

The electric pump must produce a pressure of minimum 0,2 bar (3 psi), and together with the pneumatic pump max. 0,5 bar (7 psi) resp. max. 0, 4 bar (6 psi) in case of a diaphragm carburetor, and must allow free flow-through, even when switched off.

A suitable fuel filter of 0,15 mm mesh size must be fitted between pump and carburetor. Do not use paper filters. The fuel tank must have a drain cock for condensed water. A screen of 0,3 mm mesh size should be fitted to the fuel line in the tank. Never restrict the normal fuel flow.

The fuel lines and impulse line must be of a type to comply with national regulations. The minimum diameter is 5 mm (0,2 in.).

If the fuel tank is placed higher than the carburetor, the tank connection must have a fuel cock (with filter) to shut off the fuel supply when the engine is not running.

▲ **WARNING:** The carburetor needle valve is not sufficiently tight to seal for a prolonged period of time and during transport.

National regulations may require a fuel cock to be fitted even if the fuel tank is below the carburetor.

The carburetor needle valve is not to be used as a fuel cock.

16) Carburetor

The carburetor can be adjusted by jet replacement of various approved sizes, and by adjusting idle air/fuel mixture screw, carb piston stop adjustment, needle sizes, and needle position.

The air/fuel mixture at idle speed is adjusted by the air adjusting screw. The idle r.p.m. is adjusted by the carburetor piston adjustment screw.

◆ NOTE: These idle adjustments interact, so adjusting one may require minor adjustment of the other.

◆ NOTE: On single carb engines, the carburetor must be in an exact right angle position in relation to the crankshaft in both views from top and from the intake side to ensure an equal mixture distribution to both cylinders (see ill. below).

Replacement of parts should be done only after proper trouble shooting has been carried out and then, by an experienced two cycle mechanic.

Ensure that throttle cable and linkage do not stick and that carb piston valve can be fully opened and closed. Minor cable backlash can be adjusted at cable adjustment screw and lock nut.

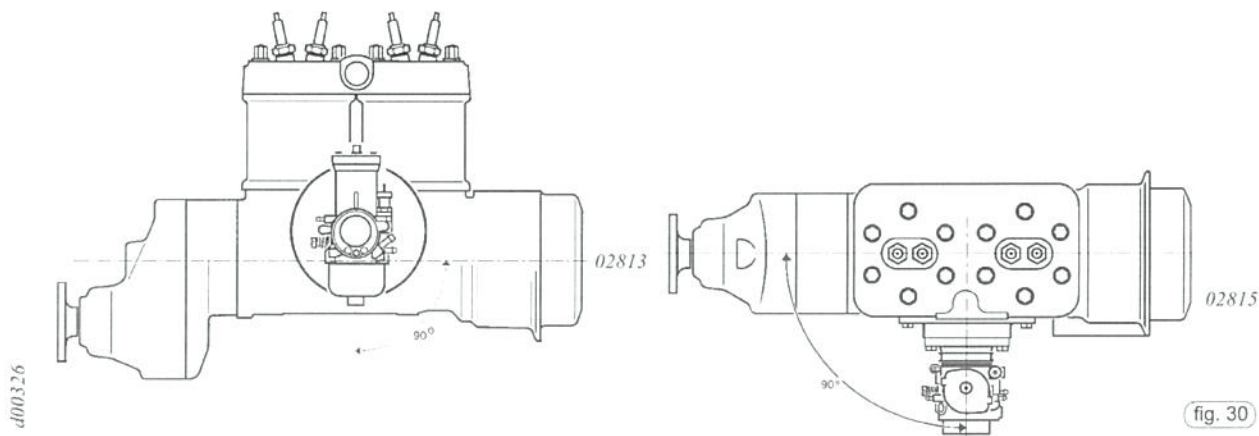
Be certain that throttle linkage is not affected by engine or airframe movement. This will change throttle settings.

Air intake filtration and/or noise reduction devices must be in place for proper carburation. See section on special operating conditions.

Special operating conditions, such as severe climate or altitude change may require different jetting. Contact your dealer.

In no case should jet changes be made by unqualified persons or those who do not have ROTAX technical information to do so.

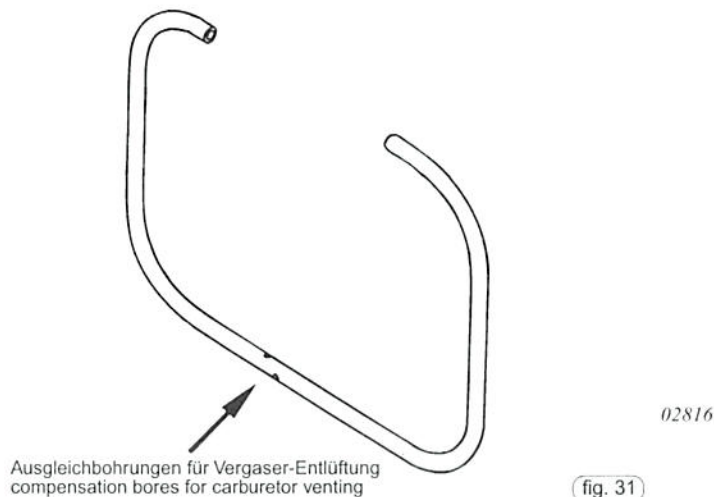
▲ WARNING: All parts liable to become loose have to be secured.



16.1) Carburetor air intake

The carburetor air intake must be protected against the ingestion of water, dirt and foreign material. Use a Rotax approved air filter. Avoid paper, foam and synthetic material types that absorb water.

Equal air pressure conditions must prevail in the vicinity of the carburetor air intake and the carburetor float chamber vent pipes (i.e. the pressure must not be influenced by the propeller air stream).



If necessary, the carburetor intake should be shielded against effects of the slipstream by a sheetmetal shield or air intake box, and the carburetor vent pipes should be routed to a calm air zone or connected to a vent chamber (see sketch below).

Engines supplied with an intake silencer must not be operated without it unless the carburetor calibration has been altered. Consult the engine supplier or manufacturer (in writing) for details. The correct carburetor calibration is also described in the parts list.

If the aircraft is to be operated in climatic conditions where carburetor icing is likely to occur, a heating system must be fitted.

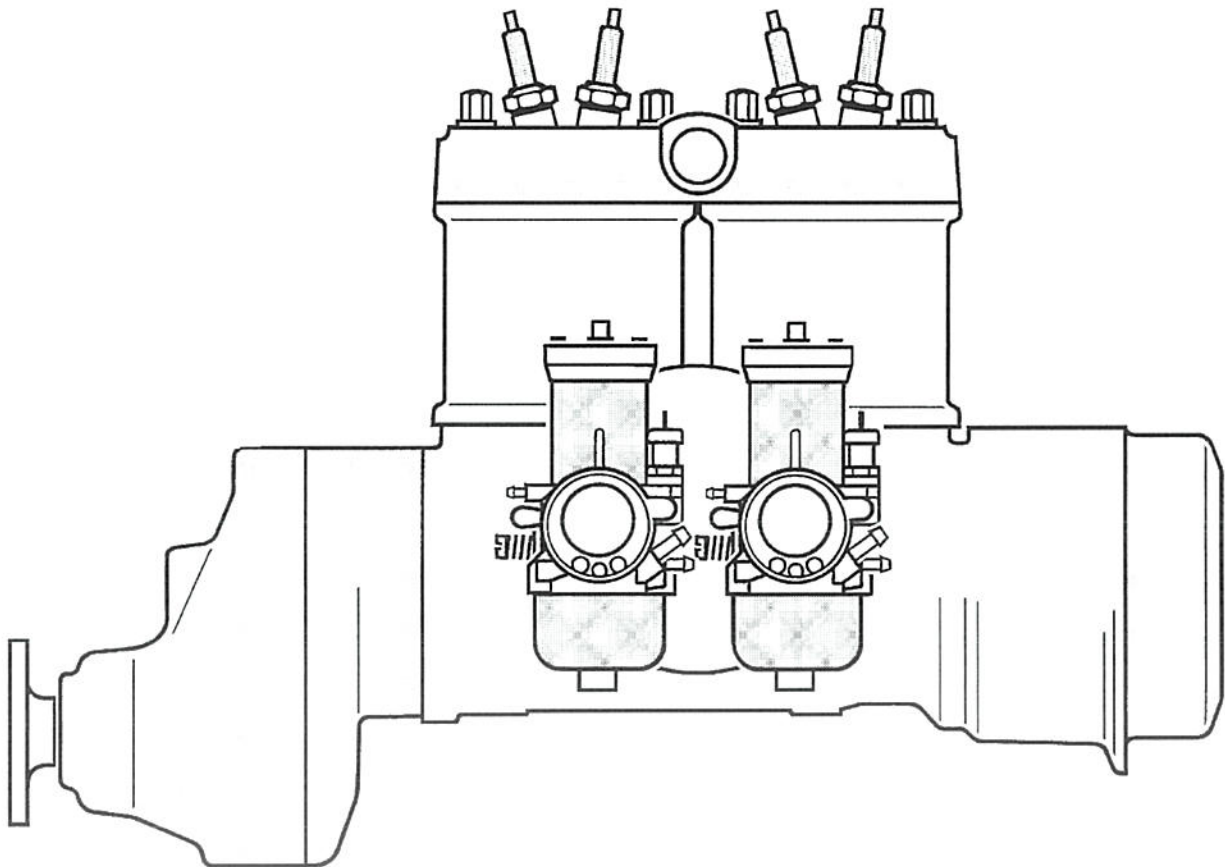
No modifications should be made to the carburetor and air intake system without consulting the engine manufacturer (in writing).



ROTAX®

Repair Manual

***for engine type
462 - 532 - 582 UL***



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recommended
price:

ATS 900,-

FOR INFORMATION ONLY.
WITHOUT COMMITMENT TO ADVISE MODIFICATIONS.

Part no: 899 081

The BING carburetor type 54 comprises a cross-draught slide carburetor with part load needle jet control, idling system and starting carburetor.

7.15.1) Attachment:

The carburetor is attached to the engine by a flexible socket pushed over the carburetor housing (43 Ø) and secured by a hose clamp. The carburetor is furnished with intake end of 52 Ø, c. 16 mm long, for connection of air filter or intake silencer.

7.15.2) Fuel intake control:

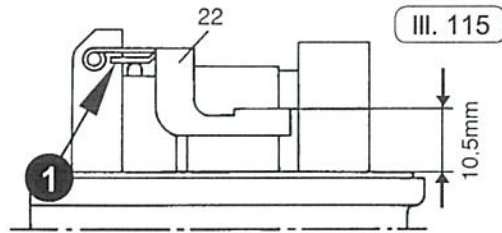
The float system 21 of the carburetor consists of 2 plastic float elements operating on a metal hinge. The floats are arranged each side of the carburetor venturi so that the carburetor can be tilted very far in all directions without impairing operation. The object of the float is to maintain the fuel level in the float chamber 25 constant.

When the fuel has reached a specified level in the float chamber, the floats lift the hinge mounted on pin 23 until the float needle 19 is pressed against the seat of the float needle valve, thus preventing any further supply of fuel. When the engine draws fuel from the carburetor, the level in the float chamber 25 drops and so does the float. The float needle opens the valve again and allows fuel to flow in from the tank.

The float needle valve regulates the fuel supply in conjunction with the floats, but it may not act as a positive stop valve when the engine is at a standstill. Minute foreign bodies may be deposited between the valve seat and the needle tip, thus preventing complete closure of the valve. When stopping the engine, therefore, the fuel cock on the tank should always be closed. A must, if the tank is located above the carburetor, but also recommended with the fuel tank in lower than carburetor position. In addition the fuel should be filtered before it reaches the carburetor. The filter should be selected so that foreign bodies greater than 0,1 mm are filtered out and the fuel supply is not impeded to too great an extent.

The float needle 19 contains a spring-loaded plunger which contacts the float hinge. This absorbs vibrations of the float 21. In addition the float needle 19 is connected to the float hinge by the retaining spring 20 to prevent it from moving between hinge and valve seat and thus reducing the fuel supply. Spring and retaining guide make a considerable contribution towards keeping the fuel level in the float chamber constant.

When fitting a new float valve, set the float hinge 22 parallel to float chamber by bending the hinge lobe accordingly 1. With the hinge parallel, the dimension shown, should be appr. 10,5 mm.



The float chamber 25 is secured to the carburetor housing by a spring clip 26. A seal 24 is provided between float chamber and carburetor housing. The space above the fuel level is connected to atmosphere by two ducts. If these ducts are blocked, an air cushion forms above the fuel level. The fuel will not lift the float sufficiently to close the needle valve, and the carburetor overflows.

The vent duct openings to atmosphere are provided with a hose 31 which prevents ingress of dust and water into the carburetor. Velocity pressure must never act upon venting ducts as it would influence pressure in float chamber, and therefore affect the air/fuel mixture.

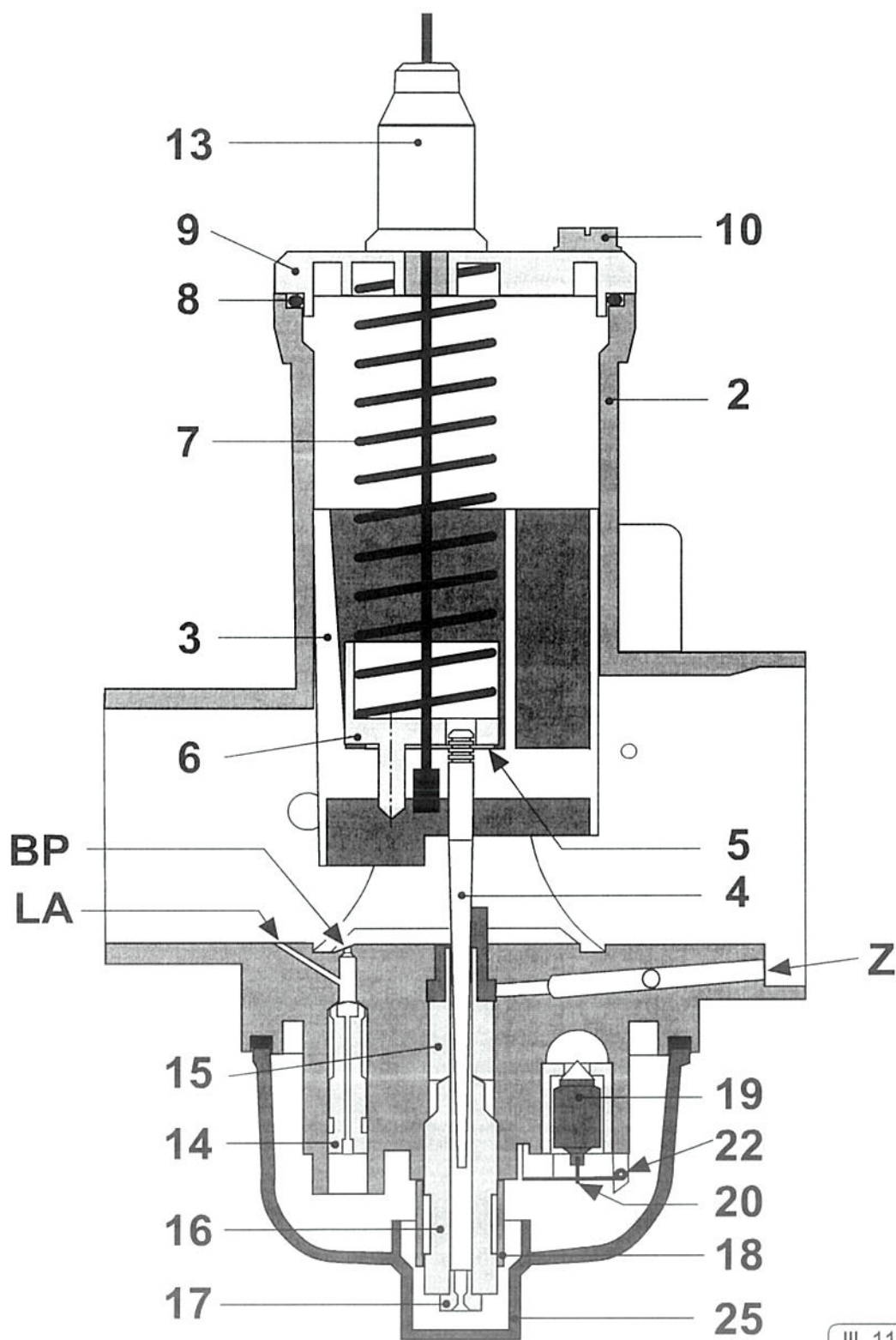
7.15.3) Main regulating system:

The amount of mixture drawn in by the engine and thus its performance is determined by the cross-sectional area of the venturi which is opened up by the throttle slide 3. This slide is lifted by a Bowden cable against the action of a return spring 7. The air flow produces a vacuum in the carburetor venturi which draws fuel from the float chamber through the jet system. On its way from the float chamber to the venturi the fuel passes through the main jet 17, mixing tube 16 and the needle jet 15; as it leaves the needle jet it is pre-mixed with air which is brought in from the filter connection via an air duct (Z) and the atomizer in an annular flow around the needle jet.

This air flow assists the atomizing process to form minute fuel droplets and thus favourably affects the fuel distribution in the intake manifold and combustion in the engine.

In the part-load range, in other words when the throttle slide is between one and three-quarters of its full stroke, less fuel is required than at full throttle. The fuel supply to the venturi is therefore reduced by a jet needle 4 which is connected with the throttle slide 3 and moves in the needle jet 15. Depending on the dimension of the taper of the jet needle, the annular gap between jet needle and needle jet is enlarged or decreased. For fine-adjustment the jet needle may be located in the throttle slide in various positions (needle positions) which, similarly to the taper, affect the amount of fuel drawn in.

7.15.4) Sectional view of Bing-double float carburetor:



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For example, a higher needle position results in a larger annular cross-section in the needle jet which allows more fuel to pass through and vice versa. For example, "needle position 2" means that the jet needle has been suspended from the spring retainer ⑤ with the second notch from the top.

When the throttle slide opening is reduced further, the amount of fuel supplied is affected also by the shape of the throttle slide at the lower end. With increasing height the cylindrical recess called air cushion results in the mixture becoming leaner. The recess on the filter side called "cut-away" has a similar effect but this extends up to a greater slide stroke.

The carburetor is adjusted using main jets and needle jets of various sizes and also atomizers, gas slides and jet needles of various types.

The jet needle ④ is located in the throttle slide ③ by the retainer ⑤. The slide spring ⑦ is located in a cup ⑥ in the throttle slide ③ in such a way that the retainer ⑤ is secured. In addition the pin at the lower end of the spring cup ⑥ provides a locking effect for the Bowden cable attachment hole in the throttle slide. A guide piece (no spare part) locates the throttle slide in the carburetor housing the correct way round.

The throttle slide movement is limited at the top by a sealing ring ⑧ and the cover plate ⑨ which is secured by two screws ⑩. The Bowden cable play is adjusted by means of an adjusting screw ⑫ and a lock nut ⑪. During idling the cable play should be at least 1 mm. The rubber bush ⑬ provides a seal between adjusting screw ⑫ and Bowden cable.

The main jet ⑰ is surrounded by a strainer ⑱. In particularly severe operating conditions this ensures that the fuel is not spun away from the main jet. The strainer does not act as a filter!

7.16.1) Mechanical synchronization:

Turn back adjustment screw ⑩ on both carbs, so that throttle slide ③ closes completely. After that turn in again adjustment screw, until it just touches the slide. From this basic position, turn adjustment screw on both carbs till reaching the idle speed wanted.

To adjust the idle air mixture screws proceed as above. Turn in resp. out until the max. idle r.p.m. is reached. Subsequently, adjust Bowden cables for simultaneous opening of the throttles, but always maintain a minimum clearance of 1 mm.

7.17) Matching of the carburetor to specific climatic conditions:

(valid for BING carburetors only)

Carb calibration was carried out conscientiously at ROTAX for the prevailing ambient conditions there. Density of the air decreases with decline of atmospheric pressure and rise of temperature. With engine operation at higher altitude, the weight of the aspirated air decreases, whereas the quantity of fuel consumed remains practically unchanged. This results generally in richer fuel/air mixture than with operation at lower altitudes.

It is advisable to match carb calibration according to engine reaction, for operation in higher altitudes, to re-establish the original composition of the fuel/air mixture.

◆ NOTE: With flying in higher altitudes at lower atmospheric pressure, the portion of oxygen in the air is reduced, too, resulting in loss of performance. This drop of performance cannot be compensated by matching the carb calibration. To match the carb to changes of atmospheric conditions a change of the main jet is generally sufficient.

		Altitude of base (metres above M.S.L.)								
		0	500	1000	1500	2000	2500	3000	3500	4000
ambient temp. on airfield (°C)	-30	104	103	101	100	98	97	95	94	93
	-20	103	102	100	99	97	96	95	93	92
	-10	102	101	99	98	96	95	94	92	91
	0	101	100	98	97	95	94	93	91	90
	+10	100	99	97	96	95	93	92	91	89
	+15	100	99	97	96	94	93	92	90	89
	+20	100	98	97	95	94	93	91	90	88
	+30	99	97	96	94	93	92	90	89	88
	+40	98	96	95	94	92	91	90	88	87
	+50	97	96	94	93	92	90	89	88	86

Find standard calibration as listed in spare parts list or from your local Rotax dealer. Only in special cases a change of jet needle and needle jet and/or a different idle jet will be necessary, too.

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Determination of jet size D_2 , for a specific altitude of operation, based on the jet size D_1 of a standard calibration:

$$D_2 = \frac{d_2 \times D_1}{d_1}$$

Find correction factor d_1 (standard calibration) and d_2 (base of operation) in the stated table.

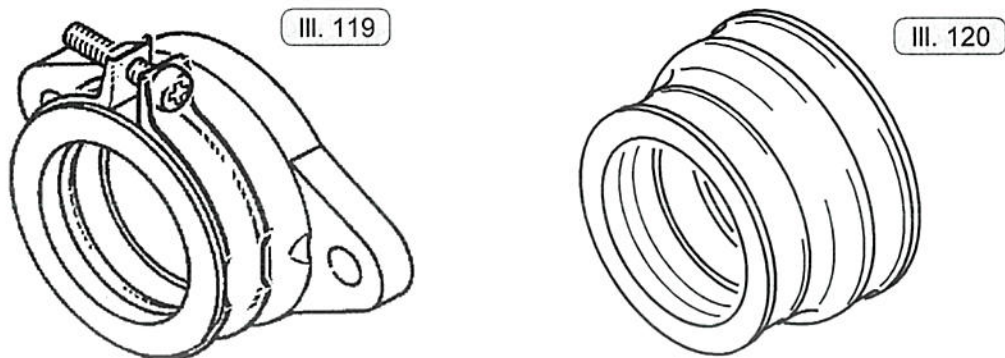
Example: An engine optimally calibrated with main jet 150 at an ambient temperature of 20°C at c. 500 m above sea level should be calibrated for operation on 2500 m above sea level at a temperature of 0°C:

$$D_2 = \frac{d_2 \times D_1}{d_1} = \frac{94 \times 150}{98} = \underline{144}$$

Operation with a main jet of 144 would result in the same composition of the fuel/air mixture.

7.18) Rubber carburetor-adaptor:

Two types of carburetor adaptors are used. The regular one is with a flange, connected by 2 hex. hd. screws with washer. On type 582, version with fresh oil lubrication, a rubber adaptor with hose clamp is used.



The carburetor adaptor has to meet high demands due to exposure to fuels, oils, different temperatures and solar radiation. Therefore check carburetor adaptors thoroughly for tightness, cracks, cuts or other physical damage. Squeezing the rubber body helps to detect beginnings of cracks.

At the slightest signs of damage exchange carburetor adaptor. Otherwise pressure conditions in carburetor will be changed, additional air will be taken in, possibly leading to engine damage. To attach carburetor, use clamps without sharp edges, only.

Carburetor has to be checked and adjusted after every 25 hours of operation. Badly adjustable idling on a carburetor could be caused by a damaged intake flange. For further information see SI 6 UL 93-E.

Possible cause	Possible cause	Remarks & Rectification
Low fuel pressure combined with air bubbles in transparent section of pipe	Air leak between fuel pump and fuel tank	Air drawn into pipeline on suction side of pump will reduce its capacity. Carefully check all hose connections and fittings. Some hose clamps do not grip evenly all round the hose and encourage air leaks. A restriction or blockage on the suction side will also encourage air leaks, so check for more than one fault. Renew faulty parts.
Low fuel pressure combined with rich mixture on the cylinder which provides the pulse for the fuel pump (black spark plug on this cylinder plus uneven running) AND/OR fuel mist spraying from fuel pump breather	Fuel pump diaphragm ruptured	Strip fuel pump and replace diaphragm.
High fuel pressure	Blockage just inside carburetor	If fuel pressure is above 0,5 bar (7.3 psi) at any engine speed, suspect a blockage just inside the carburetor, between the fuel inlet and the needle valve that controls the flow into the float chamber. Such a blockage may be caused by a small sliver of rubber, sliced off the fuel hose when it was pushed onto the carburetor connection. Remove float lever and needle valve, and blow backwards through carb inlet with an air line or hand pump to clear the obstruction.
	Partially blocked main jet	Remove float chamber and main jet. Clean jet by blowing through it. Replace.
Fuel pressure falls rapidly when engine is stopped	Inlet needle controlling flow into float chamber not sealing properly	Remove float lever and needle valve. Check for foreign matter on valve seat, check condition of needle valve tip. Renew as necessary.
	One way valves in fuel pump ineffective	Strip fuel pump. Renew components or fuel pump as necessary.
	External fuel leaks	Renew components or fuel pump as necessary.

The above does not constitute a complete list of possible faults, but is based on experience in servicing and trouble shooting.

8.17.1) Carburetor air intake:

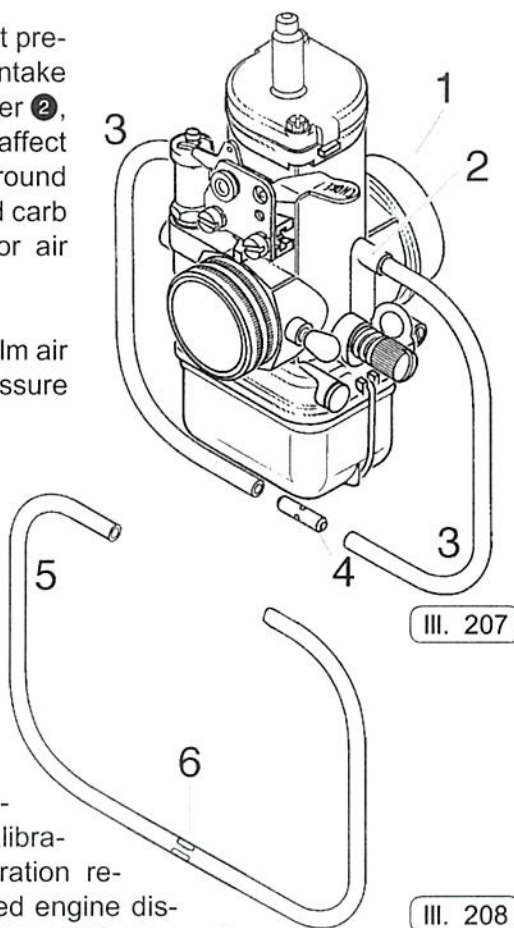
Air intake must be protected against ingestion of water, dirt and foreign matter. Avoid any filter material tending to absorb water or to swell (see chapter "Air filter").

The same pressure condition must prevail in the vicinity of carburetor air intake ① and venting tube of float chamber ②, i. e. propeller air stream must not affect air flow- and pressure condition around carb air intake. If necessary, shield carb intake by a sheet metal shield or air intake box.

Route both venting lines ③ to a calm air zone ① and join them with a pressure compensating tube ④.

On newer engine models, carbs are provided with one single venting tube ⑤ furnished with 2 pressure compensating holes ⑥ thus eliminating the need of a compensating tube ④.

Engines delivered with intake silencer must not be operated without it. Operation without intake silencer needs correction of carb calibration. Change of carburetor calibration requires written request to authorized engine distributor or engine manufacturer (ROTAX). Consult spare parts list for proper carb calibration.



10.2.2) Check engine for seizure:

A seized engine will frequently free itself instantly and can be started again immediately, but a smear of aluminium from the piston will most probably be left on the cylinder bore, and this could cause a further seizure whenever the engine is run under heavy load, even if the cause of the original seizure (for example, fuel starvation) has been cured.

To check for a seizure, switch off ignition and remove spark plugs. Remove the exhaust manifold and inspect the pistons and cylinder through the exhaust ports as you slowly turn the engine.

Any scuff marks on the pistons or bores indicate a seizure, and the top end must be dismantled. The seize marks on the pistons must be carefully cleaned off with emery cloth, the rings checked for damage and sticking, and the cylinder bores must have every trace of aluminium removed by scraping and then with emery cloth. It is sometimes difficult to see the aluminium, but it is important to completely remove it. If the damage is more than superficial, the piston should be replaced, and the cylinder rebored.

10.2.3) Inspection of the fuel system:

Check the fuel tank vent; it must be clear, or the engine will gradually starve. Check the fuel tank itself - does the pick-up pipe in the tank have a strainer (mesh filter)? This is a fairly essential requirement, but many microlights still do not have one. If you cannot see for yourself - ask the aircraft manufacturer.

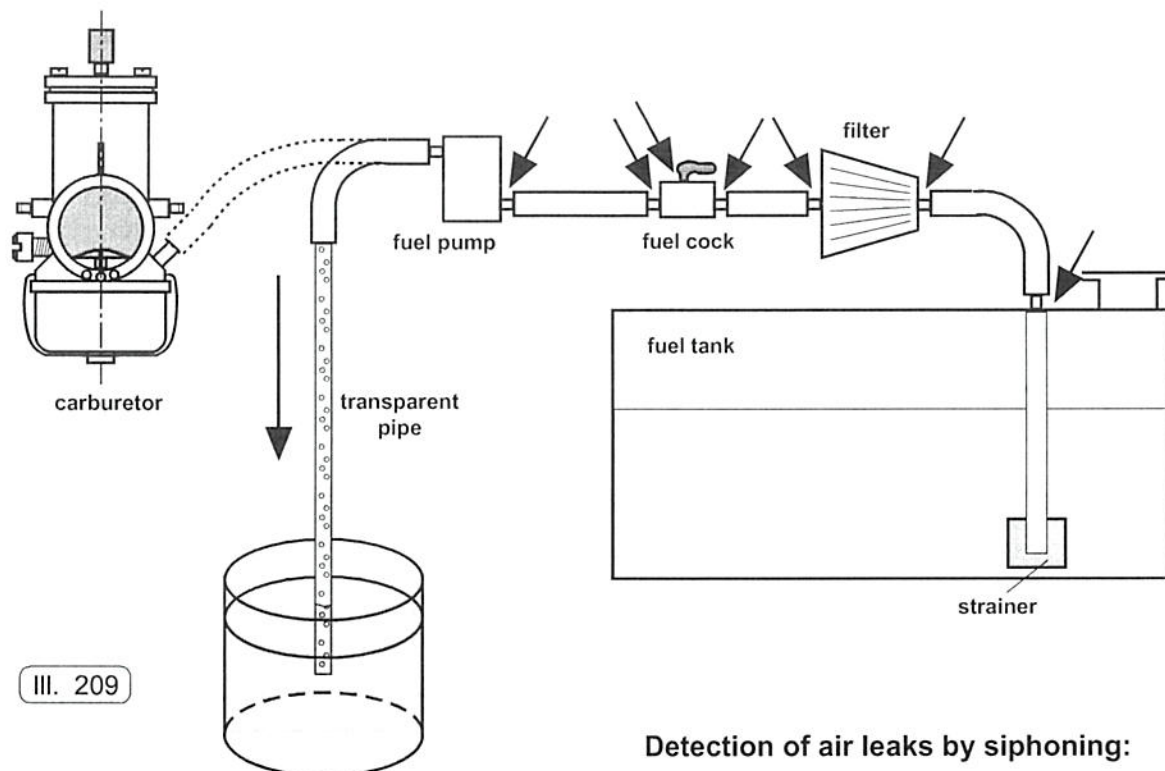
If there is no strainer, then you must thoroughly clean out the fuel tank, and always in future only fill through a filter funnel, taking the utmost care that no foreign matter enters the tank. A pick-up pipe without strainer can so easily be completely blocked by a single blade of grass in the fuel, or a flake of paint as so commonly appears from a jerrycan.

The offending blockage, having been sucked onto the tank outlet and stopped the engine dead, can, with the suction gone, float innocently back into the volume of the tank to cause the same problem again, maybe months later. Such a problem is almost impossible to trace afterwards - so don't let it happen to you, clean the tank and keep it clean.

10.2.4) Examination of fuel line between tank and fuel pump:

This section of pipe is under considerable negative pressure when the engine is running hard, and the tiniest flaw in any joint will cause air to be sucked into the system, considerably reducing the capacity of the fuel pump. Air leaks are much more dangerous when the fuel tank is mounted below the fuel pump and carburetor.

Air leaks are obviously impossible to see, but the following checks will show whether they exist.



Detection of air leaks by siphoning:

Referring to III. 199, disconnect the fuel line from the carburetor and connect a length of transparent fuel pipe, making sure the connection is absolutely airtight. Take the transparent pipe down to ground level and start siphoning fuel from a tank to a container on the ground. All parts of the fuel system above the level in the tank will be below atmospheric pressure, and any air leaks in the system will show up as bubbles in the transparent pipe. Continue siphoning for a considerable period of time.

After an initial settling period there should be no bubbles in the fuel. If bubbles persist, find the location of the air leak(s) by process of elimination.

Another way of checking for air leaks is to replace the last portion of fuel line before the carburetor with a transparent piece. Ground run the engine and look for bubbles in the line - there should be virtually none after a few minutes settling down.

◆ NOTE:

Filter and fuel tap are shown on suction side of pump to illustrate air leakage sites possible. Though, it is recommended that these be installed on the pressure side of the pump.