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STIHL[®]

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This service manual contains detailed descriptions of all the repair and servicing procedures specific to this power tool series.

As the design concept of model MS 210, 230 and 250 chainsaws is almost identical, the descriptions and servicing procedures in this manual generally apply to all three models. Differences are described in detail.

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

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

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

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 a revised 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. The manual lists all special servicing tools currently available from STIHL.

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

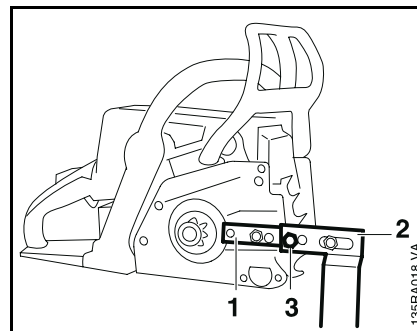
In the descriptions:

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

In the illustrations:

- Pointer (short arrow)
- ➡ Direction of movement (long arrow)

Service manuals and all technical Information bulletins are intended exclusively for the use of STIHL servicing dealers. 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 bore (3) in the assembly stand.

To service the underside of the machine (e.g. remove the oil pump), turn the machine through 180 degrees and mount it so that one clamp screw engages the inner 10 mm bore (1) in the assembly stand.

Note:

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.

2 Safety Precautions

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

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

Improper handling may result in burns or other serious injuries.

Warning!

Do not smoke or bring any fire, flame 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 210	MS 230	MS 250
Displacement:	35.2 cm ³	40.2 cm ³	45.4 cm ³
Bore:	40 mm	40 mm	42.5 mm
Stroke:	28 mm	32 mm	32 mm
Engine power to ISO 7293:	1.6 kW (2.2 HP) at 9,000 rpm	2.0 kW (2.7 HP) at 10,000 rpm	2.3 kW (3.1 HP) at 10,000 rpm
Max. permissible engine speed (with bar and chain):	12,500 rpm	14,000 rpm	14,000 rpm
Idle speed:	2,800 rpm		
Clutch:	Centrifugal clutch without linings		
Clutch engages at:	4,100 rpm		
Crankcase leakage test at gauge pressure:	0.5 bar		
under vacuum:	0.5 bar		

3.1.1 Engine (USA only)

	MS 210	MS 230	MS 250
Displacement:	2.15 cu. in	2.45 cu. in	2.77 cu. in
Bore:	1.57 in	1.57 in	1.67 in
Stroke:	1.10 in	1.26 in	1.26 in
Engine power to ISO 7293:	1.5 kW (2.01 HP)	1.9 kW (2.55 HP)	2.2 kW (2.95 HP)
Max. permissible engine speed (with bar and chain):	12,500 rpm	14,000 rpm	14,000 rpm
Idle speed:	2,800 rpm		
Clutch:	Centrifugal clutch without linings		
Clutch engages at:	4,100 rpm		
Crankcase leakage test at gauge pressure:	7.25 psi		
under vacuum:	7.25 psi		

3.2 Fuel System

Carburetor leakage test at gauge pressure:	0.8 bar (11.6 psi)
Function of tank vent at gauge pressure:	0.3 bar (4.35 psi)
	0.05 bar (0.72 psi)
Fuel:	see owner's manual

3.3 Ignition System

Air gap between ignition module and fanwheel:	0.2 – 0.4 mm (0.008 – 0.015 in)
Spark plug (resistor type):	Bosch WSR 6F NGK BPMR 7A
Electrode gap:	0.5 mm (0.02 in)

3.4 Chain Lubrication

Fully automatic speed-controlled oil pump with rotary piston

Oil delivery rate:	approx. 7.5 cc/min (0.46 cu in/min) at 10,000 rpm
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3.5 Tightening Torques

DG screws are used in the polymer and light-alloy 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 detrimentally affecting the strength of the screwed assembly, providing the specified tightening torque is observed. For this reason **always use a torque wrench**.

Fastener	Thread size	For component	Torque		Remarks
			kpm	Nm	
Spline screw	IS-M4x15	Cain brake cover	0.2	2.0	
Spline screw	IS-D4x15	Handle molding	0.16	1.6	
Spline screw	IS-P5x16	Connector (engine housing/oil pump)	0.4	4.0	
Spline screw	IS-M4x15	Ground wire (to cylinder)	0.35	3.5	
Spline screw	IS-DG5x24	Handle housing/front handle	0.35	3.5	
Spline screw	IS-DG5x24	Hand guard	0.35	3.5	
Spline screw	IS-DG5x24	Fan housing	0.35	3.5	
Spline screw	IS-DG5x24	Buffer (to front handle)	0.35	3.5	
Spline screw	IS-DG5x24	Buffer (to engine housing)	0.35	3.5	
Spline screw	IS-DG5x24	Ignition module (to engine housing)	0.4	4	
Spline screw	IS-DG5x24	Cylinder (to engine housing)	0.95	9.5	
Collar screw	DG 8x18	Guide bar mounting	1.6	16	
Collar screw (rear)	DG8x18	Guide bar mounting	0.8	8	
	M12x1	Carrier (clutch)	5.0	50	
	M14x1.25	Spark plug	2.5	25	
Collar locknut	M5	Muffler	0.8	8	
Collar locknut	M5	Filter housing/carburetor	0.27	2.7	
Collar nut	M8x1	Flywheel to crankshaft	2.8	28	
	M12x1.5	Decompression valve	1.4	14	
Spline screw	IS-DG5x16	Spiked bumper	0.37	3.7	

Use the following procedure to fit a DG screw in an existing thread:

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

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

Note:

Power screwdriver speed setting for polymer:

- DG screws max. 500 rpm

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 (counterclockwise)
	Clutch springs stretched or fatigued	Replace the clutch springs
	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
Saw chain does not stop immediately when brake is activated	Brake spring stretched or broken	Fit new brake spring
	Brake band stretched / worn / broken	Fit new brake band

4.2 Rewind Starter

Condition	Cause	Remedy
Starter rope broken	Rope pulled out too vigorously as far as stop or over edge, i.e. not vertically	Fit new starter rope
	Normal wear	Fit new starter rope
Rewind spring broken (rope does not rewind)	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 pawl or pawl itself is worn	Fit new pawl
	Spring clip fatigued	Fit new spring clip
Starter rope is difficult to pull and rewinds very slowly	Starter mechanism is very dirty (dusty conditions)	Thoroughly clean complete starter mechanism
	Lubricating oil on rewind spring becomes viscous at very low outside temperatures (spring windings stick together)	Apply a few drops of kerosine (paraffin) to spring, then pull rope carefully several times until normal action is restored

4.3 Chain Lubrication

Important!

In the event of trouble with the chain lubrication system, always investigate the other possible 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 (strainer) clogged or intake hose ruptured	Wash intake hose and pickup body (strainer) in fresh STIHL cleaner or replace if necessary
	Valve in oil tank blocked	Clean or replace valve
	Teeth on pump piston and/or worm worn	Install new oil pump and/or new worm
Machine losing chain oil	Oil seal leaking	Replace oil seal
	Bore in pump housing worn	Fit new pump housing / oil pump
Oil pump delivers too little oil	Control screw and/or control edge on pump piston worn	Fit new control screw and/or new pump piston
	Bore in pump housing worn	Fit new pump housing / 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
	Spark plug sooted, smeared with oil	Clean the spark plug or replace if necessary
	Weak spark or no spark	Faulty insulation on 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
	Incorrect air gap between ignition coil and flywheel	Set air gap correctly
	Flywheel cracked or has other damage	Install new flywheel
	Crankcase damaged (cracks)	Install new crankcase
	No ignition spark	Check operation of Master Control lever, ignition module and ignition lead

4.5 Carburetor

Condition	Cause	Remedy
Carburetor floods; engine stalls	Inlet needle not sealing. Foreign matter in valve seat or cone damaged	Remove and clean or replace the inlet needle, clean the fuel tank, pickup body and fuel line if necessary
	Inlet control lever sticking on spindle	Free off inlet control lever
	Helical spring not located on nipple of inlet control lever	Remove the inlet control lever and refit 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 design position)	Set inlet control lever flush with top edge of housing or metering chamber face
Poor acceleration	Idle jet too lean	Back off low speed screw (L) slightly
	Main jet too lean	Back off high speed screw (H) slightly
	Inlet control lever too low (relative to design position)	Set inlet control lever flush with top edge of housing or metering chamber face
	Inlet needle sticking to valve seat	Remove inlet needle, clean and refit
	Connecting bore to atmosphere blocked	Clean bore
	Diaphragm gasket leaking	Fit a new diaphragm gasket
	Metering diaphragm damaged or shrunk	Fit a new metering diaphragm

Condition	Cause	Remedy
Engine will not idle, idle speed too high	Throttle shutter opened too wide by idle speed screw (LA)	Reset idle speed screw (LA) correctly
	Engine leaking	Seal the engine
Engine stalls at idle speed	Idle jet bores or ports blocked	Clean jet bores and ports with compressed air
	Idle jet too rich	Screw down low speed screw (L) slightly
	Setting of idle speed (LA) 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
Engine speed drops quickly under load – low power	Air filter plugged	Clean or renew the air filter
	Tank vent faulty	Clean tank vent or replace if necessary
	Leak in fuel line between tank and fuel pump	Seal connections or install new fuel line
	Pump diaphragm damaged or fatigued	Fit a new pump diaphragm
	Main jet bores or ports blocked	Clean the bores and ports
	Fuel pickup body dirty	Clean the pickup body, fit a new filter
	Fuel strainers dirty	Clean the fuel strainers

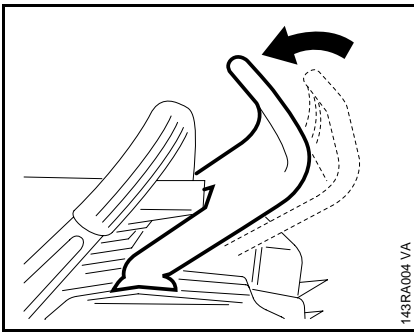
4.6 Engine

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

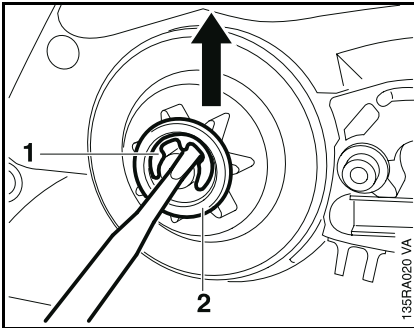
- Air filter
- Fuel system
- Carburetor
- Ignition system

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
	Gasket on carburetor spacer flange leaking	Fit a new gasket
	Engine pan leaking	Seal the engine pan
	Crankcase damaged (cracks)	Replace the crankcase
	Muffler leaking	Seal or replace the muffler
Engine does not deliver full power or runs erratically	Secondary air seepage through leaking gaskets on carburetor spacer flange	Fit new gaskets
	Piston rings worn or broken	Fit new piston rings
	Muffler / spark arresting screen carbonized	Clean the muffler (inlet and exhaust), replace spark arresting screen
	Air filter element dirty	Replace air filter element
	Fuel / impulse line severely kinked or damaged	Replace lines 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

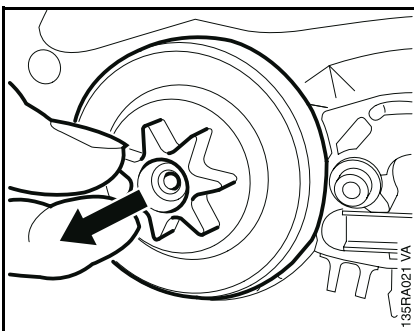
5 Clutch, Chain Drive, Chain Brake and Chain Tensioner
5.1 Clutch Drum / Chain Sprocket



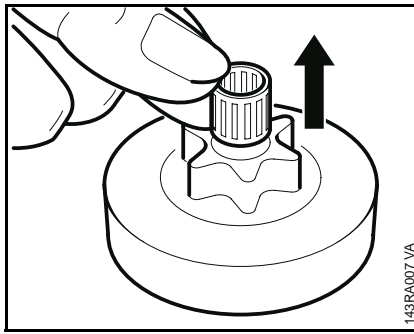
- Remove the chain sprocket cover.
- Disengage the chain brake by pulling the hand guard toward the front handle.



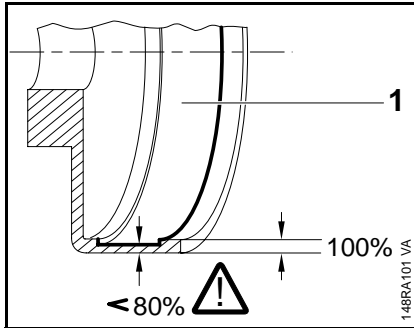
- Remove the E-clip (1).
- Remove the washer (2).



- Remove the rim sprocket, if fitted.
- Pull off the clutch drum / chain sprocket.

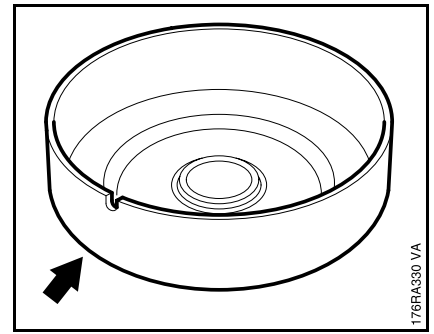


- Take the needle cage out of the sprocket.
- Clean and inspect the clutch drum / chain sprocket.



- Inspect the clutch drum (1) for signs of wear.
- If there are noticeable wear marks on the inside diameter of the clutch drum, check its wall thickness. If it is less than 80% of the original wall thickness, fit a new clutch drum.

If the clutch drum has to be replaced, also check the brake band – see 5.4.

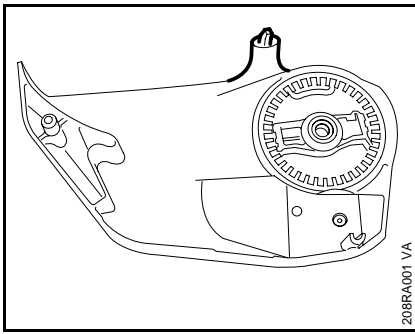


- If the clutch drum/chain sprocket is still serviceable, use No. 120 emery paper or emery cloth (grain size approx. 120 µm) to clean and roughen its friction surface.

Reassemble in the reverse sequence.

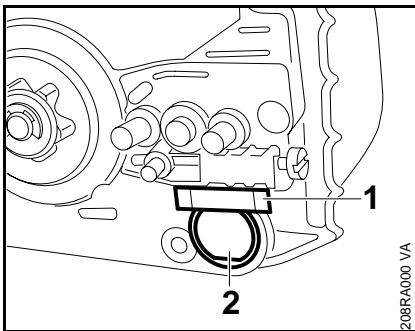
- Clean stub of crankshaft. Wash needle cage in clean white spirit and lubricate with grease – see 13.
- Replace damaged needle cage.
- Rotate clutch drum/chain sprocket and apply slight pressure at the same time until oil pump drive spring engages properly.
- If rim sprocket was fitted, re-install it with the cavities facing outward.

5.2 Chain Catcher

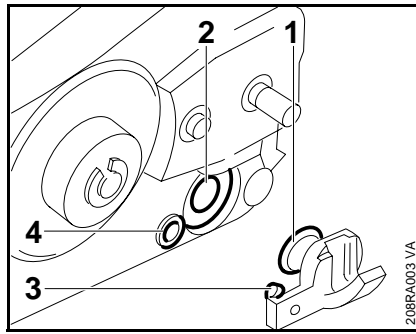


- Sprocket cover with integrally molded chain catcher.

If the chain catcher has broken off, repair as follows:



- Remove the chain bumper strip (1).
- Pry the plug (2) out of the front right-hand AV element.



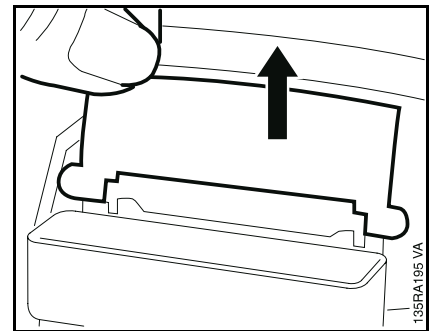
- Oil the cylindrical part (1) of the replacement chain catcher.
 - Push the chain catcher into the AV element (2) and engage the peg (3) in the housing bore (4) at the same time.
- Fit the chain bumper strip.

Assemble all other parts in the reverse sequence.

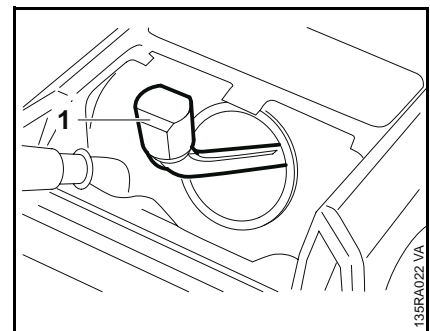
5.3 Clutch

Troubleshooting chart – see 4.1.

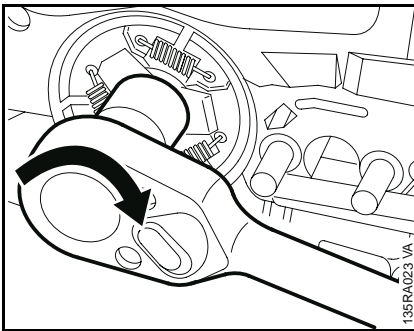
- Remove the clutch drum/chain sprocket – see 5.1.
- Remove the air filter – see 11.1.



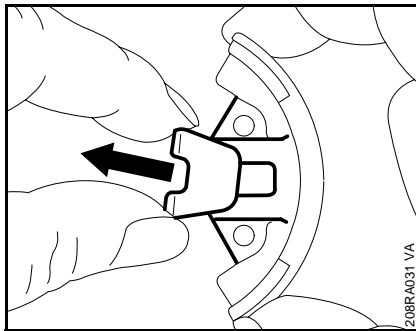
- Take out the shutter.
- Pull boot off the spark plug.
- Unscrew the spark plug.



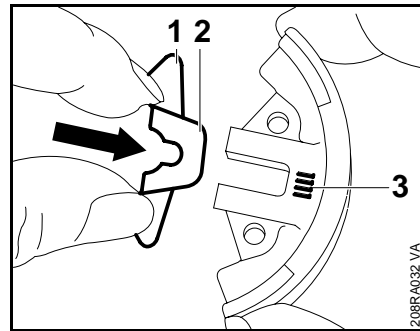
- Close the decompression valve, if fitted.
- Push the locking strip (1) 0000 893 5903 into the cylinder.



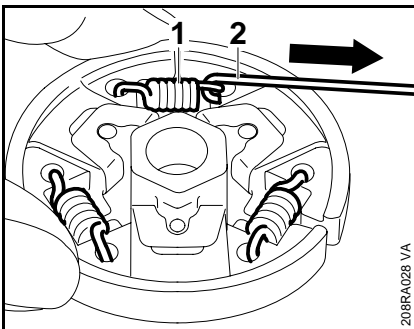
- Unscrew the clutch from the crankshaft clockwise (left-hand thread).



- Pull the retainers, if fitted, off the clutch shoes.

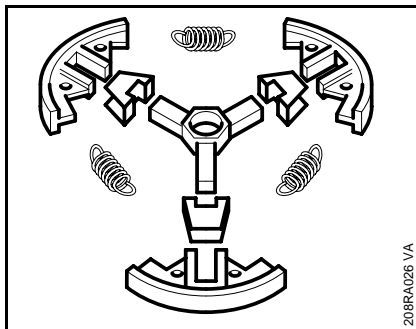


- On retainers with tabs (1), the narrow side (2) must be next to the series number (3).

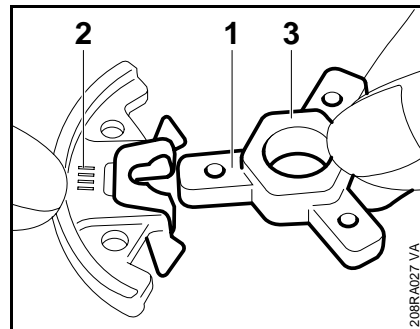


Disassembling the clutch:

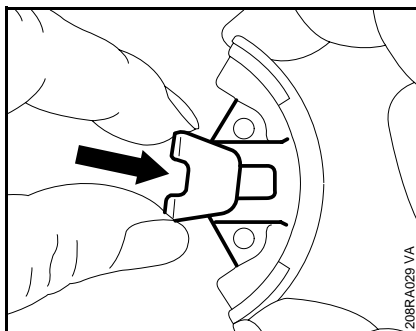
- Use hook (2) 5910 890 2800 to remove the clutch springs (1).
- Pull the clutch shoes off the carrier.



- Clean all parts with STIHL cleaner.
- Replace any damaged parts.

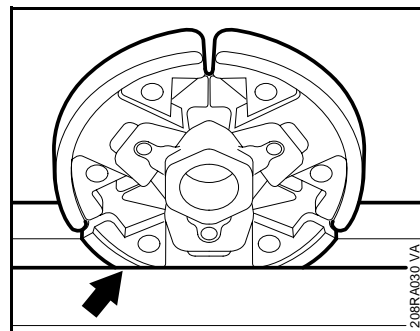


- Fit the clutch shoes over the arms (1) of the clutch carrier so that the series number (2) is on the same side as the larger hexagon (3).



Assembling the clutch:

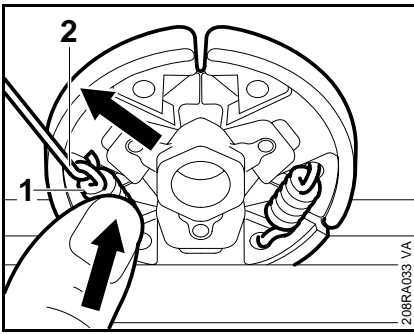
- Slip the retainers onto the clutch shoes.



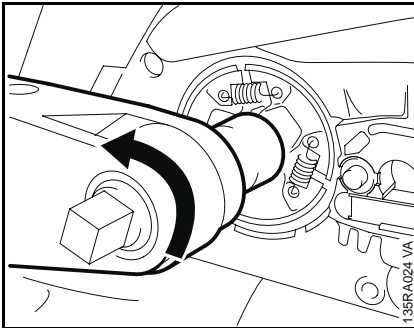
- Clamp the clutch in a vise.

5.4 Chain Brake

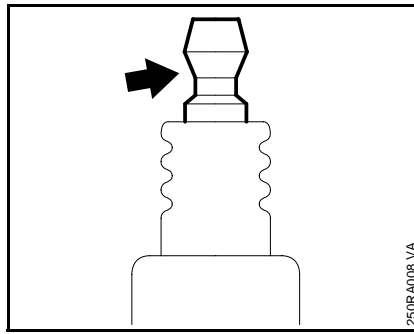
5.4.1 Checking Operation



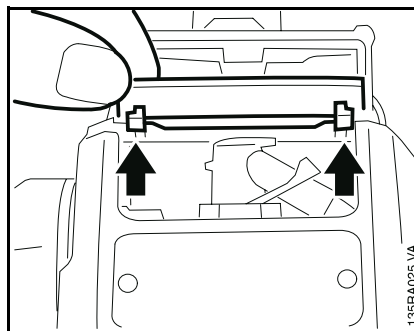
- Attach one end of each spring (1) to the clutch shoes.
- Use the hook (2) 5910 890 2800 to attach other ends of springs and press them firmly into the clutch shoes.



- Screw on the clutch and tighten down to 50 Nm (37 lbf.ft).
- Install the clutch drum / chain sprocket – [see 5.1](#).



- Remove locking strip from the cylinder.
- Insert spark plug and tighten down to 25 Nm (18.5 lb.ft).
- If spark plug has a separate terminal nut, make sure it is properly tightened down.
- Fit boot on the spark plug.



- Fit the shutter so that its lugs engage the recesses in the handle housing.
- Install the air filter – [see 11.1](#).

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.

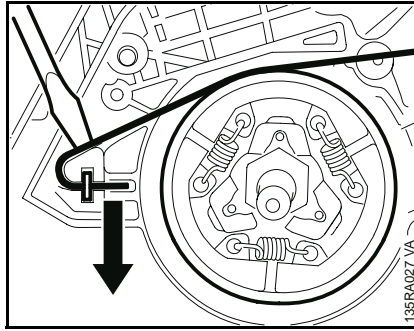
Contamination (with chain oil, chips, fine particles of abrasion, etc.) and smoothing of the friction surfaces of the brake band and clutch drum impair the coefficient of friction. This, in turn, reduces the frictional forces and thus prolongs the braking time. A fatigued or stretched brake spring has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

- Start the engine.
- With the chain brake activated (locked), open throttle wide for a brief period (max. 3 seconds) – the chain must not rotate.
- With the chain brake released, open throttle wide and activate the brake manually – the chain must come to an abrupt stop.

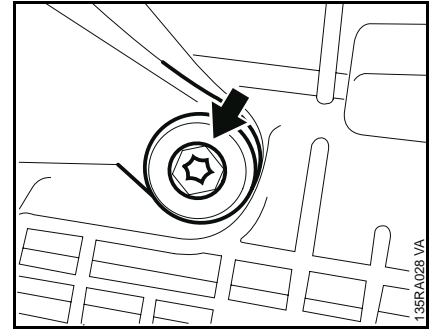
The braking time is in order if deceleration of the saw chain is imperceptible to the eye.

5.4.2 Removing

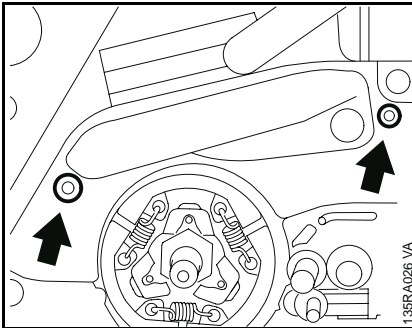
- Remove the clutch drum / chain sprocket – see 5.1.
- Release brake spring tension by pushing hand guard forward.
- Remove upper bumper strip from the tensioner.



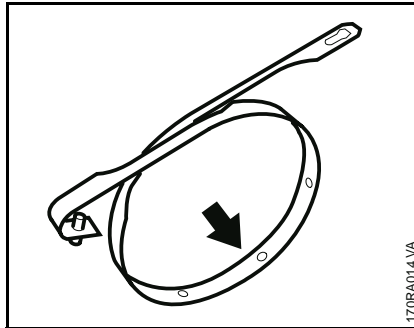
- Pry the brake band out of the engine housing.
- Disconnect the brake band from the bell crank.



- Remove the screw (arrow) from the hand guard.

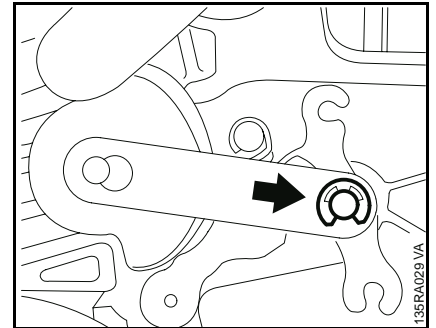


- Take out the screws.
- Remove the cover.

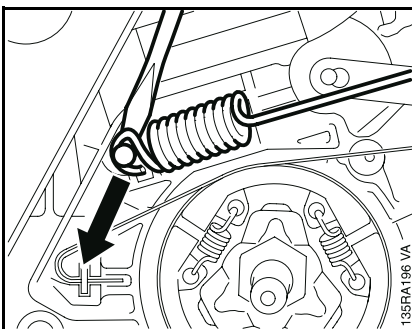


Install a new brake band if:

- 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 (0.024").



- Remove the E-clip.

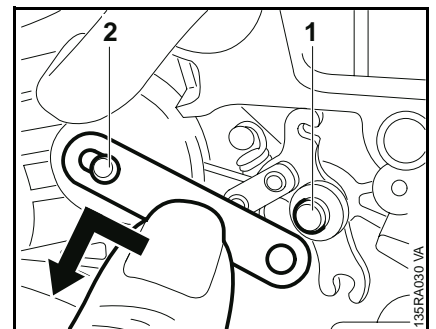


- Carefully ease the brake spring off the anchor pin and take it off the bell crank.

Important!

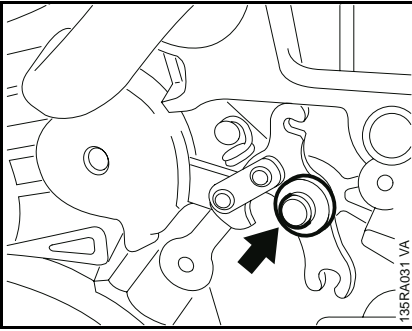
Thickness of brake band must not be less at any point.

- 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 entire friction surface (inside diameter).

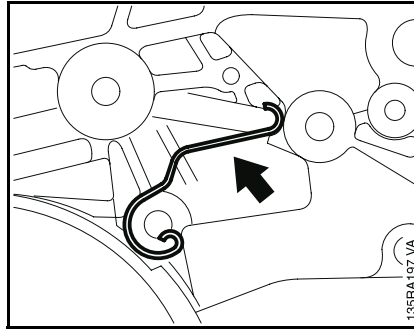


- Remove strap from bell crank pivot pin (1).
- Push the strap sideways and lift it off the hand guard pivot pin (2).

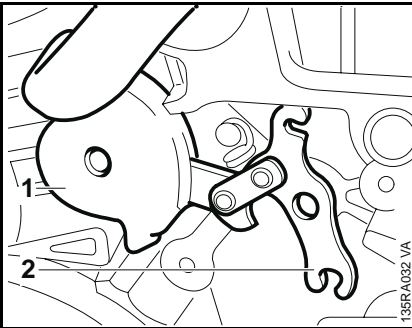
5.4.3 Installing



- Remove the washer.

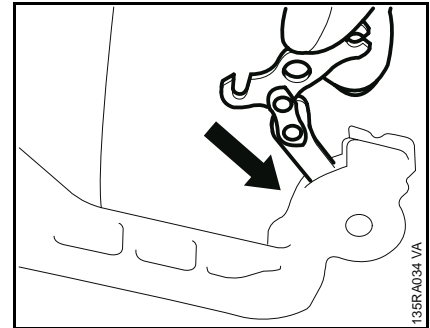


- Remove the flat spring.
- Inspect parts and replace if damaged.
- Clean the entire housing recess for the chain brake.
- If the groove of the brake spring anchor pin is worn, replace the housing.

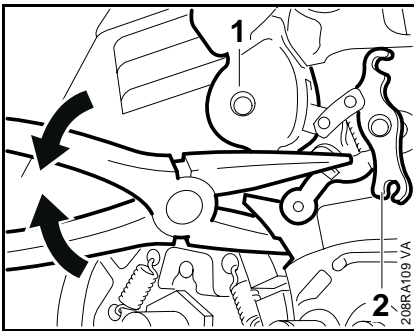


- Carefully pry the hand guard (1) and bell crank (2) off their pivot pins and lift away together.
- Pull the bell crank out of the hand guard.

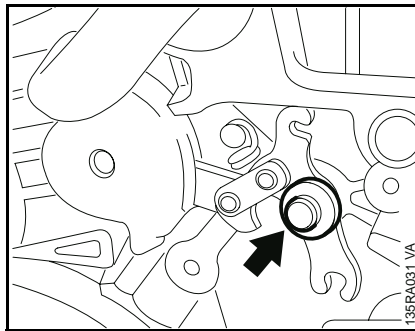
- Lubricate sliding and bearing points of chain brake with STIHL multipurpose grease or, preferably, molybdenum grease (e.g. Molykote) – see 13.
- Install the flat spring.



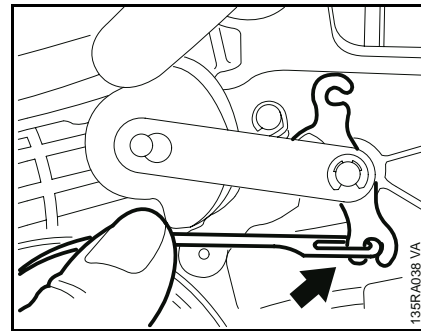
- Insert the bell crank in the side of the hand guard so that the short arm of the bell crank points to top of hand guard.



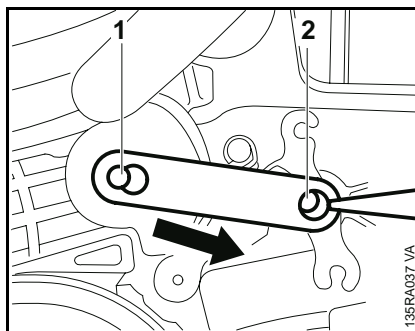
- Position the hand guard (1) against the pivot pin and fit the other side of the hand guard over the housing.
- Position the bell crank (2) against the pivot pin.
- Push the hand guard and bell crank onto their pivot pins.



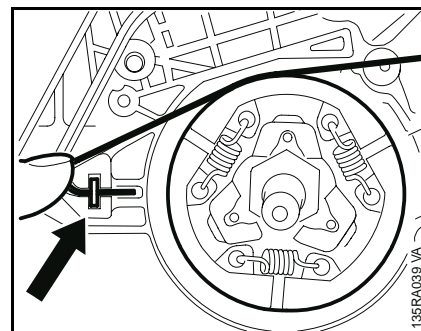
- Fit the washer.



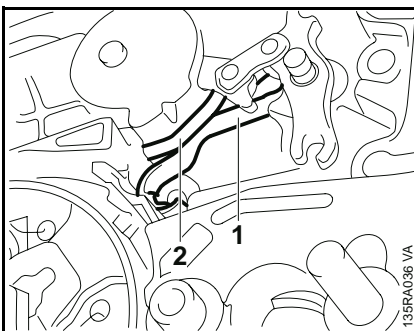
- Hook the brake spring onto the bell crank.



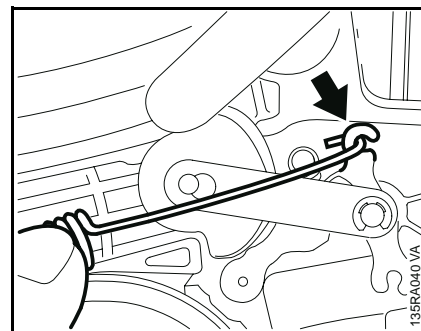
- Fit strap on the pivot pin (1) and engage it in the pivot pin's groove.
- Slip the other end of the strap over the bell crank pivot pin (2).
- Secure strap with E-clip.
- Coat the brake band with chain oil (STIHL Bioplus), [see 13](#), to protect it from corrosion and help reduce "snatching" during the first few brake applications.



- Position the brake band around the clutch and push it into the engine housing.



- Check that flat spring (1) is properly located on face (2) of hand guard bearing boss.



- Attach the brake spring to the bell crank.



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