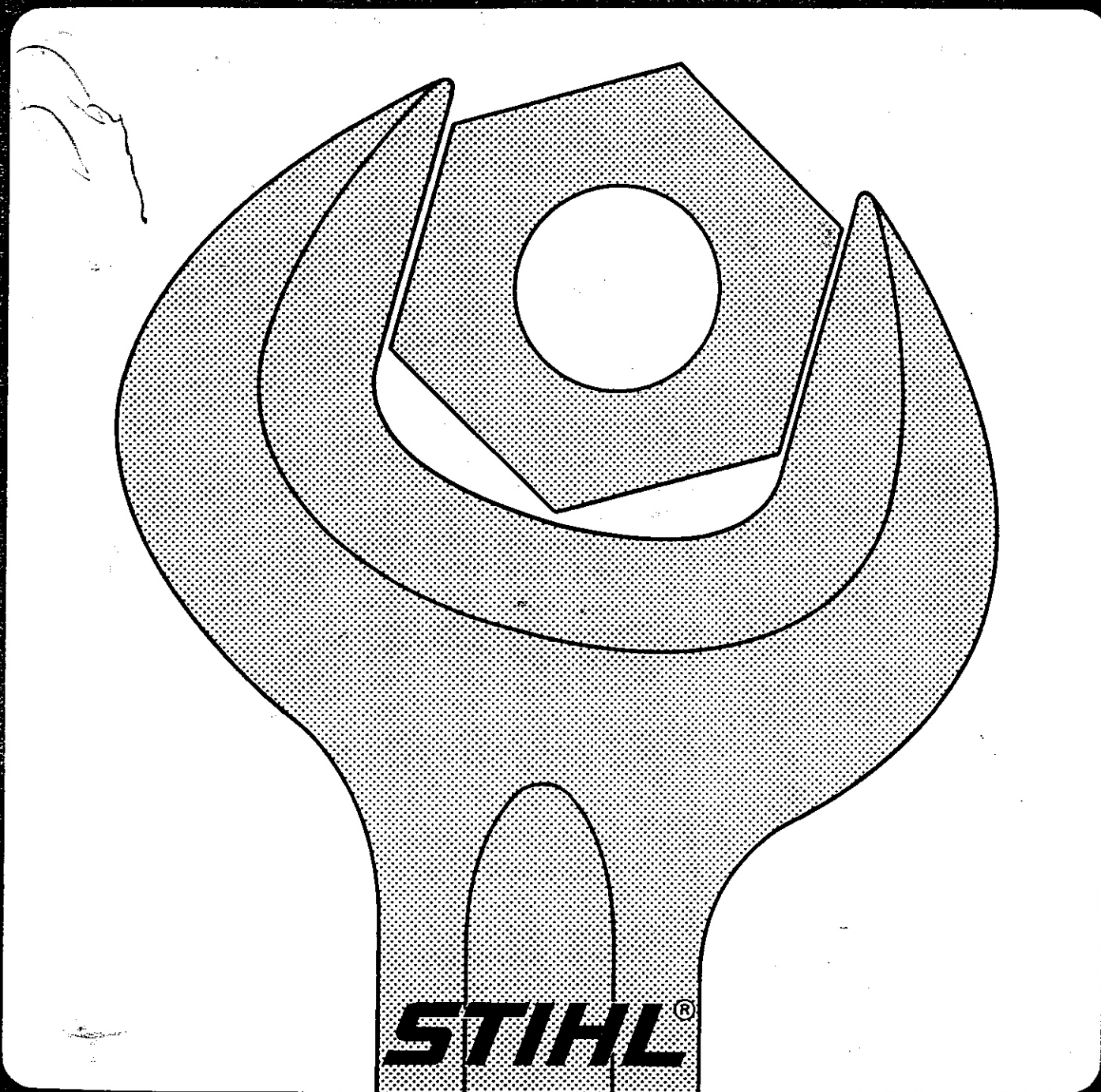
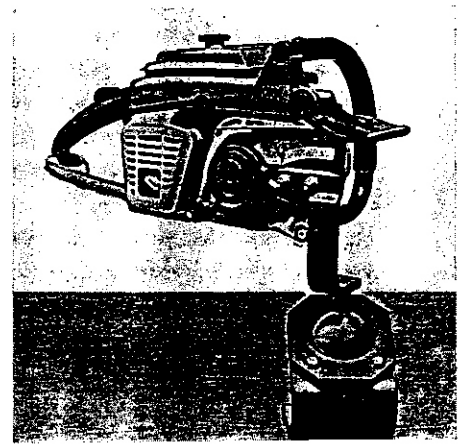
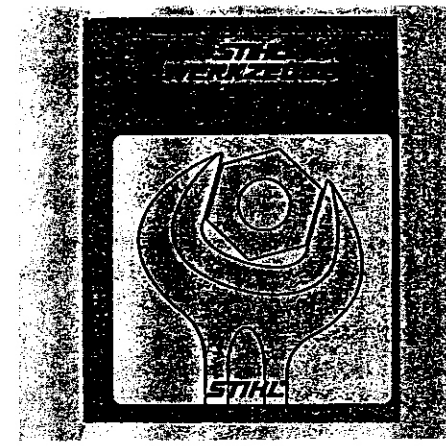
STIHL 041



PREFACE

This service manual deals with the STIHL 041 AV and 041 AV electronic chain saws from machine No. 2768500 onwards. The manual is also generally applicable to 041 and 041 Farm Boss models. However, it is advisable to consult the illustrated parts lists in the case of repairs to the hand grip, handlebar or throttle mechanism.





In the event of faults it is quite possible that a **single fault can have several causes.** It is therefore advisable to consult the "Trouble Shooting Chart" at the beginning of each chapter when tracing faults.

Our "Technical Information" bulletins give details of engineering changes which have been introduced since publication of this service manual.

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.
This 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
Jugoslav	0455 901 0423
Swedish	0455 901 0523
Italian	0455 901 0723
Portuguese	0455 901 1223

STIHL®

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SPECIFICATION

Subject to change without notice

Engine

STIHL single cylinder two-stroke engine with special impregnated cylinder barrel

Displacement:	61 cm^3
Cylinder bore:	44 mm
Piston stroke:	40 mm
Compression ratio:	9.5:1
Power output:	approx. 2.7 kW (3.7 DIN HP) at 7500 rpm to DIN 70020
Max. torque:	3.8 Nm (0.390 kpm) at 5000 rpm
Max. permissible engine speed:	11000 rpm
Mean idle speed:	2400 rpm
Crankshaft:	two-part
Crankshaft bearings:	Deep-groove ball bearings
Piston pin:	10 mm dia.
Piston pin bearing:	Needle cage
Rewind starter:	Friction shoe system with automatic starter rope rewind mechanism. Half-throttle lock button as starting aid
Starter rope:	4.5 dia x 1000 mm
Crankcase leakage test:	Test pressure (gauge) 0.5 bar (kp/cm^2) Test pressure (vacuum) 0.2 bar (kp/cm^2)

Clutch

Centrifugal clutch with press-fitted 69 mm dia. linings

Clutch engages at: 2900 rpm

Chain brake

Isolating clutch and spring-loaded shoe brake

Fuel system

Carburetor:	All-position diaphragm carburetor with integral fuel pump
High-speed adjustment screw H:	Open $^3/_4$ to $^7/_8$ of a turn
Low-speed adjustment screw L:	Open 1 to $1^1/_4$ turns
(Basic adjustment with screws initially hard against their seats)	

	Carburetor leakage test:	Test pressure (gauge) 0.5 bar (kp/cm^2)
	Fuel tank capacity:	0.62 l (620 cm^3)
	Fuel mixture:	Mixing ratio 1 : 25 (1 part oil to 25 parts gasoline) when using two-stroke engine oil; or 1 : 40 for STIHL two-stroke engine oil
	Air filter:	Flocked wire mesh filter
	Oil tank capacity:	0.25 l (250 cm^3)

Ignition system 041 and 041 AV

Breaker-controlled magneto; completely encapsulated

Magneto edge gap:	6 . . . 9 mm	
Air gap:	0.2 . . . 0.3 mm	
Ignition point:	2.4 . . . 2.6 mm before T.D.C.	
Ignition advance angle:	26°	
Breaker point gap:	0.4 mm	
Condenser:	Capacitance 0.15 . . . 0.19 μF	
Ignition armature:	Resistors, primary winding, secondary winding	
Bosch No. 2 204 211 052		
Bosch No. 2 204 211 069 and		
Bosch date code 523	1.9 . . . 2.5 Ω	5.0 . . . 6.7 kΩ
From Bosch date code 524	1.2 . . . 1.7 Ω	5.0 . . . 6.7 kΩ

Ignition system 041 AV electronic

1. **Bosch** electronic (breakerless) ignition system

Air gap:	0.2 . . . 0.3 mm
Ignition point:	2.5 mm before T.D.C. at 6000 rpm

2. **SEM** electronic (breakerless) ignition system

Air gap:	0.2 . . . 0.3 mm
Ignition point:	2.5 mm before T.D.C. at 6000 rpm

Ignition armature:	Resistors, primary winding, secondary winding	
(1110 404 3210 – SEM No. 100 480 00)	0.4 . . . 0.5 Ω	2.7 . . . 3.3 kΩ

	Spark plug:	Bosch WSR 6 F Champion RCJ 6Y Heat range 175 Electrode gap 0.5 mm
	Spark plug thread:	M 14 × 1.25; 9.5 mm long
Tightening torques for bolts and nuts	Crankshaft nut –	
	Ignition side:	21.7 lbf. ft (29.4 Nm)
	Sprocket side:	21.7 lbf. ft (29.4 Nm)
	Cylinder base screws:	5.1 lbf. ft (6.8 Nm)
	Spark plug:	18.1 lbf. ft (24.5 Nm)
	Countersunk screws M 4:	1.4 lbf. ft (2.0 Nm)
	Cheese-head screws M 4:	1.8 lbf. ft (2.5 Nm)
	Bolts and nuts M 5:	3.6 lbf. ft (4.9 Nm)
Cutting attachment	Guide bars:	Duromatic guide bars with stellite-tipped bar nose: Rollomatic guide bars with star-shaped roller nose
	Bar lengths:	Duromatic 35, 40, 45 and 50 cm Rollomatic 33 and 37 cm
	Chain:	3/8" (9.32 mm) pitch
	Chain speed:	Approx. 16 m/s at 7500 rpm
	Chain lubrication:	Fully automatic oil pump with pump plunger governed by engine speed
	Max. oil delivery rate:	14 cm^3 at 6000 rpm
	Min. oil delivery rate:	4 cm^3 at 6000 rpm
	Average oil delivery rate:	9 cm^3 at 6000 rpm
	Chain sprocket:	7-tooth for 3/8" pitch
Weight of saw	With 33 cm cutting attachment:	Approx. 7.5 kg
Special accessories	STIHL rescue kit 1110 900 5011 (kit of important replacement parts) **Gasket set 1110 007 1050** **Chain brake conversion kit 1110 007 1003**	

CLUTCH AND CHAIN DRIVE

Construction and Principle of Operation

The transmission of power from the engine to the saw chain is effected via a centrifugal clutch. This clutch consists of a spider, 3 clutch shoes, 3 tension springs and a needle cage which supports the chain sprocket and clutch drum. Washers are fitted in front of and behind the clutch to guide the clutch shoes.

As engine speed increases, centrifugal force presses the clutch shoes outwards and against the clutch drum and thus transmits engine power (torque) positively via the chain sprocket to the saw chain.

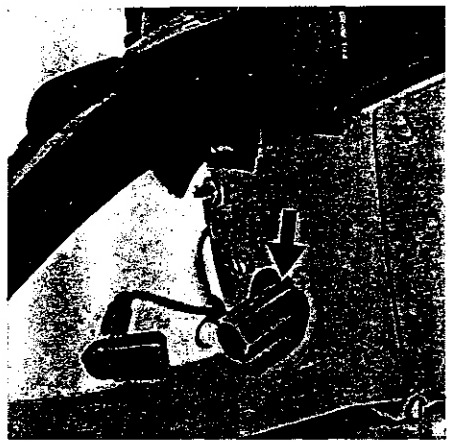
The preload and strength of the tension spring are designed so that the clutch shoes begin to make contact with the clutch drum at an engine speed of approx. 3000 rpm. The clutch engages fully above this speed.
It is therefore necessary to adjust the carburetor (see carburetor adjustment) so that the chain does not rotate at engine idle speed.

The clutch of the STIHL 041 is maintenance free but subject to normal wear and should, therefore, be inspected at regular intervals for signs of wear or damage.

Trouble Shooting Chart

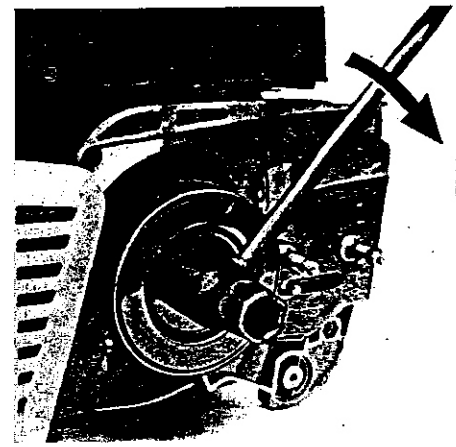
Fault	Cause	Remedy
Insufficient frictional contact, clutch slips Saw chain does not rotate at high engine speed	Clutch linings worn	Replace all clutch shoes
	Clutch linings and drum are smeared (with oil)	Wash clutch in clean gasoline, roughen linings with emery cloth, clean inside of clutch drum
Saw chain runs at idle speed	Engine idle speed too high	Readjust at idle adjustment screw
Extraneous noises	Springs are stretched or fatigued; spring hooks broken	Replace all springs
	Needle cage damaged	Replace needle cage
Excessive chain wear	Incorrect chain tension	Replace chain sprocket
	Worn chain sprocket	Tension saw chain properly

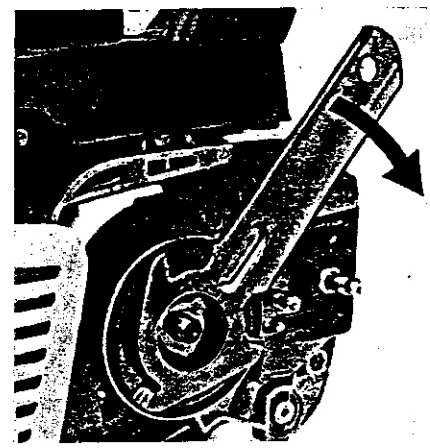
Locking screw in position



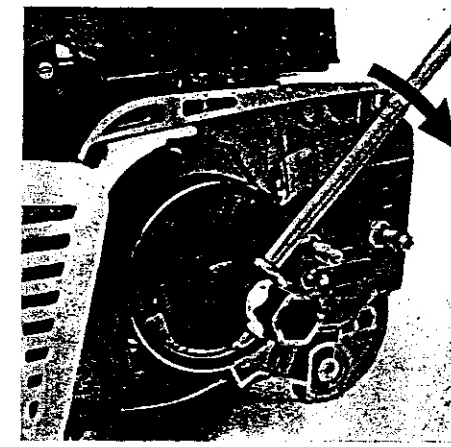
Top:
Releasing hexagon nut

Bottom:
Releasing clutch by way of clutch spider





Releasing clutch by means of integral hexagon head



First remove chain sprocket cover. Unscrew spark plug and fit locking screw 1107191 1200 in the spark plug hole. Fit combination wrench — 21 mm up to Machine No. 8731699 or 19 mm from Machine No. 8731700 onwards — on hexagon nut and turn the crankshaft clockwise until the piston crown locates against the locking screw and the crankshaft is blocked. The hexagon nut on the crankshaft can now be unscrewed. The hexagon nut and washer were phased out as from Machine No. 9647305 and replaced by clutch spider 1113162 3205 with integral 19 mm hexagon head.

Caution: The hexagon nut has a left-hand thread — unscrew it clockwise. A washer is fitted on both sides of the clutch to guide the clutch shoes.

These washers have a center recess and must be installed so that the recess locates against the clutch spider. The front washer is larger in diameter in order to protect the clutch against the ingress of dirt.

After unscrewing the hexagon nut and taking out the front washer, remove clutch with special clutch wrench. The second washer, clutch drum, needle cage and cover plate can now be removed from the crankshaft.

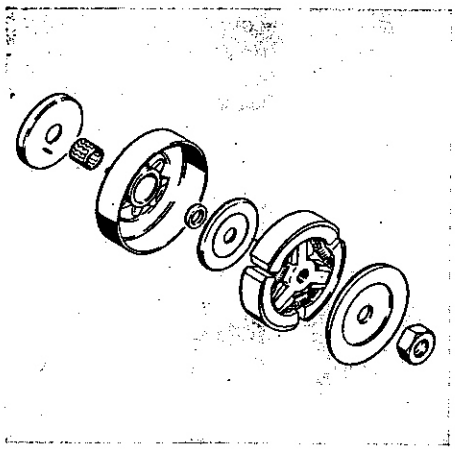
Wash all parts of the clutch, including the clutch drum and needle cage, in clean gasoline and blow out with compressed air if available. Roughen friction faces of clean clutch linings with emery cloth.

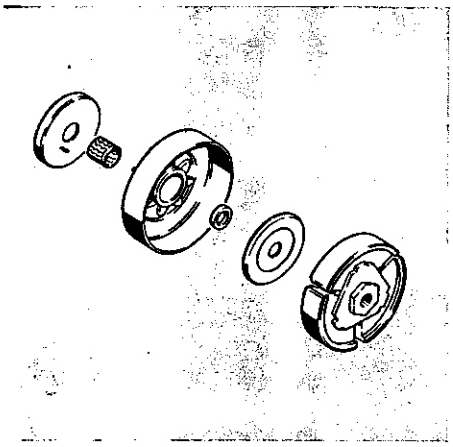
Always replace damaged or worn parts. Clutch shoes and tension springs must always be replaced in **complete sets.**

Reassembly

Top:
Component parts of early type clutch

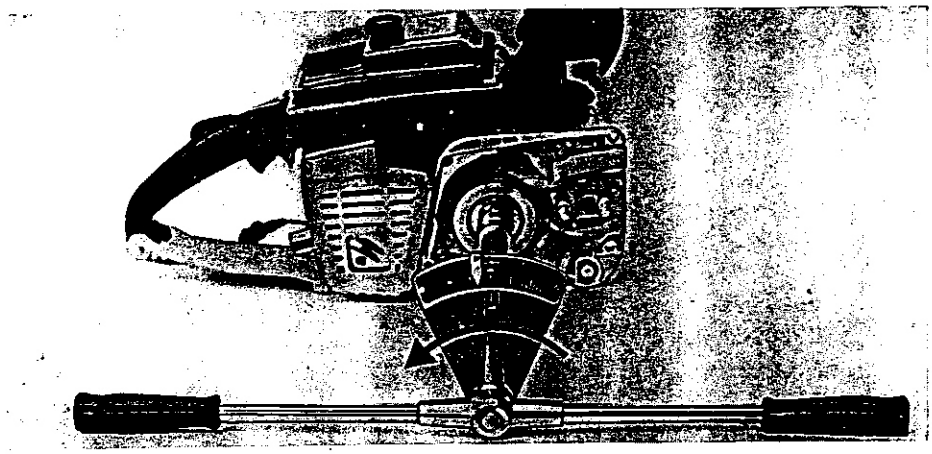
Bottom:
Component parts of new type clutch

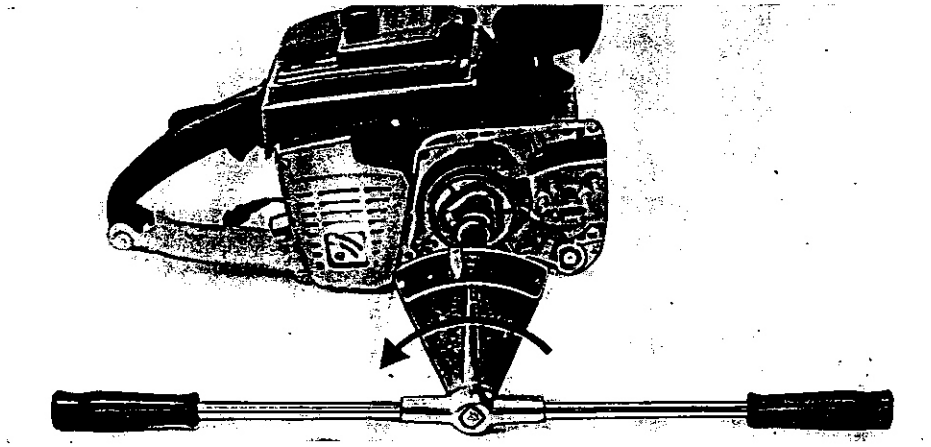




Top:
Tightening the hexagon nut

Bottom:
Tightening the clutch spider





When assembling, first fit cover plate on the crankshaft so that the cylindrical pin engages in the bore of the oil pump worm. Lubricate needle cage with anti-friction bearing grease and slide it on to crankshaft. Before fitting the chain sprocket, check whether it is still serviceable. If the scores on the teeth are deeper than approx. 0.5 mm, a new chain sprocket must be installed. A worn chain sprocket will reduce saw chain service life. Now fit the smaller washer on the crankshaft so that the outer diameter of the recess faces the crankcase.

Screw on clutch counterclockwise and tighten down with special clutch wrench. Now fit the large front washer. Screw on hexagon nut counterclockwise and tighten to a torque of 29.4 Nm (3.0 kpm) with torque wrench.

On clutches with integral hexagon head, the tightening torque is 39.2 Nm (4.0 kpm).

Remove locking screw from spark plug hole and refit spark plug. Fit cutting attachment and chain sprocket cover.

CHAIN BRAKE

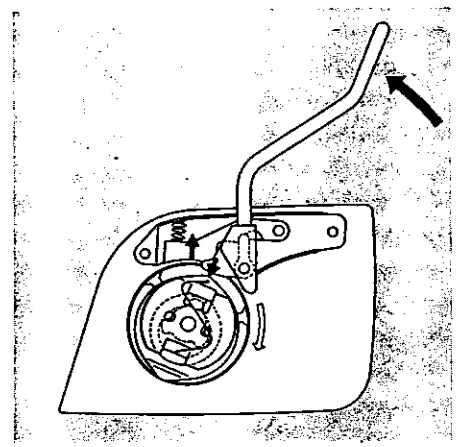
Construction and Method of Operation

This chain brake system basically consists of a chain sprocket cover assembly with cover plate, actuating lever with cam, brake shoe and two compression springs, which is coupled to the hand guard via the actuating lever. This assembly also includes the chain sprocket with clutch drum, centrifugal clutch with special clutch spider, driving plate as well as shift plate and locking ring – the last three parts are held together by a spring.

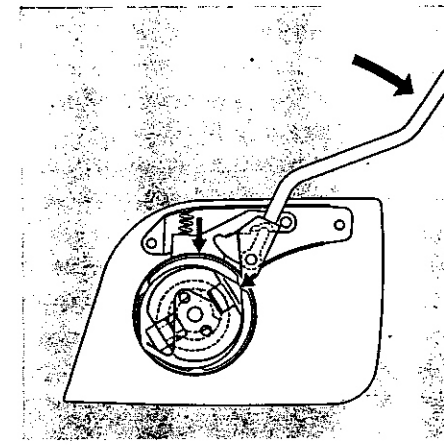
The great advantage of the STIHL chain brake is that the clutch is disengaged from the engine when the brake is actuated. In this system therefore the driving plate of the chain brake is bolted to the crankshaft and not the spider of the centrifugal clutch. The centrifugal clutch itself is mounted on the hub of the driving plate and can therefore freewheel independent of the crankshaft when the brake is actuated. The shift plate and locking ring are also located on the hub of the driving plate and cause the clutch to be engaged or disengaged from the driving plate.

There is a slotted recess in the side of the hand guard in which the actuating lever engages. When the hand guard is pulled back towards the handle bar to release (reset) the brake, the cam on the end of the actuating lever lifts the brake shoe – preloaded with two compression springs – away from the clutch drum. At the same time it restores the connection between the driving plate and the spider of the centrifugal clutch via the eccentric shift plate, i. e. the coupling is again connected to the engine.

Chain brake released



Chain brake engaged

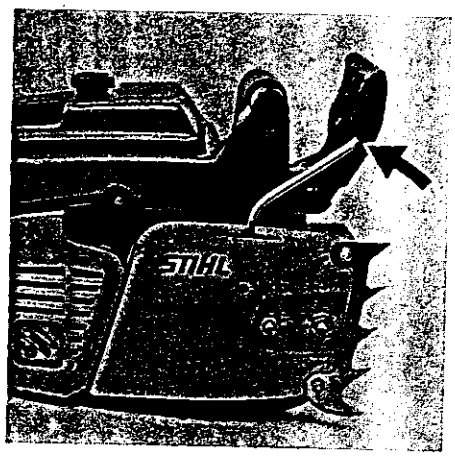


The chain sprocket and chain are set in motion when the engine reaches a certain speed, the chain stops at idle speed.

If the operator's hand slips and pushes the hand guard forwards, e. g. if the cutting attachment kicks back, the actuating lever instantaneously triggers the brake mechanism. The shift plate and locking ring disengage the centrifugal clutch even at maximum engine speed. At the same time the compression springs in the chain sprocket cover press the brake shoe against the clutch drum of the freewheeling chain sprocket. The saw chain is thus brought to a standstill within a fraction of a second while the engine continues to run unhindered.

The chain brake must be released (reset) with the engine running at idle speed. However, in order to avoid the brake being accidentally released at higher engine speeds, a spring-loaded locking ring has been installed as a speed inhibitor which prevents premature engagement. The brake can only be released (reset) and the clutch therefore engaged at a speed below 3500 rpm.

Handguard to rear



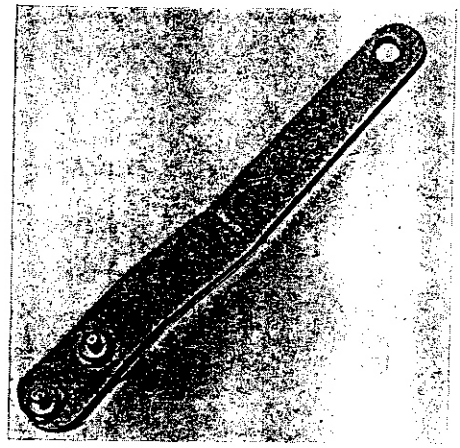
Release the chain brake by pulling the handguard back against the handlebar. This must be done or it will not be possible to disassemble the chain sprocket cover. See Chapter "Clutch and Chain Drive", page 6, for removal of chain sprocket cover, unscrewing the spark plug and blocking the crankshaft.

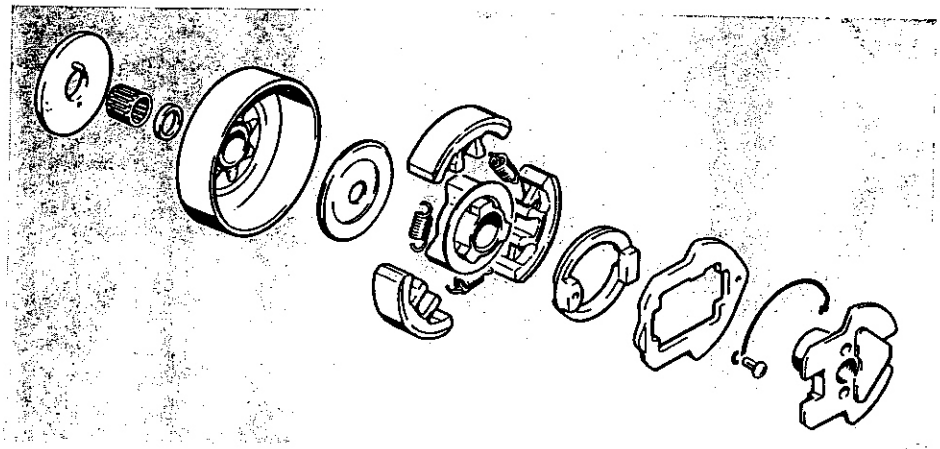
Unscrew the driving plate with face wrench 11138903600. Please note that the crankshaft has a **left-hand thread** at the clutch side and the plate must be unscrewed in the clockwise direction.

The driving plate, shift plate and locking ring (held together by a spring), clutch, rear washer, chain sprocket with clutch drum, ring, needle cage and cover plate can now be taken off the crankshaft in that order.

Top:
Face wrench

Bottom:
Component parts of clutch and chain brake





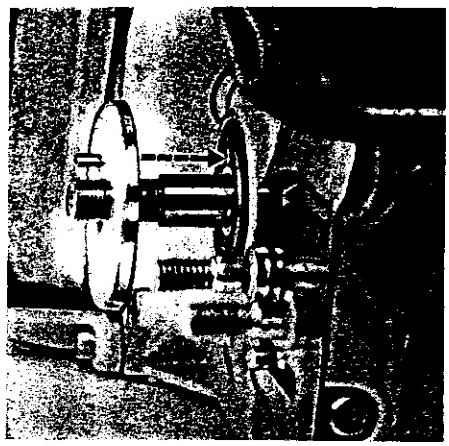
Clean all parts thoroughly, i. e. first wash in clean gasoline, blow dry with compressed air and inspect for signs of wear. Damaged or worn parts on the chain brake or clutch must always be renewed.

Clutch shoes and tension springs must always be replaced **in sets.** Roughen the surface of the clutch linings with emery cloth. See Chapter "Clutch and Chain Drive", page 6.

Unscrewing the driving pate

Assembly

Cylindrical pin of cover plate in oil pump



Before assembling in the reverse sequence, check condition of cylindrical pin in cover plate. Push cover plate on to crankshaft, making sure that the cylindrical pin engages in the bore of the oil pump worm.

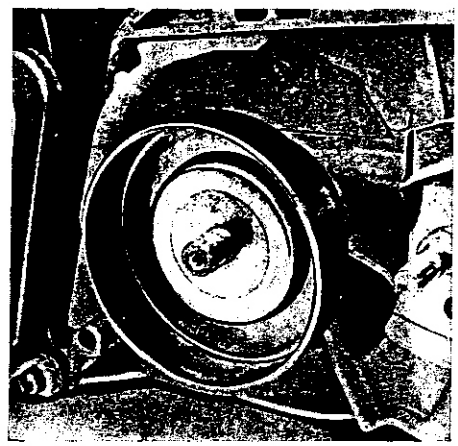
Lubricate the needle cage, ring, chain sprocket with clutch drum and washer and refit. The washer must locate against the clutch spider in order to guide the clutch shoes. The recess on the outer diameter must therefore face towards the crankcase. Fit assembled clutch on the hub of the driving plate so that the press fitted washer on the spider locates against the locking ring.

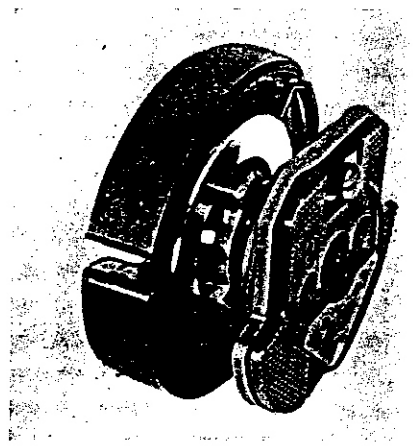
Screw driving plate with clutch on to crankshaft – counterclockwise (left-hand thread) – and tighten down with face wrench.

It is important to ensure that the shift plate and locking ring move freely

Top:
Washer correctly located in clutch drum

Bottom:
Driving plate with clutch fitted



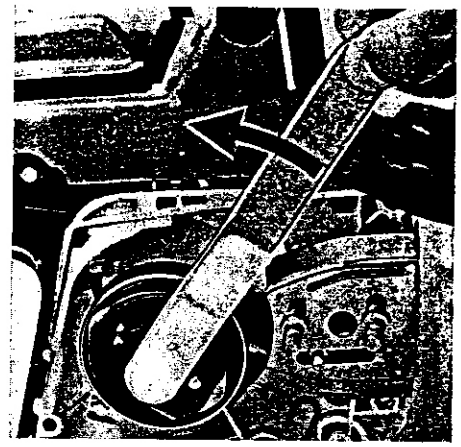


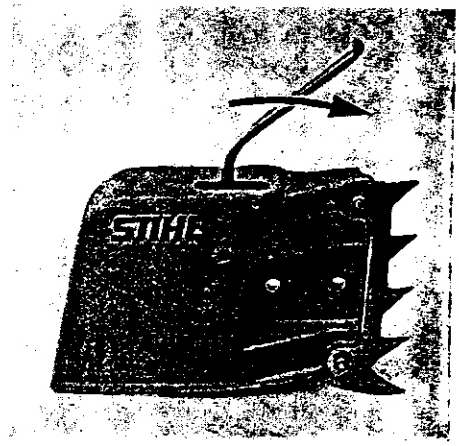
in the installed condition and the centrifugal clutch is free to rotate when the locking ring is disengaged.

The actuating lever with cam and the brake shoe housed in the chain sprocket cover are subject to normal wear. These parts should therefore be checked for signs of wear at regular intervals. With the chain sprocket cover removed, first move the actuating lever forwards, i. e to-

Top:
Tightening the clutch spider

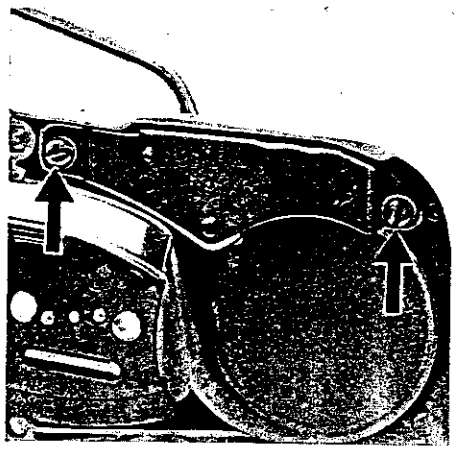
Bottom:
Actuating lever in forward position





wards the bumper spike, so that the two compression springs on the brake shoe are relieved of load.

Remove the screws from inside of sprocket cover



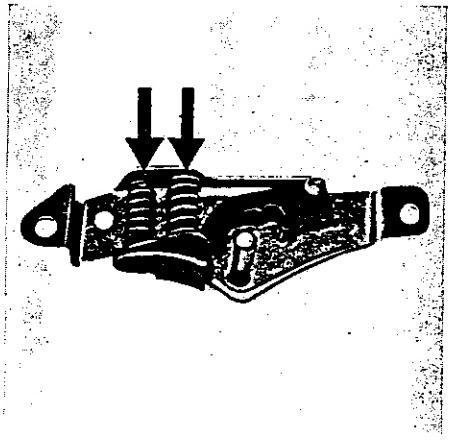
Then remove the two screws on the inside of the chain sprocket cover which secure the cover plate. Using a drift applied to the cam's bearing pin, drive the cover plate out of its seat in the chain sprocket cover by tapping lightly with a hammer.

The actuating lever with cam and the brake shoe with the two compression springs can now be removed. Replace any unserviceable parts. Lubricate cam of actuating lever with a little anti-friction grease and reassemble the parts in the reverse sequence.

Important: The compression spring with the smaller diameter is fitted on the outer edge of the brake shoe and the larger spring in the recess above the brake lining.

Top:
Drive cover plate off seat with a drift

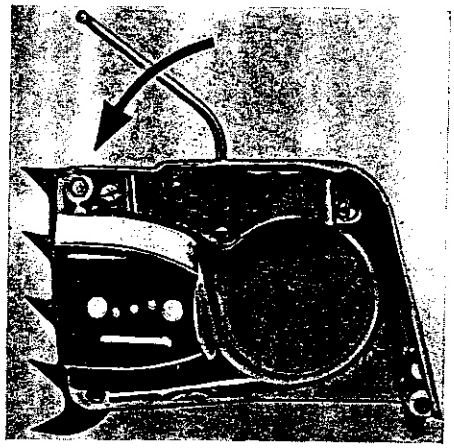
Bottom:
Correctly positioned compression springs

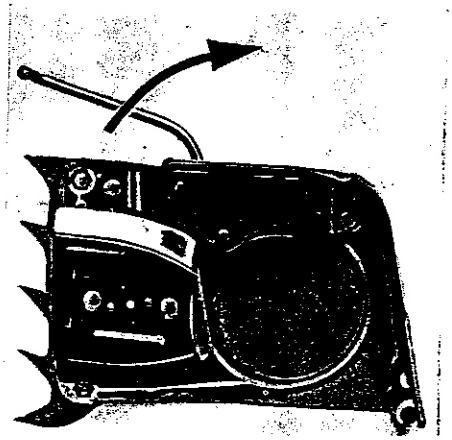


Apply the riveted bearing pins of the cover plate to the bores in the chain sprocket cover and drive into position. Coat cover plate screws with LOCTITE and screw into position. The cam actuating lever must now be moved backwards, away from the bumper spike, so that the chain sprocket cover can be fitted over the clutch drum. Engage the actuating lever in the handguard at the same time. Secure chain sprocket cover with 13 mm hexagon nuts.

Top:
Cam actuating lever forwards, brake shoe engaged

Bottom:
Cam actuating lever to rear



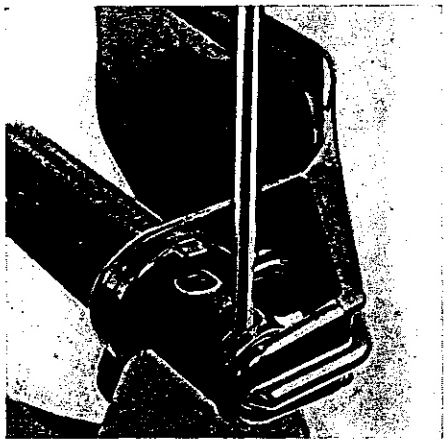


Remove locking screw from spark plug hole, refit spark plug and ignition lead terminal.

Chain Brake Conversion Kit

Mounting the Chain Brake

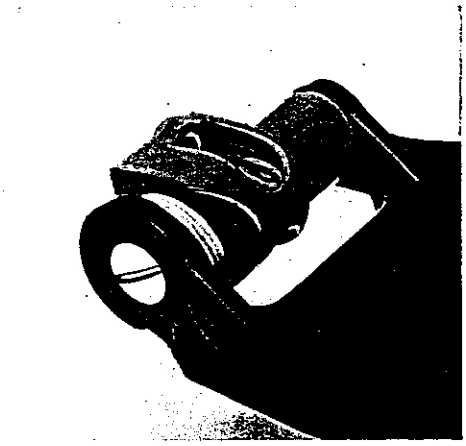
Remove cheese head screws on handle bar



Torsion spring on inner stub of hand guard

Top:
Support and torsion spring fitted on hand guard

Bottom:
Mounting on handle bar



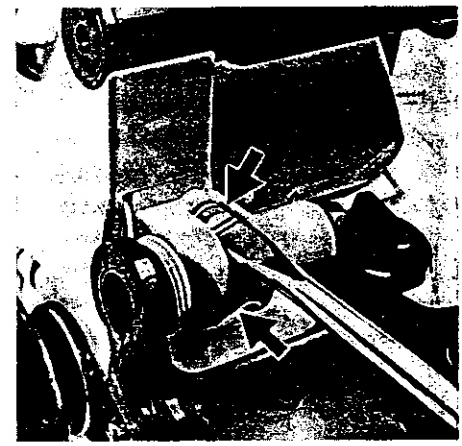
If a STIHL 041 AV electronic chain saw is to be retrofitted with a chain brake, the conversion kit 1110007 1003 should be used. This kit contains all exchange and new parts which are required for the conversion. However, conversion is only possible from Machine No. **8055700.**

To remove the handguard, unscrew the two cheese head screws at the upper end of the handle bar. Lift handle bar slightly and slide off the handguard. Refit the screws and secure handle bar in position.

Take handguard, support, torsion spring, one oval head and two cheese head screws out of conversion kit. Fit torsion spring over the right-hand stub on the inside of the handguard and engage one leg in the hole provided. Push support on to left-hand guide stub of handguard and locate in position. Fit oval head screw at side of handguard to secure the support. Locate the other end of the torsion spring in the recess on the handle bar frame, hold support in position and secure with the two cheese head screws.

See Chapter "Clutch and Chain Drive", page 6, for removal of centrifugal clutch.

Of the parts of the centrifugal clutch removed, the cover plate 1110030 7500, needle cage 9512003 3000 and washer 1110162 8900 are used again. Make sure that washer 1110162 8900, which locates against the spider between the clutch drum and the clutch to guide the clutch shoes, is correctly installed – the flat side must face the clutch spider. After fitting the greased needle cage the supplementary ring 0000961 1001, included



in the conversion kit, must be fitted over the crankshaft and against the needle cage before mounting the chain sprocket.

Continue assembly as described in Chapter – "Chain Brake" – "Assembly".

ENGINE

Construction

The Type 1110 Chain Saw is powered by a single cylinder, air-cooled two-stroke engine.

The crankcase is a two-part pressure diecasting 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 hermetically seal the crank chamber.

The connecting rod, also drop-forged, runs on needle cages both on the crank pin and the piston pin. Once the needle cage and the connecting rod have been fitted, the two halves of the crankcase 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 cage.** Cylinder and piston are made of a special aluminum alloy.

Trouble Shooting Chart

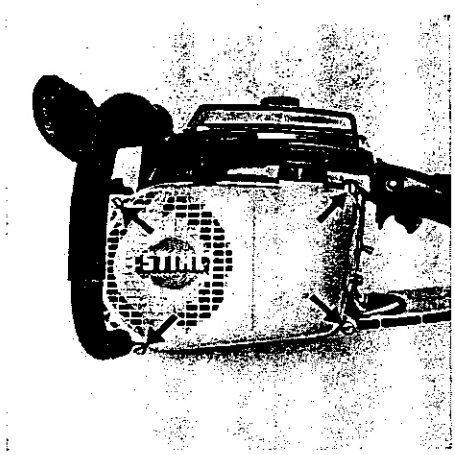
First check fuel and supply, carburetor, air filter and ignition system before looking for faults on the engine.

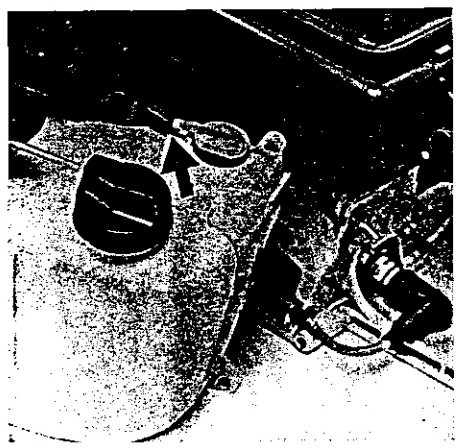
Fault	Cause	Remedy
Engine does not start easily, stalls at idle speed, but operates normally at full throttle	Oil seals in crankcase leaking	Replace oil seals
	Crankcase damaged (cracks)	Replace crankcase
Engine does not deliver full power or runs erratically	Secondary air seepage into engine through poorly mounted carburetor	Mount carburetor correctly and fit new gasket if necessary
	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

Exposing the Cylinder

Top:
Removing fan housing with rewind starter

Bottom:
Pulling fuel line off nipple

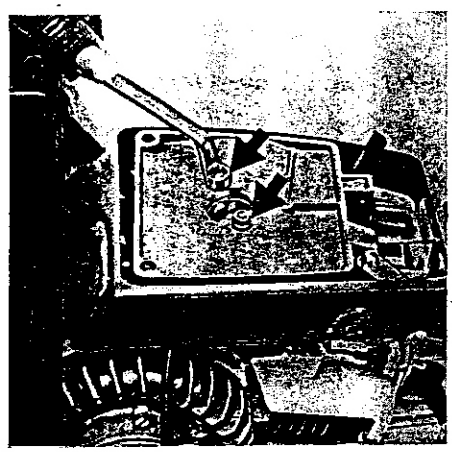


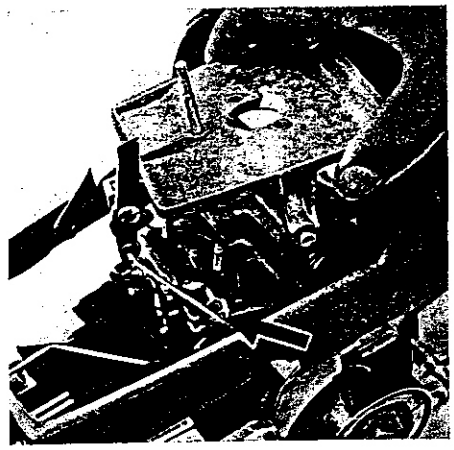


Drain fuel and oil tanks. Remove chain sprocket cover, cutting attachment as well as fan housing with cover and rewind starter, pull fuel line off nipple at the same time. Close choke valve, unscrew filter cover and take off together with air filter.

Top:
Releasing retaining nuts on filter housing

Bottom:
Lifting off filter housing and detaching choke linkage

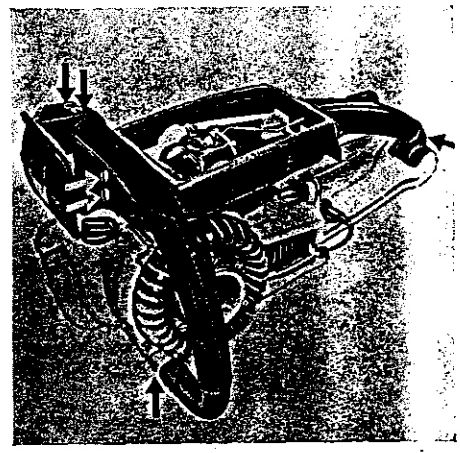


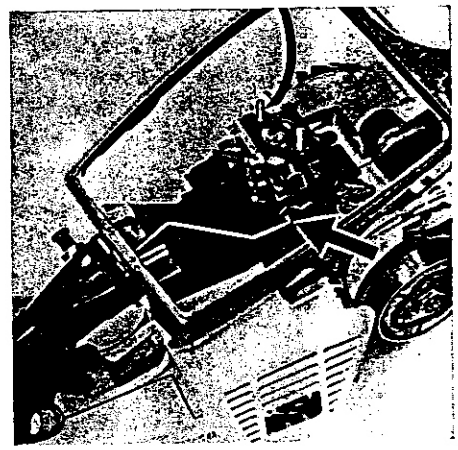


Remove the two retaining nuts securing the filter housing and take out the spacer if fitted. Lift filter housing off the studs and press choke linkage out of choke lever. To detach the handle-bar and handle frame, remove the following screws: 1 socket head screw at the lower left-hand side, 2 at the upper right-hand end of the handlebar, 2 cheese head screws at the front side of the handle frame and 1 screw which connects the handle frame to the support. Detach throttle linkage from throttle lever and then lift off handlebar and handle frame.

Top:
Removing handle-bar and handle frame

Bottom:
Detaching throttle linkage

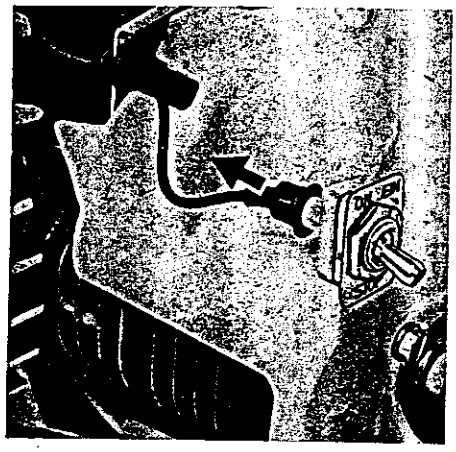


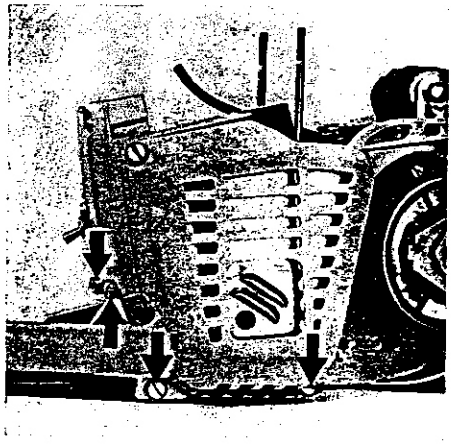


Disconnect pulse hose from carburetor and lift carburetor with insulating plate off the studs.

Top:
Removing ignition stop switch cable and rubber boot

Bottom:
Removing the guard





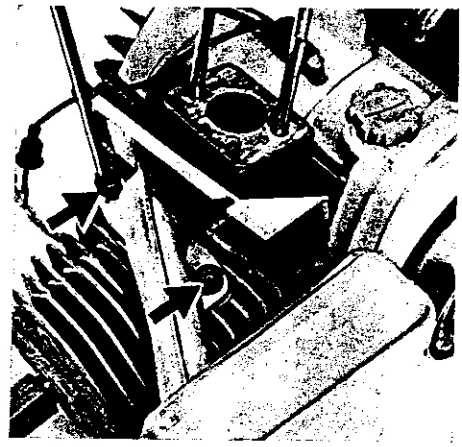
Remove ignition stop switch cable with rubber boot from switch and heat shield. Unscrew 2 cheese head screws from lower muffler mounting and 2 from guard-to-cylinder mounting. Remove guard to the rear.

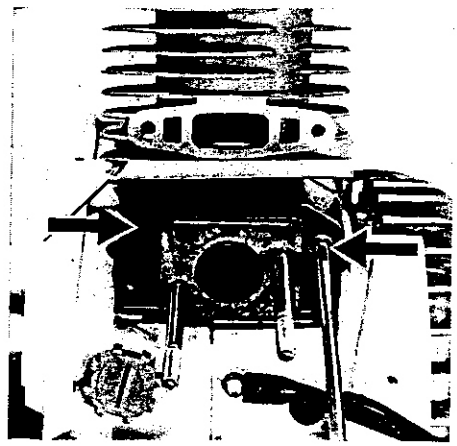
Unscrew the 2 socket head screws securing the muffler to the cylinder and remove the muffler.

Remove spacer flange and heat

Top:
Unscrewing the muffler mounting

Bottom:
Unscrewing heat shield and spacer flange

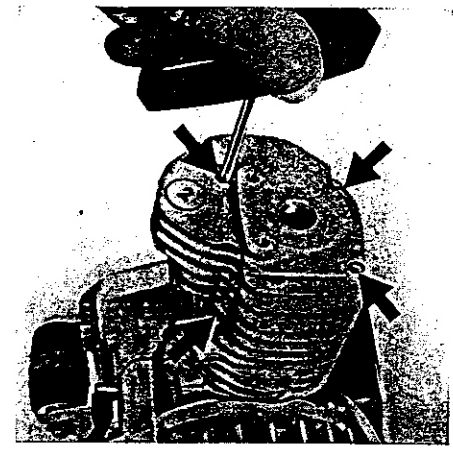




shield by unscrewing the 2 socket head screws.

Now clean the exterior of the cylinder thoroughly and inspect it for signs of damage (cracks, broken cooling fins etc.).

Unscrewing the four cylinder base screws



Remove the spark plug and then release and unscrew the 4 screws securing the cylinder. Carefully pull the cylinder off the piston.

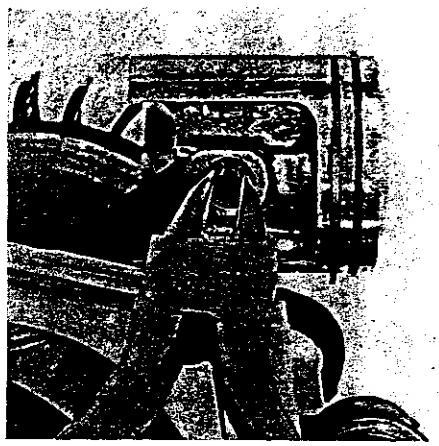
Before removing the piston it must be decided whether or not the crankshaft is to be removed, i. e. the wooden block used to lock the crankshaft – to facilitate removal of the flywheel, chain sprocket and clutch – must be fitted between the crankcase and the piston.

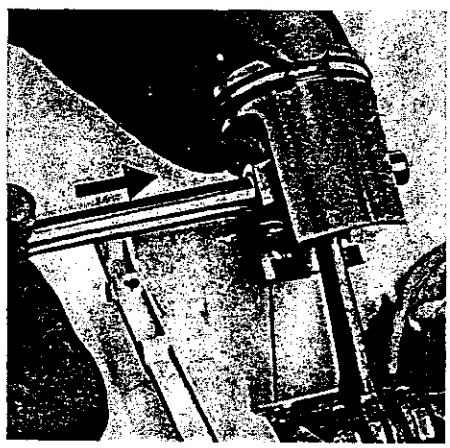
To remove the piston, first take out the 2 wire retainers which secure the piston pin and press the piston pin out of the piston and the needle cage by means of drift 1110893 4700.

Reassembly of Piston and Cylinder

Top:
Removing the wire retainers

Bottom:
Pressing out the piston pin





If the piston pin is stuck as a result of carbonization, tap it out lightly with a hammer applied to the drift. It is essential to counterhold the piston to ensure that no jolts are transmitted to the connecting rod. Now remove the piston and take needle cage out of connecting rod.

Type 1110 pistons and cylinders were previously available in 5 size groups with the letter codings A to E and subdivided into the 3 main groups A–B, C–D and E.

A was the smallest and E the largest nominal size of piston diameter or cylinder bore. The size group code is stamped on the piston crown and cylinder head respectively.

For reasons of rationalization and especially with a view to reducing stockkeeping these groups will in future be reduced to cylinders A, B and C with piston B, cylinders D and E with piston C. The new pistons B and C can be installed in all cylinders of their respective groups. Furthermore, the new parts are completely **interchangeable** with the pistons and cylinders supplied up to now.

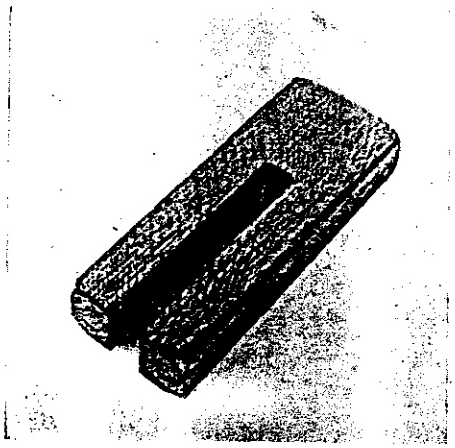
The part numbers remain exactly the same as the previous size group. Unlike the piston rings, the cylinder group divisions remain unchanged.

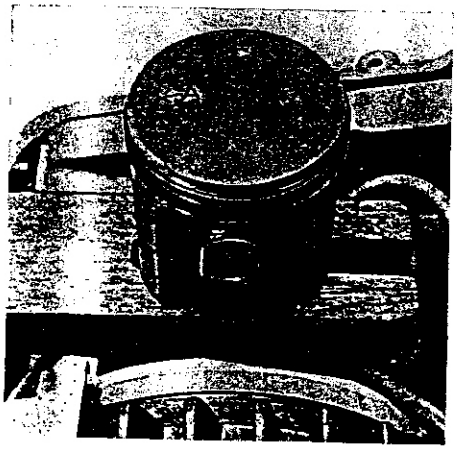
Summary

Previous version Not broken-in		Previous version Broken-in cylinder		**New version**	
Cylinder piston	for cylinder	Piston	for cylinder	Piston	for cylinder
A	AB	A	AB	–	–
B (AB)	BC	B	ABC	B	ABC
C (CD)	CD	C	BCD	C	DE
D (E)	DE	D	CDE	–	–
E	E	E	DE	–	–

Top:
Wooden assembly block

Bottom:
Piston on wooden block, arrow and "A" point towards exhaust port

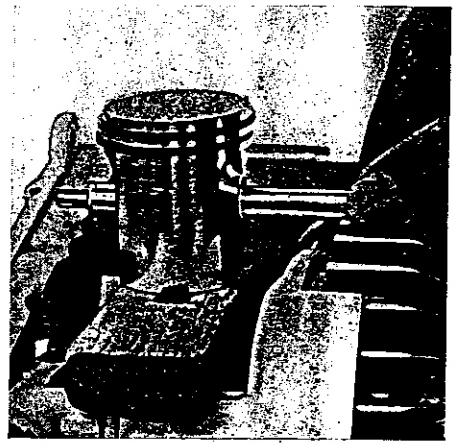


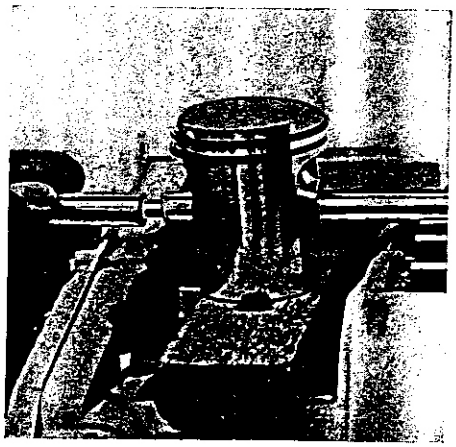


Before installing the piston, lubricate the needle cage with oil and insert it in the connecting rod. Position piston on connecting rod so that the stamped marking (arrow and A) point towards the cylinder exhaust port (towards tip of guide bar). Now fit piston pin in piston and connecting rod; assembly drift 1110893 4700 simplifies this operation. 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 in to piston. Gently move piston to and fro to ease insertion of the piston pin.

Top:
Assembly drift positioned in piston bore and connecting rod

Bottom:
Fitting piston pin



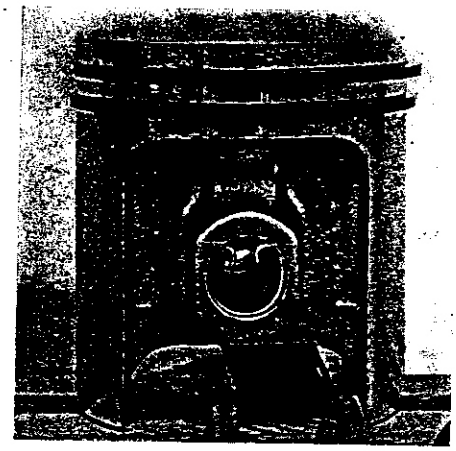


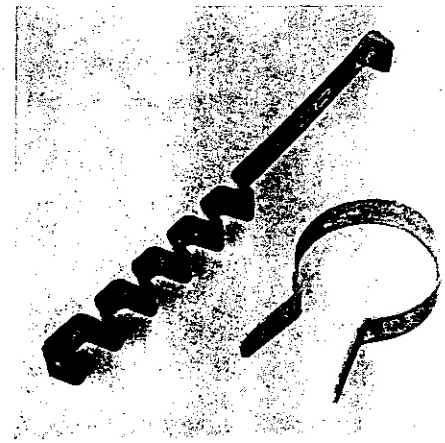
The piston pin must move freely in its bore. Never use force during assembly.

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

Top:
Wire retainer correctly installed

Bottom:
Ring compressor and clamping strap

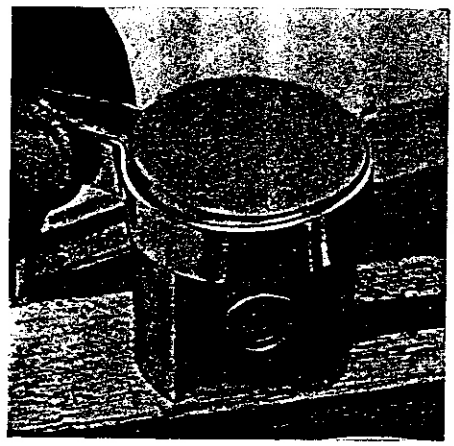




Mounting of the cylinder is best carried out using the wooden assembly block 1108 893 4800 and the ring compressor 1108 893 4900 or the clamping strap 0000 893 2600.

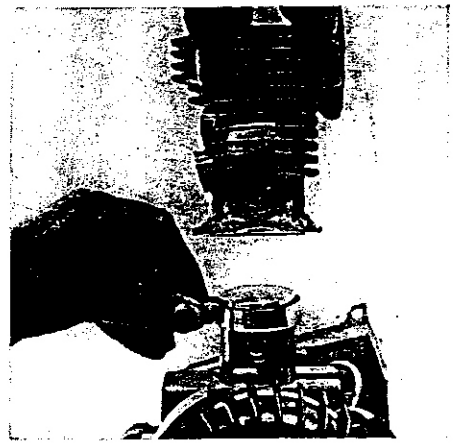
Top:
Piston rings correctly positioned

Bottom:
Holding piston rings with ring compressor

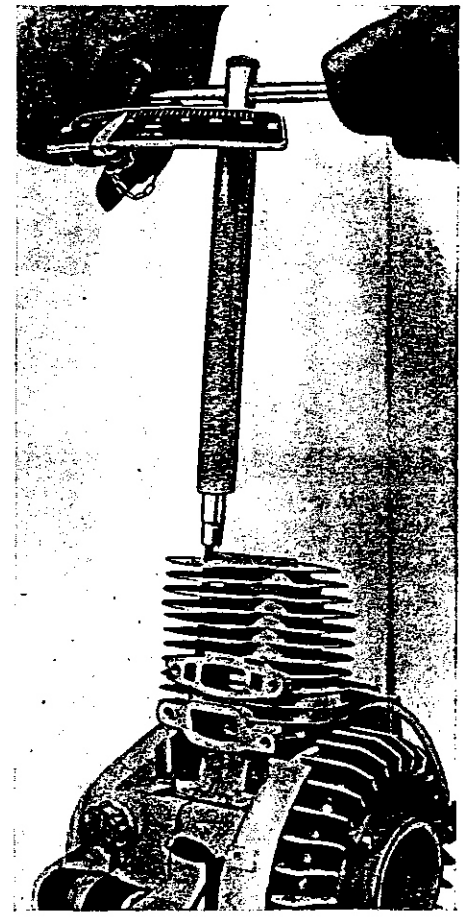


Top:
Holding piston rings with clamping strap

Bottom:
Fitting cylinder



Tightening cylinder base screws with torque wrench



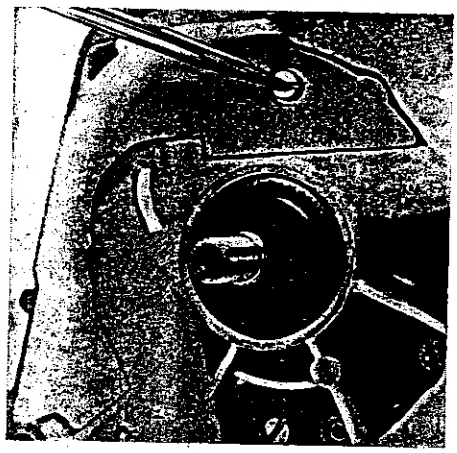
First fit new cylinder gasket on the crankcase. Lubricate piston and piston rings with oil. Place wooden block on the crankcase so that piston is resting on it. Position each piston ring so that the radii at the ring gaps locate against their respective fixing pins in the piston grooves. Using the ring 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 the ring compressor is pushed downwards as the piston rings move into the cylinder. Remove wooden assembly block and ring compressor. Align cylinder gasket and cylinder. Insert the four cylinder base screws and tighten to a torque of 6.8 Nm (0.7 kpm) in a diagonal pattern.

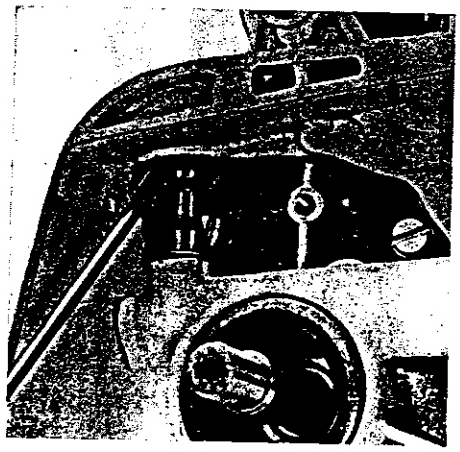
Assembly of the muffler, heat shield, flange, insulating plate, carburetor etc., is a reversal of the disassembly procedure.

Disassembly of Crankcase –
Removal of Crankshaft

Top:
Removing plastic guard

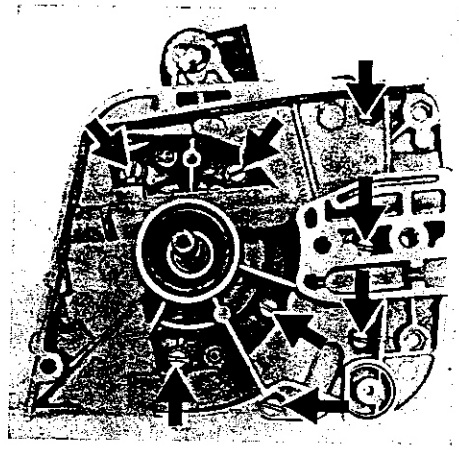
Bottom:
Removing retaining washer from control knob

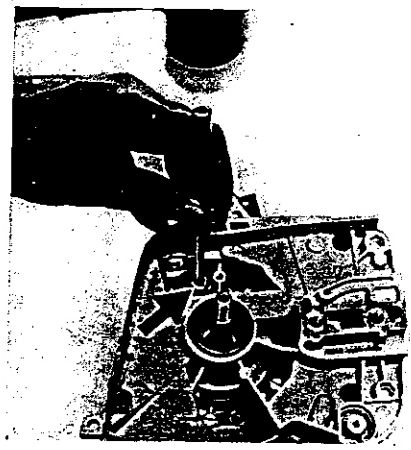




Top:
Fastening scews on crankcase

Bottom:
Knocking back the cylindrical pins





In order to remove the crankshaft the chain sprocket, clutch, flywheel, armature plate, oil pump worm, cylinder and piston must be disassembled.

The two halves of the crankcase are located by two cylindrical pins and secured with 8 cheese head screws. To disassemble the crankcase cover first remove key from crankshaft. The plastic guard and control knob of the oil feed adjustment conceal two screws.

Unscrew the plastic guard, prise retaining washer off neck of control knob with a screwdriver. Knock the two cylindrical pins back into the crankcase half on the ignition side. Unscrew studs from inner side plate and remove parts.

Now unscrew all cheese head screws. If the two halves of the crankcase do not separate easily because of a sticky gasket or if the crankshaft is stuck in the bearing inner races, split the parts by tapping the crankshaft stub lightly with a soft-nosed hammer.

The crankshaft, connecting rod and needle bearing are inseparable. This means that the crankshaft must always be replaced as a **complete unit** in the event of damage to any one of these parts.

When fitting a replacement crankshaft it is advisable to renew the ball bearings and oil seals as well. New oil seals should always be fitted.

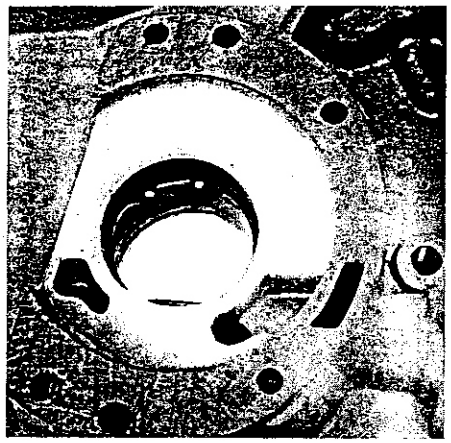
If the tapped bores for fastening screws in castings (crankcase, guard etc.) have become unserviceable as a result of overtightening or tearing, the universal installing tool 5910850 5200 with its HELI-COIL inserts can be used to repair the threads.

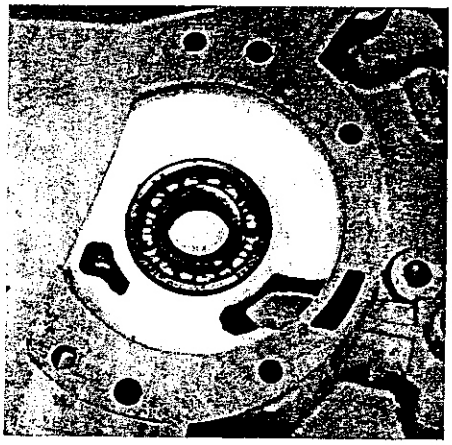
If the crankcase is damaged it must be replaced as a **complete unit.** All the other parts which are still serviceable must then be transferred from the old to the new crankcase.

Assembly of Crankcase — Installing the Crankshaft

Top:
Circlip in annular groove

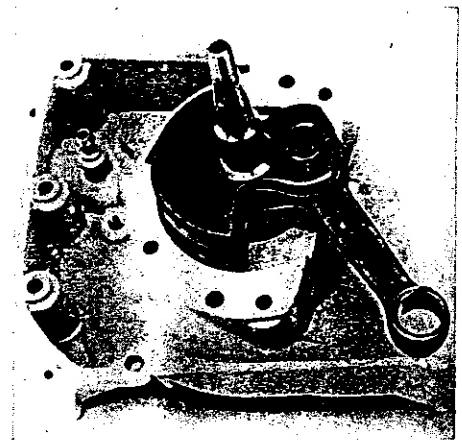
Bottom:
Ball bearing installed

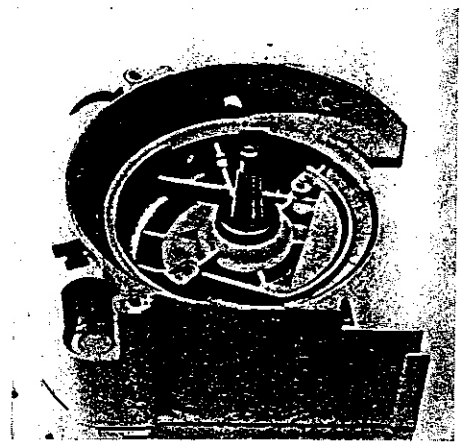




Top:
Crankshaft inserted

Bottom:
Oil seal fitted in position





Pressing oil seal into position

On the new crankcase, first fit the circlip in the annular groove of the output bearing seat. Heat both halves of the crankcase, e. g. on a heating plate. Fit ball bearings squarely — without canting — from the inside of the crankcase so that the outer races locate against the circlip or the shoulder of the bearing seat.

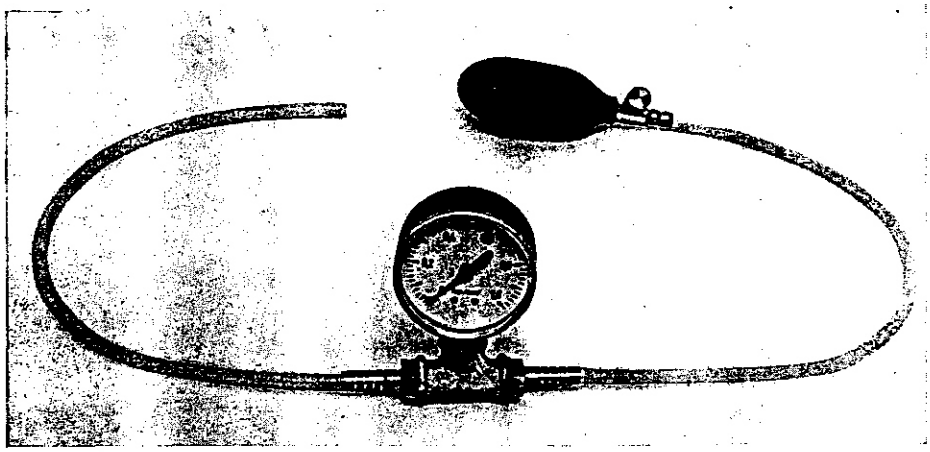
The crankshaft must also be heated before it is fitted in the inner races of ball bearings. This is best done with a soldering iron with an appropriate attachment. Now insert straight stub of crankshaft into output bearing until the shoulder of the crank web locates against the inner race. Fit oil intake hose and a new crankcase gasket. If the old crankcase is to be reused, thoroughly clean away residue of old gasket. Fit bearing on ignition side over the other crankshaft stub, place the two halves of the crankcase together and align. Drive the two cylindrical pins fully home, insert screws and tighten to a torque of 4.9 Nm (0.5 kpm) in a diagonal pattern.

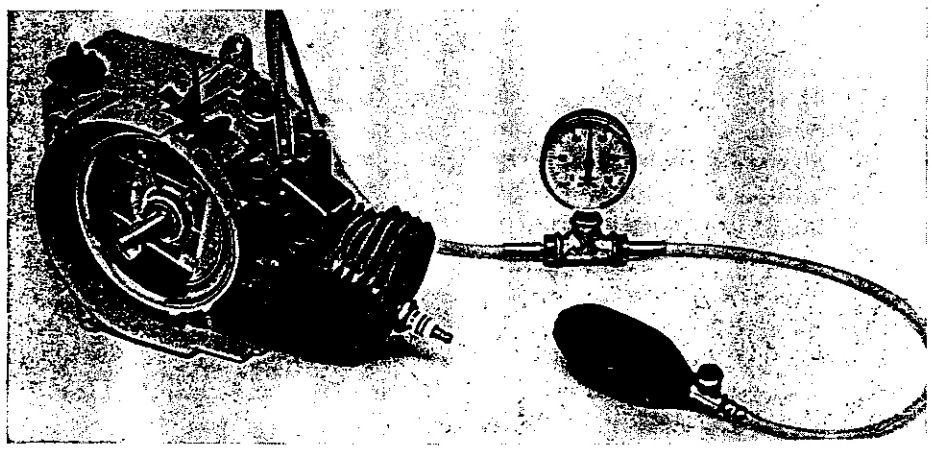
Fit oil seals over crankshaft stubs at clutch and ignition sides and press them until they are flush with the front edge of the bores. Assembly of the remaining parts is a reversal of the disassembly procedure.

Leakage Testing the Crankcase
(Pressure Test)

Top:
Carburetor and crankcase tester

Bottom:
Leakage test



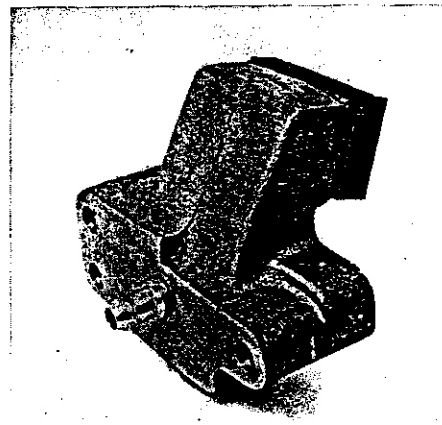


The crankcase can be checked accurately for leaks with the carburetor/crankcase tester.

Defective oil seals and gaskets, cracks or blow holes in castings are the usual causes of leaks. Such faults allow supplementary air to enter the engine and thus upset the fuel-air mixture. This makes adjustment of the prescribed idle speed difficult or even impossible. Moreover, the transition from idle speed to part or full load is not smooth.

To carry out the test, remove the carburetor and muffler. Seal the carburetor and exhaust port of the cylinder with flange 1110850 4200 and secure with cheese head screws of insulating flange. Plug the pulse nipple at the crankshaft. The spark plug must be properly tightened down and the piston at top dead center before testing (see "Adjusting Ignition Timing" — page 37).

Connecting and sealing flange



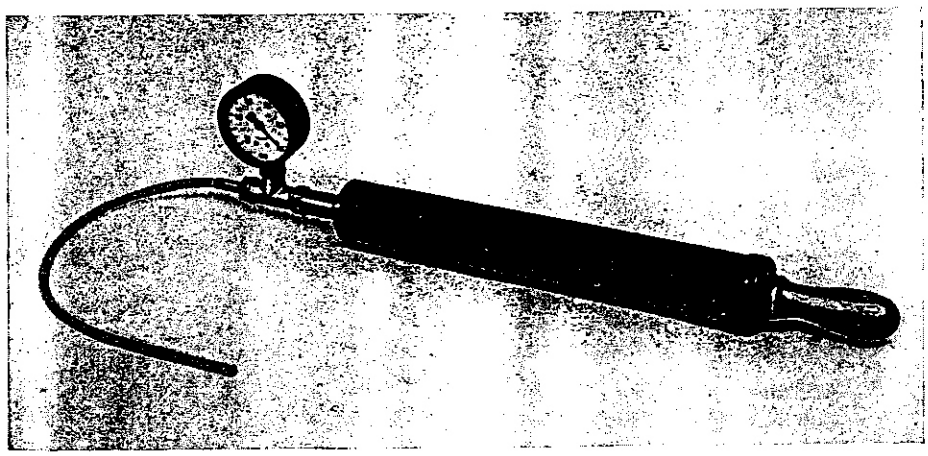
Connect tester's pressure hose to nipple of sealing flange. Close bleed screw on rubber bulb and pump in air until gauge indicates an over pressure of 0.5 bar (kp/cm²). If this pressure remains constant, the crankcase is properly sealed. However, if the pressure drops the leak must be located and the faulty part renewed.

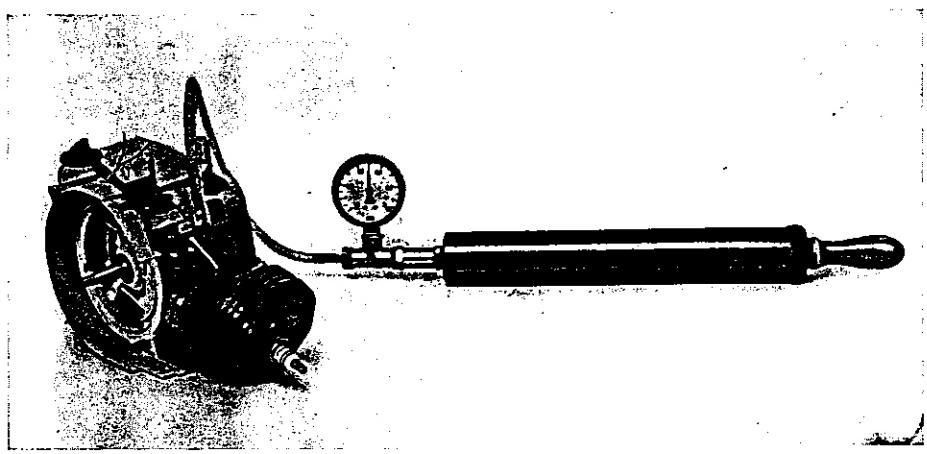
When test is completed, open the bleed screw and disconnect the hose.

Leakage Testing the Crankcase (Vacuum Test)

Top:
Vacuum tester

Bottom:
Leakage test





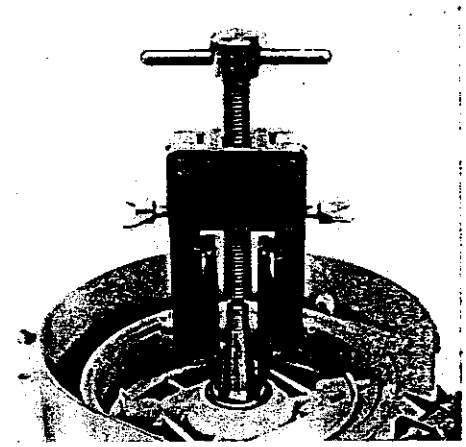
Oil seals tend to fail when subjected to a vacuum, i. e. during the piston's induction stroke the sealing lip lifts off the crankshaft owing to the lack of any counterpressure.

An additional test can be carried out with the vacuum pump 0000 850 3500 in order to detect this fault. The preparations for this test are the same as for the overpressure test.

Connect suction hose of vacuum pump to nipple of sealing flange. Pull out pump piston until the gauge indicates a vacuum of 0.5 bar (kp/cm²). When the pump piston is released the non-return valve automatically closes the suction hose.

If the vacuum reading remains constant, or rises no further than 0.2 bar (kp/cm²), the oil seals are in good condition. However, if pressure continues to rise the oil seals must be replaced even if no leaks were found in the previous overpressure test.

Extracting the oil seal



If the oil seals have to be replaced, this operation can be carried out without disassembling the engine. To do this, remove chain sprocket, clutch and ignition system. Split open the metal casing of the oil seals with a suitable chisel and remove the oil seals with a screwdriver or the universal oil seal puller 0000 890 4400.

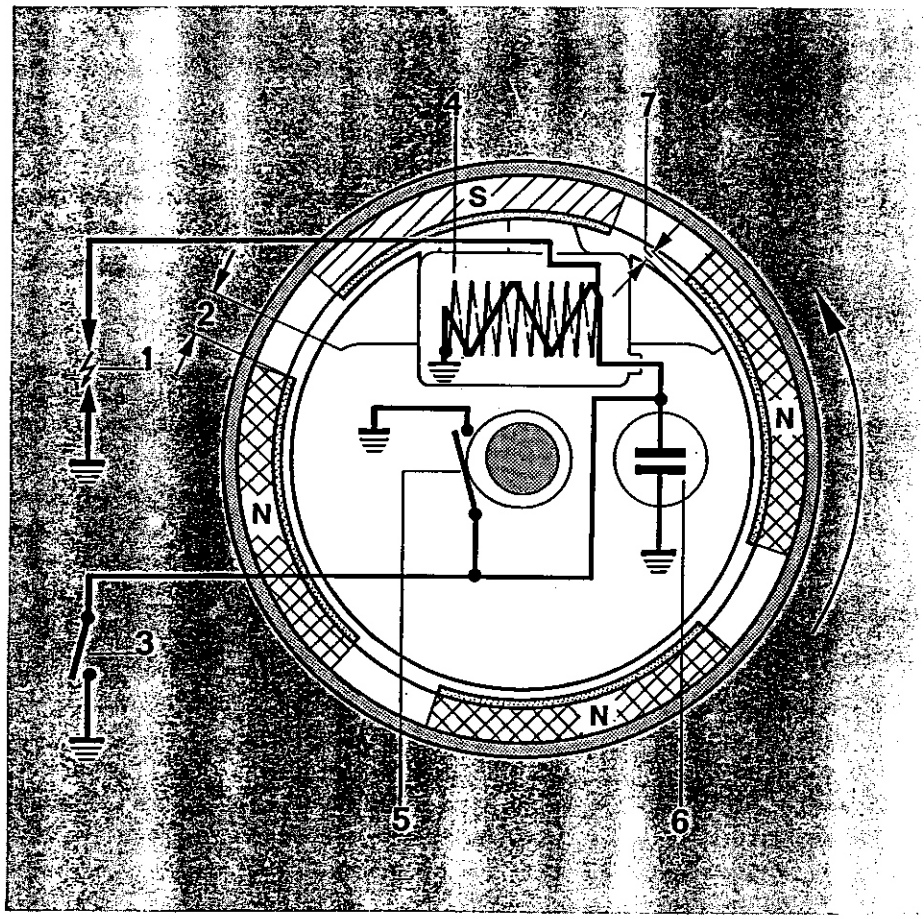
Installation of the new oil seals is as previously described.

IGNITION SYSTEM 041, 041 AV

Construction and Operation of Breaker-Controlled Ignition System

Diagram of Flywheel Magneto:

1 – Spark plug
2 – Edge gap
3 – Ignition stop switch
4 – Armature
5 – Breaker points
6 – Condenser
7 – Air gap
N – North pole
S – South pole



Like all chain saws, the STIHL 041, 041 AV are equipped with a magneto ignition system which requires neither a battery or a dynamo. The ignition system consists basically of a rotating element (flywheel with permanent magnets and pole shoes) and the fixed element (armature plate with contact set, condenser, ignition armature), as well as the high-tension lead and ignition stop switch.

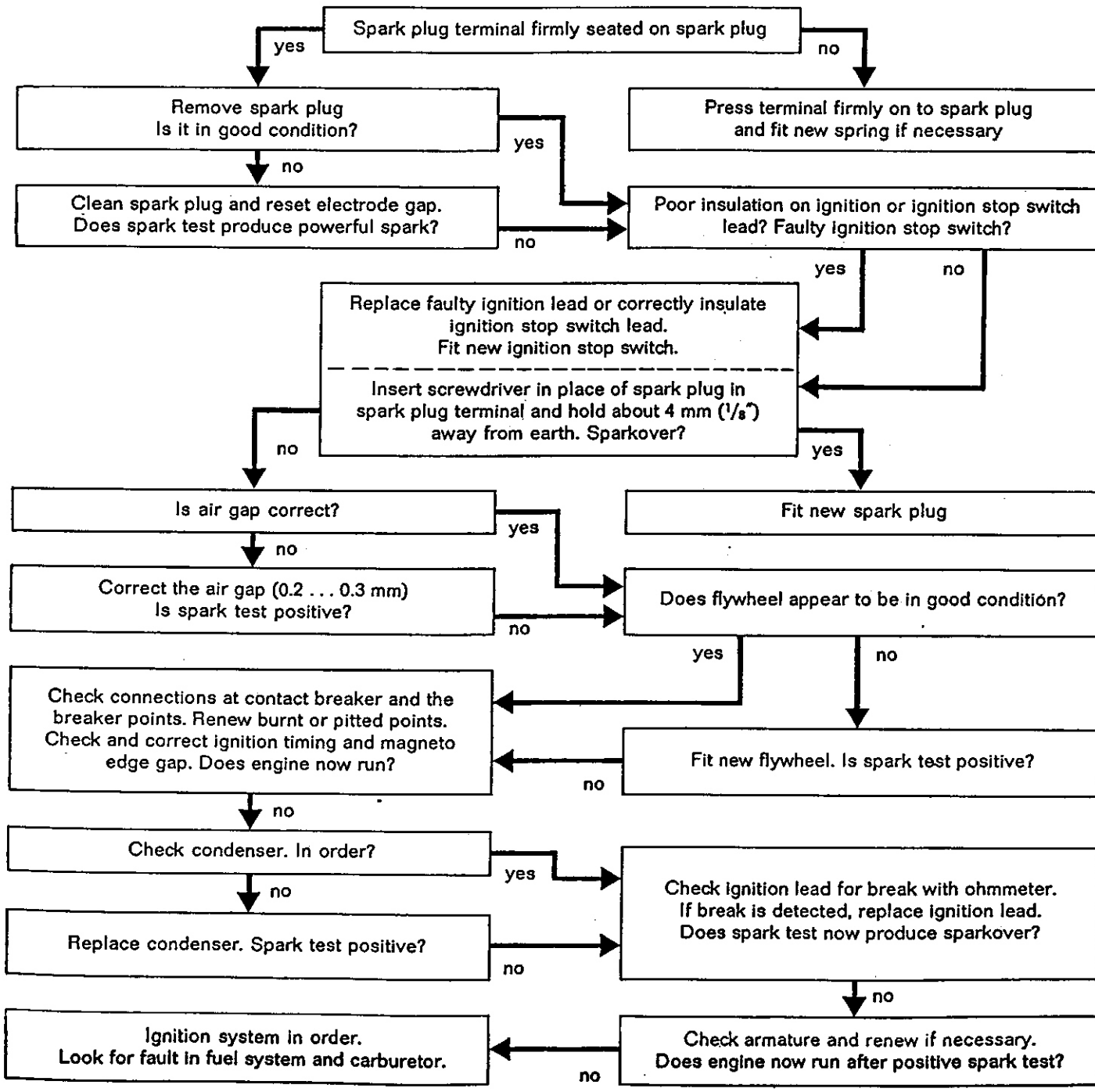
The flywheel magneto ignition system operates on the basis of magnetic induction.

An electric current is generated in a conductor which is moved through the flux lines of a magnetic field. As the flywheel rotates, the flux lines flowing between the permanent magnets, from North pole to South pole, cut through the primary windings of the armature and thus induce a low-tension current. When the contact breaker is closed, an induced current flows in the primary winding of the armature which is interrupted at maximum voltage by the contact breaker opening at the point of ignition. This causes the direction of the magnetic flux in the armature to change direction at that instant and induce a high-tension pulse in the secondary winding which produces the sparkover at the spark plug electrode.

The condenser, wired in parallel with the contact breaker mechanism, prevents excessive sparking (arcing) between the points when the contact breaker opens and therefore loss of energy and premature wear. The ignition stop switch, which is also wired in parallel with the contact breaker mechanism, short circuits the primary winding of the armature when it is operated. High-tension current can no longer be produced and the engine stops.

The contact breaker points are opened by the cam ground on the hub of the flywheel and closed by spring action.

Trouble Shooting on Breaker-Controlled Ignition System



Spark Plug

The spark plug is called on to ignite the compressed fuel-air mixture by producing a spark between the center and earth electrodes.

Trouble Shooting on the ignition system should always begin at the spark plug.

In the event of starting difficulties, low engine power or misfiring, unscrew the spark plug and check whether it has the specified heat range of 175.

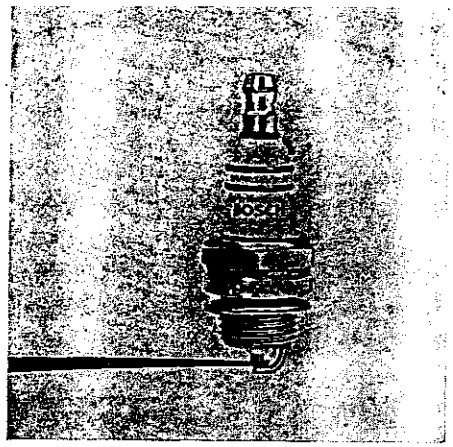
The Champion RCJ 6 Y suppressed spark plug is an alternative to the standard Bosch WSR 6 F spark plug (earlier designation: WKA 200 TR 6). These spark plugs cover a greater thermal range and have better operating characteristics under extreme conditions.

The appearance of the spark plug's insulator nose gives important information with regard to the effects of various operating conditions:

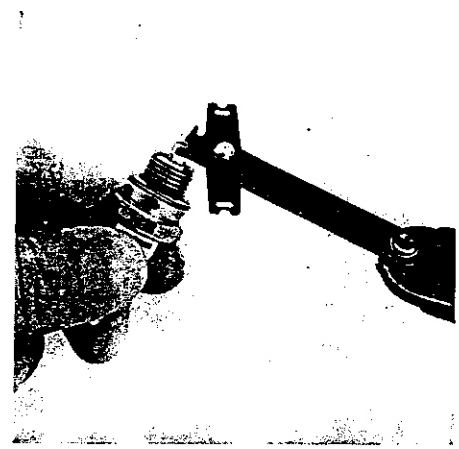
Condition of insulator nose		Some associated operating conditions
Normal:	Grey/yellow to brown, dry	Engine in order; spark plug heat range is correct
Sooted:	Velvetlike, dull black coating of soot	Mixture too rich, lack of air (dirty air filter, choke valve partly closed) electrode gap too large, heat range too high
Smeared with oil:	Coating of damp oil carbon and soot	Too much oil in fuel mix
Overheated:	Welding beads on insulator nose, eroded electrodes	Mixture too lean, spark plug loose, heat range too low

Ignition Lead

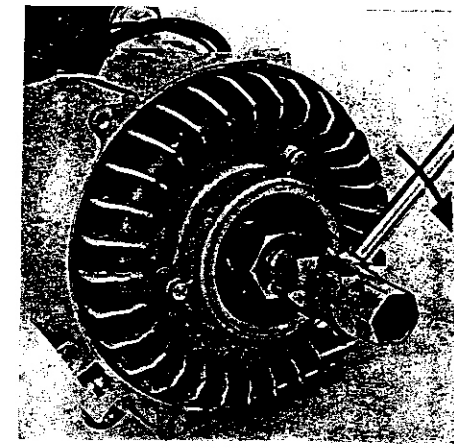
Checking the electrode gap



Readjusting the electrode gap with spark plug gauge



Pressing flywheel off the crankshaft



Never clean a sooted or carbonized spark plug with a steel wire brush. Always use a brass wire brush for this purpose and then blow out plug with compressed air. If the spark plug is smeared with oil, wash it with a grease solvent and blow out with compressed air.

As the electrode gap becomes wider through normal erosion, the gap must be checked with a feeler gauge at regular intervals and readjusted. The specified gap of **0.5 mm** can be restored by bending the earth electrode.

However, always fit a new spark plug if the electrodes are badly eroded.

Accurate checking of the spark plug is only possible with a special spark plug tester.

A provisional check can be carried out by inserting the cleaned spark plug in the spark plug terminal, holding it against earth and cranking the engine by means of the rewind starter. There should be a powerful sparkover at the electrodes.

If there is no sparkover although the spark plug is in good condition, first check the lead connections. Chafed insulation on the ignition and short-circuit switch leads will cause an earth short circuit. If this is the case the engine will not start or run erratically.

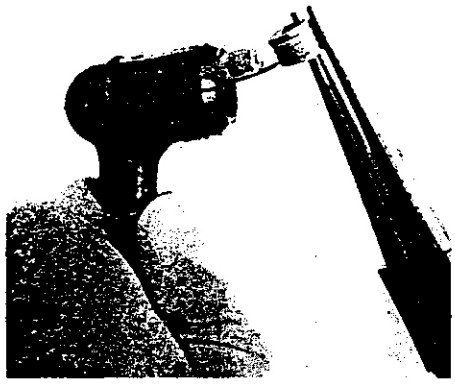
Before refitting the spark plug in the cylinder, clean spark plug seat and make sure that sealing ring is in good condition. Tighten down spark plug to a torque of 24.5 Nm (2.5 kpm).

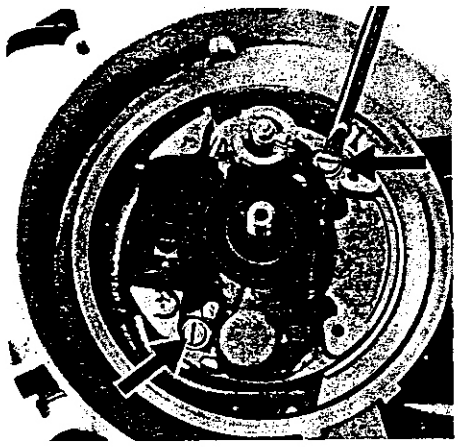
If the insulation of the ignition lead is brittle or damaged in any other way a sparkover to earth can occur at the point of damage and thus interrupt the ignition process. Renew the ignition lead in such a case.

To do this, remove fan housing with rewind starter. Pull flywheel off crankshaft with puller 1110890 4500 (see Chapter "Flywheel" – page 30), remove lead from ignition stop switch and terminal from spark plug. Disconnect spark plug terminal from ignition lead using a suitable pair of pliers to grip and pull out the leg spring in the spark plug terminal. Disconnect leg spring from ignition lead and pull lead out through the spark plug terminal.

Top:
Removing leg spring with ignition lead

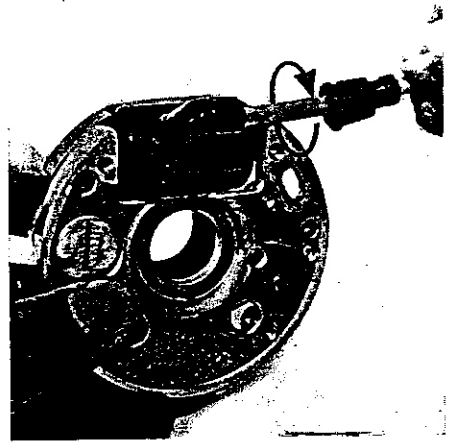
Bottom:
Unscrewing armature plate

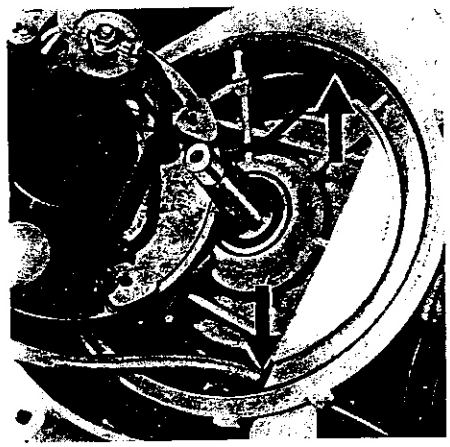




Top:
Removing ignition lead from armature

Bottom:
Inserting short-circuit wire and ignition lead through grommets in housing



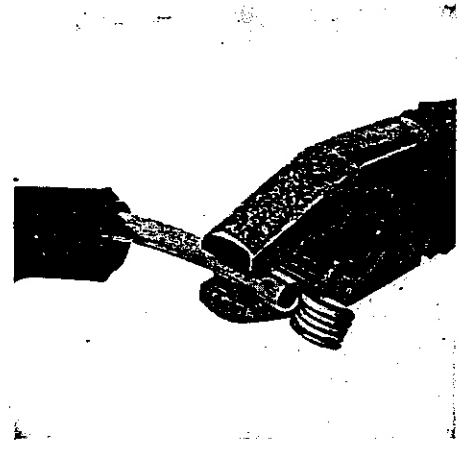


Unscrew and remove armature plate from crankcase and pull ignition lead and then the short circuit wire through the grommets in the crankcase. Now unscrew the ignition lead from the integrally cast wood screw in the armature.

The new ignition lead has a length of 290 mm and should be checked with an ohmmeter before installation. To do this, connect one of the two test leads to the spark plug terminal and the other to the end of the ignition lead. In the measuring range Ω×1 (Ω) the ohmmeter must indicate "zero (0)" ohm, i. e. no resistance.

Fit rubber boot over end of lead and screw lead firmly on to the wood screw in the armature. It is advisable to make a hole in the center of the ignition lead's cross-section with a pointed tool to ease assembly. Now push short-circuit wire and then the ignition lead through the grommets in the crankcase and refit the armature plate.

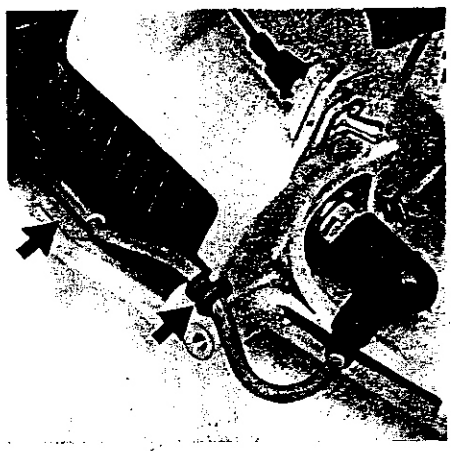
Fitting leg spring on ignition lead



Make sure that no part of the lead insulation is nipped. Coat end of lead with a little oil and then fit rubber grommet and spark plug on the ignition lead. Using a pair of flat nosed pliers, pinch the hook of the leg spring into the center of the lead's cross-section about 15 mm from the end of the lead.

Short Circuit Wire

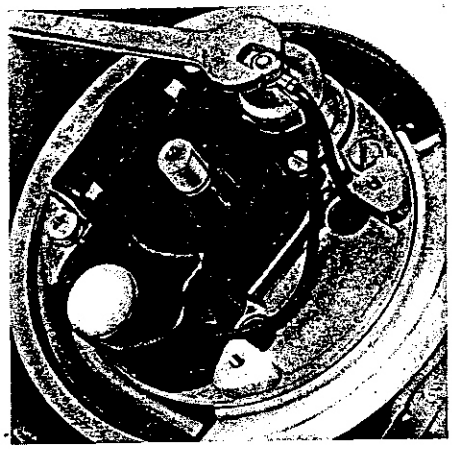
Ignition lead fitted in holder



This makes the electrical connection to the conductive core of the lead. Coat end of lead with a little oil and insert leg spring in spark plug terminal. Locate grommet on ignition lead in the shroud recess and fit the ignition lead in its holder.

Adjust ignition timing (see Chapter "Adjusting Ignition Timing" – page 37) and reassemble remaining parts in reverse sequence to that of disassembly.

Detaching wire connections



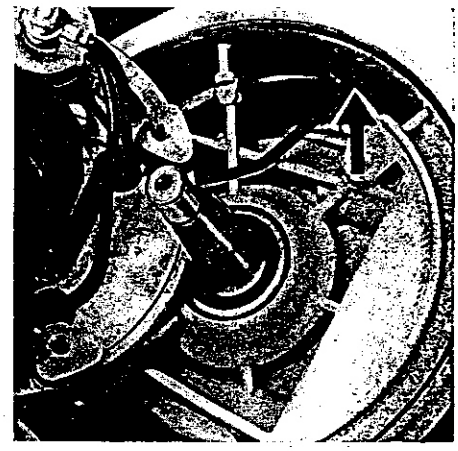
If the short circuit wire has to be replaced, first remove fan housing – with fan housing cover and rewind starter – and flywheel. The short circuit wire, connecting wire and primary circuit connection for the armature are attached to the condenser and can be disconnected by removing the hexagon nut (M 3).

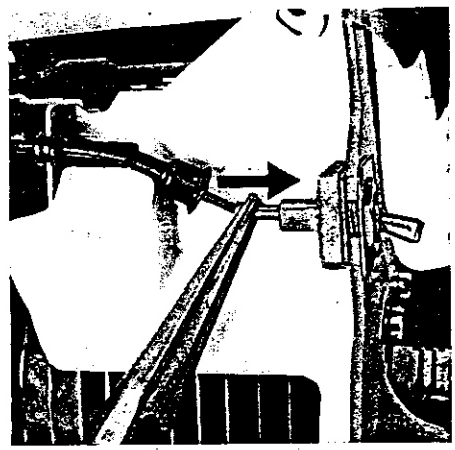
Unscrew the armature plate from the crankcase and pull the faulty short circuit wire inwards and out of the grommet in the crankcase. It is advisable to take this opportunity to check the condenser (see "Condenser" – page 34).

Insert new short circuit wire, contact sleeve first, through the grommet and refit the armature plate. Reattach connecting wire of contact set, primary circuit connection of armature and short circuit wire at condenser.

Top:
Fitting short circuit wire through grommet

Bottom:
Inserting contact sleeve in ignition stop switch





Adjust ignition timing (see "Adjusting Ignition Timing" – page 37) and assembly remaining parts in reverse sequence to that of disassembly.

Ignition Stop Switch

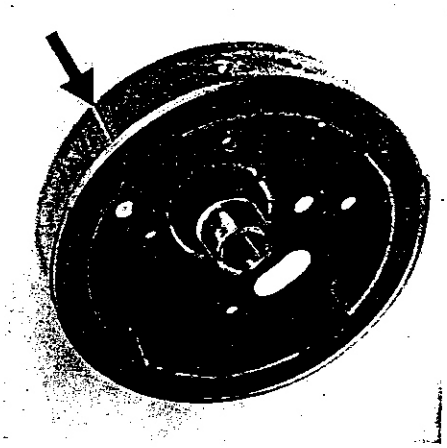
Groove in thread must face upwards

The ignition stop switch is operating correctly when it shorts out to earth only in the "STOP" position. If this is not the case the switch must be replaced.

To do this, unscrew fan housing — with fan housing cover and rewind the starter — and pull short circuit wire out of switch. Remove faulty switch and fit new one in bore so that the groove in the thread faces upwards. Fit instruction plate over switch so that lug locates in groove. Fit hexagon nut and align switch so that it locates exactly in the recess on the shroud and then tighten down the nut.

Flywheel

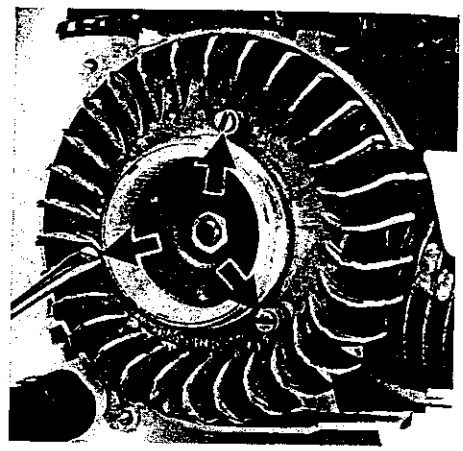
Marking on flywheel



The flywheel is mounted at the ignition side of the crankshaft on a taper seat and is located by means of a key. A dotted line marking is provided on the periphery of the flywheel for checking ignition timing. Four permanent magnets made of a ring of plastoferrite material are attached to the inner diameter of the flywheel. This ring-shaped magnetic strip is magnetized asymmetrically **— 1 South pole, 3 North poles.** This prevents the engine rotating in the wrong direction. In order to achieve an optimum magnetic flux the magnets are provided with pole shoes. The magnet's material must have neither cracks or any other signs of damage. A new flywheel must be fitted if such faults are found.

It is essential not to interchange this flywheel with other flywheels because of the different magnetization. Always check the manufacturer's code on the periphery of the flywheels:

Removing fanwheel

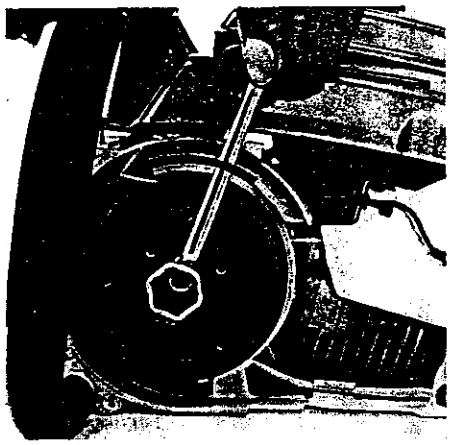


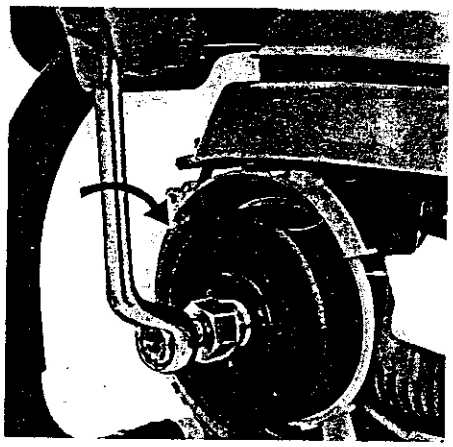
Bosch Breaker-Controlled Version 0204003033; Bosch electronic version (MHKZ) 0204098007; SEM electronic version 10046800.

Furthermore, unlike the electronic version, the hub of the flywheel is eccentrically ground to form a cam which operates the contact breaker.

Top:
Releasing hexagon nut

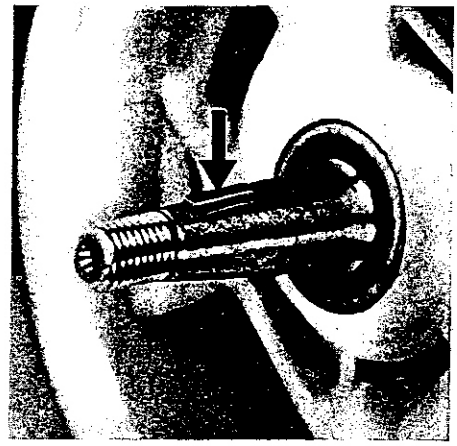
Bottom:
Pressing off flywheel

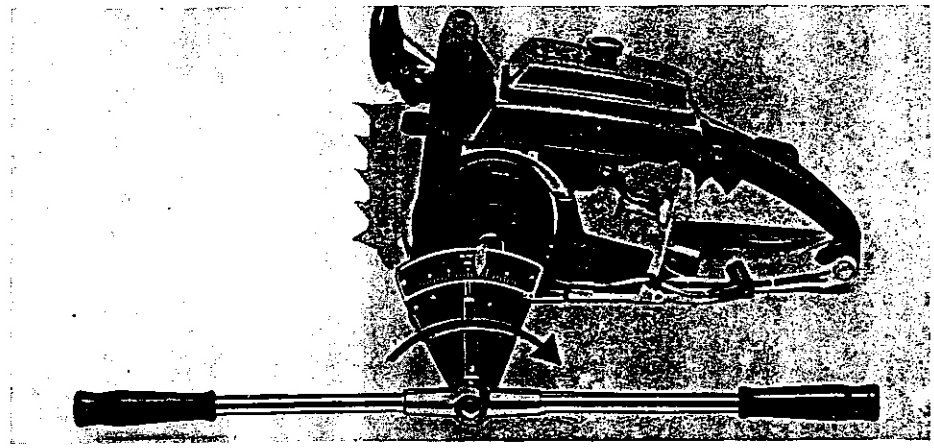




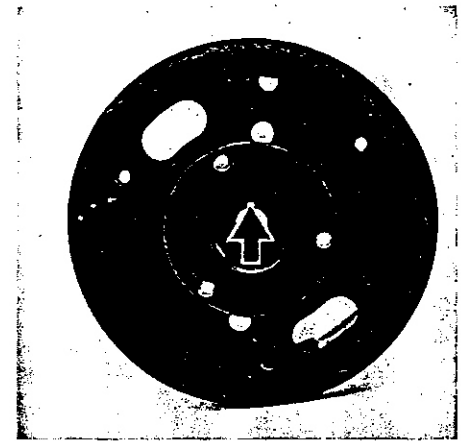
Top:
Key in position

Bottom:
Tightening the hexagon nut with a torque wrench





Key slot in flywheel hub



To remove the flywheel, first take off the fan housing with rewind starter, fanwheel and gasket. Remove spark plug and insert locking screw in spark plug hole.

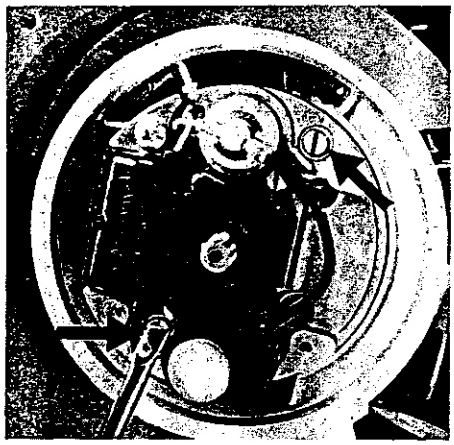
Rotate crankshaft counterclockwise until piston crown locates against the locking screw. Slacken off and remove the hexagon nut. Fit flywheel puller 11108904500 in flywheel and tighten down thrust bolt with combination wrench until flywheel hub is released from taper seat on crankshaft.

Before reinstalling the flywheel make sure that no metallic particles are attached to the magnets. The flywheel hub bore and the crankshaft taper must be free from grease. Make sure that key is properly located.

In order not to overload the key it is important that all the forces generated by the flywheel are transmitted via the taper seat between the flywheel and crankshaft. For this reason it is essential to ensure that the specified tightening torque of 29.4 Nm (3.0 kpm) for the crankshaft nut is maintained.

Armature Plate

Unscrewing the armature plate



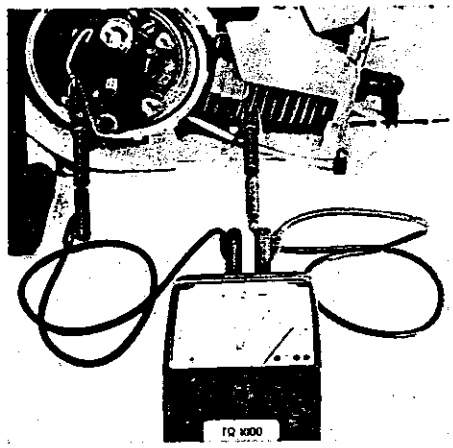
The armature plate is fitted in a recess in the crankcase concentric with the crankshaft and secured with two cheese head screws. The armature, contact set and condenser are mounted on the plate.

To remove the armature plate, unscrew the two cheese head screws and remove the connector lug and grommets from the ignition lead and short-circuit wire. Now lift off armature plate.

The ignition timing must be checked and readjusted every time the armature plate is removed.

Armature

Resistance test on primary winding



The armature is fastened to the armature plate with 2 cross-slotted screws. The windings are completely encased in plastic material to protect them against moisture and dirt.

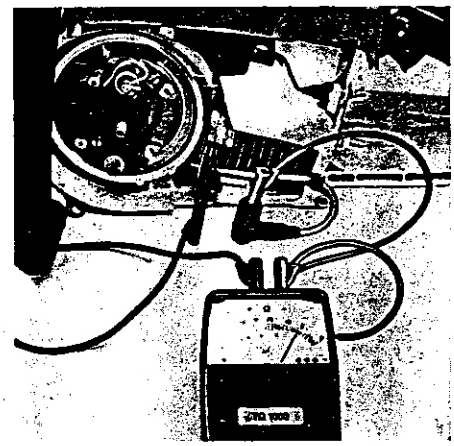
There are two ways of testing the ignition armature:

An ohmmeter (5910850 4800) can be used to check the resistance of both coil windings. However, accurate testing is only possible with an ignition coil tester.

Resistance test on primary winding

Disconnect primary wire (armature wire) from condenser or contact set to test the primary winding. Connect one of the two test leads to the primary connection and the other to ground of armature plate. In measuring range "Ω×1" (Ω) the ohmmeter should indicate the following values:

Resistance test on secondary winding



On armatures with Bosch No. 2204211069 and 2204211052 and Bosch date code "523" — 1.9 to 2.5 (Ω), from Bosch date code "524" — 1.2 to 1.7 (Ω).

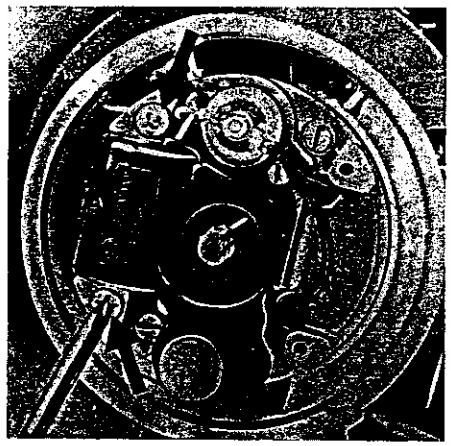
Resistance test on secondary winding

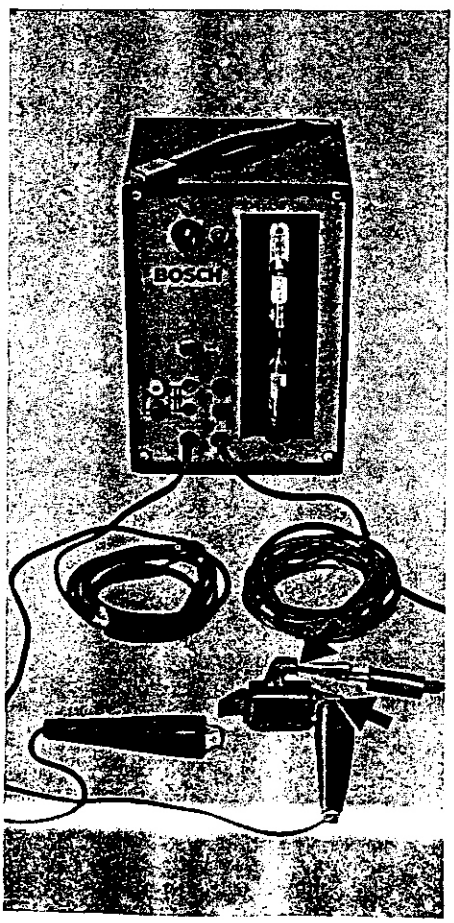
To check the secondary winding, connect banana pin of one test lead to leg spring in spark plug terminal and other test lead to ground of armature plate. In measuring range "Ω×1000" (kΩ) the ohmmeter should now indicate a value of 5.0 to 6.7 (kΩ).

Fit a new ignition armature if these values are not reached.

Top:
Unscrewing the armature

Bottom:
Armature test with ignition coil tester





Testing with ignition coil tester

The sparkover can be checked with an ignition coil and condenser tester, e. g. Bosch EFMZ 1A or EFAW 106 A. The armature must be removed from the armature plate for this purpose. A spark length of 8 mm at 2.1 A must be obtained in this test. Renew the ignition armature if these values are not achieved.

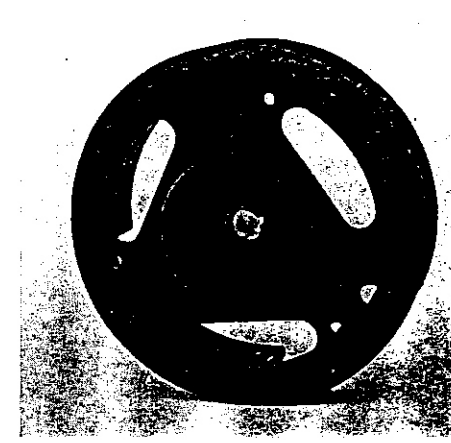
The air gap — the clearance between the flywheel pole shoes and the ignition armature — must be reset every time the armature is refitted on the armature plate.

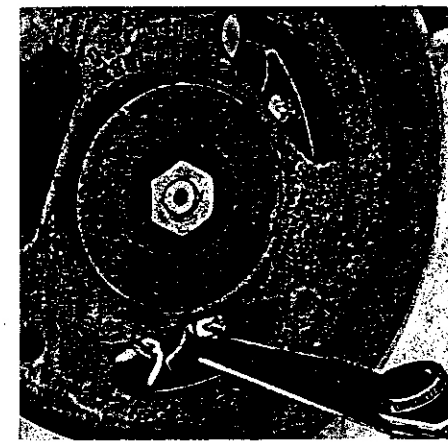
The specified air gap is 0.2 to 0.3 mm

It is best to use an old type flywheel with 3 slots, or one modified for the purpose, for this adjustment. Push this flywheel onto the crankshaft.

Top:
Old type flywheel

Bottom:
Checking air gap with feeler gauge

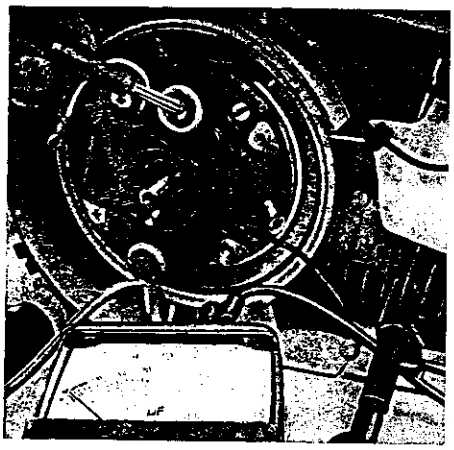




Check air gap with a feeler gauge and, if necessary, slacken off and adjust armature to correct air gap. Then tighten down the armature.

Condenser

Checking condenser with ohmmeter



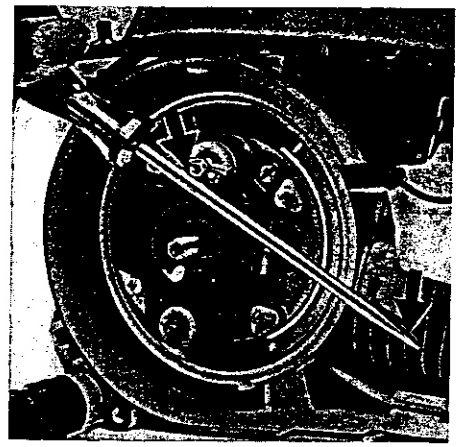
The condenser is wired in parallel with the contact breaker and prevents a sparkover while the points are opening.

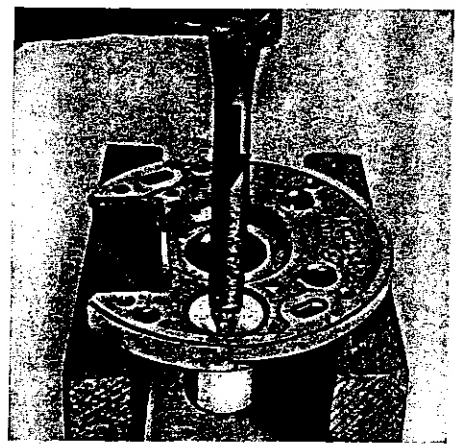
A faulty condenser is often the cause for premature pitting of breaker points. The condenser's capitance is 0.17 μF and can be checked with the ohmmeter 5910850 4800. To do this, disconnect all wires from the condenser by releasing and removing the hexagon nut (the earlier version had a soldered connection). Connect one test lead to the armature plate (ground) and the other to the condenser terminal. If the condenser is in good condition it will be charged and the ohmmeter's pointer should briefly move to about 0.2 (μF) in the measuring range "μF×1" (μF = microfarad). If this is not the case, fit a new condenser.

The condenser must be discharged after this test by shorting the terminal to ground.

Top:
Discharging the condenser

Bottom:
Knocking out the condenser





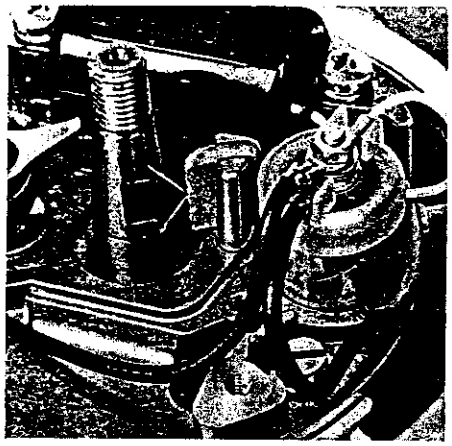
To replace the condenser, unscrew the armature plate and press or knock out condenser from the rear with a suitable tool. Insert new condenser in armature plate with installing sleeve 1110893 2400 and caulk the edge of the bore by tapping tightly with a hammer. The underside of the condenser must not project beyond the lower face of the armature plate.

Top:
Installing sleeve for condenser

Bottom:
Inserting a new condenser

Contact Set

Lubricating felt in good condition



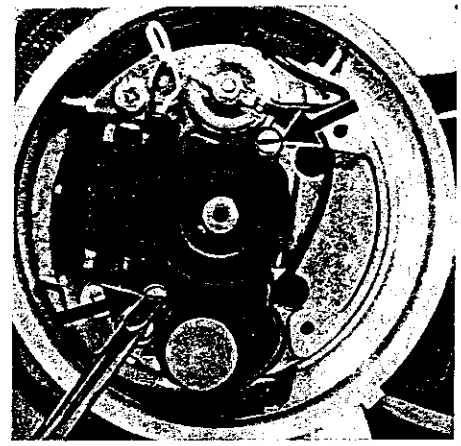
The contact set consists of a fixed contact — connected to ground — and a moving contact breaker lever which is insulated from ground and connected to the primary winding of the ignition armature.

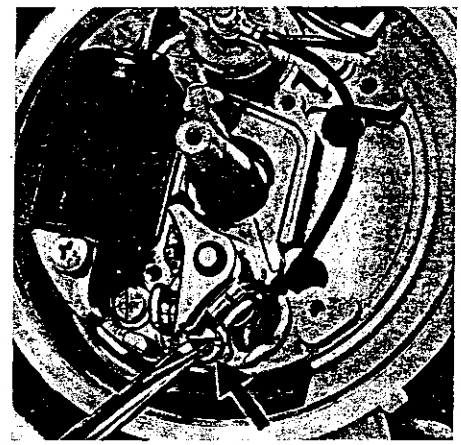
The heel of the contact breaker lever is pressed against the eccentric hub of the flywheel by a spring and is actuated by the hub. Always insure that the lubricating felt in the armature plate is in good condition as this will prevent premature wear of the heel.

The contact breaker points wear as a result of erosion (burning). Burnt contacts increase the contact breaker gap and thus "advance" the ignition point. Partly burnt contacts can be reset, while severely burnt contacts necessitate immediate renewal of the complete contact set.

Top:
Unscrewing dust cap

Bottom:
Unscrewing contact set

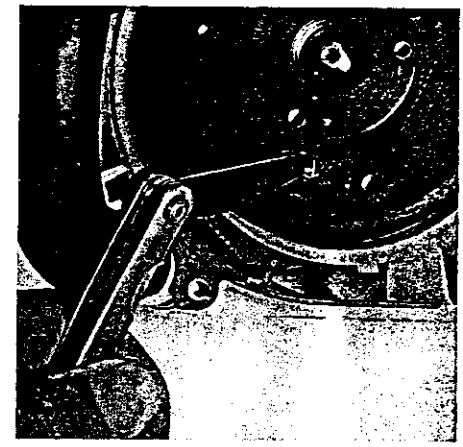




First unscrew the dust cap, remove wires from fixed contact and wire from condenser. Unscrew the cheese-head screw.

Fit new contact set, reconnect wires and adjust contact breaker gap. To do this, fit flywheel with 3 slots (or special adjusting cam 11108930500) on crankshaft and rotate it in the engine's normal direction of rotation until the keyway is approximately in

Setting contact point gap with feeler gauge

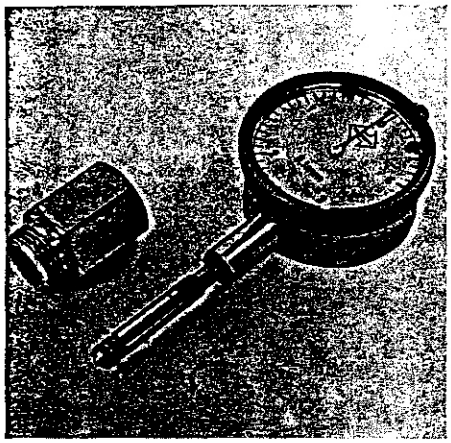


its uppermost position (T.D.C. of crankshaft); the flywheel cam opens the contact breaker lever fully in this position. Now slacken fastening screw of contact set slightly and move the fixed contact until a gap of 0.4 mm is obtained — measure with a feeler gauge.

Retighten the fastening screw and check ignition timing. Finally, coat heel of contact breaker lever with the grease supplied with the new contact set.

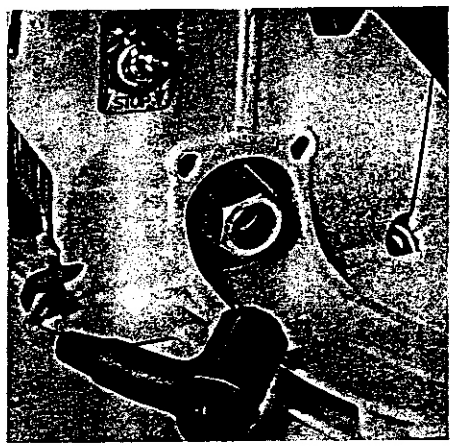
Checking Ignition Timing

Dial gauge and holder

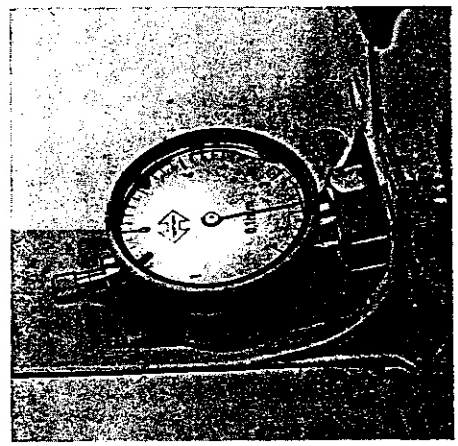


Top:
Dial gauge holder in position

Bottom:
Ignition timing unit connected up



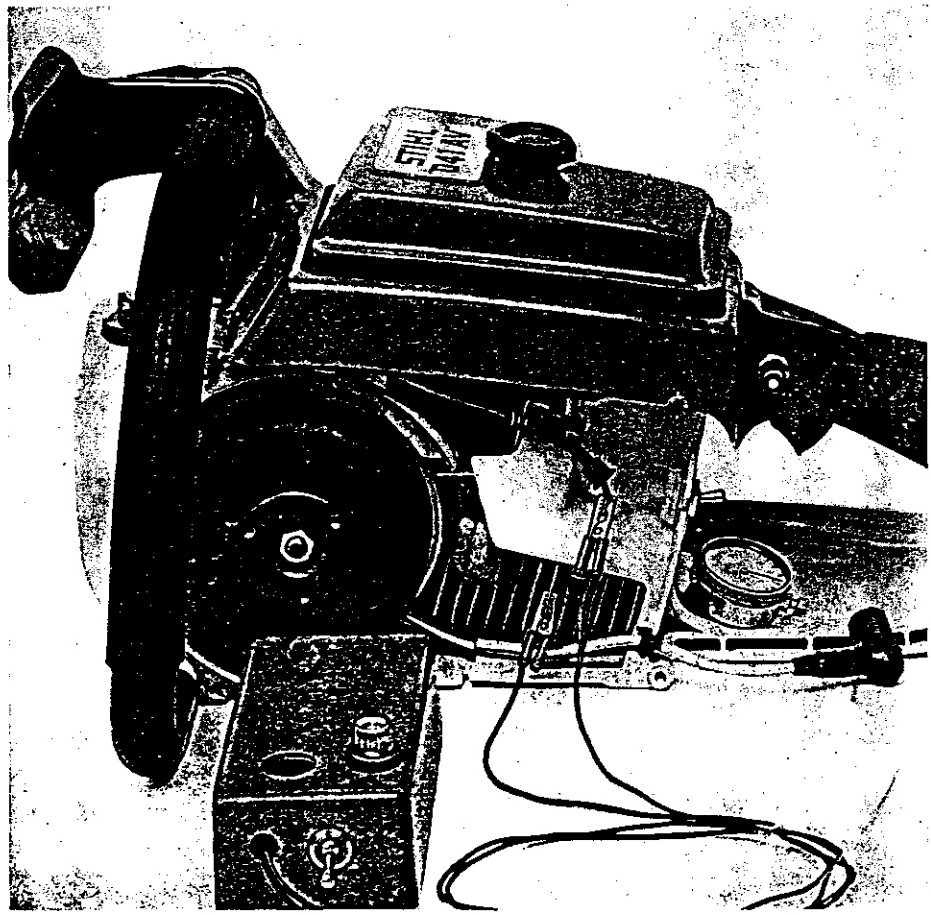
Dial gauge in position



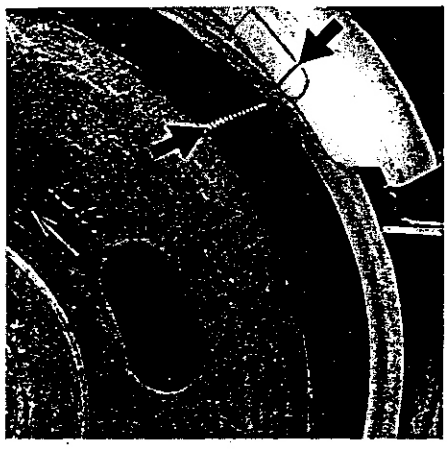
The ignition point of the 041 and 041 AV must be set at 2.4 to 2.6 mm before T.D.C. (top dead center). This means that the moving contact should just begin to lift off the fixed contact when the crankshaft is in this position.

The contact breaker points should be fully open when the crankshaft is in the T.D.C. position and the gap must be 0.35 to 0.4 mm.

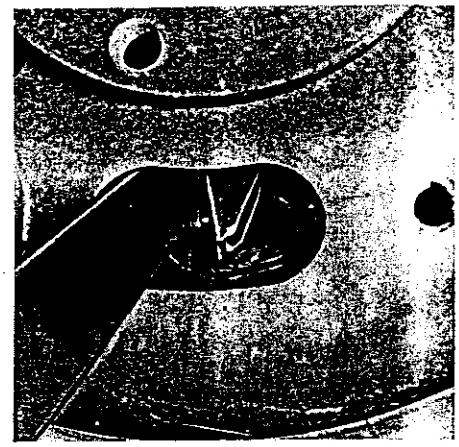
Remove shroud, fan housing and fanwheel to check ignition timing. Unscrew the spark plug and fit holder 1110890 8600 of ignition timing unit 1106890 8700 in spark plug hole. Remove short tracer pin from dial gauge, fit 20 mm (3/4") tracer pin extension and then screw short tracer pin into the extension. Insert dial gauge in seat of holder.



Marking on flywheel and crankcase



Checking contact breaker gap with feeler gauge



Bring crankshaft exactly into T.D.C. position by turning it backwards and forwards and reset dial gauge to "0" by adjusting the bezel.

Now connect one terminal clip of the ignition timing unit 0000 890 8905 to ground (e. g. cylinder fin) and the other to the contact sleeve of the short circuit wire. Switch on the ignition timing unit and turn flywheel slowly in the engine's normal direction of rotation (counterclockwise) until the indicator lamp on the timing unit lights up. The contact breaker opens in this position. The dial gauge pointer should now show a reading between 2.4 and 2.6 mm. If this is not the case, the ignition must be retimed.

Ignition timing marks are also provided on the flywheel and crankcase. Routine checking can therefore be carried out without a dial gauge using the ignition timing unit. The indicator lamp on the ignition timing unit must light up when both marks are in alignment. If this is not the case, the ignition must be retimed. If the flywheel or crankcase are replaced, a new timing mark must be applied to the crankcase. To do this, insert dial gauge in the spark plug hole and turn piston to 2.4 to 2.6 mm before T.D.C. and mark crankcase in relation to flywheel.

First pull off flywheel and unscrew dust cap from armature plate. Refit flywheel. With piston approximately in T.D.C. position, check contact breaker gap with a clean feeler gauge through opening in flywheel. It should be between 0.35 and 0.4 mm. If this is not the case, the contact breaker gap must be corrected (see "Contact Set" — page 35).

Switch on ignition timing unit and turn crankshaft slowly in engine's normal direction of rotation until the indicator lamp on the timing unit lights up. If the dial gauge now shows a value other than 2.4 to 2.6 mm, slacken off armature plate through opening and rotate it accordingly.

Turn flywheel until dial gauge indicates 2.5 mm. If the previous reading was more than 2.6 mm — turn armature plate in engine's direction of rotation; if it was below 2.4 mm — turn armature plate clockwise until indicator lamp just flickers. Now retighten armature plate.

The contact breaker gap and position of the armature plate in relation to the flywheel at the firing point are inter-related. None of these can be altered without affecting the other. It is particularly important to maintain the specified tolerances. Non

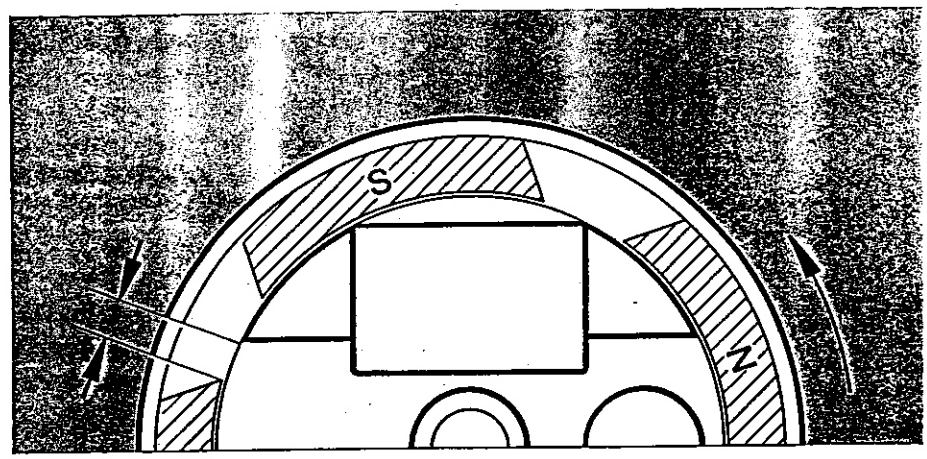
Magneto Edge Gap

observance of these tolerances will result in losses in ignition voltage and engine power.

The ignition point is displaced by increasing or reducing the contact breaker gap: too wide a gap advances the ignition while a narrow gap retards the firing point. Never attempt to alter the ignition point by increasing or reducing the contact breaker gap beyond the specified tolerance. Always replace badly burnt contacts.

After ignition timing has been adjusted, remove the flywheel and secure the dust cap to the armature plate. Reverse the disassembly sequence to refit remaining parts. If the crankshaft, flywheel or crankcase have been replaced, check the timing mark on the crankcase and renew if necessary.

Edge gap



The magneto edge gap must be measured whenever the ignition timing is checked or readjusted. The correct edge gap is assured by the position of the keyway when ignition advance and contact breaker gap are properly adjusted. The position of the magnet at the point of current interruption is defined as the edge gap. The edge gap is, therefore, the distance between the trailing pole shoe edge of the flywheel and adjacent pole shoe edge of the armature when the contact breaker points open. This gap is 6 to 9 mm (0.24 to 0.35"). It must therefore be measured from the trailing edge of the N pole in front of the S pole. If the edge gap is too large the spark during starting will be too weak; however, if the edge gap is too small the engine will misfire at high speed.

To check the edge gap, insert an 0.05 mm feeler gauge between the open contact breaker points and turn flywheel backwards until the feeler gauge can just be withdrawn. Now check the edge gap. If the edge gap is not within the permissible tolerance, it can only be corrected by altering the contact breaker gap. The edge gap is increased by reducing the contact breaker gap and vice-versa.

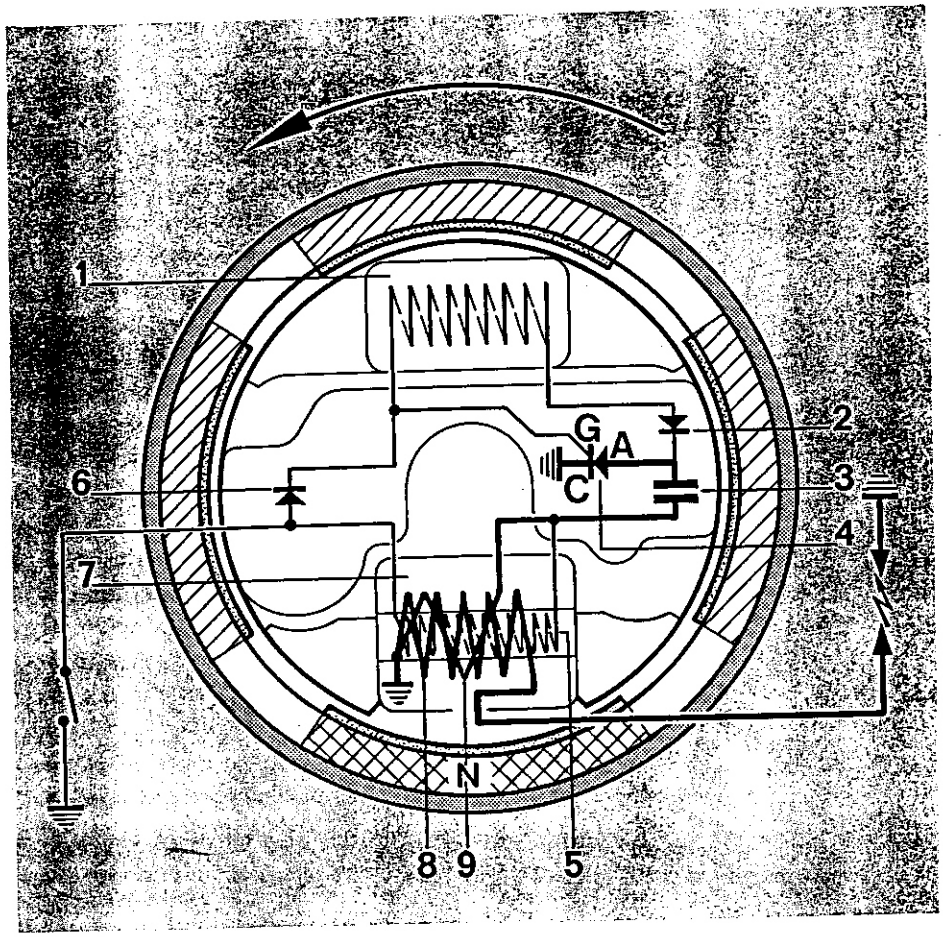
The ignition timing unit can be used in place of a feeler gauge for this purpose. The edge gap must then be measured when the indicator lamp lights up.

IGNITION SYSTEM 041 AV electronic

Construction of Electronic (Breakerless) Ignition System

Diagram of ingnition system:

1 Charging armature
2 Charging diode
3 Storage capacitor
4 Thyristor
G Gate
A Anode
C Cathode
5 Pickup armature
6 Control diode
7 Ignition armature
8 Primary winding
9 Secondary winding
N Permanent North pole magnet



In comparison with breaker-controlled magneto ignition, this ignition system offers the advantage of having no mechanically stressed components such as contact breaker points and therefore requires no special maintenance. It is impervious to dirt, moisture and fluctuations in temperature.

A new ignition system is installed on STIHL 041 AV electronic (with Quickstop) chain saws as from Machine No. **9158250.** The Bosch magneto ignition system (MHKZ) 1110400 0506 is replaced by the "MHKZ" version of Messrs. "SEM" – 1110400 0507.

These two versions are fully interchangeable providing the complete ignition system is exchanged.

As the construction and operation of both these ignition systems are almost identical the following description of the Bosch "MHKZ" applies to both systems.

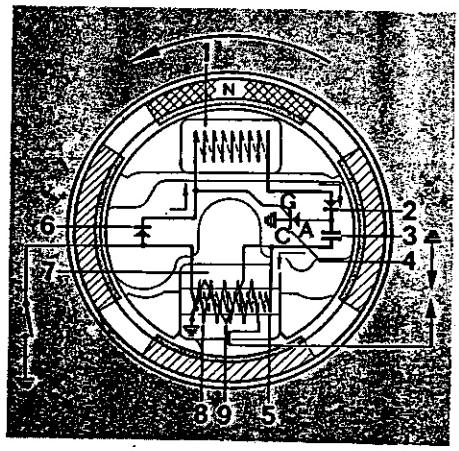
The flywheel 1110400 1206 of the Bosch version has plastoferrite permanent magnets – that of the SEM version 1110400 1207 utilizes magnetized ceramic material (see "Flywheel" – page 42). The SEM armature plate 1110400 0808 is basically the same as the Bosch version 1110400 0807. Almost all switching and control elements are also integrated on the armature plate (see "Armature Plate" – page 43).

For this reason only a complete flywheel or armature plate can be supplied as replacement parts. However, these parts need no longer be replaced in pairs but can now be replaced individually. An exception to this is the new SEM armature plate on which the ignition armature 1110404 3210 can be separately tested and exchanged if required.

Replacement ignition leads, spark plug terminals, short circuit wires and ignition stop switches can of course be supplied as required.

Description of Operation

Charging the storage capacitor



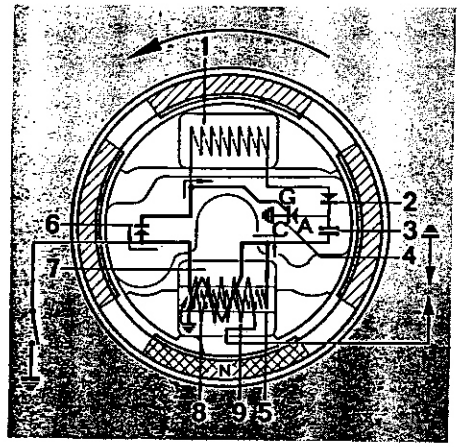
Charging

The required ignition current is generated by magnetic induction as on the breaker-controlled ignition.

When the North pole magnet of the flywheel passes the charging armature the flux lines of the magnet cut through the wire windings of the charging armature coil. This generates an alternating current in the charging diode (2). The direct current is used to charge the capacitor (3) which thus stores the energy (capacitance) required for ignition.

The storage capacitor cannot deliver any energy in this operating condition as it is inhibited by both the thyristor (4) and the charging diode (2).

Triggering the thyristor



Triggering

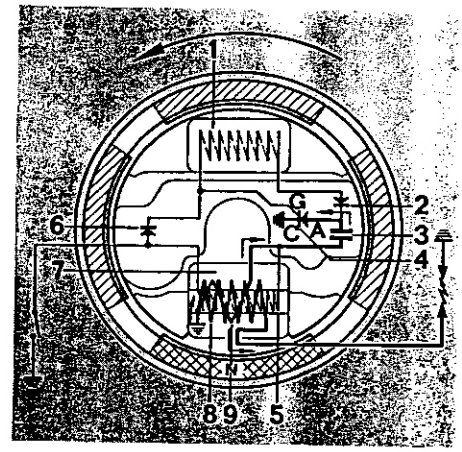
When the flywheel turns through a further 180° a voltage is induced by a change in flux in the primary winding of the ignition armature. This alternating current is rectified by the control diode (6) and fed to the gate (G) of the thyristor.

When the current has reached the required level at the appropriate engine speed, the thyristor becomes conductive in the A-C (anode-cathode) direction.

Ignition

The discharge path for the storage capacitor is opened when the thyristor becomes conductive.

Ignition process



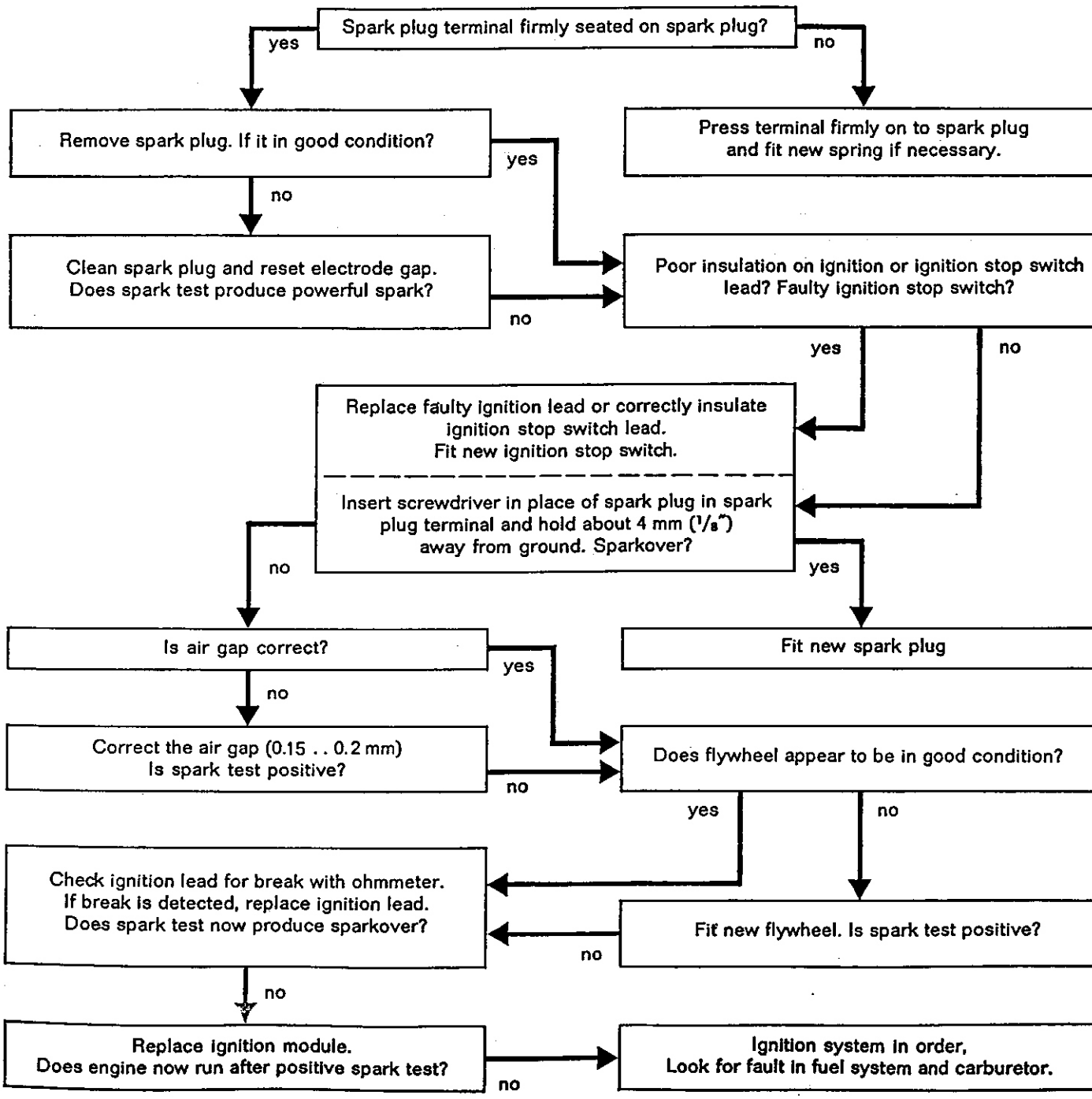
A current path is formed from the storage capacitor via the A-C link of the thyristor, ground, primary winding of the ignition armature and back to the storage capacitor.

The very rapid capacitor discharge causes a sudden rise in current in the primary winding of the ignition armature. This induces high tension in the secondary winding which is routed via the high – tension ignition lead to the spark plug. The sparkover necessary to ignite the air-fuel mixture then occurs at the spark plug electrodes.

The ignition system is switched off by operating the ignition stop switch which connects the primary winding of the ignition armature to ground via the short circuit wire.

Trouble Shooting on Electronic (Breakerless) Ignition System

Extreme caution must be exercised during fault finding, maintenance and repair work on the ignition system. Serious accidents can result from the high voltages which occur.



Flywheel

The flywheel of the "MHKZ" is mounted on the ignition side of the crankshaft on a taper seat and located by means of a Woodruff key as on the breaker-controlled ignition system.

4 permanent magnets made of a ring of plastoferrite material are attached to the inner diameter of the flywheel and are asymmetrically magnetized — **1 North pole, 3 South poles.** This prevents the engine rotating in the wrong direction. Unlike the breaker controlled version, the hub of the flywheel is not eccentrically ground.

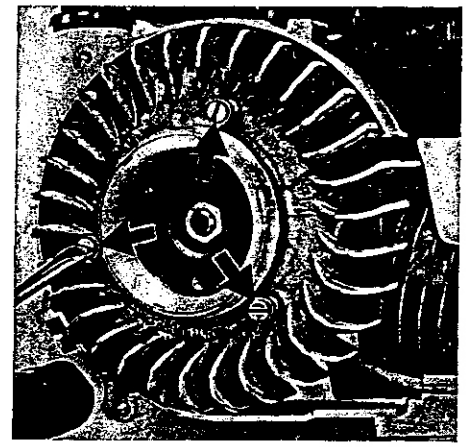
It is essential not to interchange this flywheel with other flywheels because of the different magnetization. For this reason it is advisable to check the manufacturer's code on the periphery of the flywheels: Bosch electronic version (MHKZ) 0204098007; SEM electronic version 10046800; Bosch breaker-controlled version 0204003033.

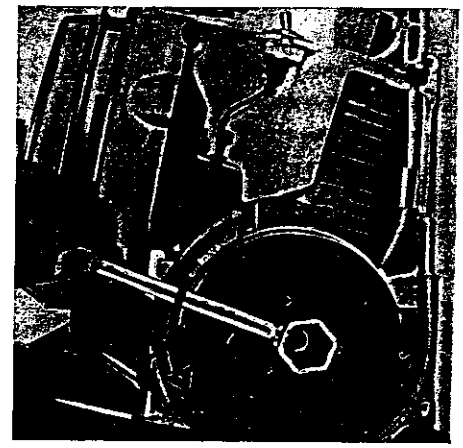
The above numbers are **not** the same as the part order numbers.

To remove the flywheel, first take off fan housing with fan housing cover and rewind starter, unscrew spark plug and insert locking screw in spark plug hole, then remove fanwheel.

Top:
Removing fanwheel

Bottom:
Releasing hexagon nut

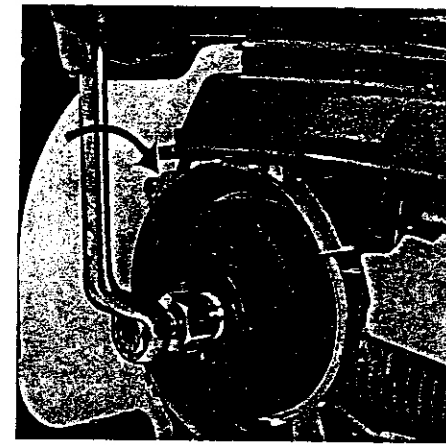




Rotate crankshaft counter-clockwise until piston crown locates against the locking screw. Slacken off and remove the hexagon nut. Fit flywheel puller 1110890 4500 in flywheel and tighten down thrust bolt with combination wrench until flywheel hub is released from taper seat on crankshaft.

Before reinstalling the flywheel make sure that no metallic particles are

Pressing off flywheel

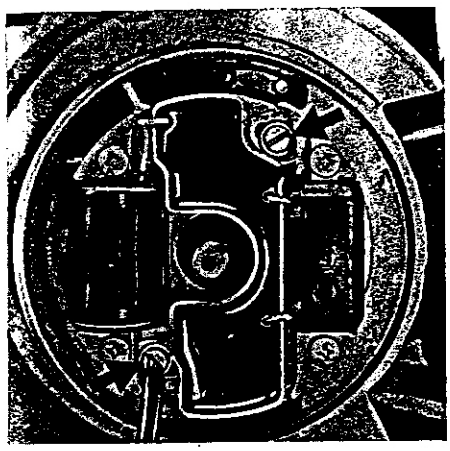


attached to the magnets. The flywheel hub bore and the crankshaft taper must be free from grease. Make sure that Woodruff key is properly located.

In order not to overload the key it is important that all the forces generated by the flywheel are transmitted via the taper seat between the flywheel and crankshaft. For this reason it is essential to ensure that the specified tightening torque of 3.0 kpm (29.4 Nm) for the crankshaft nut is maintained.

Armature Plate

Armature plate attachment



The armature plate of the "MHKZ" differs from that of the breaker controlled ignition system in that it has a charging armature. All the electronic components required by this system – in place of the breaker-controlled ignition's contact set, condenser etc. – are integrated on the armature plate and embedded in casting resin. It contains the following parts:

Charging armature, ignition armature and the electronic components – storage capacitor, thyristor, charging diode and control diode.

This armature plate is also seated concentric with the crankshaft in the crankcase and secured with two cheese head screws. Ignition timing must be checked and readjusted whenever the armature plate is removed.

See also "Construction of ignition system".

Ignition Armature

The "Bosch MHKZ "ignition armature is permanently connected to the electronic components. There is, therefore, no way of testing it in the event of a fault. The faulty armature plate must be replaced as a complete unit in such a case.

The SEM "MHKZ" ignition armature 1110404 3210 on the other hand can be removed from the armature plate and tested or replaced separately.

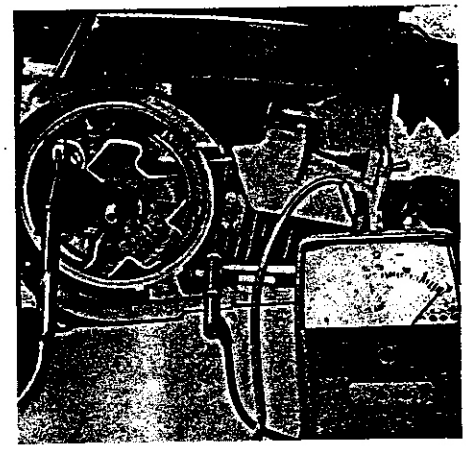
As on the breaker-controlled ignition, the coil windings are completely encased in plastic material. The resistance of both coil windings can be tested with an ohmmeter (5910850 4800).

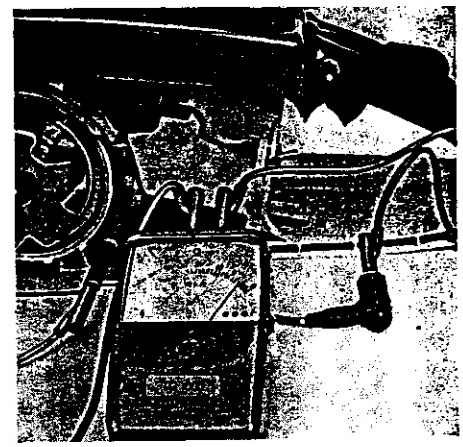
Resistance Test on Primary Winding

To test the primary winding, disconnect primary wire (stranded wire sheathed in clear plastic) from armature plate. Connect one of the two test leads to the primary connection and the other to the armature plate (ground). In measuring range "Ω × 1" (Ω) the ohmmeter should show a reading of 0.4 to 0.5 (Ω). Change the ignition armature if this value is not reached.

Top:
Resistance test on primary winding

Bottom:
Resistance test on secondary winding





Resistance Test on Secondary Winding

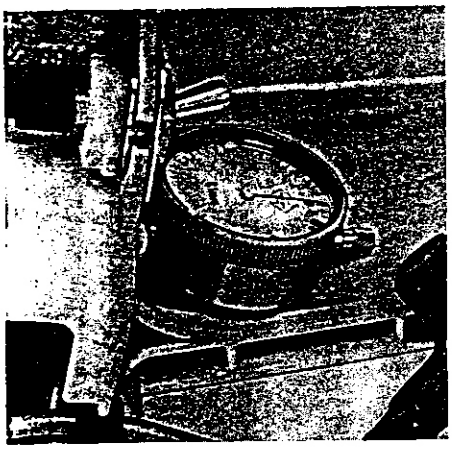
To check the secondary winding, connect banana pin of one test lead to leg spring in spark plug terminal and other test lead to armature plate (ground). In measuring range "Ω × 1000" (Ω) the ohmmeter should now indicate a value of 2.7 to 3.3 (Ω).

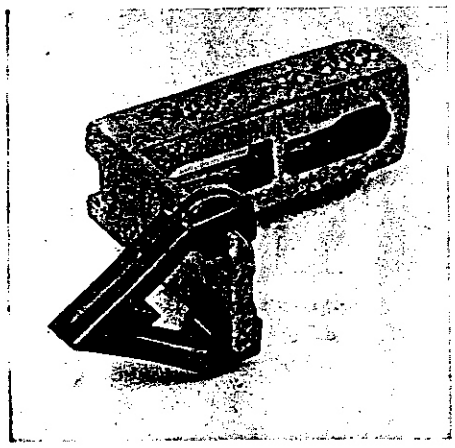
Change the ignition armature if this value is not reached.

Checking Ignition Timing

Top:
Setting piston to T. D. C.

Bottom:
Adjusting flange



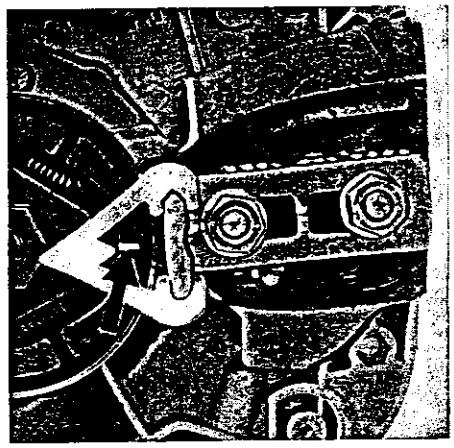


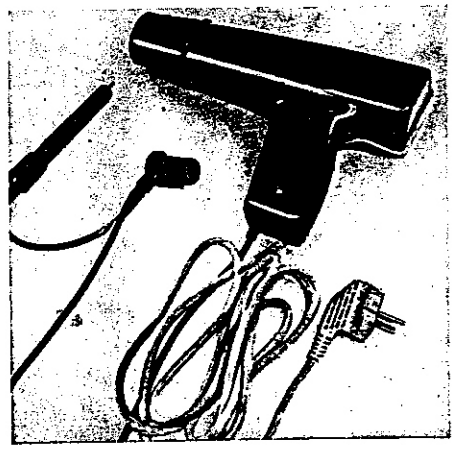
The ignition point can be checked **only** with a stroboscopic timing light. A **mains or battery powered** timing light can be used for this purpose.

The ignition point is $1.9^{\pm 0.1}$ mm before T.D.C. up to Machine No. 2783541 and $2.5^{\pm 0.1}$ mm before T.D.C. on machines after this number and must therefore be adjusted with the aid of a dial gauge by turning the flywheel clockwise.

Top:
Adjusting flange fitted and mark applied

Bottom:
Stroboscopic timing light





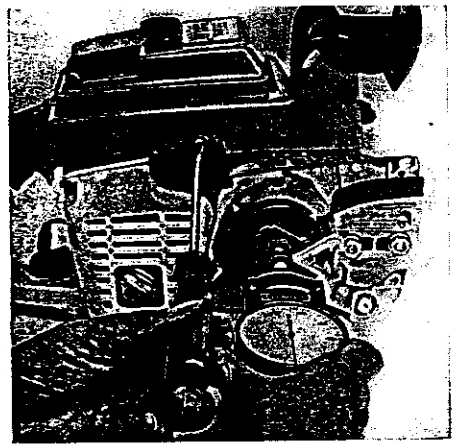
Now push and secure the adjusting flange 0000850 4000 – available as a special tool – on the guidebar mounting studs. Apply a mark to the clutch plate or clutch shoe in line with the arrow point of this flange.

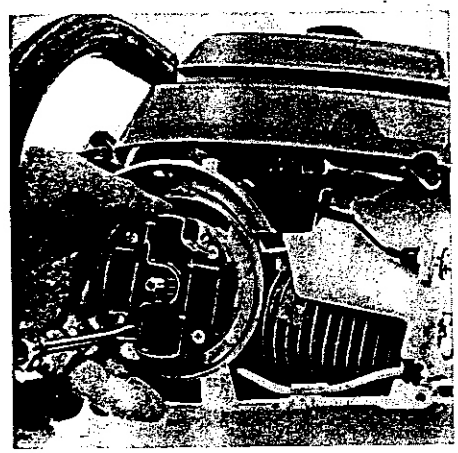
Unscrew dial gauge with holder from spark plug hole, refit and tighten down spark plug.

Connect timing light to ignition circuit between spark plug and spark plug terminal and then start the engine. Set engine speed to 6000 rpm by means of idle speed adjusting screw (check with tachometer).

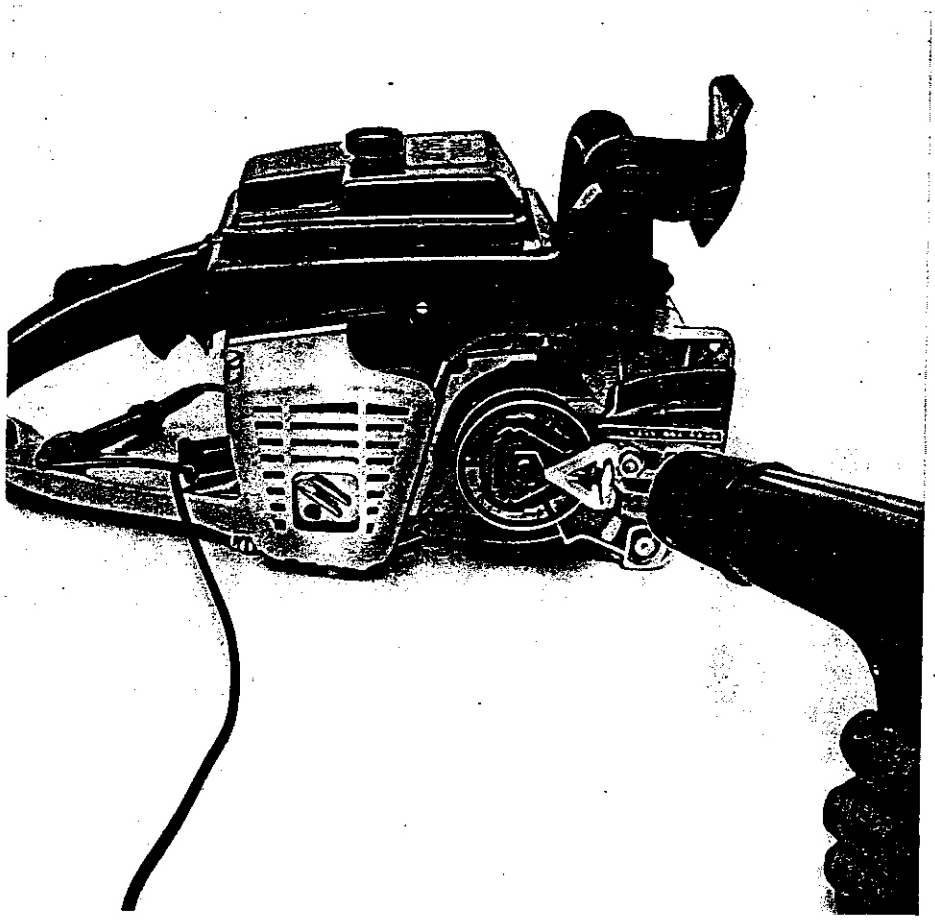
Top:
Setting engine speed with idle speed adjusting screw

Bottom:
Slackening and adjusting armature plate





Checking ignition timing with stroboscopic timing light

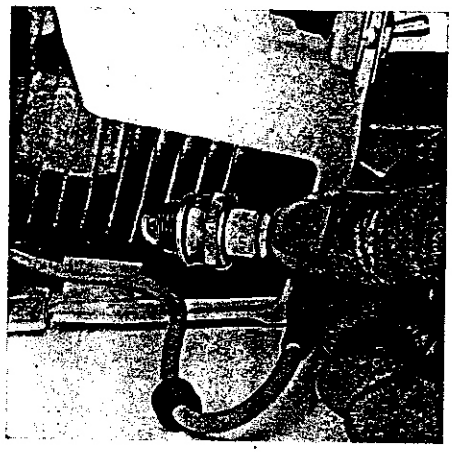


When the timing light is directed at the timing mark, the mark should appear to be in alignment with the point of the adjusting flange if ignition timing is correct.

If the mark is in front of the arrow point in the engine's direction of rotation (too far advanced) the armature plate must be turned slightly in the engine's direction of rotation. If there is too little advance, mark behind arrow point, the armature plate must be turned against the engine's direction of rotation. Move armature plate until ignition timing is correct.

Reassemble parts in reverse order to that of dissassembly.

Visual inspection of spark plug



Faults rarely on electronic ignition systems. In the event of trouble during operation, first check (visual inspection) whether the flywheel, spark plug, terminal, ignition lead, short circuit wire and ignition stop switch are in order. The following checks can be carried out:

Unscrew the spark plug and fit it in the spark plug terminal. Hold spark plug against ground. There should be a powerful sparkover at the spark plug when the engine is turned on the starter.

If this is not the case, disconnect short circuit wire from ignition stop switch and repeat the test. If a powerful spark is now obtained, the ignition stop switch is faulty. However, if there is no sparkover, the armature plate is faulty and must be replaced.

REWIND STARTER

Construction and Operation

The rewind starter is mounted on the starter post in the fan housing directly in front of the flywheel. It basically consists of the starter rope with grip, rope rotor, friction shoe and brake spring. A retaining ring holds these elements in position on the post. The starter rope – which is wound on the rope rotor by the preload of the rewind spring – rotates the rotor when the starter grip is pulled.

The friction shoe locates in a recess on the rope rotor. The braking effect of the brake spring turns the brake lever towards the rope rotor when the starter rope is pulled. This causes the sharp edges of the friction shoe plates to move against the inside of the nylon ring which is pressed into the hub of the fan wheel. The torque produced by the starter rope is transmitted via the fanwheel, mounted on the flywheel, to the crankshaft. During starting, the engine must reach the minimum speed required to generate the ignition voltage.
The withdrawn starter rope is automatically rewound on the rope rotor by the tensioned rewind spring. Always rewind starter rope slowly (never allow it to fly back).

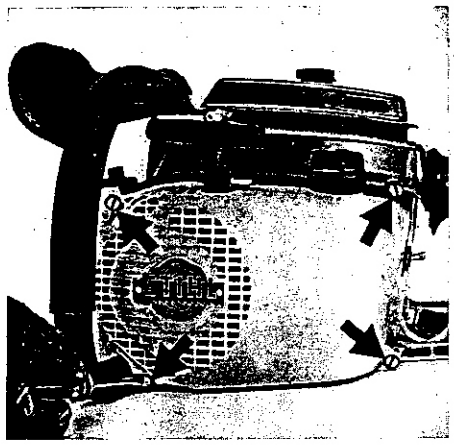
The rewind starter itself requires no maintenance. The rope rotor bearing bush should be lubricated with resin-free oil at regular intervals.

Trouble Shooting Chart

Fault	Cause	Remedy
Starter rope broken	Rope pulled out too vigorously as far as stop or over the edge, i. e. not vertically.	Replace starter rope
Rewind spring broken	Spring overtensioned – no reserve when starter rope is fully extended	Replace rewind spring
Starter rope can be pulled out almost without any resistance (crankshaft does not turn). Braking action of rewind starter reduced.	Nylon ring worn or broken by edges of friction shoe plates Fibre washers smeared with oil, dirty or worn	Replace nylon ring (renew friction shoe plates) Replace fibre washers
Starter rope is difficult to pull and rewinds very slowly	Rewind starter dirty. The lubricating oil on the rewind spring becomes viscous at very low outside temperatures and causes the spring windings to stick together.	Clean rewind starter Apply a little paraffin to the rewind spring, then pull starter rope carefully several times until it operates properly.

Disassembly

Unscrewing fan housing

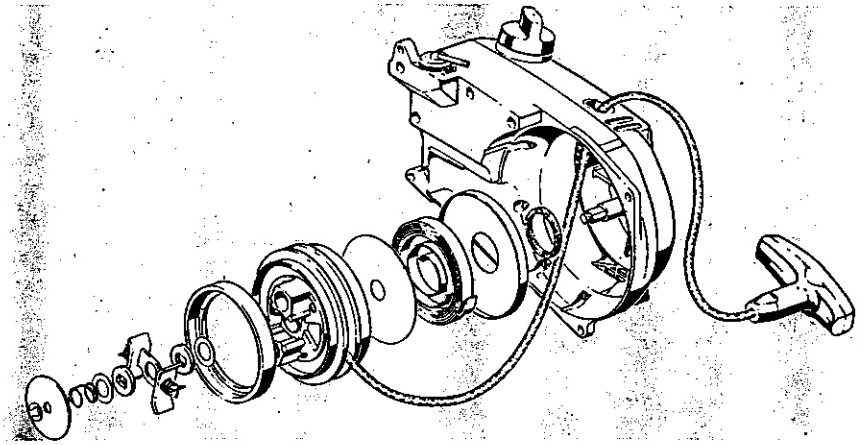


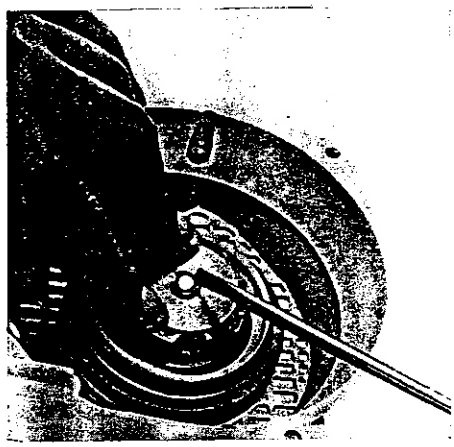
Use a screwdriver to remove the 4 cheese head screws securing the fan housing – with fan housing cover and rewind starter – to the crankcase. Pull fuel hose off connector while removing the fan housing. Now release tension on rewind spring. To do this, pull starter rope partly out of housing with grip and unwind two turns of the starter rope while holding the rope rotor firmly. Release the rope rotor and starter rope – the rewind spring is now relieved of preload. There will of course be no preload on the rewind spring if the starter rope was broken.

Use a screwdriver to carefully remove the retaining ring from the starter post while holding the thrust washer down firmly with the other hand. This prevents the preloaded brake spring flying out and possibly being lost. The component parts of the rewind starter can now be removed from the starter post.

Top:
Component parts of rewind starter

Bottom:
Removing retaining ring





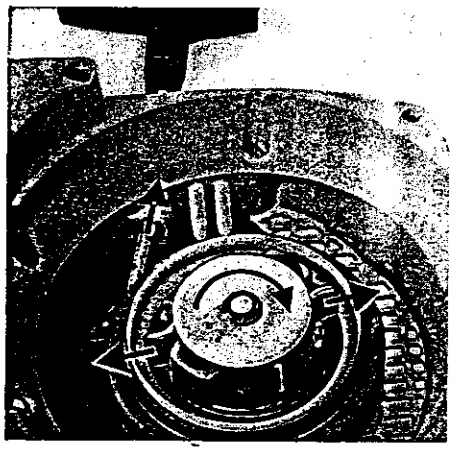
Installation of Starter Rope

Bottom:
Fitting new starter rope

Remove rope residue from the rope rotor, thread a new 4.5 mm dia. and 1000 mm long starter rope through the rope rotor and secure with a simple knot. Insert the other end of the rope through the rope bush and secure it in the starter grip with a double knot. Do not wind rope on to rope rotor.

Lubricate rope rotor with a little oil and refit it on the starter post.

Friction shoe plate rotates clockwise



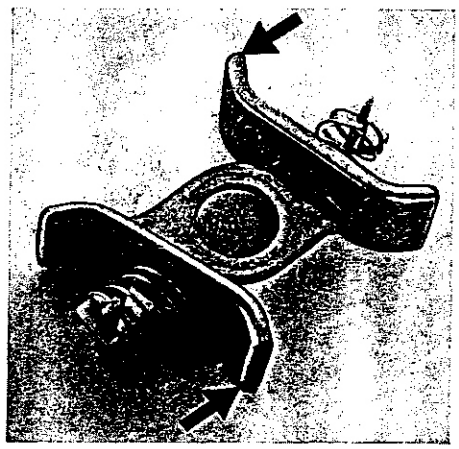
Now refit component parts of rewind starter in the sequence in the illustration.

Make sure that the two brake washers are positioned in front of and behind the friction shoe system and are free from grease.

The friction shoe system is correctly assembled when the lugs on the spring retainers rotate clockwise. Secure rope rotor with the retaining ring and tension rewind spring — see "Tensioning the Rewind Spring".

Worn Friction Shoe Plates

Worn friction shoe plates



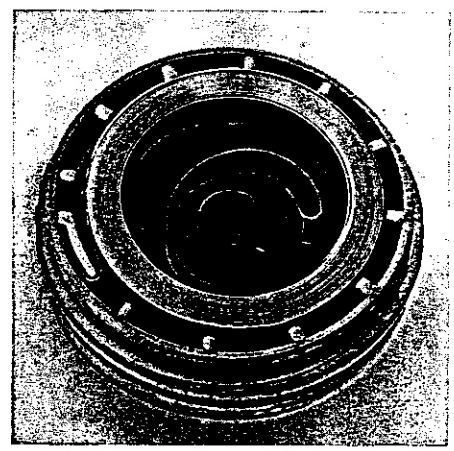
The edges of the friction shoe plates are subject to a certain amount of wear each time the rewind starter is engaged. When the edges become completely blunt the rewind starter no longer engages positively and begins to slip.

The friction shoe plates can be turned once as they have a symmetrical shape. To do this, disengage spring retainers from brake lever and remove the springs and friction shoe plates. Reassemble in reverse sequence.

It is advisable to renew the complete friction shoe once the second edge has worn.

Replacing the Rewind Spring

Rewind spring in position



The rewind spring is fitted in the spring housing of the rope rotor and protected against the ingress of dirt by a cover. Use a screwdriver to carefully prise the cover off the rope rotor and remove the faulty spring.

The replacement spring is supplied ready for assembly and is held together by a wire strap which is pushed off outwards by the edge of the spring housing during installation. Hook the outer spring loop into the cast lug of the spring housing. Lubricate spring with oil.

If the spring jumps out and uncoils during installation, it should be refitted in the spring housing in the clockwise direction, starting with the outer loop and working inwards. Fit cover on rewind spring. Install rope rotor on the starter post in the fan housing cover so that the inner spring loop engages in the recess provided.

Tensioning the Rewind Spring

Tensioning the rewind spring

Wind the starter rope completely on to the rope rotor once the new return spring or starter rope has been fitted. Now pull out starter rope about 35 to 45 cm. Hold rope rotor firmly and wind rope twice around the rope rotor.

Release rope rotor and allow starter rope to rewind slowly on to the rope rotor.

The return spring is correctly tensioned when the starter grip sits firmly in the rope bush and does not hang to one side. When the rope is fully extended it must be possible to rotate the rope rotor at least another half a turn before maximum spring tension is reached. If this is not the case, pull out the starter rope, hold the rope rotor firmly and take off one turn of the rope.

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

Replacing the Nylon Ring

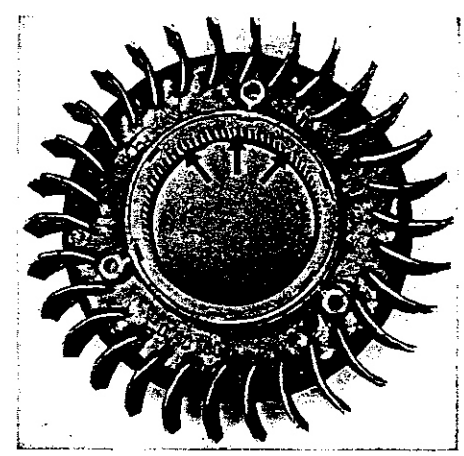
The nylon ring in the hub of the fanwheel is subject to normal wear. A new ring should be fitted if the ring is cracked or the fluting on the inner diameter of the ring is worn — it improves the grip of the friction shoe plates.

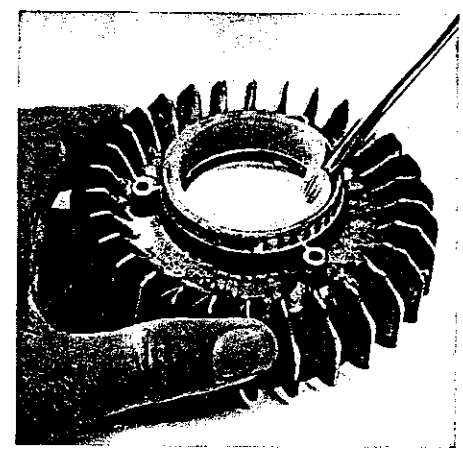
First remove the ring with a screwdriver. Carefully press new ring into position or drive it home by tapping lightly with a hammer. Make sure that ring is properly seated.

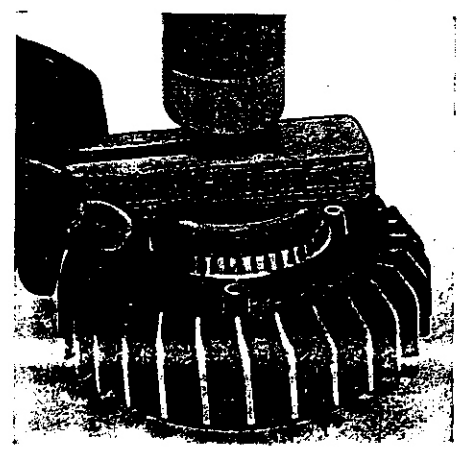
Top:
Fluting in nylon ring

Center:
Removing old ring

Bottom:
Inserting a new nylon ring



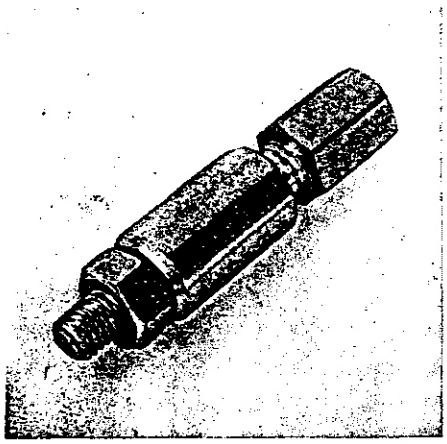




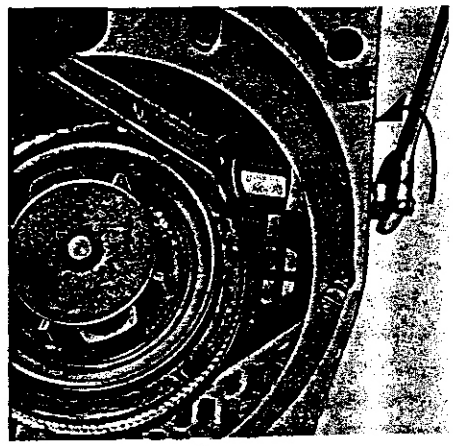
Replacing Starter Rope

Guide Bush

Installing tool for rope bush



Fitting new rope bush



A new improved starter rope guide bush is fitted as from machine No. 3240000. The number of the special installing tool has been changed from 0000 890 2200 to 0000 890 2201.

The wear on the bush is increased considerably if the starter rope is pulled off center during starting. The wall of the bush eventually wears through, becomes loose and must be replaced.

To do this, release rewind spring (see also "Disassembly" of rewind starter). Undo knot in starter rope and pull it out of starter grip and bush.

Use a screwdriver or other suitable tool to lever the old bush out of the fan housing. Fit new bush in its seat. Insert threaded end of installing tool 0000 890 2201 through the guide bush from the inside of the fan housing and fit the thrust sleeve and hexagon nut. Now tighten down the hexagon nut to fold over the lower end of the rope bush until it is firmly seated.

Refit starter rope, secure it with special knot in starter grip and retension the rewind spring.

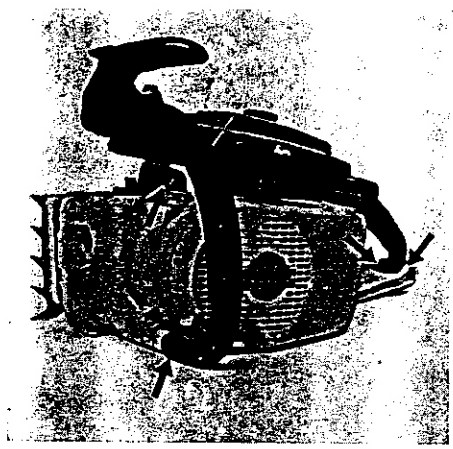
If starter rope action becomes very stiff and the rope only rewinds very slowly or not completely, it can be assumed that the rewind starter is mechanically in order but plugged with dirt.

At very low outside temperatures the oil on the rewind spring may thicken and cause the spring windings to stick together. This has a detrimental effect on the function of the rewind starter. In such a case it is sufficient to apply a little paraffin to the rewind spring. Then pull out starter rope slowly several times until its normal smooth action is restored.

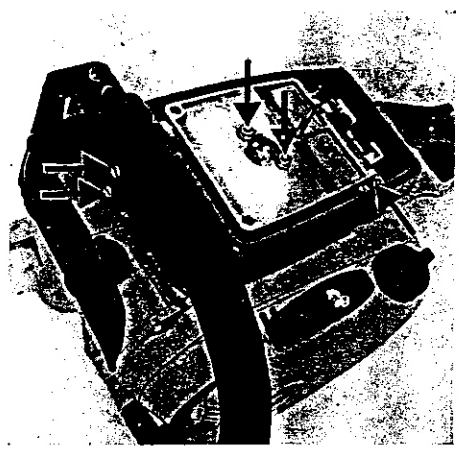
If clogged with dirt or resin, the entire rewind starter, including rewind spring, must be removed from the machine. Take special care when removing the spring. Wash all parts in paraffin or clean gasoline. Lubricate rewind spring and post when reassembling.

THE AV HANDLE

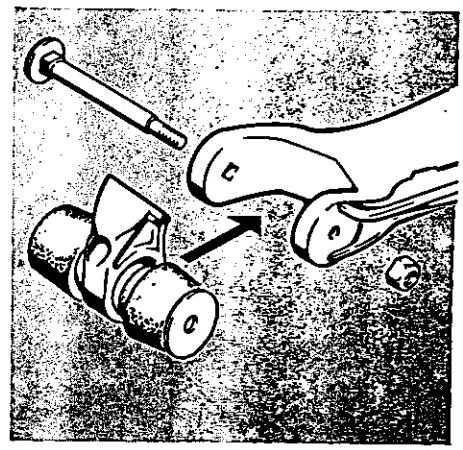
Location of vibration dampers (handle frame hinged upwards)



Remove screws and locknuts



Rubber buffer mounting



Disassembly and Repair

The hand grip and handlebar are interconnected via the handle frame and secured to the machine at three points by means of vibration dampers (rubber buffers or rubber bearings). The vibration dampers are located at the support on the extreme end of the hand grip, at the front underside of the handle frame and at the lower end of the handlebar. Always replace vibration dampers if they show signs of damage.

At end of hand grip: Unscrew nut, pull out carriage bolt and exchange faulty rubber buffer.

On handle frame: Take off filter cover and filter, remove 2 socket head screws at front of handle frame. Remove 1 cheese head screw from top rear filter housing mounting which also fastens filter housing strap to shroud. Unscrew the two M 5 locknuts, lift filter housing off studs and detach choke rod from choke spindle. Disconnect throttle rod at throttle spindle and fold handle frame upwards. Unscrew locknut and pull out carriage bolt. Change the rubber buffer.

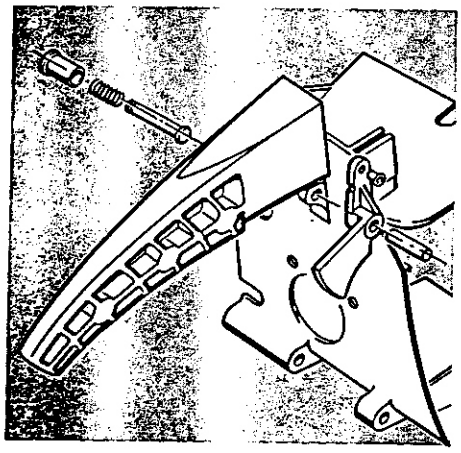
At underside of handlebar: The rubber bearing on the underside of the handlebar is secured in the support on the crankcase by a cheese head screw. Remove 2 socket head screws at top end of handlebar and 1 cheese head screw at support. Take off handlebar. Clean away residue of old rubber bearing from handlebar and support. Fit new rubber brearing.

Note: Install rubber buffers and bearings so that they are completely free from torsional stress in the longitudinal axis.

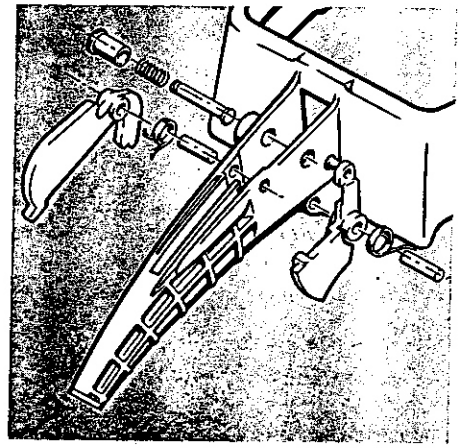
A stop washer must be fitted between the rubber buffer and bearing (threaded end) for the shoulder of the carriage bolt. This eliminates the risk of damaging the bearing when tightening down the nut.

THROTTLE MECHANISM

Throttle mechanism on 041

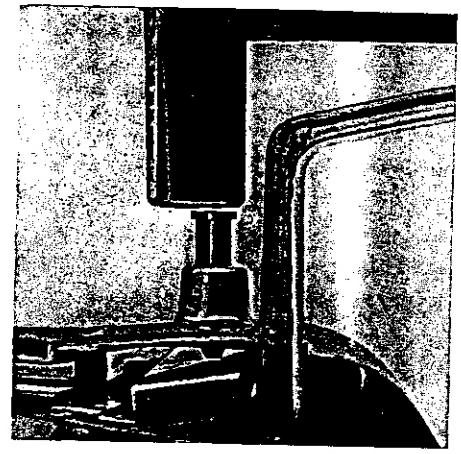


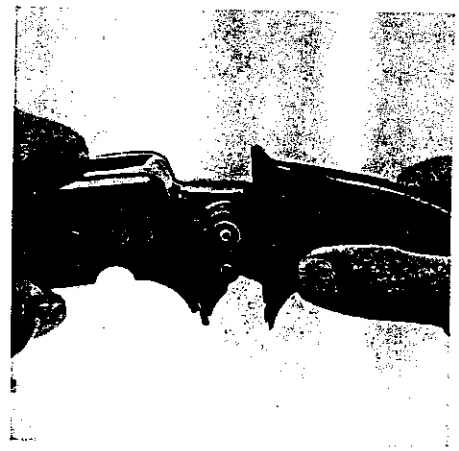
Throttle mechanism on 041 AV



Top:
Securing half-throttle lock button

Bottom:
Fitting rubber grip





Disassembly and Repair

The 041 and 041 Farm Boss models have a throttle trigger and half-throttle lock button. A throttle trigger interlock lever is standard with the AV system. This device prevents accidental throttle actuation and is therefore an important safety feature.

In order to gain access to the throttle trigger mechanism for repairs it is necessary to remove the rubber grip which holds both the cylindrical pin of the throttle trigger interlock and the throttle trigger in position. The rubber grip is stuck on with adhesive at the factory to insure that it does not slip or twist during operation. It is, therefore, possible that the grip will either be very difficult or impossible to pull off. If this is the case, cut it open lengthwise with a knife and then remove it.

The throttle trigger interlock lever and throttle trigger itself are both secured by means of a cylindrical pin on the hand grip. If either the lever or trigger or both have to be replaced, push out the two pins with a drift and exchange the damaged parts.

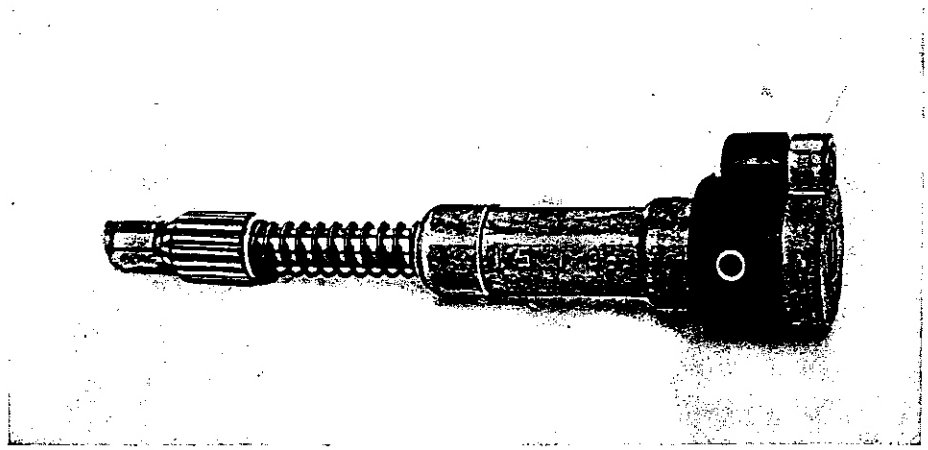
Coat the handle with adhesive before fitting a new rubber grip. It is always advisable to fit a **new rubber grip** to insure a tight fit on the handle.

Now connect throttle rod to throttle trigger and check operation of throttle mechanism. Assembly is then a reversal of the disassembly procedure.

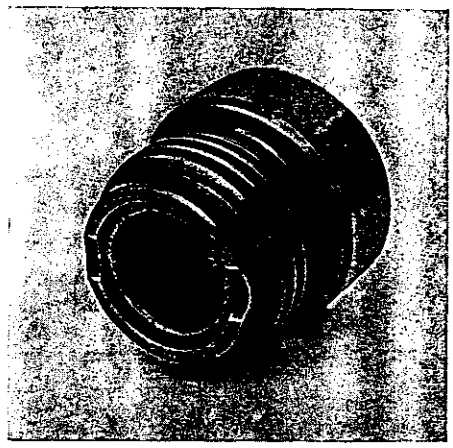
Make sure that the parts are assembled in the correct sequence and properly positioned. First fit the half-throttle lock button and then the trigger interlock lever and throttle trigger with their respective torsion springs. If the half-throttle lock button is faulty, insert bolt through bore from other side of handle and rest bolt head on a suitable base. Fit helical spring and half-throttle lock button on bolt and then secure button on bolt by tapping lightly with a hammer.

OIL PUMP

Oil pump assembled



Oil pump worm gear



Construction and Operation

The oil tank and oil pump are located in the crankcase (power take-off side). The oil pump feeds the chain lubricating oil from the oil tank to the guide bar and chain and must always operate efficiency to assure proper lubrication.

The pump is driven by the cylindrical pin in the cover plate. One end of this pin engages in a bore in the chain sprocket while the other end engages in the oil pump worm gear. Firmly coupled in this way, the chain sprocket drives the pump plunger via the cover plate and worm gear. When the pump plunger is rotated it performs a continuous stroke brought about by the angled face at the end of the plunger running against the tapered adjusting bolt and the helical spring. The pump plunger moves downwards on its intake stroke. An oil pocket at the top of the plunger "collects" the oil at the intake port and transfers it to the outlet port on its upward stroke, thus compressing the oil and forcing it through the outlet port.

The oil feed rate is in a fixed linear ratio to the chain speed. This means there is always a sufficient supply of lubricating oil to the guide bar and chain at all engine speeds. The lubricating oil is filtered by the pickup body in the oil tank to prevent any impurities reaching the oil pump.

The pump body is sealed externally on the suction and delivery sides with a rubber ring. Both oil bores on the rubber ring are provided with bushes to insure that they cannot close up in the installed condition. The thread in the boss of the pump body is only required for removing and installing operations.

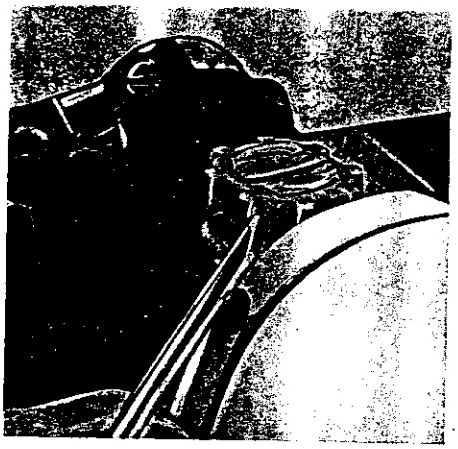
Operating faults on the oil pump itself are extremely rare. Dirt on other components is usually the cause of inadequate oil feed.

Trouble Shooting Chart

Fault	Cause	Remedy
No lubricating oil at chain	Oil tank empty	Fill up with oil
	Oil inlet bore in guide bar is blocked	Clean oil inlet bore
	Intake line or oil pickup body (strainer) clogged	Wash intake line and pickup body (strainer) in clean gasoline and blow out with compressed air. Fit new pickup body if necessary.
	Cylindrical pin in cover plate broken	Fit new cylindrical pin in cover plate, replace cover plate
	Tank vent in oil filler cap blocked	Clean oil filler cap
	Teeth on pump plunger and worm gear worn	Replace pump plunger and worm gear or preferably fit a new oil pump
Saw loses chain lubricating oil	Faulty oil seal, sealing ring or O-ring on worm gear or oil pump	Fit new oil seal, sealing ring or O-ring

Oil Feed Adjustment

Adjusting oil feed control knob with a screwdriver



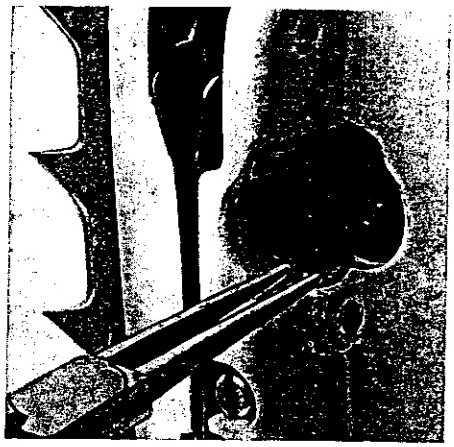
The oil feed control knob is located underneath the handle frame at the chain sprocket side and can be adjusted by applying a screwdriver to its lugs. The oil feed rate is increased by turning the control knob clockwise (broad end of arrow) or decreased by turning it counterclockwise (narrow end of arrow).

Minimum and maximum feed rates are 4 cm^3/min and 14 cm^3/min respectively at 6000 rpm. On new chain saws the oil pump is set to a mean feed rate of 9 cm^3/min for a guide bar length of 40 cm (16 in.).

This feed rate is obtained by setting the control knob to the max. feed position and then turning it back one full turn.

Disassembly and Repair

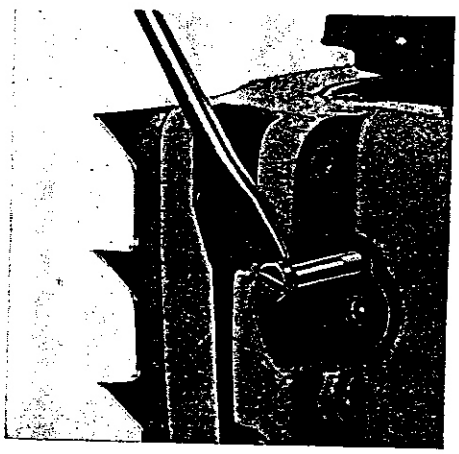
Removing circlip with circlip pliers



If the trouble persists after all other possible sources of faults have been investigated and rectified, the cause must be in the oil pump. First empty oil tank. Remove chain sprocket cover, bar and chain, chain sprocket and clutch to check cylindrical pin in the cover plate. If the cylindrical pin is broken, fit a new one or replace the complete cover plate.

The worm gear is removed by rotating the cover plate counterclockwise with the cylindrical pin engaged. Use circlip pliers to remove the circlip which holds the oil pump in the crankcase. Insert an M 5 cheese head screw in the threaded bore on the pump body, slacken off the oil pump by means of a screwdriver or pliers and carefully withdraw it from the crankcase.

Withdrawing oil pump by means of cheese head screw



Wash all parts of the oil pump — washer, rubber ring, bushes, pump body, plunger, 2 washers, helical spring and O-ring — thoroughly in clean gasoline. Pay special attention to the oil ports. Blow out with compressed air and check all parts for damage, especially the seals, and replace as necessary.

Coat parts with oil before assembly and then refit in reverse sequence to that of disassembly.

If the intake hose or pickup body have to be cleaned or renewed, empty the oil tank and use hook 11108938800 to withdraw pickup body through filler opening. Then pull hose off nipple. Make sure that the hose is not kinked or twisted in the oil tank when refitting.

CARBURETOR AND AIR FILTER

Construction and Operation of Carburetor

STIHL chain saws are equipped with an all-position diaphragm carburetor. The main components of this carburetor are the pump and metering units and the carburetor body itself. The fuel pump operates as a completely separate and independent unit although it is part of the carburetor.

Operation of Fuel Pump

The pressure in the crankcase varies with each stroke of the piston. The piston creates a depression in the crankcase on its upward stroke and overpressure on its downward stroke. This process is utilized for actuation of the fuel pump. The chamber in front of the pump diaphragm (impulse chamber) is connected to the crankcase by a hose. The changes in pressure act directly on the pump diaphragm and cause it to move in time with the piston. Control is effected via two flap valves stamped into the pump diaphragm.

The depression created by the upward stroke of the piston draws the pump diaphragm into the impulse chamber thus enlarging the pump chamber – a vacuum is produced. The inlet valve opens, the higher atmospheric pressure forces fuel from the tank into the pump chamber and presses the outlet valve onto its seat.

The downward stroke of the piston changes the relative pressures. An overpressure is built up in the crankcase and pump chamber which presses the diaphragm against the pump chamber and exerts pressure on the fuel. The overpressure forces the inlet valve to close while the outlet valve opens and allows fuel to flow to the carburetor's needle valve.

Operation of Carburetor

The opening and closing of the needle valve and, therefore, the supply of fuel to the carburetor is controlled by the metering diaphragm. The metering diaphragm is in a position of rest when atmospheric and diaphragm chamber pressures are equal (the chamber in front of the diaphragm is connected to atmosphere).

The cone of the inlet needle is held on its seat by spring pressure.

The metering diaphragm chamber is filled with fuel when the engine is running. A vacuum is created in the choke tube (venturi) during the induction stroke. Fuel is drawn into the choke tube through the jet bores between choke tube and diaphragm chamber. This in turn produces a vacuum in the diaphragm chamber and the atmospheric pressure of the free air presses the metering diaphragm towards the carburetor body. The force generated by the pressure difference times diaphragm area acts on the inlet control lever via the perforated disc on the diaphragm, overcomes spring force and lifts the inlet needle off its seat. This allows fresh fuel to flow from the pump chamber into the diaphragm chamber. The needle valve closes again as soon as atmospheric pressure is reached in the metering diaphragm chamber. Under normal operating conditions the needle valve does not open and close constantly. The metering diaphragm actually settles down to a mean level depending on engine speed and the needle valve remains open relative to the diaphragm's position.

The quantity of fuel drawn into the choke tube depends on the amount of vacuum and this in turn is influenced by the position of the choke and throttle valves. The volume of fuel can be altered to suit different operating conditions by means of adjustment screws for the idle and main jets.

Top:
Starting position

Bottom:
Idle position

1 Impulse nipple
2 Inlet valve open
3 Fuel intake
4 Choke valve
5 Valve jet
6 High speed adjustment screw
7 Pump diaphragm (intake position)
8 Outlet valve closed
9 Throttle valve

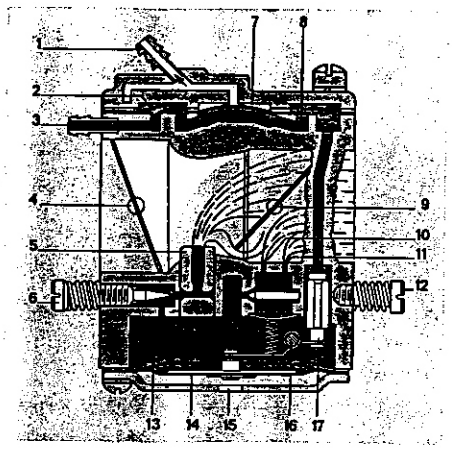
Top:
Changing from idle to part or full-throttle position

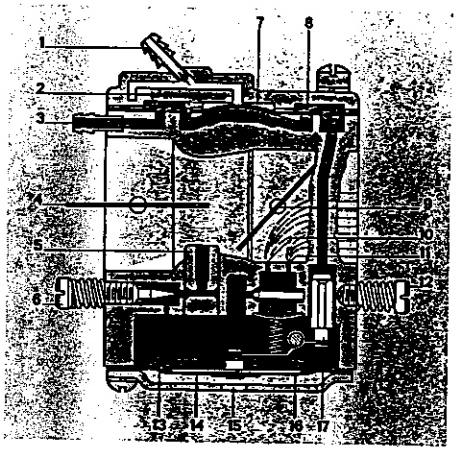
Bottom:
Full throttle position

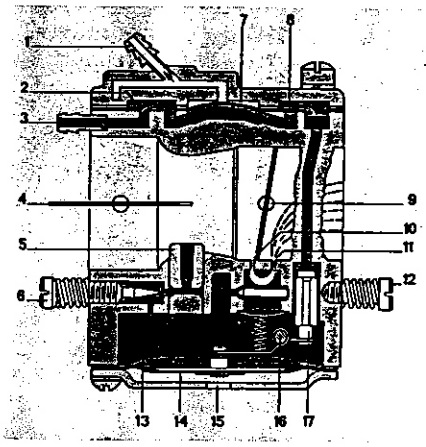
10 Secondary idle jet
11 Primary idle jet
12 Low speed adjustment screw
13 Metering diaphragm chamber
14 Metering diaphragm
15 Connection to atmosphere
16 Inlet control lever
17 Inlet needle

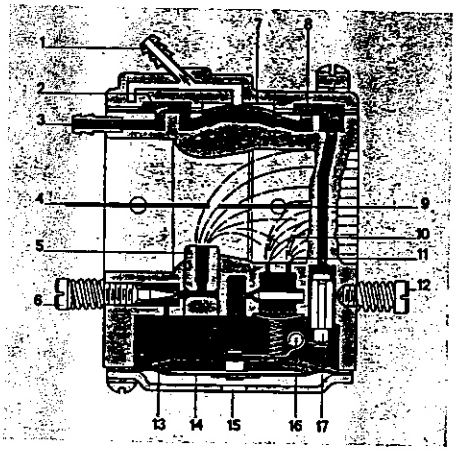
(both adjustment screws are drawn offset by 90°)

Four basic operating conditions are described below to explain the function of the carburetor:









1. The choke valve is closed and the throttle valve partly opened during the **starting process.** A powerful vacuum is created in the choke tube during the induction stroke because the entry of outside air is almost completely restricted by the closed choke valve. This means that the engine draws in a large amount of fuel through all the jets and relatively little air. A rich starting mixture is obtained in this way. The choke valve must be opened as soon as the engine fires — the mixture would otherwise be too rich and stall the engine.

2. Very little fuel is required for **idling.** The choke valve is fully opened and the throttle valve almost completely closed. The vacuum only acts on the **primary idle jet** so that fuel is only drawn off through this jet. Owing to the pressure difference between the choke tube (venturi) and the intake pipe behind the throttle valve, supplementary air could get into the diaphragm chamber through the **main jet** (valve jet), making the mixture too lean and causing the engine to stall. This is prevented by a **ball in the valve jet which closes against the inlet when there is in-**sufficient vacuum in the choke tube.

3. During the **changeover** from idle to part or full-throttle sufficient fuel must be drawn in with the suddenly increased flow of air when the throttle valve is opened. This is effected by means of the secondary idle jet which is exposed to the effetcs of vacuum at this point, thus **producing the richer, ignitable mixture required.**

4. Opening the throttle valve further brings the **main jet (valve jet),** located at the narrowest point of the choke tube (venturi), into operation and provides the fuel required for **full-throttle operation.**

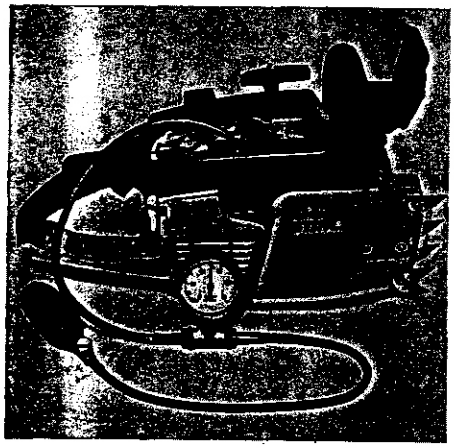
Trouble Shooting Chart

Fault	Cause	Remedy
Carburetor floods; engine stalls	Inlet valve not sealing. Foreign matter in valve seat or seat damaged	Remove inlet needle or carburetor body, clean or renew
	Helical spring not properly located on dimple of inlet control lever	Remove inlet control lever and refit correctly
	Perforated disc on diaphragm is deformed and presses constanly against inlet control lever	Fit new metering diaphragm
	Inlet control lever too high	Set inlet control lever flush with bottom of diaphragm chamber
Engine does not respond properly to throttle	Idle jet "too lean"	Back off low speed adjustment screw slightly (see carburetor adjustment)
	Inlet control lever too low	Set inlet control lever flush with bottom of diaphragm chamber
	Inlet needle sticking to valve seat	Remove inlet needle or carburetor body, clean thoroughly and refit
	Vent bore to atmosphere blocked	Clean bore
	Diaphragm gasket leaking	Fit new diaphragm gasket
	Metering diaphragm damaged	Fit new metering diaphragm
Engine will not idle	Throttle valve opened too far by idle speed adjusting screw	Readjust idle speed adjusting screw

Fault	Cause	Remedy
Engine stalls at idle speed	Idle jet bores or ports clogged	Clean jet bores and blow out with compressed air
	Idle jet "too rich"	Tighten down low speed adjustment screw slightly
	Idle speed adjusting screw not set properly – throttle valve completely closed	Set idle speed adjusting screw correctly (see carburetor adjustment)
Engine speed drops off quickly under load – low power	Air filter plugged, tank breather faulty	Clean air filter and tank breather or replace if necessary
	Leak in fuel line from tank to fuel pump	Seal or renew connections and fuel line
	Pump diaphragm damaged	Fit new pump diaphragm
	Valve jet restricted	Clean or replace valve jet
	Fuel strainer plugged or damaged	Clean fuel strainer or renew if necessary

Leakage Test (Pressure Test) on Carburetor

Pressure testing the carburetor



The carburetor can be tested for leaks with the carburetor and crankcase tester 1106 850 2900.

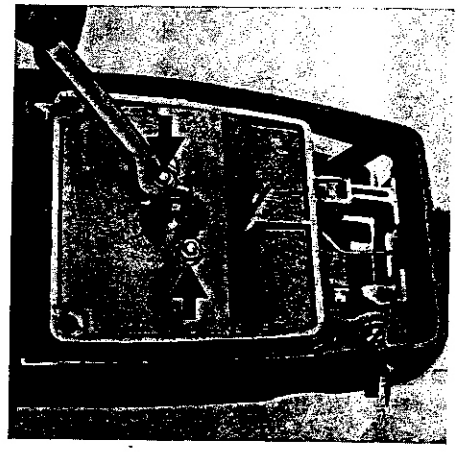
To do this, remove fuel line from nipple on end cover and fit tester's hose on the nipple. Close vent screw on rubber bulb and pump air into the carburetor until the pressure gauge indicates a pressure of 0.4 to 0.5 bar (kp/cm²). It this pressure remains constant, the carburetor is airtight. However, if it drops, there are two possible causes:

1. The inlet needle is not sealing or the valve seat in the carburetor body is dirty or damaged.
2. The metering diaphragm is damaged.

In this case the carburetor should be removed and repaired.

Disassembly of Carburetor

Removing screw and locknuts



Close choke valve and move choke lever to "0" or "Choke". Release nut on filter cover and take off together with air filter.

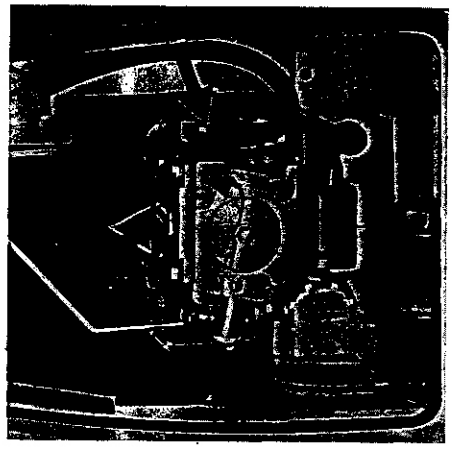
Remove cheese head screw from top rear filter housing mounting which also fastens filter housing to shroud. Unscrew locknuts, lift filter housing off studs and detach choke rod from choke spindle. Now pull fuel and impulse hoses off the nipples on the carburetor and take out carburetor and heat shield. Disconnect throttle rod from throttle sprindle.

The flange and baffle can be removed after unscrewing the two cheese head screws.

Assembly is a reversal of the disassembly procedure. Always replace damaged gaskets.

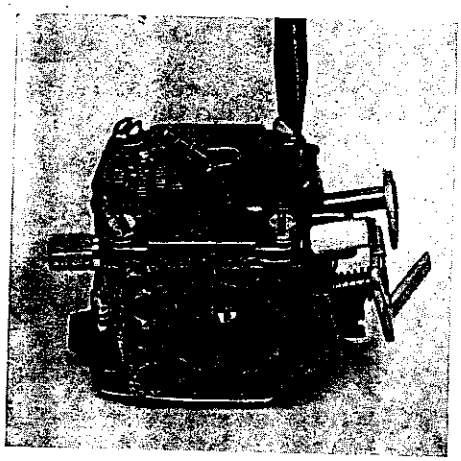
Top:
Removing filter housing and disconnecting choke rod

Bottom:
Pull off fuel and impulse hoses



Repair

Removing end cover

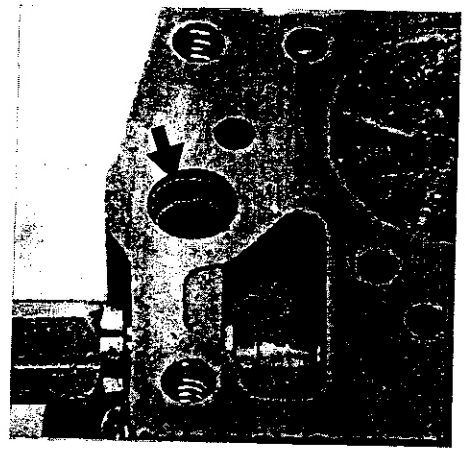


Always start repair work on the carburetor at the pump unit. To clean the fuel strainer, remove end cover and take out gasket, pump diaphragm and strainer. Wash strainer in clean gasoline and blow out with compressed air. Replace strainer if it shows any signs of damage.

Now remove metering chamber cover and take out metering diaphragm and gasket. Diaphragm and gasket are frequently stuck firmly together. If this is the case, carefully separate them.

The diaphragms are the most delicate parts of the carburetor. Due to the continuous alternating stress to which the diaphragms are subjected, the material enventually shows signs of fatigue — the diaphragms deform and swell. When this stage is reached the carburetor can no longer function correctly and the diaphragms must be replaced.

Fuel strainer



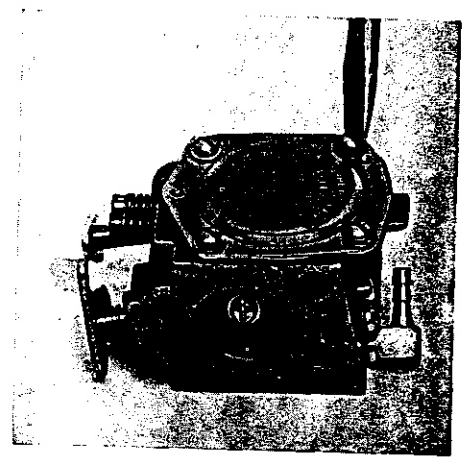
The inlet valve is located in a recess in the metering diaphragm chamber. The inlet control lever and helical spring can be removed after unscrewing the oval head screw. It is then possible to take the inlet needle out of the carburetor body. If the inlet needle is damaged — indicated by constant flooding of carburetor although needle is clean, fit a new one.

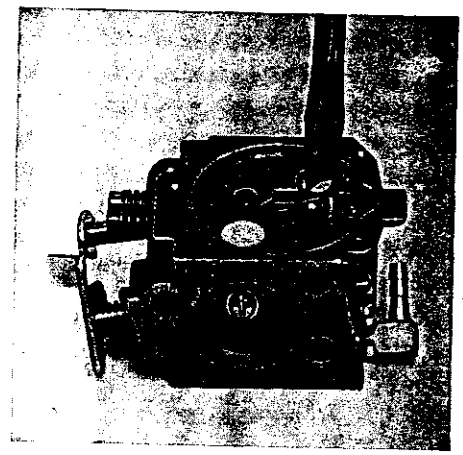
If the plastic ball in the valve jet (main jet) no longer moves freely or is stuck, press or knock out the jet from the diaphragm chamber side towards the air filter using a suitable tool of about 5 mm (0.2") diameter. However, before doing this, back off high speed adjustment screw at least two turns.

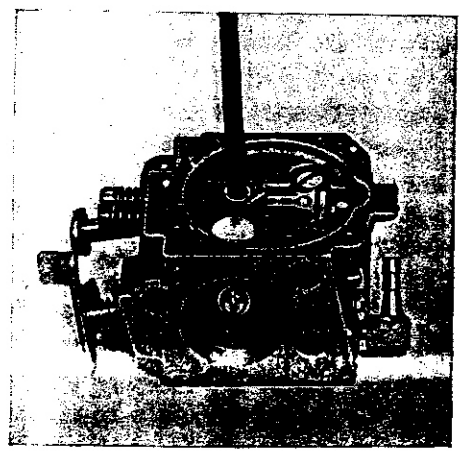
Top:
Removing metering chamber cover

Center:
Unscrewing oval head screw on control lever

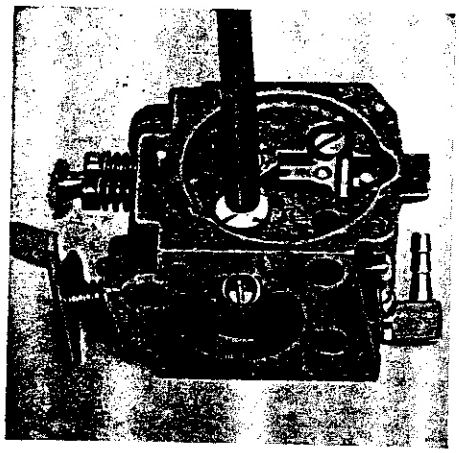
Bottom:
Pressing out valve jet







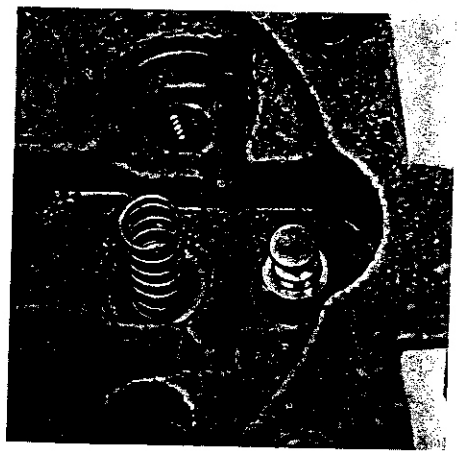
Pressing blanking plug flat



Wash all parts of the carburetor, especially bores and ports, with clean gasoline and then blow out with compressed air. Unscrew both adjustment screws for this purpose.

Check blanking plug 11101229410 for leaks by coating it with oil and applying a compressed air line to the bore for the low speed adjustment screw. If air bubbles appear in the oil, carefully caulk circumference of blanking plug and check again. Fit a new plug if leaks persist. To remove old plug, apply a punch of about 3 mm (0.12") dia. to the center of the plug. Press or tap punch until plug buckles downwards and is released from the wall of the bore. Take out plug and blow through idle bores with compressed air. Fit new blanking plug in bore with curvature facing upwards and then press it flat with a punch of about 8 mm (0.32") diameter.

Inlet needle and helical spring in position

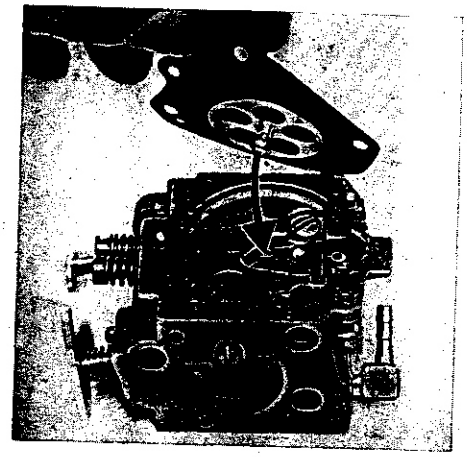


When inserting the valve jet make sure that it is exactly vertical and not canted. The rear edge of the valve jet must be flush with the bottom of the diaphragm chamber.

Fit inlet needle and helical spring in their respective bores. Insert spindle in inlet control lever, engage clevis in annular groove on head of inlet needle and secure with oval head screw. Make sure that the helical spring locates on the control lever's dimple. Tighten down oval head screw and check freedom of movement of inlet control lever, making sure that it is still flush with the bottom of the diaphragm chamber. Refit gasket, metering diaphragm and cover.

The metering side of the carburetor body and the pump end cover each have two integrally cast lugs to locate the gaskets, diaphragms and

Engage annular groove on metering diaphragm in clevis of control lever

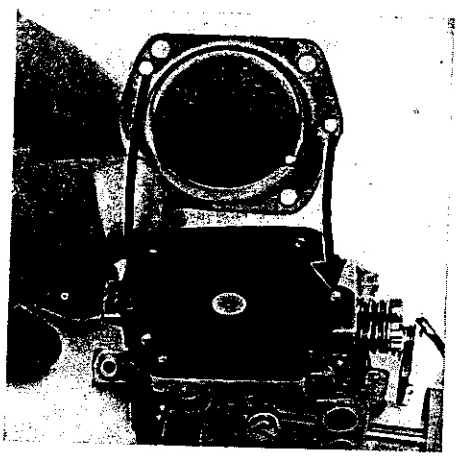


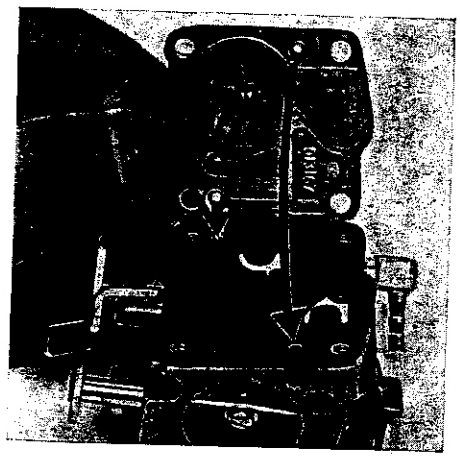
covers. Fit fuel strainer and then the pump diaphragm, gasket and end cover in that order. Make sure that the locating holes line up with the lugs. Insert four screws in each cover and tighten down alternately in diagonal pattern. Refit adjustment screws.

Carburetor Adjustment

Top:
Guide lugs on metering side of carburetor body

Bottom:
Guide lugs on pump end cover





Carry out leakage test before installing the carburetor.

Assembly is then a reversal of the disassembly procedure.

Carburetor adjustment screws

1 High speed adjustment screw
2 Low speed adjustment screw
3 Idle speed adjusting screw

The carburetor was adjusted at the factory to provide high power and low fuel consumption under local atmospheric conditions.

If the saw is operated at high altitudes (mountains) or at sea level the basic adjustment of the carburetor must be changed. This correction is made at the two adjustment screws and the idle speed adjusting screw.

The basic adjustment of the carburetor is as follows:

High speed adjustment screw H:
Open 3/4 to 7/8 of a turn
(large diameter thread)

Low speed adjustment screw L:
Open 1 to 1 1/4 turns
(small diameter thread)

Both adjustment screws should be carefully screwed down onto their seats before making the basic adjustment – only intended as a guide for readjustment. **Only check carburetor adjustment with the engine warm and air filter clean.**

Notes for readjustment of carburetor

Engine stops while idling:

Turn idle speed adjusting screw slightly clockwise while engine is running (chain should not rotate).

Chain turns at idle speed:

Turn idle speed adjusting screws slightly counterclockwise.

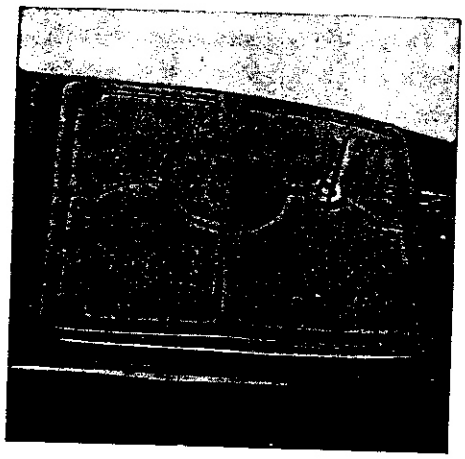
Engine runs erratically at idle speed:

Adjust at low speed adjustment screw. Turn clockwise for leaner mixture or counterclockwise for richer mixture.

Important: Even very slight alteration of the adjustment screw settings has a substantial effect on engine performance.

Air Filter

Air filter in position on filter housing



The air filter's functon is to intercept dust and dirt in the combustion air and thus reduce wear on engine components. Clogged air filters have a detrimental effect on engine performance, increase fuel consumption and make starting more difficult.

Before removing filter, close choke valve to make sure that no dirt can get into the carburetor.

Release twist lock and remove filter cover with air filter.

Knock out the filter element on the palm of the hand and then wash it in clean gasoline. Carefully blow out filter with compressed air. If the wire mesh is damaged in any way, fit a new filter element — the engine can be permanently damaged by dirt drawn in with the combustion air.

FUEL HOSE

Disassembly and Repair

The diaphragm pump draws fuel out of the tank and into the carburetor via the fuel hose. Any impurities mixed with the fuel in the tank are filtered out by the pickup body (filter and strainer). The wire gauze in the pickup body and fine pores of the filter eventually become plugged with minute particles of dirt. This restricts passage of fuel and the required fuel feed cannot be maintained.

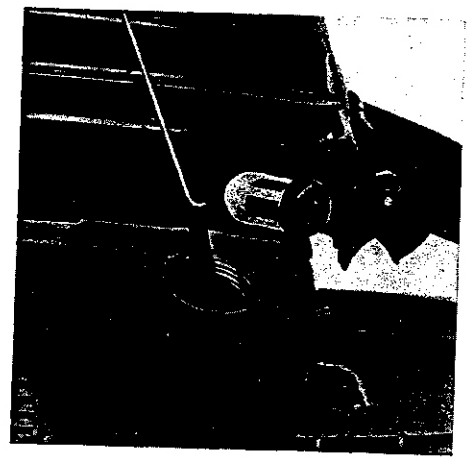
In the event of trouble with the fuel supply system, first clean the pickup body. To do this, use a hook to pull the pickup body out through the tank filler and disconnect the hose. Remove the cap and then take out the filter, strainer and insert. Carefully clean all parts. Do not damage the wire mesh in the pickup body. The filter should be renewed rather than cleaned. Take this opportunity to clean the fuel tank by flushing it out with clean gasoline.

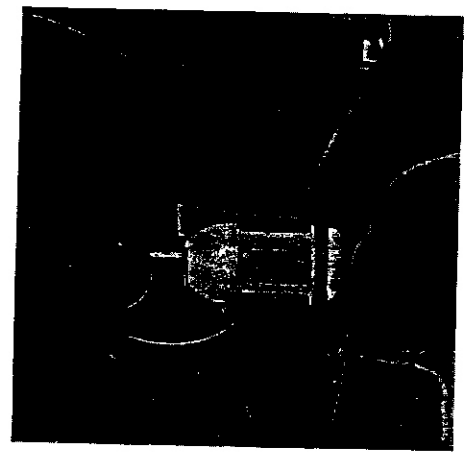
Make sure that the hose is not twisted or kinked when refitting the pickup body.

To replace a faulty hose, remove the four cheese head screws which secure the fan housing to the crankcase. Take off fan housing and disconnect fuel hose from elbow fitting at the same time. The complete elbow fitting with hose and pickup

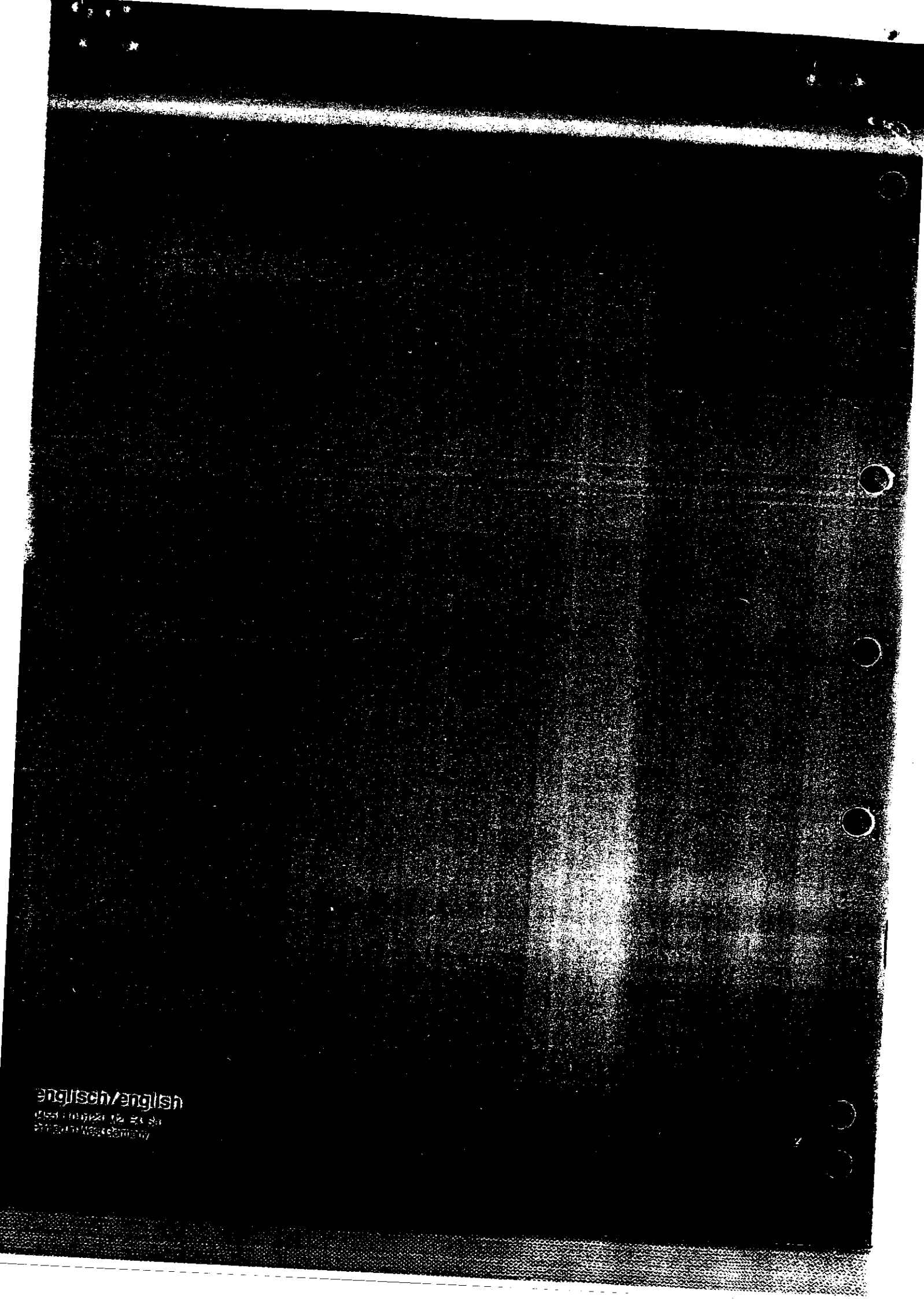
Top:
Withdrawing pickup body

Bottom:
Removing cap





body can now be removed from the tank. Reverse the above procedure to install new hose in the tank.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