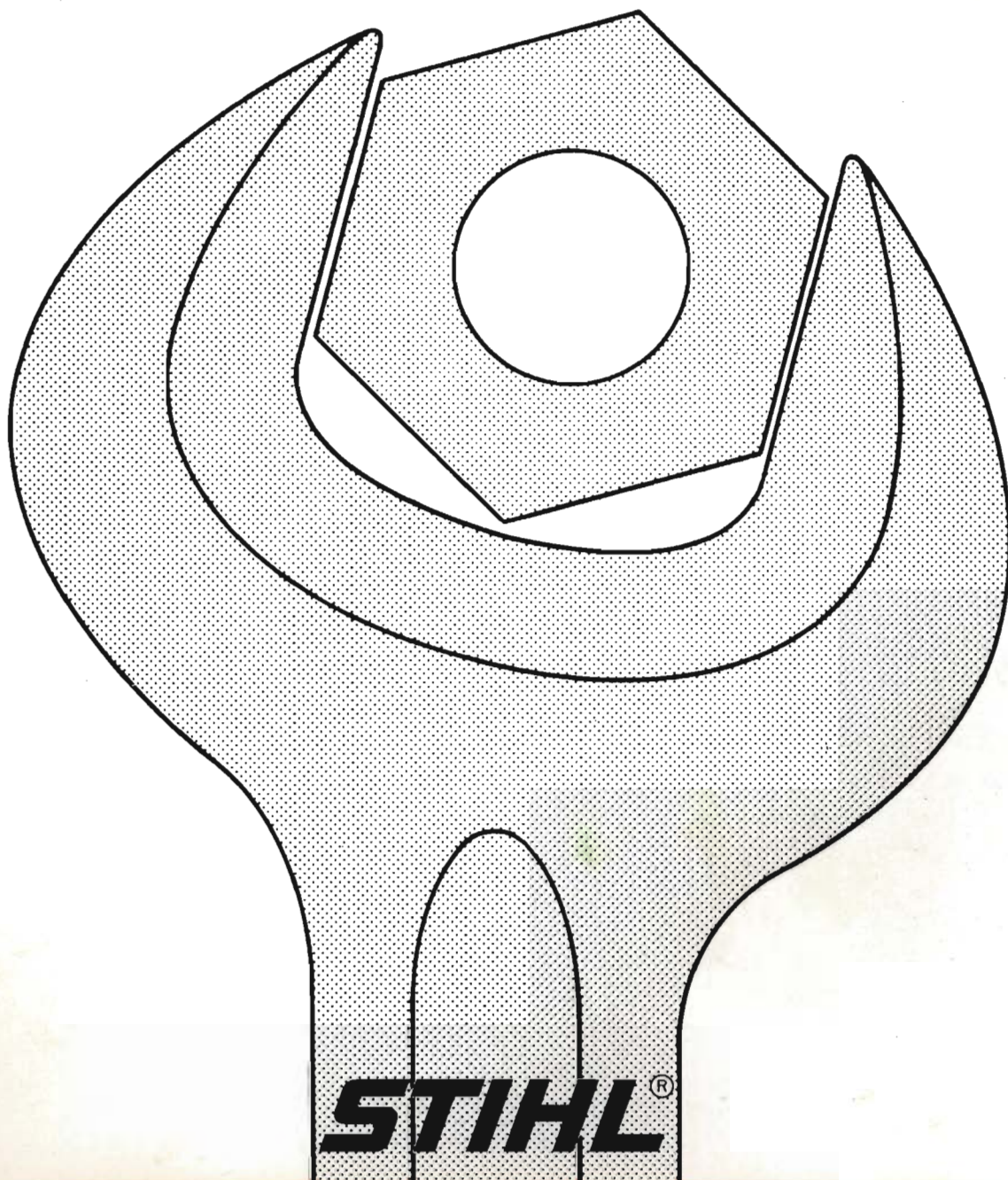


***STIHL 070, 090***



# **Power Chain Saw**

## **Stihl 070, 070 AV, 090, 090 AV, 090 G**

### **Models 1106, 1109**

# **Chain Saw Service Manual**

This Chain Saw Service Manual relates to our models Stihl 070, 070 AV, 090, 090 AV, 090 G beginning with machine number 1 163 000 (070 + 070 AV + 090 + 090 AV) and machine number 1 302 500 (090 G), April 1969. Please refer to our periodically turned out Technical Informations for repairing power saws of same model but of older design and lower machine numbers than mentioned above and for technical modifications made after this manual was printed.

This Guide Book should be used only for the instruction of our dealers and authorized service shops. Handing over or lending this manual to other persons is prohibited.

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**STIHL®**

Andreas Stihl  
Postfach 1771  
D-7050 Waiblingen

## Specifications

### Engine

STIHL single cylinder, two-stroke engine with specially impregnated cylinder bore	
Displacement:	106 cm <sup>3</sup> (6.47 cu. in) (070, 070 AV, 090 G) 137 cm <sup>3</sup> (8.36 cu. in) (090, 090 AV)
Bore:	58 mm (2.28 in) (070, 070 AV, 090 G) 66 mm (2.60 in) (090, 090, AV)
Stroke:	40 mm (1.57 in)
Compression ratio:	9.5:1
Max. torque:	7,7 Nm (5.7 lbf. ft) on 070, 070 AV, 090 G 9,5 Nm (7.0 lbf. ft) on 090, 090 AV at n = 5000 r.p.m.
Max. engine speed:	8000 r.p.m.
Mean idle speed:	2000 r.p.m. (070, 070 AV) 1800 r.p.m. (090, 090 AV, 090 G)
Crankshaft:	Two-part, drop forged
Crankshaft bearings:	2 needle bushes
Crankpin dia.:	19,0 mm (0.75 in)
Big-end bearing:	Needle cage
Piston pin dia.:	15,0 mm (0.59 in)
Small-end bearing:	Needle cage
Starter:	Pawl system (070, 070 AV) Friction shoe system (090, 090 AV, 090 G) both with automatic starter rope rewind mechanism
Starter rope:	4,5 mm (0.18 in) dia., 1000 mm (40 in) long
Clutch:	Centrifugal clutch with lining 78 mm (3.1 in) dia. (070, 070 AV) 96 mm (3.8 in) dia. (090, 090 AV, 090 G)
Engagement speed:	approx. 2600 r.p.m. (070, 070 AV) approx. 2500 r.p.m. (090, 090 AV, 090 G)
Leakage testing crankcase with overpressure:	0,5 bar (7.1 lbf/in <sup>2</sup> )
with vacuum:	0,5 bar (7.1 lbf/in <sup>2</sup> )

### Fuel System

Carburetor:	All-position diaphragm carburetor with integral fuel pump
Adjustment	
High-speed adjustment screw H:	Short with knurled head, open 1 turn
Low-speed adjustment screw L:	Long, open 1 turn (basic setting, starting with screws hard against their seats)



Leakage testing carburetor with overpressure:	0,4 bar (5.7 lbf/in <sup>2</sup> )
Fuel capacity:	0,82 l (1.73 pt)
Fuel mixture:	Mix ratio 1:40 with STIHL engine oil; 1:25 for other branded two-cycle engine oils
Air filter:	Large area flocked wire mesh filter

## Ignition System

Type:	Breaker-controlled magneto ignition system
Magneto edge gap:	7 . . . 11 mm (0.26 . . . 0.43 in)
Air gap:	0,2 . . . 0,3 mm (0.008 . . . 0.012 in)
Ignition timing:	2,8 . . . 3,2 mm (0.11 . . . 0.126 in) before T.D.C.
Spark advance:	27° . . . 29°
Breaker point gap:	0,35 . . . 0,45 mm (0.014 . . . 0.018 in)
Condenser:	Capacitance: 0,15 . . . 0,19 $\mu$ F
Armature:	Resistance of primary winding: 0,5 . . . 0,6 $\Omega$
Spark plug (suppressed):	Bosch WSR 6 F (earlier designation: WKA 200 TR 6) or Champion RCJ 6 Y Heat range: 175 (070, 070 AV, 090 G) 225 (090, 090 AV) Electrode gap: 0,5 mm (0.02 in) Spark plug thread: M 14×1,25, 9,5 mm (0.37 in) long

## Reduction gear (090 G only)

Type:	Single-speed spur gear box
Reduction:	2:1
Lubrication:	HD SAE 30 engine oil
Oil capacity:	0,15 l (0.32 pt)

## Tightening Torques

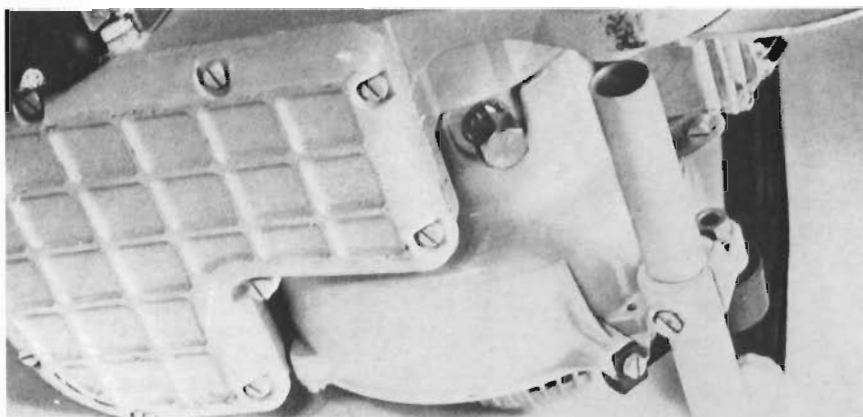
Crankshaft nut (ignition side)	
M 10×1:	45 Nm (33.2 lbf. ft)
Crankshaft nut (clutch side)	
M 10×1 left-hand thread:	44,1 Nm (32.5 lbf. ft)
M 6 nuts:	6,9 Nm (5.1 lbf. ft)
M 8 hex. head screws:	9,8 Nm (7.2 lbf. ft)
M 6 socket-head screws:	9,8 Nm (7.2 lbf. ft)
M 6 cheese-head screws:	6,9 Nm (5.1 lbf. ft)
M 5 socket-head screws:	6,9 Nm (5.1 lbf. ft)
Other M 5 screws:	4,9 Nm (3.6 lbf. ft)
M 4 screws:	2,5 Nm (1.8 lbf. ft)
Spark plug:	24,5 Nm (18.1 lbf. ft)

## Cutting Attachment

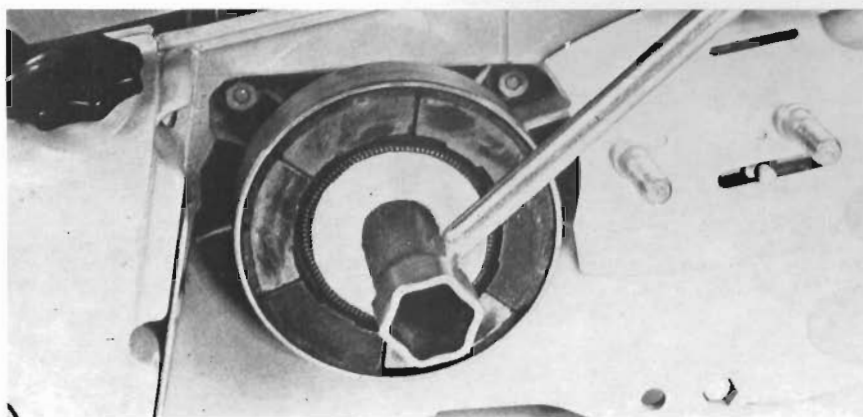
Guide bars:	STIHL Duromatic with stellite tipped nose; STIHL Rollomatic with sprocket nose. Both types with corrosion-resistant finish and induction hardened track
Bar lengths:	Duromatic 53, 63, 75, 80, 90, 105, 120 and 150 cm (21, 25, 30, 32, 35, 41, 47 and 49 in) Rollomatic 75, 90 and 105 cm (30, 35 and 41 in) for 0.404" (10.26 mm) pitch
Chain:	0.404" (10.26 mm) pitch for 070, 070 AV and 090 AV 1/2" (12.7 mm) pitch for 090 with wrap-around handle and 090 G
Chain sprocket:	7-tooth for 0.404" (10.26 mm) pitch 6-tooth for 1/2" (12.7 mm) pitch
Chain speed:	16.7 m/s (54.8 ft/sec) with 0.404" (10.26 mm) chain at 7000 r.p.m. 17.8 m/s (58.4 ft/sec) with 1/2" (12.7 mm) chain at 7000 r.p.m. (070/090) 8.9 m/s (29.2 ft/sec) with 1/2" (12.7 mm) chain at 7000 r.p.m. (090 G)
Chain lubrication:	Speed controlled oil pump, operative only when chain is running Integral hand pump for additional chain lubrication. Supplementary oil feed control by means of adjusting screw
Oil tank capacity:	0.53 l (1.12 pt)

## Weights

Dry weight without bar and chain	
070:	10.7 kg (23.6 lb)
070 AV:	11.8 kg (26.0 lb)
090:	11.5 kg (25.4 lb)
090 AV:	12.3 kg (27.1 lb)
090 G:	13.4 kg (29.5 lb)



*Screwing In crank-shaft locking screw*



*Loosening crank-shaft nut*

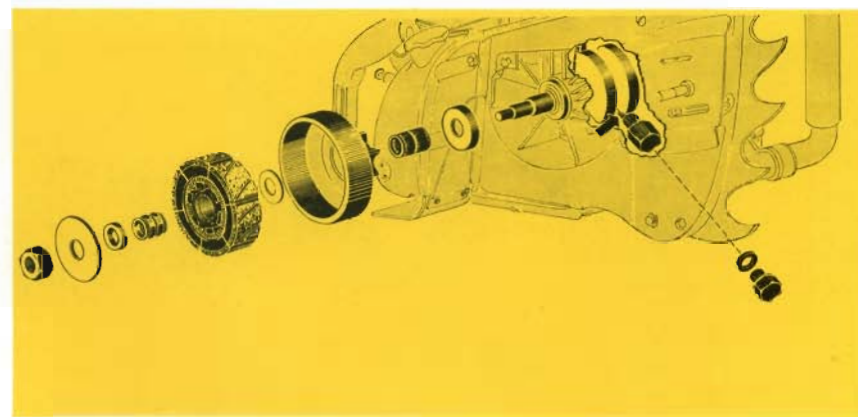
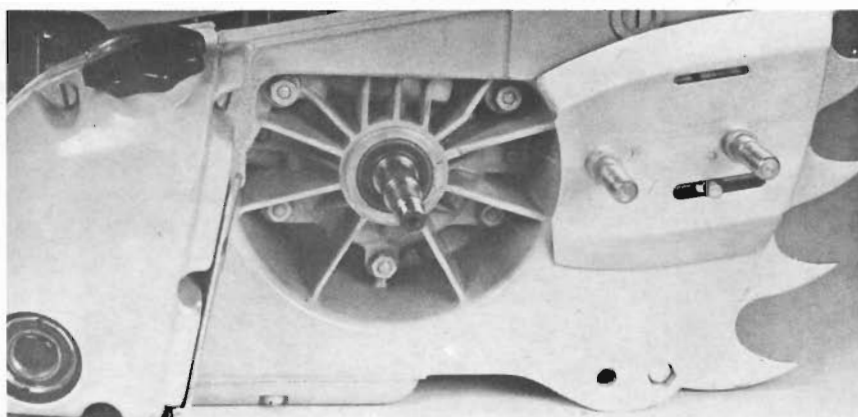
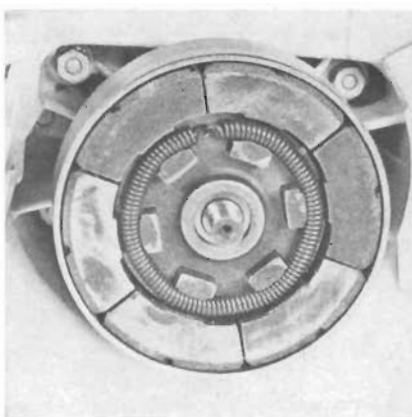
For disassembling the chain drive with clutch remove screw plug in crank-case and screw in crank-shaft locking screw, by hand, which you find in the tools kit. Turn clutch counter-clockwise until web of crank-shaft is stopped by the crank-shaft locking screw. This locks the crank-shaft and the hexagonal crank-shaft nut can now be removed with a 17 SW combination wrench by turning it clockwise. **Note: Left-hand thread!**

Remove hexagonal nut, washer and ring and then chain sprocket, clutch and spider from crank-shaft. A "Spieth" adapter sleeve is inserted into the spider of the clutch which gets deformed when the hexagonal nut is tightened and this adapter sleeve ensures a tight connection between crank-shaft and spider.

The friction linings of the clutch shoes get worn with the time. If the friction linings are worn so that the clutch shoes must be renewed only the whole set of clutch shoes can be replaced. The same applies to the clutch springs; only the whole set of springs can be replaced if a spring is broken or stretched.

When re-assembling the clutch remove all traces of oil or grease from the friction linings — oil or grease on the friction linings would cause slipping of clutch and would reduce the effectiveness of the clutch.

### **Chain Drive with clutch Disassembly and repair**



*Exposed clutch  
End play control of crank-shaft  
Installation of spring  
Disassembly of clutch with chain sprocket*

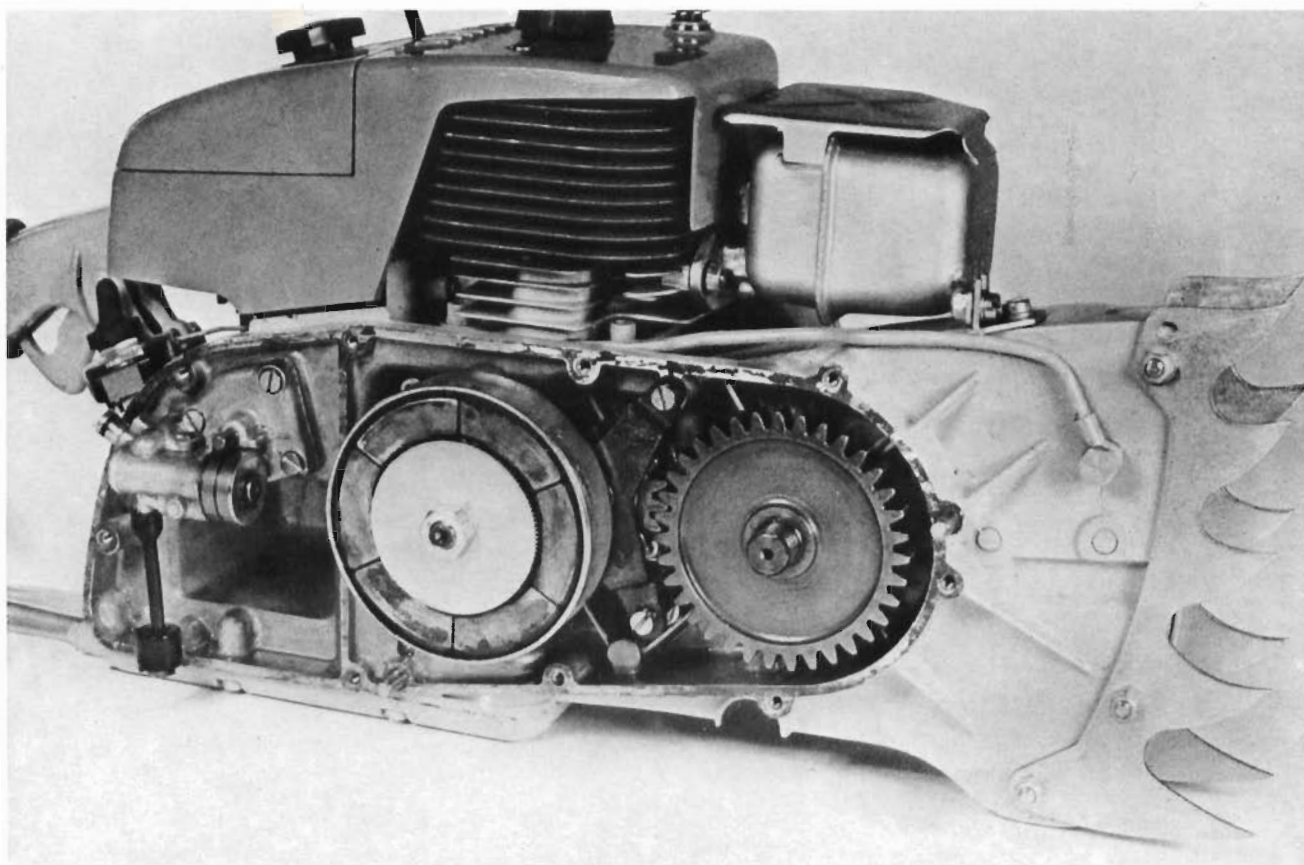
The chain drive sprocket is supported on the crank-shaft by a needle bearing (which should be greased with bearing grease every two months). The chain drive sprocket must be renewed if it has a wear of more than  $.04'' = 1 \text{ mm}$  depth. Moreover, the clutch retainer between chain sprocket and clutch is to be mounted in such a way that the radius, which you find at the centre bore is positioned at the engine side. Mount clutch with absolutely dry "Spieth" adapter sleeve, ring and washer and tighten hexagonal nut with a torque wrench to 32.5 lbf. ft (44,1 Nm).

Contrary to the models 070 and 070 AV, the clutch of the models 090, 090 AV and 090 G is composed of a spider and six clutch shoes. These clutch shoes are held in place by two springs which are positioned laterally in the recesses.

#### Replacing new clutch shoes

If the set of clutch shoes has to be replaced owing to worn friction linings insert the new clutch shoes into the mounting collar on the spider. Insert mounting bolt and press spring over mounting bolt (see illustration) into the recesses of the clutch shoes. This must be done from both sides.





**Transmission 090 G**

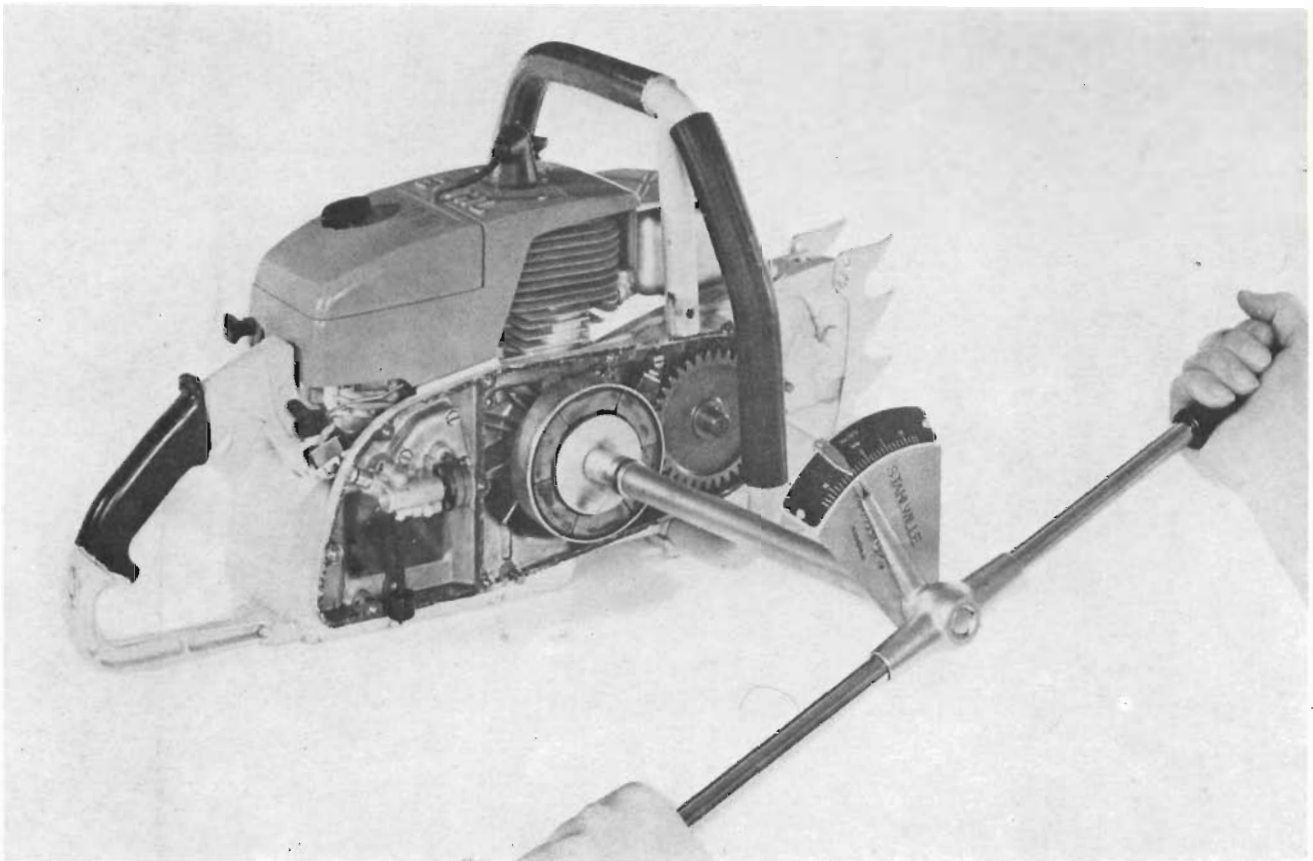
Contrary to the direct drive models 070, 070 AV, 090 and 090 AV the model 090 G (G = Transmission) is equipped with a spur wheel reduction gear which allows the use of guide bars up to 150 cm (60") length. The reduction ratio is about 2 : 1, that means the drive gear has 17 and the driven gear 35 teeth. The chain drive is positioned about in the middle of the machine under the muffler.

The model 090 G is equipped with a chain drive sprocket of  $\frac{1}{2}$ " pitch. Alternatively it can also be equipped with a chain drive sprocket of .404" pitch. It is pressed onto the drive shaft, secured by a fitting key and fastened by a hexagonal nut. After having removed the hexagonal nut the chain drive sprocket can be pulled off the drive shaft with a puller 1109 890 4401. Before reassembling the chain drive sprocket you must heat it to about 90—100° C (194—212° F). In this way it can be easily put on the drive shaft.

To disassemble transmission of the 090 G, drain gear oil from gear case. Disassemble transmission cover by removing the 11 cylindrical screws and the hex.-head screws at the wrap-around handle. For removing the transmission cover from the two adjusting pins the cover is provided with three lugs. Remove screw plug from crank-case and screw in crank-shaft locking screw by hand.

#### **Disassembly of Transmission**





*Tightening crank-shaft nut with torque wrench*

Lever off cap on clutch drum with a screwdriver. This cap protects the clutch against lubricating oil. Loosen hexagonal crank-shaft nut with 17 SW combination wrench by turning it clockwise.

**Note: Left-hand thread!** Then remove washer and ring. Now pull off clutch drum with drive sprocket and clutch with spider from crank-shaft.

Remove bracket over the small spur gear by loosening the two cylindrical screws and remove spur wheel from crank-shaft.

To loosen the hexagonal nut at chain sprocket hold sprocket with a pipe wrench. Then remove washer under sprocket and pull chain sprocket off shaft with puller 1109 890 4401.

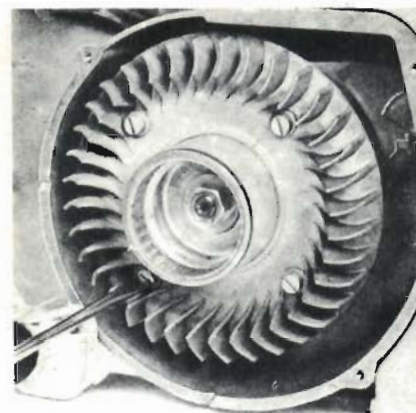
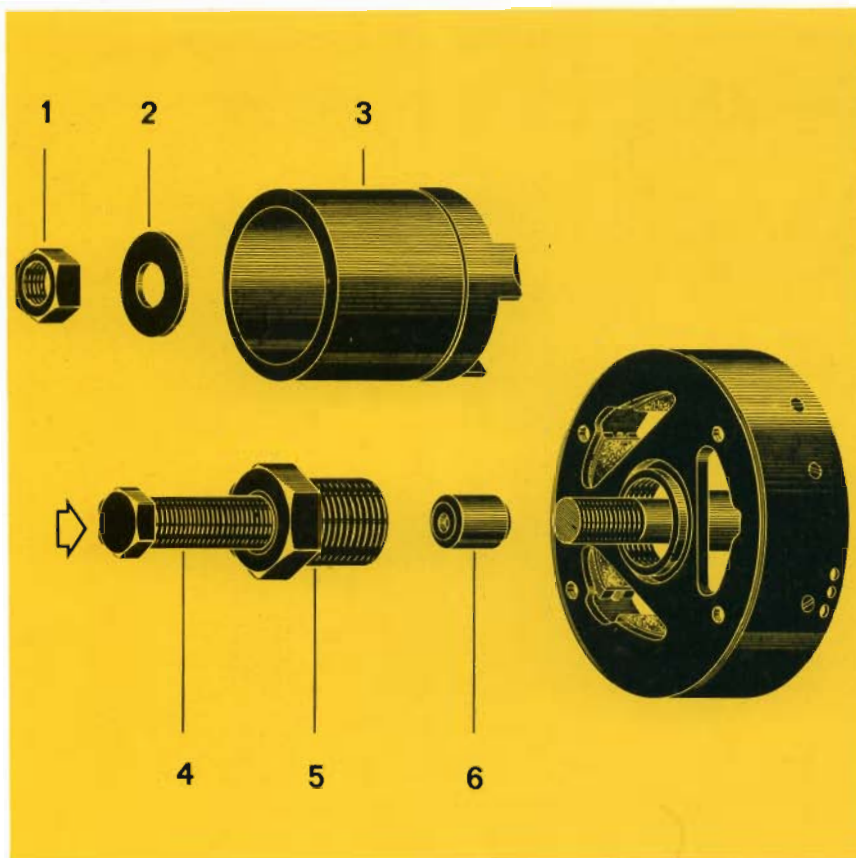
Now remove large spur gear with shaft from grooved bearing. Pull spur gear from shaft with a double-claw puller.

Before reassembling the transmission check the oil seal, the grooved bearing in the crank-case, the needle bearing in the gear case cover, the needle bearing of the small spur gear and the needle bearing of the drive gear.

The spur gears can be replaced individually.

## Lubrication

The transmission has an oil-bath lubrication. The gear oil is SAE 30 oil. The oil quantity amounts to 150 ccm (9.15 cu. inches). Refill oil through oil filler hole and check oil level at oil filler hole. The oil level is correct when the oil reaches the bottom edge of the oil filler hole with horizontally positioned engine.



The ignition spark is produced by a Bosch fly-wheel magneto which is positioned under the rewind starter or under the fan wheel.

#### Ignition system

Unscrew the four AM 5 cylindrical screws at the fan cover with rewind starter. Disassemble fan cover. Remove fan wheel which is fastened by four screws. Now lock crank-shaft by removing the screw plug and screwing crank-shaft locking nut into the screw plug hole. The crank-shaft locking screw is included in the tools kit. Then loosen hexagonal crank-shaft nut using a 17 SW combination wrench **by turning the nut counterclockwise**. Remove starter cup. Screw fly-wheel puller with pressure piece onto thread of fly-wheel until snug and turn fly-wheel clockwise until the web of the crank-shaft bottoms on the crank-shaft locking screw. Screw in pressure piece of fly-wheel puller to loosen the fly-wheel from crank-shaft taper and lift it off the crank-shaft. Now the armature plate is accessible. The point set and the condenser are positioned under the dust cap on the armature plate.

#### Exposure and Disassembly of Armature Plate

##### Illustrations:

##### Exploded view:

Removing starter cup and inserting fly-wheel puller

1. Hexagonal nut

2. Washer

3. Starter cup

4. Hex.-head screw

5. Puller sleeve

6. Thrust bolt

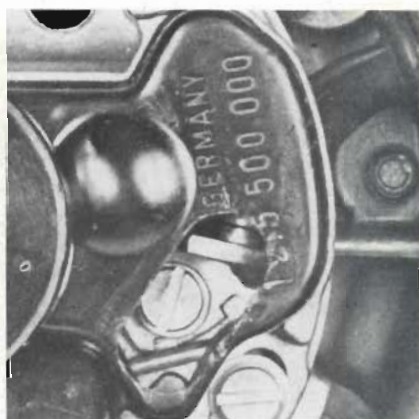
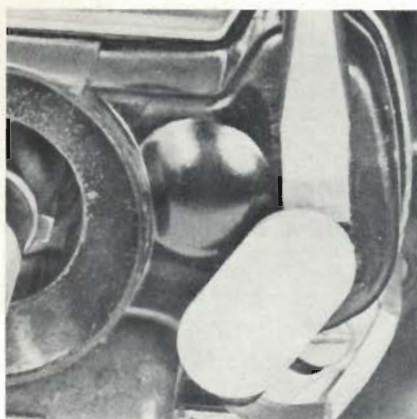
Disassembly of fan wheel

Removing fly-wheel

Remove dust cap. Take out screw which holds the breaker point base to the armature plate and remove retaining ring from breaker arm shaft. Then loosen the screw with nut connecting the ground

#### Replacing Point Set





Removing rubber cap from grommet  
Breaker points exposed for adjustment  
Exposed ignition system  
Torque wrench  
Tightening hexagonal nut with  
torque wrench

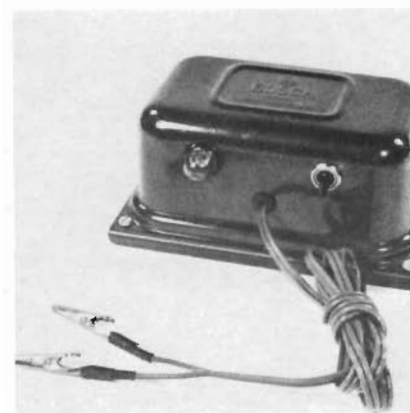
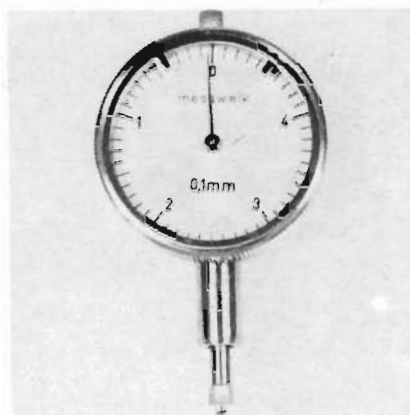
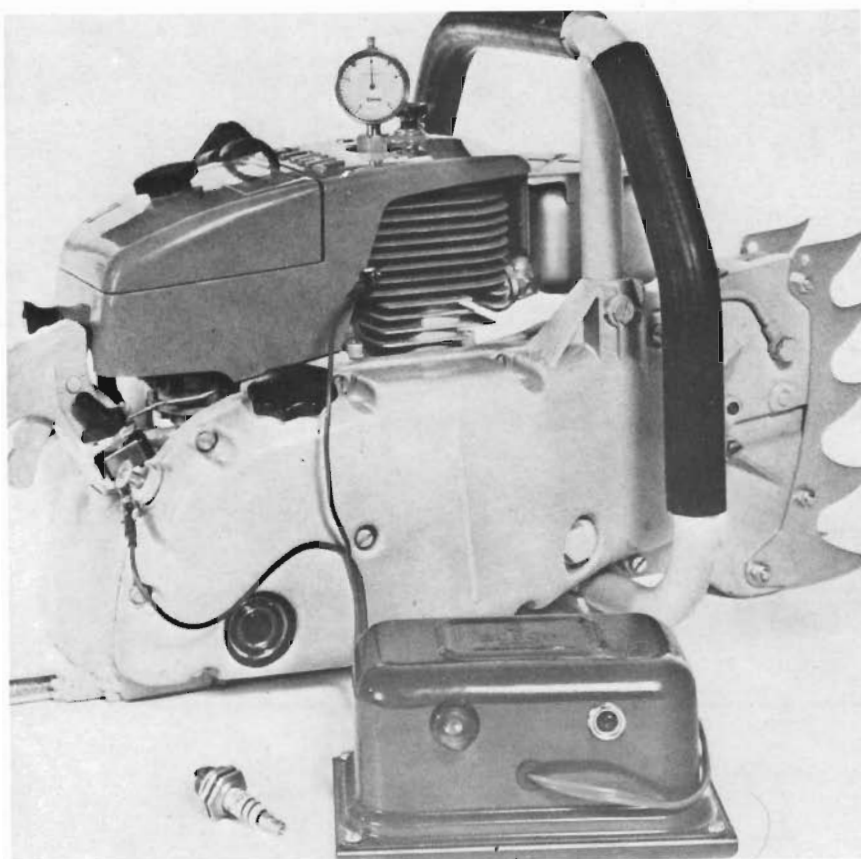
### Checking and Re-adjusting Ignition Timing

lead and the lead to the ignition coil as well as the spring of the breaker arm. Now remove the point set and replace the whole set.

For this purpose reassemble the dust cap and place fly-wheel, starter cup and washer on crank-shaft. Make sure Woodruff key is correctly positioned in the keyway of the crank-shaft and the fly-wheel. The Woodruff key should be absolutely grease free. Tighten hexagonal nut. The correct torque of the crank-shaft nut is 33.2 lbf. ft (45 Nm) and should be checked with a torque wrench. Remove crank-shaft locking screw from crank-case and screw screw plug into the screw plug hole. Turn fly-wheel and check to be sure that there is no metal to metal contact between magneto and fly-wheel. Now remove rubber cap from dust cap and adjust breaker point gap to 0.4 mm (.016"). The adjustment of the breaker point gap should be made in the following way: Screw timing dial gauge into spark plug hole and turn fly-wheel in direction of engine rotation until piston is at top dead centre. Now adjust timing dial gauge to "0" position. In this position the breaker point gap should be 0.4 mm (.016"). Check to be sure that the breaker points face each other correctly and that they lift in parallel position.

Connect one terminal of ignition timing device with the ground lead and the other terminal with the ground. Now lower piston to





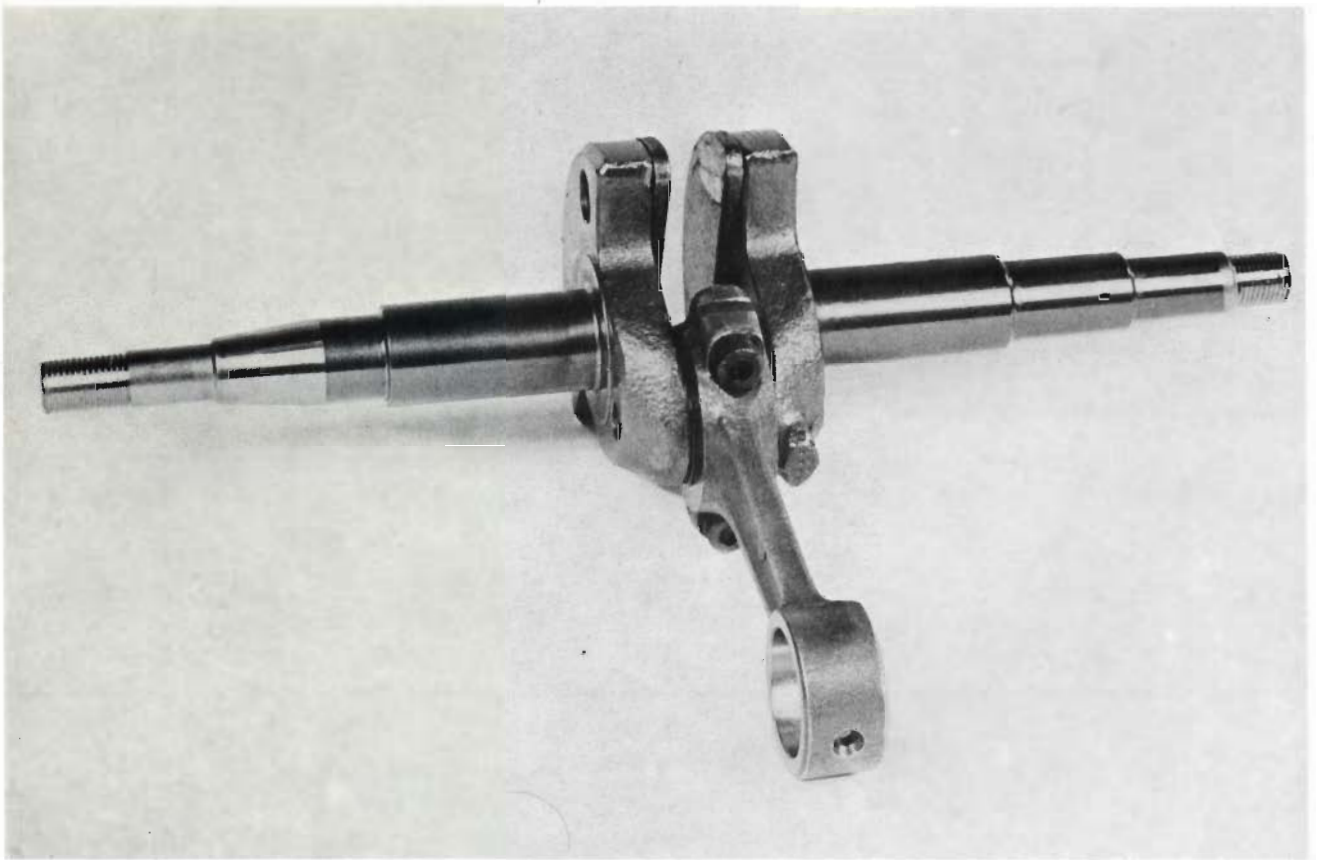
*Connecting ignition dial gauge and  
ignition timing device  
Ignition dial gauge  
Ignition timing device*

3.0 mm (0.12") before top dead centre by turning the fly-wheel in reverse direction of engine rotation (clockwise). Loosen the screws retaining the armature plate through opening in the fly-wheel and turn armature plate counterclockwise if ignition timing is too much advanced, or clockwise if ignition timing is not enough advanced until pilot lamp of ignition timing device will indicate when the breaker points open. Re-tighten the retaining screws of armature plate. Re-check timing to be sure adjustment is correct. When turning the fly-wheel in direction of engine rotation the pilot lamp should light up when piston is at 3.0 mm (0.12") before top dead centre. Use only a correct spark plug (Bosch WSR 6 F) with a correct spark gap.

Frayed or worn insulation of the breaker point base, the breaker points and the ground lead or fouled breaker points may cause short circuits in the primary circuit of the ignition system. Therefore, always inspect the ignition system for such shorts when repairing it. Furthermore, check to be sure that the ground lead does not cause a short circuit where it is connected with the breaker point base.

In case of malfunction of the ignition system also check ignition switch, high tension lead and spark plug terminal.

### **Looking for malfunction**



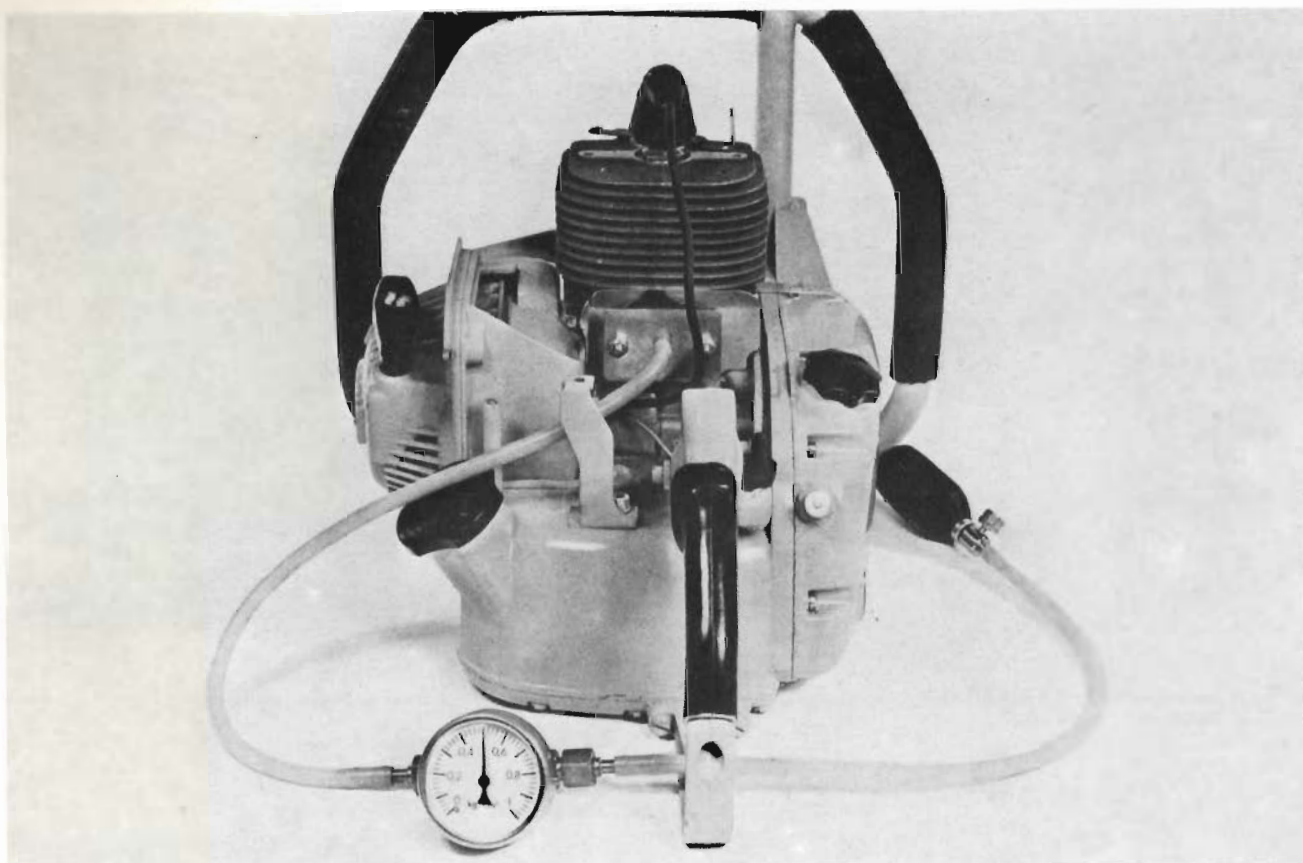
*Crank-shaft*

rollers. The bearing fits at the conrod are classified into two dimension groups:

1. Green dimension group:	Shaft	17, 996 — 18, 000
	Conrod	24, 010 — 24, 014
2. Red dimension group:	Shaft	18, 001 — 18, 005
	Conrod	24, 015 — 24, 019

The split needle cage can be replaced at will. The radial play of the crank-shaft in the needle cage is 0.010—0.018 mm (0.004—0.0072"). If a worn or damaged needle bearing should necessitate the removal of the crank-shaft from the conrod re-use parts only if bearing surfaces at crank pin and at conrod bearing are in perfect condition. If these surfaces are rough, scarred or worn reject the whole crank-shaft. When installing the needle bearing check to be sure that the bearing surfaces of the conrod are dust and grease free and are matching exactly. Tighten the two screws with inner hexagon head uniformly with torque wrench to 1 mkg (7.233 ft. lbs.).

Don't mix-up crank-shaft main bearings. If you have to replace a needle bearing you must also replace the needle cage which is fitted into the crank-case. To remove the needle cage heat crank-



*Pressure test at crank-case*

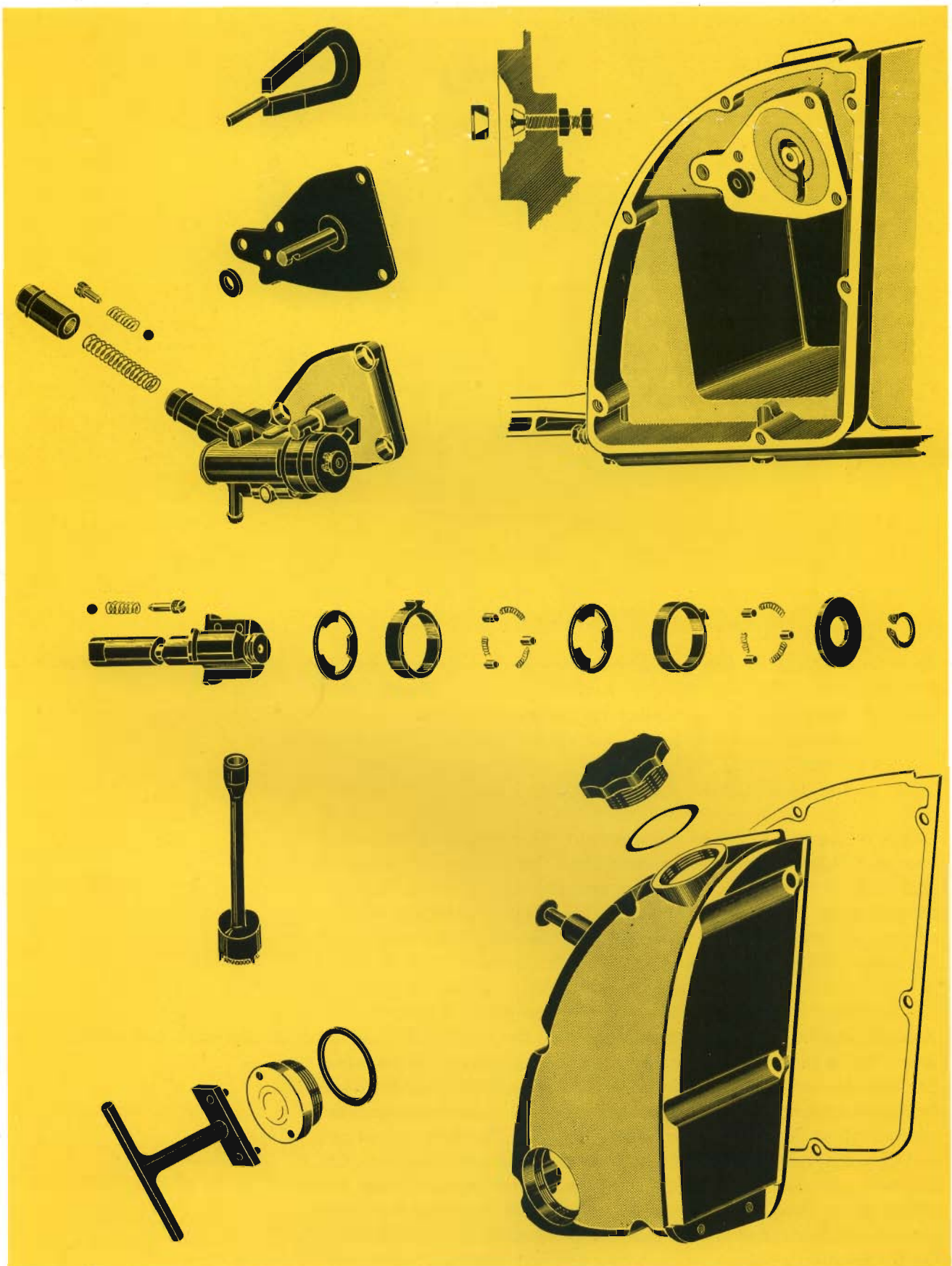
case to 90—100° C (194—212° F). The crank-shaft end play of 0.2—0.4 mm (0.008—0.016") is controlled by two plastic check plates on the crank-shaft. These check plates are available in different thicknesses in order to get the correct end play of 0.2—0.4 mm (0.008 to 0.016").

Check oil seals which are pressed into the crank-case on proper condition. After longer time of operation the sealing lip of the oil seal gets hard and then it does not seal properly anymore. Such an oil seal must be replaced. Press oil seal into crank-case without twisting or deforming the seal. Always use new oil seals when installing a new crank-shaft.

It is possible to check the driving parts of the engine for leakage due to faulty seals or flange gaskets as well as a porous crank-case. For this test you need a carburetor and crank-shaft testing device. Remove carburetor and muffler. Plug exhaust flange and connect pressure test flange with carburetor adapter. Connect open hose end of pressure testing device to nipple at carburetor adapter. For this test you must leave the spark plug in the cylinder. Raise the piston to top dead centre. If the pressure of 0.5 kp/cm<sup>2</sup> (7.1 lbf./in.<sup>2</sup>) remains constant it indicates that the crank-case is not leaking. If the pressure drops you may use oil for finding the leaking spot.

#### **Pressure Test at Crank-case**





Construction of oil pump

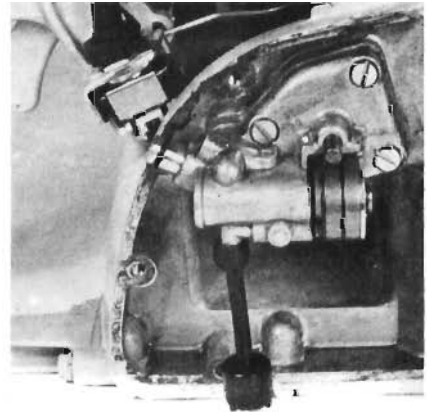
## Oil Pump: Design and Operation

The oil pump is positioned in the oil tank at the power take-off side. The oil tank cover is fastened to the crank-case by six screws and is provided with an oil inspection window. The thrust bolt for the hand operation of the oil pump is positioned in the oil tank cover. The pressure fluctuations in the crank-case are transmitted to a diaphragm which in turn causes the pump plunger to rotate. A guide pin extends into the oblique groove of the pump plunger and causes the pump plunger to go back and forth when the plunger turns.

### Disassembly

Drain oil tank before removing the oil pump. Then loosen the six screws which fasten the oil tank cover to the crank-case, and remove oil tank cover. Now unscrew the three screws connecting the oil pump to the housing and remove oil pump. Check pump rod with diaphragm, rubber cap and washer on proper condition. For replacing the diaphragm remove pin from oil pump housing. Then pull pump plunger out of housing and remove diaphragm with pump rod.

The washer is positioned on the pump rod and the rubber cap is positioned at the hex.-head screw which is screwed into the crank-case. If you replace both diaphragm and pump rod place washer from old pump rod on the new one. Don't install pump rod without washer! Check to be sure that strainer in oil pick-up body is clean.



Oil pump

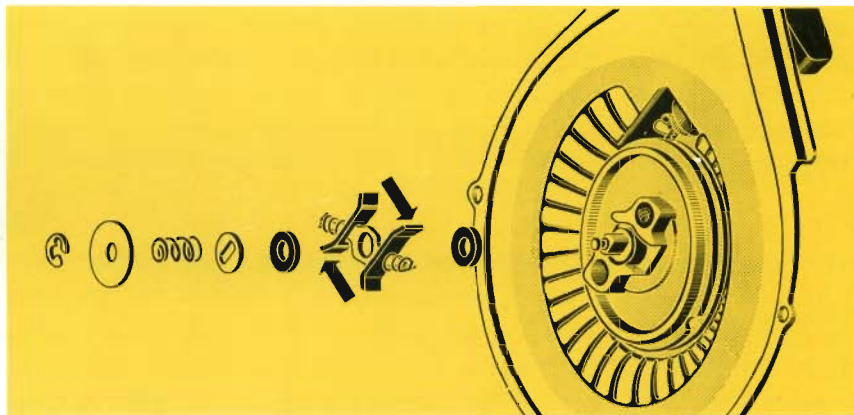
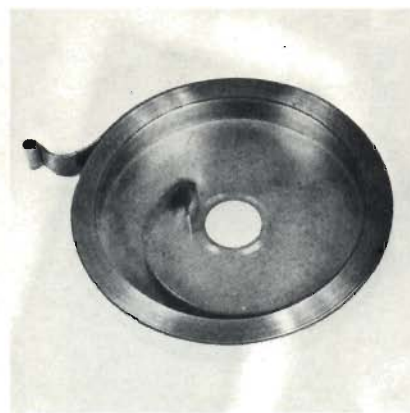
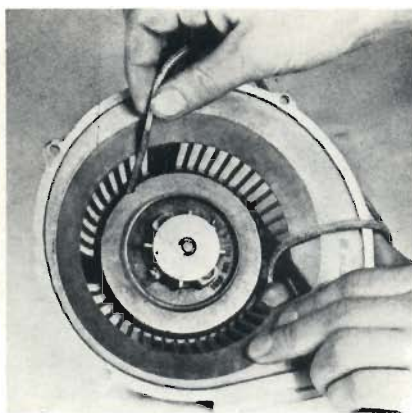
If necessary clean oil pick-up head and oil line in clean gasoline. If oil line is clogged blow line out with compressed air.

If manual oiler doesn't function properly replace 'O' ring. Check oil supply with engine under full load. The oil supply should amount to 15 ccm (0.915 cu. inches) at 5000 r. p. m. Increase oil supply by turning the hex.-head screw counter-clockwise and decrease supply by turning the screw clockwise. Don't force the screw in. Otherwise the stop plate will get loose which would block the pump diaphragm. After some time of operation you may get an erratic oil supply.

In this case disassemble pump plunger and driving assembly. The rollers of the driving assembly may be scratched on the bearing surfaces which causes an erratic oil supply. Smoothen these scratches with an oil stone. Then reassemble driving assembly in reverse sequence.

When reassembling the driving assembly check to be sure that pump rod is correctly connected with the driving assembly. Before tightening oil tank cover make sure that thrust bolt in oil tank cover and the pump plunger of the manual oiler are matching.





### Chain Lubricating Oil

The chain lubricating oil must have a viscosity 49 cSt at  $+50^{\circ}\text{C}$  ( $+122^{\circ}\text{F}$ ) and a solidifying point of about  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ).

Furthermore the oil should contain an anti-throwing agent which prevents the oil from being thrown away too quickly. We recommend to use STIHL chain lubricating oil.

### Rewind Starter

*Illustrations:*

*Friction shoe  
Relieving rope tension  
Rewind spring with housing  
Installation of starter cord  
Exploded view of rewind starter*

For disassembling the rewind starter remove filter cover. Loosen the four AM 5 screws. Relieve tension of rewind spring of exposed rewind starter as follows: pull starter rope out by about 30—40 cm (12—16"), hold rope pulley, place starter rope into recess of pulley, unwind starter rope and then release pulley slowly. In this way pre-tension of rewind spring is relieved. If rewind spring or starter rope is broken the pre-tension is already relieved.

Remove retaining ring of rewind starter holding the check plate so that it cannot jump out and the brake spring cannot get lost.



Remove brake spring and friction shoe with the two fibre washers and the one steel washer. If rewind spring is not broken remove pulley carefully so that spring cannot jump out of housing.

### **Removing the Rewind Spring**

The rewind spring which gets visible after removing the Resitex washer is located in an open spring housing. If spring should have uncoiled from this housing coil it into the housing in clockwise direction, starting with the outer loop and ending with the inner loop. New rewind springs are supplied already coiled into the spring housing. To reassemble the rewind starter place spring housing with coiled-in rewind spring into fan housing with closed side at fan housing. Place Resitex washer and rope pulley on open side of spring housing. Hook outer loop of rewind spring into boss of fan housing. Now insert rope pulley and check to be sure that the open end of the annular groove in the rope rotor engages the rewind spring. Reassemble friction shoe with fibre washer and steel washer and secure brake spring and check plate with brake retainer washer.

To install a new starter rope the rope pulley must be removed from the machine. Insert new cord into pulley and knot one end. Thread other end through hole in fan housing then through handle and secure it with a double knot. The correct length of the cord is 1000 mm (40"). To reassemble the rewind starter slide the pulley into place on shaft so that the inner loop of the rewind spring is hooked into the boss of the rope pulley. Thereby the cord must be unwound.

### **Installation of a new Starter Rope and Tensioning of Rewind Spring**

Then reassemble rewind starter in the following sequence: brake washer, friction shoe, brake washer, washer, friction shoe spring, check plate and brake retainer washer. Now pull loop of cord up between pulley and housing. Insert cord into notch of pulley and pre-tension rewind spring by seven turns (clockwise). Now hold pulley, pull cord out and let pulley turn back slowly, thereby winding the starter rope on to pulley. The spring is now correctly tensioned if pulley can still be turned one turn before reaching maximum spring tension when the cord is pulled out fully. Excessive spring tension will cause breakage of the spring.

When repairing the rewind starter inspect fibre washers. Fouled, dirty or oil saturated fibre washers have a reduced braking action and will cause problems. These washers are acting as brake washers

### **Hints for Repairing the Rewind Starter**

and are therefore subject to wear. For this reason they must be replaced from time to time. The friction shoes are ground at the ends.

That side of the friction shoes which engages the starter cup first when starting, has a ground angle of  $60^{\circ}$ . The opposite side has an angle of  $90^{\circ}$ . The edges of the friction shoes get dull after longer operation and will cause problems. Replace badly worn starter cups.

Check to be sure that ground edges are really sharp in order to increase the service life of the starter cup.

### **AV Handle**

The AV handle (AV = anti-vibration) guarantees a nearly vibration-free working with the saw. Rubber buffers connect the handle frame with the housing. These rubber buffers are located at the supporting fork and at the front side as well as on the fan side of the saw. The rubber buffers should be replaced in the following sequence:

### **Dissambly and Repair**

**At Supporting Fork:** Loosen nut with SW 10 wrench and remove it together with the washer. Then remove bolt. Push rubber handle out of supporting fork in upward direction. Now you can remove the rubber buffer. The reassembly is to be done in reverse sequence.

**At Fan Housing:** First remove pressure piece at tube from clamp by taking the screw and the lock washer out. Then unscrew the two AM 5 screws from fan housing holding the rubber buffer to the housing. Next loosen the hexagonal nut and remove it together with the lock washer. Now replace ring buffer. Reassemble parts in reverse sequence.

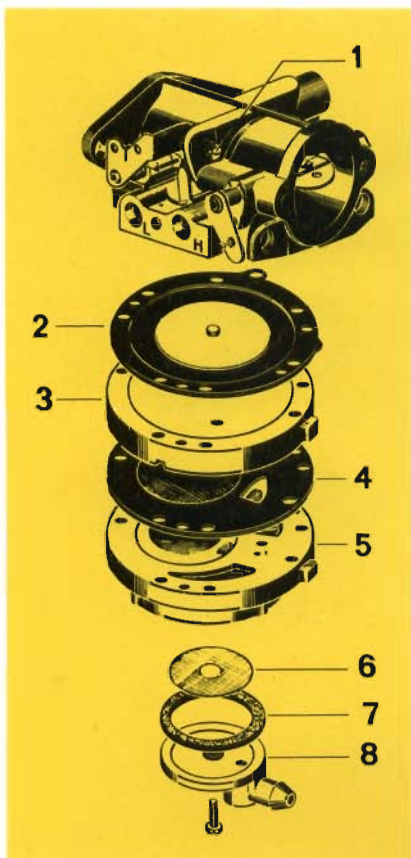


**At the Front Side:** First remove chain sprocket cover for replacing the round buffer at the front side. Then remove hexagonal nut at handle tube end together with lock washer. Unscrew the AM 6 hex.-head screw and remove the clamp with the round buffer. Remove washer between round buffer and handle tube end. As the round buffer is located on a stud remove stud from clamp by turning it counter-clockwise. Replace ring buffer and reassemble parts in reverse sequence.

*Arrangement of annular buffers*

**Note:** When reassembling the AV handle check to be sure that ring buffers have not changed the shape by improper fastening, if necessary re-bend handle tube.





## Carburetor Construction and Operation

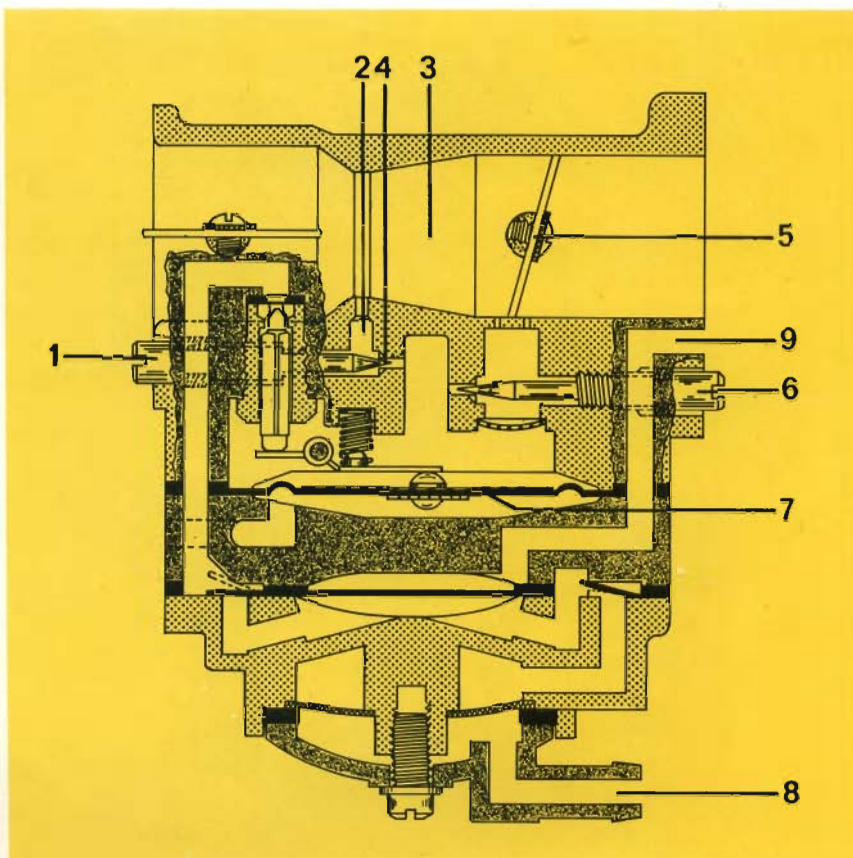
### Illustrations:

#### Individual parts of carburetor:

1. Carburetor body with idle speed regulating screw
2. Metering diaphragm
3. Diaphragm cover
4. Pump diaphragm
5. Fuel pump body
6. Fuel strainer
7. Gasket
8. Fuel strainer cover

#### Schematic view of carburetor:

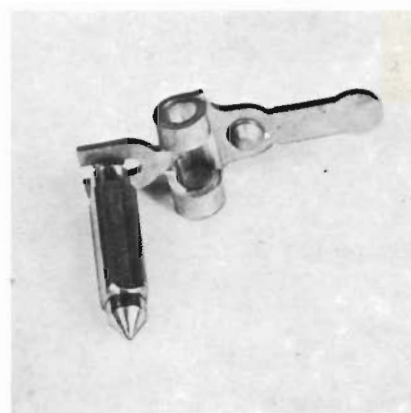
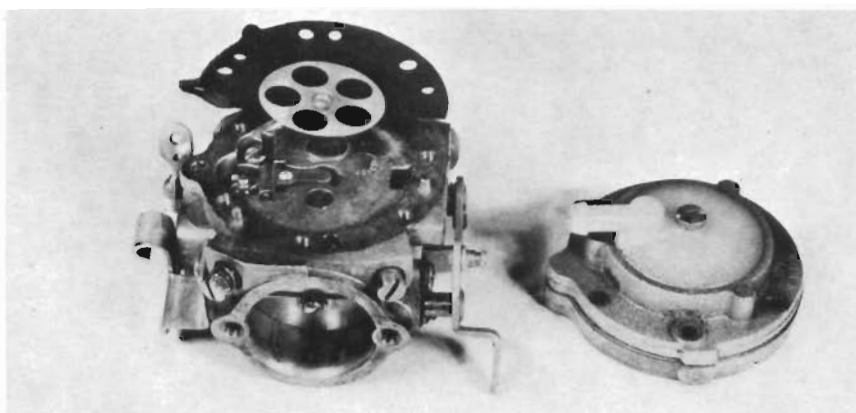
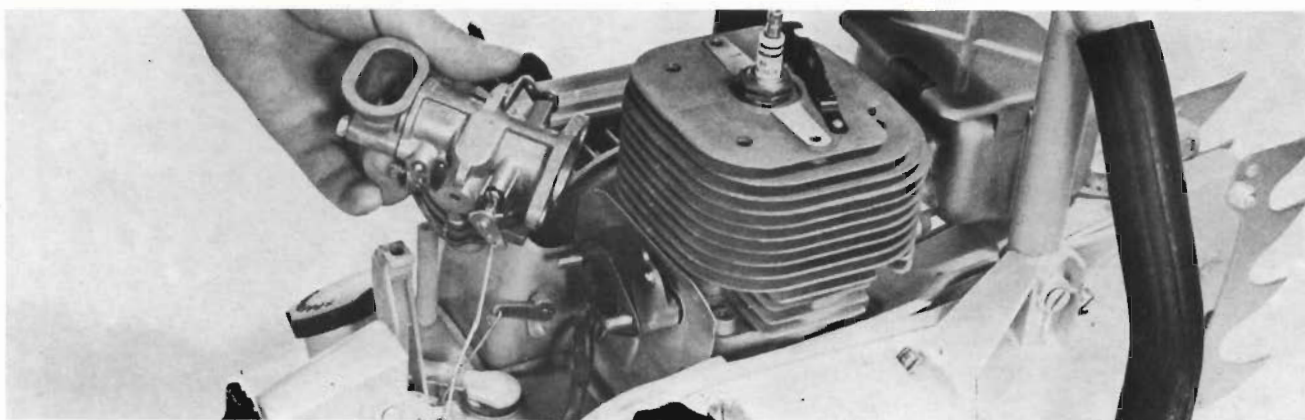
1. Main adjustment screw
2. Main jet
3. Venturi
4. Adjustable supply channel to main jet
5. Throttle shutter
6. Idle adjustment screw
7. Metering diaphragm
8. Fuel inlet
9. Impulse channel



The STIHL power chain saws 070, 070 AV, 090, 090 AV and 090 G are equipped with an HL-Tillotson diaphragm carburetor. The main parts of this carburetor are as follows: carburetor body, diaphragm cover, metering diaphragm and pump diaphragm with gaskets.

Engine operation causes pressures and vacuums at each piston stroke and a diaphragm in the carburetor will pulsate at each turn of the crank-shaft. This pumping diaphragm draws fuel from the fuel pick-up body in the fuel tank through the fuel line into the carburetor. The vacuum created by the airflow in the Venturi causes the metering diaphragm to open the inlet needle valve through the control lever and allows fuel to enter the diaphragm chamber. From there it is drawn into the Venturi, i. e., into the suction stream to the engine. The amount of fuel is controlled by the idle adjustment screw and the main adjustment screw.

To disassemble the carburetor remove cover, air filter and shroud. Three screws, two at the cylinder and one at the support are holding the shroud. Remove retainer washer at lever of choke shaft and unhook governor cable. Unscrew the two hexagonal nuts holding the carburetor to the carburetor adaptor. Remove carburetor. Unhook throttle rod from inclined carburetor and pull fuel line off the outlet fitting at tank. The carburetor adaptor and the cooling plate



with gaskets are located on the two studs. Renew sealing compound if necessary. Cracks in the carburetor adaptor or uneven surfaces at the adaptor will allow air to enter the carburetor and will cause engine problems.

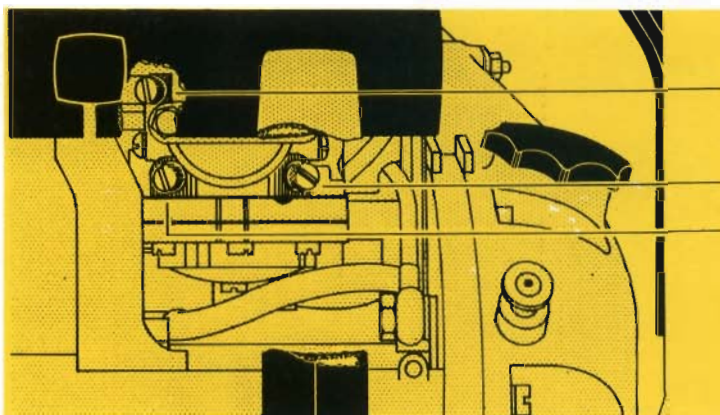
*Unhooking throttle rod from carburetor  
Carburetor with built-in control lever  
Inlet needle with inlet control lever*

When reassembling carburetor slide the fuel line onto the outlet fitting at tank and hook throttle rod into carburetor. Place high tension lead under carburetor adaptor before placing carburetor on studs. When placing the carburetor onto the studs check to be sure that the plastic bushings are inserted in the holes of the carburetor adaptor. Don't forget fibre washers and cup springs when tightening the nuts. Then hook governor cable into choke-shaft and secure it. When mounting the shroud the washer must be in its annular groove and the choke shutter slide in "1" position. Clean the air filter with compressed air blowing from inside out. Otherwise the fine dirt will be forced into the filtering material.

For cleaning the fuel strainer in the carburetor remove the plastic fuel strainer cover with gaskets which is fastened to the fuel pump body. Remove fuel strainer and clean it with gasoline. The pump and control diaphragm have to be checked and replaced from time to

#### **Maintenance of Carburetor**

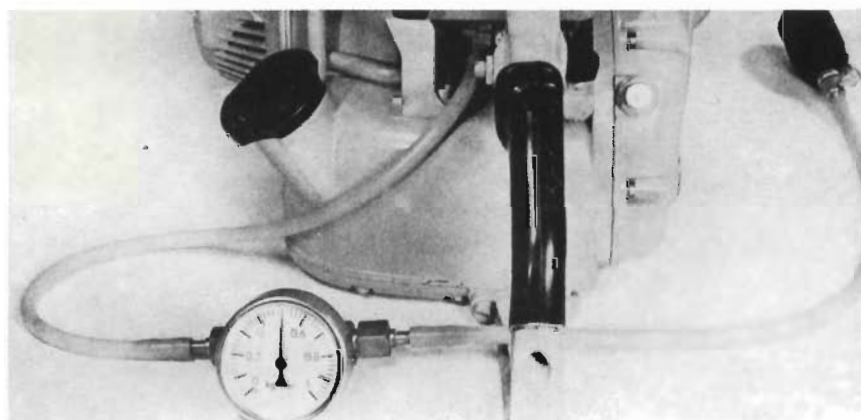




*Idle speed regulating screw*

*Main adjustment screw H*

*Idle adjustment screw L*

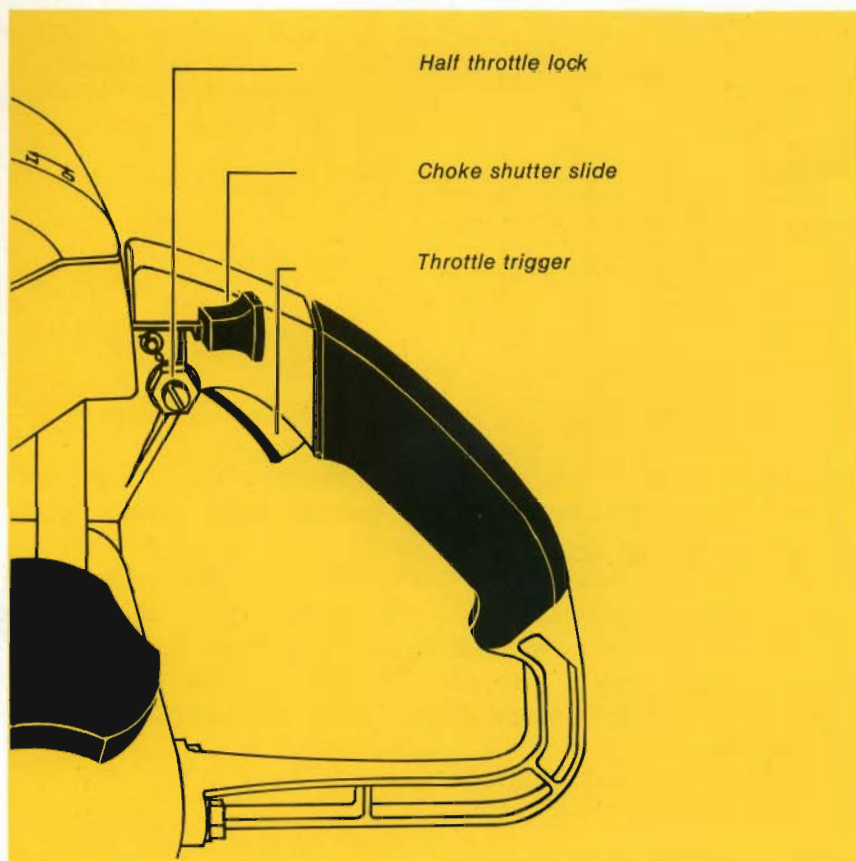


*Pressure test at carburetor*

time. In order to check these diaphragms remove the six lens head screws connecting the fuel pump body and the diaphragm cover to the carburetor body and remove fuel pump body and diaphragm cover. Pry fuel pump body apart from diaphragm cover at the lugs in order not to damage the diaphragms. This is the only spot where the diaphragms can't be damaged when disassembling the carburetor. The valve flaps of the pump diaphragm must be inspected for worn condition and the diaphragm must be replaced if the flaps are out of shape. The black diaphragm may get hard and out of shape after prolonged operation which causes erratic fuel supply and then the diaphragm must be replaced. The metering diaphragm too is subject to wear and must be checked on proper condition from time to time. A sheet metal plate is riveted to the centre part of the metering diaphragm for stabilizing the diaphragm. The rivet head butts against the long end of the control lever and the dove-tailed end of the control lever engages the annular groove of the inlet needle.

Replace inlet needle or control lever if annular groove at inlet needle or the dove-tailed end of the control lever are badly worn and don't guide correctly anymore. The long arm of the inlet control lever must be flush with the carburetor body in order to get the necessary amount of fuel. Adjust the control lever by bending it carefully. The main fuel orifice is a valve jet. If this jet is clogged clean it with compressed air.





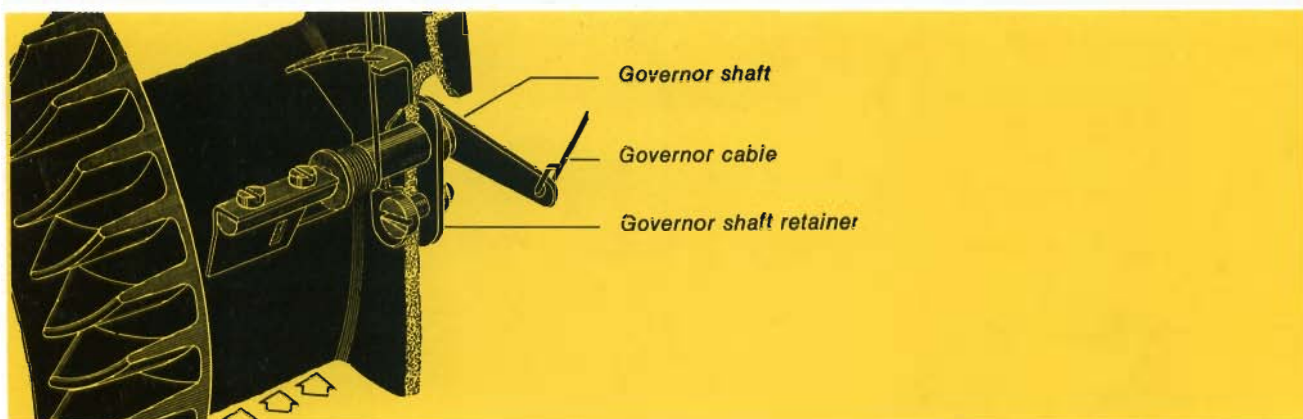
The carburetor is adjusted by three adjusting screws: the idle speed regulating screw, the idle adjustment screw and the main adjustment screw.

The idle speed regulating screw is located at the lug of the carburetor body which is cast to the carburetor body between throttle and choke shutter. The idle speed is increased by turning the idle speed regulating screw clockwise and decreased by turning it counter-clockwise. The normal setting of the main adjustment screw H is one turn open and the idle adjustment screw L  $\frac{3}{4}$  of a turn open (counter-clockwise!).

### Carburetor Adjustment

In the event of carburetor problems it is advisable to check the carburetor with a carburetor pressure testing device. Connect open hose end of pressure testing device with hose nipple of fuel strainer cover. Close venting screw at pressure ball and squeeze the ball until the pressure gauge indicates a reading of 5.7 lbf/in<sup>2</sup> (0,4 bar). The metring diaphragm and the inlet control lever is properly sealed if there is no drop in pressure. If pressure changes you must check carburetor and replace faulty parts.

### Pressure Test on Carburetor



### Speed Governor

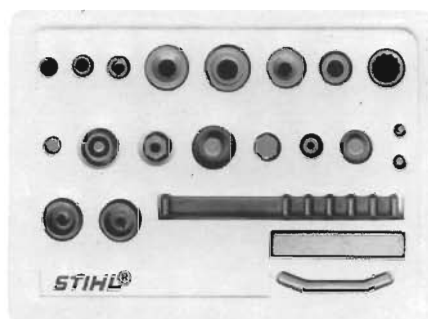
The speed governor which is located in the fan housing is actuated by the cooling airstream and acts on the choke shutter in the carburetor through the governor cable. It prevents overspeeding without loss of power. Adjust maximum speed by changing the position of the hook-on spring in the notched speed control base but adjust speed only with warm engine and correct carburetor adjustment with engine unloaded. The adjustment is correct when engine has a speed of about 7500 r. p. m. Then secure spring with varnish seal.

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**Special tool kits  
and testing tool kit**

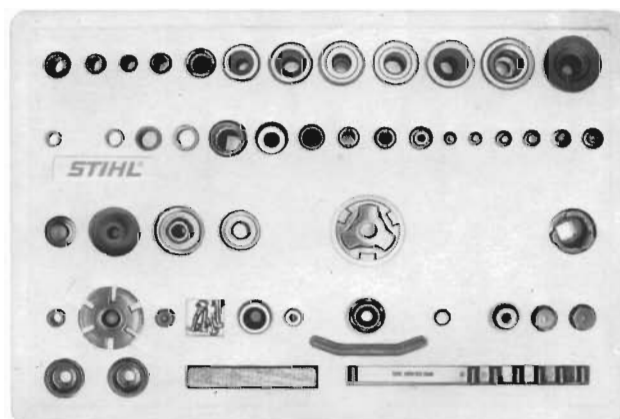
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**Special tool kit (small)**  
0000 890 1706  
(for 009 up to 032)



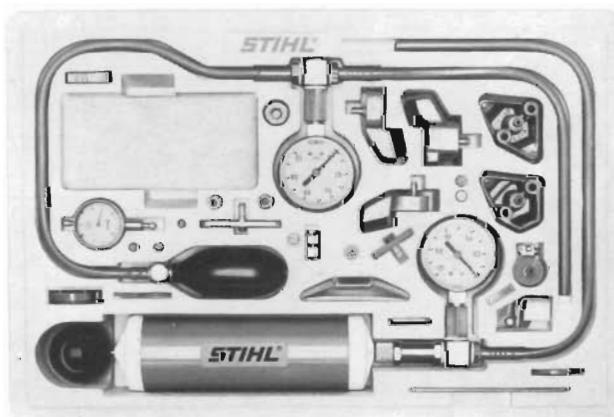
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**Special tool kit (large)**  
0000 890 1705



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**Testing tool kit 0000 890 1710**





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