

SECTION 1D

CARBURETOR

GENERAL DESCRIPTION	1D — 86
Fuel System Diagram	1D — 86
Principle of Carburetor	1D — 87
Carburetor Specifications	1D — 89
Operation of Each System	1D — 91
Operation of Auto Choke System	1D — 98
TROUBLE SHOOTING	1D — 101
ON-CAR SERVICE	1D — 104
DISASSEMBLY	1D — 106

GENERAL DESCRIPTION

FUEL SYSTEM DIAGRAM

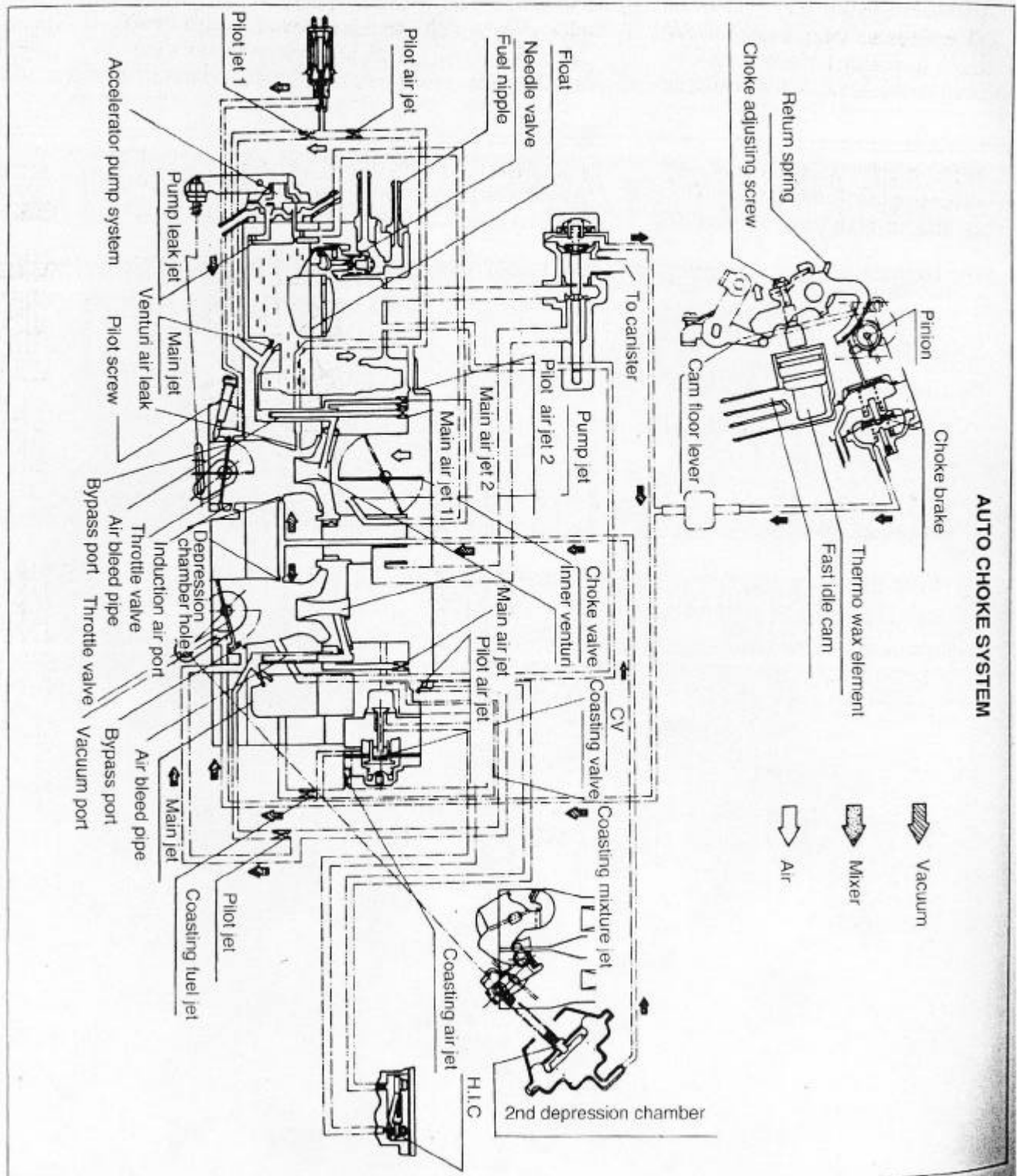


FIG. 1D — 1 FUEL SYSTEM DIAGRAM

PRINCIPLE OF CARBURETOR

Gasoline is Supplied Through Venturi Tube

As shown in the figure a narrow centered tube is called as venturi.

When airflows in the venturi, the flow in "A" of large section is slower than that in "B" of smaller section. The air pressure in "A" is higher than that in "B" accordingly. Therefore when feeding air from "A" to "C", sucking pressure in pipe is lowered in the "B" part due to the reduced air pressure. In the mean time, the fuel surface of "D" has the atmospheric pressure, and the difference in pressure cause the fuel to be sucked through venturi and mixed with fast flowing air to spray out in the cylinder.

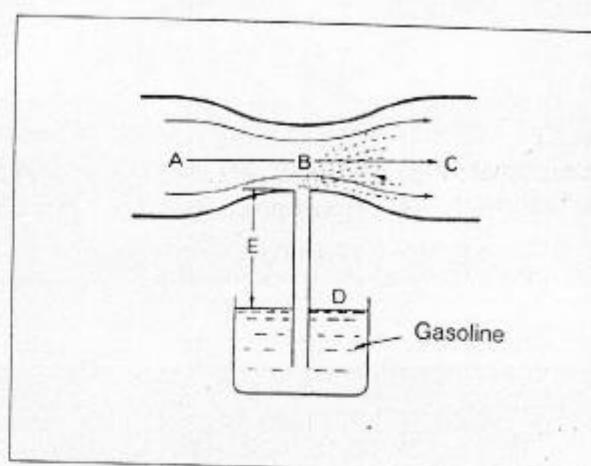


FIG. 1D — 2 SUCKED GASOLINE THROUGH VENTURI

Adjusting Fuel level by Float

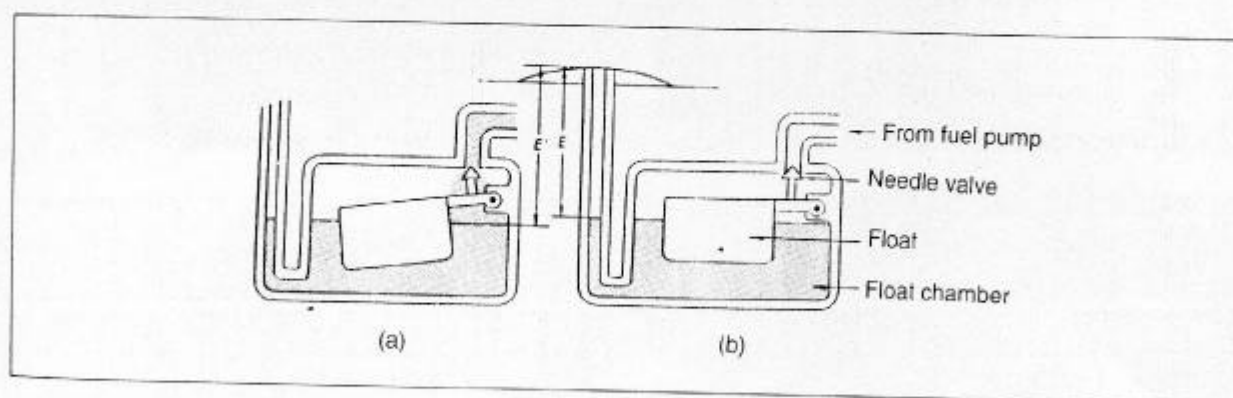


FIG. 1D — 3 ADJUSTING HEIGHT OF FUEL SURFACE

The amount of gasoline is sucked by venturi as on the faster airflow and the shorter distance between tube end and fuel surface. That is, in figure above the shorter "E" makes more fuel sucked, therefore, the same height of the fuel surface should be maintained. In the figure, when the amount of gasoline in float chamber is decreased, as in (a), the lowered float opens valve to make gasoline flow in the float chamber. As the gasoline is filled in the float chamber, the raised float close the needle valve. Accordingly the fuel surface is to be adjusted to the height between "E" and "E'".

Mixture of Gasoline and Air by Air Bleed

Better fuel-air mixture come from well mixture of gasoline and air. In the figure, the principle of air bleed is shown. Better mixture and easy suction can be made by attaching a air feeding tube on the tube for gasoline suction. This mixture is called emulsion.

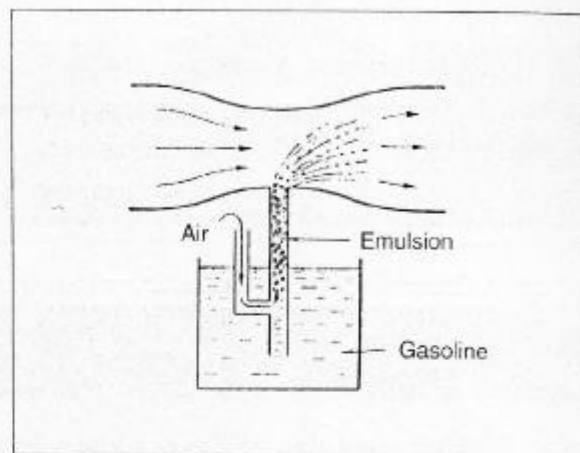


FIG. 1D — 4 PRINCIPLE OF AIR BLEED

Adjustment of fuel and air by valve

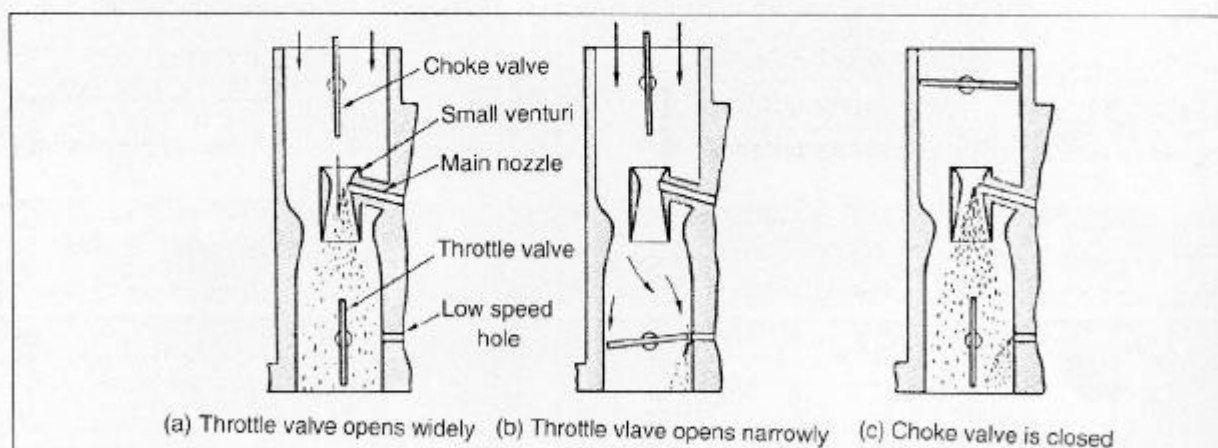


FIG. 1D — 5 ADJUSTMENT OF FUEL AND AIR AMOUNT

Choke valve and throttle valve control, in general, the gasoline and air amount to feed engine.

The throttle valve attached in the lower part of venturi changes the negative pressure in venturi as much as the opening of valve and make gasoline is sucked out from the nozzle at the part of fast airflow (high negative pressure).

The choke valve attached in the upper part of venturi controls the airflow amount into the venturi.

Figure (a) shows large amount of gasoline is coming from the main nozzle due to the high negative pressure in venturi by the large amount of air.

Figure (b) shows the throttle valve closed, and the airflow is the fastest between valve and carburetor body to spray out gasoline to the low speed port installed in this part.

Figure (c) shows the choke valve closed. The negative pressure in venturi is increased due to the limit of airflow-in, and a large amount of gasoline is to sprayed out from each nozzle. The mixture is very rich at this moment.

CARBURETOR SPECIFICATIONS (MT)

Item			Dimension	
Type			2-barrel downward intake type	
Barrel			1st	2nd
Air horn diameter	mm	Inner	59	Outer 63
Throttle bore diameter	mm		24	30
Outer venturi diameter	mm		21	26
Inner venturi diameter	mm		9 — 14	9 — 12
Air vent	mm		7	
Float system	Float valve seat inner diameter	mm	1.7	
	Level(Based on carburetor bottom line)	mm	55.5	
	Fuel return jet	mm	1.5	
	Fuel pressure	kg/cm ²	0.2 ± 0.05	
Main nozzle	mm		2.5	2.3
Main jet		(M)	98.8	(A) 180
Main air jet	mm	#1(A) 0.8, #2φ 0.6		1.1
Air bleed		n		M
Pilot air jet	mm	φ A 2.0, φ F 2.0		φ B 1.0
Pilot jet	mm	(M) 46.3		(A) 72.5
Venturi air leak	mm		2.5	
Bypass port	Diameter • pitch • 1	mm	φ 1.0 - ^a 1.89	φ 1.8 - ^d 4.91
	Diameter • pitch • 2	mm	φ 1.2 - ^b 3.70	φ 1.4 - ^e 8.21
	Diameter • pitch • 3	mm	φ 1.1 - ^c 5.88	
Pilot screw(Turn)			25/8	
Throttle valve closed, open, clearance	mm		8°/90° T 1.5	15°/90° T 1.5
Pilot outlet	mm		φ 1.4	
Accelerating pump	Diaphragm diameter	mm	24	
	Pump jet	mm	φ 0.35	
	Actuative angle		60° ± 10°	
	Pump leak jet	mm	φ 0.4	
	Discharge amount		0.35 ± 0.05CC/stroke	
H.I.C	Jet diameter	mm	φ 1.4	
	Starting operation(starting to open)		65℃	
	Pull opening		80℃	

Item		Dimension	
Operational system of 2nd throttle valve	2nd diaphragm diameter	mm	54
	Adjusting angle of throttle valve		45°
	Throttle valve clearance, closed completely	mm	0.18 ± 0.025
	Vacuum hole		1.4 1.7
Automatic choke system	1. Complete closure of choke valve/opening angle		25° ± 2° / 90° ± 2°
	2. Temperature to open choke valve		32° ± 2°
	3. Temperature at fast idle relief		10° 42' ± 30' (23°C)
	4. Choke valve clearance, choke opener activating(mm)	1st step	1.8 ± 0.1
		2nd step	2.3 ± 0.1
	5. Choke valve clearance, choke opener operating vacuum unloader activating		-50 — 70mmHg 3.1 ± 0.8
	6. Unloader throttle valve angle		55°
Coasting valve(C.V)	C.V closure		610mmHg or LESS
	Activating negative pressure		540 ± 10mmHg
	Coasting fuel jet		Ⓐ #45
	Coasting mixture jet		Ⓐ #60
	Coasting air jet		φ 1.0
Induction air port	Induction air port diameter pitch 1		1.4mm
	Induction air port diameter pitch 2		1.6mm
	Induction air port diameter pitch 3		1.6mm

OPERATION OF EACH SYSTEM

Float System

Float activates to maintain a fixed level of gasoline surface in float chamber and when the surface is lowered, the needle valve associated with the float is also lowered to let gasoline flow in. The gasoline surface is maintained in a fixed level due to the movement of needle valve up and down by the buoyancy of float.

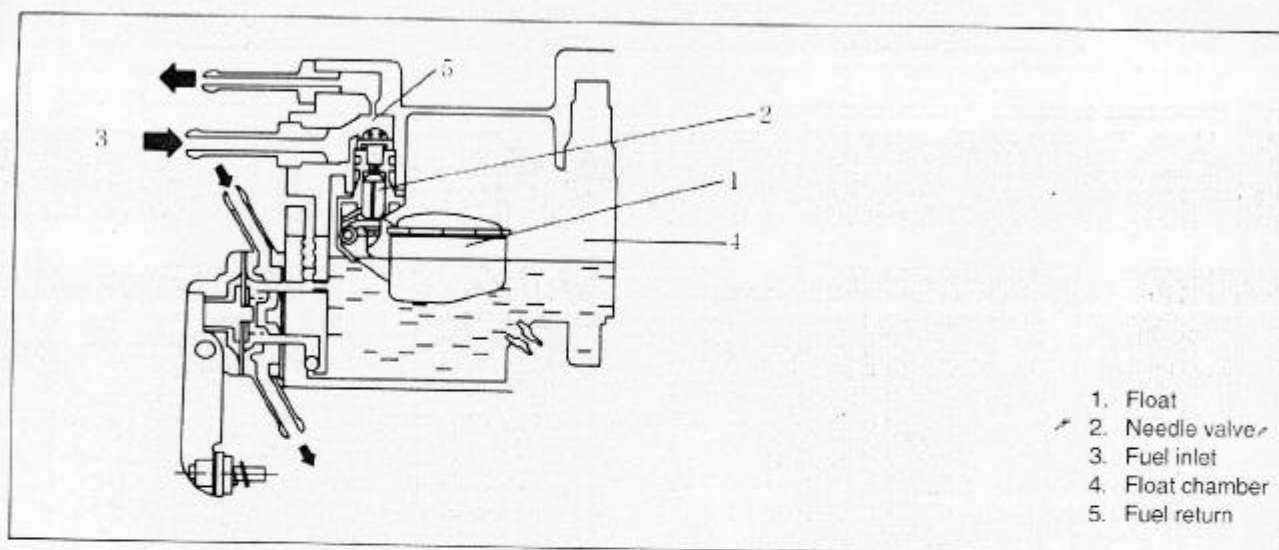


FIG.1D — 6 OPERATION OF FLOAT SYSTEM

1st Low System

Solenoid valve is installed in the system to cut fuel and the solenoid valve opens with "ON" ignition switch and closes with "OFF". The fuel passed through the main jet is measured in the pilot jet, and mixed together with air measured in the pilot air jet No.1 and No.2. The fuel-air mixture is sucked into the intake manifold from pilot outlet and bypass port according to the opening degree of throttle valve.

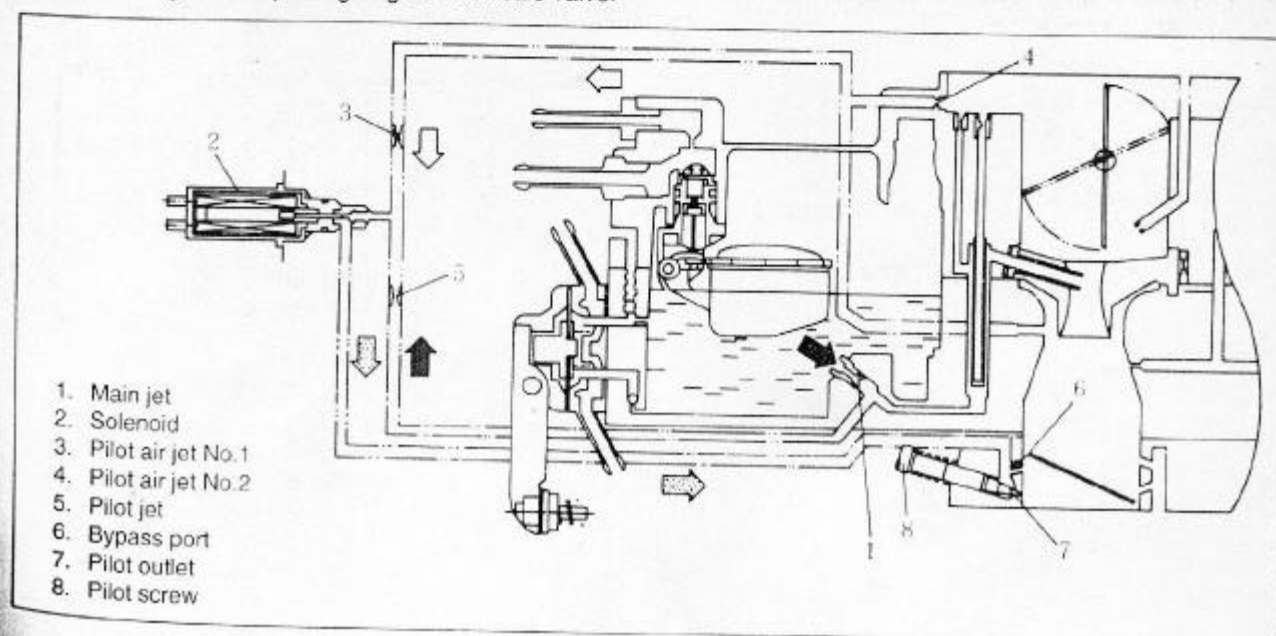


FIG.1D — 7 OPERATION OF 1ST SLOW SPEED SYSTEM

1st Main System

The gasoline in the float chamber is measured precisely in the main jet. It will be mixed together with the air coming from main air jet No.1 and No.2 in the air bleed pipe. The vaporized gasoline is to flow in the inner venturi from the main nozzle.

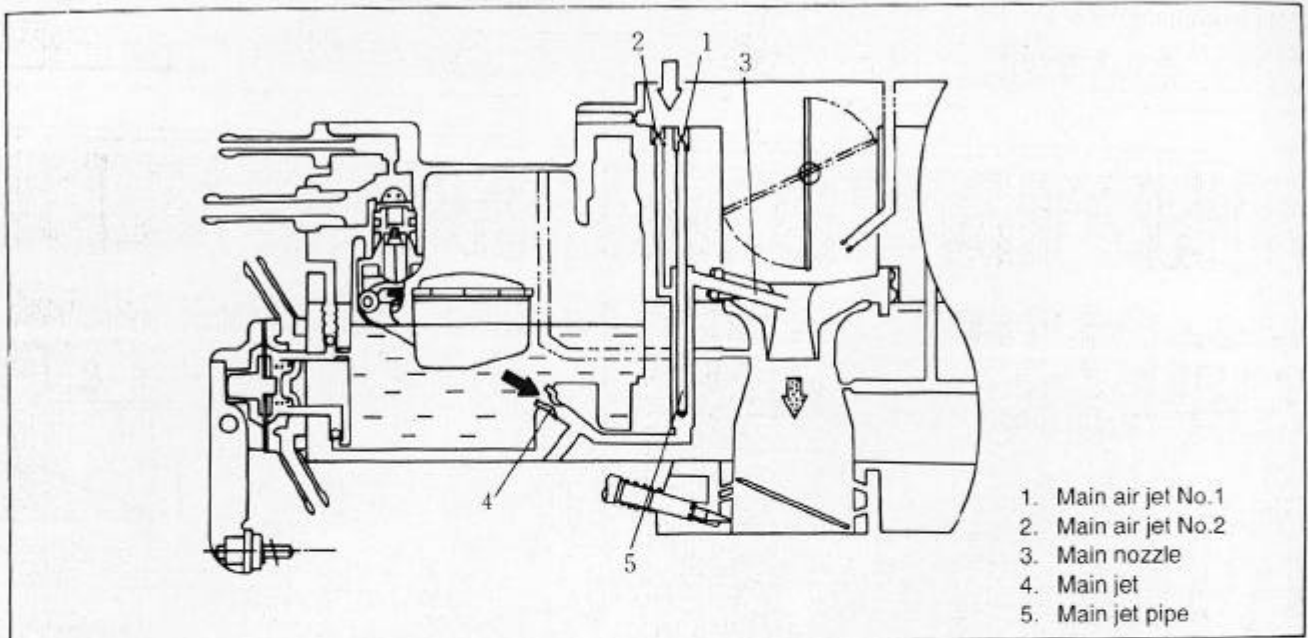


FIG. 1D — 8 OPERATION OF 1ST MAIN SYSTEM

2nd Low speed System

The 2nd low speed system operates before the 2nd main system's operation. When the 1st throttle valve opens to about 45°, and the negative pressure in the part of the figure "A" is exceeding the specified pressure to make diaphragm pull up the jamming spring, the 2nd throttle valve starts to open by releasing the 2nd valve locking system.

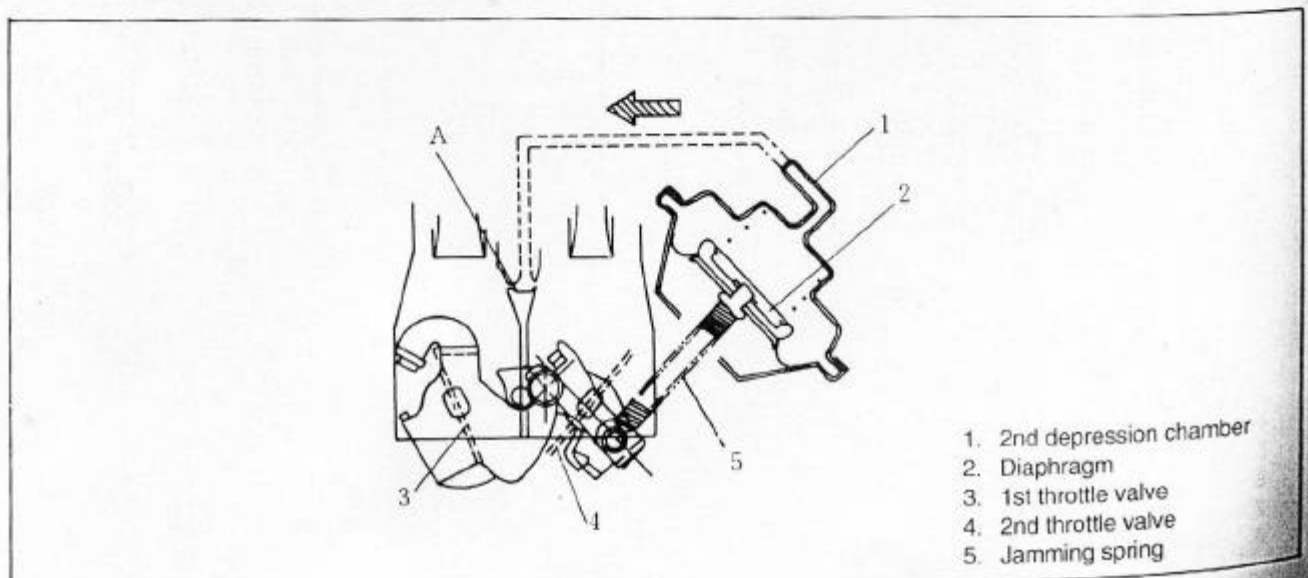


FIG. 1D — 9

When 1st throttle valve opens to above 45° and 2nd throttle valve is also starting to open, the fuel in float chamber is mixed together with the air measured in the pilot jet. And the mixed air is to flow in the intake manifold through bypass port.

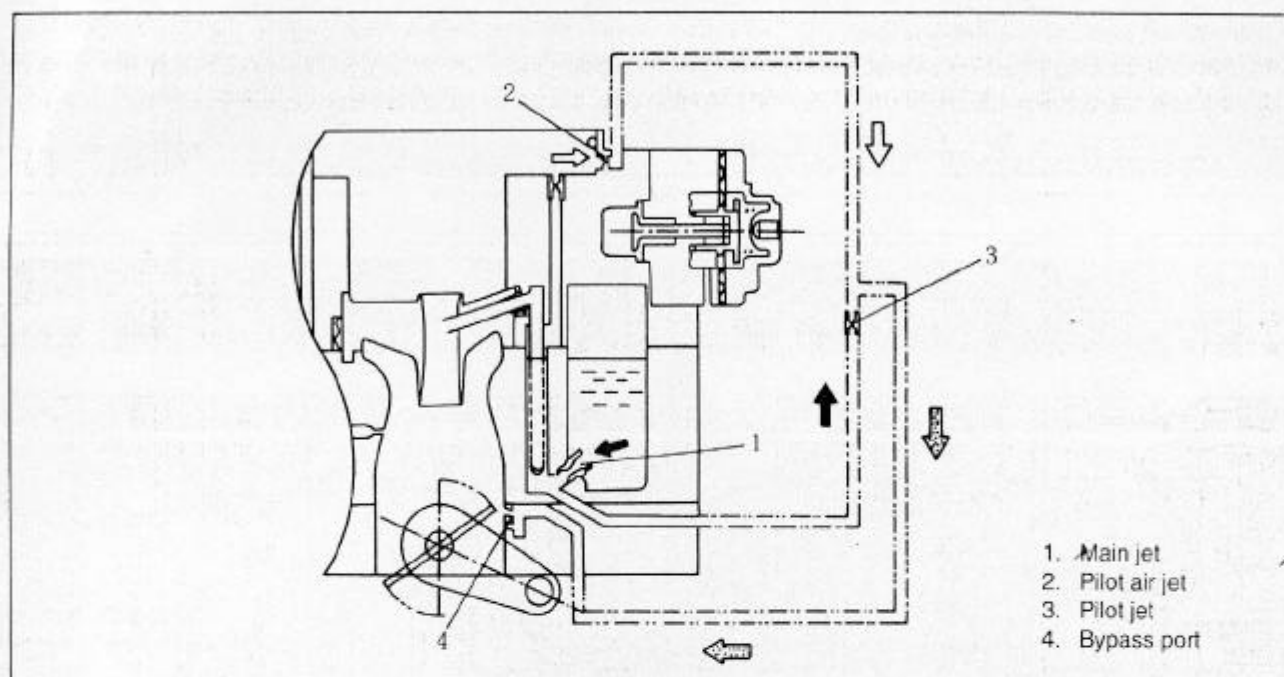


FIG. 1D — 10 OPERATION OF 2ND SLOW SYSTEM

2nd Main System

Whenever 1st throttle valve opens more widely with the 2nd low speed operating, the diaphragm activates upward with increased force due to the negative pressure. Then, the 2nd throttle valve opens widely according to the 1st valve's angle. At that time, the fuel in float chamber measured in the main jet is mixed together with the air measured in the main air jet and flowed in through air bleed pipe. This mixed air flows in the inner venturi through the main nozzle.

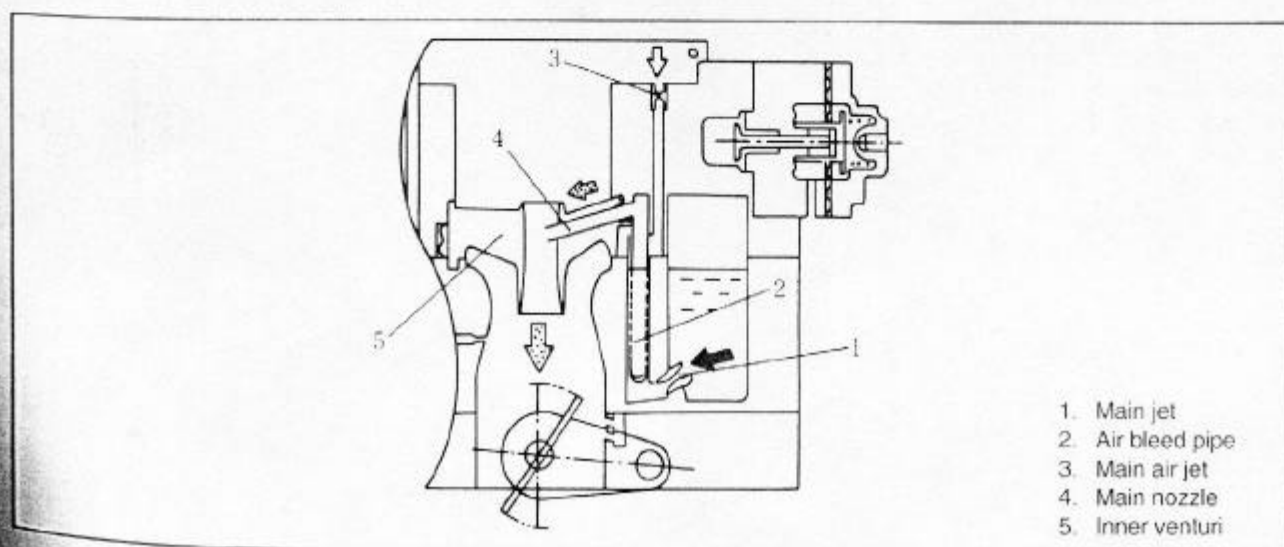


FIG. 1D — 11 OPERATION OF 2ND MAIN SYSTEM

Accelerating Pump System

The throttle valve opens if the accelerating pedal is pressed suddenly in idling rotation or slow driving. At this time accelerating pump starts to operate to provide sufficient fuel. When the accelerating pedal is pressed to press the diaphragm, fuel in pump chamber will be sprayed out from pump nozzle to venturi, with pressing outlet check ball and outlet weight upward. When the accelerating pedal returns to the normal state, the fuel in the float chamber is flowed in the pumping chamber for the preparation of the next spraying out.

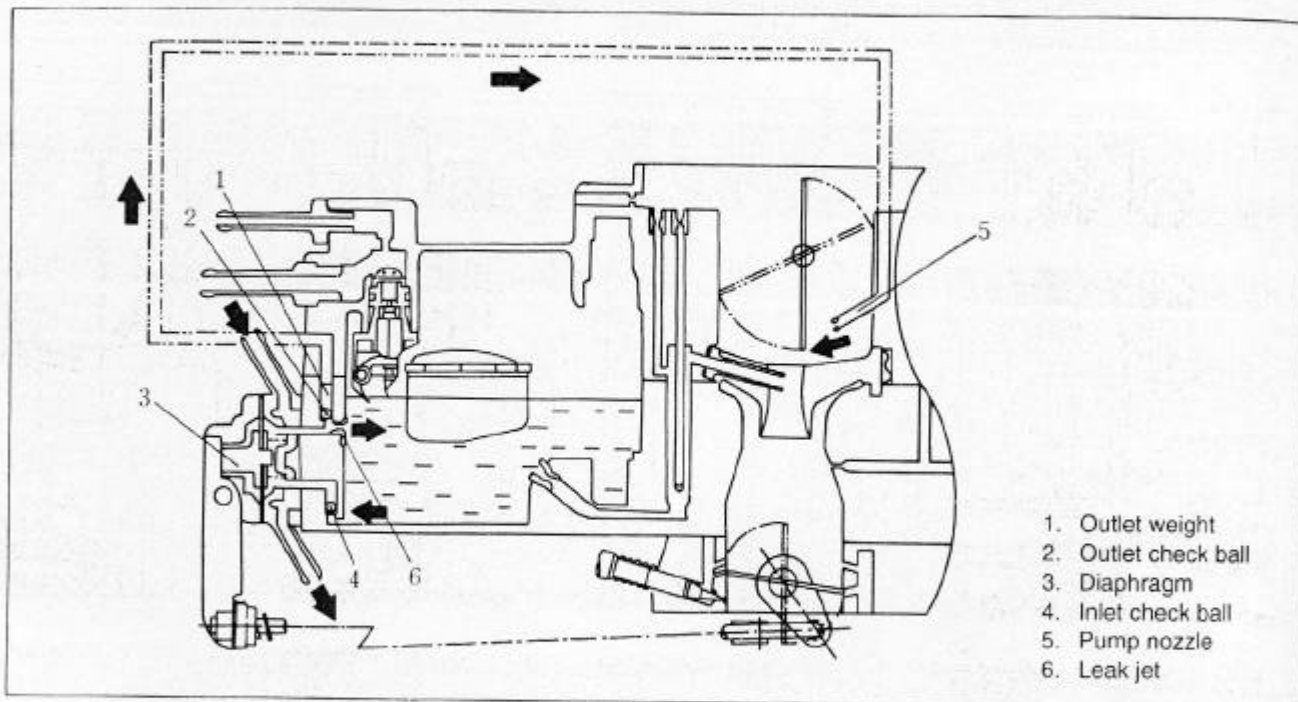


FIG. 1D — 12 ACCELERATING PUMP SYSTEM

Ball Vent Valve System

When engine starts, diaphragm is pulled due to the negative pressure of intake manifold. Such state is being maintained by the magnetic force of ball vent valve and then the associating valve with the diaphragm opens the passage between air vent and float chamber, and closes the passage the canister. When engine stops(no negative pressure of intake manifold occurs), the return spring of diaphragm closes the air vent passage to float chamber, and induces the gasoline vapor generated in the float chamber to canister.

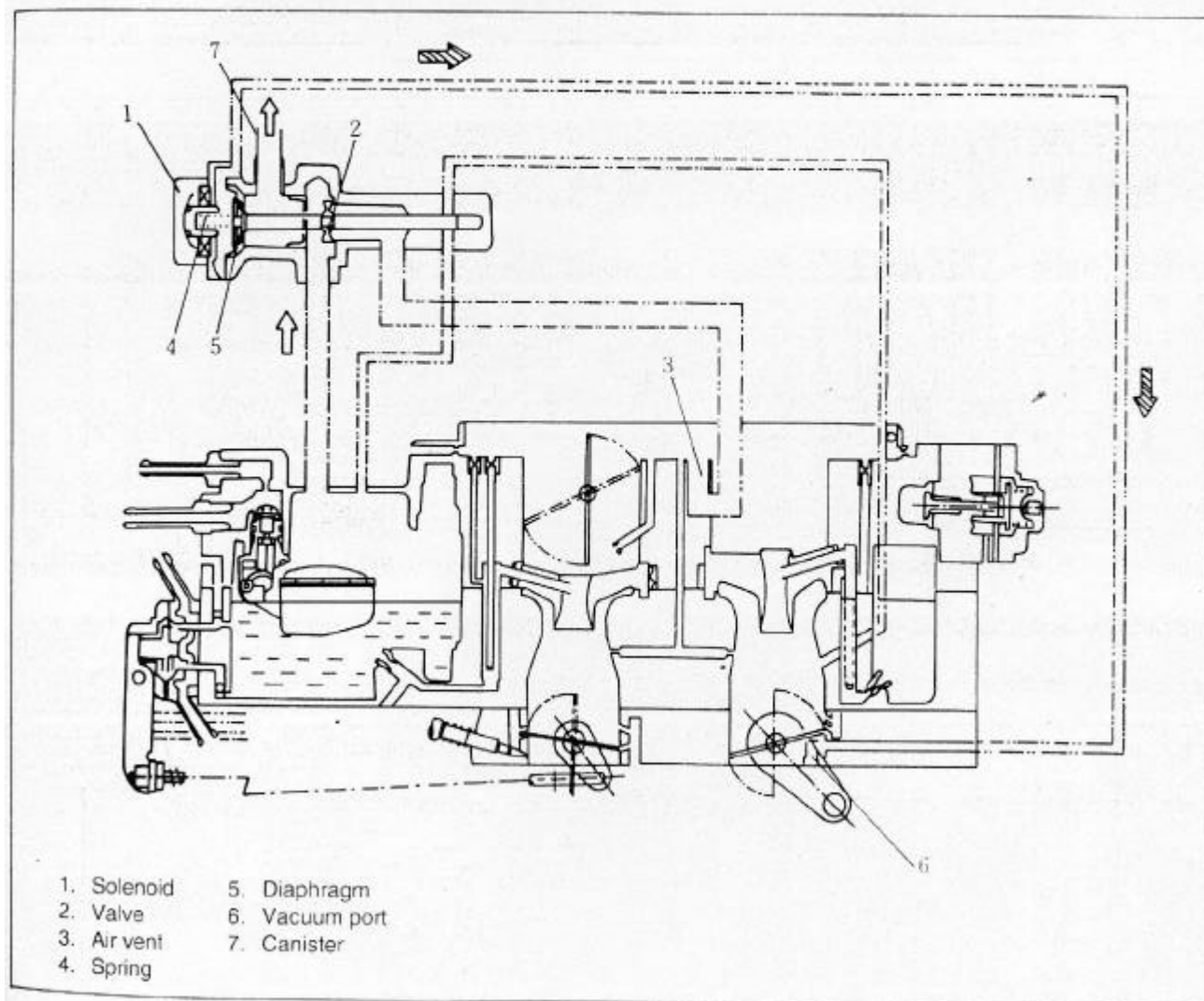


FIG. 1D — 13 OPERATING OF THE BALL VENT VALVE SYSTEM

Coasting Valve System

In case of decreasing speed, C.V(Coasting Valve) operates when the diaphragm is stretched due to the negative pressure of intake manifold. At this time, the fuel in the float chamber is measured in the coasting jet and mixed with the air measured in the coasting air jet. The mixed air is to be inlet to the intake manifold after measured again in the coasting jet of mixture to flow in the intake manifold.

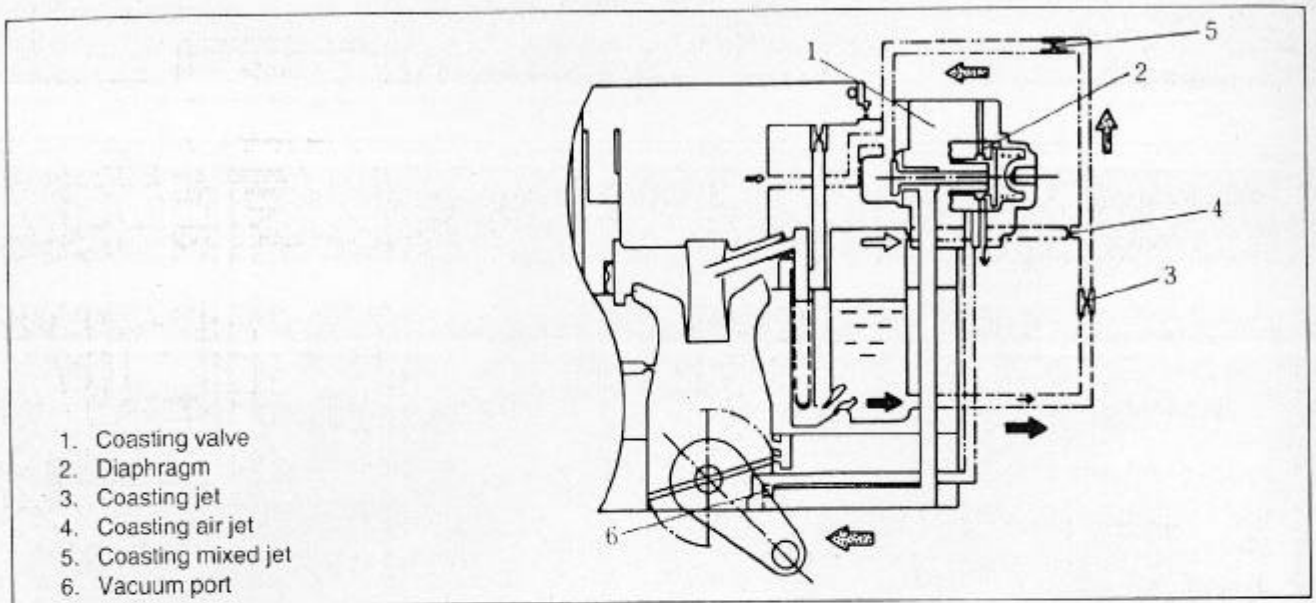


FIG. 1D — 14 OPERATION OF COASTING VALVE SYSTEM

Port Idle Compensator System

When fuel gets hot in the carburetor, percolation is generated to make rich fuel-air mixture which causes the unstable engine condition. In order to maintain the adequate mixing ratio, the bimetal valve opens at high temperature to suck the bypass air into the intake manifold from carburetor.

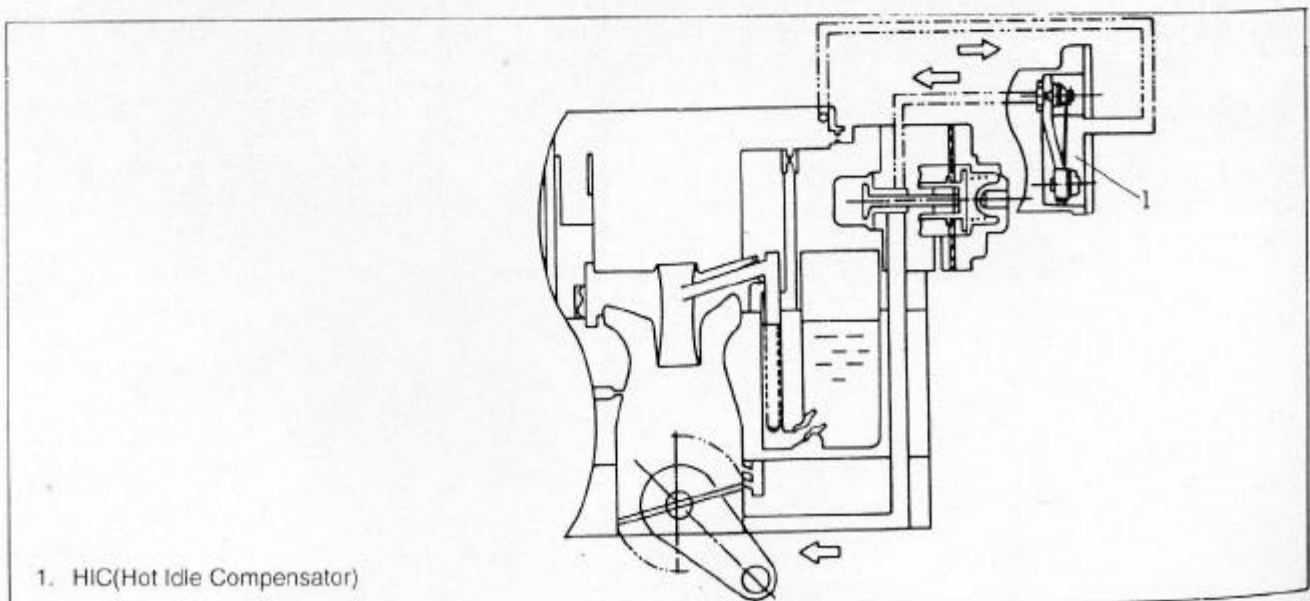


FIG. 1D — 15 OPERATION OF HIC SYSTEM

Solenoid Valve

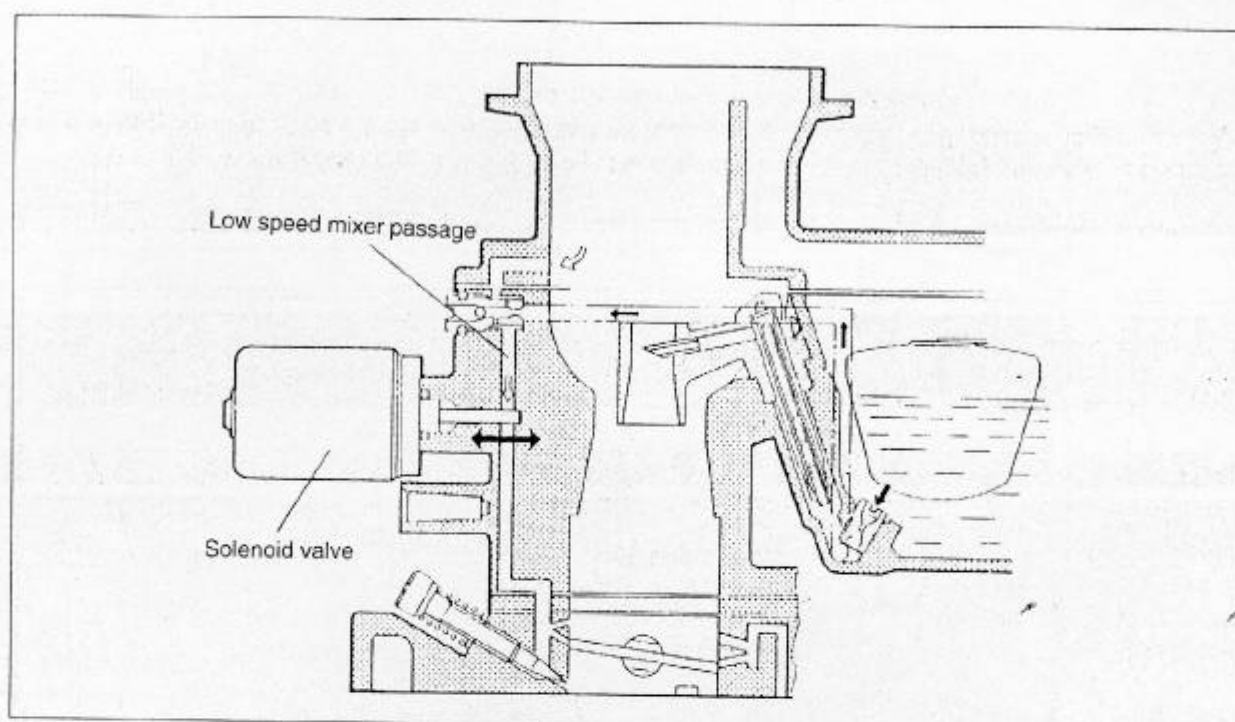


FIG. 1D — 16 SOLENOID VALVE

When the ignition switch is in "OFF", the engine turns continuously with the force of inertia to suck in the fuel-air mixture. Though sparking does not occur with the ignition switch "OFF", the continuously burning mixture due to the high temperature in the combustion chamber, shall momentarily cause the irregular revolution of engine. This state is called Running-ON or Dieseling. To prevent Running- ON, the solenoid valve closes the low speed circuit to cut off mixture with the ignition switch turned "OFF". When the ignition switch is in "ON" or engine starts, current flows in the solenoid to open the low speed circuit.

OPERATION OF AUTO CHOKE SYSTEM

Starting in Low Temperature

Thermowax contracts in low temperature and the cam lever turns toward the low temperature side by the spring force to press throttle valve in cam area for the most adequate throttle opening. As pinion is geared into rack and choke valve is attached to one end of pinion, choke valve is closed due to the turning pinion by stronger spring.

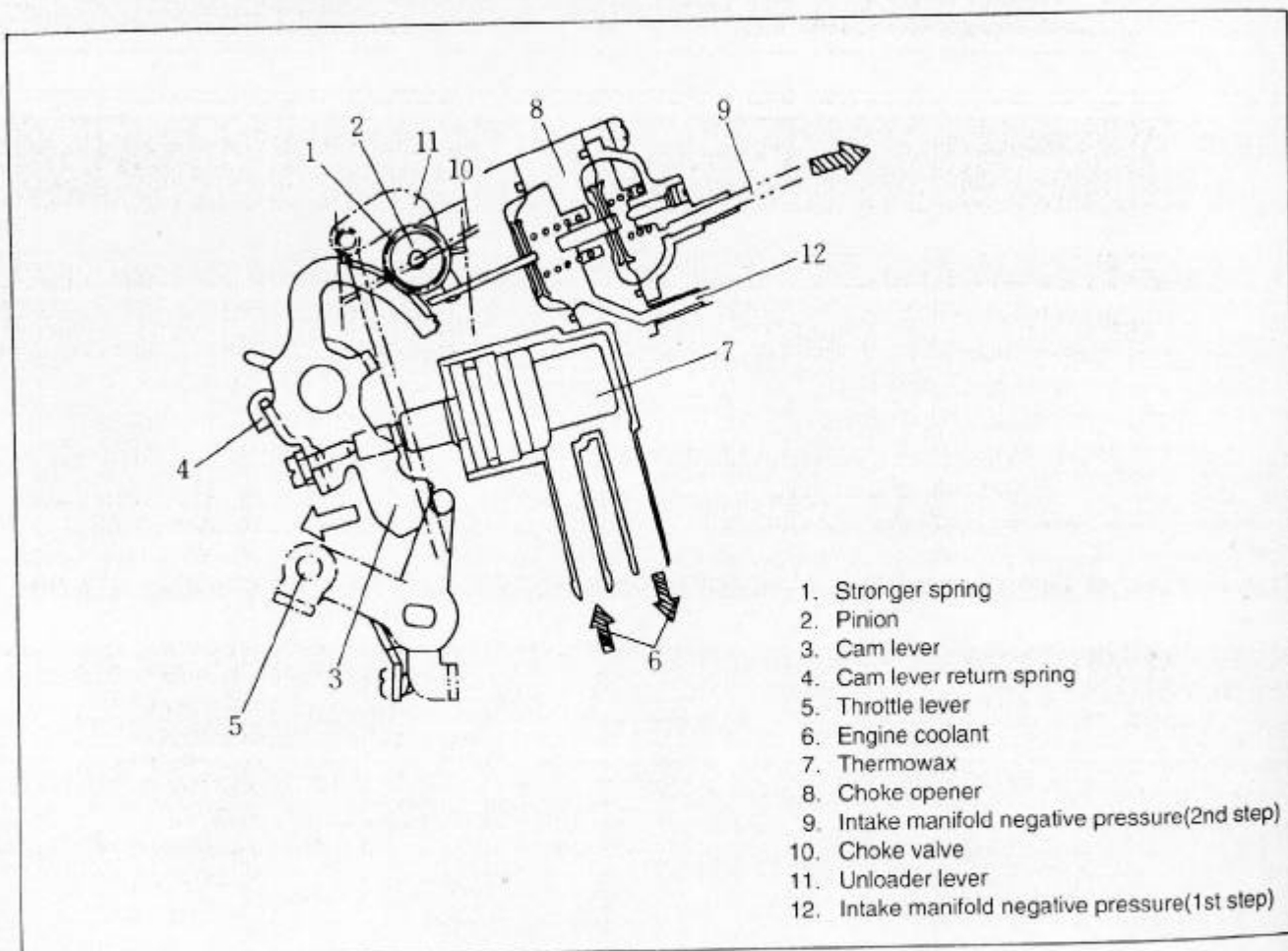


FIG. 1D — 17 OPERATION OF AUTO CHOKE SYSTEM

After Engine Starting

After engine starts, the increased negative pressure of intake manifold opens the 1st step of choke valve forcedly to prevent over concentration of fuel-air mixture. While warming up is proceeding, the temperature of engine coolant is being increased and the thermowax is expanded to turn cam lever toward the higher temperature side for making pinion which is geared into rack of cam lever and turns to open choke valve. At the same time, cam lever close throttle valve to make engine stay in an adequate state when the temperature of engine coolant reaches to specified degree or more, the negative pressure of intake manifold makes 2nd step of choke opener open choke valve forcedly to maintain an adequate mixing ratio for preventing the increase of CO and HC in the exhaust gas. In case of running car before engine gets warmed up, the unloader lever geared with throttle valve opens the choke valve to prevent mixture from over concentration.

Operating the 2nd Step of Choke Opener

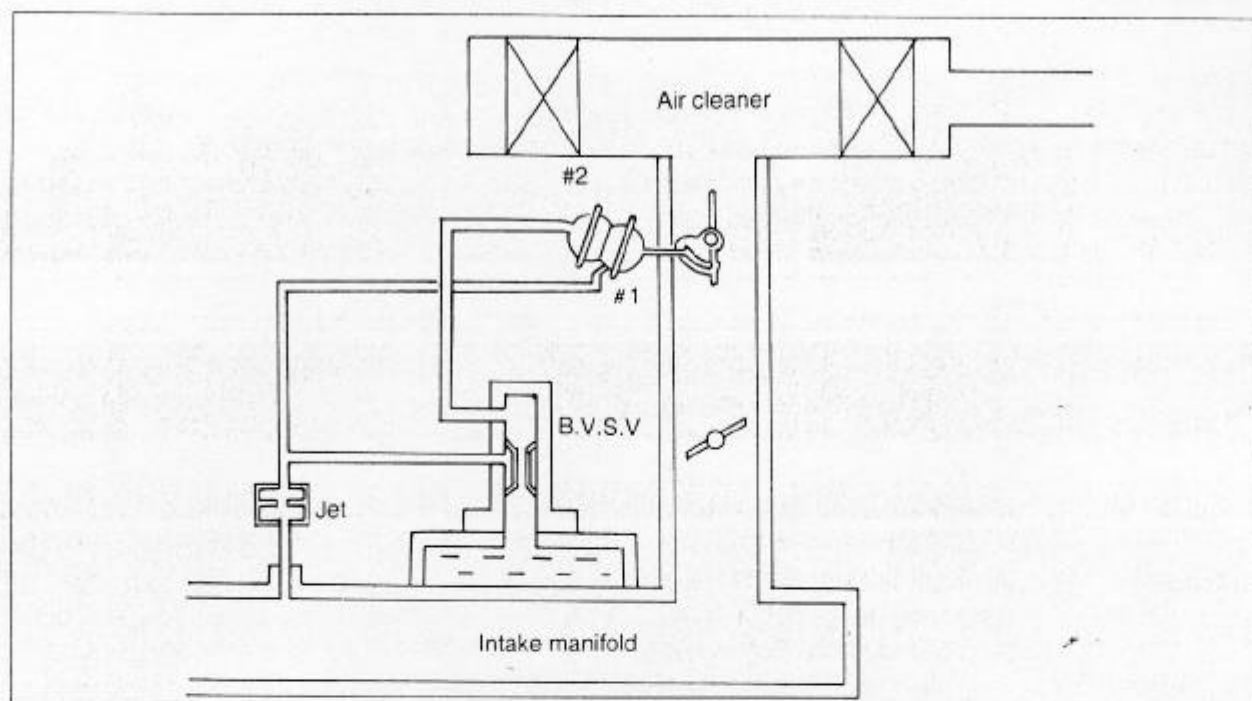


FIG. 1D – 18 2ND STEP OF CHOKE OPENER

1st step of choke opener opens choke valve immediately after starting the engine with the negative pressure generated in the intake manifold, to prevent the mixture from over concentration.

2nd step of choke opener opens the 2nd step of choke valve when the engine is warmed up to some extent after cold starting, for reducing CO and HC gas with the adequate mixture flow into engine.

The bimetal vacuum switching valve(BVSV) controls the 2nd step of choke opener according to the changing coolant temperature in the intake manifold. Under the specified temperature, BVSV closes the vacuum in intake manifold and makes the 2nd step choke opener activated above the specified temperature.

Coolant temperature	Choke opener 1st step	Choke opener 2nd step	Choke valve
Below 18 °C	ON	OFF	1.8 mm opening
Above 18 °C	ON	ON	2.3 mm opening

* Operation of BVSV

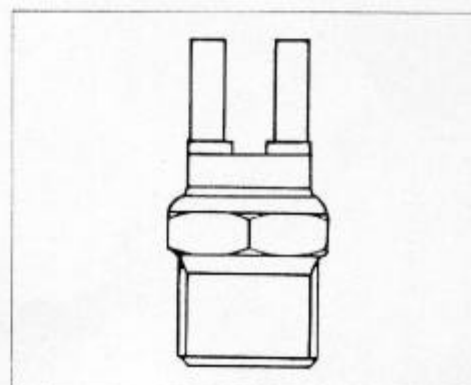


FIG. 1D – 19 BVSV

Drawing of Hose Connection

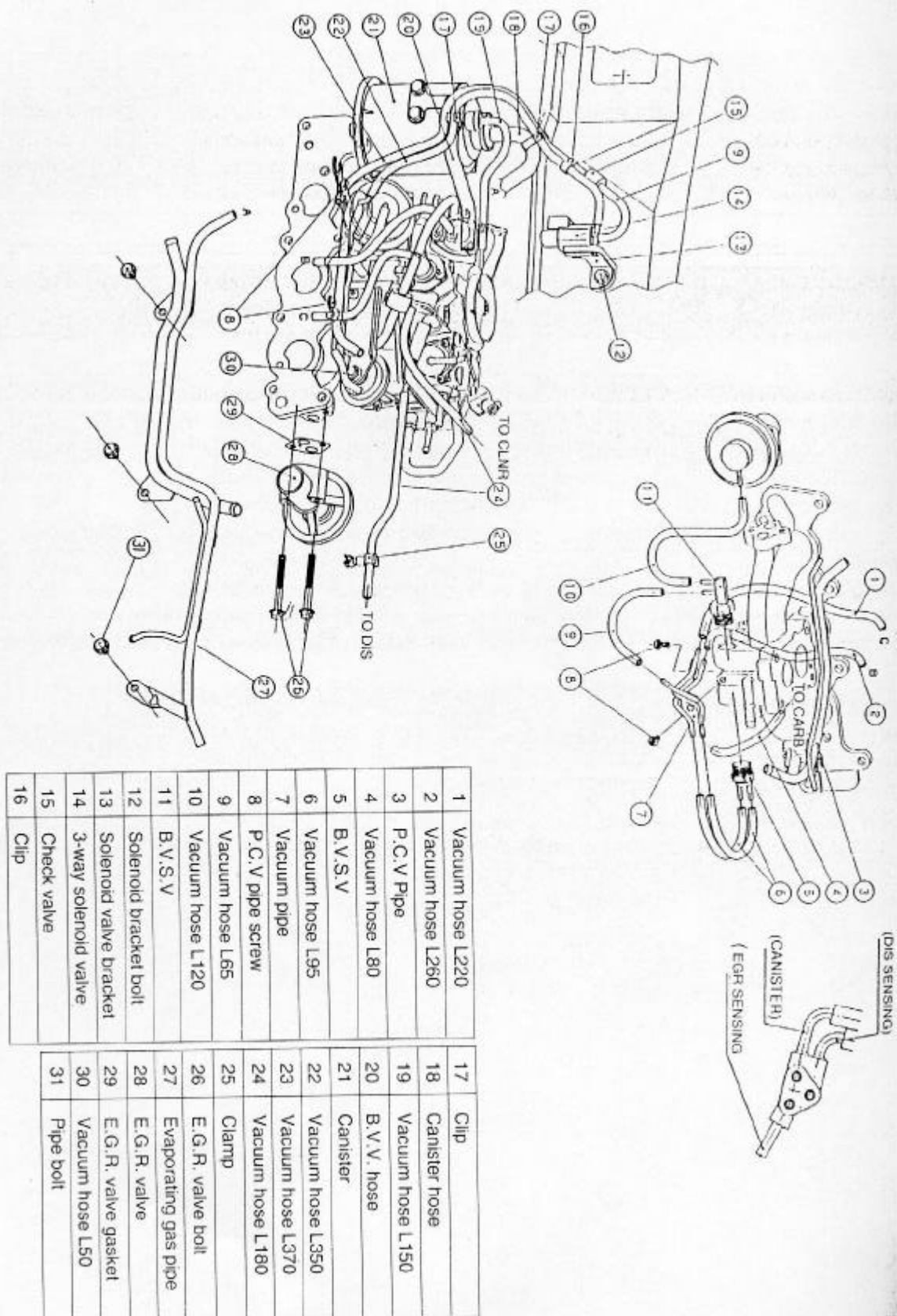
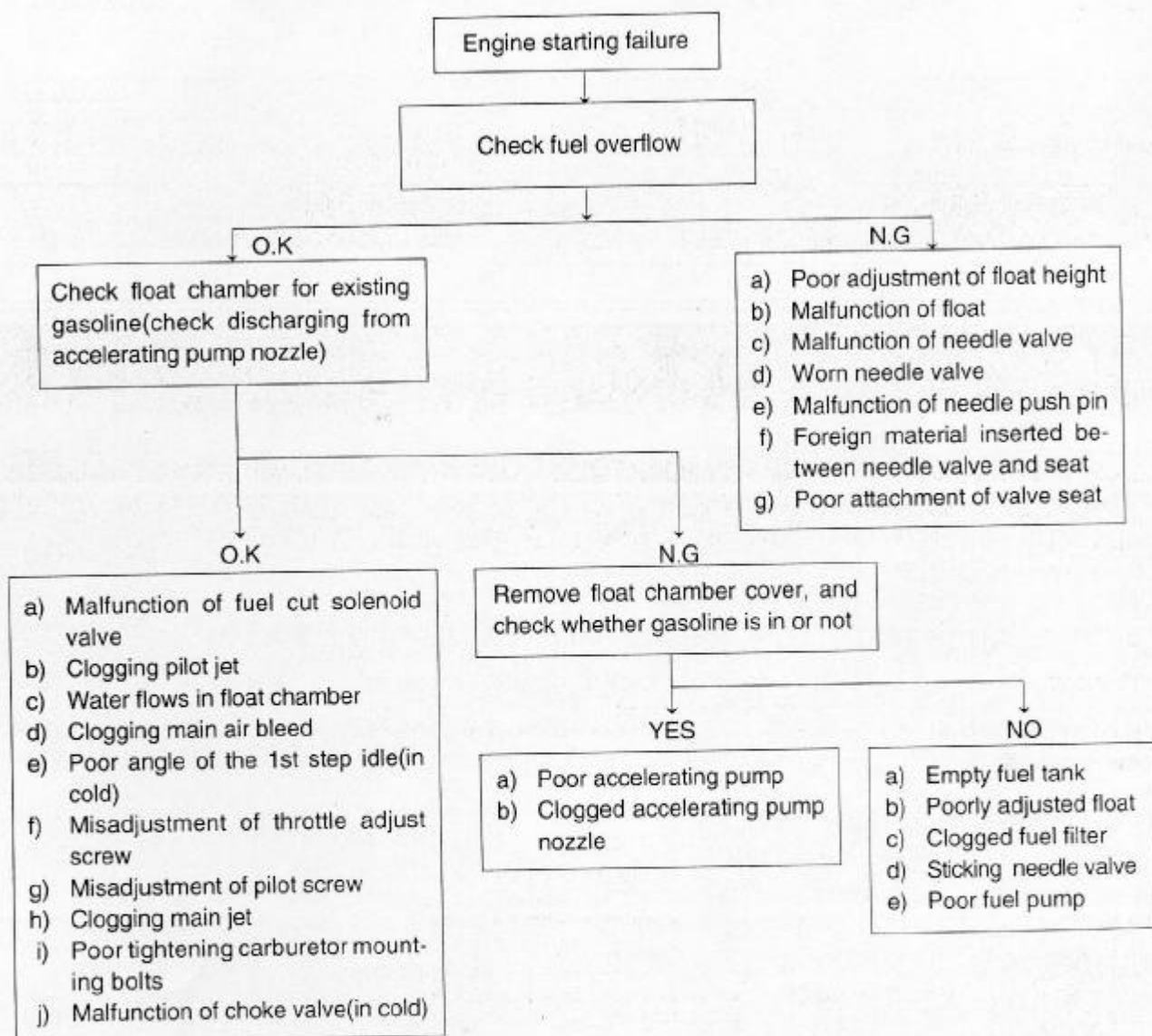
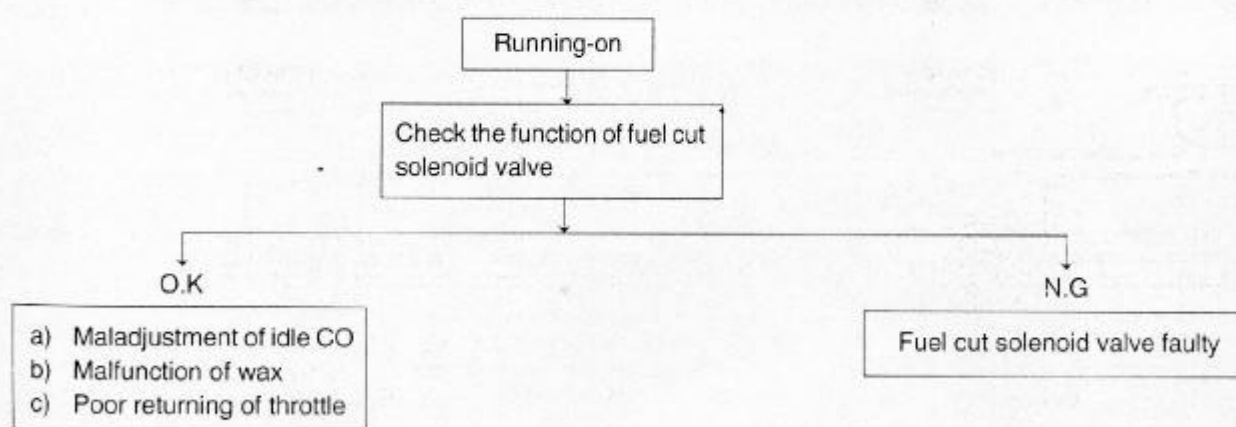
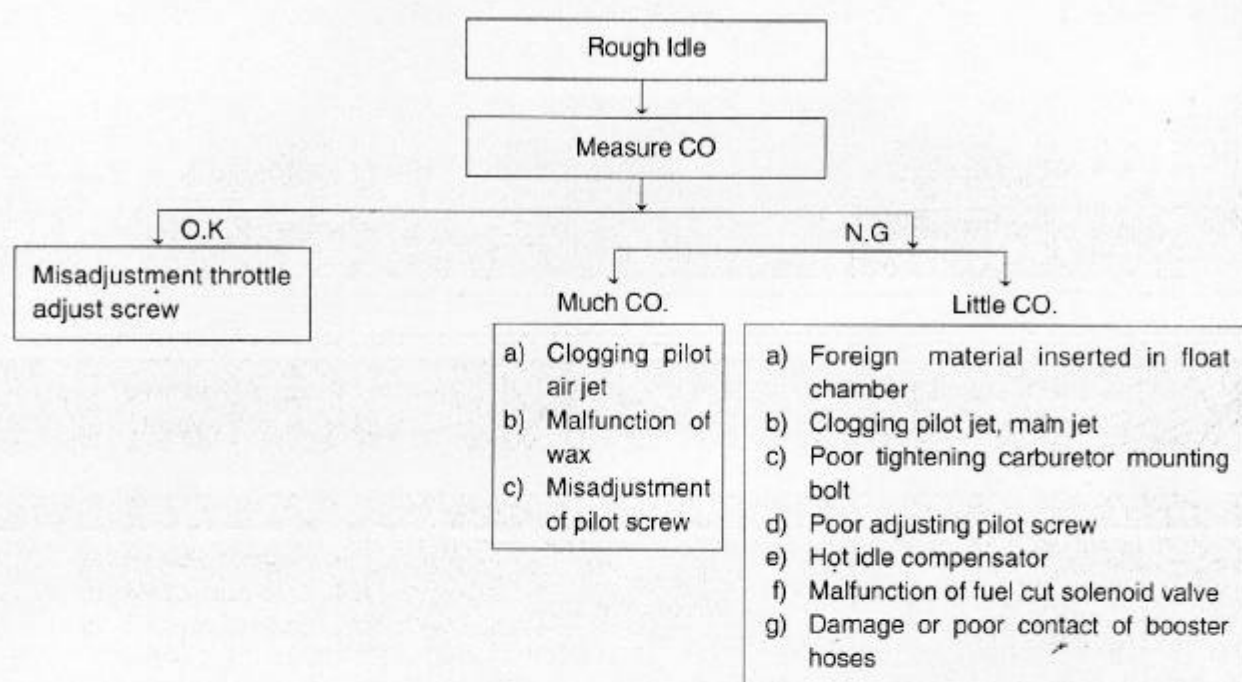


FIG. 1D - 20

TROUBLE SHOOTING

Condition	Probable Cause	Correction
Starting problem in cold weather	<ul style="list-style-type: none"> Poor closure of choke valve Weak closure of choke valve Poor operating and opening range of choke opener (poor diaphragm) 	<ul style="list-style-type: none"> Cleaning and lubrication of choke valve, choke shaft Check and repair Replace or adjust
Idling and low speed problem	<ul style="list-style-type: none"> Poor adjustment of pilot screw Poor adjustment of throttle adjust screw Clogged, loosened pilot jet Leakage at the carburetor joint(gasket damage, loosened mounting bolts) Poor returning of throttle valve(interference of throttle valve, poor link operation) Air leak at the contacting surface of main body (gasket damage, loosened mounting screw, deformation of contacting surface) Malfunction of auto choke(poor opening range of fast idle, deformation of unloader lever or rod) Damage or poor contacting of booster hoses 	<ul style="list-style-type: none"> Adjustment Adjustment Clean, replace Replace, tighten Repair, replace Replace, repair Adjust Repair, replace
Problem in medium and high speed	<ul style="list-style-type: none"> Clogged, loosened main jet Poor O-ring of main jet Clogged main air jet Short fuel flowed in float chamber(clogged filter, needle valve) 	<ul style="list-style-type: none"> Air blast, tighten, replace Replace Clean, air blast, replace Clean, air blast, replace
Poor acceleration	<ul style="list-style-type: none"> Clogged, loosened main jet Poor O-ring of main jet Poor discharge of accelerating pump(clogged passage of pump nozzle, poor operation of outlet check ball) 	<ul style="list-style-type: none"> Clean, air blast, tighten Replace Clean, air blast, repair, replace
Overflow	<ul style="list-style-type: none"> Oil leaking from valve seat(worn needle valve, attached foreign materials, deformed float, cracked float) 	<ul style="list-style-type: none"> Replace





ON-CAR SERVICE

ADJUSTING IDLE

1. Disconnect the hot idle compensator(H.I.C.) and clog it with cap.

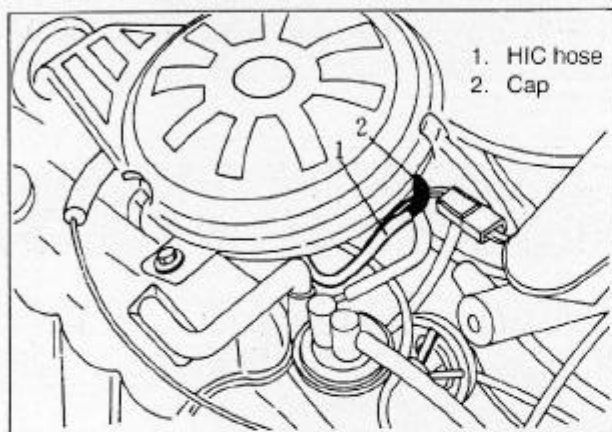


FIG. 1D — 21 HIC

2. Warming up until engine cooling fan operates.
(Adjustment should be done when the fan stops.)

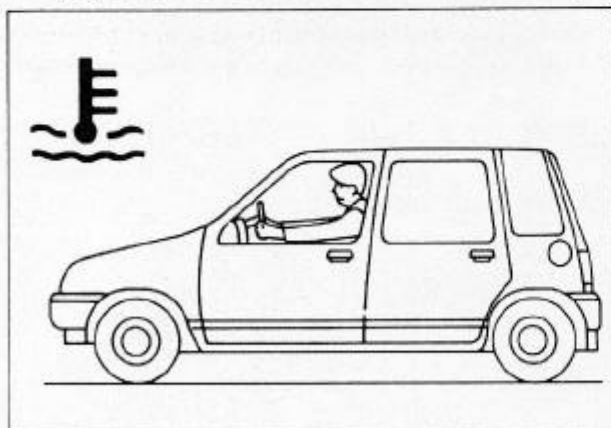


FIG. 1D — 22 WARMING UP

3. Check the carburetor link system and valves in good operating condition.
4. Check the ignition timing for specified limit(The ignition timing for some contries might differs from the standard timing to meet specified octane number of fuel).

Ignition timing(°/rpm)	$8 \pm 1/950$
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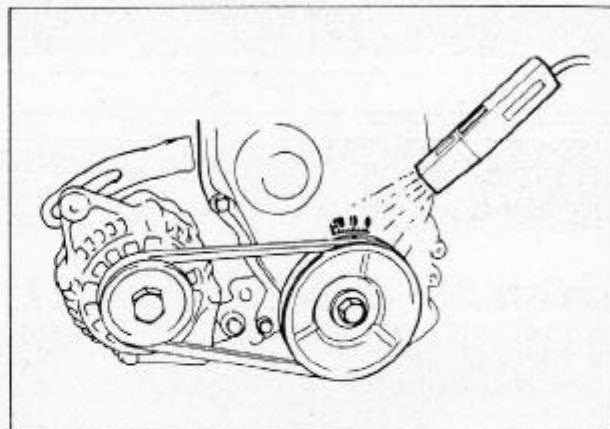


FIG. 1D — 23 ADJUSTING IGNITION TIMING

5. Confirm the cooling fan stops, set the idling rpm to specified range by turning the throttle adjust screw of carburetor.

Idling rpm	950 ± 50
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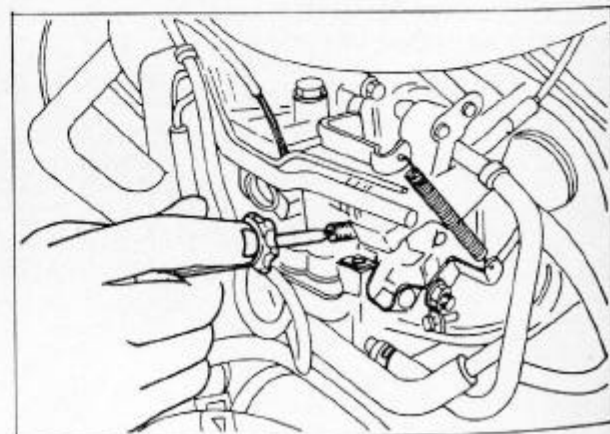


Fig. 1D — 24 ADJUSTING IDLE RPM

6. Install CO and HC tester to measure the CO and HC concentration. If the result exceeds the specified limit, adjust CO and HC concentration by turning the pilot screw little by little with the special tool(measure and adjust it in the idling state).

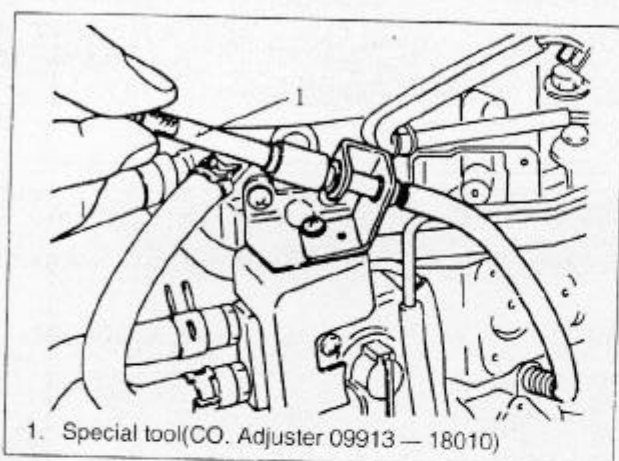


FIG. 1D — 25 ADJUSTING PILOT SCREW

7. Make HIC hose as it was. Press accelerating pedal up to 2500 rpm to check the stopping engine cooling fan in the idling state, and measure the concentration of CO and HC.

Target concentration of CO and HC	CO(%)	1.5 ± 1
	HC(ppm)	300~800

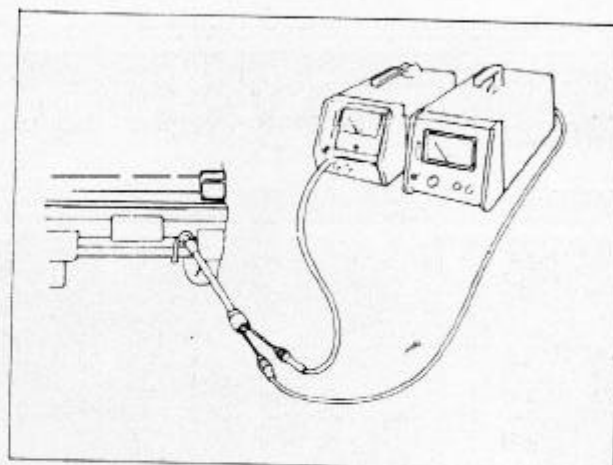


FIG. 1D — 26 MEASURING CO AND HC CONCENTRATION

DISASSEMBLY

COMPONENTS

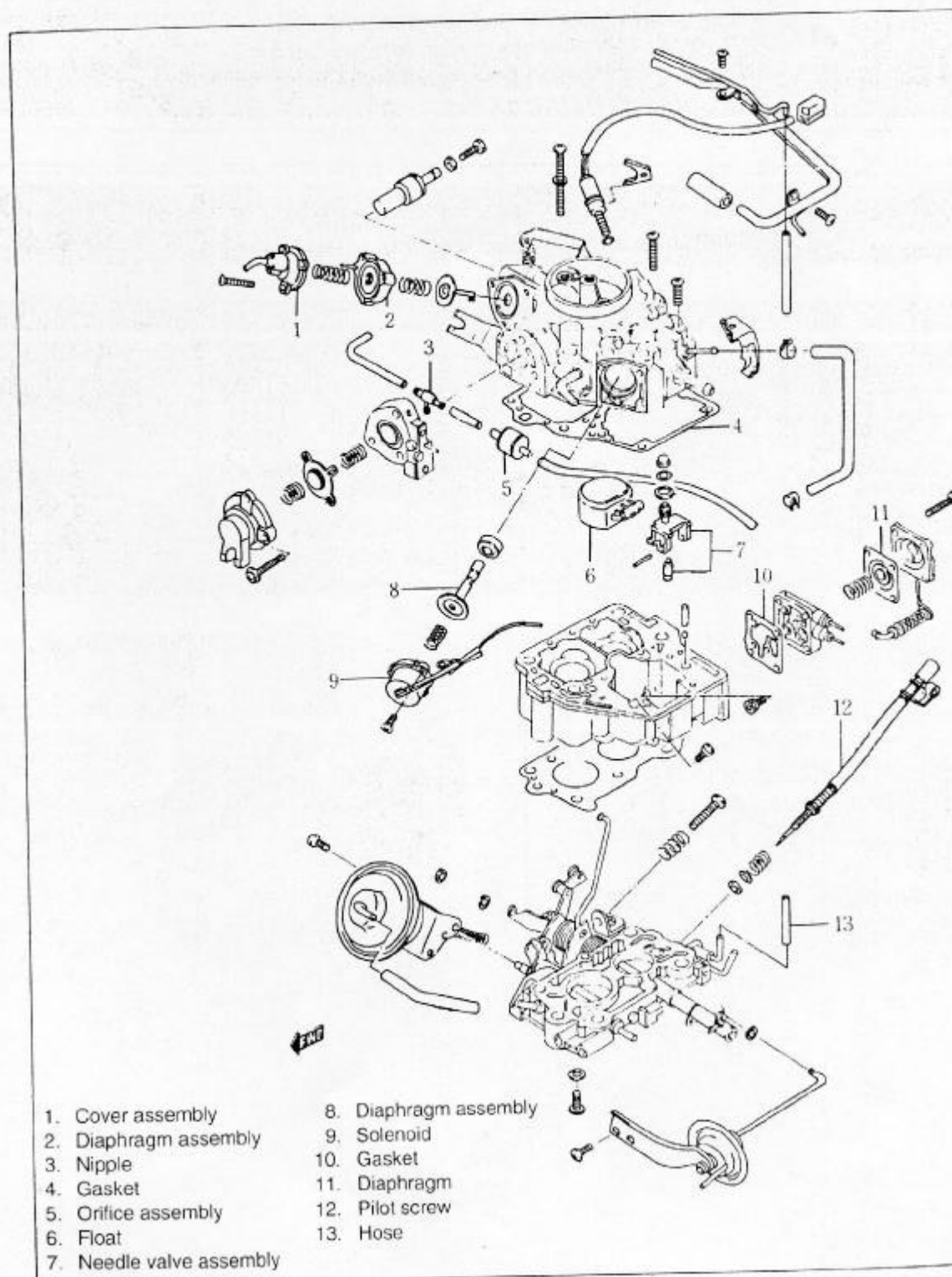


FIG. 1D - 27 COMPONENTS OF CARBURETOR

Cautions for Disassembly

- When removing the insulator gasket attached on the flange surface of carburetor, pay attention to prevent the flange surface from possible damage.
- Handle float with care against possible deformation or breaking.
- Take care of the accelerating pump weight and steel ball not to be lost upon disassembly.

Non-disassembly Parts

Following parts need a precision adjusting. They should not be disassembled.

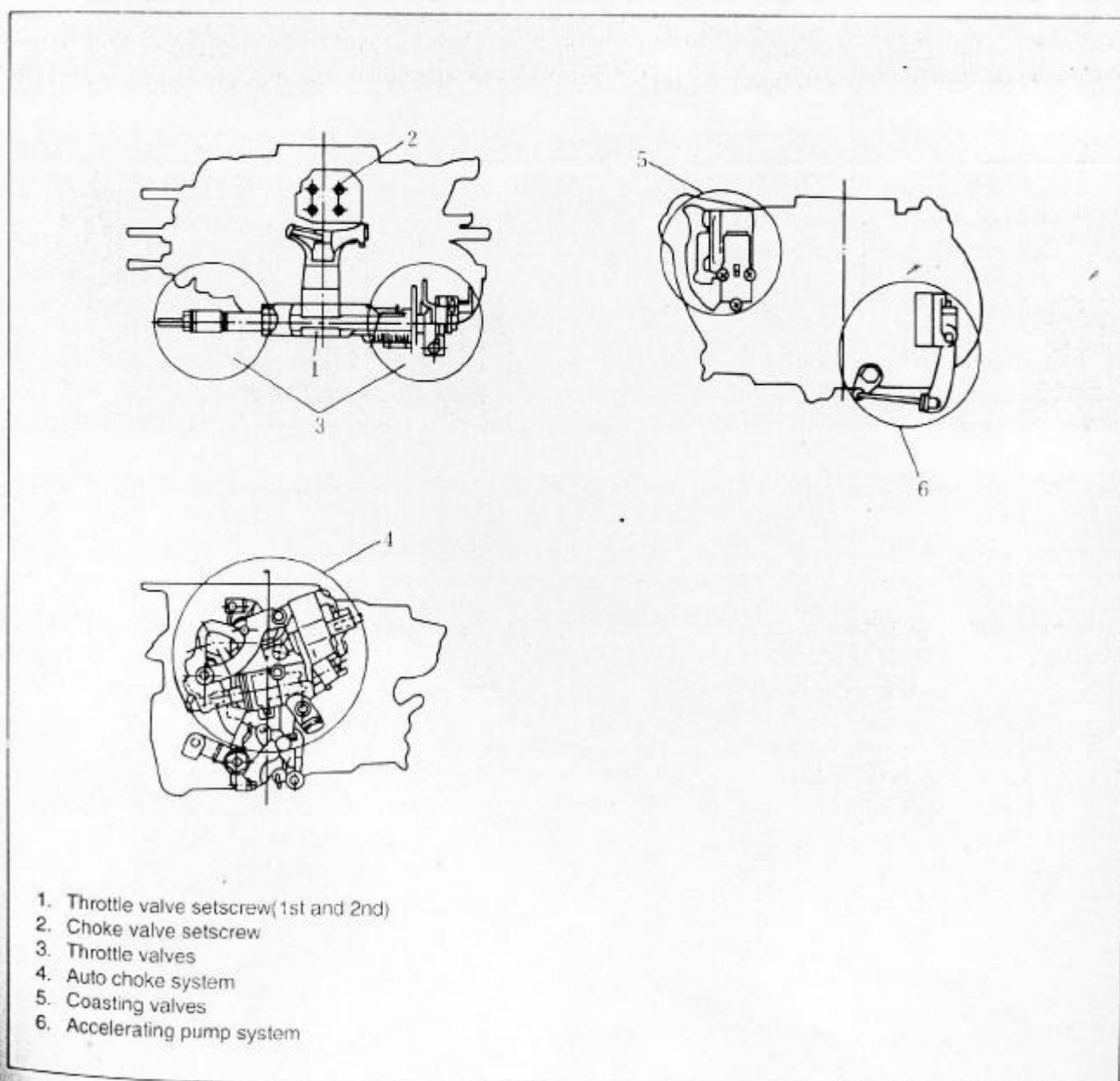


FIG. 1D — 28 NON-DISASSEMBLY PARTS OF CARBURETOR

INSPECTION

Float Level

Put float on the upper body and incline it gradually from its vertical position until the float comes to touch the needle valve. Check the specified limit.

Distance up to the top of float (mm)	17.2
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CAUTION

Measure without touching the needle valve with the float tare.

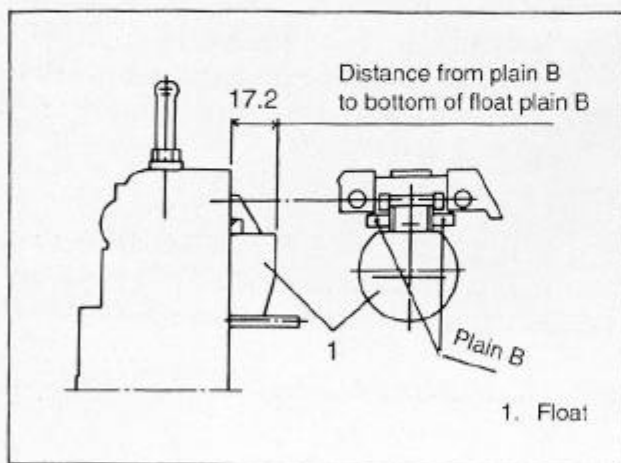


FIG. 1D — 29 MEASURING FLOAT LEVEL

Choke Opener

1. With lever pressed, close the inlet of the negative pressure hose by hand and check the lever's returning to its original place (1~2 mm of return is made due to the restoring force of diaphragm).
2. Check if lever returns rapidly when putting off the hand from the inlet of negative pressure hose.

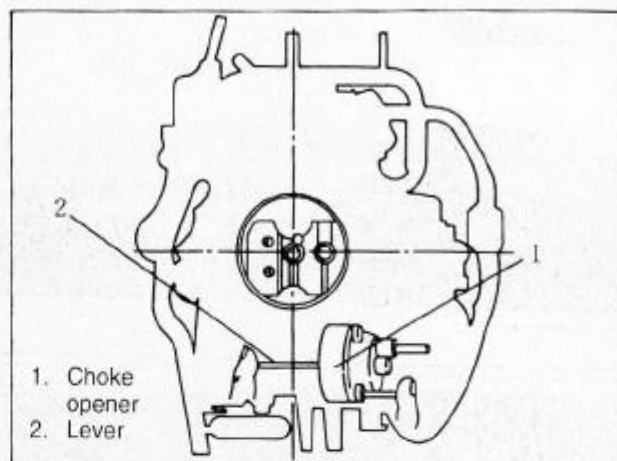


FIG. 1D — 30 CHECKING DIAPHRAGM

3. Put 400 mmHg or more negative pressure on the choke opener connecting it to vacuum pump.
4. In this state, check the choke valve clearance (Fig. A).

Choke valve clearance(mm)	1st step	1.8
	2nd step	2.3

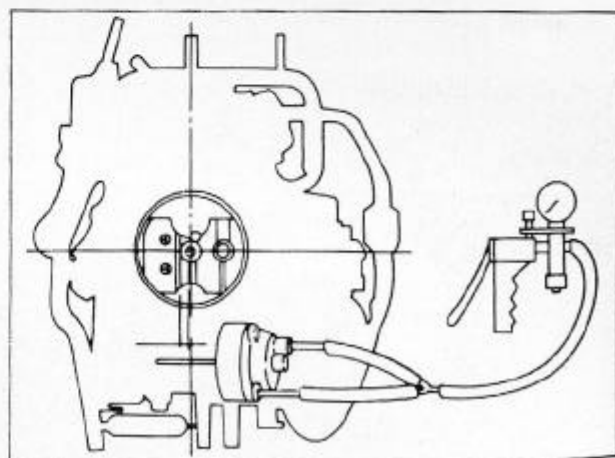


FIG. 1D — 31 CHECKING CHOKE OPENER(1ST STEP)

5. Check gasoline is remained in the diaphragm.

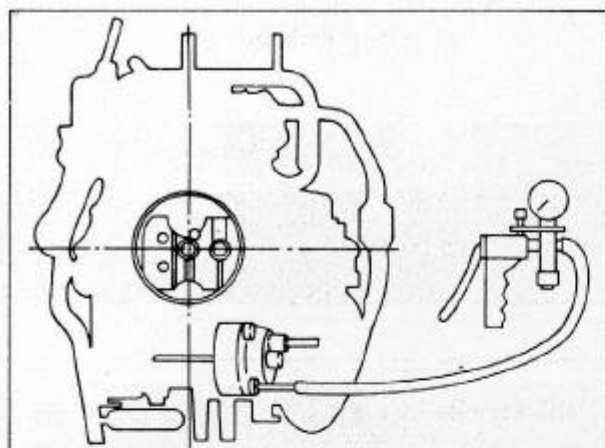


FIG. 1D-32 CHECKING CHOKE OPENER(2ND STEP)

Unloader

1. Open throttle valve fully when choke valve is closed completely.
2. In this state, measure the choke valve clearance "B".

Choke valve clearance(mm)	2.3 — 3.9
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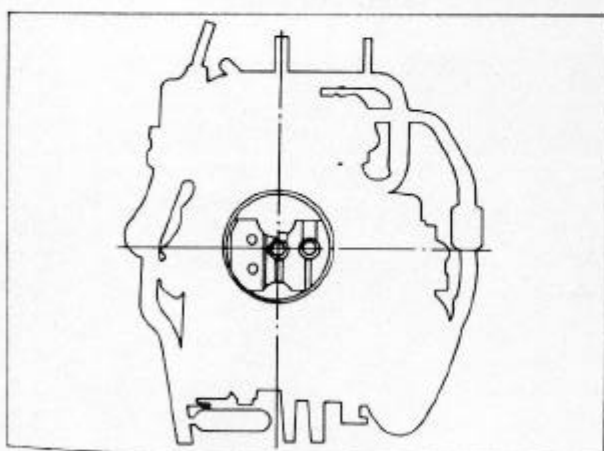


FIG. 1D-33 CHECKING UNLOADER

Accelerating Pump

1. Remove air cleaner case.
2. Check pump nozzle for spraying out fuel when accelerating pedal is pressed.

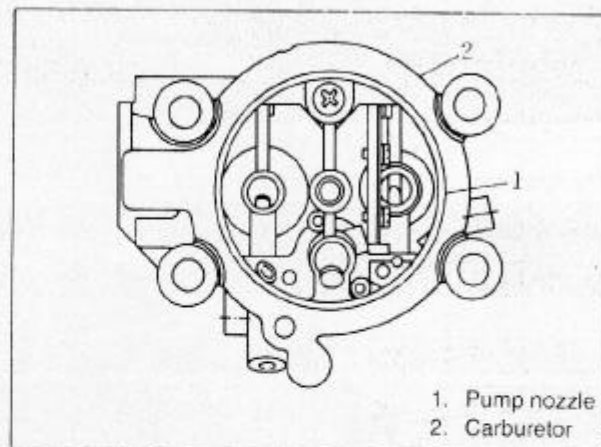


FIG. 1D-34 CHECKING ACCELERATING PUMP

If there is no spray of fuel, check diaphragm for hole, crack, stuck ball, or clogged passage. If any problem is checked, repair, clean or replace it.

2nd Diaphragm

1. Remove air cleaner case and pull off carburetor from intake manifold.
2. Remove 2nd diaphragm from carburetor.
3. Press spring down toward diaphragm with a finger strongly as shown in the figure. Then, block the vacuum port on the contacting surface to carburetor with a finger and release the spring.
4. Check the spring whether it is still the pressed down situation after taking off the finger from it.

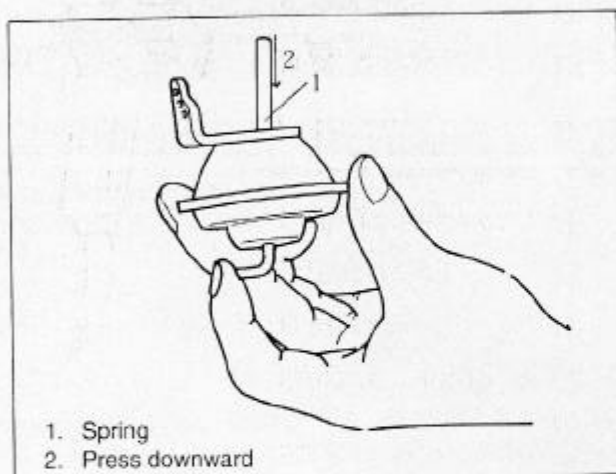


FIG. 1D—35 CHECKING THE 2ND DIAPHRAGM

5. After checking that spring is pressed down, take off the finger from the vacuum port and check the spring for its smooth restoring to the original state.
6. If any problem is found in the paragraphs 4 and 5, replace the 2nd diaphragm.

Clean

1. Clean the removed pilot jet, main jet and air jet with air.
2. Clean the passage port of carburetor body with air.
3. Remove float and needle valve in float chamber and clean it at the fuel inlet needle with air.

Air Blow

In general, air blow means to blow in compressed air with air gun. However, it is recommendable to take intake method when cleaning carburetor with air. If compressed air is blown in the passage, dust or dirt in the passage is forced to put in deep corner of carburetor, and it becomes impossible to remove it afterwards.

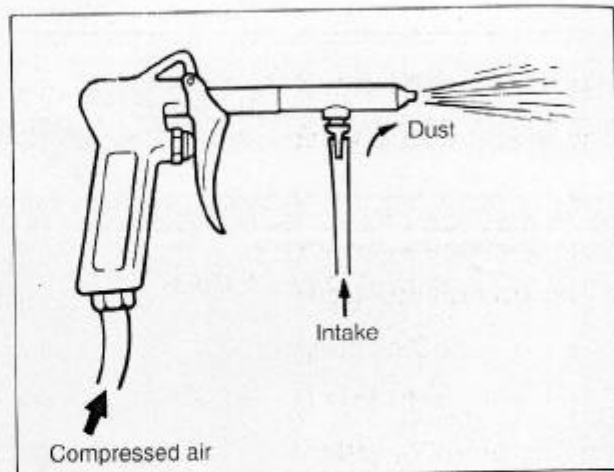


FIG. 1D—36 DIRECTION OF AIR BLOW

Cautions for Assembly

- Replace each gasket with new ones.
- Make it sure to install O- ring for seal or diaphragm without its being dent, or displaced from the specified location.
- Be careful not to let dust come in the carburetor.
- After assembling, check the assembled condition for smooth functioning of each link part.