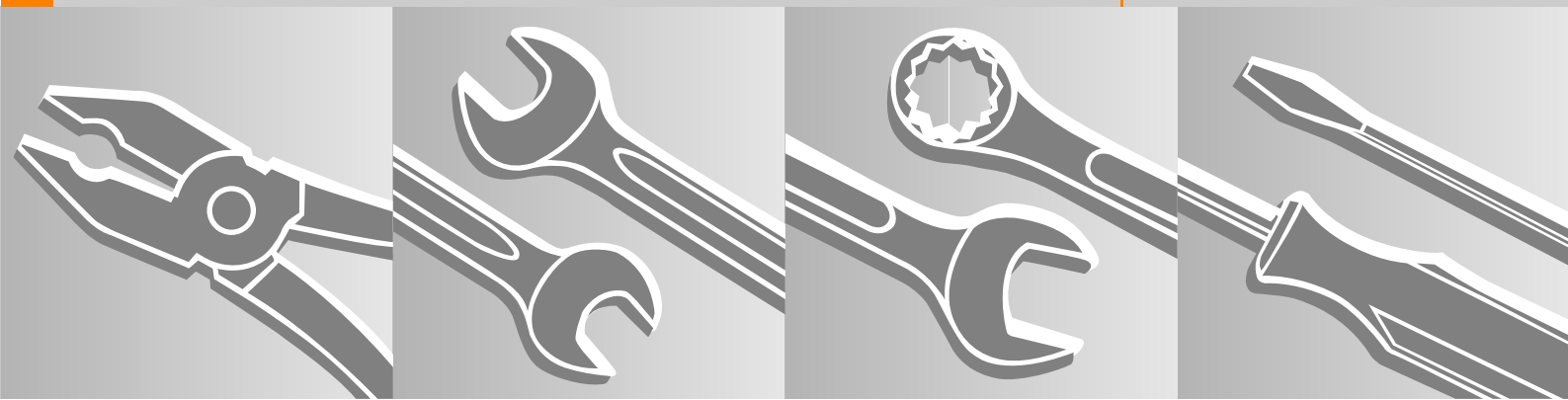


**STIHL BR 500, 550, 600**

2005-03



## Contents

<b>1.</b>	<b>Introduction</b>	<b>2</b>	<b>6.</b>	<b>Fuel System</b>	<b>17</b>	<b>8.</b>	<b>Ignition System</b>	<b>44</b>
<b>2.</b>	<b>Safety Precautions</b>	<b>2</b>	6.1	Air Filter	17	8.1	Ignition Module	45
<b>3.</b>	<b>Specifications</b>	<b>3</b>	6.2	Carburetor	19	8.2	Ignition Timing	45
3.1	Engine	3	6.2.1	Leakage Test	19	8.3	Testing the	
3.2	Ignition System	3	6.2.2	Removing		8.4	Ignition Module	45
3.3	Fuel System	3		and Installing	20		Removing and	
3.4	Tightening Torques	4	6.3	Servicing			Installing	46
<b>4.</b>	<b>Troubleshooting</b>	<b>6</b>		the Carburetor	20	8.5	Spark Plug Boot	47
4.1	Rewind Starter	6	6.3.1	Metering Diaphragm	20	8.6	Testing the	
4.2	Ignition System	7	6.3.2	Inlet Needle	21	8.7	Wiring Harness	48
4.3	Carburetor	8	6.3.3	Pump Diaphragm	22		Ignition System	
4.4	Engine	10	6.3.4	Accelerator Pump	23		Troubleshooting	49
<b>5.</b>	<b>Rewind Starter / Shroud</b>	<b>11</b>	6.4	Adjusting		<b>9.</b>	<b>Control Handle</b>	<b>52</b>
5.1	General	11		the Carburetor	25	9.1	Throttle Trigger/	
5.2	Removing and Installing	11	6.4.1	User Adjustment	25		Interlock Lever	52
5.3	Pawl	11	6.4.2	Basic Setting in	26	9.2	Setting Lever	52
5.4	Rope Rotor	12		Service Shop	26	9.3	Throttle Cable	53
5.5	Starter Rope/Grip	13	6.5	Tank Vent	27	9.3.1	Removing and	
5.6	Rope Guide Bushing	14	6.6	Fuel Hoses/	28		Installing	53
5.7	Replacing		6.7	Pickup Body	28	9.3.2	Adjusting	53
5.8	the Rewind Spring	14		Fuel Tank	29	<b>10.</b>	<b>AV System</b>	<b>54</b>
5.9	Tensioning	15	<b>7.</b>	<b>Engine</b>	<b>29</b>	10.1	Spring Elements	54
	the Rewind Spring	15	7.1	Compression		10.2	Backplate	54
	Shroud	16		Pressure	29	<b>11.</b>	<b>Fan</b>	<b>55</b>
			7.2	Checking / Adjusting		11.1	Outer Fan Housing	55
				Valve Clearances	30	11.2	Inner Fan Housing	56
			7.3	Rocker Arms /		11.3	Fanwheel	56
				Pushrods	31	11.4	Antistatic Wire	57
			7.4	Cam Followers	32	<b>12.</b>	<b>Special</b>	
			7.5	Cam Gear	33		<b>Servicing Tools</b>	<b>58</b>
			7.5.1	Decompression		<b>13.</b>	<b>Servicing Aids</b>	<b>59</b>
				System	33			
			7.6	Muffler/Spark				
				Arresting Screen	34			
			7.7	Flywheel	35			
			7.8	Testing for Leaks	35			
			7.8.1	Preparations	36			
			7.8.2	Vacuum Test	36			
			7.8.3	Pressure Test	37			
			7.9	Crankshaft	38			
			7.9.1	Oil Seals	38			
			7.9.2	Crankcase,				
				Lower Half	39			
			7.9.3	Crankshaft	40			
			7.9.4	Piston	40			
			7.9.5	Piston Rings	42			
			7.9.6	Valves / Valve				
				Springs	43			
			7.9.7	Upper Half of				
				Crankcase				
				with Cylinder	43			

**STIHL®**

© ANDREAS STIHL AG & Co. KG, 2005

## 1. Introduction

This service manual contains detailed descriptions of all the typical repair and servicing procedures for this power tool.

As the design concept of models BR 500, BR 550 and BR 600 is almost identical, the descriptions and servicing procedures in this manual generally apply to all three models. Differences are described in detail.

You should make use of the illustrated parts lists while carrying out repair work. They show the installed positions of the individual components and assemblies.

Refer to the latest edition of the relevant parts list to check the part numbers of any replacement parts.

A fault on the machine may have several causes. To help locate the fault, consult the chapter on "Troubleshooting" in this manual and the "STIHL Service Training System" for all assemblies.

Refer to the "Technical Information" bulletins for engineering changes which have been introduced since publication of this service manual. Technical information bulletins also supplement the parts list until an updated edition is issued.

The special servicing tools mentioned in the descriptions are listed in the chapter "Special Servicing Tools" of this manual. Use the part numbers to identify the tools in the "STIHL Special Tools" manual. The manual lists all special servicing tools currently available from STIHL.

Symbols are included in the text and pictures for greater clarity. The meanings are as follows:

In the descriptions:

- = Action to be taken as shown in the illustration (above the text)
- = Action to be taken that is not shown in the illustration (above the text)


In the illustrations:

- ➔ Pointer
- ➡ Direction of movement

📖 4.2  
Reference to another chapter, i.e. chapter 4.2 in this example.

Service manuals and technical information bulletins are intended exclusively for the use of properly equipped repair shops. They must not be passed to third parties.

### **Always use original STIHL replacement parts.**

They can be identified by the STIHL part number, the **STIHL** logo and the STIHL parts symbol . This symbol may appear alone on small parts.

## 2. Safety Precautions

If the engine is started up in the course of repairs or maintenance work, observe all local and country-specific safety regulations as well as the safety precautions and warnings in the instruction manual.

Gasoline is an extremely flammable fuel and can be explosive in certain conditions.

Improper handling may result in burns or other serious injuries.

### **Warning!**

Do not bring any fire, flame, spark or other source of heat near the fuel. All work with fuel must be performed outdoors only. Spilled fuel must be wiped away immediately.

### 3. Specifications

	BR 500	BR 550	BR 600
<b>3.1 Engine</b>			
Displacement:	64.8 cm <sup>3</sup> (3.95 ci)	64.8 cm <sup>3</sup> (3.95 ci)	64.8 cm <sup>3</sup> (3.95 ci)
Bore:	50 mm (2.55 in)	50 mm (2.55 in)	50 mm (2.55 in)
Stroke:	33 mm (1.3 in)	33 mm (1.3 in)	33 mm (1.3 in)
Operating speed with nozzle:	5500 rpm	6100 rpm	7200 rpm
Idle speed:	2500 rpm	2500 rpm	2500 rpm
Crankcase leakage test at gauge pressure:	0.5 bar	0.5 bar	0.5 bar
under vacuum:	0.5 bar	0.5 bar	0.5 bar
<b>3.2 Ignition System</b>			
Air gap between ignition module and fanwheel:	0.15...0.3 mm (0.006...0.012 in)	0.15...0.3 mm (0.006...0.012 in)	0.15...0.3 mm (0.006...0.012 in)
Spark plug:	NGK CMR 6 H	NGK CMR 6 H	NGK CMR 6 H
Electrode gap:	0.7 mm (0.028 in)	0.7 mm (0.028 in)	0.7 mm (0.028 in)
<b>3.3 Fuel System</b>			
Carburetor leakage test at gauge pressure:	0.8 bar	0.8 bar	0.8 bar
Operation of tank vent at gauge pressure:	0.3 bar	0.3 bar	0.3 bar
Fuel:	as specified in instruction manual	as specified in instruction manual	as specified in instruction manual

### 3.4 Tightening Torques

DG and P (Plastoform) screws are used in polymer and lightmetal components. These screws form a permanent thread when they are installed for the first time. They can be removed and installed as often as necessary without impairing the strength of the screwed assembly, providing the specified tightening torque is observed. For this reason it is **essential to use a torque wrench**.

Fastener	Thread size	For component	Torque		Remarks
			lbf.ft	Nm	
Screw	IS-P5x18	Shroud/filter housing/fan housing	3.0	4.0	
Screw	IS-P5x18	Shroud/fan housing	3.0	4.0	
Collar screw	IS-M5x16	Collar screw/cylinder/rocker arm mounting	6.6	9.0	1)
Screw	IS-DG5x16	Cover/cylinder	3.0	4.0	
Screw	IS-M5x21	Filter cover/filter housing	3.0	4.0	
Screw	IS-M5x48x22	Filter housing/carburetor/flange	4.4	6.0	
Screw	IS-P5x18	Fan housing, outer/inner	3.0	4.0	
Screw	IS-D6x32	Fan housing, inner/engine pan	8.8	12.0	
Screw	IS-D6x32	Fan housing, inner/cylinder	8.8	12.0	
Hub	IS-M12x1	Fanwheel/crankshaft	22.0	30.0	2)
Screw	IS-P4x19	Handle molding, outer/inner	1.1	1.5	
Screw	IS-P6x21.5	Handle moldings/blower tube	3.0	4.0	
Screw	IS-M4x9.5	Scoop/muffler	3.0	4.0	
Screw	IS-M6x30	Engine pan/cylinder, initial stage	3.0	4.0	3)
Screw	IS-M6x30	Engine pan/cylinder, final stage	8.8	12.0	3)
Screw	IS-DG5x24	Air guide shroud/fan housing	3.0	4.0	
Screw	IS-DG5x24	Air guide shroud/engine pan	4.4	6.0	
Screw	IS-P4x19	Detent spring/handle molding, inner	1.1	1.5	
Screw	IS-P6x25	Backplate/bearing plug	4.4	6.0	
Screw	IS-P6x25	Backplate/tank housing	4.4	6.0	
Screw	IS-M5x18	Muffler/cylinder	5.9	8.0	
Screw	IS-P6x21.5	Hose clip/blower attachment	3.0	4.0	
Nut	IS-M8x1	Flywheel/crankshaft	15.0	20.0	
Locknut	IS-M5	Rocker arm mounting			
Screw	IS-M5x18	Starter cover/shroud/engine pan	4.4	6.0	
Screw	IS-M5x18	Starter cover/shroud/cylinder	4.4	6.0	

#### Remarks:

- 1) Install with high-strength Loctite 270
- 2) Do not lubricate with grease
- 3) Tighten in crosswise pattern

Fastener	Thread size	For component	Torque		Remarks
			lbf.ft	Nm	
Screw	IS-P5x14	Harness/backplate	3.0	4.0	
Screw	IS-M5x30	Valve cover/cylinder	4.4	6.0	
Spark plug	IS-M10x1	Spark plug	6.6	9.0	
Screw	IS-DG5x20	Ignition module/cylinder	4.4	6.0	

Use the following procedure when refitting a DG or P screw in an existing thread:

Place the screw in the hole and rotate it counterclockwise until it drops down slightly. Tighten the screw clockwise to the specified torque.

This procedure ensures that the screw engages properly in the existing thread and does not form a new thread and weaken the assembly.

Power screwdriver settings for polymer:

Plastoform screws

max. 600 rpm

DG screws

max. 500 rpm

**Important:**

Do not mix up screws with and without binding head

## 4. Troubleshooting

### 4.1 Rewind Starter

Condition	Cause	Remedy
Starter rope broken	Rope pulled out too vigorously as far as stop or over edge, i.e. not vertically	Fit new starter rope
	Normal wear	Fit new starter rope
Starter rope does not rewind	Rewind spring broken	Fit new rewind spring
	Spring overtensioned – no reserve when rope is fully extended	Fit new rewind spring
	Very dirty or corroded	Clean or replace rewind spring
Starter rope can be pulled out almost without resistance (crankshaft does not turn)	Guide pegs on pawls or pawls themselves are worn	Fit new pawls
	Spring clip fatigued	Fit new spring clip
Starter rope is difficult to pull and rewinds very slowly	Starter mechanism very dirty	Thoroughly clean complete starter mechanism
	Lubricating oil on rewind spring becomes viscous at very low outside temperatures (spring windings stick together)	Coat rewind spring with a standard solvent-based degreasant (containing no chlorinated or halogenated hydrocarbons). Then pull rope carefully several times until normal action is restored. When installing, coat rewind spring and starter post with STIHL special lubricant

## 4.2 Ignition System

Exercise extreme caution while carrying out maintenance and repair work on the ignition system. The high voltages which occur can cause serious or fatal injuries!

Condition	Cause	Remedy
Engine runs roughly, misfires, temporary low of power	Spark plug boot is loose	Press boot firmly onto spark plug, and fit a new leg spring if necessary
	Spark covered in soot, smeared with oil	Install new spark plug
	Wrong air gap between ignition coil and flywheel	Reset air gap
	Flywheel cracked or damaged or pole shoes have turned blue	Install new flywheel
	Ignition timing out of adjustment, flywheel warped, key in flywheel sheared	Install new flywheel
	Flywheel magnetization weak – pole shoes have turned blue	Install new flywheel
Engine does not run	No spark	Check operation of setting lever and ignition module
	No spark	Faulty insulation on ignition lead or short circuit wire. Use ohmmeter to check ignition lead for break. If break is detected or resistance is high, fit new ignition lead  Replace or clean spark plug, replace damaged parts of ignition system



### 4.3 Carburetor

Condition	Cause	Remedy
Carburetor floods, engine stalls	Inlet needle not sealing. Foreign matter in valve seat or cone damaged	Remove and clean or replace inlet needle, clean fuel tank, pickup body and fuel line if necessary
	Inlet control lever sticking on spindle	Free off inlet control lever
	Helical spring not located on nipple of inlet control lever	Remove inlet control lever and refit correctly
	Perforated disc on diaphragm is deformed and presses constantly against inlet control lever	Fit new metering diaphragm
	Inlet control lever too high (relative to design position)	Set inlet control lever flush with upper face of housing
Poor acceleration	Idle jet too lean	Turn low speed screw (L) counterclockwise (richer) no further than stop
	Main jet too lean	Turn high speed screw (H) counterclockwise (richer) no further than stop
	Inlet control lever too low (relative to design position)	Set inlet control lever flush with upper face of housing
	Inlet needle sticking to valve seat	Remove inlet needle, clean and refit
	Diaphragm gasket leaking	Fit new diaphragm gasket
	Metering diaphragm damaged or shrunk	Fit new metering diaphragm
	Impulse hose damaged or kinked	Fit new impulse hose

Condition	Cause	Remedy
Engine will not idle, idle speed too high	Throttle shutter opened too wide by idle speed screw ( <b>LA</b> ), throttle cable adjustment incorrect	Reset idle speed screw ( <b>LA</b> ), check throttle cable adjustment
	Engine leaking	Seal the engine
Engine stalls at idle speed	Idle jet bores or ports blocked	Clean jets and ports and blow clear with compressed air
	Idle jet too rich or too lean	Set low speed screw ( <b>L</b> ) correctly
	Setting of idle speed screw incorrect – throttle shutter completely closed	Set idle speed screw ( <b>LA</b> ) correctly
	Small plastic disc in valve jet does not close	Clean or renew valve jet
Engine speed drops quickly under load – low power	Air filter plugged	Clean air filter
	Throttle shutter not opened fully	Check throttle cable adjustment
	Tank vent faulty	Clean or replace tank vent if necessary
	Fuel pickup body dirty	Clean or replace pickup body
	Fuel strainers dirty	Fit new fuel strainers
	Leak in fuel line between tank and fuel pump	Seal or renew connections and fuel line
	Setting of high speed screw ( <b>H</b> ) too rich	Turn high speed screw ( <b>H</b> ) clockwise (leaner), no further than stop
	Main jet bores or ports blocked	Clean the carburetor
	Pump diaphragm damaged or fatigued	Fit new pump diaphragm

## 4.4 Engine

Always check and, if necessary, repair the following parts before looking for faults on the engine:

- Air filter
- Fuel system
- Carburetor
- Ignition system

Condition	Cause	Remedy
Engine does not start easily, stalls at idle speed, but operates normally at full throttle	Check compression	Check combustion chamber for excessive build-up of combustion deposits, check condition of valves and valve clearance
	Manifold leaking	Seal or replace manifold
	Oil seals on crankshaft defective	Replace oil seals
	Seal between cylinder and engine pan leaking/damaged (cracks)	Seal or replace engine pan
	Decompression lever sticking	Install new cam gear
Engine does not deliver full power or runs erratically	Piston rings worn or broken	Install new piston rings
	Muffler / spark arresting screen (if fitted) carbonized	Clean muffler (inlet and exhaust openings), replace spark arresting screen (if fitted)
	Secondary air seepage through faulty flange or manifold	Replace faulty parts
	Air filter element dirty	Fit new air filter element
	Fuel / impulse line kinked or cracked	Fit new lines or position without kinks
	Pump diaphragm torn	Install new pump diaphragm
	Decompression lever sticking	Install new cam gear
	Engine pan defective (cracks)	Replace engine pan


## 5. Rewind Starter / Shroud

### 5.1 General

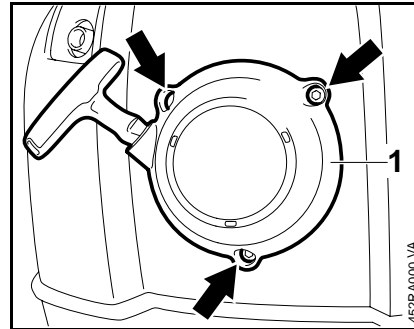
If the action of the starter rope becomes very stiff and the rope rewinds very slowly or not completely, it can be assumed that the starter mechanism is in order but plugged with dirt. At very low outside temperatures the lubricating oil on the rewind spring may thicken and cause the spring windings to stick together. This has a detrimental effect on the function of the starter mechanism. In such a case it is sufficient to apply a few drops of a standard solvent-based degreasant (containing no chlorinated or halogenated hydrocarbons) to the rewind spring.

Carefully pull out the starter rope several times and allow it to rewind until its normal smooth action is restored.

If clogged with dirt or pitch, the entire starter mechanism, including the rewind spring, must be removed and disassembled. Take particular care when removing the spring.

Lubricate the rewind spring and starter post with STIHL special lubricant,  13, before installing.

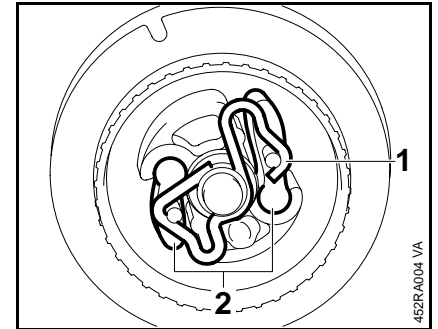
## 5.2 Removing and Installing




- Take out the screws (arrows).
- Remove the starter cover with rewind starter (1).

Install in the reverse sequence.


## 5.3 Pawl




- Remove the starter cover with rewind starter,  5.2

- Ease the spring clip (1) off the starter post starter post.
- Pull the pawls (2) out of the rope rotor.

Install in the reverse sequence.


- Lubricate pegs on pawls with grease,  13.

## 5.4 Rope Rotor

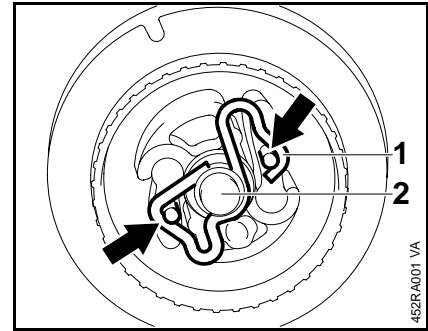
- Troubleshooting,  4.1

### Relieving tension of rewind spring

The rewind spring will not be under tension if the starter rope is broken.

- Pull out the starter rope about 5 cm and hold the rope rotor steady.
- While still holding the rotor steady, take three turns of the rope off the rotor.
- Pull out the starter rope and then slowly let go of the rotor.
- Remove the pawls,  5.3

Install in the reverse sequence.

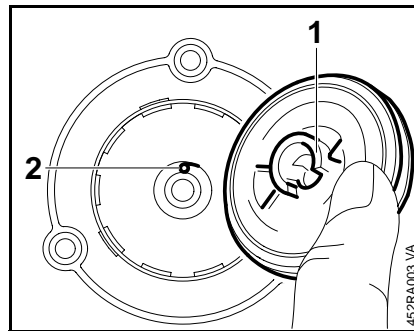



- Fit the washer and the pawls and engage the spring clip (1) in the groove on the starter post (2).
- Make sure the spring clip (1) engages the guide pegs (arrows) on the pawls and points them counterclockwise

Handle the spring clip with care. The rewind starter may not function properly if the spring clip is deformed.

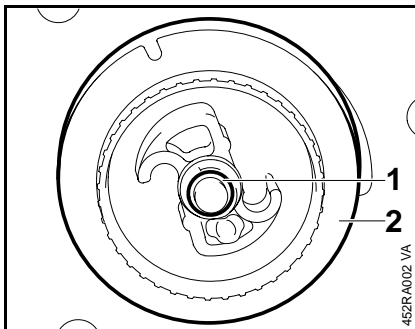
- Tension the rewind spring,  5.8


Install all other parts in the reverse sequence.





- Coat the bore in the rope rotor with STIHL special lubricant,  13.
- Fit the rope rotor on the starter post so that the driver (1) on the rotor slips behind in the inner spring loop (2).

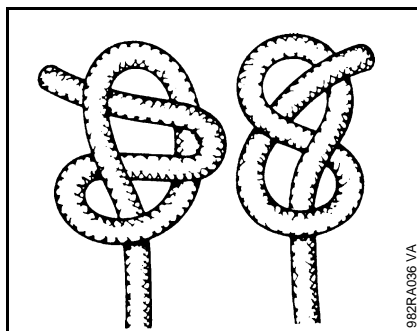
Install all other parts in the reverse sequence.



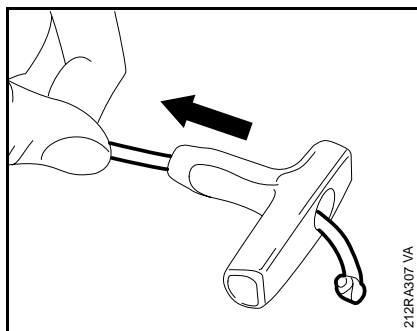
- Remove the washer (1).
- Carefully remove the rope rotor (2) from the starter post
- Remove worn or broken starter rope,  5.5

## 5.5 Starter Rope/Grip

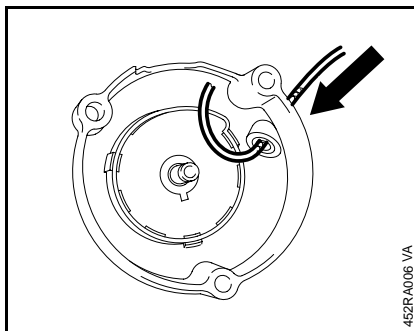
- Remove the starter cover with rewind starter,  5.2
- Remove the rope rotor,  5.4
- Remove the remaining rope from the rope rotor and starter grip.




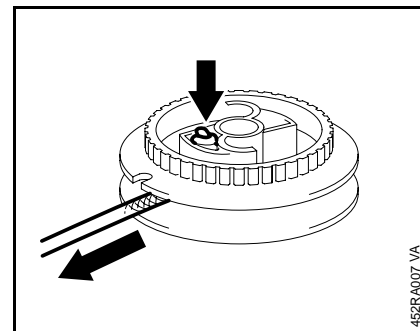
- Tie one of the special knots shown in the end of the new starter rope.




- Thread the new rope through the top of the starter grip from above.
- Pull the rope with knot into the starter grip.

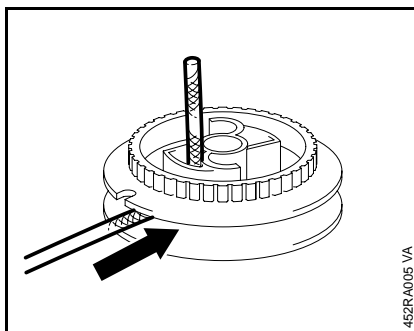


- Inspect rope guide bushing in the starter cover for damage and replace if necessary,  5.6
- Thread the starter rope through the bushing in the starter cover from outside.



- Pull the rope back into the rotor so that the knot locates in the recess (arrow).
- Tension the rewind spring,  5.8



Install all other parts in the reverse sequence.

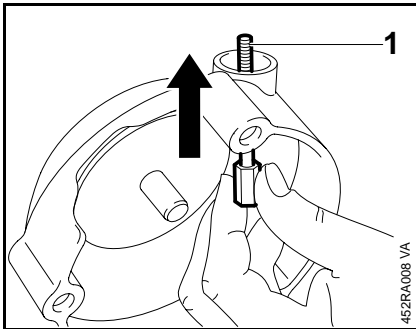


- Thread the rope through the rope rotor.
- Tie a simple overhand knot in the end of the rope.

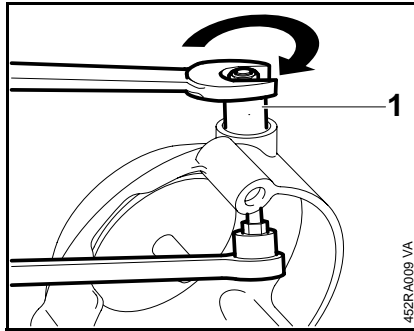
## 5.6 Rope Guide Bushing

Wear on the guide bushing is accelerated by the starter rope being pulled sideways. The wall of the guide bushing eventually wears through and the bushing becomes loose.

- Remove the starter cover with rewind starter,  5.2
- Remove the rope rotor,  5.4
- Use a suitable tool to pry the damaged bushing out of the starter cover.



- Place the new bushing in its seat in the starter cover.
- Insert the screw spindle (1) of installing tool 0000 890 2201 through the bushing from inside the cover.




- Fit the thrust sleeve (1), tapered end first, and screw on the hex nut.
- Tighten down the hex nut until the bushing is firmly seated.

The installing tool flares the lower end of the rope bushing.

- Remove the installing tool.

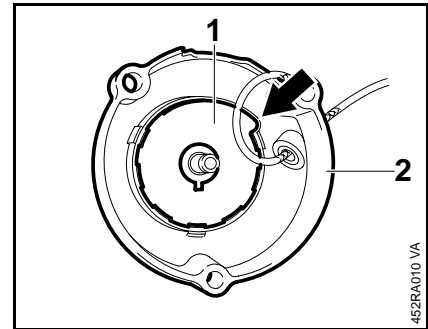
Install all other parts in the reverse sequence.

## 5.7 Replacing the Rewind Spring

- Troubleshooting,  4.1

Wear face protection and gloves.

- Remove the rope rotor,  5.4

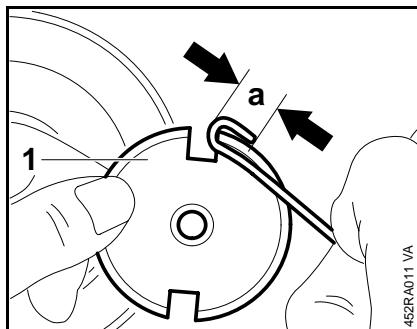


- Use a suitable tool to carefully remove the rewind spring (1) from the starter cover (2).
- Remove any pieces of broken spring from the starter cover,
- With the spring housing facing you, carefully clip the new rewind spring into the starter cover, making sure it is correctly positioned (arrow).

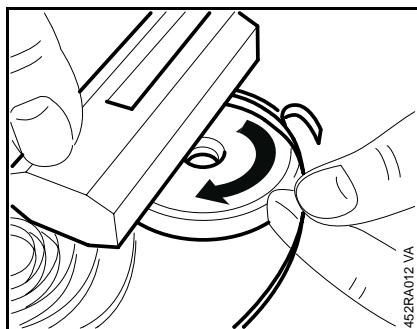
Install in the reverse sequence.

If the rewind spring pops out and uncoils during installation, refit it in special tool 1116 893 4800 as follows:

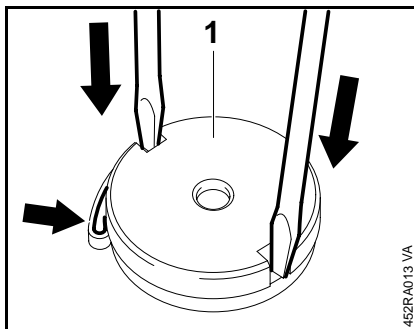
## 5.8 Tensioning the Rewind Spring



- Position the outer spring loop at distance “a” (30 mm) from the edge of the special tool (1).



- Wind the rewind spring counterclockwise, from the outside inwards.
- To simplify this operation, place the assembly block 1108 893 4800 across the top of the special tool.

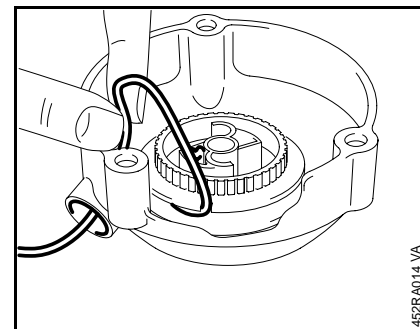


- Place the special tool (1) with the rewind spring on the spring housing.

The outer spring loop must line up with the recess in the spring housing (arrow).

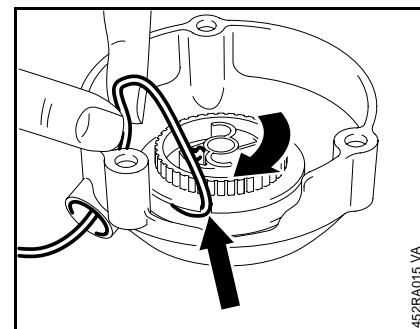
- Install the rope rotor, [5.4](#)

Install all other parts in the reverse sequence.



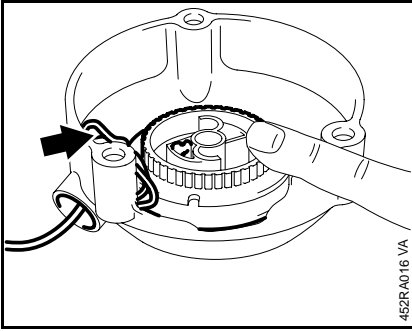
- Remove the starter cover with rewind starter, [5.2](#)

- Make a loop in the starter rope.



- Engage the rope in the notch (arrow) in the rotor. Grip the rope close to the rotor and use it to turn the rotor six full turns counterclockwise.

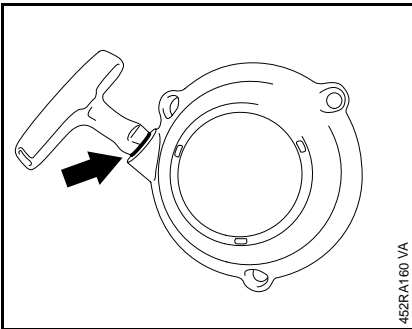




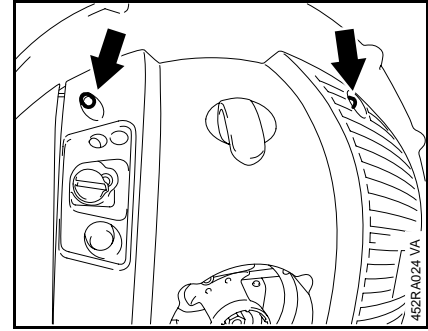
When the starter rope is fully extended, it must still be possible to rotate the rope rotor at least another half turn before maximum spring tension is reached. If this is not the case, pull the rope out, hold the rope rotor steady and take off one turn of the rope.  
Do not overtension the rewind spring as this will cause it to break.


Install in the reverse sequence.

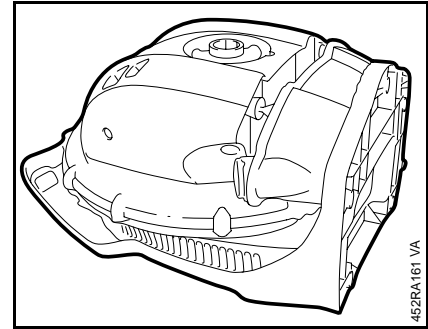
- Hold the rope rotor steady.
- Pull out the rope with the starter grip and straighten it out.
- Hold the starter grip firmly to keep the rope tensioned.
- Let go of the rope rotor and slowly release the starter grip so that the rope winds itself onto the rotor.



The starter grip must sit firmly in the rope guide bushing without drooping to one side. If this is not the case, tension the spring by one additional turn.



- Remove the starter cover with rewind starter,  5.2
- Take out the screws (arrows)



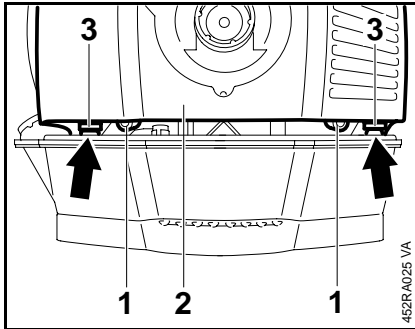
- Lay the unit on its back.

## 6. Fuel System

### 6.1 Air Filter

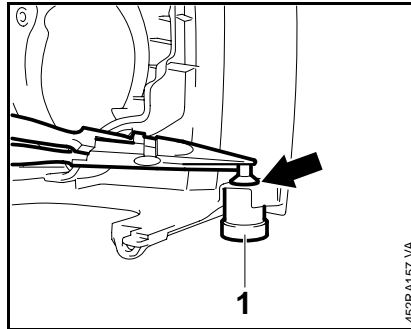
Dirty air filters reduce engine power, increase fuel consumption and make starting more difficult.

The air filter must be replaced when there is a noticeable loss of engine power.

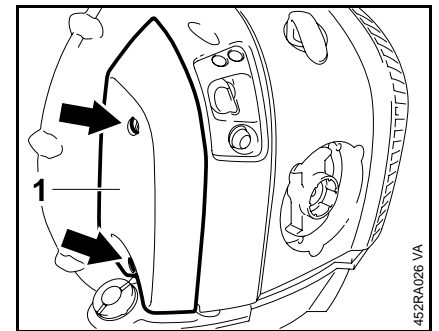


- Take out the screws (1).
- Ease the engine in the direction of the backplate until the stop buffers (3) are clear of their seats (arrows) and pull the shroud (2) towards you at the same time.rauskommen.

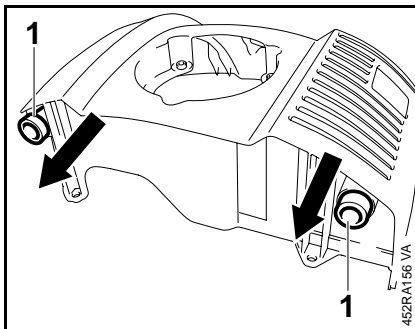
Install in the reverse sequence.



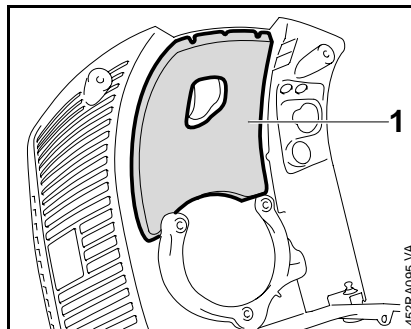
- Coat new stop buffers (1) with Press Fluid OH 723, 13.
- Use pliers to grip end of stop buffer and pull it up until its groove (arrow) engages the housing.



- Loosen the screws (arrows).
- Lift away the filter cover (1).

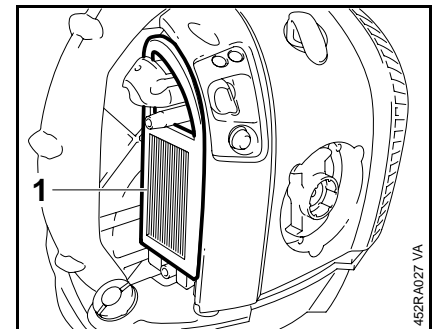


- Remove the stop buffers (1).



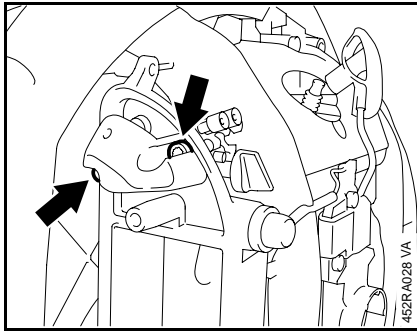
- If the shroud is replaced, also bond a soundproofing liner (1) in position.

Install all other parts in the reverse sequence.



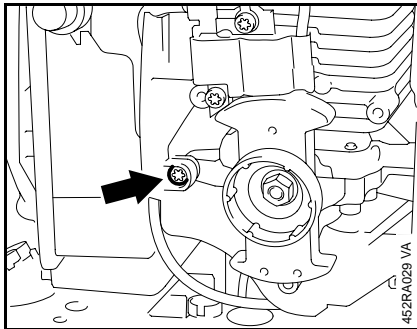
- Remove the air filter (1).

The filter element cannot be washed and must be replaced if it is heavily loaded.

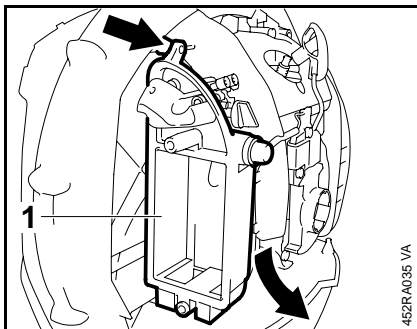


– If the filter housing has to be replaced, remove the shroud and rewind starter, 5.9

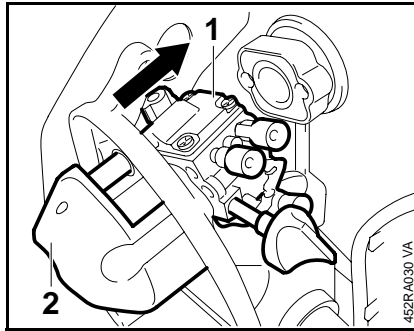
- Take out the screws (arrows)



- Take out the screw (arrow).

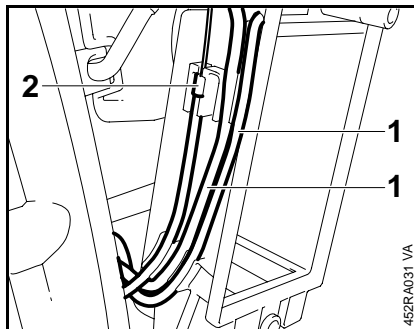


- Pull the filter housing (1) off its mounting (arrow).
- Take the filter housing (1) out of the machine.



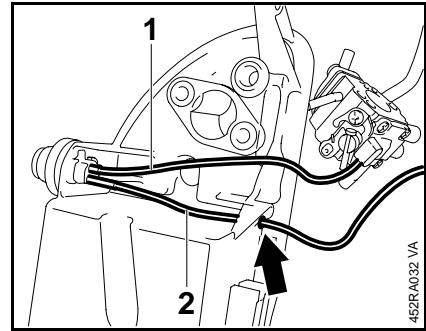
- Pull off the carburetor (1).
- If necessary, remove the baffle (2).

When installing, always fit a new gasket between the carburetor and filter housing.

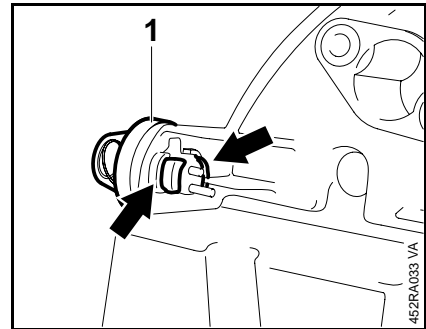


- Carefully remove the hoses (1).
- Pull out the throttle cable (2).

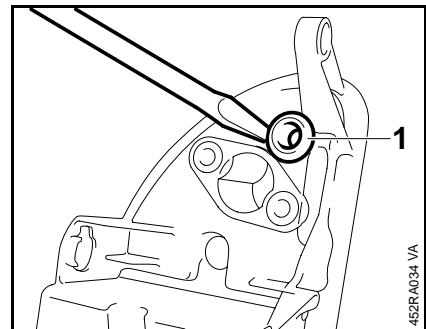
Replace damaged hoses.



- Carefully pull out the hose (1).
- Carefully disconnect the hose (2) and pull it out of the housing bore (arrow).



- Squeeze the tabs (arrows) together and disengage the fuel pump (1).

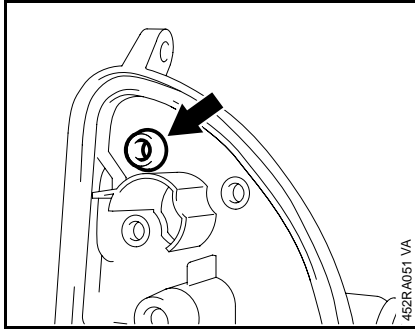


- Pry the grommet (1) out to the rear.

Install in the reverse sequence.

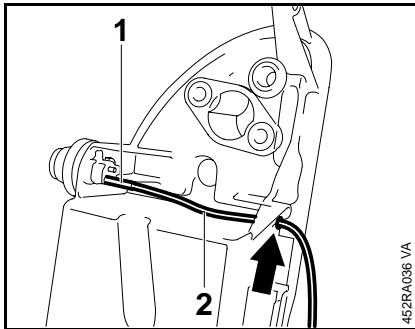
## 6.2 Carburetor

### 6.2.1 Leakage Test



Use a new grommet.

- Push the grommet into the filter housing from the rear until its groove (arrow) engages the housing.



- Clip the fuel pump in place so that the longer stub (1) is at the bottom.
- Pass the hose (2) that comes from the tank through the housing bore (arrow) and push it onto the long stub (1).

Install all other parts in the reverse sequence.

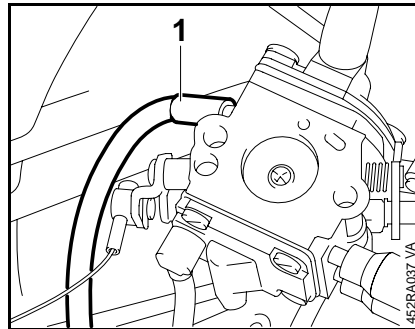
- Check tension of throttle cable, adjust if necessary, 9.3.2

- Troubleshooting, 4.3

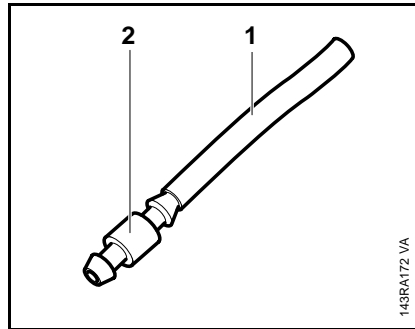
In the event of trouble with the carburetor or fuel supply system, always check, clean or replace the tank vent, 6.5

The carburetor can be tested for leaks with the carburetor and crankcase tester 1106 850 2905.

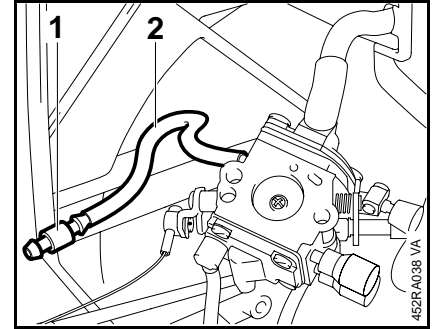
- Remove the air filter, 6.1
- Open the tank filler cap to relieve pressure.
- Close the tank filler cap.



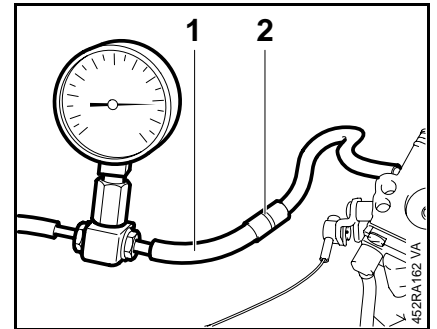
- Disconnect the fuel hose (1) from the carburetor.



- Push the hose (1) 1110 141 8600 onto the nipple (2) 0000 855 9200.

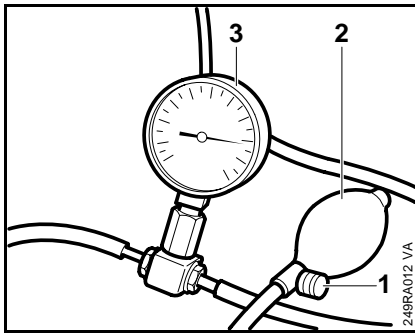


- Push the hose (2) with nipple (1) onto the carburetor's elbow connector.



- Connect hose (1) of tester 1106 850 2905 to the nipple (2).

## 6.2.2 Removing and Installing



- Close the vent screw (1) on the rubber bulb (2) and pump air into the carburetor until the pressure gauge (3) shows a reading of about 0.8 bar (80 kPa).

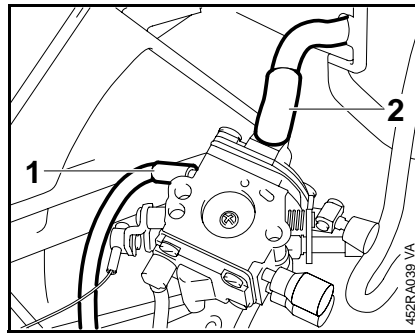
If this pressure remains constant, the carburetor is airtight. However, if it drops, there are two possible causes:

1. Inlet needle is not sealing foreign matter in valve seat or sealing cone of inlet needle is damaged or inlet control lever sticking), remove to clean, [6.3.2](#)

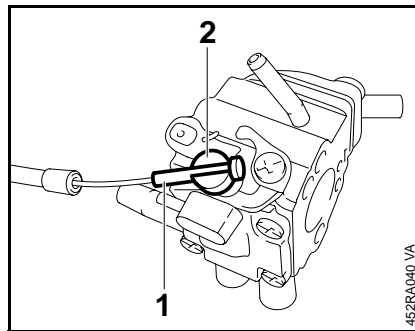
2. Metering diaphragm is damaged, replace if necessary, [6.3.1](#)

- After completing the test, open the vent screw (1) and pull the hose off the carburetor.
- Push the fuel hose onto the elbow connector.
- Install the carburetor, [6.2.2](#)

Install all other parts in the reverse sequence.



- Remove the filter housing, [6.1](#)
- Disconnect the fuel hose (1).
- Disconnect the impulse hose (2).



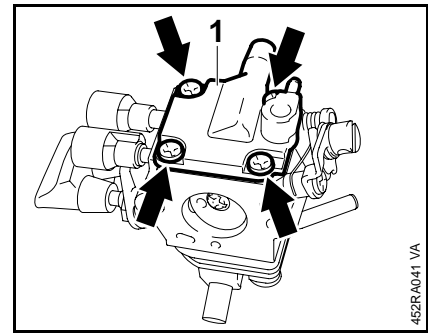
- Disconnect nipple (1) from the slotted pin (2) on the throttle lever.
- Check flange for damage and replace if necessary.

Install in the reverse sequence.

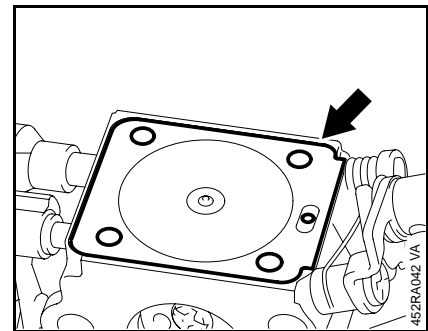
Always install new gaskets.

## 6.3 Servicing the Carburetor

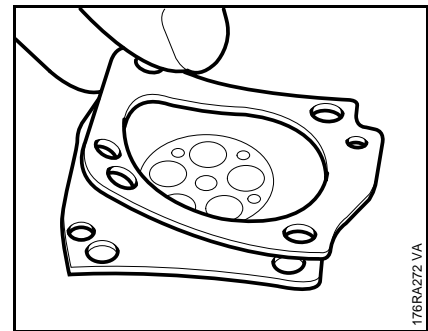
### 6.3.1 Metering Diaphragm



- Remove the carburetor, [6.2.2](#)
- Take out the screws (arrows).
- Remove the end cover (1).



- Remove the metering diaphragm and gasket (arrow) from the carburetor body or end cover.



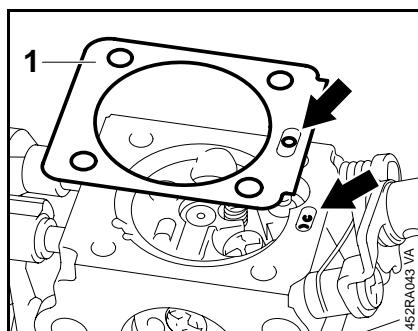
Carefully separate the diaphragm and gasket.

If the gasket and diaphragm are stuck to the carburetor, remove and separate them very carefully.

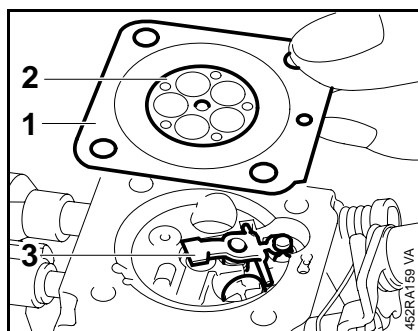
As a result of the alternating stresses, the diaphragm material and the inlet and outlet valves eventually show signs of fatigue, i.e. the diaphragm distorts and swells and has to be replaced.

Install in the reverse sequence.

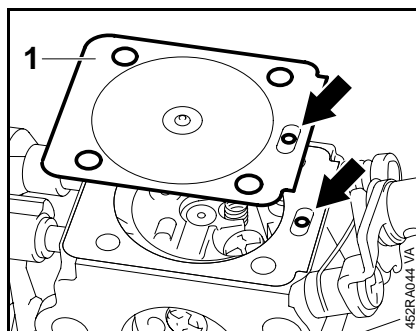
Use a new gasket.



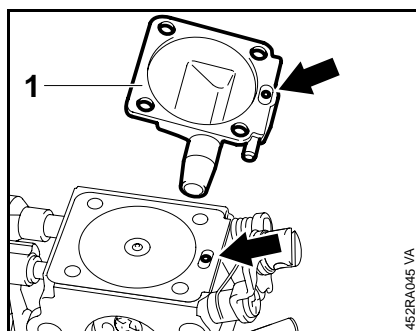
- Place the gasket (1) on the carburetor body so that the hole in the gasket lines up with the bore in the carburetor body (arrows).



- Place the metering diaphragm (1) on the carburetor body so that the perforated sheet (2) faces the inlet control lever (3).



- Line up the hole in the metering diaphragm (1) with the bore in the carburetor body.

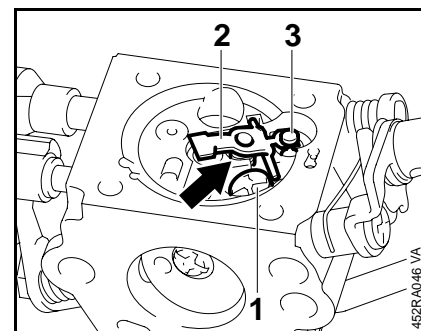


- Place the end cover (1) in position.

Make sure the bore in the end cover lines up with the hole in the metering diaphragm (arrows).

- Fit the screws and tighten them down firmly, 3.4

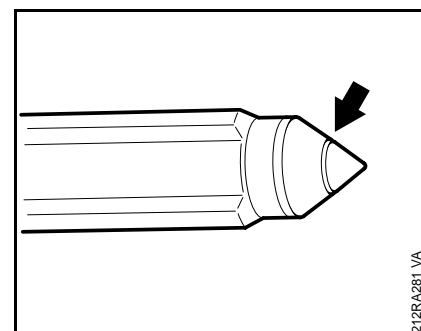
Install all other parts in the reverse sequence.



- Remove the metering diaphragm, 6.3.1
- Take out the screw (1).
- Remove the inlet control lever (2) with spindle.

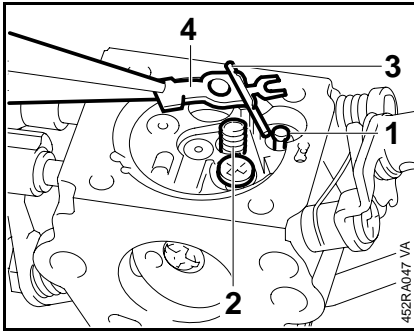
There is a small spring (arrow) under the inlet control lever. It may pop out during disassembly.

- Pull out the inlet needle (3).



- If there is an annular indentation (arrow) on the sealing cone of the inlet needle, replace the inlet needle because it will no longer seal properly.

### 6.3.3 Pump Diaphragm



Install in the reverse sequence.

- Fit the inlet needle (1).
- Place the helical spring (2) in the bore.
- Insert the spindle (3) in the inlet control levers (4).
- Engage clevis in annular groove on head of the inlet needle.
- Push the inlet control lever down and secure in position with the screw.

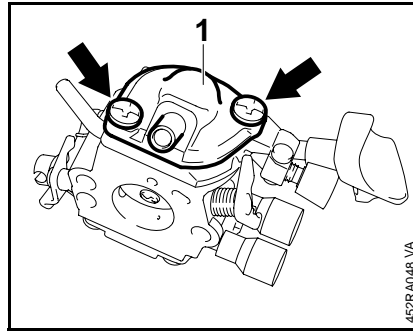
Make sure the helical spring locates on the control lever's nipple.

- Check that the inlet control lever moves freely.

The upper edge of the inlet control lever must be flush with the top of the carburetor body.

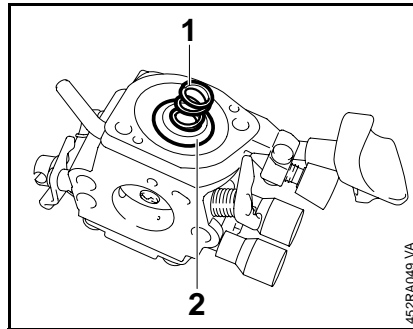
- Install the metering diaphragm, 6.3.1

Install all other parts in the reverse sequence.

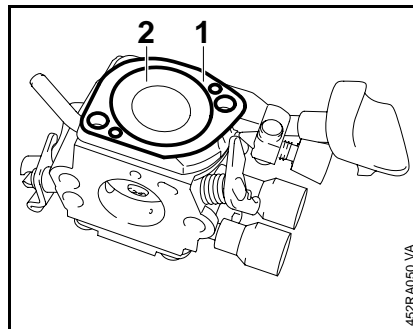


- Remove the carburetor, 6.2.2

- Take out the screws (arrows)
- Remove the end cover (1).

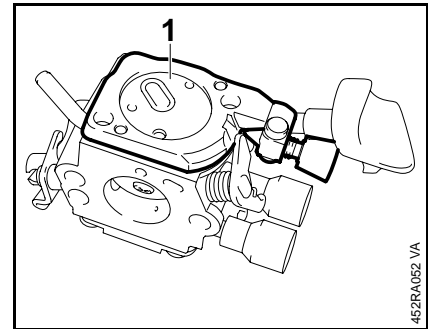


- Remove the spring (1).
- Remove the washer (2).

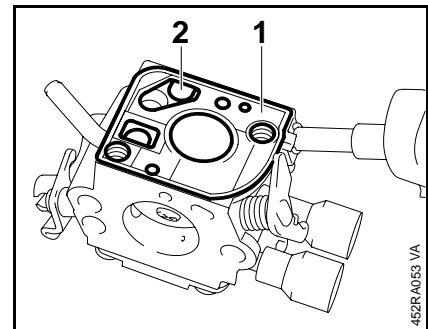


- Remove the gasket (1) with pump diaphragm (2).

- Carefully separate the diaphragm and gasket.
- Inspect the diaphragm for damage and wear, fit a new gasket.



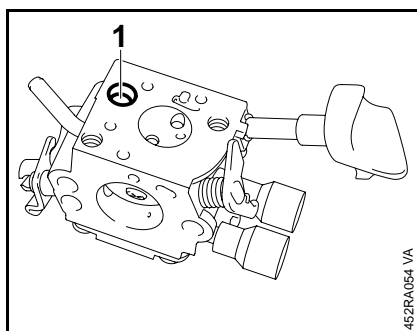
- Remove the pump cover (1).



- Remove the gasket (1) with pump diaphragm (2).

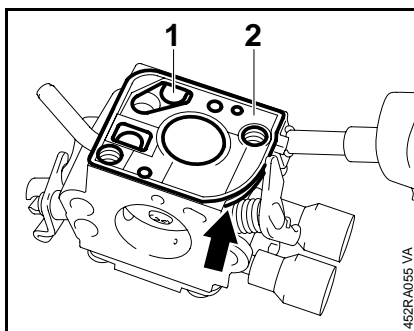
- Carefully separate the diaphragm and gasket.
- Inspect the diaphragm for damage and wear, fit anew gasket.

As a result of the alternating stresses, the diaphragm material and the inlet and outlet valves eventually show signs of fatigue, i.e. the diaphragm distorts and swells and has to be replaced.



- Examine the fuel strainer (1) for contamination and damage. If necessary, use a needle to pull it out of the carburetor body and clean or replace.

Install in the reverse sequence.



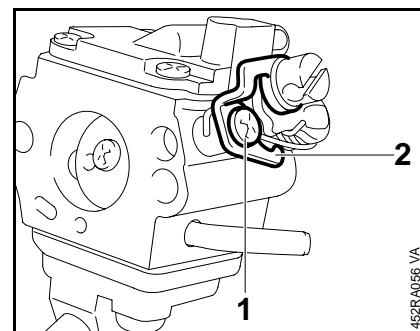
- Fit the diaphragm (1) and gasket (2) on the carburetor body so that contours (arrow) match.

- Place the end cover on the carburetor.

The pump diaphragm and gasket are held in position by cast pegs on the end cover.

- Fit the screw and tighten it down firmly, 3.4

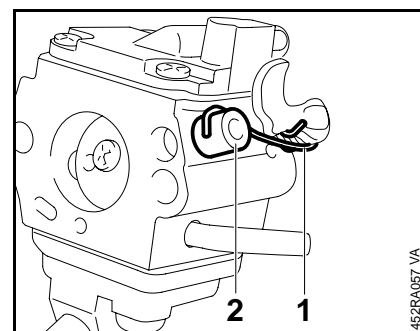
Install all other parts in the reverse sequence.



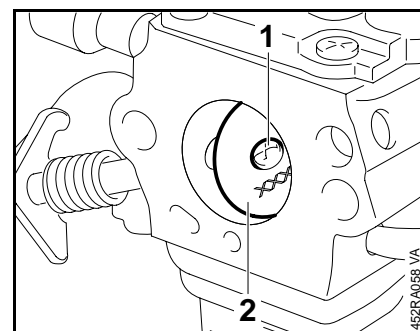
- Remove the carburetor, 6.2.2

Wear safety glasses.

- Take out the screw (1).
- Remove the throttle lever (2).



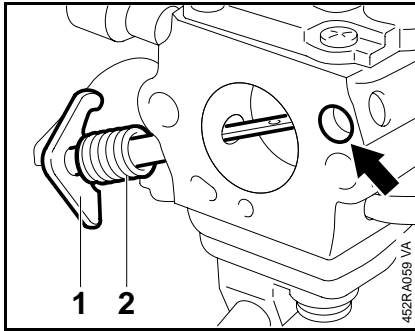
- Carefully remove the spring (1).
- Remove the sleeve (2).



Note correct installed position of throttle shutter.

- Take out the screw (1).
- Remove the throttle shutter (2).





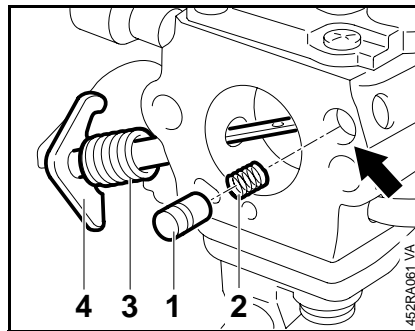
Note the installed position of the spring (2).

Always cover the bore (arrow) with a finger to stop components popping out.

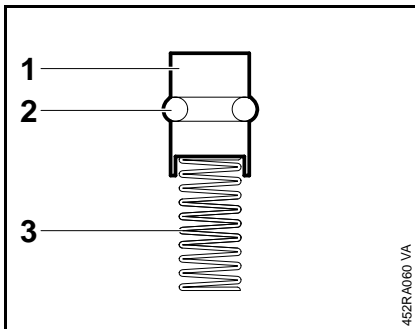
- Carefully pull out the throttle shaft (1).

– Inspect components for damage and wear, replace as necessary.

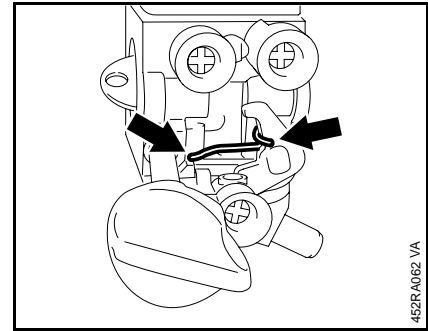
Install in the reverse sequence, always using a new pump piston.



Install the parts of the accelerator pump in the following sequence: First fit the spring (2) in the pump piston (1) and insert them both in the bore (arrow). Slide the throttle shaft (4) with spring (3) into the carburetor body. Use a suitable tool to carefully hold down the pump piston and then push the throttle shaft fully home.

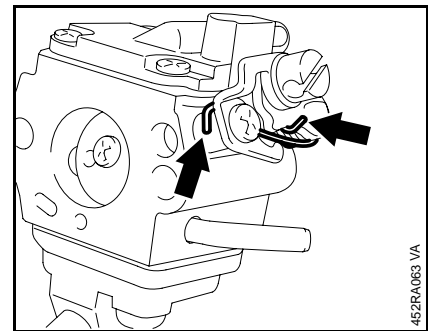


- Take the pump piston (1) with sealing ring (2) and spring (3) out of the carburetor body.

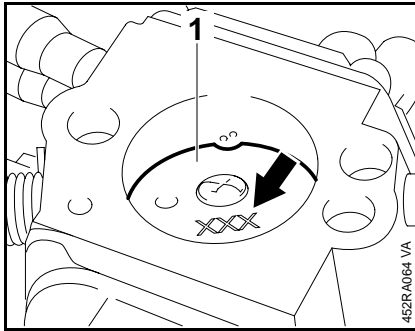


- Check correct installed position (arrows) of spring.

Install all other parts in the reverse sequence.



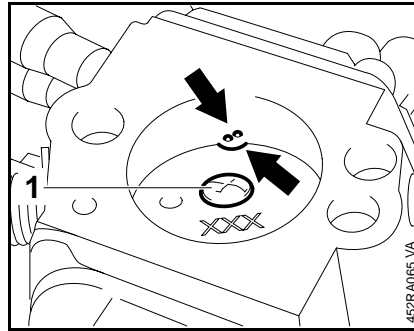
- Check correct installed position (arrows) of spring.



– Use a new screw and coat it with Loctite.

- Fit the throttle shutter (1) and tighten it down moderately, 3.4

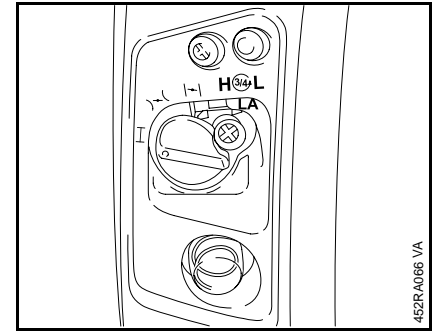
Check that the stamped digits (arrow) face up.



– Check that the notch in the throttle shutter lines up with the bores (arrows) in the carburetor body.

- Loosen the screw (1) slightly.
- Center the throttle shutter so that it moves freely.
- Tighten down the screw (1).
- Check that shutter still moves freely.

Install all other parts in the reverse sequence.



### Standard setting

Do not remove the limiter caps to carry out the standard setting.

- With this carburetor it is only possible to correct the setting of the high speed screw (H) and low speed screw (L) within fine limits.

Make the following adjustments:

- Turn the high speed screw (H) counterclockwise as far as stop.
- Turn the low speed screw (L) counterclockwise as far as stop.
- Check the air filter and replace it if necessary, 6.1

If the air filter is dirty, install a new one – do not clean.

- Check adjustment of throttle cable, 9.3.2
- Check the spark arresting screen (if fitted), 7.6
- Start the engine and allow it to warm up.
- Adjust engine idle speed.

## 6.4.2 Basic Setting in Service Shop

### Engine stops while idling

- Turn the idle speed screw (**LA**) slowly clockwise until the engine runs smoothly.

### Erratic idling behavior, engine stops even though setting of LA screw is correct, poor acceleration, idle speed too high

- Idle setting is **too lean**. Turn the low speed screw (**L**) counter-clockwise (no further than stop) until the engine runs and accelerates smoothly.

### Erratic idling behavior

- Idle setting is **too rich**. Turn the low speed screw (**L**) clockwise (no further than stop) until the engine runs and accelerates smoothly.

### Fine-tuning the carburetor for operation at high altitude

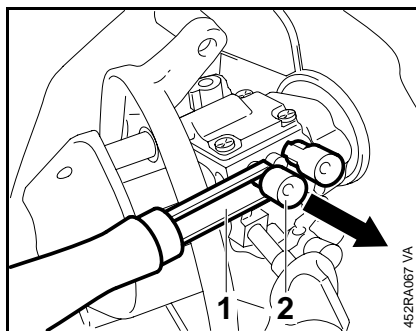
A minor correction may be necessary if engine does not run satisfactorily:


- Check the standard setting.
- Warm up the engine.
- Turn the high speed screw (**H**) clockwise (leaner), but no further than stop.

If the setting is too lean, there is a risk of engine damage due to insufficient lubrication and overheating.

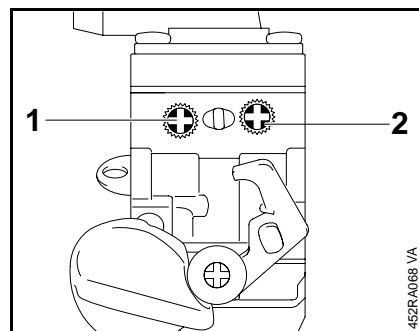
The limiter caps need to be removed only if it is necessary to replace the high speed screw (**H**) or low speed screw (**L**), clean the carburetor or adjust it from scratch.

After removing the limiter caps it is necessary to carry out the basic setting.



- Remove the shroud with rewind starter,  5.9

- Push the puller (1) 5910 890 4501, with the open side facing you, between the limiter cap (2) and carburetor body and pry the cap off. If the limiter cap is stuck on the screw, turn the puller over so that its open side faces the carburetor body. Pry off the limiter cap.



After removing the limiter caps it is necessary to carry out the basic setting.

- Screw both adjusting screws down against their seats.

Make the following adjustments:

- Open the high speed screw **H** (1) 3 1/2 turns clockwise.
- Open the low speed screw **L** (2) 2 turns clockwise.
- Set the idle speed to 2,500 rpm with the low speed screw (**L**).

### Fine tuning with tachometer

- Check the air filter and replace it if necessary.

If the air filter is dirty, install a new one – do not clean.

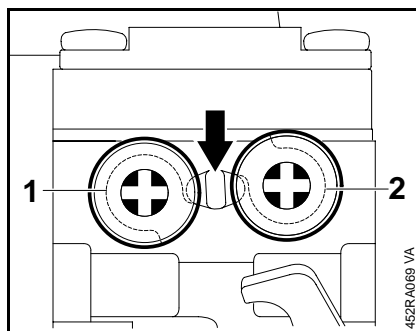
- Check the spark arresting screen (if fitted) and clean or replace if necessary.
- Warm up the engine.

Adjust the idle speed with a tachometer. Adjust the specified engine speeds within a tolerance of  $\pm 200$  rpm.

1. Adjust engine speed with idle speed screw (**LA**) to 3,300 rpm.
2. Turn low speed screw (**L**) clockwise or counter-clockwise to obtain maximum engine speed.

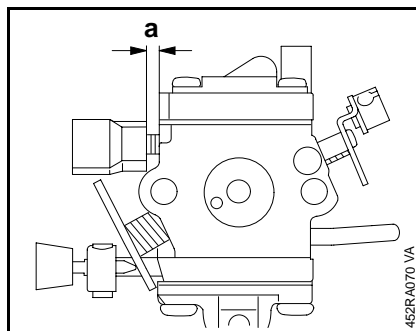
If this speed is higher than 3,700 rpm, abort the procedure and start again with step 1.

3. Use the idle speed screw (**LA**) to set engine speed again to 3,300 rpm.
4. Set the engine speed to 2,500 rpm with the low speed screw (**L**).
5. Use the high speed screw (**H**) to adjust the maximum engine speed to:  
5,500 rpm on the **BR 500**  
6,100 rpm on the **BR 550**  
7,200 rpm on the **BR 600**



Do not re-stall used caps because they may be damaged. Always install new limiter caps.

- Place the new limiter caps on the adjusting screws (1+2) so that they are positioned against the rich stop.



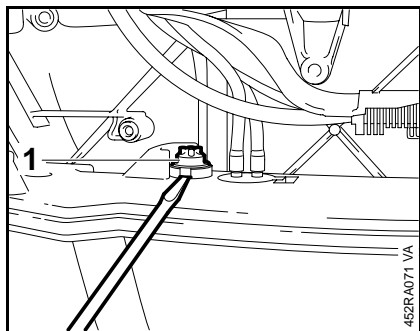
- Push the caps onto the screws until dimension "a" is 5 mm.
- Adjust engine idle speed, 6.4.1

Correct operation of the carburetor is only possible if atmospheric pressure and internal fuel tank pressure are equal at all times. This is ensured by the tank vent.

In the event of trouble with the carburetor or the fuel supply system, always check and clean the tank vent.

Check function by performing pressure and vacuum tests on fuel tank via the fuel hoses.

- Disconnect both hoses from the carburetor, 6.2.2
- Seal one of the two hoses with a suitable plug.
- Connect the other hose to the vacuum pump 0000 850 3501 and test fuel tank under vacuum.



Equalization of pressure takes place via the tank vent (1). There must be no build-up of vacuum in the tank. If the tank vent does not operate properly, replace it together with the O-ring.

- Clean the tank vent (1) and the area around it before removing.
- If the tank vent (1) has to be replaced, use a suitable tool to pry it out of the fuel tank.

Hold the tank vent during this operation to prevent it popping out.

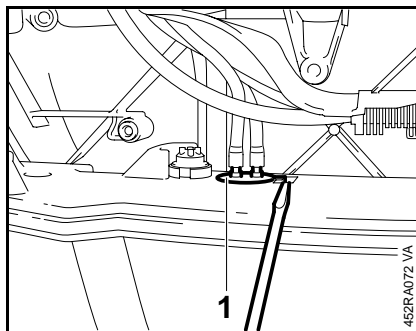
Take care not to damage the fuel tank.

Install in the reverse sequence.

Use a new O-ring.

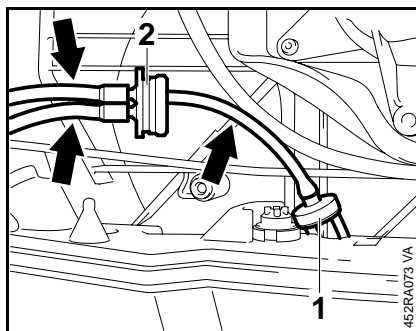
- Coat O-ring and bead of tank vent with Press Fluid OH 723 before installing, 13.
- Press home the tank vent squarely as far as stop – it must snap audibly into position.

Install all other parts in the reverse sequence.



- Remove the shroud with rewind starter, 5.9

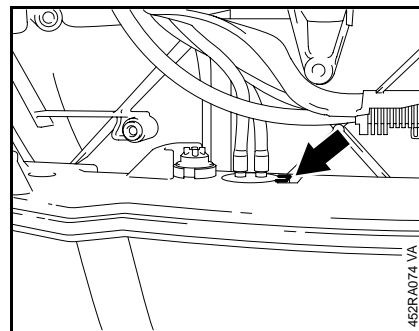
- Carefully pry the connector (1) with hoses and pickup body out of its seat.



- If necessary, pull off the fuel hoses (arrows) and pickup body (1).

Install in the reverse sequence.

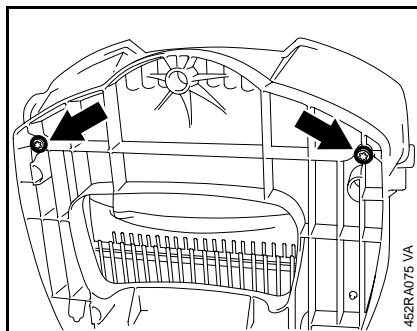
- Fit a new O-ring (2).



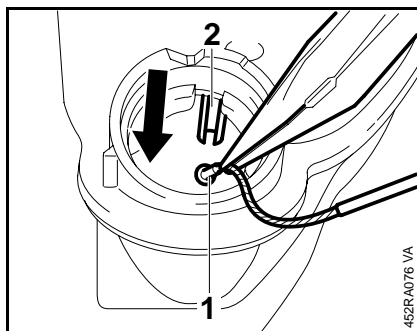
The tab on the connector (arrow) must locate in the fuel tank's recess.

- Press home the connector as far as stop – it must snap audibly into position.

## 6.7 Fuel Tank

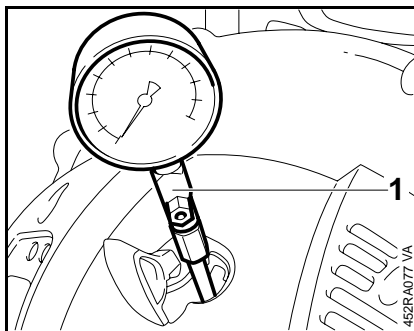


- Drain the fuel tank.
- Remove the tank vent, 6.5
- Remove the fuel hoses, 6.6
- Take the screws (arrows) out of the bottom of the backplate.
- Remove the fuel tank.



- Disconnect the tank cap cord (1) from the slot (2).
  - Remove the fuel tank cap.
- Install in the reverse sequence.

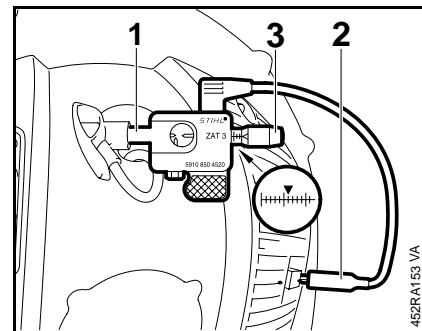
## 7. Engine 7.1 Compression Pressure



- Pull off the spark plug boot.
- Unscrew the spark plug.
- Screw compression tester 5910 850 2000 (1) into the spark plug hole.

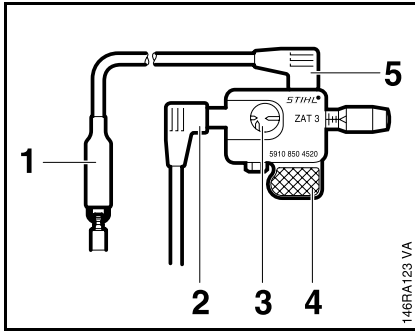
The ZAT 3 ignition system tester 5910 850 4520 must be fitted to discharge the ignition voltage.

The high voltages that occur can cause an electric shock.



- Connect spark plug boot to terminal (1).
- Attach the ground terminal (2) to the muffler.
- Set the spark gap to about 2 mm with the adjusting knob (3).

## 7.2 Checking / Adjusting Valve Clearances



When using the ZAT 3, hold it only by the handle (4) or position it in a safe place. Keep fingers or other parts of body at least 1 cm away from the spark window (3), the high voltage connection (2), ground connection (5) and the ground terminal (1).

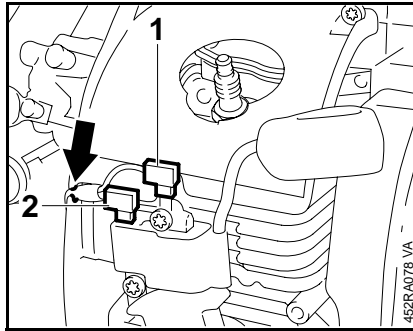
- Crank the engine quickly with the starter (min. 1,000 rpm).
- 
- Note compression pressure.

If compression pressure is below 7.5 bar, check valve clearance and readjust if necessary, 7.2.

If this produces no improvement, check the cylinder, valve seat, piston and piston rings for scores or other damage and replace if necessary.

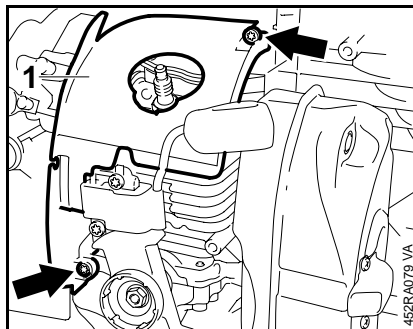
The design specification is 7.5 – 8.5 bar.

If a much higher reading is obtained (9 – 10 bar), check operation of the decompression system and replace if necessary, 7.5.1.

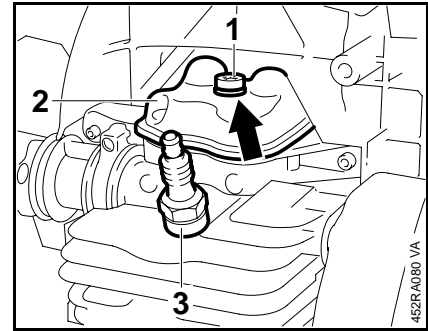


Check and adjust valve clearances only when engine is cold.

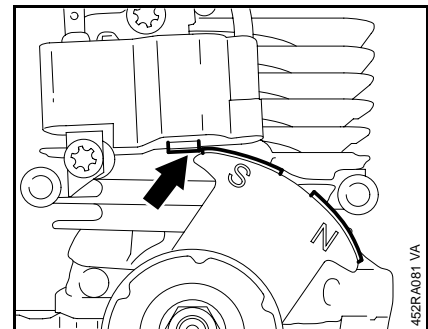
- Remove the shroud with rewind starter, 5.9
- Disconnect wires (1) and (2) from the ignition module.
- Take the wires out of the air guide shroud (arrow).



- Take out the screws (arrows)
- Remove the air guide shroud (1).

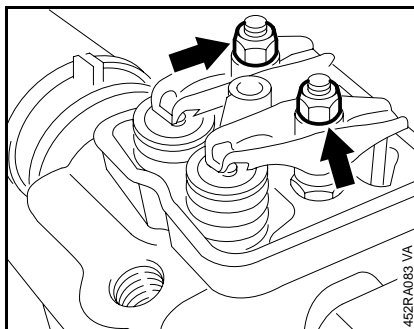


- Take out the screw (1).
- Remove the sealing ring (arrow).
- 
- Remove the valve cover (2) with gasket.
- Use combination wrench 4180 890 3400 to unscrew the spark plug.



- Rotate the crankshaft until the tip (arrow) of the flywheel lines up with the ignition module as shown.

Observe rocker arms while rotating the fanwheel. If the valves are operated by the rocker arms in this position (valve overlap), rotate the crankshaft another turn until the valves are idle (ignition TDC). Turn the crankshaft back and forth a little to check again that the valves are not operated in this position.



### Adjusting valves

Valve clearance is adjusted with the locknuts (arrows).

To increase valve clearance:  
Loosen the nut.

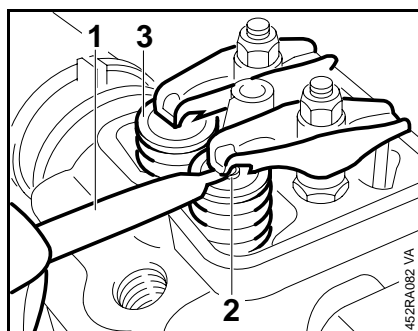
To reduce valve clearance:  
Tighten the nut.

- Turn engine over several times, check valve clearance again and adjust if necessary.

Assemble all parts in the reverse sequence.

- Thoroughly clean the sealing faces on the cylinder and cover.

Fit a new gasket.

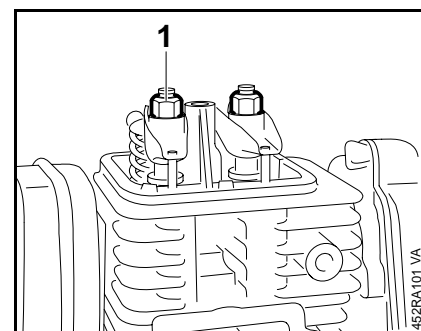


- Insert feeler gauge 4180 893 6400 (1) between rocker arm and valve stem.

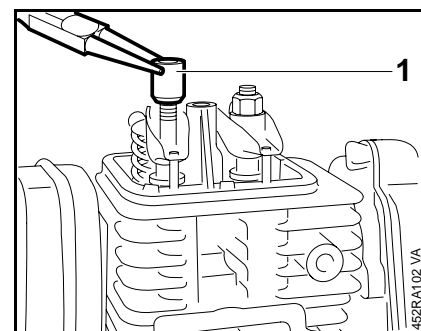
The feeler gauge must slip through with a certain resistance.

Inlet valve (2) =  $0.10 \pm 0.02$  mm  
Exhaust valve (3) =  $0.10 \pm 0.02$  mm

- Remove the inner fan housing, 11.2
- Take out the locking screw 4282 890 2700.
- Remove the valve cover, 7.2
- Set the piston to ignition TDC, 7.2

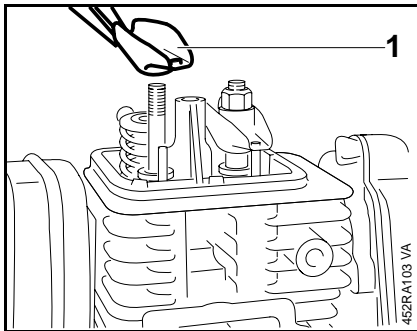


- Remove the locknut (1).

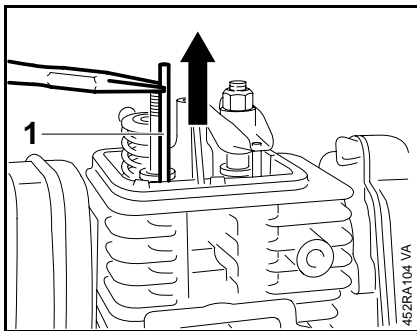


- Remove the sleeve (1).

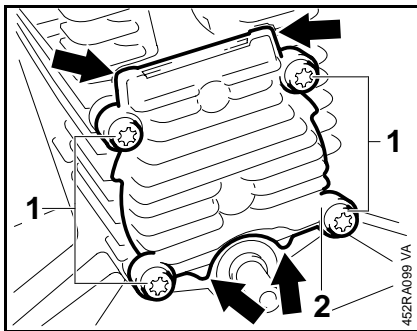




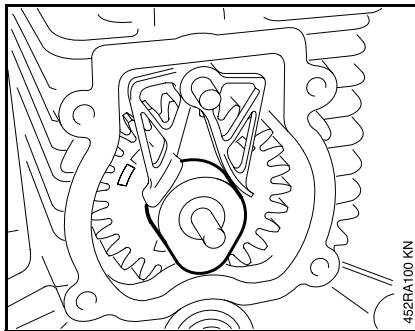
- Remove the rocker arm (1).



- Take out the pushrod (1).



- Take out the screws (1).
- Carefully pry off the cover (2) in a crosswise pattern at the points shown (arrows).



Install in the reverse sequence.

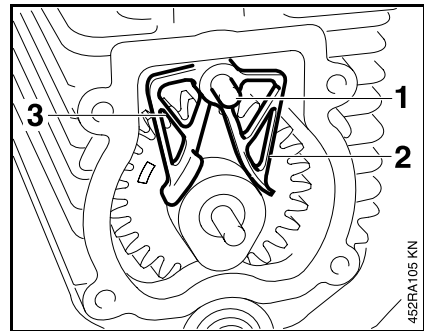
Cam lobe on cam gear must point downward.

Coat all parts with two-stroke engine oil before installing.

Make sure the pushrod is properly seated in the rocker arm and cam follower.

- Adjust the valves, 7.2
- Thoroughly clean the sealing faces on the cylinder and cover.
- Apply thin coating of sealant to cylinder sealing face, 13.

Follow maker's instructions.



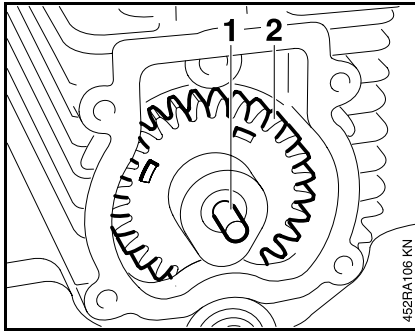
- Remove the pushrods, 7.3


- Pull out the pin (1).
- Remove the cam followers (2) and (3).

Install in the reverse sequence.

Coat all parts with two-stroke engine oil before installing.

Install the left-hand cam follower first. It controls the inlet valve.



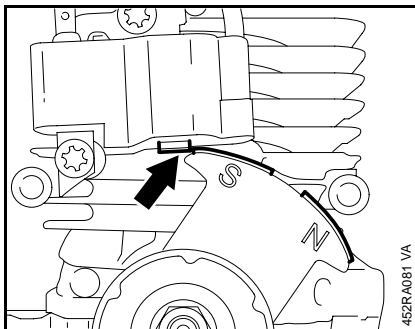
– Remove the cam followers,  7.4

● Pull out the pin (1).

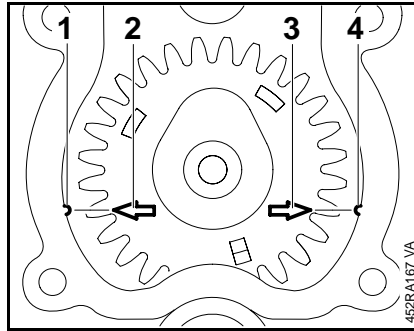
● Remove the cam gear (2).

Install in the reverse sequence.

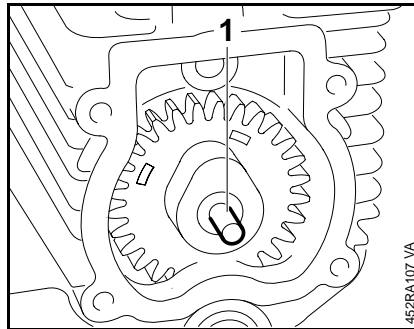
Coat all parts with two-stroke engine oil before installing.



● Rotate the crankshaft until the tip (arrow) of the flywheel lines up with the ignition module as shown.




● Fit the cam gear so that the marks (2) and (3) and in alignment with the notches (1) and (4) in the cylinder.

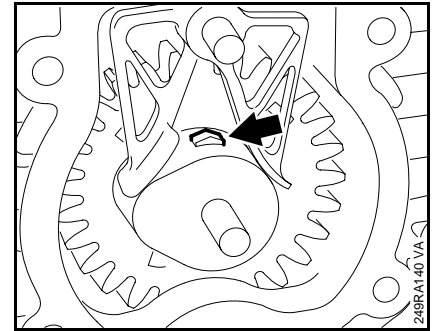



● Install the pin (1).

The marks must not move out of position while the cam gear is being fitted.

– Rotate the crankshaft until the cam lobe on the cam gear points downward.

– Install the cam followers,  7.4




– Remove cam gear cover,  7.3

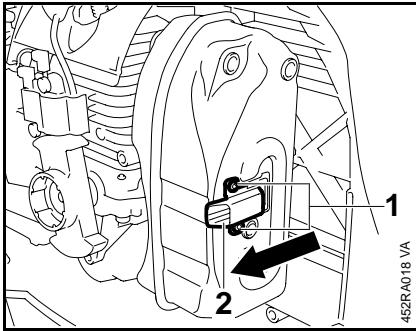
● Check free movement and function of decompression system lever (arrow).

– Lever must project about 2 mm from the cam.

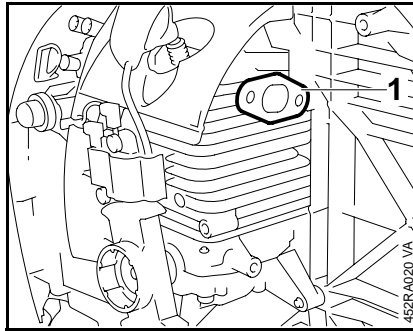
– Push decompression system lever counterclockwise. The lever must move freely and retract fully.

If the lever is difficult to move, worn or not visible, install a new cam gear,  7.5.

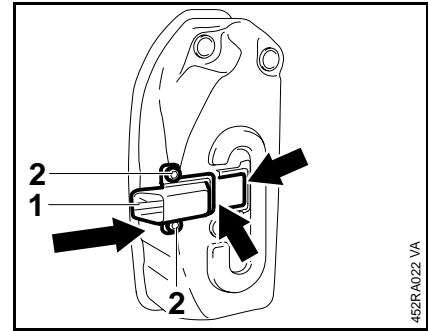
## 7.6 Muffler/Spark Arresting Screen



- Loosen the screws (1).
- Remove the scoop (2) to the left.

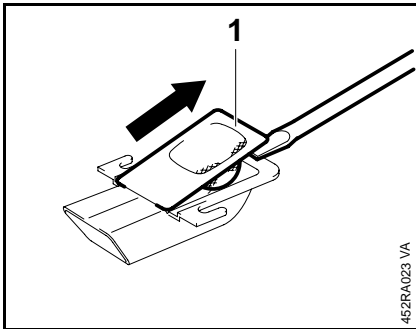


- Remove the gasket (1).
    - Clean the sealing faces.
- Install in the reverse sequence.
- Always install a new muffler gasket.

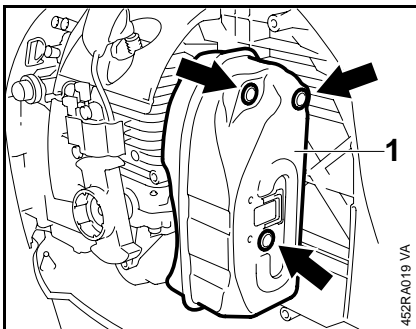


- Push the scoop (1) into place.
- Tighten down the screws (2) firmly.

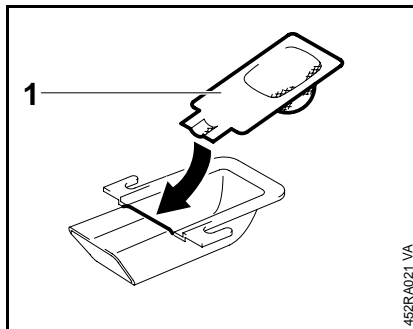
Install all other parts in the reverse sequence.



- If a spark arresting screen (1) is fitted, carefully pry it out and clean or replace it as necessary.

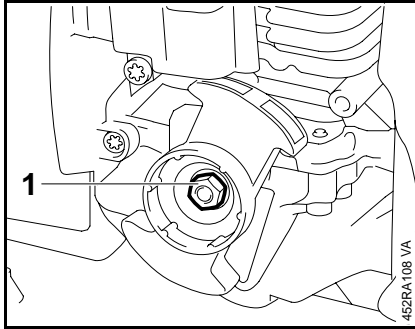


- Take out the screws (arrows)
- Remove the muffler (1).



- Carefully fit the spark arresting screen (1) in position.

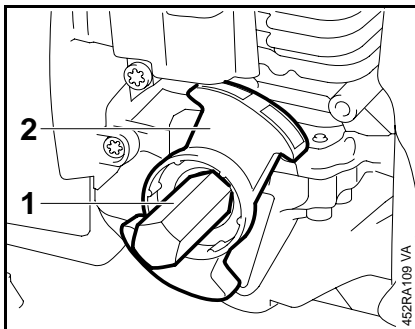
Guide lug on spark arresting screen must engage the scoop.



- Remove the shroud with rewind starter, 5.9
- Unscrew the spark plug and install the locking screw 4282 890 2700 in its place.

Always use the specified locking screw. Other locking screws may damage the piston.

- Unscrew the flywheel nut (1).



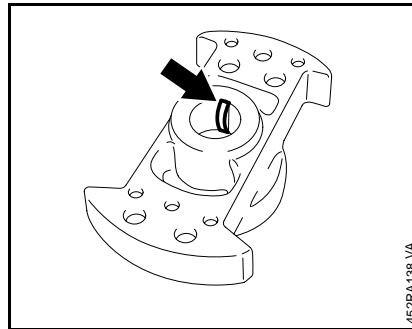
- Screw home the puller 1116 893 0800 (1).
- Tap the puller until the flywheel (2) is released from its seat.

- Lift away the flywheel.

If the flywheel or magnet poles are damaged or have turned blue, install a new flywheel.

- Clean the stub of the crankshaft and the flywheel hub bore with a standard commercial, solvent-based degreasant containing no chlorinated or halogenated hydrocarbons, 13.

Install in the reverse sequence.



- Make sure the flywheel's key (arrow) engages the slot in the crankshaft.
- Adjust gap between ignition module and flywheel, 8.4

Install all other parts in the reverse sequence.

Defective oil seals and gaskets or cracks in castings are the usual causes of leaks. Such faults allow supplementary air to enter the engine and upset the fuel-air mixture.

This makes adjustment of the prescribed idle speed difficult, if not impossible.

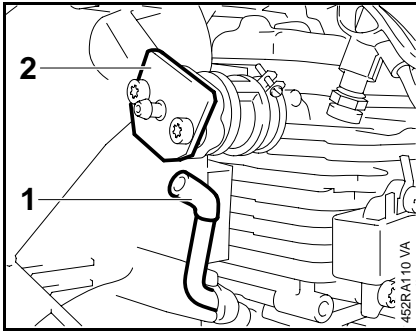
Moreover, the transition from idle speed to part or full throttle is not smooth.

The crankcase can be checked thoroughly for leaks with the carburetor and crankcase tester and the vacuum pump.

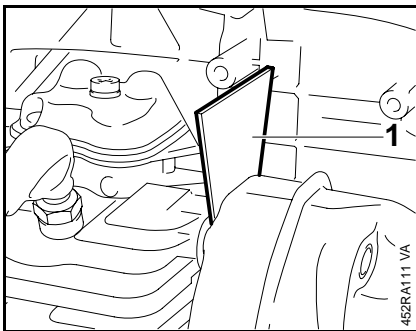
Always carry out the vacuum test first and then the pressure test.

After completing the tests, always install a new muffler gasket.

## 7.8.1 Preparations



- Remove the carburetor, 6.2.2
- Loosen the muffler mounting screws, 7.6
- Seal the impulse hose (1) with a suitable plug.
- Mount the test flange 1119 850 4201 (2) to the manifold with suitable screws.



- Slide the sealing plate 0000 855 8106 (1) between the muffler and cylinder exhaust port.
- Tighten the muffler mounting screws moderately.

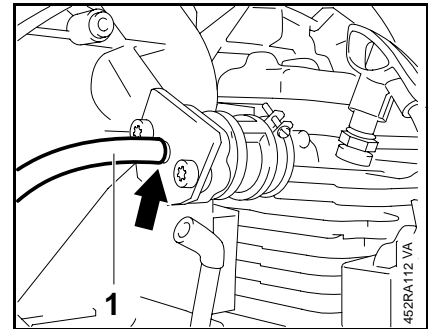
The sealing plate must completely fill the space between the screws.

- Set the piston to top dead center.
- Perform vacuum test, 7.8.2
- Perform pressure test, 7.8.3

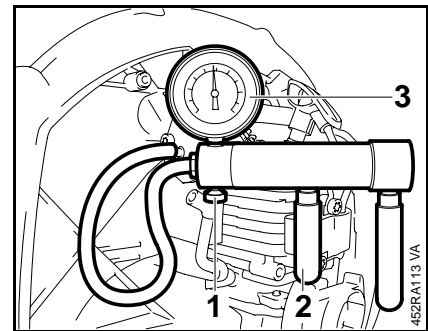
## 7.8.2 Vacuum Test

Oil seals tend to fail when subjected to a vacuum, i.e. the sealing lip lifts away from the crankshaft during the piston's induction stroke because there is no internal counterpressure.

A test can be carried out with the vacuum pump to detect this kind of fault.



- Carry out the preparations, 7.8.1
- Connect suction hose (1) of vacuum pump 0000 850 3501 to nipple (arrow) of the test flange.




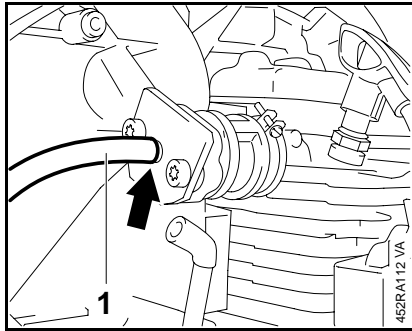
- Close the vent screw (1) on the pump.
- Operate the lever (2) until the pressure gauge (3) indicates a vacuum of 0.5 bar.


### 7.8.3 Pressure Test

If the vacuum reading remains constant, or rises to no more than 0.3 bar within 20 seconds, it can be assumed that the oil seals are in good condition.

However, if the pressure continues to rise (reduced vacuum in the crankcase), the oil seals must be replaced.

- After finishing the test, open the vent screw and disconnect the hose.
- Carry out pressure test,  7.8.3




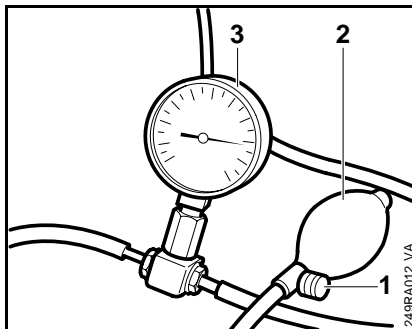
- Always carry out the vacuum test,  7.8.2, before this pressure test.
- Connect pressure hose (1) of tester 1106 850 2905 to nipple (arrow) on test flange.

If this pressure remains constant for at least 20 seconds, the crankcase is airtight. If the pressure drops, the leak must be found and the faulty part replaced.

- To find the leak, coat the suspect area with oil and pressurize the crankcase again. Bubbles will appear if a leak exists.
- If necessary, repeat the pressure test.
- After finishing the test, open the vent screw and disconnect the hose.
- Remove the test flange.
- Remove the sealing plate.

Install in the reverse sequence.

- After completing the tests, always install a new muffler gasket,  7.6




- Close the vent screw (1) on the rubber bulb.
- Pump air into the crankcase with rubber bulb (2) until the gauge (3) indicates a pressure of 0.5 bar.

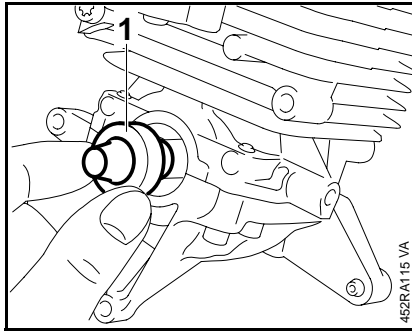
## 7.9 Crankshaft



### 7.9.1 Oil Seals

It is not necessary to disassemble the engine to replace the oil seals.

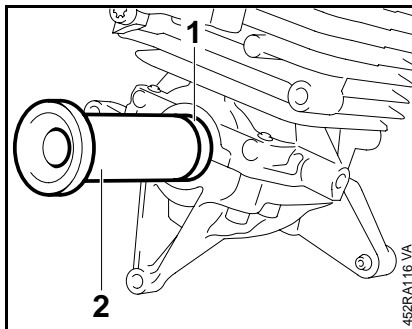
#### Starter side

- Remove the flywheel,  7.7
- Free off the oil seal in its seat by tapping it with a suitable tube or a punch.



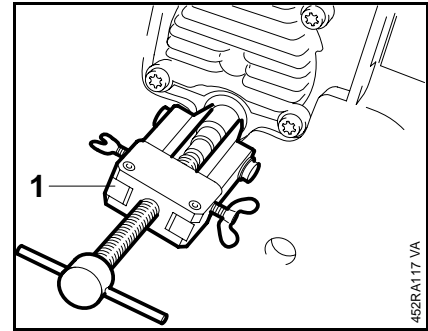
- Thinly coat the outside diameter of the oil seal with sealant,  13.
- Lubricate sealing lips of oil seal with grease,  13.
- Slip the oil seal (1) over the crankshaft and up against the crankcase.

Note installed position:  
Closed side of oil seal must face outward.




- Use the press sleeve (2) 1108 893 2405 to press home the oil seal (1) until it is flush with the crankcase.


Install all other parts in the reverse sequence.



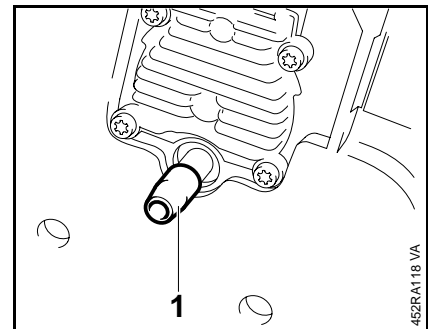
#### Fanwheel side

- Remove the fanwheel,  11.3
- Apply puller (1) 5910 890 4400 with No. 3.1 jaws and clamp the arms.
- Pull out the oil seal.

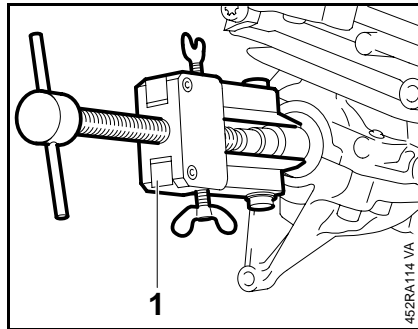
Take care not to damage the crankshaft stub.

- Inspect the crankshaft running face for scores.
- Clean sealing face in crankcase with standard solvent-based degreasant containing no chlorinated or halogenated hydrocarbons,  13.

Install in the reverse sequence.




- Slip the installing sleeve (1) 1118 893 4602 over the end of the crankshaft.



- Apply puller (1) 5910 890 4400 with No. 3.1 jaws and clamp the arms.

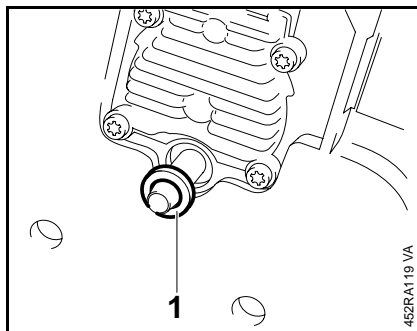
- Pull out the oil seal.

Take care not to damage the crankshaft stub.

- Inspect the crankshaft running face for scores.
- Clean sealing face in crankcase and crankshaft with standard solvent-based degreasant containing no chlorinated or halogenated hydrocarbons,  13.

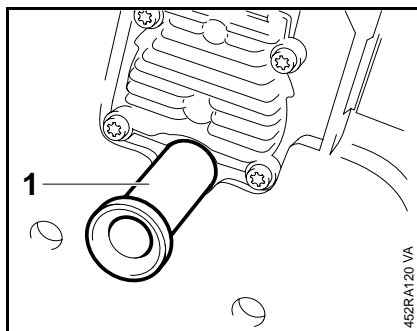
Install in the reverse sequence.

## 7.9.2 Crankcase, Lower Half



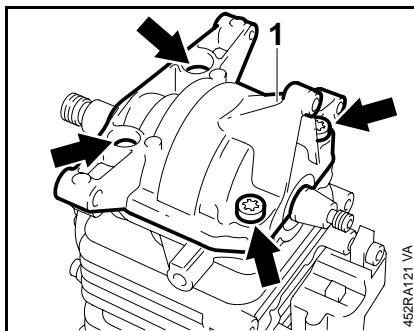
- Thinly coat the outside diameter of the oil seal with sealant, [13](#).
- Slip the oil seal (1) over the crankshaft and up against the crankcase.

Note installed position:  
Closed side of oil seal must face outward.

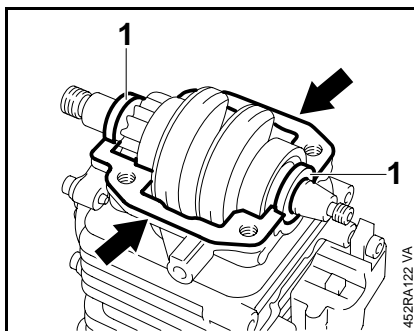


- Use the press sleeve (1) 1108 893 2405 to press home the oil seal until it is flush with the crankcase.

Install all other parts in the reverse sequence.



- Remove the inner fan housing, [11.2](#)
- Take out the screws (arrows).
- Lift away the engine pan (1).



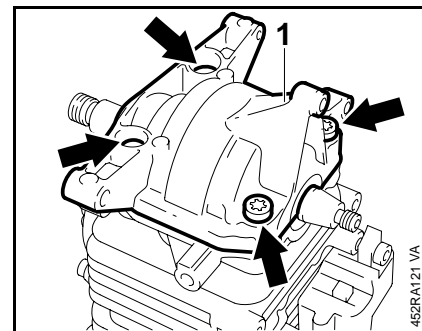
- Clean the sealing faces (arrows) on the cylinder and engine pan with standard solvent-based degreasant containing no chlorinated or halogenated hydrocarbons, [13](#).

Do not take the crankshaft out of the bearings because this will alter cam gear timing, [7.5](#).

- Check condition of oil seals (1) and replace if damaged.

Install in the reverse sequence.

- Apply thin coating of sealant to cylinder and engine pan sealing faces, [13](#).



- Fit the engine pan (1) in position.
- Tighten down the screws (arrows) in a crosswise pattern. Observe sequence and tightening torque, [3.4](#)

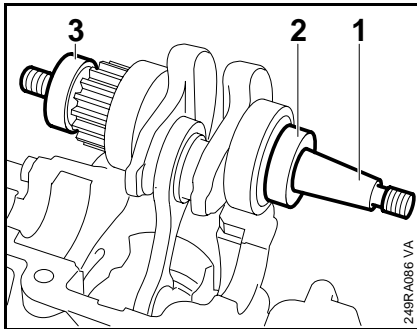
Install all other parts in the reverse sequence.



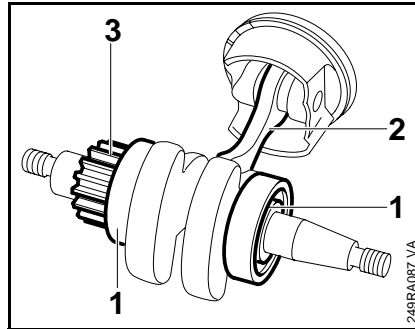
### 7.9.3 Crankshaft

Always check and, if necessary, repair the fuel system, carburetor, air filter and ignition system before looking for faults on the engine. See also "Troubleshooting", 4.

- Remove the lower half of the crankcase, 7.9.2



- Lift the crankshaft (1) and pull the piston out of the cylinder at the same time.
- Pull off the oil seals (2 and 3).
- Inspect cylinder running face for signs of damage and serious scores. Install new cylinder with piston if necessary, 7.9.7



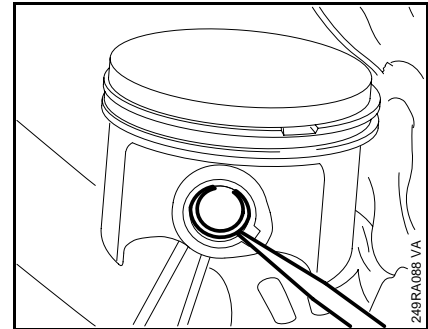
- Examine ball bearings (1), connecting rod (2) and gear (3).
- If one of these parts is damaged, install a new crankshaft assembly.

Install in the reverse sequence.

- Coat piston and piston rings with oil.
- Fit piston rings so that their gaps are offset 120 degrees.
- Use new oil seals.
- Lubricate sealing lips of oil seals with grease, 13.
- Apply thin coating of sealant to outer diameter of oil seals, 13.
- Carefully fit piston in the cylinder.
- Install the crankshaft with new oil seals in the cylinder.
- Fit lower half of crankcase, 7.9.2
- Align the flywheel and fit the cam gear, 7.5

Install all other parts in the reverse sequence.

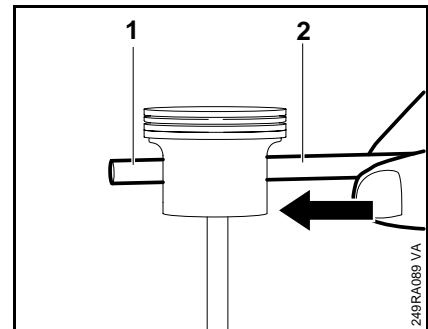
### 7.9.4 Piston



- Remove the crankshaft, 7.9

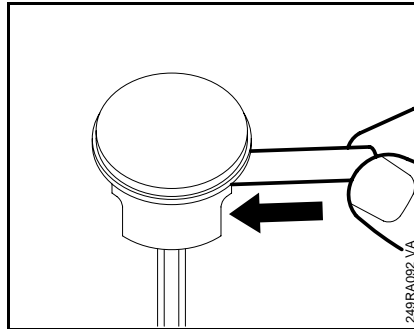
Always wear safety glasses when working with spring washers and snap rings.

- Use a suitable tool to ease the hookless snap ring out of the groove.

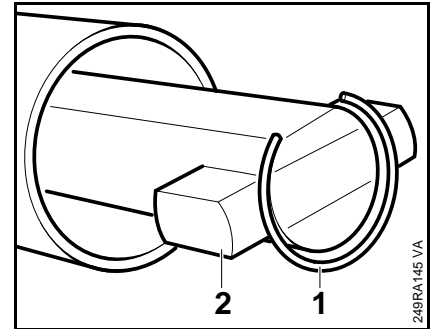


- Use the assembly drift (2) 1110 893 4700 to push the piston pin (1) out of the piston.

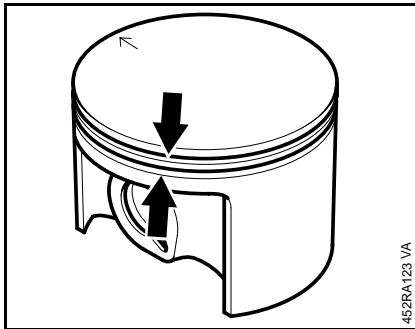
If the piston pin is stuck, tap the end of the drift lightly with a hammer if necessary. Hold the piston steady to ensure that no jolts are transmitted to the connecting rod.



- Use the assembly drift 1108 893 4700 to push the piston pin through the piston and connecting rod.

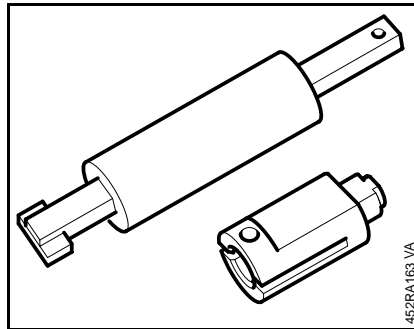


- Attach the snap ring (1) to the magnet (2) so that the snap ring gap is on the flat side of the tool's shank.



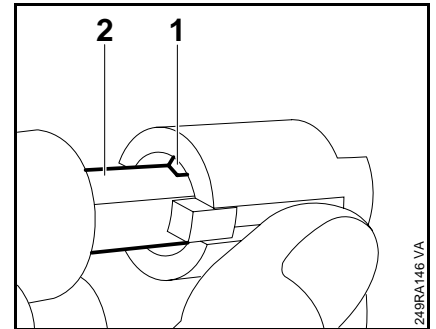
- Inspect piston rings and replace if necessary, [7.9.5](#)

Install in the reverse sequence.

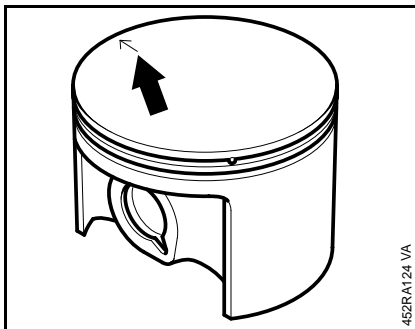


Use installing tool 5910 890 2212 with sleeve 5910 893 1704 to fit the snap ring, [12](#).

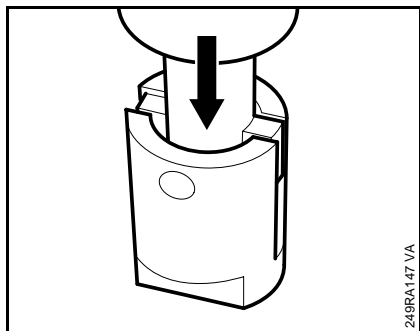
- Remove the sleeve from the tool.



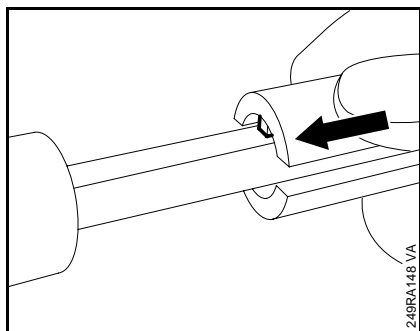
- Push the large slotted diameter of the sleeve over the magnet and snap ring. Position the sleeve so that the inner pin (1) points towards the flat face (2) of the tool's shank.



- The arrow stamped in the piston crown (arrow) points towards the exhaust port.

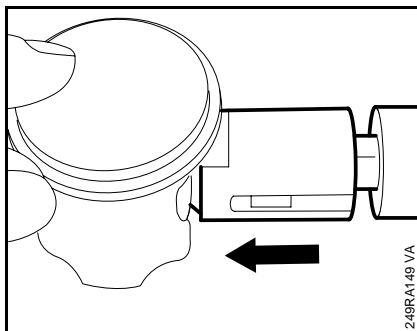


- Stand the installing tool, sleeve downward, on a flat surface (wooden board) and press vertically downwards until the sleeve butts against the tool's shoulder.

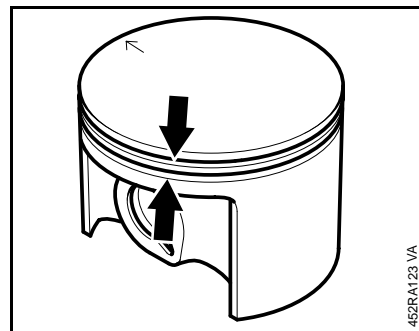


- Remove the sleeve and slip it onto the other end of the shank.

Inner pin must point towards flat face.

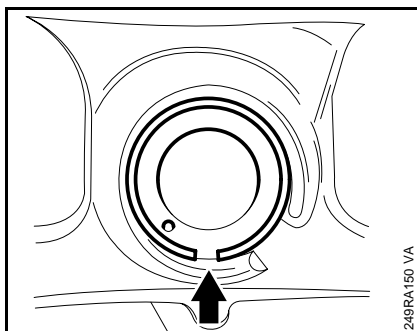


- Apply the installing tool to the piston boss, hold the piston steady, center the tool shank exactly and press home until the snap ring slips into the groove.



- Remove the piston, 7.9.4
- Remove rings from piston.
- Use a piece of old piston ring to scrape the grooves (arrows) clean.
- Install new piston rings.
- Check that piston ring gaps are offset 120 degrees.

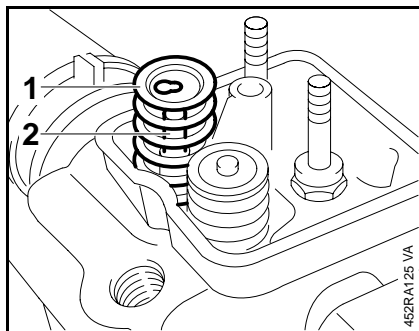
Install in the reverse sequence.



Fit the snap ring so that its gap is on the piston's vertical axis (it must point either up or down).

Install all other parts in the reverse sequence.

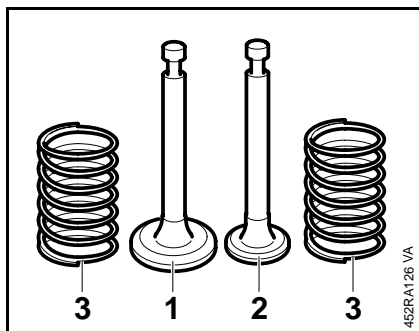
### 7.9.6 Valves / Valve Springs



- Remove rocker arms/pushrods, 7.3
- Remove the crankshaft, 7.9.3

Do not mix up the large inlet valve and the small exhaust valve.

- Press valve spring retainer (1) down and move it sideways so that the valve stem is in the large hole.
- Remove the spring retainer (1) and together with the valve spring (2).
- Take the valves out of the cylinder.

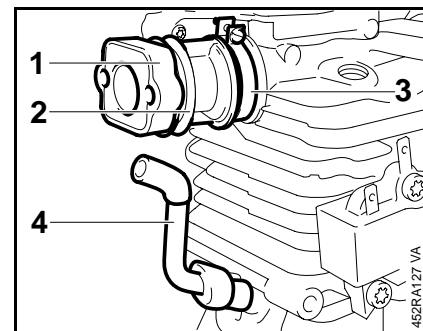


- Check valve heads (1 and 2) for damage.
- Check valve springs (3) for damage.

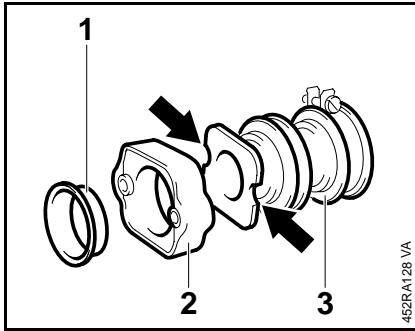
### 7.9.7 Upper Half of Crankcase with Cylinder

If the cylinder with piston has to be replaced, first carry out the following operations:

- Remove the muffler, 7.6
- Remove the crankshaft, 7.9.3
- Remove the rocker arms/pushrods, 7.3
- Remove the cam gear, 7.5
- Remove the ignition module, 8.4
- Use combination wrench 4180 890 3400 to unscrew the spark plug, check it for wear and replace if necessary.



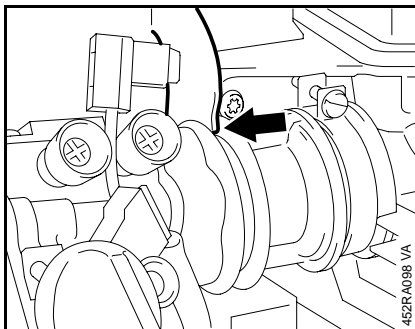
- Loosen the clamp (3) and remove the manifold (2) with flange (1).
- Pull off the impulse hose (4).



- Remove the sleeve (1).
- Check flange (2) and manifold (3) for damage and replace if necessary.
- If necessary, pull the flange (2) off the manifold (3).

Install in the reverse sequence.

- When installing, check that the notches (arrows) in the manifold line up with the screw sleeves in the flange.
- Make sure the sleeve (1) is properly seated.




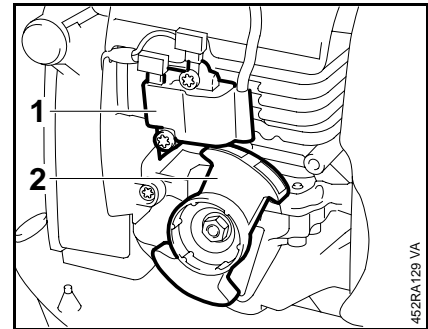
- When installing, check that the groove in the manifold is properly seated in the fan housing (arrow).

- Fit the carburetor, line up the flange and manifold so it is straight and then secure the clamp.
- Carefully tighten down the clamp until the distance between the tabs is 5–6 mm.

Use new gaskets.

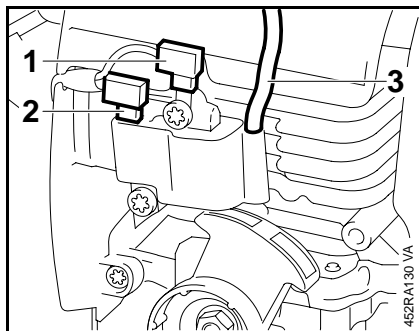
Install all other parts in the reverse sequence.

Exercise extreme caution when carrying out maintenance and repair work on the ignition system. The high voltages which occur can cause serious or even fatal accidents. Troubleshooting on the ignition system should always begin at the spark plug,  4.2.



The solid state (breakerless) ignition system basically consists of an ignition module (1) and flywheel (2).

## 8.1 Ignition Module



The ignition module accommodates all the components required to control ignition timing. There are three electrical connections on the coil body:

- High voltage output (3) for the ignition lead
- Connector tag (2) for the short circuit wire
- Screw-mounted connector tag (1) for the ground wire

Testing the ignition module in the workshop is limited to a spark test. A new ignition module must be installed if no ignition spark is obtained (after checking that wiring and stop switch are in good condition).

## 8.2 Ignition Timing

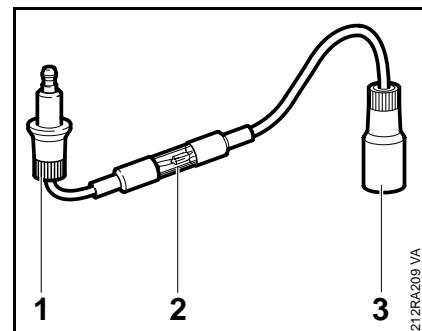
Ignition timing is fixed and cannot be adjusted during repair or servicing work.

Since there is no mechanical wear in these systems, ignition timing cannot get out of adjustment.


## 8.3 Testing the Ignition Module

To test the ignition module, use either the ZAT 4 ignition system tester 5910 850 4503 or the ZAT 3 ignition system tester 5910 850 4520.

The ignition test refers only to a spark test, not to ignition timing.



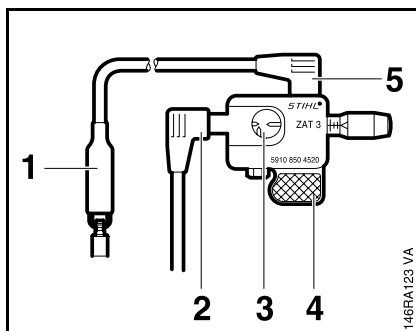
### Using the ZAT 4 ignition tester 5910 850 4503

- Before starting the test, install a new spark plug in the cylinder and tighten it down firmly,  3.4
- Pull the boot off the spark plug and connect it to the input terminal (1). Push the tester's output terminal (3) onto the spark plug.
- Crank the engine quickly with the rewind starter (min. 1,000 rpm) and check spark in the tester's window (2).

### Warning!

The engine may start and accelerate during the test.

If a spark is visible, the ignition system is in order. If no spark is visible in the window (2), check the ignition system with the aid of the troubleshooting chart, [8.7](#).



When using the ZAT 3, hold it only by the handle (4) or position it in a safe place. Keep fingers and other parts of body at least 1 cm away from the spark window (3), the high voltage connection (2), ground connection (5) and the ground terminal (1).

The high voltages that occur can cause an electric shock.

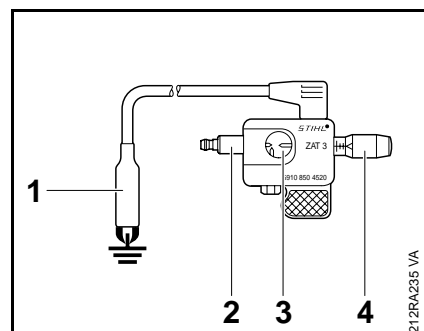
- Crank the engine quickly with the rewind starter (min. 1,000 rpm) and check spark in the tester's window (3).

#### Warning!

The engine may start and accelerate during the test.

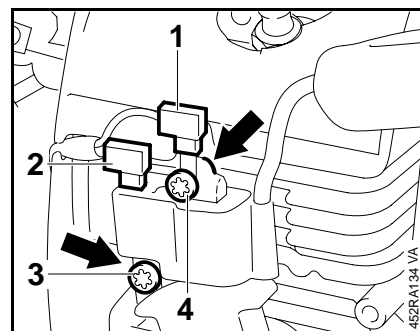
If a spark is visible, the ignition system is in order.

If no spark is visible in the window (3), check the ignition system with the aid of the troubleshooting chart, [8.7](#).



#### Using ZAT 3 ignition system tester 5910 850 4520

- Before starting the test, install a new spark plug in the cylinder and tighten it down firmly, [3.4](#)
- Pull the boot off the spark plug and connect it to terminal (2).
- Attach ground terminal (1) to the spark plug.
- Use adjusting knob (4) to set spark gap to about 2 mm.

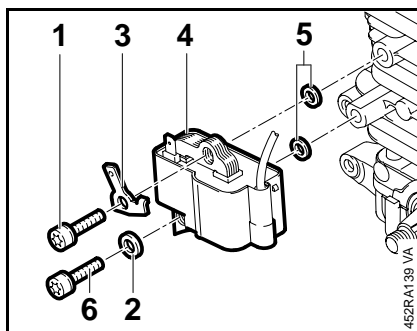


- Remove the shroud with rewind starter, [5.9](#)

- Disconnect the ground wire (1).
- Disconnect the short circuit wire (2).
- Take out the screw (3) with washer.
- Remove the screw (4) with connector tag.
- Remove the washers from between the ignition module and cylinder.

Check the ignition module and wires for damage and replace as necessary.

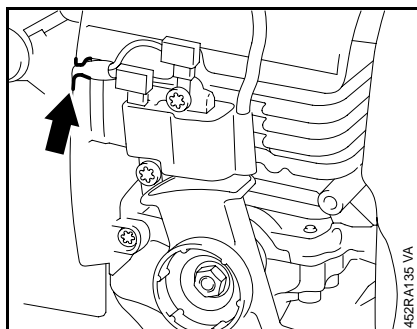
Install in the reverse sequence.



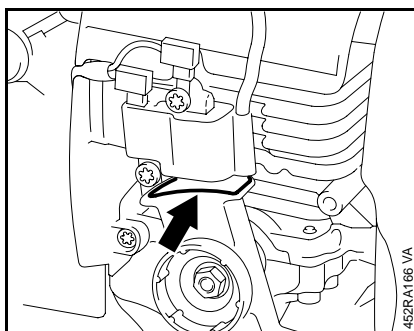
- Fit screw (6) with ignition module (4), washer (2) and washer (5) in position.
- Fit screw (1) with ignition module (4), connector tag (3) and washer (5) in position.

Pay attention to correct installed positions of the washers (5) and the connector tag (3).

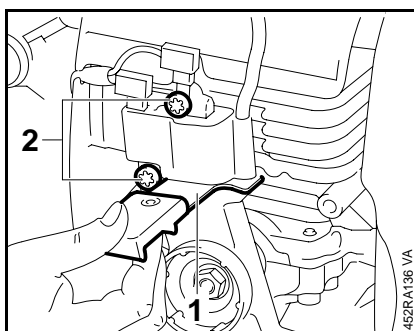
Install all other parts in the reverse sequence.



- Check that the wires are correctly positioned in the air guide shroud (arrow).

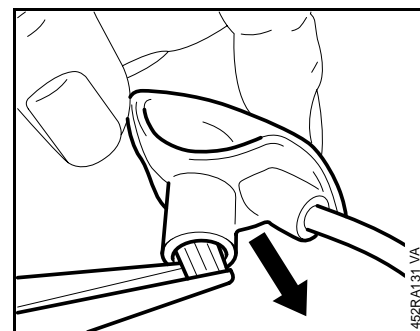


- Rotate the flywheel until the raised portion (arrow) is in line with the ignition module.



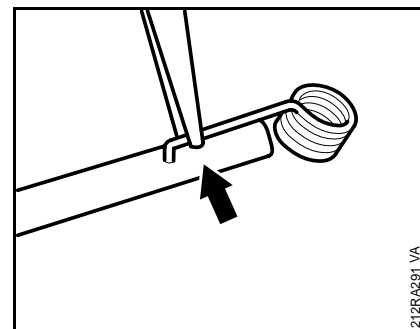
- Slide the setting gauge 4111 890 6401 (1) between the arms of the ignition module and the flywheel.
- Press the ignition module against the setting gauge.
- Tighten down the screws (2) firmly.

Install all other parts in the reverse sequence.



- Remove the shroud with rewind starter, 5.2
- Pull the boot off the spark plug.
- Use suitable pliers to pull the leg spring out of the spark plug boot.
- Unhook the leg spring from the ignition lead.
- Slide the spark plug boot back a little in the direction of the ignition module
- Coat the end of the ignition lead with Press Fluid OH 723, 13.

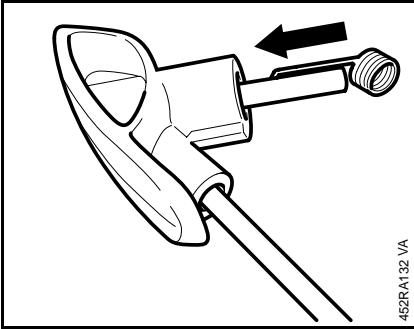
If the ignition lead is frayed or damaged, install a new ignition module.



- Pinch the hook of the leg spring into the center of the lead, i.e. about 15 mm from the end of the lead.

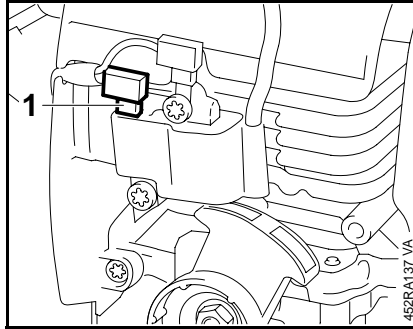


## 8.6 Testing the Wiring Harness




- Pull the lead back into the boot so that the leg spring locates properly inside it.

Install in the reverse sequence.





If the spark plug, ignition lead and spark plug boot are in order, test the resistance of the short circuit wire, ground wire and contact spring.

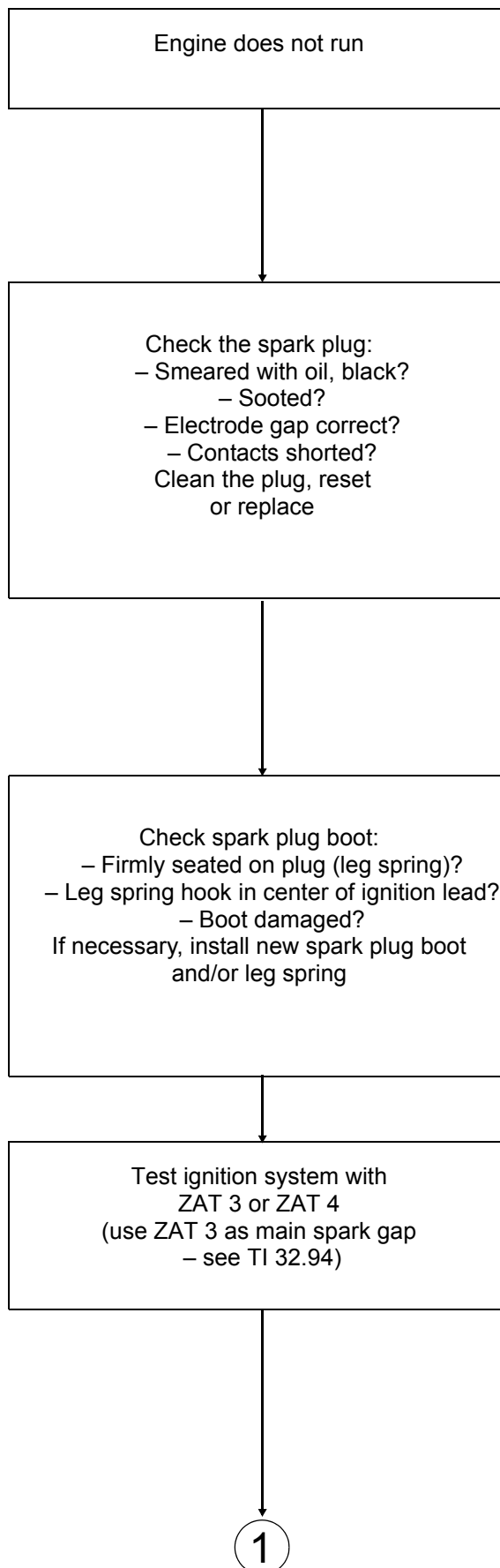
- Remove the shroud with rewind starter,  5.9
- Pull the short circuit wire (1) off the connector.
- Connect the ohmmeter to ground and the short circuit wire.
- Move the setting lever on the control handle to “0” and hold it there.

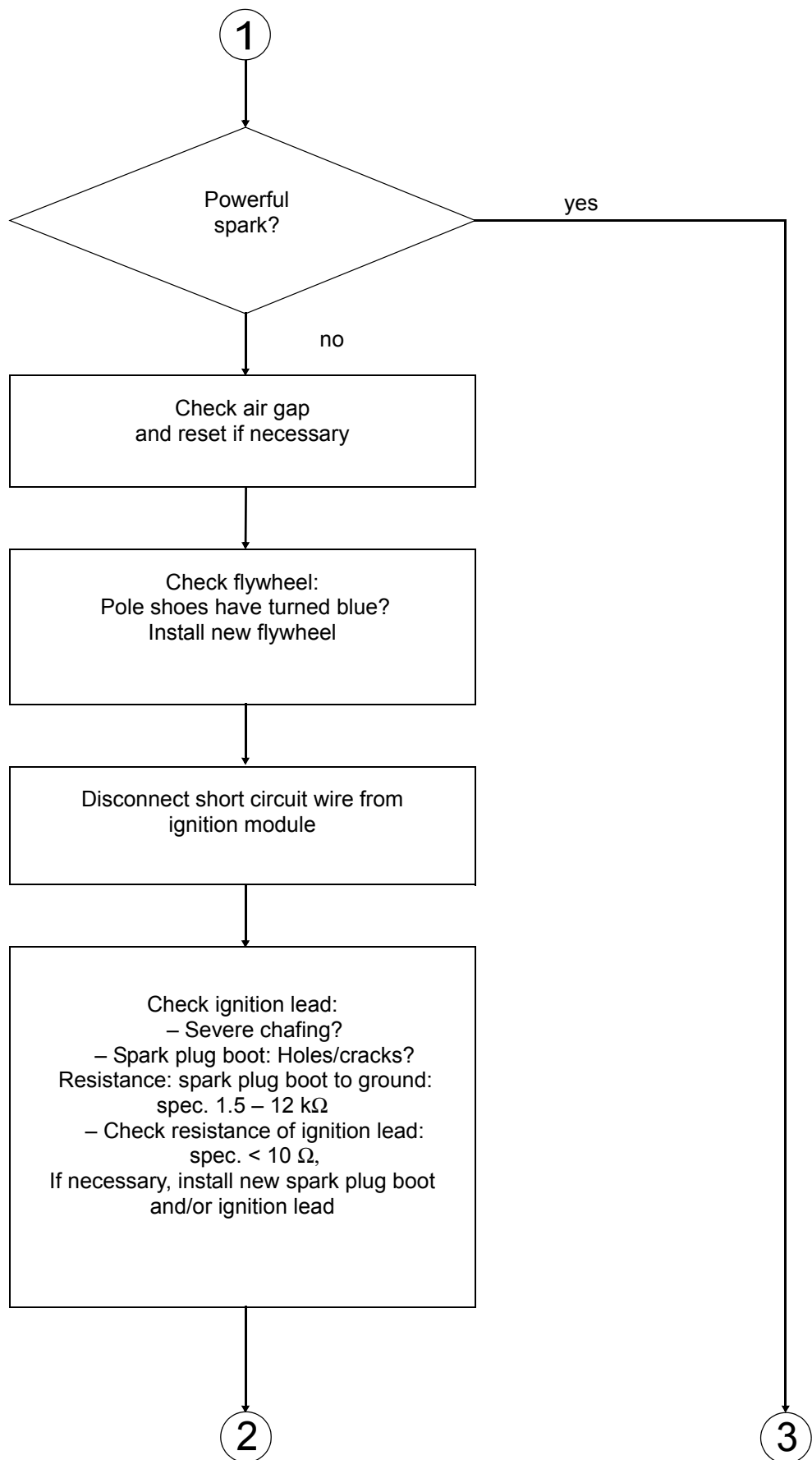
The measured resistance must be about 0  $\Omega$ . If the reading is much higher, there is a break in the wire and the throttle cable has to be replaced together with the wires.

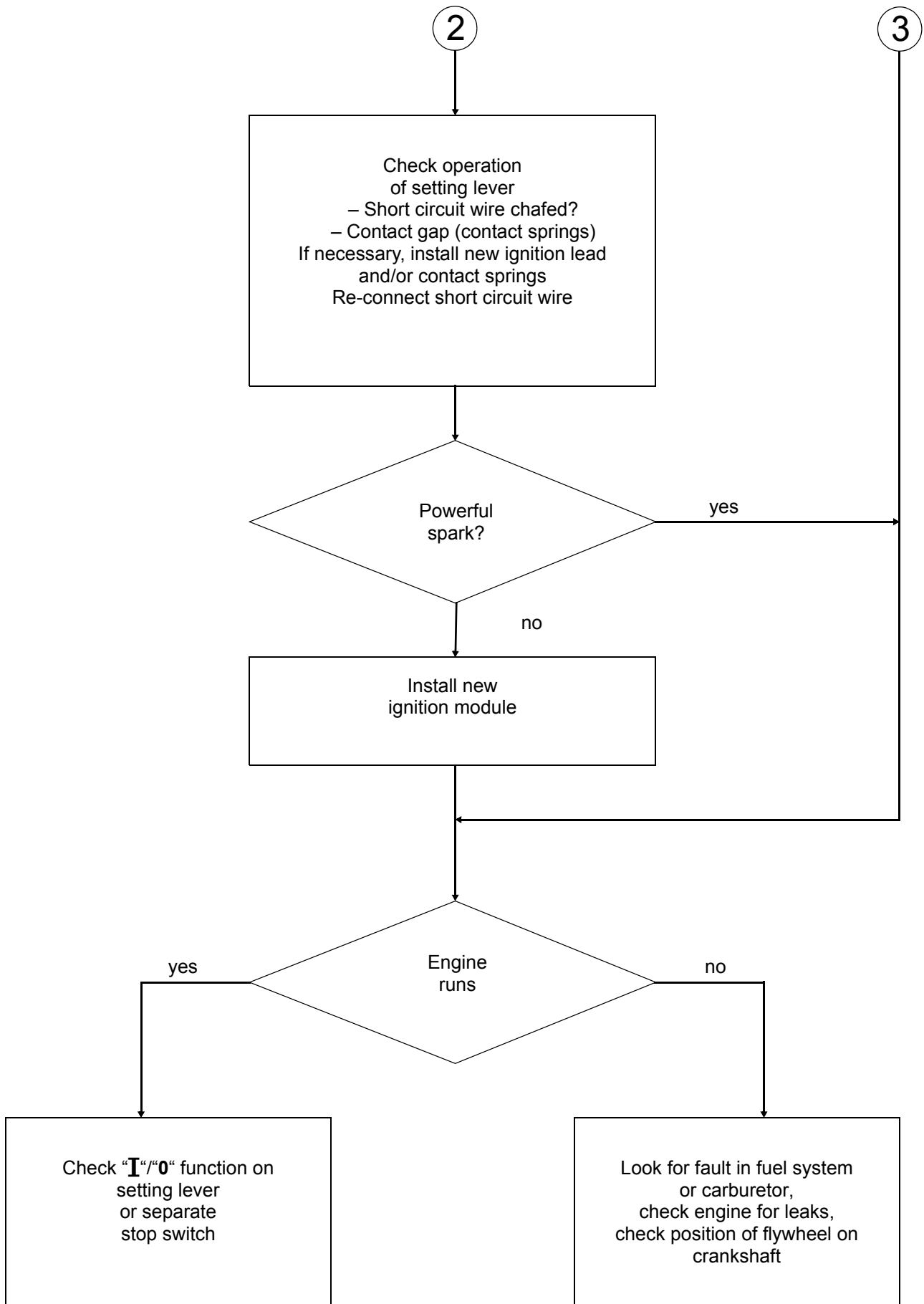
- Move the setting lever on the control handle to “I”.

The measured resistance must be infinitely high. If the reading is much lower, there is a break in the wire and the throttle cable has to be replaced together with the wires. If no fault is found, carry out the following checks:

- Examine flywheel for damage,  7.7
- Check air gap between flywheel and ignition module,  8.4

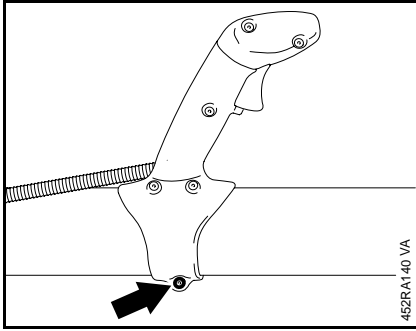




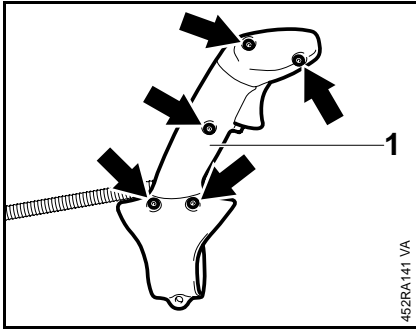


## 9. Control Handle

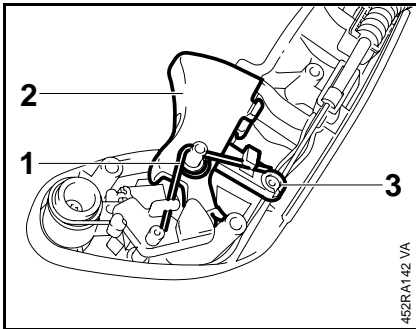
### 9.1 Throttle Trigger/Interlock Lever



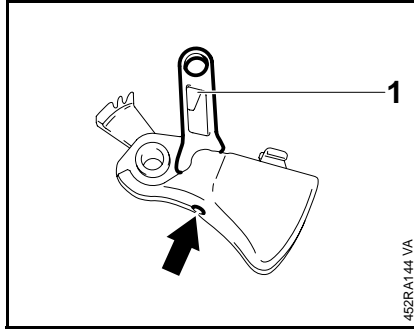
- Take out the screw (arrow).
- Remove the control handle.



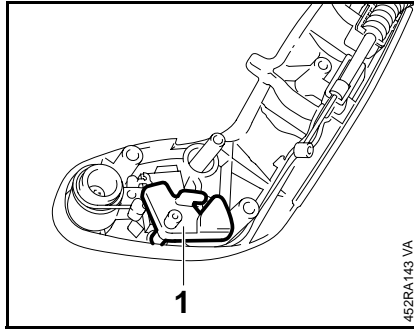
- Take out the screws (arrows)
- Remove the outer handle molding (1).



- Remove the torsion spring (1).
- Remove the throttle trigger (2) with lever (3).
- Disconnect the throttle cable.

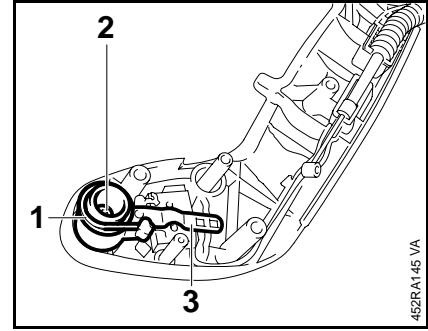


- Swing the lever (1) sideways and remove it upwards.
- If necessary, take out the grub screw (arrow).

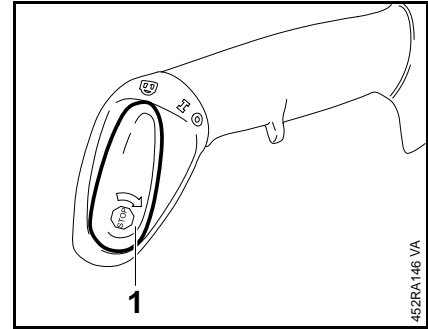


- Remove the interlock lever.
- Install in the reverse sequence.
- Adjust the throttle cable, [9.3.2](#)

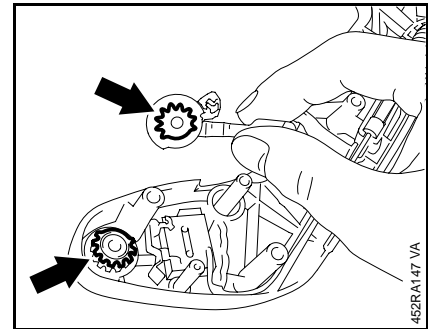
## 9.2 Setting Lever



- Remove the interlock lever, [9.1](#)
- Remove the torsion spring (1).
- Take out the screw (2) and remove the cam (3).



- Remove the setting lever (1).
- Install in the reverse sequence.

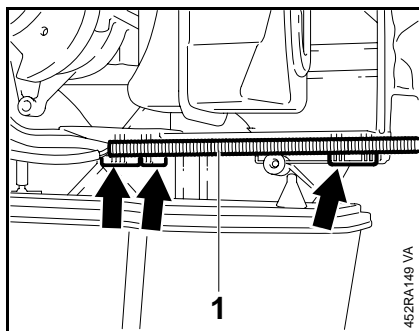


- Make sure the teeth of the setting lever mesh with those of the cam.

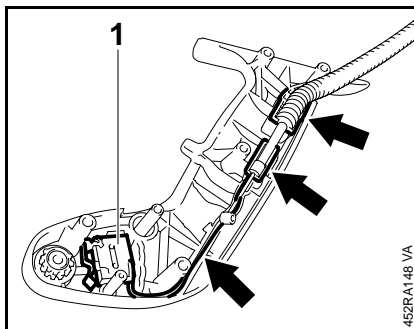
### 9.3 Throttle Cable

#### 9.3.1 Removing and Installing

- Remove the shroud with rewind starter, 5.9
- Remove the filter housing, 6.1
- Disconnect throttle cable from the carburetor, 6.2.2
- Disconnect wires from the ignition module, 8.4



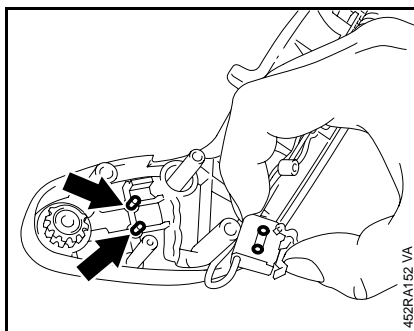
- Pull the throttle cable (1) out of the guides (arrows) on the inner fan housing.
- Remove cam from setting lever, 9.2



- Remove the switch (1).
- Pull the wires out of the guides (arrows).
- Remove the throttle cable.

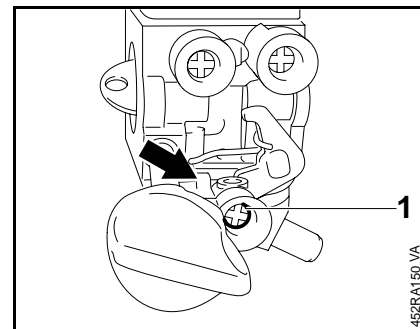
Install in the reverse sequence.

Make sure the wires are installed correctly.



- Carefully push the switch onto the fixing pins (arrows).
- Adjust the throttle cable, 9.3.2

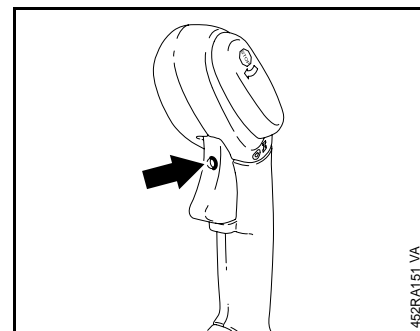
#### 9.3.2 Adjusting



- Remove the shroud with rewind starter, 5.9

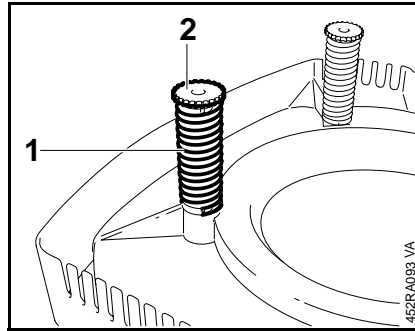
The throttle lever must butt against the stop on the carburetor cover (arrow) when the throttle trigger is pulled as far as it will go (full throttle), and butt against the idle speed screw (1) when the throttle trigger is in the idle position.

To adjust the throttle cable, squeeze the throttle trigger as far as stop.



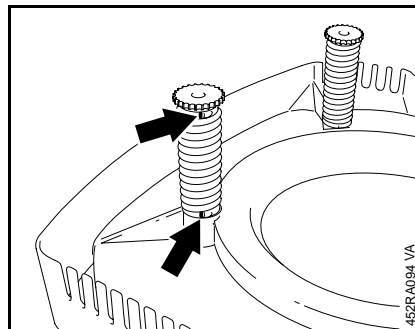
- Turn the grub screw (arrow) with a suitable tool until the throttle lever butts against the carburetor cover.
- Check idle position.

Install in the reverse sequence.



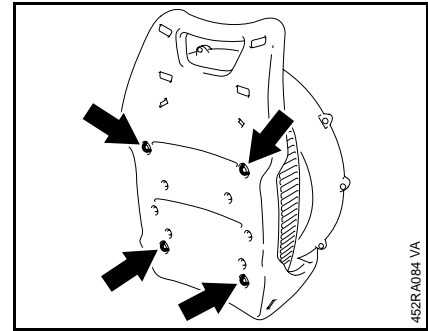
- Take the powerhead off the backplate, [10.2](#)
- Use pliers to carefully unscrew the springs (1) with bearing plugs (2).
- If necessary, unscrew the bearing plugs from the springs.

Install in the reverse sequence.



- Screw home the springs and bearing plugs as far as stop (arrows).

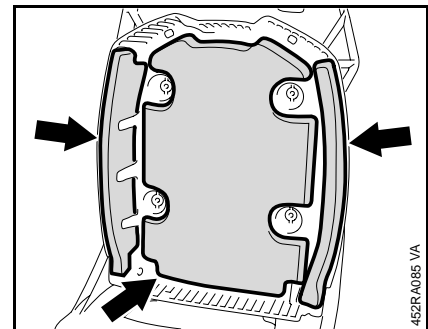
Install all other parts in the reverse sequence.



- Remove the shroud with rewind starter, [5.9](#)
- Drain the fuel tank.
- Pry out the connector with fuel hoses, [6.6](#)

Take care to ensure that no parts drop on the floor.

- Take out the screws (arrows).
- Remove the powerhead from the backplate.
- Remove the tank, [6.7](#)

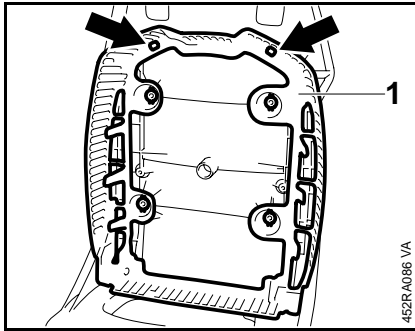


#### BR 500 only

- Remove soundproofing (arrows).

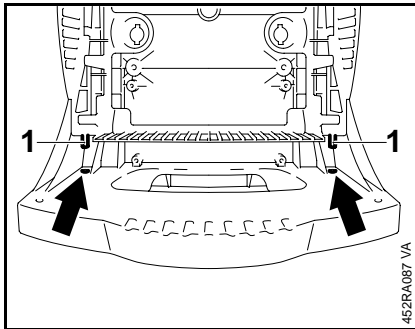
## 11. Fan

### 11.1 Outer Fan Housing



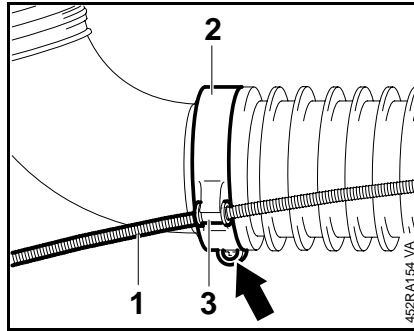
- Push the locking tabs (arrows) down and lift the protective screen (1) upwards and away.

Install in the reverse sequence.

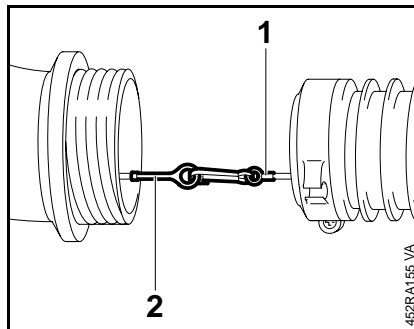



- Locate lugs (1) on bottom of protective screen in the holes (arrows) in the base of the backplate.
- Carefully push the upper half of the protective screen against the backplate until the locking tabs snap into position.

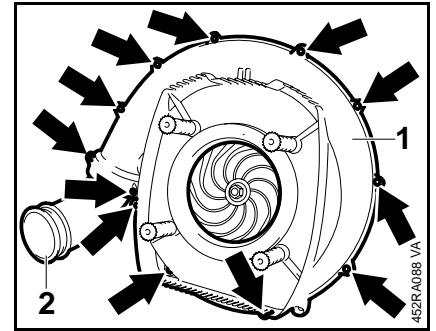
Install all other parts in the reverse sequence.



- Unclip the throttle cable (1) with grommet (3) from the hose clamp (2).
- Take out the screw (arrow).
- Remove the hose clamp (2) and pleated hose.



- Disconnect the lower half of the antistatic wire (1) from the upper half (2).
- Take the powerhead off the backplate,  10.2








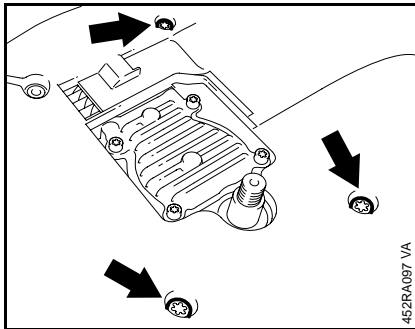
- Take out the screws (arrows).
- Remove the outer fan housing (1).
- Remove the elbow (2).

Install in the reverse sequence.



## 11.2 Inner Fan Housing

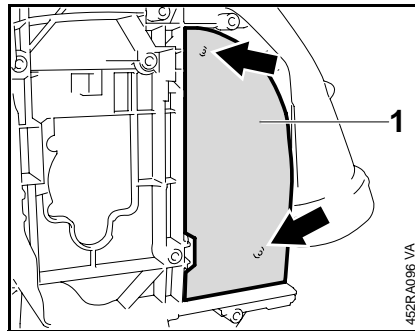
- Remove the fanwheel,  11.3
- Remove the elbow,  11.1
- Remove the air guide shroud,  7.2
- Remove the carburetor,  6.2.2
- Remove the antistatic wire,  11.4



- Take out the screws (arrows)
- Remove the engine.

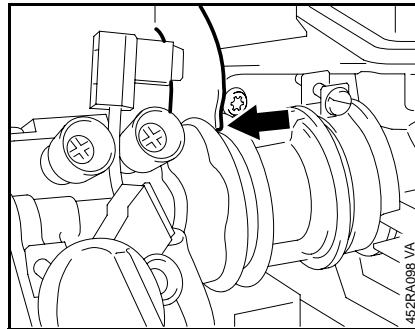
Install in the reverse sequence.

Do not lubricate the thread of the fanwheel.



### BR 500 only

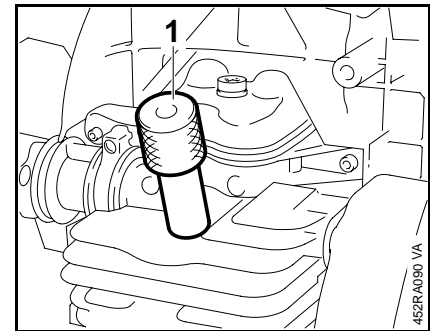
- If the fan housing is replaced, the soundproofing liner (1) must be fitted at the engine side.




- When installing, check that the groove in the manifold is properly seated in the fan housing (arrow).
- Check that the throttle cable and fuel hoses are correctly positioned.

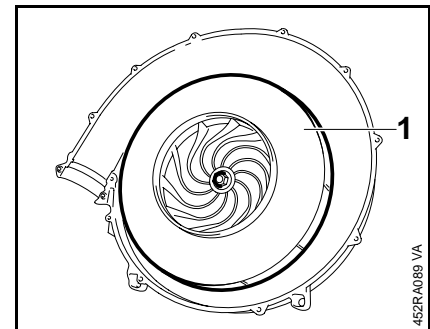
Install all other parts in the reverse sequence.

## 11.3 Fanwheel



- Remove outer fan housing,  11.1
- Use combination wrench 4180 890 3400 to unscrew the spark plug.
- Screw the locking screw 4282 890 2700 (1) fully home.

Always use the specified locking screw to avoid any risk of damaging the piston.



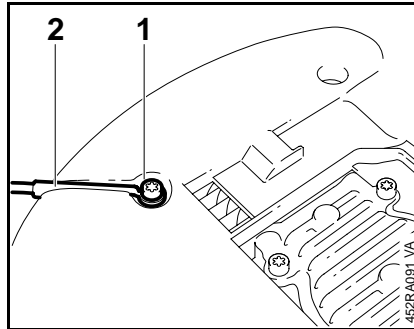
- Unscrew the fanwheel (1) counterclockwise.

Right-hand thread. Very high release torques may be necessary after long periods of operation.

## 11.4 Antistatic Wire

Install in the reverse sequence.

Do not lubricate the thread of the fanwheel.

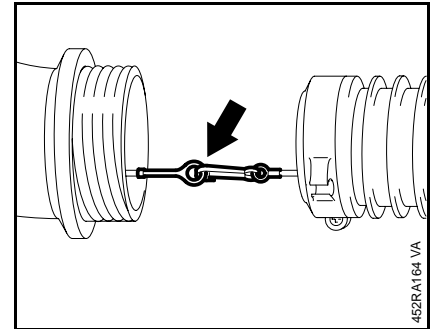


– Remove the fanwheel,  11.3

- Take out the screw (1).
- Remove the antistatic wire (2).

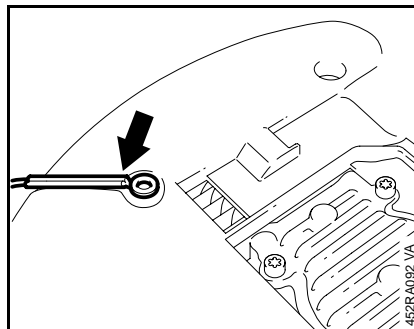
Install in the reverse sequence.

Check installed position of antistatic wire.



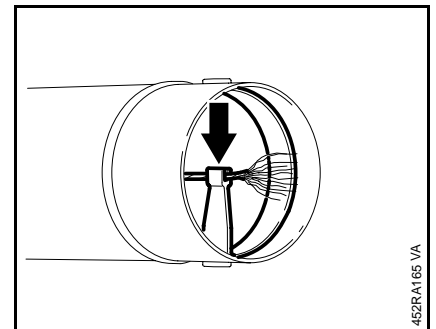
The machine may be operated only with a properly installed antistatic wire.

- Check that the hook on the antistatic wire is always connected to the eye (arrow).



- When installing, make sure the crimping (arrow) on the cable lug faces outwards.

Install all other parts in the reverse sequence.



- Make sure the sleeve on the antistatic wire is always clipped into the retainer (arrow).

Install all other parts in the reverse sequence.

## 12. Special Servicing Tools

No.	Part Name	Part No	Application	Rem.
1	Compression tester	5910 850 2000	Testing valves and piston rings for leaks	
2	Locking screw	4282 890 2700	Blocking the crankshaft	
3	Installing tool – with sleeve –	5910 890 2212 5910 893 1704	Fitting snap ring in piston	
4	Carburetor and crankcase tester	1106 850 2905	Testing crankcase and carburetor for leaks	
5	Hose	1110 141 8600	Testing carburetor for leaks	
6	Nipple	0000 855 9200	Testing carburetor for leaks	
7	Vacuum pump	0000 850 3501	Testing crankcase for leaks	
8	Feeler gauge	4180 893 6400	Adjusting valve clearances	
9	Socket, DIN 3124, 13 mm	5910 893 5608	Flywheel nut	
10	Puller	1116 893 0800	Removing flywheel	
11	Torque wrench	5910 890 0311	6 to 80 Nm; torque wrench 5910 890 0312 with optical/acoustic signal may be used as an alternative	
12	Torque wrench	5910 890 0301	0.5 to 18 Nm; torque wrench 5910 890 0302 with optical/acoustic signal may be used as an alternative	
13	Socket, 17 mm	5910 893 5610	Releasing fanwheel	
14	Puller	5910 890 4400	Universal puller	
15	– Jaws (profile # 3.1)		Removing oil seals	
16	Installing sleeve	1118 893 4602	Installing oil seal	
17	Press sleeve	1108 893 2405	Installing oil seal	
18	Combination wrench	4180 890 3400	Spark plug	
19	Assembly drift	1108 893 4700	Removing and installing piston pin	
20	Setting gauge	4118 890 6401	Adjusting air gap between ignition module and flywheel	
21	Test flange	1119 850 4201	Leakage test	
22	Bushing	0000 963 1008	For use with test flanges 1106 850 4201 and 1119 850 4201	
23	Sealing plate	0000 855 8106	Sealing exhaust port	
24	Ignition tester, ZAT 3	5910 890 4520	Testing the ignition system	
25	Ignition tester, ZAT 4	5910 850 4503	Testing the ignition system	
26	Puller	5910 890 4501	Removing limiter caps	
27	Screwdriver, T 27 x 200	5910 890 2415		

### 13. Servicing Aids

No.	Part Name	Part No	Application	Rem.
1	Lubricating grease (225 g tube)	0781 120 1111	Sliding and pivot points	
2	Press Fluid OH 723	0781 957 9000	Rubber elements of AV system	
3	STIHL special lubricant	0781 417 1315	Bearing bore in rope rotor, rewind spring in rope rotor	
4	Dirko sealant (100 g tube)	0783 830 2120	Crankcase sealing faces	
5	Standard commercial solvent-based degreasant containing no chlorinated or halogenated hydrocarbons		Cleaning crankshaft stub	
6	Loctite 270 (50 ml bottle)	0786 111 1109	High-strength threadlocking adhesive	



