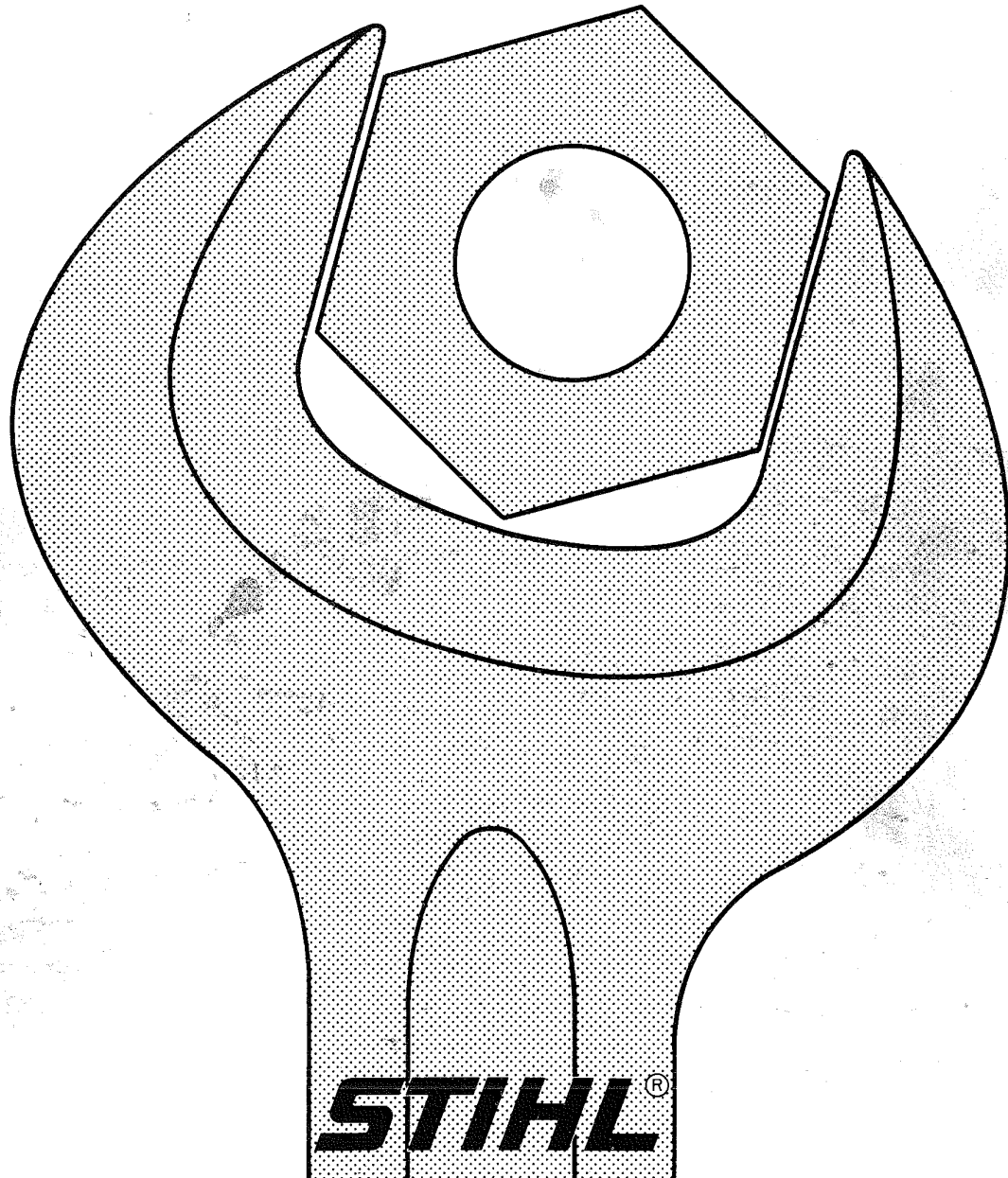


# ***STIHL 028, 038***





## SERVICE MANUAL 028/038

SPECIAL TOOL  
MANUAL

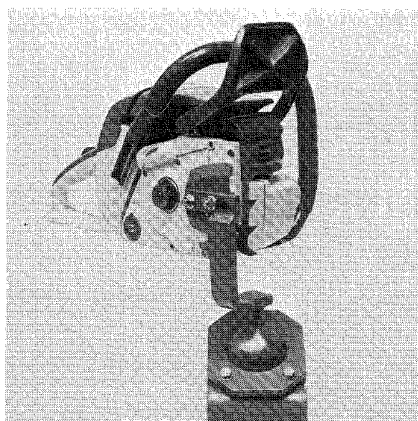
## FOREWORD

This Service Manual covers model 028 chain saws up to machine number 5561640 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.

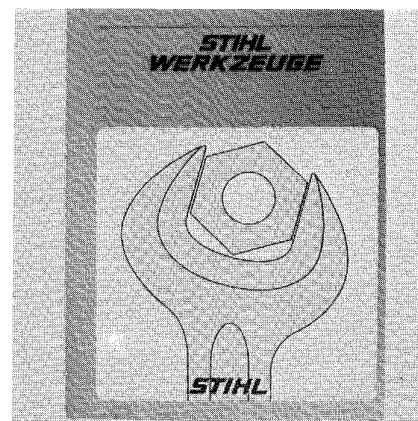
In the event of faults it is quite possible that a **single malfunction may have several causes**. It is, therefore, advisable to consult the "troubleshooting charts" when tracing faults. We also recommend that you make use of the exploded views in the illustrated parts lists while carrying out repair 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 850 3100. 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

**STIHL**® Andreas Stihl  
Postfach 1760  
D-7050 Waiblingen

## CONTENTS

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

8.	<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			
9.	<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			
10.	<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.
Clutch engages at:	Approx. 3100 rpm
Crankcase leakage test: with overpressure:	$p_0 = 0.5 \text{ bar (7.1 lbf/in}^2\text{)}$
with vacuum:	$p_u = 0.5 \text{ bar (7.1 lbf/in}^2\text{)}$

## 1.2 Fuel System

Carburetor:	All-position diaphragm carburetor with integral fuel pump
Adjustment: high-speed adjustment screw H: low-speed adjustment screw L:	Open approx. 1¼ turns Open approx. 1¼ 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 $\mu$ F
Armature:	Coil resistors
	Primary                      Secondary
	0.7 ... 1.0 $\Omega$ 7.7 ... 10.3 k $\Omega$

#### 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
Spark plug thread:	Electrode gap: 0.5 mm (0.02 in) 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
Bar lengths:	Duromatic 40 and 45 cm (16 and 18 in) Rollomatic 32, 37, 40 and 45 cm (13, 14.6, 16 and 18 in)
Chain:	0.325" (8.25 mm) pitch
Chain sprocket:	7-tooth for 0.325" chain
Chain speed:	16.4 m/s (53.8 ft/sec) at 8500 rpm
Chain lubrication:	Speed-controlled oil pump with lift plunger, operative only when chain is running
Oil delivery rate:	8 cm <sup>3</sup> /min (0.49 cu. in/min) at 6000 rpm
Oil tank capacity:	0.3 L (0.63 U.S.pt)

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	1118 900 5000
Gasket set 028	1118 007 1050



## 2. CLUTCH, CHAIN DRIVE AND CHAIN BRAKE

### 2.1 Construction and Operation

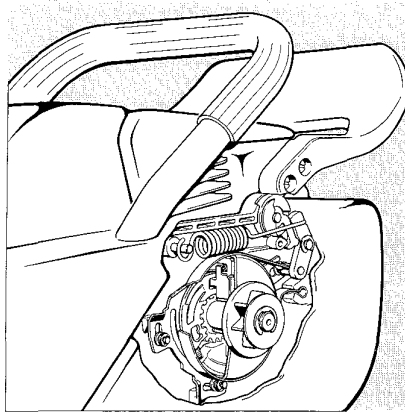
#### 2.1.1 Clutch and Chain Sprocket

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

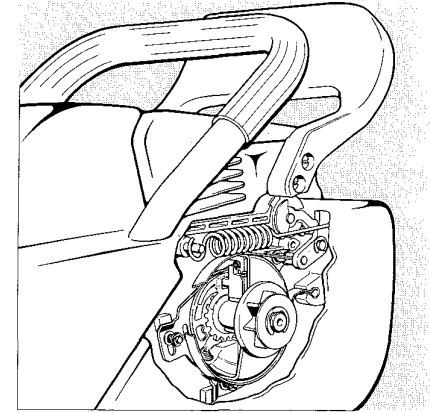
On the **Quickstop version** the hub screwed to the crankshaft is the clutch element which absorbs the torque and acceleration of the crankshaft. It is essential that the hub is always tightened down to the specified torque. The clutch spider is supported on the hub by a needle sleeve and located axially 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 preloaded 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

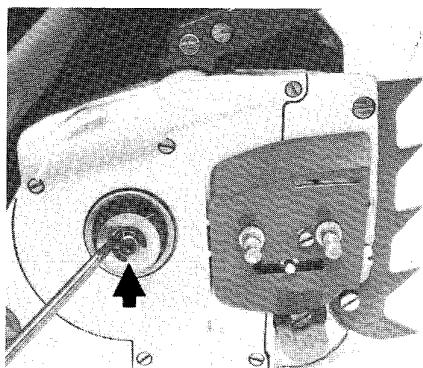
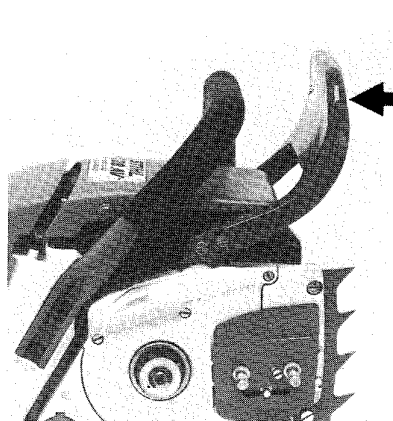
Fault	Cause	Remedy
Saw chain turns at idle speed	Engine idle speed too high	Readjust at idle speed adjustment screw
	Clutch spring stretched or fatigued, spring hooks broken	Renew clutch spring
Excessive chain sprocket wear	Incorrect chain tension	Tension saw chain properly
Chain stops in mid-cut even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



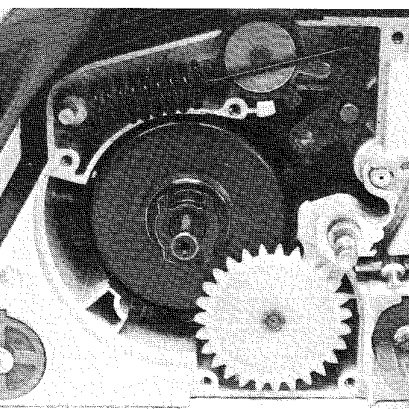
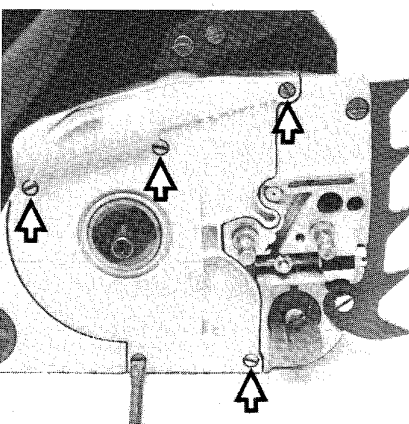
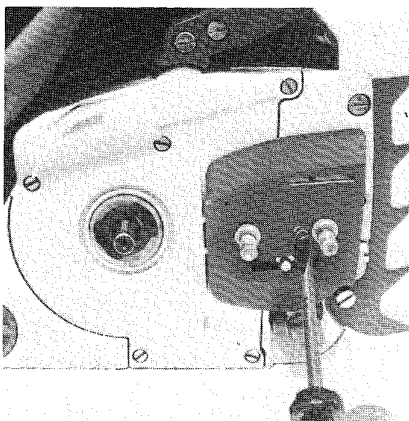
First remove chain sprocket cover and cutting attachment.

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.

Top:  
Removing the side plate

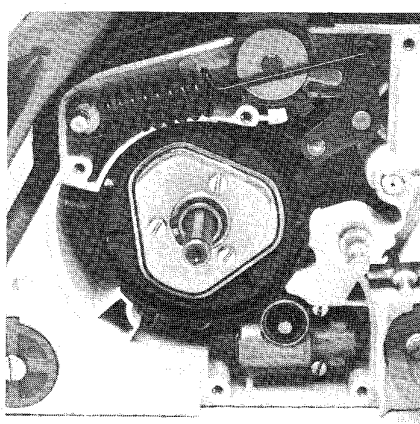
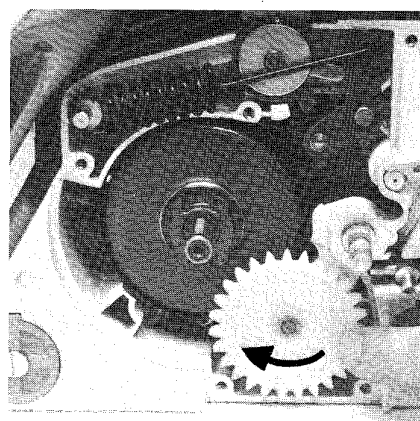
Center:  
Releasing the cover

Bottom:  
Ring-gear removed



Top:  
Removing the spur gear

Bottom:  
Clutch drum and needle sleeve removed

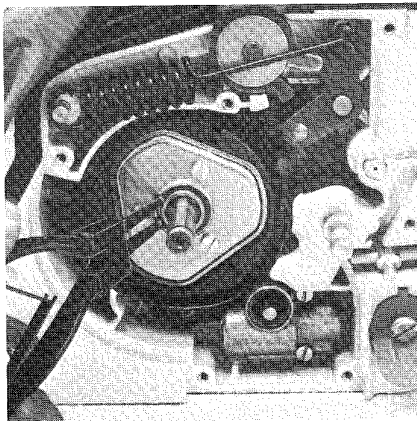


Remove the inner side plate – secured with a single M 4 x 12 cheese-head screw. Unscrew the five M 4 x 12 cheese-head screws and take off the cover. Now remove ring gear from clutch drum hub and the spur gear (with worm) from the oil pump shaft by turning it clockwise. Pull clutch drum and needle sleeve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



Top:  
Removing the circlip

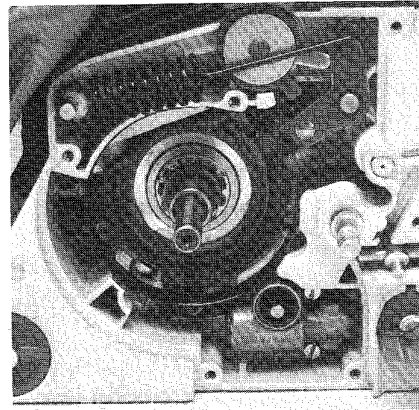
Bottom:  
Clutch, flat spring and needle sleeve removed



Top:  
Driving plate removed

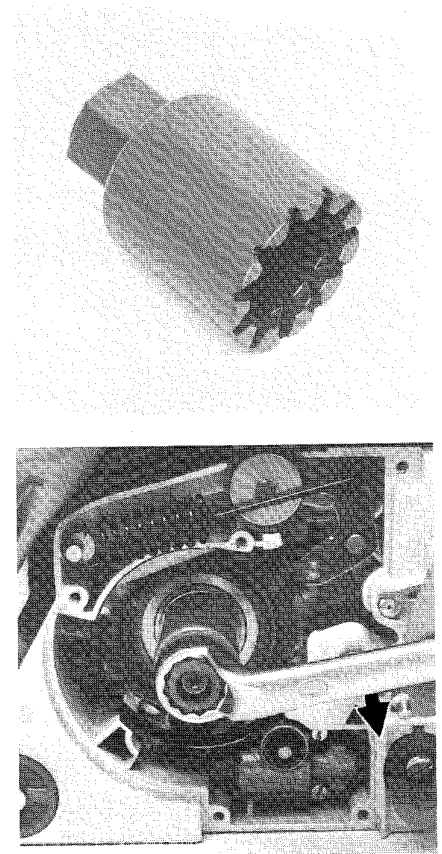
Center:  
Locking screw 1107 191 1200

Bottom:  
Locking screw inserted



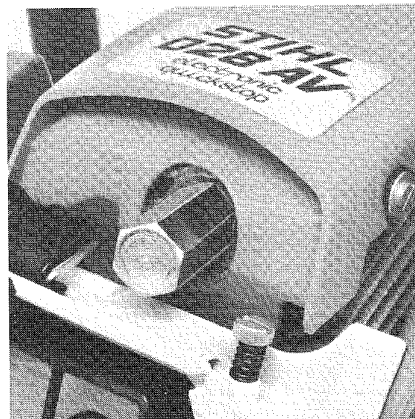
Top:  
Special socket 1118 893 1300

Bottom:  
Unscrewing the hub



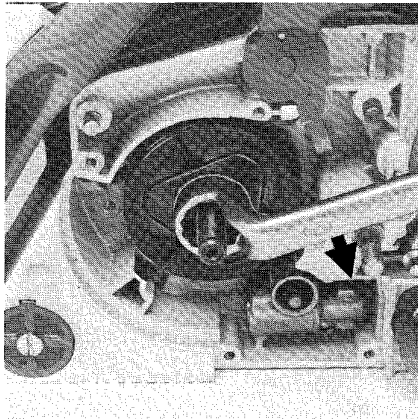
Disassembly differs on the Quick-stop and standard versions from this stage onwards.

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

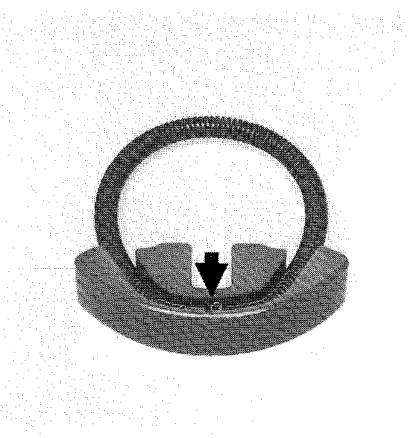
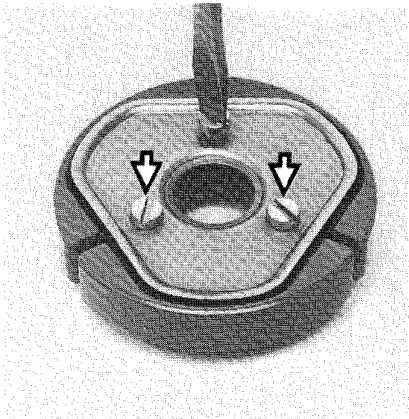


The crankshaft must also be blocked with locking screw 1107 191 1200 in order to remove the clutch spider on the **standard version**. Use a 19 mm cranked ring wrench to unscrew the clutch spider and then remove the dished cover plate.

**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.

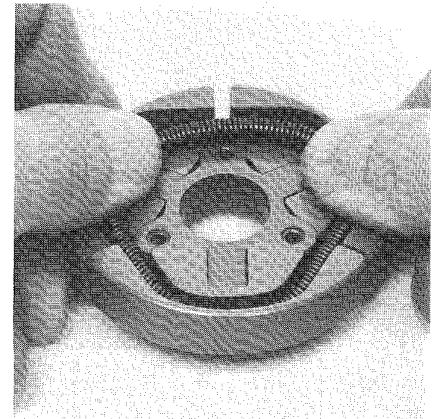
Top:  
Removing cover plateBottom:  
Clutch spring in spring recess

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

Pressing clutch spring into position



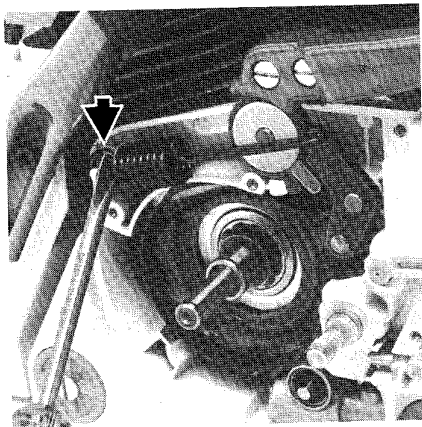
hooks are in the center of the clutch shoe. Now fit the three clutch shoes on the arms of the spider so that the spring recesses face away from the triangular plate on the spider. Grip the clutch spring with both thumbs and push it into the spring recesses of the other two clutch shoes.

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

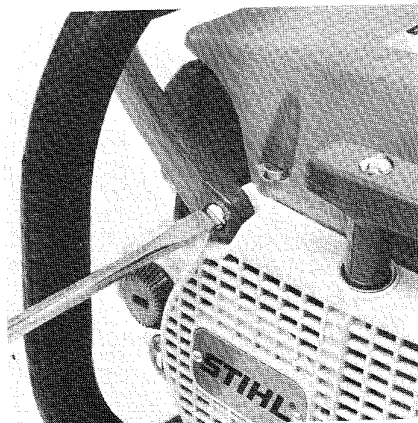
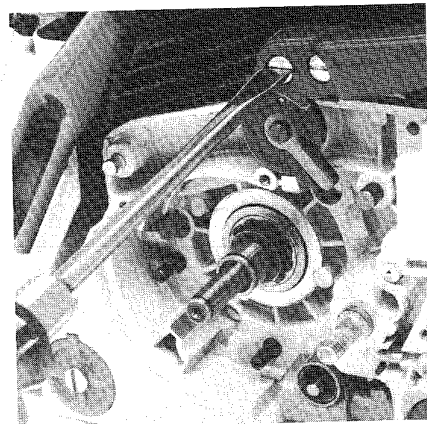
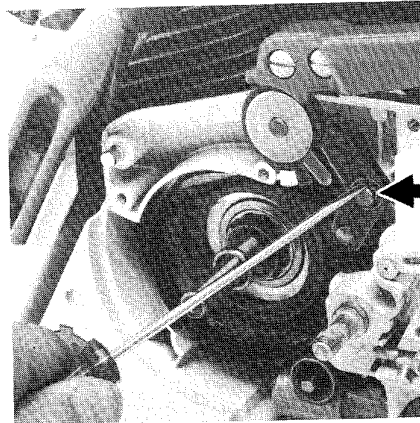
Detaching the tension spring



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 cheese-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 washerCenter 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 (trichlorethylene, 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.

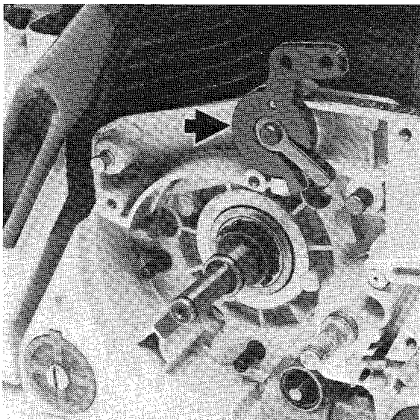
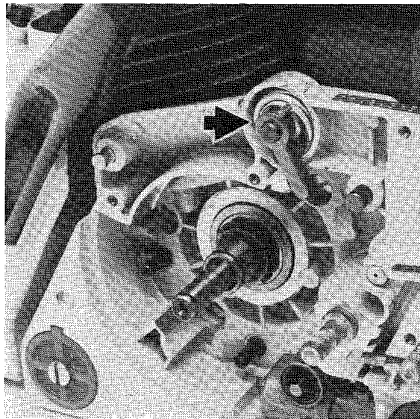


2.4 Assembly

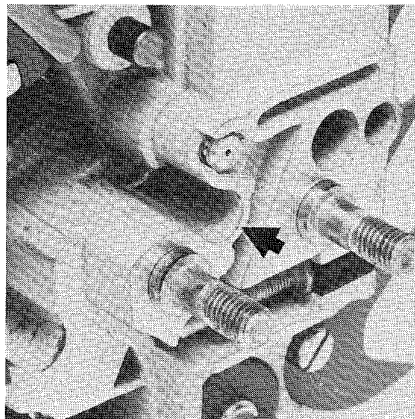
2.4.1 Chain brake

Top:  
Torsion spring and relay lever in position

Bottom:  
Actuating lever fitted



Seat for brake band

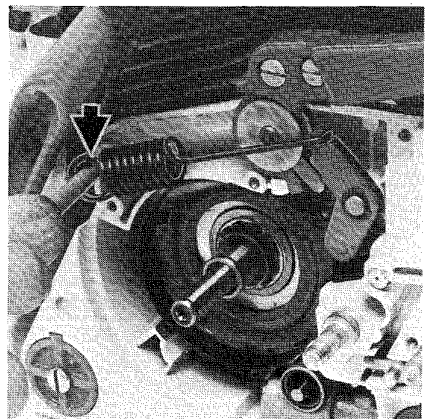
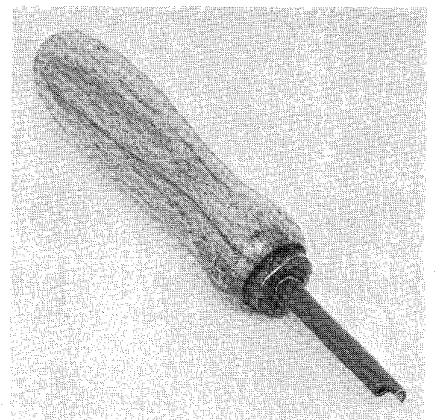
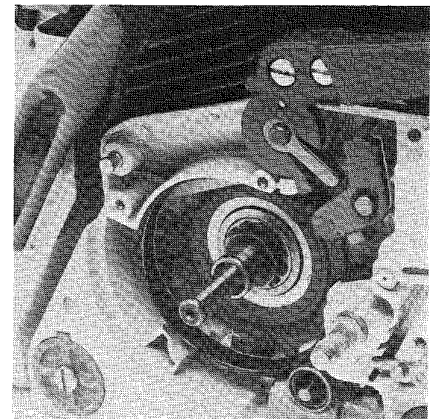


end of brake band in its seat in the crankcase and insert pivot pin of brake lever in the loop of the brake band. Fit washer, helical spring and washer on the pivot pin of the brake lever. Push lever onto pivot pin and locate pin in slot of release plate at the same time. Now secure brake lever with retaining washer and attach the tension spring using the special assembly tool.

Top:  
Brake band and brake lever in position

Center:  
Special assembly tool  
1117 890 0900

Bottom:  
Attaching the tension spring



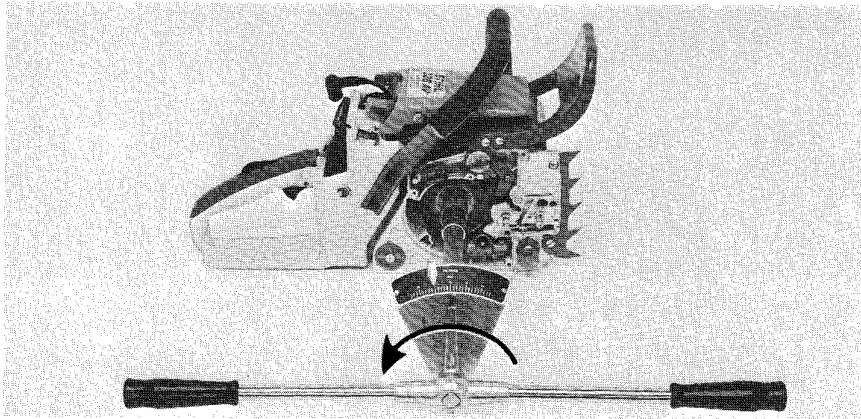
First fit the relay lever, actuating lever and handguard. The ends of the torsion spring must engage in the hole in the crankcase and the actuating lever. The M5x12 cheese-head screws must be secured with LOCTITE.

Now fit release plate in crankcase so that its slots locate over the guide pins. Fit washer, helical spring, washer and retaining washer on the guide pins in that order. Locate bent

## 2.4.2 Clutch

Top:  
Tightening the hub with a torque wrench

Bottom:  
Flat spring fitted on spider lugs



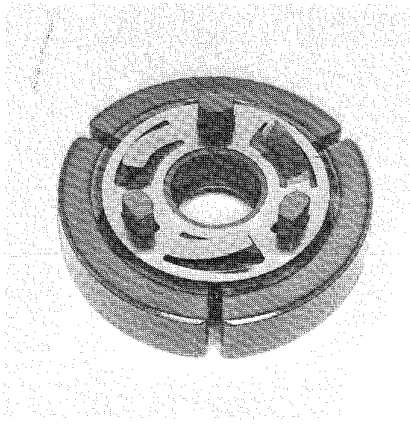
First degrease the threads on the crankshaft and hub (Quickstop) or clutch spider (standard) with a suitable solution (trichlorethylene, diluted nitro or similar).

The initial assembly operations are different on the Quickstop and standard versions.

On the **Quickstop version**, fit the flange washer on the crankshaft, screw hub counter-clockwise onto the crankshaft and tighten to a torque of 49.0 Nm (5.0 kpm) using the special socket 1118 893 1300 and a torque wrench.

**It is essential to observe the specified torque as the hub may otherwise loosen during operation.**

Engage the driving plate on the teeth of the hub. The chain brake must be in the released condition during this operation. Fit flat spring on lugs of clutch spider; the raised spring tabs



must face away from the clutch. Now push clutch together with greased needle sleeve onto the hub and turn backwards and forwards until the clutch spider lugs engage in the driving plate. Fit circlip to secure clutch.

On the **standard version**, fit cover plate on the crankshaft so that the raised outer diameter faces away from the crankcase. Screw spider of clutch assembly counter-clockwise

onto the crankshaft and tighten to a torque of 49.0 Nm (5.0 kpm) using a torque wrench with a 19 mm socket.

**It is essential to observe the specified torque as the spider may otherwise loosen in operation.**

The assembly procedure is now the same for both versions.

Lubricate needle sleeve of clutch drum with antifriction grease and fit it on the crankshaft.

Push clutch drum onto crankshaft and needle sleeve and then fit spur gear onto oil pump shaft. Slip ring gear onto hub of clutch drum.

Finish off by fitting cover and chain sprocket; remove the locking screw, fit and tighten down the spark plug.



### 3. ENGINE

#### 3.1 Construction

Series 028 chain saws are powered by an air-cooled, single cylinder two-stroke engine.

The crankcase is a two-part pressure die-casting made of a special magnesium alloy. The two-part drop-forged crankshaft is supported in two deep-groove ball bearings. Two oil seals, in the crankcase at the ignition side and in the ball bearing

at the other side, hermetically seal the crank chamber.

The connecting rod, also drop-forged, is supported on needle cages both on the crankpin and the piston pin. Once the needle cage and the connecting rod have been fitted, the two halves of the crankshaft are pressed together to form a torsionally rigid assembly and then

machine finished. For this reason a **replacement crankshaft can only be supplied complete with connecting rod and needle sleeve.**

Cylinder and piston are made of a special aluminum alloy. The cylinder bore is impregnated in a special process.

#### 3.2 Troubleshooting Chart

First check fuel supply, carburetor, air filter and ignition system before looking for faults on the engine.

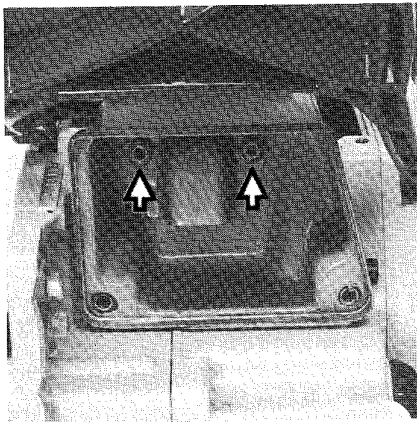
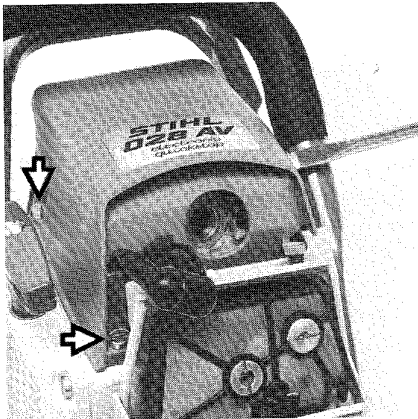
Fault	Cause	Remedy
Engine does not start easily, stalls at idle speed, but operates normally at full throttle	Oil seals in crankcase leaking	Replace oil seals
	Elbow connector leaking	Seal or replace elbow connector
	Crankcase damaged (cracks)	Replace crankshaft
Engine does not deliver full power or runs erratically	Secondary air seepage into engine through poorly mounted or faulty elbow connector	Mount elbow connector correctly or replace
	Piston rings leaking or broken	Replace piston rings
Engine overheating	Insufficient cylinder cooling. Air inlet opening in fan housing blocked or cooling fins on cylinder plugged	Thoroughly clean all cooling air openings



## 3.3 Exposing the Cylinder

Top:  
Removing the shroud

Bottom:  
Unscrewing the muffler

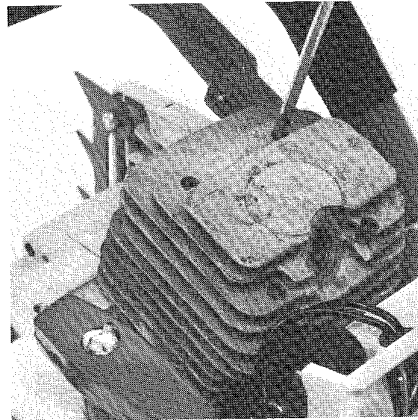


First remove carburetor box cover, unscrew spark plug and take off the shroud and two-part muffler.

The cooling fins of the cylinder are now easily accessible and can be cleaned thoroughly. Check for damage (cracks, broken cooling fins, etc).

## 3.4 Disassembly of Cylinder and Piston

Removing the cylinder base screws



Drain fuel and oil tanks. Remove the carburetor (see 10.4) and unscrew the four cylinder base screws. Carefully pull the cylinder off the piston and press the elbow connector forwards and out of the tank housing.

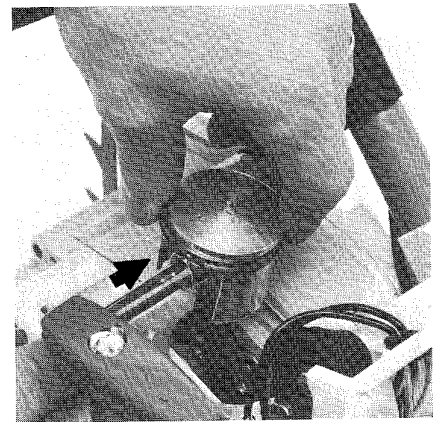
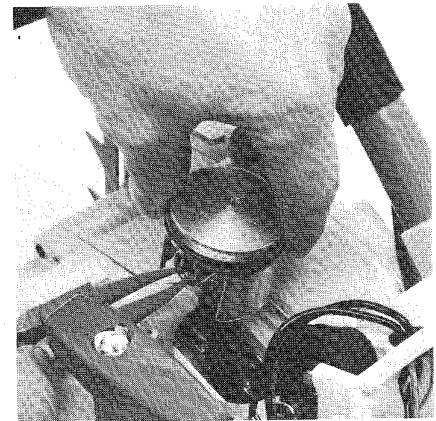
Before removing the piston it must be decided whether or not the crankshaft is to be removed, i.e. the wooden block used to lock the crankshaft – to facilitate removal of the flywheel and hub (Quickstop) or clutch spider (standard) – must be fitted between the crankcase and the piston.

To remove the piston, first take out the two wire retainers and press the piston pin out of the piston and needle cage by means of drift 1110 893 4700.

If the piston pin is stuck as a result of carbonization, tap it out lightly with a hammer and the drift. It is

Top:  
Removing the wire retainers

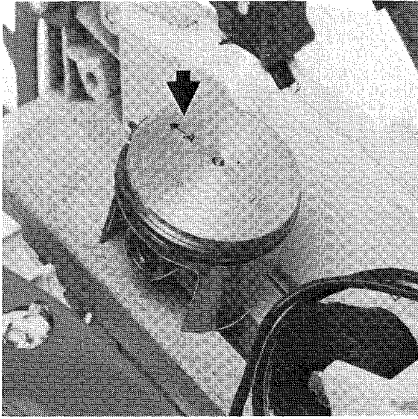
Bottom:  
Pushing out the piston pin



essential to counterhold the piston to insure that no jolts are transmitted to the connecting rod. Remove the piston.

### 3.5 Reassembly of Piston and Cylinder

Arrow and "A" point towards exhaust port

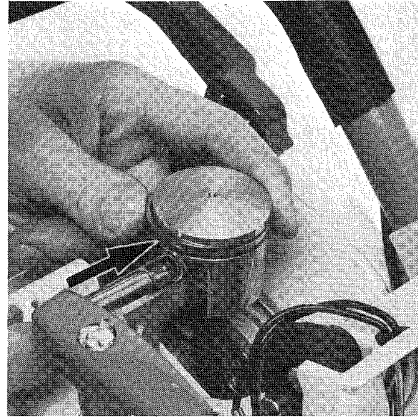


If the cylinder has to be replaced the new cylinder must always be installed with a matching piston. Replacement cylinders are only supplied complete with piston.

If only the piston is to be renewed, every replacement piston (marked "B") can be used with any cylinder.

Before installing the piston, lubricate the needle cage with oil and insert it in the connecting rod. Position piston on connecting rod so that the stamped markings (arrow and A) point towards the cylinder exhaust port (towards tip of guide bar). Now fit piston pin in piston and connecting rod (needle cage). To do this, push assembly drift through piston bore and connecting rod to align both bores concentrically. Fit piston pin on spigot of assembly drift and slide into piston. Gently move piston to and fro to ease insertion of piston pin.

Fitting the piston pin



**The piston pin must move freely in its bore. Never use force during assembly.**

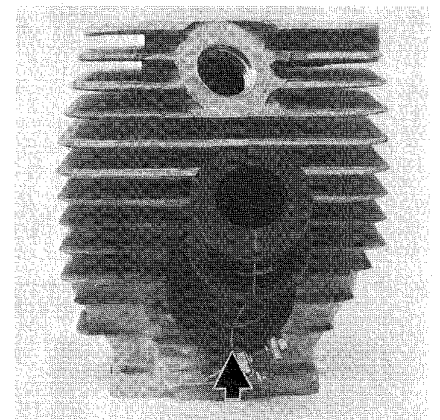
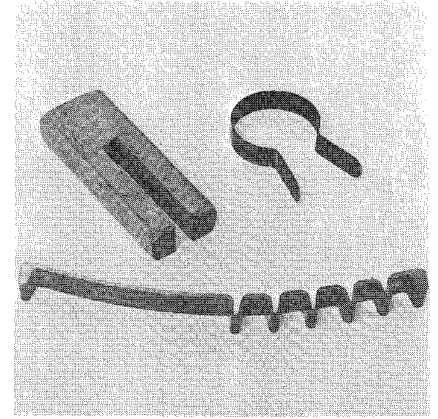
Insert the two wire retainers and make sure that they are properly seated.

Mounting of the cylinder is best carried out using the wooden assembly block and the ring compressor 1113 893 4900 or clamping strap 0000 893 2600.

The elbow connector must be fitted if a new cylinder is used. To insure a perfect seal, coat the inside of the elbow connector's neck with sealing paste 0783 810 1101. Fit elbow connector on the intake stub so that it faces upwards (towards cylinder head) and the moulding seam is vertical (parallel with cylinder center line). Then secure elbow connector

Top:  
Wooden assembly block, ring compressor and clamping strap

Bottom:  
Elbow connector in position

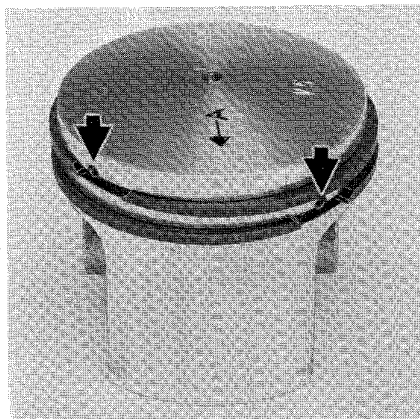
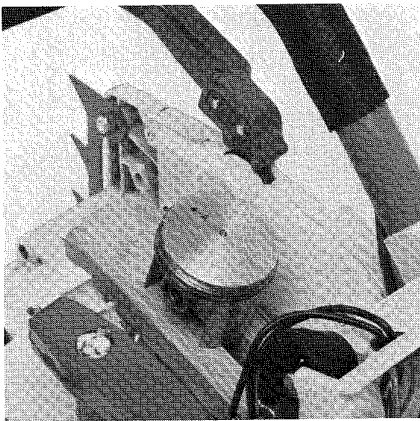


with hose clamp, making sure that the clamp is correctly seated and does not distort the elbow connector when tightened down.



Top:  
Piston on wooden assembly block

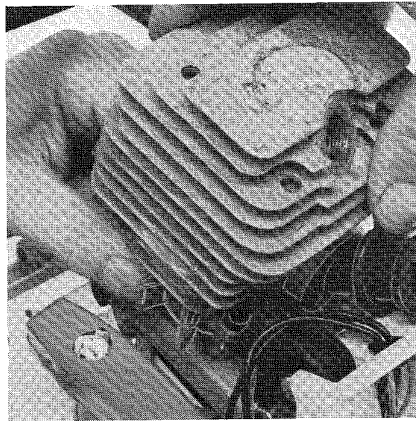
Bottom:  
Piston rings correctly positioned



Fit new cylinder gasket on the crankcase. Lubricate piston and piston rings with oil. Place wooden block on the crankcase so that piston is resting on it.

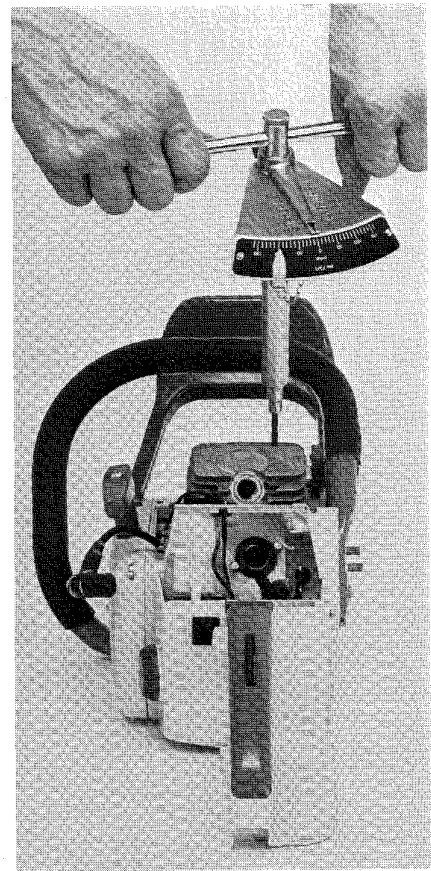
Position each piston ring so that the radii at the ring gaps locate against their respective fixing pins in the piston grooves.

Fitting the cylinder



Insert the four M 5 x 16 socket head screws in the cylinder mounting holes. Using the ring compressor or clamping strap, compress the piston rings while making sure they are correctly positioned. Fit cylinder over the piston with the exhaust port facing in the direction of the guide bar tip. During this process make sure that the cylinder is properly aligned, i.e. the outer edges of the cooling fins must be exactly parallel with the outer edge of the crankcase at the sprocket side. If this alignment is not carried out, the piston rings may break. The ring compressor is pushed downwards as the piston rings move into the cylinder. Remove wooden assembly block and ring compressor. Push flange of elbow connector through the bore in the tank housing (do not use a sharp tool for this purpose) and align the cylinder gasket and cylinder. Tighten down the four cylinder base screws to a torque of 7.8 Nm (0.8 kpm) in a diagonal pattern.

Tightening cylinder base screws with torque wrench



Insert sleeve in elbow connector and then refit carburetor (see 10.4), muffler, shroud, spark plug and carburetor box cover.

**BUY NOW**

**Then Instant Download  
the Complete Manual  
Thank you very much!**