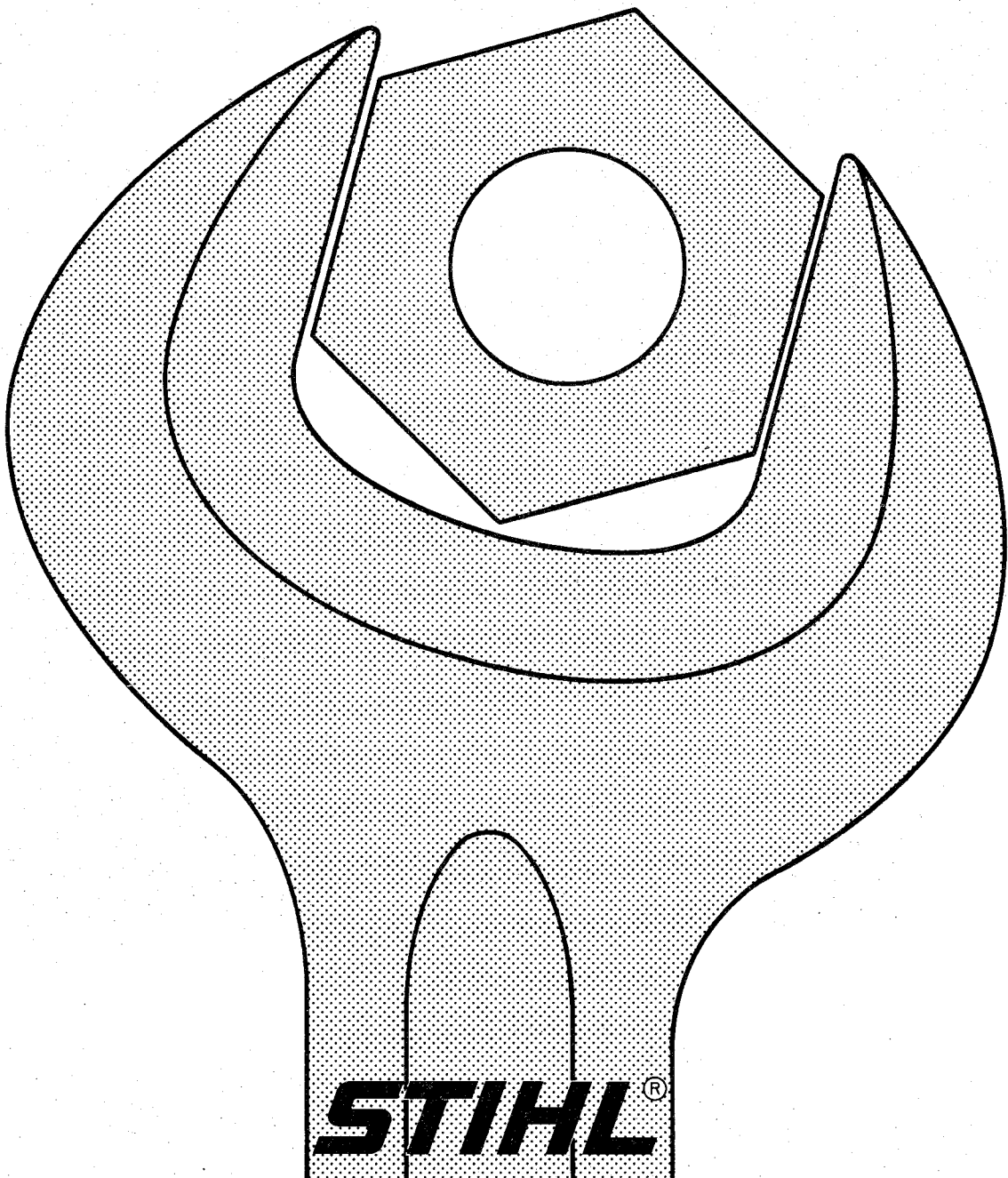


STIHL 045, 056



STIHL®

SERVICE MANUAL
STIHL 045, 056

CONTENTS

FOREWORD

This Service Manual covers model 045 chain saws up to machine number 5 919 430 as well as later machines unless technical information bulletins have been issued in the meantime with updated repair procedures.

Model 045 have substantially the same constructional features as model 056 chain saws. This Service Manual can therefore be used for the 056 chain saws as well.

In the event of faults it is quite possible that a single fault may have several causes. It is therefore advisable to consult the "Trouble-shooting Chart" in each chapter when tracing faults. We also recommend that you make use of the exploded views in the illustrated parts lists when carrying out repair work.

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

Specifications

Saw Chain Drive with Clutch

Saw chain drive with clutch, trouble shooting, disassembly and repair

Driving Parts

Crankshaft with connecting rod, cylinder and piston, exposing the cylinder, removing cylinder and piston, crankshaft and crankcase pressure testing

Ignition System

Flywheel Magneto

Function, spark plug, high tension lead, short-circuit wire and stop switch, checking and adjusting the ignition timing, flywheel, stator plate, exchanging the breaker point set, ignition coil, condenser, trouble shooting

Ignition System

Electronic Ignition

Advantages and function, controlling the function of the electronic system on the motor-checking and adjusting the ignition timing – removal of trigger plate – repair of the electronic – trouble shooting

Rewind Starter

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STIHL®

Andreas Stihl
Postfach 1760
D-7050 Waiblingen

We reserve the right to change design if this is deemed advantageous or necessary.

Engine

	STIHL-one-cylinder two-cycle engine with heavy-chromium plated cylinder wall
Piston displacement:	4.94 cu. in (81 cm ³)
Cylinder bore:	2.0" (52 mm)
Piston stroke:	1.52" (38 mm)
Stroke-bore-ratio:	0.76
Compression:	9.5:1
Max torque:	48.6 Nm at 5500 r.p.m.
Max. allowed speed:	11000 r.p.m.
Mean idle speed:	1800 r.p.m.
Bearings:	Grooved ball bearing; bearing driving side with integrated sealing ring
Crankshaft:	Split and two part
Crankpin:	Ø 16 mm (0.630") in diameter
Piston pin:	Ø 13 mm (0.512") in diameter
Length of conrod:	70 mm (2.756") distances between axes
Rewind starter:	Forced engagement with automatic rewind of starter rope. Easy starting by starting throttle lock
Starter rope:	Ø 4.5x1000 mm (0.177x9.370") in diameter
Clutch:	Heavy-duty centrifugal clutch with pressed-on friction linings, 78 mm (3.071") in diameter
Clutch starting to engage at:	abt. 2500 r.p.m.
Pressure test of crankcase:	Testing pressure 0.5 bar (7.1 lbf./in ²)

Fuel System

Carburetor:	All position Tillotson diaphragm carburetor HS with integral fuel pump
Venturi:	17.6 mm (0.693") in diameter
High speed adjustment screw H:	1¼ turns open
Low speed adjustment screw L:	1 turn open
Pressure test of carburetor:	0.4 bar (0.57 lbf./in ²)
Fuel tank capacity:	0.82 l – 820 cm ³ (1.73 pt)

Fuel mixture:	Regular grade gasoline and branded two-cycle engine oil 1:40 with STIHL two-cycle engine oil 1:25 with other branded two-cycle engine oils
Air filter:	Amply dimensioned wire mesh filter

Ignition System 045 AV

Bosch flywheel magneto, fully enclosed	
Magneto edge gap:	6...9 mm (0.24...0.35 in)
Advanced ignition:	2.5...2.7 mm (0.098...0.106") before top dead center
Advanced ignition angle:	26.2...27.5° before top dead center
Breaker point gap:	0.35...0.4 mm (0.014...0.016 in)
Condenser:	Capacity about 0.15...0.19 μ F

Ignition System 045 AVE/AVEQ

Magneto high tension condenser ignition system (capacitor discharge) without breaker points, water- and dirtproof.	
Advanced ignition:	2.5...2.7 mm (0.098...0.106") before top dead center
Advanced ignition angle:	26.2...27.5° before top dead center
Spark plug:	Bosch WSR 6 F Heat range 175 Electrode gap 0.5 mm (0.02 in) Spark plug thread M 14x1.25 Length of thread 9.5 mm (0.37 in)
Armature air gap:	0.2...0.3 mm (0.007...0.011 in)

Torques for Screws and Nuts

Crankshaft nut	
Magneto side M 10x1:	30 Nm (21.70 ft/lbf.)
Crankshaft nut	
Clutch side M 12x1.5 – lefthand:	35 Nm (25.32 ft/lbf.)
Clutch carrier	
M 12x1.5 – lefthand:	50 Nm (36.165 ft/lbf.)
Cylinder head screws M 6x25:	10 Nm (7.233 ft/lbf.)
Spark plug:	30 Nm (21.70 ft/lbf.)

Cutting Attachment

Guide bars:	STIHL Duromatic bar with carbide tipped nose; STIHL Rollomatic bar with spider nose. Either type is protected from corrosion by induction-hardened contact surfaces
Bar lengths:	Duromatic 40, 45, 50 and 63 cm (16, 18, 20 and 25") Rollomatic 37, 40, 45, 50 and 63 cm (15, 16, 18, 20 and 25")
Oilomatic-chains:	9.32 mm (3/8")-Rapid and -Topic 10.26 mm (0.404")-Rapid
Chain speed:	17.4 m/sec. (57.1 ft per second) at 8000 r.p.m. with 3/8" chain 19.2 m/sec. (63 ft per second) at 8000 r.p.m. with 0.404" chain
Chain lubrication:	Fully automatic oil pump with pump plunger, output depending on chain speed, pump supplying oil only when chain is running, additional quantity control by adjusting control bolt.
Maximum oil output:	15 cm ³ /min. (0.92 cu. in per minute) at 6000 r.p.m.
Minimum oil output:	8.5 cm ³ /min. (0.52 cu. in per minute) at 6000 r.p.m.
Mean oil output:	12 cm ³ /min. (0.73 cu. in per minute) at 6000 r.p.m.
Oil tank capacity:	0.36 l = 360 cm ³ (0.76 pt)
Chain sprocket:	7 teeth

Weights

Motor dry	AV/AVE:	AVEQ:
without bar and chain:	7.9 kg (17.4 lb)	8.3 kg (18.3 lb)
with 37 cm (15") bar and chain:	9.1 kg (20.1 lb)	9.5 kg (20.9 lb)

Extras

STIHL repair kit (set of the most common wearing parts)	
for friction shoe rewind starter	1115 900 5000
for single pawl rewind starter	1115 900 5001
Set of gaskets	1115 007 1050

SAW CHAIN DRIVE AND CLUTCH

The power from the engine is transmitted to the saw chain by a centrifugal clutch. This clutch is composed of clutch carrier, clutch shoes and clutch springs. But the two washers in front of and behind the clutch as well as the chain sprocket with clutch drum riveted onto it are also needed for a proper operation of the clutch.

With increasing speed the clutch shoes, held by the clutch springs,

are forced to the outside; they are pressed against the clutch drum which is connected with the chain sprocket thus transmitting the engine power to the chain sprocket and the saw chain.

The clutch springs have a certain pre-tension so that clutch will not engage before the engine speed of about 2500 r.p.m. is reached. The carburetor has to be adjusted in such a way (see paragraph carbure-

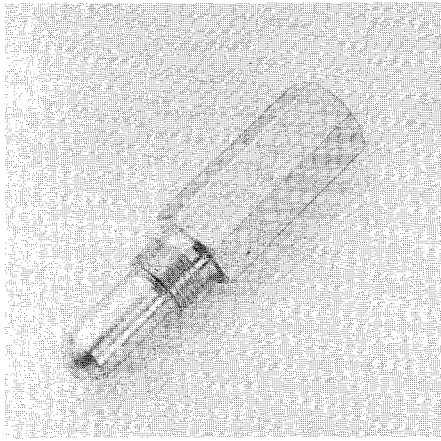
tor adjustment) that the chain does not rotate at idle speed.

The clutch of the STIHL 045 AV and 045 AV electronic needs almost no maintenance at all but, of course, normal wear cannot be avoided. Therefore, the clutch and the chain sprocket must be checked on proper condition periodically.

Troubles	Causes	How to correct
Bad engagement, clutch slips, chain does not rotate	Clutch linings worn	Replace the complete set of clutch shoes
	Clutch and chain sprocket dirty (oil)	Wash in clean gasoline, roughen clutch linings with emery cloth
Saw chain does not stop running when idling, extraneous noises	Engine speed too high when idling	Readjust idle adjustment screw
	Spring stretched or fatigued Spring hooks damaged	Replace all springs
	Needle cage damaged	Replace needle cage
No chain lubrication	Drive pin of cover plate broken	Install new cover plate
Extreme chain wear	Worn chain sprocket	Replace chain sprocket

Disassembly and Repair

Locking screw



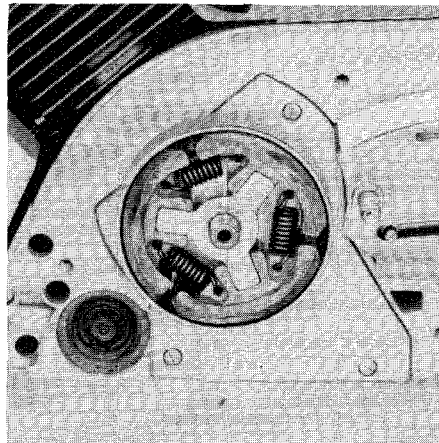
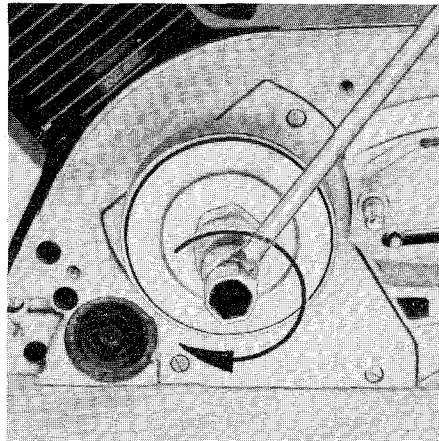
A dirty or improperly operating clutch must be disassembled and repaired.

For disassembly first loosen the two hex. nuts with which the chain sprocket cover is fastened and remove chain sprocket cover from bar studs. Take off saw chain from chain sprocket and remove with guide bar. Pull off spark plug terminal and unscrew spark plug with combination wrench, screw crankshaft locking screw 11071911200 into spark plug thread and tighten it by hand. This will properly lock the crankshaft.

Note: Hexagonal nut and clutch have left-hand thread. Therefore, unscrew by turning them clockwise.

Put combination wrench on hex. nut and screw clockwise till piston rests

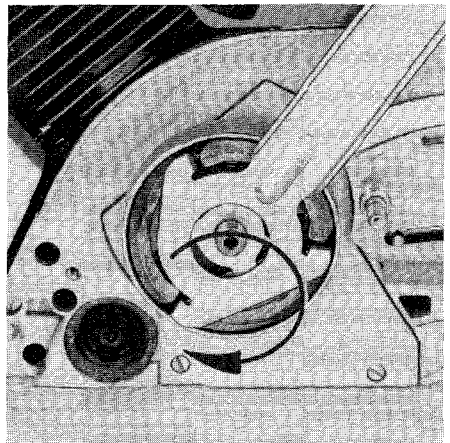
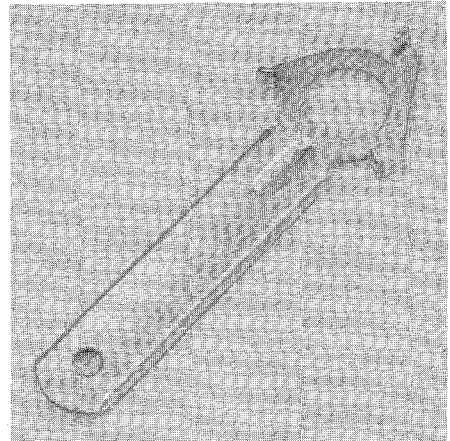
Top: Loosening the crankshaft nut
Bottom: Chain sprocket, clutch with carrier, clutch shoes and clutch springs



against the crankshaft locking screw. Loosen and unscrew hex. nut.

To guide the clutch shoes on the clutch carrier the clutch is equipped on both sides with a washer. The washers are indented in their center and must be installed in such a way that they are resting with the recess against the carrier. The front washer is of larger diameter to better protect the clutch against saw dust.

Top: Clutch wrench
Bottom: Loosening the clutch

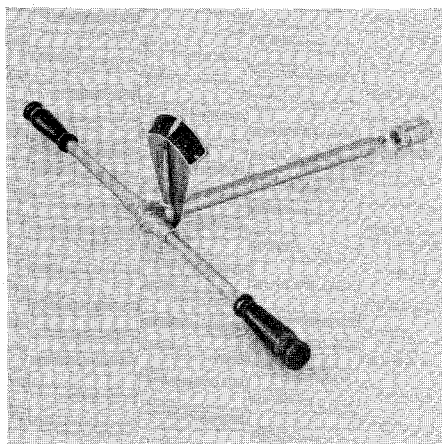


To disassemble clutch take off front washer. Screw off clutch with wrench 11118931300 clockwise.

Thereafter remove second retaining washer, chain sprocket, needle cage and cover plate from crankshaft.

The drive pin pressed into the cover plate extending into a boring in the

Torque wrench with insert

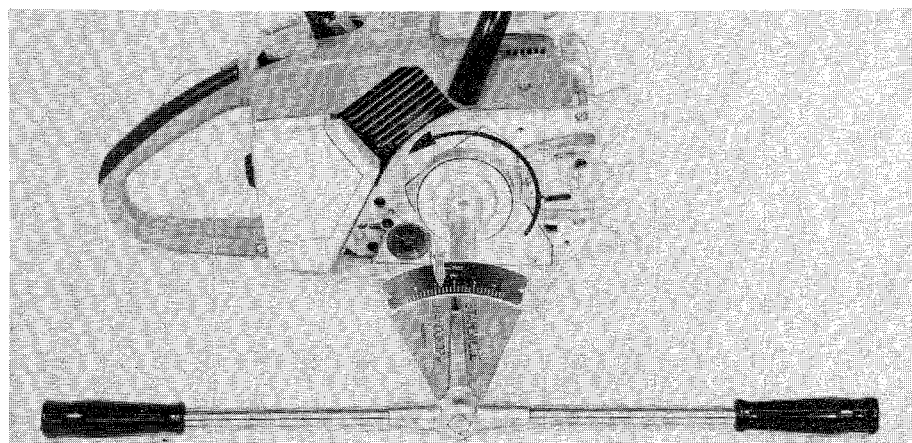
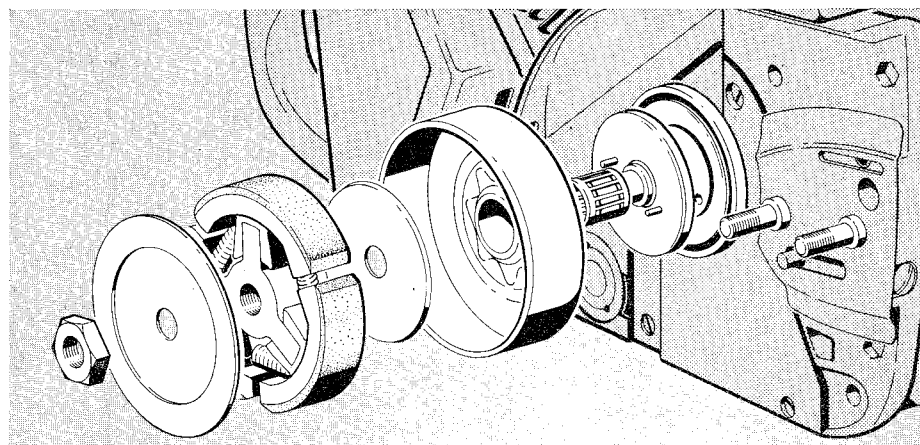


chain sprocket and into the small spur gear is driving the oil pump at engaged clutch.

Replace damaged parts of the clutch; only **complete sets** of clutch shoes and clutch springs should be replaced! If clutch is only fouled all parts must be washed in clean gasoline and then cleaned with compressed air. Roughen surfaces of clutch linings with emery cloth. Clean the dirty inside of the clutch drum with a clean, dry rag.

The stress to the chain sprocket is especially tough. If it shows visible wear at the teeth it has to be exchanged. This wear should not exceed a depth of 0,5 mm (0.019"). A worn chain sprocket reduces the life of the saw chain. If the cover plate too is not in proper condition it has to be replaced as well.

Top: Disassembly of clutch and sprocket cover
Bottom: Tightening the crankshaft nut



To reassemble the clutch place cover plate onto crankshaft so that driving pin extends into the boring of the small spur gear of the oil pump. Then put greased needle cage, chain sprocket and the washer which is smaller in diameter (observe correct inserting position) back into place. Screw in clutch with wrench anti-clockwise and tighten with 5 kpm (36.165 ft/lbf.). Then put front washer which is larger in diameter onto crankshaft. Screw in

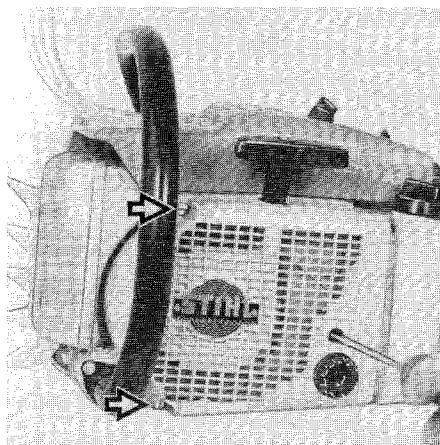
hex. nut and tighten with torque wrench at 3,5 kpm (25.281 ft/lbf.). Finally insert spark plug.

DRIVING PARTS

Crankshaft with connecting rod,
cylinder and piston

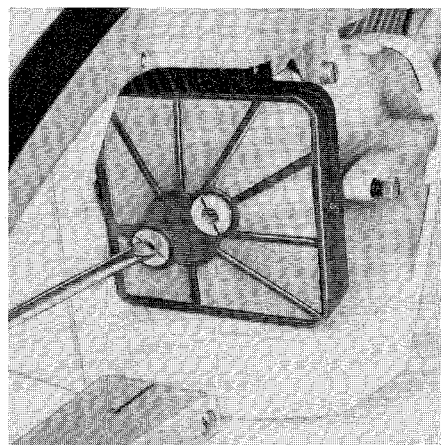
Exposing the Cylinder

Disassembly of fan housing cover

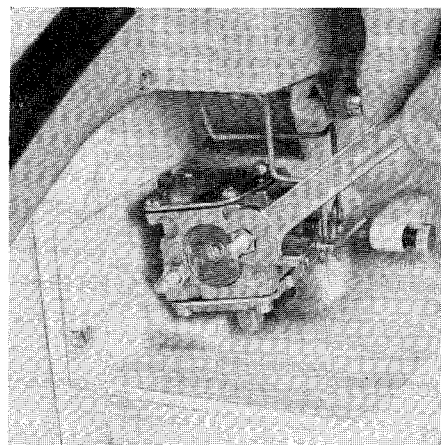


The STIHL 045 AV and 045 AV electronic saws are driven by an air-cooled one-cylinder two-cycle engine. The split two part crankshaft is supported in the crankcase made of electron die cast metal (magnesium alloy). Crankshaft and connecting rod are drop forged. The crankshaft is rigidly pressed together when needle cage and connecting rod are installed. Cylinder and piston are made of a special aluminium alloy. The cylinder wall is heavily chromium impregnated.

Top: Loosening the slotted nuts of the air filter



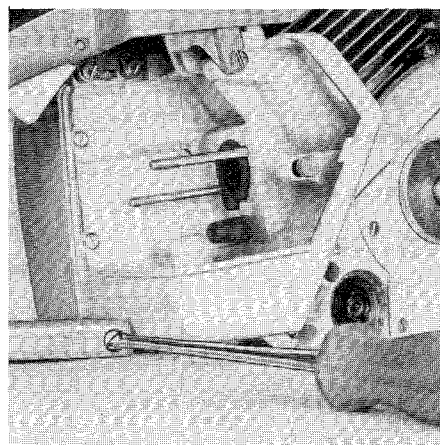
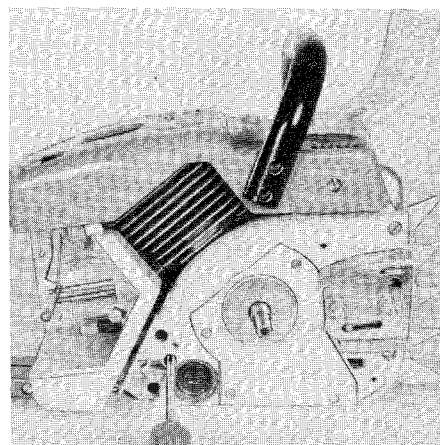
Bottom: Loosening the hex. nuts



Take off chain sprocket cover and fan housing cover with rewind starter. Unscrew locking screw of carburetor box cover and cover and remove cover. Loosen two slotted nuts of air filter and pull off filter from the studs.

Pry off retaining washers at carburetor from choke shaft and throttle shaft and unhook starter and throttle rod on carburetor.

Top and bottom: Removing the cover

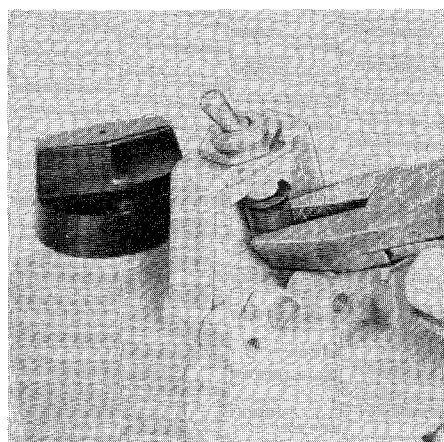
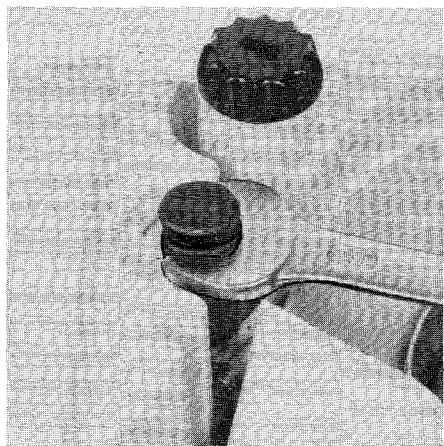


Unscrew 2 hex. nuts (SW 8) of the carburetor fixation and remove carburetor from studs; to do so pry off impulse hose from nipple at the carburetor.

Now remove handle frame. To do so unscrew collar screw at the right front side as well as the 2 cyl. hd. screws with inner hex. with which the handle bar is tightened to the handle frame and the 4 cyl. hd.

Disassembly of Cylinder and Piston

Top: Loosening the annular buffer
Bottom: Pulling off the short circuit wire

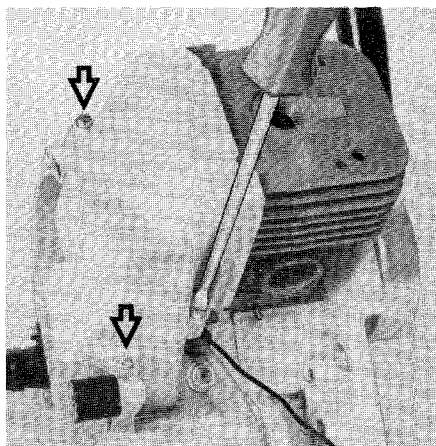


screws with which the handle frame is screwed onto the carburetor box.

Unscrew collar stud next to the oil inspection window with which the carburetor box is fastened through the rubber buffer to the crankcase and unscrew also the annular buffer with which the tank housing is fastened.

Pull elbow connector with screw driver from carburetor box and re-

Disassembly of fan cover

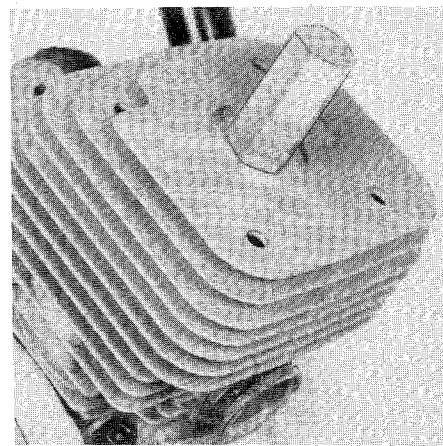


move impulse hose from nipple at the cylinder.

Carefully disconnect short circuit wire at the stop switch. Carburetor box with tank housing can now be removed completely. Remove tensioning clamp at cylinder with flat-nose pliers and pull off elbow connector. Unscrew 3 cyl. hd. screws M 4 x 16 of the fan cover fixation and remove fan housing. First, however, pull out high tension lead of the guidance in the fan cover.

Now clean outside of cylinder thoroughly and check for defective-ness.

Screwed in locking screw



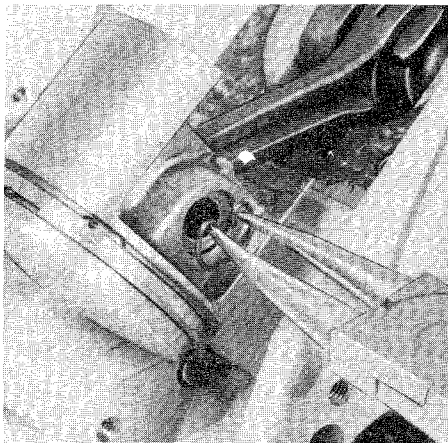
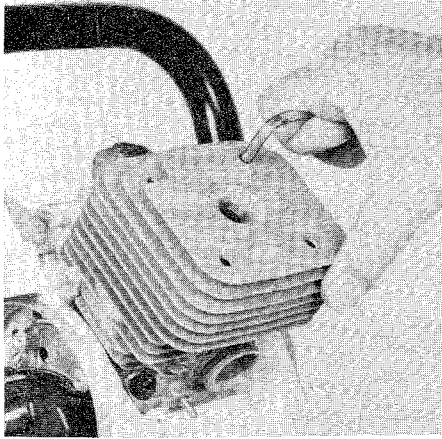
Before unscrewing cylinder remove spark plug and insert locking screw into spark plug port by hand until it fits tight.

Thereafter unscrew hex. nut for fastening the flywheel and remove the flywheel with the puller from the crankshaft (see paragraph flywheel).

Moreover, disassemble the hex. nut for the fastening of the clutch as well as the clutch from the crankshaft. Should you find out during further disassembly that crankcase or crankshaft happen to be defective the clutch cannot be removed anymore from crankshaft with a taken off cylinder.

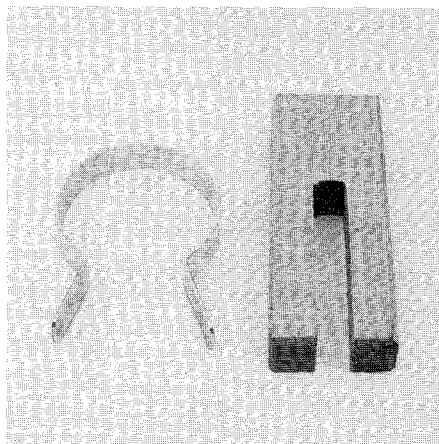
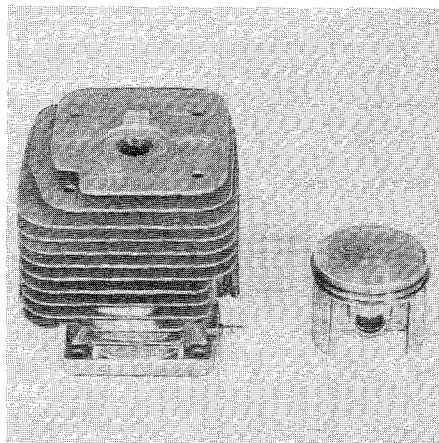
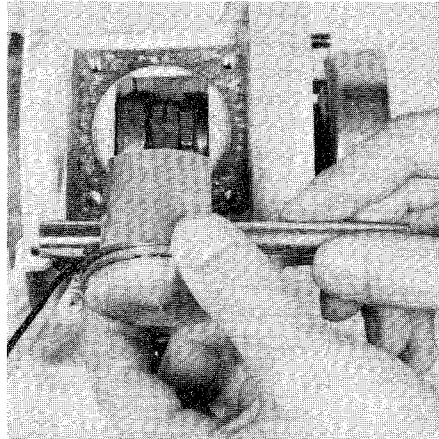
Thereafter remove locking screw again.

Top: Unscrewing the cylinder
Bottom: Taking off the snap rings



Now take off the 4 cyl. head screws for the muffler fixation and lift off exhaust muffler. Unscrew 4 cyl. head screws with inner hex at the cylinder bottom. Cylinder can now be pulled off the piston. After taking off the snap rings which secure the piston pin the pin can be pressed out of the piston and the piston can be taken off. The piston pin is supported in the connecting rod by a needle cage, it has a sliding fit and can be driven out of the piston with

Top: Inserting the piston pin
Center: Cylinder and piston
Bottom: Piston ring compressor and wooden support



the push rod 1111 893 4700. If the piston pin is tight by wear or carbonization free pin with a light hammer blow thereby at the same time counterholding the piston.

Cylinder and piston are combined in one tolerance group.

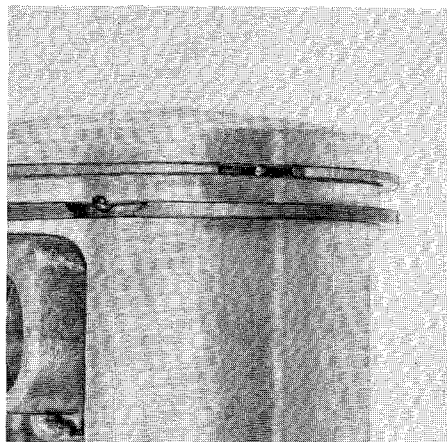
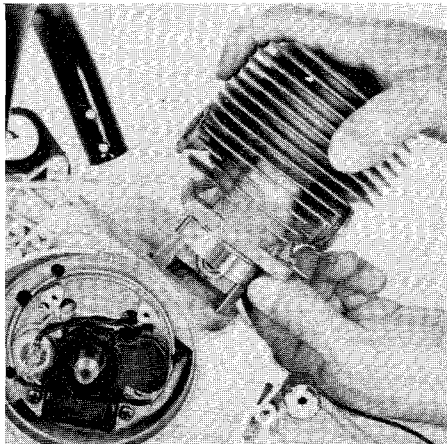
A damaged piston can be exchanged by a new one without any difficulties, however, if the cylinder has to be replaced always replace the piston as well.

First mount piston to connecting rod in reverse sequence thereby slightly greasing the needle cage.

The piston has to be installed in such a way that the arrow marked "A" at the bottom of the piston points towards the exhaust port of the cylinder.

The wooden support and the piston ring compressor are helping to place the cylinder onto the piston (illustration). When sliding on the cylinder take care that the exhaust opening points upwards. The wooden support supports the piston on the crankcase. With the piston ring compressor 1107 893 4900 the piston rings are pressed together allowing the cylinder to slide on more easily.

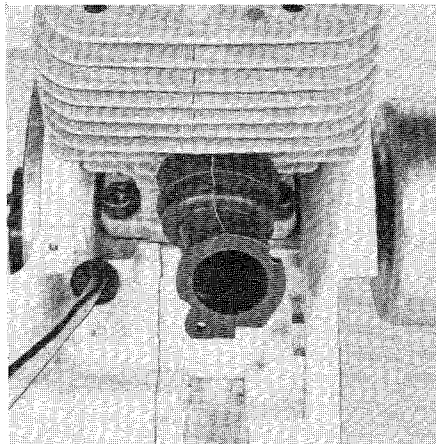
Top: Mounting the cylinder
Bottom: Mounted piston rings



First, however, apply sufficient oil to the piston and take care that the piston rings are correctly mounted.

The piston rings are of different thickness. The thinner one is placed in the groove under the bottom of the piston. To assure a proper sealing they are each adjusted in the groove at the piston by a cylindrical pin. The piston ring should not come to rest on these pins as it would

Elbow connector mounted to cylinder



lead to ring breakage when the piston is mounted into the cylinder.

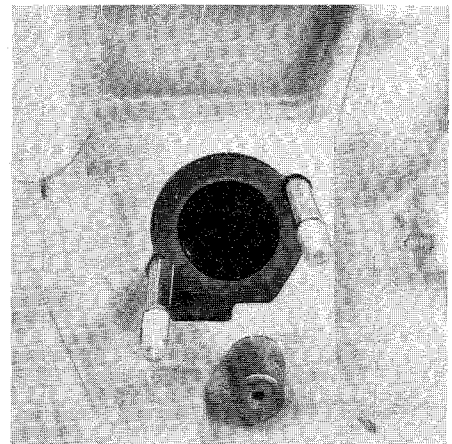
Tighten the cyl. head screws at the bottom of the cylinder with a torque of 1,0 kpm (7.233 ft/lbf.).

Then first mount muffler, fasten elbow connector with hose clip onto cylinder. The proper mounted elbow connector is shown on illustration.

Note: The injection moulded seam of the elbow connector is parallel to the moulding seam of the cylinder.

Check impulse hose for proper seat in carburetor box. Should it become necessary to replace the hose always start to mount it at the carburetor box. Then slide impulse hose over connector at cylinder and press elbow connector **carefully** with a screw driver into the boring of the carburetor box.

Elbow connector mounted in carburetor box



Care has to be taken that the end of the elbow connector is correctly seated with its stop lugs in the carburetor box boring.

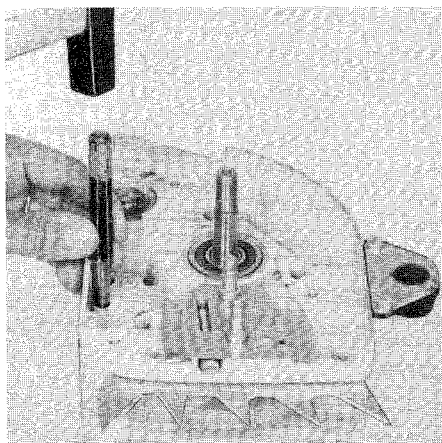
The proper position of the elbow connector is achieved when injection moulded seam rests parallel to the moulding seam of the cylinder.

Reverse disassembly sequence for assembling the remaining parts such as carburetor, fan housing etc. When mounting the shroud take care that the spark plug terminal is located within the shroud.

Before reassembly all gaskets have to be renewed.

Crankshaft and Crankcase

Punching out cylindrical pins

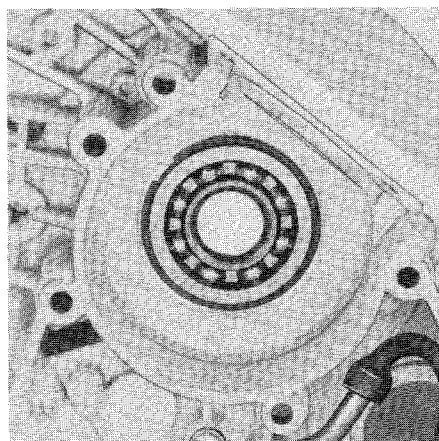
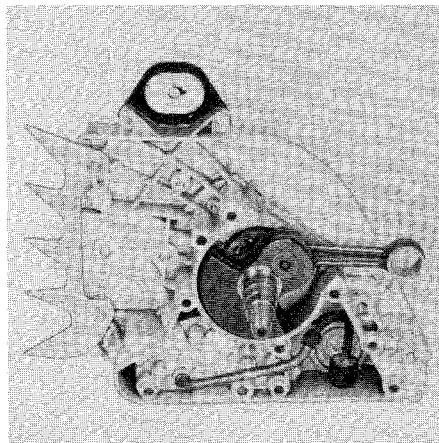


To replace a damaged crankshaft first of all the cylinder has to be exposed. Moreover, the handle frame and the individual parts of the ignition system as well as the oil pump have to be disassembled (see respective section).

Both crankcase halves are aligned by two cylindrical pins and screwed together by 8 cyl. hd. screws. Loosen screws and punch back cylindrical pins. If crankcase halves are still held together by the gasket loosen crankcase halves apart by light blows with a wooden or rubber hammer. If crankcase is damaged and has to be exchanged then remove the remaining parts attached to it such as rubber buffers, side plate etc.

The crankshaft is supported on the ignition side by a grooved ball bearing and sealed with a separate

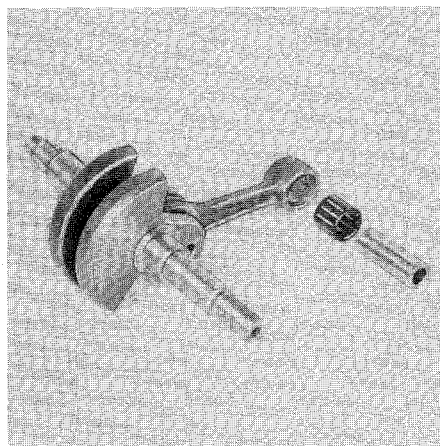
Top: Disassembled crankcase
Bottom: Ball bearing secured by circlip



oil seal towards the crankcase. At the clutch side the crankshaft is supported by a grooved ball bearing with an integrated oil seal. The outer ring of this grooved ball bearing is provided with an annular groove in which a circlip is positioned securing the bearing in the crankcase; however, at the magneto side the ball bearing is tightly pressed into the crankcase.

The crankshaft is a two part

Crankshaft with piston pin and needle cage



execution with the crank pin forged onto the shaft of the driving side. The solid conrod is provided with a lubrication boring at the big end.

As the fine machining of the crankshaft is done only after final assembly spare crankshafts can only be supplied with conrod and needle cage already installed!

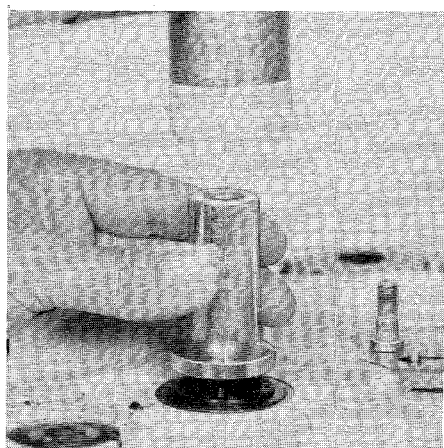
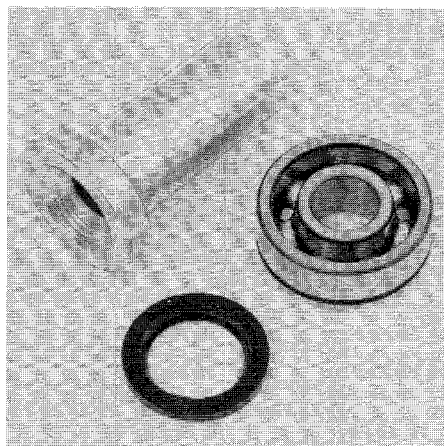
Before assembling the crankcase halves check oil seal and the sealing ring built into the ball bearing 95230030440 for proper function, if necessary replace defective parts.

The oil seal which is installed in the grooved ball bearing can be supplied as spare part and can be exchanged if necessary. The inserting is done with the mounting sleeve at the mounted ball bearing.

Pressure Testing the Crankcase

Top: Mounting sleeve, ball bearing and seal

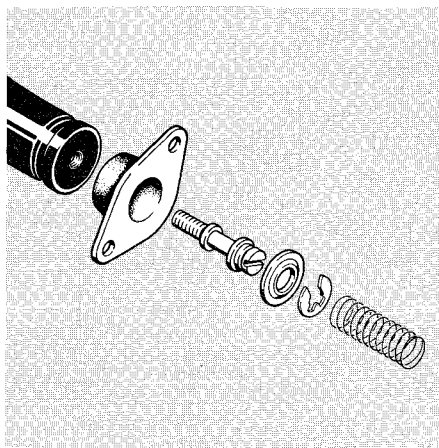
Bottom: Inserting the oil seal into the ball bearing



When properly installed the sealing ring must be flush with the lateral edges of the ball bearing.

To insert the crankshaft also the inner races of the ball bearings have to be warmed up (soldering iron). Mount new gasket. Then punch cylindrical pins into crankcase again and turn in screws. Tighten screws one after the other crosswise. Proceed with installation by reversing

Mounting contact spring into handle bar



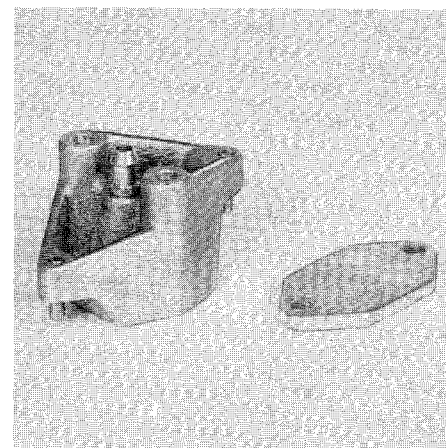
disassembly sequence. When mounting the handle bar make sure that the contact spring has a proper ground connection to the crankcase.

When installing new ball bearings first heat the respective crankcase part on a hot plate. Position the bearing without tilting it so that it either butts at the retaining ring or at shoulder of the bearing seat in the crankcase. Don't interchange the bearings.

Insert the bearing with the mounted sealing ring and with groove for retaining ring pointing into the crankcase part of the driving side.

All gaskets have to be exchanged when reassembling.

Connecting and sealing flange



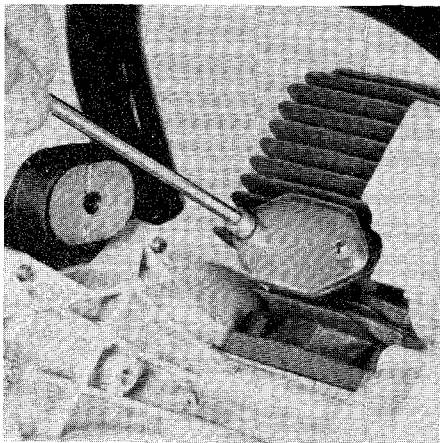
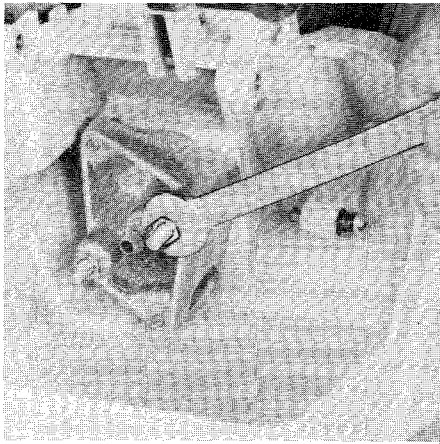
With the carburetor or crankshaft pressure testing device it is possible to check the engine on proper tightness.

Faulty oil seals and gaskets, cracks or enclosures in the cast parts are most common reasons for leaking crankcases. Through such leaks additional air may enter the crankcase and may change the composition of the fuel-air mixture.

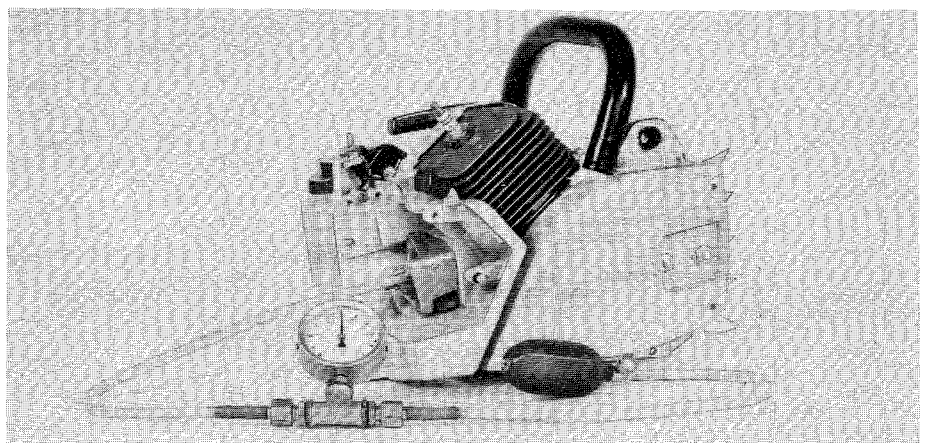
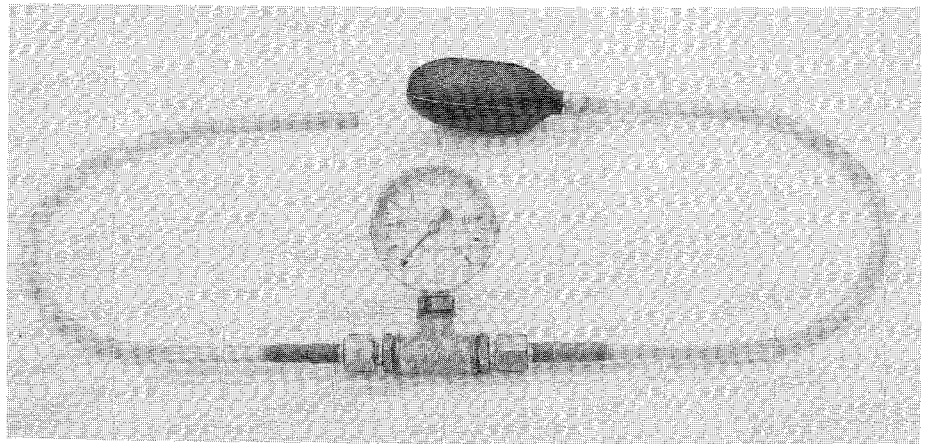
Consequently the adjustment of the recommended idle speed will be most difficult if not impossible. Moreover, no smooth acceleration will be achieved. Therefore you should pressure test the crankcase if you notice such trouble.

Take off handle frame, air filter and muffler. Shut exhaust port at the cylinder with sealing flange

Top: Fastening the connecting flange
Bottom: Fastening the sealing flange



Top: Carburetor and crankcase tester
Bottom: Pressure testing the crankcase



11158554205 and also shut intake opening of elbow connector in carburetor box with sealing flange 11138504200. Place and fasten this sealing flange on studs of carburetor box so that inserted cylindrical pin is pushed into the impulse hose and seals the end of the impulse hose. Connect pressure hose to fitting of pressure test flange.

With screwed in spark plug piston must be positioned in top dead center. Close venting screw at pressure ball, pump air into the crankcase until the pressure gauge indicates a reading of 7 lbf./in.² (0.5 kp/cm²).

The crankcase is properly sealed if there is no drop in pressure; if pressure changes you must find out the leaky spots and replace the faulty part.

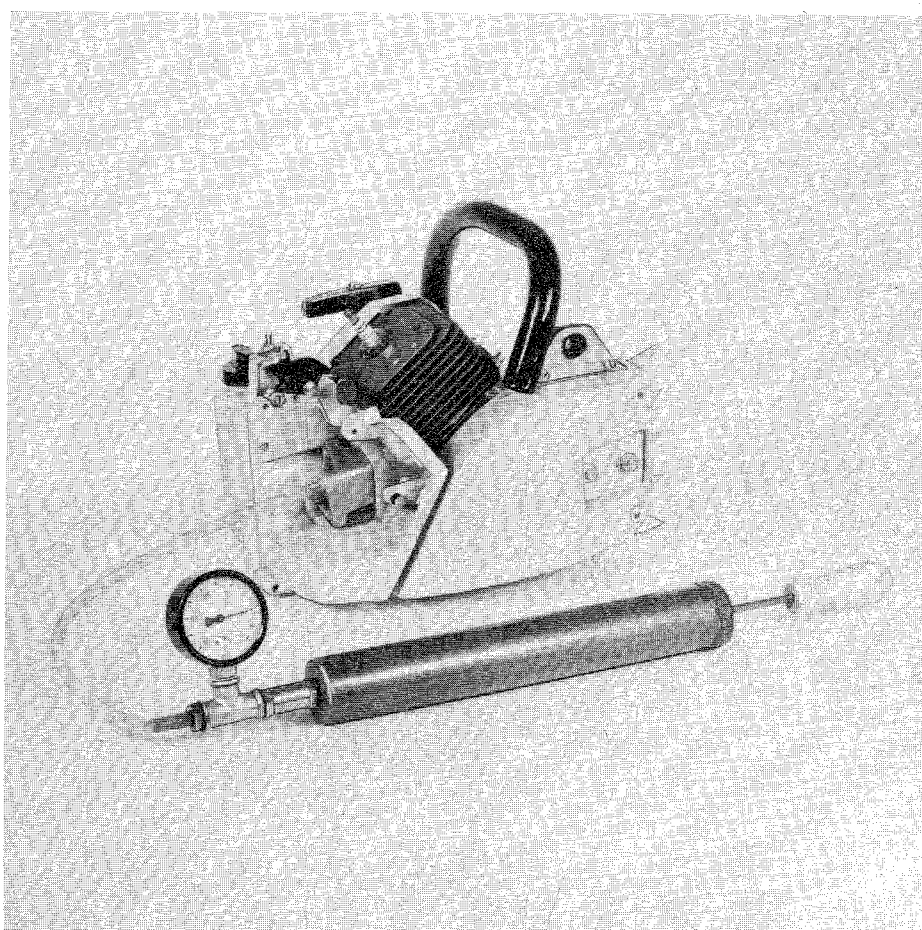
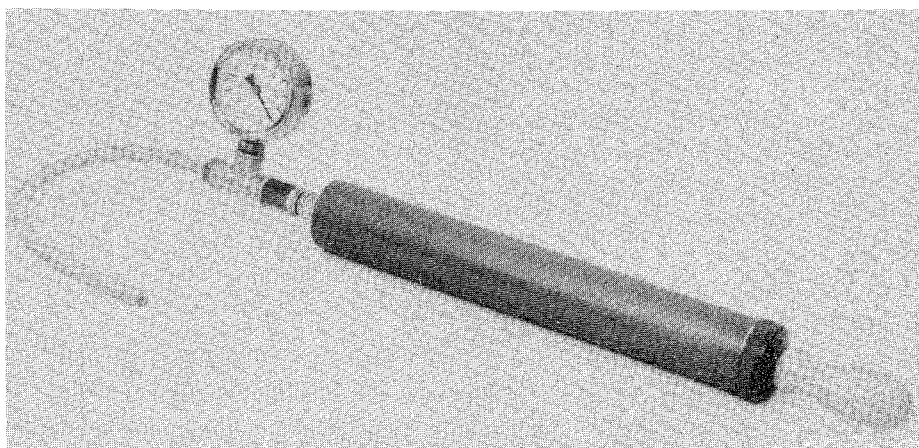
After the test open venting screw again and pull off hose.

Sealing Test with Vacuum Pump

As leaky crankshaft seals draw air mainly at low pressure, that means at intake, an additional sealing test can be carried out with the new vacuum pump 0000 850 3500.

For this test close cylinder exhaust port and elbow connector with the two sealing flanges (see pressure testing). Connect pressure hose of vacuum pump to fitting of pressure testing flange. Pull out pump plunger until pressure gauge indicates a reading of 7.1 lbf./in.² (0.5 kp/cm²). The integral relief valve shuts itself automatically. The crankcase is sealing properly if this low pressure doesn't drop below 2.84 lbf./in.² (0.2 kp/cm²). However, if the pressure drops below this reading then the oil seals have to be replaced, even though if no leakage has been found when pressure testing previously.

Top: Vacuum pump
Bottom: Sealing test with vacuum pump



IGNITION SYSTEM

Ignition System 045 AV

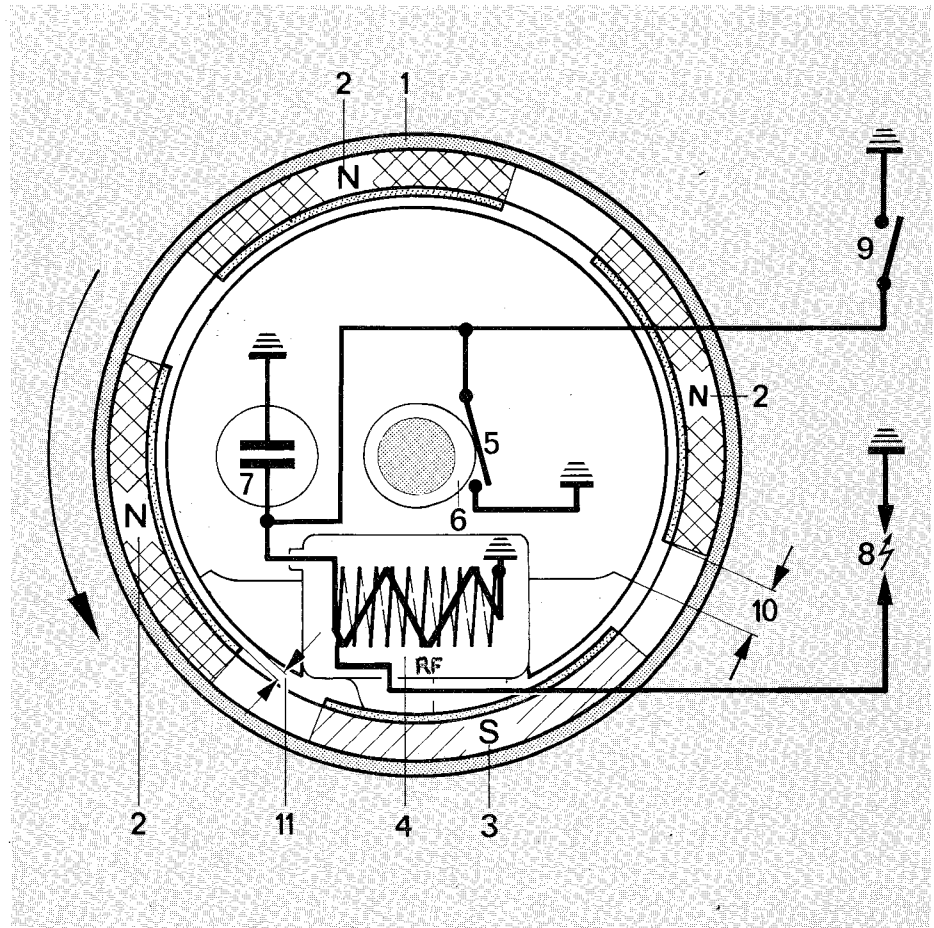
Design and Operation of Fly-Wheel Magneto Ignition System (Ignition System with Breaker Points)

Schematic view of ignition system:

- 1 Flywheel
- 2 North pole — permanent magnet
- 3 South pole — permanent magnet
- 4 Coil w. primary and secondary winding
- 5 Breaker points
- 6 Cam
- 7 Condenser
- 8 Spark plug
- 9 Ignition switch
- 10 Magneto edge gap
- 11 Armature air gap

Like all power chain saws the STIHL 045 AV is equipped with a flywheel magneto ignition system needing neither a battery or a dynamo. The main parts of the Bosch flywheel magneto are the flywheel with permanent magnets and pole shoes as well as contact set, condenser, ignition coil, high tension lead, spark plug, ground lead and ignition switch.

The flywheel magneto operates on the principal of electromagnetic induction. Electric current is produced when a wire is moved through a magnetic field. When the flywheel is turning, the lines of force between the permanent magnets which flow out at the north pole of the magnet and flow in at the south pole of the magnet cut across the wire turns of the primary winding of the ignition coil and induce therein a low voltage current.



When the current in the primary winding is at the maximum, the electric circuit is interrupted by the breaker point.

This will cause the magnetic field in the armature core to collapse and to induce a high voltage current in the secondary winding which is necessary for the ignition and this high voltage current will flow to the spark plug.

The condenser which is connected parallel with the breaker points prevents an excessive sparking (electric arc) between the contact sets and therefore a loss of energy and premature wear.

The breaker point is opened by the cam which is ground to the crankshaft and closed by a spring. The running engine can be stopped by grounding the primary windings

which is done by activating the ignition switch.

Spark Plug

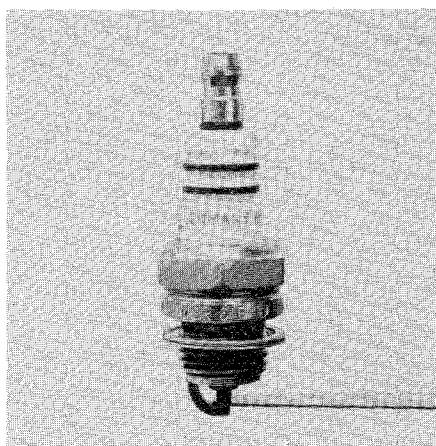
The spark plug provides the means for igniting the compressed fuel air mixture. Ignition occurs when a spark jumps the air gap between the centre electrode and the ground electrode. Therefore, in case of trouble with the ignition system trouble shooting should begin at the spark plug.

If the engine is difficult to start or if you notice a loss of power remove and check spark plug. The correct heat range of the spark plug must be 175. Do not clean a fouled spark plug with a steel brush. Remove carbon coating on the spark plug with a brass brush. Blow out spark plug with compressed air. If spark plug is fouled by oil remove the fouling with a grease solvent fluid and blow out spark plug with compressed air afterwards. Fouling of the plug may be caused by an improper fuel-air mixing ratio, a too rich carburetor adjustment, a clogged air filter or a partly closed choke shutter.

The electrode gap must be checked with a feeler gauge and adjusted at regular intervals as the gap becomes larger by normal erosion of the electrodes.

The electrode gap can be adjusted to the required distance of 0.02" (0,5 mm) by bending the ground electrode. A new spark plug, how-

Checking the electrode gap



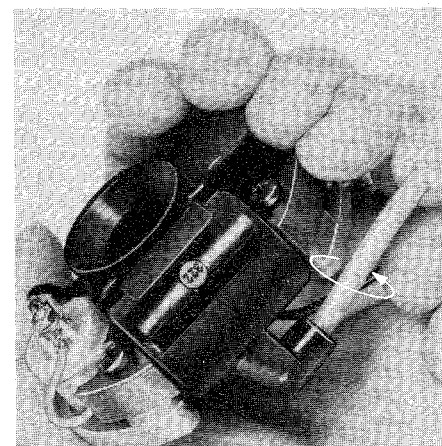
ever, must be used if electrodes are badly eroded.

An exact control of the spark plug is only possible with a spark plug testing device. If you do not have such a spark plug testing device insert the unscrewed and cleaned spark plug into the spark plug terminal and connect it with ground. A strong spark must jump the electrode gap when pulling the rewind starter.

Before inserting spark plug clean spark plug port and check gasket on proper condition. Torque spark plug to 21.70 ft/lbf. (3.0 kpm).

High Tension Lead, Ground Lead and Ignition Switch

Removing the high tension lead

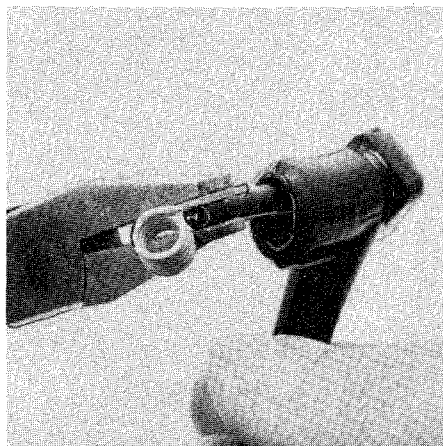


If no spark occurs inspite of spark plug being in proper condition you should first check the lead terminals. Frayed or worn insulation of high tension and ground lead will cause accidental ground connection and the engine does not start or it will run irregularly.

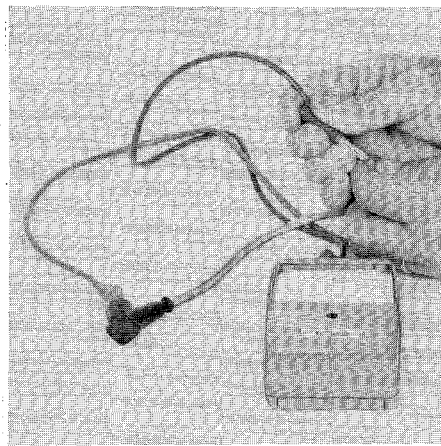
Remove chain sprocket cover, fan housing with rewind starter, air filter and carburetor assembly, handle frame as well as carburetor box and tank housing (see page 8) to get access to the ignition system for repair works. Moreover remove fan wheel and pull off flywheel.

To replace a faulty high tension lead push it back through rubber grommet and unscrew from ignition coil. The high tension lead of the 045 AV and 045 AV electronic has a length of 260 mm (10.236").

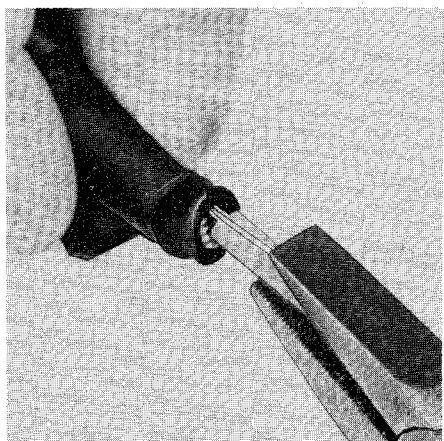
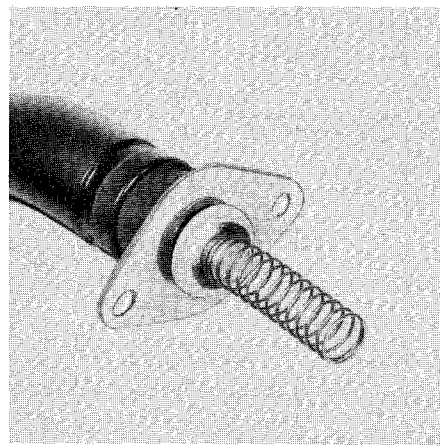
Top: Connecting the spring to the high tension lead
Bottom: Inserting the hook-on-spring



Testing the high tension lead with pocket ohmmeter



Hooked on contact spring



new high tension lead. Carefully position all leads so that the insulation cannot chaff against sharp edges!

With an ohmmeter it can be checked whether the connection between the spark plug terminal and the high tension lead end is conductive. The ohmmeter must show a reading of "zero" ohm.

Special care has to be taken that the ignition switch is grounding only when switch is in "off" position. A faulty switch must be replaced. Moreover, it is very important that the ground lead is tightly connected with the contact pin to the ignition switch.

If no grounding is achieved always check the proper insertion of the contact spring.

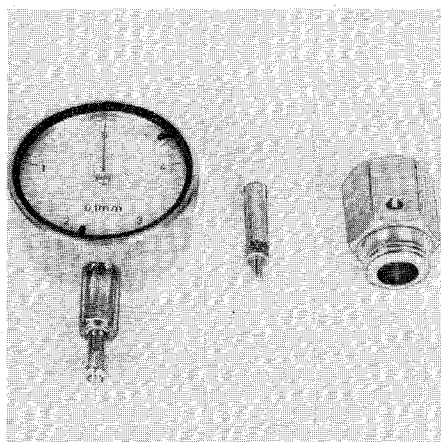
To do so screw off handle bar completely. The contact spring is positioned in a collar screw at the upper

At a new high tension lead the hook-on spring has to be newly mounted. At the end of the cable leading to the spark plug terminal first push in the hook of the spring **exactly in the center** of the wire profile to get a connection with the wire in the centre of the lead. Then oil or grease the lead and insert spring with flat nose pliers into the spark plug terminal (see illustration). Do not forget to slide hose 11134058800 and grommet over the

end of the handle bar and at the crankcase it is positioned in a boring. When adapting the handle bar take care that the contact spring is correctly positioned. Otherwise faulty running could be experienced.

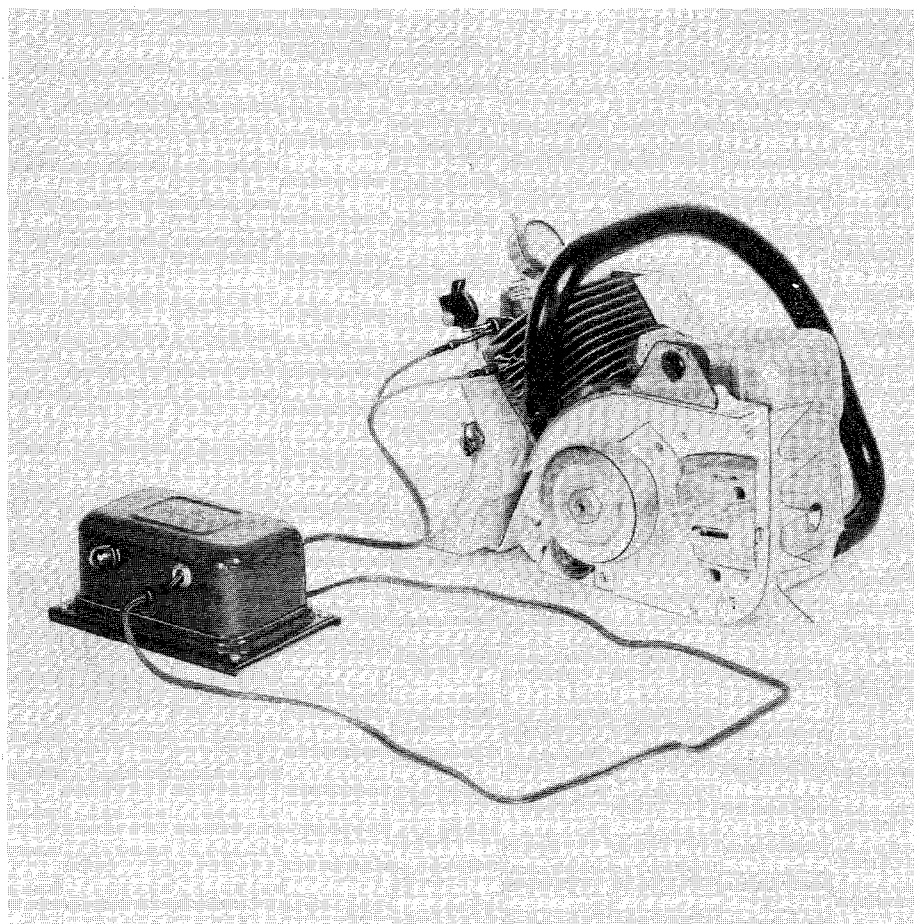
Checking the Ignition Timing

Dial gauge with feeler extension and holder



The correct ignition timing (advanced ignition) of the 045 AV is 2,5—2,7 mm (0.098—0.106") before top dead centre. If breaker points are new the ignition timing should be in the upper range, namely at 2,7 mm (0.106"). When breaker points are fully open the breaker point gap must be 0,35—0,4 mm (0.014" to 0.016"). Take off air filter, handle frame, fan housing with rewind starter, fan wheel and flywheel to check ignition timing. Now remove spark plug. Screw holder 1110 890 8600 into spark plug port and insert ignition timing dial gauge. The feeler pin of dial gauge can be elongated by an intermediate piece. Bring piston to top dead center position by turning the clutch; at this position of the piston adjust timing dial gauge in such a way that indicator points to "0" position. Connect one pole clip of Bosch ignition timing device 0000 890 8905 with ground, the other clip has to be connected to the contact pin of the ground lead. Then

Connected ignition timing device

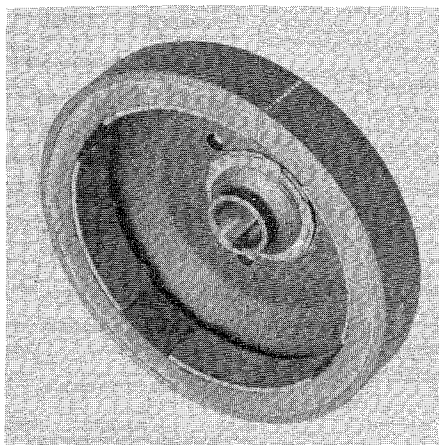


turn clutch about $\frac{1}{4}$ of a turn in reverse direction of engine rotation. Switch on ignition timing device and turn crankshaft slowly in direction of engine rotation until control light at the ignition timing device lights up. The breaker points open at this position, the indicator of the timing dial gauge must now read between 2,5—2,7 mm (0.098—0.106"), otherwise the ignition timing must be readjusted.

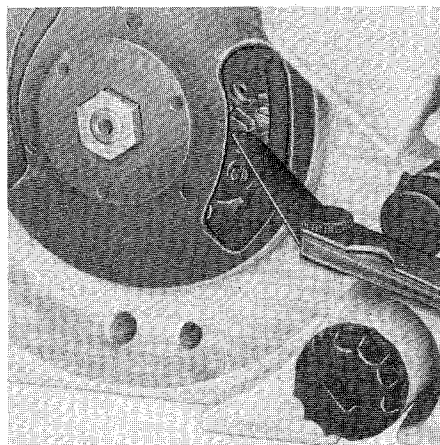
The ignition timing is also marked by two marks at the flywheel and the crankcase (see illustration). To control the timing you don't necessarily need an ignition timing dial gauge. The ignition timing device will be sufficient. If the two marks are in opposite direction the control light of the ignition timing device must light up. If not the ignition point must be readjusted. If the crankcase or the flywheel have to be exchanged the mark for checking the ignition

Adjusting the Ignition Timing

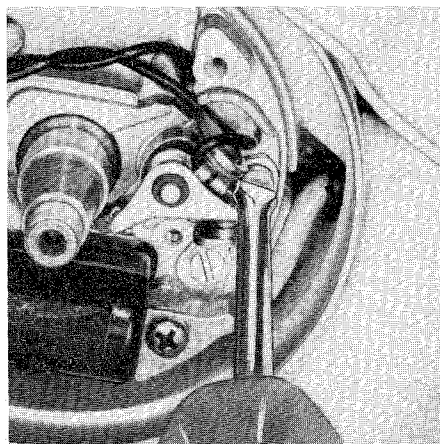
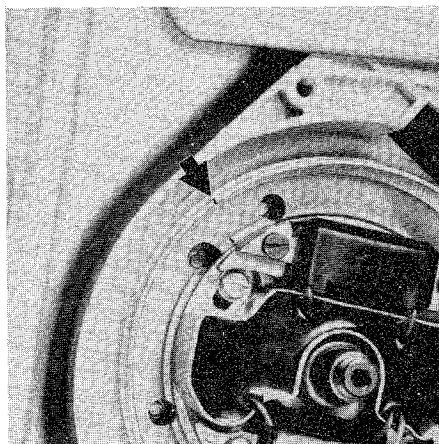
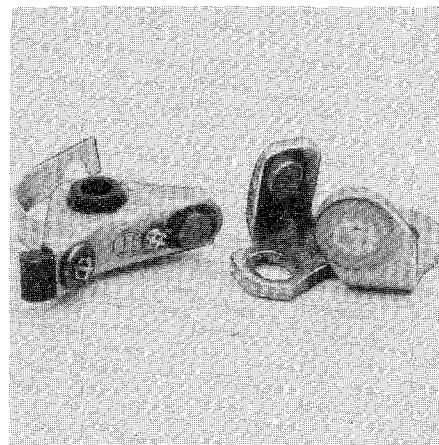
Top: Marking on flywheel
Bottom: Marking on crankcase



Top: Controlling breaker gap
Bottom: Loosening the breaker point set



Burned breaker point



point at the crankcase has to be newly punched into the crankcase. To do so insert ignition timing dial gauge in spark plug port and raise piston to 2,5—2,7 mm (0.098—0.106") before top dead center. Then transfer the timing mark of the flywheel onto the crankcase.

First check breaker point gap with feeler gauge. The max. gap must be between 0,35—0,4 mm (0.013—0.016") at top dead center of the piston. If you have to adjust the breaker point gap loosen cyl. hd. screw at the contact set and adjust contact bank till the contacts show the specified gap. Tighten cyl. hd. screw again. Turn crankshaft somewhat in reverse direction of engine rotation and switch on ignition timing device. Now turn crankshaft in engine ro-

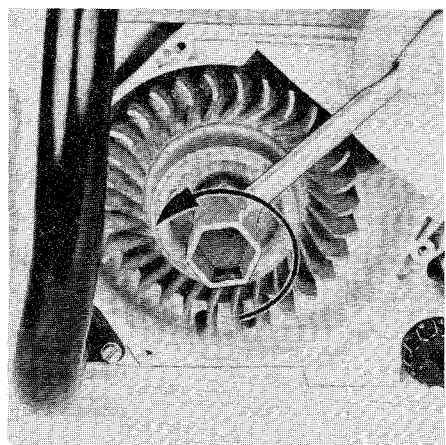
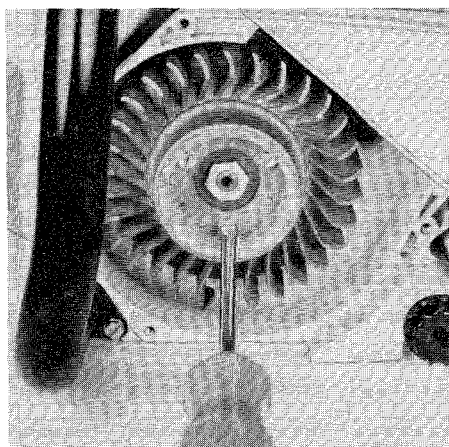
tation direction until control lamp starts to light up which must happen at a piston position of 2,7 mm (0.098") before top dead center. If control light lights up at another piston position the armature plate or the contact set have to be readjusted.

Badly burned breaker points have to be replaced.

When a new crankshaft or crankcase is installed the ignition timing must be readjusted in any case.

Flywheel

Top: Removing the fanwheel
Bottom: Loosening the crankshaft nut

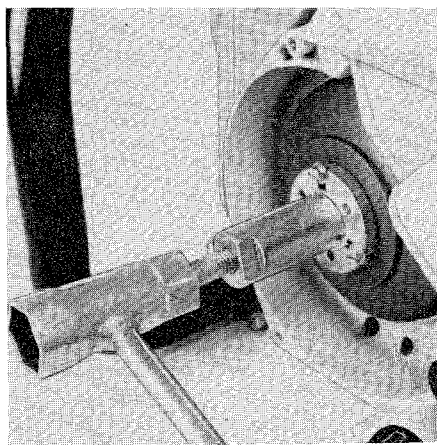
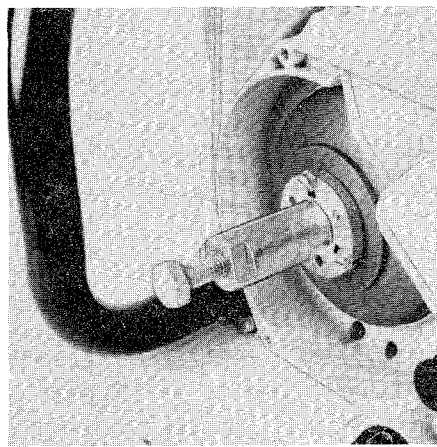


The flywheel is positioned on the crankshaft and is fixed by a key. It is designed in such a way that it also protects the armature plate against pollution.

To remove flywheel take off fan wheel. To do so screw out the 3 cyl. hd. screws which are tightening the fanwheel to the flywheel.

Then replace spark plug by the crankshaft locking screw. Loosen

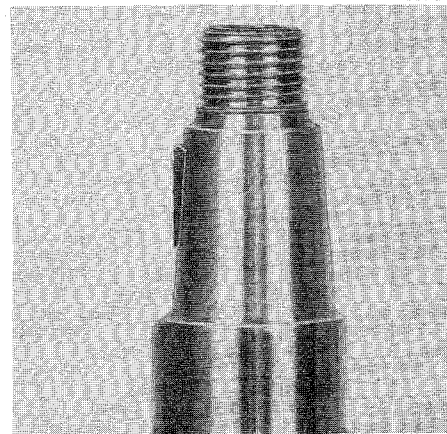
Top: Mounted flywheel puller
Bottom: Pulling off the flywheel



and unscrew crankshaft nut with combination wrench (SW 17). Screw flywheel puller 1107 890 4500 with the 3 cyl. hd. screws of the fanwheel fixation to the flywheel and turn in thrust screw. Thus loosening the flywheel from the crankshaft taper and it can be taken off.

4 permanent magnets of Plastroferrit material are positioned at the inner side of the flywheel. They are

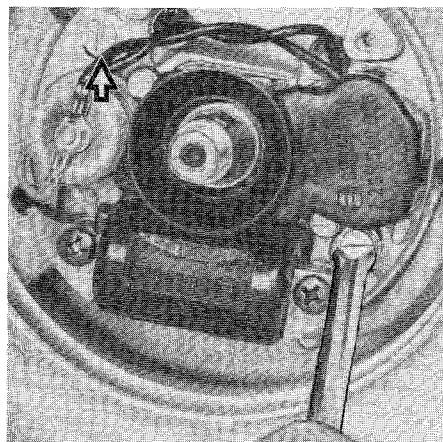
Correctly inserted key



unsymmetrically magnetized.: 1 south pole, 3 north poles. This way a backwards running of the engine is prevented. Pole shoes are fixed to it so that no loss of energy is suffered. The magnets should not be cracked or in any other way be defective. If necessary the flywheel has to be replaced completely. Before reinstallation take care that no magnetic parts stick to the permanent magnet; flywheel and crankshaft taper must be completely free of grease. Also a proper seat of the key is very important. The recommended torque for the crankshaft nut is 3 kpm (21.699 ft/lbf.).

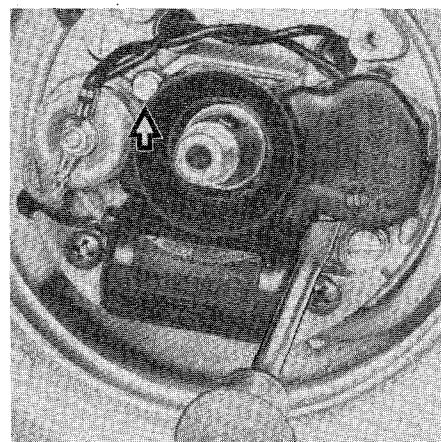
Armature Plate

Loosening the armature plate

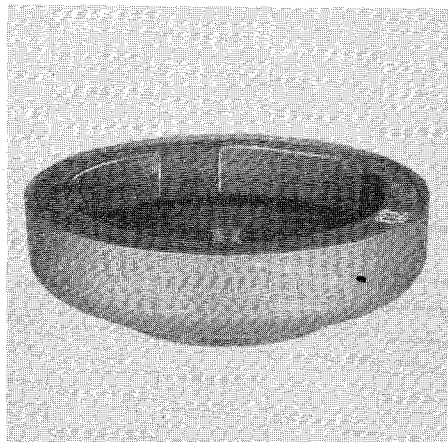


Replacing the Breaker Points

Loosening the protecting cap



Flywheel of the breaker point ignition system



Important!

Don't interchange the flywheel of the breaker point ignition system with flywheel of electronic ignition system. The flywheels are differently magnetized.

They can be distinguished by a number which is stamped into the flywheel.

The flywheels of the breaker point ignition are provided with the Bosch number 0204003028. The flywheels of the electronic ignition system are provided with the Bosch number 0204098002. These numbers, however, are not to be used as spare parts order numbers.

The armature plate is fastened to the crankcase by two cyl. hd. screws. The breaker point set and the ignition coil are fastened onto it. Furthermore, the condenser is pressed into a provided boring.

To remove armature plate loosen cyl. hd. screws and hex. nut with which the wire connections (ground lead) are fastened to the condenser and unscrew high tension lead from ignition coil. The armature plate is protected against dust by the flywheel as well as by the ring gasket which is positioned between plate and crankcase.

Should nevertheless dust reach the armature plate only clean with a brush, compressed air or a dry rag; never use gasoline or a similar cleansing agent!

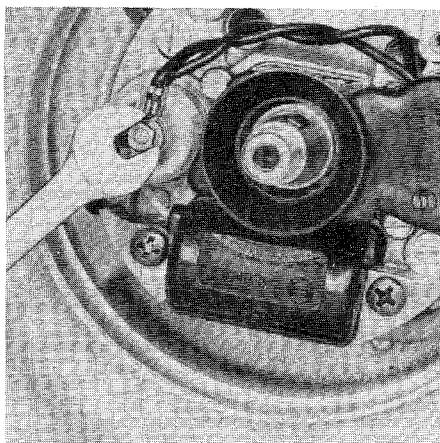
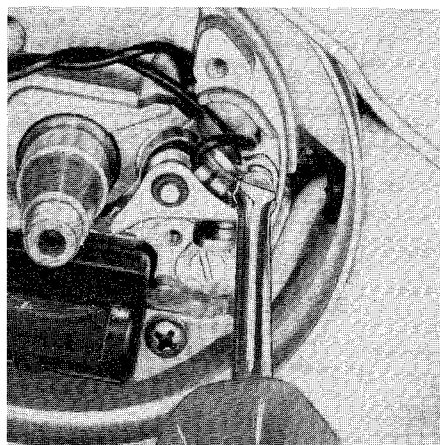
The breaker points are burning out after some time. The breaker point assembly is composed of a stationary part, the breaker base, which has ground connection and a moving breaker arm; this breaker arm is insulated against ground and connected by wires with the armature coil through the condenser.

Remove dust protecting cap to check breaker point set. The breaker point assembly is fastened to the armature plate by a cyl. hd. screw and is activated by an eccentric grinding at the crankshaft. For a long service life of the breaker arm it is very important that the lubrication felt is in good condition.

Burned or damaged breaker points have to be replaced. Always replace the complete breaker point set. To do so unscrew cyl. hd. screw and hex. nut with which the wire con-

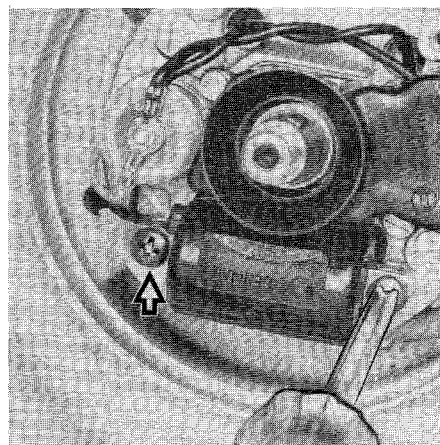
Controlling the Ignition Coil

Top: Loosening the breaker point set
Bottom: Loosening the wire connections



nections are fastened to condenser. Replace breaker point set by a new one and fasten cyl. hd. screw again. Also the connection with the condenser by a connecting wire has to be provided again. After the installation readjust ignition timing.

Unscrewing the ignition coil



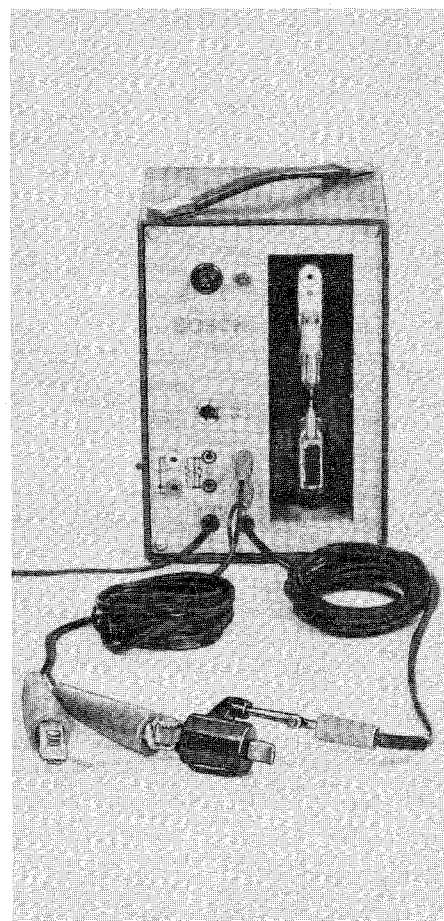
The ignition coil is screwed onto the armature plate with 2 cross slotted screws. For controlling remove the coil. To do so unscrew 2 cross slotted screws and loosen the wire connection at condenser.

With an ignition coil testing device such as the Bosch EFMZ 1 A or EFAW 106 A the disassembled armature can be tested on spark-over.

The sparking distance should be at 12 V at least 6 mm (0.236").

Exchange armature if this reading is not obtained.

A simple resistance test of the two ignition coil windings can be made with the Siemens pocket ohmmeter.

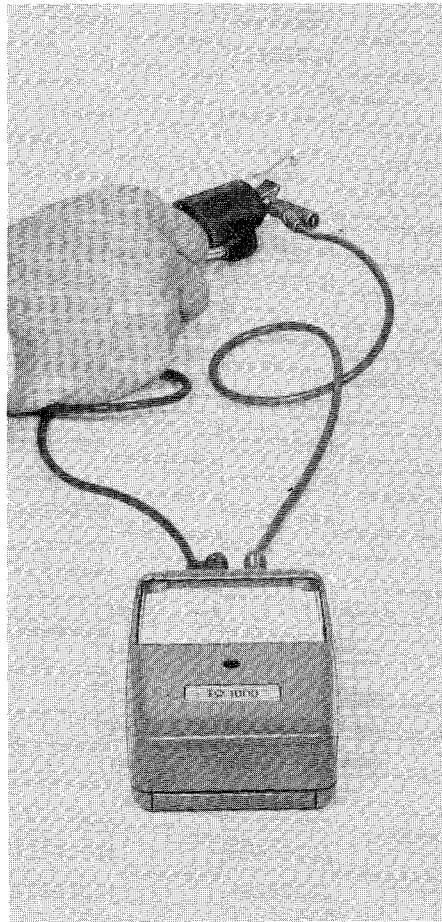
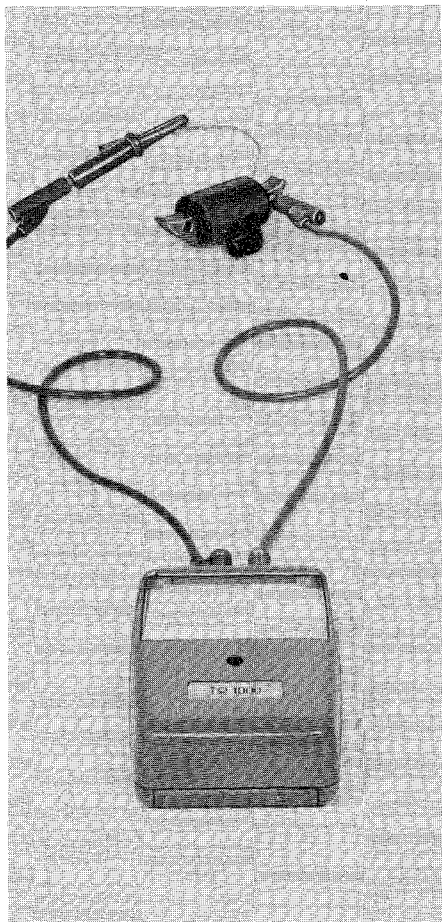


Resistance Test of Primary Winding with Ohmmeter

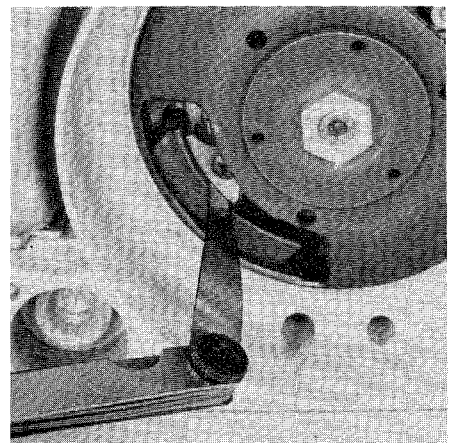
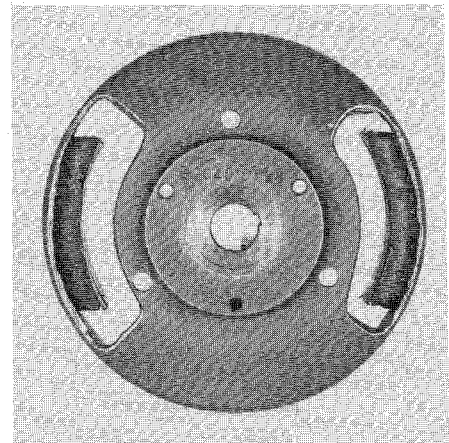
Resistance Test of Secondary Winding

Resistance test of primary winding

Resistance test of secondary winding



Top: Reworked old flywheel
Bottom: Armature air gap control



To test primary winding measure resistance between yellow wire and ground lead (armature core) on disassembled armature.

The ohmmeter must show a reading of 2,2 ohm.

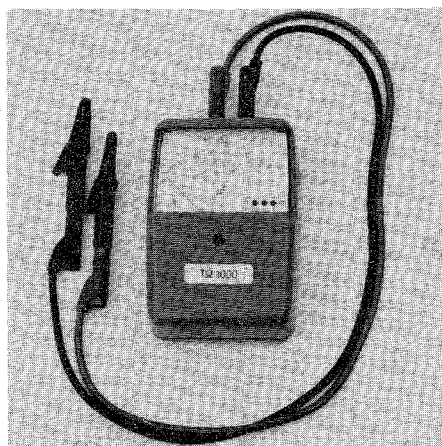
Unscrew high tension lead. Resistance between high tension lead connection and ground (armature core) must be 5,0 to 6,7 k Ω .

Replace armature if test data is not within the specified range. If ignition coil has been removed you have to control the armature gap before mounting the flywheel with a feeler gauge. Armature air gap is distance between pole shoes of ignition coil and flywheel.

To check the armature air gap two cutouts on an old flywheel (see illustration) have to be made. This reworked old flywheel which serves now as special tool has to be mounted to the crankshaft and now the armature air gap can be easily checked for the correct distance of 0,2—0,3 mm (0.007—0.018") and if necessary it can be readjusted by centering the armature coil.

Condenser

Pocket ohmmeter



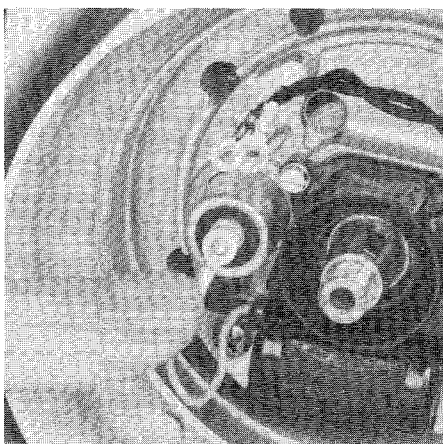
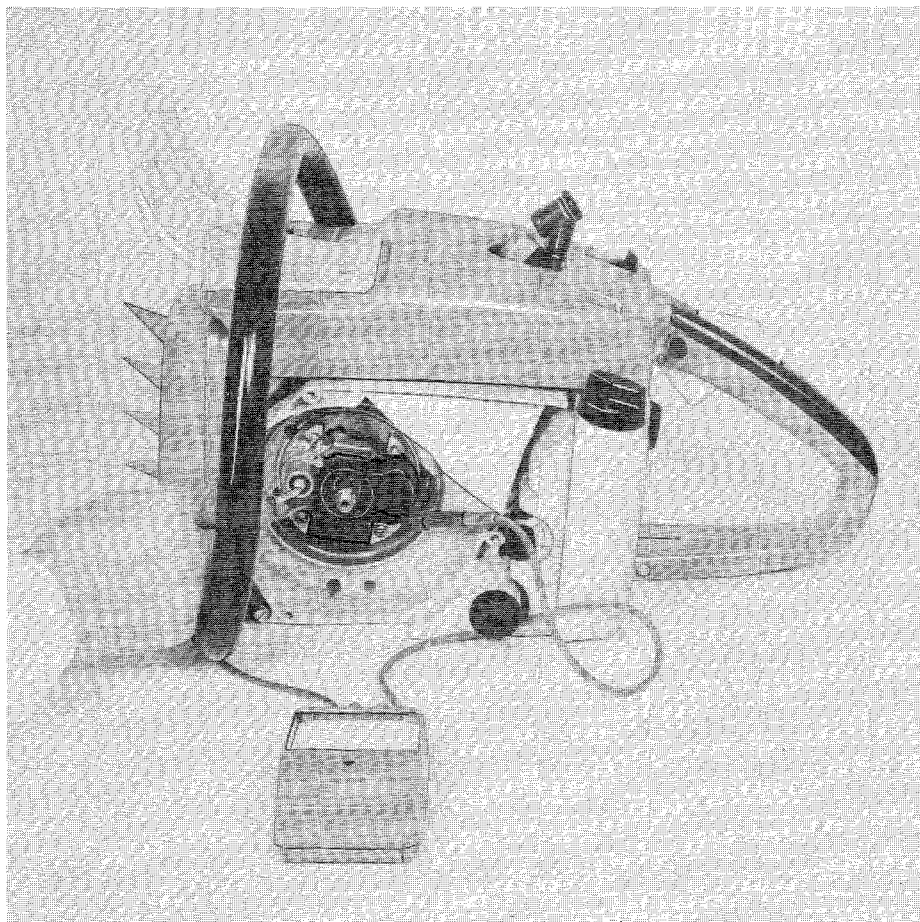
A defective condenser very often is the cause for burned breaker points. The condenser of the 045 AV is pressed into a boring provided in the armature plate.

The capacity of the condenser can be tested with the Siemens pocket ohmmeter 5910 850 4800.

To do so unscrew hex. nut of condenser and disconnect wires.

Attach negative pole (—) of ohmmeter to ground (armature plate) and hold positive pole (+) to connection of the condenser. (Threaded screw). The pointer of the ohmmeter must deflect for a short time between 0,15 and 0,19 μ F on the F-scale (F-microfarad). If the ohmmeter shows another reading the condenser must be replaced.

Condenser test with pocket ohmmeter

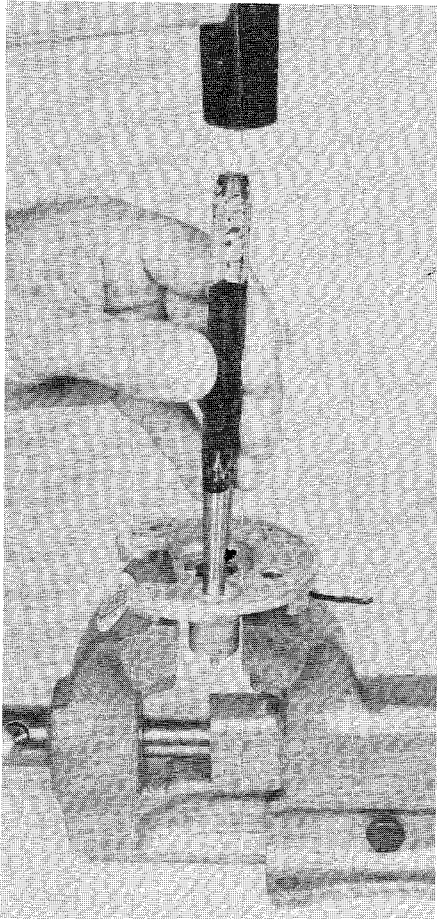


As the condenser is charged during the test by the ohmmeter you have to discharge it after the test by short — circuiting — hold condenser lead terminal against housing of condenser (ground).

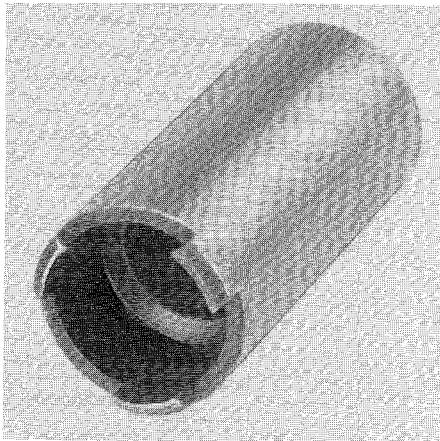
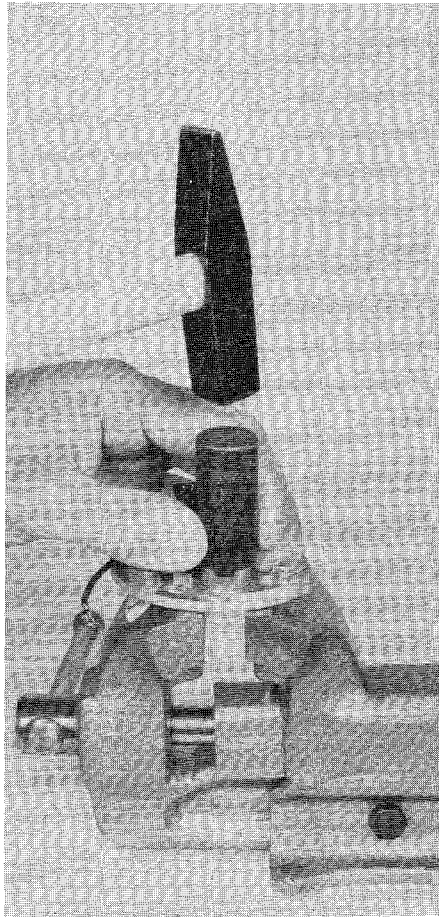
To remove a defective condenser take off armature plate (see page 22) and press out condenser from behind with a screwdriver or with light hammer blows.

Trouble Shooting of Flywheel Magneto

Top: Pressing out condenser
Bottom: Mounting sleeve

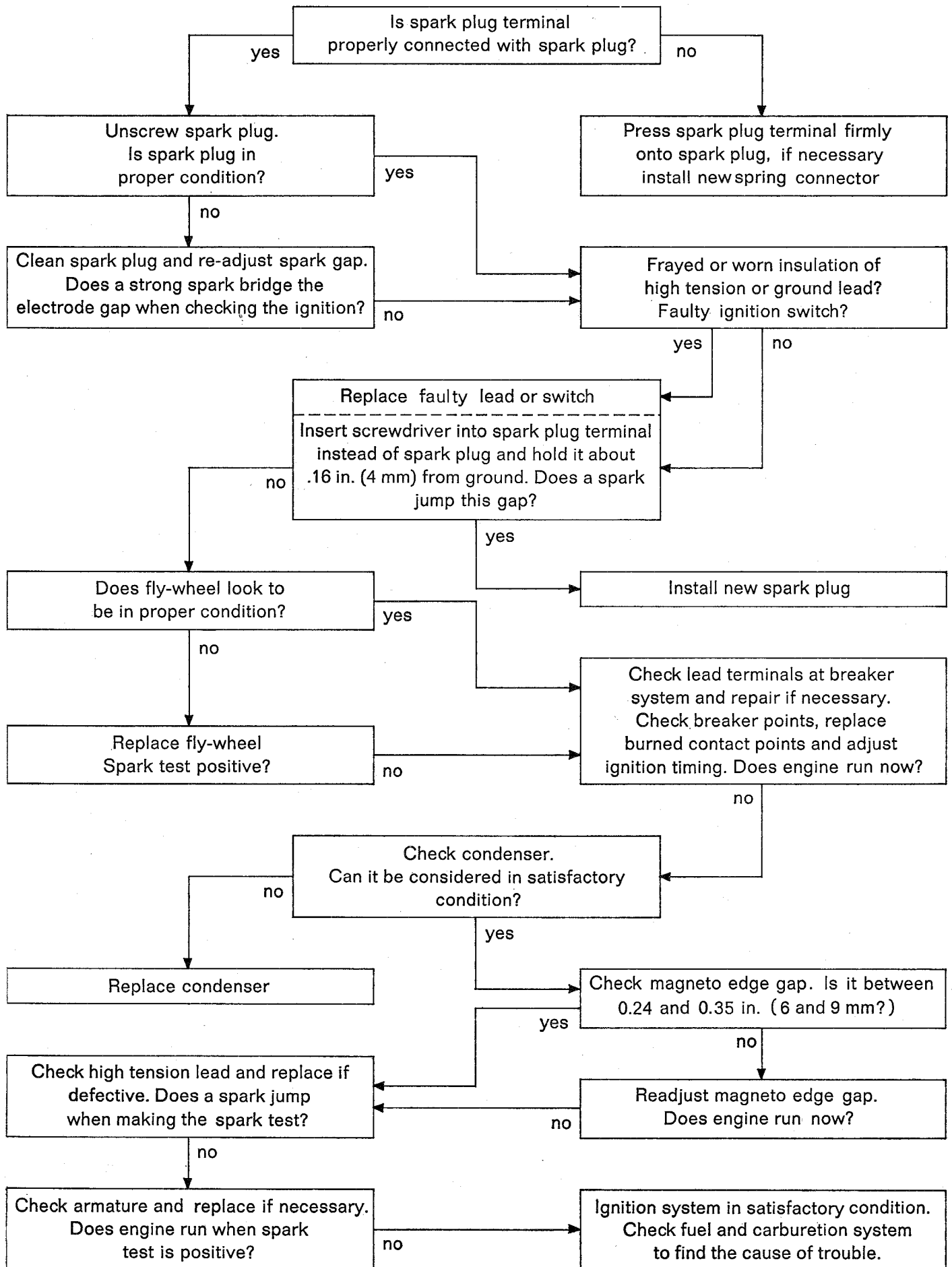


Inserting a new condenser



The insertion is done with the inserting sleeve 11108932400 under light hammer blows. On the 045 AV the bottom side of the condenser should project not more than 0.02" (0,5 mm) over the bottom side of the contact plate.

When you follow the arrows of the following chart and answer the questions therein you will soon find the cause of the malfunction of the ignition system and be able to correct it.



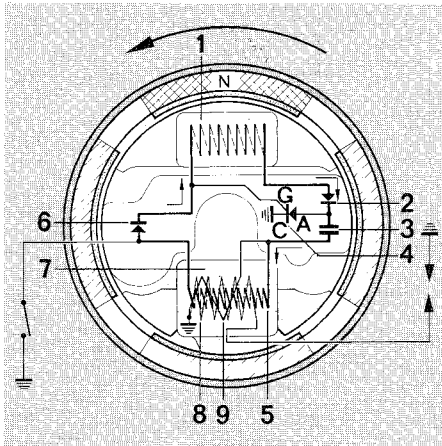
IGNITION SYSTEM 045 AV ELECTRONIC

Design and operation of high tension condenser discharge ignition (MHKZ)

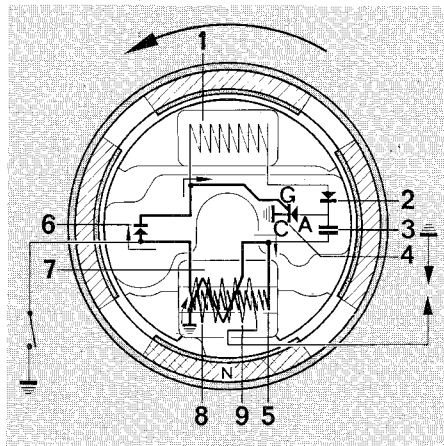
Schematic view of ignition system:

- 1 Charging coil
- 2 Charging diode
- 3 Capacitor
- 4 Thyristor
- G Grid
- A Anode
- C Cathode
- 5 Transmitter coil
- 6 Trigger diode
- 7 Ignition armature
- 8 Primary winding
- 9 Secondary winding
- N North pole permanent magnet

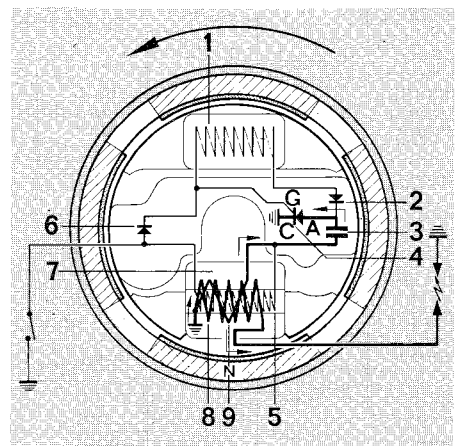
Charging the capacitor



Triggering the thyristor



Ignition process



This ignition system has the advantage over the breaker point ignition system that it has no mechanically stressed wearing parts, such as breaker points. Therefore, this ignition works trouble free even when contaminated by humidity and temperature fluctuations.

The required ignition current of the electric system develops from magnetic induction as well. The flywheel is composed of 4 permanent magnets made of Plastroferrit material which are unsymmetrically magnetized (3 south poles — 1 north pole); therefore, a reverse running of the engine is not possible.

Charging

When the north pole magnet of the flywheel passes the charging coil the force lines of the magnet cross the wire coils of the charging coil wiring. Thus producing an alter-

nating voltage in the charging coil which is rectified by the charging diode (D1). With this direct current the capacitor (C) is now charged and loaded with the required energy (capacity) for the ignition.

Since the thyristor (Th) as well as the charging diode (D1) are self-arresting no energy can be discharged from the capacitor at this stage.

Triggering

When the flywheel makes a further turn of 130° then there is a voltage induced in the wiring of the transmitter coil by the flux change as well. This alternating voltage is rectified by the diode (D2) and led to the control grid (G) of the thyristor. If the electric current has reached the required voltage according to the motor revolutions the thyristor connects through and becomes conductive in direction A—C (anode — cathode).

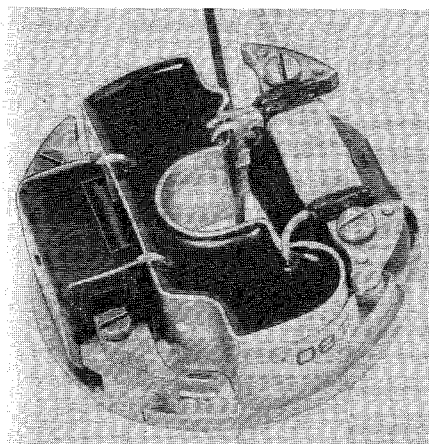
Igniting

When the thyristor connects through the discharge of the capacitor is no longer blocked. A current path is formed which leads from the capacitor over the A—C distance of the thyristor, over ground and primary winding of the ignition coil back to the capacitor.

The very fast discharge of the condenser causes a sudden current rise in the primary winding of the ignition coil. Thus a high voltage is induced in the secondary winding which is led over the high tension wire to the spark plug. At the electrodes of the spark plug the spark jumps over and ignites the air-fuel mixture. To switch off the ignition activate ignition stop switch. Thereby the primary winding of the ignition coil is connected to ground through the short-circuit wire.

Armature Plate

Removed armature plate

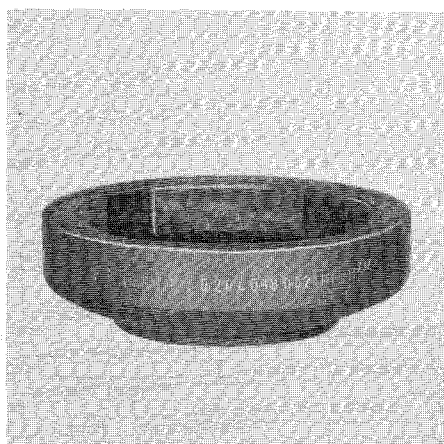


Not only the capacitor, charging and ignition coil and all other electronic elements are now attached to the aluminium stator plate completely molded in cast resin but also there is now added a transmitter coil which is needed for the triggering of the thyristor.

Thus on the stator plate the following parts are installed: Charging coil, transmitter coil, ignition coil and the electronic elements such as capacitor, thyristor, charging diode and trigger diode.

Flywheel

Flywheel of electronic ignition



The flywheel is composed of 4 permanent magnets which are made of a new kind of Plastroferrit material. To avoid a loss of energy there are pole shoes provided. The unsymmetrically magnetization of the magnets (1 north pole — 3 south poles) avoids the reverse running of the motor.

The flywheel of the electronic ignition should never be interchanged with the flywheel of the common breaker ignition system! Both flywheels are of different magnetization.

The flywheel of the electronic ignition system is provided with the Bosch number **0204 098 002**.

This number, however, **cannot** be used as order number.

Setting the Ignition Timing

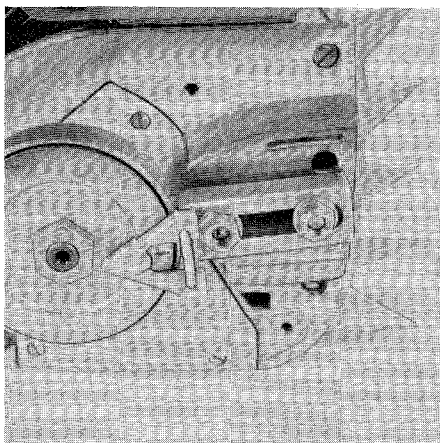
The setting of the ignition timing is done by means of the 2 groove marks provided on armature plate and flywheel.

First, however, the fan housing with starter device as well as the fan wheel have to be taken off.

Also the spark plug has to be removed. Now screw holder 1110 890 8600 into the spark plug thread and insert dial gauge. Adjust scale of dial gauge in "0" position at top dead center position of piston. Now set the piston by turning the flywheel in reverse direction of engine rotation at 2,5—2,7 mm (0.098—0.106") before top dead center.

The groove marking of the flywheel has now to be transferred onto the crankcase. Pull off flywheel and turn armature plate in such a way that the groove marking provided on it is exactly in line with a marking on the crankcase. Now fasten armature plate again, mount and tighten flywheel. Finally reassemble fan housing again.

The marking on the armature plate retains its validity at all times. The marking on the crankcase, however, has to be controlled after replacing the case or when installing a new armature plate and if necessary the marking has to be renewed.

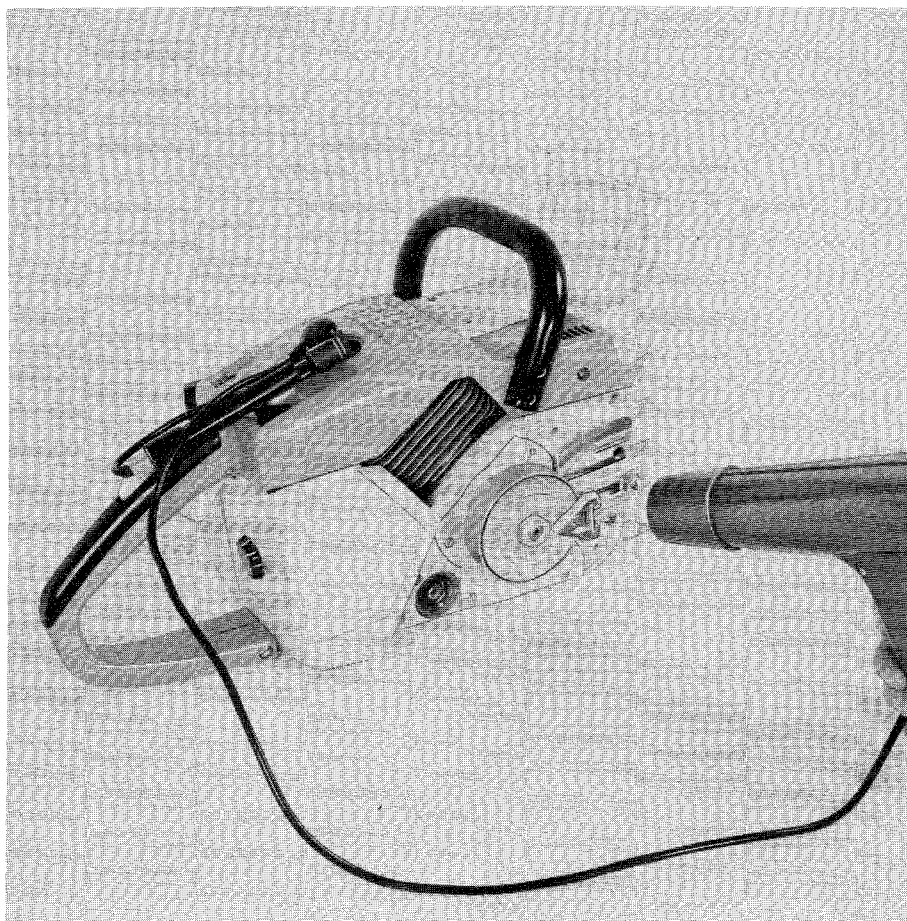
Mounted adjusting adapter

The ignition timing can also be checked and adjusted with a strob-light. To do so first set the piston by means of the dial gauge at 2,5 to 2,7 mm (0.016") before top dead center.

Then slide on and tighten the adjusting adapter 00008504000 which can be purchased as special tool onto the bar studs. Now place a marking opposite of the indicator point of the flange onto the clutch washer- or on older saws onto a clutch shoe.

Connect strob-light to electric circuit between spark plug and ignition stop switch and start the engine. Engine speed has to be adjusted to 6000 r.p.m. by setting the idle speed regulating screw (control with revolution counter).

If the marking is now flashed with the strob-light, then it must be in line

Flashing the marking with Strob-light

with the point of the adjusting adapter if timing is set correctly.

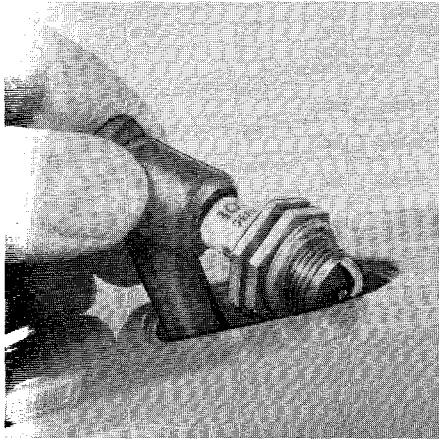
Should the marking be found to be positioned before the indicator point in direction of engine rotation (too much advanced ignition) then the armature plate has to be turned slightly to the left. Should advanced ignition be too low (marking behind indicator point) then the armature plate has to be adjusted somewhat to the right side. Adjust armature

plate as long as you find the correct ignition timing. Then place setting mark into crankcase as described above.

Functional Control of the Electronic System on the Motor

Maintenance and Repair

Controlling the spark of the spark plug

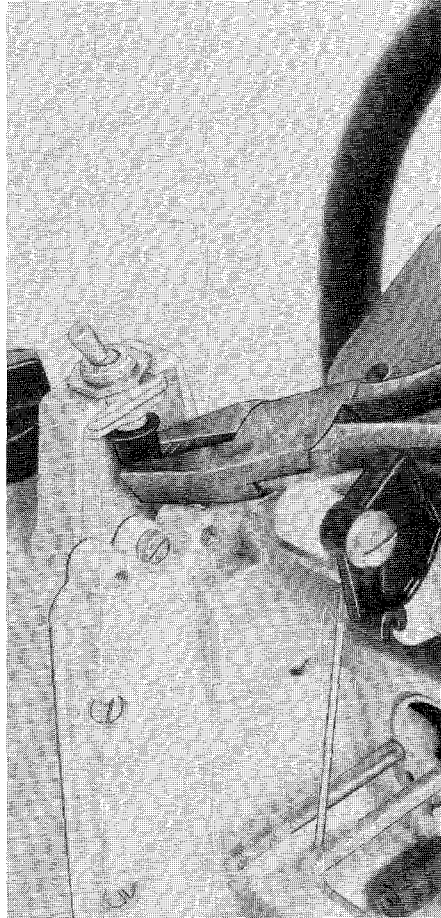


Since for this ignition system only the flywheel and the complete armature plate can be purchased as spare parts the trouble shooting is limited to a simple functional and visual control.

Should ignition troubles occur on the MHKZ first control the spark plug, the high tension lead and short circuit wire as well as the ignition switch for proper function. Also the correct mounting position of the contact spring has to be checked (see breaker point ignition).

The function of the electronic system can be controlled by a very simple testing process. To do so remove sparkplug and insert removed plug into spark plug terminal (ignition stop switch position 1). Hold spark plug to ground. When pulling the starter rope rapidly sparks must jump between the electrode of the plug.

Pulling off the short circuit wire



If no spark shows remove short circuit wire from sliding contact at the ignition switch (see page 18) and repeat the spark test.

Should sparks show up then the ignition switch is defective. If, however, no sparks are jumping again then the armature plate is defective. Provided that high tension lead, spark plug terminal and spark plug are in proper working condition.

Because of the integrated assembly of all charging and triggering elements on the armature plate for this system only the complete armature plate 11154000805 and the flywheel 11154001205 can be supplied as spare parts. These parts, however, need no longer to be replaced as set but can be replaced separately.

Ignition wire and spark plug terminal are naturally available as spare parts as well.

REWIND STARTER

Disassembly and Repair

Design and Operation

The rewind starter of the STIHL 045 AV and 045 AV electronic is mainly composed of starter rope and grip, rope rotor, rewind spring, friction shoes and brake springs. Moreover there are different washers and one lock washer by which the individual parts are held onto the starter axle.

When pulling the starter rope the friction shoe system is forced out of its dead position in such a way, that the sharpened edges of the friction shoe plates engage at the inner side of the plastic ring which is pressed into the flywheel. Through the flywheel crankshaft, connecting rod and piston are now moved; fuel is sucked in and as soon as the motor reaches its minimum speed the necessary ignition current is achieved. The pulled out starter rope is now automatically recoiled by the rewind spring.

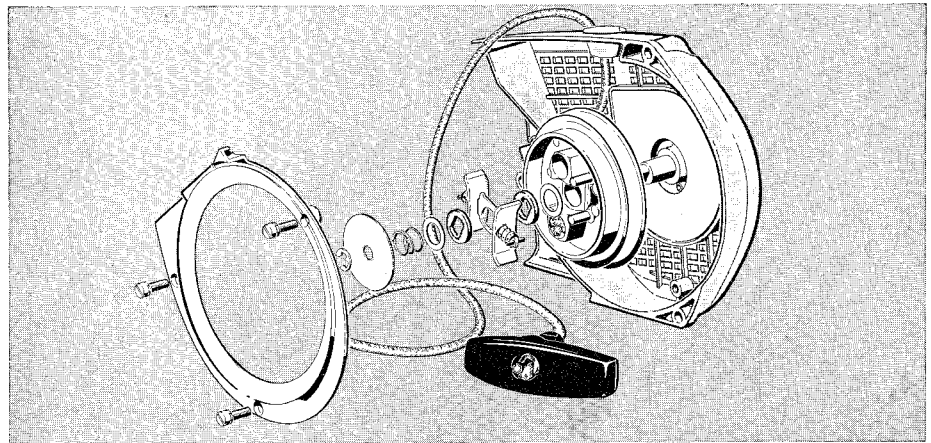
The rewind starter is maintenance-free; but, of course, normal wear cannot be avoided.

The following troubles may occur:

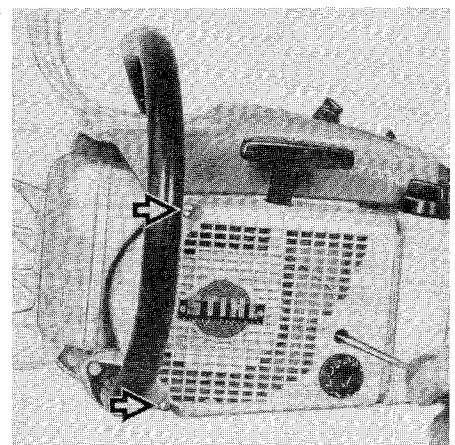
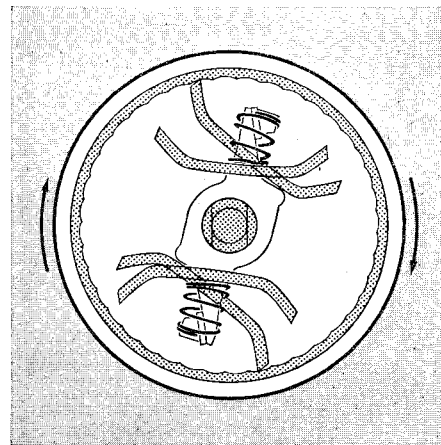
Starter rope broken (when pulling it out too far) — exchange starter rope.

Rewind spring broken (if pretension is too high the spring has no reser-

Top: Individual parts of the starter device
Bottom: Schematic functioning of starter device



Bottom: Removing the fan housing



ves when rope is fully pulled out) — renew spring.

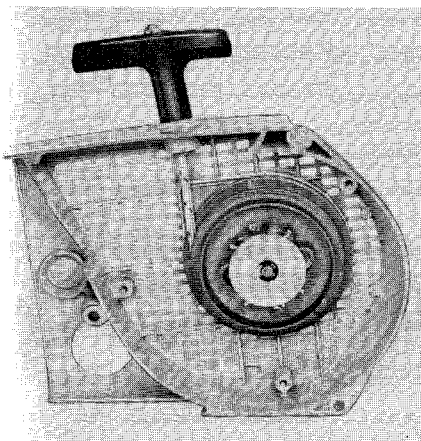
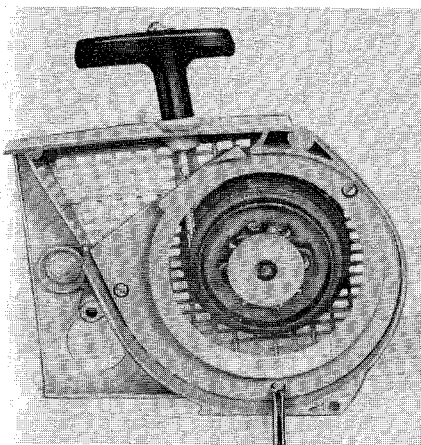
Friction shoe plates not in satisfactory condition or rewind starter contaminated — renew friction shoe plates respectively clean rewind starter.

First unscrew fan housing with rewind starter and loosen the 3 cyl. hd. screws of the segment fixation.

do so pull out starter rope somewhat, hold rope rotor and unwind some windings of the rope. Release rope rotor again; now the pretension of the rewind spring is relieved. Now untension rewind spring. To If starter rope is broken then the pretension of the spring has already been relieved.

Installation of a new Starter Rope

Top: Unscrewing the segment
Bottom: Exposed starter device

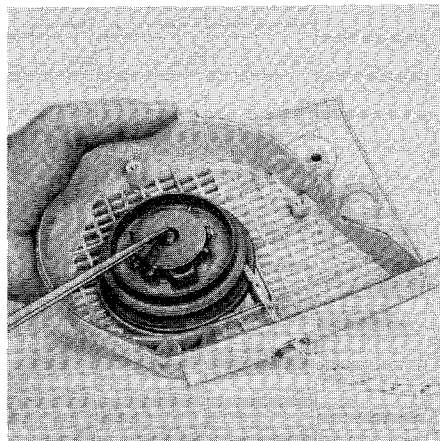
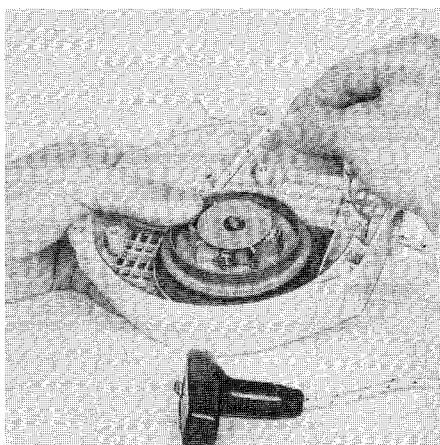


Remove retaining ring with screw driver from the shaft.

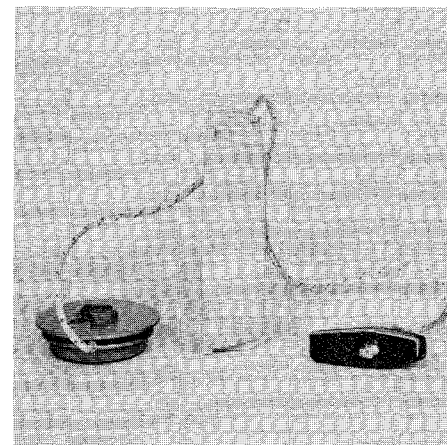
Hold the washer with your other hand so that it cannot jump out and the brake spring underneath cannot get lost.

Now the individual parts of the rewind starter can be taken off the starter axle one after the other.

Top: Untensioning of recoil spring
Bottom: Prying off retainer washer



Threaded in starter rope



First remove remaining starter rope end from the rope rotor which now can be taken off as well.

A new rope is inserted into rope rotor and secured with a single knot. The other end of the rope is threaded through the rope bushing in the fan housing cover and secured with a double knot in the grip. The correct length of the rope is 1000 mm (39.37") the diameter 4,5 mm (0.177").

Then mount rope rotor again by applying some oil. Finally the rewind spring is tensioned.

Note:

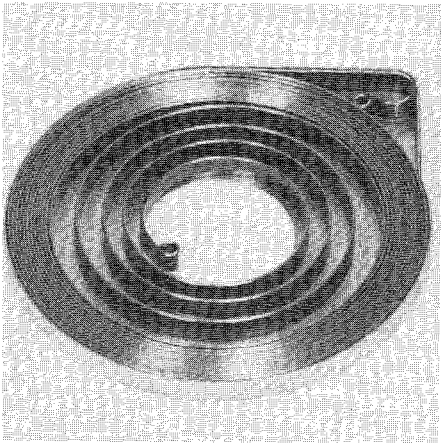
Don't apply any oil to the brake washers which are situated in front and behind the friction shoe.

Installation of Rewind Spring

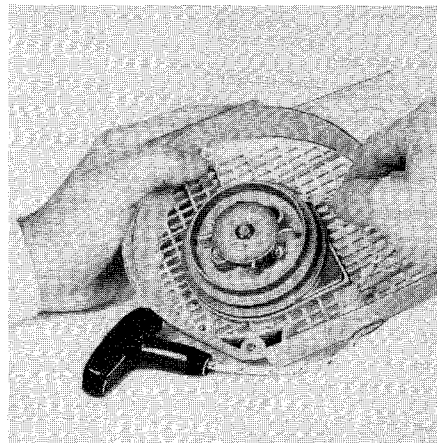
Tensioning Rewind Spring

General Repair

Rewind spring — ready for installation



Tensioning of the rewind spring



A broken rewind spring can only be replaced by a new one. Spare springs can only be supplied complete with spring housing and therefore can be easily installed into the intake provided in the fan housing. **Before installing rewind spring apply some oil.**

Should rewind spring jump out of the spring housing it has to be recoiled again. By the special design of the spring housing it is granted that the outer spring loop is hooked into the cast lug of the fan housing automatically. Now mount rope rotor again and tension rewind spring.

To tension rewind spring pull out starter rope between rope rotor and fan housing in such a way that a loop is formed.

Now the rope rotor is turned 7 times in clockwise direction. Thereby the rope should not be coiled up. Hold rope rotor tight, pull out starter rope and let go rope rotor slowly thereby rewinding the rope onto the rotor.

The spring is correctly tensioned if at completely pulled out starter rope the rope rotor can still be turned at least $\frac{1}{2}$ turn before reaching maximum spring tension.

Excessive spring tension will cause breakage of the spring.

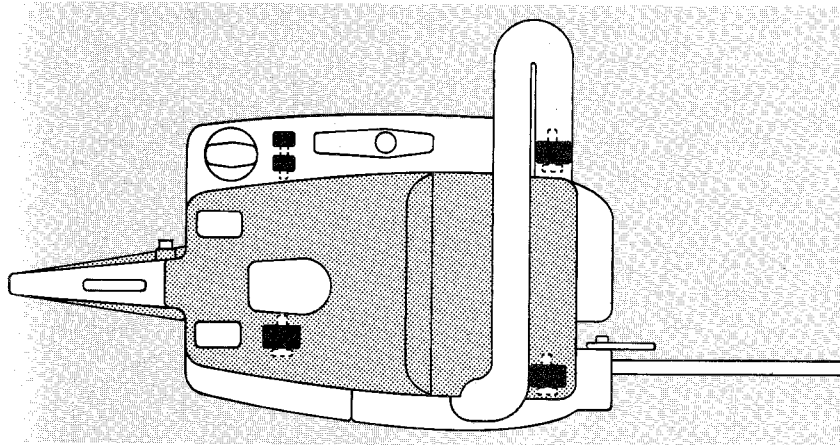
If pulling of the starter rope is difficult and if rope recoils only very slowly or not completely the cause for it can be that the rewind starter is mechanically in proper condition, but is heavily contaminated. At very low temperature the oil in the rewind spring may not be liquid anymore, the spring coils will then stick together and will affect the operation of the rewind starter. In this case you only need to apply some kerosene to the rewind spring. Pull out starter rope carefully until starter functions properly again.

A dirty or resinified rewind starter has to be completely disassembled — also the rewind spring. Attention when removing rewind spring!

Wash all parts in kerosene or clean gasoline. When reinstalling apply some oil to rewind spring and axle.

AV-HANDLE

Schematic view of rubber-mounts



Center: Unscrewing the rubber buffer at the handle frame

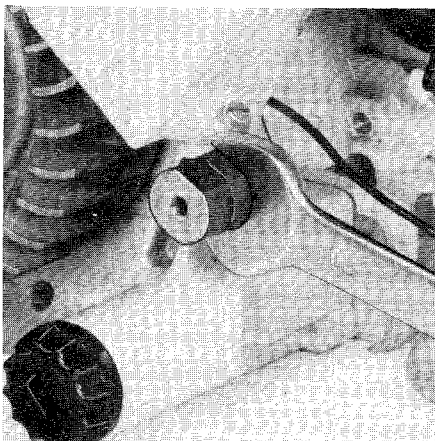
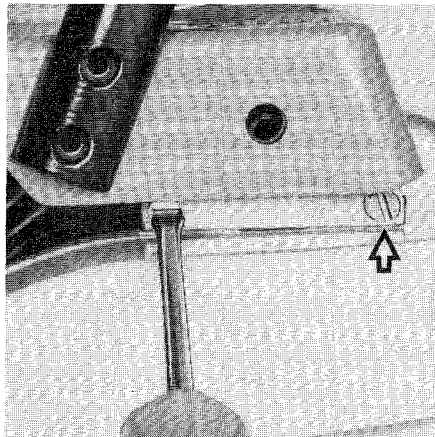
Bottom: Unscrewing the annular buffer

Both handles are attached to each other by the handle frame and are fastened to the machine by 4 strategically located points. The rubber buffers are located at the front part of the engine at the bottom side of the handle frame as well as at the upper end of the handle bar.

At the rear side of the machine the handle frame is screwed together tightly with carburetor box and tank housing. At the clutch side the rubber buffer is fastened to carburetor box and crankcase and the annular buffer on the magneto side is fastened to the tank housing and crankcase. **Damaged shock absorbers have to be replaced.**

At the bottom side of handle bar

First unscrew handle bar completely. Thereafter screw out collar screw of rubber buffer fixation at handle



bar. When mounting the handle bar take care that contact spring is always placed properly. This spring has to close the circuit between the electric ground contact to the ignition stop switch.

At the handle frame

Disassemble handle bar. At handle frame first loosen collar screw and both cyl. hd. screws through which the rubber buffer is fastened to the crankcase and exchange rubber buffer.

At rear part of engine

Unscrew fan housing and chain sprocket cover. Unscrew annular buffer at magneto side with a fork wrench (SW 16). Unscrew collar screw at clutch side which fastenes the carburetor box next to the oil inspection window. Take off carburetor box with tank housing (see paragraph "exposing the cylinder").

Now the annular buffer which is fastened with two cyl. hd. screws to carburetor box and the rubber buffer which is screwed onto the crankcase can be exchanged.

Note: Install annular buffers or rubber buffers in such a way that they are not twisted in their longitudinal axis.

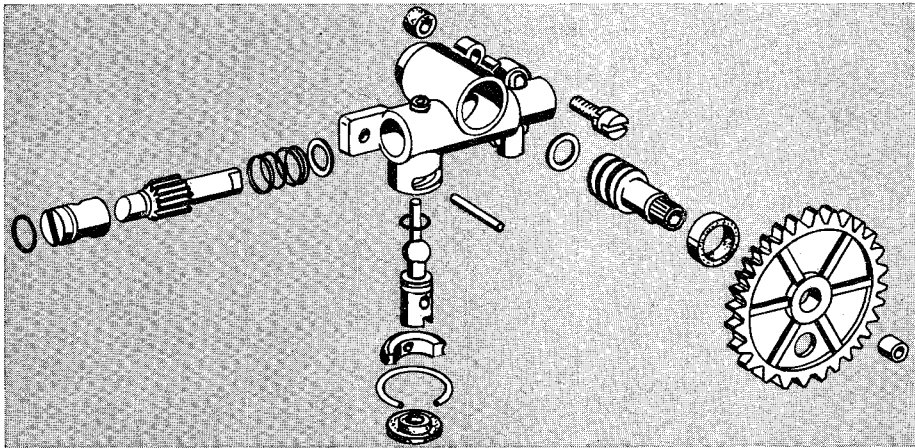
OIL PUMP

Oil Quantity Control

Disassembly of Oil Pump

Operation

Component parts of the pump



The oil pump for chain lubrication is positioned on the drive side and protected by a cover. It is driven by the chain sprocket, the pump is pumping oil only when the clutch is starting to engage.

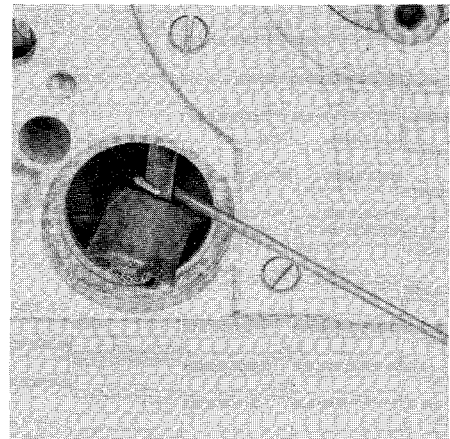
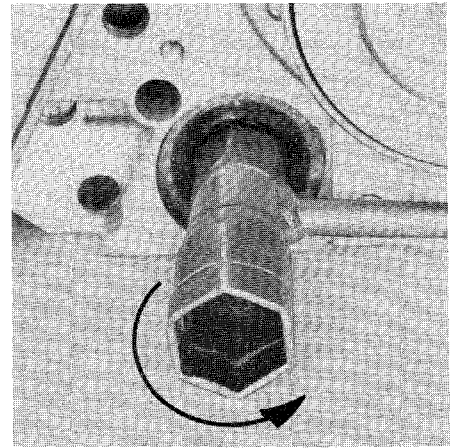
The worm gear is driven by the chain sprocket via the drive pin; the worm gear drives the pump plunger. The cam surface at the end of the plunger rides on the ball shaped part of the control bolt which causes the spring loaded plunger to move back and forth. An oil pocket at the pump plunger controls the intake and outlet of chain oil from the oil tank to the bar and chain.

The chain lubricating oil is filtered by a pick-up body in the oil tank.

The oil supply can be adjusted by the control knob depending on the length of the bar to be used with the saw. Turning the control bolt at the bottom side of the machine clockwise (—) decreases the oil flow, turning it counter-clockwise (+) increases the flow. The control bolt can be turned with a screwdriver one quarter of a turn at a maximum.

The maximum oil feed is 15 cm³/min. (0.92 cu. in.) the minimum oil feed is 8,5 cm³/min. (0.52 cu. in.) at 6000 r.p.m. each. On new chain saws 045 AV and 045 AV electronic the factory adjustment is set at a mean oil feed of 12 cm³/min. (0.73 cu. in.).

Top: Loosening the oil inspection window
Bottom: Pulling out the oil pick-up body

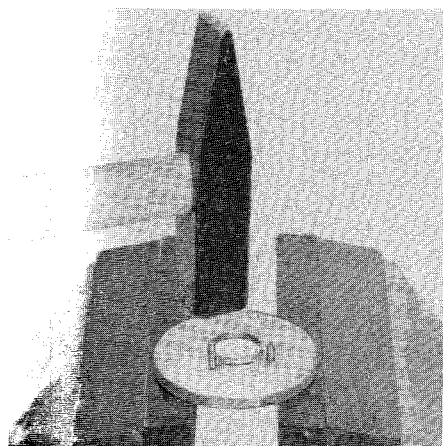


If oil feed respectively chain lubrication is working irregularly first clean oil inlet hole in guide bar and bar groove.

Then first check oil hose with pick-up body. Empty oil tank and screw out oil inspection window with combination wrench. Pull end of hose with the hook provided with the tool kit out of the threaded hole for the oil inspection window and clean if

Repair

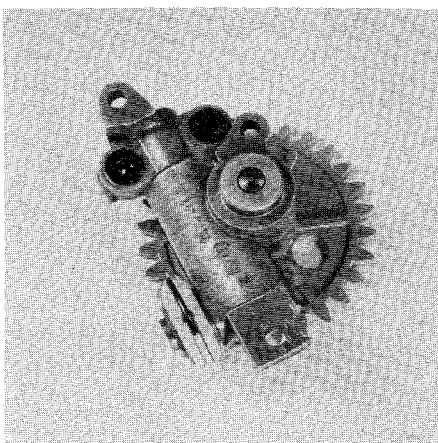
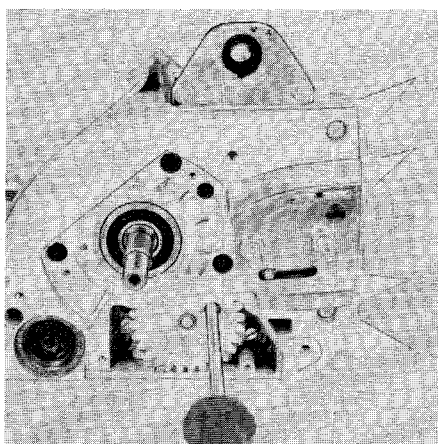
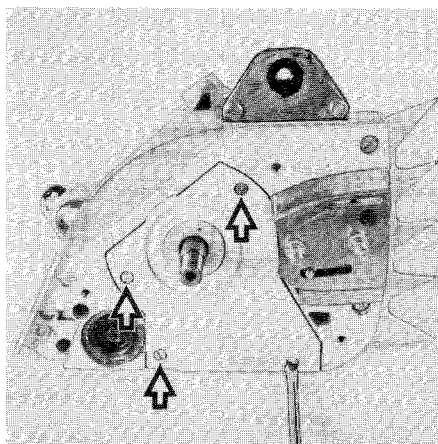
Inserting a new drive pin



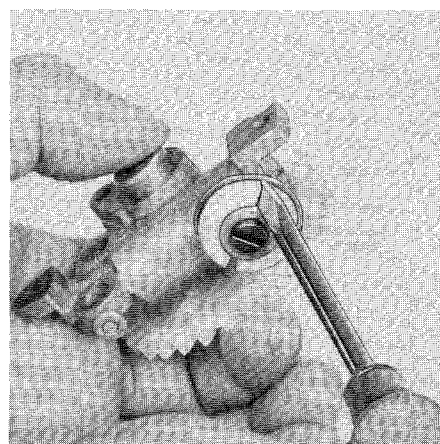
necessary. Don't pull off hose completely from elbow connector. Do not kink or twist hose when putting it back into the tank. To insert a new hose the crankcase has to be disassembled.

To disassemble oil pump take off clutch and chain sprocket (see page 6). If a drive pin is broken a new one has to be inserted. The cover in front of the pump is secured to the crankcase by 4 cyl. hd. screws. Remove screws, take off cover and pull small spur gear off the crankshaft. To fully disassemble the oil pump unscrew 3 cyl. hd. screws M 4 x 12. One of these screws can only be reached by the boring at the big spur gear.

Top: Loosening the plastic cover
Center: Loosening the oil pump
Bottom: Removed oil pump



Prying off the lock washer



The pump plunger with worm gear toothing is inserted in the pump housing and is guided in a brass bushing which is sealed against the housing by an "O" ring. Troubles with the pump are very seldom.

To disassemble the oil pump pry retaining ring off the two segments. Remove segments and pull cylindrical pin out of control bolt.

Then take control bolt with "O" ring, bushing, pump plunger with helical spring and washer out of pump housing. Then pull worm gear with spur gear and ring washer out carefully.

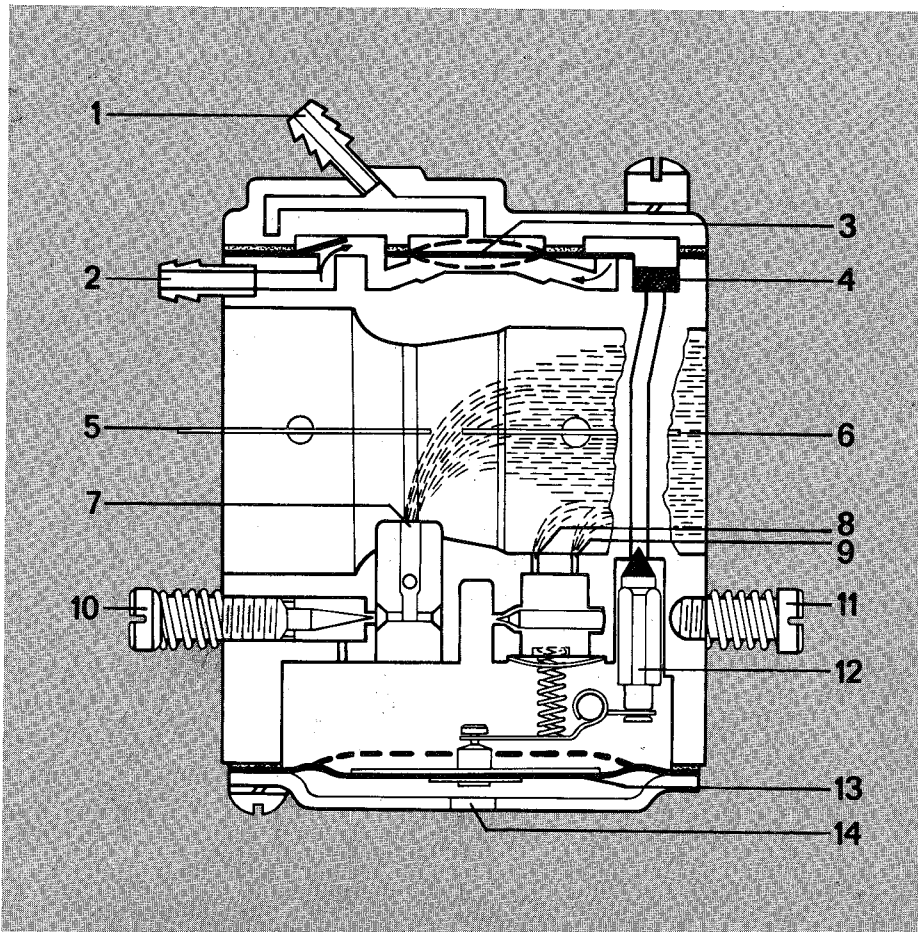
Don't forget check plate of worm gear!

CARBURETOR AND AIR FILTER

Design and Operation of Carburetor

Schematic view of carburetor:

- | | |
|---------------------------|---------------------------------|
| 1 Impulse fitting | 8 Secondary idle discharge port |
| 2 Fuel intake fitting | 9 Primary idle discharge port |
| 3 Pump diaphragm | 10 Main adjustment screw |
| 4 Fuel screen | 11 Idle adjustment screw |
| 5 Choke shutter | 12 Inlet needle |
| 6 Throttle shutter | 13 Metering diaphragm |
| 7 Main nozzle (valve jet) | 14 Atmospheric vent |



The inlet needle of the needle valve is linked with the metering diaphragm by the inlet control lever. The chamber under the metering diaphragm is vented to the outside (atmosphere) through a hole in the metering diaphragm cover of the carburetor. The upward stroke of the piston creates a vacuum in the crankcase and, therefore, in the Venturi of the carburetor and thus a pressure drop to the atmosphere.

This low pressure, which varies with the engine speed and the load on the engine and with the position of the throttle shutter, creates an air stream drawing fuel out through the fuel jets into the Venturi. At the same time the metering diaphragm is pushed upward and unseats the inlet needle thus allowing fuel to flow into the diaphragm chamber.

The 045 AV and 045 AV electronic STIHL power chain saws are equipped with an all-position HS-Tillotson diaphragm carburetor with integral fuel pump. Thereby the fuel pump is operating separately and independently from the other part of the carburetor.

of pressure and vacuum at each stroke of the piston cause pulsation of the pump diaphragm thus forcing the pump diaphragm to operate in a direct relationship to the engine speed.

In this way the pumping diaphragm draws fuel from the fuel pick-up body through the fuel line and through the inlet and outlet valves of the pump to the needle valve of the carburetor.

The impulse hose connects the impulse chamber of the fuel pump with the crankcase. The alternate surges

Carburetor- and Elbow Connector Disassembly

Take off carburetor box cover. Remove slotted nuts of air filter, pull air filter from studs. Remove retaining washers from choke and throttle shaft and unhook starter- as well as throttle rod from carburetor. Then unscrew 2 hex. nuts (SW 8) of carburetor fixation and pull carburetor from studs (see page 8).

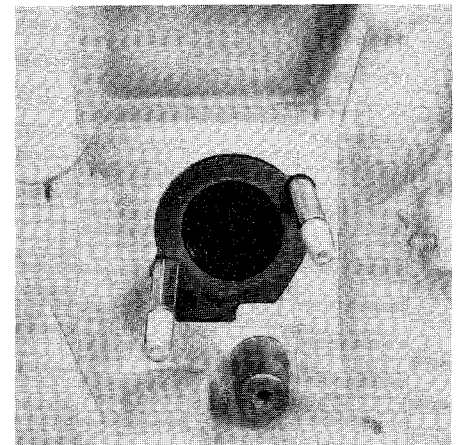
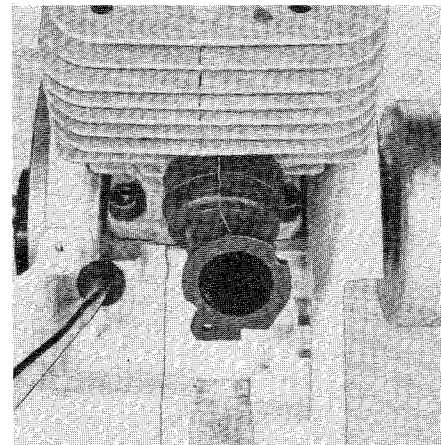
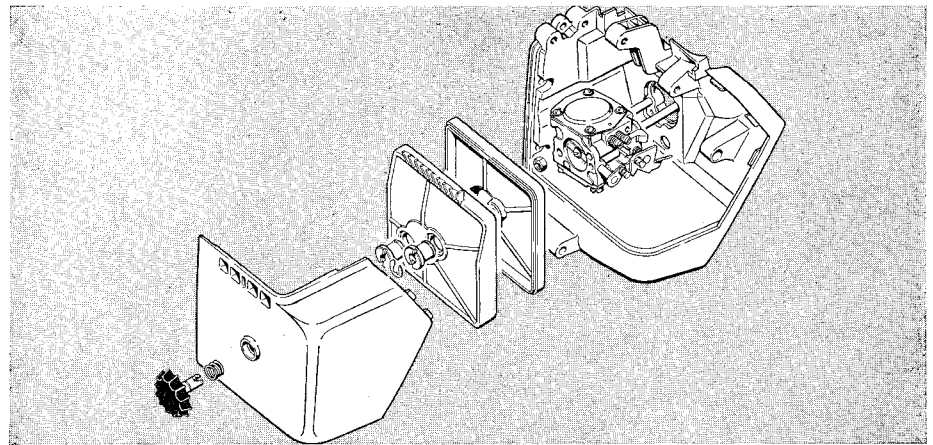
Moreover, if the elbow connector has to be removed first take off the complete carburetor box with tank housing (see page 19). Remove hose clip of elbow connection from cylinder and pull off elbow connector.

Check all parts on proper condition prior to installation. By-pass air may enter through defective elbow connector and cause engine trouble.

When reassembling first fasten elbow connector with hose clip to cylinder. Then attach impulse hose at carburetor box and slide it on to adapter at the cylinder afterwards. Push elbow connector into carburetor box. Check to be sure that the end of the elbow connector is properly positioned between the two locking lugs in the carburetor box boring. The cast seam of the cylinder has to be in parallel posi-

Top: Carburetor set-up
Bottom: Elbow connector assembled to cylinder

Bottom: Elbow connector installed in carburetor box



tion to the moulding seam of the elbow connector, this is the correct position of the elbow connector to mount the carburetor box.

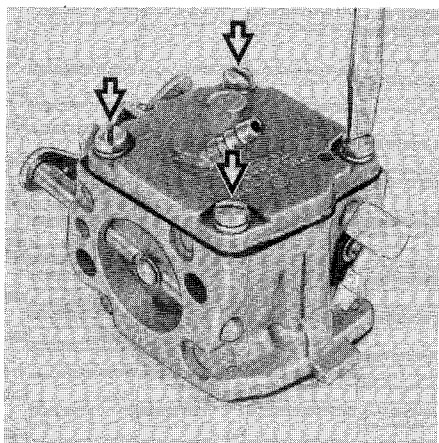
Reverse disassembly sequence to install the remaining parts, i. e. carburetor, air filter, carburetor box cover etc.

Clean air filter thoroughly with a

soft brush or wash it in clean gasoline prior to installation.

Repairing the individual parts of the Carburetor

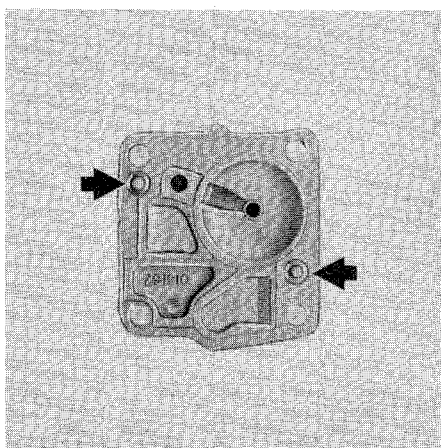
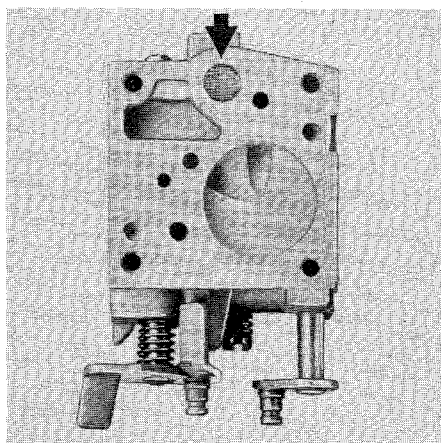
Loosening cover plate



The HS carburetor differs from the HL models in design and dimensions. It is smaller and the pump diaphragm and the metering diaphragm are specially separated from each other. The built in fuel pump is located underneath the cover plate into which the impulse nipple is fitted; whereas the control diaphragm with the needle valve is located under the smaller steel control diaphragm cover.

After loosening the 4 lens head screws by which the diaphragm cover is fastened to the carburetor body, first remove gasket, then pump diaphragm. In most cases gasket and diaphragm are sticking together caused by the tight pressing in installed condition. Separate both parts carefully. The pump diaphragm is provided with 2 valve flaps — the inlet — and outlet valve — which have to be thoroughly inspected on wear. After removing gasket

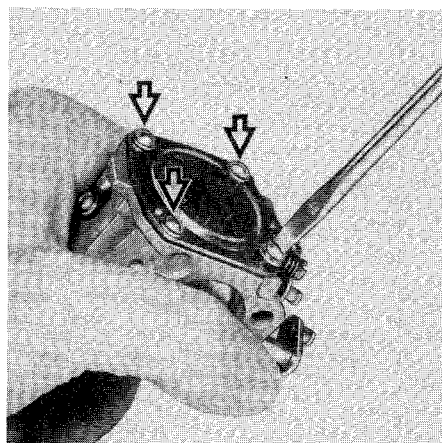
Top: Filter strainer
Bottom: Guide pin at cover plate



and diaphragm you will see the filter strainer. This strainer can get clogged after some time of operation and should therefore be checked from time to time and cleaned if necessary. **Exchange strongly arched pump diaphragms.**

To reassemble the pumping part first place the gasket and then the diaphragm onto the guide pins of the cover and fasten the cover again to the carburetor body.

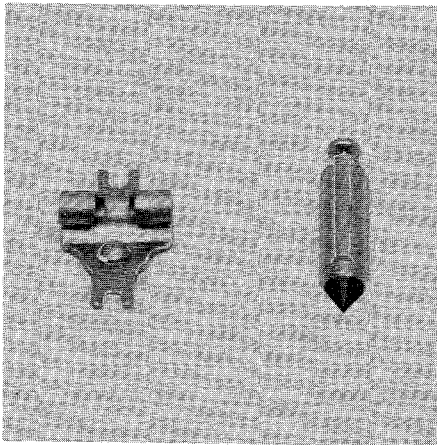
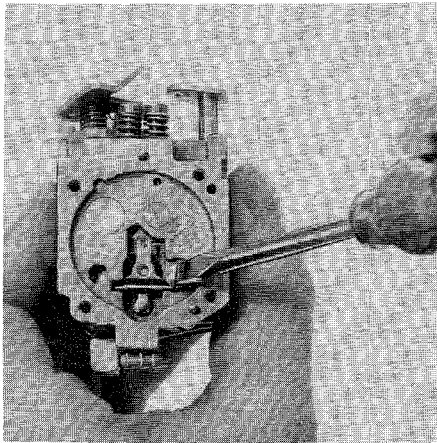
Loosening the steel cover plate



After unscrewing the 4 button head screws take off the steel diaphragm cover. Under the cover you will first find in correct sequence the metering diaphragm and the gasket. Lift metering diaphragm carefully out of the dovetailed guide of the inlet control lever.

The fulcrum of the inlet control lever is fastened to the carburetor body with a lens head countersunk screw. The inlet needle is hooked into the second dove-tailed guide of the inlet control lever. The lever is installed under spring load with a small spring.

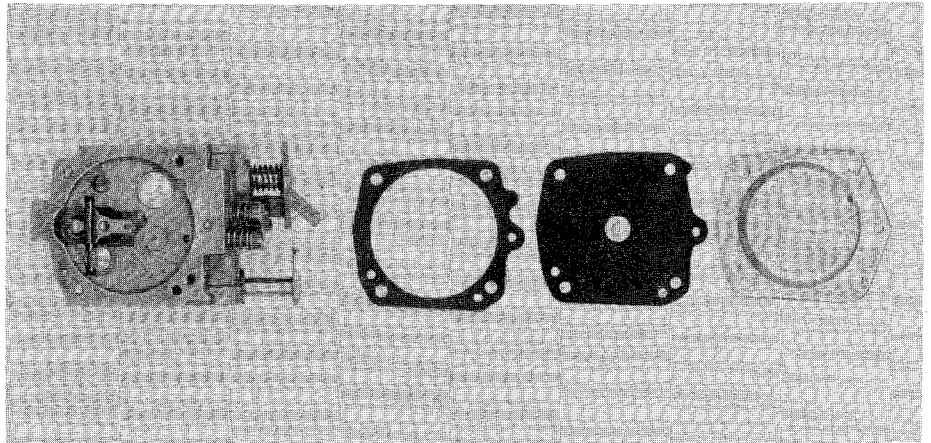
Top: Disassembly of inlet control lever
Bottom: Inlet control lever with inlet needle



To disassemble loosen lens head countersunk screw, then remove inlet control lever with inlet needle and do not loose small spring.

In the HS carburetor the closing taper of the inlet needle is a rubber tip which is pressed into the inlet needle.

Carburetor with disassembled gasket, metering diaphragm and steel cover plate

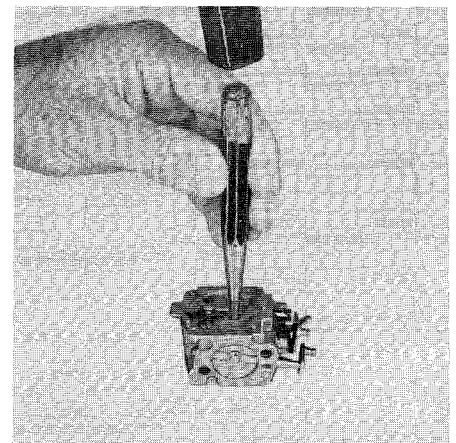
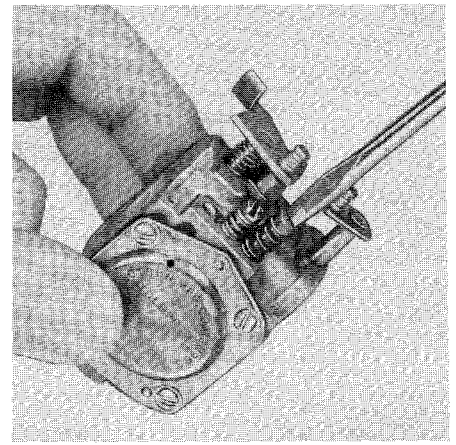
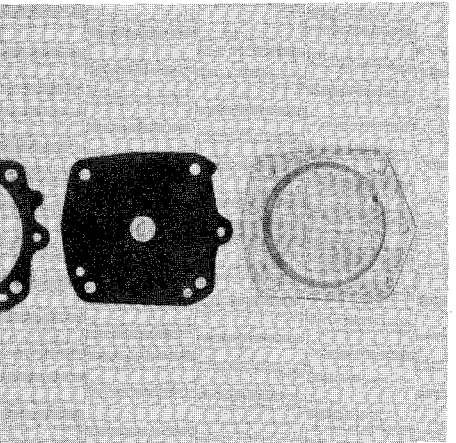


The main fuel orifice (main nozzle) of the carburetor is positioned in the valve jet. This valve jet is pressed into the carburetor body at the narrowest point of the Venturi.

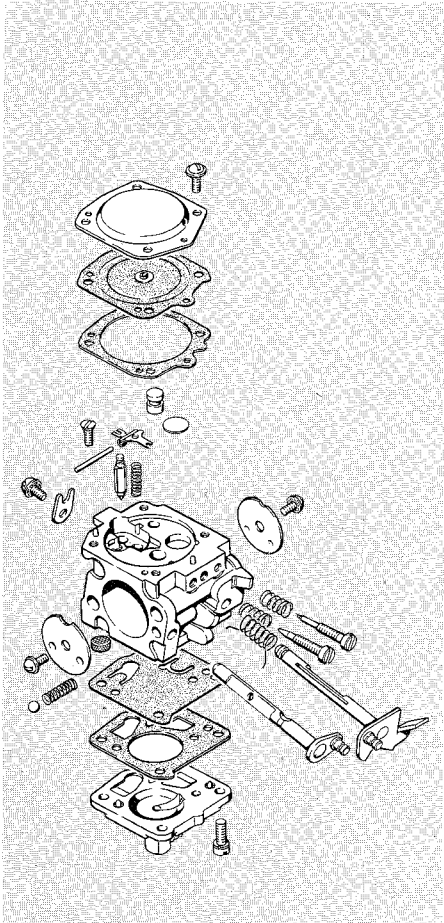
A small ball in the valve jet closes the jet when the engine is idling and when there is not enough air passing through the Venturi to create the necessary vacuum. This prevents at this engine speed air from entering the diaphragm chamber through the valve jet; otherwise the fuel air mixture (gas) would lean out and the engine would falter.

When the vacuum in the Venturi is increased at partial or full load the ball in the valve jets opens the fuel orifice and the necessary amount of fuel required for that respective speed range can flow into the Venturi.

Center: Removing main adjustment screw
Bottom: Knocking out valve jet



Carburetor component parts

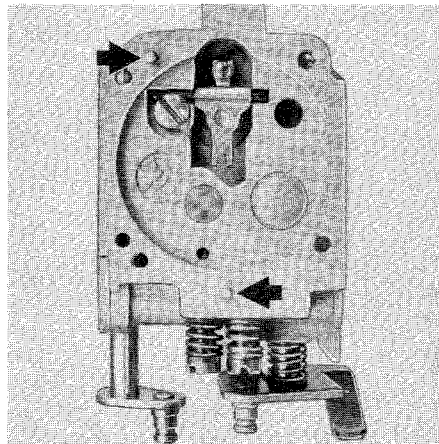


If the valve jet is defective you must blow it out of the carburetor body in the direction of the Venturi. To do so remove main adjustment screw.

To check and clean the other fuel ports remove the plug and install a new one afterwards.

When reassembling you must keep in mind that the inlet control lever

Guide pins at carburetor body

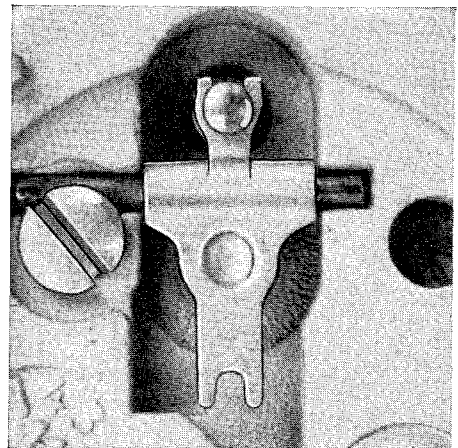


is force controlled by the metering diaphragm. Inlet needle and metering diaphragm must be hooked into the respective dove-tailed guides at the inlet control lever. Then install gasket. Gasket and metering diaphragm have to be placed accurately onto the 2 guide pins. Then fasten cover plate with the round-headed screws.

All fuel channels and ports of the carburetor must be free of deposits. When carburetor is dismantled they must be checked on free passage and cleaned if necessary.

Moreover, the carburetor adjustment screws must be checked on proper condition. It is important that the tapered ends are not bent or damaged. Install new parts whenever a part is defective or does not function properly.

Installed inlet control lever



When reassembling the carburetor check to be sure that inlet needle is correctly linked to the guide of the inlet control lever. The dovetailed end of the inlet control lever should not be bent. Install inlet control lever so that the longer end of the lever is flush with floor of diaphragm chamber.

Carburetor Adjustment

Hints for readjusting the Carburetor

Top: 1 Low speed adjustment screw
 2 High speed adjustment screw
 3 Idle speed regulating screw
 Center: Idle speed regulating screw
 Bottom: Idle speed adjustment screw: long
 High speed adjustment screw: short

The factory setting of the carburetor gives best performance and economic fuel consumption at the local atmospheric condition. Working up in the mountains or near sea level necessitates a readjustment of the carburetor which has to be made at the adjustment screw and the idle speed regulating screw.

You get a richer fuel-air mixture by turning out the adjustment screws and a leaner mixture by turning them in.

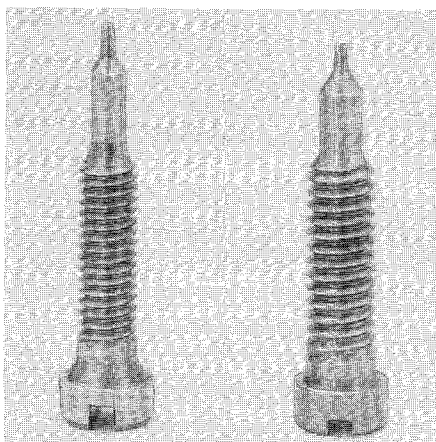
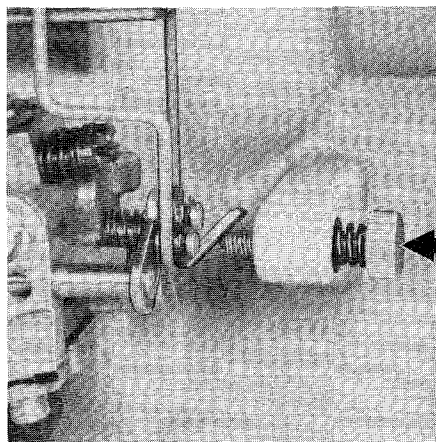
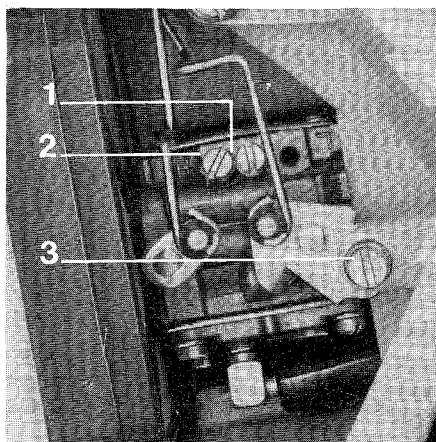
The normal setting of the two carburetor adjustment screws is as follows:

High speed adjustment screw H
 (short): $1\frac{1}{8}$ turns open

Low speed adjustment screw L
 (long): 1 turn open

These specifications are based on the medium force fit of the adjustment screws.

Turn both adjustment screws gently in until both are seated. Turning the idle speed regulating screw clockwise increases the idling speed and turning it counter clockwise lowers the idling speed.



Engine stops when idling:

With running engine turn idle speed regulating screw clockwise (chain should not move).

Chain moves when engine is idling:

Turn idle speed regulating screw counter-clockwise.

Engine speed is erratic when idling:

Slightly adjust idle adjustment screw.

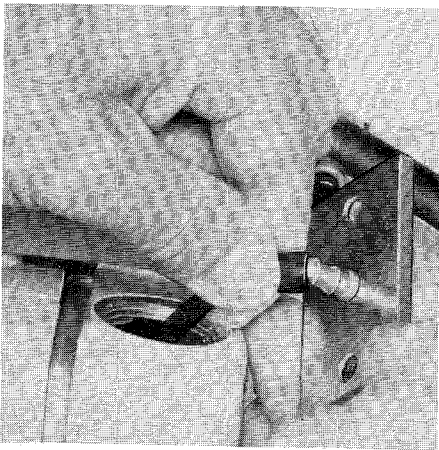
You get a leaner mixture by turning it clockwise and a richer mixture by turning it counter-clockwise.

Note: Already a fraction of a turn of the adjusting screws is changing the adjustment entirely.

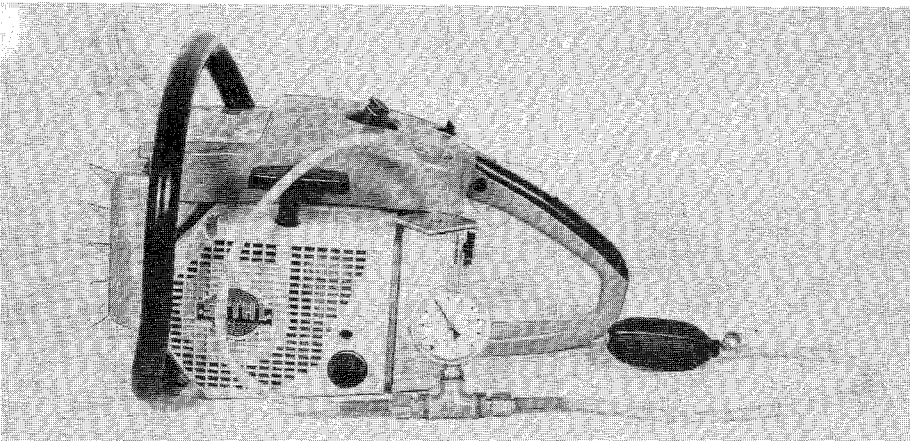
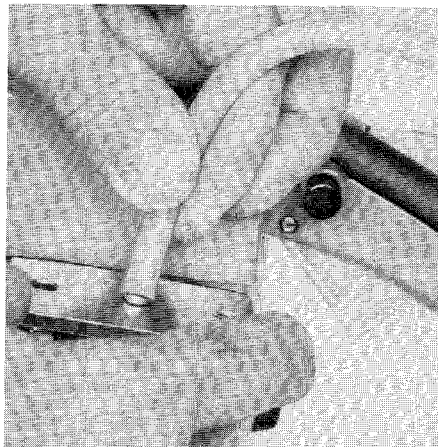
Do not interchange the carburetor adjustment screws. High speed adjustment screw: short, low speed adjustment screw: long.

Pressure Test of Carburetor

Top: Connecting fuel hose to flange
Bottom: Pressure testing the carburetor



Bottom: Connecting the testing device



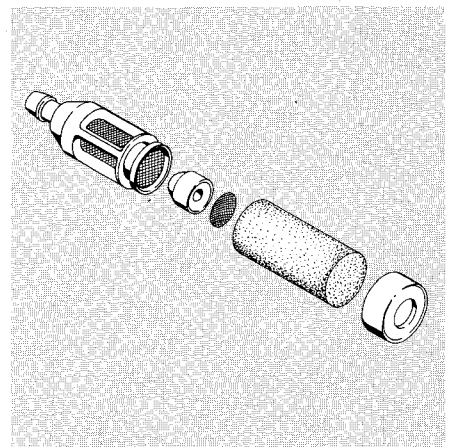
Should the carburetor work irregularly it can easily be tested for tightness with the combined carburetor-crankcase tester.

To do so pull fuel hose as well as pick-up body out of fuel tank with hook 11108938800. Pull off pick-up body and insert nipple of the flange 11068504200 into fuel hose. Slide the end of the hose of the pressure testing device onto the connector

at the flange. Close ventilating screw at the pressurising ball. Now pump air into the carburetor through the pressurising ball until the manometer shows a pressure of $0,4 \text{ kp/cm}^2$ (5.68 lbf./in.^2). If this pressure reading remains constant for a while the carburetor is of proper tightness; if not carburetor has to be repaired. To do so remove carburetor from saw.

Component parts of pick-up body

Component parts of the pick-up body



Tank housing and carburetor box are screwed together by 7 cyl. hd. screws. The fuel flows through the pick-up body and the elbow flange to the carburetor.

The pick-up body should be cleaned at regular intervals. This is even more important when the carburetor is heavily fouled.

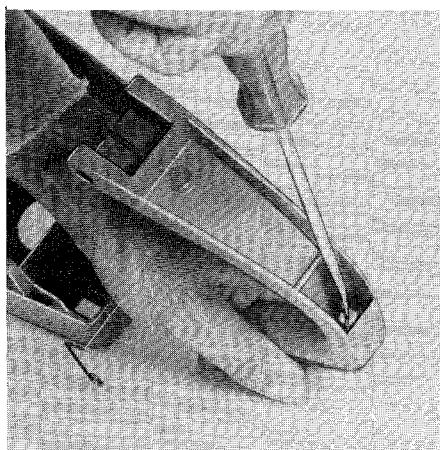
For cleaning take pick-up body out of the tank using the special hook. Then pull off the complete pick-up body from fuel hose.

The individual parts such as pick-up body, insert, strainer, filter and cap have to be cleaned in gasoline and must be reassembled again. If the pick-up body is heavily fouled then the fuel tank has to be cleaned as well. This has to be done by rinsing it with clean gasoline.

THROTTLE CONTROL

Disassembly

Loosening the pistol stock fixation



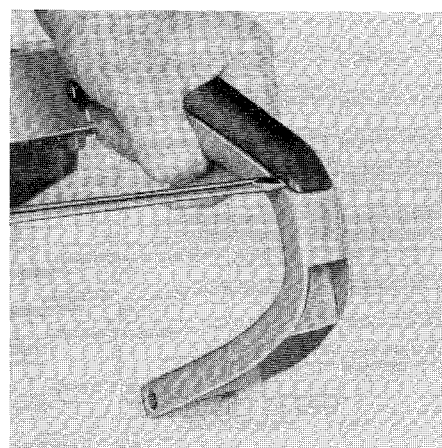
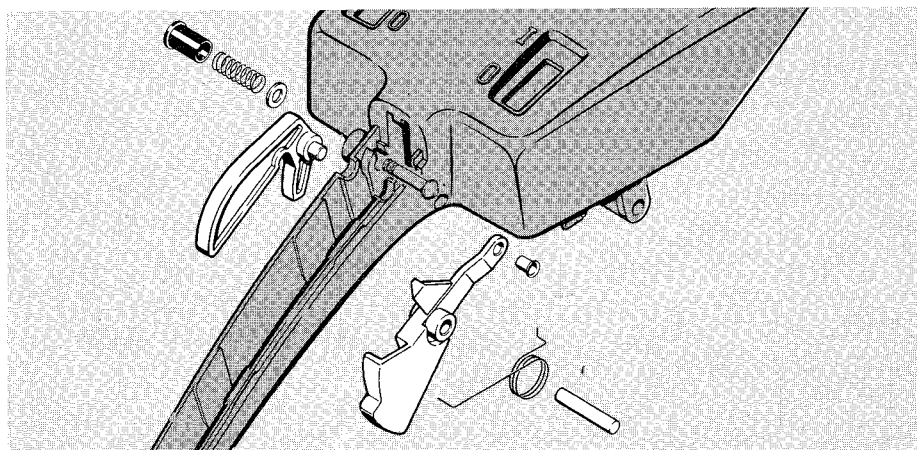
The power chain saws STIHL 045 AV and 045AV electronic are equipped with a throttle trigger inter-lock. This prevents unintentional throttling and therefore is an important safety feature.

To make repairs on the throttle trigger mechanism completely disassemble the handle frame (see page 8). Then screw out cylinder self tapping screw of pistol stock fixation at handle grip end. Now the pistol stock can be pried off with a screwdriver.

Also the trigger (throttle trigger inter-lock) which is fastened by the pistol stock in recess in the handle grip can now be removed as well. The throttle trigger is fastened to the handle bar by a cylindrical pin which can be pressed out with a punch to replace the throttle trigger.

When reassembling take care that all parts are installed in the proper

Top: Component parts of throttle trigger
Bottom: Prying off the pistol stock

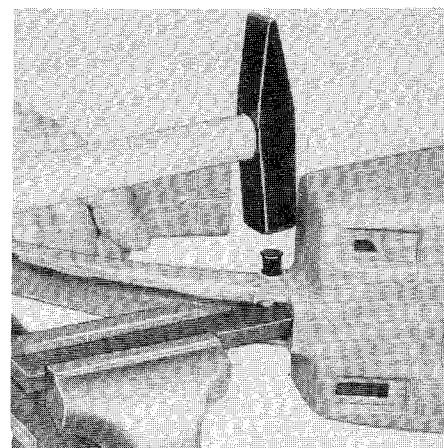


sequence, especially for the leg spring position. First mount the throttle lever with the matching leg spring. Then mount the trigger with pistol stock.

If the half throttle lock button has to be repaired always a new part has to be riveted into place.

Before screwing on the handle frame again hook the throttle rod to the throttle trigger. Reverse dis-

Riveting the half throttle lock button

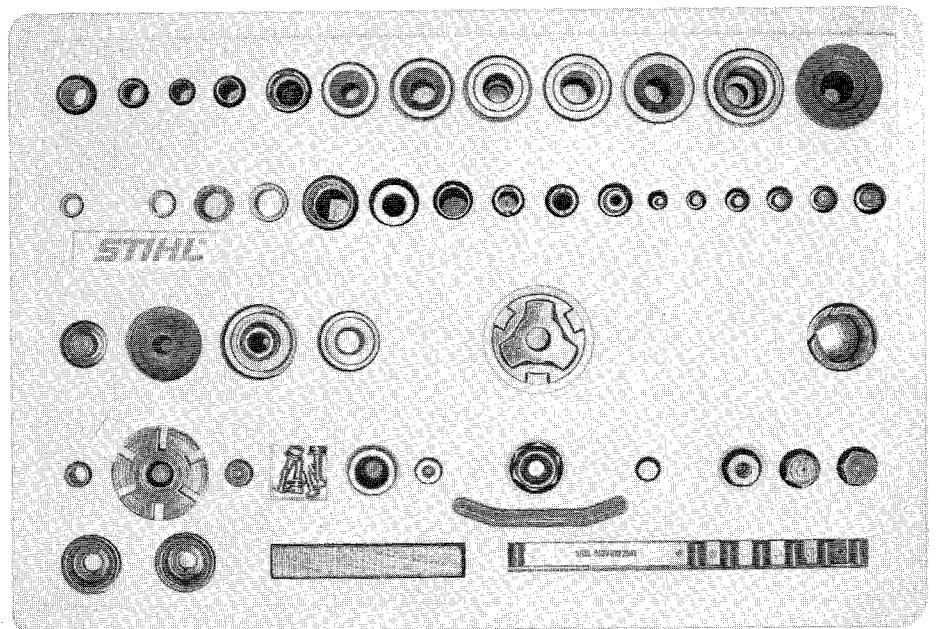


assembly sequence to install the remaining parts.

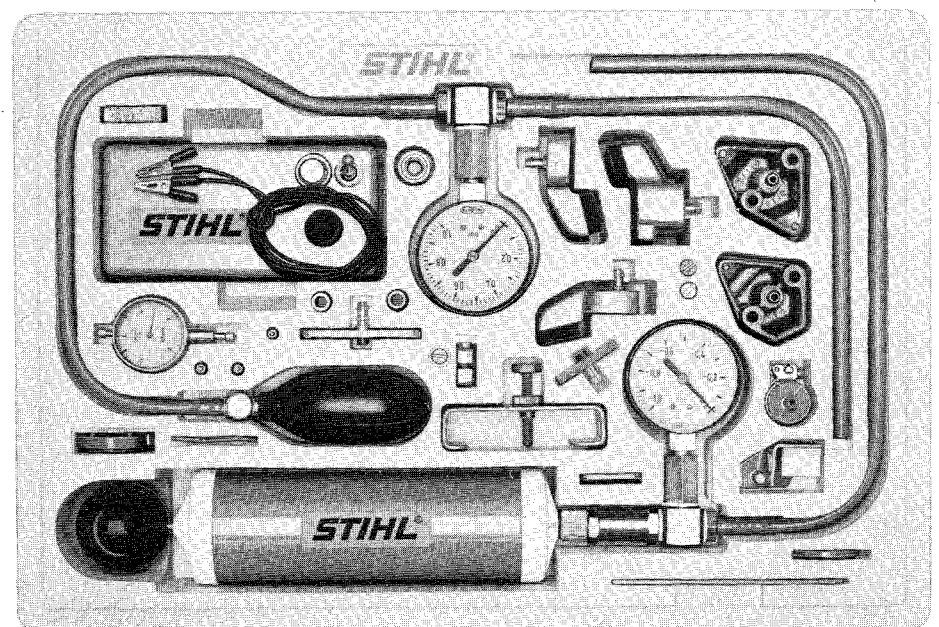
**Special Tools for STIHL Power
Chain Saws 045**

External type pliers for retaining ring A 19	0811 611 8300
External type pliers for retaining ring A 10	0811 611 8200
Internal type pliers for retaining ring C 19	0811 641 8300
Crankshaft locking screw	1107 191 1200
Mounting bolt for piston	1111 893 4700
Clamping strap	0000 893 2600
Wooden support for mounting cylinder	1108 893 4800
Ignition timing device with dial gauge	1106 890 8700
Strob — light	5910 850 4705
Pocket ohmmeter	5910 850 4800
Revolution counter	5910 850 1001
Ignition timing device with battery	0000 890 8905
Flywheel puller	* 1107 890 4500
Pressing sleeve for condenser	1110 893 2400
Clutch wrench	1115 893 1300
Torque wrench for crankshaft nuts	5910 890 0310
Universal puller for sealing rings	0000 890 4400
Installation tool for Gripp thread insert	5910 850 5210
Installation tool for helicoil insert	5910 850 5200
Carburetor and crankshaft pressure testing device	1106 850 2900
Flange	1113 855 4205
Flange	1113 850 4200
Low pressure testing device for crankcase	0000 890 3500
Puller for general repair works	1106 890 4510
Mounting tool for rope bushing	0000 890 2201
Mounting tool for rope bushing	0000 890 2200
Adjusting adapter for flashing	0000 850 4000
Groove gauge for guide bar 1,6 mm (0.063")	1106 893 9000
Groove opener for guide bars 1,6 mm (0.063")	1106 893 9200

Special tool kit
0000 890 1705



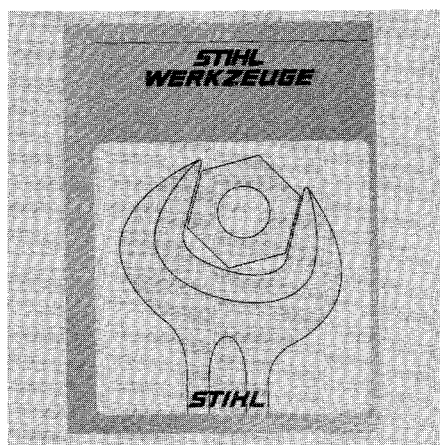
Testing tool kit
0000 890 1710



MANUAL FOR SPECIAL TOOLS

In addition to the special tools illustrated and mentioned (with part number) in this workshop manual other special tools are available.

In our manual for special tools all available special tools are illustrated and listed with part number — subdivided into groups for different chain saw models and another group for all chain saw models.



This manual for special tools is available in different languages under the following specification numbers:

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