18R ENGINE TUNE-UP

18R ENGINE TUNE-UP ITEM

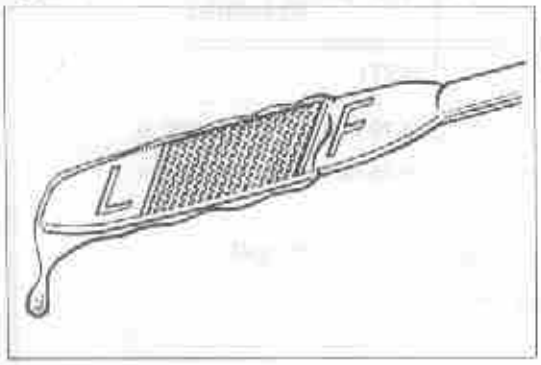
	ITEM			REMARKS		
1	ENGINE OIL	Oil level check		"Full" line		
		Oil replenishment		API service SE classification		
		Oil capacity				
	Dry refill	w/Oil filter	RX, RT	4.2 liters	4.4 US qt	3.7 Imp.qt
			RH	5.4 liters	5.7 US qt	4.8 Imp.qt
			RN	4.4 liters	4.7 US qt	3.9 Imp.qt
			RN4WD	5.5 liters	5.8 US qt	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

ENGINE OIL

CHECK OIL LEVEL

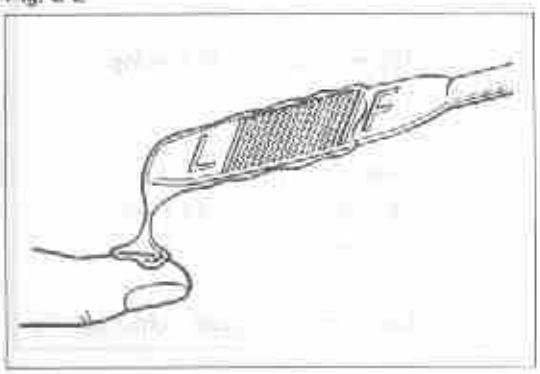
Fig. 2-1



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.

CHECK OIL QUALITY

Fig. 2-2



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

REPLACE OIL FILTER

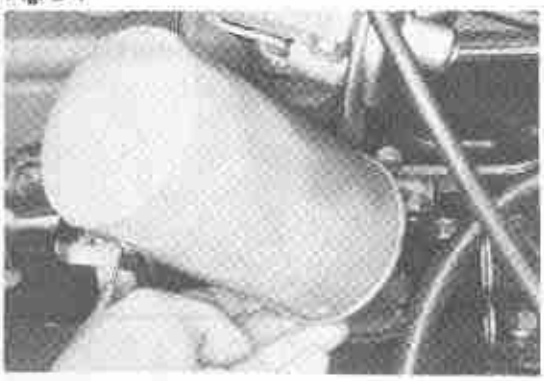
Fig. 2-3

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.

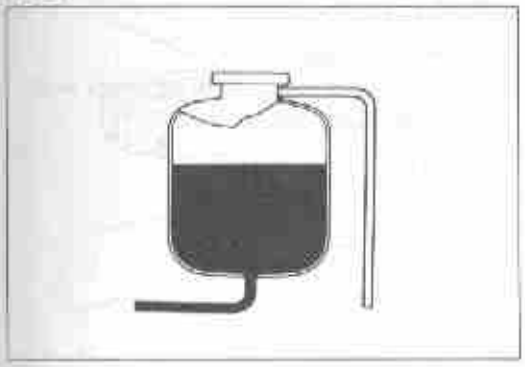
Fig. 2-4



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

COOLING SYSTEM

Fig. 2-5



CHECK COOLANT LEVEL

If low, fill reservior to FULL line.

– Note –

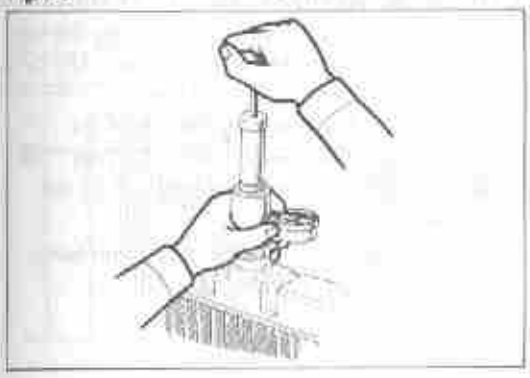
To maintain freeze protection, use a recommended anti-freeze.

Fig. 2-6

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. 2-7

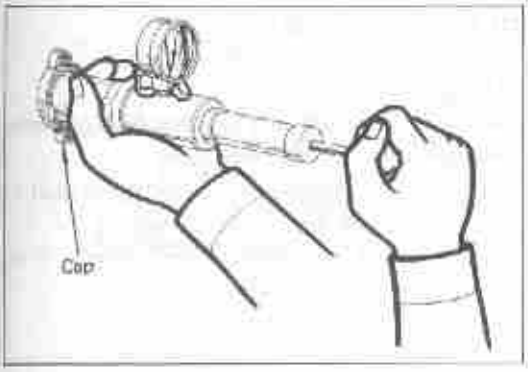


CHECK COOLING SYSTEM

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. 2-8



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 limit

0.6 kg/cm² (8.5 psi)

Standard **0.9 kg/cm² (12.8 psi)**

Fig. 2-9

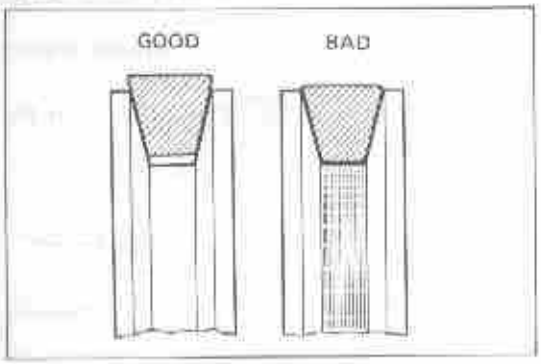
DRIVE BELT

VISUAL CHECK

Check the drive belt for:

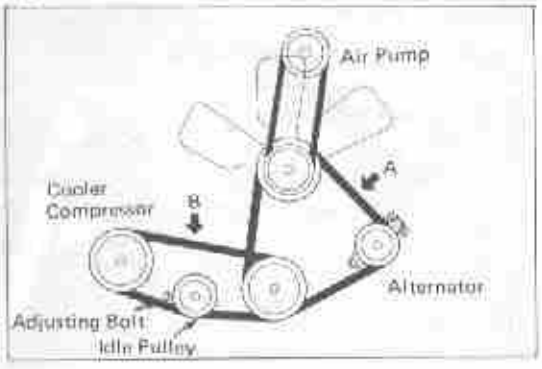
1. Cracks, deterioration, stretching or wear.
2. Adherence of oil or grease.

Fig. 2-10



3. Improper belt-to-pulley contact.

Fig. 2-11



CHECK & ADJUST BELT TENSION

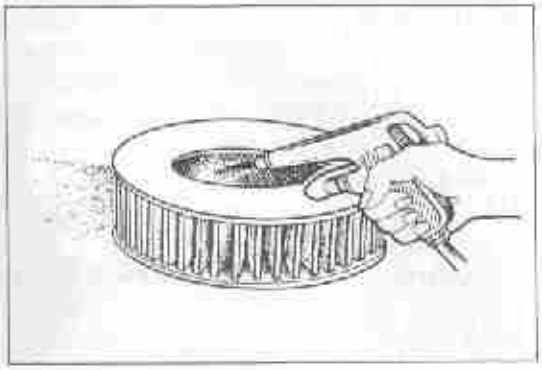
With 10 kg (22 lb) of force, press on the belts at the points indicated in the figure. The belts should deflect the amount specified.

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

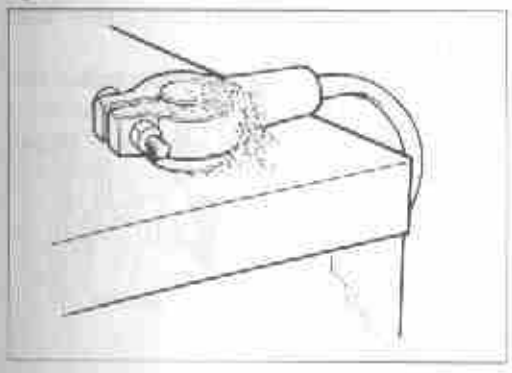
1. Remove the air cleaner element.

– 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



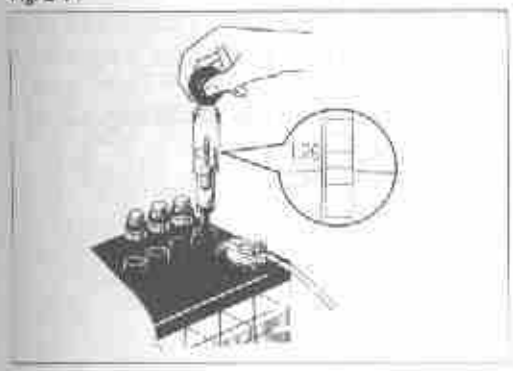
BATTERY

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

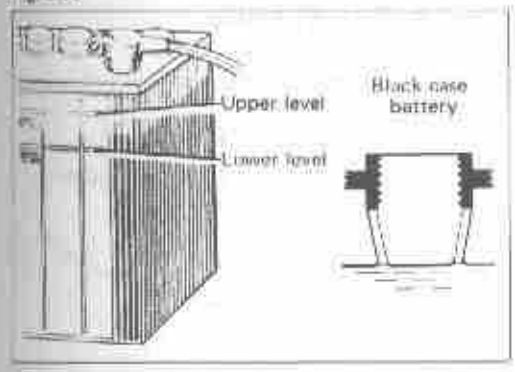


MEASURE SPECIFIC GRAVITY

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)

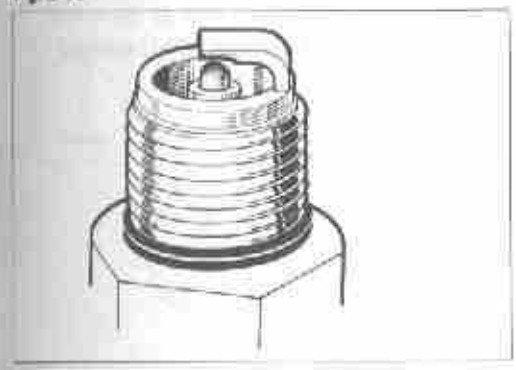
Fig. 2-15



CHECK ELECTROLYTE LEVEL

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

Fig. 2-16



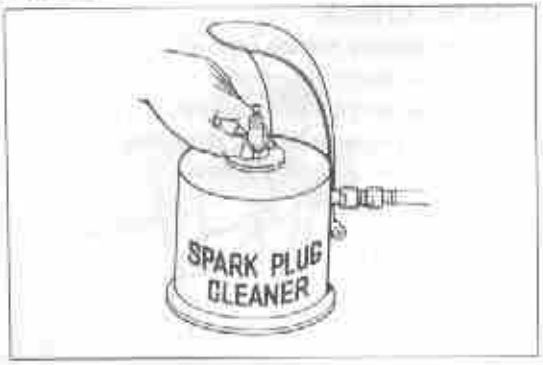
SPARK PLUG

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.

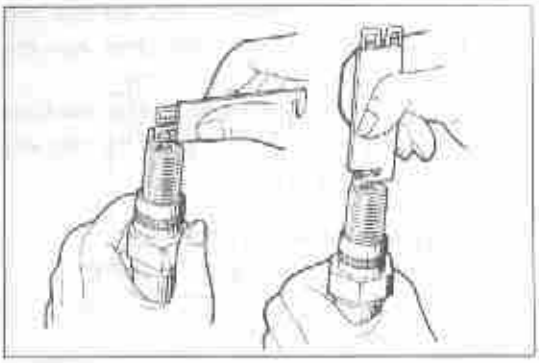
Fig. 2-17



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

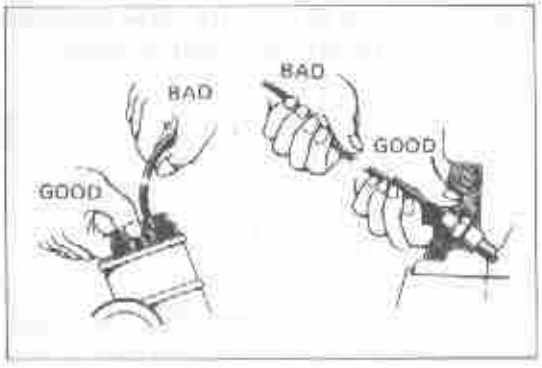


ADJUST GAP

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



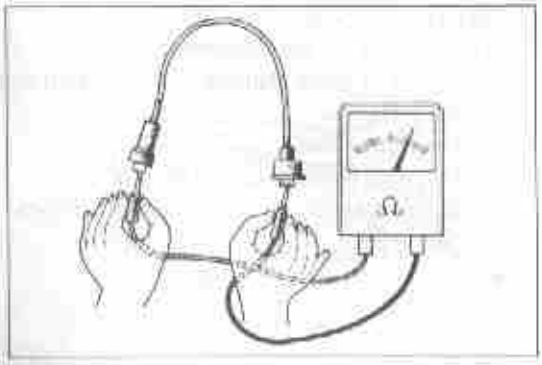
HIGH TENSION CORD

CHECK RESISTANCE

– Note –

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

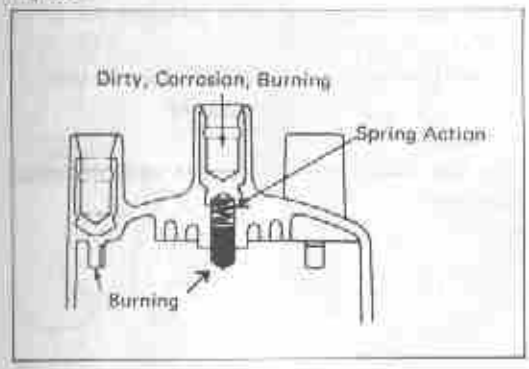
Fig. 2-20



Check the cord resistance with an ohmmeter.

Resistance **Less than 25 kΩ per cord**

Fig. 2-21



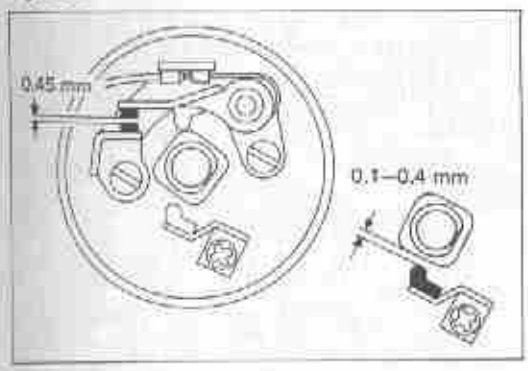
DISTRIBUTOR

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.

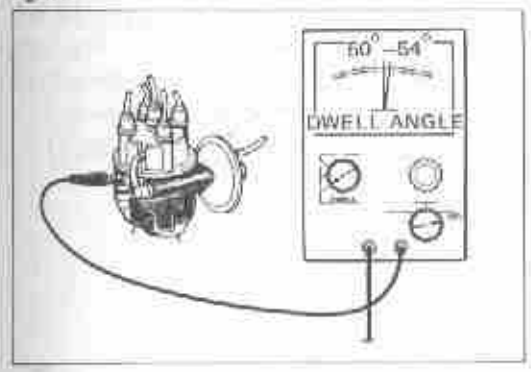
Point gap 0.45 mm (0.018 in)

Damping spring gap

0.1 – 0.4 mm

(0.004 – 0.016 in)

Fig. 2-23



INSPECT DWELL ANGLE

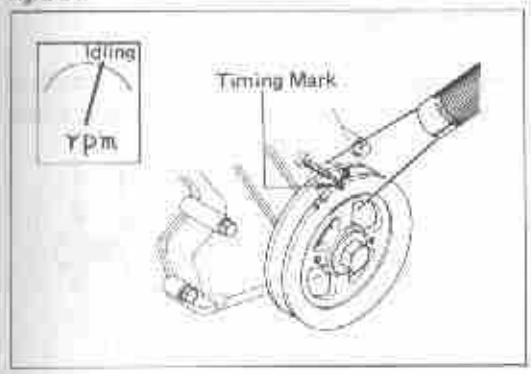
Inspect the dwell angle with a dwell angle tester.

Dwell angle 50 – 54°

Variation

within 3° (at idling to 2000 rpm)

Fig. 2-24



INSPECT IGNITION TIMING

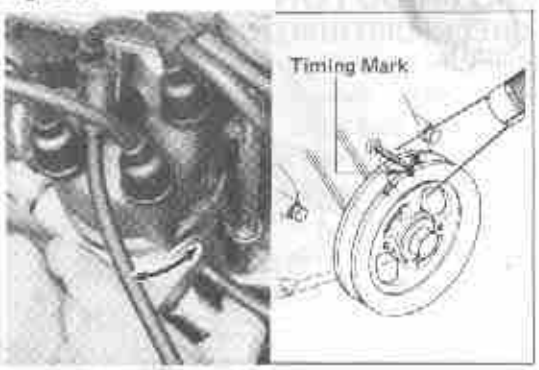
1. To inspect the ignition timing, the engine should be running at idle.
2. The octane selector must be set at the standard position.

Ignition timing

7° BTDC/750 ± 50 rpm

(Red mark)

Fig. 2-25



ADJUSTMENT

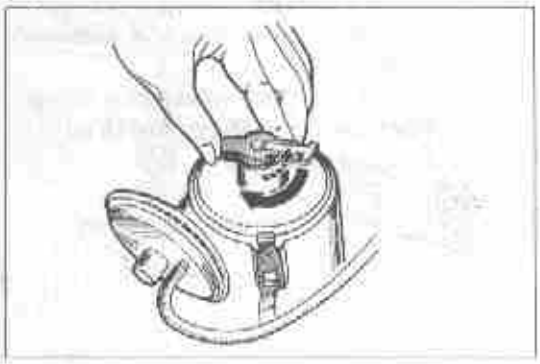
Turn the distributor body to align the timing marks.

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

– Note –

Do not make this adjustment with the octane selector.

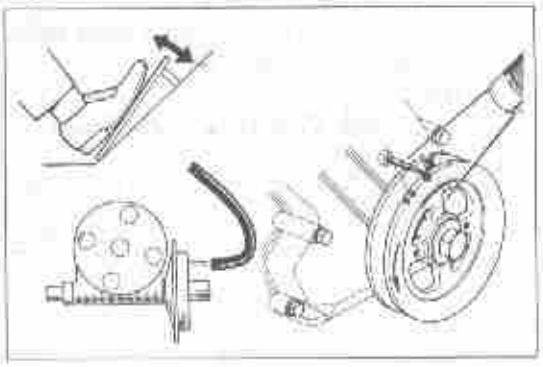
Fig. 2-26



GOVERNOR CHECK OPERATION

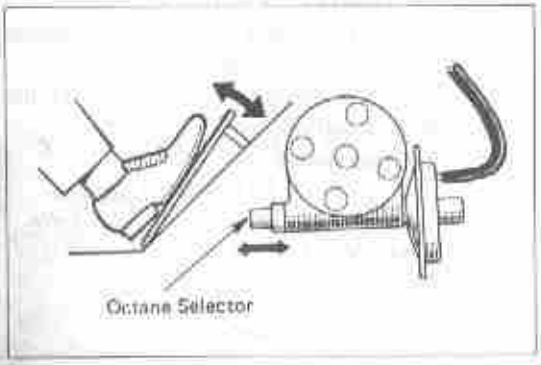
1. Turn the rotor clockwise and release. The rotor should return quickly.
2. Check the rotor for looseness.

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

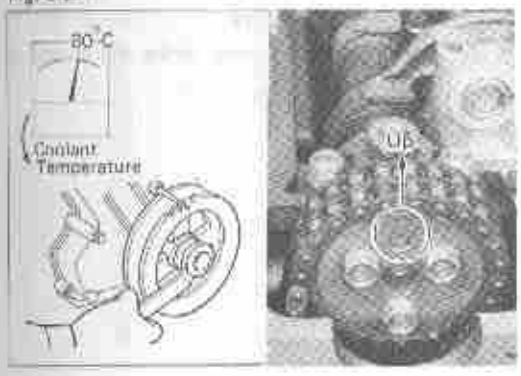
Connect the distributor vacuum hose.

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

VALVE CLEARANCE

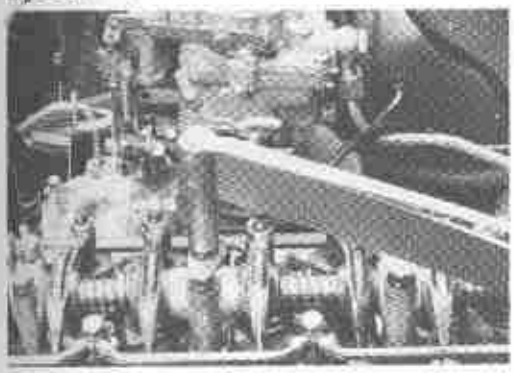
ADJUSTMENT

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.

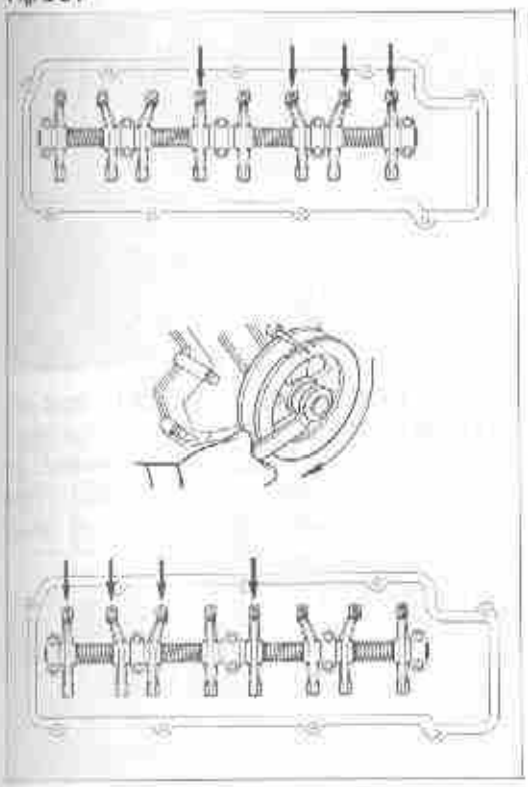
Fig. 2-30



4. Tighten the rocker support.

Torque	**1.7 – 2.3 kg-m (12.3 – 16.6 ft-lb)**

Fig. 2-31



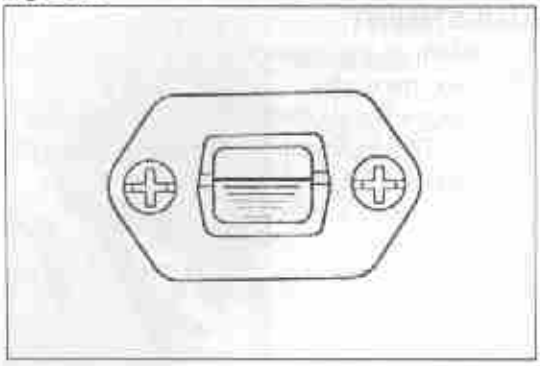
5. Adjust only the valves indicated by arrows in the figure.
   Valve clearance is measured between the valve stem and rocker arm adjusting screw.

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

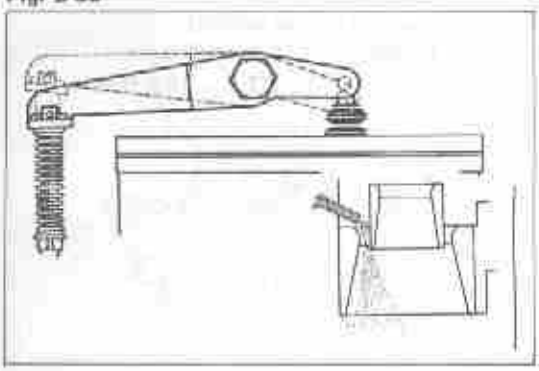


CARBURETOR

CHECK OPERATION

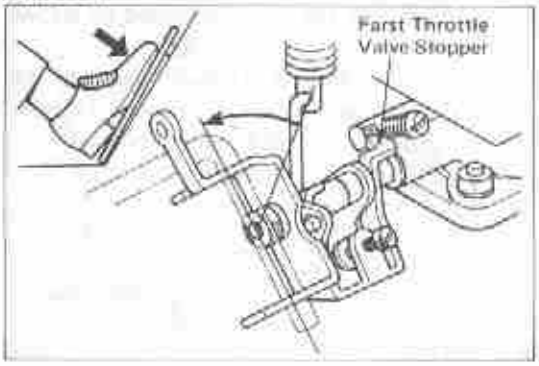
1. Check the float level while the engine is idling.

Fig. 2-33



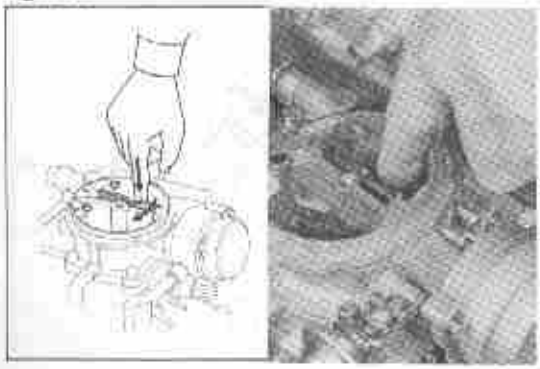
2. Check the acceleration pump operation.
Gasoline should shoot out with force from the jet when the throttle valve is opened.

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.

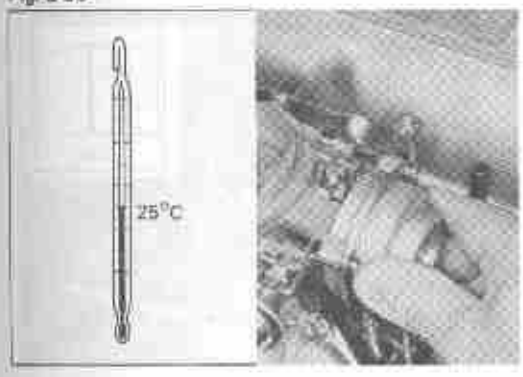
Fig. 2-35



[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.

Fig. 2-36



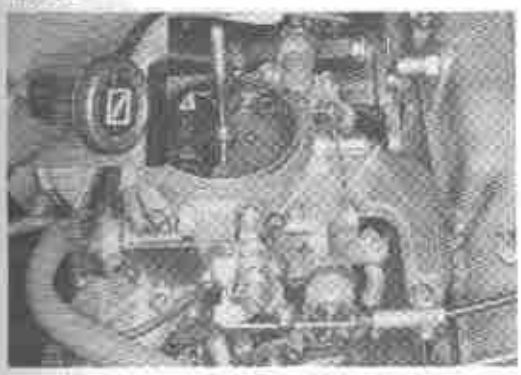
2. Check to see that the choke valve just closes exactly when the atmospheric temperature reaches 25°C (77°F).
If it doesn't, loosen the three screws and adjust by turning the coil housing.

Fig. 2-37

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

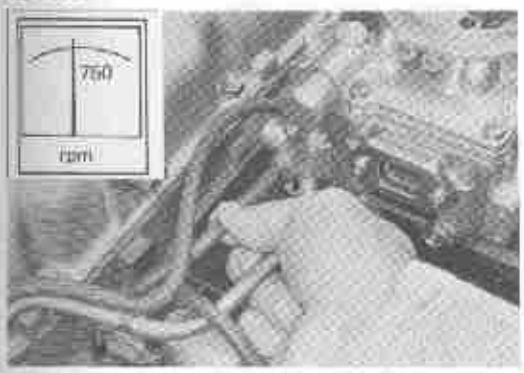
Fig. 2-38



MANUAL CHOKE

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

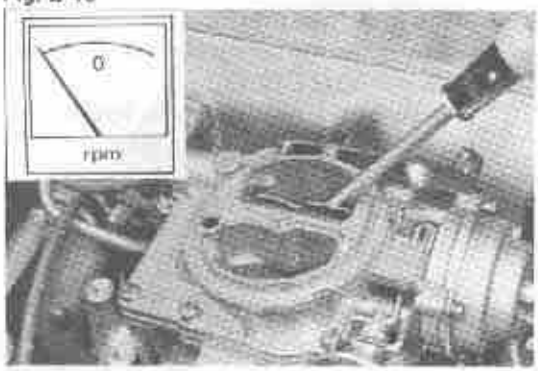
Fig. 2-39



AAP

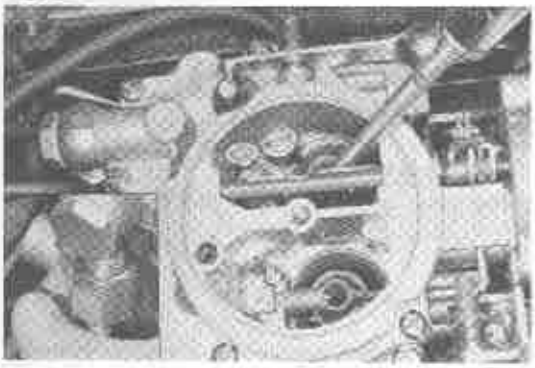
1. Start the engine.
2. Pinch the AAP hose shut.

Fig. 2-40



3. Stop the engine and open the choke valve.

Fig. 2-41



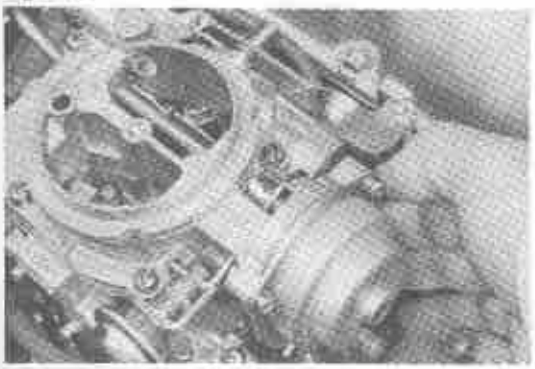
4. Release the AAP hose. Gasoline should spurt out of the accelerator pump jet.

Fig. 2-42

TVSV (for AAP)

With engine idling (below 80°C, 140°F), disconnect the hose from the AAP diaphragm. The engine should idle roughly or die.

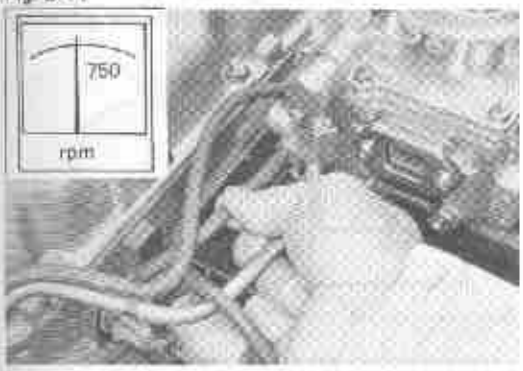
Fig. 2-43



[HOT CONDITION] AUTOMATIC CHOKE

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

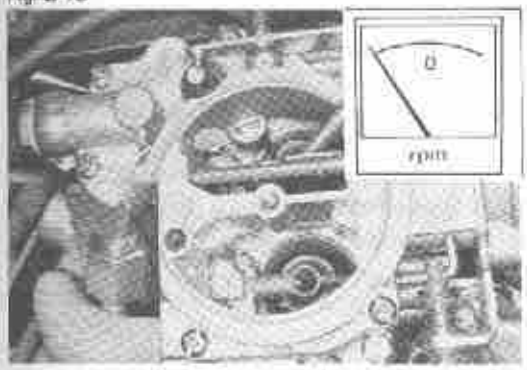
Fig. 2-44



AAP

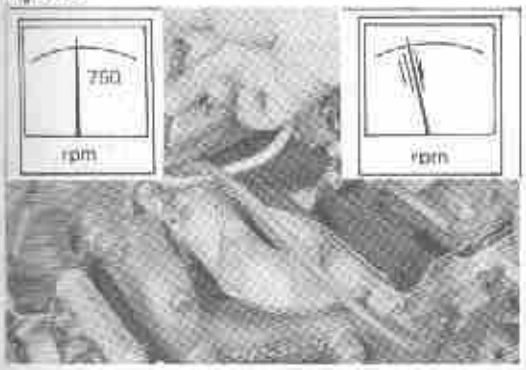
1. Start the engine.
2. Pinch the AAP hose shut.

Fig. 2-45



3. Stop the engine.
4. Release the hose. Gasoline should not spurt out.

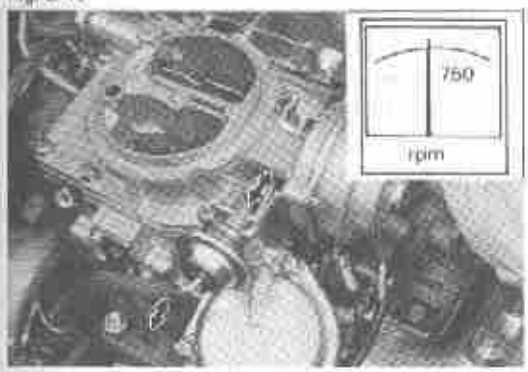
Fig. 2-46



TVSV (for AAP)

With the engine idling (above 80°C, 140°F), disconnect the hose from the AAP diaphragm. The engine should continue idling smoothly and not die.

Fig. 2-47



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. 2-48

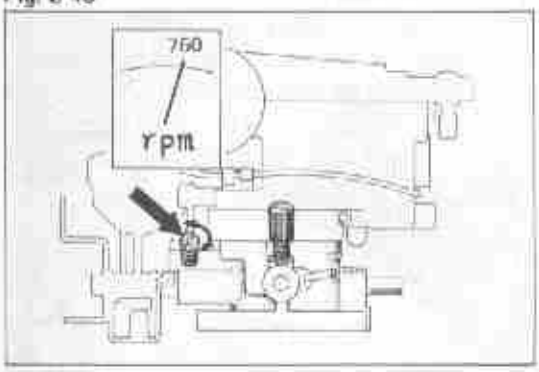
INITIAL IDLE SPEED

If necessary, adjust the idle mixture adjusting screw with SST.
SST [09243-00020]

Preliminary check

1. Coolant temp. – about 80°C (180°F)
2. Choke valve – fully open
3. Accessories – all off (wiper, heater, lights, air conditioner, etc.)
4. Vacuum lines – all connected
5. Ignition timing – initial set position
6. Transmission – Neutral

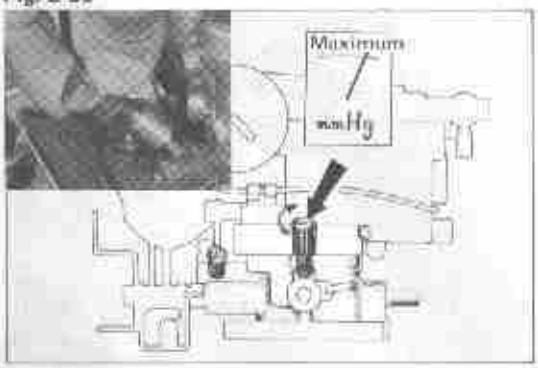
Fig. 2-49



BEST IDLE

1. Set the idle at 750 rpm with the idle speed adjusting screw.

Fig. 2-50

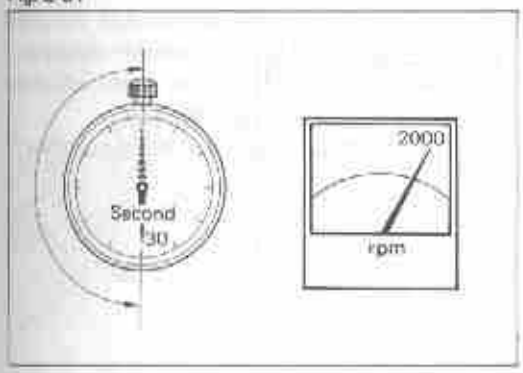


2. Set to maximum vacuum with the idle mixture adjusting screw.
3. If necessary, repeat the adjustments above until the specified rpm and maximum vacuum are obtained.

Idle speed	**750 ± 50 rpm**
Vacuum	**420 mmHg (16.5 inHg)**

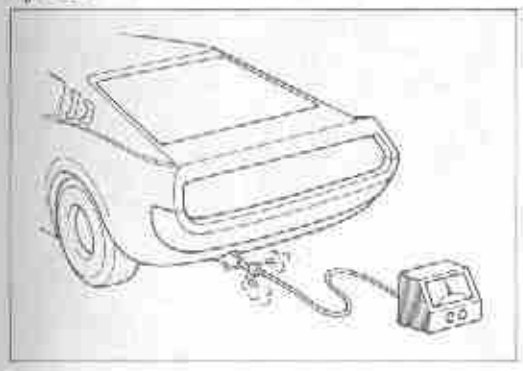
CO CONCENTRATION

Fig. 2-51



1. Measure the CO concentration.
   (1) Race the engine about 2000 rpm for 30 – 60 seconds.

Fig. 2-52

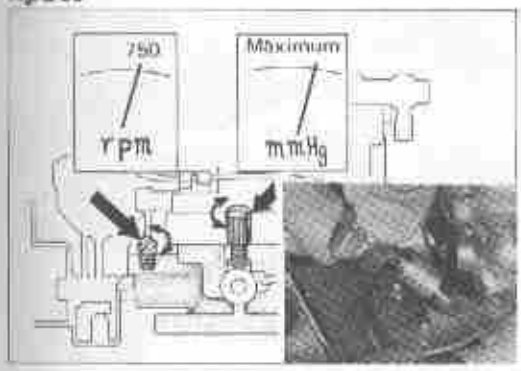


   (2) Before measuring, wait 1 to 3 minutes after racing the engine to allow the concentration to stabilize.

CO concentration

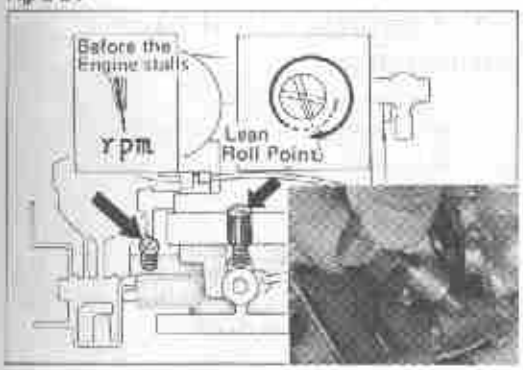
Less than 1 – 3%

Fig. 2-53



2. Adjust the CO concentration.
   (1) Set the idle to 750 rpm with the idle adjusting screw.
   (2) Set to maximum vacuum with the idle mixture adjusting screw.
   (3) If necessary, repeat the steps above until adjustments are as specified.

Fig. 2-54

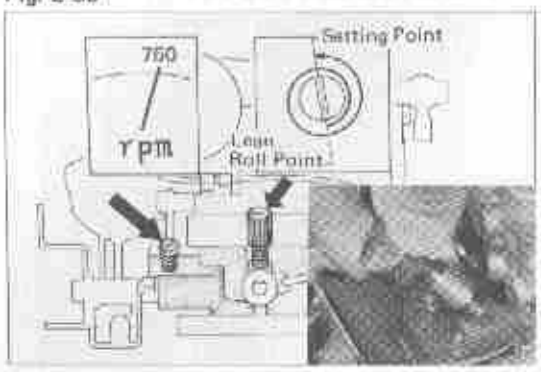


   (4) Turn the idle mixture adjusting screw clockwise until the lean roll point is obtained.

– Note –

The lean roll point is where the engine idle becomes very rough just before the engine stalls.

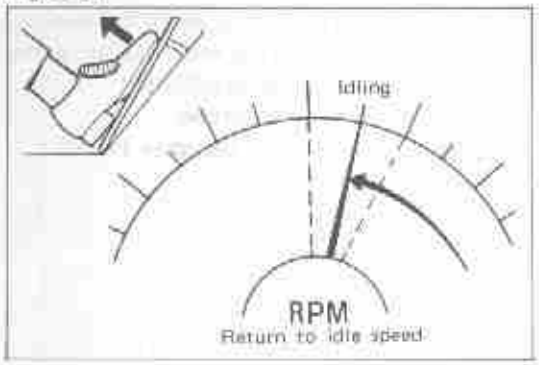
Fig. 2-55



(5) Then turn the idle mixture adjusting screw 1-1/2 turns counter clockwise.
(6) Now adjust the idle speed adjusting screw to obtain 750 rpm.
(7) Repeat the above steps, if necessary.

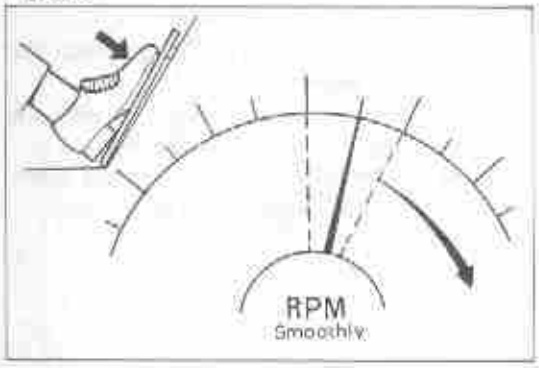
ENGINE CONDITION

Fig. 2-56



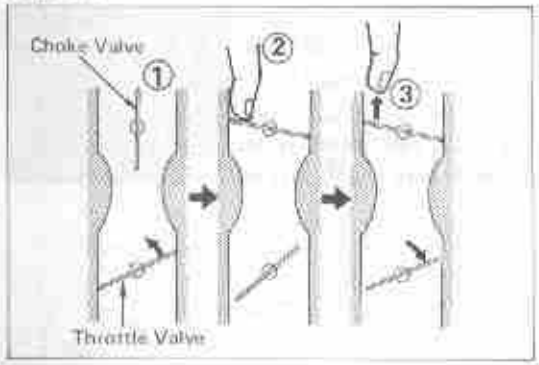
1. Check to see that the engine returns to idle when the accelerator pedal is released both suddenly and slowly.

Fig. 2-57



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

Fig. 2-58

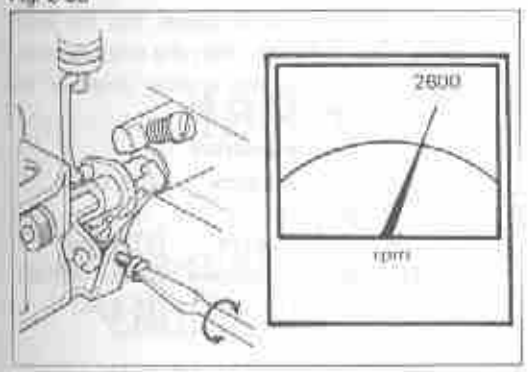


FAST IDLE (Automatic Choke)

ADJUSTMENT

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.

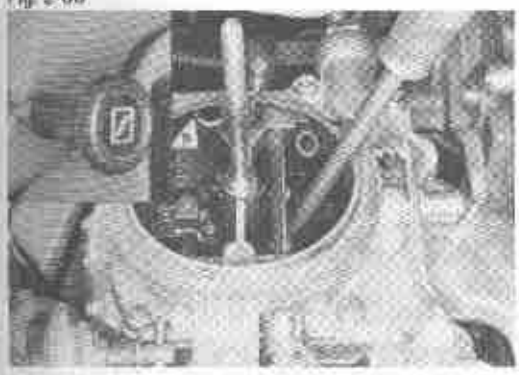
Fig. 2-59



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

Fast idle speed **2600 ± 200 rpm**

Fig. 2-60



FAST IDLE [Manual Choke]

ADJUSTMENT

1. Pull the choke knob out all the way.
2. Fully open the choke valve with a screwdriver.

Fig. 2-61

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

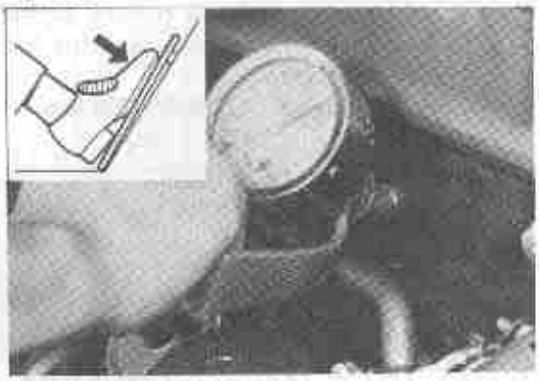
Fast idle speed **2600 ± 200 rpm**

Fig. 2-62

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. 2-63



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

11.5 kg/cm² (163.1 psi)

Limit

9.0 kg/cm² (127.8 psi)

Difference of pressure between cylinder

1.0 kg/cm² (14.2 psi)