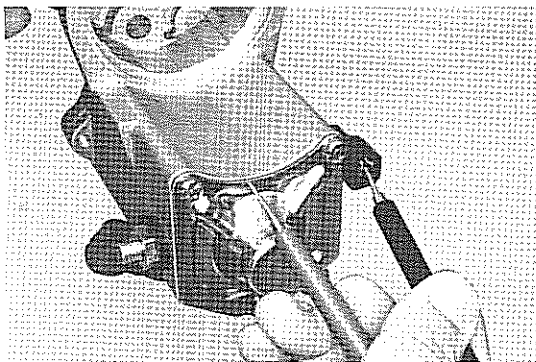
Fig. 9-98



Magnetic Switch

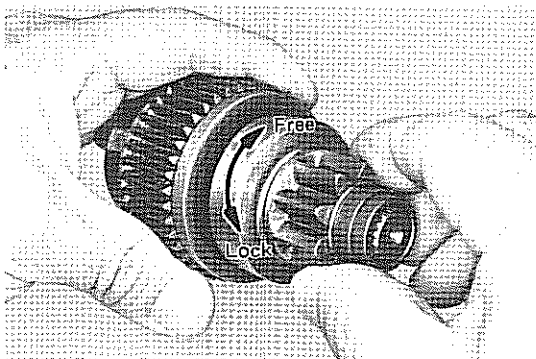
1. Pull-in coil open circuit test
Check for continuity between 50 terminal and C terminal.

Fig. 9-99



2. Hold-in coil open circuit test
Check for continuity between 50 terminal and the magnetic switch body.

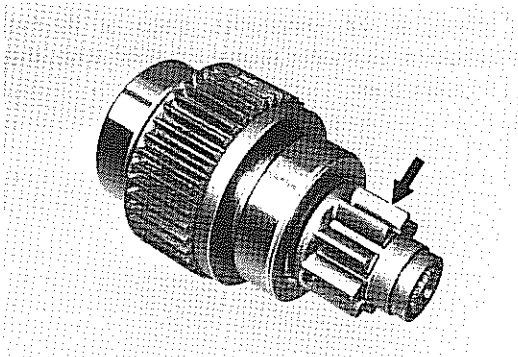
Fig. 9-100



Clutch

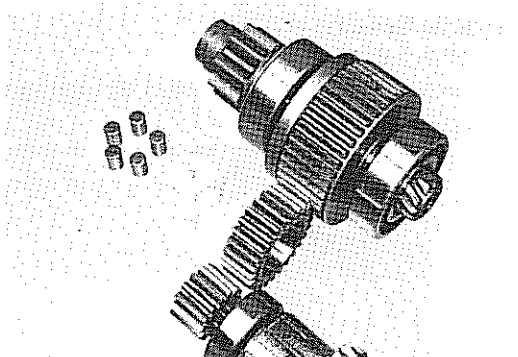
1. Rotate pinion. It should turn free in clockwise direction and lock when turned counterclockwise.

Fig. 9-101



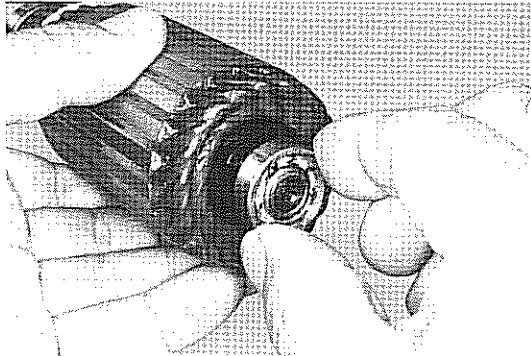
2. Inspect the gear teeth for wear or damage. Also inspect the flywheel ring gear for same.

Fig. 9-102

**Gear**

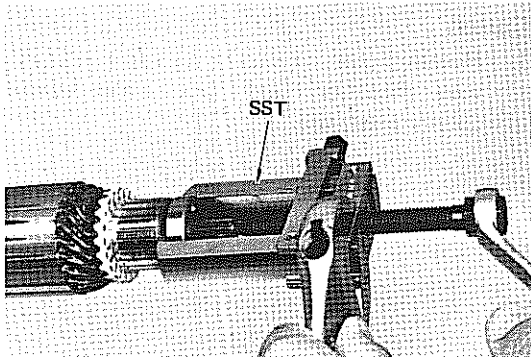
- Inspect the gears for wear or damage.

Fig. 9-103

**Bearing**

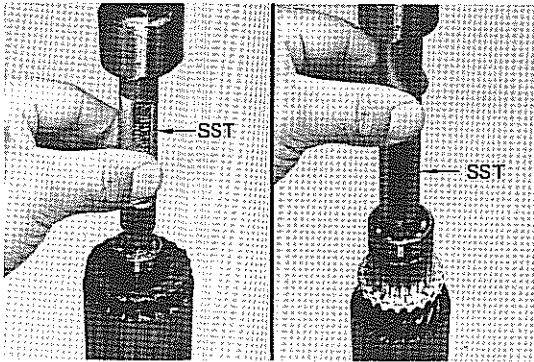
1. Inspect the bearing for wear or damage.

Fig. 9-104



2. Replace armature bearing if defective.
 - (1) Remove the bearing with SST. SST [09286-46011]

Fig. 9-105



- (2) Replace the front bearing, and drive in the rear bearing with SST, SST [09285-76010]

Fig. 9-106



Starter Housing

Inspect for wear or damage.

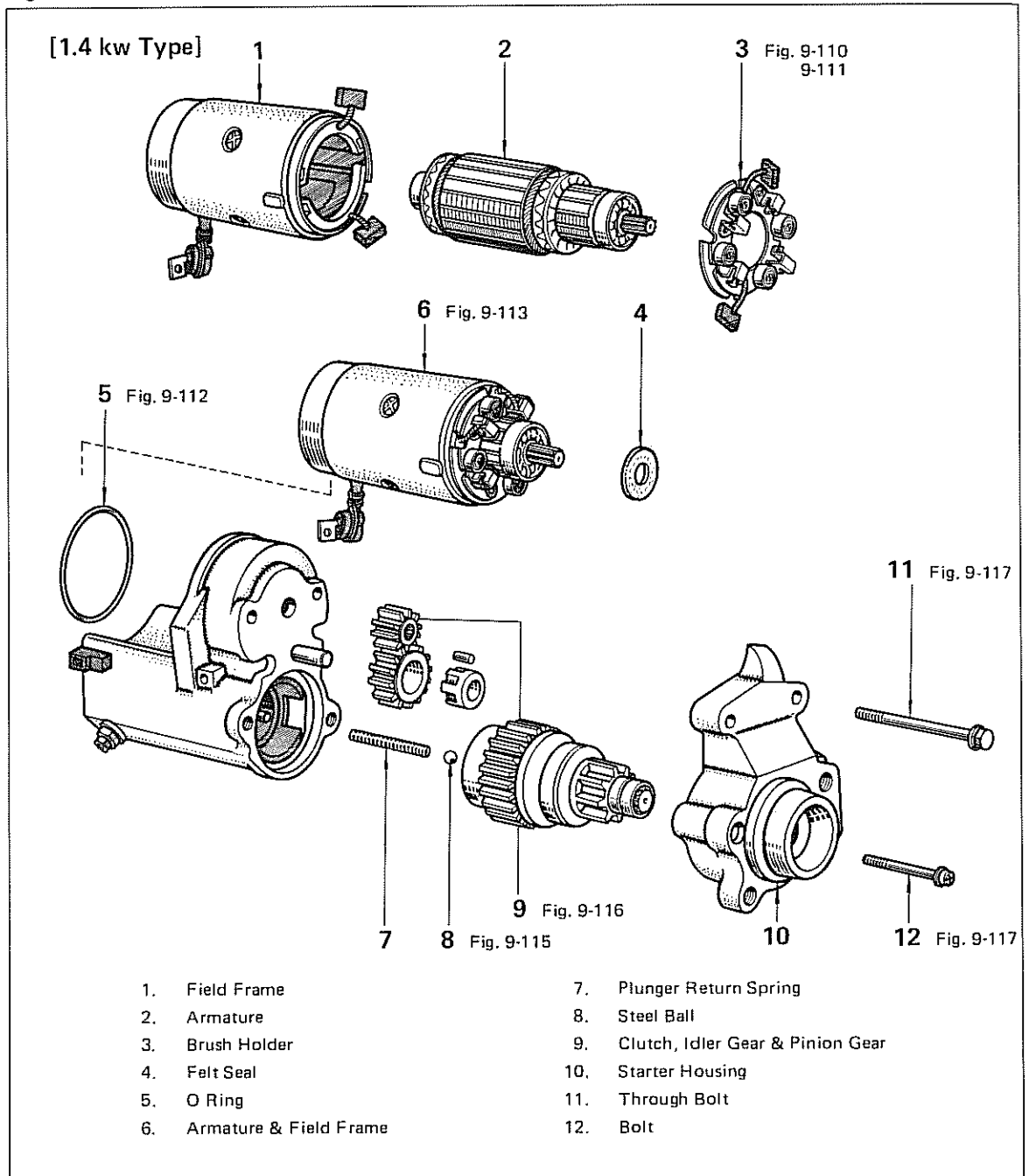
ASSEMBLY

— Note —

When assembling, lubricate the bearings and gears with high temperature grease.

Assemble the parts in the numerical order shown in the figure.

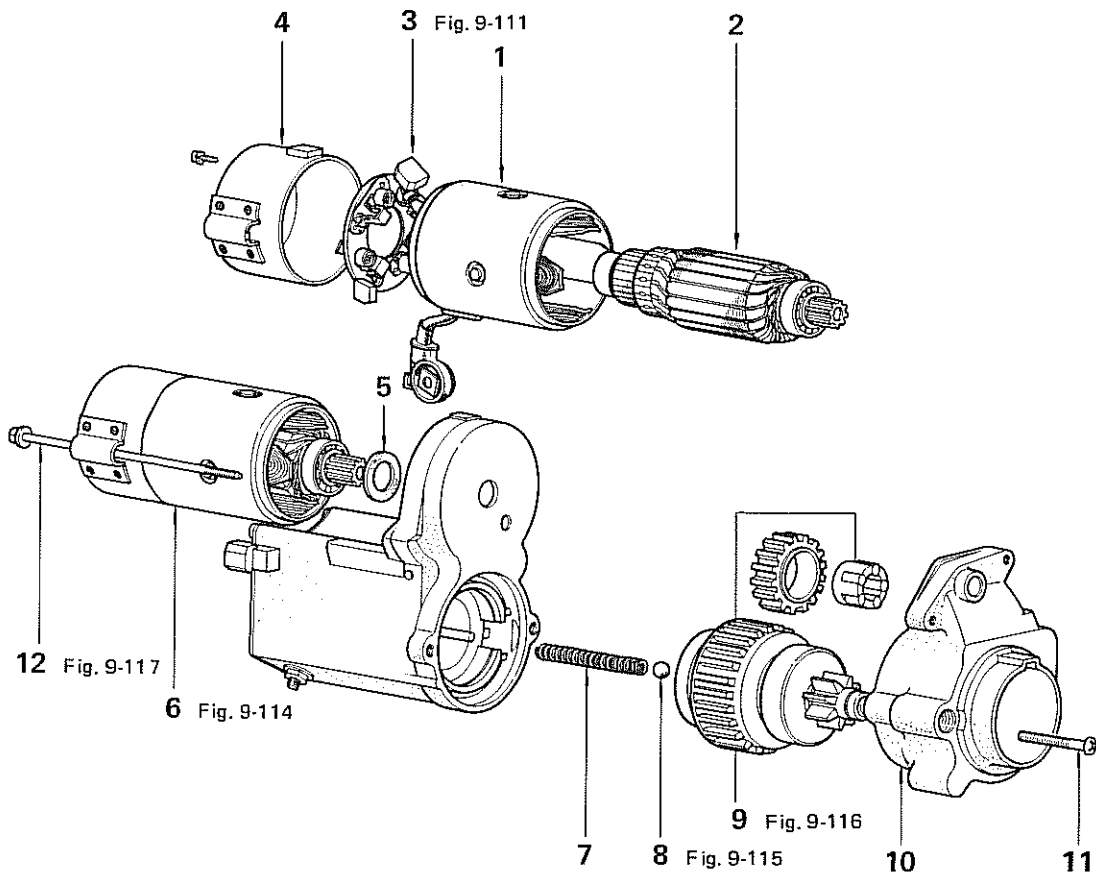
Fig. 9-107



Assemble the parts in the numerical order shown in the figure.

Fig. 9-108

[0.9 kw Type]



- | | |
|---------------------------|--------------------------|
| 1. Field Frame | 7. Plunger Return Spring |
| 2. Armature | 8. Steel Ball |
| 3. Brush Holder | 9. Clutch & Idler Gear |
| 4. End Cover | 10. Starter Housing |
| 5. Felt Seal | 11. Bolt |
| 6. Field Frame & Armature | 12. Through Bolt |

Use high temperature grease to lubricate bearings and gears as shown in the figure below.

Fig. 9-109

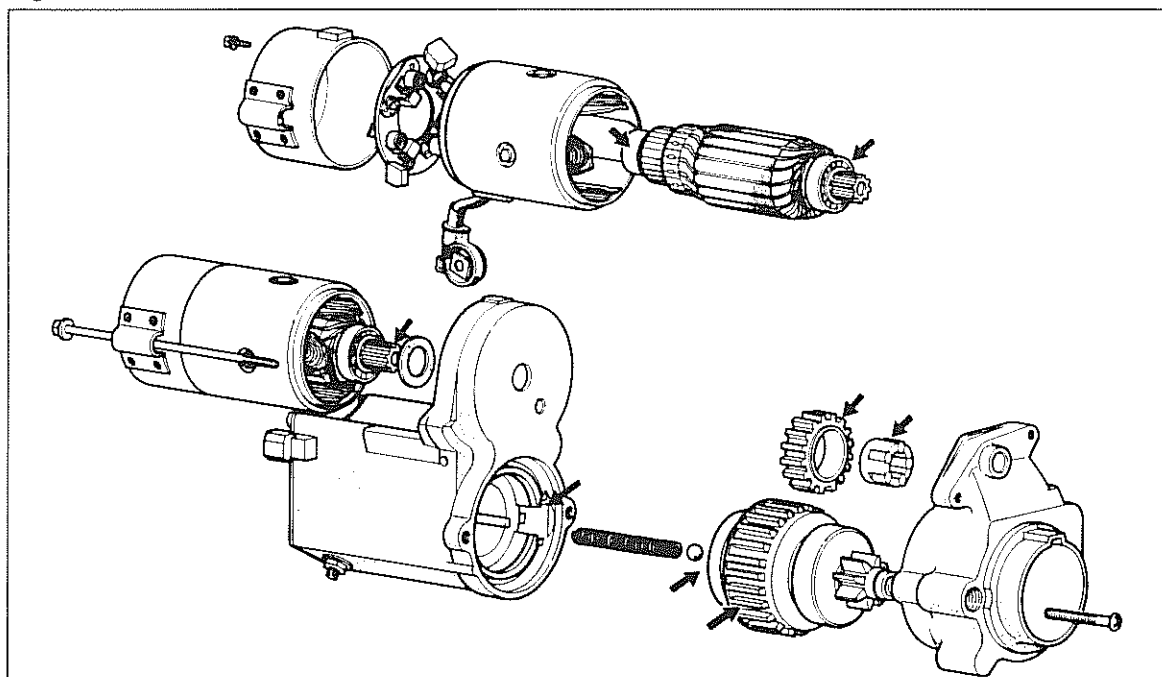
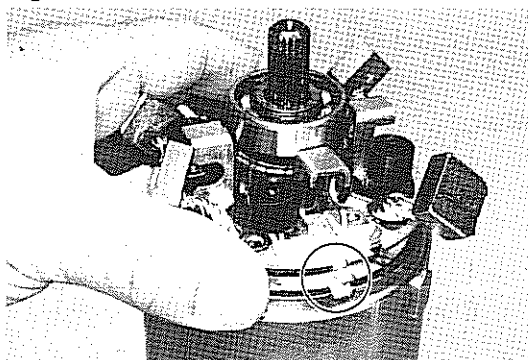
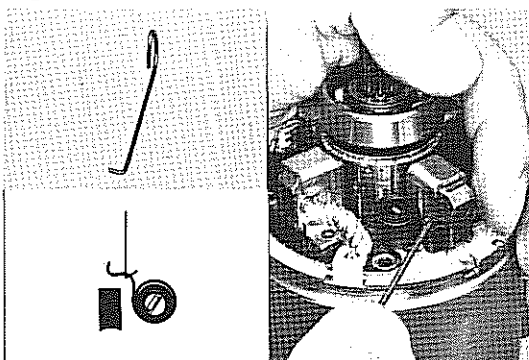


Fig. 9-110



Align the brush holder tab with the notch in the field frame.

Fig. 9-111

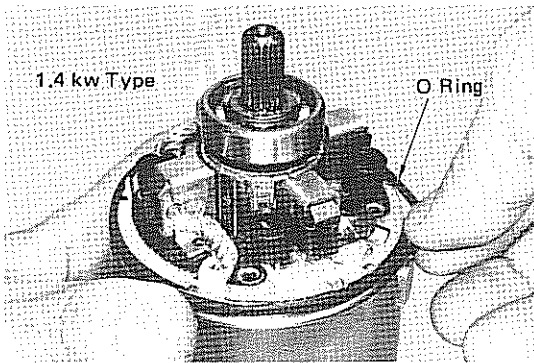


Fit four brushes into the brush holder, using care not to damage them.

— Note —

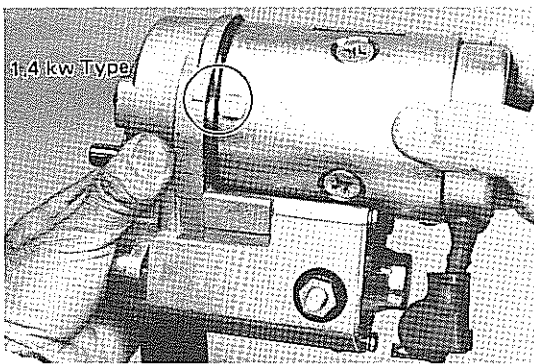
Check to see that the (+) lead wires are not grounded.

Fig. 9-112



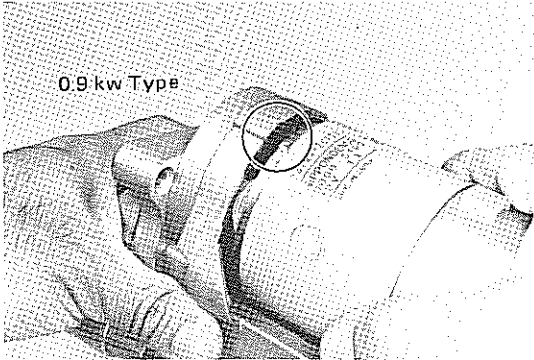
Install the O ring around the brush holder.

Fig. 9-113



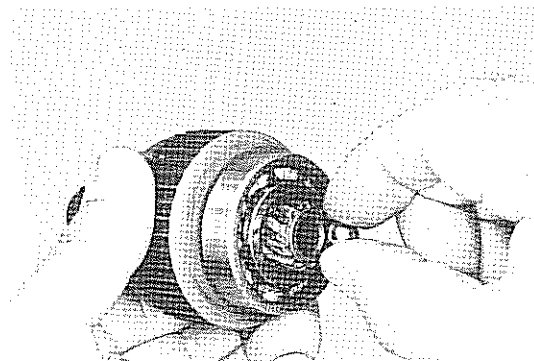
Face the field coil lead wire towards the magnetic switch, and install the field frame with the armature, aligning the bolt anchors with the mark on the magnetic switch.

Fig. 9-114



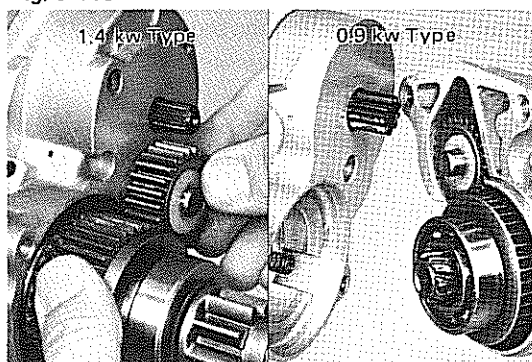
Match the protrusion of the yoke core with the starter housing notch.

Fig. 9-115



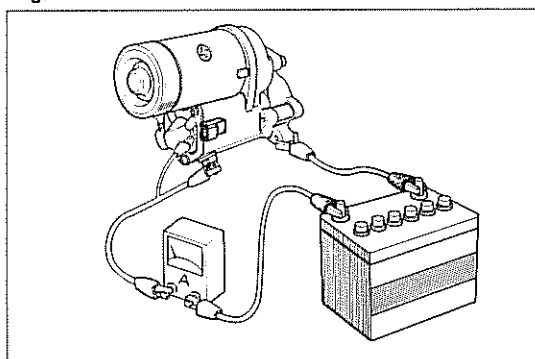
Apply grease and insert the ball into the clutch shaft hole.

Fig. 9-116



Install the idler gear roller bearing in the direction shown in the figure.

Fig. 9-117



PERFORMANCE TEST (NO-LOAD)

Connect the starter to a battery. If the starter shows smooth and steady rotation with the pinion jumping out and draws less than specified current, it is satisfactory.

Specified current: Less than 80A

IGNITION SYSTEM

	Page
IGNITION SYSTEM CIRCUIT.....	10-2
DISTRIBUTOR	10-7
IGNITION COIL.....	10-26
HIGH TENSION CORD.....	10-28
SPARK PLUG	10-29

IGNITION SYSTEM CIRCUIT

Fig. 10-1

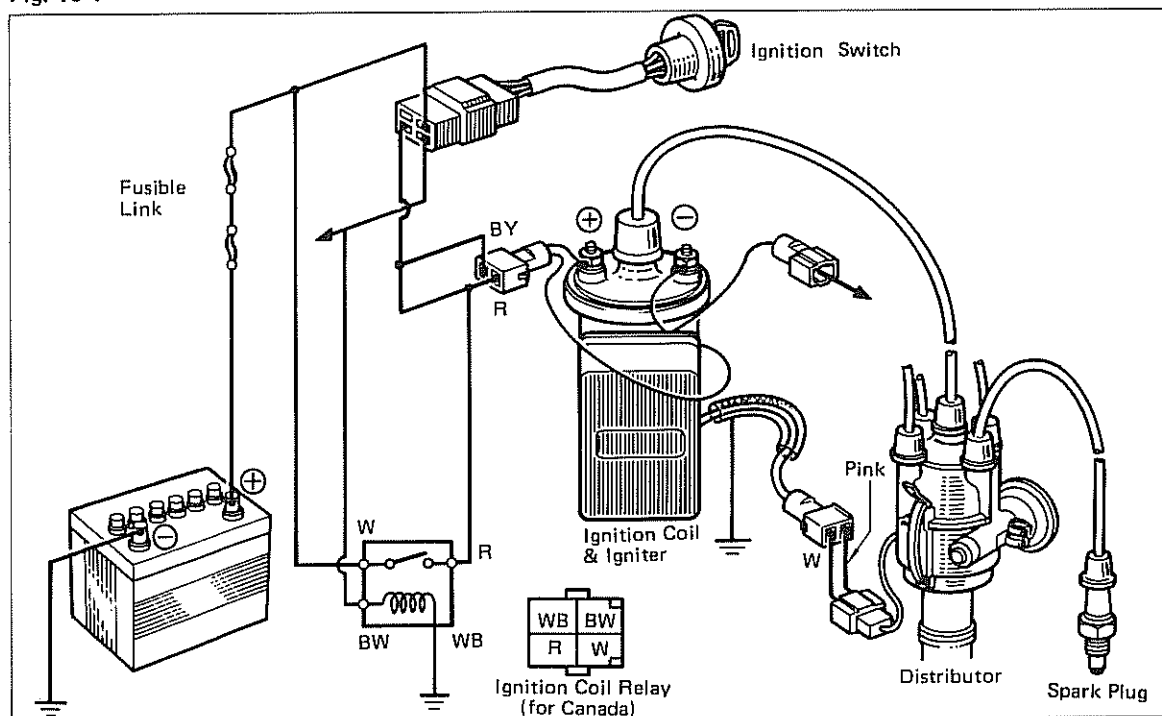


Fig. 10-2

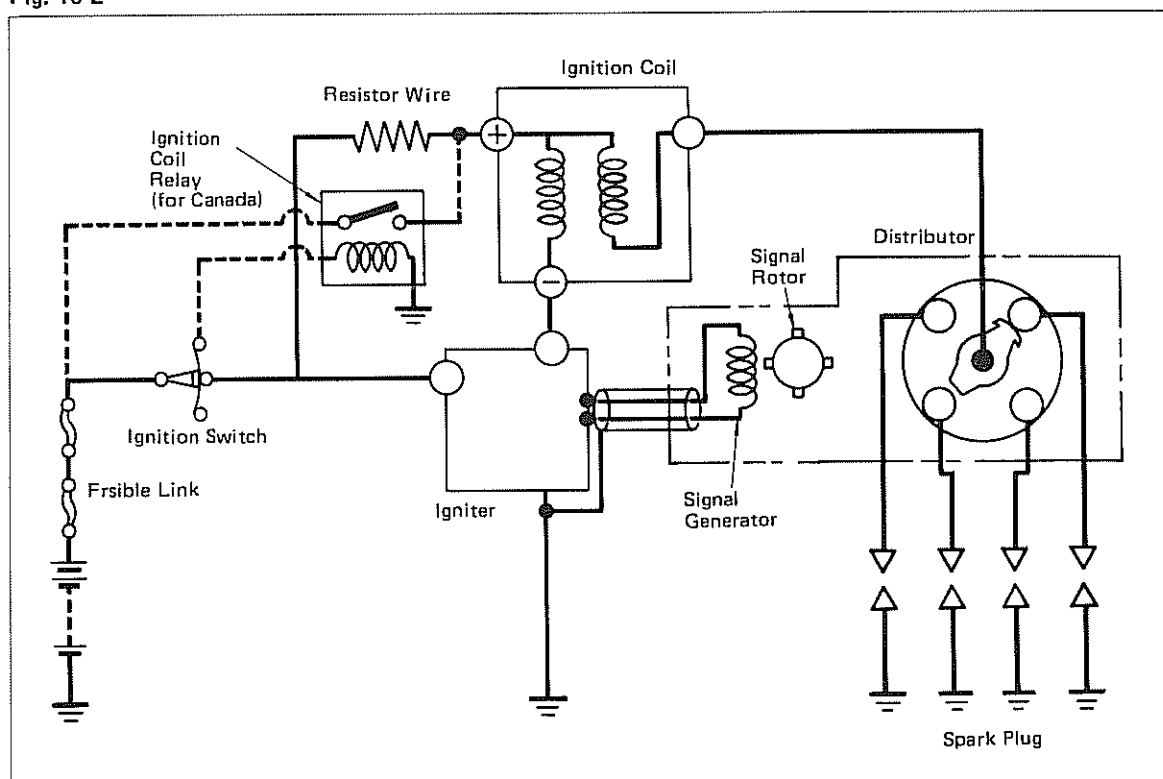


Fig. 10-3

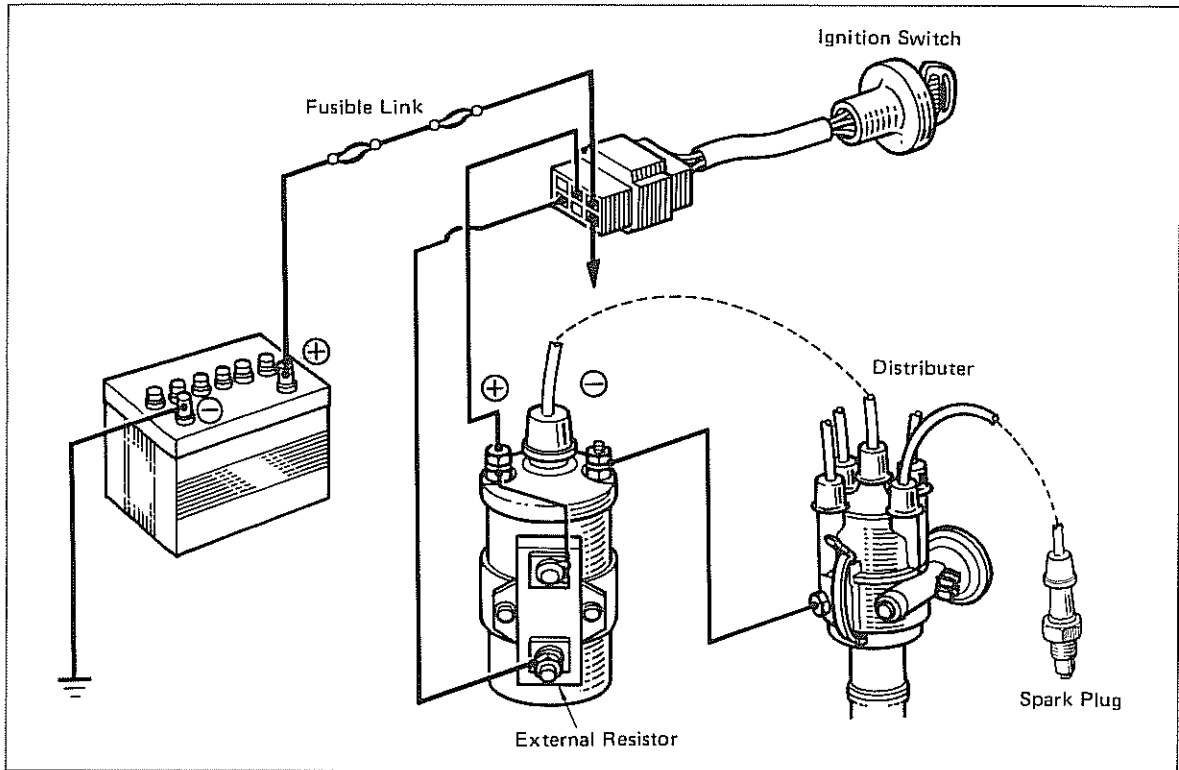


Fig. 10-4

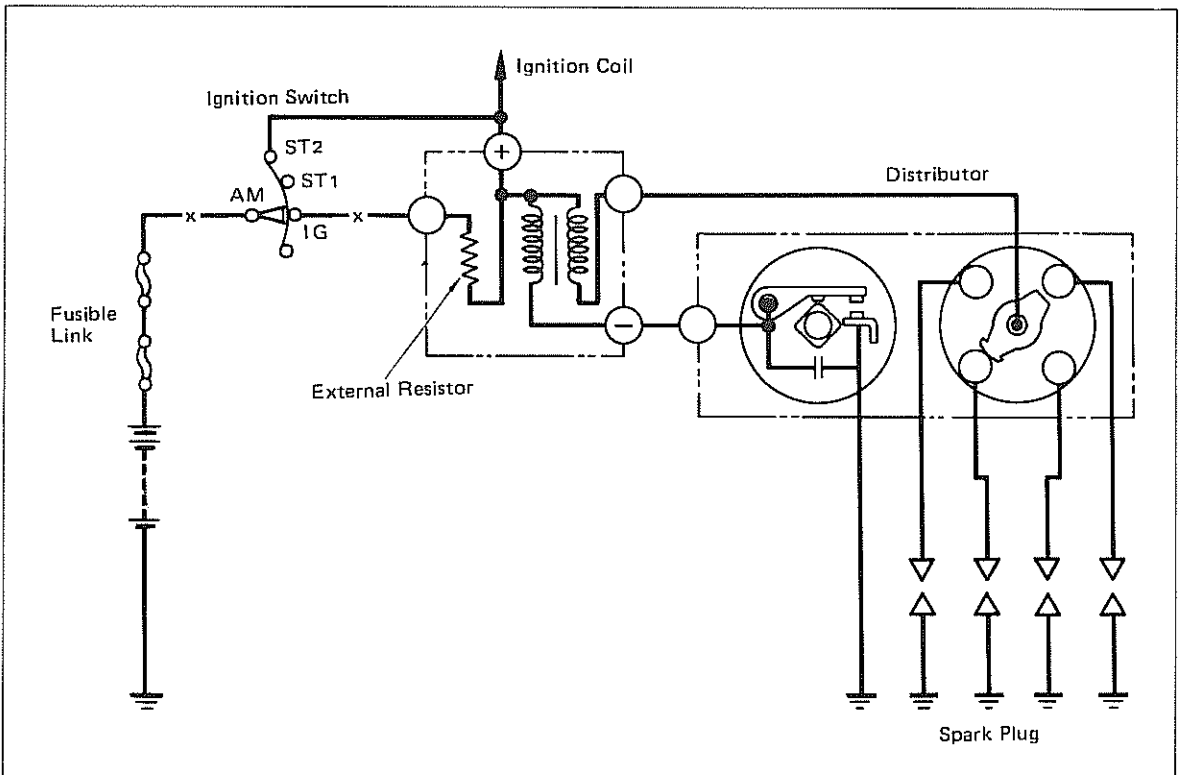
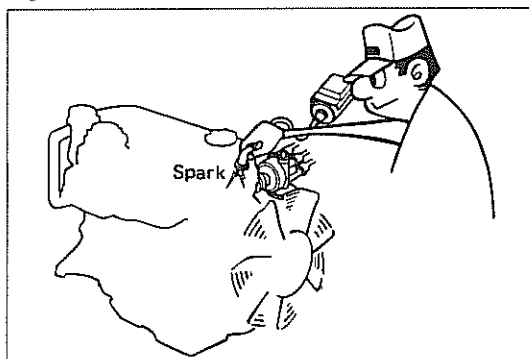


Fig. 10-5

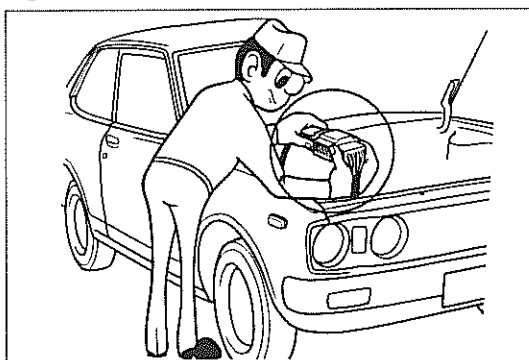
**ON-VEHICLE INSPECTION****For USA****Spark Test**

Pull the ignition coil-to-distributor resistive cord from the distributor and hold its end close to a ground. Then start the engine and check for spark.

— Caution —

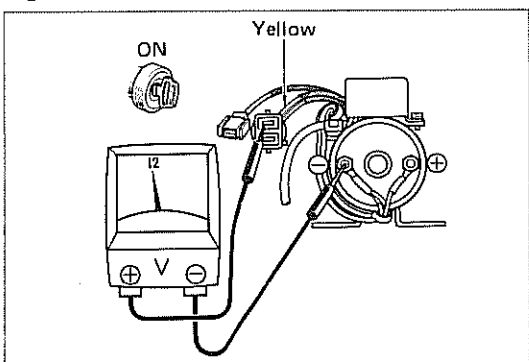
The check must be made for as short a time as possible.

Fig. 10-6

**Connector**

Check the connector and wiring.

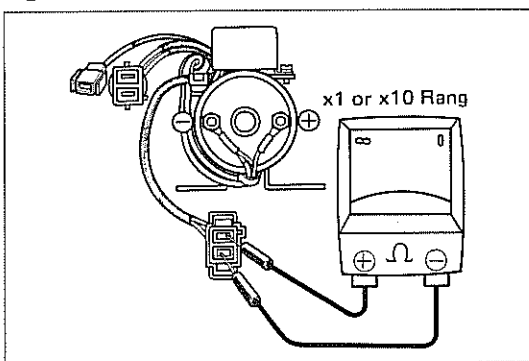
Fig. 10-7

**Igniter**

1. Check the voltage between the ignition coil (—) terminal and the resistor wire terminal.
 - (1) Turn on the ignition switch.
(But, not starting)
 - (2) Check the voltage between the ignition coil (—) terminal and resistor wire terminal using a voltmeter.

Voltage: 12V

Fig. 10-8

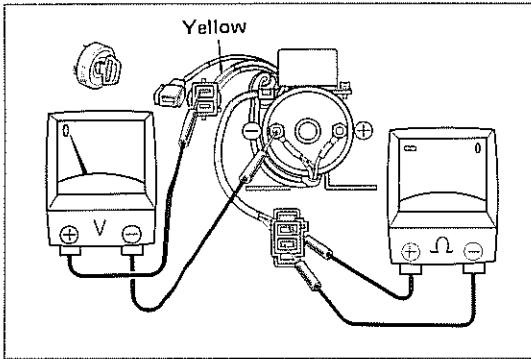


2. Check the voltage between the ignition coil (—) terminal and the resistor wire terminal.
 - (1) Disconnect the wiring connector from the distributor.
 - (2) Select the 1Ω or 10Ω range on the ohmmeter.
 - (3) Use the ohmmeter to provide resistance between the two terminals of the igniter as illustrated.

— Caution —

Care must be taken not to intermix the (+) and (—) terminals of the ohmmeter.

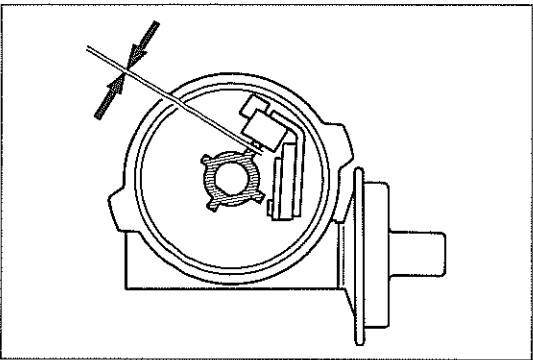
Fig. 10-9



- (4) Turn on the ignition switch.
(But do not start)
- (5) Check the voltage between the ignition coil (–) terminal and resistor terminal with the voltmeter.

Voltage should be nearly zero.

Fig. 10-10

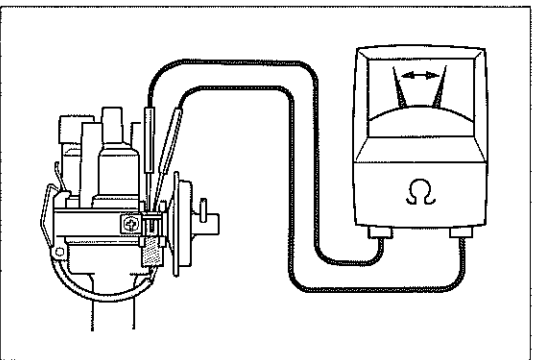


Distributor

1. Check the air gap.
 - Check the air gap between the timing rotor and pick up coil projection by using a feeler gauge.

**Air gap: 0.2 – 0.4 mm
(0.008 – 0.016 in.)**

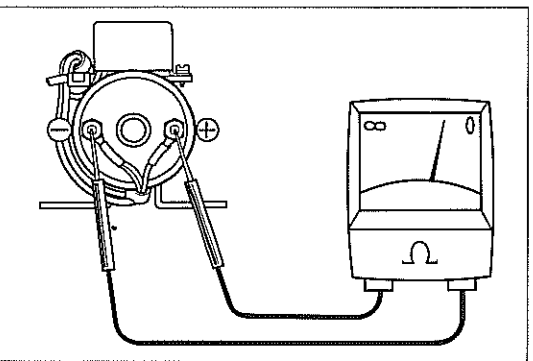
Fig. 10-11



2. Check the signal generator.
 - Check the resistance of the signal generator with an ohmmeter.

Resistance: 130 – 190 Ω

Fig. 10-12



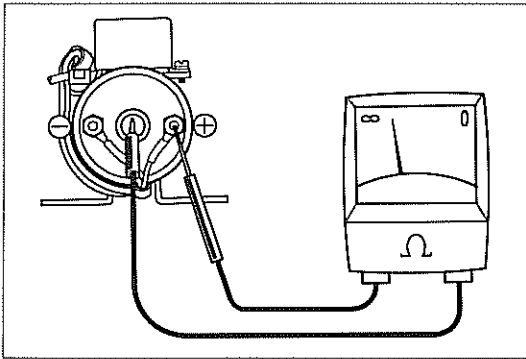
Ignition Coil

1. Check the ignition coil resistances with an ohmmeter.

- (1) Primary coil resistance: between (+) and (–) terminal.

**Resistance: 1.3 – 1.7 Ω
(at Cold)**

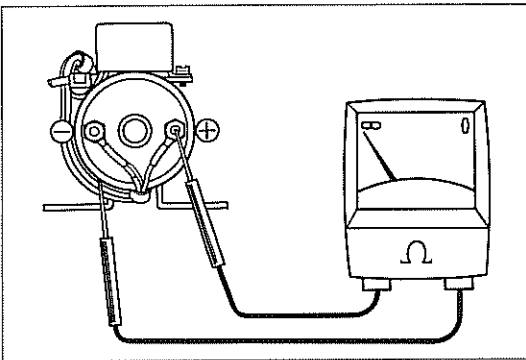
Fig. 10-13



- (2) Secondary coil resistance: between (+) terminal and high tension terminal.

Resistance: 12.0 – 16.0 k Ω
(at Cold)

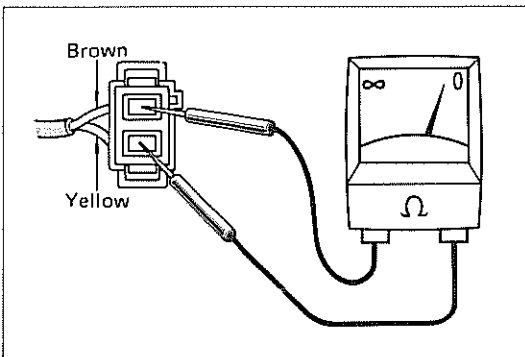
Fig. 10-14



2. Check the insulation resistance between the (+) terminal and coil case with an ohmmeter.

Resistance: Infinity

Fig. 10-15



Resistor Wire

1. Check the resistor wire resistance with an ohmmeter.

Resistance: 1.2 Ω (at Cold)

DISTRIBUTOR CUTAWAY VIEW

Fig. 10-16

For USA & CANADA

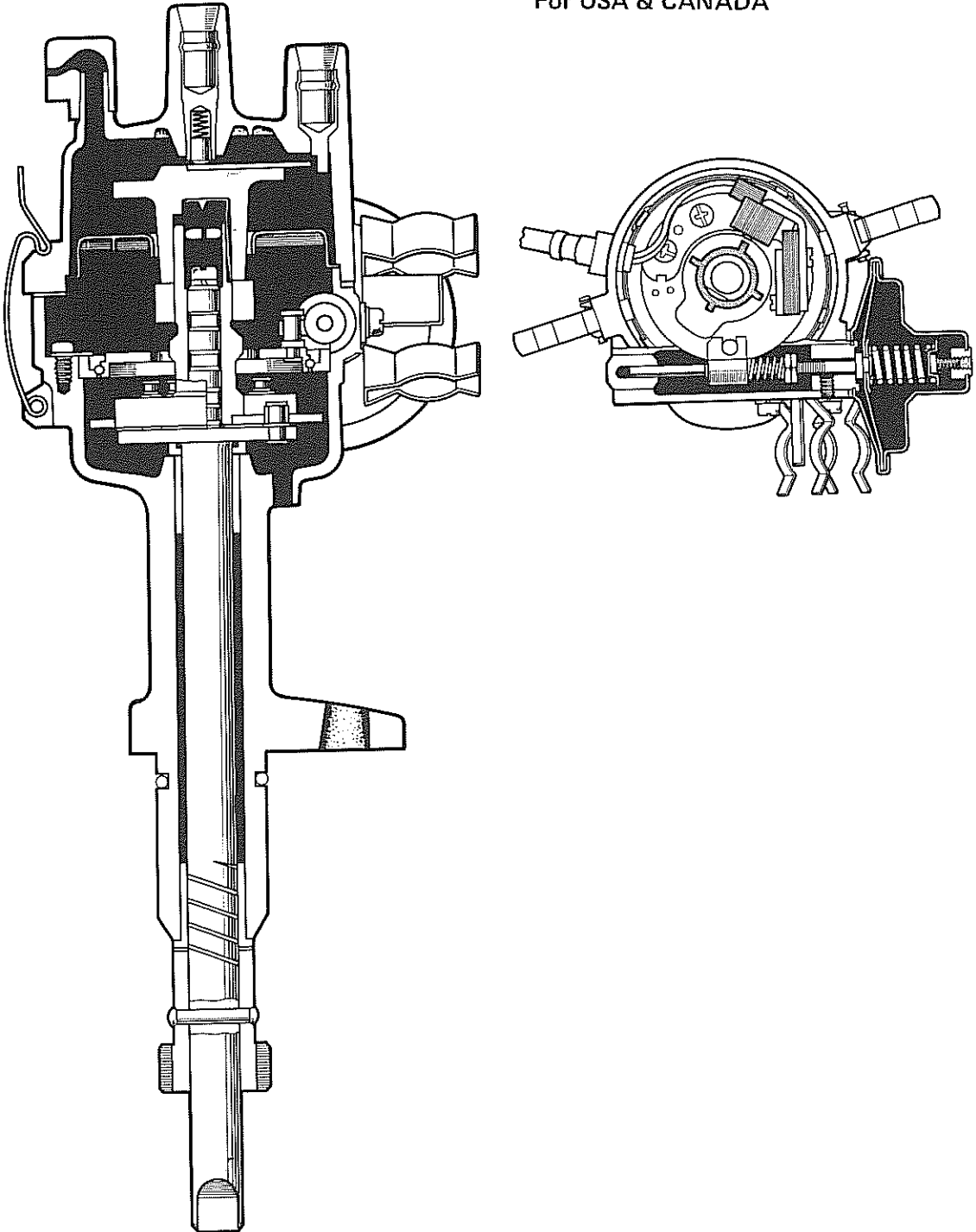
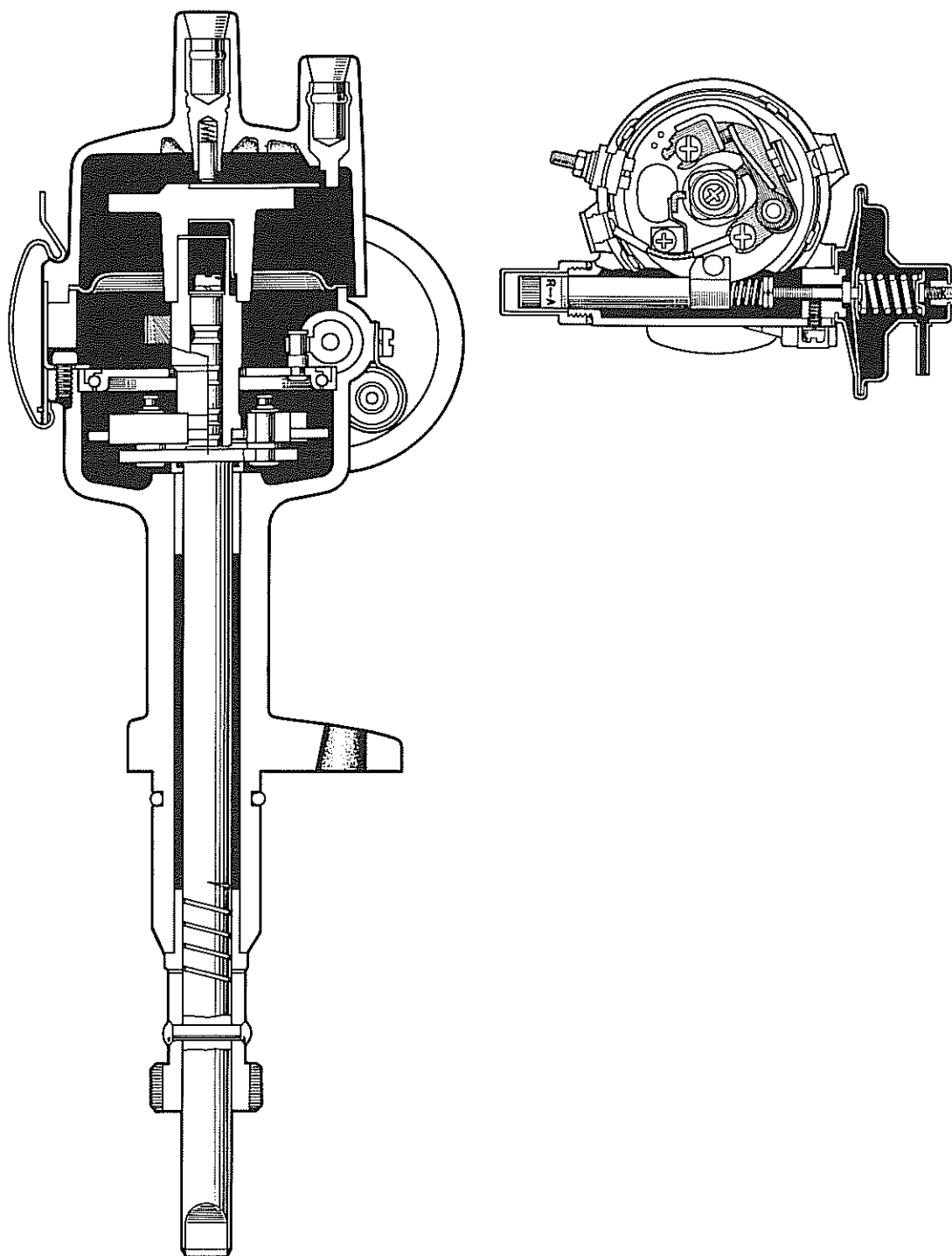


Fig. 10-17



DISASSEMBLY

Disassemble the parts in the numerical order shown in the figure.

Fig. 10-18

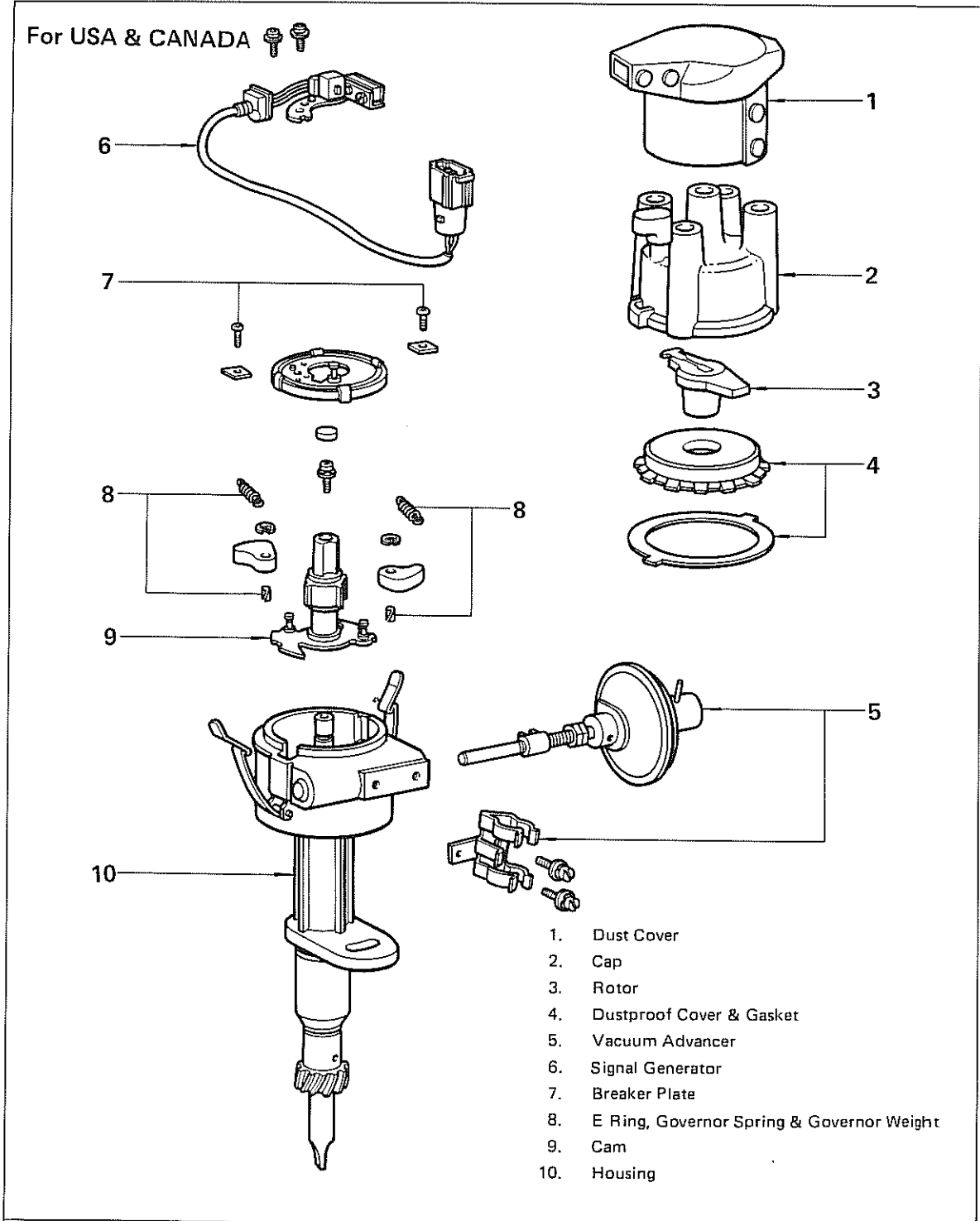
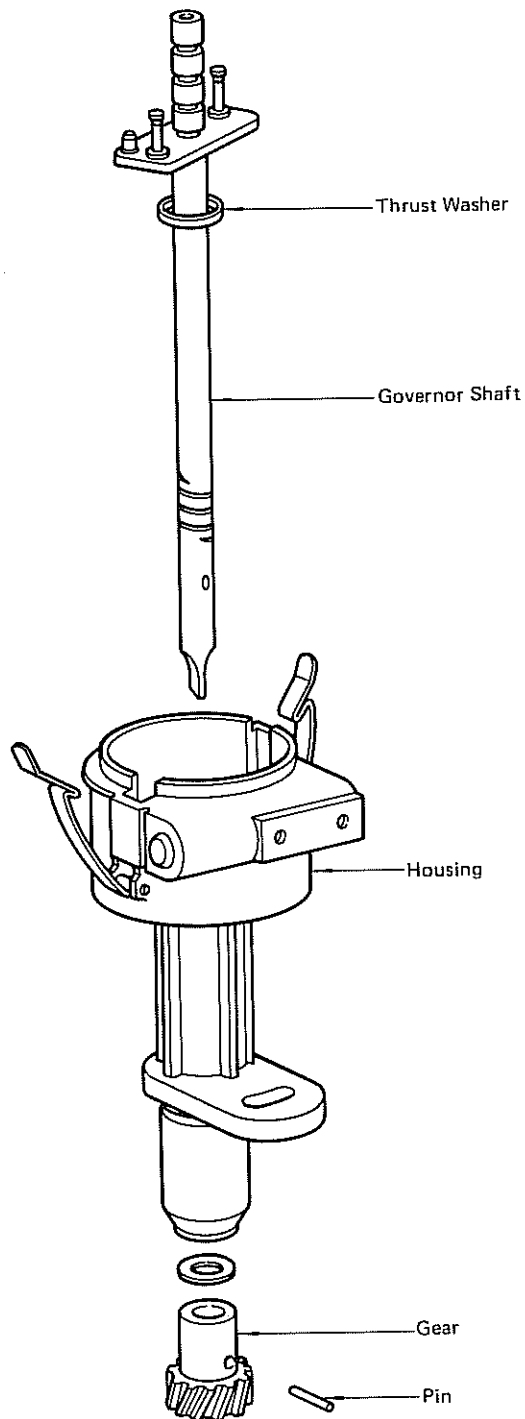


Fig. 10-19



Disassemble the parts in the numerical order shown in the figure.

Fig. 10-20

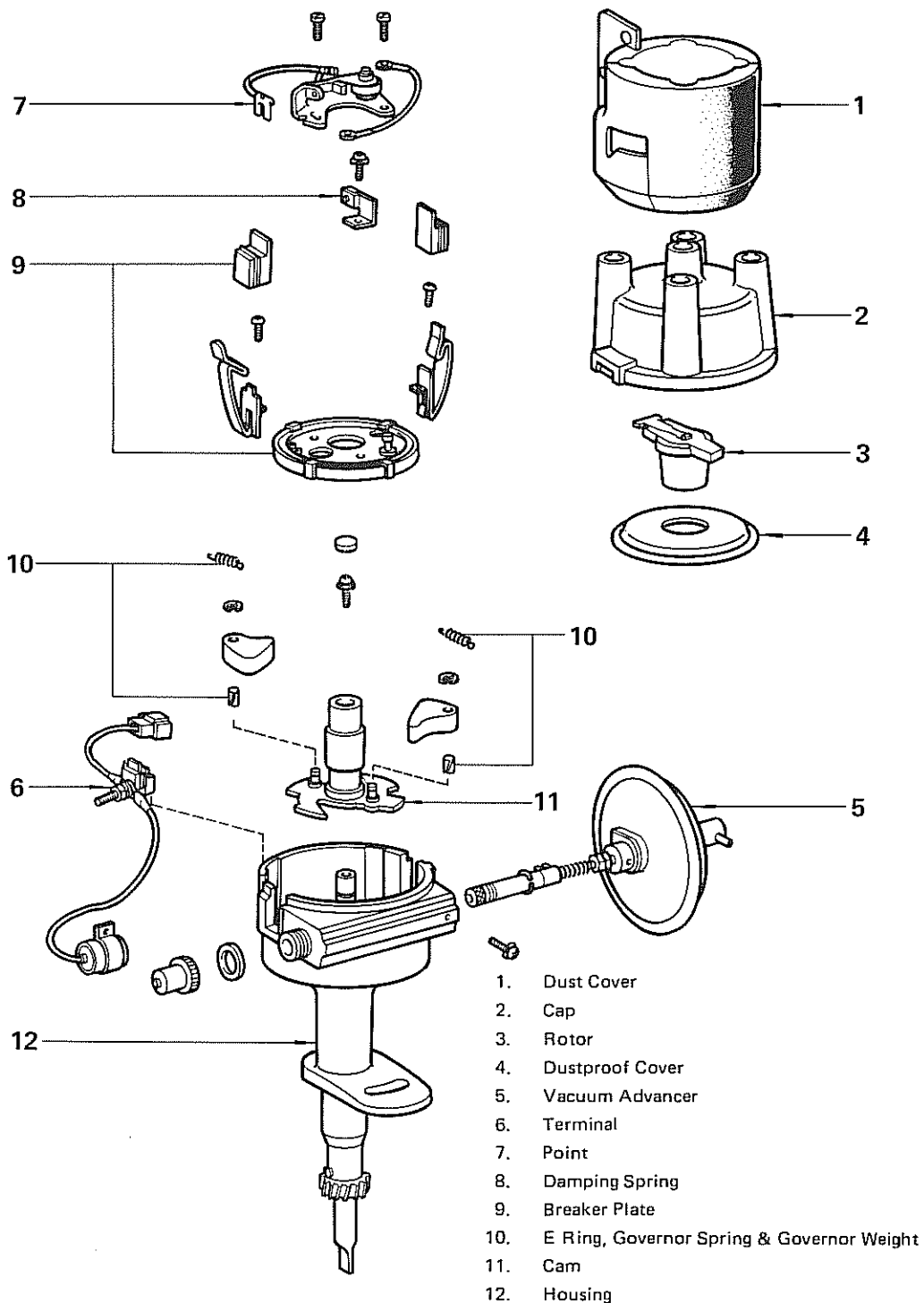


Fig. 10-21

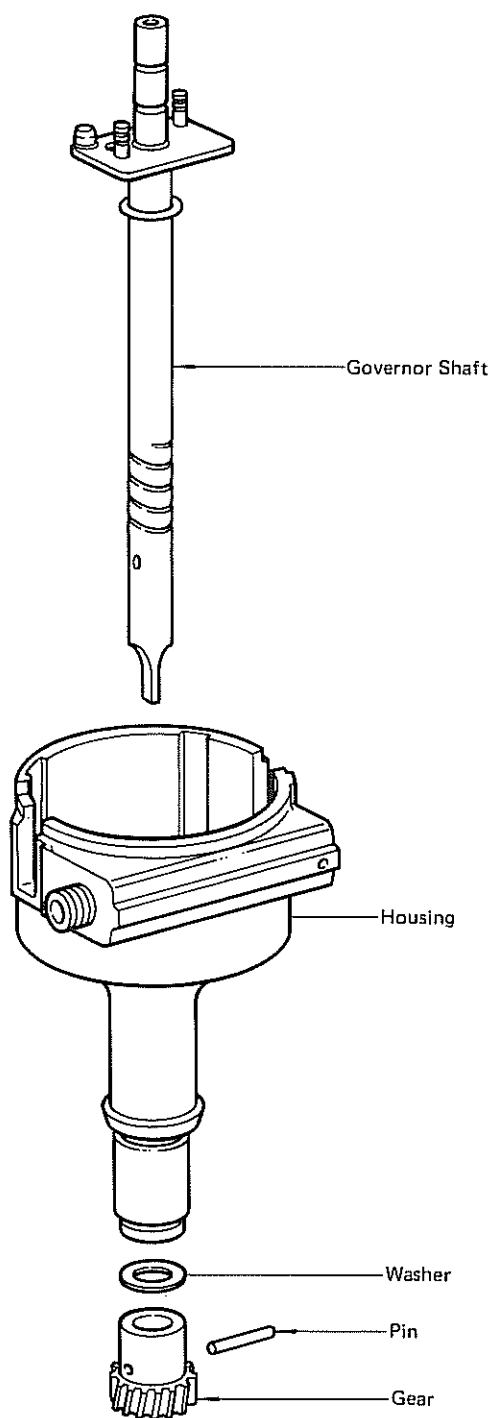
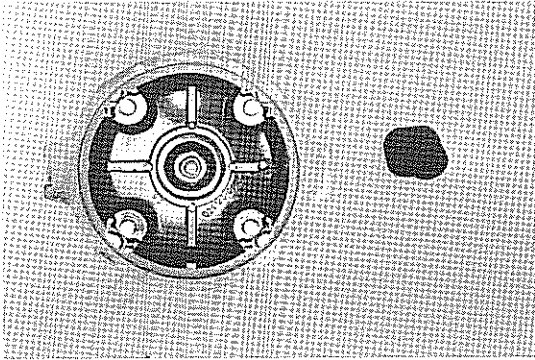


Fig. 10-22

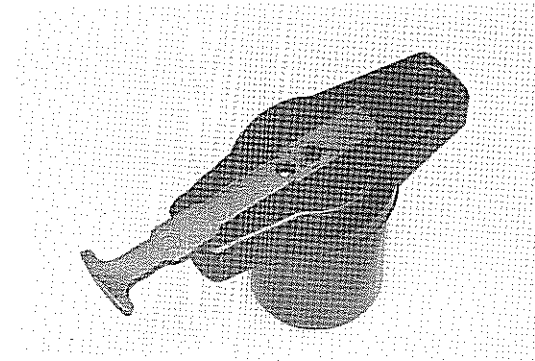


INSPECTION & REPAIR

Cap

Inspect for cracks, carbon tracks, burnt or corroded terminals, and check the center contact for wear.

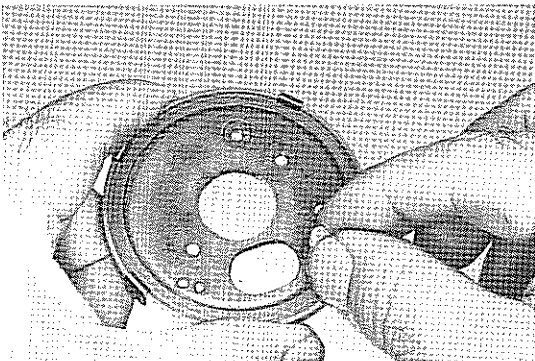
Fig. 10-23



Rotor

Inspect for cracks, carbon tracks, burnt or corroded terminals.

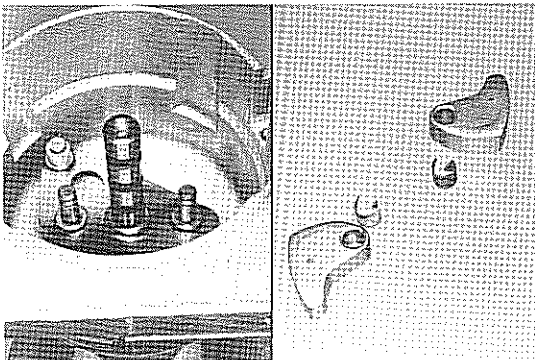
Fig. 10-24



Breaker Plate

Check the breaker plate for smooth rotation.

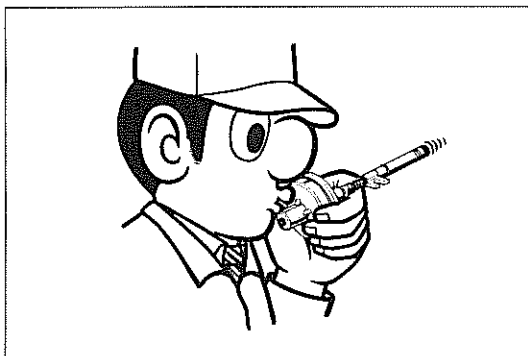
Fig. 10-25



Governor Weight & Pin

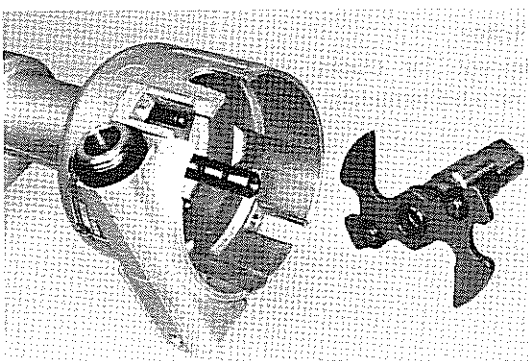
Rotate the governor weight to check for binding as shown in the figure.

Fig. 10-26

**Vacuum Advancer Diaphragm**

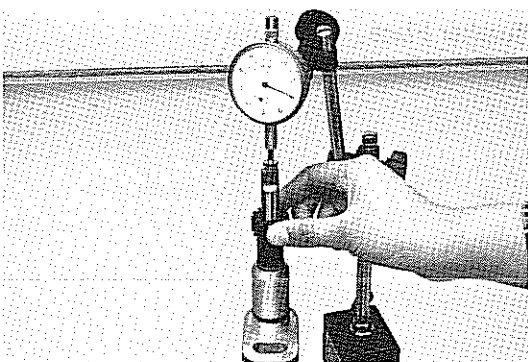
Suck on the tube. The diaphragm should move.

Fig. 10-27

**Cam & Shaft**

Inspect the cam for wear or damage. Check the fit between the cam and shaft.

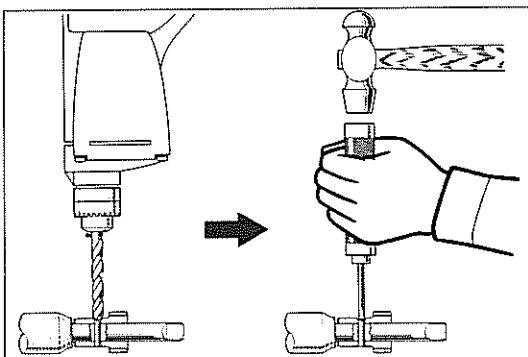
Fig. 10-28

**Governor Shaft & Housing**

1. Check the shaft thrust clearance.

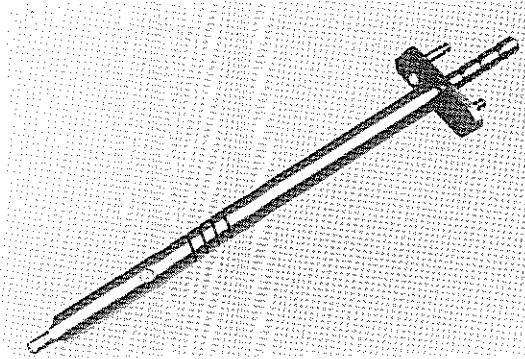
Thrust clearance: 0.15 – 0.50 mm
(0.006 – 0.020 in.)

Fig. 10-29



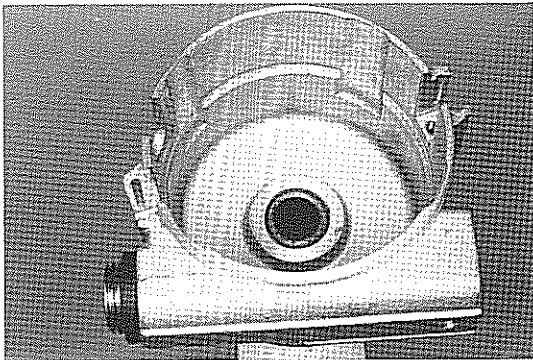
2. Remove the gear and pin. Grind off the pin end and then remove the pin and gear.

Fig. 10-30



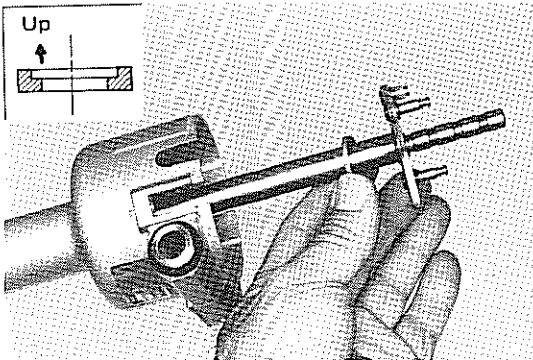
3. Inspect the governor shaft for wear or damage.

Fig. 10-31



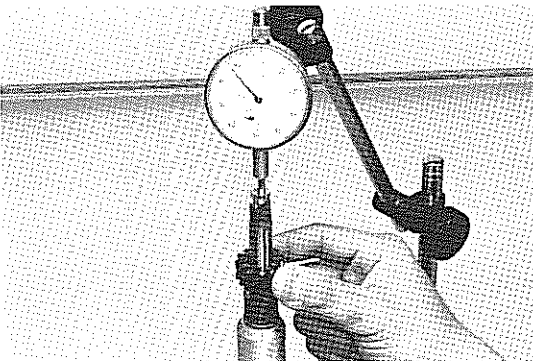
4. Inspect housing bushings and O ring for wear, deformation or damage.

Fig. 10-32

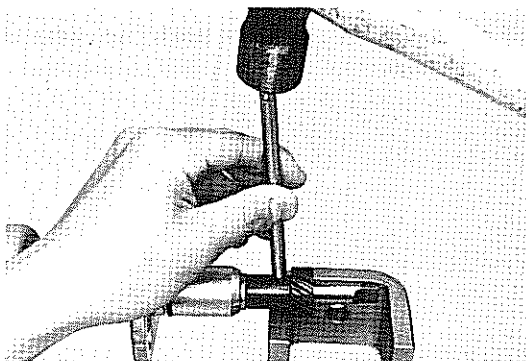


5. Assemble washer as shown in the figure.

Fig. 10-33



6. Before staking the pin, recheck the thrust clearance.

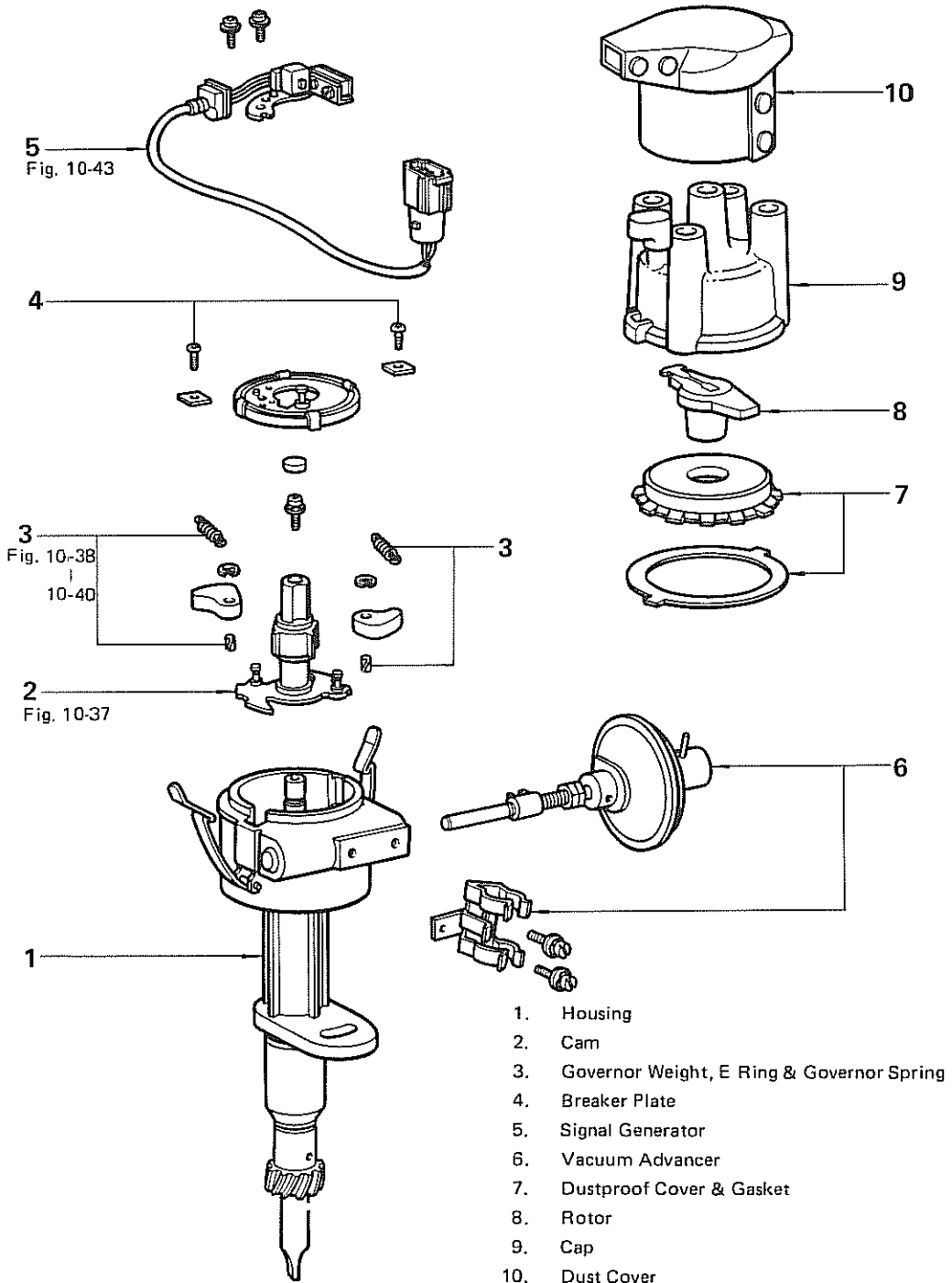
Fig. 10-34

7. Peen both pin ends with a vise.

ASSEMBLY

Assemble the parts in the numerical order shown in the figure.

Fig. 10-35



Assemble the parts in the numerical order shown in the figure.

Fig. 10-36

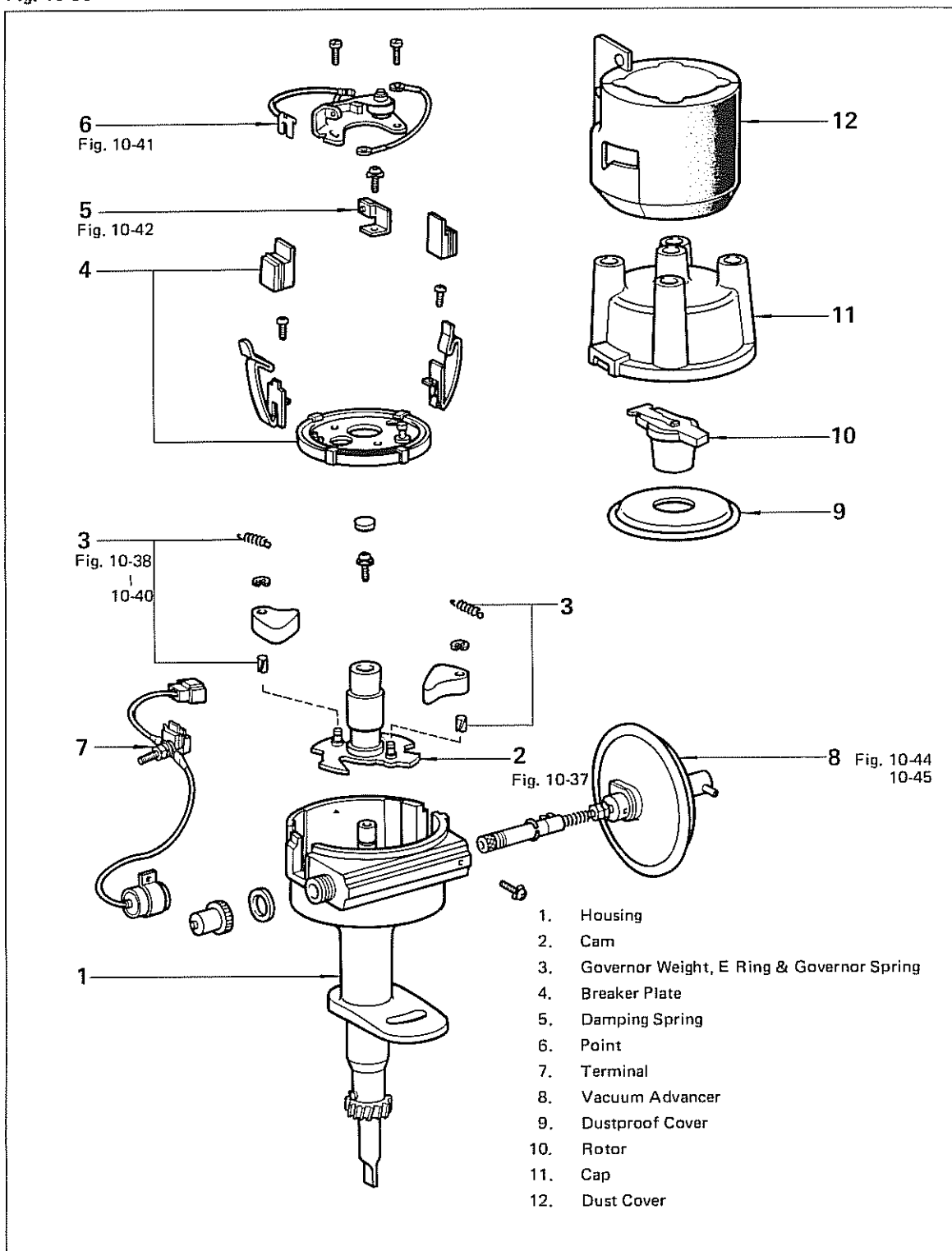
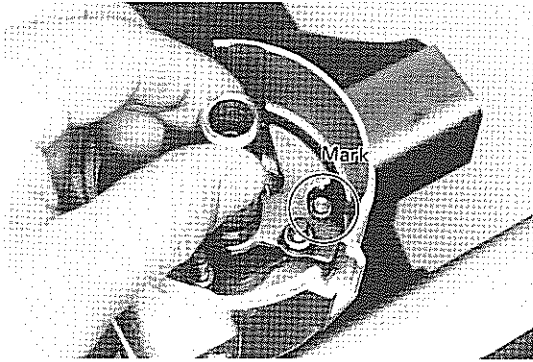
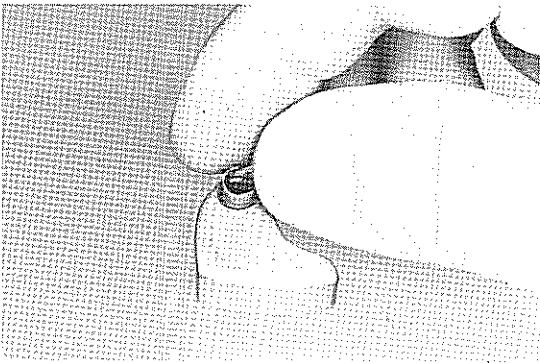


Fig. 10-37



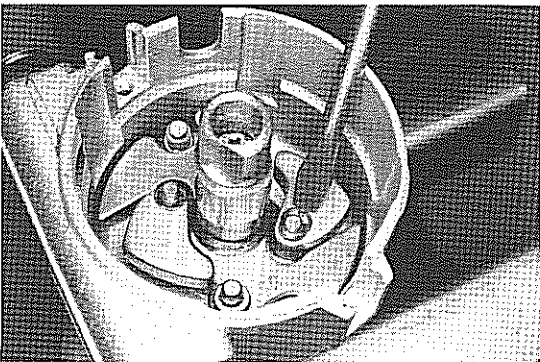
Match the 13.5 mark with the stopper, fit on the cam.

Fig. 10-38



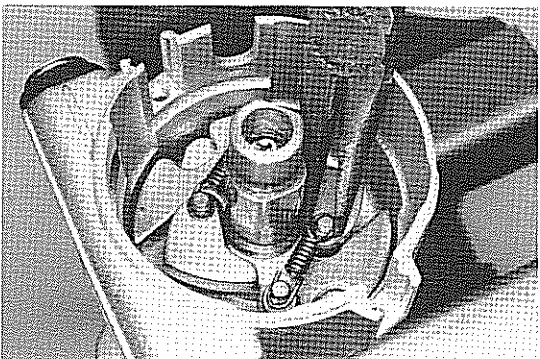
Install the bearing into the pin hole.

Fig. 10-39



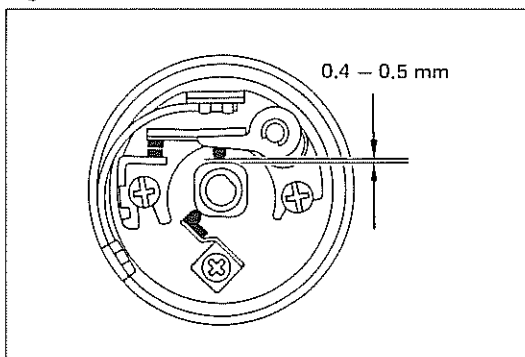
Insure that the E ring is installed in the groove.

Fig. 10-40



Insure that the governor spring is installed.

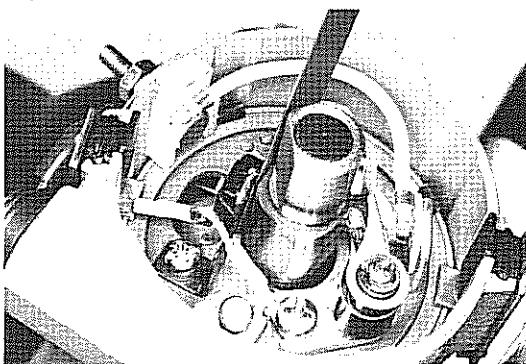
Fig. 10-41

**ADJUSTMENT**

Adjust the gap.

Rubbing block gap: 0.4 – 0.5 mm
(0.016 – 0.020 in.)

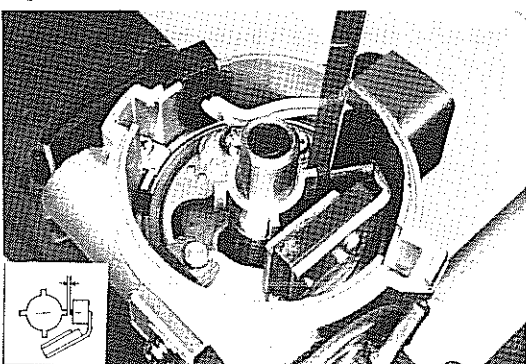
Fig. 10-42



Install the damping spring and adjust it.

Damping spring gap: 0.1 – 0.4 mm
(0.004 – 0.016 in.)

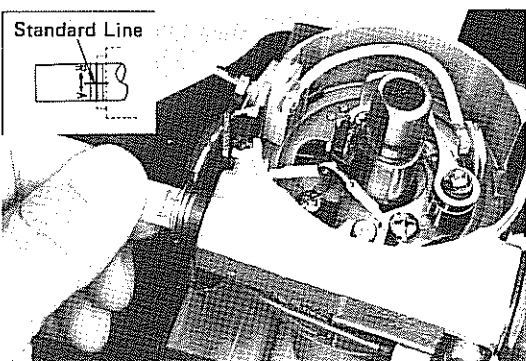
Fig. 10-43



Adjust the air gap. (For USA & Canada)

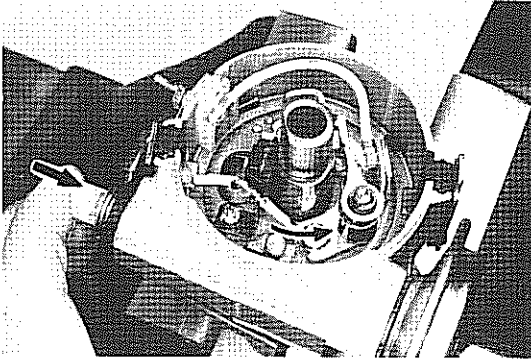
Air gap: 0.2 – 0.4 mm
(0.008 – 0.016 in.)

Fig. 10-44



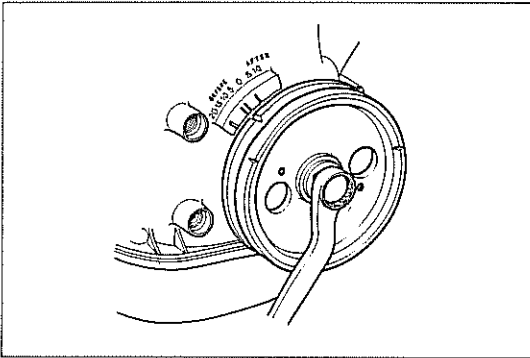
Set the octane selector at the standard line.

Fig. 10-45



Check the breaker plate for smooth rotation.

Fig. 10-46



INSTALLATION



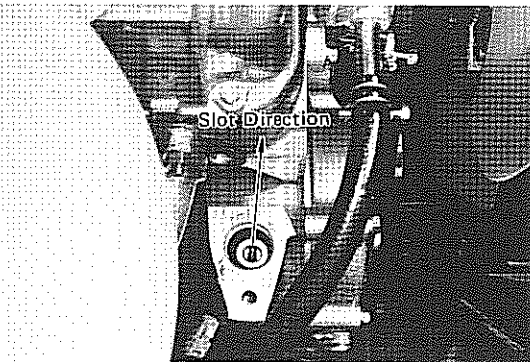
1. Set the No.1 cylinder to 10° BTDC/compression. Align the timing mark with the pointer.

At this time, rocker arms on the No.1 cylinder should be loose and the rockers on No.4 should be tight.

[For Iraq, Chile and Peru]

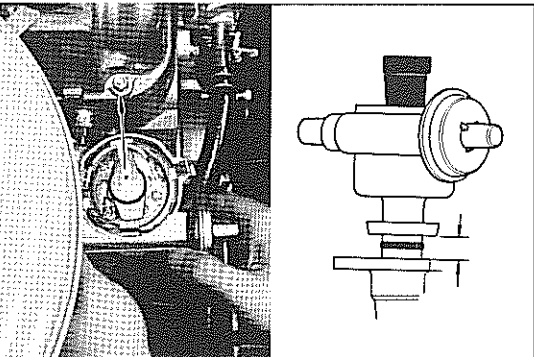
Set the No.1 cylinder to 3.5° BTDC/compression.

Fig. 10-47



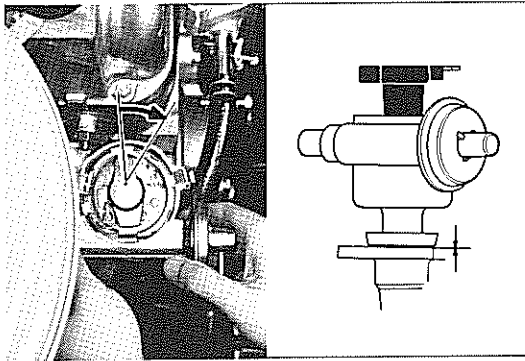
2. Set the oil pump shaft slot in the direction shown in the figure.

Fig. 10-48



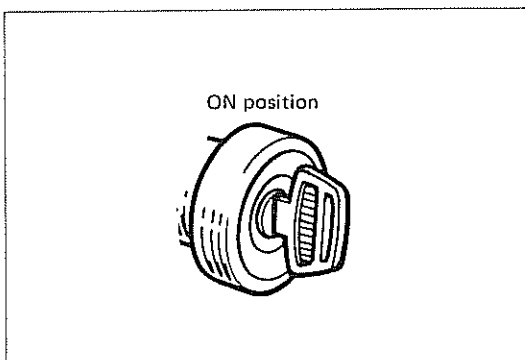
3. Before inserting the distributor, position the rotor and diaphragm as shown in the figure.

Fig. 10-49



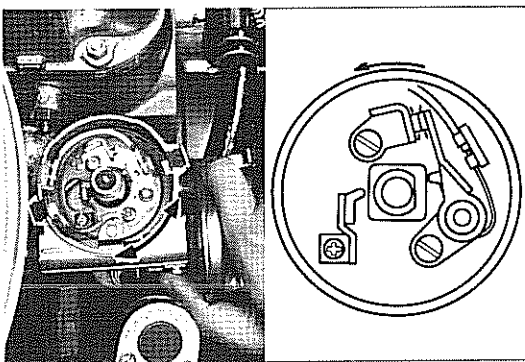
4. When fully installed, rotor should point in the direction shown in the figure.

Fig. 10-50



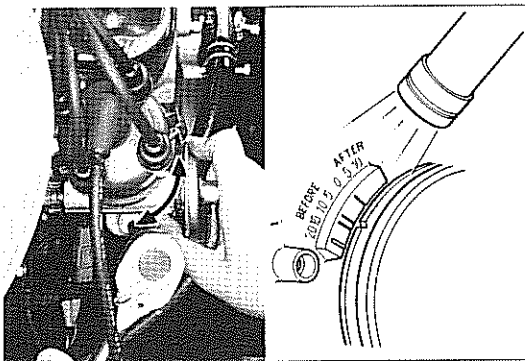
5. Turn ignition switch to the ON position. Do not turn the starter motor.

Fig. 10-51



6. Rotate the distributor body counterclockwise to just where there is a spark between the points, and tighten the calmp bolt in that position.

Fig. 10-52



7. Check the ignition timing at idle.

Ignition timing:

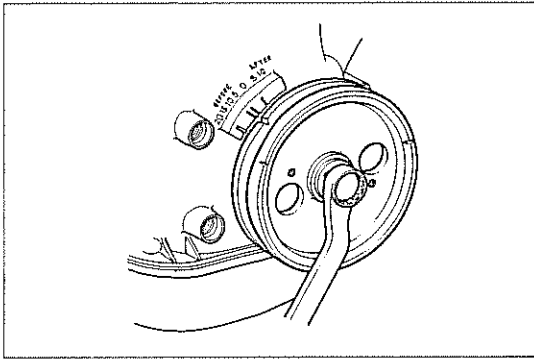
10° BTDC/idle speed

[For Iraq, Chile and Peru]

3.5° BTDC/idle speed

If necessary, align the timing marks by turning the distributor body.

Fig. 10-53



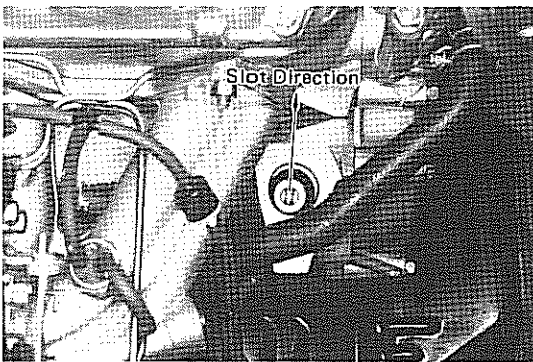
INSTALLATION

For USA



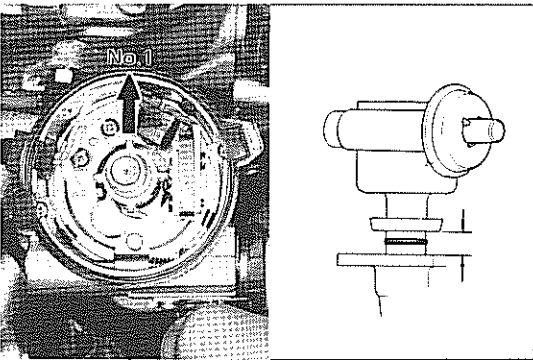
1. Set the No.1 cylinder to 10° BTDC/compression. Align the timing mark with the pointer.
At this time, the rocker arms on No.1 cylinder should be loose and rockers on No.4 should be tight.

Fig. 10-54



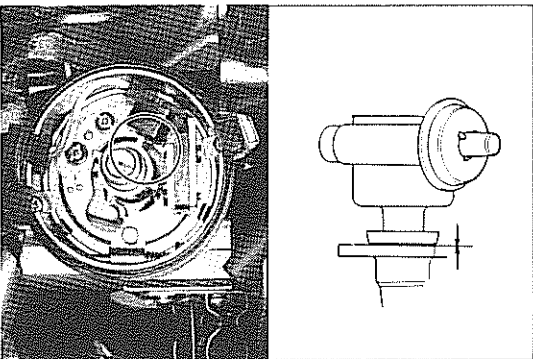
2. Set the oil pump shaft slot in the direction shown in the figure.

Fig. 10-55



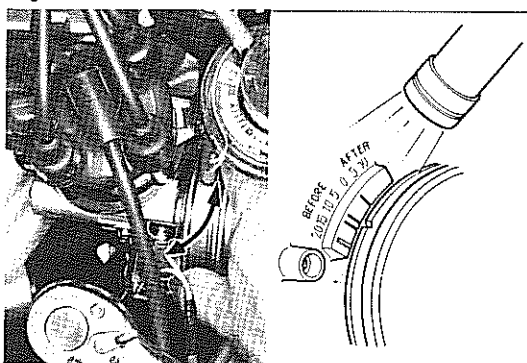
3. Before inserting the distributor, position the rotor and diaphragm as shown in the figure.

Fig. 10-56



4. When fully installed, the rotor should point in the direction shown in the figure.
5. Adjust the housing by moving it so that the signal rotor will just begin to cut the lines of flux and tighten the set bolt.

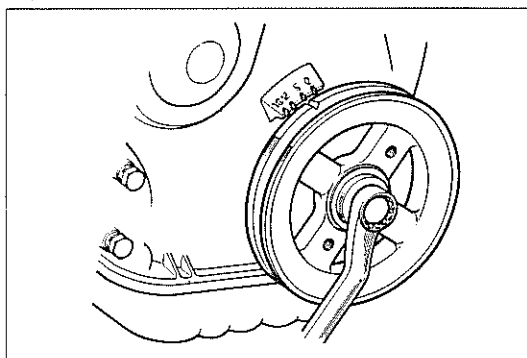
Fig. 10-57



6. Inspect ignition timing at idle speed using a timing light, and adjust it so that the timing pointer aligns with the 10° mark on the crankshaft pulley.

Ignition timing: 10° BTDC/900 rpm Max.

Fig. 10-58

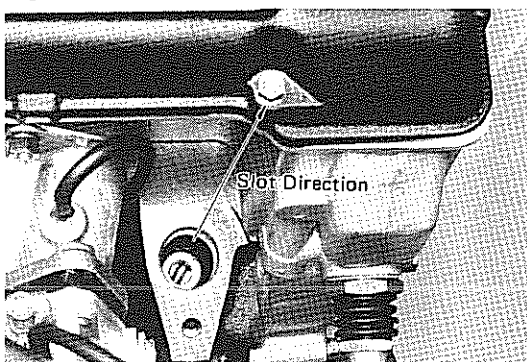


INSTALLATION

For 2T-G Engine

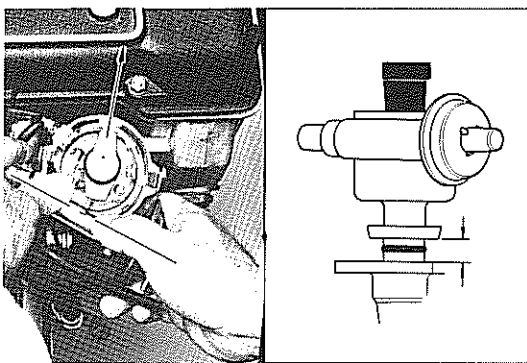
1. Set the No.1 cylinder to 12° BTDC/compression. Align the timing mark with the pointer.
At this time the rocker arms on No.1 cylinder should be loose and rockers on No.4 should be tight.

Fig. 10-59



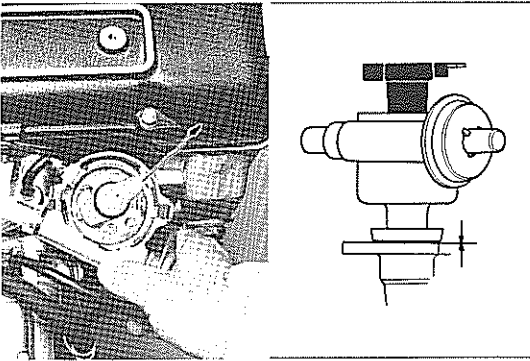
2. Set the oil pump shaft slot in the direction shown in the figure.

Fig. 10-60



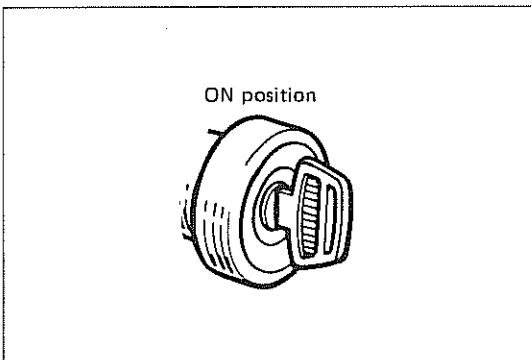
3. Before inserting the distributor, position the rotor and diaphragm as shown in the figure.

Fig. 10-61



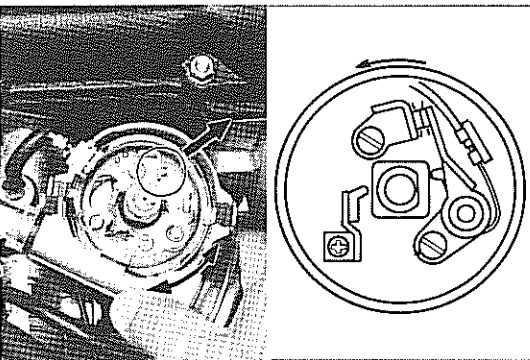
4. When fully installed, rotor should point toward as shown in the figure.

Fig. 10-62



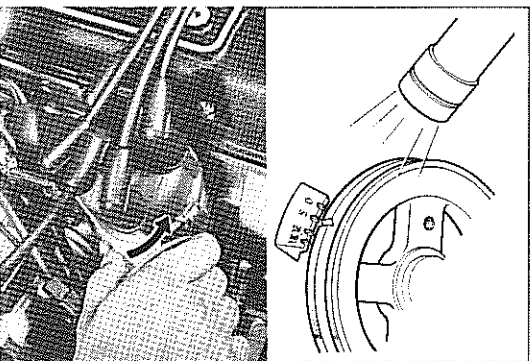
5. Turn ignition switch to ON position. Do not turn the starter motor.

Fig. 10-63



6. Rotate the distributor body counterclockwise until a spark jumps between the points and tighten the clamp bolt in that position.

Fig. 10-64



7. Check ignition timing in idling condition.
Ignition timing: 12° BTDC/idle speed
 If necessary, align the timing marks by turning distributor body.

Fig. 10-65

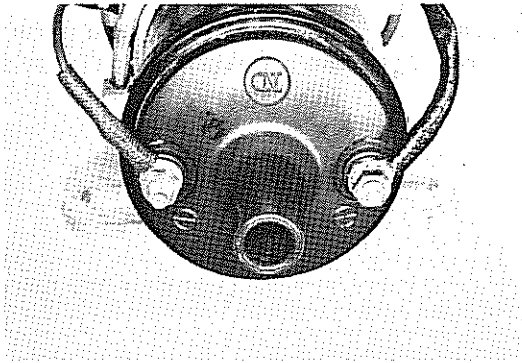


Fig. 10-66

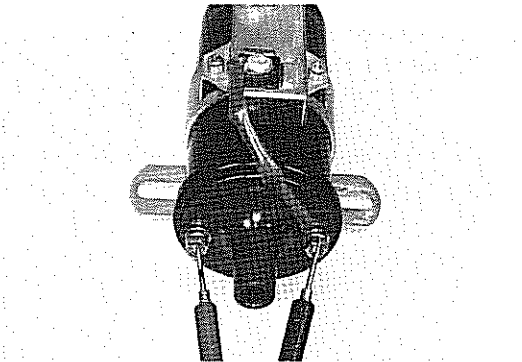


Fig. 10-67

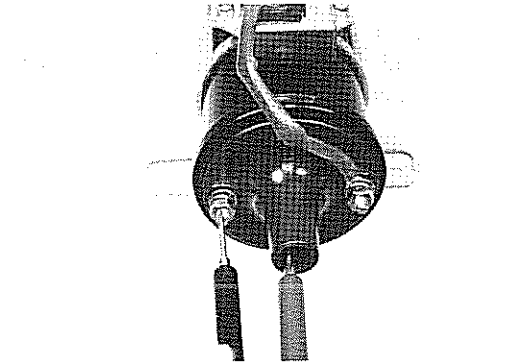
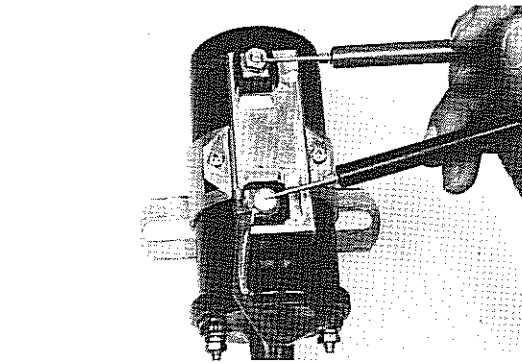


Fig. 10-68



IGNITION COIL



INSPECTION

1. Clean the coil and inspect it for carbon paths around the terminals and check the outside body for cracks.
2. Inspect the high tension cord insertion hole for carbon deposit or corrosion.



3. Measure the following resistances. If the reading is not within the specified resistance, replace the coil.

Primary coil resistance

(Reference only): 1.3 – 1.6 Ω



Secondary coil resistance

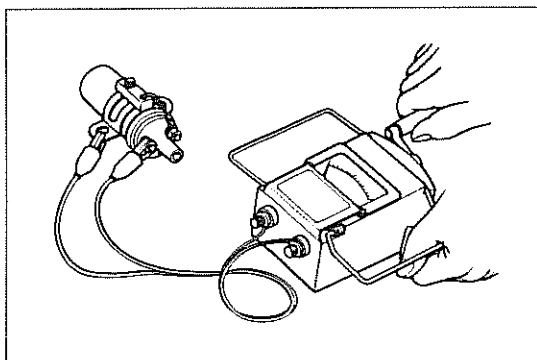
(Reference only): 9.5 – 14.5 k Ω



External resistor resistance

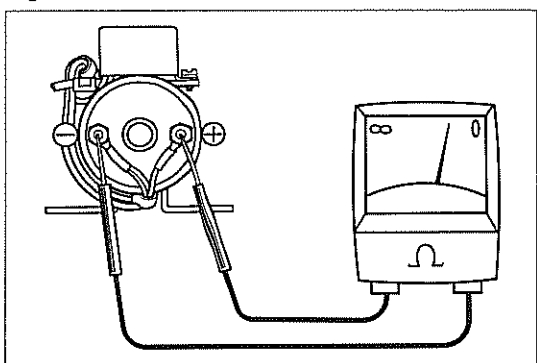
(Reference only): 1.3 – 1.7 Ω

Fig. 10-69



Insulation resistance:
Over 10 M Ω at 500V

Fig. 10-70

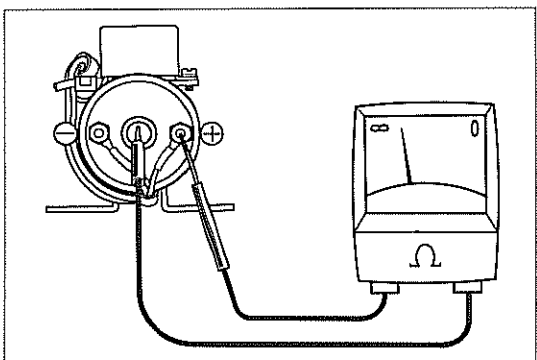


[For USA & CANADA]

4. Measure the following resistances. If the reading is not within the specified resistance, replace the coil.

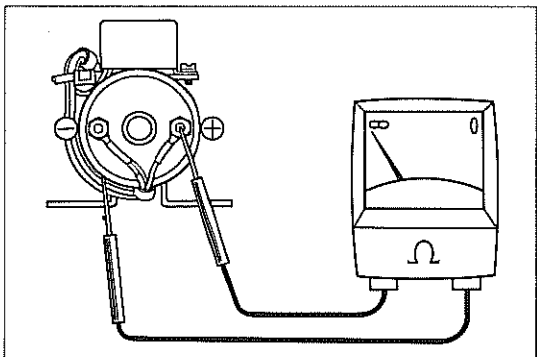
Primary coil resistance
(Reference only): 1.3 – 1.6 Ω

Fig. 10-71



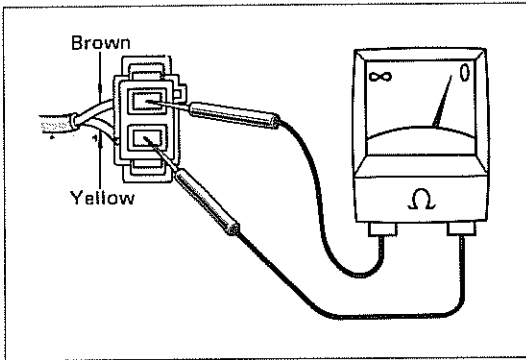
Secondary coil resistance
(Reference only): 9.5 – 14.5 k Ω

Fig. 10-72



Insulation resistance:
Over 10 M Ω at 500V

Fig. 10-73

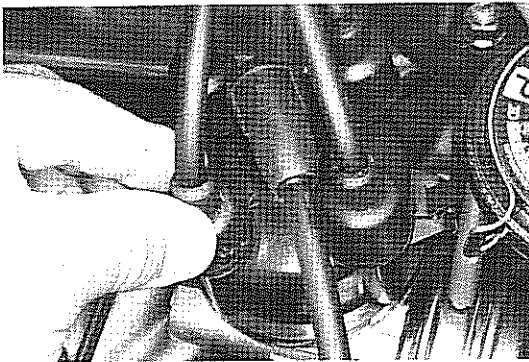


Wire resistance: 1.2 Ω (at Cold)

— Note —

Check the resistor wire resistance using an ohmmeter.

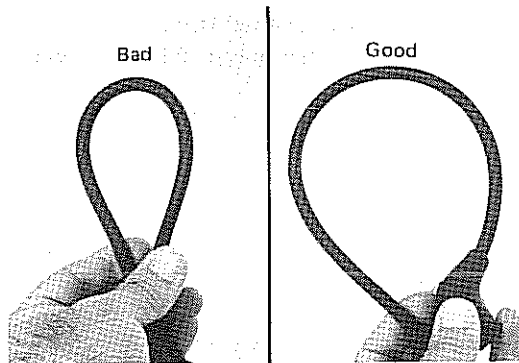
Fig. 10-74



— Caution —

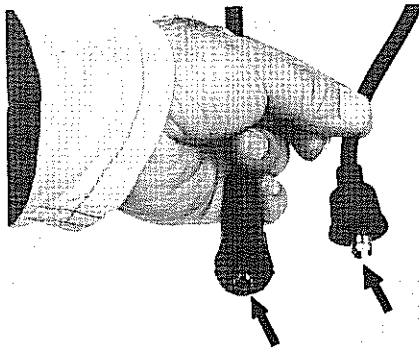
1. Carefully remove high tension cords by pulling on the rubber boots.

Fig. 10-75



2. Do not bend the cords as the conductors will break.

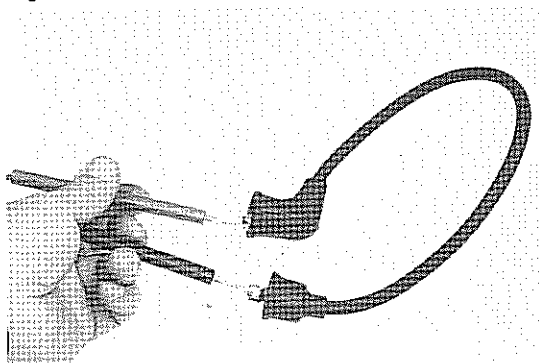
Fig. 10-76



INSPECTION

1. Check the condition of the cord terminal. If any terminal is corroded, clean it. If it is broken or distorted, replace the cord.

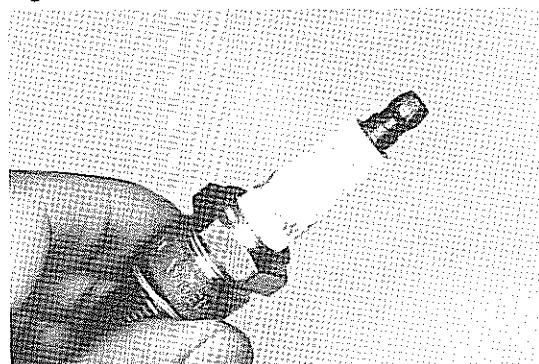
Fig. 10-77



2. Check the resistance of each cord between both ends. If the reading exceeds the limit, replace the cord.

Resistance: Less than 25 k Ω

Fig. 10-78



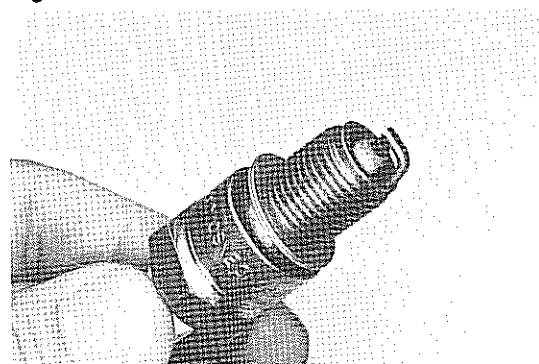
SPARK PLUG

INSPECTION

Inspect for the following items. Clean or replace the plugs if necessary.

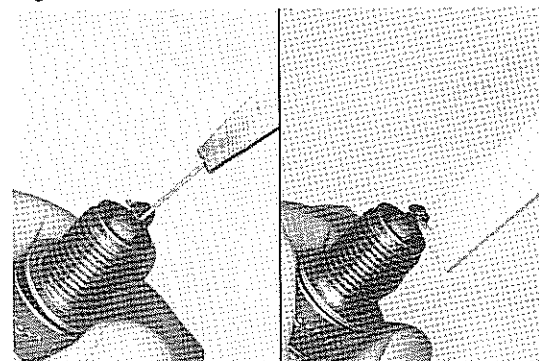
1. Cracks or damages in the threads or insulator.
2. Damaged or deteriorated gaskets.

Fig. 10-79



3. Wear on the electrodes.
4. Burnt condition of electrode and the amount of carbon deposit.

Fig. 10-80



GAP ADJUSTMENT

Check the plug gap with plug gap gauge. If not to specified value, adjust by bending the ground (outer) electrode.

Spark plug gap:

0.7 – 0.8 mm

(0.028 – 0.031 in.)

MEMO

CHARGING SYSTEM

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CHARGING SYSTEM CIRCUIT	11-2
ON-VEHICLE INSPECTION	11-4
ALTERNATOR	11-10
ALTERNATOR REGULATOR	11-35

CHARGING SYSTEM CIRCUIT

Fig. 11-1

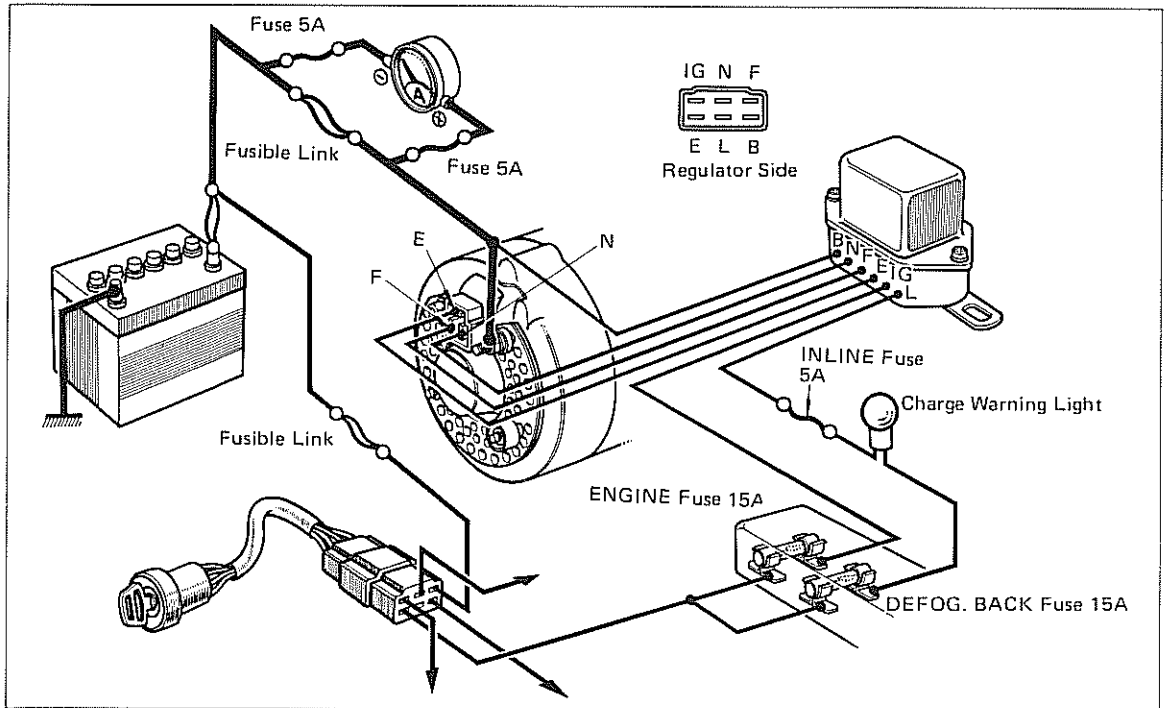


Fig. 11-2

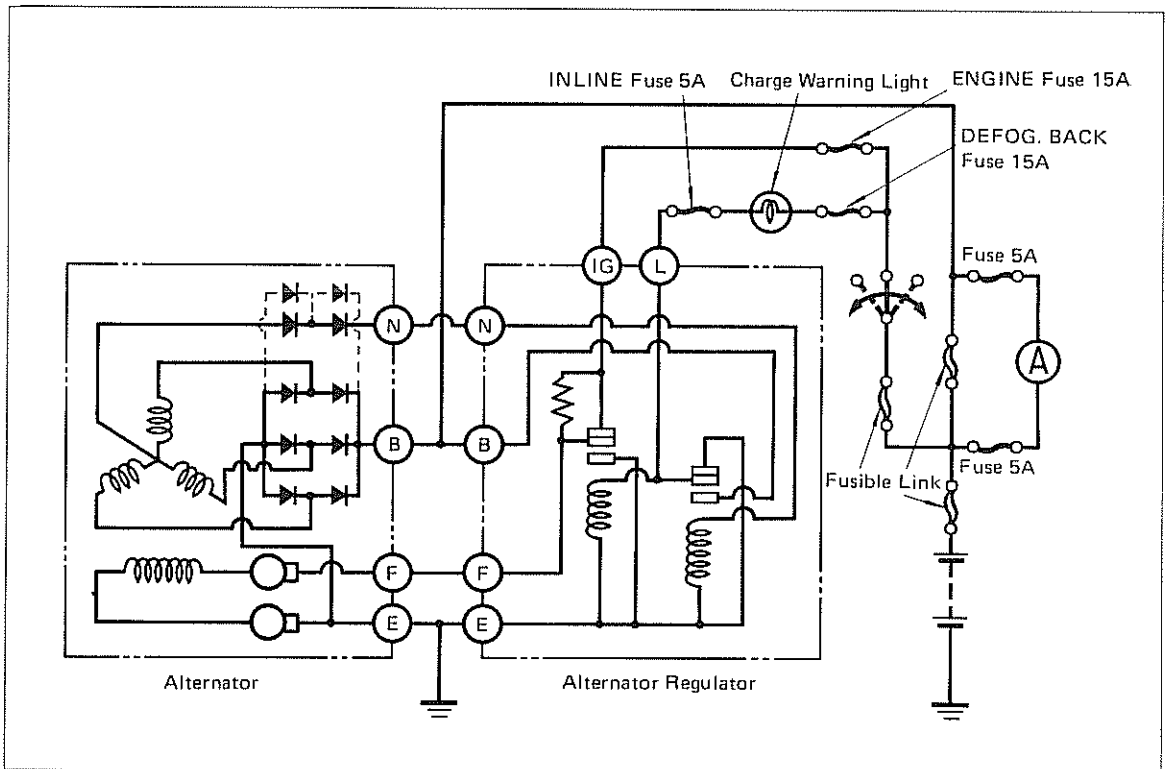
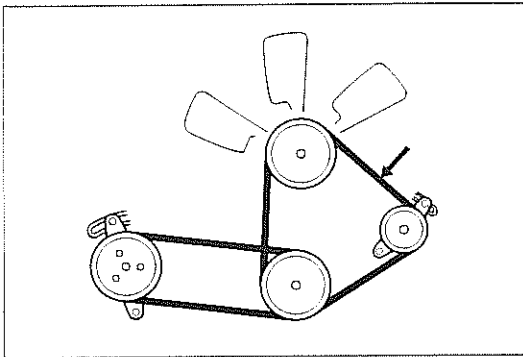


Fig. 11-5



ON-VEHICLE INSPECTION



1. Inspect the following system components:
Drive belt tension at 10 kg (22 lb):
 8 – 12 mm
 (0.3 – 0.5 in.)

Fig. 11-6



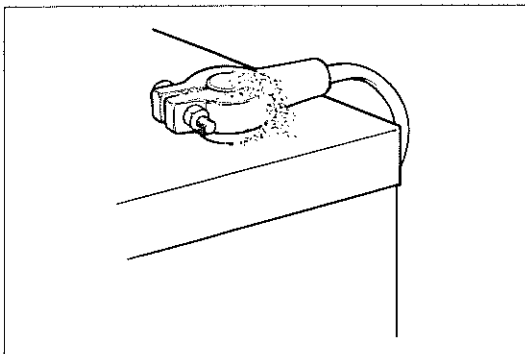
2. Fuses
 ENGINE fuse 15A
 GAUGE fuse 15A

Fig. 11-7



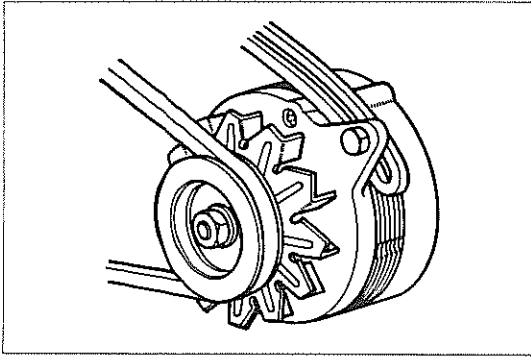
3. Installed condition of wiring for alternator and regulator.

Fig. 11-8



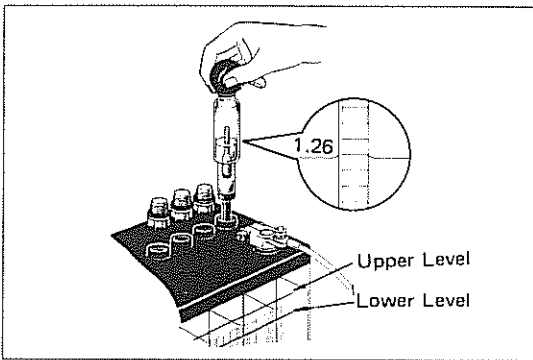
4. Battery terminal and fusible link
 Loose
 Corroded
 Burnt

Fig. 11-9



5. Alternator on-vehicle condition
Abnormal noise from alternator when engine is running.

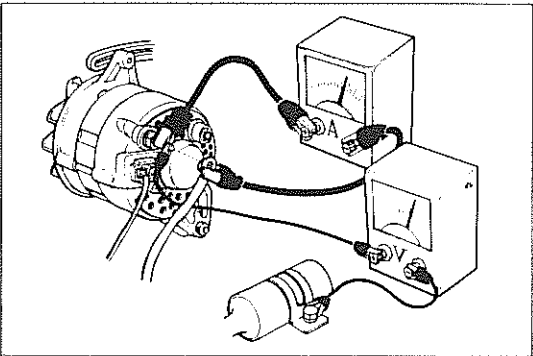
Fig. 11-10



6. Specific gravity 1.25 – 1.27

Connect the voltmeter and ammeter as shown in the figure.

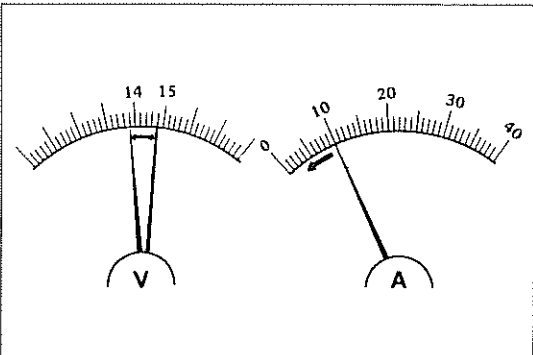
Fig. 11-11



PERFORMANCE TEST USING VOLT-METER & AMMETER

1. Disconnect the wire from terminal B of the alternator and connect the wire to the negative terminal of the ammeter.
2. Connect the test lead from the positive terminal of the ammeter to terminal B of the alternator.
3. Connect the positive lead of the voltmeter to terminal B of the alternator.
4. Connect the negative lead of the voltmeter to ground.

Fig. 11-12



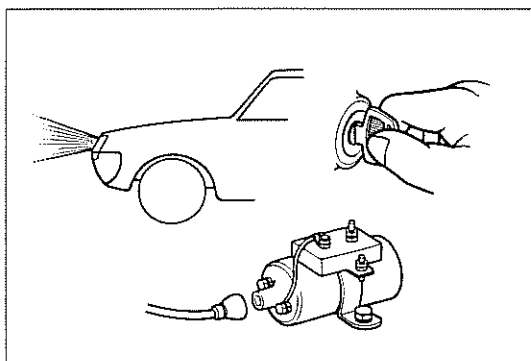
— Note —

Be careful not to cause a short.

No-load Performance Test

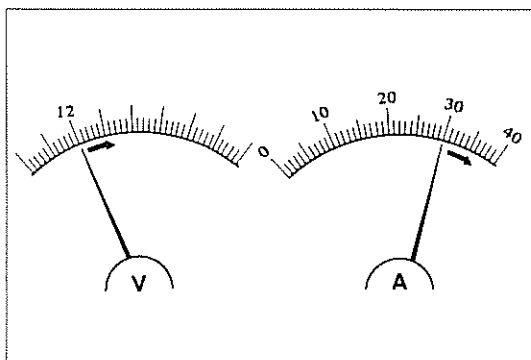
Regulated voltage:	13.8 – 14.8V
Current:	Less than 10A
Engine speed:	Idling to 2,000 rpm

Fig. 11-13

**Load Performance Test**

1. Crank the engine with ignition coil high tension cord disconnected for about 5 to 10 seconds.
2. Turn on headlights and accessories.

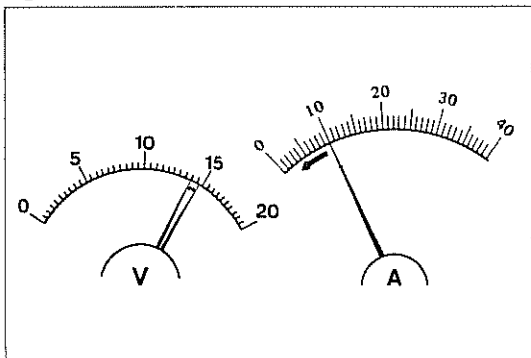
Fig. 11-14



3. Start engine, and run it at approximately 2,000 rpm.

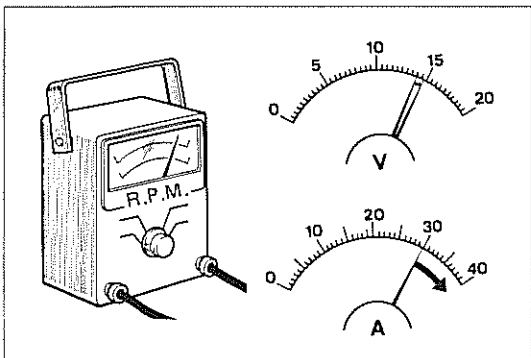
Regulated voltage: 12V
Current: More than 30A

Fig. 11-15

**WITH IC REGURATOR TYPE****No-load Performance Test**

Regulated voltage: 14.0 – 14.7V
Current: Less than 10A
Engine speed: Idling to 2,000 rpm

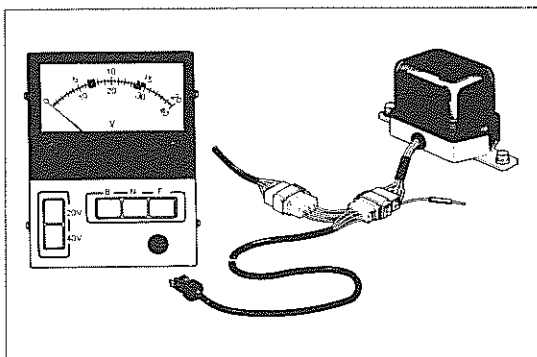
Fig. 11-16

**Load Performance Test**

1. Run engine at 2,000 rpm.
2. Turn on headlights and all accessories.

Regulated voltage: 14.0 – 14.7V
Current: More than 30 A

Fig. 11-17



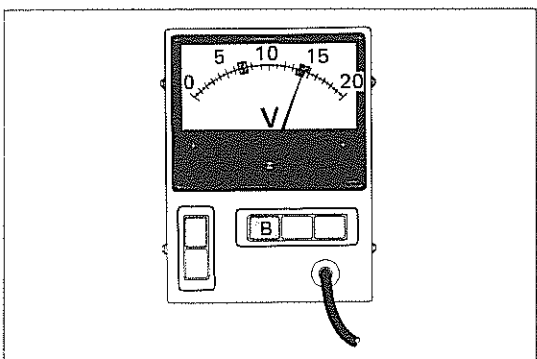
PERFORMANCE TEST BY ALTERNATOR CHECKER

SST [09081-00011]

1. Unplug the alternator regulator connector and plug in the checker connector.

Push 20V switch.

Fig. 11-18



2. Check B terminal voltage.

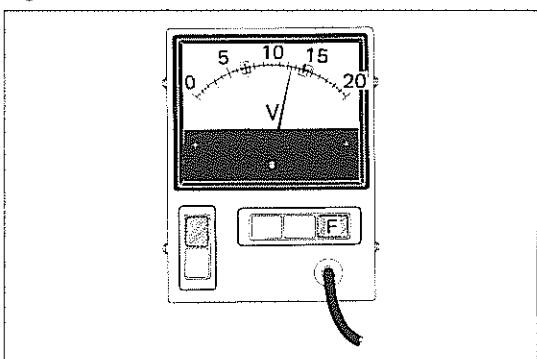
Push B switch.

Raise engine speed from idling to 2,000 rpm.

Standard voltage: 13.8 – 14.8V

If not within standard, probable cause is the alternator regulator.

Fig. 11-19



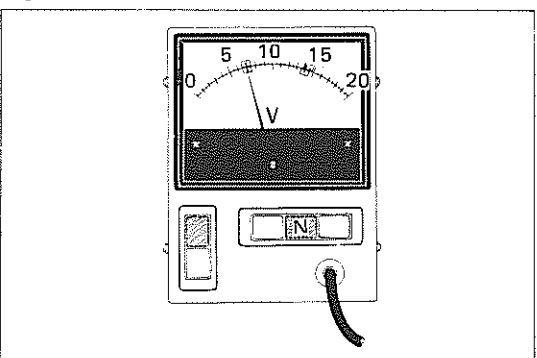
3. Check F terminal voltage.

Push F switch.

Gradually raise engine speed. The checker reading should gradually decrease from 12 to 3 volts.

If decrease is not registered, probable cause is alternator regulator.

Fig. 11-20



4. Check N terminal voltage.

Push N switch.

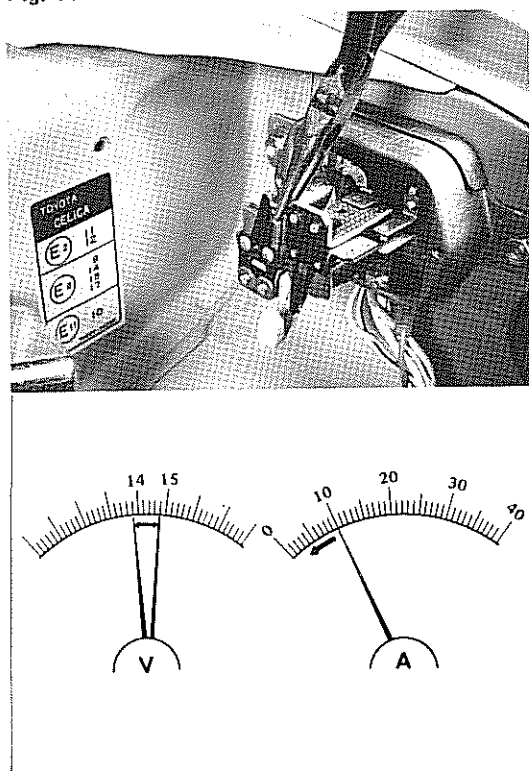
Maintain engine speed at approximately 1,500 rpm. The pointer should be at a half of B terminal voltage.

Standard voltage: 6.9 – 7.4V

If the voltage is higher, the cause will be (+) rectifier.

If the voltage is lower, the cause will be (–) rectifier.

Fig. 11-21

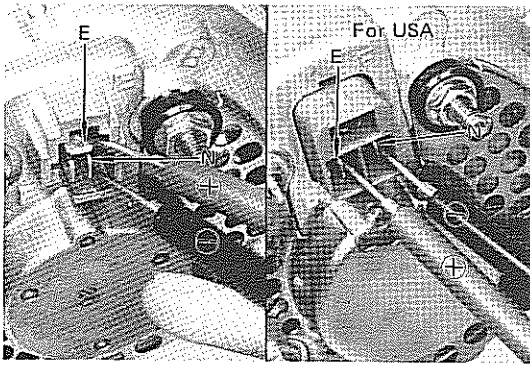
**ADJUST OUTPUT VOLTAGE**

If not within the output voltage, adjust by bending the adjusting arm.

Voltage: 13.8 – 14.8V

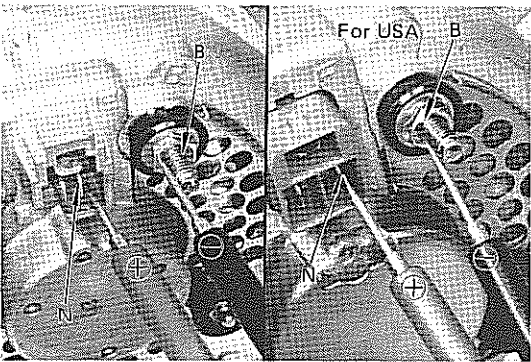
Engine speed: Idling to 2,000 rpm

Fig. 11-22

**ALTERNATOR INSPECTION**

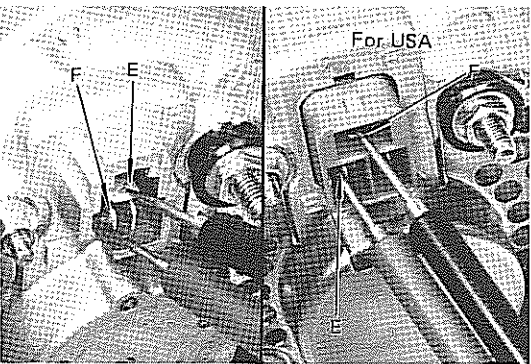
1. Negative side rectifier short test.
Connect an ohmmeter (—) lead to N terminal and (+) lead to E terminal.
Meter should indicate infinity.

Fig. 11-23



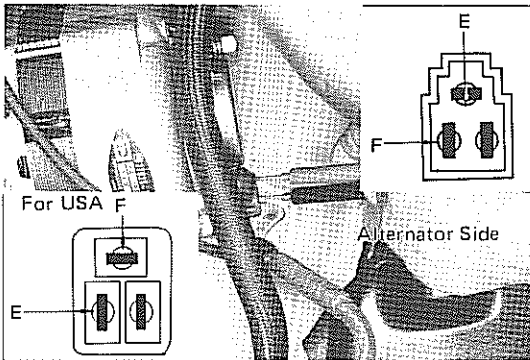
2. Positive side rectifier short test.
Connect an ohmmeter (—) lead to B terminal and (+) lead to N terminal.
Meter should indicate infinity.

Fig. 11-24



3. Check rotor coil resistance.
Resistance: 5 – 9 Ω

Fig. 11-25



4. Turn the ignition switch to ON position, and check to see if there is battery voltage at F terminal. If not, check the ENGINE fuse.

ALTERNATOR CUTAWAY VIEW

Fig. 11-26

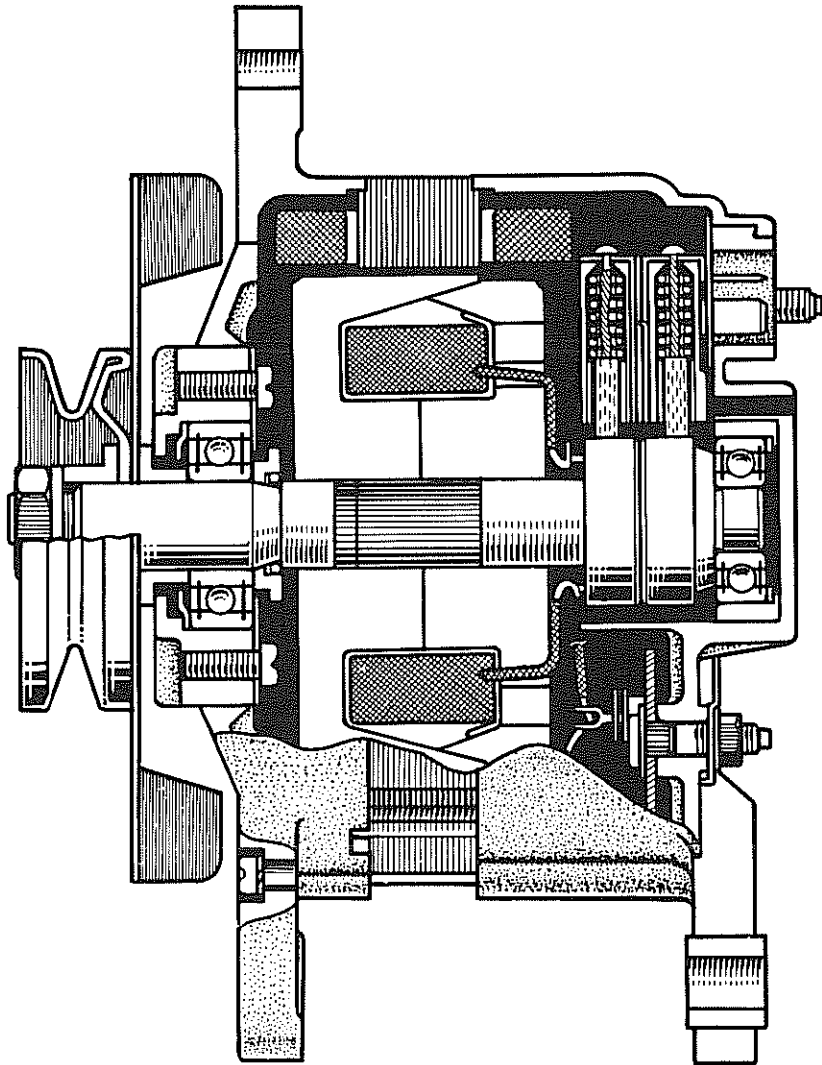
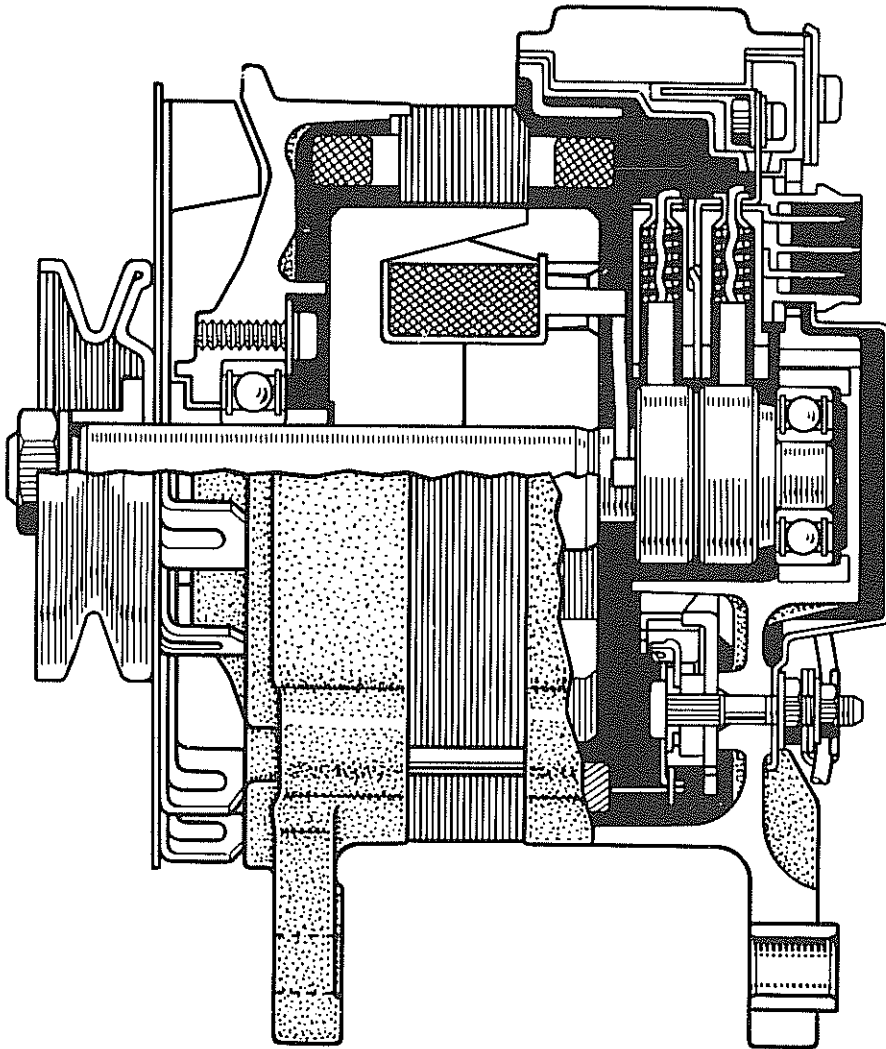


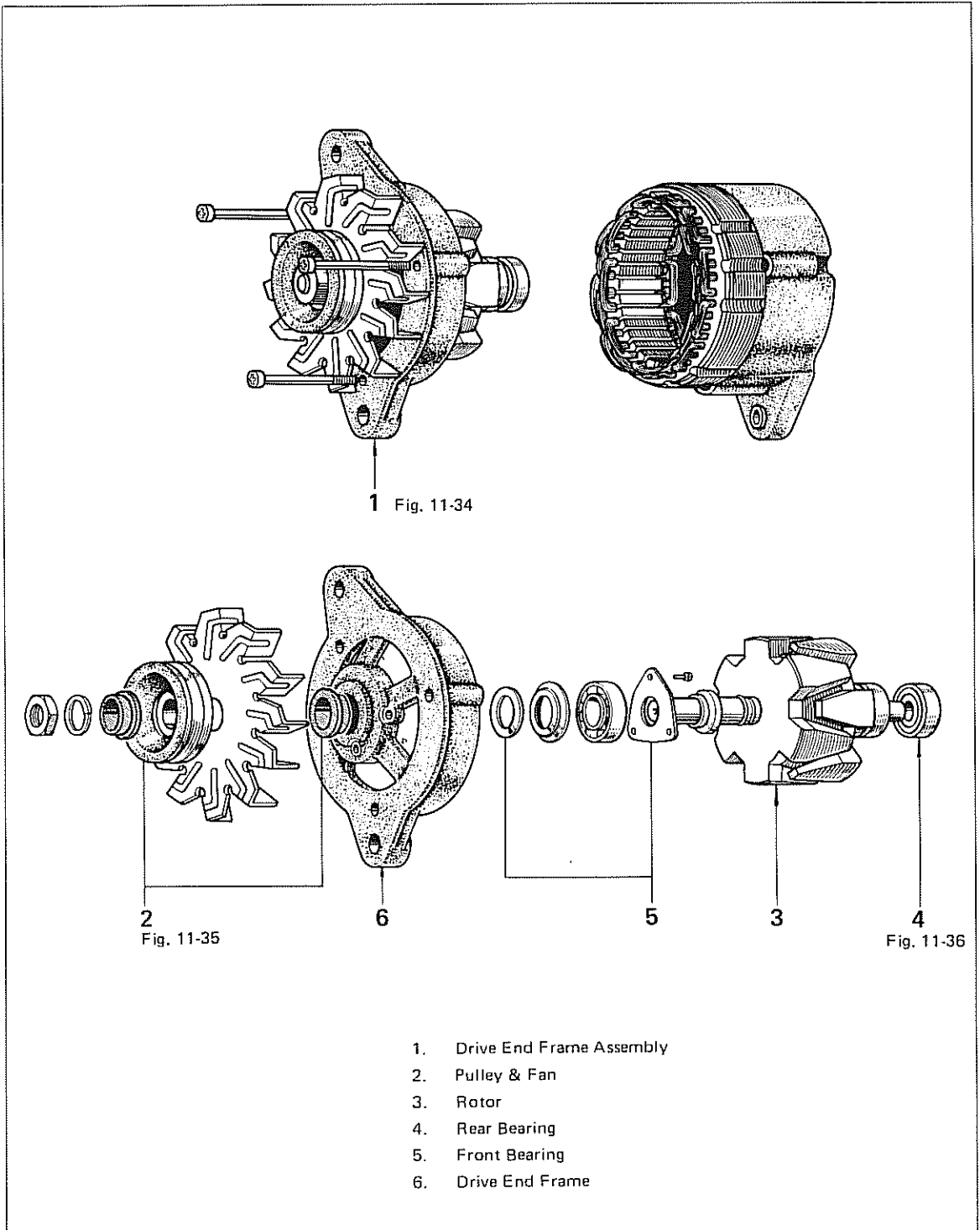
Fig. 11-27

For ALTERNATOR WITH IC REGULATOR



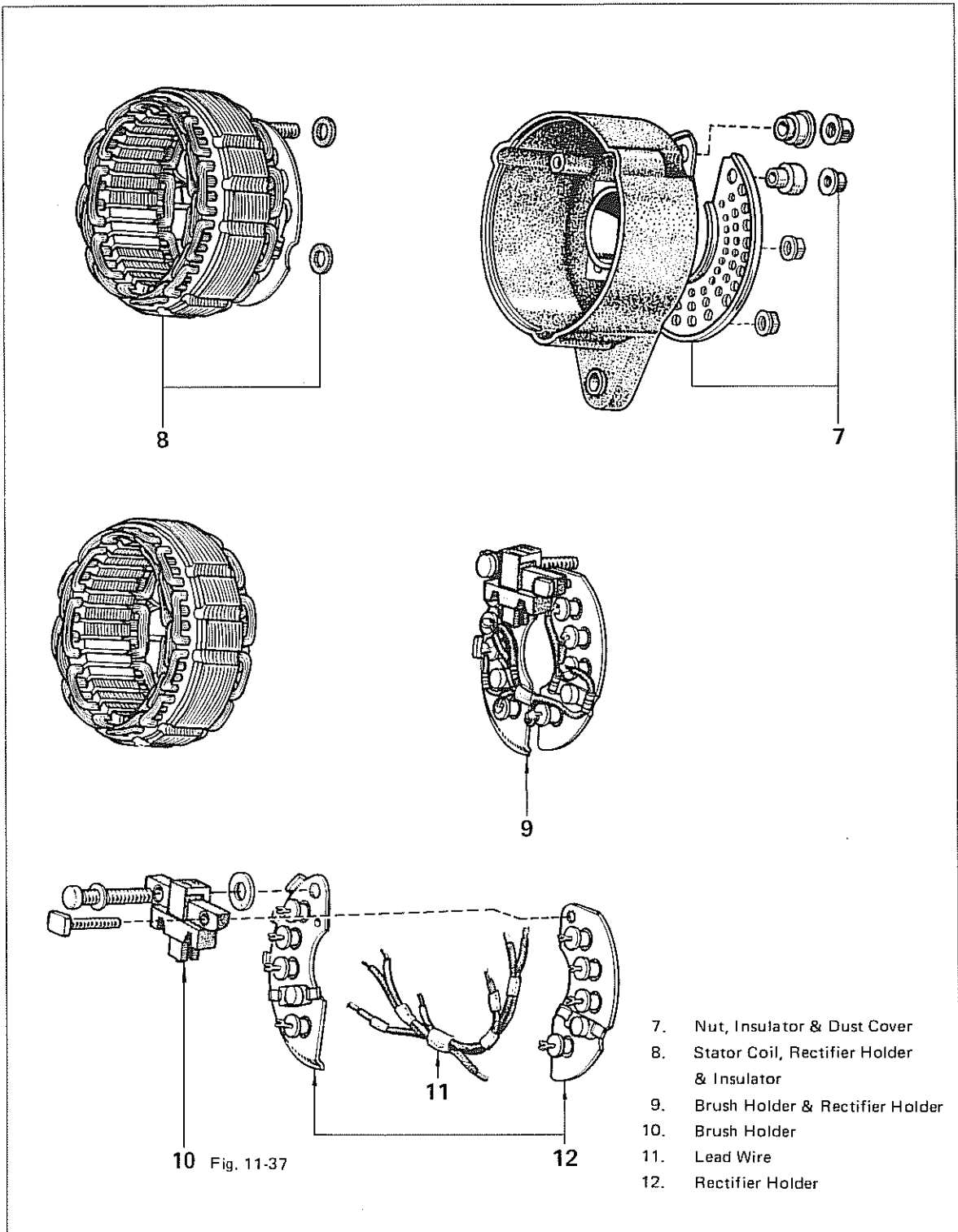
DISASSEMBLY

Disassemble the parts in the numerical order shown in the figure.

Fig. 11-28

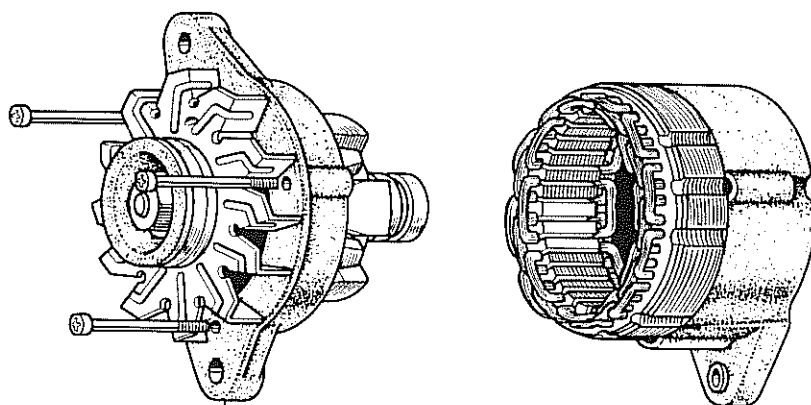
Disassemble the parts in the numerical order shown in the figure.

Fig. 11-29

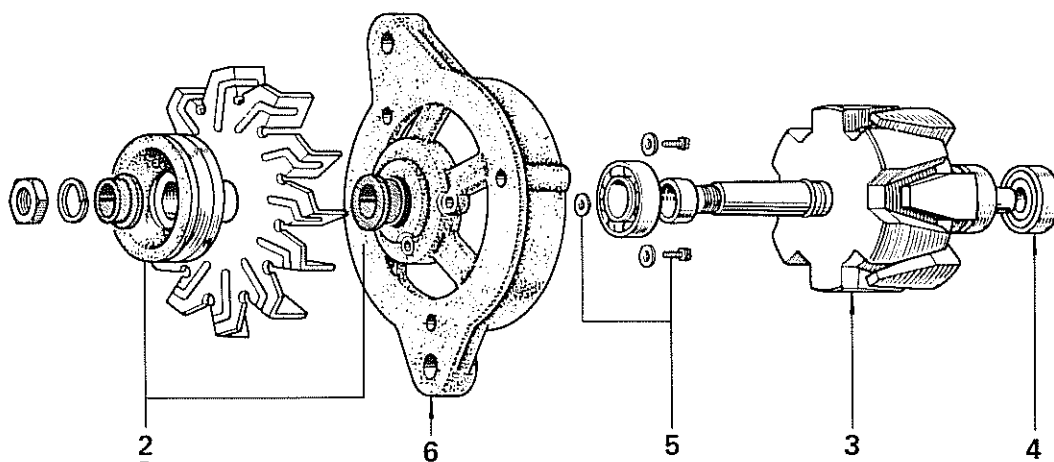


Disassemble the parts in the numerical order shown in the figure.

Fig. 11-30



1
Fig. 11-34



2
Fig. 11-35

4
Fig. 11-36

1. Drive End Frame Assembly
2. Pulley & Fan
3. Rotor
4. Rear Bearing
5. Front Bearing
6. Drive End Frame

Disassemble the parts in the numerical order shown in the figure.

Fig. 11-31

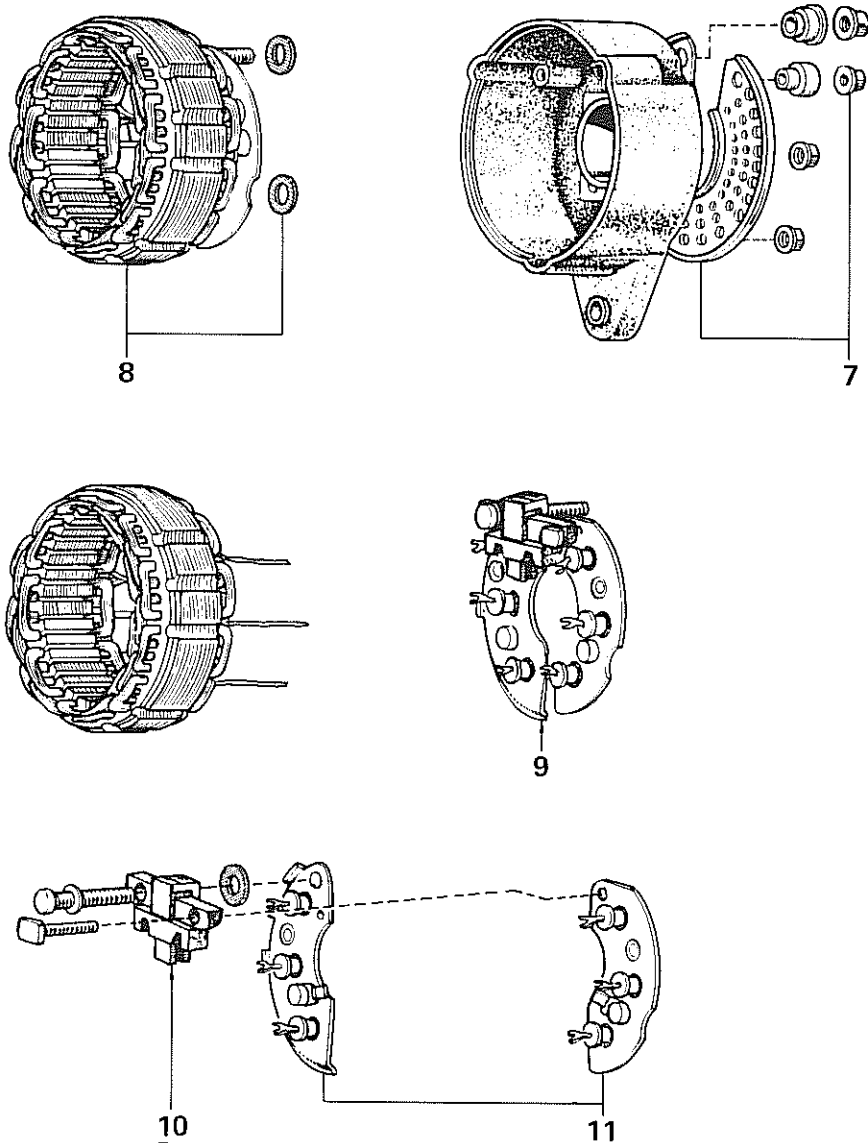
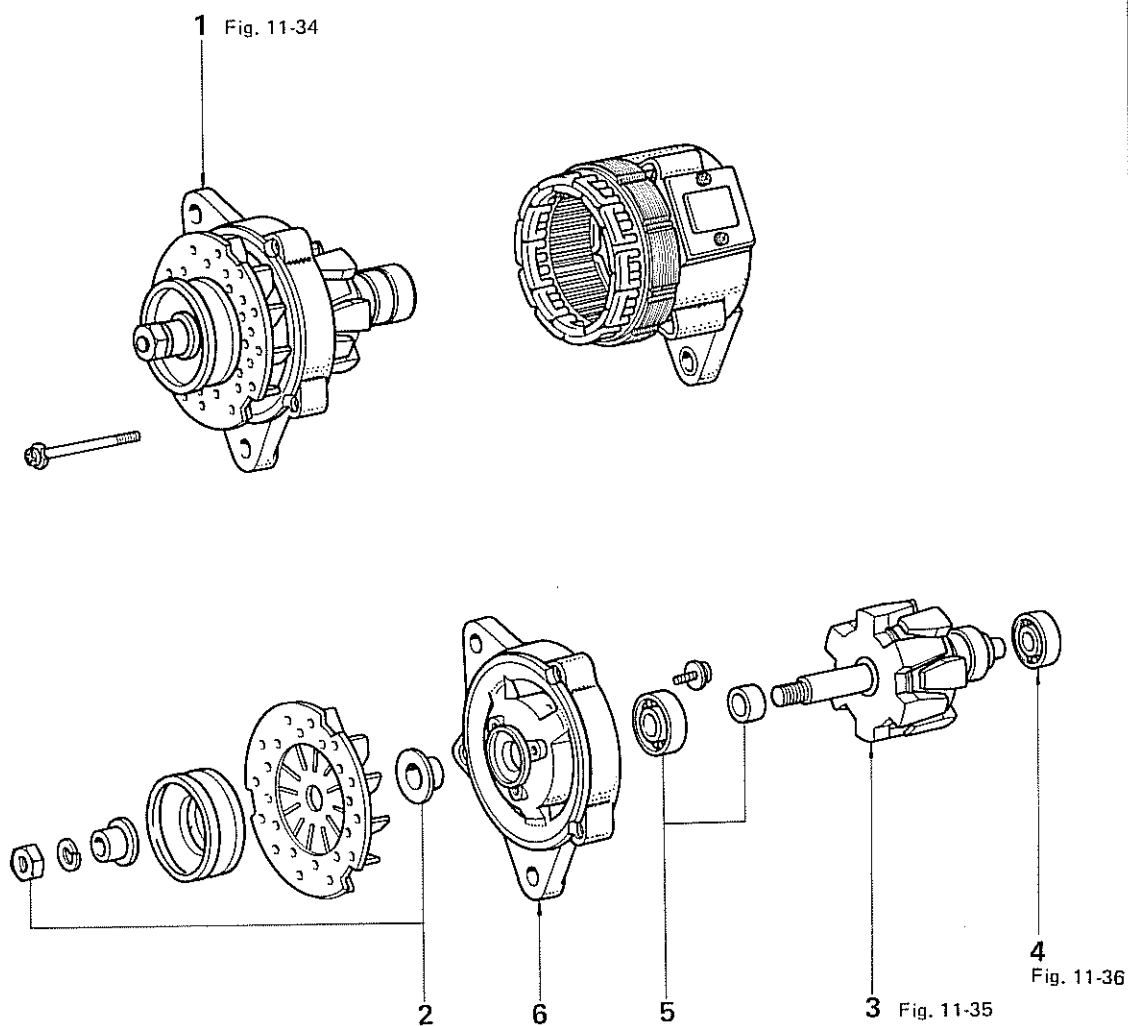


Fig. 11-37

- 7. Nut, Insulator & Dust Cover
- 8. Stator Coil, Rectifier Holder & Insulator
- 9. Brush Holder & Rectifier Holder
- 10. Brush Holder
- 11. Rectifier Holder

For Alternator with IC Regulator

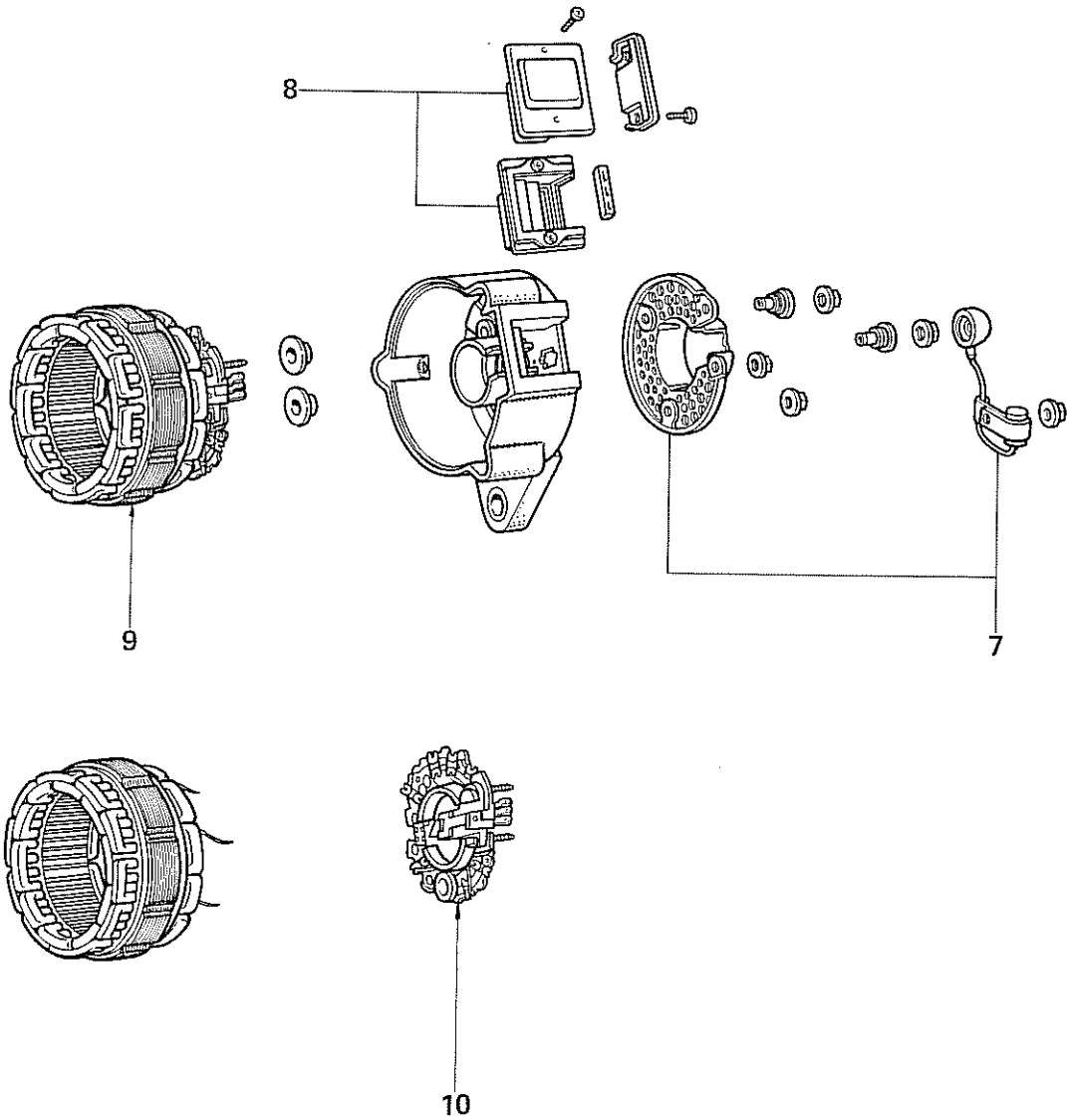
Disassemble the parts in the numerical order shown in the figure.

Fig. 11-32

1. Drive End Frame Assembly
2. Pulley & Fan
3. Rotor
4. Rear Bearing
5. Front Bearing
6. Drive End Frame

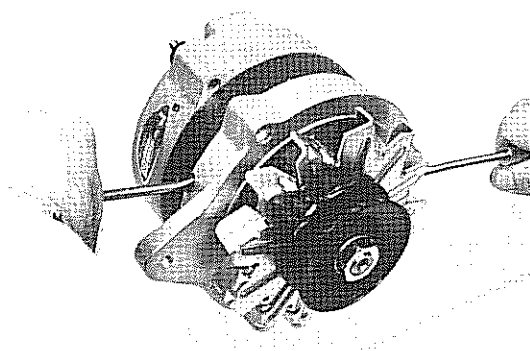
Disassemble the parts in the numerical order shown in the figure.

Fig. 11-33



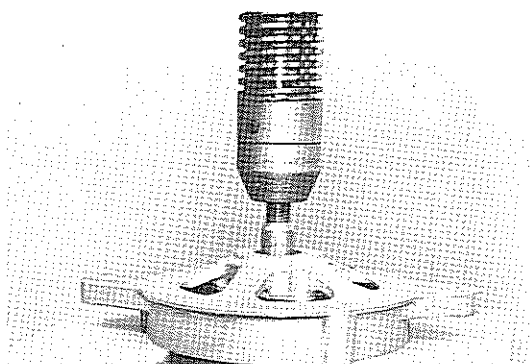
- 7. Nut, Insulator & Dust Cover
- 8. IC Regulator
- 9. Stator Coil & Rectifier Holder
- 10. Rectifier Holder with Brush

Fig. 11-34



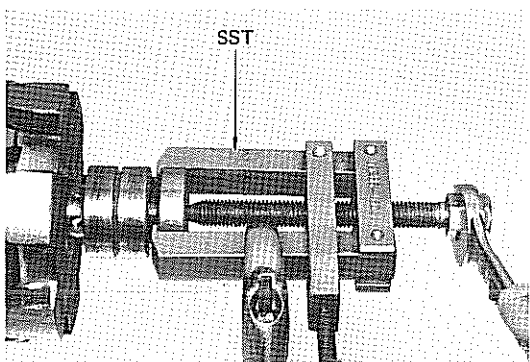
Pry the drive end frame from the stator and tap it off.

Fig. 11-35



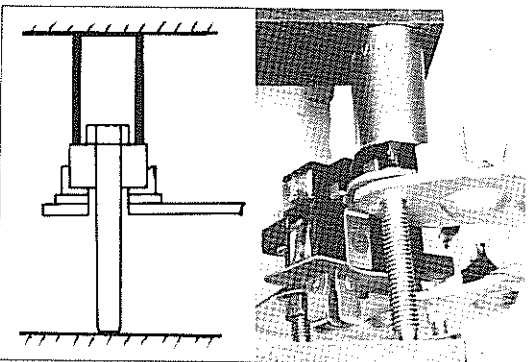
Remove the rotor from the drive end frame with a press.

Fig. 11-36



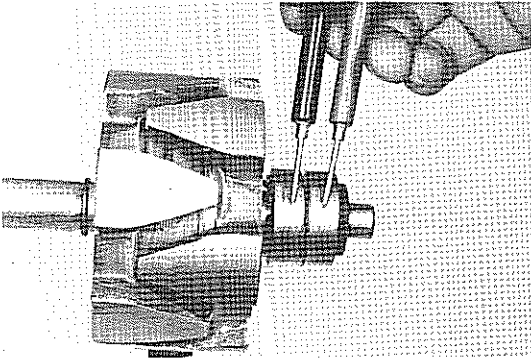
Remove the rotor shaft rear bearing with SST, SST [09286-46011]

Fig. 11-37



Remove the brush holder assembly with a 10 mm socket wrench and vise.

Fig. 11-38



INSPECTION & REPAIR

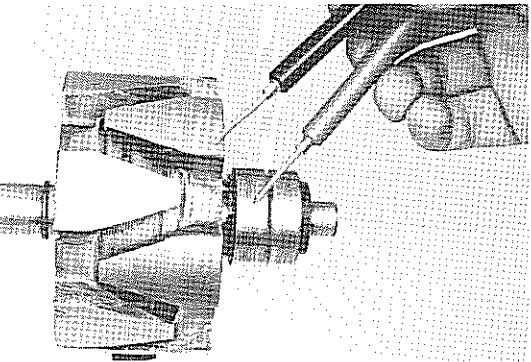
Rotor

1. Open circuit test

Standard resistance: $4.1 - 4.3 \Omega$



Fig. 11-39

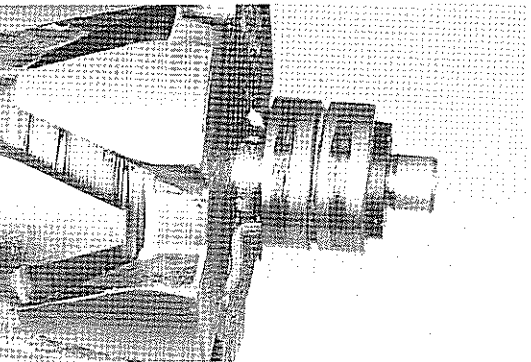


2. Ground test

Meter should indicate infinity.



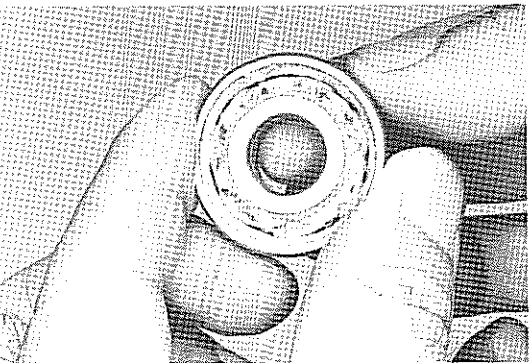
Fig. 11-40



3. Check slip ring for being dirt or burn.



Fig. 11-41

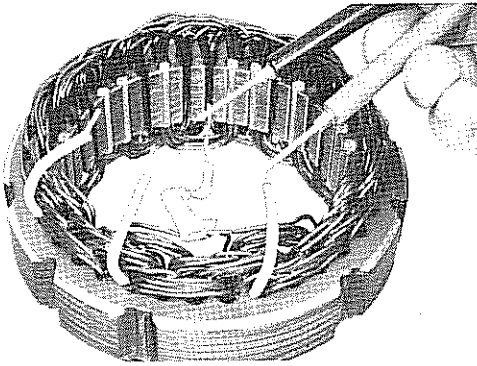


Bearing

Check bearing for wear or roughness.

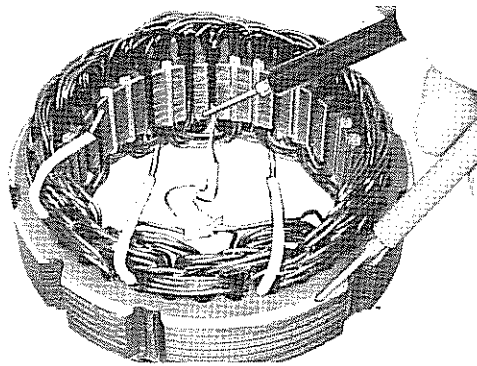


Fig. 11-42

**Stator**

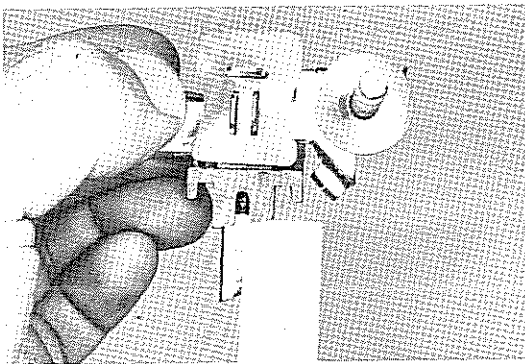
1. Open circuit test
Test all four leads for continuity.

Fig. 11-43



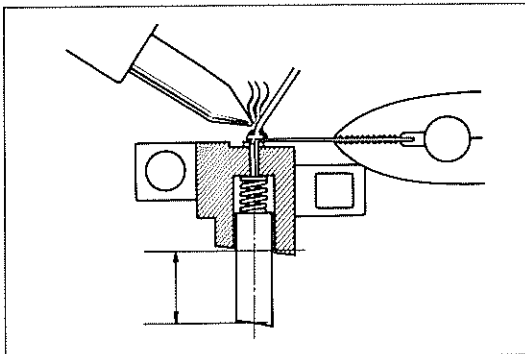
2. Ground test
Meter should indicate infinity.

Fig. 11-44

**Brush & Brush Holder**

1. Check the exposed brush length.
Minimum exposed length: 5.5 mm (0.22 in.)

Fig. 11-45



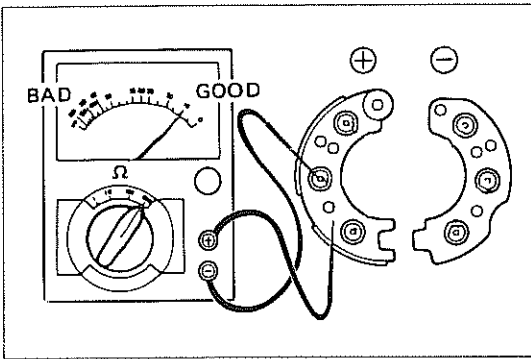
2. When replacing the brushes, assemble them as shown in the figure.

Exposed length: 12.5 mm (0.49 in.)

with IC regulator

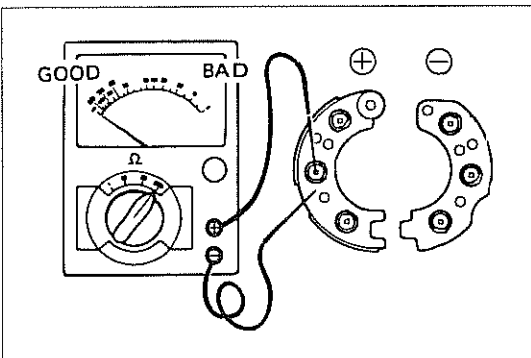
16.5 mm (0.65 in.)

Fig. 11-46

**Rectifier**

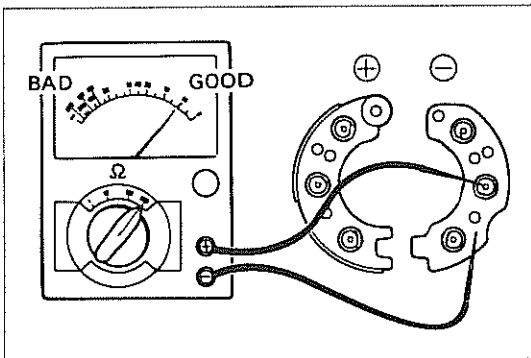
1. Rectifier holder positive side
Connect an ohmmeter (+) lead to the rectifier holder, and the (–) lead of the meter to the rectifier terminal. If there is no continuity, rectifier assembly must be replaced.

Fig. 11-47



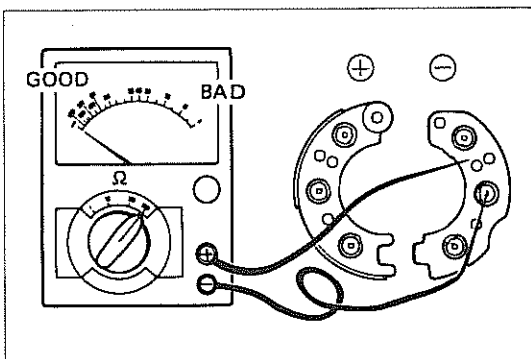
2. Reverse polarity of test leads and check again. If there is continuity, rectifier assembly must be replaced.

Fig. 11-48



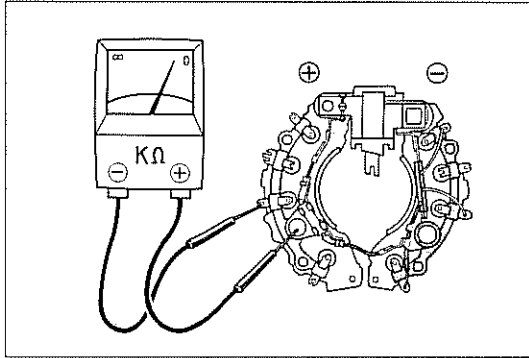
3. Rectifier holder negative side
Connect an ohmmeter (+) lead to the rectifier terminal, and the (–) lead of the meter to the rectifier holder. If there is no continuity, rectifier assembly must be replaced.

Fig. 11-49



4. Reverse polarity of test leads and check again. If there is continuity, rectifier assembly must be replaced.

Fig. 11-50

**Rectifier (for Alternator with IC Regulator)****1. Rectifier holder positive side**

Connect an ohmmeter (+) lead to the rectifier holder, and the (-) lead of the meter to the rectifier terminal. If there is no continuity, rectifier assembly must be replaced.

Fig. 11-51

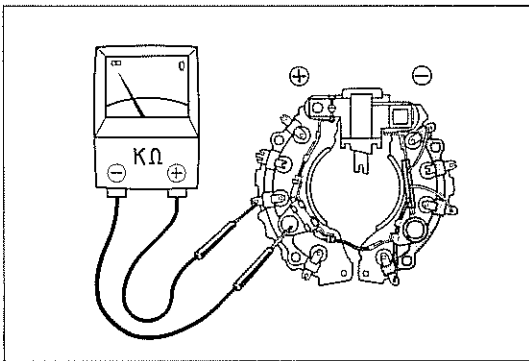
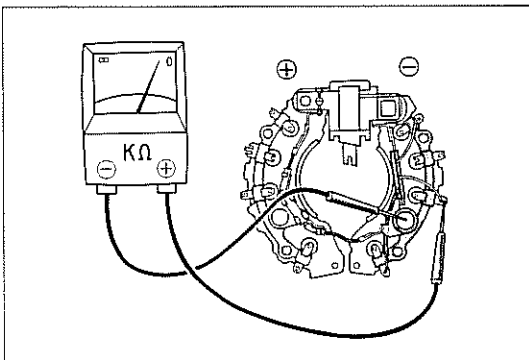
**2. Reverse polarity of test leads and check again. If there is continuity, rectifier assembly must be replaced.**

Fig. 11-52

**3. Rectifier holder negative side**

Connect an ohmmeter (+) lead to the rectifier terminal, and the (-) lead of the meter to the rectifier holder. If there is non continuity, rectifier assembly must be replaced.

Fig. 11-53

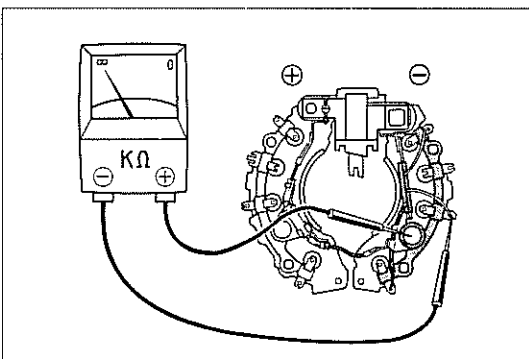
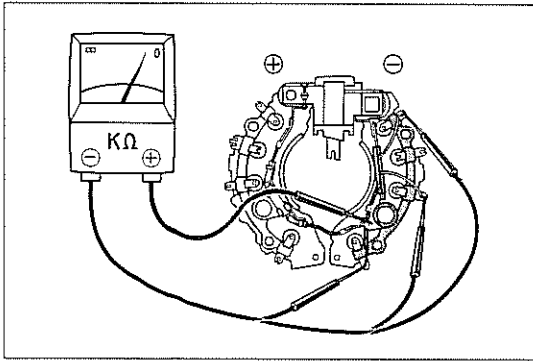
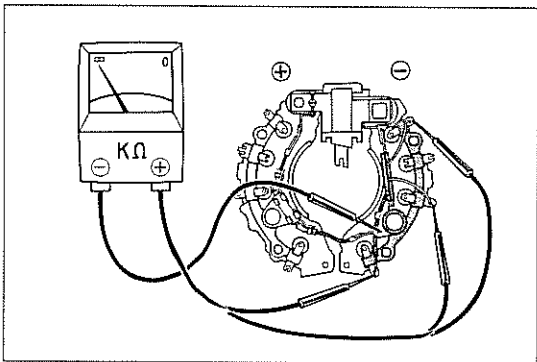
**4. Reverse polarity of test leads and check again. If there is continuity, rectifier assembly must be replaced.**

Fig. 11-54

**Field Diodes (for Alternator with IC Regulator)**

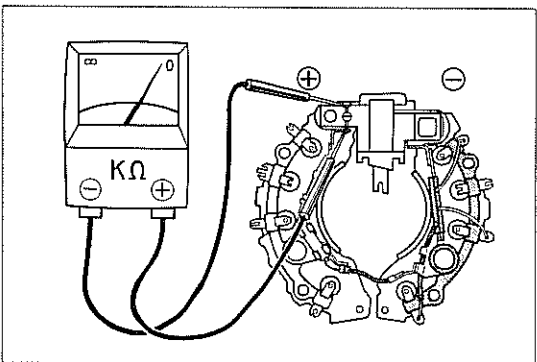
1. Connect an ohmmeter (+) lead to the rectifier holder, and the (—) lead of the meter to the field diode terminal. If there is no continuity, rectifier assembly must be replaced.

Fig. 11-55



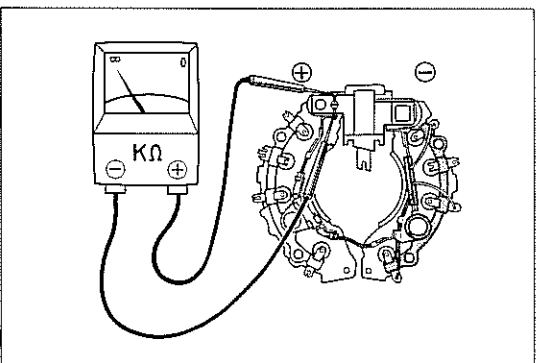
2. Reverse polarity of test leads and check again. If there is continuity, rectifier assembly must be replaced.

Fig. 11-56

**Diode (for Alternator with IC Regulator)**

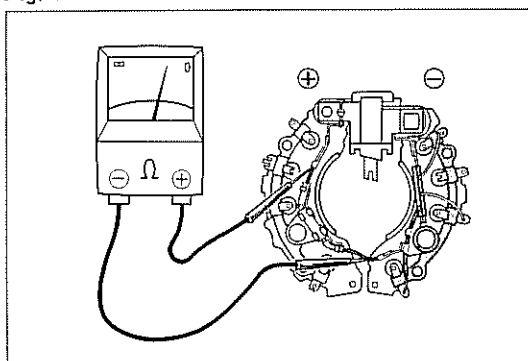
1. Connect an ohmmeter (+) lead to the resistor side, and the (—) lead of the meter to the diode other side. If there is no continuity, rectifier assembly must be replaced.

Fig. 11-57



2. Reverse polarity of test leads and check again. If there is continuity, rectifier assembly must be replaced.

Fig. 11-58

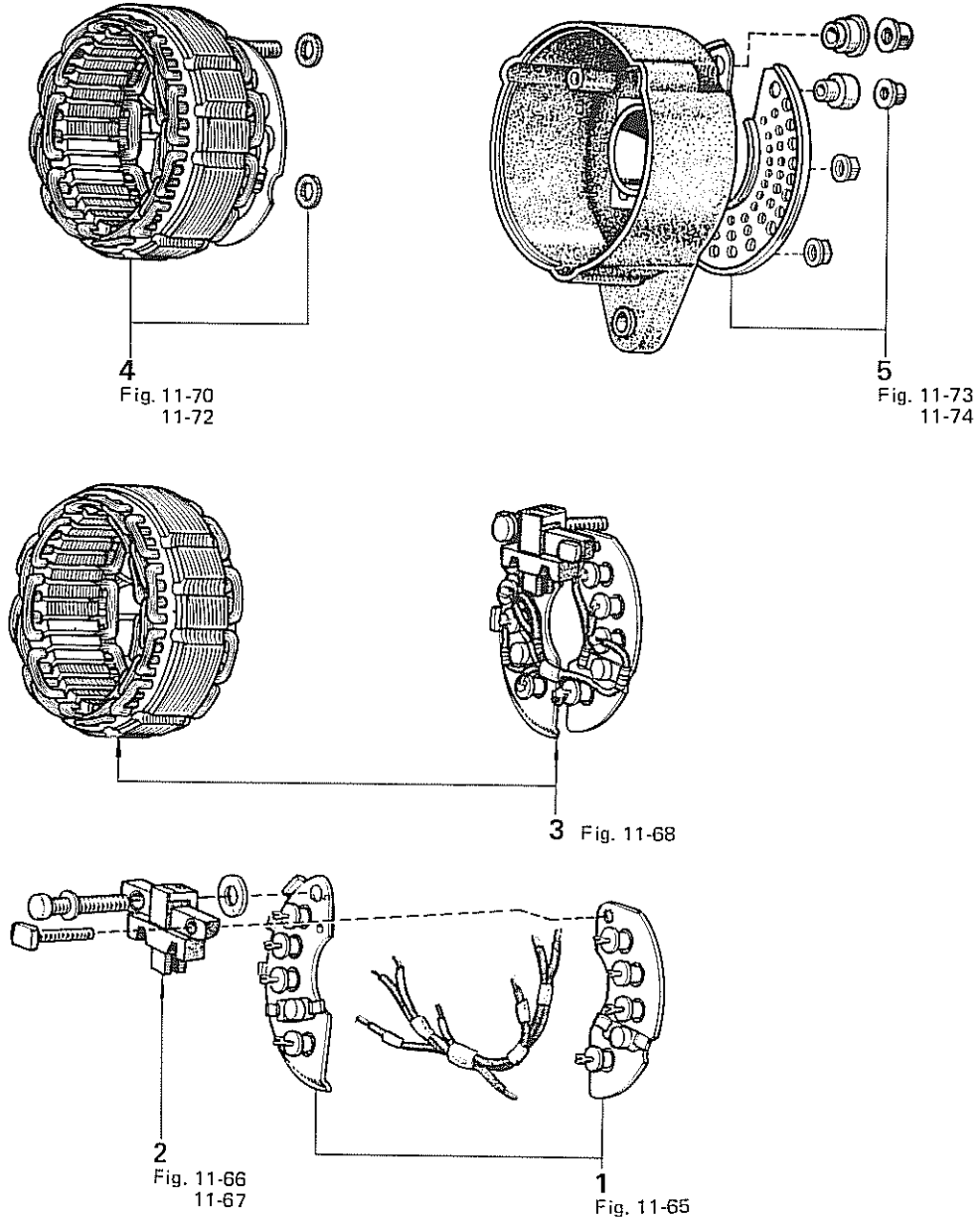
**Resistor (for Alternator with IC Regulator)**

Connect an ohmmeter (+) lead to the diode side, and the (-) lead of the meter to the (-) rectifier side. If there is no continuity, rectifier assembly must be replaced.

Resistance: 2.8 – 3.0 Ω

ASSEMBLY

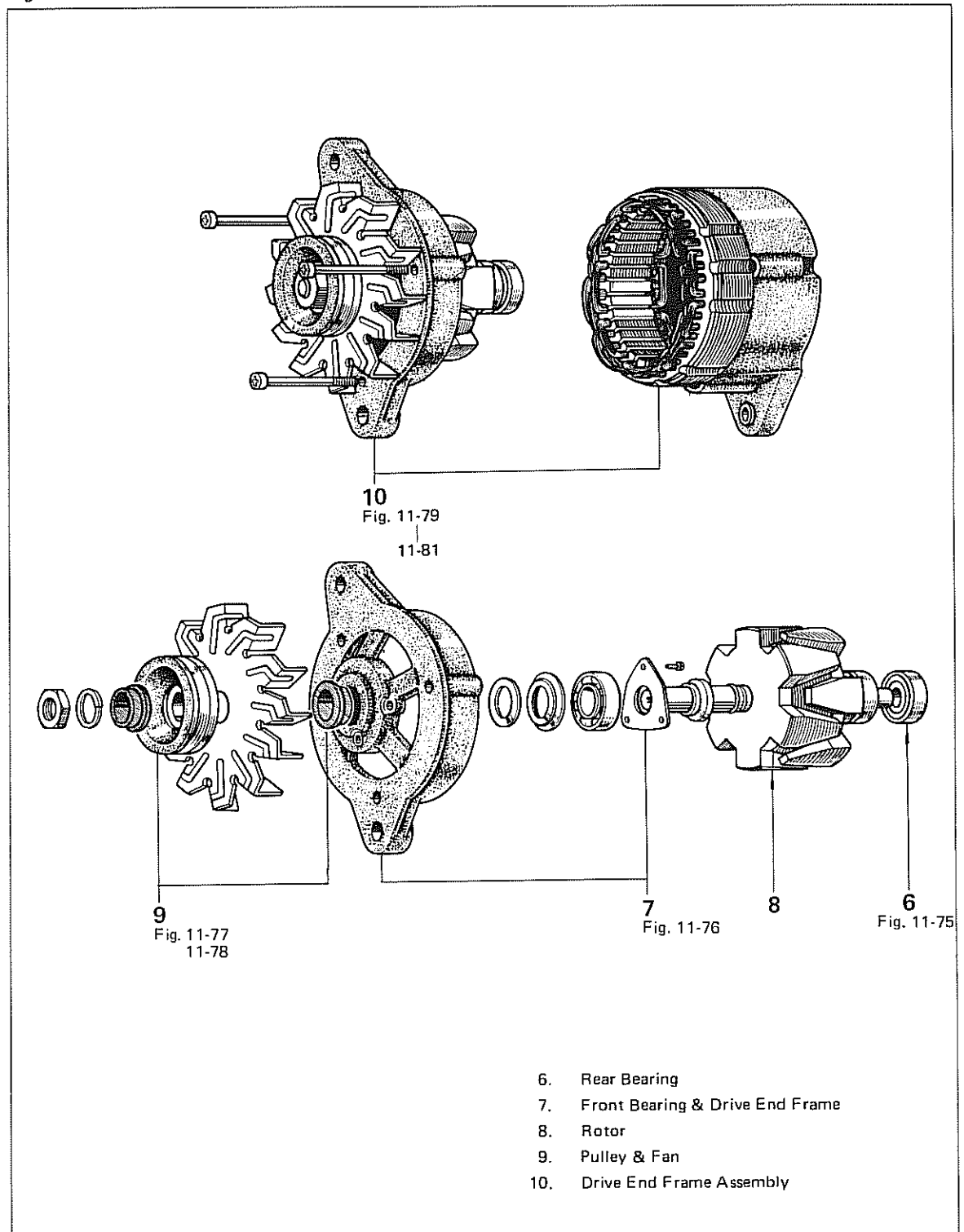
Assemble the parts in the numerical order shown in the figure.

Fig. 11-59

1. Rectifier Holder & Lead Wire
2. Brush Holder
3. Brush Holder & Rectifier Holder
4. Stator Coil, Rectifier Holder & Insulator
5. Dust Cover, Insulator & Nut

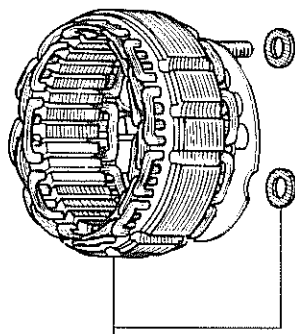
Assemble the parts in the numerical order shown in the figure.

Fig. 11-60

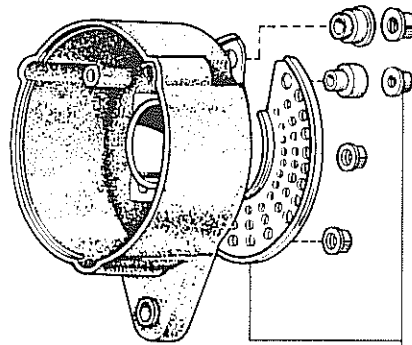


Assemble the parts in the numerical order shown in the figure.

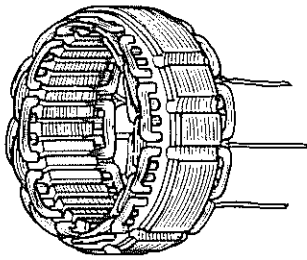
Fig. 11-61



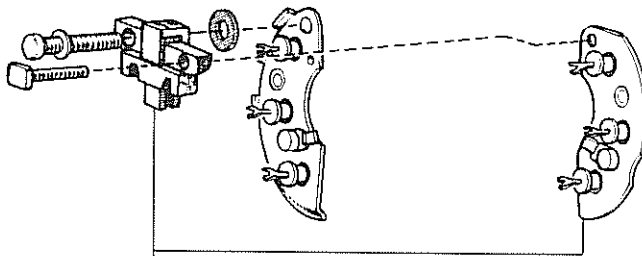
3
Fig. 11-72



4
Fig. 11-73
11-74



2
Fig. 11-69

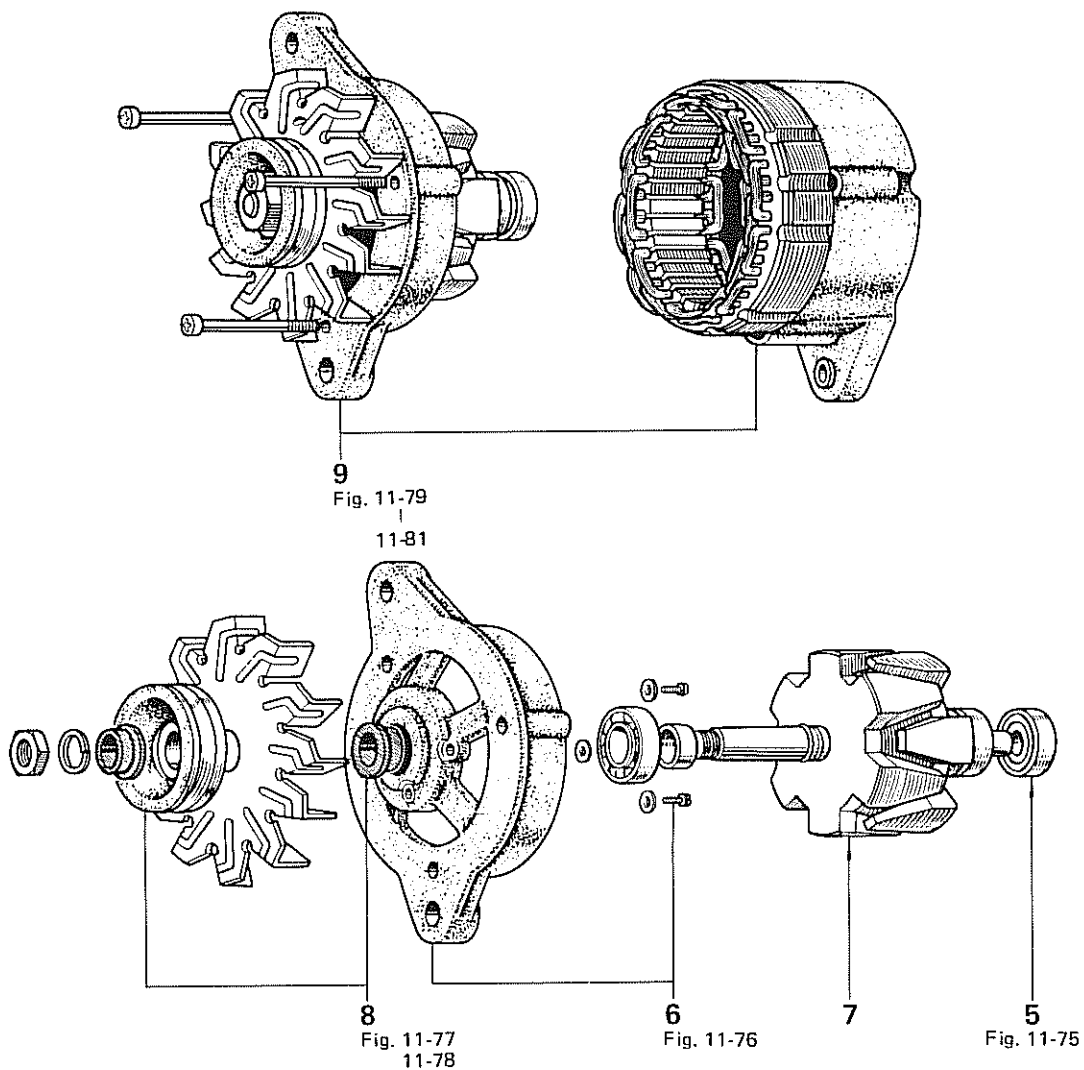


1
Fig. 11-66
11-67

1. Brush Holder & Rectifier
2. Brush Holder, Rectifier Holder & Stator Coil
3. Stator Coil, Rectifier Holder & Insulator
4. Dust Cover & Insulator

Assemble the parts in the numerical order shown in the figure.

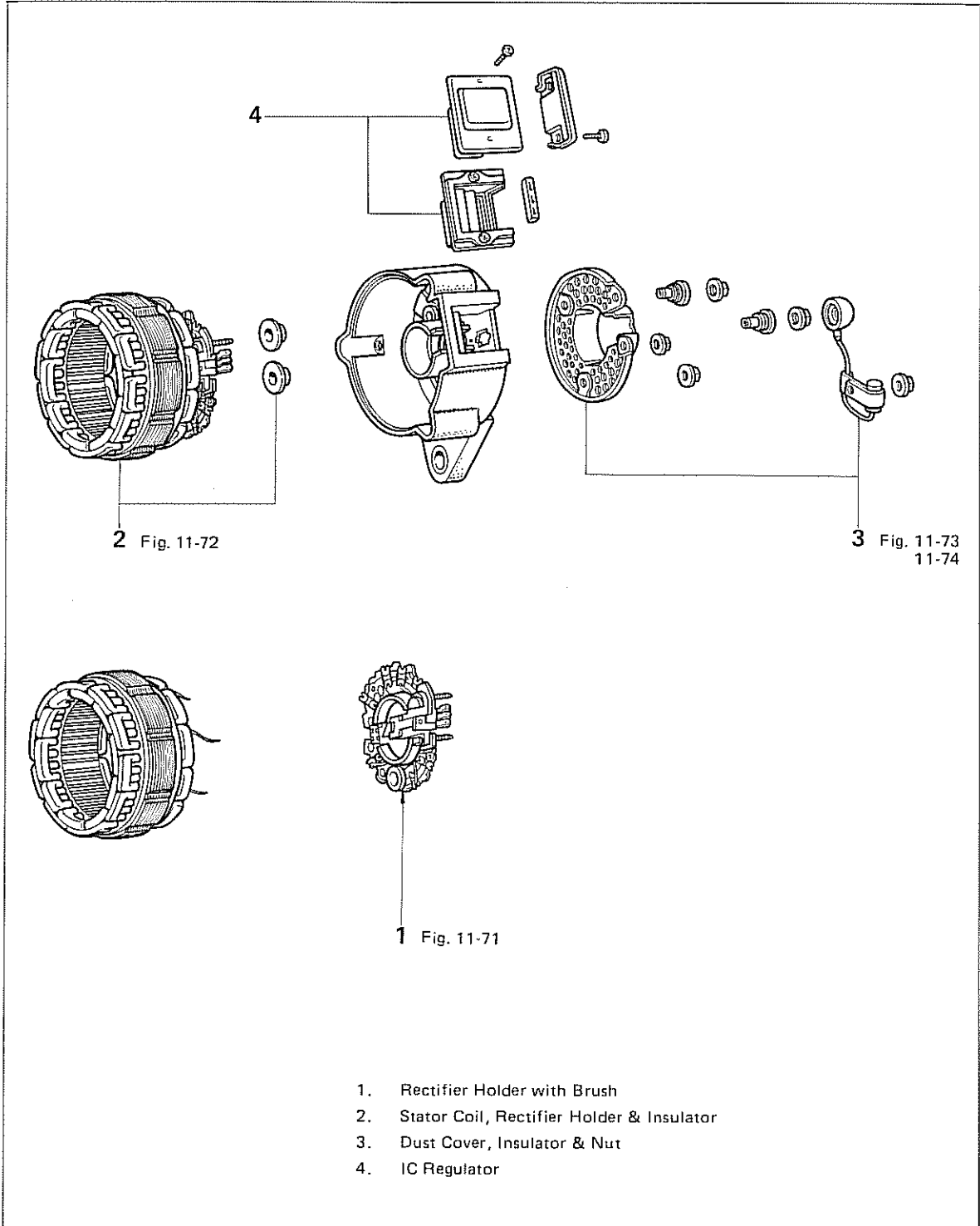
Fig. 11-62



5. Rear Bearing
6. Front Bearing & Drive End Frame
7. Rotor
8. Pulley & Fan
9. Drive End Frame Assembly, Stator Coil & End Frame

For Alternator with IC Regulator

Assemble the parts in the numerical order shown in the figure.

Fig. 11-63

Assemble the parts in the numerical order shown in the figure.

Fig. 11-64

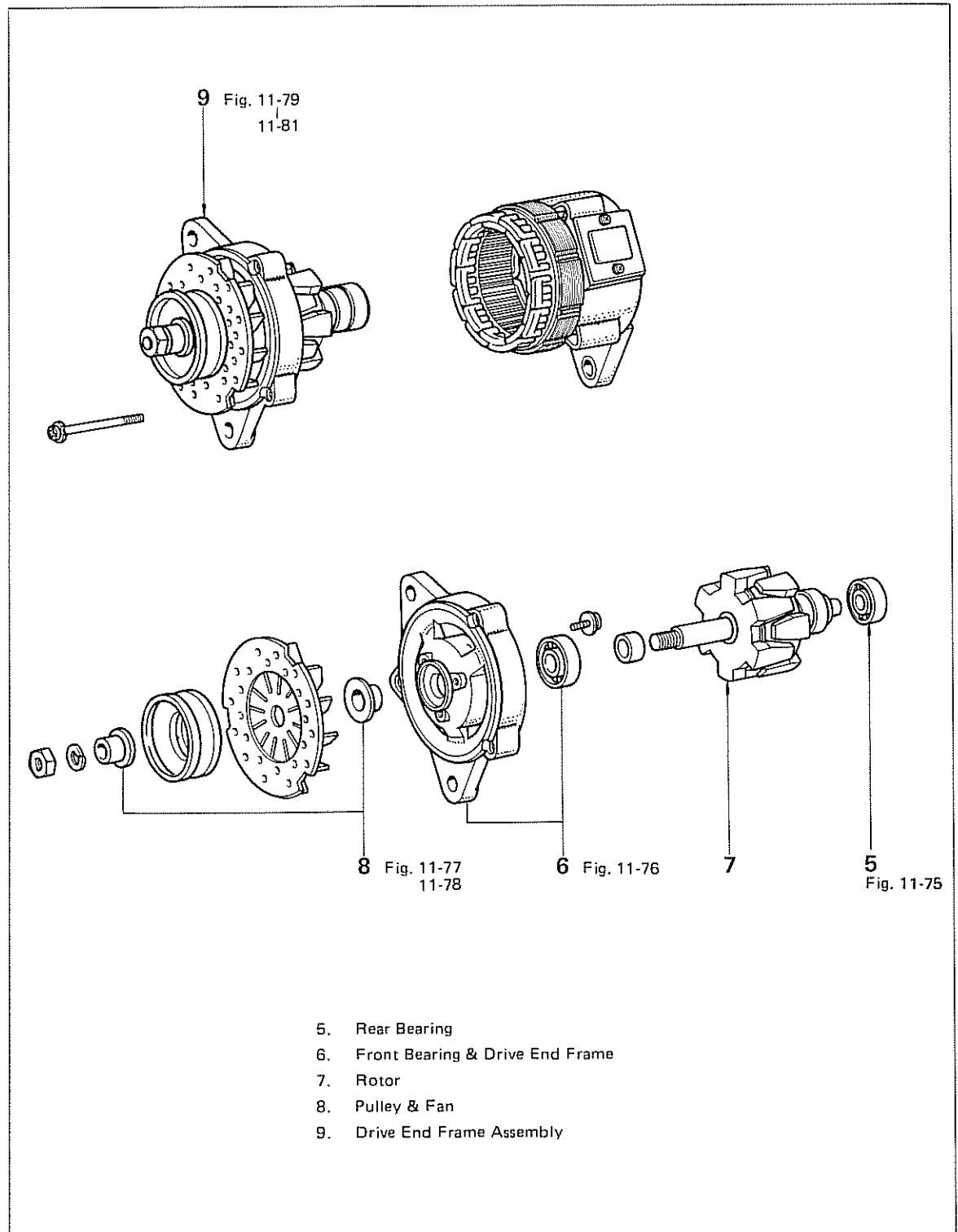
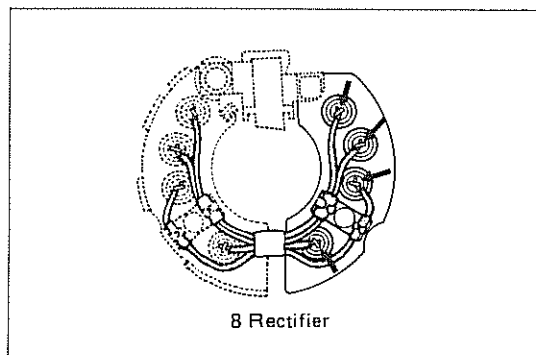
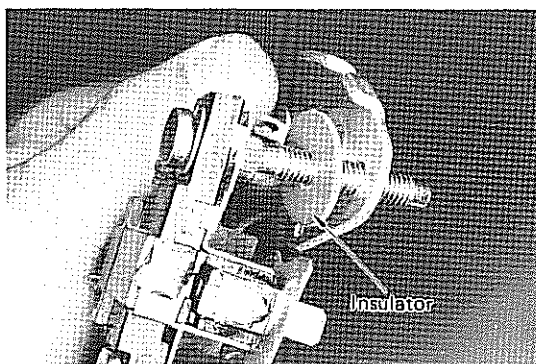


Fig. 11-65



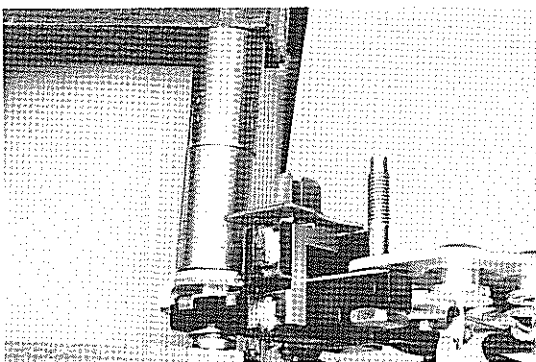
[With 8 rectifier]
Solder negative side rectifiers.

Fig. 11-66



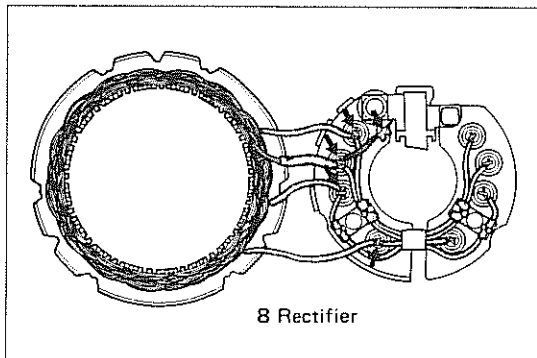
Insert insulator between the positive rectifier holder and brush holder.

Fig. 11-67



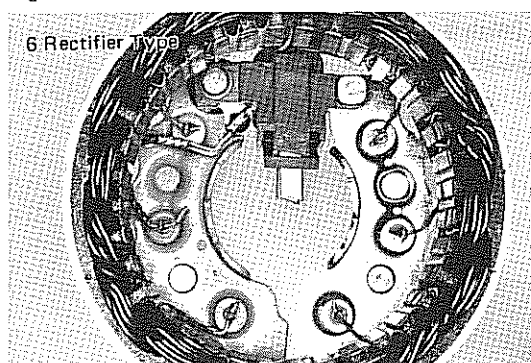
Install the brush holder onto the rectifier holder with a socket wrench and vise.

Fig. 11-68



[With 8 rectifier]
Connect stator coil N lead onto (+) rectifier terminal and brush holder terminal.

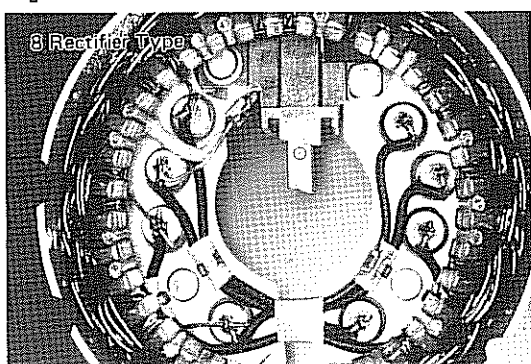
Fig. 11-69



[With 6 rectifier]

Solder each lead wire onto rectifier or terminal as shown in the figure.

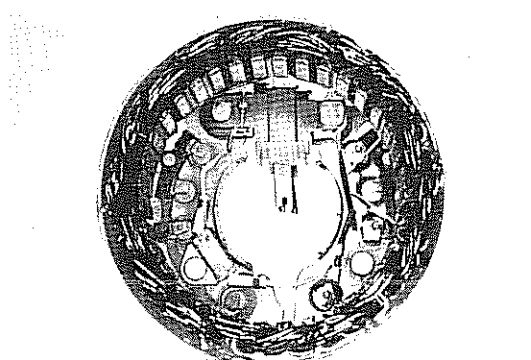
Fig. 11-70



[With 8 rectifier]

Solder each lead wire onto rectifier or terminal as is shown in the figure.

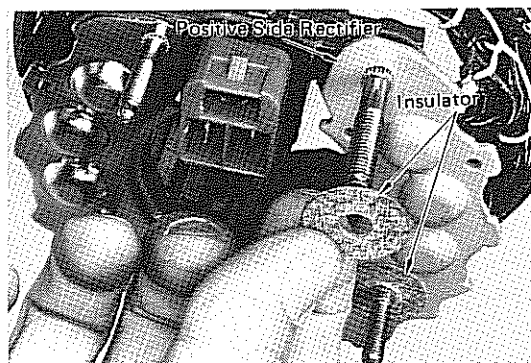
Fig. 11-71



[with IC regulator]

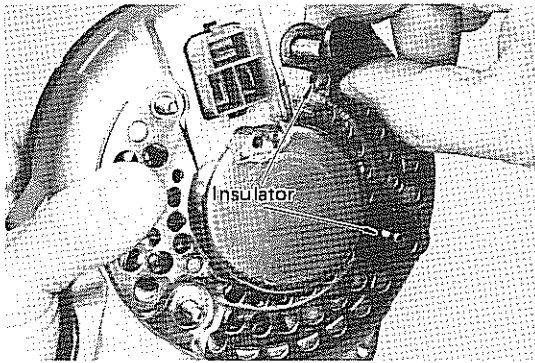
Solder each lead wire onto rectifier or terminal as is shown in the figure.

Fig. 11-72



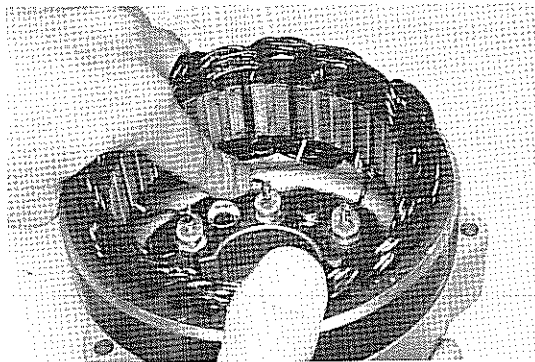
Assemble the rear end frame and rectifier holder with insulators.

Fig. 11-73



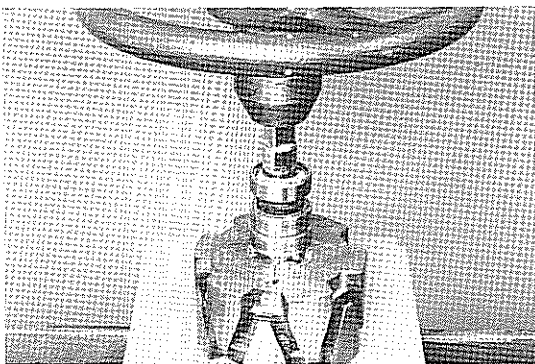
Assemble the rear end cover with the insulators.

Fig. 11-74



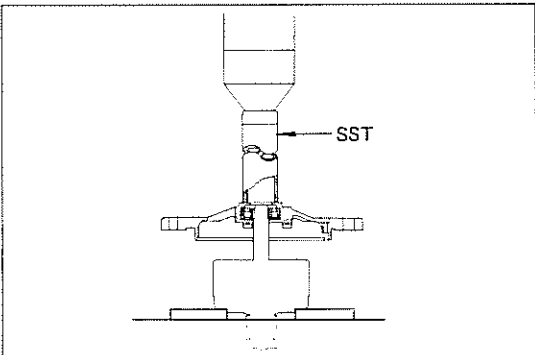
If there is danger of the stator coil terminal wiring contacting the frame or rotor, correct by bending the wiring.

Fig. 11-75



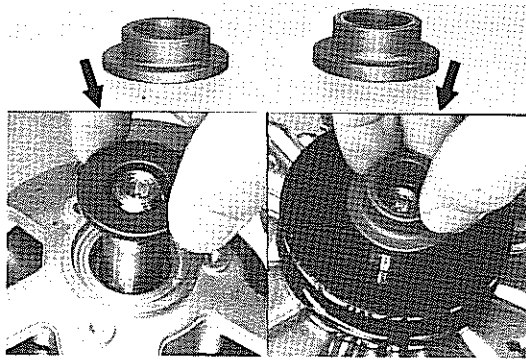
Press the rear bearing onto the rotor shaft, with a press.

Fig. 11-76



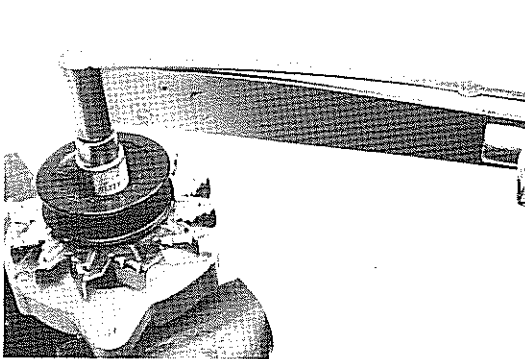
Press and drive the end frame assembly onto the rotor shaft with SST.
SST[09612-22010]

Fig. 11-77



Install the collars as shown in the figure.

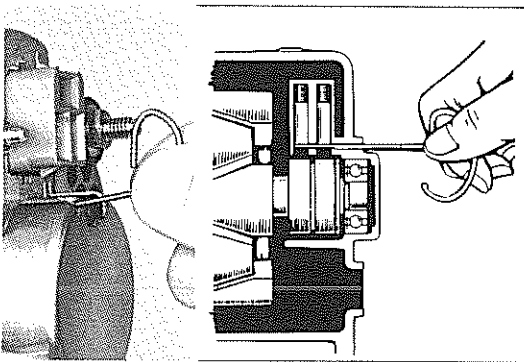
Fig. 11-78



Tighten the nut to specified torque.

Tightening torque: 5.0 – 6.5 kg-m
(37 – 47 ft-lb)

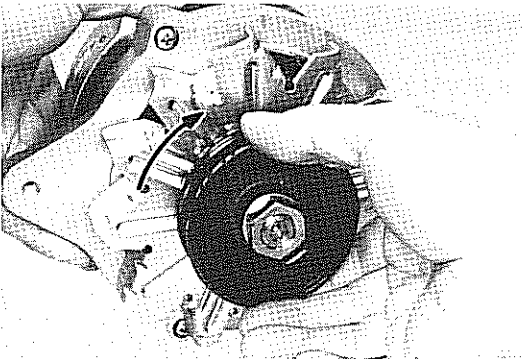
Fig. 11-79



Push in brushes and temporarily lock them in place with a wire inserted through the access hole in end frame.

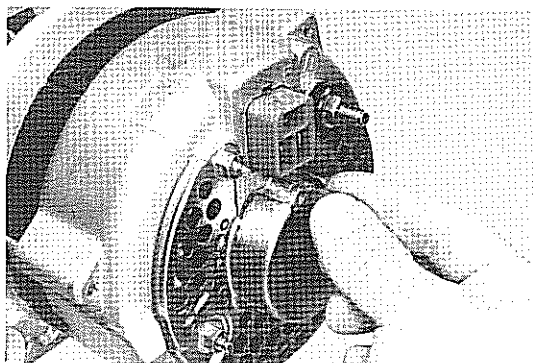
Position lead wires to clear rotor.

Fig. 11-80



Remove locking wire from the rear end frame and make sure the rotor rotates smoothly.

Fig. 11-81



Seal the brush service hole.

ALTERNATOR REGULATOR

Fig. 11-82

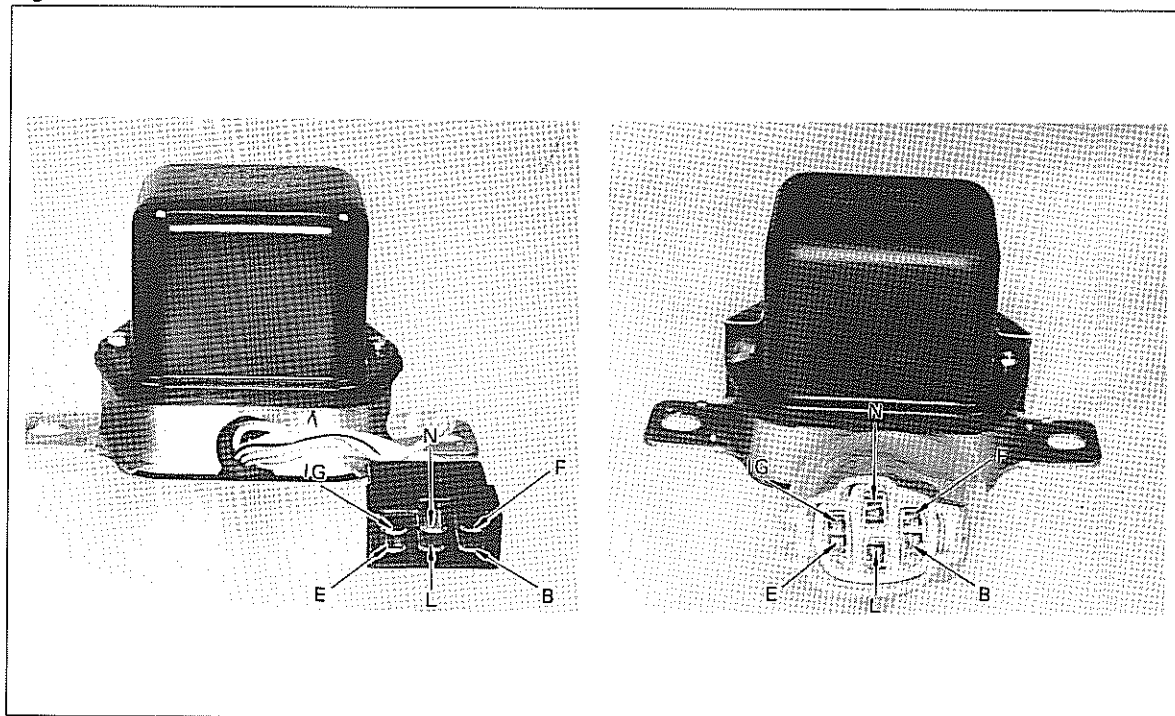
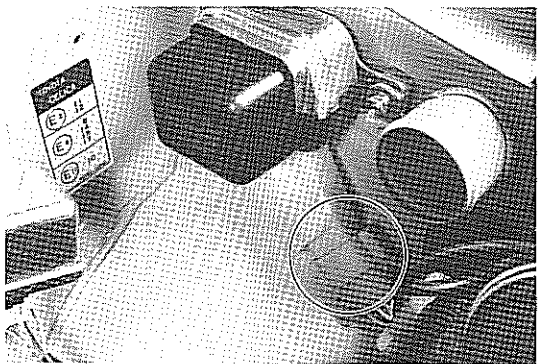


Fig. 11-83

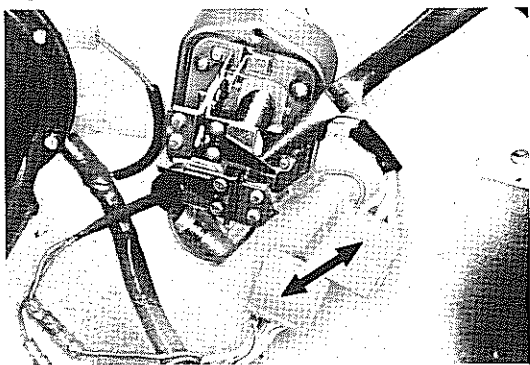


INSPECTION & ADJUSTMENT



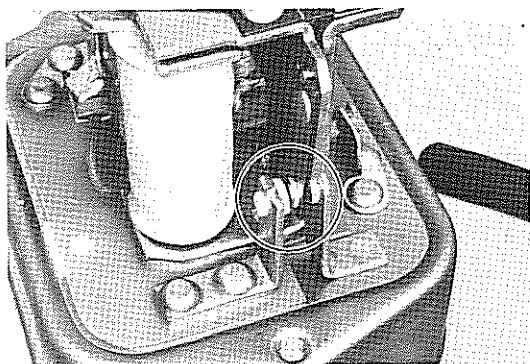
Check the connector fitting condition before inspecting the regulator.

Fig. 11-84



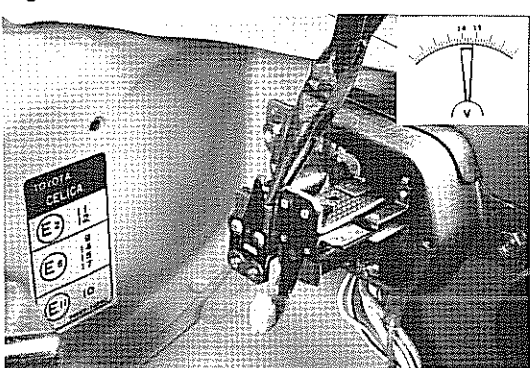
Always be sure to have the regulator connector pulled out when inspecting and adjusting.

Fig. 11-85



Inspect each point surface for burn or excessive damage. Replace if defective.

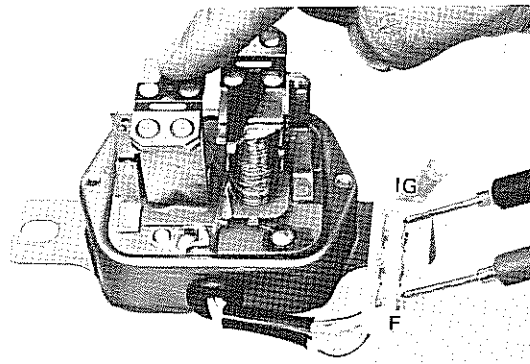
Fig. 11-86



Voltage adjustment
To adjust, bend the voltage regulator adjusting arm.

Regulated voltage: 13.8 – 14.8V

Fig. 11-87

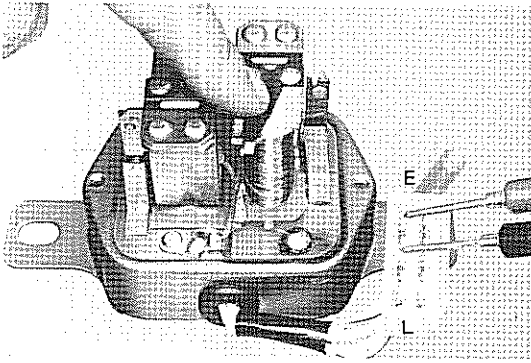


Resistance measurement between terminals.

IG – F

Voltage regulator	At rest 0 Ω
	Pulled in approx. 11 Ω

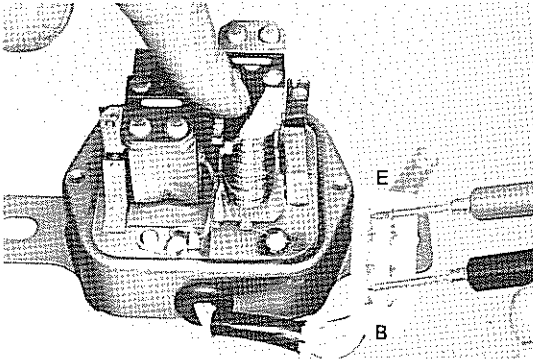
Fig. 11-88



L — E

Voltage relay	At rest	0 Ω
	Pulled in approx.	100 Ω

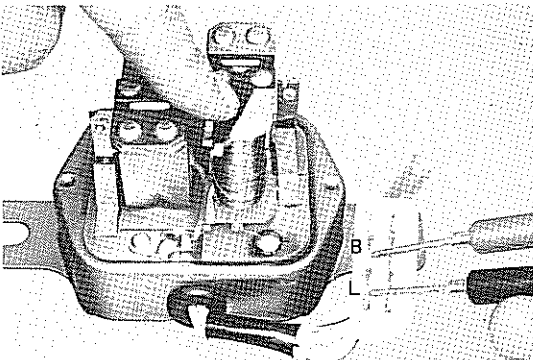
Fig. 11-89



B — E

Voltage relay	At rest	infinity
	Pulled in approx.	100 Ω

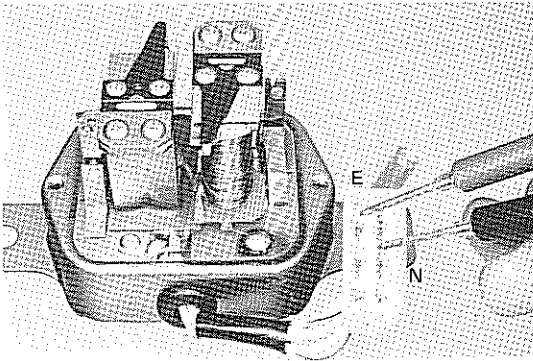
Fig. 11-90



B — L

Voltage relay	At rest	infinity
	Pulled in	0 Ω

Fig. 11-91



N — E

Approx. 25 Ω

MEMO

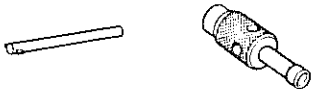
SST & SERVICE SPECIFICATIONS

	Page
SST(SPECIAL SERVICE TOOL)	12-2
STANDARD BOLT TIGHTENING TORQUE ...	12-10
2T & 3T ENGINE TIGHTENING TORQUE FOR MAIN PARTS ...	12-12
2T & 3T ENGINE SERVICE SPECIFICATIONS	12-12
2T-G ENGINE TIGHTENING TORQUE FOR MAIN PARTS ...	12-27
2T-G ENGINE SERVICE SPECIFICATIONS...	12-27

SST(SPECIAL SERVICE TOOL)**2T & 3T ENGINE TUNE-UP****Engine Oil**

Illustration	Tool No.	Tool Name
	09228-44010	Oil Filter Wrench

Idle Speed & Idle Mixture Adjustment

Illustration	Tool No.	Tool Name
	09243-00020	Idle Adjusting Screw Wrench

2T-G ENGINE TUNE-UP**Engine Oil**

Illustration	Tool No.	Tool Name
	09228-44010	Oil Filter Wrench

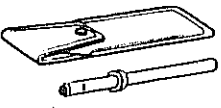
Valve Timing

Illustration	Tool No.	Tool Name
	09248-27010	Valve Timing Adjusting Gauge

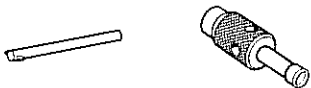
Valve Clearance

Illustration	Tool No.	Tool Name
	09248-27010	Valve Timing Adjusting Gauge

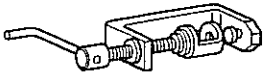
Carburetor

Illustration	Tool No.	Tool Name
	09240-27010	Float Level Gauge (Before Sept., 1979)
	09240-27020	Float Level Gauge (After Sept., 1979)

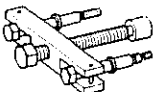
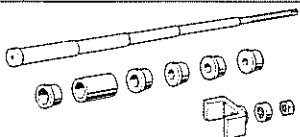
Idle Speed & Idle Mixture Adjustment

Illustration	Tool No.	Tool Name
	09243-00020	Idle Adjusting Screw Wrench

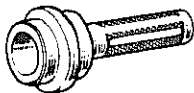
2T & 3T ENGINE SERVICE**Cylinder Head**

Illustration	Tool No.	Tool Name
	09201-60011	Valve Stem Guide Remover & Replacer
	09202-43013	Valve Spring Compressor

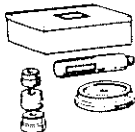
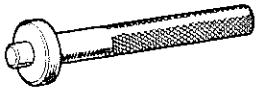
Timing Chain

Illustration	Tool No.	Tool Name
	09213-31021	Crankshaft Pulley Puller
	09214-60010	Crankshaft Pulley & Gear Replacer
	09215-25010	Camshaft Bearing Remover & Replacer

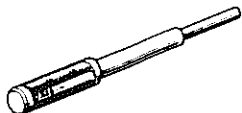
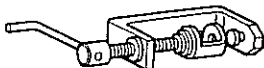
Timing Chain (Cont'd)

Illustration	Tool No.	Tool Name
	09223-22010	Crankshaft Front Oil Seal Replcaer

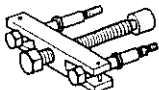
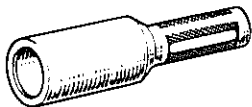
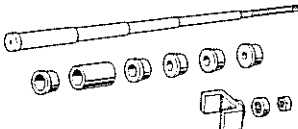
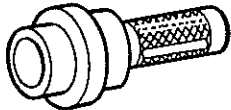
Cylinder Block

Illustration	Tool No.	Tool Name
	09221-25015	Piston Pin Remover & Replacer
	09250-10011	A Replacer Set
	09303-35011	Input Shaft Front Bearing Puller
	09304-12012	Input Shaft Front Bearing Replacer

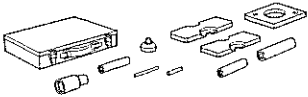
2T-G ENGINE SERVICE**Cylinder Head**

Illustration	Tool No.	Tool Name
	09201-60011	Valve Stem Guide Remover & Replacer
	09202-43013	Valve Spring Compressor
	09248-27010	Valve Timing Adjusting Gauge

Timing Chain

Illustration	Tool No.	Tool Name
	09213-31021	Crankshaft Pulley Puller
	09214-60010	Crankshaft Pulley & Gear Replacer
	09215-25010	Crankshaft Bearing Remover & Replacer
	09223-22010	Crankshaft Front Oil Seal Replacer

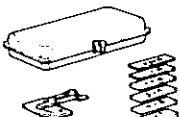
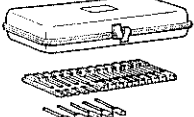
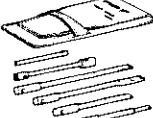
COOLING SYSTEM**Water Pump**

Illustration	Tool No.	Tool Name
	09236-00100	Water Pump Overhaul Tool Set

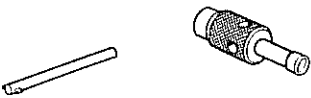
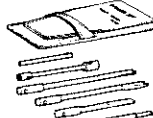
Water Pump (With Temperature Controlled Coupling)

Illustration	Tool No.	Tool Name
	09236-00100	Water Pump Overhaul Tool Set

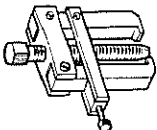
FUEL SYSTEM**Carburetor**

Illustration	Tool No.	Tool Name
	09240-00014	Carburetor Adjusting Gauge Set
	09240-00020	Wire Gauge Set
	09243-00020	Idle Adjusting Screw Wrench
	09860-11011	Carburetor Driver Set

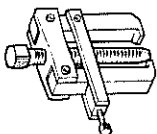
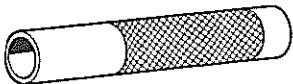
Solex Carburetor

Illustration	Tool No.	Tool Name
	09243-00020	Idle Adjusting Screw Wrench
	09860-11011	Carburetor Driver Set

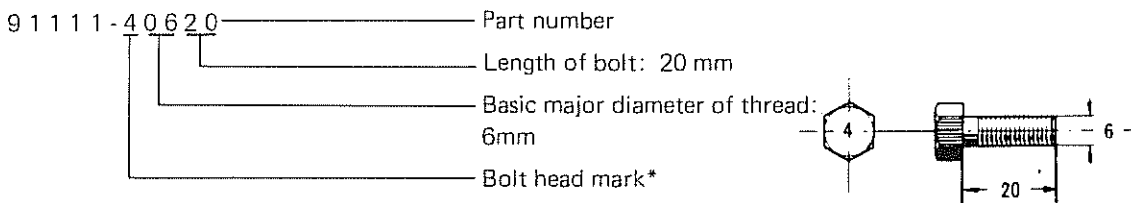
STARTING SYSTEM**Reduction Type Starter**

Illustration	Tool No.	Tool Name
	09285-76010	Injection Camshaft Bearing Cone Replacer
	09286-46011	Injection Pump Spline Shaft Puller

CHARGING SYSTEM**Alternator**

Illustration	Tool No.	Tool Name
	09286-46011	Injection Pump Spline Shaft Puller
	09612-22010	Tilt Handle Bearing Replacer

STANDARD BOLT TIGHTENING TORQUE



* Explanation of bolt head marks are as indicated in the following table.

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Basic diameter mm	Pitch mm	Torque limit kg-m (ft-lb)
4T	6	1	0.4 – 0.7 (3 – 5)
	8	1.25	1.0 – 1.6 (8 – 11)
	10	1.25	1.9 – 3.1 (14 – 22)
	10	1.5	1.8 – 3.0 (14 – 21)
	12	1.25 (ISO)	3.5 – 5.5 (26 – 39)
	12	1.5	3.5 – 5.5 (26 – 39)
	12	1.75	3.0 – 5.0 (22 – 36)
	13	1.5	4.5 – 7.0 (33 – 50)
	14	1.5	5.0 – 8.0 (37 – 57)
	14	2	4.7 – 7.7 (34 – 55)
	16	1.5	7.5 – 11.0 (55 – 79)
	16	2	7.1 – 10.6 (52 – 76)
5T	6	1	0.6 – 0.9 (5 – 6)
	8	1.25	1.5 – 2.2 (11 – 15)
	10	1.25	3.0 – 4.5 (22 – 32)
	10	1.5	2.7 – 4.2 (20 – 30)
	12	1.25 (ISO)	5.0 – 8.0 (37 – 57)
	12	1.5	5.0 – 7.0 (37 – 50)
	12	1.75	4.8 – 6.8 (35 – 49)
	13	1.5	6.5 – 9.0 (48 – 65)
	14	1.5	7.5 – 11.0 (55 – 79)
	14	2	7.0 – 10.5 (51 – 75)
	16	1.5	12.0 – 17.0 (87 – 122)
	16	2	11.5 – 16.5 (84 – 119)
6T	6	1	0.6 – 0.9 (5 – 6)
	8	1.25	1.5 – 2.2 (11 – 15)
	10	1.25	3.0 – 4.5 (22 – 32)
	10	1.5	2.7 – 4.2 (20 – 30)
	12	1.25 (ISO)	5.0 – 8.0 (37 – 57)
	12	1.5	5.0 – 7.0 (37 – 50)
	12	1.75	4.8 – 6.8 (35 – 49)

SPECIFIED TORQUE FOR STANDARD BOLTS (Cont'd)

Class	Basic diameter mm	Pitch mm	Torque limit kg-m (ft-lb)
7T	6	1	0.8 – 1.2 (6 – 8)
	8	1.25	2.0 – 3.0 (15 – 21)
	10	1.25	4.0 – 5.5 (29 – 39)
	10	1.5	3.7 – 5.2 (27 – 37)
	12	1.25 (ISO)	7.5 – 10.5 (55 – 75)
	12	1.5	7.0 – 9.0 (51 – 65)
	12	1.75	6.0 – 8.5 (44 – 61)
	13	1.5	8.0 – 12.0 (58 – 86)
	14	1.5	10.0 – 15.0 (73 – 108)
	14	2	9.5 – 14.0 (69 – 101)
	16	1.5	15.0 – 23.0 (109 – 166)
	16	2	14.0 – 22.0 (102 – 159)

– Note –

These torque specifications are applicable only for steel (female) threads. They do not apply to other types of material or if the tightening surface is subjected to heat or vibration.

2T & 3T ENGINE TIGHTENING TORQUE FOR MAIN PARTS

Tightening parts	kg-m	ft-lb
Rocker arm support x Cylinder head		
x Cylinder block	8.5 – 9.5	61 – 68
Intake manifold x Cylinder head	1.8 – 2.5	13 – 18
Exhaust manifold x Cylinder head	3.0 – 4.5	22 – 32
Crankshaft bearing cap x Cylinder block	7.2 – 8.8	53 – 63
Connecting rod cap x Connecting rod	4.0 – 5.0	29 – 36
Crankshaft pulley x Crankshaft	6.5 – 8.5	47 – 61
Flywheel x Crankshaft	7.5 – 10.5	55 – 75
Camshaft timing sprocket x Camshaft	7.0 – 11.0	51 – 79
Spark plug x Cylinder head	1.5 – 2.1	11 – 15
Oil pan x Cylinder block	0.5 – 0.8	44 – 69 in.-lb
Exhaust manifold x Exhaust pipe	4.0 – 5.0	29 – 36

2T & 3T ENGINE SERVICE SPECIFICATIONS

ENGINE TUNE-UP

[Except USA & Canada]

Drive belt tension	at 10 kg (22 lb)			
Fan – Alternator		8 – 12 mm		0.3 – 0.5 in.
Crank – Cooler compressor		11 – 14 mm		0.4 – 0.6 in.
Battery electrolyte specific gravity	at 20°C (68°F)	1.25 – 1.27		
Engine oil capacity				
TE, TA & TT series				
Dry refill	w/Oil filter	4.2 liters	4.4 US qt	3.7 Imp. qt
Drain & refill	w/Oil filter	3.8 liters	4.0 US qt	3.3 Imp. qt
	w/o Oil filter	3.3 liters	3.5 US qt	2.9 Imp. qt
Coolant capacity	w/Heater	8.0 liters	8.5 US qt	7.0 Imp. qt
Spark plug				
Type	ND	W16EP, W16EPR		
	NGK	BP5ES-L, BPR5ES		
Gap		0.7 – 0.8 mm		0.028 – 0.031 in.
Distributor				
Dwell angle		52°		
Rubbing block gap		0.4 – 0.5 mm		0.016 – 0.020 in.

[Except USA & Canada] (Cont'd)

Damping spring gap			0.1 – 0.4 mm	0.004 – 0.016 in.
Ignition timing	at Idle speed		10° BTDC	
			3.5° BTDC (For Iraq, Chile and Peru)	
Firing order			1–3–4–2	
Valve clearance	Hot	Intake	0.20 mm	0.008 in.
		Exhaust	0.33 mm	0.013 in.
	Cold	Intake	0.18 mm	0.007 in.
		Exhaust	0.30 mm	0.012 in.
Idle speed	at Neutral			
	2T	M/T	650 rpm	
		A/T	750 rpm	
	2T-B	M/T	800 rpm	
	3T	M/T	650 rpm	
		A/T	750 rpm	
	3T-C	M/T	700 rpm	
		A/T	750 rpm	
Idle mixture speed	at Neutral			
	3T	M/T	700 rpm	
		A/T	800 rpm	
	3T-C	M/T	760 rpm	
		A/T	810 rpm	
CO concentration	at Idle speed		1.0 – 2.0 %	
Intake manifold vacuum	at Idle speed			
	2T & 2T-B	M/T	More than 430 mmHg (16.9 in.Hg)	
	2T	A/T	More than 400 mmHg (15.7 in.Hg) (N range)	
	3T & 3T-C	M/T	More than 450 mmHg (17.7 in.Hg) (N range)	
		A/T	More than 400 mmHg (15.7 in.Hg) (N range)	
Fast idle speed	2T & 3T		(a) New vehicle 2,300 rpm	
			(b) After 1,000 km 2,700 rpm	
	2T-B		(a) New vehicle 2,200 rpm	
			(b) After 1,000 km 2,500 rpm	
	3T-C	M/T	3,200 rpm	
		A/T	3,000 rpm	
Throttle positioner setting speed				
	2T	M/T	1,300 rpm	
	2T-B	M/T	1,200 rpm	
	3T-C		1,400 rpm	
	3T	M/T	1,300 rpm	
		A/T	1,000 rpm	

[Except USA & Canada] (Cont'd)

Compression pressure		at 250 rpm	
2T, 3T & 3T-C	STD	11.5 kg/cm ²	163 psi
	Limit	9.0 kg/cm ²	128 psi
2T-B	STD	12.0 kg/cm ²	170 psi
	Limit	10.0 kg/cm ²	142 psi
Difference between each cylinder		Less than 1.0 kg/cm ² (14 psi)	

[For USA & Canada]

Drive belt tension (w/Borroughs drive belt tension gauge No. BT-33-73F)				
New belt (All)				125 ± 25 lb
Used belt (All)				80 ± 20 lb
Battery electrolyte specific gravity at 20°C (68°F)				1.25 – 1.27
Engine oil capacity				
Dry fill			4.2 liters	4.4 US qt 3.7 Imp. qt
Drain & refill	w/Oil filter change		3.8 liters	4.0 US qt 3.3 Imp. qt
	w/o Oil filter change		3.3 liters	3.5 US qt 2.9 Imp. qt
Coolant capacity	w/Heater	M/T	8.0 liters	8.5 US qt 7.0 Imp. qt
		A/T	7.9 liters	8.4 US qt 7.0 Imp. qt
Spark plug				
Type	for U.S.A.	ND	W14EX-U11, W16EX-U11	
		NGK	BP5EA-11, BP5EA-L11	
	for Canada	ND	W16EPR, W16EXR-U, W14EXR-U	
		NGK	BPR5ES, BPR5EA-L, BPR5EA	
Gap	for U.S.A.		1.1 mm	0.043 in.
	for Canada		0.8 mm	0.031 in.
Distributor air gap			0.2 – 0.4 mm	0.008 – 0.016 in.
Ignition timing			10° BTDC @ Max. 950 rpm (w/Sub-vacuum advancer OFF)	
Firing order			1 – 3 – 4 – 2	
Valve clearance	Hot	Intake	0.20 mm	0.008 in.
		Exhaust	0.33 mm	0.013 in.
Idle mixture speed (w/Cooling fan OFF – Canada only)	M/T	w/o P.S	760 rpm	
		w/P.S	920 rpm	
	A/T	w/o P.S	810 rpm	
		w/P.S	920 rpm	

[For USA & Canada] (Cont'd)

Idle speed	M/T	w/o P.S	700 rpm
(w/Cooling fan OFF		w/P.S	850 rpm
– Canada only)	A/T	w/o P.S	750 rpm
		w/P.S	850 rpm
Fast idle speed	for Fed. & Canada	w/o P.S	3,000 rpm
(w/Cooling fan OFF		w/P.S	2,800 rpm
– Canada only)	for California	w/o P.S	2,800 rpm
		w/P.S	2,600 rpm
Intake manifold vacuum	at Idle speed		More than 450 mmHg (17.7 in.Hg)
Throttle positioner setting speed			
	for Federal	M/T	1,600 rpm
		A/T	1,300 rpm
	for California		1,400 rpm
Compression pressure		STD	More than 11.5 kg/cm ² (163 psi)
		Limit	9.0 kg/cm ² 128 psi
Difference between each cylinder			Less than 1.0 kg/cm ² (14 psi)

ENGINE**Cylinder Head**

Surface warpage	Limit	0.05 mm	0.002 in.
Maximum reface	Limit	0.2 mm	0.01 in.
Manifold mounting surface warpage	Limit	0.10 mm	0.004 in.
Valve seat	Contacting surface angle	45°	
	Contacting width	1.2 – 1.6 mm	0.05 – 0.06 in.
	Refacing angle	IN 30°, 45°, 60°	
		EX 30°, 45°, 65°	

Valve & Guide Bushing

Valve				
Overall length	STD	IN & EX	109.0 mm	4.29 in.
	Limit	IN & EX	108.5 mm	4.27 in.
Face angle			44.5°	
Stem diameter		IN	7.970 – 7.985 mm	0.3138 – 0.3144 in.
		EX	7.965 – 7.980 mm	0.3136 – 0.3142 in.
Stem oil clearance	STD	IN	0.025 – 0.060 mm	0.0010 – 0.0024 in.
		EX	0.030 – 0.065 mm	0.0012 – 0.0026 in.
	Limit	IN	0.08 mm	0.003 in.
		EX	0.10 mm	0.004 in.

Valve & Guide Bushing (Cont'd)

Head edge thickness	Limit	IN	0.5 mm	0.02 in.
		EX	0.7 mm	0.03 in.
Guide bushing				
Inner diameter			8.01 – 8.03 mm	0.315 – 0.316 in.
Outer diameter		STD	13.04 – 13.05 mm	0.513 – 0.514 in.
		O/S 0.05	13.09 – 13.10 mm	0.515 – 0.516 in.
Replacing temperature (Cylinder head side)			80 – 100°C	176 – 212°F

Valve Spring

Free length			42.1 mm	1.66 in.
Installed length			37.7 mm	1.48 in.
Installed load		STD	26.3 kg	58.0 lb
		Limit	23.7 kg	52.2 lb
Squareness		Limit	1.9 mm	0.07 in.

Valve Rocker Arm & Shaft

Oil clearance	STD	0.01 – 0.05 mm	0.0004 – 0.0020 in.
	Limit	0.06 mm	0.0024 in.

Manifold

Installing surface warpage	Limit	0.3 mm	0.01 in.
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Valve Lifter

Oil clearance	STD	0.02 – 0.03 mm	0.0008 – 0.0012 in.
	Limit	0.1 mm	0.004 in.
Outer diameter	STD	22.178 – 22.199 mm	0.8731 – 0.8740 in.
	O/S 0.05	22.229 – 22.249 mm	0.8751 – 0.8759 in.

Camshaft

Circle runout	Limit	0.04 mm	0.002 in.
Thrust clearance	STD	0.07 – 0.15 mm	0.003 – 0.006 in.
	Limit	0.3 mm	0.01 in.
Oil clearance	STD	0.025 – 0.066 mm	0.0010 – 0.0026 in.
	Limit	0.1 mm	0.004 in.

Camshaft (Cont'd)

Journal diameter		No.1	46.459 – 46.475 mm	1.8291 – 1.8297 in.
		No.2	46.209 – 46.225 mm	1.8192 – 1.8199 in.
		No.3	45.959 – 45.975 mm	1.8094 – 1.8100 in.
		No.4	45.709 – 45.725 mm	1.7996 – 1.8002 in.
		No.5	45.459 – 45.475 mm	1.7897 – 1.7904 in.
Bearing type			STD, U/S (0.125, 0.250)	
Cam height	STD	IN	38.36 – 38.46 mm	1.510 – 1.514 in.
		EX	38.25 – 38.35 mm	1.506 – 1.510 in.
	Limit	IN	38.29 mm	1.507 in.
		EX	38.19 mm	1.504 in.

Timing Chain Tensioner & Damper

Tensioner plunger head thickness	Limit	12.5 mm	0.49 in.
Vibration damper thickness	Limit	5.0 mm	0.20 in.

Timing Chain & Sprocket

Chain slack	at 10 kg (22 lb)	Limit	13.5 mm	0.53 in.
Chain elongation	at 5 kg (11 lb)	Limit	291.4 mm	11.47 in.
Crankshaft sprocket wear		Limit	59.4 mm	2.34 in.
Camshaft sprocket wear		Limit	113.8 mm	4.48 in.

Cylinder Block

Warp	Limit	0.05 mm	0.002 in.
Cylinder bore	STD	85.00 – 85.05 mm	3.346 – 3.348 in.
Wear	Limit	0.2 mm	0.008 in.
Taper and out-of-round	Limit	0.02 mm	0.0008 in.
Difference between each cylinder		Less than 0.05 mm (0.002 in.)	
Lifter bore diameter	STD	22.200 – 22.221 mm	0.8740 – 0.8748 in.
	O/S 0.05	22.250 – 22.271 mm	0.8760 – 0.8768 in.

Piston & Piston Ring

Piston diameter	STD	84.94 – 84.99 mm	3.344 – 3.346 in.
	O/S 0.50	85.44 – 85.49 mm	3.364 – 3.366 in.
	O/S 0.75	85.69 – 85.74 mm	3.374 – 3.376 in.
	O/S 1.00	85.94 – 85.99 mm	3.383 – 3.385 in.

Piston & Piston Ring (Cont'd)

Piston oil clearance		0.05 – 0.07 mm	0.002 – 0.003 in.
Piston ring end gap	No.1	0.25 – 0.56 mm	0.010 – 0.022 in.
	No.2	0.20 – 0.51 mm	0.008 – 0.020 in.
	Oil	0.30 – 0.78 mm	0.012 – 0.030 in.
Piston ring to ring groove clearance	No.1	0.020 – 0.060 mm	0.0008 – 0.0024 in.
	No.2	0.015 – 0.055 mm	0.0006 – 0.0022 in.
	Oil	0.015 – 0.060 mm	0.0006 – 0.0024 in.
Piston pin installing temperature		Normal temperature	

Connecting Rod & Bearing

Runout	Limit	0.05 mm	0.002 in.
Twist	Limit	0.05 mm	0.002 in.
Thrust clearance	STD	0.16 – 0.26 mm	0.006 – 0.010 in.
	Limit	0.3 mm	0.012 in.
Bearing oil clearance	STD	0.024 – 0.048 mm	0.0009 – 0.0019 in.
	Limit	0.08 mm	0.003 in.
Bearing type		STD, U/S (0.05, 0.25, 0.50)	

Crankshaft

Circle runout	Limit	0.06 mm	0.002 in.
Thrust clearance	STD	0.02 – 0.22 mm	0.001 – 0.009 in.
	Limit	0.3 mm	0.01 in.
Main journal			
Diameter	STD	57.976 – 58.000 mm	2.2825 – 2.2835 in.
	U/S 0.05	57.93 – 57.95 mm	2.2807 – 2.2814 in.
U/S finished diameter	U/S 0.25	57.73 – 57.75 mm	2.2728 – 2.2736 in.
	U/S 0.50	57.48 – 57.50 mm	2.2630 – 2.2637 in.
Taper and out-of-round	Limit	0.01 mm	0.0004 in.
Oil clearance	STD	0.024 – 0.048 mm	0.0009 – 0.0019 in.
	Limit	0.10 mm	0.004 in.
Bearing type		STD, U/S (0.05, 0.25, 0.50)	

Crankshaft (Cont'd)

Crank pin journal			
Diameter	STD	47.976 – 48.000 mm	1.8888 – 1.8898 in.
	U/S 0.05	47.93 – 47.95 mm	1.887 – 1.888 in.
U/S finished diameter	U/S 0.25	47.73 – 47.75 mm	1.879 – 1.880 in.
	U/S 0.50	47.48 – 47.50 mm	1.869 – 1.870 in.
Taper and out-of-round	Limit	0.01 mm	0.0004 in.
Oil clearance	STD	0.024 – 0.048 mm	0.0009 – 0.0019 in.
	Limit	0.08 mm	0.003 in.
Bearing type	STD, U/S (0.05, 0.25, 0.50)		
Thrust washer thickness	STD	2.440 – 2.490 mm	0.0961 – 0.0980 in.
	O/S 0.125	2.503 – 2.553 mm	0.0985 – 0.1005 in.
	O/S 0.250	2.585 – 2.615 mm	0.1018 – 0.1030 in.

Flywheel

Runout	Limit	0.1 mm	0.004 in.
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LUBRICATION SYSTEM**Oil Pump**

Tip clearance	STD	0.04 – 0.16 mm	0.0016 – 0.0063 in.
	Limit	0.25 mm	0.010 in.
Side clearance	STD	0.03 – 0.09 mm	0.0012 – 0.0035 in.
	Limit	0.15 mm	0.006 in.
Body clearance	STD	0.10 – 0.16 mm	0.0039 – 0.0063 in.
	Limit	0.25 mm	0.010 in.

COOLING SYSTEM**Water Pump**

Bearing installing temperature	80°C	176°F
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Radiator

Radiator cap relief valve opening pressure			
	STD	0.75 – 1.05 kg/cm ²	10.7 – 14.9 psi
	Limit	0.6 kg/cm ²	8.5 psi

Thermostat

Valve opening temperature	Low temp. type		High temp. type	
	Start to open at	Fully opens at	Valve opening travel	Identification mark
Start to open at	82°C	180°F	88°C	190°F
Fully opens at	95°C	203°F	100°C	212°F
Valve opening travel	8 mm	0.3 in.	8 mm	0.3 in.
Identification mark	82 punch mark or Blue painting mark		88 punch mark or Red painting mark	

FUEL SYSTEM**Carburetor****[Except USA & Canada]**

Engine type		2T	2T-B	3T	3T-C
Part number		21100-26830	21001-26100	21100-28060	21100-28120
		21100-26840	(21100-26850) (21100-26860)	21100-28070	21100-28130
		21100-26880		21100-28140	
		21100-26890	21001-26110		
		21100-2A010	(21100-2A020) (21100-2A030)		
Accelerating pump stroke		5 mm (0.20 in.)	3 mm (0.12 in.)	5 mm (0.20 in.)	←
Float level	Raised position	4 mm (0.16 in.)	←	6.5 mm (0.26 in.)	4.5 mm (0.18 in.)
	Lowered position	1.2 mm (0.05 in.)	←	←	←
Throttle valve closed angle	Primary	7°	←	←	←
	Secondary	20°	←	←	←
Throttle valve fully opened angle					
	Primary	90°	←	←	←
	Secondary	80°	90°	80°	←
Secondary touch angle		50 + 7°	←	←	50 + 7°
Kick-up					
Secondary throttle valve to body clearance		0.2 mm (0.008 in.)	←	←	←
(Primary throttle valve fully opened)					
Fast idle angle		15 + 7°	8.5 + 7°	17 + 7°	15 + 7°
Unloader angle		27 + 20°	None	27 + 20°	27 + 20°
Choke valve fully closed angle		20°	←	←	←
Throttle positioner set angle	M/T	9 + 7°	5.5 + 7°	10 + 7°	10 + 7°
	A/T	None	←	10 + 7°	10 + 7°
Choke breaker		19 + 20°	None	20 + 20°	19 + 2°

[For USA & Canada]

Part number	for Federal	21100—28080	
	for California	21100—28090	
	for Canada	21100—28100	
	for Federal w/HAC	21100—28110	
Accelerating pump stroke		5.0 mm	0.197 in.
Float level	Raised position	6.5 mm	0.256 in.
	Lowered position	1.2 mm	0.047 in.
Choke valve fully closed angle		20°	
Throttle valve closed angle (from horizontal plane)	Primary	7°	
	Secondary	20°	
Throttle valve fully opened angle (from horizontal plane)	Primary	90°	
	Secondary	80°	
Secondary touch angle (from horizontal plane)		57°	
Kick-up			
Secondary throttle valve to body clearance		0.15 mm	0.006 in.
Primary throttle opening angle (from bore)		64 — 90°	
Unloader angle (from horizontal plane)		47°	
Fast idle angle (from horizontal plane)		24°	
Throttle positioner angle (from horizontal plane) (except Canada)		17° for Federal 16.5° for California	
Choke opener angle (from horizontal plane)		85° for U.S.A. 77° for Canada	
Choke breaker angle (from horizontal plane)		40° for Federal & Canada 42° for California	
Idle mixture adjusting screw preset position		Screw out 3 turns	

STARTING SYSTEM**Starter****[Except USA & Canada]**

Motor type	Conventional type	
Rating voltage and output power	12V — 0.8 kw, 12V — 1.0 kw	
No-load characteristic	at 11V	
	Current	Less than 50A
	Revolution	More than 5,000 rpm
Armature shaft		
Outer diameter	12.43 — 12.44 mm	0.489 — 0.490 in.
Bushing bore	12.475 — 12.505 mm	0.4911 — 0.4923 in.

[Except USA & Canada] (Cont'd)

Bushings to shaft clearance	STD	0.035 – 0.077 mm	0.0014 – 0.0030 in.
	Limit	0.2 mm	0.01 in.
Thrust clearance	Limit	1.0 mm	0.04 in.
Commutator			
Outer diameter	STD	32.7 mm	1.29 in.
	Limit	31 mm	1.2 in.
Runout	Limit	0.3 mm	0.012 in.
Mica depth	STD	0.4 – 0.8 mm	0.02 – 0.03 in.
	Limit	0.2 mm	0.01 in.
Brush length	0.8 kw	STD	16 mm
		Limit	10 mm
	1.0 kw	STD	19 mm
		Limit	10 mm
Pinion end to stop collar clearance		0.1 – 4.0 mm	0.004 – 0.157 in.
Moving stud length (Reference only)		34 mm	1.3 in.

[For USA & Canada]

Rating output power			12V, 1.0 kw	12V, 1.4 kw
No-load characteristic	at 11.5 V	Current	Less than 90 A	Less than 90 A
		Revolution	More than 3,000 rpm	More than 3,500 rpm
Commutator				
Outer diameter	STD		30 mm 1.2 in.	←
	Limit		29 mm 1.1 in.	←
Mica depth	STD		0.45 – 0.75 mm	←
	Limit		0.018 – 0.030 in.	←
Brush length	STD		13.5 mm 0.53 in.	14.5 mm 0.57 in.
	Limit		10 mm 0.4 in.	←
Spring installed load	STD		1,445 – 1,955 g	1,785 – 2,415 g
			3.2 – 4.3 lb	3.9 – 5.3 lb
	Limit		1,200 g 2.6 lb	←

IGNITION SYSTEM**Distributor****[Except USA & Canada]**

Rubbing block	0.45 mm		0.018 in.		
Dwell angle	52°				
Damping spring gap	0.1 — 0.4 mm		0.004 — 0.016 in.		
Governor shaft thrust clearance	0.15 — 0.50 mm		0.006 — 0.020 in.		
Distributor advance angle (Parts No.)	Governor		Vacuum		
	Dis. rpm	Advance angle	mmHg	in. Hg	Advnace angle
for 2T (19100—26162)	500 ± 177	Advance begins	90 ± 15	3.5 ± 0.6	Advance begins
	876	2.1 ± 1.0°	126 ± 5	5.0 ± 0.2	37 ± 1.1°
	1,400	6.2 ± 1.0°	228 ± 8	9.0 ± 0.3	10.5 ± 0.9°
	2,700	10.0 ± 1.0°	280 ± 4	11.0 ± 0.2	13.0 ± 1.0°
	3,000	9.9 ± 1.0°			
for 2T-B (19100—26163)	500 ± 88	Advance begins	84 ± 22	3.3 ± 0.9	Advance begins
	1,000 ± 22	7.0 ± 0.9°	146 ± 8	5.7 ± 0.3	3.7 ± 0.9°
	1,800	10.0 ± 1.0°	220 ± 4	8.7 ± 0.2	7.0 ± 1.0°
	3,000	9.6 ± 1.0°			
for 3T (19100—26210)	500 ± 180	Advance begins	110 ± 17	4.3 ± 0.7	Advance begins
	800	1.6 ± 1.0°	160	6.3	4.1 ± 1.4°
	1,400	6.2 ± 1.0°	200	7.9	6.8 ± 1.3°
	2,700	10.0 ± 1.0°	240	9.5	9.0 ± 1.3°
	3,000	9.9 ± 1.0°	280	11.0	10.9 ± 1.2°
			330	13.0	13.0 ± 1.0°
for 3T-C (19100—28070)	700 ± 91	Advance begins	Main		
	1,200	5.5 ± 1.0°	70 ± 20	2.8 ± 0.8	Advance begins
	3,000	5.0 ± 1.0°	152 ± 4	6.0 ± 0.2	5.4 ± 1.1°
			270 ± 5	10.6 ± 0.2	10.0 ± 1.0°
			Sub		
			200 ± 38	7.9 ± 1.5	Advance begins
		300 ± 13	11.8 ± 0.5	4.0 ± 1.0°	

[For USA & Canada]

Air gap	0.2 — 0.4 mm	0.008 — 0.016 in.
Governor shaft thrust clearance	0.15 — 0.50 mm	0.006 — 0.020 in.

[For USA & Canada] (Cont'd)

Distributor advance angle (Part No.)	Governor		Vacuum		
	Dis. rpm	Advance angle	mmHg	in.Hg	Advance angle
for Federal (19100-28030)	700	Advance begins	Main		
	955	1.9°	70	2.8	Advance begins
	1,300	5.0°	164	6.5	9.2°
	3,000	9.0°	240	9.5	15.0°
			Sub		
	200		7.9		Advance begins
for California (19100-28040)	700	Advance begins	Main		
	955	1.9°	70	2.8	Advance begins
	1,300	5.0°	136	5.4	7.6°
	2,800	8.0°	180	7.1	12.0°
	3,000	7.8°	Sub		
	200		7.9		Advance begins
for Canada (19110-28050)	700	Advance begins	Main		
	955	1.9°	70	2.8	Advance begins
	1,300	5.0°	162	6.4	7.0°
	3,000	9.0°	230	9.1	11.5°
			Sub		
	200		7.9		Advance begins
	300		11.8		4.0°

Ignition Coil**[Except USA & Canada]**

Primary coil resistance	1.3 – 1.5 Ω
Secondary coil resistance	7.2 – 9.8 k Ω
External resistor resistance	1.3 – 1.7 Ω
Insulation resistance w/500V megohm meter	More than 100 M Ω

[For USA & Canada]

	Federal & Canada	California
Primary coil resistance	0.4 – 0.5 Ω	0.8 – 1.0 Ω
Secondary coil resistance	8.5 – 11.5 k Ω	11.5 – 15.5 k Ω
Insulation resistance w/500V megohm meter	More than 10 M Ω	←

High Tension Cord

Resistance	Limit	Less than 25 k Ω /m
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Spark Plug**[Except USA & Canada]**

Type	ND	W16EP, W16EPR	
	NGK	BP5ES-L, BPR5ES	
Gap		0.7 – 0.8 mm	0.028 – 0.031 in.

[For USA & Canada]

Type	for U.S.A.	ND	W14EX-U11, W16EX-U11	
		NGK	BP5EA-11, BP5EA-L11	
	for Canada	ND	W16EPR, W16EXR-U, W14EXR-U	
		NGK	BPR5ES, BPR5EA-L, BPR5EA	
Gap	for U.S.A.		1.1 mm	0.043 in.
	for Canada		0.8 mm	0.031 in.

CHARGING SYSTEM (Except ALTERNATOR WITH IC REGULATOR)**Alternator**

Maximum output current		12V, 40A, 45A, 50A, 55A	
Rotor coil resistance		3.9 – 4.1 Ω	
Brush exposed length	STD	12.5 mm	0.49 in.
	Limit	5.5 mm	0.22 in.

Alternator Regulator

Regulating voltage		13.8 – 14.8 V (50A)	
	Add on type	14.0 – 14.7 V (55A)	

CHARGING SYSTEM (For ALTERNATOR WITH IC REGULATOR)**Alternator with IC Regulator**

Rating output		12V, 55A	
Rotor coil resistance		2.8 – 3.0 Ω	
Brush exposed length	STD	16.5 mm	0.65 in.
	Limit	5.5 mm	0.22 in.

Alternator Regulator

Regulating voltage	at 25°C (77°F)	14.0 – 14.7 V
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Charge Warning Relay

Actuating voltage	7.0 – 9.0 V
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2T-G ENGINE TIGHTENING TORQUE FOR MAIN PARTS

Tightening parts	kg-m	ft-lb
Cylinder head x Cylinder block	7.2 – 8.8	53 – 63
Intake manifold x Cylinder head	1.6 – 2.2	12 – 15
Exhaust manifold x Cylinder head	3.5 – 4.5	26 – 32
Crankshaft bearing cap x Cylinder block	7.2 – 8.8	53 – 63
Connecting rod cap x Connecting rod	4.0 – 5.0	29 – 36
Crankshaft pulley x Crankshaft	6.0 – 7.0	44 – 50
Flywheel x Crankshaft	8.2 – 8.8	60 – 63
Camshaft sprocket x Camshaft	7.0 – 8.0	51 – 57
Camshaft bearing cap x Cylinder head	1.2 – 1.8	9 – 13
Distributor drive gear x Pump drive shaft	6.0 – 7.0	44 – 50
Pump drive shaft thrust plate x Cylinder block	1.5 – 2.1	11 – 15
Chain tensioner No.2 x Cylinder head	3.0 – 4.0	22 – 28
Chain vibration damper No.3 x Cylinder head	1.5 – 2.1	11 – 15
Spark plug x Cylinder head	1.4 – 2.0	11 – 14
Oil pan x Cylinder block	0.4 – 0.8	3 – 5

2T-G ENGINE SERVICE SPECIFICATIONS

ENGINE TUNE-UP

Drive belt tension	at 10 kg (22 lb)			
Fan – Alternator	New	6 – 8 mm		0.2 – 0.3 in.
	Used	8 – 12 mm		0.3 – 0.5 in.
A/C compressor –Crankshaft		11 – 14 mm		0.4 – 0.6 in.
Battery electrolyte specific gravity	at 20°C (68°F)	1.25 – 1.27		
Engine oil capacity				
TE, TA series				
Dry refill	w/ Oil filter	4.5 liters	4.8 US qt	4.0 Imp. qt
Drain & refill	w/ Oil filter	3.8 liters	4.0 US qt	3.3 Imp. qt
	w/o Oil filter	3.2 liters	3.4 US qt	2.8 Imp. qt
Coolant capacity	w/Heater			
TE series		8.7 liters	9.2 US qt	7.7 Imp. qt
TA series		8.5 liters	9.0 US qt	7.5 Imp. qt
Spark plug				
Type	ND	W20EXR-U		
	NGK	BPR6EA, BPR6EY		

ENGINE TUNE-UP (Cont'd)

Gap			0.7 — 0.8 mm	0.028 — 0.031 in.
Distributor				
Dwell angle			52°	
Rubbing block gap			0.4 — 0.5 mm	0.016 — 0.020 in.
Damping spring gap			0.1 — 0.4 mm	0.004 — 0.016 in.
Ignition timing			12° BTDC/1,000 rpm	
Firing order			1-3-4-2	
Valve clearance	Cold	Intake	0.29 ± 0.05 mm	0.011 ± 0.002 in.
		Exhaust	0.34 ± 0.05 mm	0.013 ± 0.002 in.
Initial idle speed			1,000 ± 50 rpm	
CO concentration		at Idle speed	1.0 — 1.5 %	
Intake manifold vacuum		at Idle speed	More than 385 mm Hg (15.2 in. Hg)	
Front and rear difference (Idle to 2,000 rpm)			Below 10 mm Hg (0.4 in. Hg)	
Compression pressure		STD	11.6 kg/cm ²	165 psi
		Limit	10.0 kg/cm ²	142 psi
Difference between each cylinder			Less than 1.0 kg/cm ² (14 psi)	

ENGINE**Cylinder Head**

Surface warpage	Limit	0.05 mm	0.002 in.
Maximum reface	Limit	0.2 mm	0.008 in.
Valve seat			
Contacting surface angle		45°	
Contacting width		1.2 — 1.6 mm	0.05 — 0.06 in.
Refacing angle		30°, 45°, 60°	
Valve lifter bore	Black	37.951 — 37.957 mm	1.4941 — 1.4944 in.
	Blue	37.957 — 37.963 mm	1.4944 — 1.4946 in.
	Yellow	37.963 — 37.969 mm	1.4946 — 1.4948 in.
	Red	37.969 — 37.975 mm	1.4948 — 1.4951 in.

Valve & Guide Bushing

Valve				
Overall length	STD	IN	106.2 mm	4.18 in.
		EX	105.1 mm	4.14 in.

Valve & Guide Bushing (Cont'd)

	Limit	IN	105.7 mm	4.16 in.
		EX	104.6 mm	4.12 in.
Face angle			44.5°	
Stem diameter		IN	8.460 – 8.475 mm	0.3331 – 0.3337 in.
		EX	8.455 – 8.470 mm	0.3329 – 0.3335 in.
Stem oil clearance	STD	IN	0.025 – 0.055 mm	0.0010 – 0.0022 in.
		EX	0.030 – 0.060 mm	0.0012 – 0.0024 in.
	Limit	IN	0.08 mm	0.003 in.
		EX	0.10 mm	0.004 in.
Head edge thickness	Limit	IN	0.8 mm	0.03 in.
		EX	1.2 mm	0.05 in.
Guide bushing				
Inner diameter			8.500 – 8.515 mm	0.3346 – 0.3352 in.
Outer diameter	STD		14.02 – 14.03 mm	0.5520 – 0.5524 in.
Replacing temperature (Cylinder head side)			110 – 130°C	230 – 266°F

Valve Spring

Free length		Inner	45.9 mm	1.81 in.
		Outer	47.4 mm	1.87 in.
Installed length		Inner	36.5 mm	1.44 in.
		Outer	39.0 mm	1.54 in.
Installed load	STD	Inner	7.3 kg	16.1 lb
		Outer	23.7 kg	52.3 lb
	Limit	Inner	6.7 kg	14.8 lb
		Outer	21.8 kg	48.1 lb
Squareness	Limit	Inner & Outer	1.6 mm	0.06 in.

Valve Lifter

Oil clearance	STD		0.02 – 0.03 mm	0.0008 – 0.0012 in.
	Limit		0.1 mm	0.004 in.
Outer diameter	Black		37.925 – 37.931 mm	1.4931 – 1.4933 in.
	Blue		37.931 – 37.937 mm	1.4933 – 1.4936 in.
	Yellow		37.937 – 37.943 mm	1.4936 – 1.4938 in.
	Red		37.943 – 37.949 mm	1.4938 – 1.4941 in.

Camshaft

Circle runout		Limit	0.04 mm	0.002 in.
Thrust clearance		STD	0.15 – 0.35 mm	0.006 – 0.014 in.
		Limit	0.4 mm	0.02 in.
Oil clearance		STD	0.025 – 0.062 mm	0.0010 – 0.0024 in.
		Limit	0.15 mm	0.006 in.
Journal diameter		STD	31.954 – 31.970 mm	1.2580 – 1.2587 in.
Cam height	STD	IN & EX	46.37 – 46.47 mm	1.826 – 1.830 in.
	Limit	IN & EX	46.0 mm	1.81 in.

Manifold

Installing surface warpage	Limit	IN & EX	0.1 mm	0.004 in.
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Timing Chain & Sprocket

Chain elongation	No.1 (at 5 kg)	Limit	291.4 mm	11.47 in.
	No.2 (17-links)	Limit	147.0 mm	5.79 in.
Crankshaft sprocket wear		Limit	60.0 mm	2.36 in.
Pump drive shaft sprocket wear		Limit	114.5 mm	4.51 in.
Camshaft drive sprocket wear		Limit	78.2 mm	3.08 in.
Camshaft timing sprocket wear		Limit	78.2 mm	3.08 in.

Timing Chain Tensioner & Vibration Damper

No.1 tensioner thickness	Limit	12.5 mm	0.49 in.
No.1 damper thickness	Limit	5.0 mm	0.20 in.
No.2 damper thickness	Limit	5.5 mm	0.22 in.
No.3 damper thickness	Limit	6.5 mm	0.26 in.
Tensioner slipper thickness	Limit	7.5 mm	0.30 in.

Pump Drive Shaft

Thrust clearance		STD	0.07 – 0.15 mm	0.003 – 0.006 in.
		Limit	0.3 mm	0.01 in.
Journal diameter	Outer	No.1	46.459 – 46.475 mm	1.8291 – 1.8297 in.
		No.2	46.209 – 46.225 mm	1.8192 – 1.8199 in.
	Inner	No.1	46.500 – 46.525 mm	1.8307 – 1.8317 in.
		No.2	46.250 – 46.275 mm	1.8209 – 1.8218 in.
Oil clearance		STD	0.025 – 0.066 mm	0.0010 – 0.0026 in.
		Limit	0.08 mm	0.003 in.

Cylinder Block

Warpage	Limit	0.05 mm	0.002 in.
Cylinder bore			
Diameter	STD	85.00 – 85.05 mm	3.346 – 3.348 in.
Wear	Limit	0.2 mm	0.008 in.
Taper and out-of-round	Limit	0.02 mm	0.0008 in.
Difference between each cylinder		Less than 0.05 mm (0.002 in.)	

Piston & Piston Ring

Piston diameter	STD	84.94 – 84.99 mm	3.3441 – 3.3461 in.
	O/S 0.25	85.19 – 85.24 mm	3.3539 – 3.3559 in.
	O/S 0.50	85.44 – 85.49 mm	3.3638 – 3.3657 in.
	O/S 0.75	85.69 – 85.74 mm	3.3736 – 3.3756 in.
	O/S 1.00	85.94 – 85.99 mm	3.3835 – 3.3854 in.
Piston oil clearance		0.05 – 0.07 mm	0.002 – 0.003 in.
Piston ring end gap	No.1	0.25 – 0.53 mm	0.010 – 0.021 in.
	No.2	0.18 – 0.46 mm	0.007 – 0.018 in.
	Oil	0.15 – 0.44 mm	0.006 – 0.017 in.
Piston ring to ring groove clearance	No.1	0.02 – 0.06 mm	0.0008 – 0.0024 in.
	No.2	0.015 – 0.055 mm	0.0006 – 0.0022 in.
	Oil	0.015 – 0.060 mm	0.0006 – 0.0024 in.
Piston pin installing temperature		Normal temperature	

Connecting Rod & Bearing

Thrust clearance	STD	0.16 – 0.26 mm	0.006 – 0.010 in.
	Limit	0.3 mm	0.012 in.
Bearing oil clearance	STD	0.024 – 0.048 mm	0.0009 – 0.0019 in.
	Limit	0.08 mm	0.003 in.
Bearing type		STD, U/S (0.05, 0.25, 0.50)	

Crankshaft

Circle runout	Limit	0.06 mm	0.002 in.
Thrust clearance	STD	0.02 – 0.22 mm	0.001 – 0.009 in.
	Limit	0.3 mm	0.01 in.
Main journal			
Diameter	STD	57.976 – 58.000 mm	2.2825 – 2.2835 in.
	U/S 0.05	57.94 – 57.95 mm	2.2811 – 2.2815 in.
U/S finished diameter	U/S 0.25	57.74 – 57.75 mm	2.2732 – 2.2736 in.
	U/S 0.50	57.49 – 57.50 mm	2.2634 – 2.2636 in.

Crankshaft (Cont'd)

Taper and out-of-round	Limit	0.01 mm	0.0004 in.
Oil clearance	STD	0.032 – 0.056 mm	0.0013 – 0.0022 in.
	Limit	0.10 mm	0.004 in.
Bearing type		STD, U/S (0.05, 0.25, 0.50)	
Crank pin journal			
Diameter	STD	47.976 – 48.000 mm	1.8888 – 1.8898 in.
	U/S 0.05	47.94 – 47.95 mm	1.8874 – 1.8878 in.
U/S finished diameter	U/S 0.25	47.74 – 47.75 mm	1.8795 – 1.8799 in.
	U/S 0.50	47.49 – 47.50 mm	1.8697 – 1.8701 in.
Taper and out-of-round	Limit	0.01 mm	0.0004 in.
Oil clearance	STD	0.024 – 0.048 mm	0.0009 – 0.0018 in.
	Limit	0.08 mm	0.003 in.
Bearing type		STD, U/S (0.05, 0.25, 0.50)	
Thrust washer thickness	STD	2.440 – 2.490 mm	0.0961 – 0.0980 in.
	O/S 0.125	2.503 – 2.553 mm	0.0985 – 0.1005 in.
	O/S 0.250	2.565 – 2.615 mm	0.1010 – 0.1030 in.

Flywheel

Runout	Limit	0.1 mm	0.04 in.
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LUBRICATION SYSTEM**Oil Pump**

Tip clearance	STD	0.04 – 0.16 mm	0.002 – 0.006 in.
	Limit	0.25 mm	0.010 in.
Side clearance	STD	0.03 – 0.09 mm	0.001 – 0.004 in.
	Limit	0.15 mm	0.006 in.
Body clearance	STD	0.10 – 0.16 mm	0.004 – 0.006 in.
	Limit	0.25 mm	0.010 in.

COOLING SYSTEM**Water Pump**

Bearing installing temperature	More than 80°C (176°F)
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Radiator

Radiator cap relief valve opening pressure	STD	0.75 — 1.05 kg/cm ²	10.7 — 14.9 psi
	Limit	0.6 kg/ cm ²	8.5 psi

Thermostat

Valve opening temperature	Low temp. type		High temp. type	
Start to open at	82°C	180°F	88°C	190°F
Fully opens at	95°C	203°F	100°C	212°F
Valve opening travel	8 mm	0.3 in.	8 mm	0.3 in.
Identification mark	82 punch mark or Blue painting mark		88 punch mark or Red painting mark	

FUEL SYSTEM**Carburetor**

Parts number	21100-88243 21100-88244	Mikuni Solex	40 PHH-4
Float position			
Float level (Use SST) (From carburetor body upper surface)	20 — 21 mm		0.79 — 0.83 in.
Float level adjustment	1.8 mm		0.07 in. (One turn with float level adjust screw)
Accelerating pump discharging time	1.1 — 1.7 second		
Idle mixture adjusting screw preset position	Screw out 2 turn		

STARTING SYSTEM**Starter**

Motor type	Conventional type		
Rating voltage and output power	12 V – 0.8 kw, 12 V – 1.0 kw		
No-load characteristic at 11V			
	Current	Less than 50 A	
	Revolution	More than 5,000 rpm	
Armature shaft			
Outer diameter	12.43 – 12.44 mm		0.489 – 0.490 in.
Bushing bore	12.475 – 12.505 mm		0.4911 – 0.4923 in.

Starter (Cont'd)

Bushings to shaft clearance	STD	0.035 — 0.077 mm	0.0014 — 0.0030 in.	
	Limit	0.2 mm	0.01 in.	
Thrust clearance	Limit	1.0 mm	0.04 in.	
Commutator				
Outer diameter	STD	32.7 mm	1.29 in.	
	Limit	31 mm	1.2 in.	
Runout	Limit	0.3 mm	0.012 in.	
Mica depth	STD	0.4 — 0.8 mm	0.02 — 0.03 in.	
	Limit	0.2 mm	0.008 in.	
Brush length	0.8 kw	STD	16 mm	0.6 in.
		Limit	10 mm	0.4 in.
	1.0 kw	STD	19 mm	0.7 in.
		Limit	10 mm	0.4 in.
Pinion end to stop collar clearance		0.1 — 4.0 mm	0.004 — 0.157 in.	
Moving stud length (Reference only)		34 mm	1.3 in.	

IGNITION SYSTEM**Distributor**

Rubbing block		0.4 – 0.5 mm	0.016 – 0.020 in.		
Dwell angle		52°			
Damping spring gap		0.1 – 0.4 mm	0.004 – 0.016 in.		
Governor shaft thrust clearance		0.15 – 0.50 mm	0.006 – 0.020 in.		
Distributor advance angle (Parts No.)	Governor		Vacuum		
	Dis. rpm	Advance angle	mm Hg	in. Hg	Advance angle
(19100 – 88224)	580 ± 87	Advance begins	60 ± 27	2.36 ± 1.06	Advance begins
	900 ± 45	6.5 ± 1.0°	150 ± 4	5.91 ± 0.16	4.0 ± 1.0°
	2,000	10.5 ± 1.0°			
	3,000	10.2 ± 1.0°			

Ignition Coil

Primary coil resistance		1.3 – 1.6 Ω
Secondary coil resistance		10.2 – 13.8 kΩ
External resistor resistance		1.3 – 1.5 Ω
Insulation resistance	w/500 V megohm meter	More than 100 MΩ

High Tension Cord

Resistance	Limit	Less than 25 kΩ
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Spark Plug

Type	ND	W20EXR-U	
	NGK	BPR6EA, BPR6EY	
Gap		0.7 – 0.8 mm	0.028 – 0.031 in.

CHARGING SYSTEM**Alternator**

Maximum output current		12V, 40A, 45A, 50A, 55A	
Brush exposed length	STD	12.5 mm	0.49 in.
	Limit	5.5 mm	0.22 in.
Rotor coil resistance		3.9 – 4.1 Ω	

Alternator Regulator

Regulating voltage	13.8 – 14.8 V
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