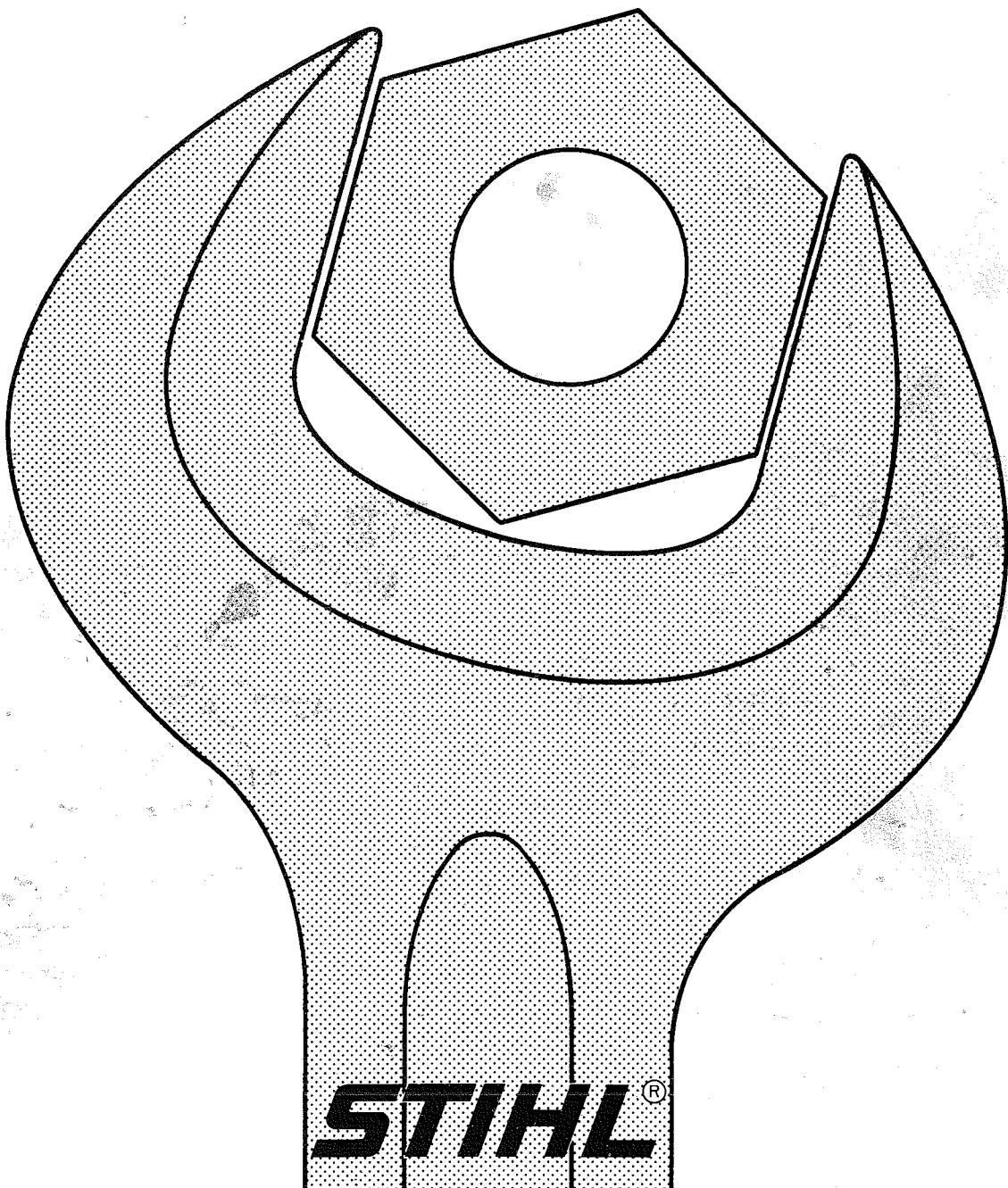


---

# **STIHL 028, 038**



## SERVICE MANUAL 028/038

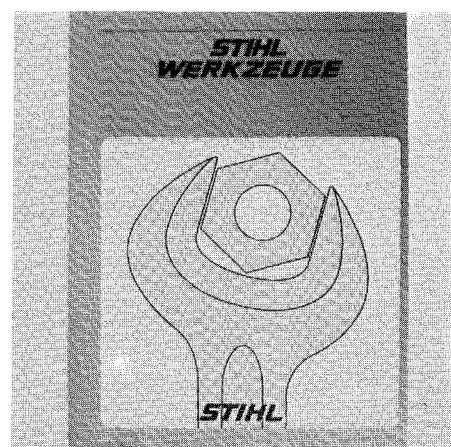
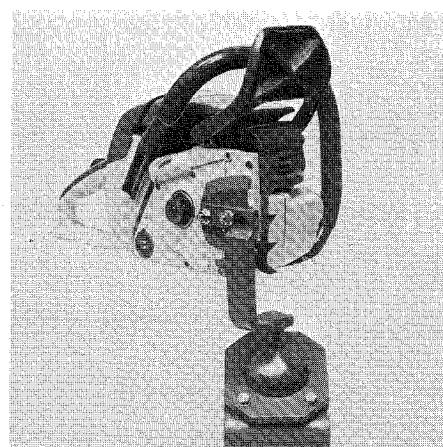
### FOREWORD

This Service Manual covers model 028 chain saws up to machine number 5 561640 as well as later machines unless technical information bulletins have been issued in the meantime with updated repair procedures.

Models 038 have substantially the same constructional features as model 028 chain saws. This Service Manual can therefore be used for the 038 chain saws as well.

In the event of faults it is quite possible that a **single malfunction may have several causes**. It is, therefore, advisable to consult the "troubleshooting charts" when tracing faults. We also recommend that you make use of the exploded views in the illustrated parts lists while carrying out repair work.

This service manual and all technical information bulletins are intended exclusively for the use of STIHL servicing staff and dealers and must not be passed on to third parties.



Repair work is made considerably easier if the chain saw is mounted on assembly stand 5910 8503100. The saw is easily attached to the stand by means of the two stud bolts and collar nuts for bar mounting.

While on the assembly stand, the chain saw can be swivelled into any required position to suit the repair in question. This not only has the advantage of keeping the component in the best position for the repair, but also leaves both hands free for the work, and thus represents a considerable time-saving.

Our special tool manual illustrates and lists the part numbers of all available machine-related tools as well as general purpose tools for all machines.

The special tool manual is available in various languages and can be ordered by quoting the appropriate part number listed hereunder.

German	0455 901 0023
English	0455 901 0123
French	0455 901 0223
Spanish	0455 901 0323
Yugoslav	0455 901 0423
Swedish	0455 901 0523
Italian	0455 901 0723
Portuguese	0455 901 1223

## CONTENTS

<b>1.</b>	<b>Specifications</b>	<b>4</b>	<b>4.</b>	<b>Ignition System</b>	<b>26</b>	<b>4.5.1</b>	Checking on breaker-controlled ignition	<b>45</b>
			4.1	Construction	26	4.5.2	Adjustment on breaker-controlled ignition	45
			4.2	Operation	26	4.5.3	Checking on electronic ignition	47
<b>2.</b>	<b>Clutch, Chain Drive and Chain Brake</b>	<b>7</b>	4.2.1	General information	26	4.6	Magneto edge gap	48
2.1	Construction and operation	7	4.2.2	Breaker-controlled magneto ignition	27			
2.1.1	Clutch and chain sprocket	7	4.2.3	Bosch transistor-controlled magneto ignition	28			
2.1.2	Chain brake	8	4.2.4	SEM thyristor-controlled magneto ignition	29			
2.2	Troubleshooting chart	8	4.2.4.1	Charging the storage capacitor	29	<b>5.</b>	<b>Rewind Starter</b>	49
2.3	Disassembly and repair	9	4.2.4.2	Triggering the thyristor	29	5.1	Construction and operation	49
2.3.1	Clutch	9	4.2.4.3	Ignition	30	5.2	Troubleshooting chart	49
2.3.2	Chain brake	12	4.2.4.4	Troubleshooting chart	31	5.3	Disassembly	50
2.4	Assembly	13	4.3	Breaker-controlled ignition system	31	5.4	Replacing the starter rope	50
2.4.1	Chain brake	13	4.3.1	Electronic ignition system	32	5.5	Replacing the rewind spring	51
2.4.2	Clutch	14	4.3.2			5.6	Tensioning the rewind spring	51
<b>3.</b>	<b>Engine</b>	<b>15</b>	4.4	Function and repair of components	33	5.7	Replacing starter rope guide bush	52
3.1	Construction	15	4.4.1	Spark plug	33	5.8	Routine maintenance	52
3.2	Troubleshooting chart	15	4.4.2	Ignition lead	34			
3.3	Exposing the cylinder	16	4.4.3	Short-circuit wire/ground wire	35			
3.4	Disassembly of cylinder and piston	16	4.4.4	Short-circuit contact	36			
3.5	Assembly of piston and cylinder	17	4.4.5	Flywheel	37			
3.6	Disassembly of crankcase – removal of crankshaft	19	4.4.6	Armature (Bosch)/ignition module (SEM)	39	<b>6.</b>	<b>AV Handle System</b>	53
3.7	Installing the Crankshaft – assembly of crankcase	21	4.4.6.1	Resistance test on primary winding	39	6.1	Construction and operation	53
3.8	Leakage testing the crankcase	23	4.4.6.2	Resistance test on secondary winding	39	6.2	Repair	53
3.8.1	Pressure test	23	4.4.6.3	Ignition coil tester	40			
3.8.2	Vacuum test	25	4.4.6.4	Disassembly and assembly	40	<b>7.</b>	<b>Master Control</b>	55
3.8.3	Replacing the oil seals	25	4.4.7	Condenser	41	7.1	Construction and operation	55
			4.4.8	Contact set	42	7.2	Disassembly and assembly	55
			4.4.9	Trigger plate	44			
			4.5	Ignition timing	44			

<b>8.</b>	<b>Electric Handle Heating System</b>	56	10.7	Fuel line and tank vent	71
8.1	Construction and operation	56	10.8	Air filter and choke	72
8.2	Troubleshooting	56			
8.3	Disassembly and assembly	58			
8.3.1	Switch	58			
8.3.2	Heating element in pistol grip	58			
8.3.3	Handlebar	58			
8.3.4	Generator	59			
<b>9.</b>	<b>Chain Lubrication</b>	60			
9.1	Construction and operation of oil pump	60			
9.2	Troubleshooting chart	61			
9.3	Oil tank/tank vent	62			
9.4	Repair of pickup body and valve	62			
9.5	Disassembly and repair of oil pump	63			
<b>10.</b>	<b>Fuel System</b>	64			
10.1	Construction and operation of carburetor	64			
10.1.1	Operation of fuel pump	64			
10.1.2	Operation of carburetor	64			
10.2	Troubleshooting chart	66			
10.3	Leakage test on carburetor	68			
10.4	Disassembly of carburetor	68			
10.5	Repair of carburetor	69			
10.6	Carburetor adjustment	71			
10.6.1	Notes for fine adjustment of carburetor	71			

---

## 1. SPECIFICATIONS

### 1.1 Engine

STIHL single cylinder, two-stroke engine with special impregnated cylinder bore	
Displacement:	47 cm <sup>3</sup> (2.87 cu. in)
Bore:	44 mm (1.73 in)
Stroke:	31 mm (1.22 in)
Compression ratio:	9.5:1
Max. torque:	2.65 Nm (1.95 lbf. ft) at 6000 rpm
Max. permissible engine speed:	12000 rpm
Mean idle speed:	2200 rpm
Crankshaft:	Two-part, drop-forged
Crankshaft bearings:	2 deep-groove ball bearings
Crankpin:	14.4 mm (0.57 in) dia.
Big-end bearing:	Needle cage
Piston pin:	10.0 mm (0.39 in) dia.
Small-end bearing:	Needle cage
Rewind starter:	Pawl engagement with automatic starter rope rewind mechanism
Starter rope:	3.5 mm (0.14 in) dia., 1060 mm (41.8 in) long
Clutch:	Centrifugal clutch without linings, 76 mm (3 in) dia. Approx. 3100 rpm
Clutch engages at:	
Crankcase leakage test:	
with overpressure:	$p_0 = 0.5 \text{ bar (7.1 lbf/in}^2\text{)}$
with vacuum:	$p_0 = 0.5 \text{ bar (7.1 lbf/in}^2\text{)}$

---

### 1.2 Fuel System

Carburetor:	All-position diaphragm carburetor with integral fuel pump
Adjustment:	
high-speed adjustment screw H:	Open approx. 1 1/4 turns
low-speed adjustment screw L:	Open approx. 1 1/4 turns (basic setting with screws initially hard against their seats)
Carburetor leakage test	
with overpressure:	$p_0 = 0.4 \text{ bar (5.7 lbf/in}^2\text{)}$
Fuel capacity:	0.52 L (1.1 U.S.pt)

Fuel mixture:	Fuel mix 1:40 with STIHL two-cycle engine oil; 1:25 for other branded two-cycle engine oils
Air filter:	Flat wire mesh filter

### 1.3 Ignition System

#### 028 AV and 028 AVQ

Type:	Breaker-controlled magneto ignition system	
Magneto edge gap:	4 . . . 8 mm (0.16 . . . 0.31 in)	
Air gap:	0.2 . . . 0.3 mm (0.008 . . . 0.012 in)	
Ignition timing:	2.2 . . . 2.3 mm (0.087 . . . 0.091 in) before T.D.C.	
Ignition advance angle:	27 . . . 28°	
Breaker point gap:	0.35 . . . 0.4 mm (0.014 . . . 0.016 in)	
Condenser:	Capacitance 0.15 . . . 0.19 µF	
Armature:	Coil resistors	
	Primary	Secondary
	0.7 . . . 1.0 Ω	7.7 . . . 10.3 kΩ

#### 028 AVE

Type:	Transistor-controlled (breaker-less) magneto ignition system	
Air gap:	0.2 . . . 0.3 mm (0.008 . . . 0.012 in)	
Ignition timing:	2.6 mm (0.1 in) before T.D.C. at 8000 rpm	
Ignition advance angle:	30° at 8000 rpm	
Armature:	as 028 AV/028 AVQ	

#### 028 AVEQ

Type:	Thyristor-controlled (breaker-less) magneto ignition system	
Air gap:	0.2 . . . 0.3 mm (0.008 . . . 0.012 in)	
Ignition timing:	2.6 mm (0.1 in) before T.D.C. at 8000 rpm	

#### All Models

Spark plug (suppressed):	Bosch WSR 6 F or Champion RCJ 6 Y
Heat range: 200	
Electrode gap: 0.5 mm (0.02 in)	
Spark plug thread:	M 14 x 1.25; 9.5 mm (0.37 in) long

---

#### 1.4 Tightening Torques

Crankshaft nut (ignition side) M 8 x 1:	30 Nm (22 lbf. ft)
Hub/spider (output side):	50 Nm (37 lbf. ft)
M 5 socket head screws:	8 Nm (6 lbf. ft)
M 5 cheese-head screws:	5 Nm (3.7 lbf. ft)
M 4 cheese-head screws:	2.5 Nm (1.8 lbf. ft)
M 5 nuts:	5 Nm (3.7 lbf. ft)
Spark plug:	25 Nm (18.4 lbf. ft)

**Important: The M 5 x 12 screws on the front handguard and the M 4 x 8 screws on the spider are fitted with LOCTITE.**

---

#### 1.5 Cutting Attachment

Guide bars:

STIHL Duromatic guide bars with stellite-tipped bar nose; STIHL Rollomatic guide bars with sprocket nose. Both types with corrosion resistant finish and induction hardened track

Duromatic 40 and 45 cm  
(16 and 18 in)

Rollomatic 32, 37, 40 and 45 cm  
(13, 14.6, 16 and 18 in)

0.325" (8.25 mm) pitch

7-tooth for 0.325" chain

16.4 m/s (53.8 ft/sec) at 8500 rpm

Speed-controlled oil pump with lift plunger, operative only when chain is running

8 cm<sup>3</sup>/min (0.49 cu. in/min)  
at 6000 rpm

0.3 L (0.63 U.S.pt)

Bar lengths:

Chain:

Chain sprocket:

Chain speed:

Chain lubrication:

Oil delivery rate:

Oil tank capacity:

#### 1.6 Weights

Model:

AV/AVE

AVQ/AVEQ

Dry weight with 32 cm  
bar and chain:

6.5 kg (14.3 lb)

6.6 kg (14.5 lb)

#### 1.7 Special Accessories

STIHL rescue kit 028  
Gasket set 028

1118 900 5000

1118 007 1050

## 2. CLUTCH, CHAIN DRIVE AND CHAIN BRAKE

### 2.1 Construction and Operation

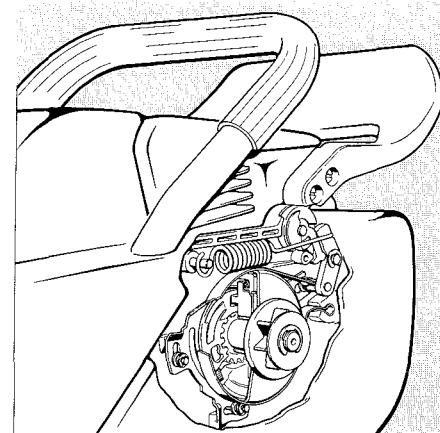
#### 2.1.1 Clutch and Chain Sprocket

The transmission of power from the engine to the saw chain is effected via a centrifugal clutch. On "Quick-stop" models, the centrifugal clutch incorporates an isolating clutch which is actuated by the chainbrake.

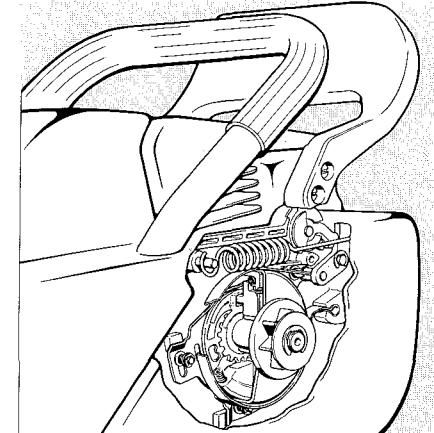
On the **Quickstop version** the hub screwed to the crankshaft is the clutch element which absorbs the torque and acceleration of the crankshaft. It is essential that the hub is always tightened down to the specified torque. The clutch spider is supported on the hub by a needle sleeve and located axially with a circlip. The driving plate is located on the three lugs of the clutch spider and can move axially while remaining in constant mesh with the spider. The flat spring between the spider and driving plate presses the driving plate against the release plate; this means that the internal teeth of the driving plate are always in mesh with the teeth of the hub when the chain brake is released, and thus provides positive transmission of engine torque to the clutch spider. When the chain brake is actuated, the release plate disengages the driving plate from the hub. The clutch spider and hub can then rotate independently.

On the **standard version** the clutch spider assumes the function of the hub and must therefore always be tightened to the specified torque.

Chain brake engaged



Chain brake released



The centrifugal clutch has three clutch shoes without linings. The clutch drum and chain sprocket are separate components. The spur gear which drives the oil pump is a ring-gear, positively mounted to the hub of the clutch drum. The chain sprocket has two integrally cast lugs which engage in corresponding recesses on the drum hub. As the lugs have odd sizes, the chain sprocket can only be fitted in one position.

When the engine is running at idle speed the clutch shoes are also in the idle position, because the tension of the clutch spring is greater than the centrifugal force. As engine speed increases, centrifugal force presses the clutch shoes outwards against the clutch drum and thus transmit engine torque positively via the chain sprocket to the saw chain.

The preload and strength of the clutch spring are designed so that

the clutch shoes begin to make contact with the clutch drum at an engine speed of approx. 3100 rpm (engagement speed). The clutch engages fully above this speed. The correct idle setting on the carburetor is therefore essential in order to insure that the clutch engagement speed is not reached when the engine is idling.

## 2.1.2 Chain Brake

The chain brake is a spring-loaded band brake without linings. Its main components are the brake band, tension spring, handguard and release plate – which operates the isolating clutch.

The chain brake is actuated by means of the handguard which can be used to release and engage the brake.

The **chain brake is released (reset)** by pulling the handguard back against the handlebar. This movement is transmitted via a lever system which preloads the tension spring and disengages the brake band. At the same time the release plate moves back and allows the driving plate to engage in the teeth of the hub. The brake lever, which is connected to the tension spring, brake band and release plate, is locked in the idle position by the relay lever.

The **chain brake is actuated** by moving the handguard towards the bar nose. This movement unlatches the brake lever and causes the brake band to be clamped around the clutch drum by the force of the pre-loaded brake spring. The release plate simultaneously disengages the driving plate from the hub and interrupts the flow of power between the crankshaft and the centrifugal clutch. Clutch drum and saw chain are brought to a standstill within a fraction of a second even if the engine continues running at high speed.

## 2.2 Troubleshooting Chart

Fault	Cause	Remedy
Saw chain turns at idle speed	Engine idle speed too high Clutch spring stretched or fatigued, spring hooks broken	Readjust at idle speed adjustment screw Renew clutch spring
Excessive chain sprocket wear	Incorrect chain tension	Tension saw chain properly
Chain stops in mid-cut even with engine at maximum speed – Isolating clutch disengages during cutting	Isolating clutch worn Flat spring broken	Renew hub and driving plate Renew flat spring
Isolating clutch does not re-engage after releasing chain brake	Engine idle speed too high Flat spring broken	Readjust at idle speed adjustment screw Renew flat spring
Saw chain does not stop immediately when chain brake is engaged	Tension spring broken	Renew tension spring

## 2.3 Disassembly and Repair

### 2.3.1 Clutch

Top:  
Chain brake released

Bottom:  
Pressing out the retaining washer

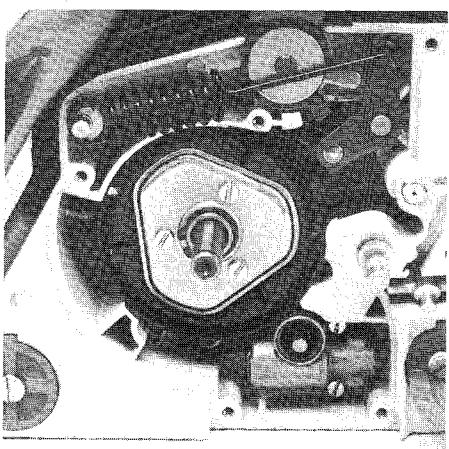
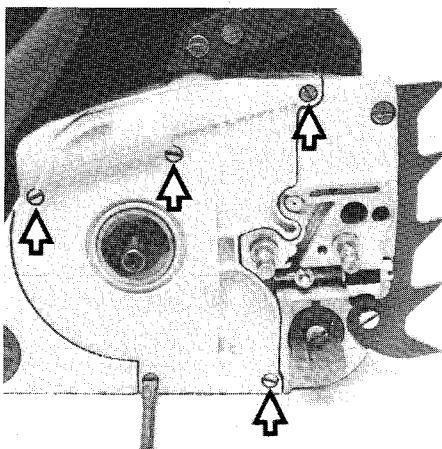
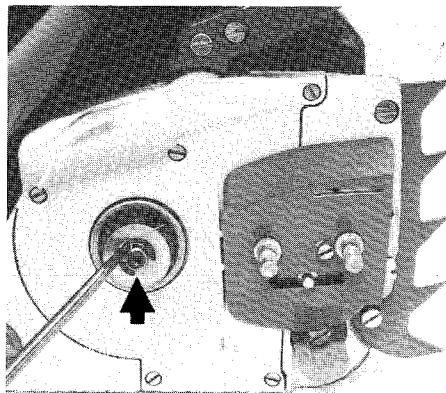
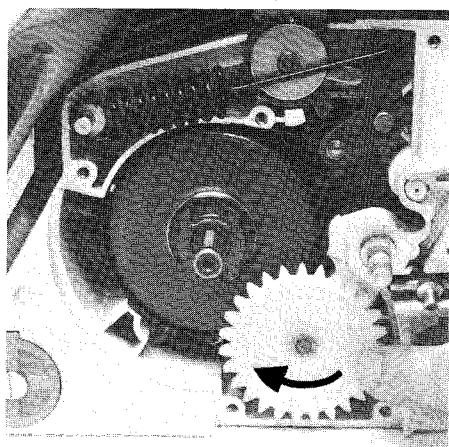
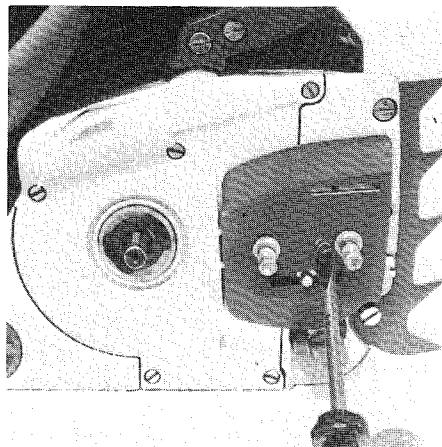
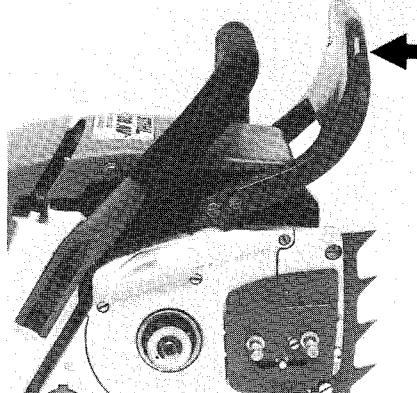
Top:  
Removing the side plate

Center:  
Releasing the cover

Bottom:  
Ring-gear removed

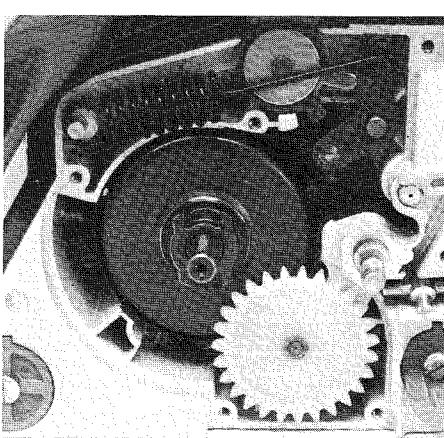
Top:  
Removing the spur gear

Bottom:  
Clutch drum and needle sleeve removed



First remove chain sprocket cover and cutting attachment.

The chain brake must be released before removing the chain sprocket. Use a screwdriver, about 5 mm wide, to press the retaining washer out of the annular groove in the crankshaft. The thrust washer, chain sprocket and needle sleeve can now be pulled off the crankshaft.



Remove the inner side plate – secured with a single M 4 x 12 cheese-head screw. Unscrew the five M 4 x 12 cheese-head screws and take off the cover. Now remove ring gear from clutch drum hub and the spur gear (with worm) from the oil pump shaft by turning it clockwise. Pull clutch drum and needle sleeve off the crankshaft.

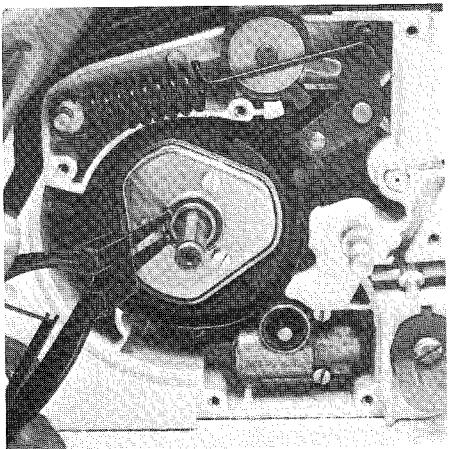
**Thank you very much  
for your reading. Please  
Click Here Then Get  
More Information.**

**NOTE:**

**If there is no response to  
click on the link above,  
please download the PDF  
document first and then  
click on it.**

Top:  
Removing the circlip

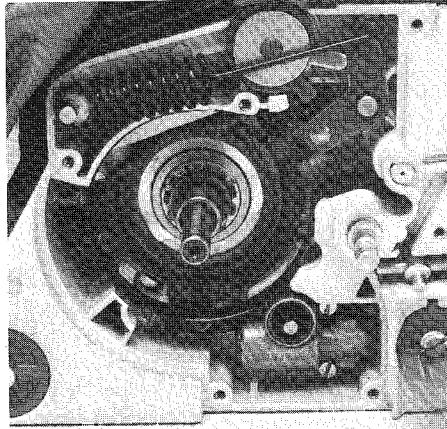
Bottom:  
Clutch, flat spring and needle sleeve removed



Top:  
Driving plate removed

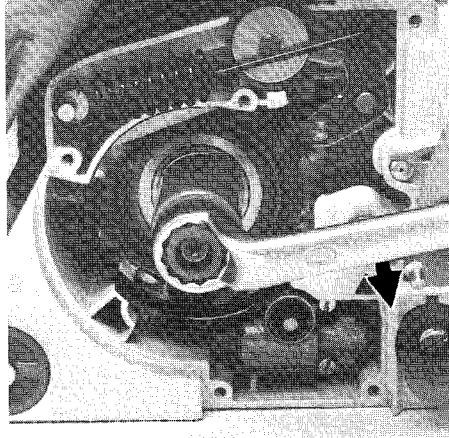
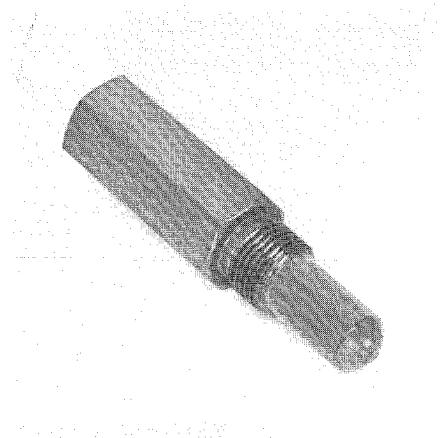
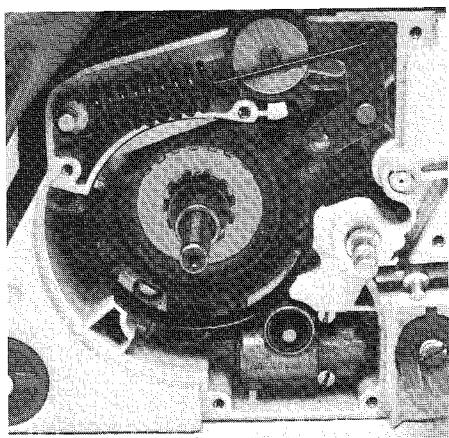
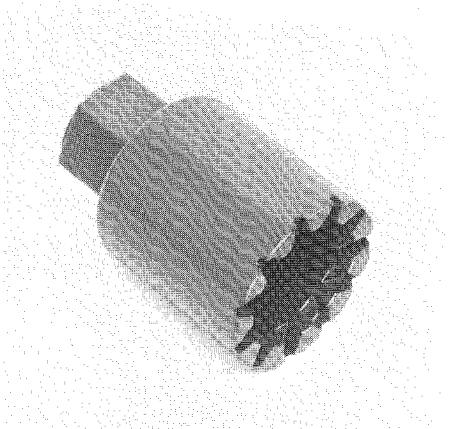
Center:  
Locking screw 1107 191 1200

Bottom:  
Locking screw inserted



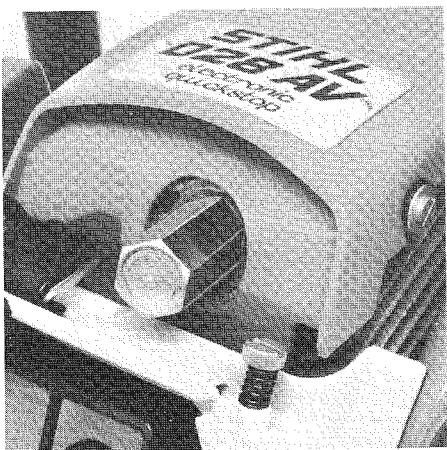
Top:  
Special socket 1118 893 1300

Bottom:  
Unscrewing the hub



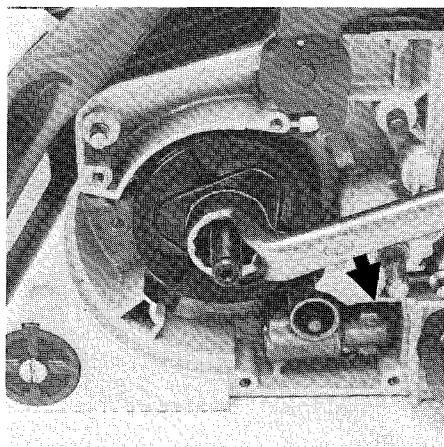
Disassembly differs on the Quickstop and standard versions from this stage onwards.

On the **Quickstop version**, first remove the circlip which locates the clutch spider on the hub. The clutch with flat spring and needle sleeve can now be pulled off the hub. If the hub has to be removed, first remove the driving plate and block the crankshaft. To do this, unscrew



spark plug and fit locking screw 1107 191 1200 in the spark plug hole and tighten down by hand. Use special socket 1118 893 1300 to unscrew the hub. Remove washer from behind hub.

Unscrewing the clutch spider



The crankshaft must also be blocked with locking screw 11071911200 in order to remove the clutch spider on the **standard version**. Use a 19 mm cranked ring wrench to unscrew the clutch spider and then remove the dished cover plate.

**Caution: The hub and clutch spider have left-hand threads – unscrew them clockwise.**

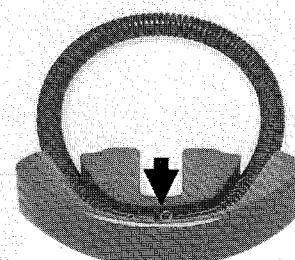
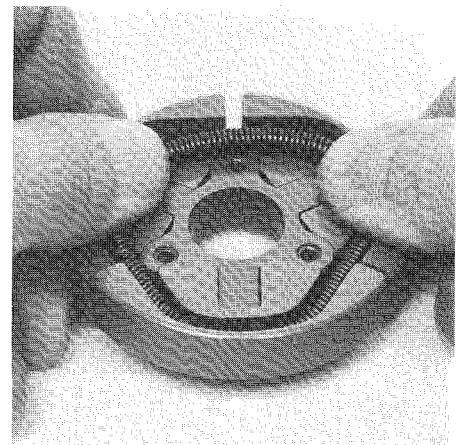
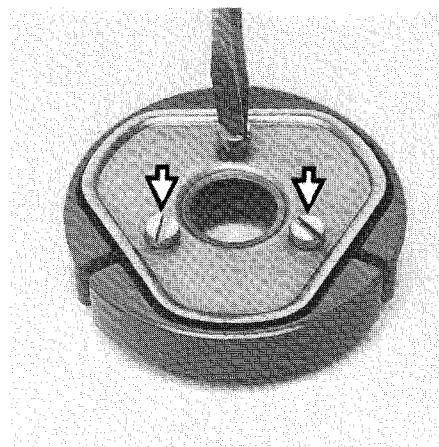
Wash all parts of the clutch, including the needle cages, in clean gasoline and blow out with compressed air if available. Also clean crankshaft stub.

Always replace damaged or worn parts.

Top:  
Removing cover plate

Bottom:  
Clutch spring in spring recess

Pressing clutch spring into position



Use the following procedure to replace the clutch spring, clutch shoes or spider:

First unscrew the cover plate from the spider (Quickstop only) and then remove the clutch shoes.

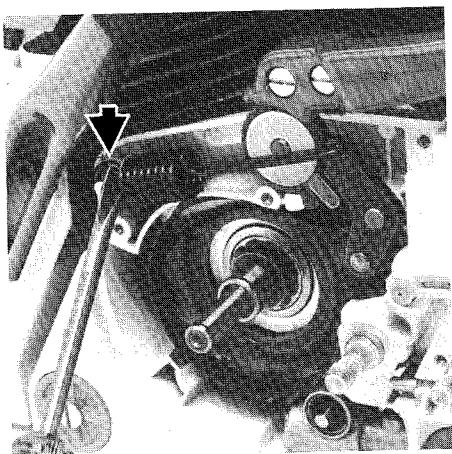
To assemble the clutch, first position the clutch spring in the spring recess of one clutch shoe, so that the spring

hooks are in the center of the clutch shoe. Now fit the three clutch shoes on the arms of the spider so that the spring recesses face away from the triangular plate on the spider. Grip the clutch spring with both thumbs and push it into the other two clutch shoes.

Refit the cover plate on the Quickstop clutch. The three M 4 x 8 cheese-head screws must be secured with LOCTITE.

### 2.3.2 Chain Brake

Detaching the tension spring



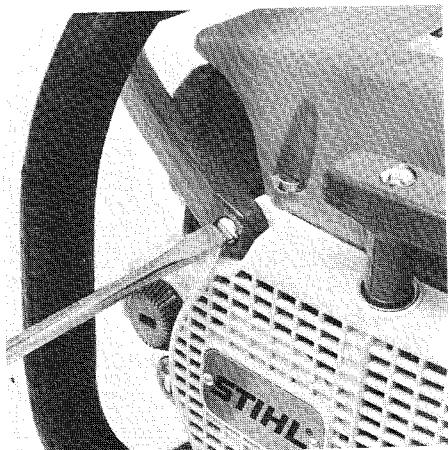
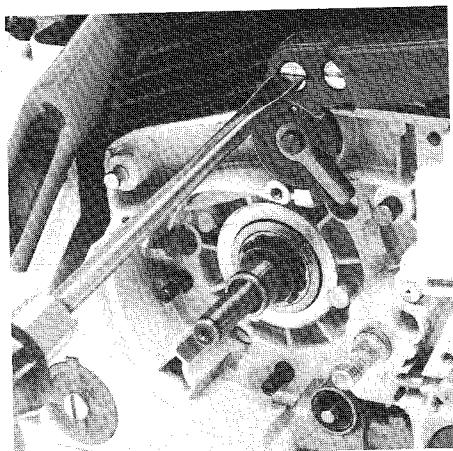
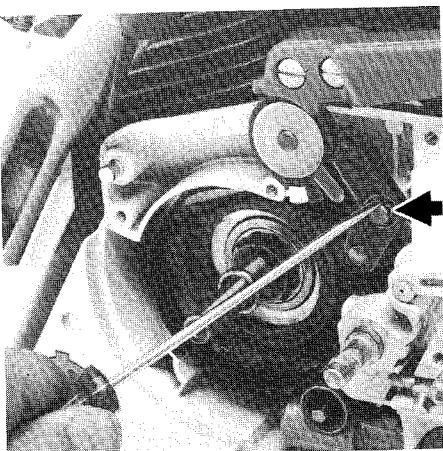
The clutch drum must be removed before the brake band can be disassembled. To do this, engage the chain brake and detach the tension spring. Remove retaining washer from brake lever's pivot pin and carefully withdraw the brake lever. Collect the washers and helical spring on the brake band's pivot pin. The other end of the brake band can now be prised out of its seat in the crankcase.

Take out the clutch before removing the release plate. Remove the retaining washers, washers and helical springs from the guide pins and take the release plate out of the crankcase.

Unscrew the handguard (the chee-se-head screws will be difficult to remove because they are fitted with LOCTITE) and then take out the actuating lever, relay lever and torsion spring.

Top:  
Removing retaining washer

Center and Bottom:  
Unscrewing the handguard



The spring guide pins in the crankcase must be replaced if they are damaged.

These screw pins must be bonded in position to prevent them loosening in operation. To do this, use a suitable solution (trichlorethlene, diluted nitro or similar) to completely degrease the threads in the crankcase and on the pins themselves. Then coat the threads of the screw pins with a little adhesive – 101, part number 0786 111 1101, (LOCTITE 242) – and screw them into the crankcase. Tighten to a torque of 4.9 Nm (0.5 kpm).

It is essential to use a suitable screwdriver with a tip which fits snugly in the slot of the pin in order to avoid damaging the pin material. A 1 x 6.5 screwdriver in accordance with DIN 5265 is recommended for this purpose.