

SU Type Twin Carburetor

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INTRODUCTION TO THIS WEB PAGE

This web page on the Hitachi-SU carburetor is copied from a Service Manual for the Datsun 510, published by Nissan, whose permission to copy we gratefully acknowledge. We used optical character recognition to avoid huge graphics files with their inherent slowness on the net; naturally we then went over the data with a fine tooth comb on a best effort basis but we do not warrant that the data are 100% identical to the original. If any of you detect an error please let us know at info@sportsimports.ca. Thanks.

We also added some data for the Datsun Roadsters to the "Specifications". The SUs fitted to most Roadsters are quite similar to those dealt with in this article. We preferred to copy this article, rather than one from any of the Roadster shop manuals, because it considers points, such as the needle valve problem dealt with below, not covered in the earlier Roadster manuals.

We find that the standard web display resolution of 800x600 is best. We have tried to ensure that you can print the entire web page (about twenty 8 1/2" x 11" pages) without having graphics split onto two pages. It works better with Netscape 3 and 4 than with Netscape 2; it's best to specify 0.25" margins.

Important notice regarding tuning

Before you retune your SU - any SU on any engine - including British built SUs on MGs etc - please be aware that one of the most common ways to burn out the exhaust valves on an engine fitted with one or more SUs is to lean out the mixture because you were unaware that the needle valve in the float chamber was leaking when you tuned the SU. Forty years ago I found that out the hard way after an exhilarating trip in a Triumph TR3 in the mountains of New York state!

WHY IT HAPPENS

When the engine is idling the fuel pump is producing enough pressure to overcome the resistance of an old tired needle valve in the float chamber, and so the carburetor floods. As you tune an SU at idle, this means that you temporarily have a rich mixture which can fool you into believing that you should turn the mixture adjusting nuts (called "idle adjusting nuts" in the Nissan article) so as to lean out the mixture. Don't do it! Read below.

HOW TO AVOID THIS DISASTER

Instead, do as the table in Idling adjustment advises (in regards to setting the idle speed) and "race the engine" (they mean take it up to about 3-4000 rpm for ten seconds) and then shut the engine down to idle and immediately judge whether the nuts need adjusting; this is best done by using the piston lifter (not mentioned in the Nissan article, but clearly seen in External view of carburetors - one is slightly below the right of the air intake on the RH carb directly above the "al" of "external" - to lift the piston about 1/32" - if the carburetor is adjusted properly the engine speed should momentarily increase very slightly and then return to what it was before you lifted the piston. *If you find the the mixture is no longer as rich - you have one or more leaky needle valves.*

If they are leaking, buy a new needle valve for each float chamber and try again; as a temporary measure you can try to lap the old valve to its seat or, as a last resort, simply follow the advice in the paragraph above.

In any case, even with perfect needle valves, you should *always* make your decision (as to whether or not to adjust the nuts) *immediately* after revving the engine, closing the throttle and lifting the piston as described above.

DESCRIPTION

The model HJL38W6 carburetor is of a horizontal, variable venturi type, which is used in the L16 and L18 engines. This carburetor is designed to keep constant flow of intake air through the venturi under all engine speeds. That is, the venturi opening is automatically adjusted by sliding the suction piston in accordance with the change in volume of intake air.

Metering calibration is accomplished entirely by the jet needle fixed into the suction piston. Then, the relative position of the taper jet needle and nozzle gives the correct air-fuel mixture covering all operating speeds.

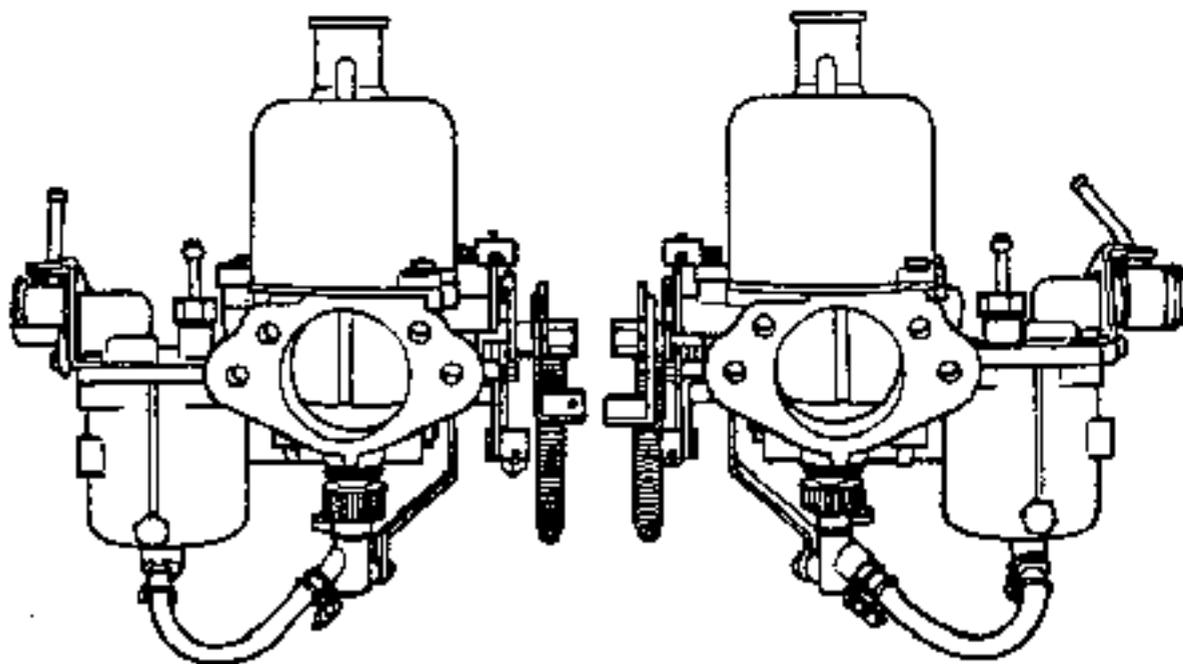


Fig. EF-32 External view of carburetors

When starting the engine, the nozzle is lowered by pulling the choke knob. Consequently, an enriched air-fuel mixture is obtained. Under normal running, the vacuum in the suction chamber lifts the suction piston which slides the jet needle up and the proper mixture is supplied.

This carburetor has the following characteristics:

1. Air flows fast in the venturi when the engine runs at low speeds. Therefore, fuel is fully turned into spray, so that good driveability can be obtained.
2. As the venturi opens wide at high speed running, high output can be provided to reduce fuel intake resistance.
3. The fuel control mechanism is simple in construction because of single nozzle,

thus affording troublefree operation and smoother acceleration.

4. Engine output and accelerating characteristics are greatly improved by the use of two parallel synchronized carburetors. This means that the fuel is fed to two engine cylinders by the front and rear carburetors evenly.

STRUCTURE AND OPERATION

- 1 Suction chamber
- 2 Suction spring
- 3 Float chamber cover
- 4 Suction guide
- 5 Nipple
- 6 Throttle chamber
- 7 Suction piston rod
- 8 Needle valve
- 9 Throttle valve
- 10 Float chamber
- 11 Float lever
- 12 Float
- 13 Sleeve
- 14 Clip
- 15 Fuel hose
- 16 Oil cap nut
- 17 Plunger rod
- 18 Transverse hole
- 19 Oil damper
- 20 Suction piston
- 21 Nozzle
- 22 Idle adjusting nut

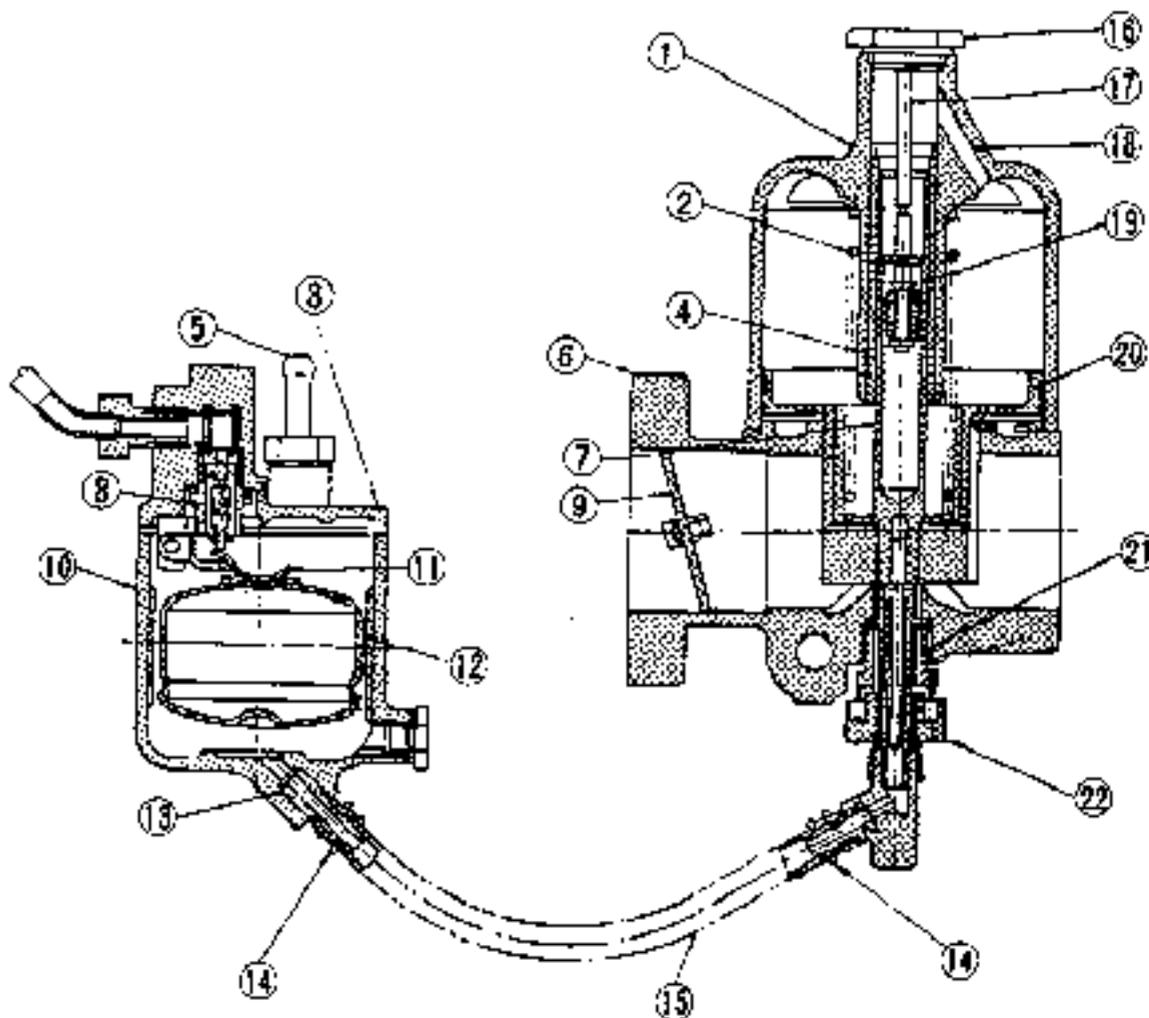


Fig. EF-33 Cross-sectional view of carburetor

Float chamber

of fuel is controlled by the float system. Fuel fed from the fuel pump enters into the float

closes the valve seat. As the float drops, the needle moves down and opens the valve

The float system is basically the same in operation as that used in the conventional type carburetor. The level

chamber through the needle seat. Flow continues until fuel level raises the float to the position where the needle

seat. Then, fuel enters the float chamber, thus keeping the fuel level constant.

Venturi control system

The suction chamber is mounted above the venturi, and the suction piston slides vertically within the suction chamber, changing the venturi opening area.

Venturi vacuum pressure operates on the upper surface of the suction piston through the suction port, and atmospheric pressure is applied to the bottom of the suction piston through the air hole from the air cleaner. The difference between the upper vacuum pressure and lower atmospheric pressure moves the suction piston up and down. The suction piston stops as a balanced condition exists between the pressure difference and the piston weight plus spring tension. The vacuum pressure is produced by the air flow velocity. For instance, when the throttle

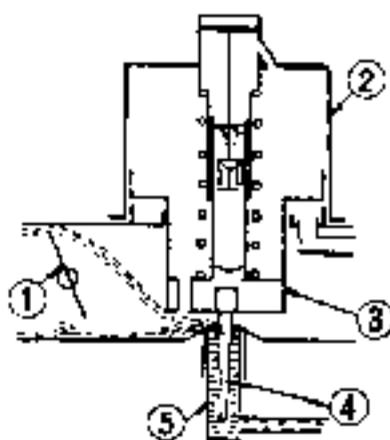
valve is opened by depressing the accelerator pedal, the flow velocity of the intake air increases. This also increases vacuum pressure in the venturi, and the suction piston is lifted until the piston is balanced, and the venturi opening area enlarges.

When the throttle valve is closed by releasing the accelerator pedal, the flow velocity of the engine intake air in the venturi is reversely decreased. The piston goes down and the venturi opening area becomes small. The intake air flow velocity recovers as the venturi opening decreases. The piston stops going down because of a balance between the upper and the lower forces operating the suction piston.

Thus, the opening area is adjusted automatically to keep the flow of the

intake air at constant velocity in the venturi. Consequently, the venturi opening is optimum for any engine operating conditions. In addition, the suction piston rod is equipped with an oil damper to prevent the piston rising quickly as a result of sharp throttle opening. As the plunger rod positioned in an oil well operates as a fluid brake on a rapidly rising stroke but exerts no restriction on its fall, it provides an approximate degree of enrichment for acceleration.

The oil reservoir in the suction piston rod which the oil damper plunger is equipped should be topped up to the level periodically every three months or 5,000 km (3,000 miles) with thin engine oil of preferably SAE 20 but not thicker than SAE 30.



- 1 Throttle valve
- 2 Suction chamber
- 3 Suction piston
- 4 Jet needle
- 5 Nozzle

Fig. EF-34 Idling

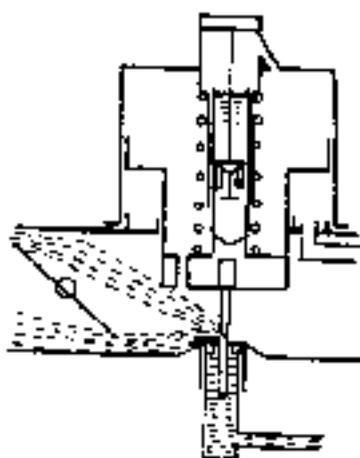


Fig. EF-35 Partial throttle

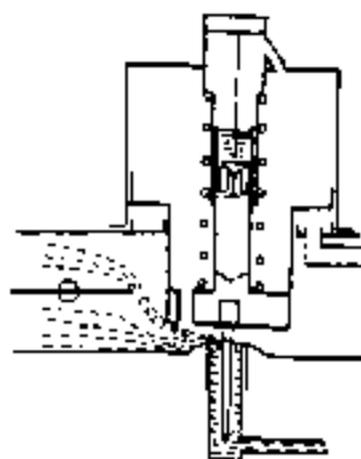


Fig. EF-36 Full throttle open (low speed)

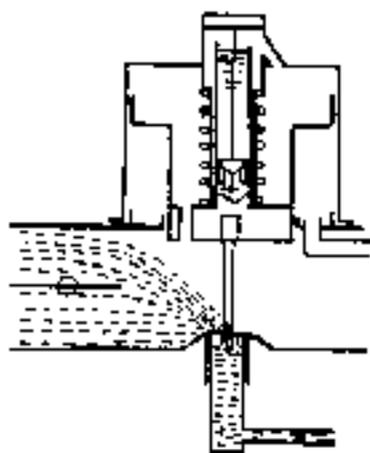


Fig. EF-37 Full throttle open (high speed)

engine speeds can be done by changing the nozzle opening. (Hence the term "Constant Vacuum" for this type of carburetorPat)

The suction piston rises or falls under the influence of engine suction controlled by the degree of throttle opening. Accordingly, nozzle opening (clearance between the nozzle and needle) changes, and optimum air-fuel mixture can be obtained for any engine speed.

The operating conditions of the variable venturi and fuel control are shown in figures EF 34 to 37.

When starting the engine, the nozzle is drawn down via a link mechanism by pulling the choke knob. As a result, the nozzle opening between the nozzle and jet needle is increased, and enriched fuel mixture required for starting is fed to the system.

Fuel control system

Fuel is sprayed into the venturi by intake air flow through the opening between

the nozzle and taper jet needle fixed into the suction piston. The static pressure at the nozzle of the venturi is almost constant so that fuel control for various

Furthermore, the throttle valve is set at the proper position for starting (approximately 6.5 degrees) by the linkage.

CONTROL AND ADJUSTMENT

Idling adjustment



Fig. EF-38 Idle adjust nut

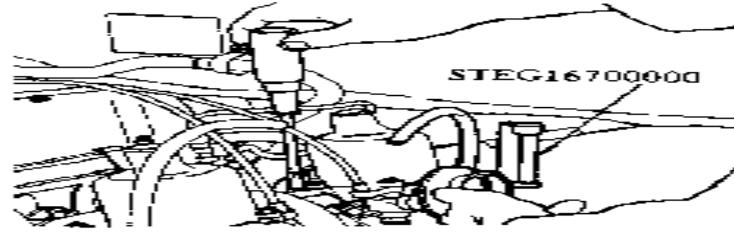


Fig. EF-39 Flow meter

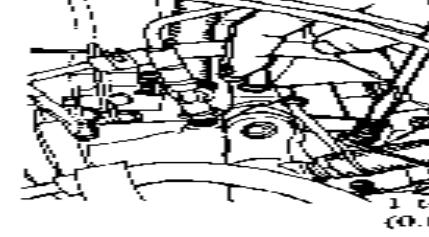


Fig. EF-40 Adjust fast id

The procedure for idling adjustment is described herein since proper idling adjustment of these two carburetors is extremely important in obtaining peak vehicle performance and in effectively

reducing fuel consumption.

It should also be noted that improper carburetor adjustment has an adverse affect not only upon idling but also upon

acceleration, output, fuel consumption, and other vehicle performance factors.

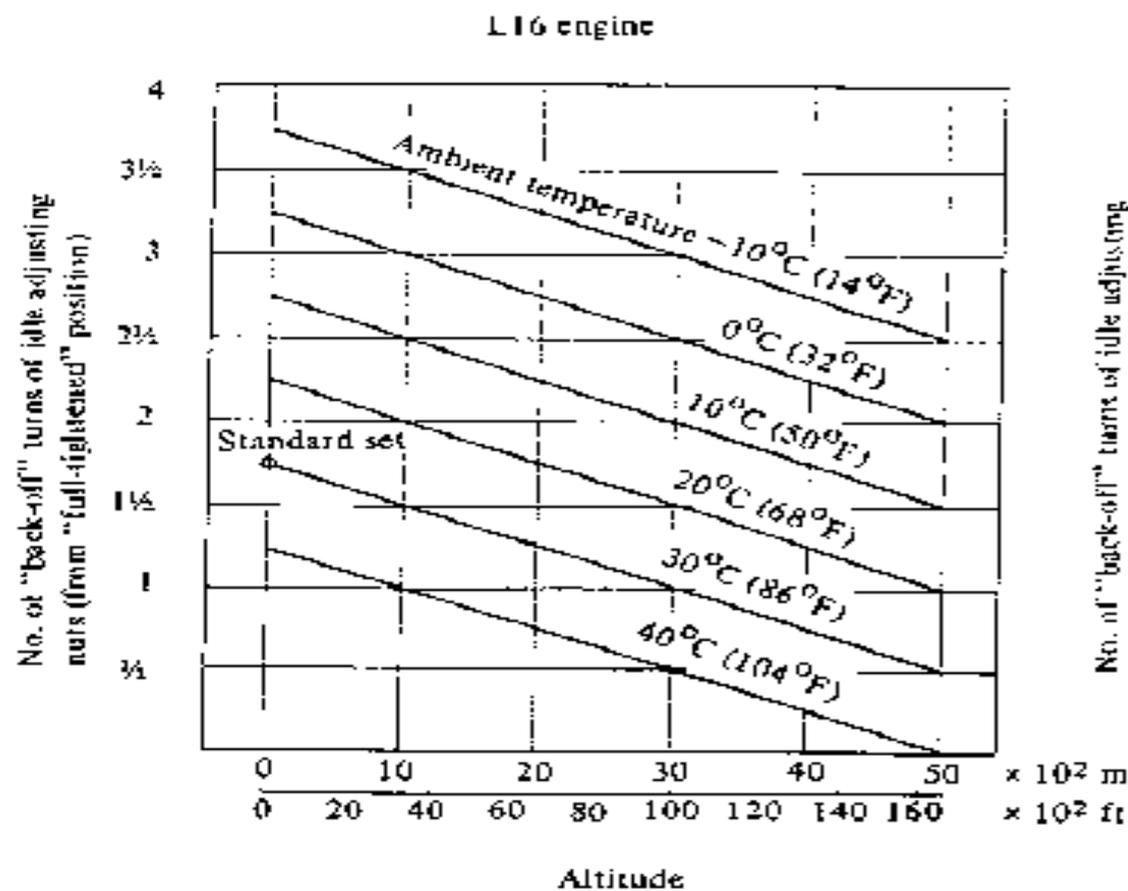


Fig. EF-41 Relationship between altitude and idle adjusting nut setting (L16 engine)

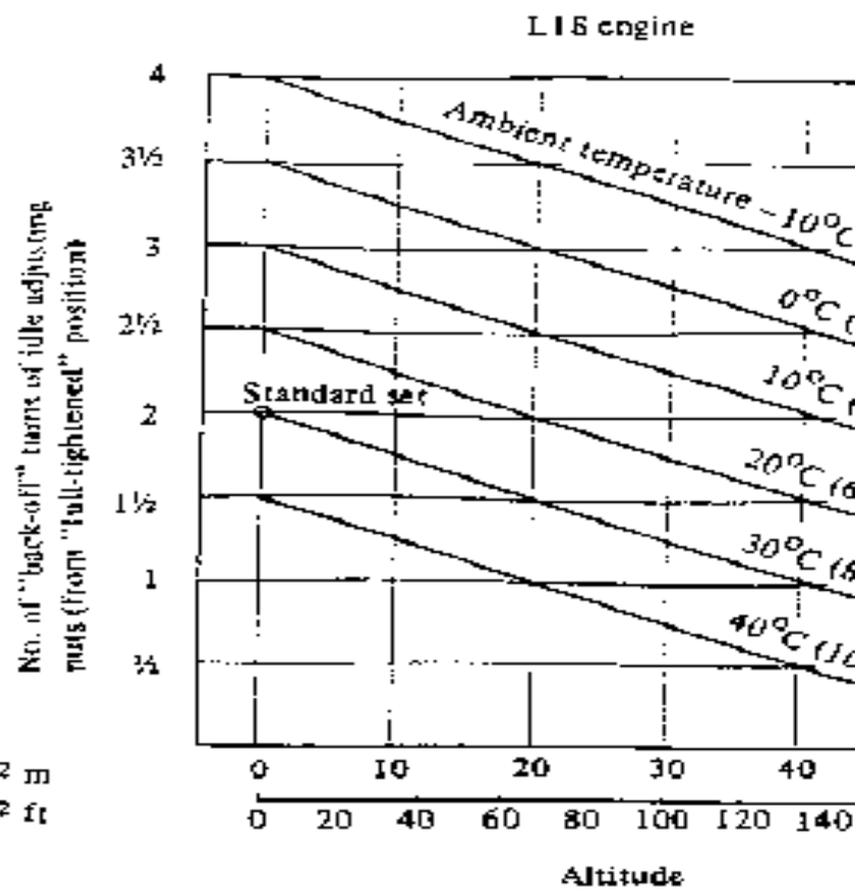


Fig. EF-42 Relationship between altitude and idle adjusting nut setting

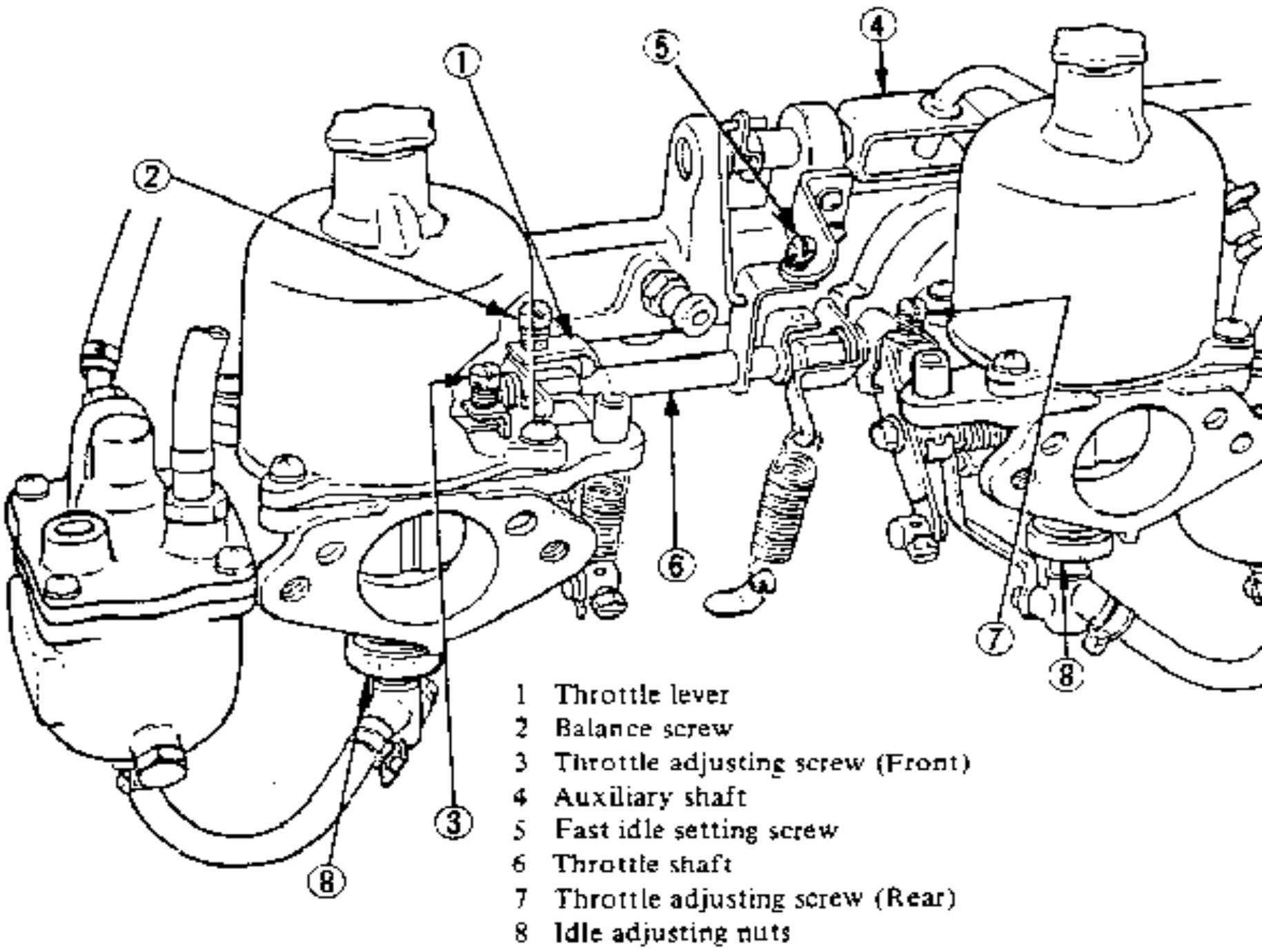
Altitude/Temperature/Idle setting Graphs

Throttle valve synchronization adjustment (using a flow meter) and idling adjustment

Operating procedure	Instructions
1. Remove air cleaner.	a. Warm up engine prior to adjustment, and fully return choke lever.

<p>2. Loosen both front and rear carburetor throttle adjusting screws, balance screw, and fast idling setting screw.</p>	<p>a. Make sure front and rear throttle shafts are not connected.</p>
<p>3. Tighten front and rear idle adjusting nuts all the way, and turn out as required according to outside temperatures and altitude. Refer to Figures EF-41 and 42..</p> <p>Note: Always turn in or out these nuts equally.</p>	<p>a. Determine best idling mixture by referring to Figures EF-41 and 42.</p> <p>b. Also refer to Figures EF-41 and 42, for altitude at which vehicle is to be operated.</p>
<p>4. Turn in front and rear throttle adjusting screws a few turns, and start engine.</p>	<p>a. Make sure that the engine is at normal operating temperature.</p>
<p>5. Turn in or out front and rear throttle adjusting screws and reduce the engine speed to 600 to 700 rpm.</p>	<p>a. Reduce engine speed to the extent that the engine operates stably.</p>
<p>6. Apply a flow meter to front carburetor air cleaner flange, turn in or out air flow adjusting screw, and align the upper end of the float in the glass tube to the scale.</p>	<p>a. Stand the flow meter float vertically.</p>
<p>7. Then apply the flow meter to rear carburetor air cleaner flange. (Do not move the flow meter air flow adjusting screw.) If the flow meter float is not aligned with the front carburetor scale, turn in or out rear carburetor throttle adjusting screw and align float with the front carburetor scale.</p>	<p>a. Match front and rear throttle valve openings.</p> <p>b. Throttle valve openings are even, and air flow is also uniform when the positions of the floats in the glass tubes of the flow meters stop at the same position for both front and rear carburetors.</p>
<p>8. Turn in or out front and rear idle adjusting nuts simultaneously by each 1/8 turn until the fastest and most stable engine speed is obtained.</p>	<p>a. Idling fuel flow quantity is reduced by tightening idle adjusting nut (turning it to the right) and is increased by loosening idle adjusting nut (turning it to the left).</p> <p>b. Front and rear idle adjusting nut adjusting positions (number of turns by which both nuts are backed off) must be the same.</p>
<p>9. Back off (loosen) front and rear throttle adjusting screws, and set engine speed to rated speed.</p>	<p>a. Repeat steps 6 and 7 above, and set engine speed to rated speed by adjusting front and rear carburetors so that the air flow of both front and rear carburetors is the same. Rated idling speeds of the L16 and L18 are as follows:</p> <p>Engine idle speed rpm: 650</p> <p>Standard vacuum at idle speed, mmHg/(inHg): 400(15.75) or above</p>
<p>10. Turn in balance screw until screw head contacts the throttle connecting lever.</p>	<p>a. Make sure that idling speed does not change.</p> <p>b. Adjust balance screw so that suction pistons act simultaneously.</p>
<p>11. Move throttle shaft, and rapidly accelerate the engine (race the engine) a few times. Make sure that idling speed does not change.</p>	<p>a. Make sure that adjustment is proper.</p>
<p>12. Turn fast idle setting screw to increase engine speed approximately 1,500 rpm., apply the flow meter to both front and rear carburetors, and verify that the flow meter float positions are even.</p> <p>If uneven, readjust balance screw.</p>	<p>a. Increase engine speed, and insure that the link interlock action operates properly.</p> <p>b. Readjust balance screw and match the air flow of front and rear carburetors.</p>
<p>13. Back off fast idle setting screw and decrease engine speed. After racing engine, apply the flow meter to front and rear carburetors, and re-confirm that the float positions are even. If uneven, adjust front and rear throttle adjusting screws so that engine speed does not change, and equalize the flow meter float positions. Then, repeat step 12.</p>	<p>a. Match the idling air flow of front and rear carburetors.</p> <p>b. Adjust idling speed.</p>
<p>14. Set throttle shaft so that throttle valve starts to open, and adjust the clearance at fast idling setting screw to 1 to 2 mm (0.0394 to 0.0787 in).</p>	<p>-----</p>
<p>15. Stop engine, and install air cleaner and duct.</p>	<p>-----</p>

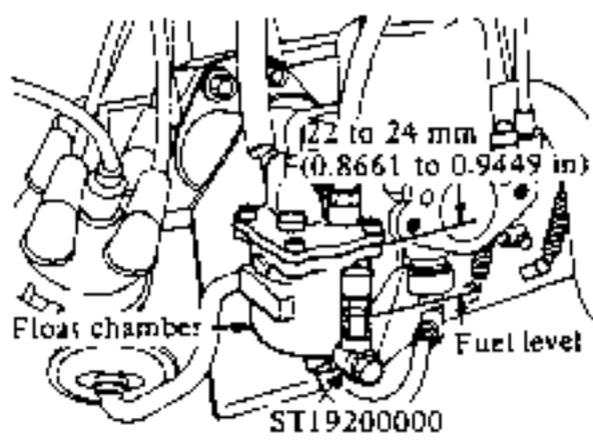
Throttle valve synchronization adjustment (using a flow meter) and idling adjustment



Inspection of float level

To measure the fuel level, take off drain plug and set special tool "Float level gauge ST19200000." Then, operate engine at idling speed.

If the fuel level indicated on glass tube is 22 to 24 mm (0.8661 to 0.9449 in) below the top of float chamber, the fuel level is proper.



Also, the float level gauge is marked with a standard fuel level.

If no gauge is available, check adjustment 4 in "Adjustment of float level" following.

EF044

Fig. EF-44 Checking float level

Adjustment of float level

If level of fuel in float chamber is found to be more or less specified tolerances, this must be corrected as follows:

1. Remove four set screws securing float chamber cover in place. Cover and float lever can then be taken out as a unit.

2. With float lever and cover assembled, hold them by hand, or on a work bench, horizontally, with back of float cover facing up.

3. Lift up float lever with your finger and then lower it slowly until lever seat contacts valve stem.

4. Adjustment is correct if dimension "H," Figure EF-45, is 11 to 12 mm (0.4331 to 0.4724 in). Adjustment can be made by bending float lever as required.

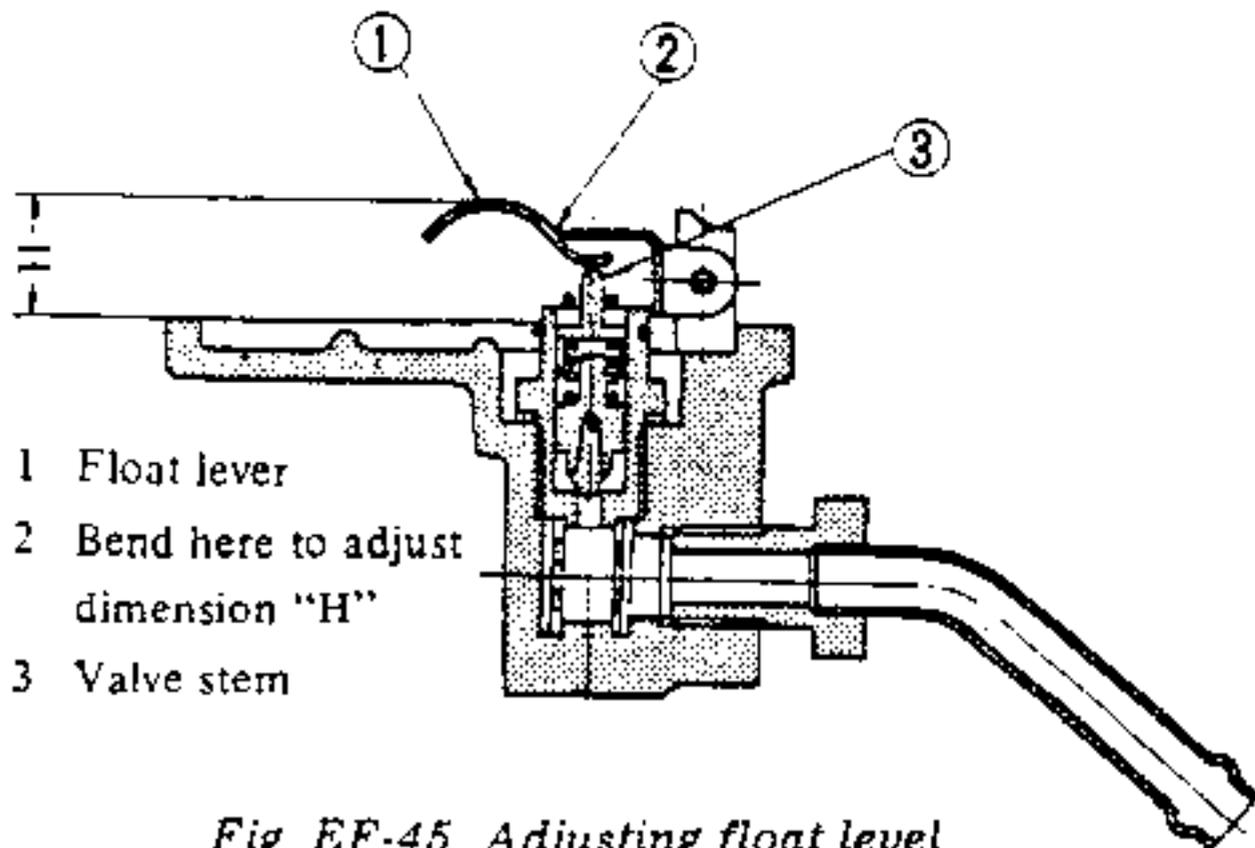


Fig. EF-45 Adjusting float level

Adjustment of starting interlock valve opening

Adjustment of throttle opening is made by changing the length of connecting rod with a suitable tool such as radio pinchers. Opening becomes greater when the length of rod is increased. Adjustment is correct if clearance between throttle valve and air horn is 0.6 mm (0.0236 in), distance "B" in Figure EF-46, with the choke lever held all the way out.

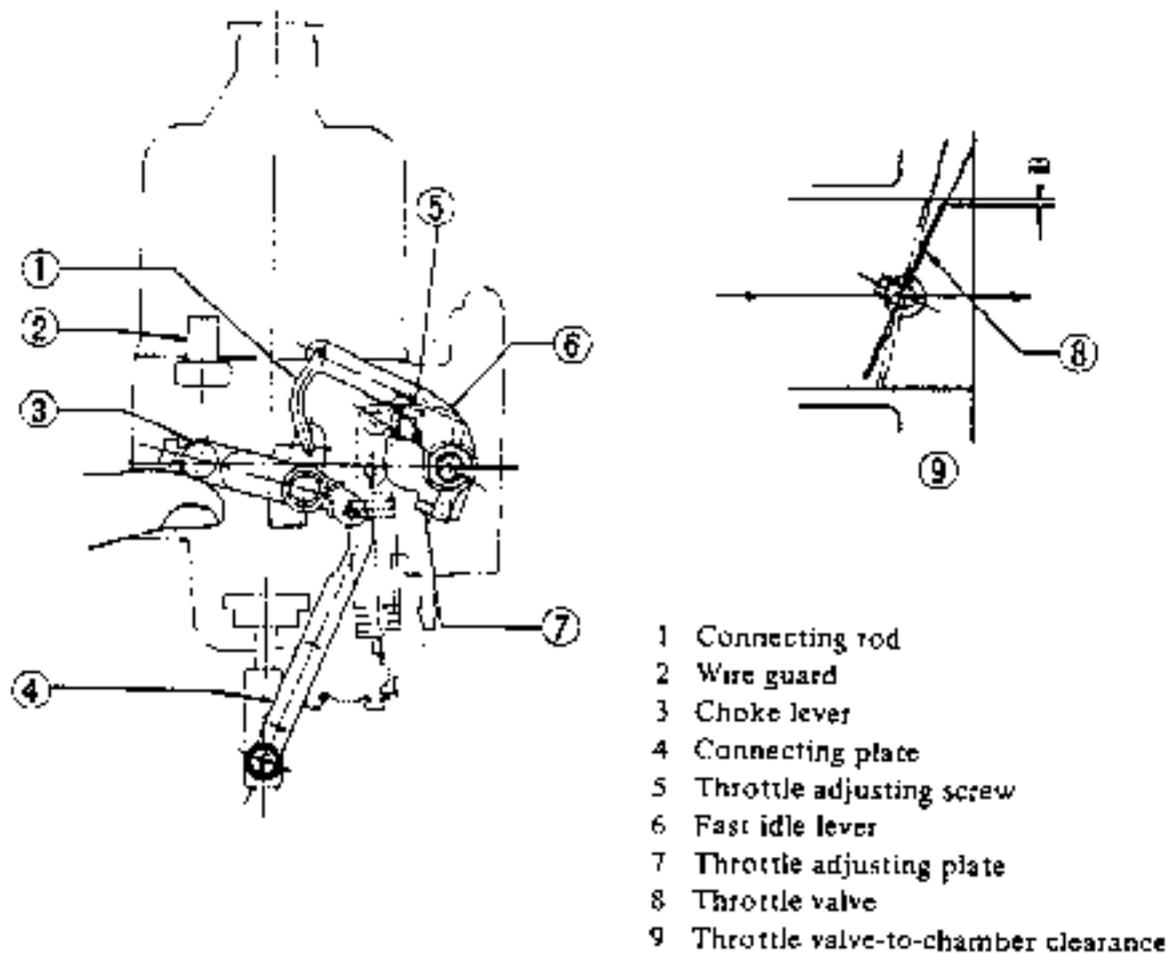


Fig. EF-46 Adjusting starting interlock opening

Checking damper oil

When there is not a sufficient amount of damper oil, acceleration and other operating performance features become sluggish. When new carburetors are installed on the engine, or when overhaul is performed, damper oil must be added without fail. Use engine oil (MS#20 or 10W-30) for damper oil. Do not use lower or higher weight oils.

Periodic inspection may vary depending

(3,000 miles) of driving (or approximately every 3 months).

To check damper oil level, remove oil cap nut as shown in Figure EF-48 and check oil level marking on the two grooves on plunger rod. No difficulty will be encountered and there is no danger until the oil level reaches the lower line. If the oil level drop below the lower line, add oil. Total oil volume is approximately 3 cc (0.18 cu in). Slowly fill damper with oil to upper line.

upon driving conditions. However, the damper oil should be checked approximately every 5,000 km

When removing and replacing

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oil cap nut, be careful not to bend rod. If oil cap nut is loose, it may fall off. Be sure that it is sufficiently tightened by hand.

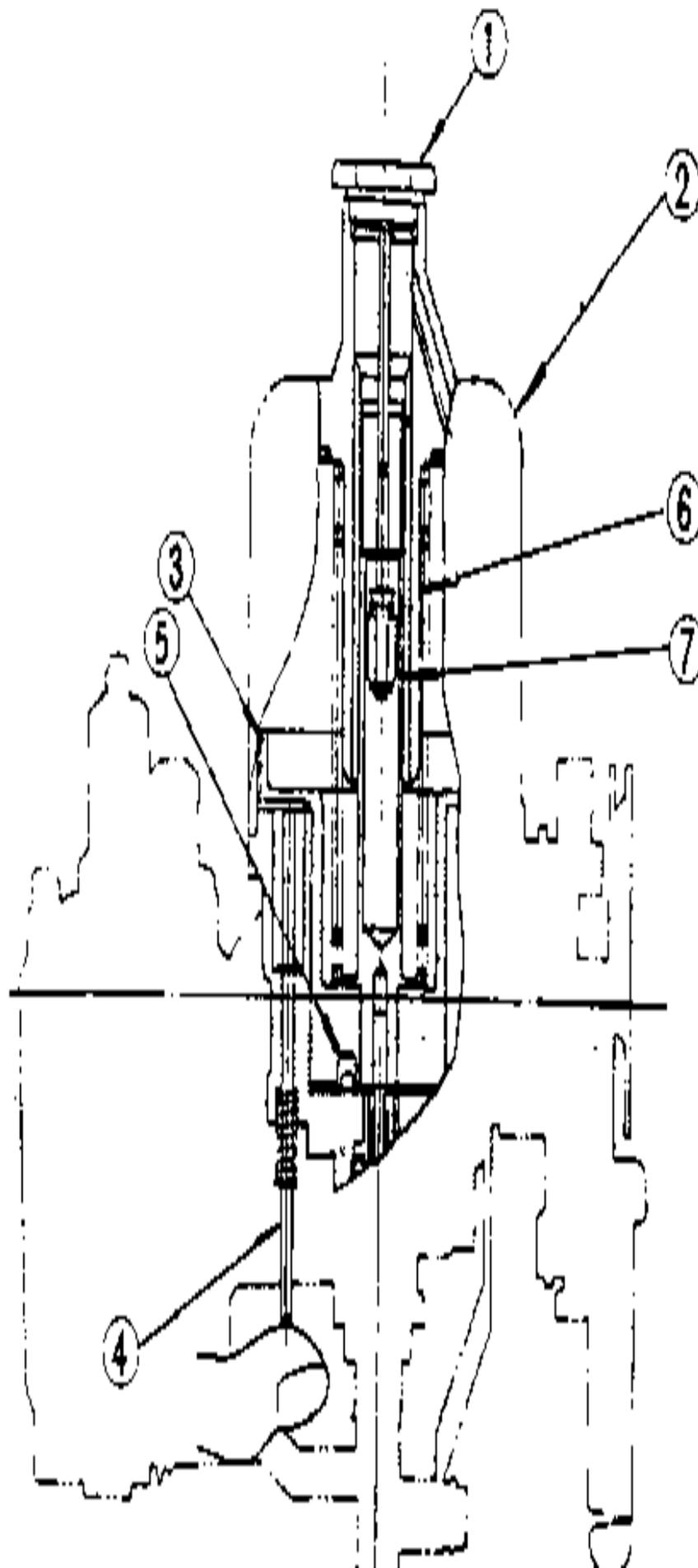
Periodic inspection of suction chamber and suction piston

Periodic inspection is required to constantly maintain suction chamber and suction piston in proper operating condition. This is due to the fact that dust in the air is drawn into chamber and accumulates on the sliding portion of suction piston.

Make sure that the suction piston operates smoothly being installed on the engine by proceeding as follows:

1. - First, remove oil cap nut.
2. Gradually raise lifter with your finger. Lifter head will contact suction piston when lifter has been raised approximately 1.5 mm (0.0591 in). Raise lifter further. Suction piston will then be raised approximately 8 mm (0.3150 in).
3. Release your finger from lifter. Suction piston will drop, and the sound of suction piston striking against venturi will be heard.

The conditions of piston and chamber are satisfactory if suction piston rises smoothly. The condition of the center ring described in the following paragraph "DISASSEMBLY AND ASSEMBLY" can also be checked in this manner.



To check the bend of plunger rod, remove air cleaners raise suction piston with your finger tip with oil cap nut applied to the assembly, and let piston drop freely. Suction piston will

offer strong resistance when lifted since oil damper is actuated. Under satisfactory

conditions, piston will drop smoothly when your finger is removed from suction piston.

DISASSEMBLY AND ASSEMBLY

Carburetor should not be disassembled unless absolutely necessary. When it must be disassembled, extra caution should be exercised to avoid damaging venturi and other components which consist of very high precision parts.

piston and suction chamber

1. Remove four set screws and take out suction chamber.
2. Remove suction spring, nylon packing and suction piston from suction chamber.
3. To remove these components, place suction chamber and suction piston on a work bench so that the inside of suction chamber and the sliding part of suction piston are not damaged. Be extremely careful not to bend jet needle on the lower part of suction piston. (See Figure EF-50.)
4. Do not remove jet needle from suction piston unless absolutely necessary. When it must be removed, first loosen jet needle set screw. To accomplish this, hold jet needle within 2 mm (0.0787 in) from the shoulder with a pair of pliers so as not to damage needle and remove needle by pulling and turning slowly so as not to bend needle.
5. Idling and other operating performance features will be adversely affected if jet needle is not installed correctly in suction piston. Set jet needle in suction piston so that the

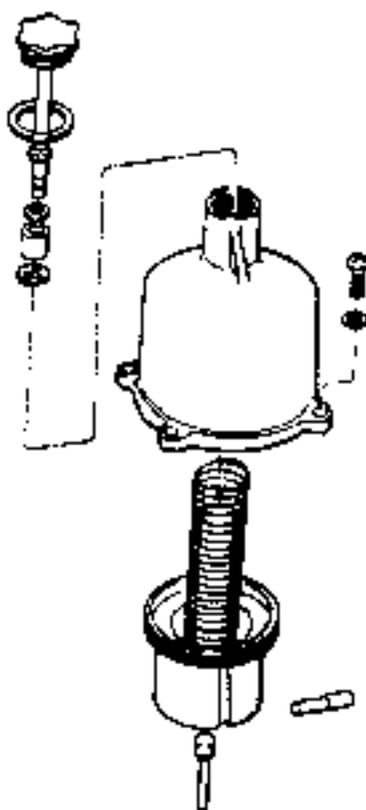
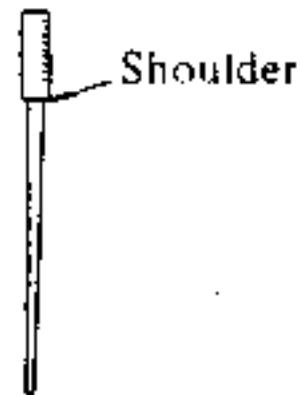


Fig. EF-49 Disassembling

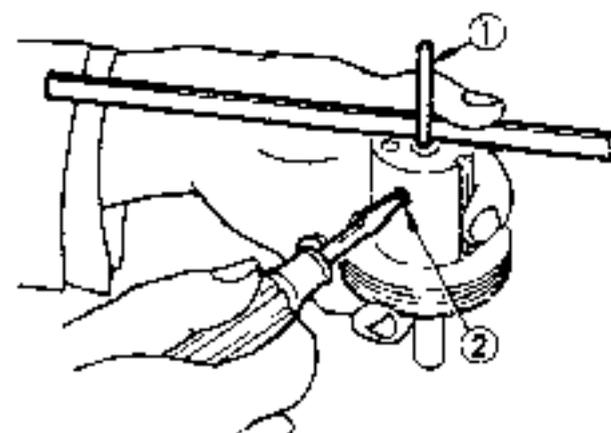
shoulder portion is flush with the bottom of suction piston. Apply an appropriate tool having a horizontal (flat) surface such as slide calipers to the lower end as shown in Figure EF-51, so that the shoulder of jet needle contacts the surface of tool, and tighten jet needle set screw. Jet needle will then be installed correctly.

6. Wash suction chamber and suction piston with clean solvent and dry with compressed air so as to remove all dust



EF050

Fig. EF-50 Jet needle



- 1 Jet needle
- 2 Jet needle set screw

Fig. EF-51 Installing jet needle

oil, etc. from piston and chamber.

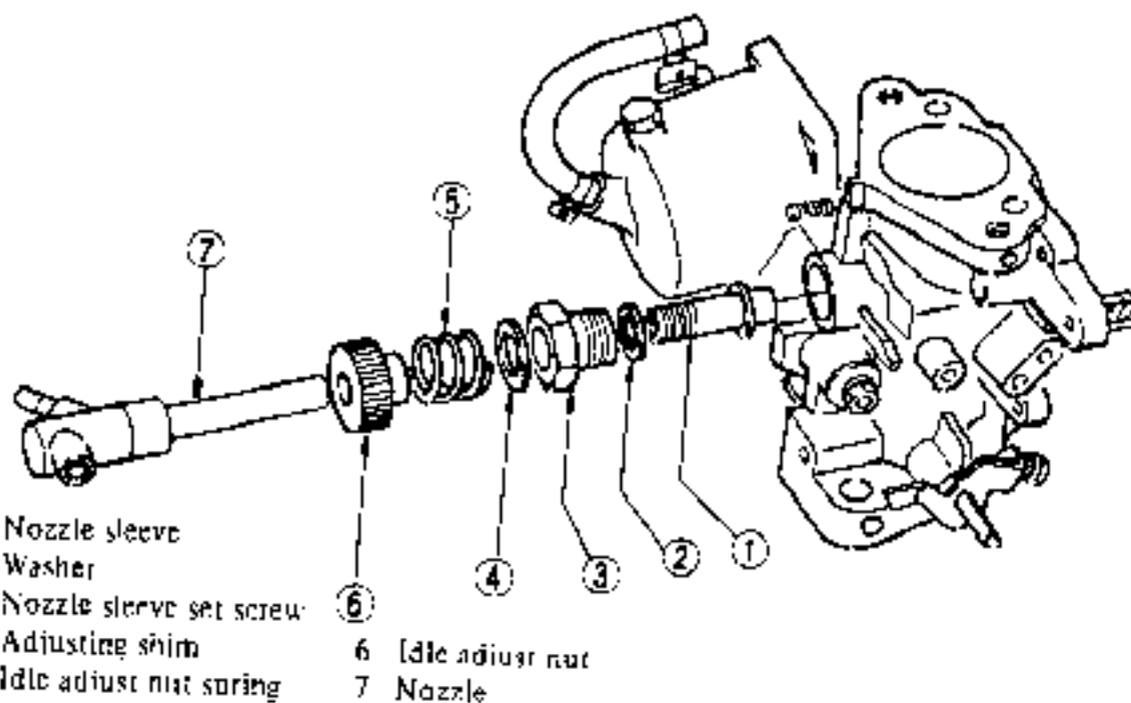
7. Then apply a few drops of light oil to suction piston rod and reassemble. Under no circumstances should oil be applied to the inside suction chamber or to the large end of suction piston since this may cause trouble and result in improper or defective operation.

Disassembly and assembly of nozzle

1. Disassembly

Nozzle can be easily removed. However, unless absolutely necessary, do not disassemble nozzle since reassembly of nozzle sleeve, washer, and nozzle sleeve set screw is extremely difficult.

(1) First, remove the 4 mm (0.1575 in) diameter screw, and then remove connecting plate from nozzle head. This can be done easily by pulling lightly on starter lever.



- 1 Nozzle sleeve
- 2 Washer
- 3 Nozzle sleeve set screw
- 4 Adjusting shim
- 5 Idle adjust nut spring
- 6 Idle adjust nut
- 7 Nozzle

Fig. EF-52 Disassembling nozzle

Next, loosen clip, and remove fuel line. Nozzle can then be removed. When nozzle is removed, jet needle will remain inside. Thus, be careful not to damage either jet needle or nozzle and not to bend

and idle adjusting spring.

(3) Nozzle sleeve can be removed by removing nozzle sleeve set screw. (Do not disassemble unless absolutely necessary.)

Nozzle jet is the heart of carburetor and is a high precision component. Clean nozzle with solvent and dry with compressed air.

jet needle.

Exploded view of disassembled parts is shown in Figure EF-52.

(2) Next, remove idle adjusting nut

2. Assembly

(1) For centering piston and suction chamber, remove oil cap nut with parts properly assembled (jet needle and suction piston assembled) without damper oil applied.

(2) Assemble nozzle sleeve, washer, nozzle sleeve set screw by tightening nozzle sleeve set screw temporarily.

(3) Set suction piston to its fully closed position, and insert nozzle until it contacts nozzle sleeve.

(4) When nozzle jet contacts with jet needle, move nozzle sleeve slightly so that it is at right angle to center axis,

and position nozzle Sleeve so that nozzle jet does not contact with jet needle.

(5) Without disturbing the above setting, raise suction piston with your finger, and lower it slowly. If suction piston drops smoothly until suction Piston stop pin drops on venturi, making a light striking sound, the condition of piston is satisfactory. Securely tighten nozzle sleeve at this position with nozzle sleeve set screw.

(6) Remove nozzle, install idle adjusting, spring, and idle adjusting nut on nozzle sleeve, and reinstall nozzle. Connect fuel line leading to float chamber to nozzle nipple, and tighten

clip fully.

Note: Exercise care not to twist fuel line.

(7) With choke lever lightly pulled out, place connecting plate between 4 mm (0.1575 in) washer and sleeve collar 4 mm (0.1575 in); fasten plate to nozzle head by means of screws, 4 mm (0.1575 in). In installing plate, check to be certain that collar is installed in hole in plate by moving choke lever as necessary.

(8) After the above steps have been completed, again check to be sure that suction piston lowers freely without binding.

Disassembly of float chamber

To disassemble, follow steps given under "CONTROL AND ADJUSTMENT - Adjustment of float level".

Disassembly of link and related components

In disassembling and reassembling interlock link and related components, be careful not to bend or deform any of components.

Before disassembly, mark links and levers so that they can be placed back to their original parts or locations from which they were removed.

After assembly, check to be sure that they operate smoothly.

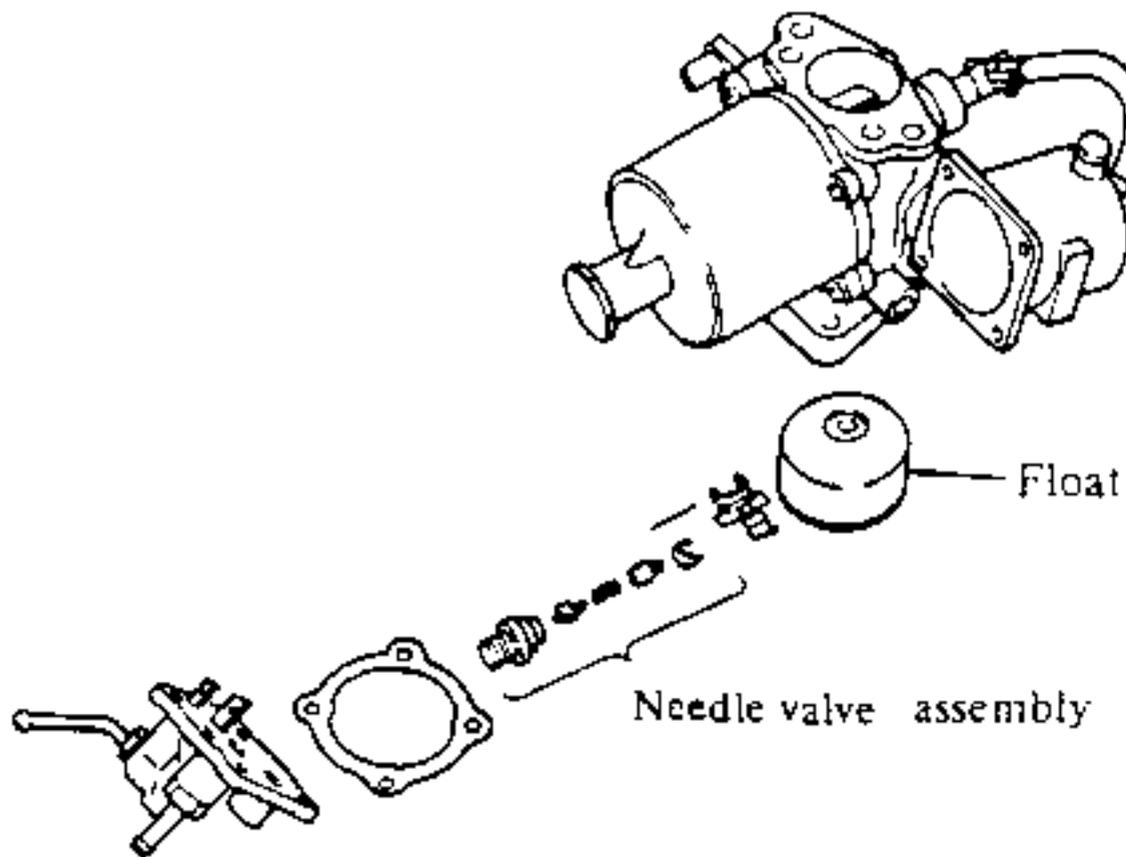


Fig. EF-53 Disassembling float chamber

Specifications

Item	Carburetor Model		
	HJL38W6	HJB38W	HJG46W
Applied engine (car)	L16 & L18 (510)	R (SPL311-1600)	U20 (SRL311-2000)

Bore, mm (in)	38 (1.4961)	38 (1.4961)	46 (1.8111)
Piston lift, mm (in)	29 (1.1417)		
Jet needle	M-76		
Nozzle jet dia., mm (in)	2.34 dia. (0.092 1)		
Suction spring	#23		
Float chamber needle valve, inner dia., mm (in)	1.5 dia. (0.059 1)		
Float level, mm (in)	23 (0.9055)		
Float venting	Inner vent type		
Fuel pressure, kg/sq cm (lb/sq in)	0.24 (3.4140)		
Throttle clearance at full throttle, mm (in)	0.6 (0.0236)		
Position at full throttle	6.5 degrees		

TROUBLE DIAGNOSES AND CORRECTIONS

The causes of trouble and appropriate corrective actions are shown on TABLE to permit immediate repair of carburetor in the event carburetor trouble develops.

Improper engine operation can be attributed to many different causes. Although carburetor may be normal, if the electrical system is defective, the cause of trouble sometimes may seem to be in carburetor. If engine does not operate satisfactorily, first check electrical system before attempting to adjust carburetor.

Condition	Probable cause	Corrective action
Overflow	Leakage from float, or float bent or damaged.	Replace float.
	Dirty needle valve seat.	Clean valve seat.
	Loose needle valve.	Retighten.
	Defective needle valve seat.	Refit or replace.
	Excessive fuel pump pressure.	Repair pump.
	Fuel pump drawing in air.	Repair pump.
Excessive fuel consumption	Overflow.	Described above.
	Faulty suction piston operation.	Described below.
	Defective nozzle return.	Readjust.
	Worn jet needle.	Replace.
	Worn nozzle jet.	Replace.
	Improper idling adjustment.	Readjust.
	Jet needle not properly installed.	Readjust.
	Improper throttle valve interlock adjustment.	Readjust.
Insufficient output	Throttle valve does not open fully.	Readjust.
	Faulty suction piston operation.	Described below.

	Defective nozzle return.	Readjust.
	Nozzle or fuel line clogged.	Clean.
	Jet needle not properly installed.	Readjust.
	Needle valve clogged.	Clean.
	Defective fuel pump.	Readjust.
Improper idling	Faulty suction piston operation.	Described below.
	Defective nozzle return.	Readjust.
	Worn jet needle.	Replace.
	Improper idle adjusting nut adjustment.	Readjust.
	Worn throttle valve shaft.	Replace.
	Air leakage due to defective packing between manifold and carburetor.	Replace gasket.
	Improper throttle valve interlock adjustment.	Readjust.
	Loose throttle lever interlock link.	Readjust or repair.
Engine operation is irregular or erratic	Defective suction piston.	Described below.
	Insufficient damper oil or improper oil used.	Replenish or replace.
	Improper idling adjustment.	Readjust.
	Jet needle not properly installed.	Readjust.
Engine does not start.	Overflow.	Described above.
	No fuel fed to the engine.	Check pump, fuel line. and needle valve.
	Improper idling adjustment.	Readjust.
	Defective suction piston.	Described below.
Faulty suction piston operation	Sticking due to dirt and other foreign matter.	Clean.
	Sticking due to deformation (bulging or caving) of suction chamber or suction piston.	Repair or replace.
	Nozzle not properly centered.	Correct.
	Bent jet needle.	Replace.
	Bent plunger rod.	Correct.

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