TOYOTA

18R ENGINE

REPAIR MANUAL

INCLUDES

18R, 18R-C & 18R-G

TOYOTA MOTOR CORPORATION

Pub. No. 98196E

FOREWORD

This manual describes the repair procedures for the 18R, 18R-C & 18R-G engines equipped on the TOYOTA CELICA, CORONA, CRESSIDA, HI-LUX, and HIACE.

Under DISASSEMBLY and ASSEMBLY, you will find disassembled views which carry numbers indicating the sequence of operation procedure. The operations can be accomplished by following these numbers. To facilitate understanding, there are also some figure numbers after operation numbers showing the locations of work details. The texts have different symbol marks which supersede the figure explanation.

This manual provides complete information on the maintenance and service of those engines, and it is hoped that it will see much use.

All information contained in this manual is the most up-to-date at the time of publication, and we reserve the right to make any changes without further notice.

For service of emission control devices, refer to each emission control repair manual.
For new service specification data, refer to service specification manuals.

TOYOTA MOTOR CORPORATION

SECTION CONTENT

GENERAL

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 to facilitate 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	O/S	Oversize
BDC	Bottom Dead Center	RH	Right-hand
BTDC	Before Top Dead Center	RHD	Right-hand Drive
EX	Exhaust	SST	Special Service Tool
IN	Intake	STD	Standard
LH	Left-hand	T	Tightening Torque
LHD	Left-hand Drive	TDC	Top Dead Center
MP	Multipurpose	U/S	Undersize
M/T	Manual Transmission	W/	with
OPT	Option	W/O	without

SYMBOLS

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

REMOVE or DISASSEMBLE

INSTALL or ASSEMBLE

INSPECT

MEASURE

TIGHTEN

CLEAN

IMPORTANT

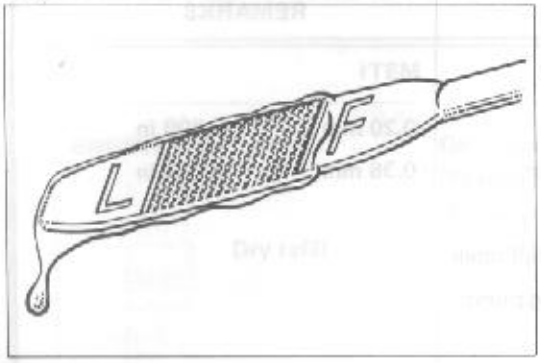
18R ENGINE TUNE-UP

18R ENGINE TUNE-UP ITEM

	ITEM			REMARKS		
1	ENGINE OIL	Oil level check		"Full" line		
		Oil replenishment		API service SE classification		
		Oil capacity				
	Dry refill	w/Oil filter	RX, RT	4.2 liters	4.4 US qt	3.7 Imp.qt
			RH	5.4 liters	5.7 US qt	4.8 Imp.qt
			RN	4.4 liters	4.7 US qt	3.9 Imp.qt
			RN4WD	5.5 liters	5.8 US qt	4.8 Imp.qt
	Drain & refill	w/Oil filter	RX, RT	3.8 liters	4.0 US qt	3.3 Imp.qt
			RH	5.0 liters	5.3 US qt	4.4 Imp.qt
			RN	3.8 liters	4.0 US qt	3.3 Imp.qt
			RN4WD	5.1 liters	5.4 US qt	4.5 Imp.qt
		w/o Oil filter	RX, RT	3.2 liters	3.4 US qt	2.8 Imp.qt
			RH	4.4 liters	4.7 US qt	3.9 Imp.qt
			RN	3.2 liters	3.4 US qt	2.8 Imp.qt
			RN4WD	4.5 liters	4.8 US qt	4.0 Imp.qt
		Quality check				
		Oil filter replacement		SST [09228-44010]		
2	COOLING SYSTEM	Coolant level check		"Full" line		
		Quality check				
	Coolant capacity	w/Heater	RX, RT	8.0 liters	8.5 US qt	7.0 Imp.qt
			RH	9.6 liters	10.1 US qt	8.4 Imp.qt
			RN	9.0 liters	9.5 US qt	8.0 Imp.qt
3	DRIVE BELT	Tension Fan – Alternator				
			New	5 – 6 mm		0.20 – 0.24 in
			Used	7 – 8 mm		0.28 – 0.31 in
		AC – Crankshaft		15 – 18 mm		0.59 – 0.71 in
4	AIR CLEANER	Element cleaning				
5	BATTERY	Specific gravity		1.25 – 1.27		at 20°C (68°F)
		Electrolyte level				
6	SPARK PLUG	Visual check				
		Cleaning				
		Plug gap		0.8 mm		0.03 in
7	HIGH TENSION CORD	Resistance		Less than 25 kΩ per cord		
8	DISTRIBUTOR	Distributor cap				
		Heel gap		0.45 mm		
		Damping spring gap		0.1 – 0.4 mm		0.004 – 0.168 in
		Dwell angle		50 – 54°		
		Dwell angle variation		within 3°		
		Ignition timing		7° BTDC/750 ± 50 rpm		
		Governor operational				
		Vacuum operational				

	ITEM		REMARKS	
	WARM UP ENGINE			
9	VALVE CLEARANCE (HOT)	Intake	0.20 mm	0.008 in
		Exhaust	0.36 mm	0.014 in
10	CARBURETOR	Automatic check		
		Check throttle valve full open		
		Check the accelerating pump		
		Float level		
11	INITIAL IDLE SPEED	Idle speed	750 ± 50 rpm	
		Manifold vacuum	420 mm Hg	16.5 in Hg
12	CO CONCENTRATION		1–3 %	
13	ENGINE CONDITION			
14	FAST IDLE		2600 ± 200 rpm	
15	COMPRESSION PRESSURE	Standard	11.5 kg/cm^2	163.1 psi
		Limit	9.0 kg/cm^2	127.8 psi
		Difference of pressure between cylinders	Less than 1.0 kg/cm^2	14.2 psi

Fig. 2-1

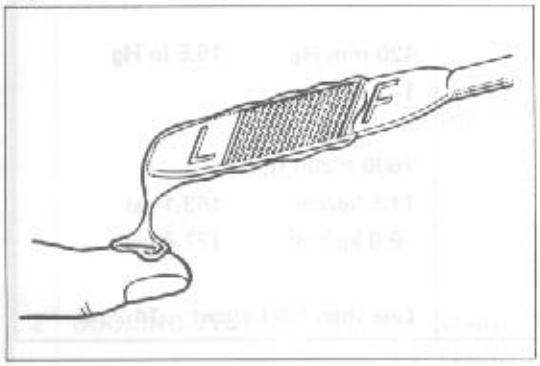


ENGINE OIL

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.

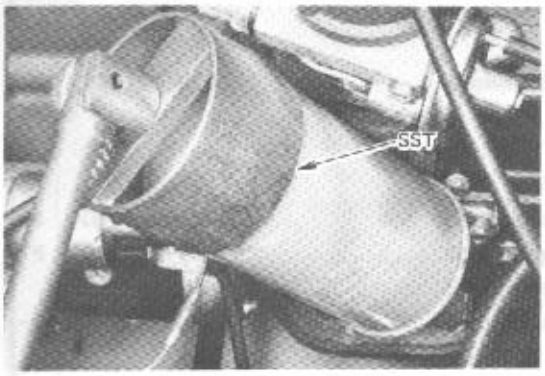
Fig. 2-2



CHECK OIL QUALITY

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

Fig. 2-3



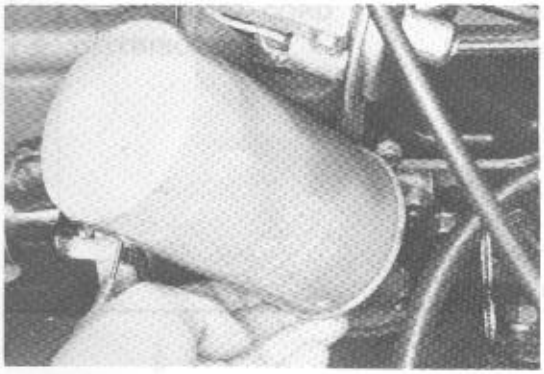
REPLACE OIL FILTER

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. 2-4

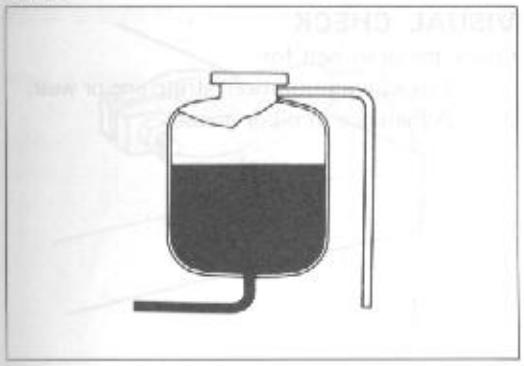


3. Start the engine and check for oil leakage.
4. Stop the engine and recheck the oil level.

COOLING SYSTEM

CHECK COOLANT LEVEL

Fig. 2-5



If low, fill reservior to FULL line.

– Note –

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

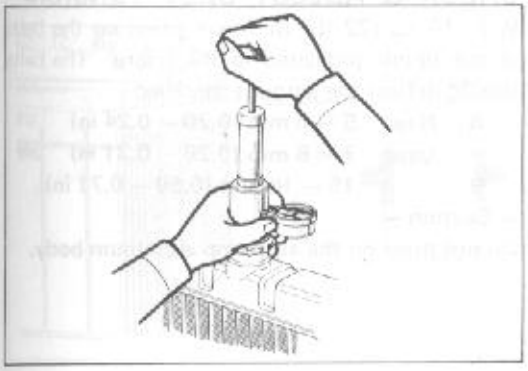
CHECK COOLANT QUALITY

Fig. 2-6

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.

CHECK COOLING SYSTEM

Fig. 2-7

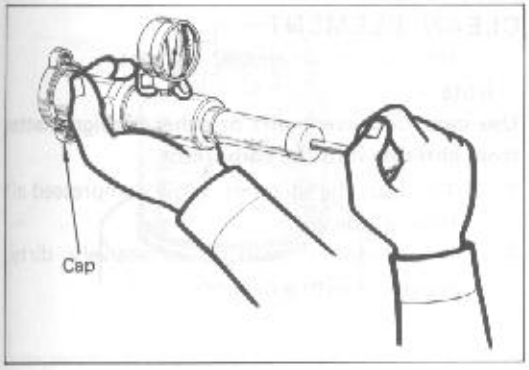


Check for:

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.

INSPECT RADIATOR CAP OPERATION

Fig. 2-8



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 limit	
	0.6 kg/cm² (8.5 psi)
Standard	**0.9 kg/cm² (12.8 psi)**

Fig. 2-9

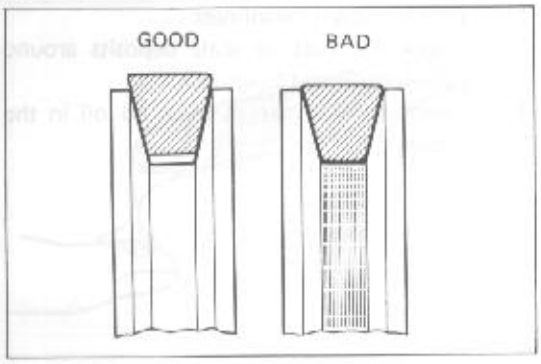
DRIVE BELT

VISUAL CHECK

Check the drive belt for:

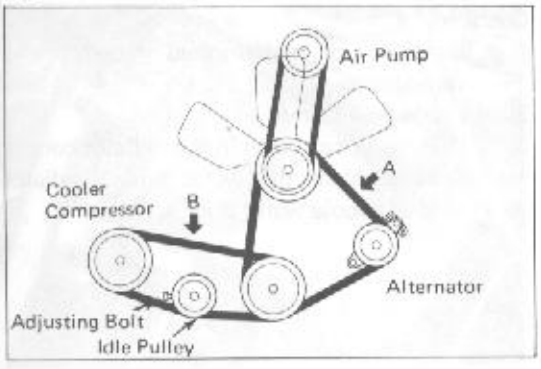
1. Cracks, deterioration, stretching or wear.
2. Adherence of oil or grease.

Fig. 2-10



3. Improper belt-to-pulley contact.

Fig. 2-11



CHECK & ADJUST BELT TENSION

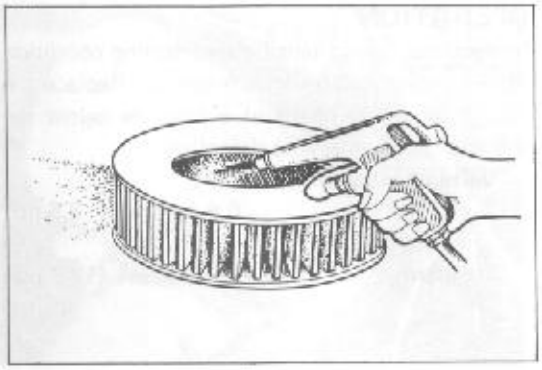
With 10 kg (22 lb) of force, press on the belts at the points indicated in the figure. The belts should deflect the amount specified.

A:	New	5 – 6 mm (0.20 – 0.24 in)
	Used	7 – 8 mm (0.28 – 0.31 in)
B:		15 – 18 mm (0.59 – 0.71 in)

– Caution –

Do not press on the air pump aluminum body.

Fig. 2-12



AIR CLEANER

CLEAN ELEMENT

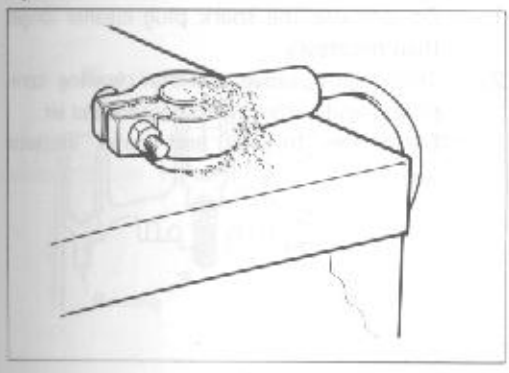
1. Remove the air cleaner element.

– 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. 2-13



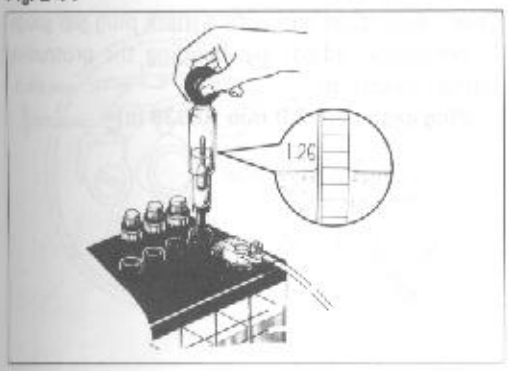
BATTERY

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. 2-14

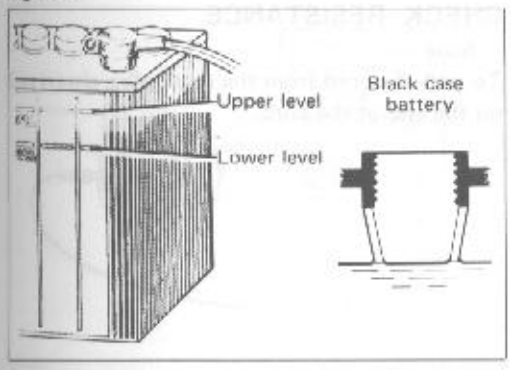


MEASURE SPECIFIC GRAVITY

1. Insert the hydrometer into the cell and hold it so that the float does not 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)

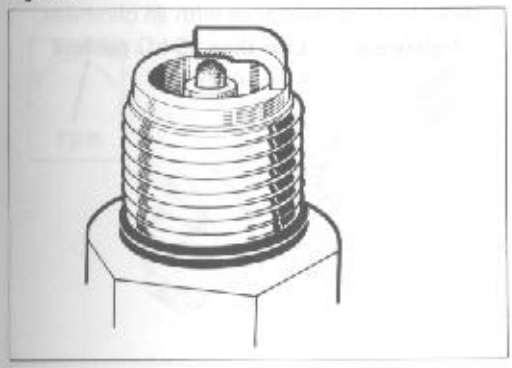
Fig. 2-15



CHECK ELECTROLYTE LEVEL

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

Fig. 2-16



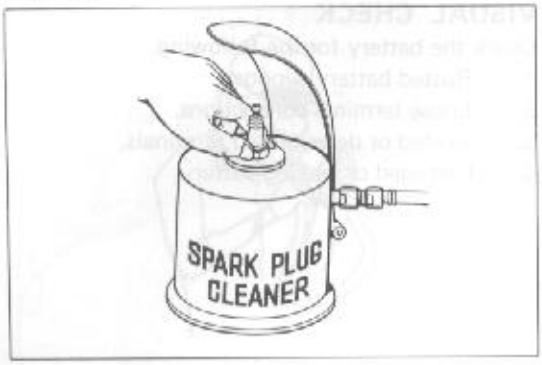
SPARK PLUG

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.

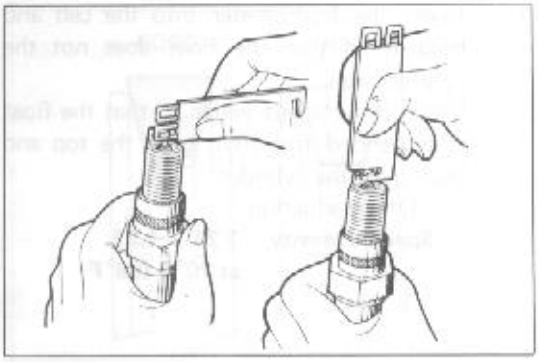
Fig. 2-17



CLEAN SPARK PLUGS

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. 2-18

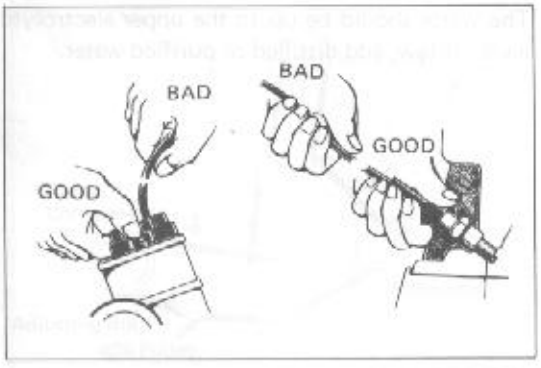


ADJUST GAP

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

Plug gap **1.0 mm (0.039 in)**

Fig. 2-19



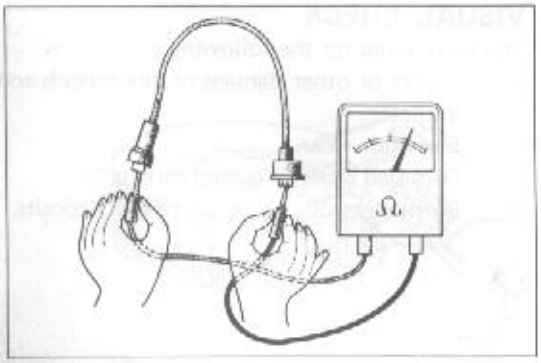
HIGH TENSION CORD

CHECK RESISTANCE

– Note –

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

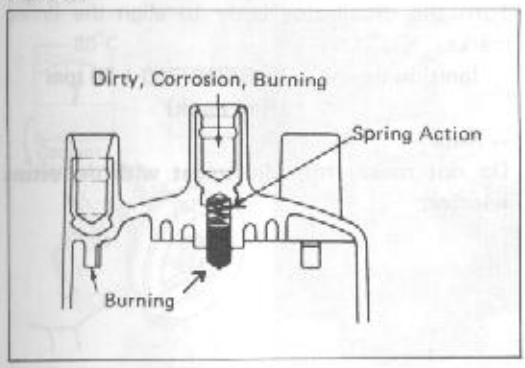
Fig. 2-20



Check the cord resistance with an ohmmeter.

Resistance **Less than 25 kΩ per cord**

Fig. 2-21



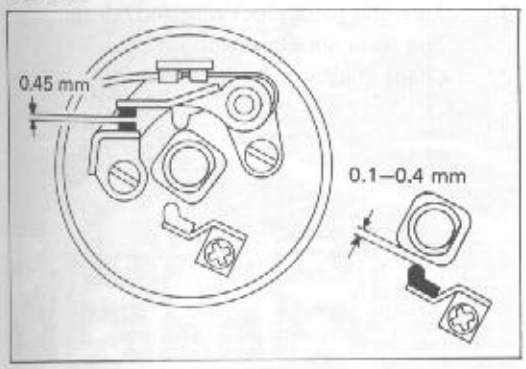
DISTRIBUTOR

CHECK DISTRIBUTOR CAP

Check the cap and rotor for:

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

Fig. 2-22

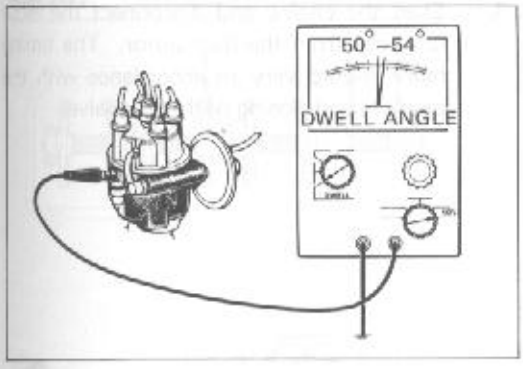


ADJUST HEEL GAP

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

Point gap 0.45 mm (0.018 in)
Damping spring gap
0.1 – 0.4 mm
(0.004 – 0.016 in)

Fig. 2-23

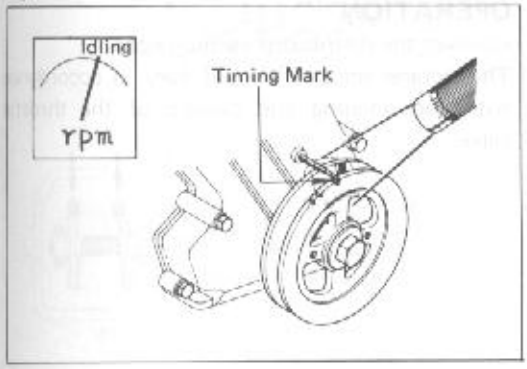


INSPECT DWELL ANGLE

Inspect the dwell angle with a dwell angle tester.

Dwell angle 50 – 54°
Variation
within 3° (at idling to 2000 rpm)

Fig. 2-24

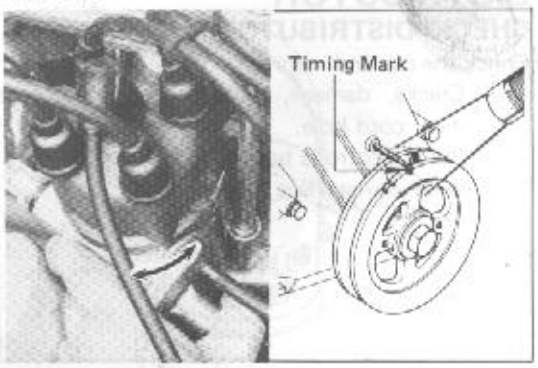


INSPECT IGNITION TIMING

1. To inspect the ignition timing, the engine should be running at idle.
2. The octane selector must be set at the standard position.

Ignition timing
7° BTDC/750 ± 50 rpm
(Red mark)

Fig. 2-25



ADJUSTMENT

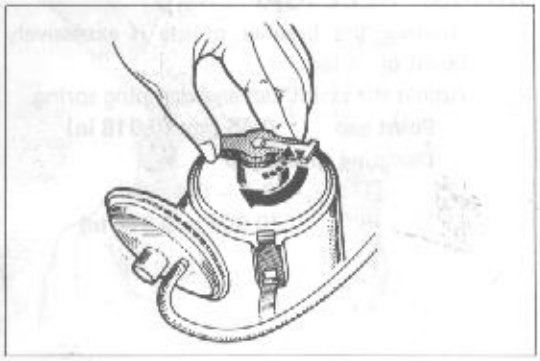
Turn the distributor body to align the timing marks.

Ignition timing **7° BTDC/750 ± 50 rpm (Red mark)**

– Note –

Do not make this adjustment with the octane selector.

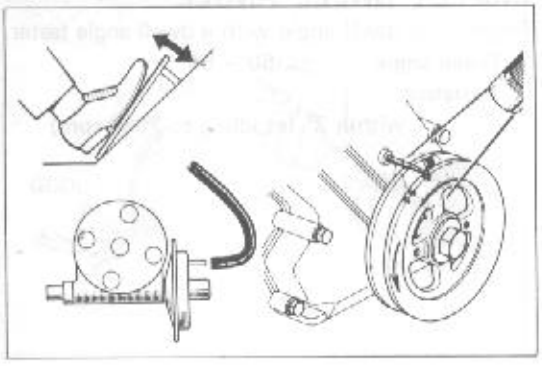
Fig. 2-26



GOVERNOR CHECK OPERATION

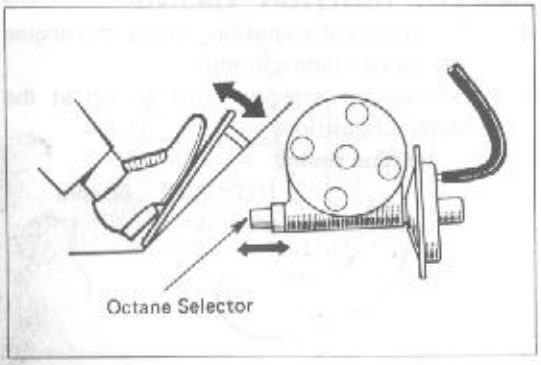
1. Turn the rotor clockwise and release. The rotor should return quickly.
2. Check the rotor for looseness.

Fig. 2-27



3. Start the engine and disconnect the vacuum hose from the distributor. The timing mark should vary in accordance with the opening and closing of throttle valve.

Fig. 2-28



VACUUM ADVANCE CHECK OPERATION

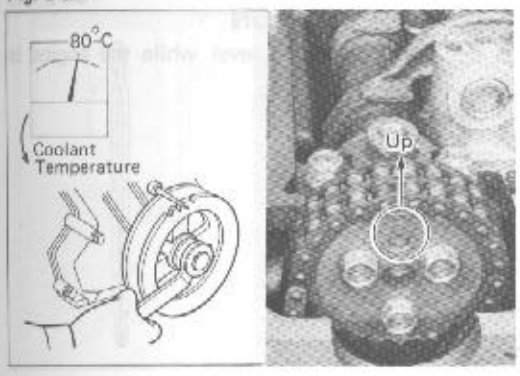
Connect the distributor vacuum hose.

The octane selector should vary in accordance with the opening and closing of the throttle valve.

VALVE CLEARANCE

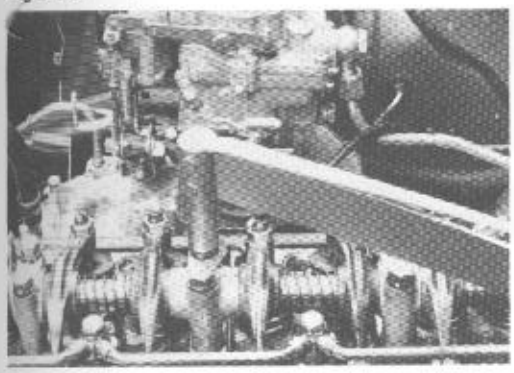
ADJUSTMENT

Fig. 2-29



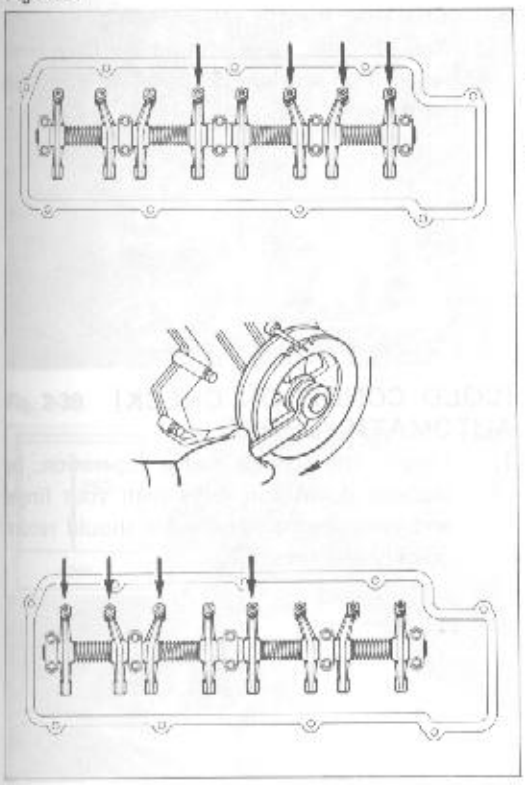
1. Warm up the engine.
2. Stop the engine.
3. Set the No. 1 cylinder to TDC/compression. At TDC position, the camshaft knock pin should point upwards.

Fig. 2-30



4. Tighten the rocker support.
   Torque **1.7 – 2.3 kg-m (12.3 – 16.6 ft-lb)**

Fig. 2-31

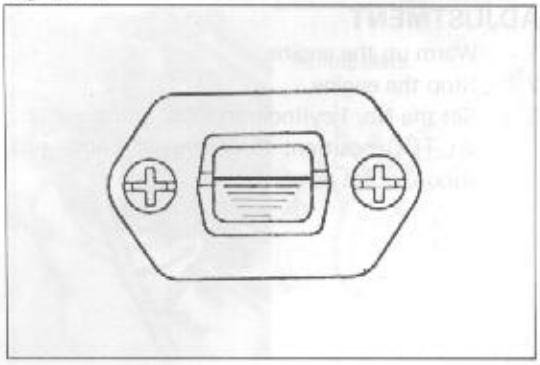


5. Adjust only the valves indicated by arrows in the figure.
   Valve clearance is measured between the valve stem and rocker arm adjusting screw.
   Intake **0.2 mm (0.008 in)**
   Exhaust **0.36 mm (0.012 in)**

6. Rotate the crankshaft 360°.

7. Adjust the remaining valves indicated by arrows.

Fig. 2-32

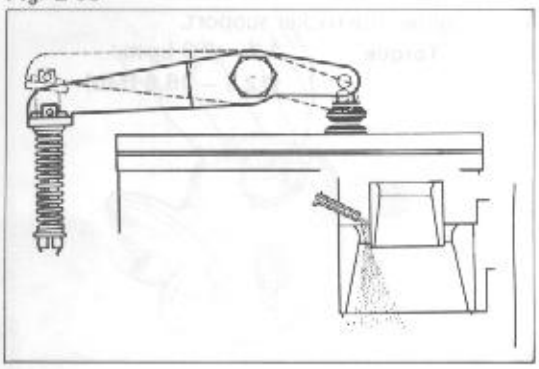


CARBURETOR

CHECK OPERATION

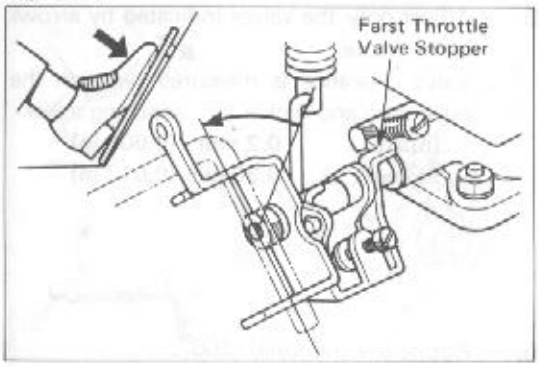
1. Check the float level while the engine is idling.

Fig. 2-33



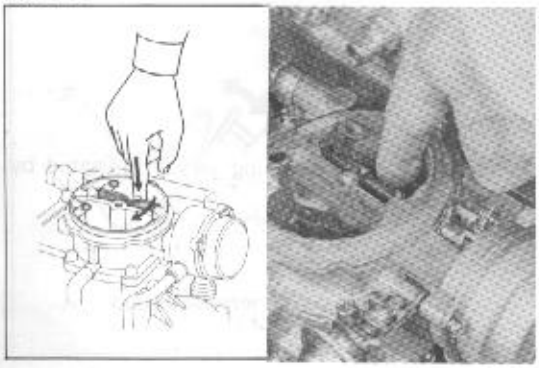
2. Check the acceleration pump operation. Gasoline should shoot out with force from the jet when the throttle valve is opened.

Fig. 2-34



3. Check the throttle valve opening. The throttle valve should be fully open when the accelerator pedal is depressed all the way.

Fig. 2-35



[COLD CONDITION CHECK] 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.