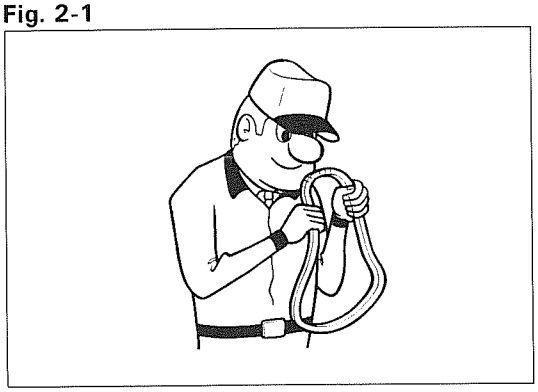
ENGINE TUNE-UP

ENGINE TUNE-UP ITEMS

	ITEM		REMARKS
1	DRIVE BELT		
	(General countries)		
	Deflection at 10 kg (22 lb) force		
	Fan — Alternator	New belt	5 — 7 mm 0.20 — 0.28 in.
		Used belt	7 — 10 mm 0.28 — 0.39 in.
	Crank — Air pump	New belt	8 — 10 mm 0.31 — 0.39 in.
		Used belt	10 — 14 mm 0.39 — 0.55 in.
	(USA & Canada)		
	Borroughs belt tension gauge		
	No. BT-33-73F	New belt	100 — 150 lbs
		Used belt	60 — 100 lbs
2	BATTERY		
	Specific gravity		1.25 — 1.27 when fully charged at 20°C (68°F)
	Electrolyte level		Correct level
3	ENGINE OIL		
	Oil level check		F line
	Oil replenishment	USA & Canada	API service SE or better
		General	API service SC, SD, SE or better
	Oil capacity		
	(21R, 21R-C) Dry fill		4.8 liters 5.1 US qt 4.2 Imp.qt
	Drain & refill		
	w/ Oil filter change		4.3 liters 4.5 US qt 3.8 Imp.qt
	w/o Oil filter change		3.6 liters 3.8 US qt 3.2 Imp.qt
	(22R) Dry fill		4.8 liters 5.1 US qt 4.2 Imp.qt
	Drain & refill		
	w/ Oil filter change		4.6 liters 4.9 US qt 4.0 Imp.qt
	w/o Oil filter change		3.8 liters 4.0 US qt 3.3 Imp.qt
	Oil filter replacement		SST [09228-44010]
4	COOLING SYSTEM		
	Coolant level		Full line
	Coolant quality, Leakage		
	Radiator cap 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
	Coolant capacity (w/ Heater)		
	21R-C (RA)		7.5 liters 7.9 US qt 6.6 Imp.qt
	21R, 21R-C (RX, RT)		8.0 liters 8.5 US qt 7.0 Imp.qt
	22R	RB (RHD)	10.5 liters 11.1 US qt 9.2 Imp.qt
		RB (LHD)	10.7 liters 11.3 US qt 9.4 Imp.qt
		ex. RB	8.4 liters 8.9 US qt 7,4 Imp.qt
5	AIR CLEANER		
	Clean element		Correct level
	Oil capacity (Oil bath type)		
6	SPARK PLUGS		
	Visual check, Cleaning		
	Gap		0.8 mm 0.031 in.

	ITEM	REMARKS
7	HIGH TENSION CORD	
	Resistance	Less than 25 kΩ per cord
8	DISTRIBUTOR	
	Distributor cap	
	Air gap (Breaker points less type)	0.2 – 0.4 mm 0.008 – 0.016 in.
	Rubbing block gap (Breaker points type)	0.45 mm 0.0177 in.
	Damping spring gap (Breaker points type)	0.1 – 0.4 mm 0.004 – 0.016 in.
	Governor advancer, Vacuum advancer	
9	IGNITION TIMING	
	Dwell angle (Breaker points type)	52°
	Ignition timing 21R-C (Australia)	5° BTDC/MAX. 600 rpm (M/T) or 650 rpm (A/T) w/vacuum advancer cut
	21R, 21R-C (Sweden)	8° BTDC/Max. 750 rpm
	22R	8° BTDC/Max. 950 rpm
10	VALVE CLEARANCE Hot Intake	0.20 mm 0.008 in.
	Exhaust	0.30 mm 0.012 in.
11	CARBURETOR	
	Automatic choke, Choke breaker	
	Choke opener (22R except RB)	
	FICB (21R ECE & 21R-C)	
	Float level, Acceleration pump	
12	IDLE SPEED ADJUSTMENT (except Canada RN 4x4, RB, RX, RA60, 61 & RT133)	
	Idle speed M/T	700 rpm
	A/T Fed. RN 4-A/T	700 rpm
	Canada RA, RT-A/T	850 rpm
	Others A/T	750 rpm
13	IDLE SPEED & IDLE MIXTURE ADJUSTMENT (Canada RN 4x4, RB, RX, RA60, 61 & RT133)	
	Idle speed Canada RN 4x4	700 rpm
	RB	800 rpm
	RX, RA61	750 rpm
	RA60 & RT133 (Australia)	600 rpm (M/T), 650 rpm (A/T)
14	FAST IDLE SPEED ADJUSTMENT	
	21R & 21R-C	2,400 rpm
	22R (RB)	2,400 rpm
	22R (others)	2,600 rpm
15	THROTTLE POSITIONER SETTING SPEED	
	Calif. RN 4x4 and RN C&C	1,050 rpm
	RX except ECE A/T, RA60, 61 & RT133	1,200 rpm
	Australia RB	1,400 rpm
16	DASH POT	
	Timing required to return to idle position	Approx. 3 seconds
17	COMPRESSION PRESSURE at 250 rpm	
	STD 21R	More than 11.0 kg/cm² (157 psi)
	21R-C	More than 11.5 kg/cm² (164 psi)
	22R	More than 12.0 kg/cm² (171 psi)
	Limit 21R & 21R-C	9.0 kg/cm² 128 psi
	22R	10.0 kg/cm² 142 psi
	Difference between each cylinder	1.0 kg/cm² 14 psi

Fig. 2-1



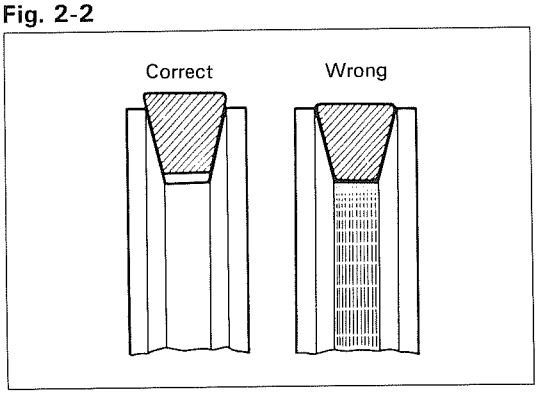
DRIVE BELT

VISUAL CHECK

Check for:

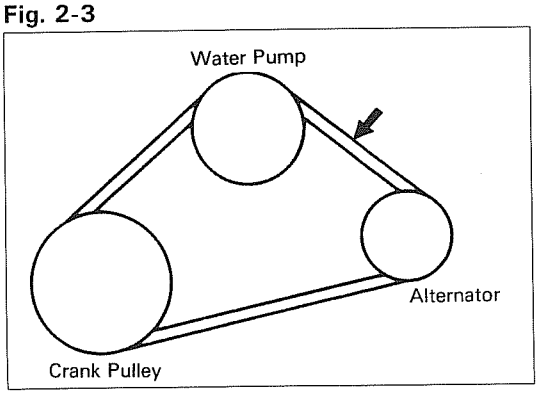
1. Cracks, deterioration, stretching or wear.
2. Adherence of oil or grease.

Fig. 2-2



3. Improper belt-to-pulley contact.

Fig. 2-3



CHECK & ADJUST BELT TENSION

General countries

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.

Drive belt tension:

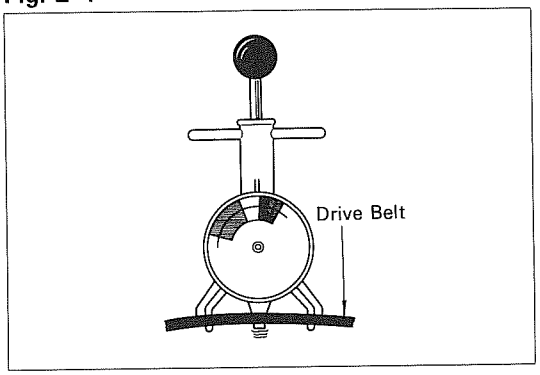
Fan—Alternator

New belt	**5 — 7 mm (0.20 — 0.28 in.)**
Used belt	**7 — 10 mm (0.28 — 0.39 in.)**

Crank—Air pump

New belt	**8 — 10 mm (0.31 — 0.39 in.)**
Used belt	**10 — 14 mm (0.39 — 0.55 in.)**

Fig. 2-4



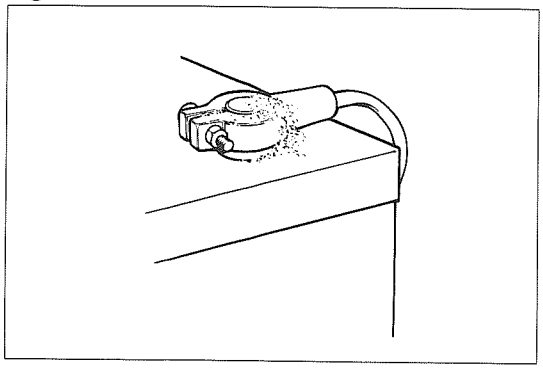
USA & Canada

Using a Borroughs tension gauge BT-33-73F, adjust the following value.

Drive belt tension:

New belt	**100 — 150 lbs**
Used belt	**60 — 100 lbs**

Fig. 2-5



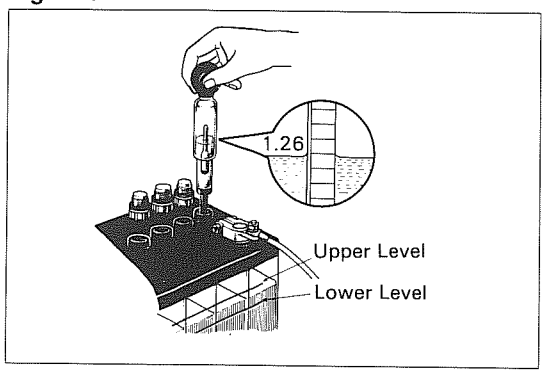
BATTERY

VISUAL CHECK

Check for:

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

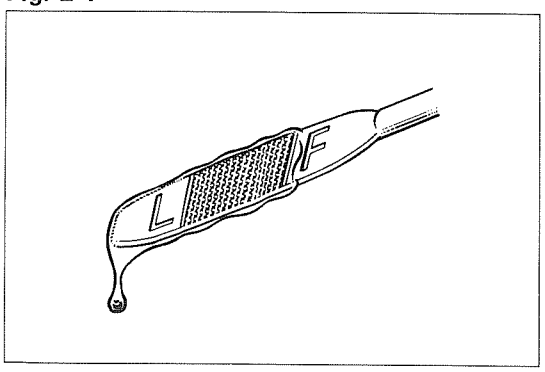
Fig. 2-6



MEASURE SPECIFIC GRAVITY

1. Check the specific gravity of the electrolyte with a hydrometer.
   Specific gravity:
   1.25 – 1.27
   [When fully charged at 20°C (68°F)]
2. Check the electrolyte quantity of each cell. If insufficient, refill with distilled water.

Fig. 2-7



ENGINE OIL

CHECK OIL LEVEL

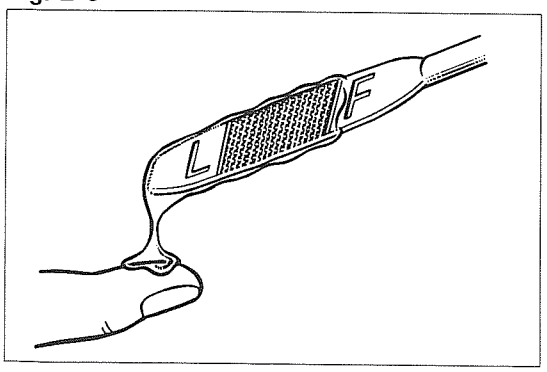
The oil level should be between the L and F marks. If low, check for leakage and add oil up to the F mark.

Use the engine oil indicated below.

USA & Canada ——— API service SE or better

General ——— API service SC, SD, SE or better

Fig. 2-8

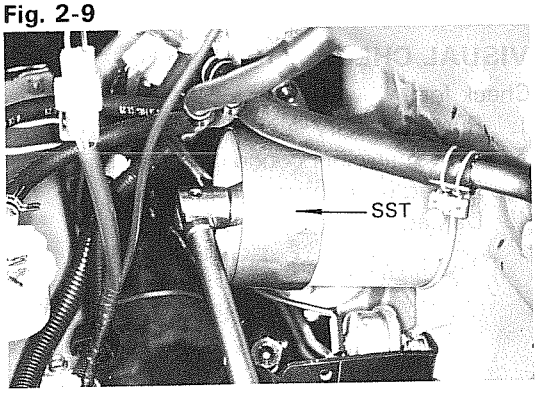


CHECK OIL QUALITY

Check for:

1. Deterioration.
2. Entry of water.
3. Discoloration or thinning.

Fig. 2-9

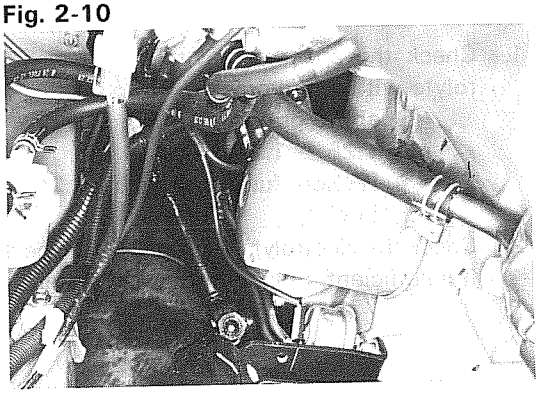


REPLACE OIL FILTER

1. Remove the oil filter with SST.
   SST [09228-44010]
2. Install a new filter and tighten it firmly by hand.

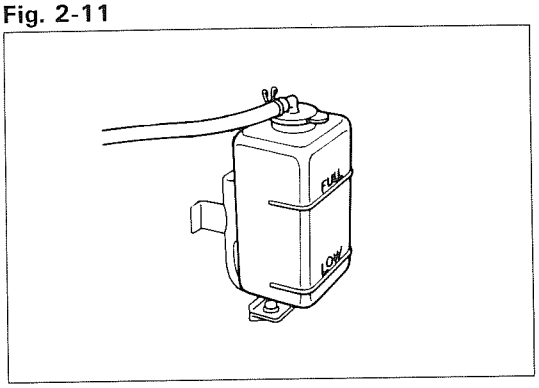
— Note —
Do not tighten with SST or a wrench.

Fig. 2-10



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

Fig. 2-11



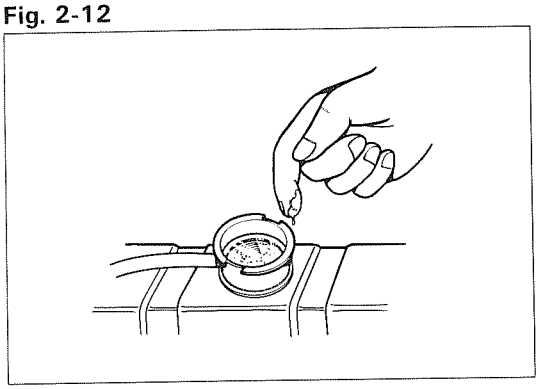
COOLING SYSTEM

CHECK COOLANT LEVEL

If low, fill reservoir to FULL line.

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

Fig. 2-12

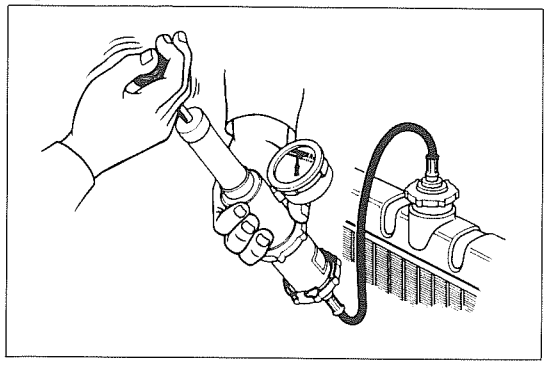


CHECK COOLANT QUALITY

Check for:

1. Coolant cleanliness.
2. Rust or scale deposits around the radiator cap and filler neck.
3. Entry of oil.

Fig. 2-13

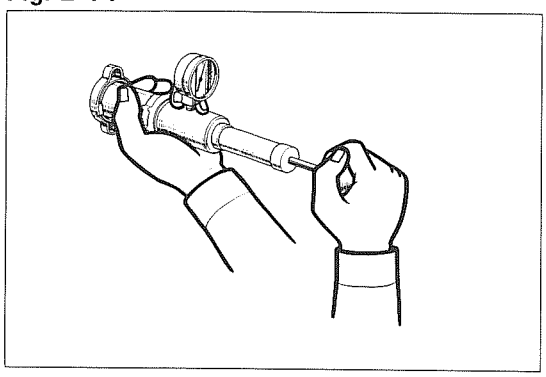


CHECK COOLING SYSTEM PARTS

Check for:

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

Fig. 2-14

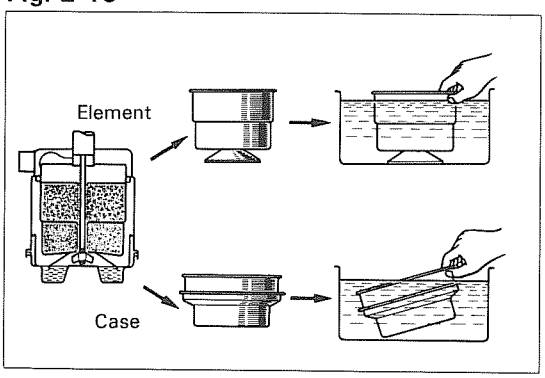


5. Faulty operation of radiator cap.
   Inspect the spring tension and seating condition of the radiator cap vacuum valves. If the valve opens at a pressure below specification or is otherwise defective, replace the radiator cap.

Valve opening pressure:

STD	**0.75 – 1.05 kg/cm² (10.7 – 14.9 psi)**
Limit	**0.6 kg/cm² (8.5 psi)**

Fig. 2-15

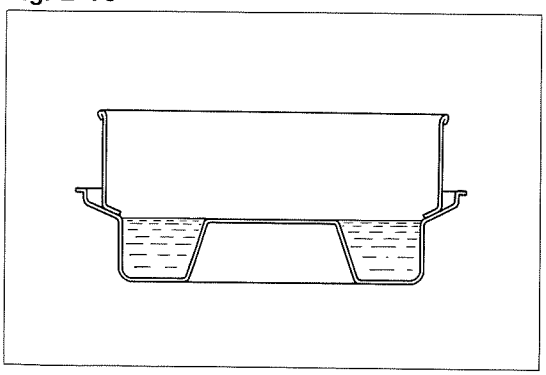


AIR CLEANER [Oil Bath Type] (RB only)

CLEAN ELEMENT

1. Remove the air cleaner cap and element.
2. Wash the element and case with kerosene and dry them thoroughly.

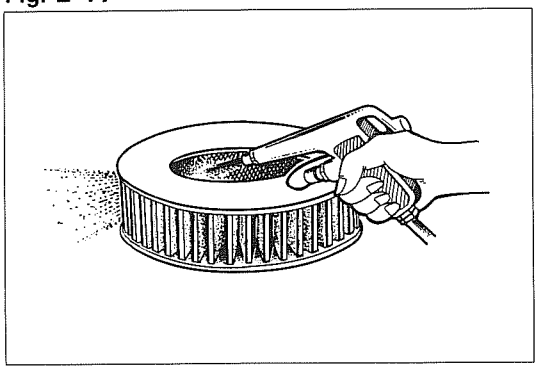
Fig. 2-16



INSTALL AIR CLEANER

1. Refill the case up to the indicated level with clean engine oil.
2. Saturate the element with clean engine oil.
3. Install the cap and element.
4. Tighten the air cleaner on the air cleaner support.

Fig. 2-17



[Paper Element Type]

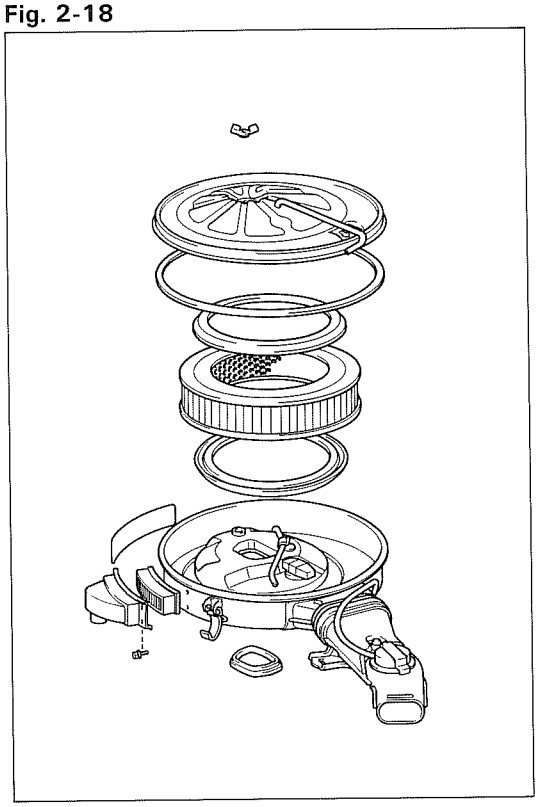
CLEAN ELEMENT

1. Remove the air cleaner.

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

2. Remove the element and blow compressed air from inside.
3. Replace the element with a new one if torn or excessively dirty.

Fig. 2-18



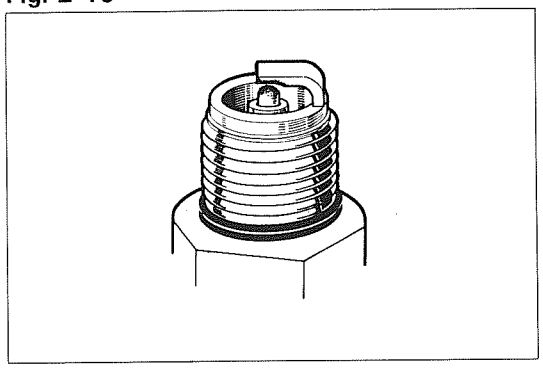
VISUAL CHECK

Check for:
1. Damaged, worn or deteriorated gaskets.
2. Damaged or worn seal washer.

INSTALL AIR CLEANER

1. Install the gaskets.
2. Finger tighten the front and rear stays.
3. After installing the element, tighten the air cleaner cap with the clips.
4. Tighten the wing nut and both stays.

Fig. 2-19

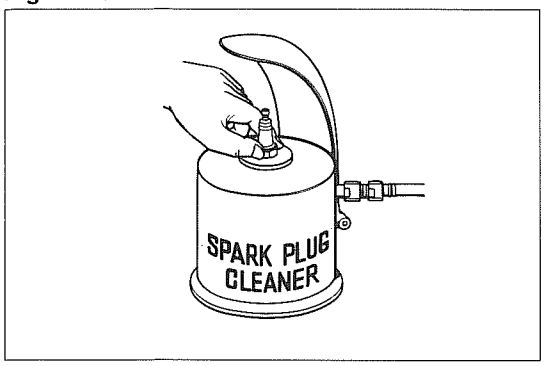


SPARK PLUGS

VISUAL CHECK

Check for:
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.

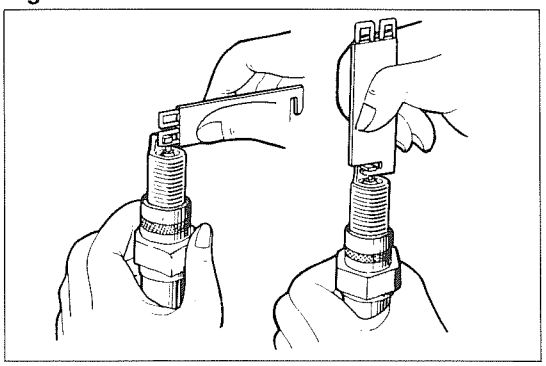
Fig. 2-20



CLEAN SPARK PLUGS

1. Do not use the spark plug cleaner any longer than necessary.
2. Thoroughly blow off the cleaning compound and carbon on the threads with compressed air.
3. Clean off the dirt from the outer s urface of insulator and threads.

Fig. 2-21

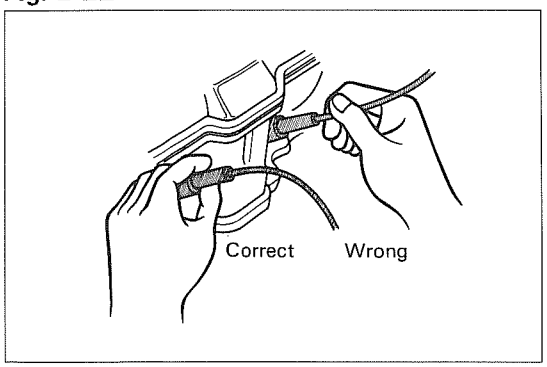


ADJUST SPARK PLUG GAP

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

Spark plug gap: 0.8 mm (0.031 in.)

Fig. 2-22



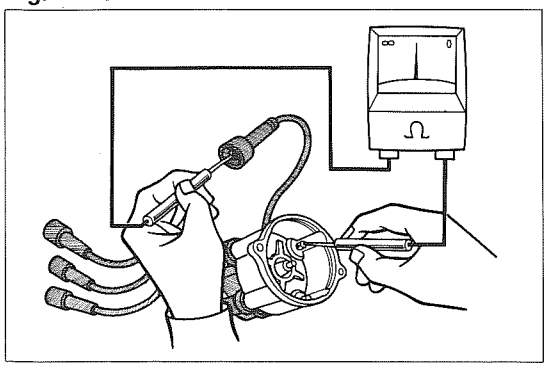
HIGH TENSION CORD

CHECK RESISTANCE

– Note –

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

Fig. 2-23

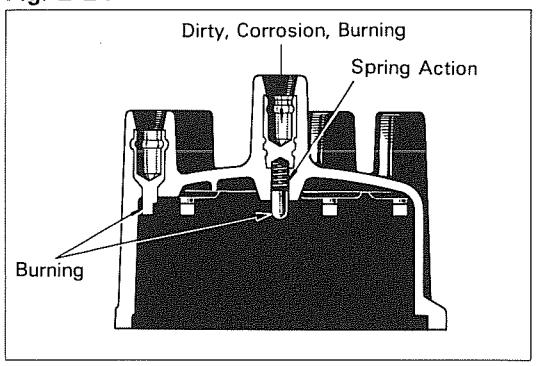


Check the cord resistance.

Resistance:

Less than 25 kΩ per cord

Fig. 2-24



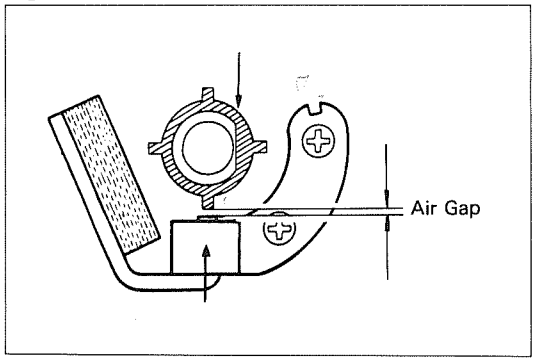
DISTRIBUTOR

CHECK DISTRIBUTOR CAP

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

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

Fig. 2-25

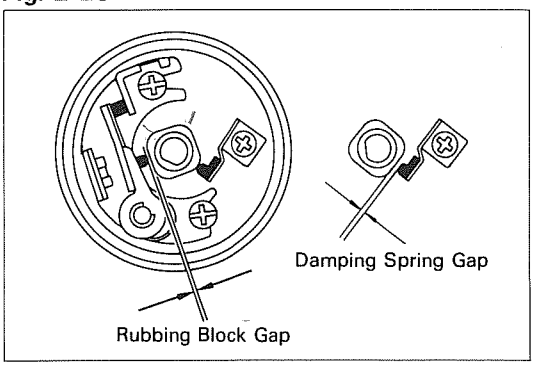


ADJUST GAP

1. Adjust the air gap. (Breaker points less type)

Air gap: 0.2 — 0.4 mm (0.008 — 0.016 in.)

Fig. 2-26

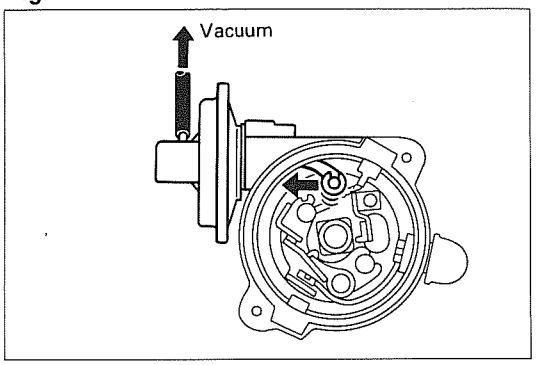


2. Adjust the rubbing block gap and damping spring gap. (Breaker points type)

Rubbing block gap: 0.45 mm (0.0177 in.)

Damping spring gap: 0.1 — 0.4 mm (0.004 — 0.016 in.)

Fig. 2-27



CHECK VACUUM ADVANCER OPERATION

Apply vacuum to the diaphragm and check that the vacuum advancer moves in accordance with the vacuum.

Fig. 2-28

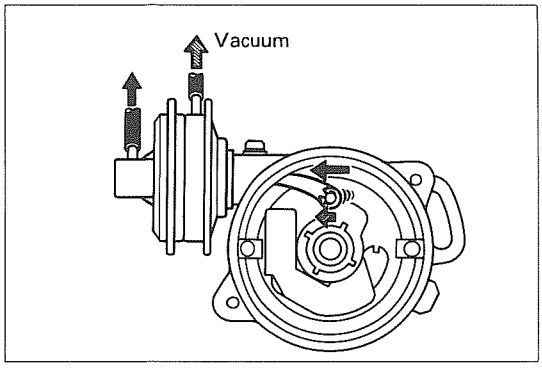
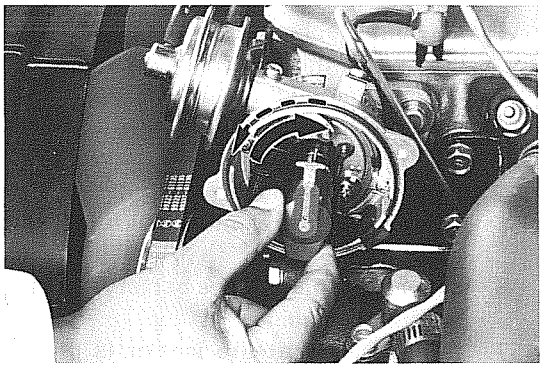


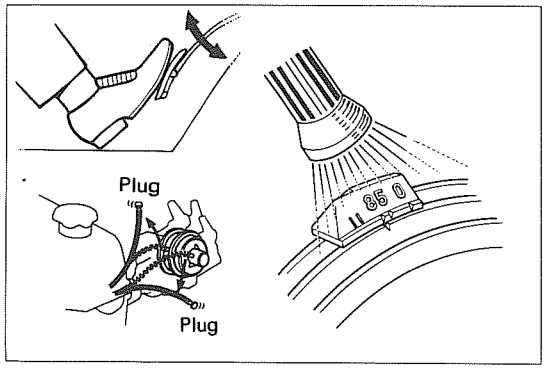
Fig. 2-29



CHECK GOVERNOR OPERATION

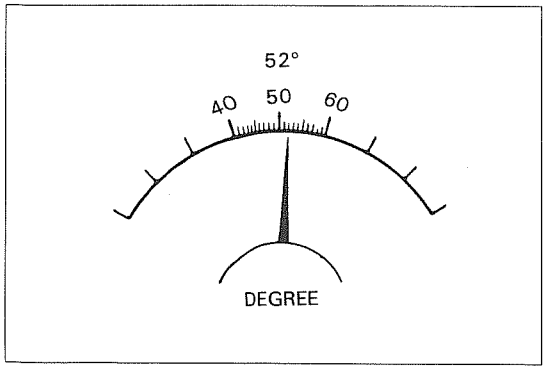
1. Turn the rotor clockwise and release it. The rotor should return quickly.
2. Check the rotor for looseness.

Fig. 2-30



3. Start the engine and disconnect the vacuum hoses from the distributor. The timing mark should vary with the engine rpm.

Fig. 2-31



IGNITION TIMING

CHECK DWELL ANGLE (Breaker points type)

Using a dwell angle tester, check the dwell angle at idle speed before adjusting the ignition timing.

Dwell angle: 52°

If the angle does not meet specification, adjust the rubbing block gap as follows.

More than 53° ——→ Decrease the gap.
Less than 51° ——→ Increase the gap.

Fig. 2-32

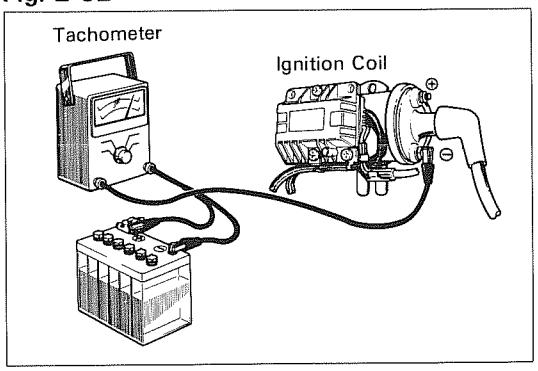


Fig. 2-33

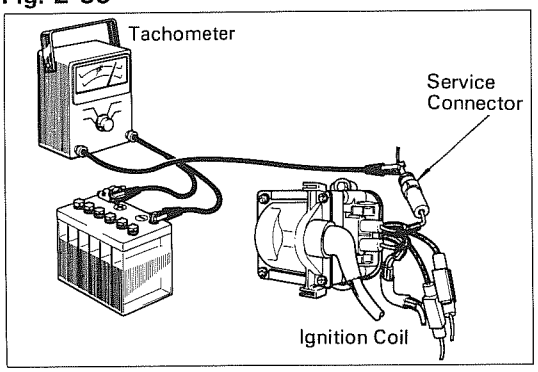


Fig. 2-34

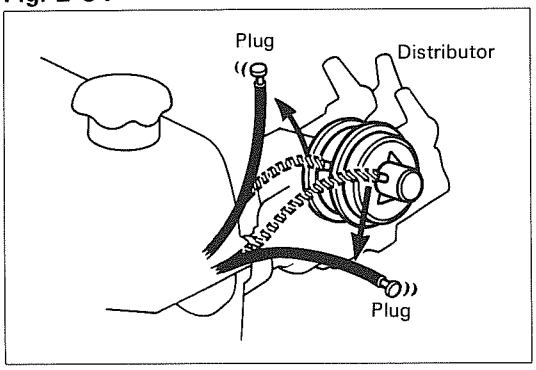
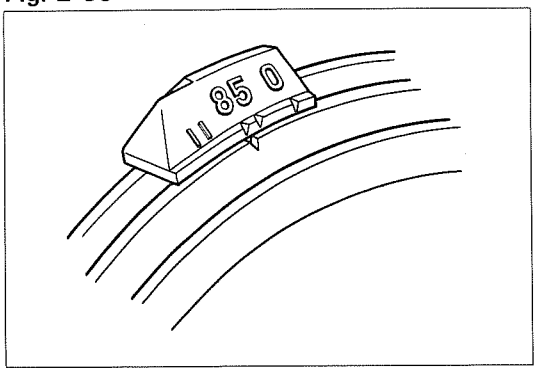


Fig. 2-35



CHECK IGNITION TIMING

1. Connect a tachometer and timing light.

– Note –

1. **For RB, USA RT, USA RA and RX, connect the tachometer (+) terminal to the ignition coil (–) terminal.**
2. **For RN, Canada RT and Canada RA, remove the rubber cap and connect the tachometer (+) terminal to the service connector from the igniter.**
3. **Do not keep the ignition switch ON for more than 10 minutes if the engine will not start.**
4. **As some tachometers are not compatible with this ignition system, it is recommended that you consult with the manufacturer.**
5. **NEVER allow the ignition coil terminals to touch ground as it could result in damage to the igniter and/or ignition coil.**
6. **Do not disconnect the battery when the engine is running.**
7. **Make sure that the igniter is properly grounded to the body.**

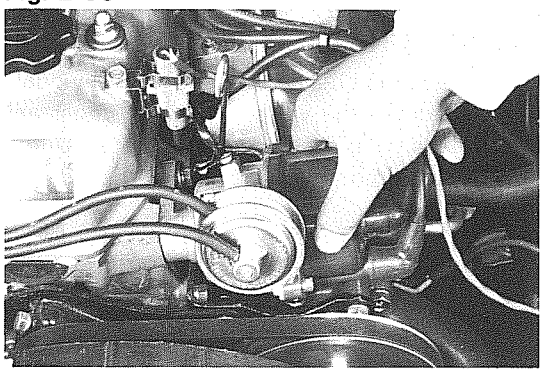
2. Warm-up the engine.
3. Disconnect the vacuum hoses from the distributor and plug the ends of them.

4. Check the ignition timing with the engine idling.

Ignition timing:

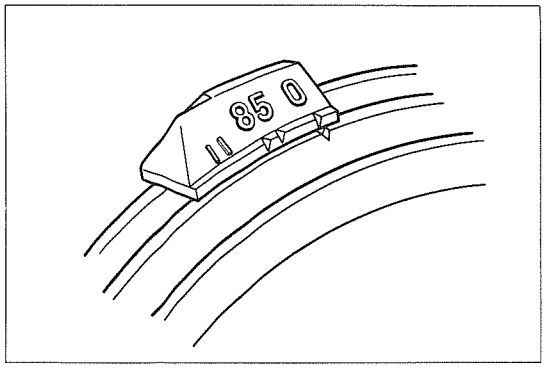
21R, 21R-C (Sweden)
8° BTDC/Max. 750 rpm
21R-C (Australia)
5° BTDC/Max. 600 rpm (M/T)
5° BTDC/Max. 650 rpm (A/T)
22R
8° BTDC/Max. 950 rpm

Fig. 2-36



5. If necessary, loosen the distributor set bolt and turn the distributor to align the timing marks.
6. Recheck the ignition timing after tightening the distributor.

Fig. 2-37

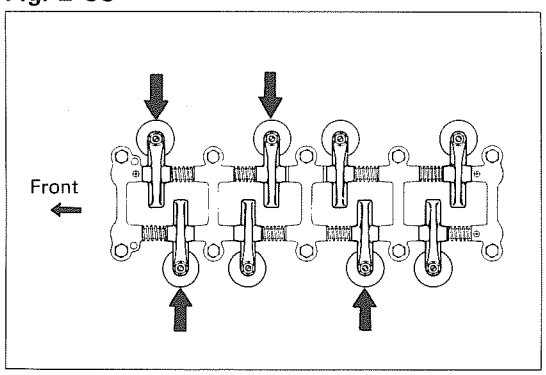


VALVE CLEARANCE

ADJUSTMENT

1. Warm-up the engine, then stop it.
2. Set No. 1 cylinder to TDC/compression.

Fig. 2-38

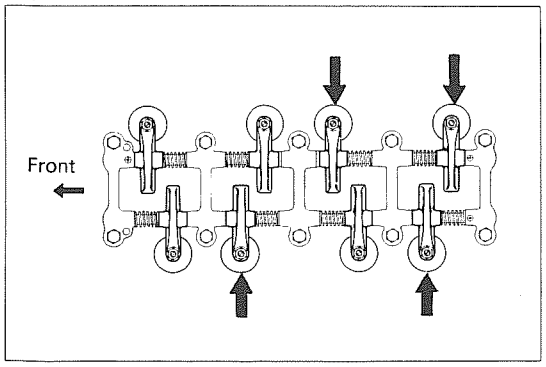


3. Adjust the valve clearance.
   The valve clearance is measured between the valve stem and rocker arm adjusting screw.
   Adjust only the valves indicated by arrows.

Valve clearance:

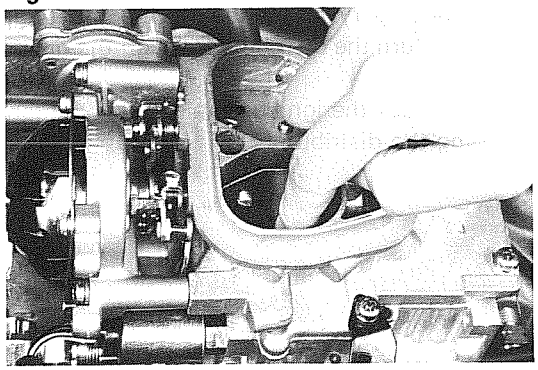
Intake	**0.20 mm (0.008 in.)**
Exhaust	**0.30 mm (0.012 in.)**

Fig. 2-39



4. Rotate the crankshaft 360°.
5. Adjust the remaining valves indicated by arrows.

Fig. 2-40

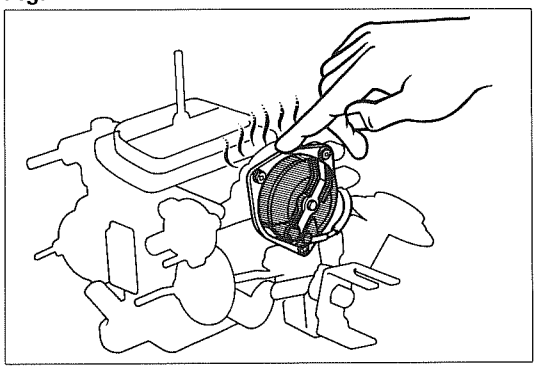


CARBURETOR

AUTOMATIC CHOKE

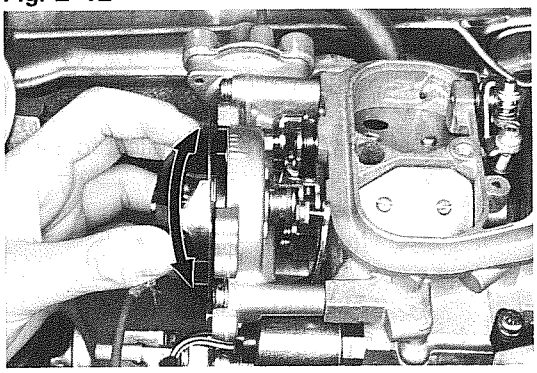
1. Check the choke valve operation by pushing down the valve with your finger and releasing it. The valve should return quickly and smoothly.

Fig. 2-41



2. Warm-up the engine.
3. Shortly after, check that the choke valve begins to open and the choke housing is heated.

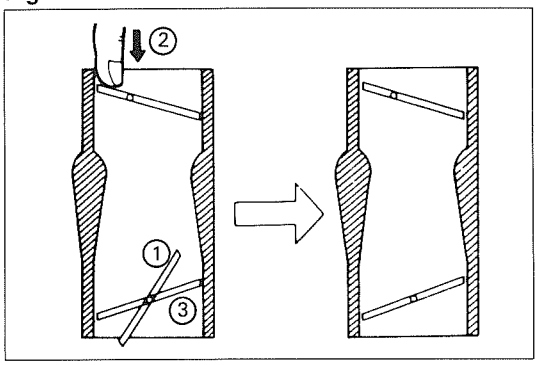
Fig. 2-42



4. (except USA & Canada)
   Check the engine starting and running condition. If necessary, adjust the automatic choke setting by turning the coil housing.

— Note —
If mixture is too rich---Turn clockwise.
If too lean---Turn counterclockwise.

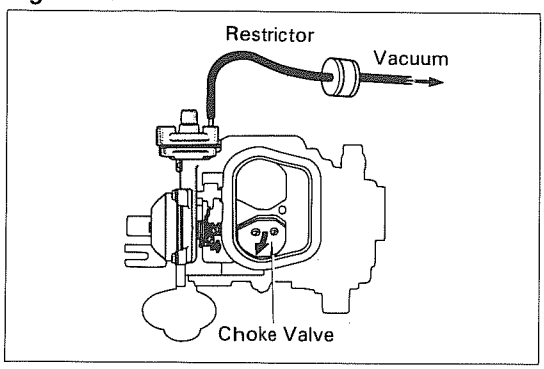
Fig. 2-43



CHOKE BREAKER

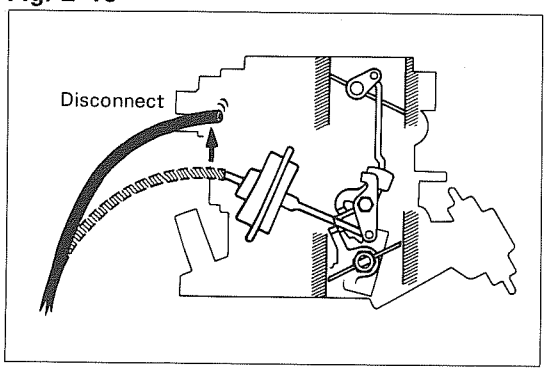
1. While holding the throttle valve slightly open, push the choke valve closed and hold it closed as you release the throttle valve.

Fig. 2-44



2. Disconnect the vacuum hose between the restrictor and vacuum pipe at the restrictor side.
3. Apply vacuum to the restrictor and check that the choke valve slightly opens.

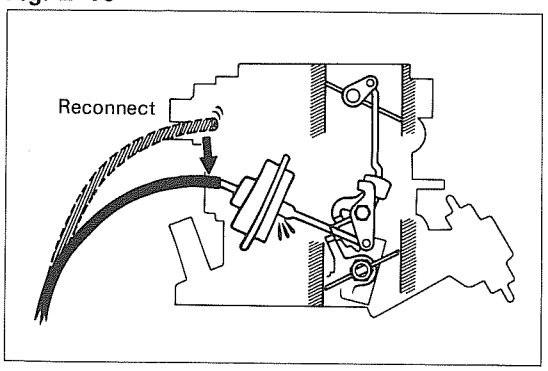
Fig. 2-45



CHOKE OPENER (22R except RB)

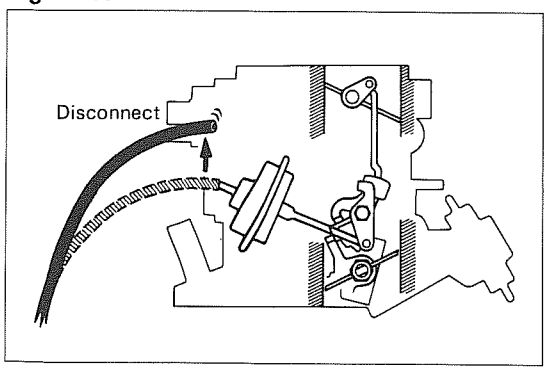
1. With the coolant temperature below 60°C (140°F), disconnect the vacuum hose from the choke opener diaphragm.
2. Step down on the accelerator pedal and release it before starting the engine.

Fig. 2-46



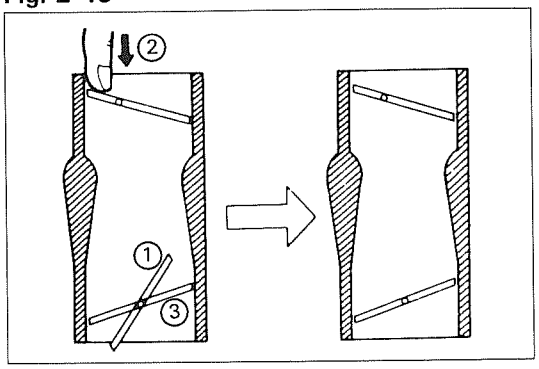
3. Reconnect the vacuum hose and check that the choke linkage does not move.

Fig. 2-47



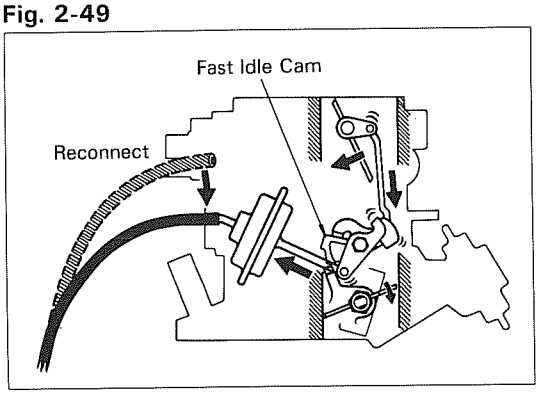
4. Warm-up the engine to normal operating temperature and then stop it.
5. Disconnect the vacuum hose from the choke opener diaphragm.

Fig. 2-48



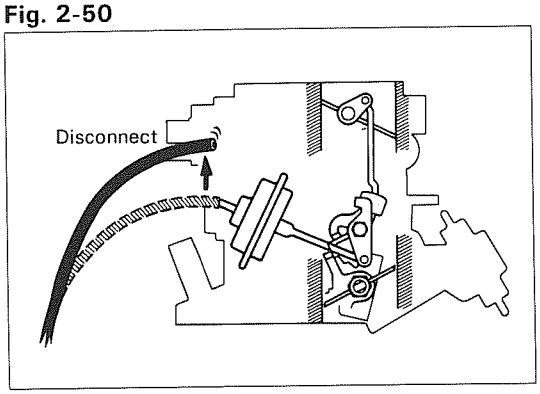
6. While holding the throttle valve slightly open, push the choke valve closed and hold it closed as you release the throttle valve.
7. Start the engine, but do not touch the accelerator pedal.

Fig. 2-49



8. Reconnect the vacuum hose, and check that the choke linkage moves and that the fast idle cam is released to the fourth step.

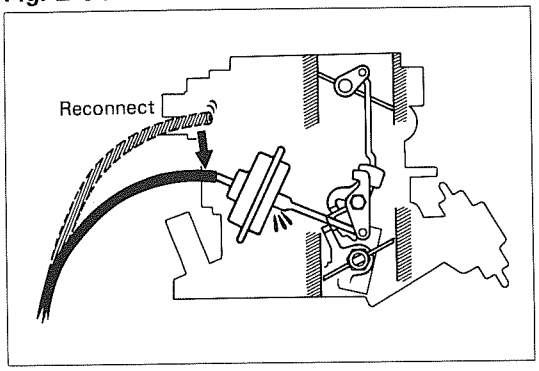
Fig. 2-50



FAST IDLE CAM BREAKER (FICB) (21R ECE & 21R-C)

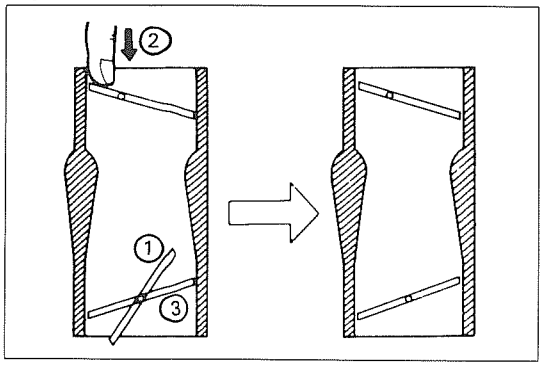
1. With the coolant temperature below 30°C (86°F), disconnect the vacuum hose from the FICB diaphragm.
2. Step down on the accelerator pedal and release it before starting the engine.

Fig. 2-51



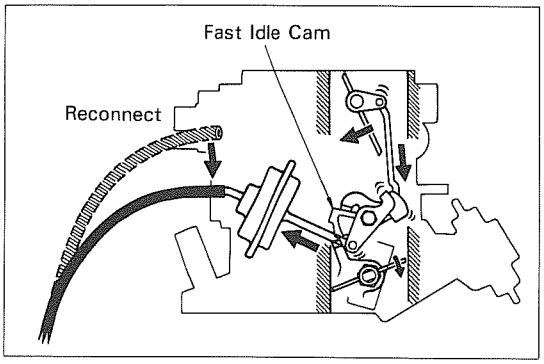
3. Reconnect the vacuum hose and check that the FICB lever does not move.

Fig. 2-52



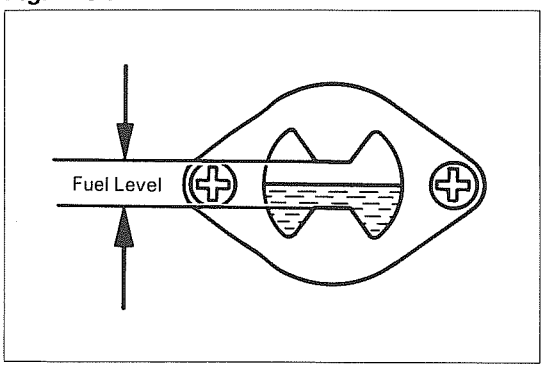
4. Warm-up the engine to normal operating temperature and then stop it.
5. Disconnect the vacuum hose from the FICB diaphragm.
6. While holding the throttle valve slightly open, push the choke valve closed, and hold it closed as you release the throttle valve.

Fig. 2-53



7. Start the engine, but do not touch the accelerator pedal.
8. Reconnect the vacuum hose, and check that the FICB lever moves and that the fast idle cam is released to the third step or beyond.

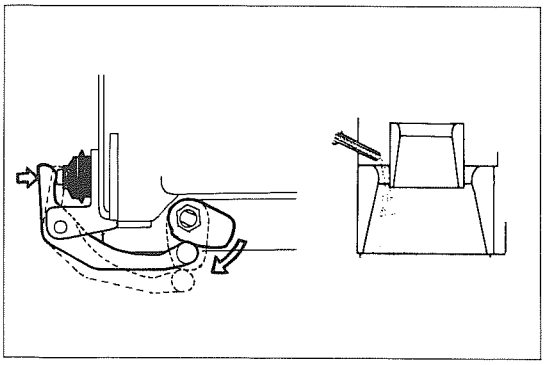
Fig. 2-54



CHECK FLOAT LEVEL

Check the fuel level while the engine is idling.

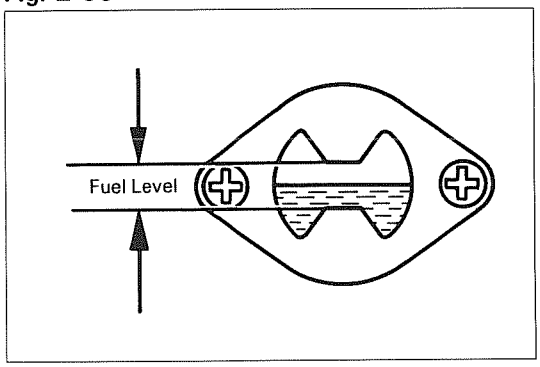
Fig. 2-55



CHECK 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 fully depressed.

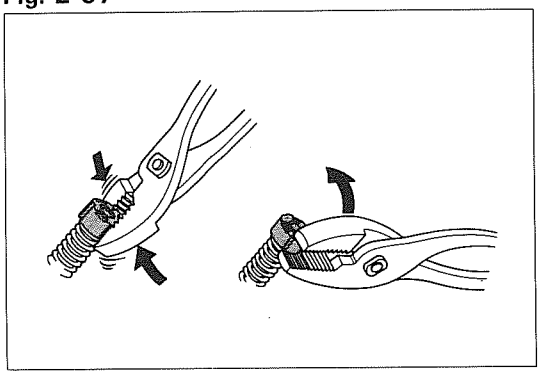
Fig. 2-56



IDLE SPEED ADJUSTMENT (except Canada RN 4x4, RB, RX, RA60, 61 & RT133)

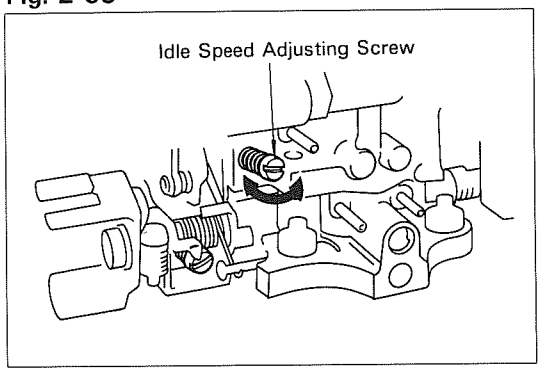
1. Check the following items beforehand.
   (1) Air cleaner installed
   (2) Normal operating coolant temperature.
   (3) Choke fully open
   (4) All accessories switched off
   (5) All vacuum lines connected
   (6) Ignition timing set correctly
   (7) Transmission in N range
   (8) Fuel level should be about even with the correct level in the sight glass.

Fig. 2-57



2. Break the idle limiter cap on the idle speed adjusting screw, if installed.

Fig. 2-58

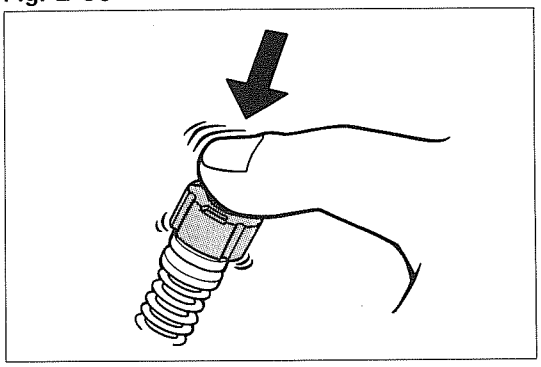


3. Adjust the idle speed by turning the idle speed adjusting screw.

Idle speed:

M/T	**700 rpm**
A/T	
Fed. RN4-A/T	**700 rpm**
Canada RT, RA-A/T	**850 rpm**
Others A/T	**750 rpm**

Fig. 2-59



4. Install a new limiter cap on the idle speed adjusting screw, if one was installed.

Fig. 2-60

SEE

FUEL SYSTEM SECTION

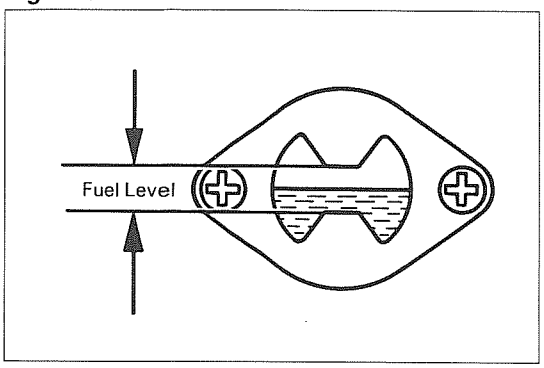
Fig. 6-144 to 6-157

— Note —

For the idle mixture adjustment, the idle mixture adjusting screw is adjusted and plugged with a steel plug by the manufacturer.

If necessary, remove the plug and follow the procedure described in FUEL SYSTEM section.

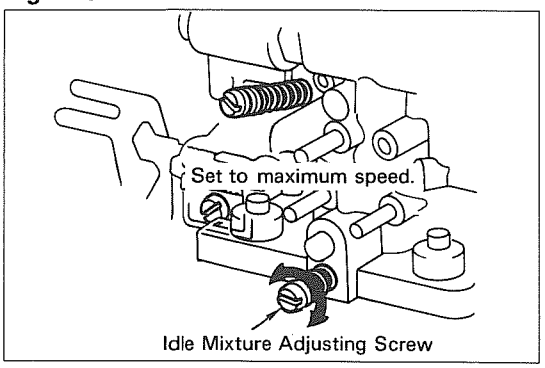
Fig. 2-61



IDLE SPEED & IDLE MIXTURE ADJUSTMENT (Canada RN 4x4, RB, RX RA60, 61 & RT133)

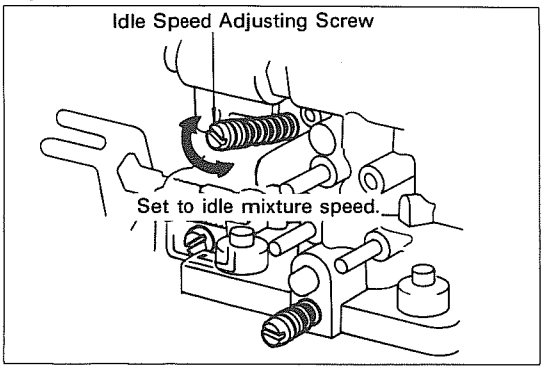
1. Check the following items beforehand.
   (1) Air cleaner installed
   (2) Normal operating coolant temperature
   (3) Choke fully open
   (4) All accessories switched off
   (5) All vacuum lines connected
   (6) Ignition timing set correctly
   (7) Transmission in N range
   (8) Fuel level should be about even with the correct level in the sight glass.

Fig. 2-62



2. Start the engine.
3. Set to the maximum speed by turning the idle mixture adjusting screw.

Fig. 2-63



4. Set to the idle mixture speed by turning the idle speed adjusting screw.

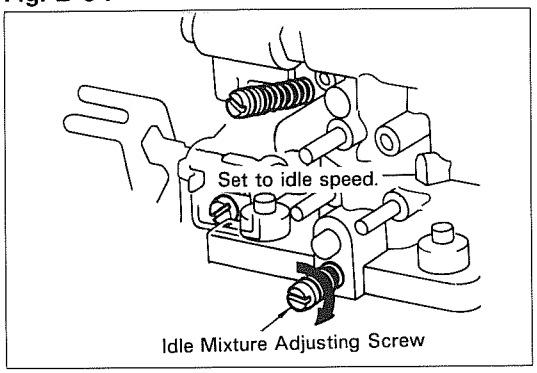
Idle mixture speed:

Canada	**RN 4x4**	**740 rpm**
	RB	**850 rpm**
	RX, RA61	**800 rpm**
Australia	**RA60, RT133**	
		650 rpm (M/T)
		700 rpm (A/T)

— Note —

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

Fig. 2-64



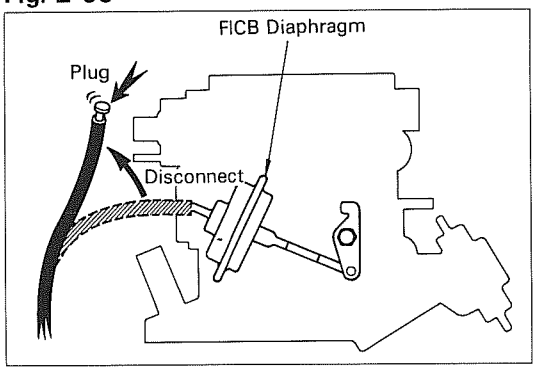
5. Set to the idle speed by screwing in the idle mixture adjusting screw.

Idle speed:

Canada	**RN 4x4**	**700 rpm**
	RB	**800 rpm**
	RX, RA61	**750 rpm**
Australia	**RA60, RT133**	
		600 rpm (M/T)
		650 rpm (A/T)

— Note —
This is the "Lean Drop Method" for setting idle speed and mixture.

Fig. 2-65



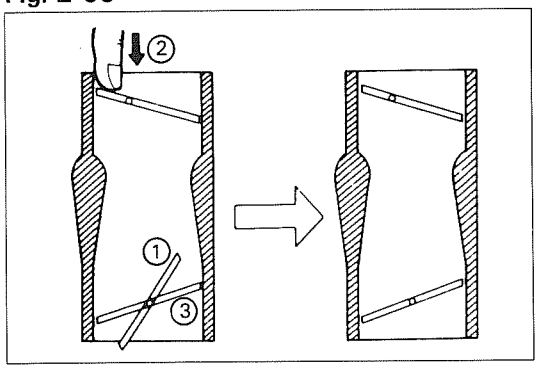
FAST IDLE SPEED ADJUSTMENT

A. 21R, 21R-C ENGINE

1. Warm-up the engine and then stop it.
2. Disconnect the vacuum hose from the FICB diaphragm and plug the end of hose.

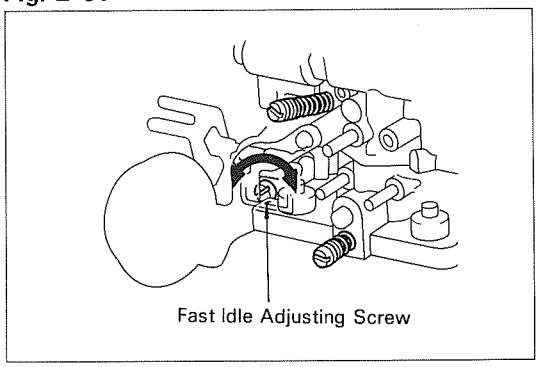
— Note —
FICB is equipped on 21R ECE and 21R-C only.

Fig. 2-66



3. While holding the throttle valve slightly open, push the choke valve closed, and hold it closed as you release the throttle valve.
4. Start the engine, but do not touch the accelerator pedal.

Fig. 2-67

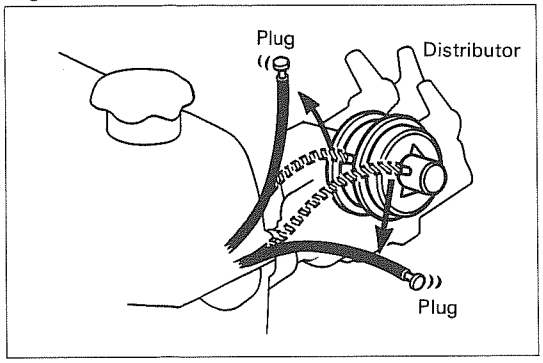


5. Adjust the fast idle speed by turning the fast idle adjusting screw.

Fast idle speed: 2,400 rpm

6. Reconnect the hose to the FICB diaphragm and check that the FICB lever moves and that the fast idle cam is released to third step or beyond.

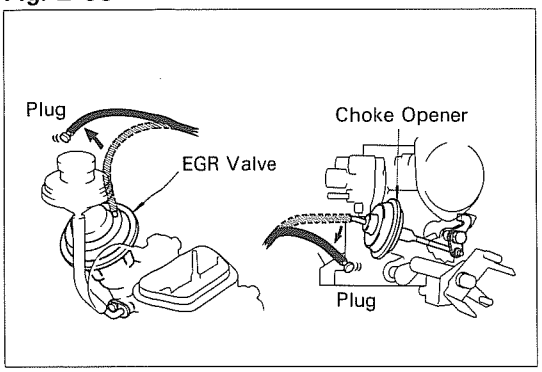
Fig. 2-68



B. 22R ENGINE

1. Warm-up the engine and then stop it.
2. Disconnect the vacuum hoses from the distributor vacuum advancer and plug the ends of them.

Fig. 2-69

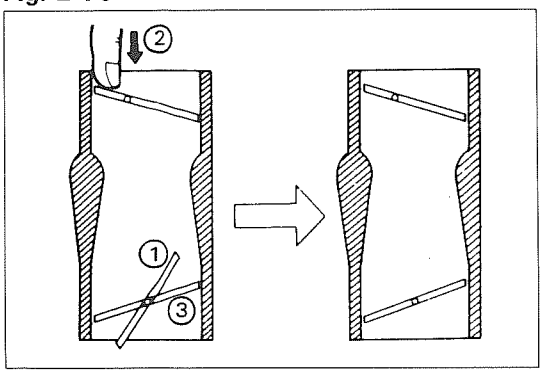


3. Disconnect the vacuum hoses from the choke opener diaphragm and EGR valve, and plug the ends of the hoses.

– Note –

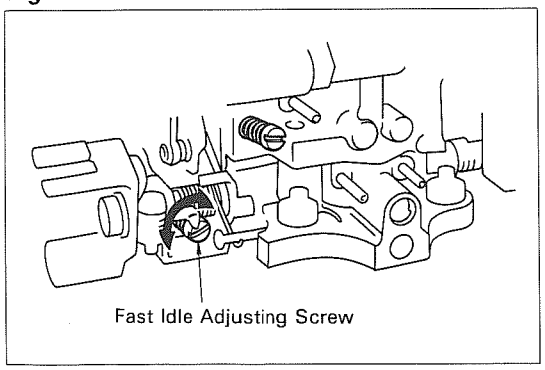
1. **EGR system is not equipped on Canada RN 4x4 and RB.**
2. **Choke opener system is not equipped on RB.**

Fig. 2-70



4. While holding the throttle valve slightly open, push the choke valve closed and hold it closed as you release the throttle valve.

Fig. 2-71



5. Start the engine and adjust the fast idle speed by turning the fast idle adjusting screw.

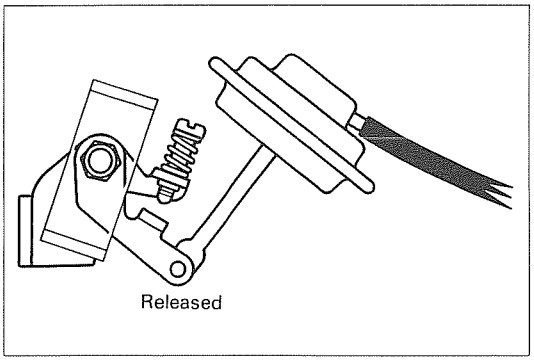
Fast idle speed:

RB	**2,400 rpm**
Others	**2,600 rpm**

– Note –

Do not touch the accelerator pedal.

Fig. 2-72

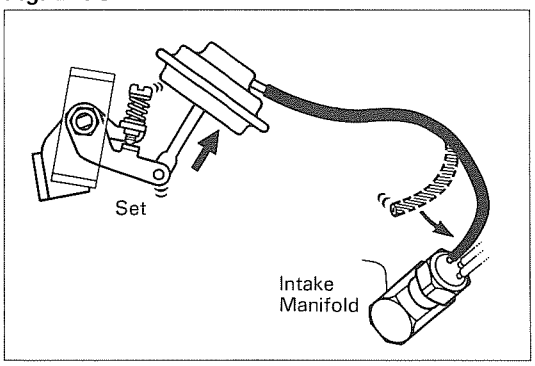


THROTTLE POSITIONER (Calif. RN 4x4, RN C&C, Australia RB, RX except ECE A/T, RA60, 61 & RT133)

CHECK THROTTLE POSITIONER OPERATION

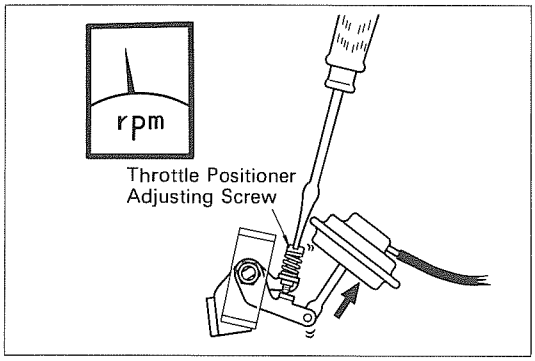
1. Warm-up the engine.
2. Check that the throttle positioner is released at idle.

Fig. 2-73



3. Connect the throttle positioner diaphragm directly to the intake manifold with a vacuum hose.
4. Check that the throttle positioner is set.

Fig. 2-74



CHECK THROTTLE POSITIONER SETTING SPEED

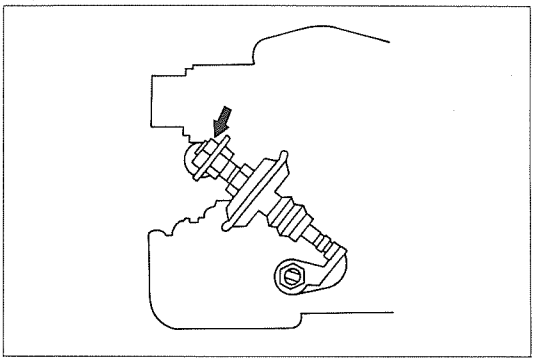
1. After the throttle positioner is set, check that the engine speed is correct.

Throttle positioner setting speed:

Calif. RN 4x4, RN C&C	**1,050 rpm**
RX except ECE A/T, RA60, 61 & RT133	**1,200 rpm**
Australia RB	**1,400 rpm**

2. If necessary, adjust with the throttle positioner adjusting screw.

Fig. 2-75



DASH POT (USA RT A/T & USA RA A/T)

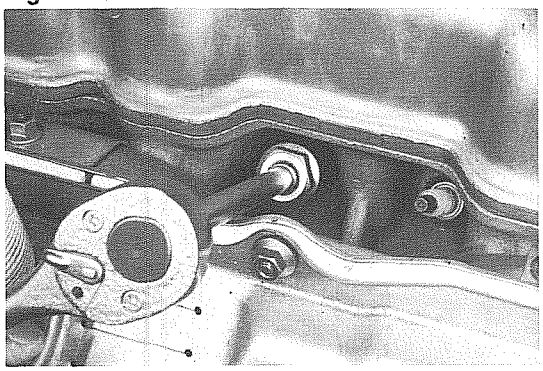
ADJUSTMENT

1. Warm-up and race the engine.
2. Check the time required for the throttle valve shaft touch the dash pot and return to idle position.

Time required:
Approx. 3 seconds

3. If necessary, adjust by turning the dash pot adjusting nut.

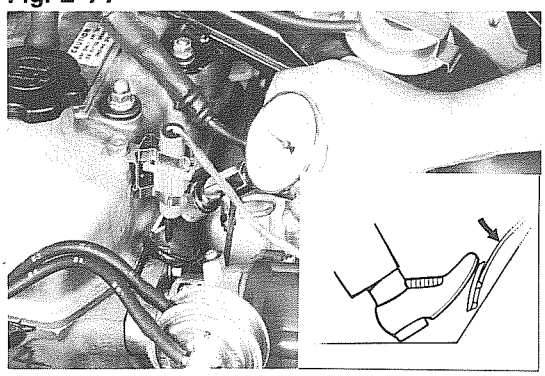
Fig. 2-76



COMPRESSION PRESSURE

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

Fig. 2-77



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

Compression pressure:

STD

21R

More than 11.0 kg/cm² (157 psi)

21R-C

More than 11.5 kg/cm² (164 psi)

22R

More than 12.0 kg/cm² (171 psi)

Limit

21R & 21R-C

9.0 kg/cm² (128 psi)

22R 10.0 kg/cm² (142 psi)

Difference between each cylinder: 1.0 kg/cm² (14 psi)

— Note —

Always use a fully charged battery to obtain engine revolution of more than 250 rpm.

MEMO