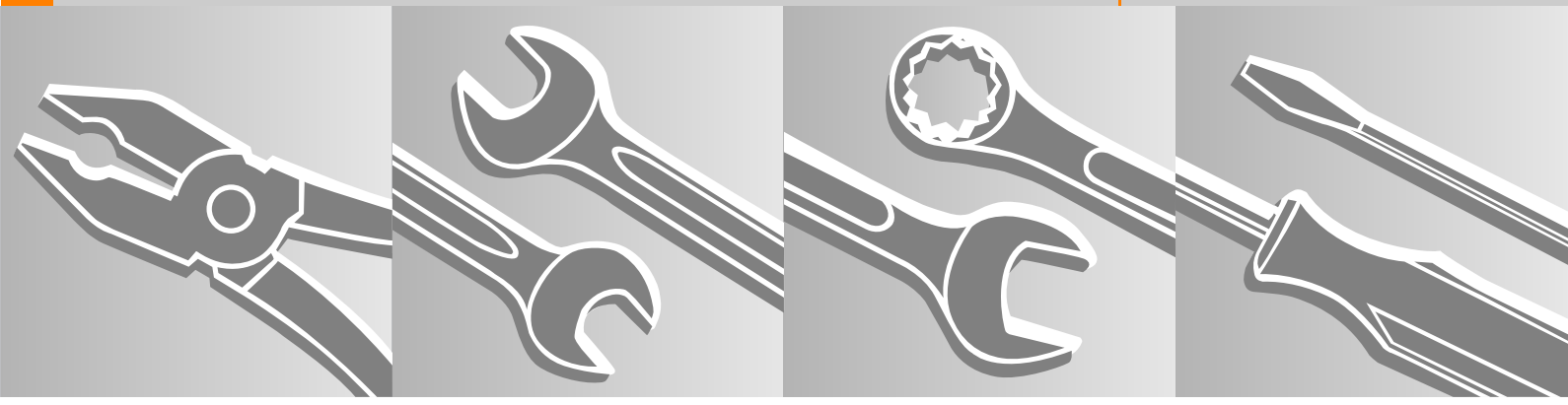
STIHL MS 650, 660

2007-09



Contents

STIHL®

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

As the design concept of models MS 650 and MS 660 is almost identical, the descriptions and servicing procedures in this manual generally apply to both 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" 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 tools mentioned in the descriptions are listed in chapter "Special Servicing Tools" of this manual. Use the part numbers to identify the tools in the "STIHL Special Tools" manual which lists all the 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)

▶| Situation applies from serial No.

|◀ Situation applies up to serial No.

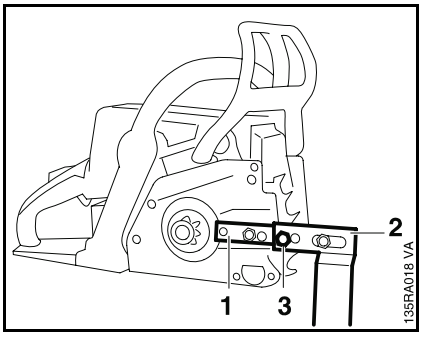
In the illustrations:

➔ 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.



Servicing and repairs are made considerably easier if the clamp (**1**) 5910 890 2000 is used to mount the machine on assembly stand (**2**) 5910 890 3100 so that one clamp screw engages the outer 10 mm hole (**3**) in the assembly stand.

To service the underside of the machine (e.g. remove the front handle), turn it upside down and mount it so that one clamp screw engages the inner 10 mm hole in the assembly stand.

Pull the hand guard back against the front handle for this purpose.

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.

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.

If parts are heated during servicing work, always wear suitable protective gloves.

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

3.1 Engine

	MS 650	MS 660
Displacement:	84.9 cm^3	91.6 cm^3
Bore:	52 mm	54 mm
Stroke:	40 mm	40 mm
Engine power to ISO 7293:	4.8 kW (6.5 bhp) at 9,500 rpm	5.2 kW (7.1 bhp) at 9,500 rpm
Max. permissible engine speed with bar and chain:	13,500 rpm (carburetor with limiter caps) 13,000 rpm (carburetor without limiter caps)	13,500 rpm (carburetor with limiter caps) 13,000 rpm (carburetor without limiter caps)
Idle speed:	2,500 rpm	2,500 rpm
Clutch:	Centrifugal clutch without linings	
Clutch engages at:	3,000 rpm	3,000 rpm
Crankcase leakage test		
at gauge pressure:	0.5 bar	0.5 bar
under vacuum:	0.5 bar	0.5 bar

3.2 Fuel System

Carburetor leakage test at gauge pressure:	0.8 bar
Operation of tank vent at gauge pressure:	0.3 bar
Fuel:	as specified in instruction manual

3.3 Ignition System

Air gap between ignition module and fanwheel:	0.15 – 0.3 mm
Spark plug (suppressed):	Bosch WSR 6 F NGK BPMR 7 A
Electrode gap:	0.5 mm

3.4 Chain Lubrication

Fully automatic, speed-controlled oil pump with rotary piston

Oil delivery rate:	5.5 – 15 cm^3 at 10,000 rpm

3.5 Tightening Torques

DG and P screws (Plastoform) are used in polymer and light metal 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
			Nm	
Screw	IS-M4x8	Chain tensioner cover plate	3.0	
Starter post	M8	Starter post in fan housing	12.0	
Screw	M8x21.5	Collar screw for guide bar	23.0	1)
Screw	IS-M4x12	Chain brake cover	3.0	
	M10x 1	Decompression valve or plug	14	
Screw	M4x10	Spring housing/fan housing	2.5	
Nut	M5	Flange on filter base	2.0	
Twist lock	M5	Filter cover	1.0	
Screw	IS-M4x12	Generator (for carburetor/handle heating only)	3.5	1)
Screw	IS-P6x21.5	Front handle, top, with stiffener (not wrap-around handle)	7.0	
Screw	IS-P6x19	Front handle, top (wrap-around handle)	7.0	
Screw	IS-P6x19	Front handle, bottom	7.0	
Screw	IS-P4x19	Handle molding	1.6	
Screw	IS-M4x 8	Rubber buffer/crankcase	3.5	
Screw	IS-M5x40x25	Hand guard, left	7.0	
Screw	IS-M5x16	Shroud/crankcase	7.0	
Screw	IS-M5	Chain catcher/spiked bumper (with wrap-around handle)	6.0	
Screw	IS-M5x20	Chain catcher/spiked bumper/ crankcase	9.0	
Screw	M5x12	Spiked bumper/crankcase, top with nut	7.5	
Screw	IS-M5	Chain sprocket cover/spiked bumper	6.0	
Screw	IS-M5x20	Crankcase/oil tank housing	11.5	

Remarks:

1) Loctite 243, medium strength

Fastener	Thread size	For component	Torque Nm	Remarks
Screw	IS-M5x20	Fan housing, magnesium	7.0	
	M12x1 L	Clutch carrier	70.0	3)
Screw	IS-M4x12	Oil pump	3.0	2)
Screw	P6x19	Annular buffer	6.0	
Screw	IS-M5x16	Annular buffer/tank housing, top right	7.0	1)
Screw	IS-M5x12	Annular buffer plate	9.0	1)
Screw	IS-M5x20	Wrap-around handle with bracket	7.0	
Screw	M5x 6	Muffler, bottom	6.5	1)
Screw	IS-M6x20	Muffler, bottom/crankcase	15.0	1)
Screw	M5x16	Muffler/cylinder	11.5	1)
Screw	P4x10	Guard/tank housing	2.0	
	M10x1	Flywheel	45.0	4)
Screw	IS-M4x10	Segment/fan housing	2.5	
Screw	IS-M4x8	Inner side plate	3.0	
Nut	M5	Carburetor	3.5	
	M14x1.25	Spark plug	25.0	
Screw	M5x20	Ignition module	8.0	
Screw	M6x25	Cylinder/crankcase, 0.5 mm gasket	15.0	
Screw	M6x25	Cylinder/crankcase, 1 mm gasket	15.0	

Remarks:

1) Loctite 243, medium strength
2) Install with Hylomar sealant (0783 810 1101)
3) Left-hand thread
4) Degrease crankshaft/flywheel faces and install dry

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 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 setting for polymer: DG and P screws max. 500 rpm
Do not use an impact screwdriver for releasing or tightening screwed assemblies.

Do not mix up screws with and without binding heads.

4. Troubleshooting Chart

4.1 Clutch, Chain Drive, Chain Brake, Chain Tensioner

Condition	Cause	Remedy
Saw chain stops under load at full throttle	Clutch shoes badly worn	Install new clutch
	Clutch drum badly worn	Install new clutch drum
	Brake band stuck	Check freedom of movement and function of brake band.
Saw chain rotates at idle speed	Engine idle speed too high	Readjust with idle speed screw (**LA**) (counterclockwise)
	Clutch springs stretched or fatigued	Replace the clutch springs or install new clutch
	Clutch spring hooks broken	Replace the clutch springs
Loud noises	Clutch springs stretched or fatigued	Replace all clutch springs
	Needle cage damaged	Fit new needle cage
	Clutch shoe retainer broken	Fit new retainer
	Clutch shoes and carrier worn	Install new clutch
Chain sprocket wears rapidly	Chain not properly tensioned	Tension chain as specified
	Wrong chain pitch	Fit chain of correct pitch
	Insufficient chain lubrication	Check chain lubrication
	Chain sprocket worn	Fit new chain sprocket

Condition	Cause	Remedy
Saw chain does not stop immediately when brake is activated	Brake spring stretched or broken	Fit new brake spring
	Brake band stretched, worn or broken	Fit new brake band
	Clutch drum worn	Fit new clutch drum

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 peg 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 is 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 little standard solvent-based degreasant (containing no chlorinated or halogenated hydrocarbons), then pull rope carefully several times until normal action is restored

4.3 Chain Lubrication

In the event of trouble with the chain lubrication system, check and rectify other sources of faults before disassembling the oil pump.

Condition	Cause	Remedy
Chain receives no oil	Oil tank empty	Fill up with oil
	Oil inlet hole in guide bar is blocked	Clean oil inlet hole
	Intake hose or pickup body clogged or intake hose ruptured	Fit new intake hose and pickup body
	Sealing ring between oil pump and crankcase faulty	Remove oil pump, fit new sealing ring and reinstall pump
	Valve in oil tank blocked	Clean or replace valve
	Teeth on pump piston and/or worm worn	Install new oil pump
Machine losing chain oil	Sealing ring between oil pump and crankcase faulty	Remove oil pump, fit new sealing ring and reinstall pump
	Housing gasket faulty	Fit new gasket
	Oil pump damaged or worn	Install new oil pump
	Vent valve does not close	Install new vent valve
Oil pump delivers insufficient oil	Adjusting screw and/or control edge on pump piston worn	Fit new adjusting screw and/or oil pump
	Intake hose or pickup body clogged	Clean or replace intake hose/ pickup body
	Oil pump worn	Install new oil pump

4.4 Ignition System

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

Condition	Cause	Remedy
Engine runs roughly, misfires, temporary loss of power	Spark plug boot is loose	Press boot firmly onto spark plug and fit new spring if necessary
	Ignition lead loose in ignition module	Secure the ignition lead
	Spark plug sooted, smeared with oil	Clean the spark plug or replace if necessary
	Too much oil in fuel mix, poor quality oil	Fill up with fuel mix of specified quality
	Incorrect air gap between ignition module and flywheel	Set air gap correctly
	Flywheel cracked or has other damage or pole shoes have turned blue	Install new flywheel
	Ignition timing wrong, flywheel out of adjustment, key in flywheel has sheared off or is missing	Install new flywheel, fit new key
	Weak magnetization in flywheel – pole shoes have turned blue	Install new flywheel
	Crankcase damaged (cracks)	Replace crankcase
No spark	Faulty Master Control lever or ignition module	Check operation of Master Control lever and ignition module

Condition	Cause	Remedy
No spark	Faulty insulation or break in ignition lead or short circuit wire.	Use ohmmeter to check ignition lead for break. If break is detected or high resistance measured, fit a new ignition lead; check short circuit wire for ground contact in run position
	Check operation of spark plug. Inspect Master Control lever, ignition coil/lead for damaged insulation and leakage current	Clean or replace spark plug, replace faulty parts of ignition system

Condition	Cause	Remedy
Carburetor floods; engine stalls	Inlet needle not sealing. Foreign matter in valve seat or cone damaged	Remove and clean or replace the inlet needle, clean the fuel tank, pickup body and fuel line if necessary
	Inlet control lever sticking on spindle	Free off the inlet control lever
	Helical spring not located on nipple of inlet control lever	Remove the inlet control lever and install it correctly
	Perforated disc on diaphragm is deformed and presses constantly against the inlet control lever	Fit a new metering diaphragm
	Inlet control lever too high (relative to correct installed position)	Replace inlet control system (lever, spindle, spring)
Poor acceleration	Idle jet too lean	Rotate low speed screw (**L**) counterclockwise (richer), (no further than stop on carburetors with limiter caps)
	Main jet too lean	Rotate high speed screw (**H**) counterclockwise (richer), (no further than stop on carburetors with limiter caps)
	Inlet control lever too low (relative to correct installed position)	Install new inlet control system (lever, spindle, spring)
	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 (**LA**)	Set idle speed screw (**LA**) correctly
	Throttle rod sticking	Check and free off throttle rod
	Oil seals/crankcase leaking	Seal or replace oil seals/ crankcase
Engine stalls at idle speed	Idle jet too rich or too lean	Set low speed screw (**L**) correctly
	Setting of idle speed incorrect – throttle shutter completely closed	Set idle speed screw (**LA**) correctly
	Small plastic plate in valve jet does not close	Clean or renew valve jet
	Idle jet bores or ports blocked	Clean the carburetor

Condition	Cause	Remedy
Engine speed drops quickly under load – low power	Air filter dirty	Clean the air filter
	Throttle shutter not opened fully	Check throttle rod
	Tank vent faulty	Install new tank vent
	Fuel pickup body dirty	Install new pickup body
	Fuel strainers dirty	Install new fuel strainer
	Leak in fuel line between tank and fuel pump	Seal connections or install a new fuel line
	Setting of high speed screw (**H**) too rich	Rotate high speed screw (**H**) clockwise (leaner), no further than stop
	Main jet bores or ports blocked	Clean the carburetor
	Pump diaphragm damaged or fatigued	Fit new pump diaphragm
	Impulse hose damaged or kinked	Fit new impulse hose

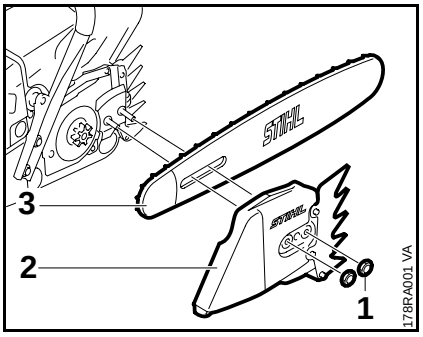
4.6 Engine

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

– Air filter
– Fuel system
– Carburetor
– Ignition system

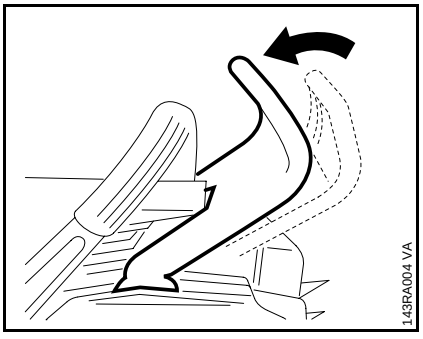
Condition	Cause	Remedy
Engine does not start easily, stalls at idle speed, but operates normally at full throttle	Oil seals in crankcase damaged	Replace the oil seals
	Crankcase leaking or damaged (cracks)	Seal or replace the crankcase
Engine does not deliver full power or runs erratically	Piston rings worn or broken	Fit new piston rings
	Muffler / spark arresting screen carbonized	Clean the muffler (inlet and exhaust), replace spark arresting screen, replace muffler if necessary
	Air filter element dirty	Replace air filter element
	Fuel / impulse hose severely kinked or damaged	Fit new hoses or position them free from kinks
	Decompression valve sticking	Replace the decompression valve
Engine overheating	Insufficient cylinder cooling. Air inlets in fan housing blocked or cooling fins on cylinder very dirty	Thoroughly clean all cooling air openings and the cylinder fins

5. Clutch, Chain Drive, Chain Brake and Chain Tensioner



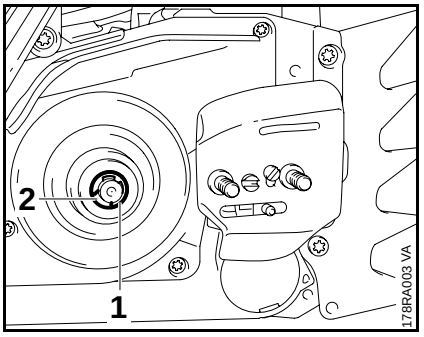
Wear work gloves to protect your hands from injury.

- Unscrew the hex nuts (1).
- Remove the chain sprocket cover (2).
- Remove the bar (3) and chain.

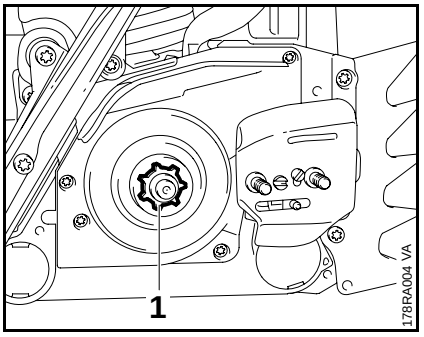


- Disengage the chain brake by pulling the hand guard towards the front handle.

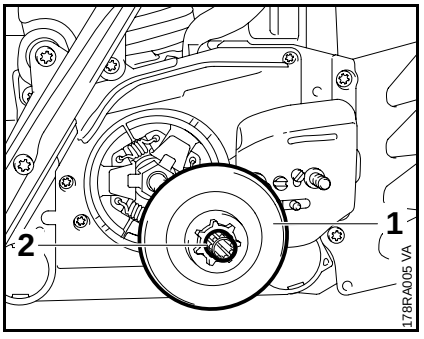
5.1 Clutch Drum / Chain Sprocket



- Remove the E-clip (1).
- Remove the washer (2).

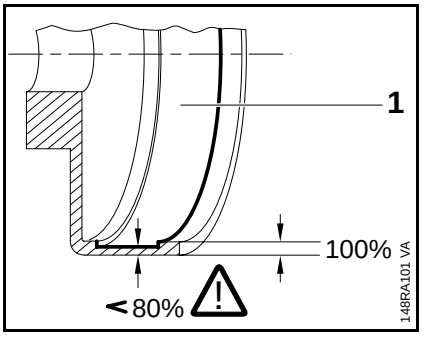


- Remove the rim sprocket (1).



- Remove the clutch drum (1) with needle cage (2).

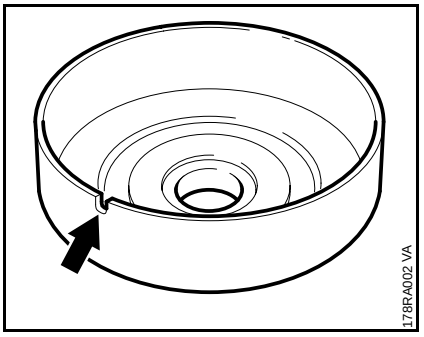
– Examine the needle cage for signs of damage.



- Inspect the clutch drum (1) for wear.

If there are signs of serious wear on the inside diameter of the clutch drum (1), check the remaining wall thickness. If it is less than about 80% of the original thickness, fit a new clutch drum.

If the clutch drum has to be replaced, also check the brake band – 🕮 5.5.2.

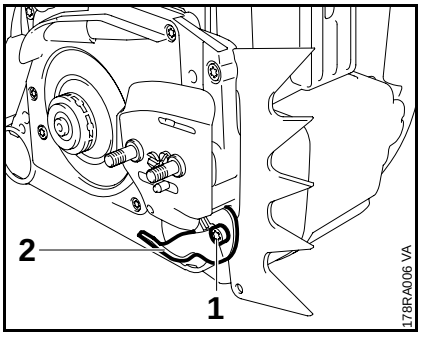


Clean stub of crankshaft. Wash the needle cage, examine it for damage and replace if necessary. Lubricate needle cage with STIHL multi-purpose grease – 🕮 17.

- Rotate clutch drum/chain sprocket and apply slight pressure at the same time until the oil pump drive spring engages the notch (see arrow).

Reassemble in the reverse sequence.

5.2 Replacing the Chain Catcher

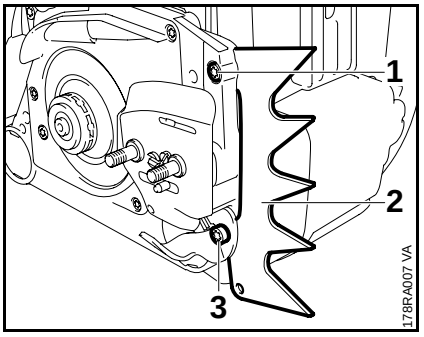


– Remove the chain sprocket cover, chain and bar – 🕮 5

- Take out the screw (1).
- Remove the chain catcher (2).

Reassemble in the reverse sequence.

5.3 Spiked Bumper



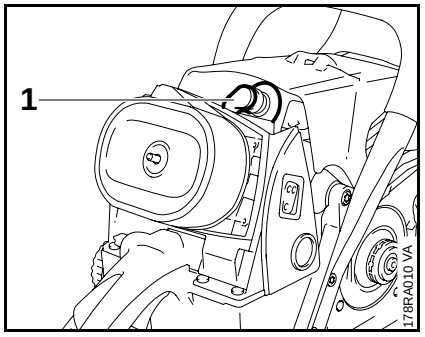
– Remove the chain sprocket cover, chain and bar – 🕮 5

- Hold the self-locking nut steady and take out the screw (1).
- Take out the screw (3).
- Remove the spiked bumper (2) and chain catcher.

Reassemble in the reverse sequence.

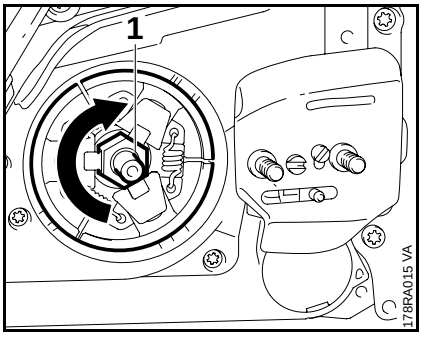
– Troubleshooting chart – 🕮 4.1

– Remove the clutch drum/chain sprocket – 🕮 5.1

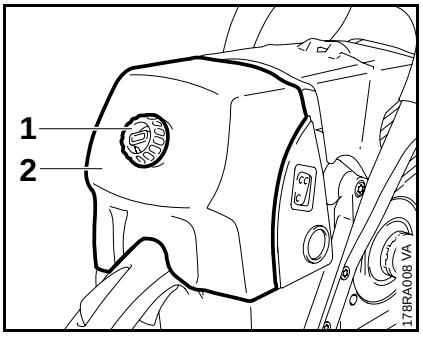


● Pull the boot (1) off the spark plug.

– Unscrew the spark plug.

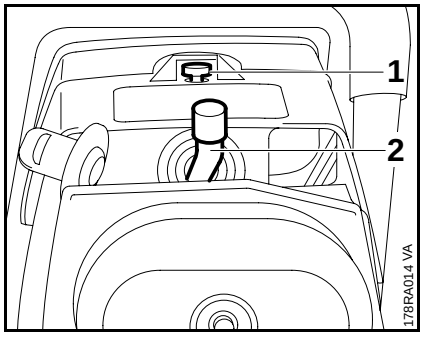


● Unscrew the clutch (1) from the crankshaft clockwise (left-hand thread).



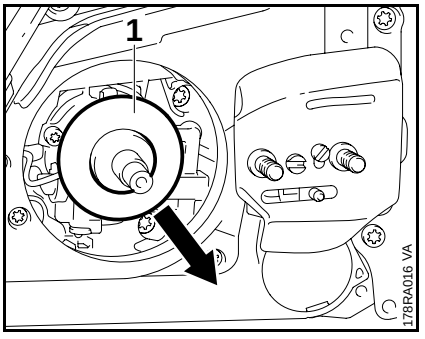
● Loosen the twist lock (1).

● Remove carburetor box cover (2) to the rear.



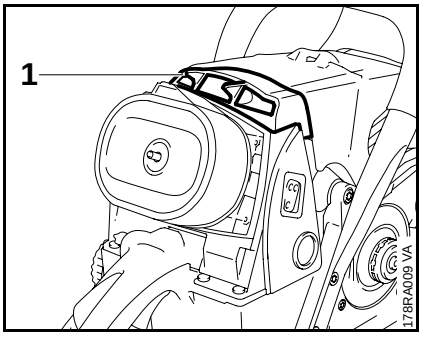
● Close the decompression valve (1).

● Push the locking strip (1) 0000 893 5903 into the spark plug hole so that "OBEN-TOP" faces up.

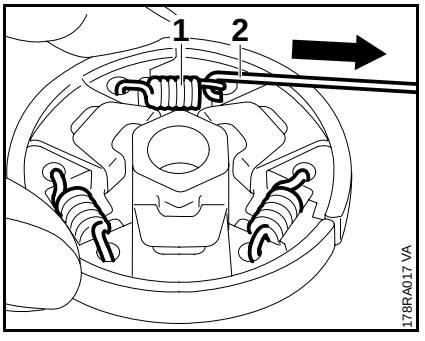


● Remove the cover washer (1) and clean it if necessary (note the installed position of the cover washer).

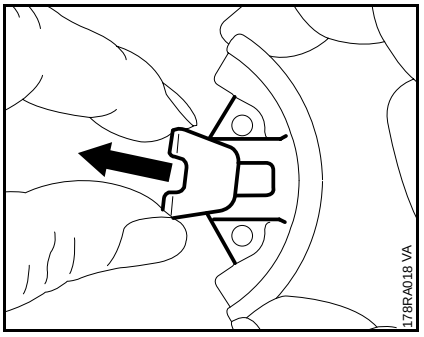
Disassembling the clutch



● Pull off the air baffle (1) upwards.

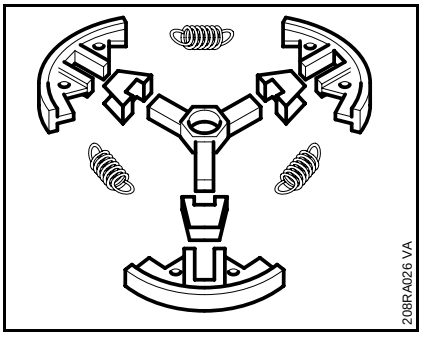


● Use hook (2) 5910 890 2800 to remove the clutch springs (1).



– Pull the clutch shoes off the carrier.

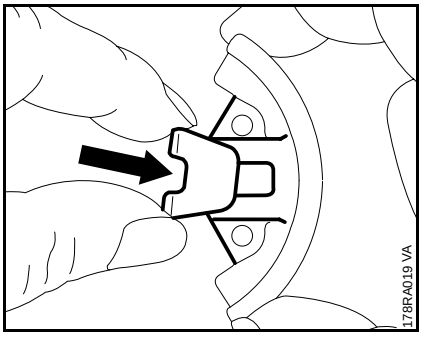
● Pull the retainers off the clutch shoes.



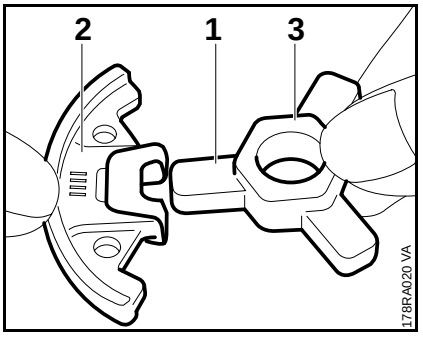
– Clean all parts – 🕮 17.

– Replace any damaged parts.

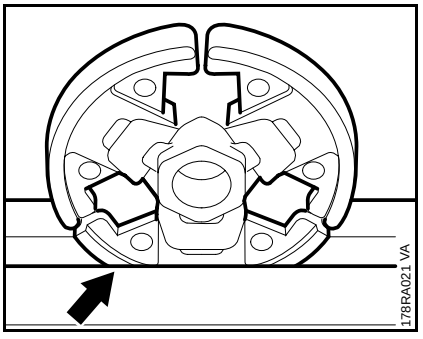
Assembling the clutch



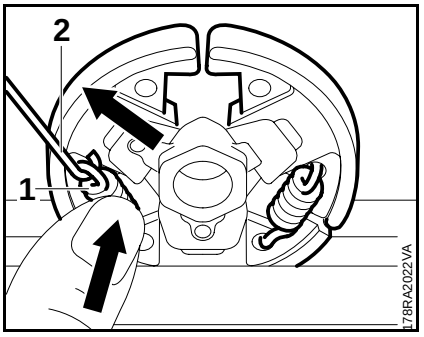
● Slip the retainers onto the clutch shoes.



● Fit the clutch shoes over the arms (1) of the clutch carrier so that the series number (2) is on the same side as the longer hexagon (3).

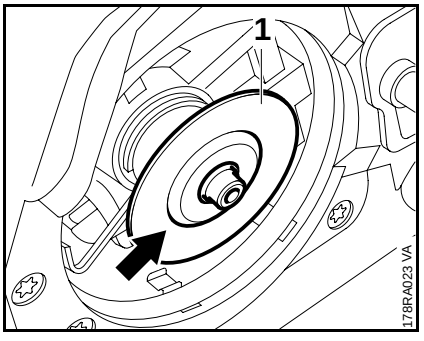


● Clamp the clutch in a vise.

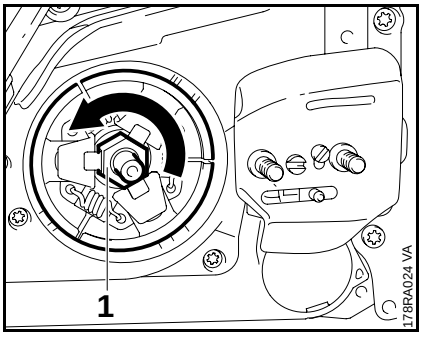


● Attach one end of each spring (1) to the clutch shoes.

● Use the hook (2) 5910 890 2800 to attach other end of the spring and press it firmly into the clutch shoe.



● Fit the cover washer (1) on the crankshaft so that its raised center (arrow) faces outwards.



- Screw home the clutch (1), hexagon facing outward, and tighten it down firmly – 🕮 3.5

The clutch has a left-hand thread.

– Remove locking strip from the cylinder.

Reassemble all other parts in the reverse sequence.

5.5 Chain Brake

5.5.1 Checking Operation

The chain brake is one of the most important safety devices on the chainsaw. Its efficiency is measured in terms of the chain braking time, i.e. the time that elapses between activating the brake and the saw chain coming to a complete standstill. The shorter the braking time, the better the efficiency and protection offered against being injured by the rotating chain.

Contamination (with chain oil, chips, fine particles of abrasion, etc.) and smoothing of the friction surfaces of the brake band and clutch drum impair the coefficient of friction. This, in turn, reduces the frictional forces and thus prolongs the braking time. A fatigued or stretched brake spring has the same negative effect.

– Start the engine.

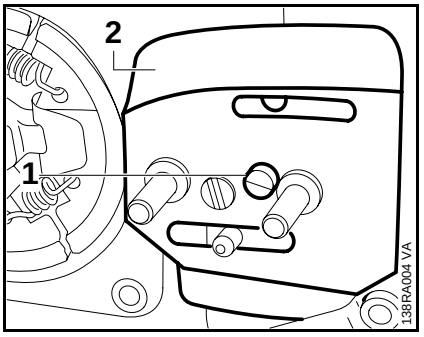
– With the chain brake activated (locked), open the throttle wide for a brief period (max. 3 seconds) – the chain must not rotate.

– With the chain brake released, open the throttle wide and activate the brake manually – the chain must come to an abrupt stop.

The braking time is in order if deceleration of the saw chain is imperceptible to the eye.

If the chain brake does not operate properly, see troubleshooting chart – 🕮 4.1.

5.5.2 Removing

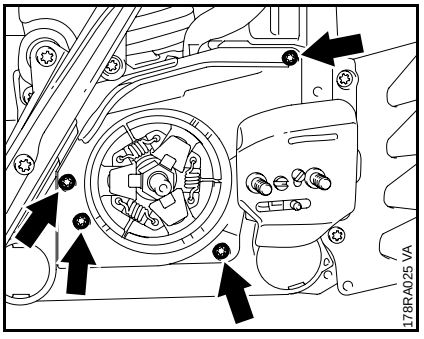


– Troubleshooting chart – 🕮 4.1

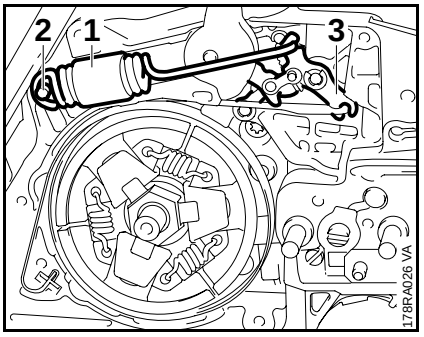
– Remove the chain sprocket cover, chain, bar and clutch drum – 🕮 5.1

- Take out the screw (1).
- Remove the inner side plate (2).

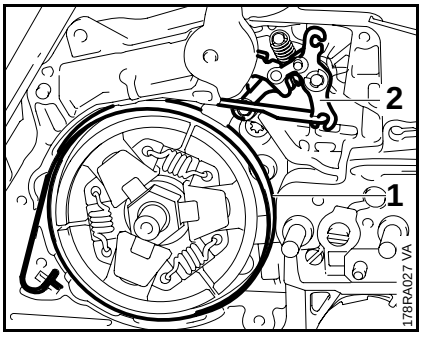
– Engage the chain brake by pushing the hand guard away from the front handle.



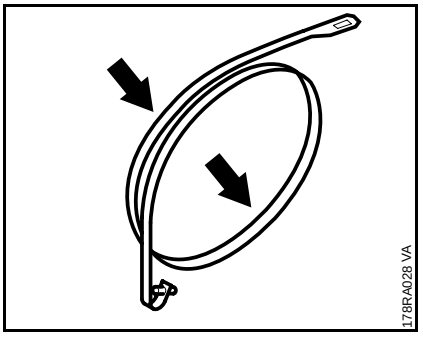
- Take out the screws (arrows).
- Remove the cover.



- Carefully ease the brake spring (1) off the anchor pin (2).
- Remove the brake spring (1) from the brake lever (3).



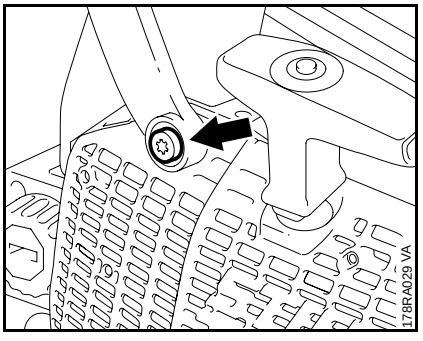
- Pry the brake band (1) out of the crankcase.
- Disconnect the brake band (1) from the brake lever (2).



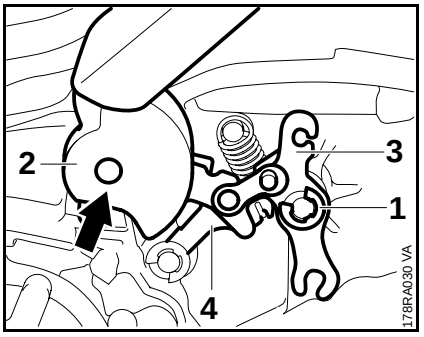
Install a new brake band if there are noticeable signs of wear (large areas on inside diameter and/or parts of outside diameter) and its remaining thickness is less than 0.6 mm.

The thickness of the brake band must not be less at any point.

If the brake band is still serviceable, use No. 120 emery paper or emery cloth (grain size approx. 120 µm) to clean and roughen its friction face (inside diameter).

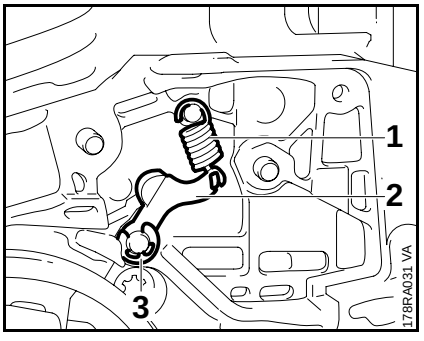


- Take out the screw (arrow).



- Remove the E-clip (1).
- Pry the hand guard (2) together with the brake lever (3) off the pivot pin (arrow).

– Pull the lever out of the hand guard.



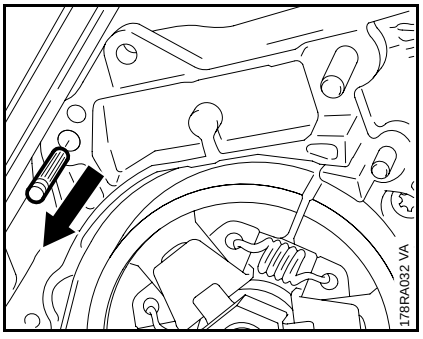
- Disconnect the spring (1).
- Remove the E-clip (3).
- Remove the lever (2) with spring (1).

Clean all disassembled parts in standard solvent-based degreasant containing no chlorinated or halogenated hydrocarbons.

– Inspect parts and replace if damaged.

– Clean the entire housing recess for the chain brake.

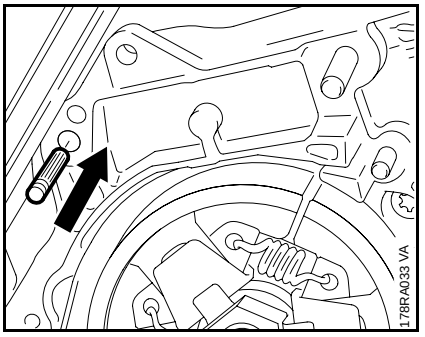
If the groove in the brake spring anchor pin is worn, follow the steps below to install a new pin:



– Remove the cylinder – 🕮 6.5.1

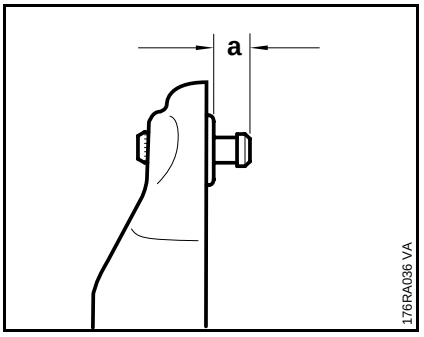
● Use a suitable punch to drive the anchor pin (1) out of the crankcase, from the inside outwards.

Do not drive out the pin in the other direction as this would damage the annular bead which was formed in the crankcase bore when the pin was originally installed. In such a case neither the new anchor pin nor the brake spring would locate properly. Furthermore, the crankcase could be damaged in this way and possibly impair correct operation of the chain brake.



– If the brake spring anchor pin has been removed, coat the knurled shank of the new pin with Loctite before installing – 🕮 17.

● Position the new pin in the bore so that the knurling on the pin meshes with the existing knurling in the bore. Turn pin back and forth as necessary.

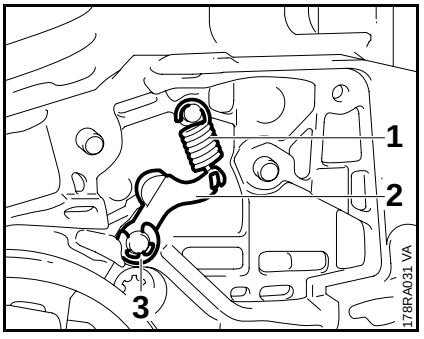


- Carefully tap home the pin squarely to obtain dimension "a" (about 4.3–4.7 mm).

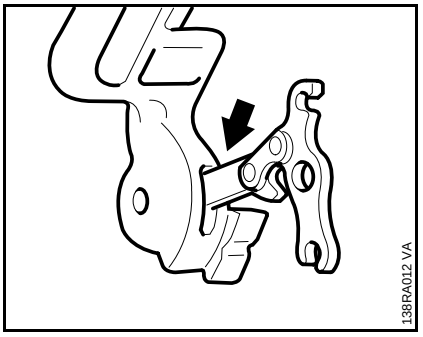
Make sure the pin is installed completely square.

– Install the cylinder – 🕮 6.5.2

Coat all sliding and bearing points with STIHL multipurpose grease – 🕮 17.

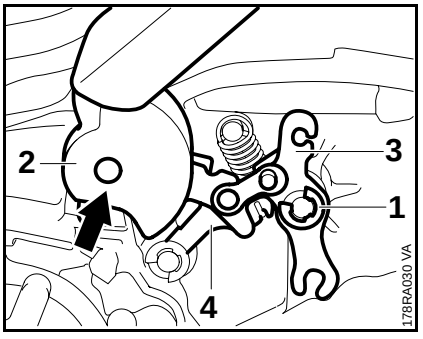


- Fit the lever (2).
- Fit the E-clip (3).
- Attach the spring (1).



- Insert the lever in the side of the hand guard bearing boss.

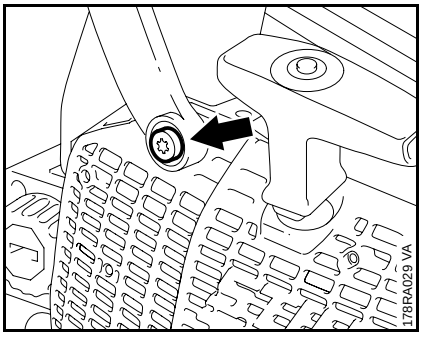
The short arm of the brake lever must point to the top of the hand guard.



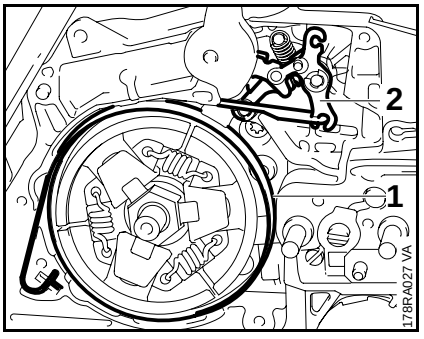
- Position bearing boss (arrow) of hand guard (2) against the pivot pin and fit the other side of the hand guard over the fan housing.
- Position the brake lever (3) against the pivot pin.
- Press the cam lever (4) slightly downward and push the hand guard and bell crank onto their pivot pins.
- Fit the E-clip (1).

Coat all sliding and bearing points with STIHL multipurpose grease – 🕮 17.

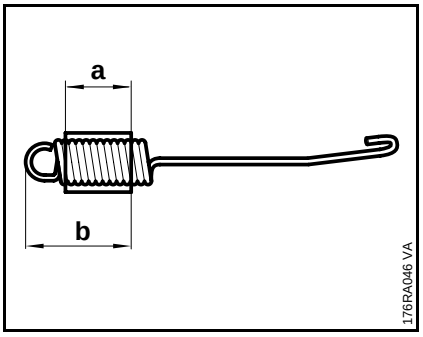
Do not lubricate the brake band.



- Fit the screw (arrow) and tighten it down firmly – 🕮 3.5



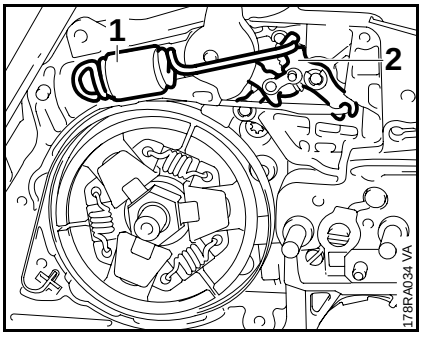
- Attach brake band (1) to brake lever (2) and push it into the crankcase.



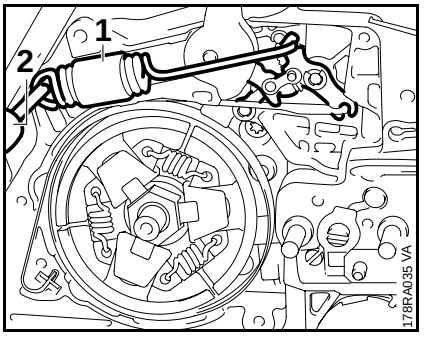
- The turns of brake spring must be tightly against one another in the relaxed condition. If this is not the case, replace the brake spring.

  Check correct position of protective tube:

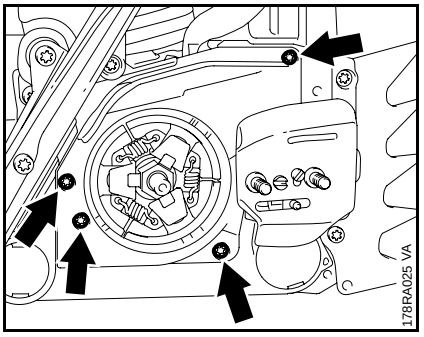
  a = 18 mm
  b = 33 mm



- Hook the brake spring (1) to the brake lever (2).



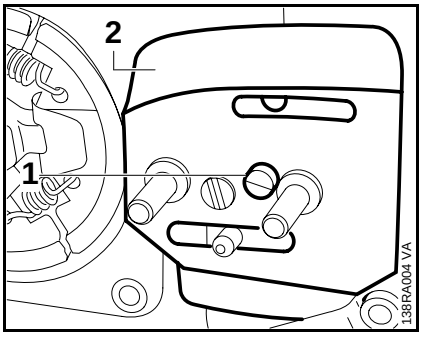
- Use the assembly tool (2) 1117 890 0900 to attach the brake spring (1) to the anchor pin (arrow).



– Place cover in position.

- Insert screws (arrows) and tighten them down firmly – 🕮 3.5

– Install the clutch drum/chain sprocket – 🕮 5.1

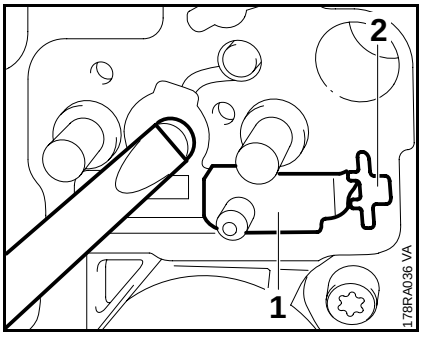


- Fit the side plate (2) over the collar screws and push it against the crankcase.

- Fit the screw (1) and tighten it down firmly.

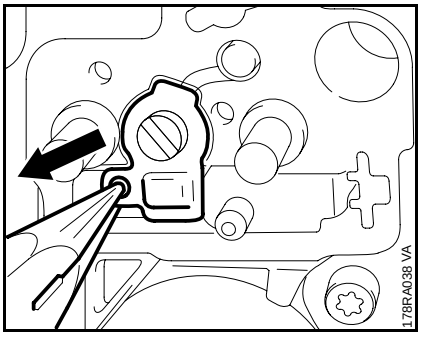
– Mount the guide bar and chain sprocket cover. Tighten down nuts on the chain sprocket cover – 🕮 3.5

– Check operation of chain brake – 🕮 5.5.1

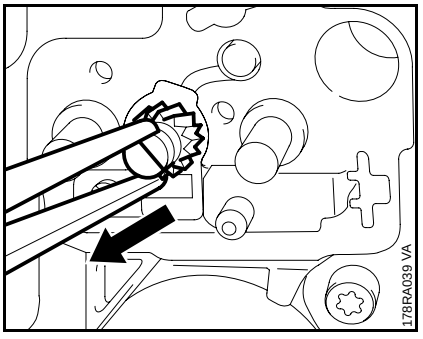


– Remove the inner side plate – 🕮 5.5.2

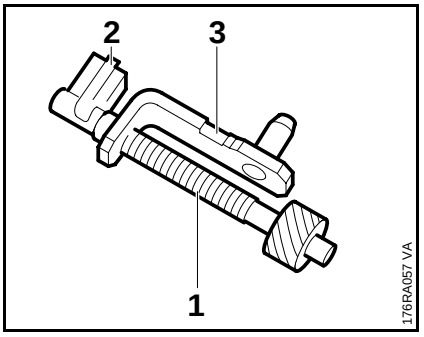
● Rotate the spur gear clockwise until tensioner slide (1) butts against the thrust pad (2).



● Remove the cover plate.



● Pull out the spur gear.

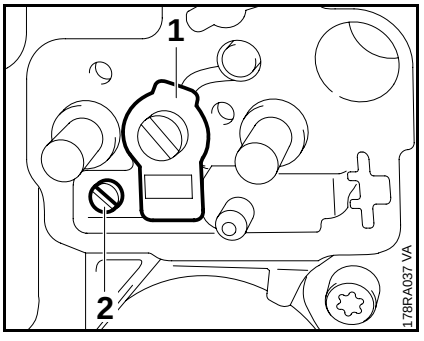


● Inspect the teeth on the spur gear and adjusting screw (1), replace both parts if necessary. To do this, pull off the thrust pad (2) and unscrew the tensioner slide (3).

Install in the reverse sequence.

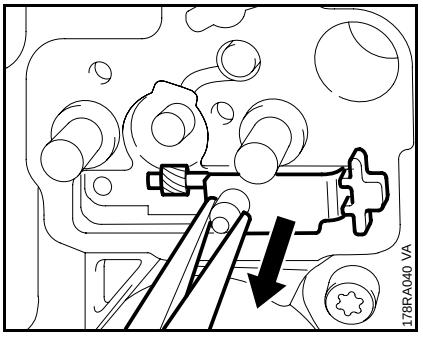
Always replace the adjusting screw and spur gear as a matching pair.

Coat teeth of adjusting screw and spur gear with grease, 🕮 17, before installing.

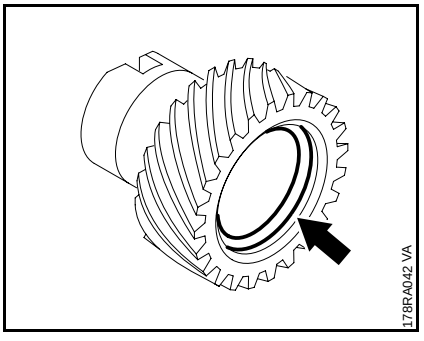


● Pull out the retainer (1).

● Take out the screw (2).

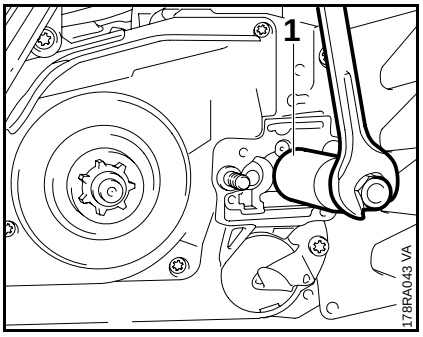


● Take out the tensioner slide with adjusting screw and thrust pad.



● When reassembling, check that O-ring (arrow) is fitted in spur gear and coat it with oil before fitting the spur gear.

5.7 Bar Mounting Studs



Removing

– Remove the chain sprocket cover, bar and chain – 🕮 5.1

● Push stud puller (1) 5910 893 0501 over the collar stud as far as it will go. Use a 15 mm wrench to unscrew the collar stud counterclockwise.

Installing

– Before installing, coat thread of collar stud with Loctite – 🕮 17

– Install and tighten down the collar stud – 🕮 3.5

Reassemble all other parts in the reverse sequence.

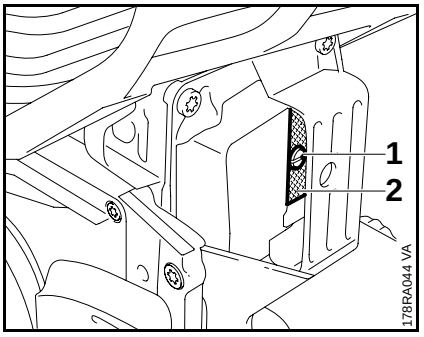
6. Engine

6.1 Muffler/Spark Arresting Screen

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

– Troubleshooting chart – 🕮 4.6

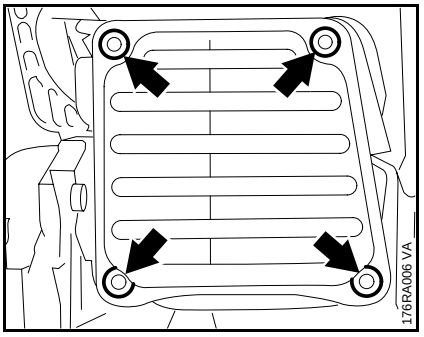
Only machines with spark arresting screen in top casing



● Take out the screw (1).

● Remove the spark arresting screen (2) and clean or replace if necessary.

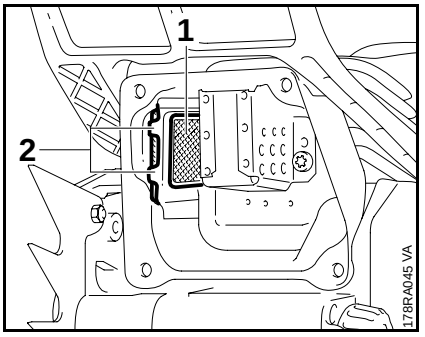
All machines



● Take out the screws (arrows).

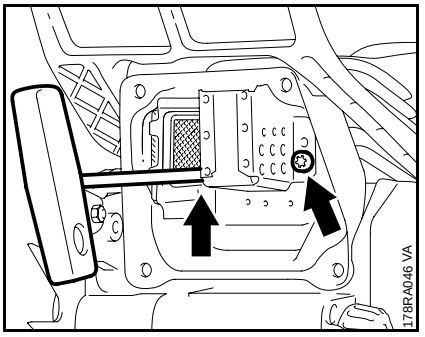
– Remove the top casing.

– Remove the gasket (if fitted).



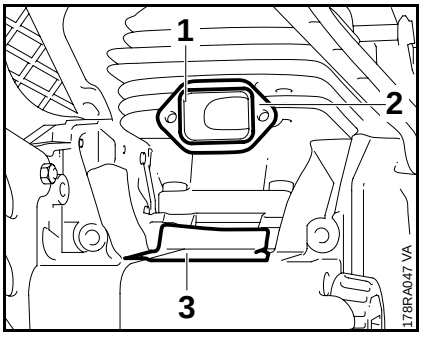
● Inspect spark arresting screen (1) (if fitted). If necessary, bend back the retaining tabs (2) and pull out the screen.

– Clean or replace the spark arresting screen if necessary.



● Take out the screws (arrows).

– Remove the bottom casing.



- Remove the gasket (1).

– Clean the sealing faces.

– Inspect the heat reflecting foil and replace if necessary – 🕮 6.7.2

Installing

- Install a new gasket (2) with its bead (3) pointing outward.

– Coat threads of screws with Loctite – 🕮 17

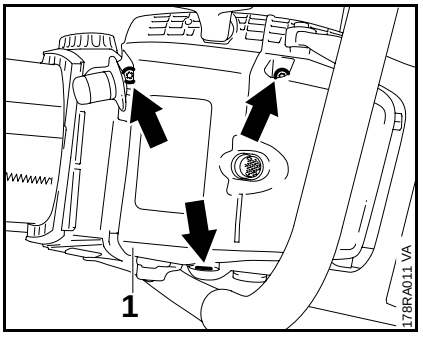
– Fit the bottom casing.

– Tighten down the screws firmly – 🕮 3.5

– Note different sizes of mounting screws when fitting top casing: Lower mounting screws are M6x20 and the upper mounting are M5x6.

– Fit the top casing.

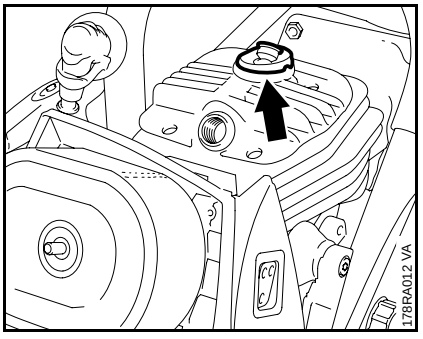
– Tighten down the screws firmly – 🕮 3.5



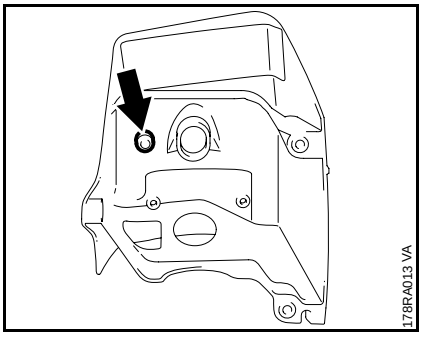
– Unscrew the spark plug – 🕮 5.4

- Take out the screws (arrows).

- Lift the shroud (1) away vertically.



– Before fitting the shroud, check that the cover (arrow) is properly seated on the decompression valve.



– Before fitting the shroud, check that cap (arrow) is properly seated.

Always replace damaged caps and grommets in sets.

– Fit the shroud and tighten down the screws firmly – 🕮 3.5

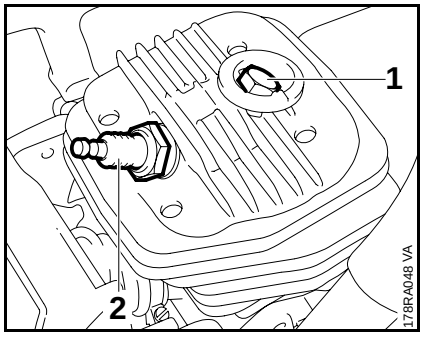
Defective oil seals and gaskets or cracks in castings are the usual causes of leaks. Such faults allow supplementary air to enter the engine and upset the fuel-air mixture.

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.

For systematic troubleshooting, always perform the vacuum test first and then the pressure test.



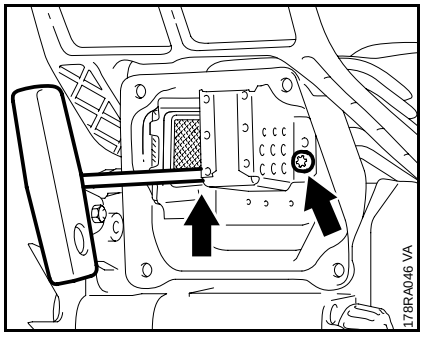
– Remove the shroud – 🕮 6.2

– Remove the decompression valve – 🕮 6.8

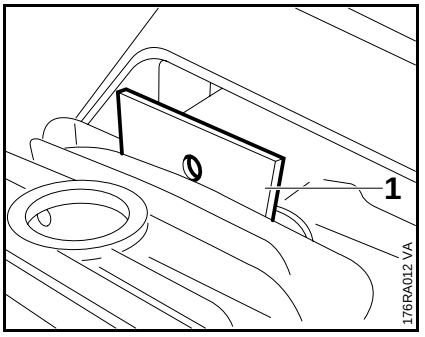
● Install plug (1) 1122 025 2200 and tighten down to 25 Nm.

● Fit spark plug (2) and tighten it down firmly – 🕮 3.5

– Remove muffler top casing – 🕮 6.1.



● Back off the bottom casing screws (arrows) half way – 🕮 6.1

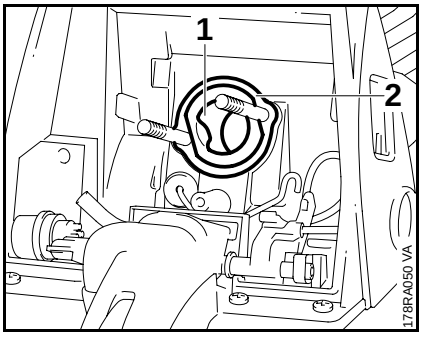


● Fit the sealing plate (1) 0000 855 8106 between the muffler and cylinder exhaust port and tighten down the screws moderately.

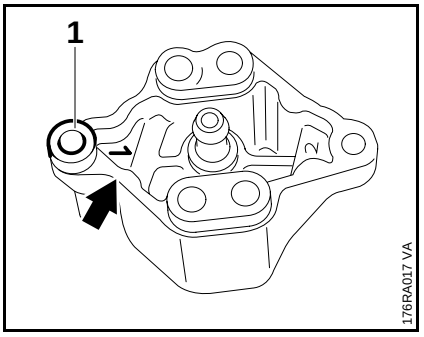
The sealing plate must completely fill the space between the two screws.

– Remove the carburetor – 🕮 12.2.1

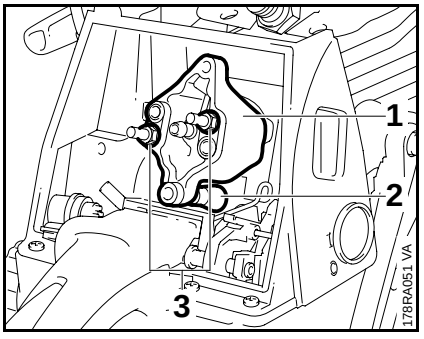
– Set the piston to top dead center. This can be checked through the inlet port.



● Check that the sleeve (1) and washer (2) are in place.



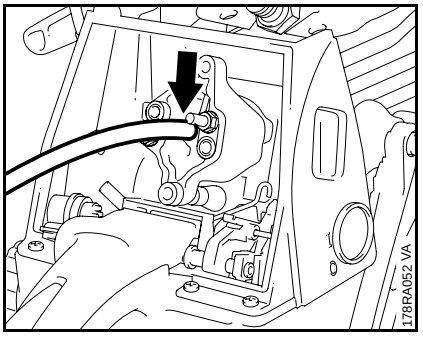
- Check that the pin (1) in the test flange 1128 850 4200 is in hole No. 1 (arrow), fit if necessary.



- Push the test flange (1) into position.
- When fitting the test flange, make sure the pin locates properly in the impulse hose (2).
- Fit the nuts (3) and tighten them down firmly.

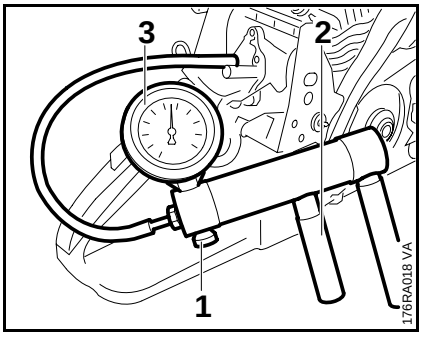
Oil seals tend to fail when subjected to a vacuum, i.e. the sealing lip lifts away from the crankshaft during the piston's induction stroke because there is no internal counter-pressure.

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



– Preparations – 🕮 6.3.1

- Connect suction hose (arrow) of vacuum pump 0000 850 3501 to nipple (arrow) of the test flange.

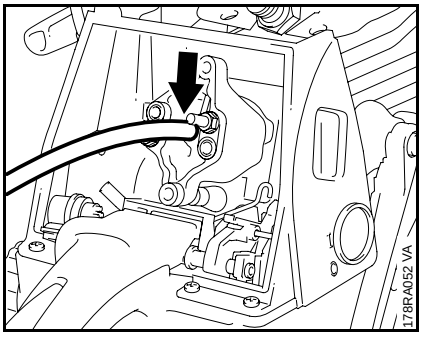


- Close the vent screw (1) on the pump.
- Operate lever (2) until pressure gauge (3) indicates a vacuum of 0.5 bar.

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.

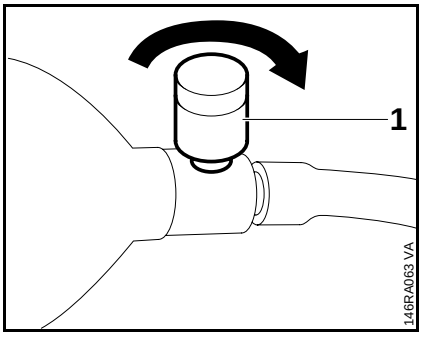
– After finishing the test, open the vent screw and disconnect the hose.

– Continue with pressure test – 🕮 6.3.3

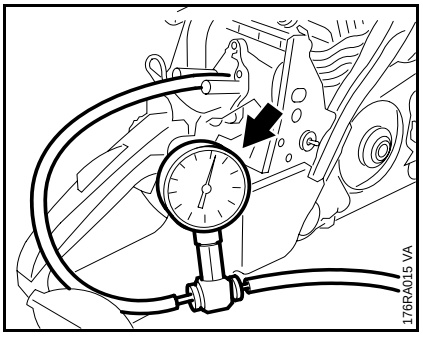


– Preparations – 🕮 6.3.1

● Connect pressure hose (1) of tester 1106 850 2905 to nipple (arrow) on test flange.



● Close vent screw (1) on the rubber bulb.



● Pump air into the crankcase with rubber bulb until the gauge (arrow) indicates a pressure of 0.5 bar. If this pressure remains constant for at least 20 seconds, the crankcase is airtight.

– However, if the pressure drops, the leak must be located and the faulty part replaced.

To find the leak, coat the suspect area with oil and pressurize the crankcase. Bubbles will appear if a leak exists.

– After finishing the test, open the vent screw and disconnect the hose of tester 1106 850 2905.

– Remove the test flange.

– Install the carburetor – 🕮 12.2.1

– Loosen the muffler bottom casing screws and remove the sealing plate.

– Take out the screws one at a time and refit with Loctite – 🕮 17

– Tighten down the screws firmly – 🕮 3.5

– Mount the muffler top casing.

– Unscrew the plug from the cylinder.

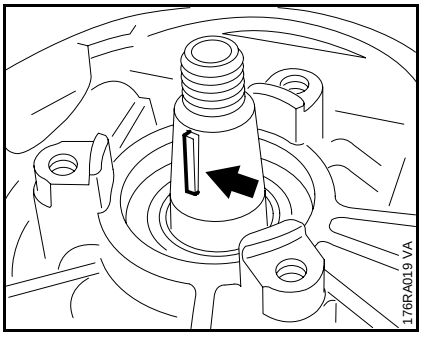
– Install the decompression valve – 🕮 6.8

Reassemble all other parts in the reverse sequence.

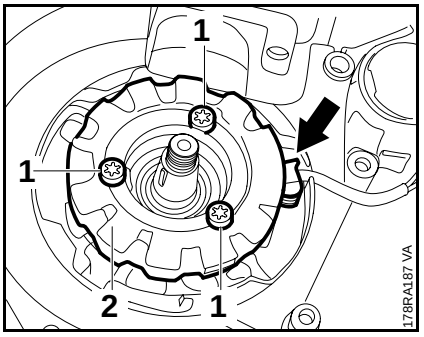
It is not necessary to disassemble the complete crankcase to replace the oil seals.

Flywheel side

– Remove the flywheel – 🕮 7.3.1

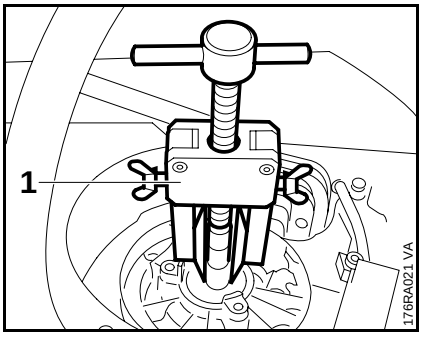


● Remove the key (arrow) from the crankshaft.



● On machines with handle/ carburetor heating, take out the screws (1).

● Remove the generator (2).



– Free off the oil seal in its seat by tapping it with a suitable tube or a punch.

● Apply puller (1) 5910 890 4400 with No. 6 jaws 0000 893 3711.

– Clamp the puller arms.

– Pull out the oil seal.

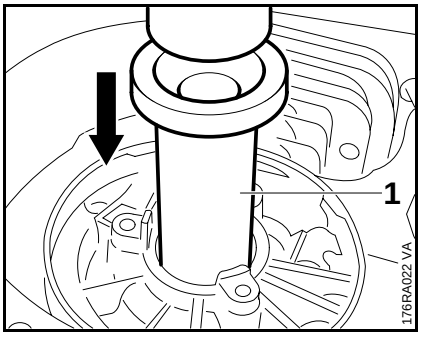
Take care not to damage the crankshaft stub.

– The crankshaft sealing face and taper must be free from grease. Clean with a standard solvent-based degreasant containing no chlorinated or halogenated hydrocarbons – 🕮 17

– Lubricate sealing lips of oil seal with grease – 🕮 17

– Thinly coat the outside diameter of the oil seal with sealant – 🕮 17

– Slip the oil seal, open side facing the crankcase, over the crankshaft stub.



● Use the press sleeve (1) 1108 893 2405 to install the oil seal.

The seating face must be flat and free from burrs.

– Wait about one minute, then rotate the crankshaft several times.

– Install the generator (if fitted) and tighten down the screws firmly – 🕮 3.5

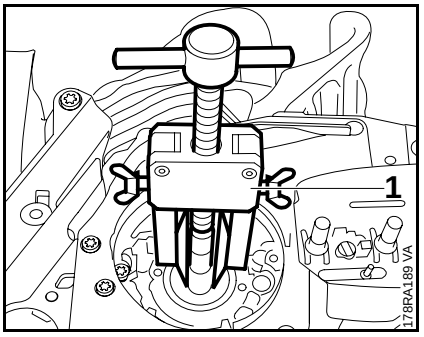
– Install the flywheel – 🕮 7.3.2.

Reassemble all other parts in the reverse sequence.

Clutch side

– Remove the clutch drum – 🕮 5.1

– Remove the oil pump – 🕮 11.3.1



– Free off the oil seal in its seat by tapping it with a suitable tube or a punch.

● Apply puller (1) 5910 890 4400 with No. 3.1 jaws 0000 893 3706.

– Clamp the puller arms.

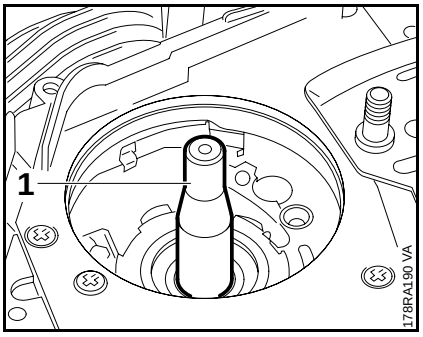
– Pull out the oil seal.

Take care not to damage the crankshaft stub.

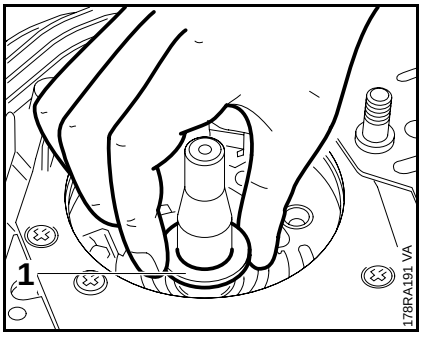
– Cleaning sealing face with standard solvent-based degreasant containing no chlorinated or halogenated hydrocarbons – 🕮 17

– Thinly coat the outside diameter of the oil seal with sealant – 🕮 17

– Lubricate the sealing lips of the oil seal with grease – 🕮 17

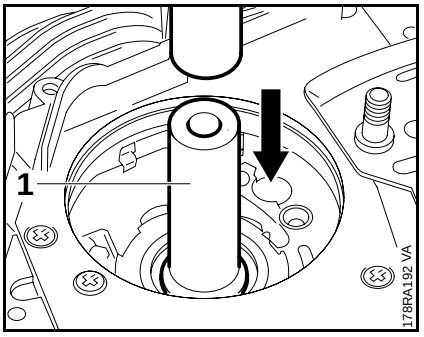


- Push installing sleeve (1) 1118 893 4600 on to the crankshaft stub.



- Slip the oil seal, open side facing the crankcase, over the crankshaft stub.

– Remove the installing sleeve.



- Use press sleeve (1) 1108 893 2405 to press home the oil seal.

– Install the oil pump – 🕮 11.3.1

– Install the clutch drum, 🕮 5.1

Reassemble all other parts in the reverse sequence.

Before removing the piston, decide whether or not the crankshaft has to be removed as well. The crankshaft has to be blocked to remove the flywheel and clutch by resting the piston on the wooden assembly block with the cylinder removed or loosened.

– Remove the shroud – 🕮 6.2

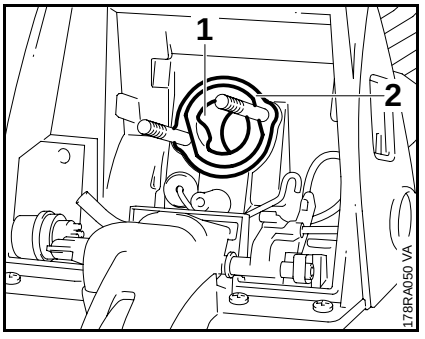
– Remove the fan housing with rewind starter – 🕮 8.2

– Remove the carburetor – 🕮 12.2.1

– Remove the decompression valve – 🕮 6.8

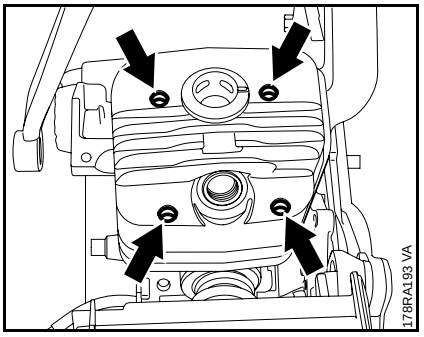
– Remove the muffler – 🕮 6.1

– Pull off the spark plug boot and unscrew the spark plug.

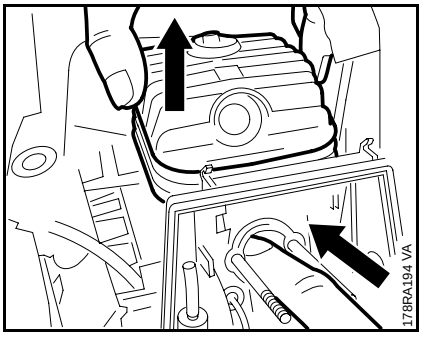


- Take the sleeve (1) out of the manifold.

- Remove the washer (2).

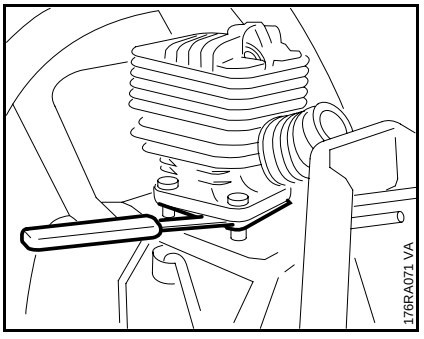


- Take out the cylinder base screws through the holes (arrows) in the cylinder.



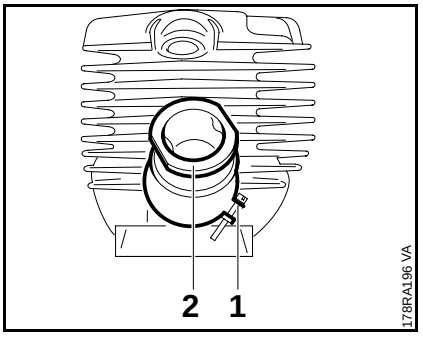
- Carefully lift the cylinder and, at the same time, push the manifold through the tank housing opening.

Do not use pointed or sharp-edged tools for this job.



- Carefully separate the cylinder gasket from the cylinder base.

– Pull the cylinder off the piston.



- Loosen the hose clamp (1).

– Pull the manifold (2) off the intake stub.

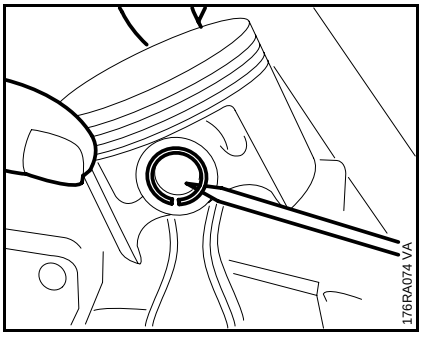
– Inspect the cylinder for damage and scores and replace if necessary.

– If a new cylinder has to be installed, **always** fit a new matching piston.

– Before removing the piston, decide whether or not the crankshaft has to be removed as well. The crankshaft has to blocked to remove the flywheel and clutch by resting the piston on the wooden assembly block with the cylinder removed or loosened.

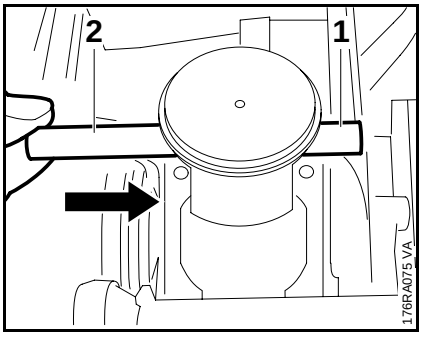
– Remove the clutch – 🕮 5.4

– Remove the flywheel – 🕮 7.3.1



- Remove the hookless snap rings from the piston.

Wear safety glasses to protect your eyes when working with spring washers and snap rings.



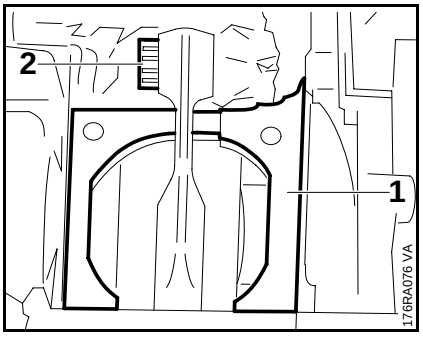
- Use the assembly drift (2) 1111 893 4700 to push the piston pin (1) out of the piston.

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

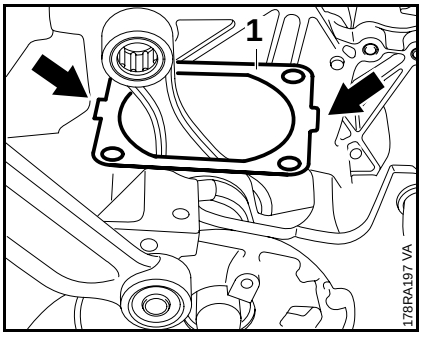
– Remove the piston from the connecting rod and take the needle cage out of the small end.

– Remove the cylinder gasket from the crankcase.

– Inspect the piston rings and replace if necessary – 🕮 6.6

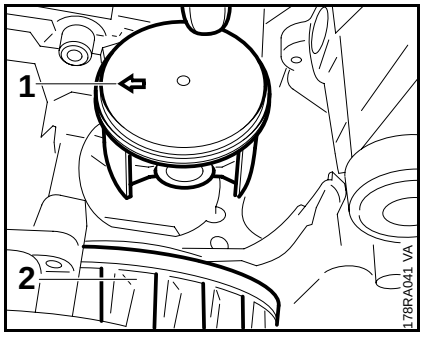


- Thoroughly clean the gasket seating surface (1).
- Lubricate the needle cage (2) with oil and fit it in the small end.



- Fit a new cylinder gasket (1), curvature facing down, on the crankcase.

Note gasket thicknesses:
- with tabs (arrows) = 0.5 mm,
- without tabs = 1.0 mm

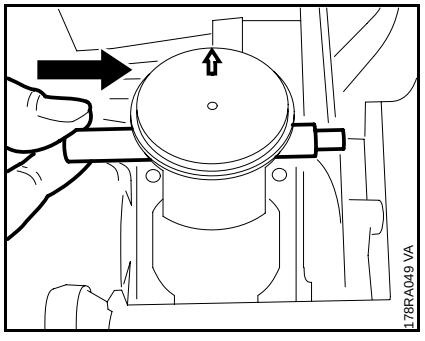


- Check installed position of piston:
  1 = Arrow points to exhaust port (muffler)
  2 = Flywheel

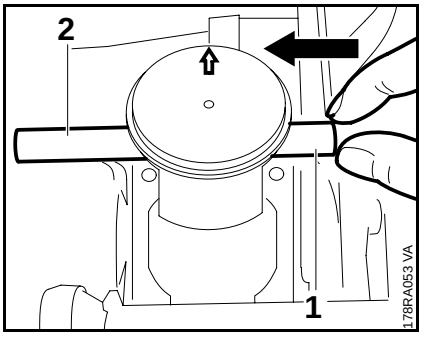
– Heat the piston on an electric heating plate to approx. 60°C (140°F).

Wear suitable gloves to protect your hands from burn injuries.

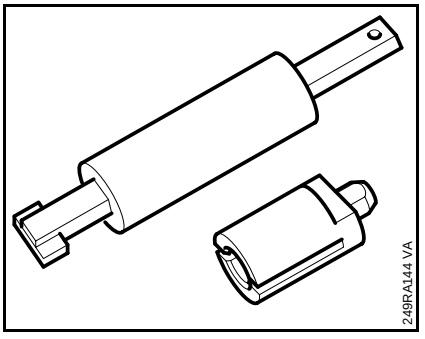
– Slip the piston over the connecting rod.



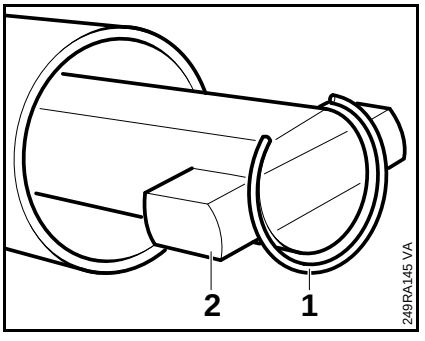
- Push the assembly drift 1111 893 4700, small diameter first, through the piston and small end (needle cage) and line up the piston.



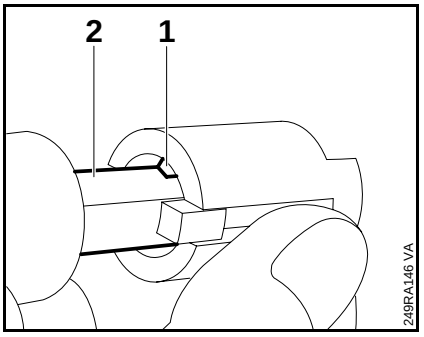
- Fit the piston pin (1) on the assembly drift (2) and slide it into the piston.



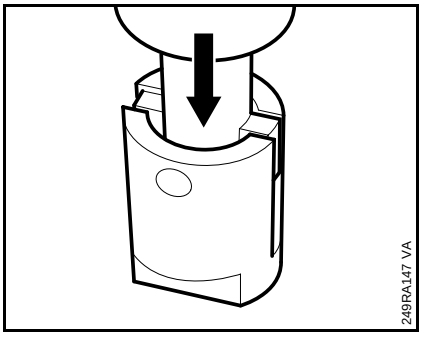
- Remove the sleeve from installing tool 5910 890 2212.



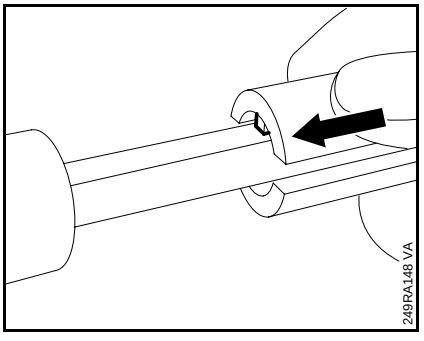
- Attach the snap ring (1) to the magnet (2) so that the snap ring gap is on the flat side of the tool's shank.



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

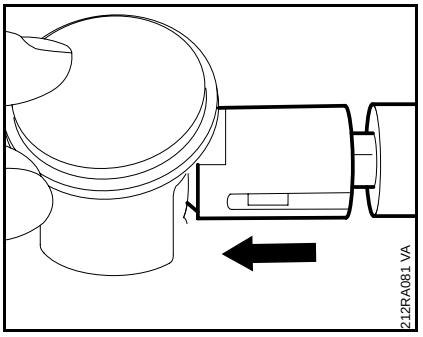


- Stand the installing tool, sleeve downward, on a flat surface (wooden board) and press vertically downwards until the sleeve butts against the tool's shoulder.

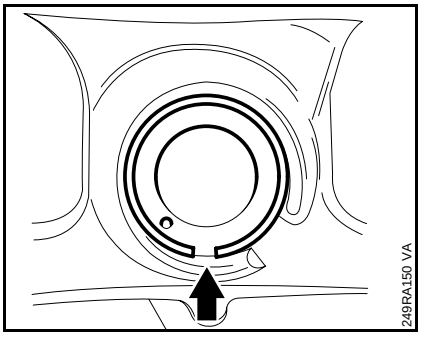


- Remove the sleeve and slip it onto the other end of the shank.

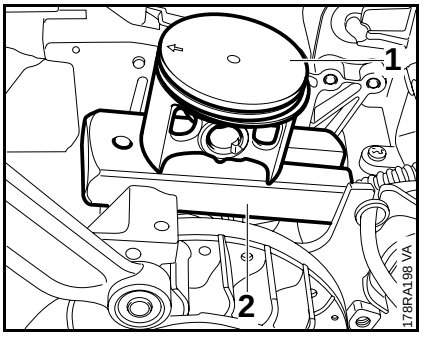
Inner pin must again point toward flat face.



- Apply the installing tool 5910 890 2212 to the piston boss, hold the piston steady, center the tool shank exactly and press home until the snap ring slips into the groove.

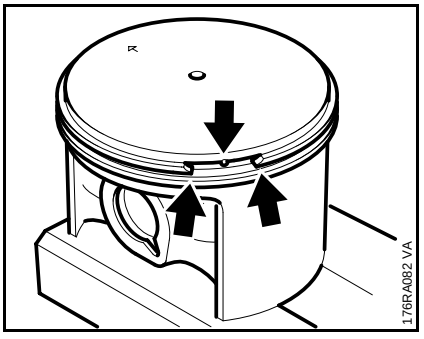


- Fit the snap rings so that their gaps are on the piston's vertical axis (they must point either up or down – see arrow).

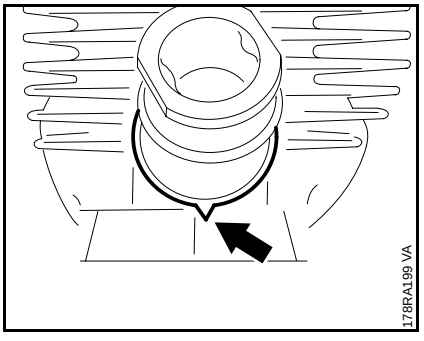


– Lubricate the piston and piston rings with oil.

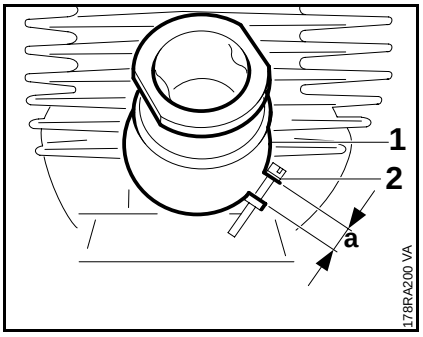
- Rest the piston (1) on the wooden assembly block (2) 1108 893 4800.



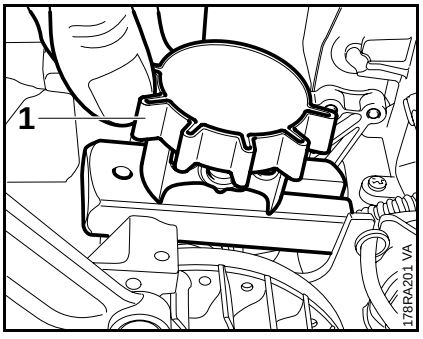
- Align the piston rings so that the radii at the ring gap meet at the fixing pin.



- Push the manifold on to the intake port.
- Pay attention to the correct installed position (arrow).

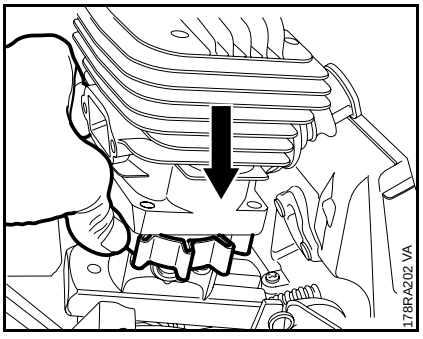


- Position the clamp (1) at an angle of 45° with the screw head (2) on the right.
- Tighten down the screw until the gap “a” between the two ends of the clamp is 5 – 6 mm.



– Check correct installed position of piston rings.

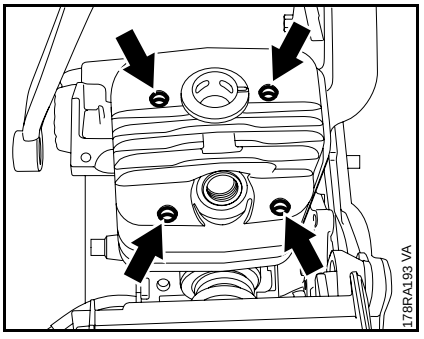
- Use the clamping strap (1) 0000 893 2600 to compress the rings around the piston.



– Lubricate the inside of the cylinder with oil.

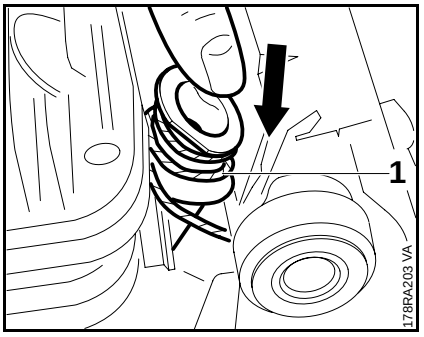
- Line up cylinder as it will be in the installed condition. It is important to observe this point as the piston rings might otherwise break.
- Slide the cylinder over the piston, the clamping strap moves downwards at the same time.

– Remove the clamping strap and wooden assembly block.

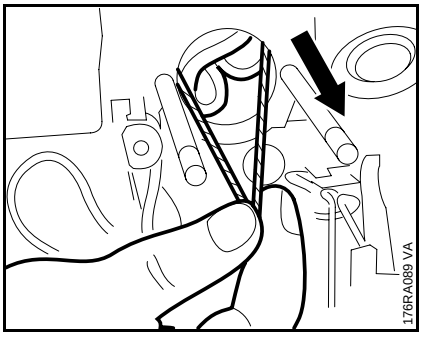


– Line up the cylinder and cylinder gasket.

- Insert the cylinder base screws (arrows), but do not tighten them down yet.



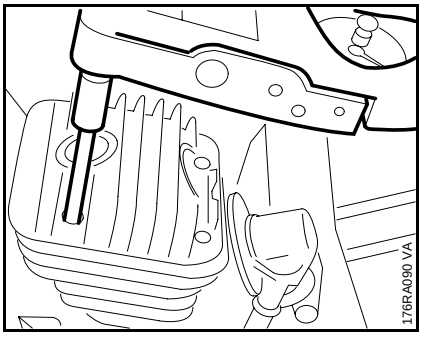
- To pull the manifold flange through the intake opening in the tank housing, wind a piece of string (1) (about 15 cm long) around the back of the flange and pass the ends of the string through the intake opening.
- Press the manifold down.



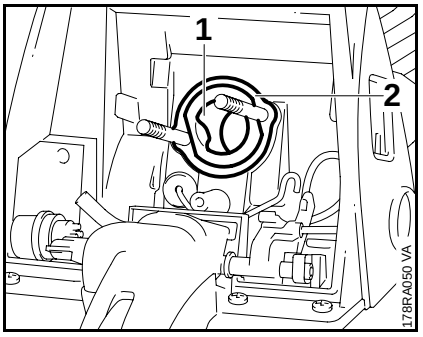
● Pull the ends of the string outward.

The manifold flange is pulled through the carburetor housing intake opening without damaging the manifold.

– Check that the flange is properly seated in the carburetor housing.



● Tighten down the cylinder base screws in an alternate pattern – 🕮 3.5



● Fit sleeve (1) in manifold.

● Fit the washer (2) on the studs.

– Screw home the decompression valve and tighten it down firmly – 🕮 3.5

– Fit the spark plug and tighten it down firmly – 🕮 3.5

– Install the carburetor – 🕮 12.2.1

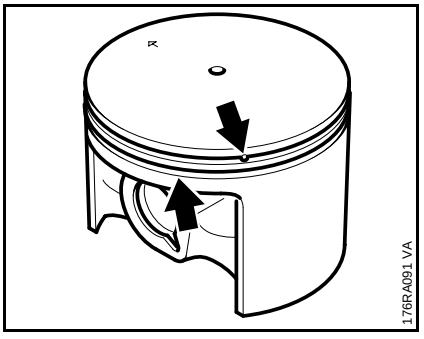
– Install the muffler – 🕮 6.1

– Fit the shroud – 🕮 6.2

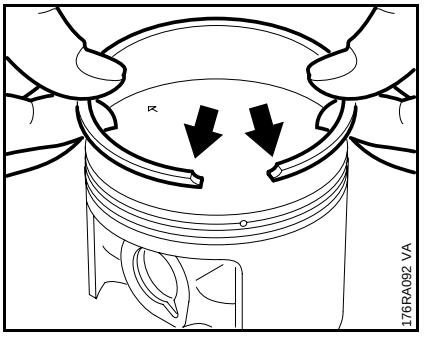
Reassemble all other parts in the reverse sequence.

– Remove the piston – 🕮 6.5.1

– Remove the rings from the piston.



● Use a piece of old piston ring to scrape the grooves clean.



● Install the new piston rings in the grooves so that the radii at the ends of the rings face upward.

– Install the piston – 🕮 6.5.2

– Remove the spiked bumper – 🕮 5.3

– Remove the chain catcher – 🕮 5.2

– Drain the oil tank.

– Drain the fuel tank.

Dispose of fuels and lubricants properly in accordance with local environmental requirements.

– Remove the shroud – 🕮 6.2

– Remove the fan housing with rewind starter – 🕮 8.2

– Remove the ignition module – 🕮 7.1

– Remove the flywheel – 🕮 7.3.1

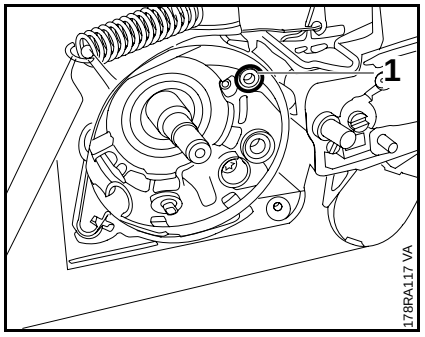
– On machines with handle heating and/or carburetor heating, remove the generator – 🕮 14.5

– Remove the chain brake – 🕮 5.5.2

– Remove the clutch – 🕮 5.4

– Remove the muffler –, 🕮 6.1

– Remove the oil pump – 🕮 11.3.1

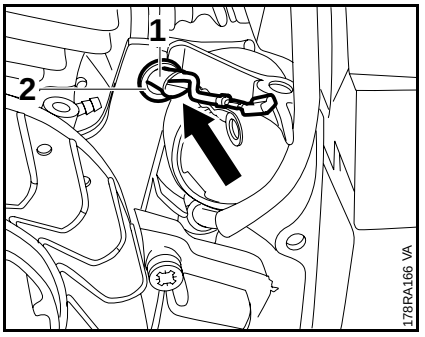


● Take the sealing ring (arrow) out of the housing bore.

– Remove the oil suction hose – 🕮 11.1

– Remove the oil seals – 🕮 6.4

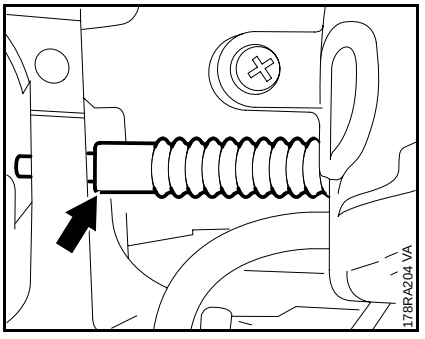
– Remove the piston – 🕮 6.5.1



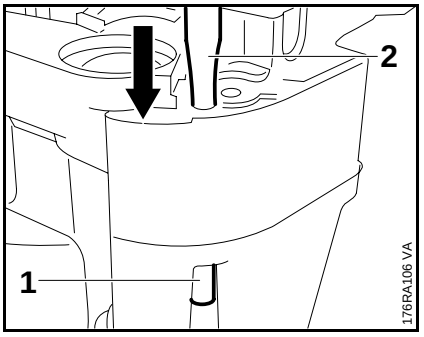
● Push the rubber grommet (2) and wire (1) out of the housing.

– Pull the short circuit wire and ground wire out of the housing.

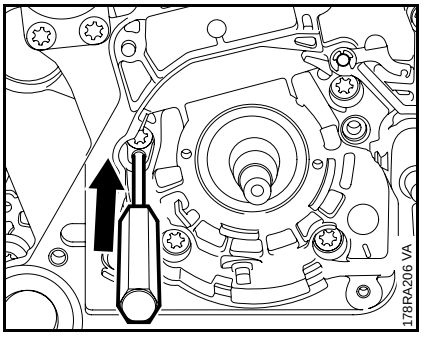
– Separate the crankcase and tank housing – 🕮 12.10



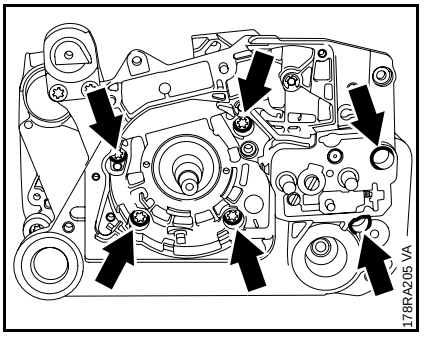
● Pull the impulse hose off the connector (arrow).



- At the chain tensioner side of the crankcase, use a 4 mm drift (2) to drive the dowel pin out of the two halves of the crankcase.

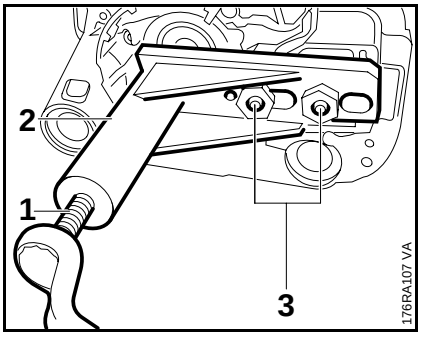


- At the clutch side of the crankcase, use a 4 mm drift (2) to drive the dowel pin out of the two halves of the crankcase.



– Take the heat reflecting foil off the crankcase.

- Remove the screws (arrows) from the two halves of the crankcase.



– Remove the chain tensioner – 🕮 5.6

- Back off the spindle (1) in service tool AS 5910 007 2205 all the way.

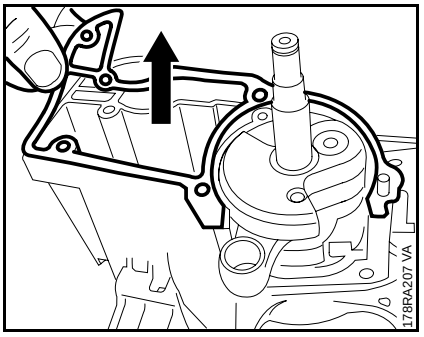
- Slip service tool AS (2) over the two collar studs.

- Fit the hex nuts (3) (for sprocket cover) and tighten them down by hand.

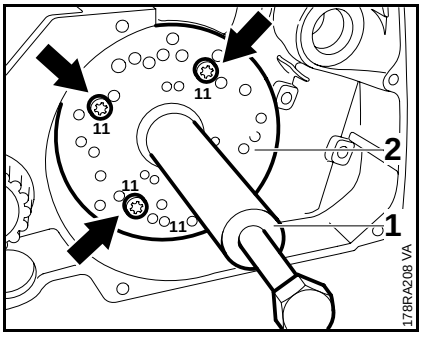
- Turn the spindle (1) of the service tool clockwise until the crankshaft is pressed out of the ball bearing.

The two halves of the crankcase separate during this process.

– Remove the service tool AS.



- Remove the gasket from the crankcase.

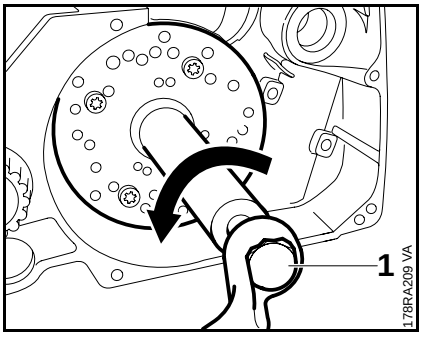


– Unscrew the spindle of service tool ZS (1) 5910 007 2220 a little (left-hand thread)

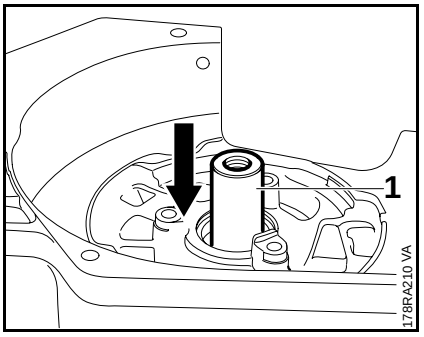
- Position the service tool ZS (1) 5910 893 2101 against the flywheel side so that number 11 is at the bottom.

The cylinder flange faces up.

- Fit three M5x72 screws (arrows) in the holes marked “11“ and tighten them down against the drilled plate.



- Turn the spindle (1) counter-clockwise until the crankshaft is pushed out of the ball bearing.

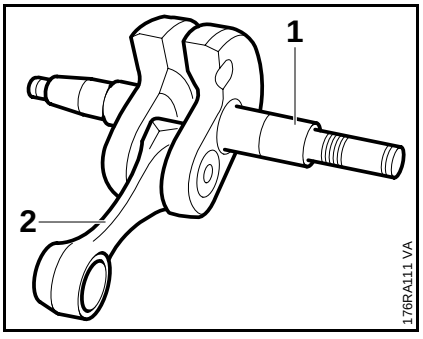


- Use press arbor (1) 1122 893 7200 to press the ball bearing at the flywheel side out of the crankcase, from the outside inwards

If the crankcase has to be replaced, all the components still fitted must be removed and checked for damage. This involves the following operations:

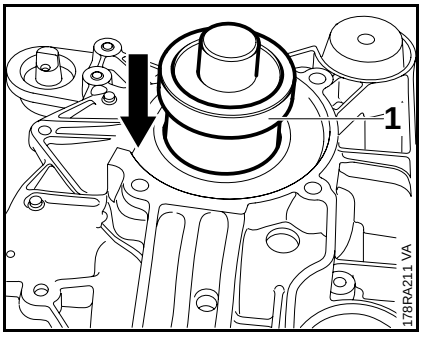
– Remove the annular buffers – 🕮 9.1

– Unscrew the bar mounting studs – 🕮 5.7



- The crankshaft (1), connecting rod (2) and needle bearing form an inseparable unit. It must always be replaced as a complete unit.

When fitting a replacement crankshaft, always install new oil seals and ball bearings.



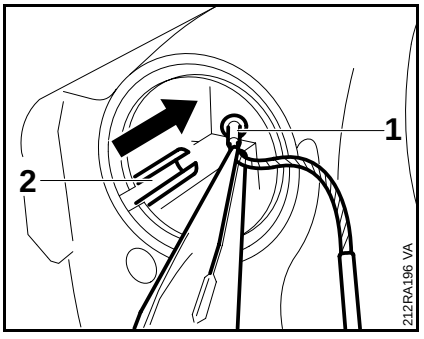
- Use the press arbor (1) 1124 893 7200 to press the ball bearing at the clutch side out of the crankcase, from the inside outwards.

– Inspect both halves of the crankcase for cracks and replace if necessary.

The crankcase must be replaced as a complete unit even if only one half is damaged.

Check the condition of all other parts, replace if necessary and transfer to the new crankcase.

If only the ball bearings are replaced, all rubber and polymer components, such as oil suction hose and annular buffers, may be left in position.



- Remove nipple of tank cap cord (1) from the slot (2).

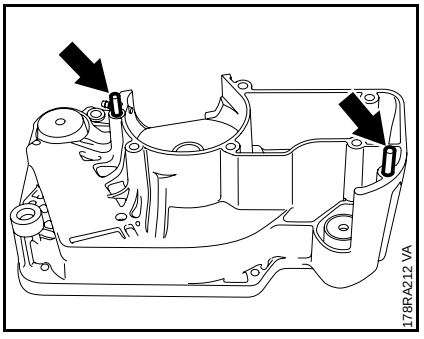
– Remove the tank cap.

New crankcases are supplied with preassembled ball bearings and oil seals.
It is necessary to stamp the machine's serial number on the crankcase with 2.5 mm figure stamps.

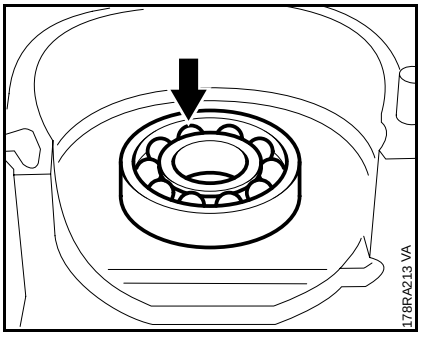
If only the ball bearings have to be replaced, make sure the annular buffers, suction hose and oil tank cap are removed before the crankcase is heated.

If the original crankcase is used again, remove all gasket residue and clean the mating surfaces thoroughly to guarantee a perfect seal.

If a new crankcase is installed, the following additional operations are necessary:



- Dowel pins (arrows) must be in position. If necessary, drive them into the flywheel half of the crankcase.

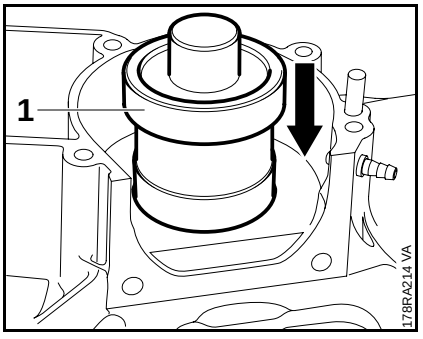


– Heat the area of the ball bearing seat on the flywheel side of the crankcase to about 120 °C (250 °F).

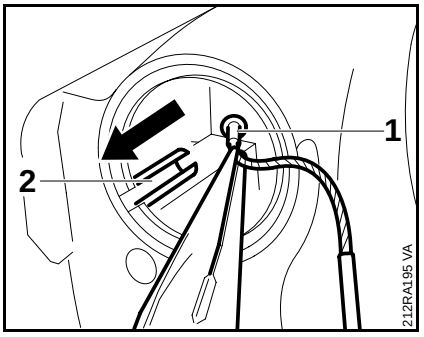
Wear suitable gloves to protect your hands from burn injuries.

- Push the ball bearing, open side (balls visible) facing the crankcase, into the crankcase by hand, from the inside outwards as far as stop.

This operation must be carried out very quickly because the bearing absorbs heat immediately and begins to expand.

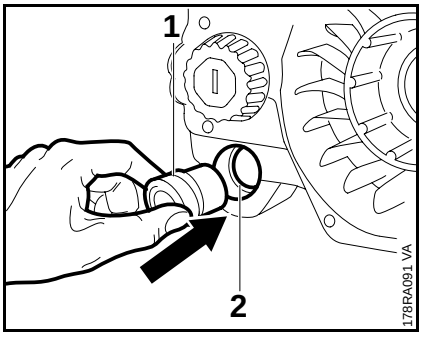


- If it is not possible to heat the flywheel side of the crankcase, use press arbor (1) 1124 893 7200 to press home the ball bearing as far as stop.

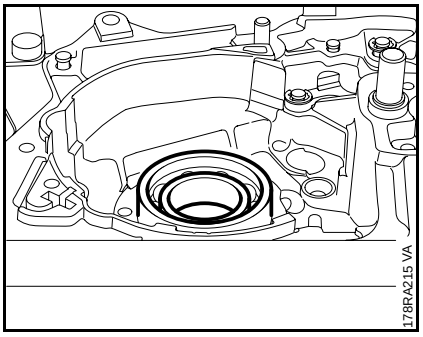


– Wait for crankcase to cool down.

- Fit nipple of tank cap cord (1) in the slot (2) and pull it forwards.



- Push the annular buffer home so that its annular groove (1) engages the housing rib (2).



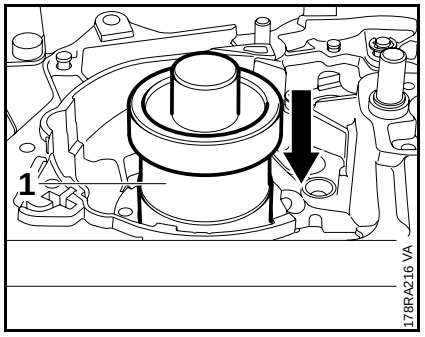
– Heat the area of the ball bearing seat on the clutch side of the crankcase to about 120 °C (250 °F).

Wear suitable gloves to protect your hands from burn injuries.

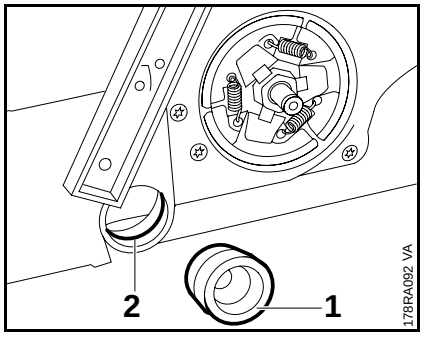
- Push the ball bearing, open side (balls visible) facing the crankcase, into the crankcase by hand, from the outside inwards as far as stop.

The ball bearing must be flush with the inside of the crankcase. It projects about 1 mm at the clutch side (at the oil pump).

This operation must be carried out very quickly because the bearing absorbs heat immediately and begins to expand.

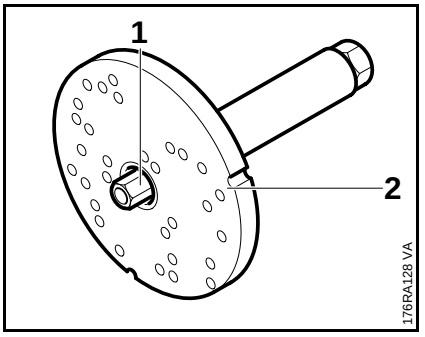


- If it is not possible to heat the clutch side of the crankcase, use press arbor (1) 1124 893 7200 to press home the ball bearing flush with the inside of the crankcase.



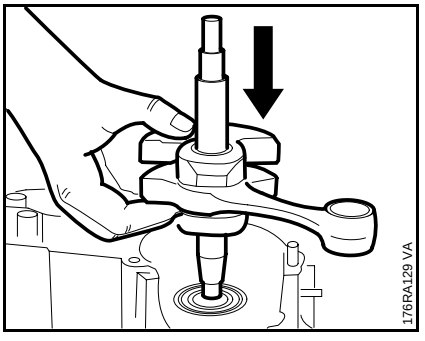
– Wait for crankcase to cool down.

- Push the annular buffer home so that its annular groove (1) engages the housing rib (2).

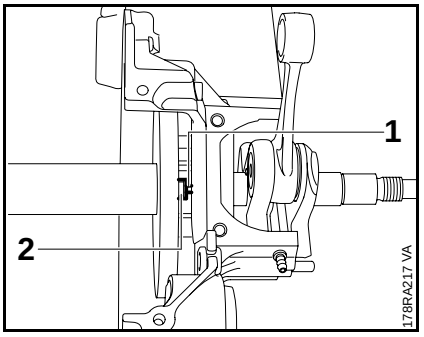


- Screw spindle of service tool ZS (2) 5910 893 2101 fully home and then screw the threaded sleeve (1) 5910 893 2421 onto the spindle as far as stop.

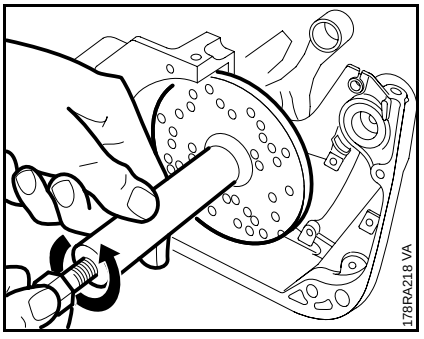
– Lubricate tapered stub of crankshaft with oil.



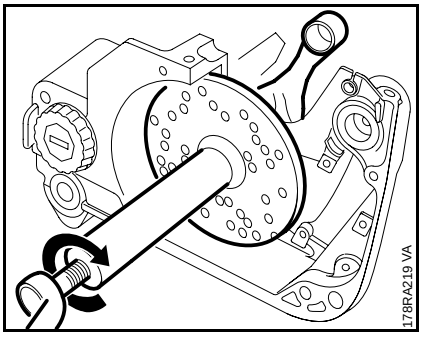
- Place tapered stub of crankshaft in ball bearing at the flywheel side of the crankcase.



● Screw threaded sleeve (2) to thread (1) of crankshaft stub.

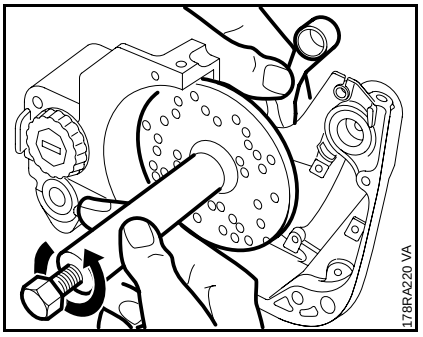


● Hold the spindle steady and rotate the service tool counter-clockwise until the drilled plate butts against the crankcase.

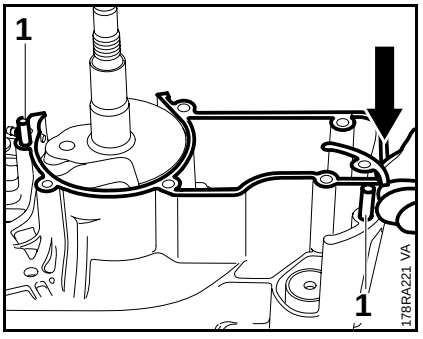


● Turn the spindle clockwise until the crankshaft locates against the ball bearing.

The connecting rod must point toward the cylinder flange while the crankshaft is being installed.



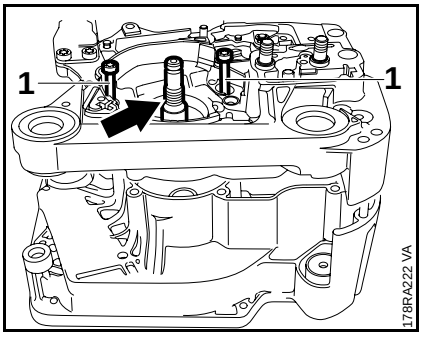
● Hold the crankshaft steady, release the spindle counter-clockwise and then unscrew the service tool, also counter-clockwise.



● Place new gasket (arrow) on the flywheel side of the crankcase.

● The gasket is held in position by the pins (1).

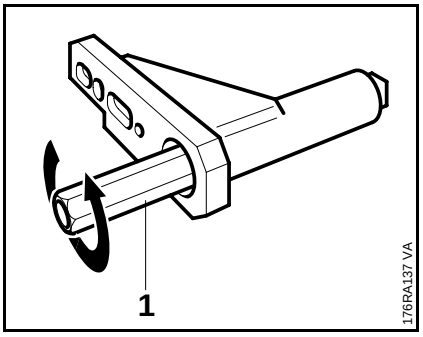
– Fit bar mounting studs at clutch side – 🕮 5.7



– Lubricate straight stub of crankshaft (arrow) with oil.

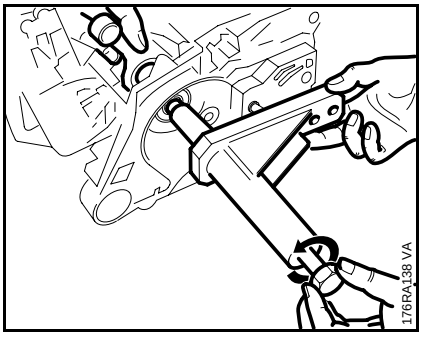
– Fit crankshaft stub in the ball bearing.

● To prevent the crankcase halves and gasket twisting, fit M5x72 screws (arrows) in two crankcase holes and tighten them down as far as stop.



– Screw the spindle (counter-clockwise, left-hand thread) fully into the service tool AS 5910 890 2205.

● Screw the spindle (left-hand thread) fully into the service tool AS 5910 890 2205.

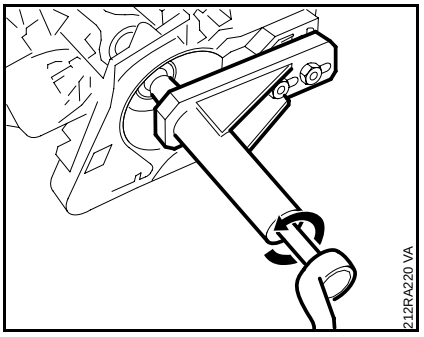


– Push the threaded sleeve over the crankshaft stub.

● Hold the crankshaft steady and rotate the spindle counter-clockwise to screw the threaded sleeve onto the crankshaft.

– Let go of the crankshaft. Hold the service tool steady and continue turning the spindle until the tool locates against the guide bar mounting face.

– Fit the hex nuts (for chain sprocket cover) on the collar studs and screw them down finger-tight.

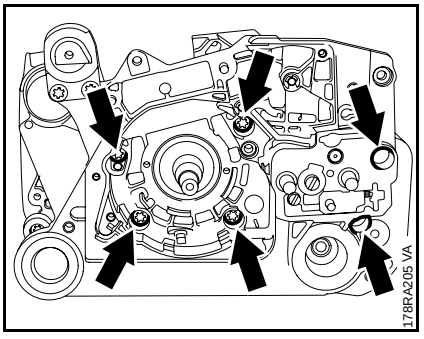


● Check alignment of crankcase halves relative to dowel pins, then rotate the spindle counterclockwise. Pull the crankshaft in until the two halves of the crankcase meet.

– Unscrew the hex nuts.

– Unscrew the spindle clockwise and take away the service tool.

– Take out the two M5x72 screws.



● Fit the screws (arrows) and tighten them down firmly in an alternate pattern – 🕮 3.5

– Install the chain tensioner – 🕮 5.6

– Trim away any excess gasket material in the area of the cylinder mounting face.

– Install the oil seals – 🕮 6.4

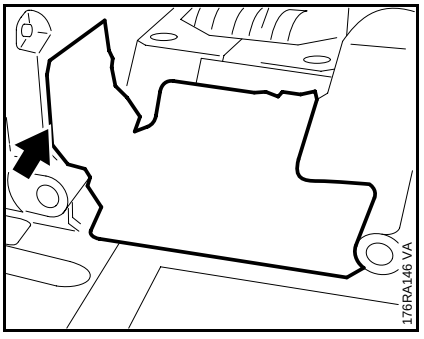
– Install the oil suction hose – 🕮 11.1

– Install the oil pump – 🕮 11.3

– Install the tank housing – 🕮 12.10

– Install the wiring harness – 🕮 15

– Clean both halves of the crankcase.



● Stick the heating reflecting foil in position, without creases, so that it covers the housing wall at the clutch side.

– Install the piston and cylinder – 🕮 6.5.2

– Install the muffler –🕮 6.1

– Install the flywheel – 🕮 7.3.2

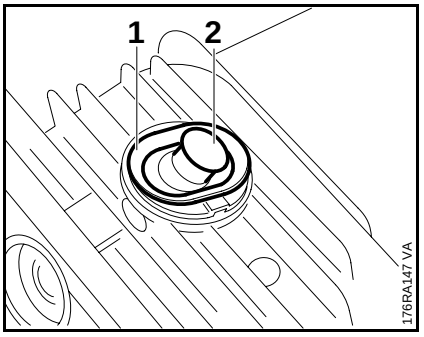
– Install the fan housing with rewind starter – 🕮 8.2

– Install the ignition module – 🕮 7.1

– Install the carburetor – 🕮 12.2.1

– Install the chain brake – 🕮 5.5.3

– Install the clutch – 🕮 5.4



– Remove the shroud – 🕮 6.2

● Remove the cover (1).

● Unscrew the decompression valve (2).

Reassemble in the reverse sequence.

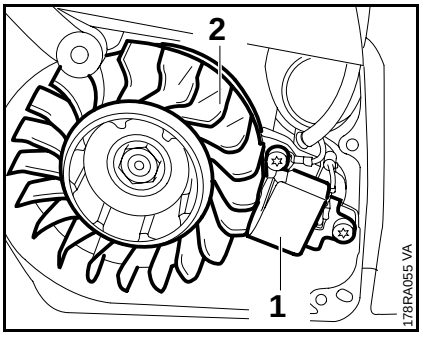
– Fit the decompression valve and tighten it down firmly – 🕮 3.5

● Fit the cover (1).

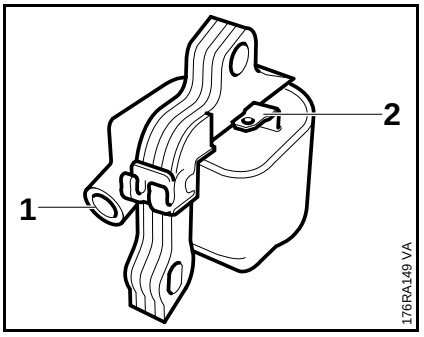
– Fit the shroud – 🕮 6.2

Exercise extreme caution when troubleshooting or carrying out maintenance and repair work on the ignition system. The high voltages that occur can cause serious or even fatal accidents.

Troubleshooting on the ignition system should always begin at the spark plug – 🕮 4.5



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



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

- High voltage output (1) for ignition lead
- Connector tag (2) for short circuit wire

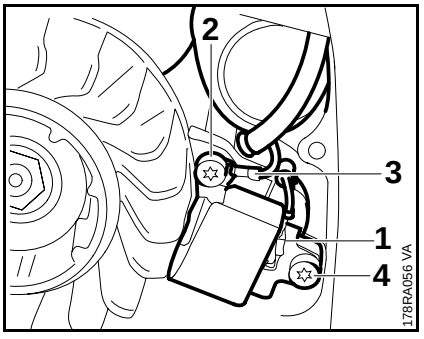
Testing in the workshop is limited to a spark test.
A new ignition module must be installed if no ignition spark is obtained (after checking that wiring and stop switch are in good condition)

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 as a result of wear.

– Remove the shroud – 🕮 6.2

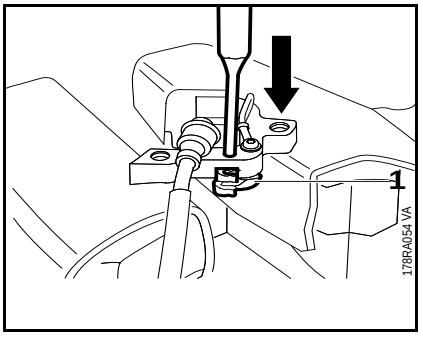
– Remove the fan housing with rewind starter – 🕮 8.2



- Pull off the short circuit wire (1).
- Take out the screw (2).
- Remove the ground wire (3).
- Take out the screw (4).

– Remove the ignition module.

If the ignition lead or spark plug boot is damage, install new parts – 🕮 7.2.3.



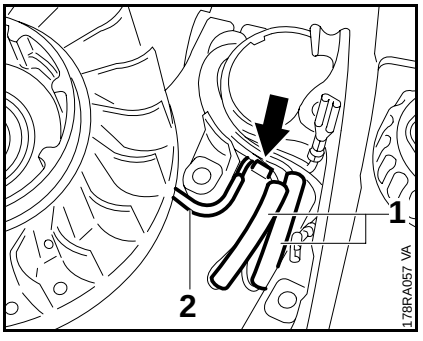
- If necessary, use a suitable punch to drive the pin out of the wire retainer (1).

– Remove the wire retainer.

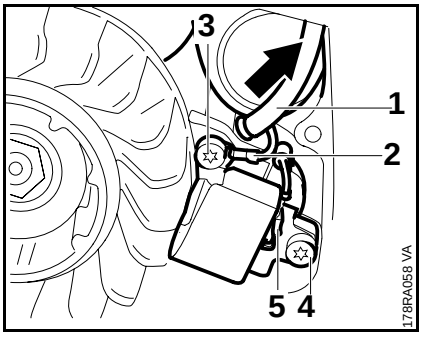
– If necessary, install the ignition lead, 🕮 7.2.3, before fitting the wire retainer.

– Coat threads of screws with Loctite 242, 🕮 17, before installing.

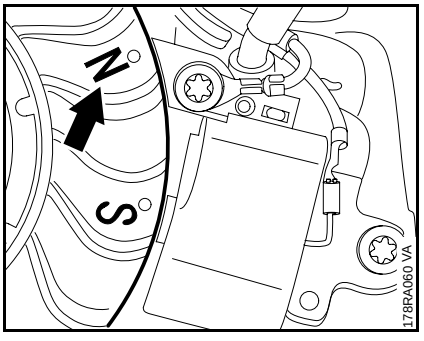
Reassemble in the reverse sequence.



- On machines with handle and/or carburetor heating, position the wire (1) under the ignition module.
- Push the wire (2) into the wire retainer (arrow).

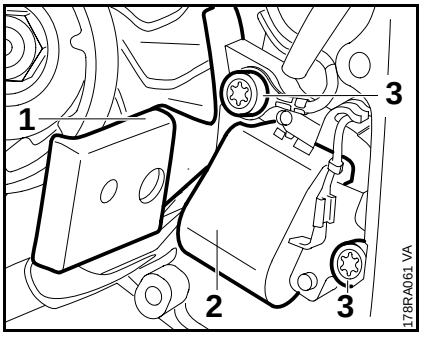


- Secure ground wire (2) with screw (3).
- Tighten down screws (3 + 4) moderately.
- Connect the short circuit wire (5).
- Position the ignition lead (1) in the guide (arrow).



- Rotate the flywheel until the “N” mark (arrow) is in line with the top of the ignition module.

7.2.2 Testing the Ignition Module



- Slide the setting gauge (1) 1111 890 6400 between the arms of the ignition module and the flywheel.

– Press the ignition module (2) against the setting gauge.

- Tighten down the screws (3) firmly – 🕮 3.5

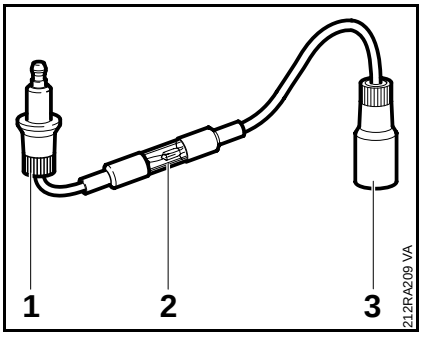
– Remove the setting gauge and use a feeler gauge to check the air gap. It should be 0.2 mm.

– Install the fan housing with rewind starter – 🕮 8.2

– Fit the shroud – 🕮 6.2

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 – 🕮 3.5

- Remove spark plug boot and connect it to the input terminal (1).

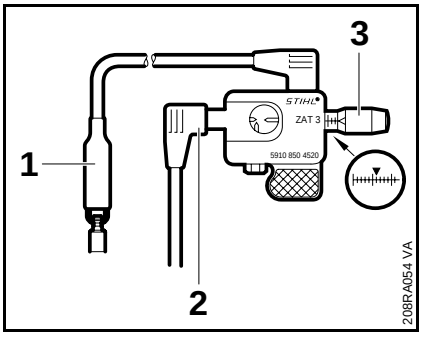
- Push the tester's output terminal (3) onto the spark plug.

– Set the Master Control lever to "I"

- 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 – 🕮 7.6



Using the ZAT 3 ignition tester 5910 850 4520

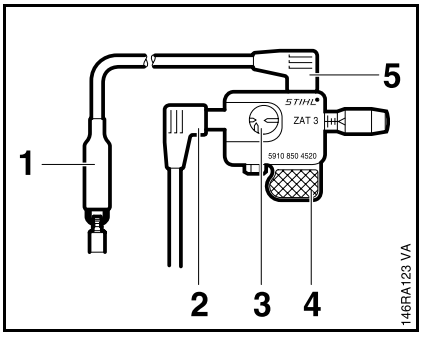
– Before starting the test, install a new spark plug in the cylinder and tighten it down firmly – 🕮 3.5

- Remove spark plug boot and connect it to terminal (2).

- Attach ground terminal (1) to the spark plug.

- Use adjusting knob (3) to set spark gap to about 2 mm.

7.2.3 Spark Plug Boot/ Ignition Lead



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

Warning!
High voltage – risk of electric shock.

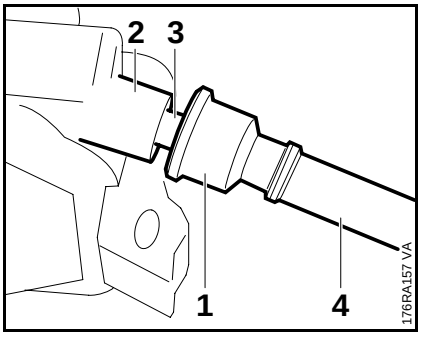
– Set the Master Control lever to "I".

● Crank the engine quickly with the rewind starter (min. 1,000 rpm) and check sparkover 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 – 🕮 7.6.

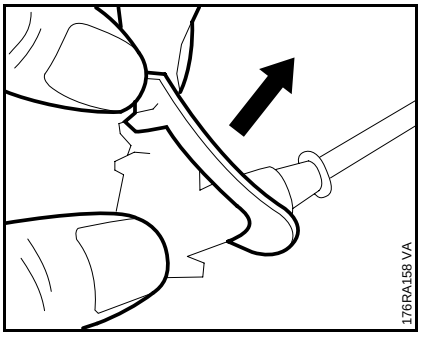


– Remove the ignition module – 🕮 7.2.1

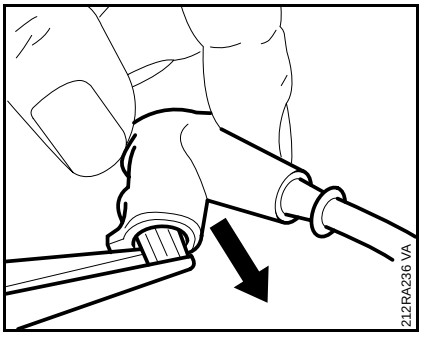
● Pull the grommet (1) off the high voltage output (2).

● Unscrew the ignition lead (3) from the contact pin and pull it out of the high voltage output.

● Remove the grommet and insulating tube (4) from the ignition lead.



● Pull the cover off the spark plug boot.



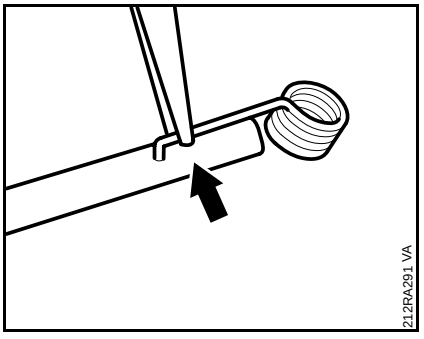
● Use suitable pliers to pull the leg spring out of the spark plug boot.

– Unhook the leg spring from the ignition lead.

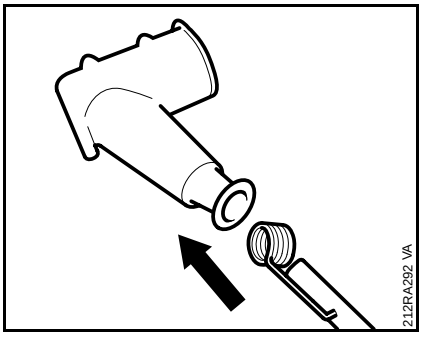
– Pull the boot off the ignition lead.

– Cut new ignition lead to a length of 185 mm.

– Use a pointed tool to pierce the center of the ignition lead's insulation, about 15 mm from the end of the lead.

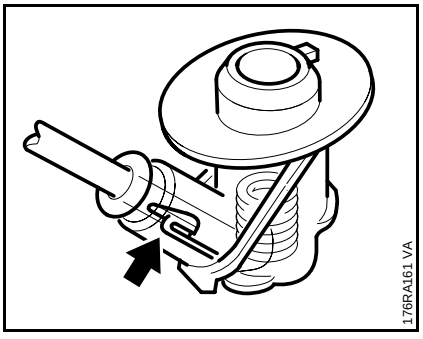


● Pinch the hook of the leg spring into the center of the lead (arrow).



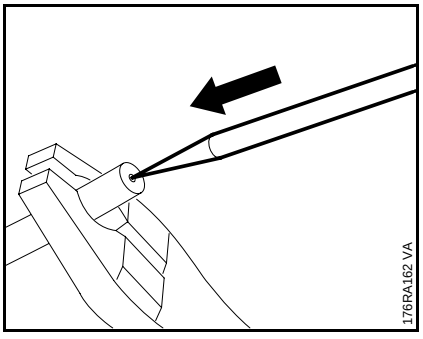
– Coat inside of spark plug boot with Press Fluid OH 723.

● Push the ignition lead and leg spring into the spark plug boot.



● Make sure the leg spring locates properly inside the spark plug boot.

– Push the cover over the spark plug boot.



● Use a pointed tool to pierce the center of the other end of the ignition lead which screws into the module.

– Slip the insulating tube and grommet over the ignition lead.

– Pack the high voltage output with STIHL multipurpose grease – 🕮 17

Do not use either graphite grease or silicone insulating paste.

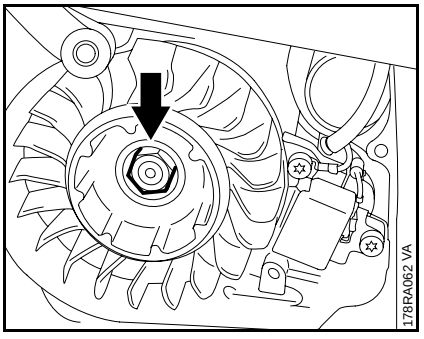
– Screw the ignition lead into the ignition module.

– Push the grommet over the high voltage output.

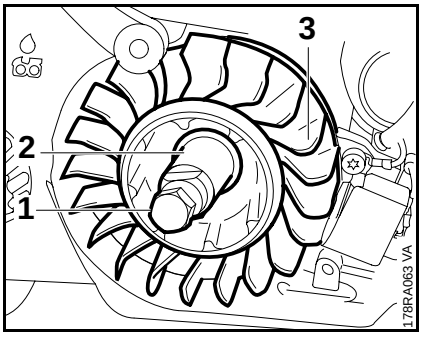
– Install the ignition module – 🕮 7.2.1

– Remove the fan housing with rewind starter – 🕮 8.2

– Use locking strip to block the piston – 🕮 5.4

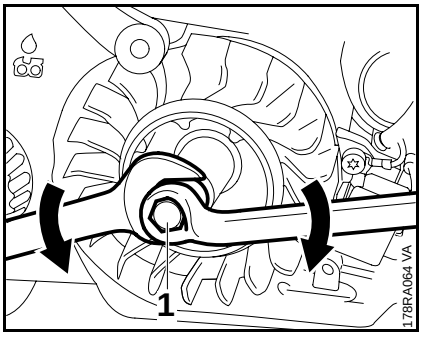


● Use socket 5910 893 5610 (for torque wrench) to unscrew the flywheel nut (arrow).



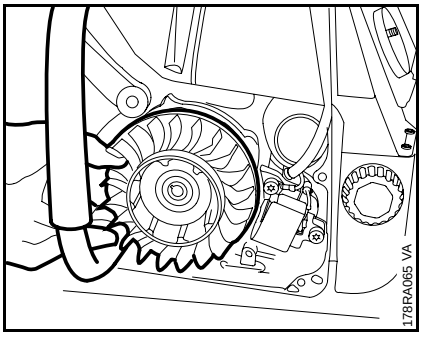
● Back off the thrust bolt (1) of puller (2) 1106 890 4501.

● Screw puller into the flywheel (3).



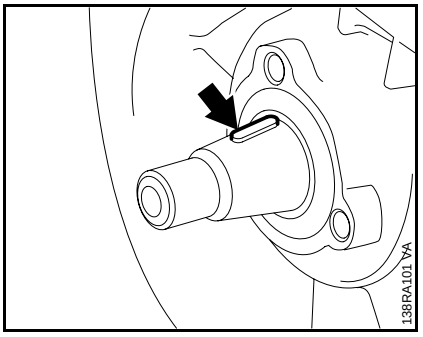
- Hold the puller steady and screw home the thrust bolt (1) until the flywheel is released.

– Remove the puller from the flywheel.



- Pull off the flywheel.

Inspect flywheel and magnet poles for signs of damage or blue discoloration. If you find any damage, install a new flywheel.



Degrease crankshaft stub, key and slot in flywheel hub with standard solvent-based degreasant containing no chlorinated or halogenated hydrocarbons – 🕮 17

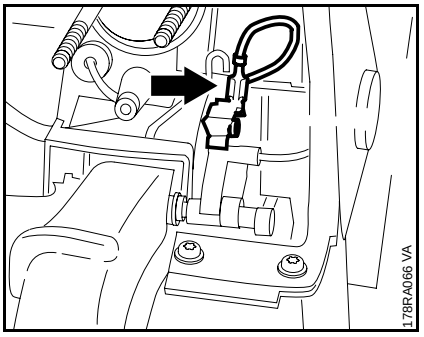
- Check that key (arrow) is properly seated.

– Fit the flywheel in position.

– Fit and tighten down the flywheel nut firmly – 🕮 3.5

– Set gap between ignition module and flywheel – 🕮 7.2.1

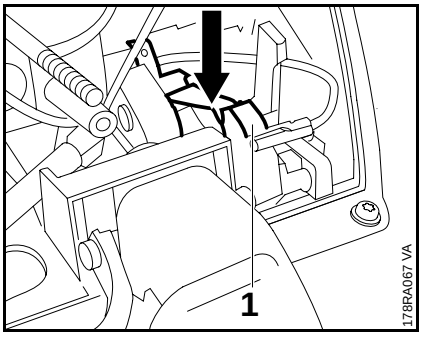
Reassemble all other parts in the reverse sequence



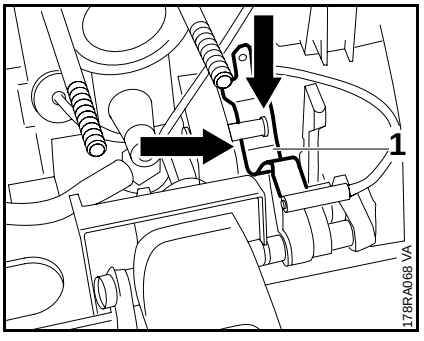
– Remove the carburetor – 🕮 12.2.1

– Set the Master Control lever to CHOKE.

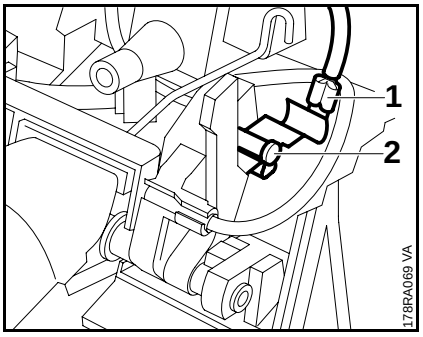
- Pull off the connector (arrow).



- Push the contact spring down and past the cam (1).

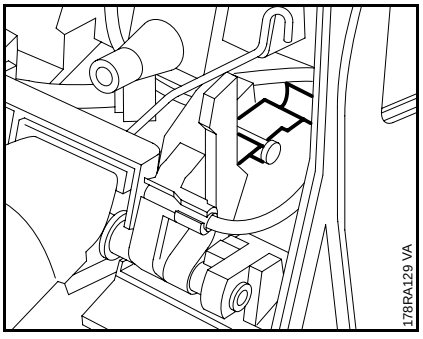


- Pry the contact spring (1) downwards off the pin and remove it sideways.

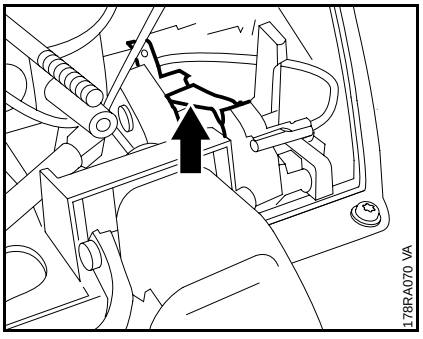


Installing

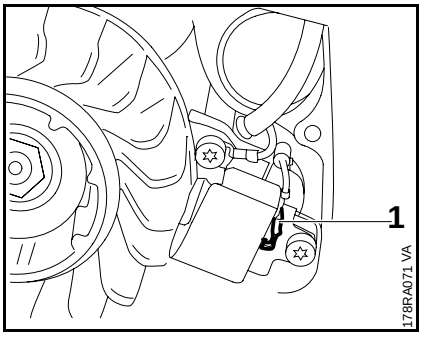
- Fit the connector (1).
- Position the contact spring below the pin (2).



- Clip the contact spring to the pin.



- Pull the front end of the contact upwards onto the cam.



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

– Remove the fan housing with rewind starter – 🕮 8.2

- Disconnect short circuit wire (1).

– Connect the ohmmeter to ground and the short circuit wire.

– Set Master Control lever to "0"

The resistance measured must be about 0 Ω. If it is much higher, the reason is a break in the wire. The wire or contact spring has to be replaced.

– Set Master Control lever to "I"

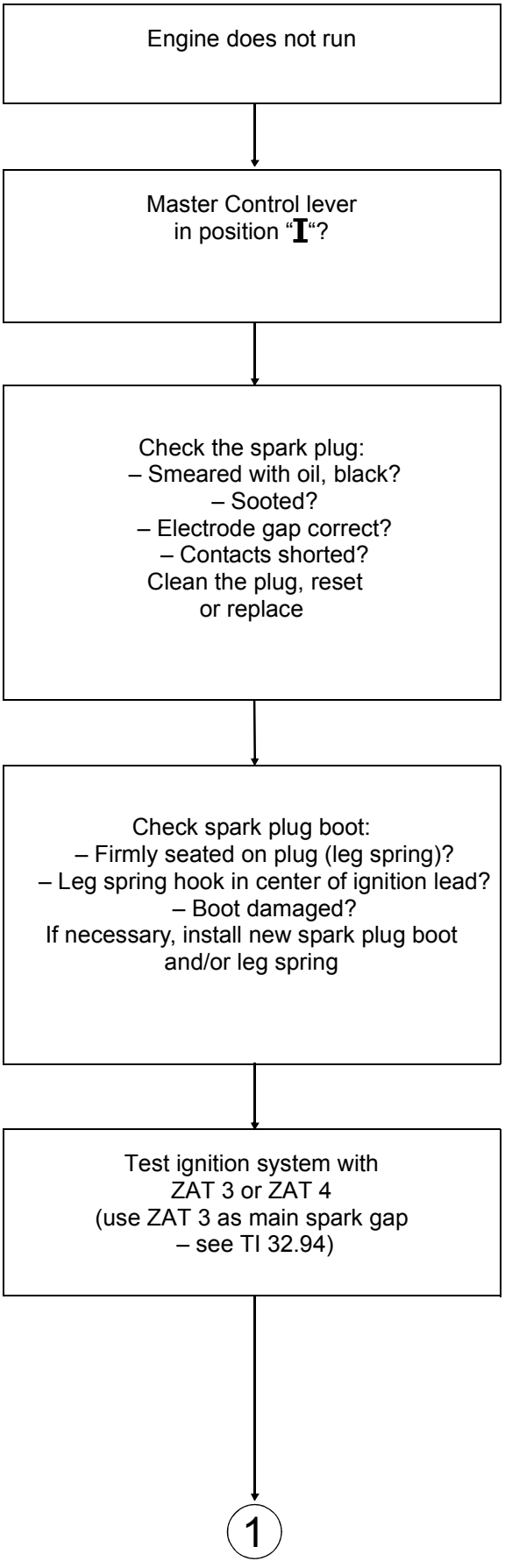
The resistance measured must be infinitely high. If not, fit a new short circuit wire.
If no fault can be found, carry out further checks:

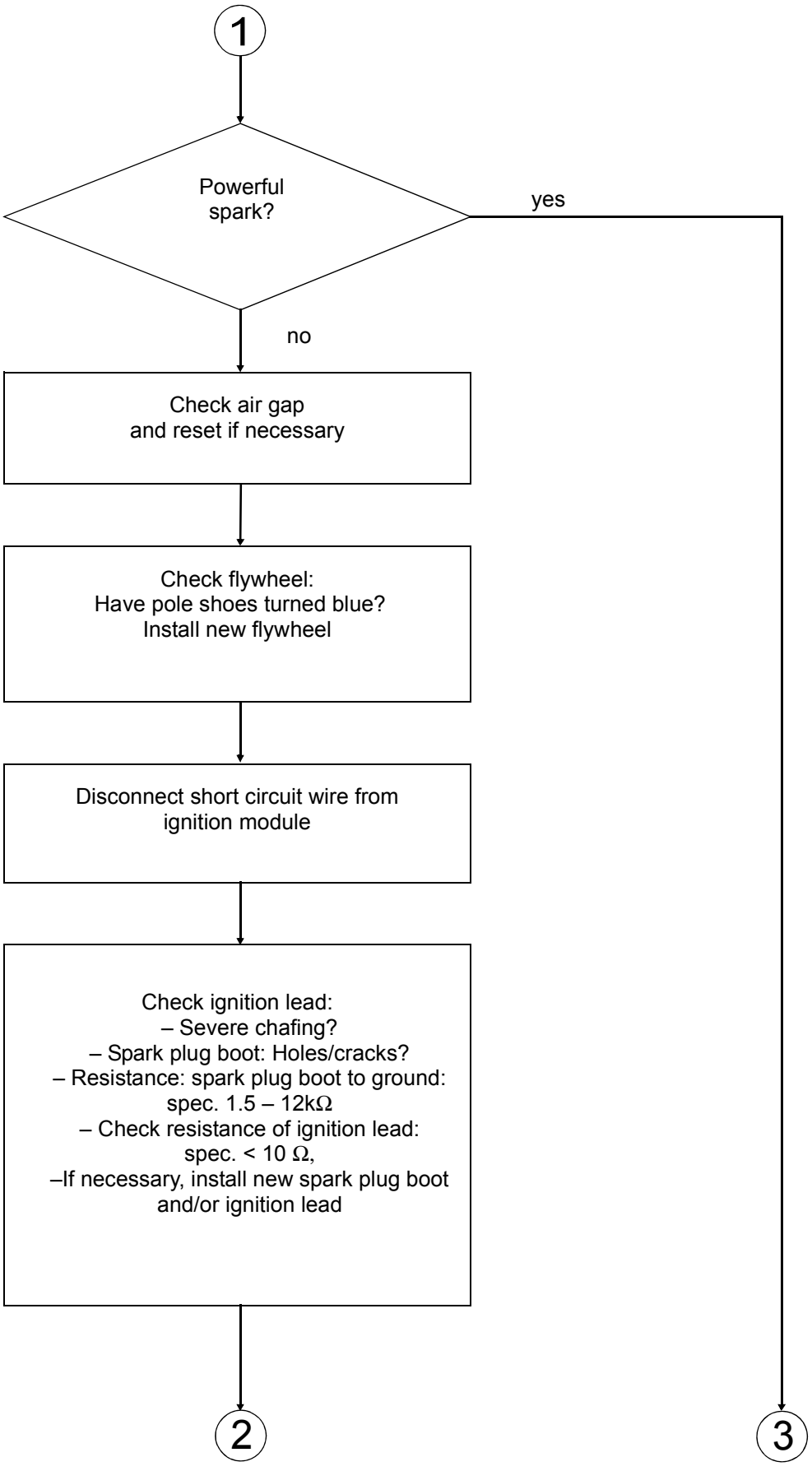
– Inspect the flywheel for damage – 🕮 7.3

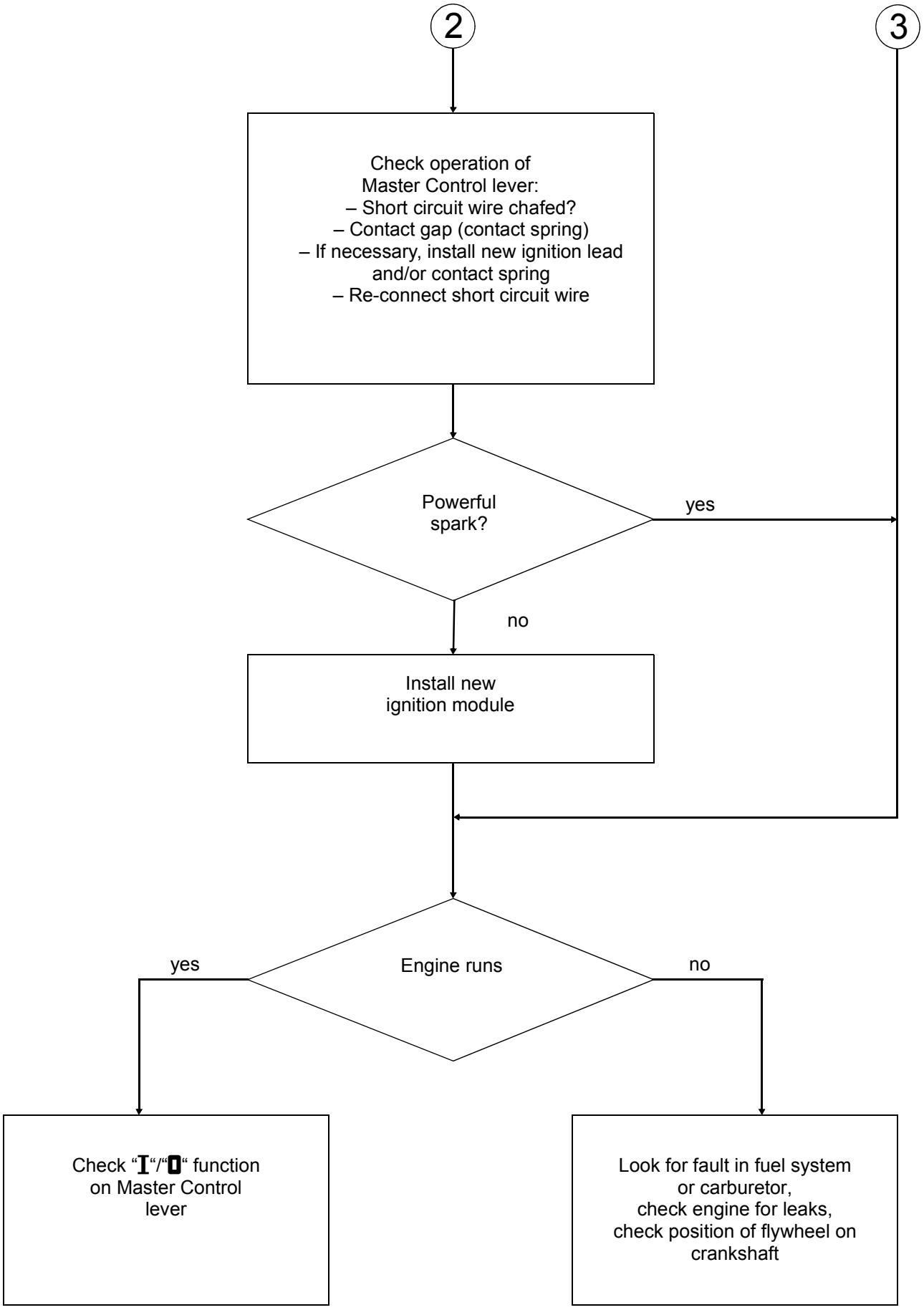
– Check air gap between flywheel and ignition module – 🕮 7.2.1

It neither of these checks reveals a fault, install a new ignition module – 🕮 7.2.1

Reassemble in the reverse sequence.


Engine does not run
Master Control lever
in position "I"?
Check the spark plug:
– Smeared with oil, black?
– Sooted?
– Electrode gap correct?
– Contacts shorted?
Clean the plug, reset
or replace
Check spark plug boot:
– Firmly seated on plug (leg spring)?
– Leg spring hook in center of ignition lead?
– Boot damaged?
If necessary, install new spark plug boot
and/or leg spring
Test ignition system with
ZAT 3 or ZAT 4
(use ZAT 3 as main spark gap
– see TI 32.94)
1


1
Powerful spark?
yes
no
Check air gap and reset if necessary
Check flywheel: Have pole shoes turned blue? Install new flywheel
Disconnect short circuit wire from ignition module
Check ignition lead:
– Severe chafing?
– Spark plug boot: Holes/cracks?
– Resistance: spark plug boot to ground: spec. 1.5 – 12kΩ
– Check resistance of ignition lead: spec. < 10 Ω,
–If necessary, install new spark plug boot and/or ignition lead
2
3


2
3
Check operation of
Master Control lever:
– Short circuit wire chafed?
– Contact gap (contact spring)
– If necessary, install new ignition lead
and/or contact spring
– Re-connect short circuit wire
Powerful
spark?
yes
no
Install new
ignition module
Engine runs
yes
no
Check "I"/"O" function
on Master Control
lever
Look for fault in fuel system
or carburetor,
check engine for leaks,
check position of flywheel on
crankshaft

8. Rewind Starter

8.1 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.

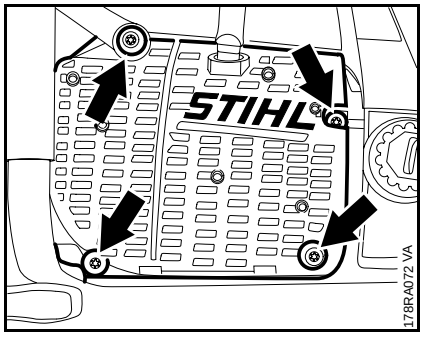
Carefully pull out the starter rope several times and allow it to rewind until its normal smooth action is restored.

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.

Clean all components – 🕮 17.

Before installing, lubricate the rewind spring and starter post with STIHL special lubricant – 🕮 17.

8.2 Removing and Installing



- Remove the screws (arrows) from the fan housing.

– Carefully push the hand guard upwards.

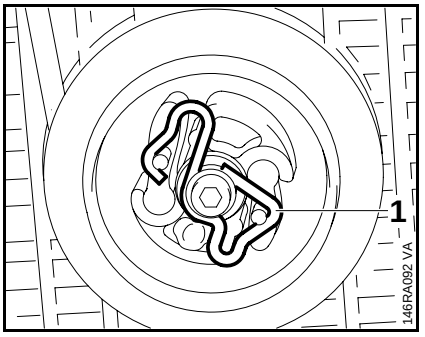
– Pull the lower edge of fan housing away from the crankcase and remove it downwards.

Reassemble in the reverse sequence.

The hand guard is secured to the fan housing and crankcase with the IS-M5x40 screw.

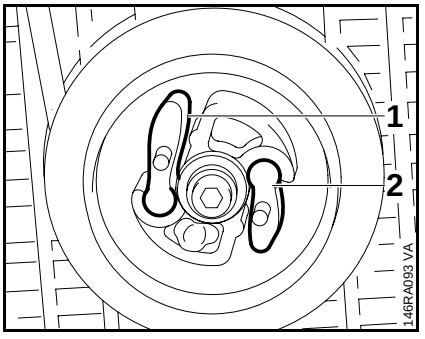
– Tighten down the screws firmly – 🕮 3.5

8.3 Pawls



– Remove the fan housing with rewind starter – 🕮 8.2

- Carefully ease the spring (1) off the starter post.



- Pull the pawls (1 + 2) out of the rope rotor.

– Lubricate pegs of new pawls with grease – 🕮 17

Reassemble in the reverse sequence.

– Remove the fan housing with rewind starter – 🕮 8.2

Relieving tension of rewind spring

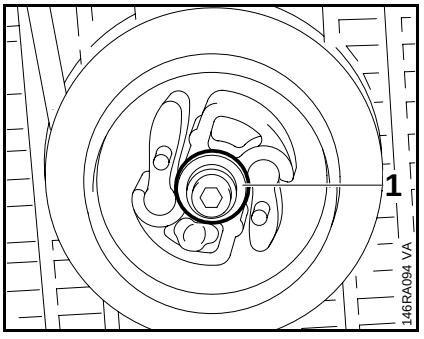
– Pull out the starter rope about 5 cm and hold the rope rotor steady.

– While still holding the rope rotor steady, take three full turns off the rope rotor.

– Pull out the rope with the starter grip and slowly release the rope rotor.

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

– Remove the pawls – 🕮 8.3



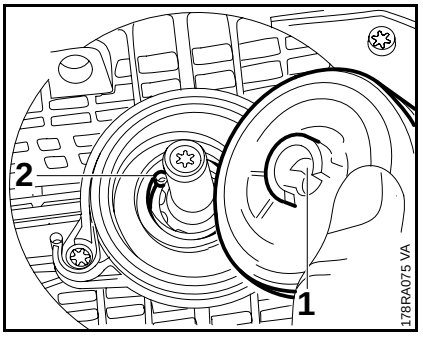
● Remove the washer (1) from the starter post.

– Carefully pull the rope rotor off the starter post.

– Remove the starter rope or remaining rope from the rotor.

– Remove remaining rope from the fan housing, if necessary.

– Install a new starter rope – 🕮 8.5



● Fit the rotor on the starter post so that its lug (1) slips behind the inner spring loop (2).

Reassemble all other parts in the reverse sequence.

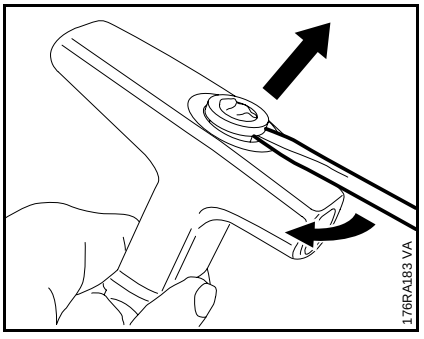
– Tension the rewind spring – 🕮 8.6

– Remove the fan housing with rewind starter – 🕮 8.2

– Remove the segment – 🕮 8.7

– Relieve tension of rewind spring – 🕮 8.4

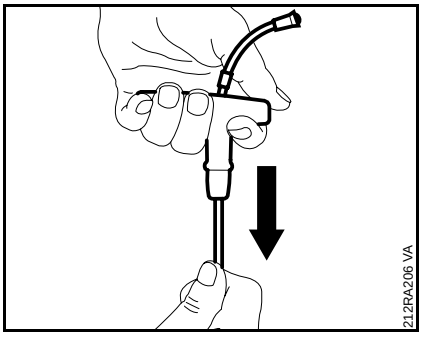
The rewind spring will not be under tension if the starter rope is broken.



Machines with ElastoStart grip

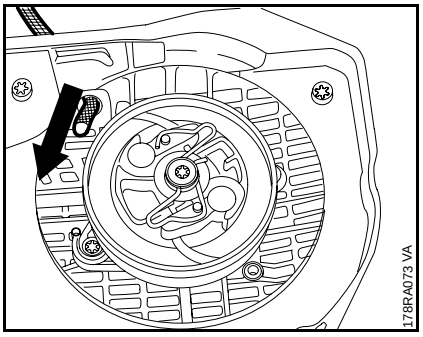
● Pry the cap out of the grip.

– Remove remaining rope from starter grip.

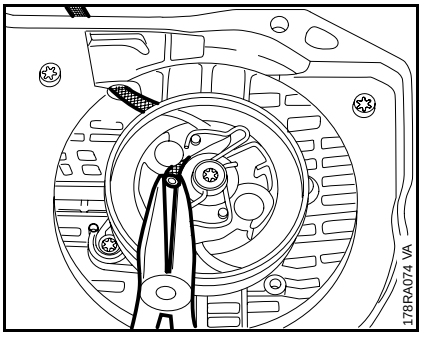


● Thread the new starter rope through the top of the starter grip.

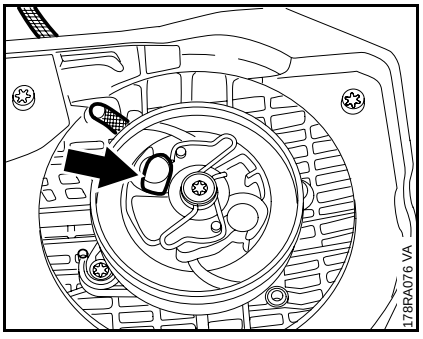
8.6 Tensioning the Rewind Spring



- Thread the other end of the rope, from outside, through the guide bushing in the fan housing.



- Thread the end of the rope through the hole in the side of the rotor, pull it out.



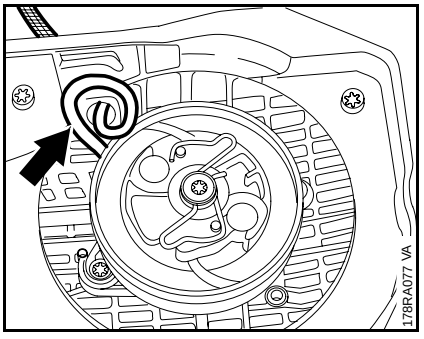
– Secure the rope with a simple overhand knot.

- Pull rope back until knot locates in recess (arrow) in rope rotor.

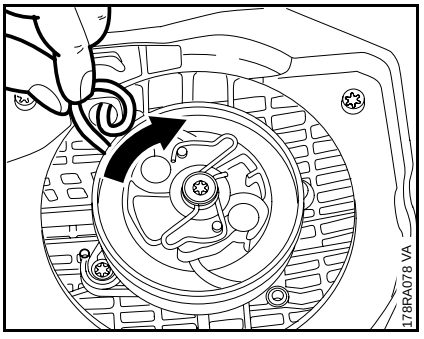
– Tension the rewind spring – 🕮 8.6

– Remove the fan housing with rewind starter – 🕮 8.2

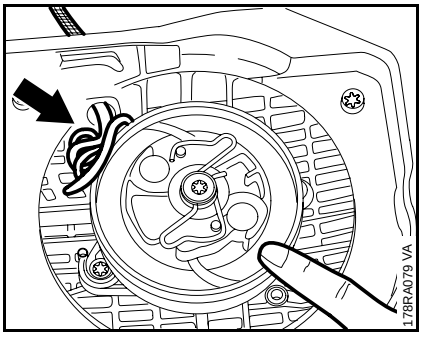
– Relieve tension of rewind spring – 🕮 8.4



- Make a loop in the starter rope.



- Grip the rope next to the rotor and use it to turn the rope rotor six times clockwise.

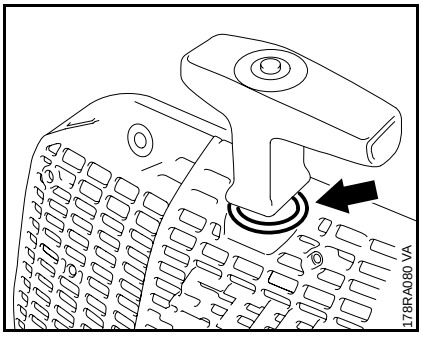


- Hold the rope rotor steady.

- 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 rope so that it can rewind properly.



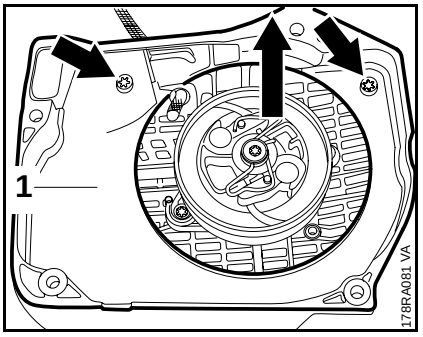
- The rewind spring is correctly tensioned when the starter grip sits firmly in the rope guide bushing (arrow) without drooping to one side. If this is not the case, tension the spring by one additional turn.

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.

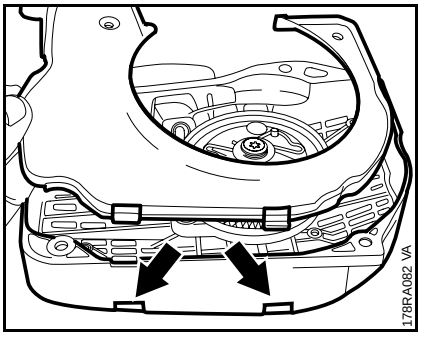
Do not overtension the rewind spring as this will cause it to break.

– Install the fan housing with rewind starter – 🕮 8.2

8.7 Segment



- Take out the screws (arrows).
- Pull out the segment (1) upwards.



Installing

- Engage tabs (1) in the slots (arrows).

Reassemble all other parts in the reverse sequence.

8.8 Starter Rope Guide Bushing

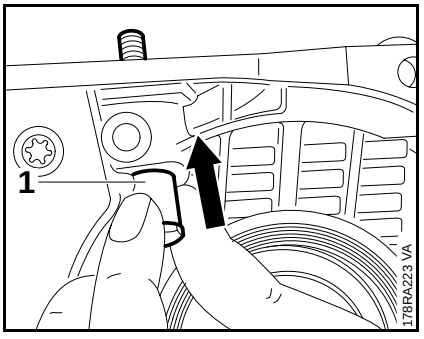
Wear on the guide bushing is accelerated by the starter rope being pulled sideways. The wall of the bushing eventually wears through and the bushing becomes loose.

– Remove the fan housing with rewind starter – 🕮 8.2

– Remove the rope rotor – 🕮 8.4

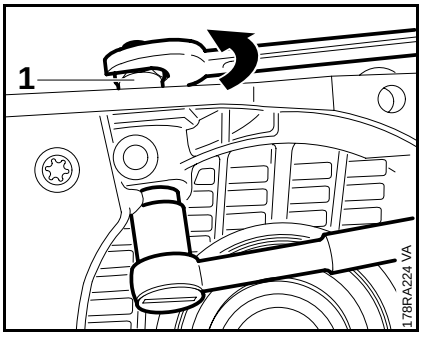
– Use a suitable tool to pry the damaged bushing out of the fan housing.

– Place the new bushing in the fan housing.



- Insert the screw spindle (1) of the installing tool 0000 890 2201 through the bushing from inside the fan housing.

8.9 Replacing the Rewind Spring



- Fit the thrust sleeve (1), tapered end first, and 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.

Reassemble all other parts in the reverse sequence.

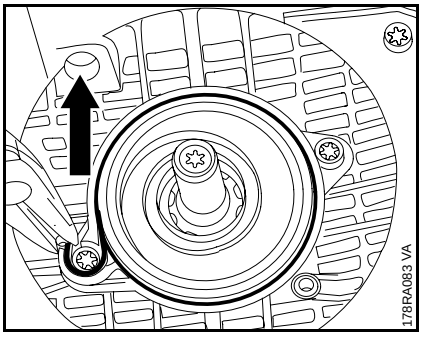
– Troubleshooting chart – 📖 4.2

The replacement spring comes ready for installation and is secured in a frame.

Removing

Wear a face shield and work gloves.

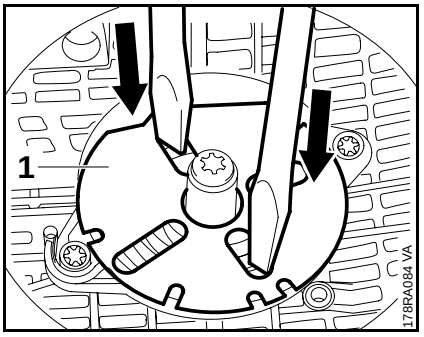
– Remove the rope rotor – 📖 8.4



- Use suitable pliers to grip the outer spring loop and lift it up.

– Take the rewind spring out of the fan housing.

– Remove any remaining pieces of spring from the fan housing.

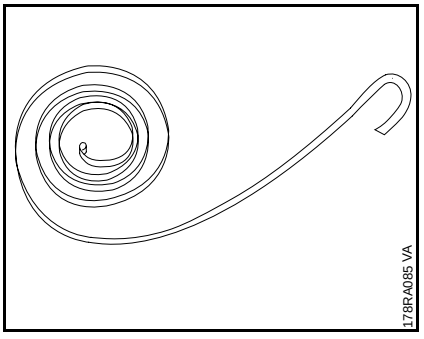


Installing

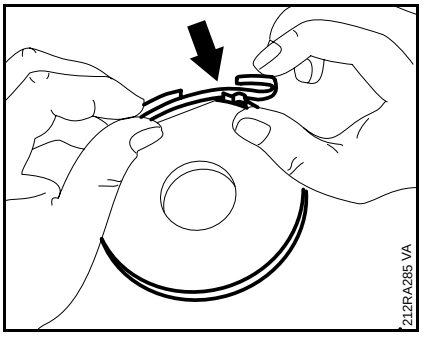
– Lubricate the spring with a few drops of STIHL special lubricant before installation –📖 17

- Position replacement spring with frame (1) in the fan housing.
- Position suitable tools on the recesses (arrows) and push the spring into its seat in the fan housing.

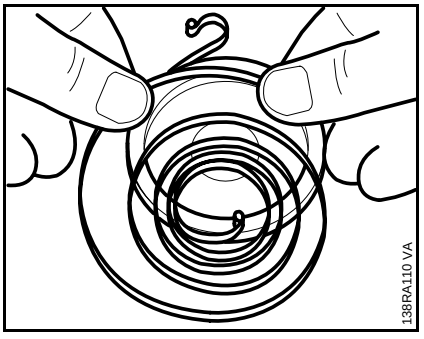
If the rewind spring pops out during installation, fit it in the installing tool 1116 893 4800 as follows:



- Arrange the rewind spring as shown in the illustration.



- Position the anchor loop about 25 mm from the edge of the spring housing.



- Fit the rewind spring in the spring housing in the counterclockwise direction, starting from outside and working inwards.

– Place the spring housing in the fan housing.

– Press the spring loop into the recess in the fan housing at the same time.

– Install the rope rotor – 🕮 8.4

– Tension the rewind spring – 🕮 8.6

Reassemble all other parts in the reverse sequence.

9.1 Annular Buffers between Crankcase and Tank Housing

The crankcase and tank housing are connected by vibration damping rubber buffers and springs. Damaged rubber buffers (annular buffers) and springs must always be replaced in sets.

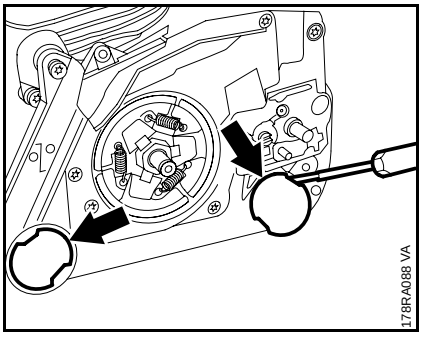
– Remove the front handle – 🕮 10.3

– Remove the air filter – 🕮 12.2.1

– Remove the shroud – 🕮 6.2

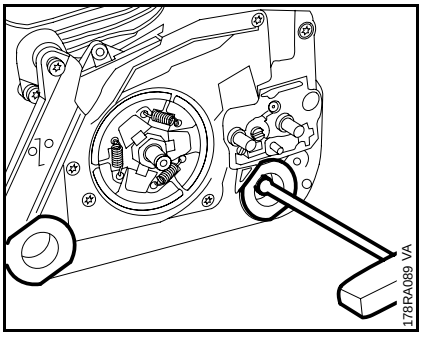
– Remove the fan housing with rewind starter – 🕮 8.2

– Remove the chain catcher – 🕮 5.2

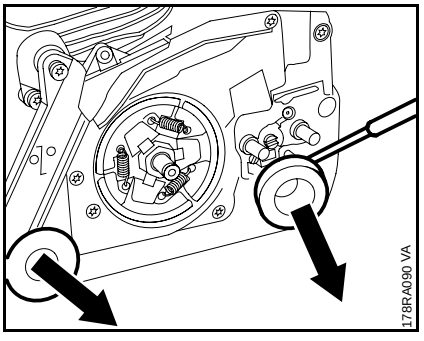


Removing at clutch side

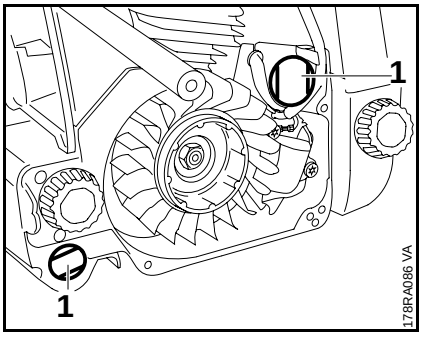
- Pry the plugs (arrows) out of the annular buffers.



- Take the screws out of the annular buffers.

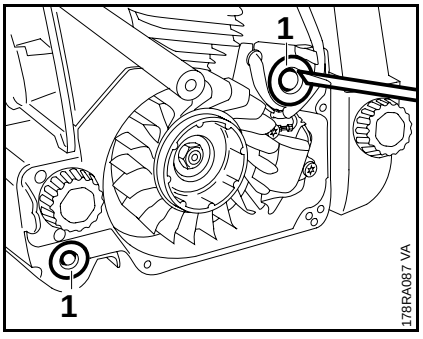


- Pry the annular buffers (arrows) out of the crankcase.



Removing at flywheel side

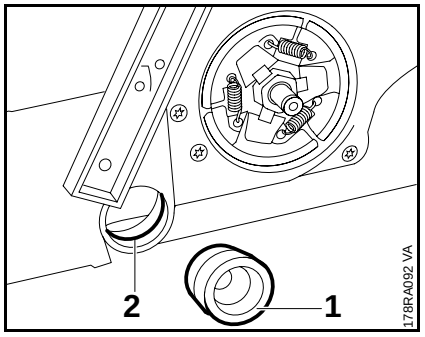
- Pry the plugs (arrows) out of the annular buffers.



– Take the screws out of the annular buffers.

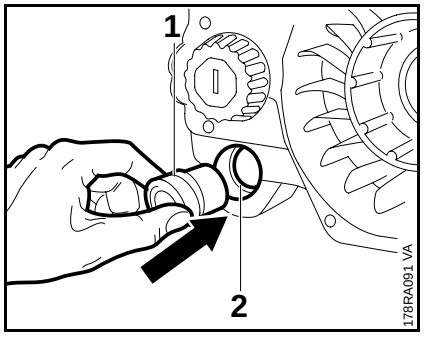
- Pry the annular buffers (1) out of the crankcase.

Note:
Coat annular buffers with STIHL Press Fluid before installing.



Installing at clutch side

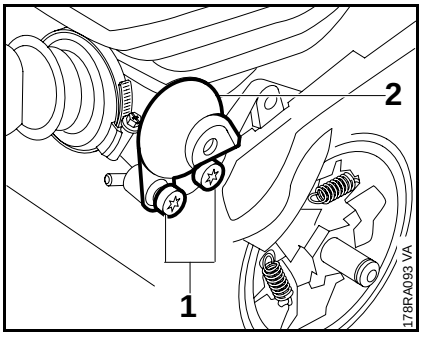
- Push the annular buffer (1) home from outside so that its groove engages the housing rib (2).



Installing at flywheel side

- Push the annular buffer home from outside so that its groove (1) engages the housing rib (2).

Reassemble all other parts in the reverse sequence.

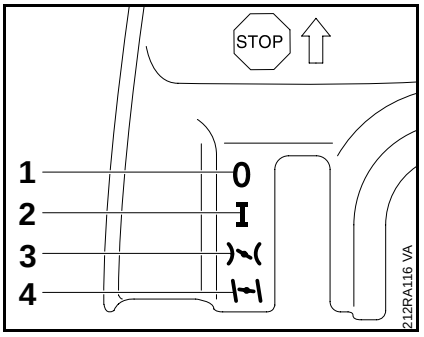


– Remove the crankcase from the tank housing – 🕮 12.10

- Take out the screws (1).

- Remove the annular buffer (2).

Reassemble in the reverse sequence.



The Master Control lever moves the switch shaft to select the required function.

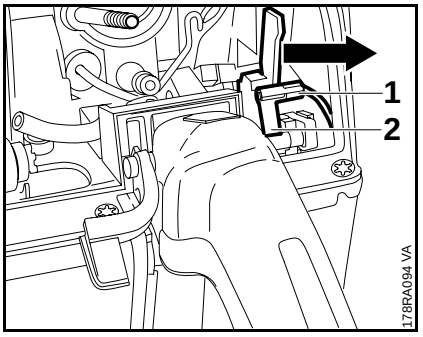
The following positions can be selected with the Master Control lever:

“STOP“ (1) closes short circuit contact, interrupts ignition

“RUN“ (2) is the normal operating position

“START“ (3) opens the throttle shutter slightly. The choke shutter is fully open (warm start)

“CHOKE“ (4) opens the throttle shutter slightly. The choke shutter is closed (cold start)



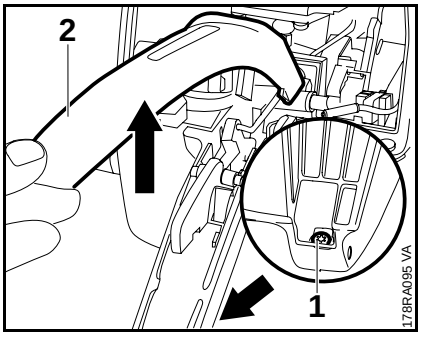
Removing

– Remove the air filter – 🕮 12.1

– Remove the carburetor – 🕮 12.2.1

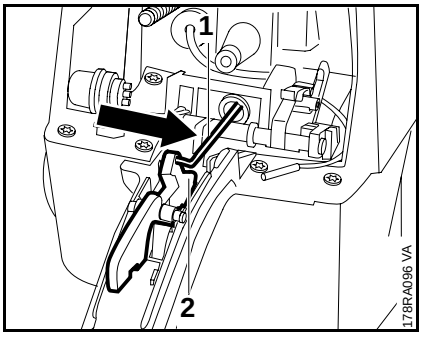
– Set Master Control lever to “CHOKE“.

● Pull the short circuit wire (1) sideways out of the switch shaft (2).



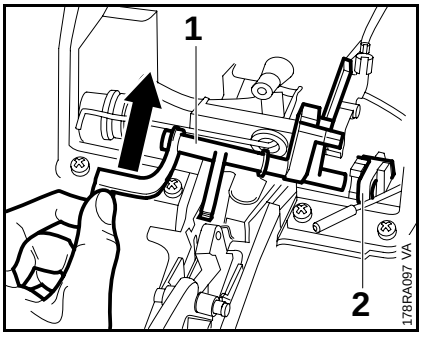
● Take out the screw (1).

– Remove the handle molding (2).



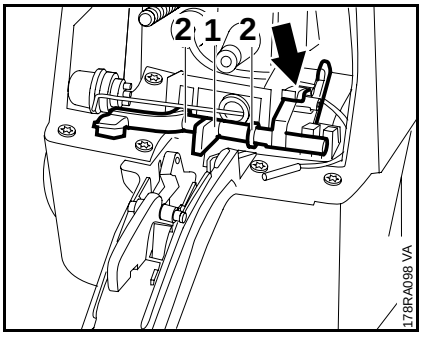
● Disconnect the throttle rod (1) from the trigger (2).

– Put the throttle rod to one side.



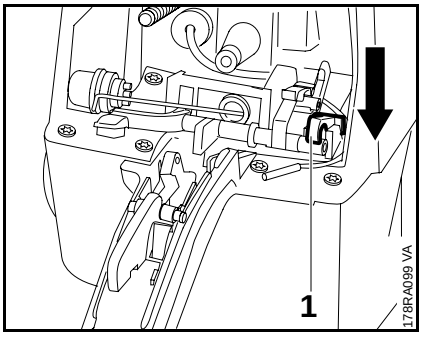
● Carefully swing the left end of the switch shaft (1) upwards and pull it out of the retainer (2).

– Pull the retainer out of its guide.

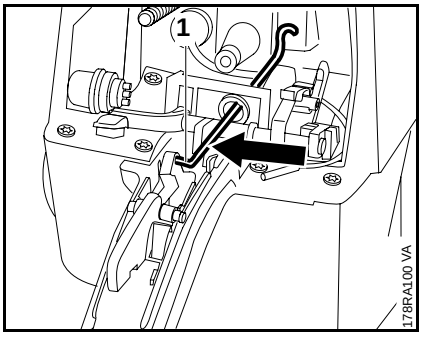


Installing

- Fit the switch shaft (1) in the “STOP“ position, the contact spring (arrow) on top.
- Push the switch shaft into the mounts (2) on the housing.



- Engine the retainer (1).



- Attach the throttle rod (1) to the throttle trigger.

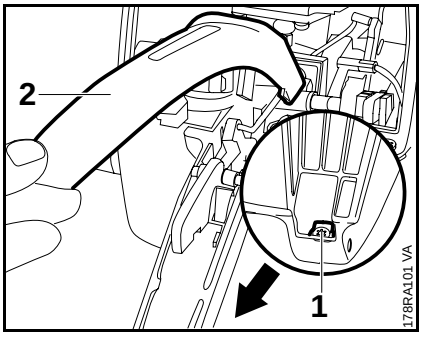
– Fit the handle molding.

– Connect short circuit wire to switch shaft.

– Install the carburetor – 🕮 12.2.1

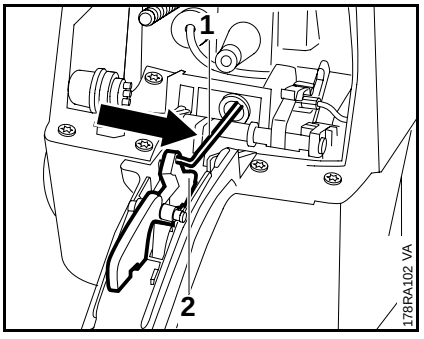
– Check operation.

Reassemble all other parts in the reverse sequence.



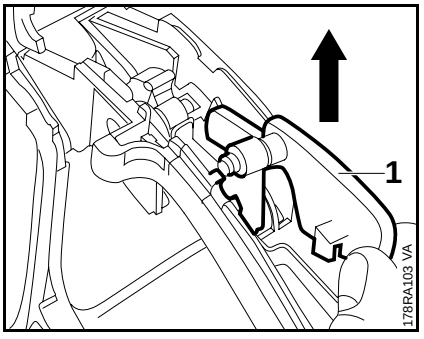
– Remove the air filter – 🕮 12.1

- Take out the screw (1).
- Remove the handle molding (2).

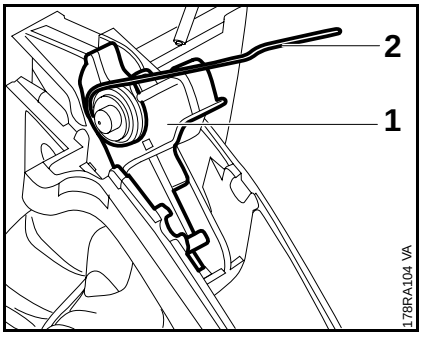


- Pull the throttle rod (1) sideways out of the trigger (2).

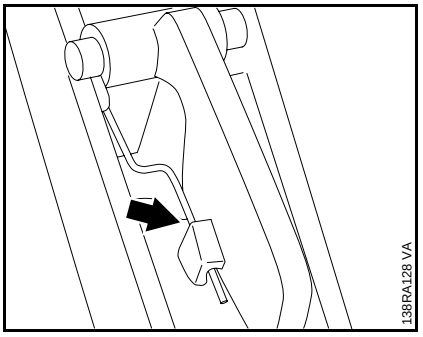
– Move the Master Control to the “RUN“ position.



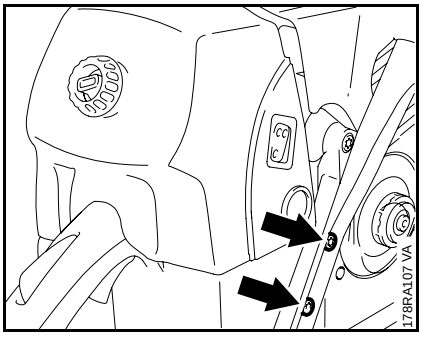
- Remove the interlock lever (1).



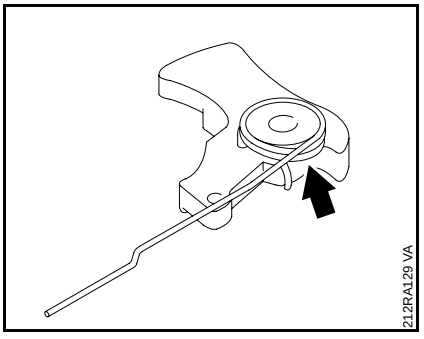
- Remove the throttle trigger (1) with torsion spring (2).



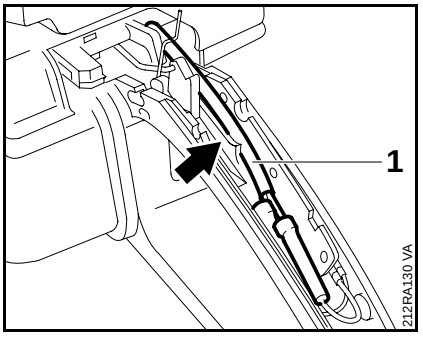
- When installing, make sure the torsion spring is under the interlock lever and engages the notch (arrow).



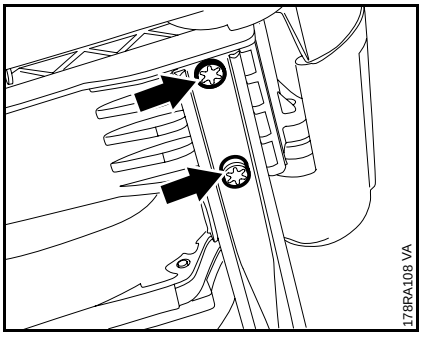
- Take out the screws (arrows).



- Remove the torsion spring from the throttle trigger.



- On machines with handle heating the wires (1) from the heating element must be in the guide (arrow) under the interlock lever.

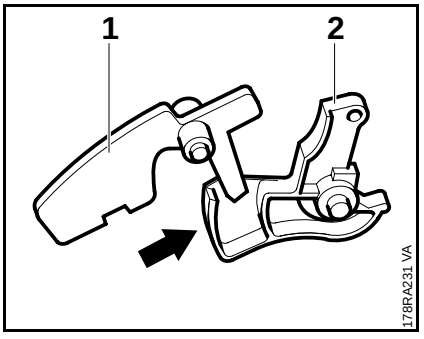


- Take out the screws (arrows).

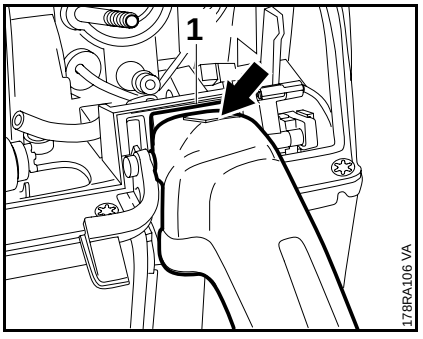
– Remove the front handle.

Reassemble in the reverse sequence.

Installing



- Fit the interlock lever (1) so that it engages the throttle trigger (2) when operated (arrow).



- Position the handle molding so that its front edge (arrow) engages the frame (1).

Reassemble all other parts in the reverse sequence.

Machines with handle heating

– Remove the front handle with heating element – 🕮 14.4

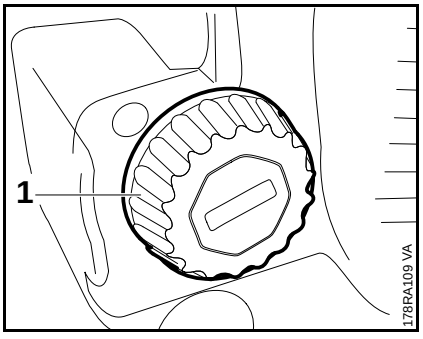
– Check the heating element – 🕮 14.1

11. Chain Lubrication
11.1 Pickup Body / Suction Hose

Impurities gradually clog the fine pores of the filter with minute particles of dirt. This prevents the oil pump from supplying sufficient oil to the bar and chain. In the event of problems with the oil supply system, first check the oil tank and the pickup body. Clean the oil tank if necessary.

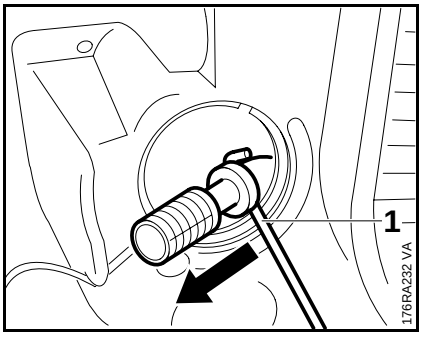
– Troubleshooting chart – 🕮 4.3

Pickup body



● Unscrew the oil tank cap (1) and drain the oil tank.

Collect chain oil in a clean container or dispose of it properly at an approved disposal site.



● Use hook (1) 5910 893 8800 to pull the pickup body out of the oil tank.

Do not stretch the oil hose too much during this operation.

– Pull the pickup body out of the suction hose.

– Fit a new pickup body.

– Flush out the oil tank.

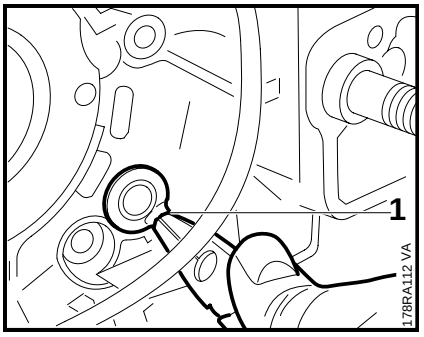
Note:
Take care no to damage the fuel hose. Do not use pointed tools.

Reassemble in the reverse sequence.

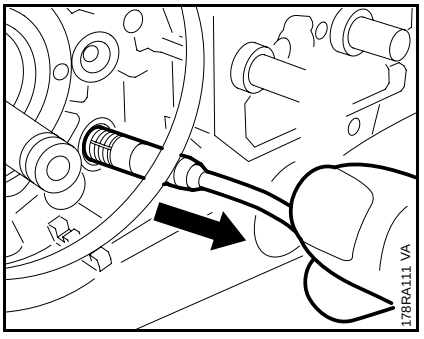
Suction Hose

– Remove the clutch – 🕮 5.4

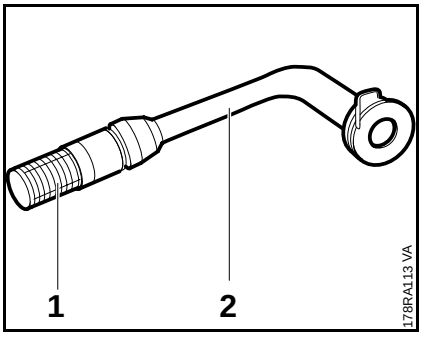
– Remove the oil pump – 🕮 11.3.1



● Grip the tab (arrow) of the suction hose with pliers and pull the grommet out of the bore.



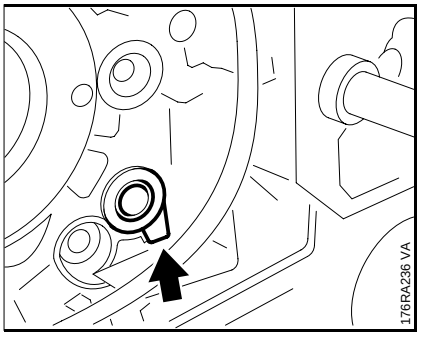
● Pull the suction hose with pickup body out of the crankcase.



● Pull the pickup body (1) off the suction hose (2).

11.2 Valve

11.2.1 Cleaning



– Insert the suction hose in the crankcase.

– Lubricate grommet with a little oil.

● Use a blunt tool to push the suction hose into the crankcase so that the tab locates in its seat at the bottom right (arrow).

Reassemble all other parts in the reverse sequence.

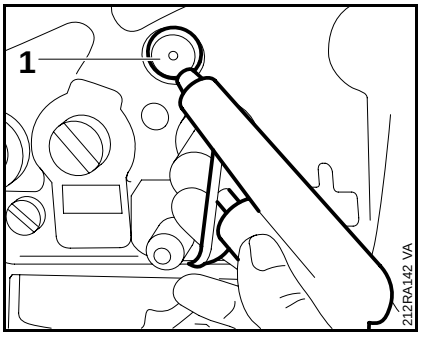
A valve is installed in the tank wall to keep internal tank pressure equal to atmospheric pressure.

– Remove the oil tank cap.

– Drain the oil tank.

Collect chain oil in a clean container or dispose of it properly at an approved disposal site.

– Remove the inner side plate – 🕮 5.5.2

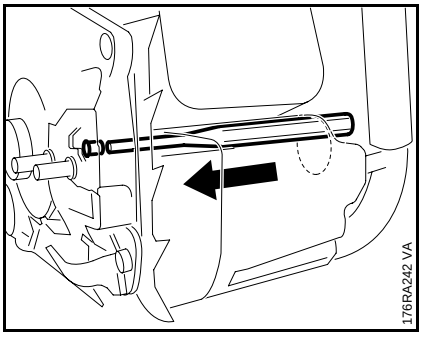


● Blow the valve (1) clear with compressed air (from outside to inside of tank).

– Flush out the oil tank.

Reassemble in the reverse sequence.

11.2.2 Replacing



– Remove the oil tank cap.

– Drain the oil tank.

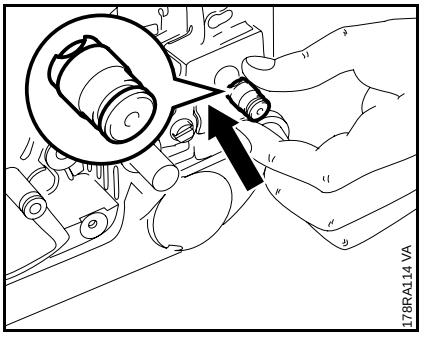
Collect chain oil in a clean container or dispose of it properly at an approved disposal site.

– Remove the inner side plate – 🕮 5.5.2

● Use a 6 mm drift to carefully drive the valve out of its seat and into the oil tank.

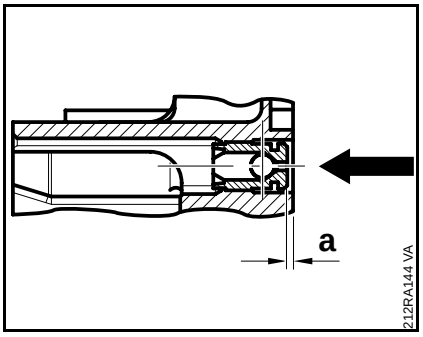
– Remove the old valve from the oil tank.

Reassemble in the reverse sequence.



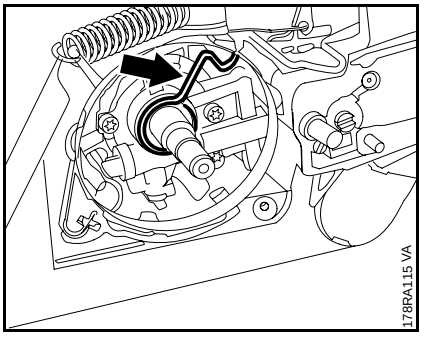
● Carefully insert the new valve in the housing bore from outside.

Check the correct installed position.



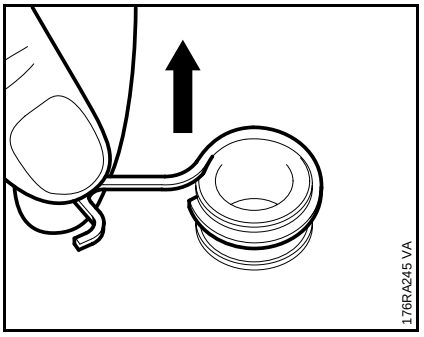
- Use a 6 mm drift to carefully press home the new valve from outside until it is about 0.8 – 1.2 mm below the housing face ('a' in illustration).

Reassemble all other parts in the reverse sequence.

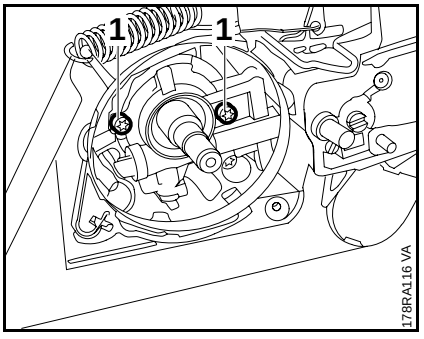


– Remove the clutch – 🕮 5.4

- Pull the worm with drive spring (arrow) out of the oil pump and off the crankshaft stub.

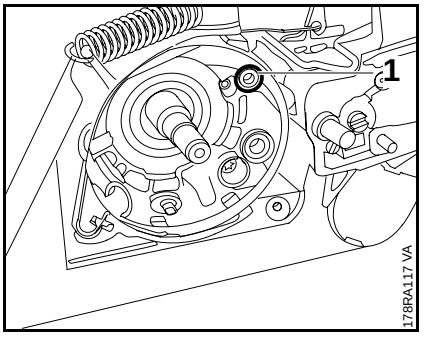


- Take the drive spring off the worm.



- Take out the screws (1).

– Pull off the oil pump.



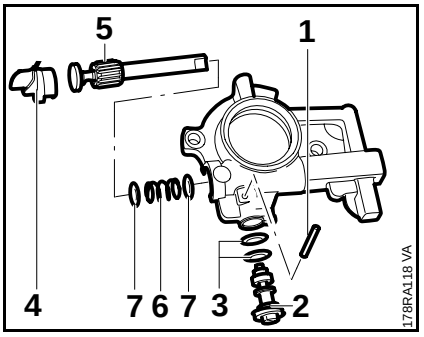
- Replace the sealing ring (1).

Always use a new sealing ring.

– Lubricate the worm with grease before installing – 🕮 17

– Coat oil pump screws with Hylomar sealant – 🕮 17

Reassemble in the reverse sequence.



Always check the suction hose and pickup body before disassembling the oil pump.

– Remove the oil pump – 🕮 11.3.1

● Use a 2 mm drift to drive out the spring pin (1).

● Pull out the control bolt (2).

● Remove the O-rings (3).

● Pry out the plug (4).

● Remove the pump piston (5) with spring (6) and washers (7).

– Clean all parts and examine for serviceability – 🕮 17

Always install new O-rings.

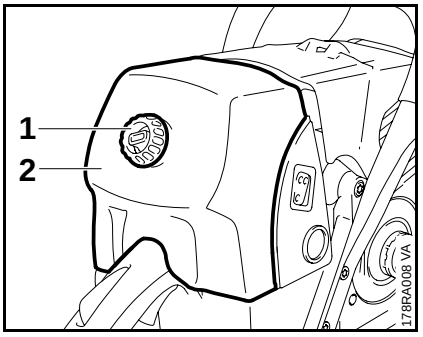
– Lubricate the pump piston and worm with grease before installing – 🕮 17

● When fitting the control bolt (2), press in the plug (4) against spring pressure.

Reassemble in the reverse sequence.

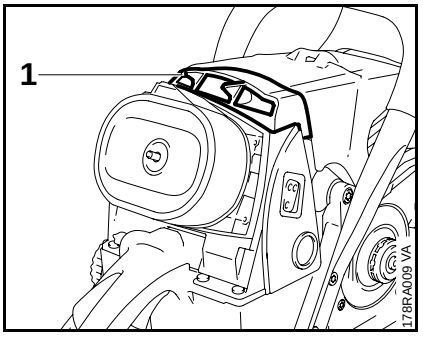
Dirty air filters reduce engine power, increase fuel consumption and make starting more difficult.

The air filter should be cleaned when there is a noticeable loss of engine power.

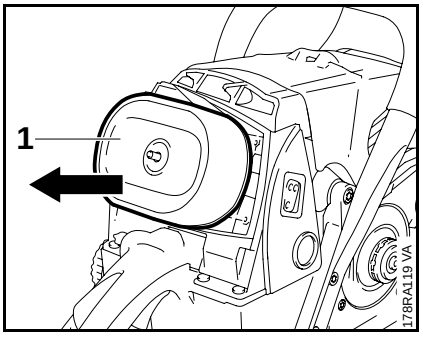


● Unscrew the twist lock (1).

● Remove the filter cover (2).



● Pull off the air baffle (1) vertically.



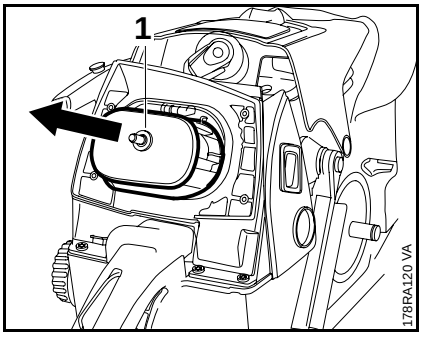
● Remove the air filter (1).

– Remove and clean the felt prefilter (machines with HD air filter).

– Knock out the filter or blow it clear with compressed air from the inside outwards.

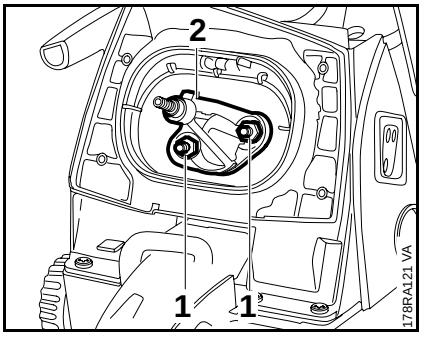
– In case of stubborn dirt, wash all parts of the filter in STIHL universal cleaner or a fresh, non-flammable cleaning solution (e.g. warm soapy water) and allow to dry.

– **Do not use a brush** to clean the felt prefilter. Replace damaged filters.

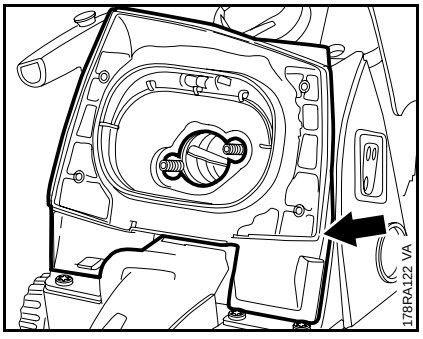


● Pull off the baffle (1) in the direction of the arrow.

12.2 Carburetor
12.2.1 Removing and Installing



- Unscrew the nuts (arrows).
- Pull off the flange (1).



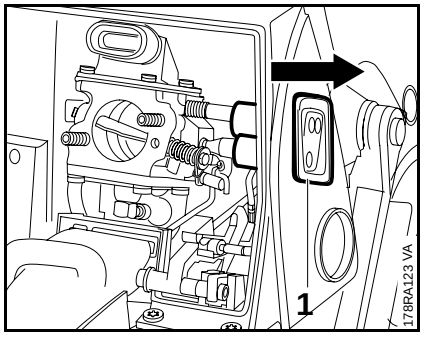
- Remove the filter base (arrow).

– Wash the filter mesh in the filter base thoroughly in a fresh, non-flammable cleaning solution and blow out with compressed air.

If filter mesh is damaged, install a new filter base.

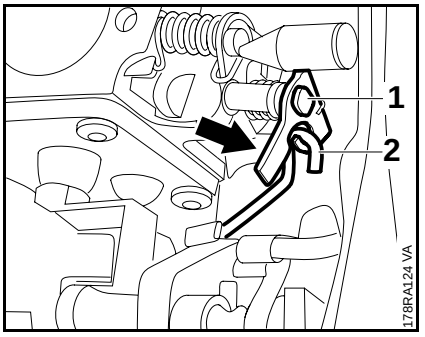
Reassemble in the reverse sequence.

The following servicing procedures show a carburetor without limiter caps. The procedures are exactly the same on carburetors with limiter caps.



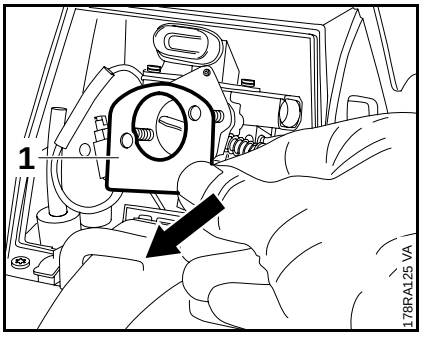
– Remove filter base – 🕮 12.1

- Pull the grommet (1) off the adjusting screws and out of the housing.



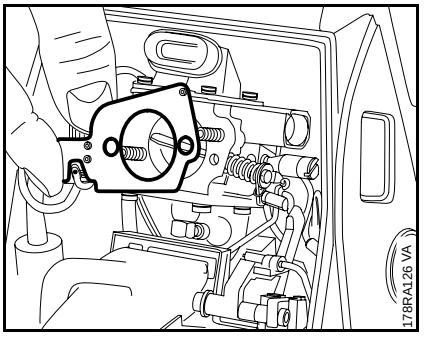
– Open the throttle wide.

- Hold the throttle shaft (1) steady (arrow).
- Release the throttle trigger and take the rod (2) out of the throttle shaft.

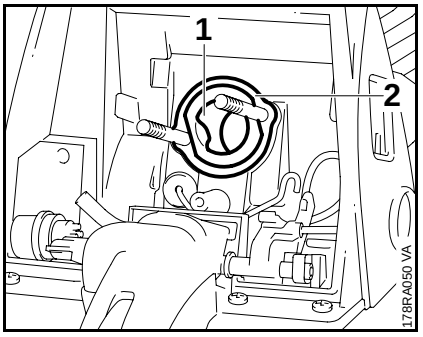


Machines with carburetor heating

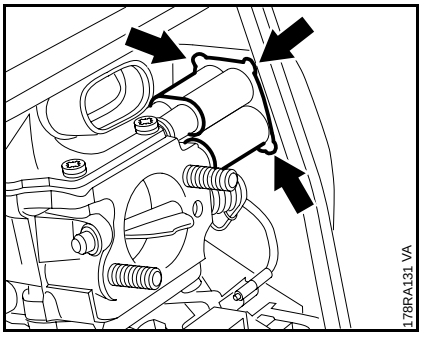
- Remove the baffle plate (1).



- Pull the heating element off the studs.



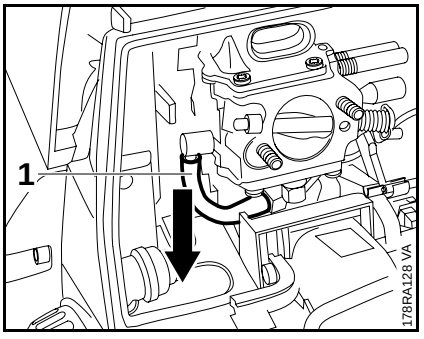
- Before fitting the carburetor, check that the sleeve (1) and washer (2) are in place.



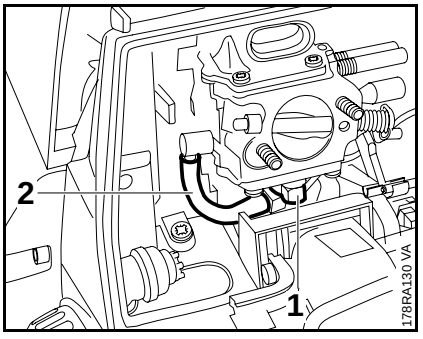
- Fit the grommet so that the tabs (1) engage behind the inside of the housing.

– On machines with carburetor heating, make sure that wiring is properly positioned – 🕮 15.2

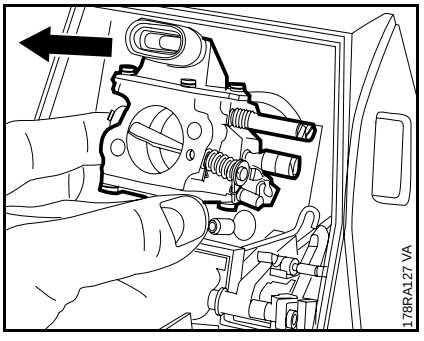
All machines



- Pull the fuel hose (1) off the carburetor.

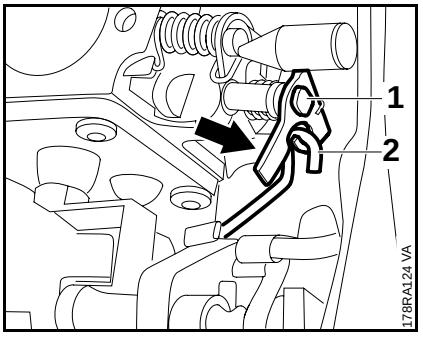


- When pushing the carburetor into position, check that the impulse hose (1) is correctly seated.
- Connect the fuel hose (2).



- Remove the carburetor.

Reassemble in the reverse sequence.

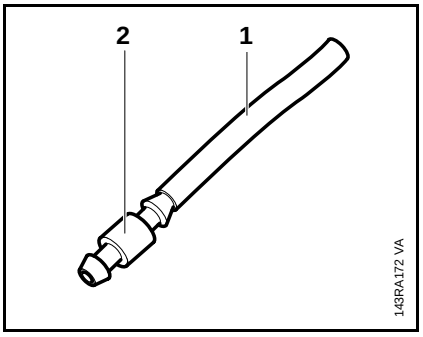


- Squeeze the throttle trigger and hook the rod (2) to the throttle shaft (1).

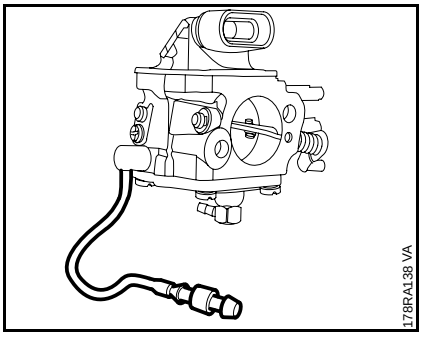
In the case of problems with the carburetor or fuel supply system, also check and clean the tank vent – 🕮 12.6.

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

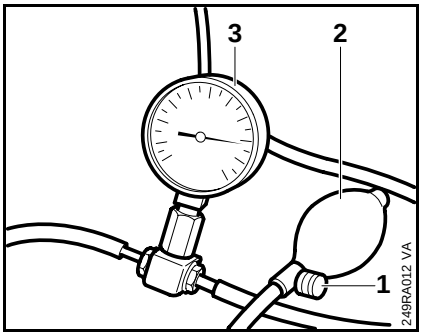
– Remove the carburetor – 🕮 12.2.1



● Push the fuel line (1) 1110 141 8600 onto the nipple (2) 0000 855 9200.



● Push the fuel line with nipple onto the carburetor's elbow connector.



● Push the nipple into the pressure hose of tester 1106 850 2905.

● 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 approx. 0.8 bar (80 kPa).

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

1. The 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 – 🕮 12.3.2

2. Metering diaphragm damaged, replace if necessary – 🕮 12.3.1

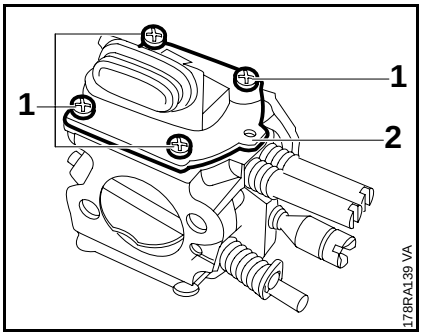
– After completing the test, open the vent screw (1) and pull the fuel line off the carburetor.

– Install the carburetor – 🕮 12.2.1

– Push the fuel hose onto the elbow connector.

Reassemble all other parts in the reverse sequence.

12.3 Servicing the Carburetor
12.3.1 Metering Diaphragm



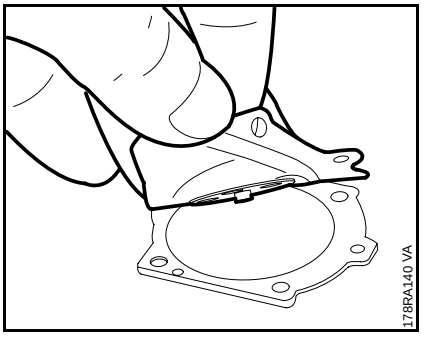
– Remove the carburetor – 🕮 12.2.1

– Remove sleeve from end cover.

● Take out the screws (1).

● Remove the end cover (2).

● Remove the metering diaphragm and gasket from the carburetor or end cover.



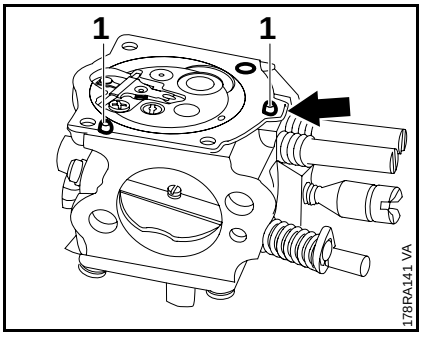
● Carefully separate the diaphragm and gasket.

– Inspect diaphragm for damage and wear and replace if necessary.

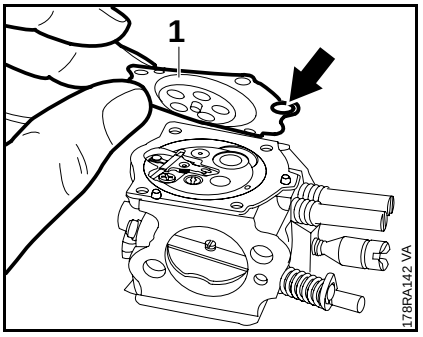
If the gasket and diaphragm are stuck to the carburetor, remove them very carefully.

The diaphragm material is subjected to continuous alternating stresses and eventually shows signs of fatigue, i.e. the diaphragm distorts and swells and has to be replaced.

Reassemble in the reverse sequence.



- Place the gasket on the carburetor body so that the tab (arrow) points towards the adjusting screws. The cast pegs (1) hold the gasket in position.



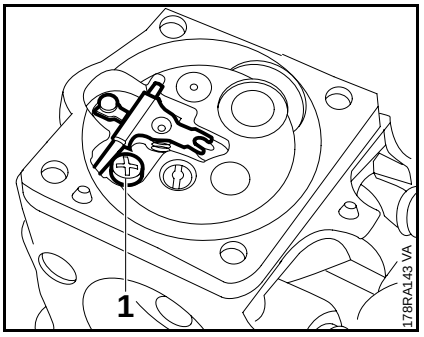
- Fit the metering diaphragm (1) on the carburetor body so that the perforated plate faces the inlet control lever and the tab (arrow) points towards the adjusting screws.

The gasket and metering diaphragm are held in position by integrally cast pegs.

– Fit the end cover.

– Insert the screws and tighten them down firmly – 🕮 3.5

Reassemble all other parts in the reverse sequence.



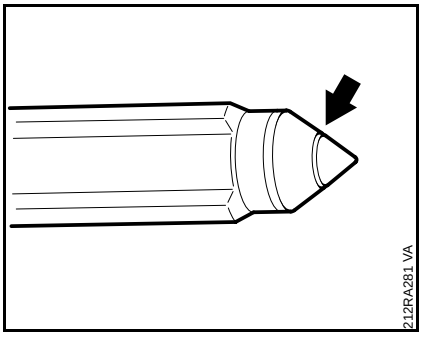
– Remove the metering diaphragm – 🕮 12.3.1

- Take out the screw (1).

– Remove the inlet control lever with spindle.

There is a small spring under the inlet control lever which may pop out during disassembly.

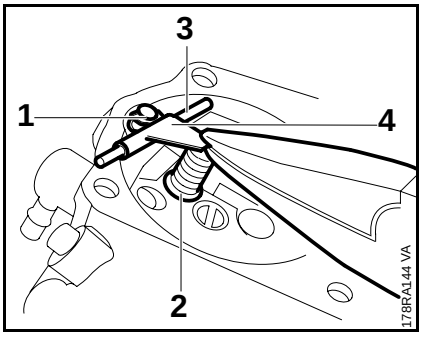
– Take out the inlet needle.



- If there is an annular indentation (arrow) on the sealing cone of the inlet needle, fit a new inlet needle.

Reassemble in the reverse sequence.

12.3.3 Fixed Jet



- Fit the inlet needle (1).
- Fit spring (2) in bore.
- Insert spindle (3) in the inlet control lever (4).

– Engage clevis in annular groove on head of the inlet needle.

– Press the inlet control lever down and secure it with the screw.

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

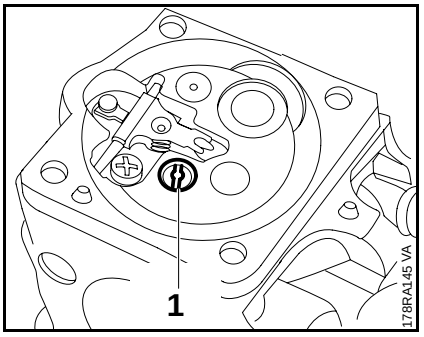
– Check that inlet control lever moves freely.

Note:
The upper face of the inlet control lever must be flush with the top of the carburetor body (+/- 0.1 mm).

– Install the metering diaphragm – 🕮 12.3.1

Reassemble all other parts in the reverse sequence.

12.3.4 Pump Diaphragm

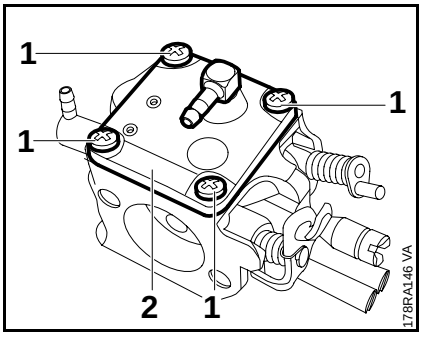


– Remove the metering diaphragm – 🕮 12.3.1

- Unscrew the fixed jet (1).

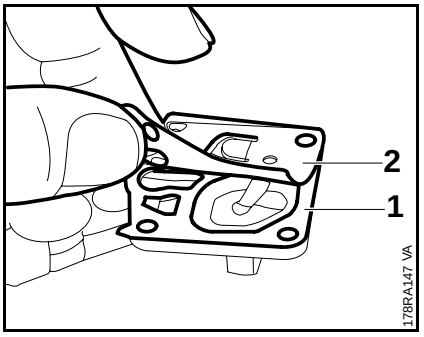
Take care not to damage the jet.

Reassemble in the reverse sequence.

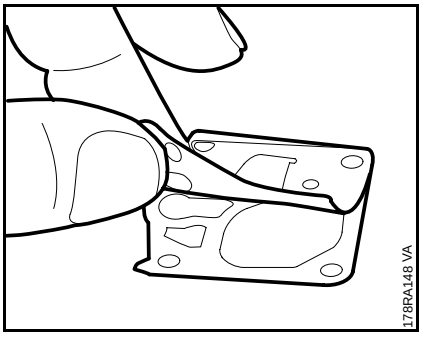


– Remove the carburetor – 🕮 12.2.1

- Take out the screws (1).
- Remove the end cover (2).



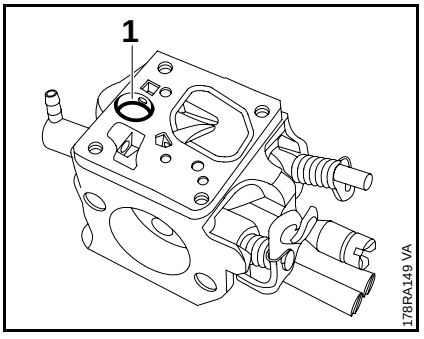
- Carefully remove the gasket (1) and pump diaphragm (2) from the end cover or carburetor body.



- Carefully separate the diaphragm and gasket.

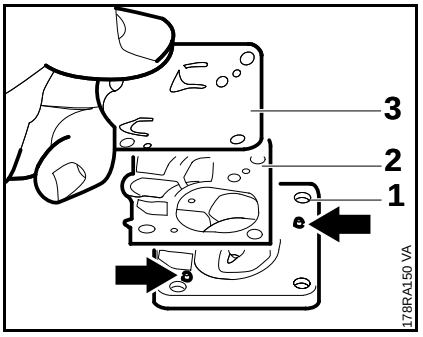
– Inspect diaphragm for damage and wear, install a new gasket.

The diaphragm material, inlet and outlet valves are subjected to continuous alternating stresses and eventually shows signs of fatigue, i.e. the diaphragm distorts and swells and has to be replaced.



- Inspect the fuel strainer (1) for contamination and damage. If necessary, remove it from the carburetor and clean or replace.

Reassemble in the reverse sequence.



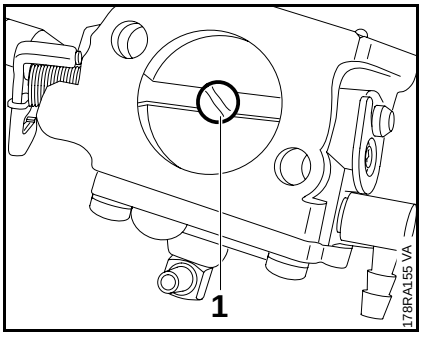
- Place the gasket (2) on the end cover (1).
- Place the diaphragm (3) on the end cover (1).
- Line up the diaphragm and gasket so that they are centered by the cast pegs (arrows).

– Fit the carburetor on the end cover.

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

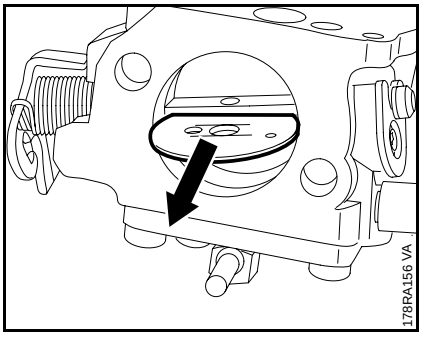
– Fit screw and tighten it down firmly – 🕮 3.5

Reassemble all other parts in the reverse sequence.



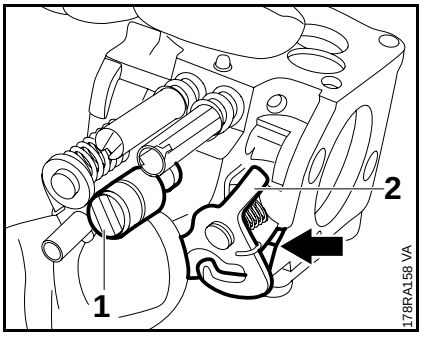
– Remove the carburetor – 🕮 12.2.1

- Take out the screw (1).

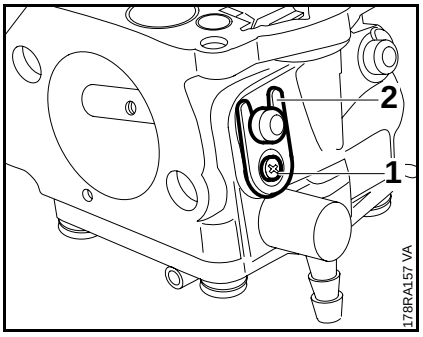


– Set the throttle shaft to the full throttle position.

- Carefully pull the throttle shutter out of the shaft.



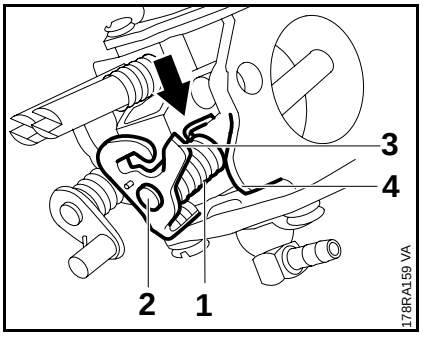
- Unscrew the idle speed screw (**LA**) (1).
- In idle position, lever (2) butts against carburetor (arrow).



- Take out the screw (1).
- Swing the clip (2) to the side and pull it off.

– Pull the throttle shaft out of the carburetor.

Examine parts for damage and wear and replace if necessary.



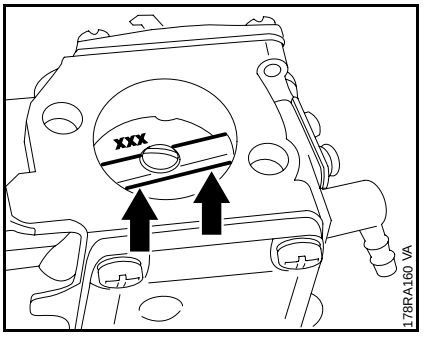
Installing

- Push the spring (1) onto the throttle shaft (2) and engage it in position.
- Push the throttle shaft into the carburetor and position the spring against the carburetor body.
- Rotate the throttle shaft counter-clockwise (tensioning the spring) until the lever (3) is above the edge (4) of the carburetor.
- Push the throttle shaft fully home.

– Fit the clip and secure it in position with the screw.

– Turn the throttle shaft to the wide open position.

– Fit the throttle shutter in the shaft.



- Check that the stamped digits face you when the throttle shutter is closed. The marks (arrows) must be parallel to the throttle shaft.

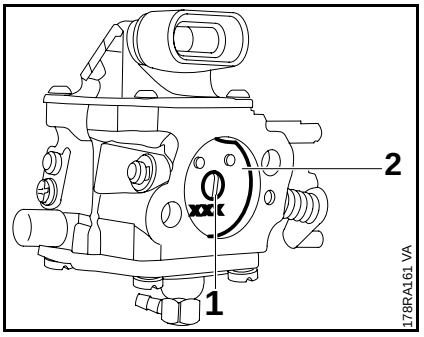
– Check that the center of the notch in the throttle shutter is in line with the hole in the carburetor body.

– Fit the idle speed screw (**LA**).

– Install the carburetor – 🕮 12.2.1

– Carry out user adjustment – 🕮 12.4

12.3.6 Removing and Installing the Choke Shaft

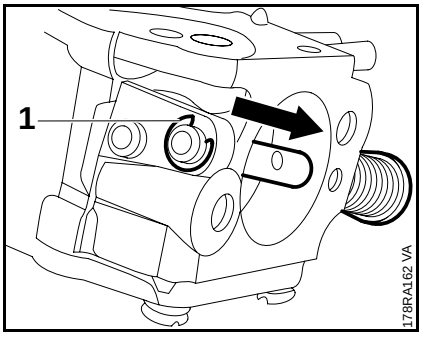


– Remove the carburetor – 🕮 12.2.1

● Close the choke shutter (2) against spring pressure.

● Take out the screw (1).

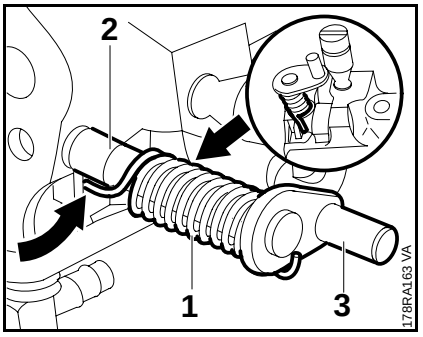
– Remove the choke shutter.



● Remove the E-clip (1).

– Pull out the choke shaft.

Examine parts for damage an wear and replace if necessary.



Installing

● Push the spring (1) onto the choke shaft (2) and engage it in position.

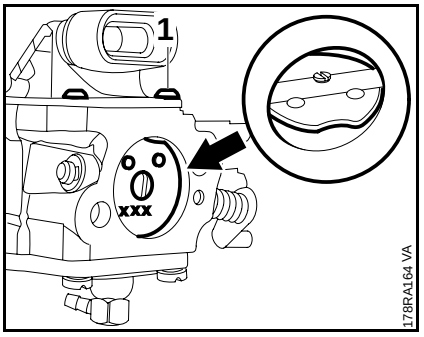
● Fit the choke shaft, lever (3) pointing down, in the carburetor – below the idle speed screw (**LA**).

● Position the spring against the edge of the carburetor body (arrow) and push home the choke shaft at the same time.

– Fit the E-clip.

– Rotate choke shaft against spring pressure to the choke position.

– Fit the choke shutter.



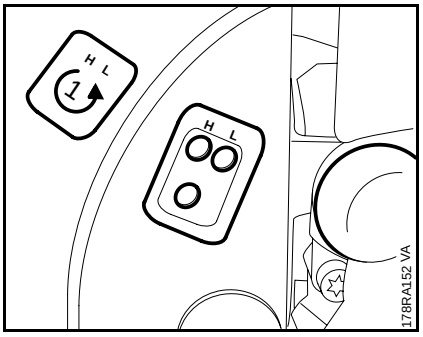
● Check that the stamped digits face you when the choke shutter is closed. The indentations (arrows) must be parallel to the choke shaft.

● Check that the notch in the choke shutter points towards the end cover (1).

– Install the carburetor – 🕮 12.2.1

– Carry out user adjustment – 🕮 12.4

12.4 User Adjustment
12.4.1 Carburetor without Limiter Caps



Standard setting

– Shut off the engine.

– Check the air filter and clean or replace as necessary.

– Check and clean or replace spark arresting screen (if fitted).

– Check chain tension.

● Carefully screw down both adjusting screws (**H** and **L**) until they are against their seats.

Then make the following adjustments:

● Open high speed screw (**H**) one full turn.

● Open low speed screw (**L**) one full turn.

If no tachometer is available, do not turn the high speed screw (**H**) beyond the standard setting to make the mixture leaner.

Adjusting idle speed

– Adjust idle speed with a tachometer. Adjust specified engine speeds within tolerance of +/- 200 rpm.

1. Adjust engine speed with idle speed screw (**LA**) to 3,000 rpm.

2. Turn low speed screw (**L**) counterclockwise to obtain maximum engine speed.

If this speed is higher than 3,400 rpm, abort the procedure and start again with step 1.

3. Use the idle speed screw (**LA**) to set engine speed again to 3,000 rpm.

4. Set the engine speed to 2,500 rpm with the low speed screw (**L**).

5. Open the throttle wide and set maximum engine speed to 13,000 rpm with the high speed screw (**H**).

Engine stops while idling

– Set the low speed screw (**L**) one full turn open.

– Turn the idle speed screw (**LA**) clockwise until the saw chain begins to move. Then turn it back one quarter turn.

Chain runs while engine is idling

– Set the low speed screw (**L**) one full turn open.

– Turn the idle speed screw (**LA**) counterclockwise until the chain stops running. Then turn the screw another one quarter turn in the same direction.

Erratic idling behavior, poor acceleration

Erratic engine running behavior even though low speed screw (**L**) is set one full turn open.

– Idle setting too lean. Turn the low speed screw (**L**) counter-clockwise until the engine runs and accelerates smoothly.

– It is usually necessary to change the setting of the idle speed screw (**LA**) after every correction to the low speed screw (**L**).

12.4.2 Carburetor with Limiter Caps

Adjustments for operation at high altitude

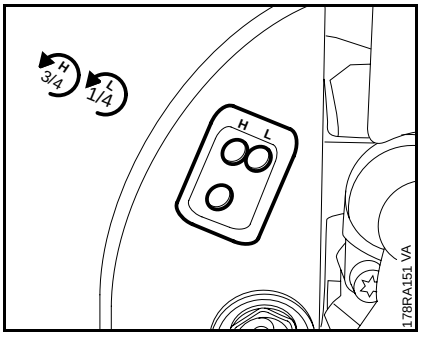
A minor correction may be necessary if engine power is not satisfactory when operating at high altitude.

– Check standard setting.

– Warm up the engine.

– Turn high speed screw (**H**) very slightly clockwise (leaner).

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



Standard setting

The limiter caps must not be removed for the standard setting.

– Check the air filter and clean or replace as necessary.

– Check and clean or replace spark arresting screen (if fitted).

– Check chain tension.

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

– Open the high speed screw (**H**) counterclockwise as far as stop.

– Close the low speed screw (**L**) clockwise as far as stop, then open it one quarter turn counter-clockwise.

Adjusting engine idle speed

Engine stops while idling

– Set the low speed screw (**L**) one quarter turn open.

– Turn the idle speed screw (**LA**) clockwise until the saw chain begins to move. Then turn it back one quarter turn.

Chain runs while engine is idling

– Set the low speed screw (**L**) one quarter turn open.

– Turn the idle speed screw (**LA**) counterclockwise until the chain stops running. Then turn the screw another one quarter turn in the same direction.

Erratic idling behavior, poor acceleration

Erratic engine running behavior even though low speed screw is set one quarter turn open.

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

– It is usually necessary to change the setting of the idle speed screw (**LA**) after every correction to the low speed screw (**L**).

12.5 Basic Setting (Carburetor with Limiter Caps)

Adjustments for operation at high altitude

A minor correction may be necessary if engine power is not satisfactory when operating at high altitude.

– Check standard setting.

– Warm up the engine.

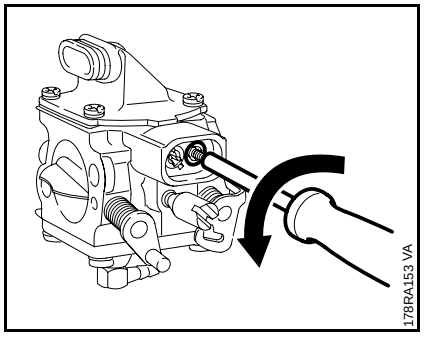
– Turn high speed screw (**H**) very slight clockwise (leaner) no further than stop.

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

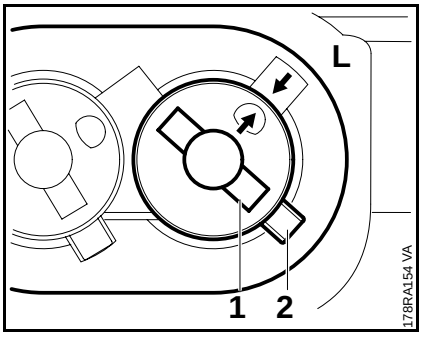
The limiter caps have to be removed from the adjusting screws only if it is necessary to replace the high speed screw (**H**) or low speed screw (**L**), clean the carburetor or carry out the basic setting.

Perform the following operations:

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



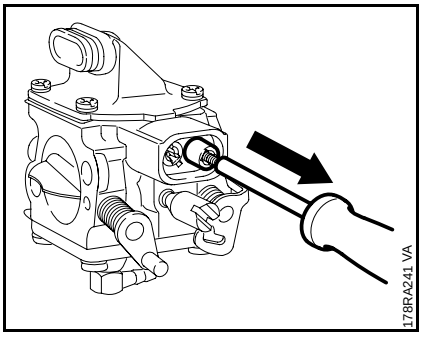
- Screw puller 5910 890 4500 about 5 turns counterclockwise into the limiter cap.



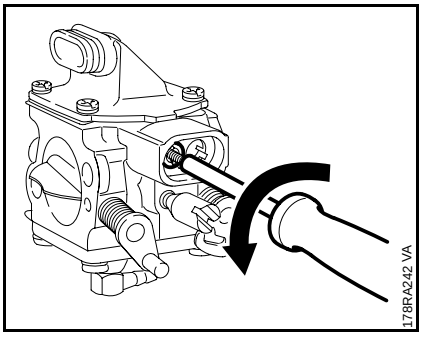
- Use the puller to turn the limiter cap on the low speed screw **L** clockwise as far as stop, then turn it back one quarter turn so that its slot (1) is in line with the slot (2) in the carburetor body – limiter cap's lug must be visible through the slot in the carburetor body.

- Marks on limiter cap and segment are in alignment (arrow).

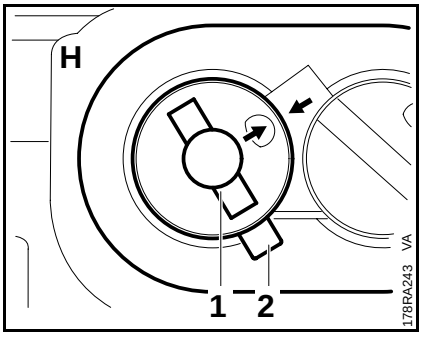
Note:
The lug is in line with the slot.
On older machines, the limiter cap's lug is at 90° to the slot. Align the lug relative to the slot by eye.



- Pull off the limiter cap.

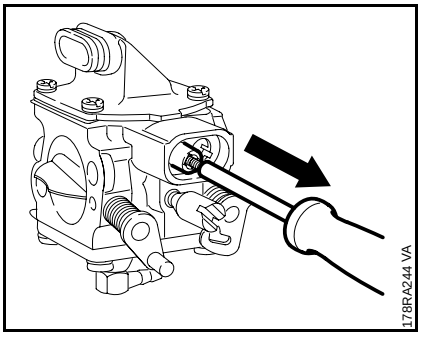


- Screw puller 5910 890 4500 about 5 turns counterclockwise into the limiter cap.



- Line up the limiter cap on the high speed screw (**H**) so that its slot is in line with the slot in the carburetor body – limiter cap's lug must be visible through the slot in the carburetor body.
- Marks on limiter cap and segment are in alignment (arrow).

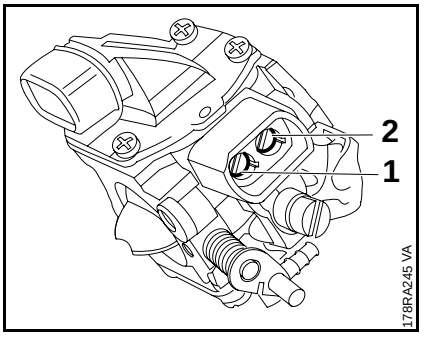
Note:
The lug is in line with the slot.
On older machines, the limiter cap's lug is at 90° to the slot. Align the lug relative to the slot by eye.



– Pull off the limiter cap.

Note:
Limiter caps that have been removed once are damaged and must not be re-used.

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



– Screw down both adjusting screws until they are against their seats.

– Open the high speed screw (**H**) (1) one full turn.

– Open the low speed screw (**L**) (2) one full turn.

The basic setting of the carburetor is easier with the setting disk 5910 893 6600 fitted on the screwdriver.

Adjusting idle speed (with tachometer)

– Check the air filter and clean or replace as necessary.

– Check the spark arresting screen and clean or replace as necessary.

– Check chain tension.

– Warm up the engine.

Adjust specified engine speeds within tolerance of +/- 200 rpm.

1. Adjust engine speed with idle speed screw (**LA**) to 3,000 rpm.

2. Turn low speed screw (**L**) counterclockwise to obtain maximum engine speed.

If this speed is higher than 3,400 rpm, abort the procedure and start again with step 1.

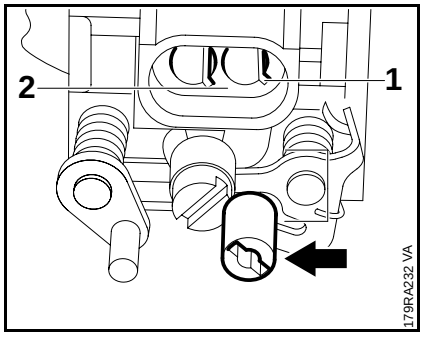
3. Use the idle speed screw (**LA**) to set engine speed again to 3,000 rpm.

4. Set the engine speed to 2,500 rpm with the low speed screw (**L**).

5. Open the throttle wide and set maximum engine speed to 13,500 rpm with the high speed screw (**H**).

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

6. Install new limiter caps.



- Line up limiter cap lug (arrow) with slot (1) in carburetor.
- Push the limiter caps onto the adjusting screws until they are flush with the carburetor body (2).

Limiter caps that have been removed once are damaged and must not be re-used.

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.

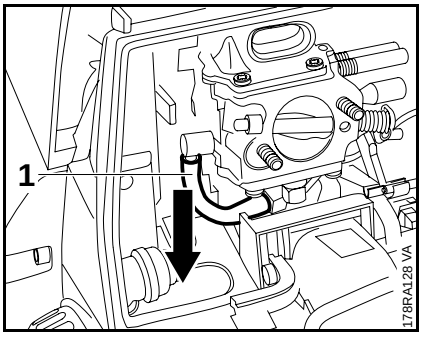
In the event of trouble with the carburetor or the fuel supply system, always check and clean the tank vent.
Check function by performing vacuum test on the tank via the fuel hose.

– Remove the air filter – 🕮 12.1

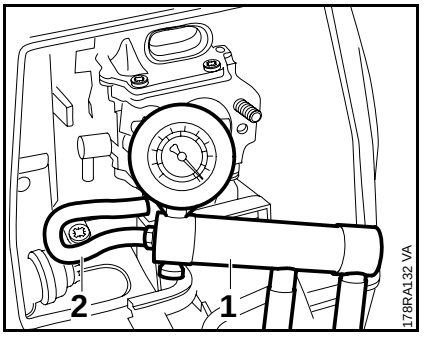
– Remove the filter base – 🕮 12.1

– Drain the fuel tank.

Dispose of fuel properly in accordance with environmental requirements.



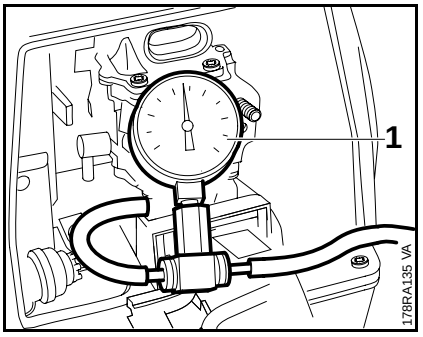
- Pull fuel hose (1) off the carburetor.



Vacuum test

- Connect vacuum pump (1) 0000 850 3501 to fuel hose (2) and create vacuum in fuel tank.

Equalization of pressure takes place via the tank vent. There must be no build-up of vacuum in the tank. In the event of a malfunction, install a new tank vent.



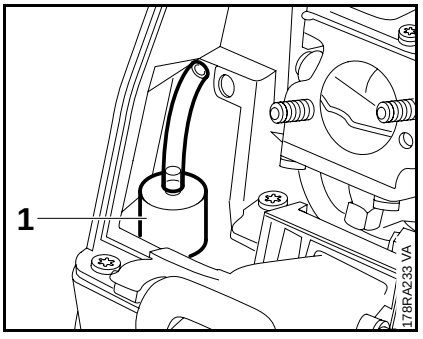
Pressure test

- Connect carburetor and crankcase tester 1106 850 2905 (1) to the fuel hose.

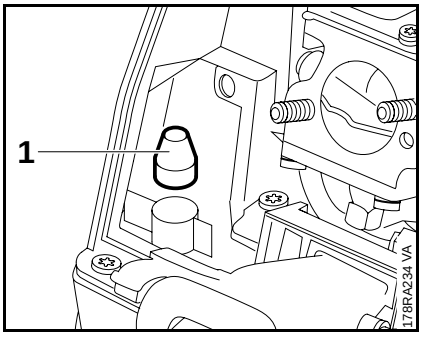
– Squeeze the rubber bulb until the the pressure gauge shows a reading of 0.5 bar. If this pressure remains constant for at least 20 seconds, the tank, including the tank vent, is airtight. If it drops, the leak must be found and the defective part replaced.

– Clean area around the tank vent.

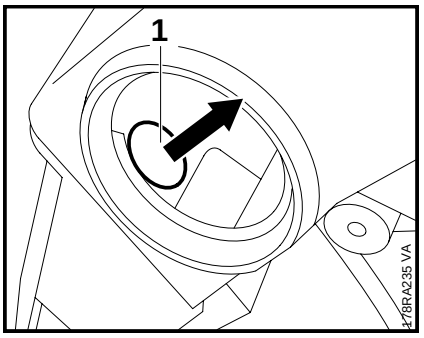
Version with connector and hose



- Pry off the connector (1).



- Remove the filter element (1).



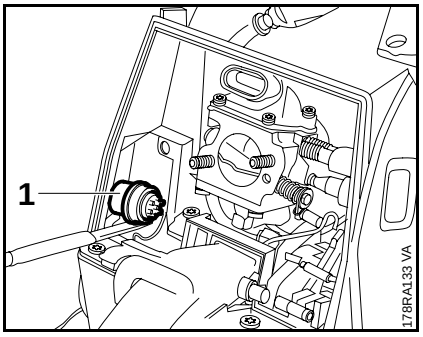
- Pull the valve (1) into the tank.

Installing

– Place the valve in the tank and carefully pull it into position from the carburetor housing.

Reassemble all other parts in the reverse sequence

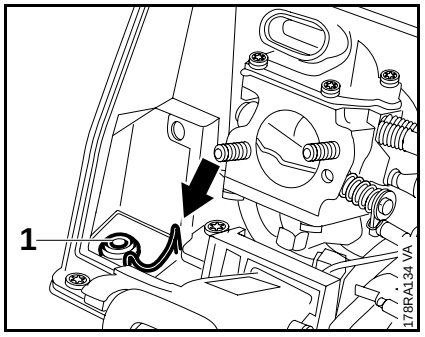
– Test tank for leaks – 🕮 12.6



Tank vent on MS 650 and MS 660 from serial # 1 63 264 274 and 360 548 784

– Carefully pry out the tank vent (1).

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



● Remove the grommet (1).

Take care not to damage the grommet. If grommet is damaged, install a new one.

Installing

– Before installing, lubricate outside diameter of grommet with Press Fluid OH 723 0781 957 9000 or two-stroke oil.

– Lubricate tank vent's nipple with Press Fluid OH 723 0781 957 9000 or two-stroke oil before fitting it in the grommet.

● Fit tank vent in the guides (arrow) on the tank housing.

Reassemble all other parts in the reverse sequence

– Test tank for leaks – 🕮 12.6

Any impurities mixed with the fuel are retained by the pickup body (filter). The fine pores of the filter eventually become clogged with minute particles of dirt. This restricts the passage of fuel and results in fuel starvation.
In the event of trouble with the fuel supply system, always check the fuel tank and the pickup body first. Clean the fuel tank if necessary.

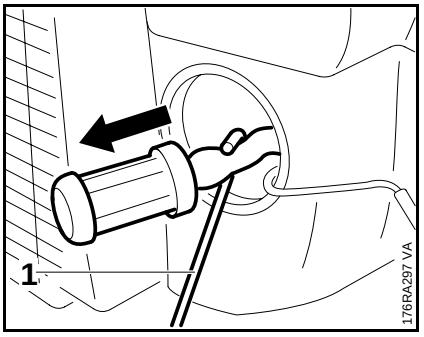
Cleaning the fuel tank

– Remove the fuel tank cap and drain the tank.

– Pour a small amount of clean gasoline into the tank. Close the tank and shake the saw vigorously.

– Open the tank again and drain it.

Dispose of fuel properly in accordance with environmental requirements.



Pickup Body

- Use hook (2) 5910 893 8800 to pull the pickup body (1) out of the fuel tank.

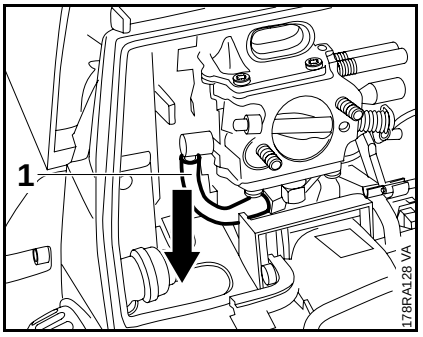
Do not stretch the fuel hose too much during this operation.

– Pull the pickup body off the fuel hose.

Note:
Take care not the damage the fuel hose. Do not use pointed tools.

– Replace the pickup body.

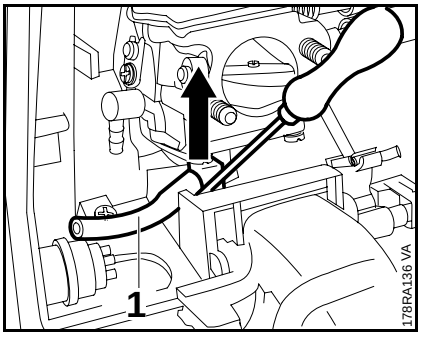
Reassemble in the reverse sequence.



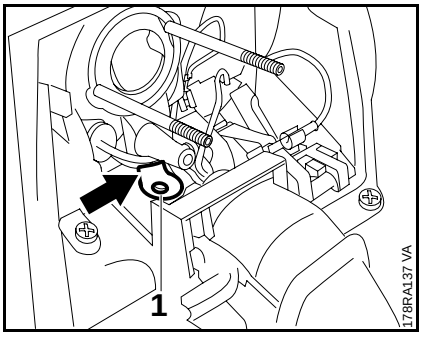
– Remove the air filter – 🕮 12.1

– Remove filter base – 🕮 12.1

- Pull the fuel hose (1) off the carburetor.



- Carefully pry the fuel hose out of the grommet in the tank.



– Remove the carburetor – 🕮 12.2.1

– Remove the pickup body (1) – 🕮 12.7

– Remove the carburetor housing.

- Pull the grommet (arrow) with hose out of the tank.

– Pull out the fuel hose.

Reassemble in the reverse sequence.

When installing, make sure the flat side of the grommet points towards the cylinder.

Before installing, lubricate outside diameter of grommet with Press Fluid OH 723 0781 957 9000 or two-stroke oil.

– Test tank for leaks – 🕮 12.6

12.10 Separating Crankcase and Tank Housing

– Drain the fuel tank.

– Drain the oil tank.

Collect fuels and lubricants in clean containers or dispose of properly in accordance with regulations.

– Remove the front handle – 🕮 10.3

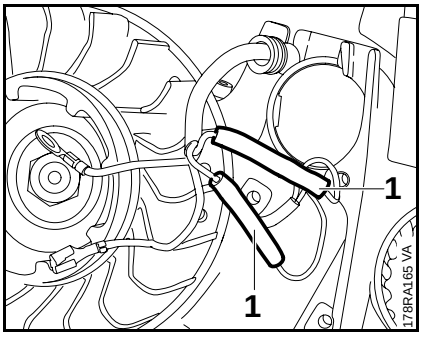
– Remove the shroud – 🕮 6.2

– Remove the carburetor – 🕮 12.2.1

– Remove the fan housing with rewind starter – 🕮 8.2

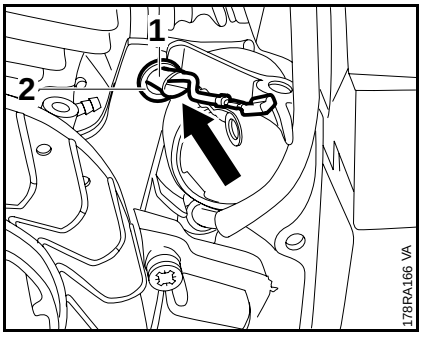
– Disconnect or remove the short circuit wire and ground wire from the ignition module – 🕮 7.2.1

Machines with handle heating and/or carburetor heating

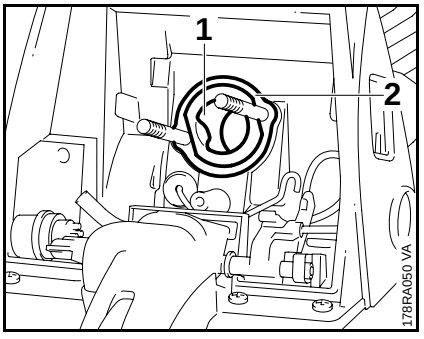


– Remove the ignition module – 🕮 7.2.1

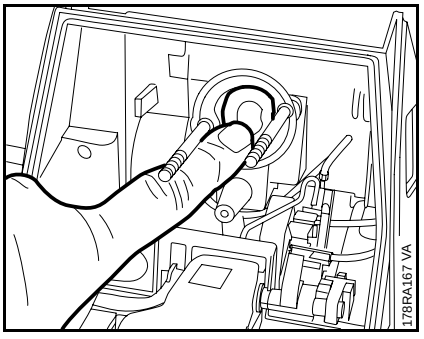
● Pull connectors (1) out of guide (arrow) and disconnect.



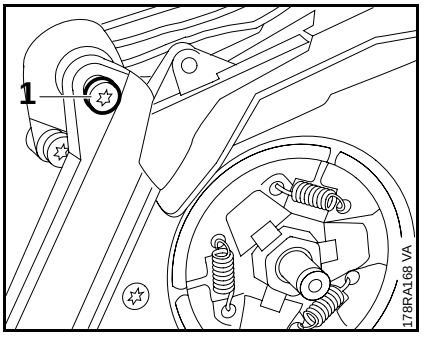
● Push the wires (1) inwards through the grommet.



● Take the sleeve (1) out of the manifold and pull off the washer (2).

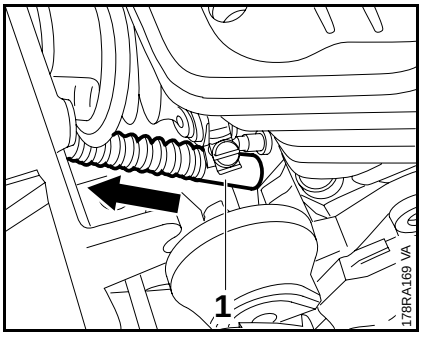


● Push the manifold flange through the housing opening.



● Take out the screw (1).

– Remove the annular buffers at both sides – 🕮 9.1



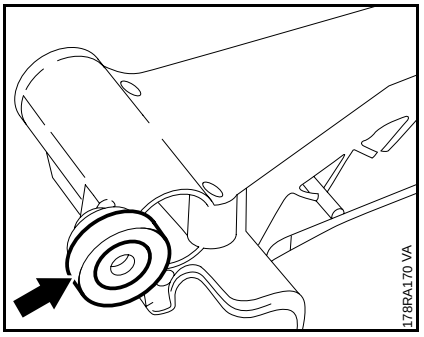
● Pull off the impulse hose (1).

– Carefully separate the crankcase from the tank housing.

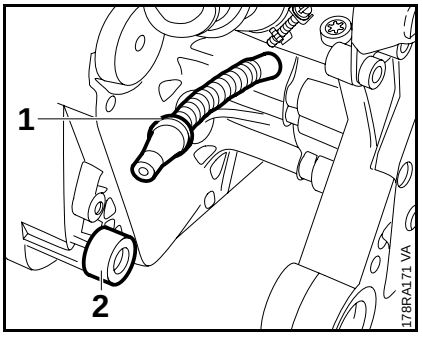
– Replace the tank housing – 🕮 12.11

– Replace the crankcase – 🕮 6.7

Note the following points when reassembling.

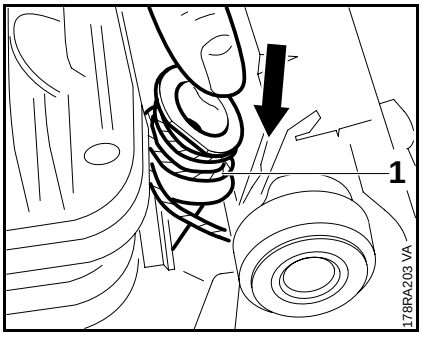


- Make sure ring (arrow) is in position and not damaged.



– Connect impulse hose (1) to engine housing.

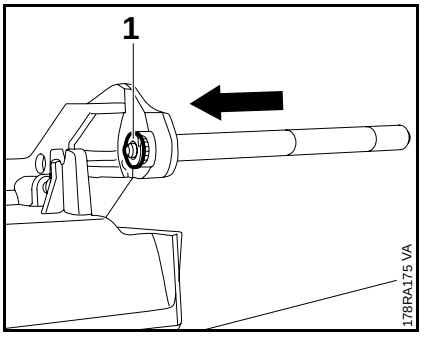
– Examine rubber buffer (2) for damage.



- To pull the manifold flange through the intake opening in the tank housing, wind a piece of string (1) (about 15 cm long) around the back of the flange.

– Pass the ends of the string through the intake opening.

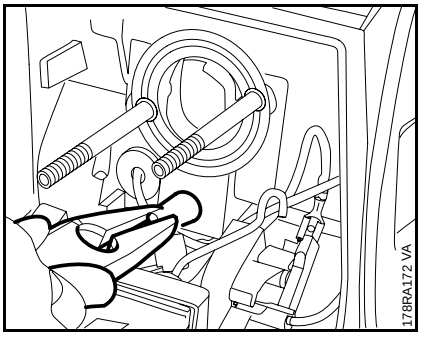
– Press the manifold down.



- Check the sleeve (1) for wear.

- If necessary, use 7 mm punch to drive out the sleeve, from the outside inwards.

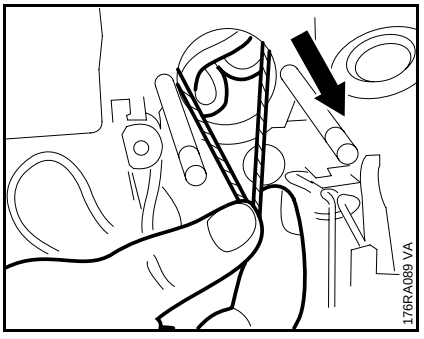
– Drive home the sleeve with drift 1114 893 4700.



– Impulse hose must not be twisted or kinked.

- Thread the impulse hose through the bore and pull it in until its groove engages.

– Wiring in carburetor housing – 🕮 15



- Pull the ends of string outwards.

Check that flange is properly seated in the tank housing.

Reassemble all other parts in the reverse sequence.

12.11 Replacing the Tank Housing

– Separate the crankcase/tank housing – 🕮 12.10

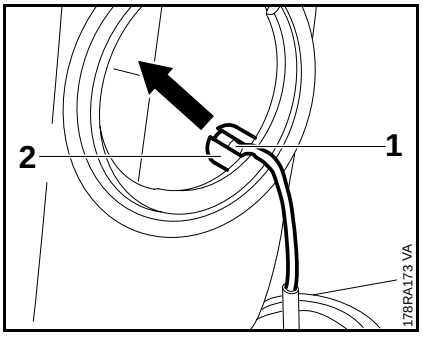
– Remove the front handle – 🕮 10.3

– On machines with handle heating, remove the heater switch – 🕮 14.2

– Remove the throttle trigger – 🕮 10.2

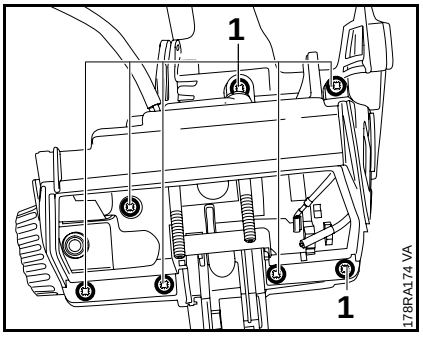
– Remove the switch shaft – 🕮 10.1

– Remove the contact spring – 🕮 7.4



● Pull tank cap cord (1) out of slot (2).

– Remove the tank cap.



● Take out the screws (1).

– Remove carburetor housing from tank housing.

– Remove the short circuit wire – 🕮 15.1

– Remove the fuel hose in the tank – 🕮 12.9

– Remove the tank vent – 🕮 12.6

Reassemble in the reverse sequence.

Make sure the impulse hose and wires are correctly positioned without kinks.

– Test tank vent for leaks –🕮 12.6

13. Carburetor Heating

Current is supplied via wires to the heating element installed between the heating plate and carburetor.

Carburetor heating is controlled by a thermostatic switch on the heating plate.

The carburetor heating system should be checked if running problems occur when the cold engine is idling or running at part load, particularly at temperatures below freezing.

Idling problems with a hot engine are also an indication of a fault in the carburetor heating system.

Complete system

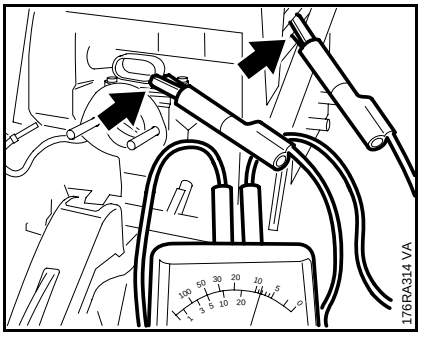
The generator and heating element are checked in the following test which should be performed at an ambient temperature of at least + 20 °C (68 °F).

If the temperature is lower than + 13 °C (55 °F), the thermostatic switch may close and produce false readings.

Test the thermostatic switch separately.

– Remove filter base –🕮 12.1

– Set the ohmmeter to measuring range “Ω“.

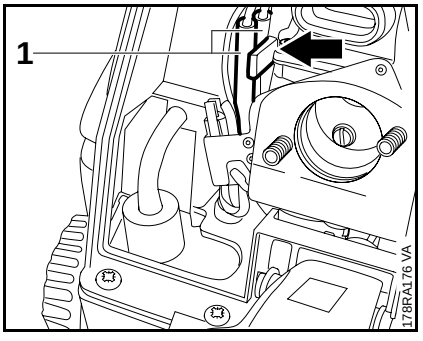


● Clip one of the two test leads to the carburetor body and the other to a cylinder fin (ground).

– If the system is in good condition the ohmmeter will indicate about 8 Ω in measuring range "Ω".

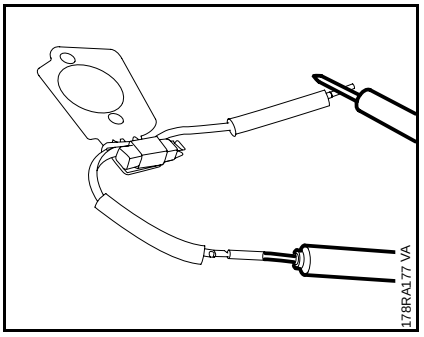
To ensure good electrical contact, press the heating plate and the heating element against the carburetor during the measurement.

If the reading obtained is outside this tolerance, test each component separately.



● Remove the wires from the retainer (arrow).

● Push back the insulating tubes (1) and disconnect the pin and socket connectors.



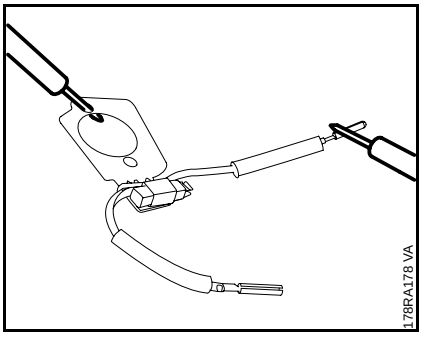
Thermostatic switch

– Remove the heating element.

● Clip test leads to the heating element’s connectors.

At temperatures above + 20 °C (68 °F), the ohmmeter must indicate an infinitely high value in measuring range “Ω“.

Cool the switch down to below + 6 °C (42 °F). The ohmmeter must indicate a value of about 8 Ω in measuring range “Ω“. If a higher value is indicated, install a new heating element.



Heating element

– Remove the heating element.

● Clip one test lead to the heating element, and the other test lead to the wire that goes to the heating element.

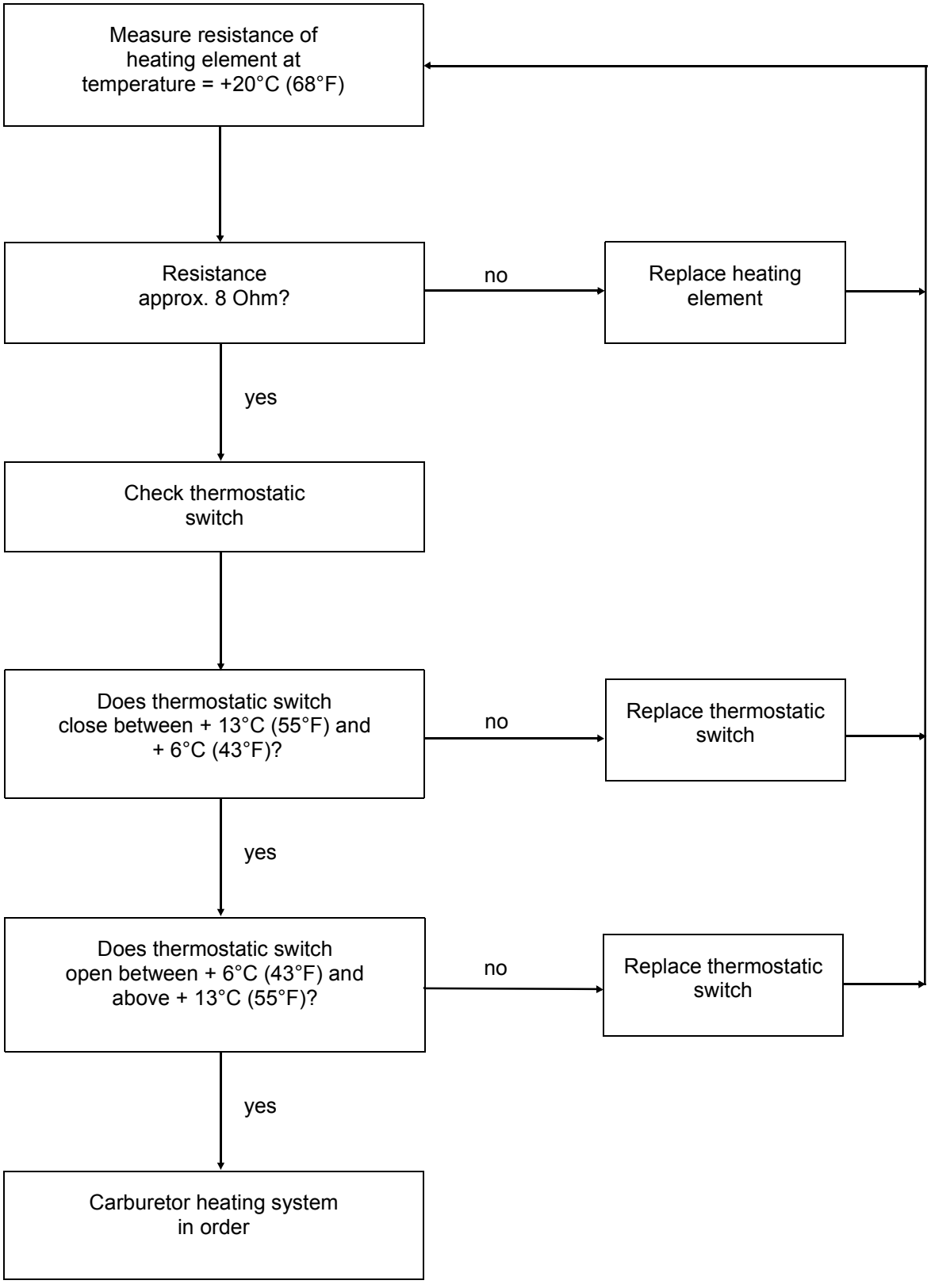
If the heating element is in good condition the ohmmeter will show a reading of about 8 Ω in measuring range “Ω“.

If the reading obtained is outside this tolerance, install a new heating element.

Reassemble in the reverse sequence.

Make sure the pin and socket connector is straight.

13.2 Troubleshooting Chart

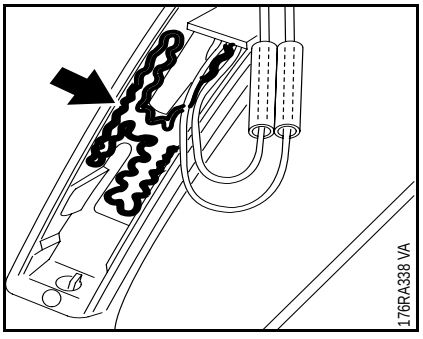


The entire handle heating system is maintenance-free and subject to practically no wear. Faults in the generator, heating elements and wiring are generally caused by mechanical damage.

There are two reasons for failures in the heating system:

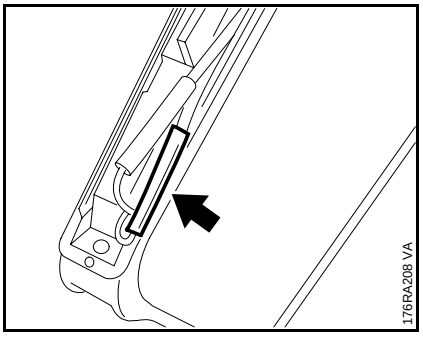
1. A break in the circuit due to a faulty wire or component.

2. A short circuit resulting from damage to the insulation.



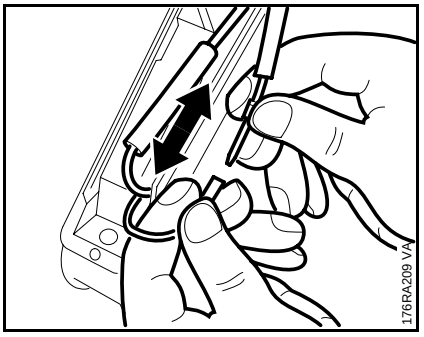
- The heating element in the rear handle may overheat and fail if it is not bonded firmly in position, i.e. completely flat (no creases).

Tracing the cause of a fault

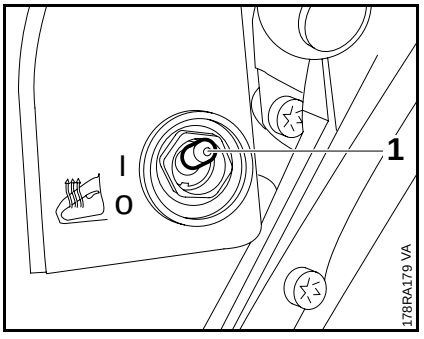


– Remove the handle molding – 🕮 10.1

- Push back the insulating tube (arrow) on the pin and socket connector of the wire between the generator and rear handle heating element.



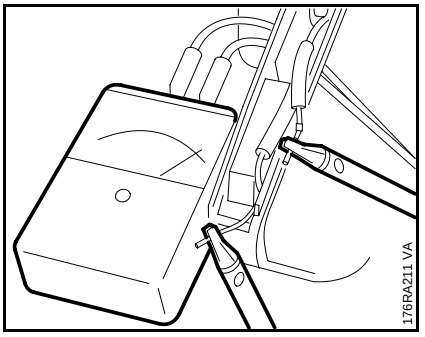
- Separate the pin and socket connector.



- Set the heater switch (1) to "I"

– Set the ohmmeter to "Ω".

– Set the Master Control lever to "0"



– Clip one ohmmeter test lead to the generator wire and the other test lead to the rear handle heating element wire.

All electrical components of the handle heating system are connected in series with the ohmmeter.

If the system is in order, the ohmmeter will show a reading of about 10 Ω in measuring range "Ω".

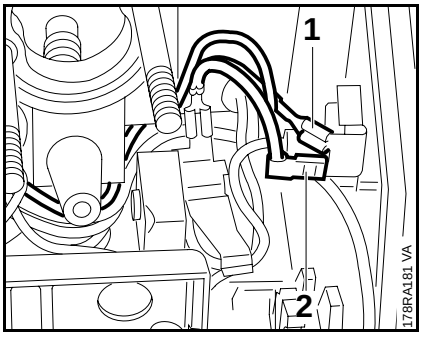
If no reading is obtained, there is a break in the circuit.

If the ohmmeter shows a very low value, there is a short circuit in one of the components.

In either case it is necessary to check each component separately, 🕮 14.5.1.
The generator wire remains disconnected from the heating element during this check.

– After completing the test, reconnect the wires and push the insulating tube over the pin and socket connector.

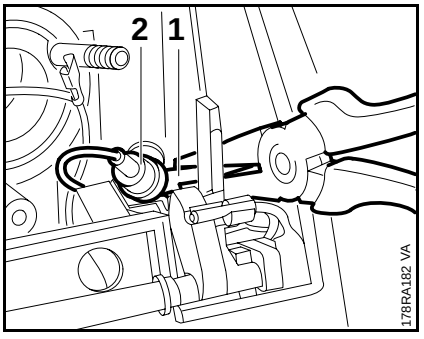
– Install the interlock lever and handle molding – 🕮 10.2



– Remove the carburetor – 🕮 12.2.1

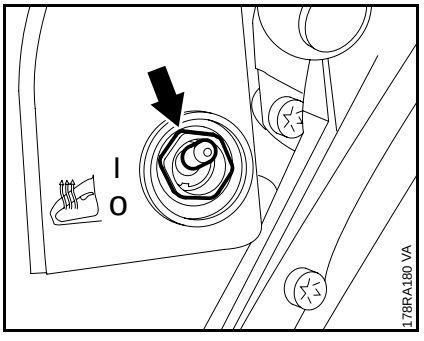
● Pull of the connector (2).

● Pull off the connector (1).



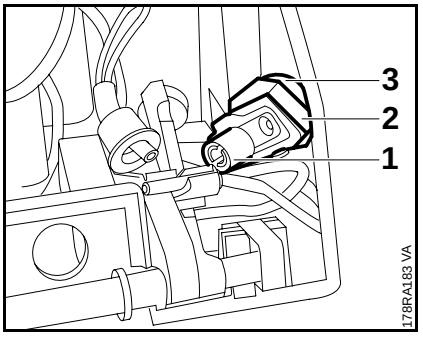
● Push back the rubber grommet (2) a little.

● Pull the connector sleeve (1) out of the heater switch.

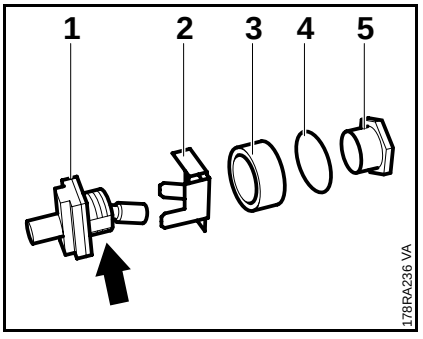


● Unscrew the nut (arrow) from the switch.

– Remove the washer.



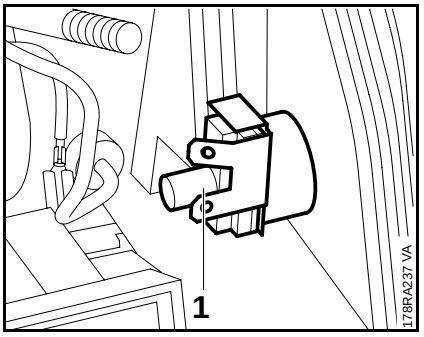
● Remove the heater switch (1) with connector tags (2) and ring (3) inwards.



● Assemble the heater switch (1) with connector tags (2) and ring (3).

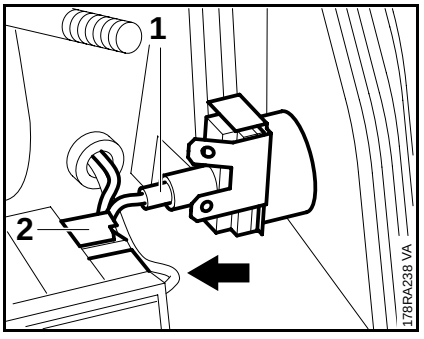
● Position the heater switch with the groove (arrow) facing down.

● The washer (4) and hex nut (5) are fitted from outside.



● Fit the heater switch (1) and line it up properly.

– Fit the washer with nut from outside and tighten down firmly.



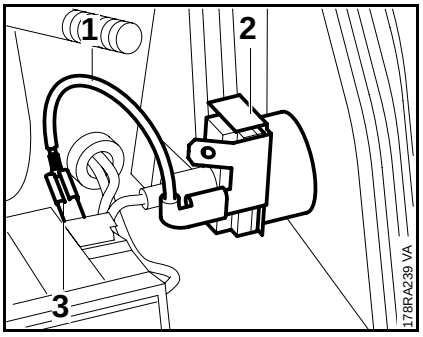
● Push the connector sleeve (1) into the switch.

– Push the rubber grommet over the switch.

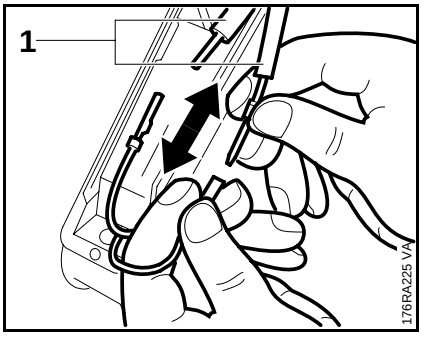
– Position the wire under the contact spring (2) (arrow).

– Check freedom of movement of contact spring.

14.3 Heating Element in Rear Handle



● Fit the short circuit wire (1) between the connector tags (2) and contact spring (3).

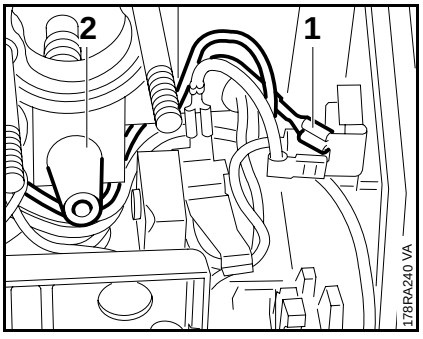


– Remove the upper handle molding – 🕮 10.1

● Slide the two insulating tubes (1) off the pin and socket connectors and separate the connectors.

Avoid creases. If the heating element is not fitted perfectly flat, heat transfer will be interrupted and the element may fail as a result of overheating. The ambient temperature during installation should not be less than + 15°C (59°F).

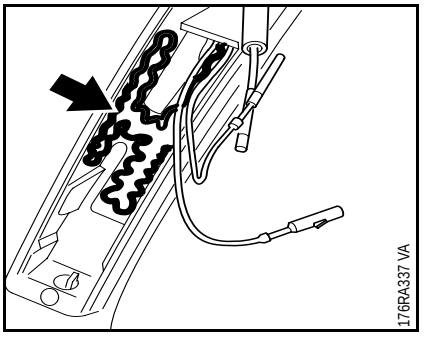
Reassemble in the reverse sequence.



● Push the wires (1) onto the connector tags.

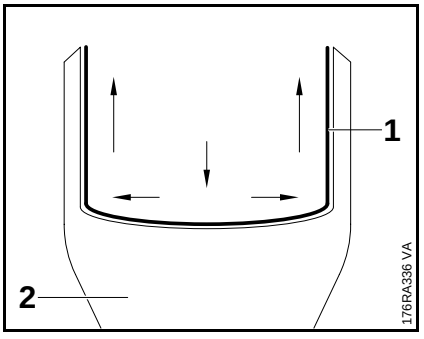
– Position the wires under the impulse hose (2).

– Install the carburetor – 🕮 12.2.1



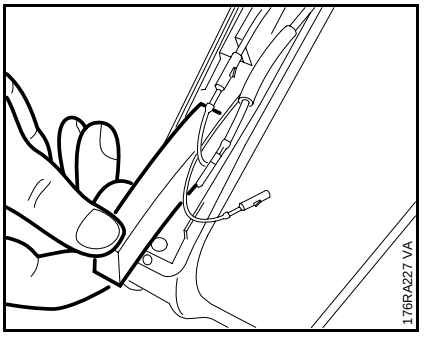
● Take pressure pad and heating element out of the handle recess.

Before fitting the new heating element, clean the surface inside the handle so that it is free from grease, dirt and moisture.



– Removing the backing from the new heating element.

● Place heating element (1) in handle housing (2) and press firmly and uniformly into position, from the center outwards.



● Fit a new expanded rubber pressure pad on top of the heating element. The heating element must be completely covered.

Reassemble all other parts in the reverse sequence.

Check operation of heating element

Run the saw at maximum revs for no more than 30 seconds with the heating switched on.

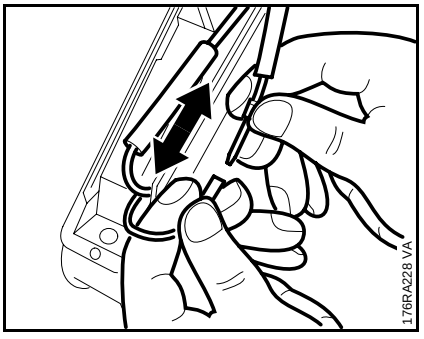
14.4 Heating Element in Front Handle

The heating element in the front handle (handlebar) is not replaceable. A new handle must be fitted if the heating element is faulty.

– Remove the carburetor – 🕮 12.2.1

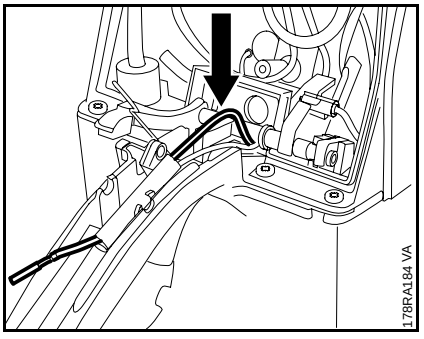
– Remove the interlock lever – 🕮 10.2

– Slide the insulating tube off the pin and socket connector of the wire between the front handle heating element and the rear handle heating element.



● Separate the pin and socket connector.

– Take the wire out of its guide.



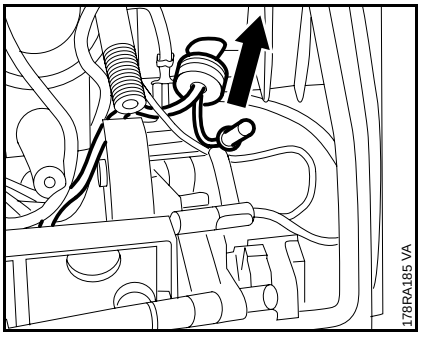
● Pull the wire (arrow) out of the insulating tube.

– Pull the wire into the carburetor housing.

– Pull the connector sleeve out of the heater switch – 🕮 14.2

– Take grommet off the contact sleeve.

– Remove the front handle – 🕮 10.3



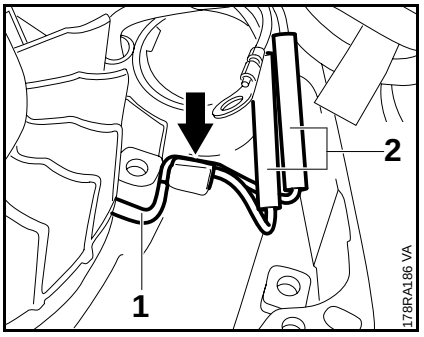
● Take the connecting wires out through the grommet.

Reassemble in the reverse sequence.

– When installing, position the connecting wire in the handle molding under the contact spring and the switch shaft,

– Positioning the wiring – 🕮 15.2

14.5 Generator

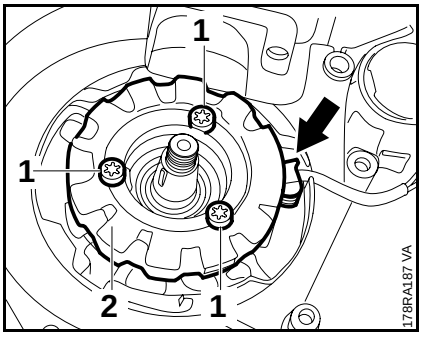


– Remove the ignition module – 🕮 7.2.1

– Remove the flywheel – 🕮 7.3.1

● Pull the wires (1) out of the guide (arrow).

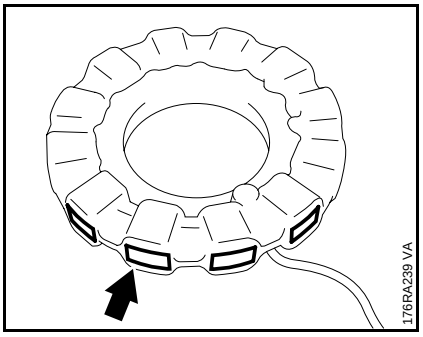
● Push back the insulating tubes (2) and separate the pin and socket connectors.



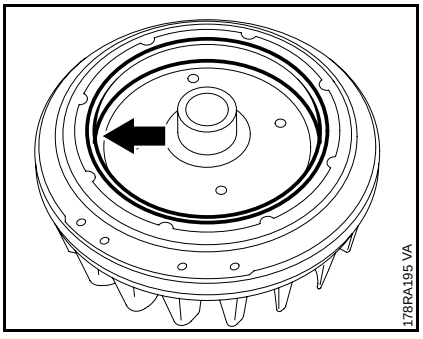
● Take the wire out of the guide (arrow).

● Take out the screws (1).

● Remove the generator (2).

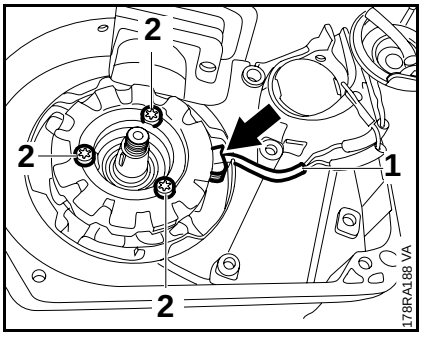


- Inspect the generator and poles (arrow) for cracks or other damage. If damage is found, replace the generator.



- Inspect the magnet ring (arrow) in the flywheel for cracks or other damage. If damage is found, replace the flywheel.

Reassemble in the reverse sequence.



- Place the generator in position with the connecting wires (1) facing the crankcase.
- Position the generator wire in the crankcase recess (arrow).
- Push the guide into the crankcase bore.

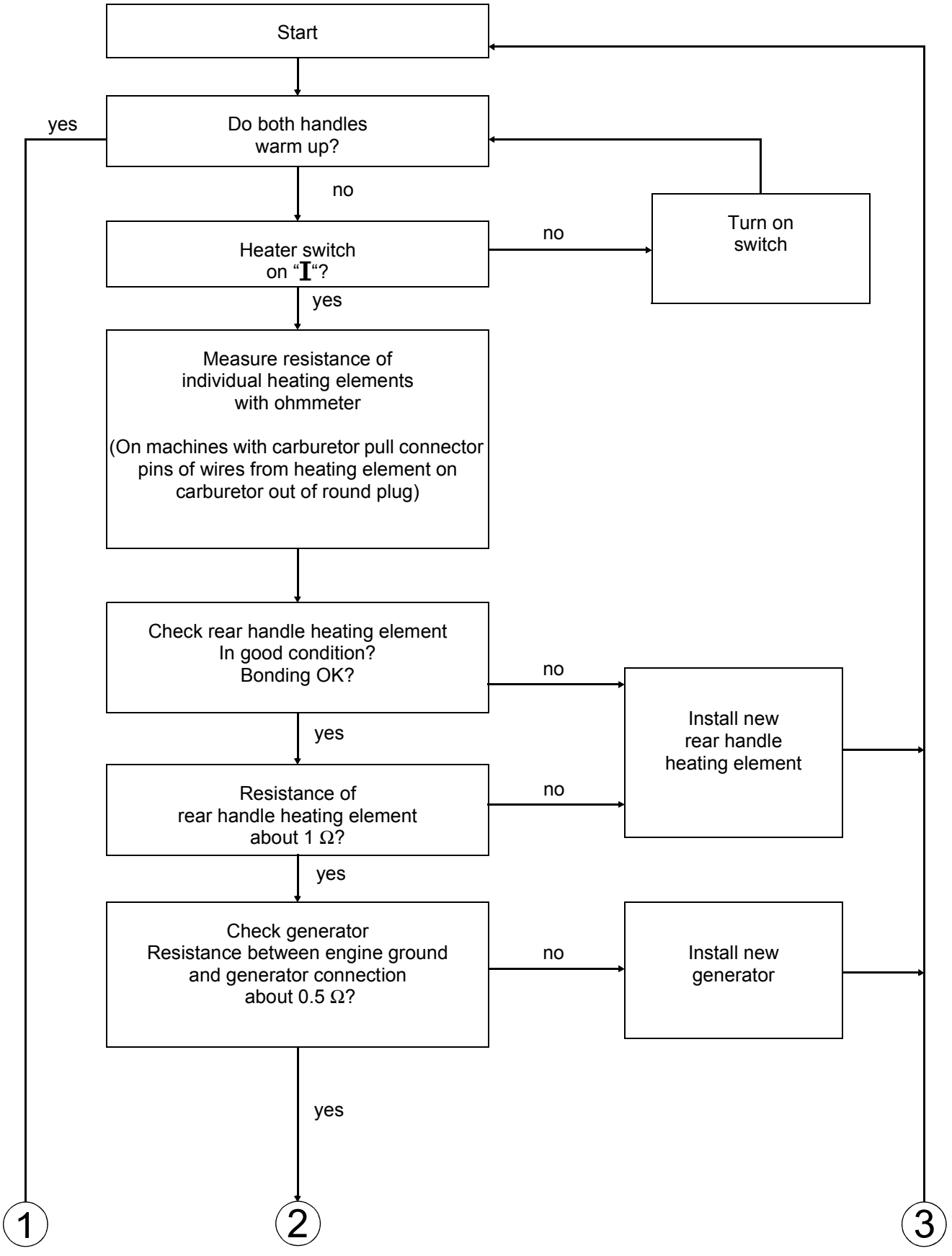
– Install screws (2) with Loctite 242 – 🕮 17

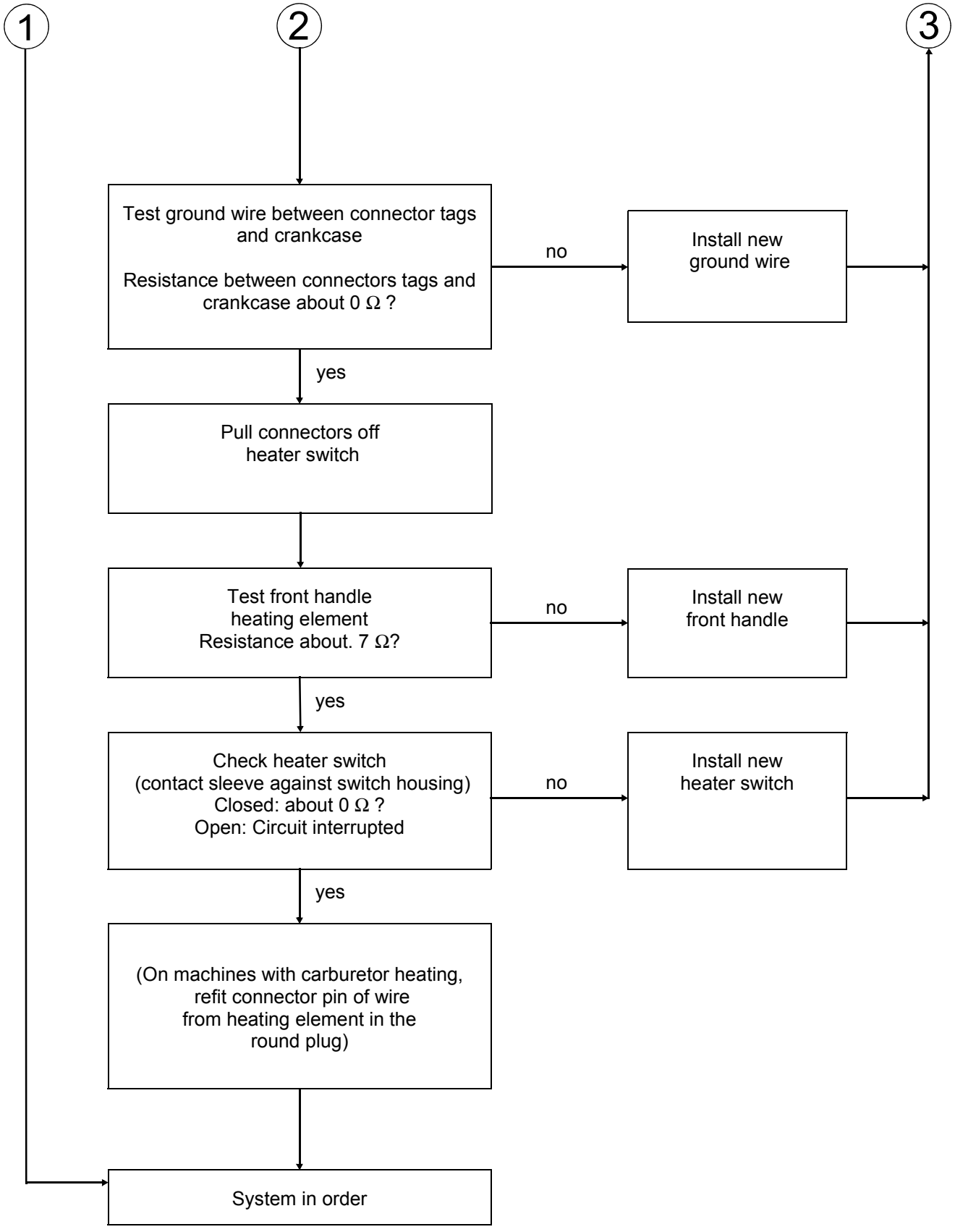
- Tighten down the screws firmly – 🕮 3.5

Reassemble all other parts in the reverse sequence.

– Positioning the wiring – 🕮 15.2

14.5.1 Troubleshooting Chart




1
2
3
Test ground wire between connector tags and crankcase
Resistance between connectors tags and crankcase about 0 Ω ?
no
Install new ground wire
yes
Pull connectors off heater switch
Test front handle heating element Resistance about. 7 Ω?
no
Install new front handle
yes
Check heater switch (contact sleeve against switch housing) Closed: about 0 Ω ? Open: Circuit interrupted
no
Install new heater switch
yes
(On machines with carburetor heating, refit connector pin of wire from heating element in the round plug)
System in order

14.5.2 Test Connections and Test Values

– The pin and socket connections of the wires in the rear handle must be disconnected to test the individual components separately.

Component	Ohmmeter connection (use either test lead)		Resistance Ω		If faulty	
	Lead 1	Lead 2	Spec.	Actual	Cause	Remedy
Switch	Switch terminal [1)]	Switch housing	< 0.5	-	Switch faulty	Replace switch
Connector tags	Connector tags	Ground	0	> 1.0	Poor ground connection	Replace ground wire
Heating element in rear handle	Connector on wire from rear handle heating element	Connector on wire from rear handle heating element	1.0	0.8...1.2	Heating element OK	
				-	Break in wire, heating element damaged	Install new heating element or repair insulation
				0	Short circuit – damaged insulation	
Heating element in front handle	Connector on wire from front handle heating element	Ground	7.0	6.0...8.0	Heating element OK	
				-	Break in wire, heating element damaged	Install new front handle
				0	Short circuit – damaged insulation	Repair insulation
Generator	Connector on red wire	Ground	0.5	0.3...1.0	Generator OK	

[1)] Pull out wire for this purpose

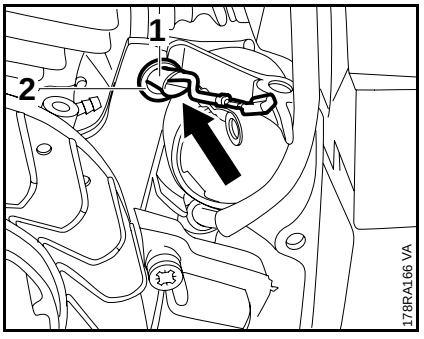
Component	Ohmmeter connection (use either test lead)		Resistance Ω		If faulty	
	Lead 1	Lead 2	Spec.	Actual	Cause	Remedy
Generator	Connector on yellow wire	Ground	0.5	0.3...1.0	Generator OK	
				-	Break in wire, generator damaged	Install new generator
				0	Short circuit – damaged insulation	Repair insulation
Generator	Connector on yellow wire	Connector on red wire	1.0	0.8...1.8	Generator OK	
				-	Break in wire, generator damaged	Install new generator
				0	Short circuit – damaged insulation	Install new generator

– Remove the fan housing with rewind starter – 🕮 8.2

– Remove the shroud – 🕮 6.2

– Pull off the spark plug boot.

– Remove short circuit wire and ground wire – 🕮 7.2.1



● Push the wire (1) out of the grommet (2).

● Pry out the grommet.

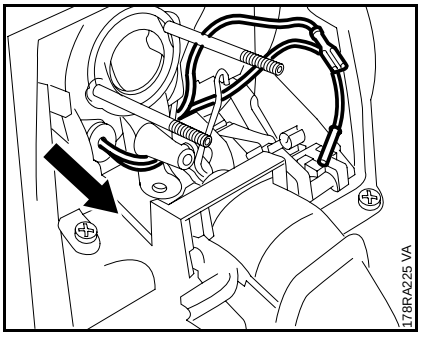
– Inspect grommet for damage.

– Remove the air filter and filter base – 🕮 12.1

– Ease the connector sleeve off the switch shaft – 🕮 10.1

– Remove the carburetor – 🕮 12.2.1

– Remove connector from contact spring – 🕮 7.4

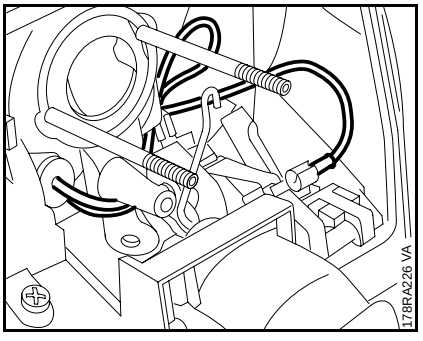


● Pull the wiring harness out of the grommet.

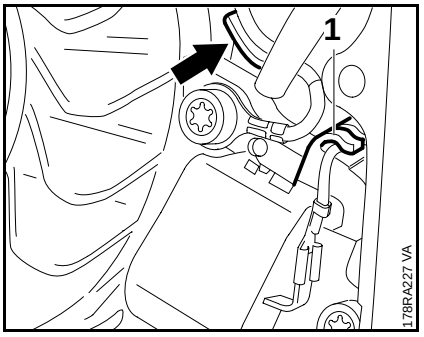
– Inspect grommet for damage.

Reassemble in the reverse sequence.

Positioning the wiring



● Position the short circuit wire and ground wire under the impulse hose.



● Push the wiring harness into the guide (arrow).

● Fit short circuit wire in retainer (1) on ignition module.

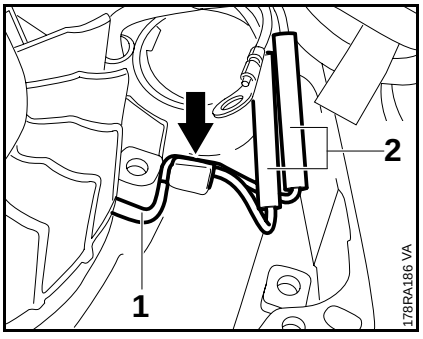
15.2 Wiring Harness with Handle and Carburetor Heating

– Remove the fan housing with rewind starter – 🕮 8.2

– Remove the shroud – 🕮 6.2

– Pull off the spark plug boot.

– Remove short circuit wire and ground wire – 🕮 7.2.1



● Pull wire (1) out of guide (arrow).

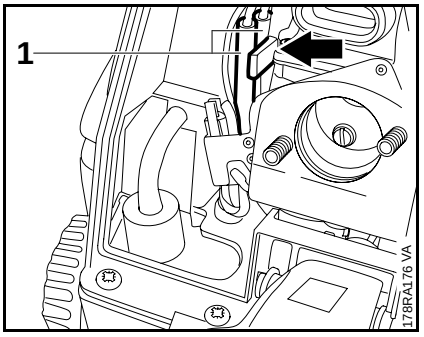
● Separate the connectors (2) (single or double core).

– Push the wire out of the grommet – 🕮 15.1

– Pry out the grommet – 🕮 15.1

– Inspect grommet for damage.

– Remove the air filter and filter base – 🕮 12.1



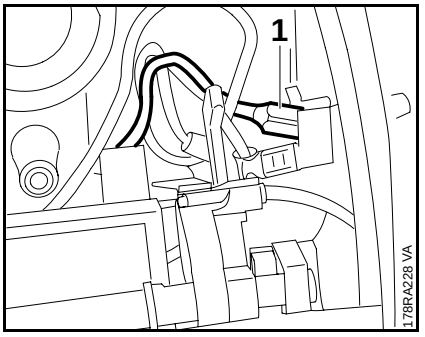
On machines with carburetor heating

● Pull the wires out of the guide (arrow).

● Pull back the insulating tubes (1) and separate the connectors.

– Remove the carburetor – 🕮 12.2.1

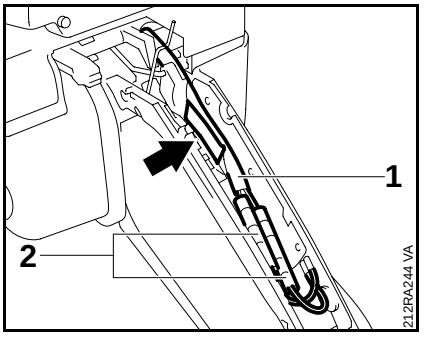
– Ease the connector sleeve off the switch shaft – 🕮 10.1



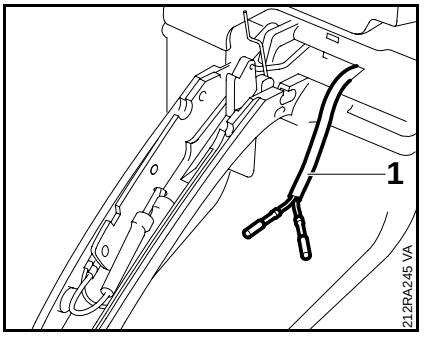
● Pull the connector (1) off the heater switch.

– Remove the upper handle molding – 🕮 10.1

– Remove the interlock lever – 🕮 10.2

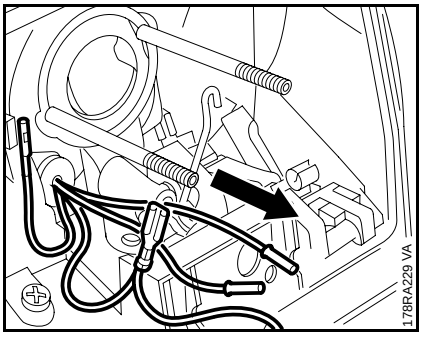


● Push back the insulating hose (1) and separate the connectors (2).



- Pull the wires out of the insulating tube (1).

– Pull the wire into the carburetor housing.

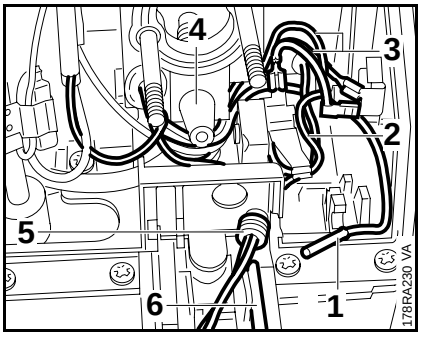


- Pull the wiring harness out of the grommet.

– Inspect grommet for damage.

– Remove wires of front handle heating system – 🕮 14.4

Reassemble in the reverse sequence.



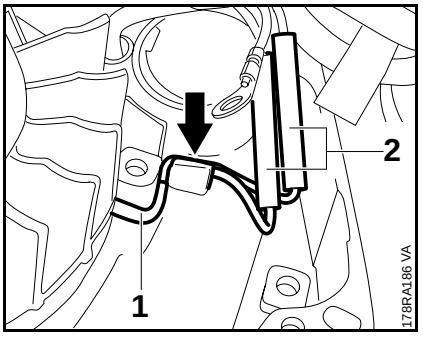
Positioning the wiring

- Position the short circuit wire (1) and ground wires (3) under the impulse hose (4).

– Check freedom of movement of contact spring (not restricted by wires on heater switch).

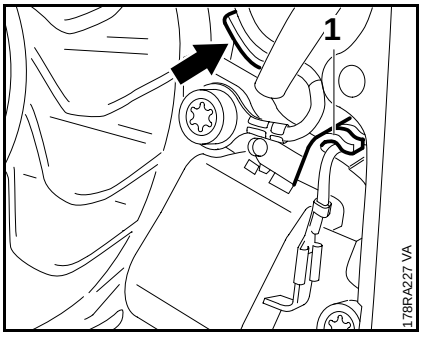
- Position wire (2) to front handle under the contact spring.

- Route wires to rear handle through the grommet (5) and insulating hose (6).



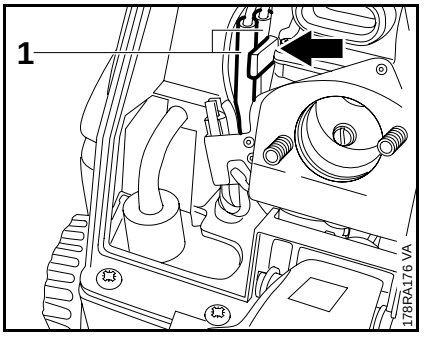
- Position generator wire (1) in the guide (arrow).

- Pull insulating tubes (2) over the wires.



- Push wiring harness into guide (arrow).

- Fit short circuit wire in retainer (1) on ignition module.



- Pull insulating tubes (1) over the wires.

- Fit the wires of the carburetor heating system in the guide (arrow).

No.	Part Name	Part No.	Application	Rem.
1	Locking strip	0000 893 5903	Blocking the crankshaft	
2	Hook	5910 890 2800	Detaching springs from clutch shoes	
3	Assembly tube	117 890 0900	Attaching springs	
4	Stud puller M8	5910 893 0501	Removing bar mounting studs	
5	Carburetor and crankcase tester	1106 850 2905	Testing crankcase and carburetor for leaks	
6	- Plug	4221 025 2200	Testing crankcase for leaks	
7	- Sealing plate	0000 855 8106	Sealing exhaust port	
8	- Flange	1128 850 4200	Leakage test	
9	Vacuum pump	0000 850 3501	Testing crankcase for leaks, testing tank vent	
10	Puller	5910 890 4400	Removing oil seals	
11	- Jaws (No. 6)	0000 893 3711	Removing oil seal(s)	
12	- Jaws (No. 3.1 + 4)	0000 893 3706	Removing oil seal(s)	
13	Press sleeve	1108 893 2405	Installing oil seal	
14	Installing sleeve	1118 893 4600	Installing oil seal	
15	Assembly drift	0000 893 4700	Removing and installing the piston pin	
16	Installing tool	5910 890 2212	Fitting hookless snap rings in piston	
17	Wooden assembly block	1108 893 4800	Fitting piston	
18	Clamping strap	0000 893 2600	Compressing piston rings	
19	Service tool AS	5910 007 2205	Removing crankshaft (clutch side)	
20	Screw sleeve	5910 893 2409	Installing crankshaft	
21	Service tool ZS (set)	5910 007 2200	Removing crankshaft (flywheel side)	
22	- Washer	5910 893 2101	Removing crankshaft	
23	Assembly drift	1122 893 7200	Removing ball bearings	
24	Press arbor	1124 893 7200	Installing ball bearings	
25	Screw sleeve	5910 893 2421	Installing crankshaft	
26	Setting gauge	1111 890 6400	Setting air gap between ignition module and flywheel	
27	Ignition system tester ZAT 4	5910 850 4503	Testing ignition system	
28	Ignition system tester ZAT 3	5910 850 4520	Testing ignition system	
29	Socket for torque wrench 17 mm	5910 893 5610	Releasing flywheel	
30	Puller	1106 890 4501	Removing flywheel	
31	Installing tool	0000 890 2201	Flaring rope guide bushing	
32	Installing tool	1116 893 4800	Installing rewind spring	
33	Hook	5910 893 8800	Removing pickup body	

No.	Part Name	Part No.	Application	Rem.
34	Fuel hose	1110 141 8600	Testing carburetor for leaks	
35	- Nipple	0000 855 9200	Testing carburetor for leaks	
36	Puller	5910 890 4500	Removing limiter cap	
37	- Setting disk	5910 893 6600	Installing limiter cap	
38	Drift	1114 893 4700	Installing sleeve	
39	Assembly stand	5910 890 3100	Holding saw for servicing/repairs	
40	Torque wrench	5910 890 0301	0.5 to 18 Nm Alternative: Torque wrench 5910 890 0302 with optical/acoustic signal	
41	Torque wrench	5910 890 0311	6 to 80 Nm Alternative: Torque wrench 5910 890 0312 with optical/acoustic signal	
42	Crimping tool	5910 890 8210	Attaching connectors to electrical wires	
43	Screwdriver bit T 27 x 125	0812 542 2104	Removing and installing spline socket head screws with electric or pneumatic screwdrivers; tighten down screws with torque wrench	
44	T-handle screwdriver T 27 x 150	5910 890 2400	IS-P screws (4 mm)	1)
45	Pliers, DIN 5254-A 19	0811 611 8380	Removing and installing external circlips	

Remarks:

1) Use only for releasing P screws.

No.	Part Name	Part No.	Application
1	Lubricating grease (225g tube)	0781 120 1111	Oil seals, oil pump drive, chain sprocket bearing, sliding and bearing points of brake band, pawl pegs
2	Ignition lead HTR (10 m)	0000 930 2251	
3	STIHL special lubricant	0781 417 1315	Bearing bore in rope rotor, rewind spring in fan housing
4	Press Fluid OH 723	0781 957 9000	
5	STIHL multipurpose grease	0781 120 1109	High voltage output on ignition module
6	Medium-strength threadlocking adhesive (Loctite 243) (250 ml bottle)	0786 110 0101	
7	Hylomar sealant	0783 810 1101	Oil pump
8	Standard commercial solvent-based degreasant containing no chlorinated or halogenated hydrocarbons		Cleaning sealing faces

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