

Workshop Manual

2-cycle Engine Troubleshooting and Carburation Adjustment

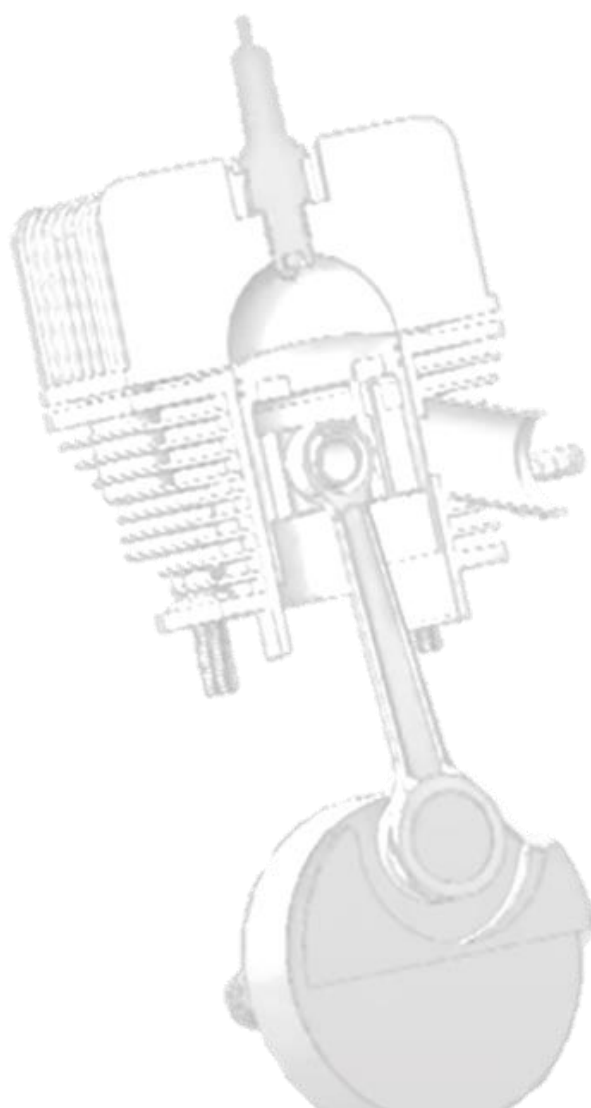




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1. Introduction

IMPORTANT

Carburettor replacement should never be the first option in the event of an engine malfunction.

Before replacing the carburettor, please verify if there is any mechanical breakage. If there is no breakages, please re-perform the carburettor setting/calibration as indicated in chapter 5.

The user manual contains a “troubleshooting” section dealing with issues that are easy to fix by the end user.

There are many different trouble causes and symptoms. The main elements of the machine that will be analyzed are the following:

- 1. Ignition System:** It should produce a strong spark at the best timing.
- 2. Compression:** There should be no compression loss so optimum cylinder pressure is maintained.
- 3. Fuel System and Carburetion:** It should deliver the air-fuel mixture at the optimum mixing ratio.

The Chapter 2 contains a table that analyzes the possible operating anomalies, indicating the causes and actions to be taken to resolve them. Following the indications of the Chapter 2 will reduce the time required to identify the causes of the problems.

2. Troubleshooting

PROBLEM	PROBABLE CAUSE	REMEDY
The engine does not start	Blocked air filter	Execute the filter cleaning
	The spark plug is badly connected or faulty	Check spark or replace spark plug
	Fuel pipe	Verify if there is damage on the pipe
	Coil earth connection	Check electrical cabling of earth wire
	The coil is faulty and does not supply current or the air gap is too large	Check coil
	Insufficient pressure	Check tightness of cylinder head screws, replace gasket if necessary. Check wear and tear of the piston rings
	The Primer is faulty	Check the operating efficiency and integrity of the petrol pipe and rubber primer button.
	Carburettor dirty	Check and clean the carburettor
The engine starts but does not run	The tank cap has a clogged breather pipe	Clean and/or replace the cap
	Insufficient pressure	Check that the spark plug is secured. Check for any cracks in the casing. Check wear and tear of the piston rings
	Exhaust is blocked	Check that there is airflow through the exhaust system and replace if necessary



PROBLEM	PROBABLE CAUSE	REMEDY
The engine is inefficient or the runs irregularly	The coil air gap has been poorly adjusted	Adjust the air gap and if the problem persists, replace the coil.
	Fuel pipe	Verify if there is damage on the pipe
	Intake Manifold or Air collector	Verify if there is damage on the Intake Manifold (rubber part) or Air collector (plastic part). Verify if the washers are present and not damage.
	Fuel filter	Verify if the positioning of the fuel filter in the fuel tank is correct.
	Insufficient pressure	Check that the spark plug is secured. Check for any cracks in the casing. Check wear and tear of the piston rings
	Oxidation or loosening of spark plug connections	Perform spark test or replace spark plug
	Carburettor screw fixing	The screws used to fix the carburettor on the collector or on the cylinder should be tighten
	Air seepage in the carburettor	Replace the carburettor gaskets
	Carburettor dirty	Check and clean the carburettor
The engine judders	Engine screws loose	Tighten the screws
	Engine shaft off-centre	Replace the engine shaft
	Engine timing faulty	Check wear and tear of the connecting rod of the engine shaft, replace shaft if necessary
	The electric cables are disconnected, damage or broken	Check and/or replace the cables



3. Checking Procedures (Three Elements)

In addition to the fault described in the above table, the troubleshooting can be carried out on a specific components or sub-system of the machine.

When one of the three elements is at fault, an engine will fail to run properly. Diagnosis of the engine should start with the most likely causes of the engine using simple checking procedure:

Ignition System: Start the diagnosis flow from the exhaust to intake side:

Spark plug → Plug cap → Start/Stop switch, Earth and Switch Cable → Ignition Coil → Flywheel

Compression: Start the diagnosis flow from the outside to inside:

External condition → Tightening condition → Cylinder → Piston → Crank

Fuel System & Carburation: Start the diagnosis flow from the intake to exhaust side:

Tank Cap → Fuel → Vent Valve → Fuel Filter → Fuel Pipe → Carburettor → Intake Manifold

3.1 The engine does not start

Remove the cap from the spark plug.

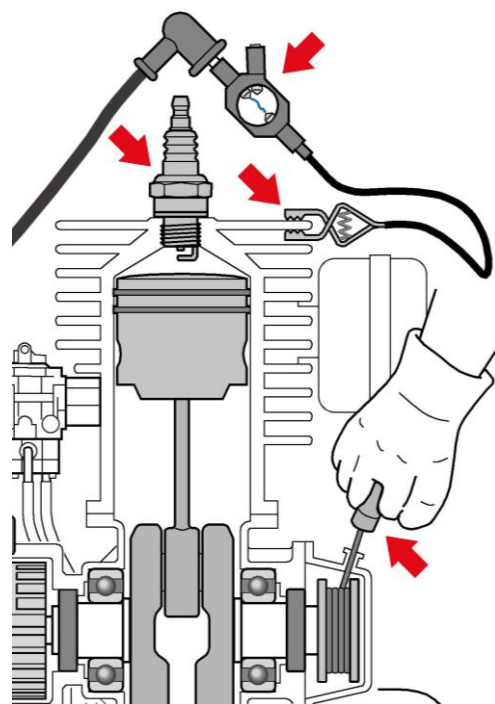
Fully insert the metal terminal of the tester into the spark plug cap and apply the alligator clip to a metal part of the engine.

Pull the recoil starter knob, and check whether sparks arise or not.

The spark must be regular and blue-violet in color; if it is irregular and reddish in color, it means that the coil is defective.

ATTENTION

Checking the emission of sparks by moving the spark plug close to a metal part of the engine can be dangerous and may cause a flame if fuel vapors are still present inside the cylinder.

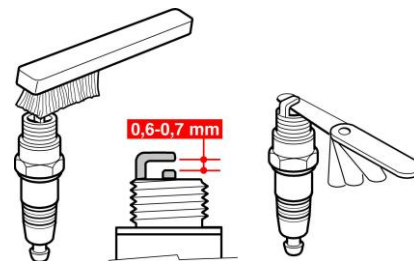


If no spark appears in the tester

If sparks appear in the tester

3.1.1 Spark plug

Wet plug electrodes	Make them dry
Carbon deposited on the electrodes	Clean
Burnt out of the electrodes	Replace
Improper spark gap	Adjust (0.6~0.7)
Insulation failure by insulator damage	Replace



**3.1.2 Switch**

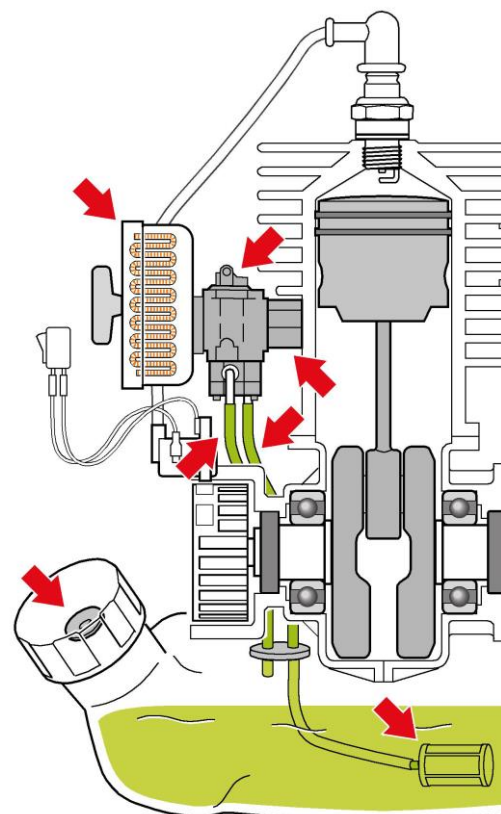
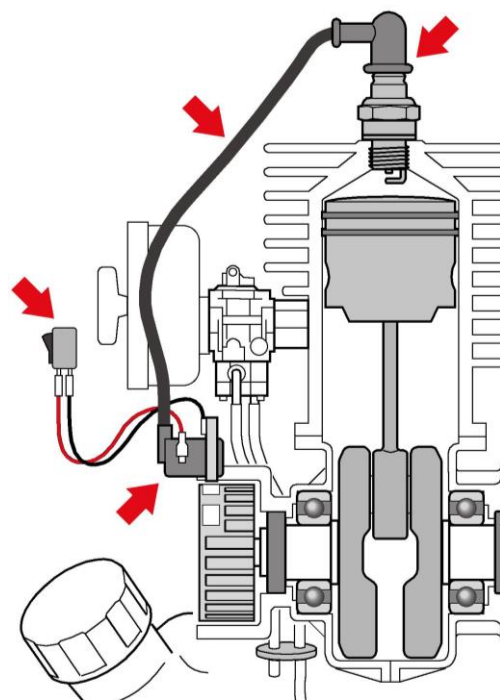
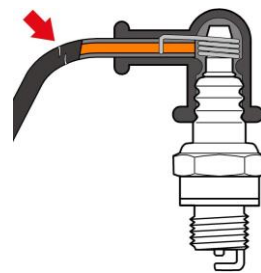
Switch is OFF	ON the switch
Switch is faulty	Replace
Primary wiring ground	Repair

3.1.3 Ignition System

Plug cap is OFF	Plug ON
Plug cap is damaged	Replace
Air gap is not proper	Adjust 0,35 mm
Faulty contact of plug cap sprig	Repair
High tension cable is damaged	Replace
Ignition coil inside failure	Replace

3.1.4 Fueling - Air cleaner, Fuel, Carburettor

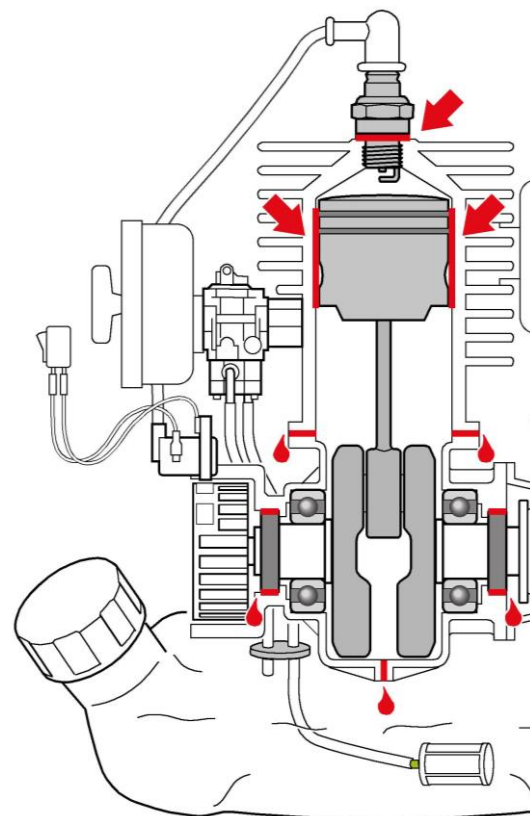
Clogged air cleaner	Clean
Clogged fuel tank air vent	Clean
Clogged fuel filter	Clean
Incorrect fuel	Change with proper fuel
Clogged or damage fuel pipes	Clean or replace
Carburettor mis adjusted	Readjust
Clogged carburettor	Clean
Intake manifold	Clean or replace
Screws loosed	Tighten the screws





3.1.5 Compression

Spark plug is loosened	Retighten
Gas leakage from cylinder and crankcase gasket	Replace gasket
Cylinder wall and piston ring worn or damaged	Replace
Gas leakage from crankcase gasket or oil sealing	Replace



3.2 The engine stops

If no spark appears in the tester

Check the engine cranking

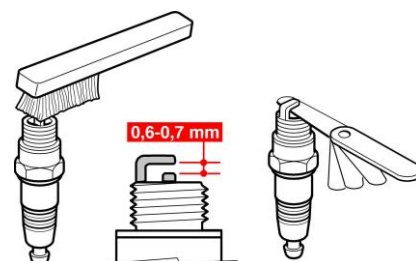
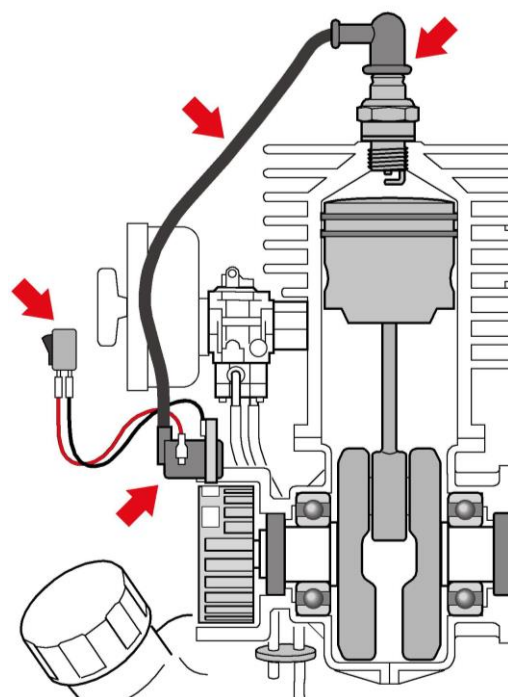
Cranking is smooth

If sparks appear in the tester

Does not crank

3.2.1 Spark plug, Switch, Ignition coil

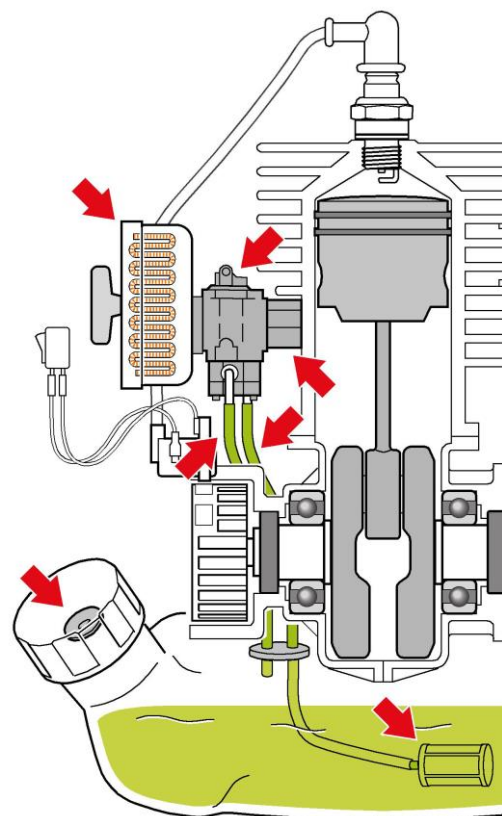
Plug cap disconnect	Connect
Carbon deposited on the plug electrodes	Clean
Switch cable or high tension cable sheath worn out	Replace
Ignition coil inside failure	Replace





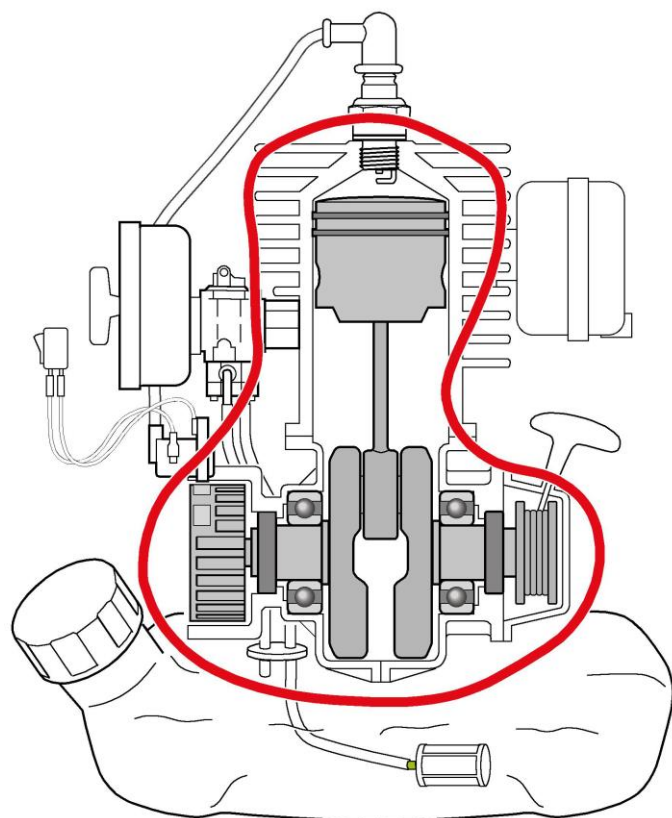
3.2.2 Fuel Carburettor

Lack of fuel	Refill
Clogged fuel filter and fuel piping	Cleaning or replace



3.2.3 Engine inside

Some parts are damaged	Check and replace
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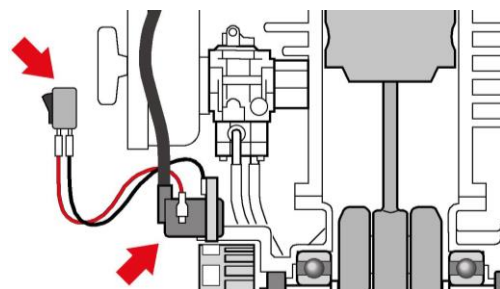




3.3 The engine does not stops

3.3.1 Switch

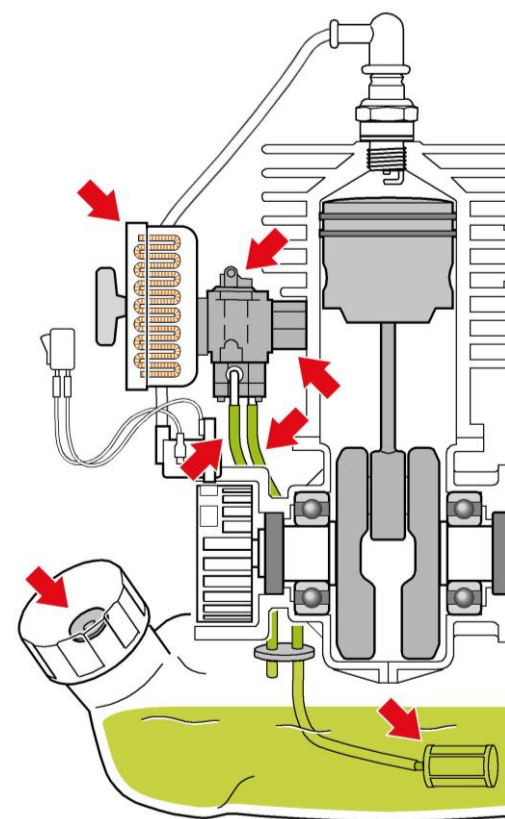
Switch leads disconnect	Connect
Switch is damaged	Replace



3.4 Engine speed does not go up

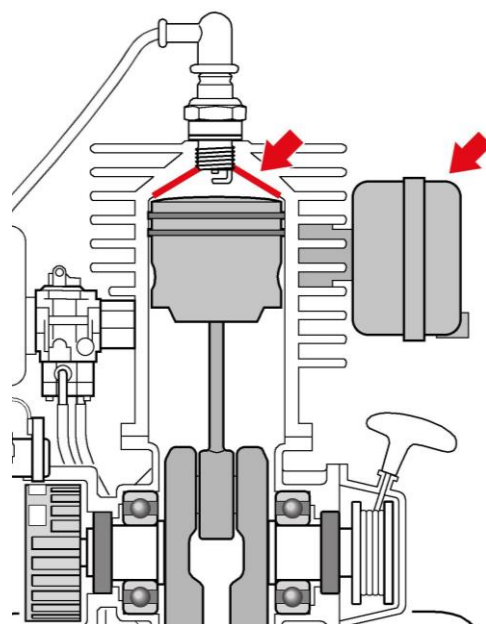
3.4.1 Fuelling

Clogged air cleaner	Clean
Clogged fuel filter	Clean or replace
Incorrect fuel	Change with proper fuel
Carburettor mis adjusted	Readjust
Clogged carburettor	Clean
Diafram stiffened	Replace
Intake manifold	Clean or replace
Screws loosed	Tighten the screws



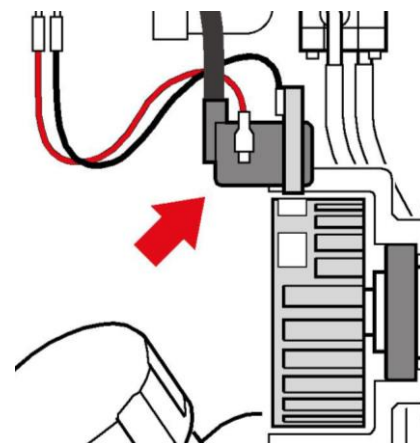
3.4.2 Exhaust passage

Clogger muffler with carbon	Clean
Clogger cylinder exhaust part with carbon	Clean



3.4.3 Ignition System

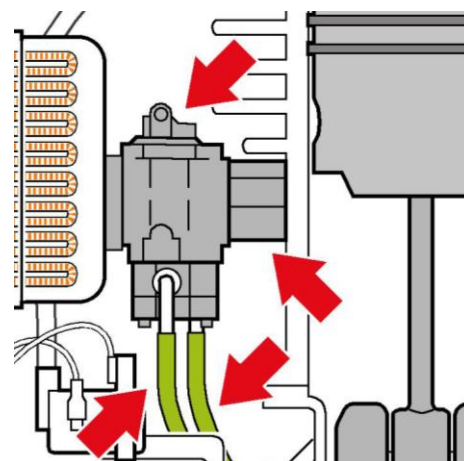
Ignition coil inside failure	Replace
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3.5 Idling instability

3.5.1 Carburettor

Carburettor mis adjusted	Readjust
Leaking inlet valve	Clean or replace
Air entering from Intake Manifold gasket or carburetor gasket	Replace or retighten



3.5.2 Fuel line

Hole in the fuel line	Replace
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3.5.3 Engine

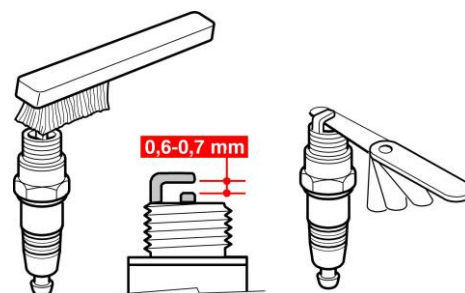
Air entering from crank case gasket	Replace
Air entering from oil seals	Replace



4. Ignition System

4.1 Spark plug inspection

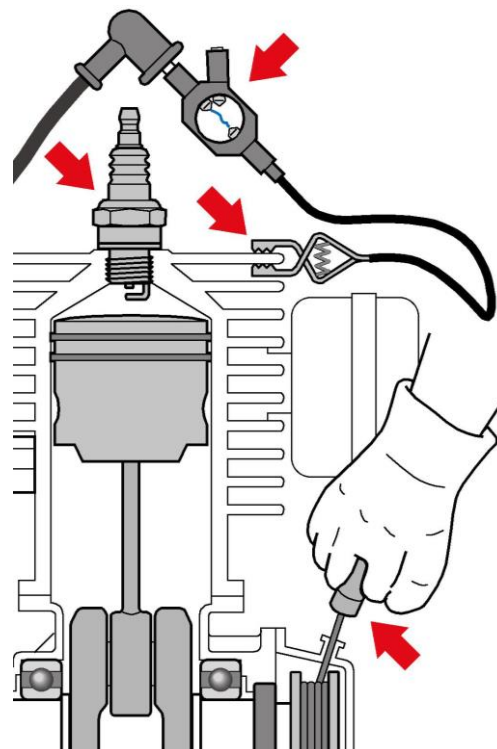
- Clean the carbon deposits and adjust its spark gap to 0.6 - 0.7 mm.
- Replace the spark plug with a new one if its electrode is found excessively dirty or worn out.



4.2 Spark strength control

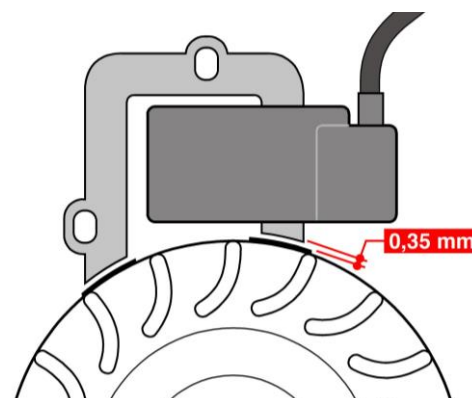
- Disconnect the spark plug cap.
- Fully insert the metal terminal of the tester into the spark plug cap and apply the alligator clip to a metal part of the engine.
- Pull the recoil starter knob, and check the quality of the spark.

The spark must be regular and blue-violet in color; if it is irregular and reddish in color, it means that the coil is defective.



4.3 Coil air gap check

- Check the gap between the iron core of the ignition coil and rotor with a thickness gauge.
- If the gap is out of standard, adjust the gap of 0,35 mm, by using the air gap gauge (special tool).





5. Carburation

5.1 General Informations

5.1.1 Original calibration

Each machine's carburation is factory-adjusted, in controlled environmental conditions, comparable to those found at sea level. This calibration allows for optimal carburation, ensuring top performances and simultaneously reducing pollutant emissions.

5.1.2 Environmental variables

An endothermic engine's performance varies according to the atmospheric pressure and is therefore sensitive to variations in altitude.

Performance decreases normally around 10% for each 1000 metres of altitude above sea level. This is indicated by a reduction in the maximum speed, which causes an increase in fuel consumption.

5.1.3 When to calibrate carburation

Normally, carburation must be calibrated after the carburettor has been replaced or serviced and when environmental conditions of use deviate significantly from factory conditions.

5.1.4 Necessary equipment

Carburation must be calibrated by a qualified Service Centre, using an electronic tachometer. Special screwdrivers suited to the various adjusting screws are necessary, whose shape is indicated in the summary charts at the end of this document.

5.1.5 Operator precautions

Carburation must be calibrated in a suitable place, and requires proper devices for suction and fume removal. The operator must wear suitable clothing and use the personal protective equipment provided for by the laws in force on the matter of safeguarding health and preventing accidents at the workplace.

5.2 Types of carburetors

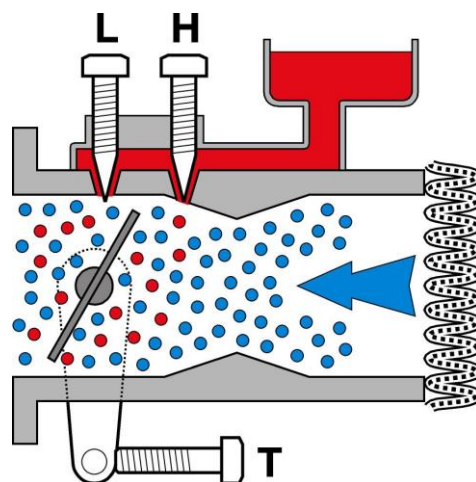
NOTE - Two types of carburetor are mounted on the engines of STIGA machines, the characteristics and operating principles of which are shown in the following paragraphs.

5.2.1 Two-jet carburetor

a) Operating principle

The operating principle of the carburettor mounted on these machines is represented in the diagram.

Air, under the effect of a vacuum created by the piston, pulls fuel through the low «L» and high «H» jets located respectively above and below the butterfly valve.





With the engine running at minimum (and throttle released), the butterfly valve is almost completely closed and fuel comes mainly from the «L» jet.

Accelerating, the butterfly valve opens and the input composed mainly of fuel flows through the «H».

b) Adjusting screws and effects

These carburetors are equipped with:

«L» screw for the low jet:

tightening (clockwise), the passage of the air/fuel mixture is closed and the minimum speed is reduced;

loosening (anticlockwise), the passage of the air/fuel mixture is opened and the minimum speed is increased;

«H» screw for the high jet:

tightening (clockwise), a weaker air/fuel mixture is obtained with an increase in engine speed;

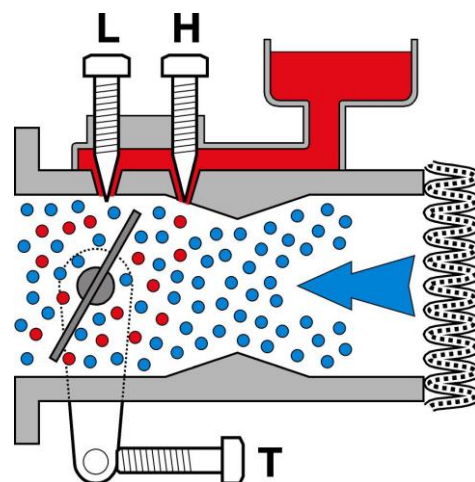
loosening (anticlockwise), a richer air/fuel mixture is obtained with a reduction in engine speed;

«T» screw for butterfly valve adjusting:

tightening (clockwise), the butterfly valve is opened and the minimum speed is increased;

loosening (anticlockwise), the butterfly valve is closed and the minimum speed is reduced;

Adjustments should be made one at a time, making sure that the desired effects are obtained.



5.2.2 One-jet carburetor

a) Operating principle

The operating principle of the carburetor mounted on these machines is represented in the diagram.

Air, under the effect of a vacuum created by the piston, pulls fuel through the high «H» jet above the valve connected to the throttle.

b) Adjusting screws and effects

These carburetors are equipped with:

«H» screw for the high jet (if provided):

tightening (clockwise), a weaker air/fuel mixture is obtained with an increase in engine speed;

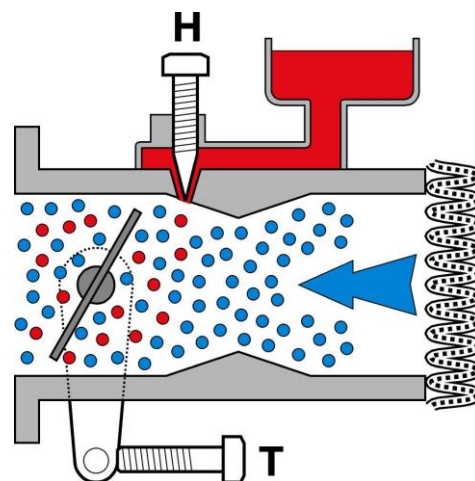
loosening (anticlockwise), a richer air/fuel mixture is obtained with a reduction in engine speed;

«T» screw for valve adjusting:

tightening (clockwise), the valve is opened and the minimum speed is increased;

loosening (anticlockwise), the valve is closed and the minimum speed is reduced.

Adjustments should be made one at a time, making sure that the desired effects are obtained.



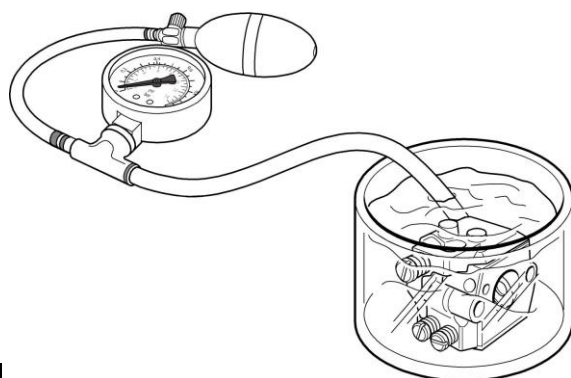


5.3 Pressure testing

NOTE - This test can provide an initial indication of the causes of malfunction before any action on the carburetor and must always be performed after any disassembly or repair.

The pressure test must be performed with the carburetor fully assembled, following this procedure.

1. Tighten the screws of the high speed jet «H» and of the low speed jet «L» (if present) and then unscrew them by one turn.
2. Connect the pressure tool hose to the fuel inlet fitting.
3. Immerse the carburetor in a container full of water.
4. Pump up to a pressure of 50 kPa (0.5 bar) and close the tap.
5. Check that no air bubbles form, an unequivocal symptom of leaks. In this case, the following table provides information on the element that may have caused the leak.



Leakage Point	Defective item
Diffuser jets	Needle valve
Pulse tube	Pump diaphragm
Ventilation hole above the dispenser	Membrane

5.4 Calibration Procedures

NOTE- Each type of machine is equipped with a specific carburettor and equally specific procedures for calibration, as indicated in the following chapters.

5.4.1 Chain Saws

>>> Machine presetting

Before calibrating:

- empty the fuel tank and refill it with petrol/oil mixture in the proportions indicated in the machine Instruction Manual;
- make sure that the air filter is clean and properly fitted.

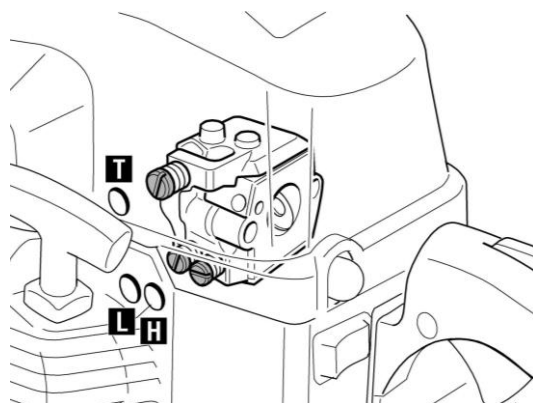
The machine must be set up:

- with the chain mounted and tightened properly, taking every possible care not to cause accidents should the chain start to move;
- resting on a counter in a horizontal position.

a) Carburation pre-calibration

This operation is necessary when the machine is not properly tuned and is not able to run long enough to carry out the checks indicated at point “b”.

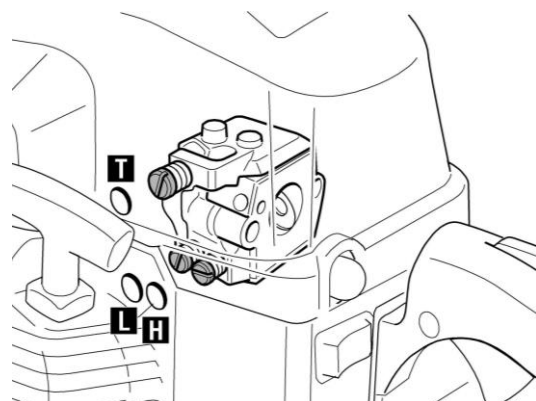
1. Tighten the «L» and «H» screws completely without forcing them, then loosen them (anticlockwise) with 2 complete turns.
2. Tighten the «T» screw 2 complete turns from the beginning of the contact with the butterfly valve lever.





b) Carburation calibration

1. Start up the engine following the indications in the Instruction Manual, and accelerate for at least 1 minute continuously to warm it up. If the engine will not run for a long enough time, you must reset the adjustments and carry out pre-calibration, as indicated at point "a".
2. Release the throttle to reduce the engine to minimum.
3. Tighten the «L» screw to where the engine tends to turn off, at an undefined speed.
4. Turn the «T» screw appropriately in both directions, until the "TOP" rotation speed in the chart (*Engine RPM setting*) is reached for each machine model.
5. Loosen the «L» screw (anticlockwise) until the minimum rotation speed is reached corresponding to the value indicated in the chart (*Engine RPM setting*) for each machine model, keeping the engine running with the chain stopped.
6. Accelerate completely and check that the maximum rotation speed corresponds to the value indicated in the chart (*Engine RPM setting*) for each machine model.
7. If the values are different, turn the «H» screw appropriately in both directions to obtain the correct maximum speed.
8. Check the minimum speed once more and if necessary, turn the «T» screw appropriately in both directions, until the value indicated in the chart (*Engine RPM setting*) is reached for each machine model.



c) Results and check

When calibration is completed, accelerate twice completely, alternating by allowing the engine to return to minimum, to check acceleration progression and if minimum and maximum values are maintained.

The minimum engine speed must be such as to not cause the chain to move when the throttle and choke are not operated.

5.4.2 Brush Cutters

>>> Machine presetting

Before calibrating:

- empty the fuel tank and refill it with petrol/oil mixture in the proportions indicated in the machine Instruction Manual;
- make sure that the air filter is clean and properly fitted.

The machine must be set up with:

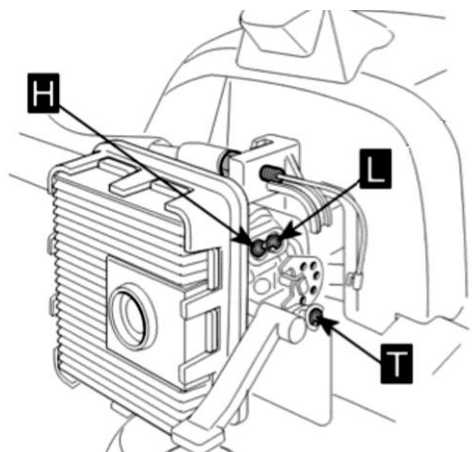
- cutting line head mounted, with the line cut to the maximum allowed length;
- guards mounted.

5.4.2.1 Two-jet Carburetors

a) Carburation pre-calibration

This operation is necessary when the machine is not properly tuned and is not able to run long enough to carry out the checks indicated at point "b".

1. Tighten the «L» and «H» screws completely without forcing them, then loosen them (anticlockwise) with 2 complete turns.

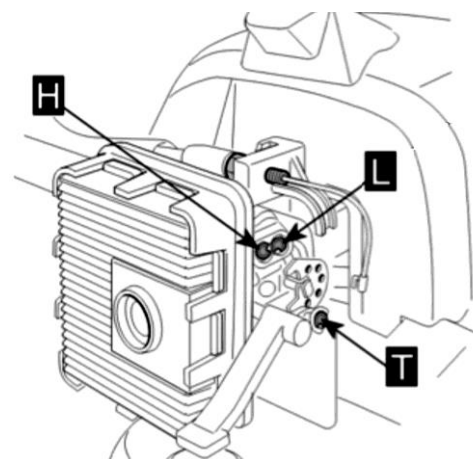




2. Tighten the «T» screw 2 complete turns from the beginning of the contact with the butterfly valve lever.

b) Carburation calibration

1. Start up the engine following the indications in the Instruction Manual, and accelerate for at least 1 minute continuously to warm it up. If the engine will not run for a long enough time, you must reset the adjustments and carry out pre-calibration, as indicated at point "a".
2. Release the throttle to reduce the engine to minimum.
3. Tighten the «L» screw to where the engine tends to turn off, at an undefined speed.
4. Turn the «T» screw appropriately in both directions, until the "TOP" rotation speed in the chart (Engine RPM setting) is reached for each machine model.
5. Loosen the «L» screw (anticlockwise) until the minimum rotation speed is reached corresponding to the value indicated in the chart (Engine RPM setting) for each machine model, keeping the engine running with the cutting line head stopped.
6. Accelerate completely and check that the maximum rotation speed corresponds to the value indicated in the chart (Engine RPM setting) for each machine model.
7. If the values are different, turn the «H» screw appropriately in both directions to obtain the correct maximum speed.
8. Check the minimum speed once more and if necessary, turn the «T» screw appropriately in both directions, until the value indicated in the chart (Engine RPM setting) is reached for each machine model.



c) Results and check

When calibration is completed, accelerate twice completely, alternating by allowing the engine to return to minimum, to check acceleration progression and if minimum and maximum values are maintained.

The minimum engine speed must be such as to not cause the cutting device to move when the throttle and choke are not operated.

5.4.2.2 One-jet Carburetors

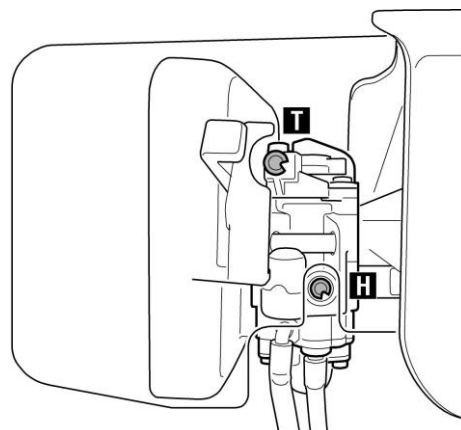
a) Carburation pre-calibration

This operation is necessary when the machine is not properly tuned and is not able to run long enough to carry out the checks indicated at point "b".

1. Tighten the «T» screw 2 complete turns from the beginning of the contact with the valve lever.
2. Tighten the «H» screw (if provided) completely without forcing it, then loosen it (anticlockwise) with 2 complete turns.

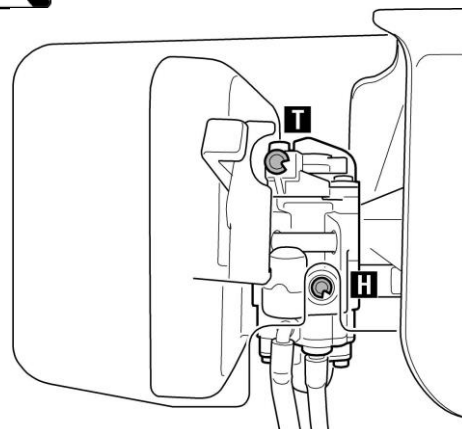
b) Carburation calibration

1. Start up the engine following the indications in the Instruction Manual, and accelerate for at least 1 minute continuously to warm it up. If the engine will not run for a long enough time, you must reset the adjustments and carry out pre-calibration, as indicated at point "a".
2. Release the throttle to reduce the engine to minimum.
3. Check that the minimum rotation speed corresponds to the value indicated in the chart (Engine RPM setting) for each machine model.





4. If the values are different, use the «T» screw to obtain the correct minimum speed.
5. Accelerate completely and check that the maximum rotation speed corresponds to the value indicated in the chart (Engine RPM setting) for each machine model.
6. If the values are different, use the «H» screw in both directions (only on carburetors that are equipped with them) to obtain the correct maximum speed.



c) Results and check

When calibration is completed, accelerate twice completely, alternating by allowing the engine to return to minimum, to check acceleration progression and if minimum and maximum values are maintained.

The minimum engine speed must be such as to not cause the cutting device to move when the throttle and choke are not operated.

5.4.3 Edge Cutters

>>> Machine presetting

Before calibrating:

- empty the fuel tank and refill it with petrol/oil mixture in the proportions indicated in the machine Instruction Manual;
- make sure that the air filter is clean and properly fitted.

5.4.3.1 Two-jet Carburetors

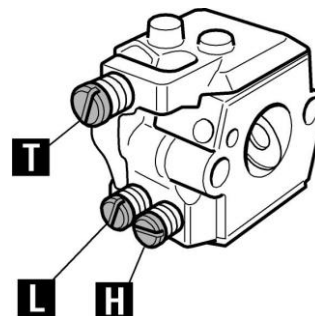
a) Carburation pre-calibration

This operation is necessary when the machine is not properly tuned and is not able to run long enough to carry out the checks indicated at point “b”.

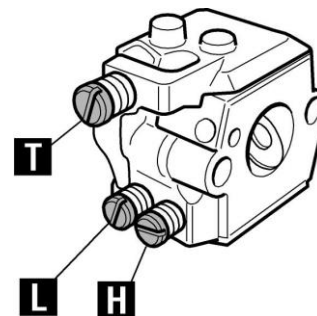
1. Tighten the «L» and «H» screws completely without forcing them, then loosen them (anticlockwise) with 2 complete turns.
2. Tighten the «T» screw 2 complete turns from the beginning of the contact with the butterfly valve lever.

b) Carburation calibration

1. Start up the engine following the indications in the Instruction Manual, and accelerate for at least 1 minute continuously to warm it up. If the engine will not run for a long enough time, you must reset the adjustments and carry out pre-calibration, as indicated at point “a”.
2. Release the throttle to reduce the engine to minimum.
3. Tighten the «L» screw to where the engine tends to turn off, at an undefined speed.
4. Turn the «T» screw appropriately in both directions, until the “TOP” rotation speed in the chart (Engine RPM setting) is reached for each machine model.
5. Loosen the «L» screw (anticlockwise) until the minimum rotation speed is reached corresponding to the value indicated in the chart (Engine RPM setting) for each machine model, keeping the engine running with the cutting line head stopped.



6. Accelerate completely and check that the maximum rotation speed corresponds to the value indicated in the chart (Engine RPM setting) for each machine model.
7. If the values are different, turn the «H» screw appropriately in both directions to obtain the correct maximum speed.
8. Check the minimum speed once more and if necessary, turn the «T» screw appropriately in both directions, until the value indicated in the chart (Engine RPM setting) is reached for each machine model.



c) Results and check

When calibration is completed, accelerate twice completely, alternating by allowing the engine to return to minimum, to check acceleration progression and if minimum and maximum values are maintained.

The minimum engine speed must be such as to not cause the cutting device to move when the throttle and choke are not operated.

5.4.3.2 One-jet Carburetors

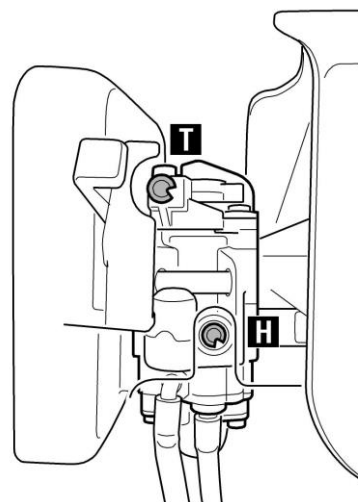
a) Carburation pre-calibration

This operation is necessary when the machine is not properly tuned and is not able to run long enough to carry out the checks indicated at point "b".

1. Tighten the «T» screw 2 complete turns from the beginning of the contact with the valve lever.
2. Tighten the «H» screw (if provided) completely without forcing it, then loosen it (anticlockwise) with 2 complete turns.

b) Calibration phases

1. Start up the engine following the indications in the Instruction Manual, and accelerate for at least 1 minute continuously to warm it up. If the engine will not run for a long enough time, you must reset the adjustments and carry out pre-calibration, as indicated at point "a".
2. Release the throttle to reduce the engine to minimum.
3. Check that the minimum rotation speed corresponds to the value indicated in the chart (Engine RPM setting) for each machine model.
4. If the values are different, use the «T» screw to obtain the correct minimum speed.
5. Accelerate completely and check that the maximum rotation speed corresponds to the value indicated in the chart (Engine RPM setting) for each machine model.
6. If the values are different, use the «H» screw in both directions (only on carburetors that are equipped with them) to obtain the correct maximum speed.



c) Results and check

When calibration is completed, accelerate twice completely, alternating by allowing the engine to return to minimum, to check acceleration progression and if minimum and maximum values are maintained.

The minimum engine speed must be such as to not cause the cutting device to move when the throttle and choke are not operated.

5.4.4 Blowers

>>> Machine presetting

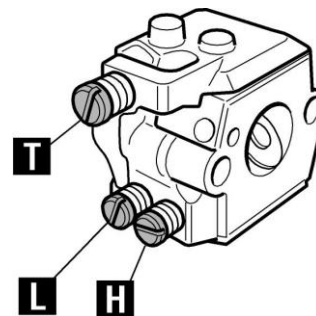
- Before calibrating:
- empty the fuel tank and refill it with petrol/oil mixture in the proportions indicated in the machine Instruction Manual;
- make sure that the air filter is clean and properly fitted.

The machine must be set up with the blower tube mounted.

a) Carburation pre-calibration

This operation is necessary when the machine is not properly tuned and is not able to run long enough to carry out the checks indicated at point "b".

1. Tighten the «L» and «H» screws completely without forcing them, then loosen them (anticlockwise) with 2 complete turns.
2. Tighten the «T» screw 2 complete turns from the beginning of the contact with the butterfly valve lever.



b) Carburation calibration

1. Start up the engine following the indications in the Instruction Manual, and accelerate for at least 1 minute continuously to warm it up. If the engine will not run for a long enough time, you must reset the adjustments and carry out pre-calibration, as indicated at point "a".
2. Release the throttle to reduce the engine to minimum.
3. Tighten the «L» screw to where the engine tends to turn off, at an undefined speed.
4. Turn the «T» screw appropriately in both directions, until the "TOP" rotation speed in the chart (Engine RPM setting) is reached for each machine model.
5. Loosen the «L» screw (anticlockwise) until the minimum rotation speed is reached corresponding to the value indicated in the chart (Engine RPM setting) for each machine model.
6. Accelerate completely and check that the maximum rotation speed corresponds to the value indicated in the chart (Engine RPM setting) for each machine model.
7. If the values are different, turn the «H» screw appropriately in both directions to obtain the correct maximum speed.
8. Check the minimum speed once more and if necessary, turn the «T» screw appropriately in both directions, until the value indicated in the chart (Engine RPM setting) is reached for each machine model.

c) Results and check

When calibration is completed, accelerate twice completely, alternating by allowing the engine to return to minimum, to check acceleration progression and if minimum and maximum values are maintained.