



Repair Instructions No. 4054.8 E/4
SACHS Snowmobile Engine
Type SA 280 A

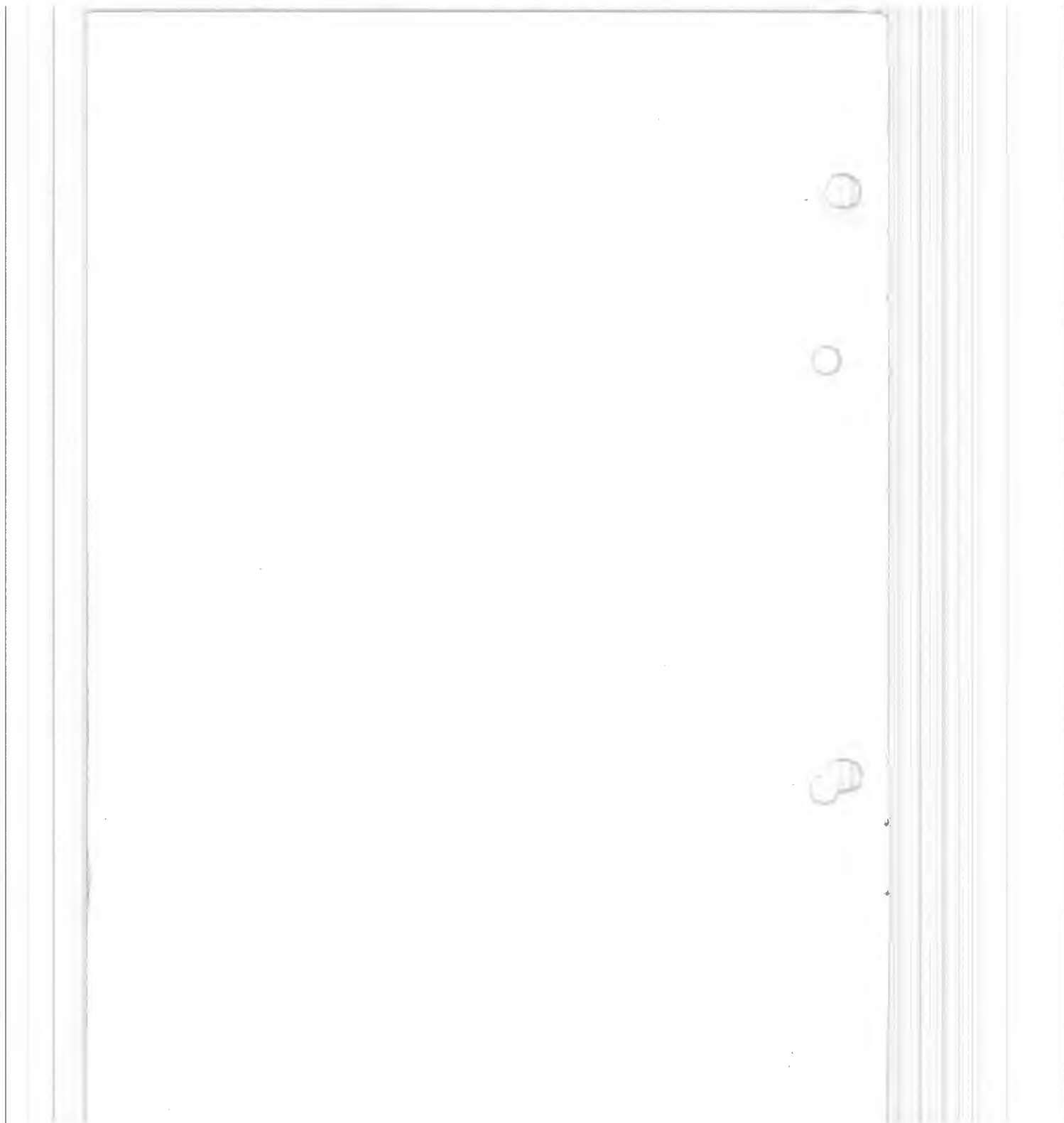
280

290

340 C (competition)

14.63
11.13
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350

FICHTEL & SACHS AG 8720 SCHWEINFURT



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PREFACE

This manual is designed to give dealers and their staff all guidance and information necessary to enable them to provide an efficient repair and maintenance service, but it is in no way intended as a substitute for the practical and theoretical training available to personnel at our customer service training school.

It will be found useful as a ready reference in day-to-day workshop practice. Our illustrated Spare Parts List, containing details of the various units and their construction, will also be found helpful when used in conjunction with this booklet.

Of course, good maintenance and repair work and efficient service to customers call for good equipment, a well fitted-out workshop, and trained personnel.

Dealers are requested to make this manual and all SACHS circulars containing technical information and modifications available to every individual responsible for actual servicing. It is emphasized that all information of this nature is intended for use in the workshops and not for office filing.

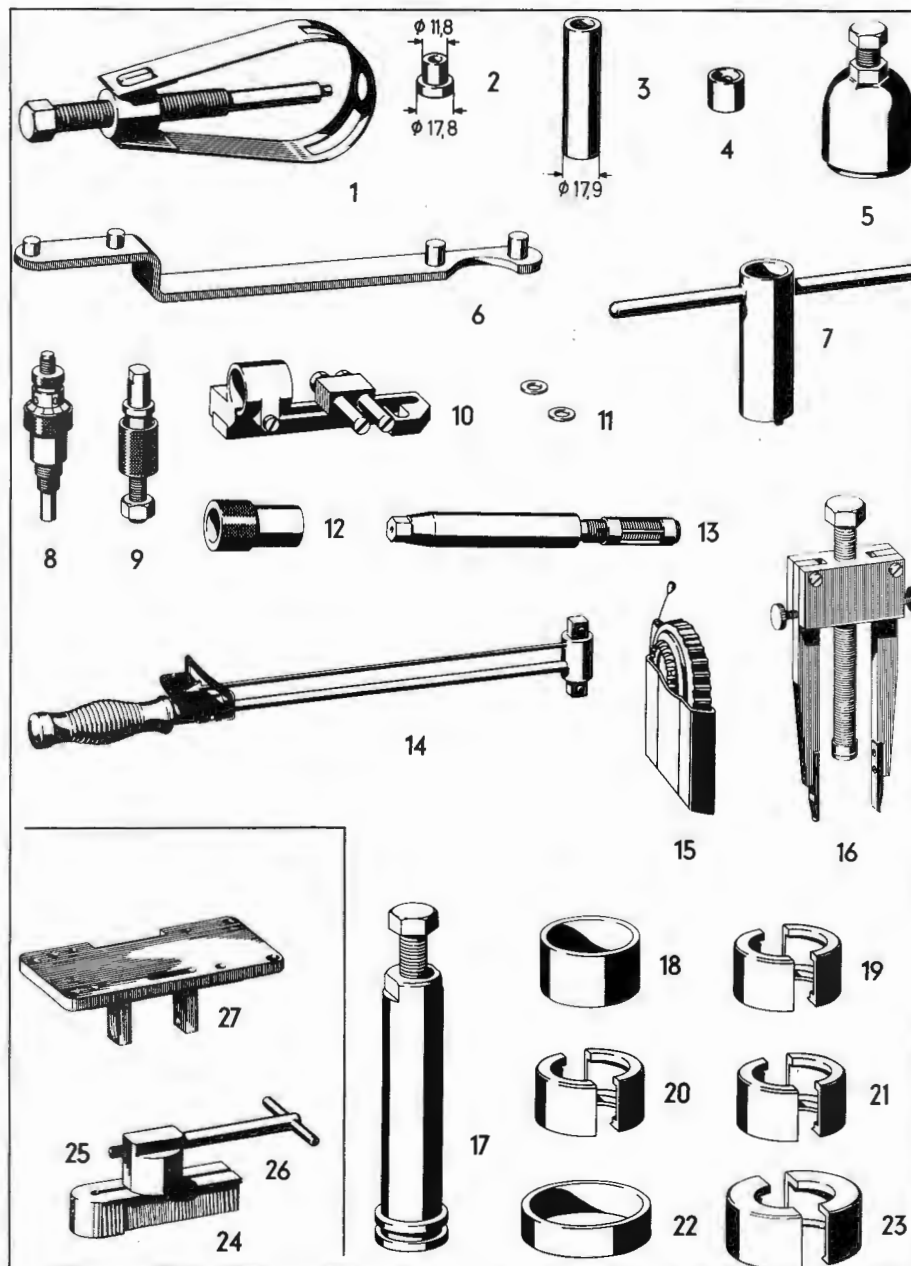
We hope that this manual will be of real practical assistance to all our dealers, agents and associates.

FICHTEL & SACHS AG
SCHWEINFURT
Service Dept.

Technical Data

Description:	SACHS SA 280 A	SACHS SA 280	SACHS SA 290	SACHS SA 340 C
Type:	Fan-cooled single-cylinder two-stroke gasoline engine			
Direction of rotation:	Anti-clockwise as seen on the output shaft of the engine			
Swept capacity:	277 cc (16.902 cu in.)		293 cc (17.879 cu in.)	336 cc (20.503 cu in.)
Bore:	φ 71 mm (2.795 in.)		φ 73 mm (2.874 in.)	φ 78 mm (3.071 in.)
Stroke:		70 mm (2.756 in.)		
Compression ratio:	8.3		9.5	9
Output:	14 HP (DIN) at 4800 rpm	16.5 HP (DIN) at 5600 rpm	19.5 HP (DIN) at 5500 rpm	30 HP (DIN) at 6500 rpm
Ignition:	BOSCH flywheel dynamo magneto			
	6 V 36 W			
	12 V 40 W			
	12 V 75 W			
Ignition timing:	6 V 36 W equipment: 4.0...4.5 mm before TDC (0.15748...0.1771 in.)			
	12 V 40 W and 12 V 75 W equipment:			
	Stopped engine: 0.3...0.5 mm before TDC (0.0118...0.0197 in.)			
	Running engine: 4.1...4.7 mm before TDC (0.1614...0.1850 in.)			
Contact breaker gap:	0.4 ± 0.05 mm (0.016 ± 0.002 in.)			
Pole shoe gap:	6 V 36 W equipment: 16...19 mm (0.62992...0.74803 in.)			
	12 V 40 W equipment: stopped engine 32...36 mm (1.2598...1.4173 in.)			
	running engine 14...18 mm (0.5512...0.7087 in.)			
	12 V 75 W equipment: stopped engine 25...29 mm (0.9843...1.1417 in.)			
	running engine 7...11 mm (0.2756...0.4331 in.)			
Spark plug:	BOSCH M 240 T 1			BOSCH W 290 T 16
Carburettor:	TILLOTSON diaphragm carburettor			
	HL-242 A 7/8" (22.20 mm dia.)	HR-18 A 1 1/16" (30.16 mm dia.)	HD-13 A 1 1/2" (38.10 mm dia.)	
Carburettor adjustment:	Main jet: not adjustable Idling jet: 1 1/4 turn open	Main jet: 1 turn open Idling jet: 1 turn open	Main jet: 1 1/4...1 1/2 turns open Idling jet: 1 turn open	Main jet: 1 1/4 turn open
Air cleaner:	Intake silencer			
Exhaust muffler:	Swirl-type exhaust silencer			
Starter:	Recoil starter			
	on request solenoid-controlled starter 12 V - 0.4 HP, or inertia-pinion type starter 12 V - 0.4 HP, necessary battery 12 Volt 32...38 Ah			
Engine lubrication:	Two-stroke mixture mixed in 25 : 1 ratio			

REPAIR TOOLS AND ASSEMBLY JIG



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Illustr. No.	Part number	Description	for engine			
			SA 280 A	SA 280	SA 290	SA 340 C
Repair tools						
1	0276 065 101	Gudgeon pin extractor	x	x	x	x
2	0977 069 000	Insert for gudgeon pin extractor . .	x	x	x	x
3	0977 068 000	Locating pin for piston	x	x	x	x
4	0976 088 100	Protective cap, 14 mm dia. bore . .	x	x	x	x
5	0977 063 105	Puller for magneto flywheel M 50 x 1	x	x	x	x
6	0976 111 100	Retaining lever for magneto flywheel	x	x	x	x
7	0976 128 001	Pin spanner for starter hub	x	x	x	
8	0276 135 000	Timing gauge for spark advance . .	x	x	x	x
9	0676 027 005	Extracting and removing tool for small-end bush	x	x	x	x
10	0276 157 000	Guiding bar assy.	x	x	x	x
11	1831 163 001	Washers 10.2 mm dia. bore (2 pieces)	x	x	x	x
12	0276 158 002	Guiding bush no. 4, 21.7 mm dia. bore	x	x	x	x
13	0276 159 003	Adjustable reamer 17.5...19.5 mm (0.689...0.768 in.)	x	x	x	x
14	0276 170 000	Torque key	x	x	x	x
15	1376 020 000.8	Revolution counter	x	x	x	x
16	0276 161 101	Extractor for oil seals	x	x	x	x
	0276 164 100	Extractor hook 3 mm (1 piece), spare part for 0276 161 101				
	0276 164 101	Extractor hook 2 mm	x	x	x	x
	1476 012 000.8	Thrust bearing assy., spare part for 0276 161 101				
17	1476 013 000.8	Extractor sleeve assy., consisting of: 1476 011 000.8 extractor sleeve 1440 027 001.8 hexagon head bolt 1476 012 000.8 thrust tool	x	x	x	x
18	1447 009 000.8	Clamping ring, 58 mm I. D.	x	x	x	x
19	1476 014 000.8	Extractor shells for inner races of roller bearings NJ 305 E C3		x ¹	x ¹	x ²
20	1476 014 002.8	Extractor shells for inner races of roller bearings NJ 205 C3 NA . . .	x	x	x	
21	1476 014 025.8	Extractor shells for inner races of roller bearings NJ 206 E C3 NA . .		x	x	x
22	1447 010 000.8	Clamping ring 75 mm I. D.	x	x	x	x
23	1476 015 000.8	Extractor shells for grooved ball bearings 6305 C3	x	x ³	x	x
Assembly jig						
24	0276 081 000	Clamping base	x	x	x	x
25	0276 082 000	Swivel unit	x	x	x	x
26	0276 085 005	Setscrew	x	x	x	x
27	0977 041 000	Mounting plate	x	x	x	x

x¹ = and for bearing bush (recoil starter)

x² = only for bearing bush (recoil starter)

x³ = only for equipment with electric starter

TAKING DOWN THE ENGINE

Remove all connections from engine to frame or unit (cables, electric connections etc.).
Unscrew exhaust muffler, i. e. manifold and bracket.

Remove the engine and clean thoroughly before taking down.

When giving the engine a general overhaul, components should be removed in the sequence indicated.

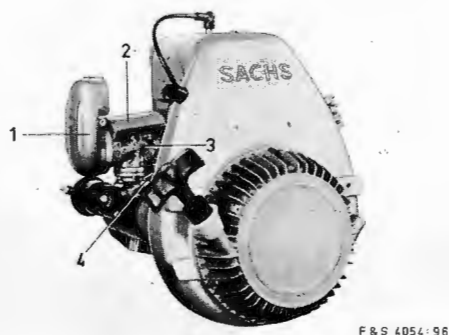


Fig. 1

Exhaust muffler, carburettor and electric starter

Fig. 1

Screw down engine on the assembly jig with 2 hexagon head bolts M 10 x 40, as shown in the adjoining illustration.

Remove intake silencer (1).

Unscrew adapter flange and take off cover plate (2), or unscrew intake silencer (Fig. 302, p. 53) with cover plate.

Pull off impulse pipe (4).

Remove carburettor (3).

Remove insulating sleeves and insulating flange.

If there is an intake stack between carburettor and cylinder, remove it only if necessary.

Unscrew electric starter.

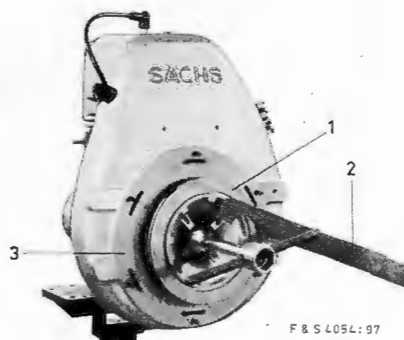


Fig. 2

Recoil starter, starter hub and fan

Fig. 2

Detach recoil starter.

Unlock nut in the starter hub (1).

Hold starter hub with retaining lever (2, repair tool no. 6), unscrew the nut and remove starter hub with spring ring and washer.

Note:

In the case of the Fairbanks recoil starter release nut, hold starter hub with strap spanner and unscrew nut.

In the case of the recoil starter with friction jaws release nut, hold starter hub with pin spanner (repair tool no. 7) and unscrew it.

Take off starter hub with spring ring and washer.

Remove the cylindrical pin and the bearing roller from the magneto flywheel (Fairbanks recoil starter) resp. 2 bearing rollers (recoil starter with friction jaws).

Take off cover disc (3).

Unscrew fan and remove gasket.

Cover plate and fan housing

Fig. 3

Unscrew fixing clip (3) for ignition lead (not in the case of 75 W equipment) and cover (1).

Detach leads at terminals 1, 2 and 3 of the terminal box (5) and remove fan housing (4).

Note:

Remove cover flanges on fan housing for electric starter connection, if fitted.

Take care of dowel tubes.

Note:

Remove short-circuiting button only if necessary.

Remove rubber cap (2) and short-circuiting button.

Detach short-circuiting lead from insulator.

Remount parts in reverse order.

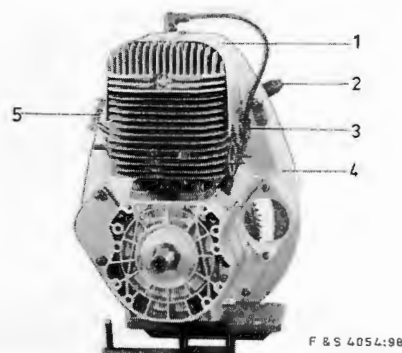


Fig. 3

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Magneto flywheel

Fig. 4

Fit protective cap (repair tool no. 4) to threaded end of crankshaft.

Fit retaining lever (1, repair tool no. 6) to magneto flywheel and pull off the flywheel by means of the extractor (2, repair tool no. 5).

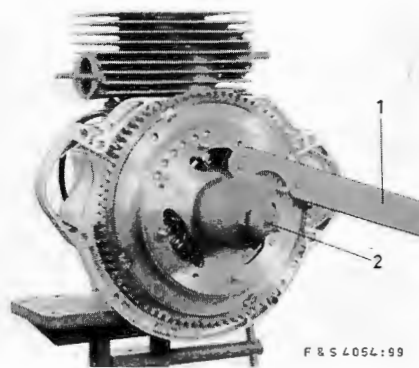


Fig. 4

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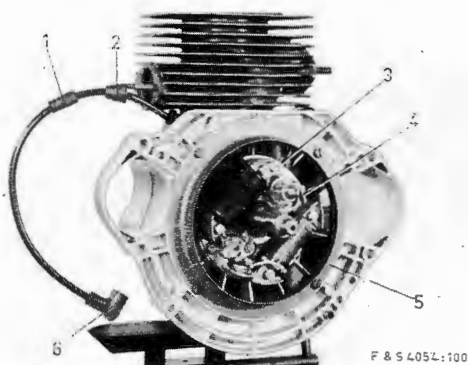


Fig. 5

Labyrinth ring and armature base plate

Fig. 5

Unscrew labyrinth ring (5). Pull ignition lead with spring out of the spark plug terminal (6), pull off rubber sleeve (1) and rubber cap (2) and screw out the ignition lead socket.

Unscrew armature base plate (4) and remove it together with ignition lead (not in the case of 75 W equipment) and insulating tube (with lead).

Remove Woodruff key.

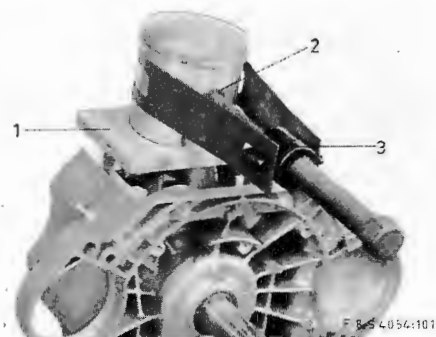


Fig. 6

Cylinder head, cylinder and piston

Fig. 6

Unscrew cylinder head and cylinder.

Pull off cylinder without twisting (danger of breaking piston rings).

Remove cylinder flange gasket.

Note:

The SACHS SA 280 A and SA 280 cylinders can be rebored three times, and those of the SA 290 and SA 340 C twice. Use appropriate piston (see Spare Parts List).

When fitting new or replacement cylinders and pistons, care should be taken to ensure that the colored spot on the crown of the piston is the same color as that in the induction port of the cylinder (i. e. red or white).

Place cylinder on home-made slotted wooden board (1).

Cover the crankcase, take out the two wire circlips. If necessary, force out gudgeon pin with gudgeon pin extractor (3, repair tool no. 1) and insert (2, repair tool no. 2).

When fitting the steel band, care should be taken to ensure that the piston rings are in their grooves (danger of breaking piston rings).

Remove slotted wooden board.

Crankcase and crankshaft

Fig. 7

Unscrew 6 hexagon socket head screws from crankcase.

Note:

When dismantling the crankcase, have a look at the table of crankshaft bearings on page 10.

Split crankcase by tapping the crankcase half power takeoff side slightly with a rubber hammer.

Remove crankcase half power takeoff side and gasket.

Take care of dowel tubes.

Unscrew screwed nipple (1) and oil drain cock (2).

Unscrew crankcase half magneto side from the assembly jig and heat it to 100...150 ° C (212...302 ° F) for removing the crankshaft (grooved ball bearing).

Take out crankshaft.

Clean all parts thoroughly, check for wear and replace when necessary.

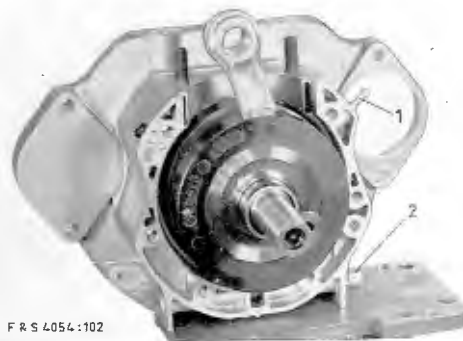


Fig. 7

Use only genuine SACHS spares.

Crankshaft bearings

Type	Version	Bearing	without electric starter	sepa- rable	insepa- rable	with electric starter	sepa- rable	insepa- rable
SA 280 A	14 HP (DIN)	magneto side	cylindrical roller bearing	x				
		p. t. o. side	grooved ball bearing		x			
SA 280	16.5 HP (DIN)	magneto side	cylindrical roller bearing	x		grooved ball bearing		x
		p. t. o. side	cylindrical roller bearing	x		cylindrical roller bearing	x	
SA 290	18 resp. 20 HP (DIN)	magneto side	cylindrical roller bearing	x		grooved ball bearing		x
		p. t. o. side	cylindrical roller bearing	x		cylindrical roller bearing	x	
SA 290	19.5 HP (DIN)	magneto side	grooved ball bearing		x	grooved ball bearing		x
		p. t. o. side	cylindrical roller bearing	x		cylindrical roller bearing	x	
SA 340 C	30 HP (DIN)	magneto side	grooved ball bearing		x			
		p. t. o. side	cylindrical roller bearing	x				

WORK ON INDIVIDUAL PARTS

SACHS special extracting tool for crankshaft oil seals (without dismantling the engine)

FICHTEL & SACHS AG have developed a special extracting tool by means of which damaged oil seals can be replaced without a major disassembly of the engine being necessary.

Engine troubles caused by leaking or damaged oil seals can thus be remedied in a relatively short time.

When replacing oil seals, the following points should be borne in mind:

Extracting oil seals

Fig. 8

Before extracting oil seal be sure to establish installation dimension x, o or y, in order that the new oil seal can be fitted to the same dimension.

Note:

If the correct installation dimension is not adhered to, engine troubles may occur by closed oil bores in the crankcase or by rotating parts moving against other parts.

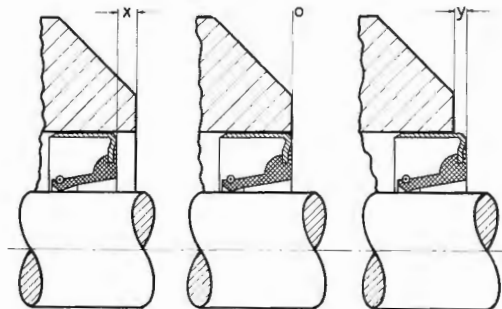


Fig. 8

Fig. 9

If the oil seal is locked towards outside by means of a collar (a) or other locking element, it cannot be extracted.

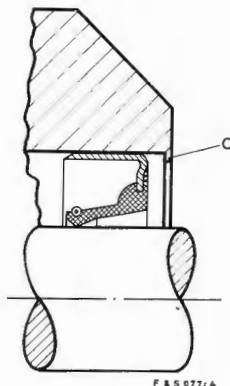


Fig. 9

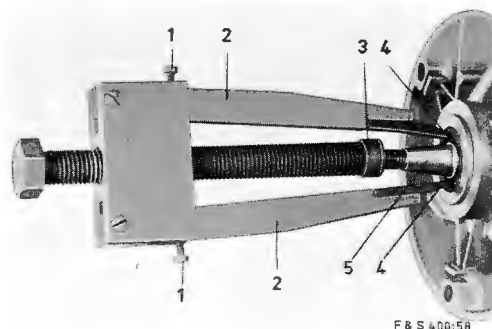


Fig. 10

Fig. 10

Place the extracting tool in position in such a way that the two hooks (4) grip behind the sheet steel rim of the oil seal. Pre-tension the two legs (2) evenly with cylinder head screws (1), taking care that shaft (5) and thrust screw (3) are in alignment.

Screw in thrust screw and extract oil seal.

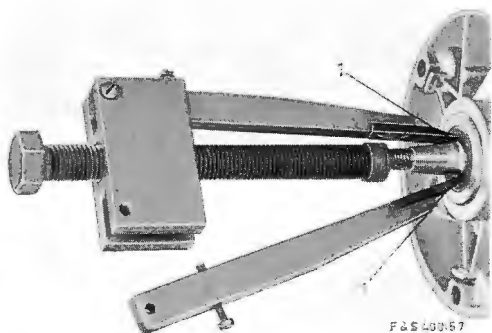


Fig. 11

Fig. 11

If the gap between shaft and sheet steel rim of oil seal is too narrow and the extracting tool cannot completely be placed in position, take off one leg of the extracting tool and insert both hooks (1) in inclined position.

Remount leg and extract oil seal as described under Fig. 10.

Note:

If the oil seal has got stuck (oxidation), the sheet steel rim may break. Therefore it is advisable to knock the oil seal out of its force fit by means of a tube.

Fitting the oil seal



Fig. 12

Fig. 12

Before fitting the oil seal, fill the space around the tension spring with a little heat-resisting grease and lightly smear the sealing lip.

To protect the sealing lip of the oil seal from damage caused by sharp edges on the shaft, use shell sleeve. If necessary, put smooth adhesive tape around sharp edges.

Place oil seal in position and press it in by means of a suitable tube, taking care of exact installation dimension x, o and y (Fig. 8).

The oil seal must not be tilted when being pressed in.

Changing crankshaft bearings

Heat crankcase halves to about 100...150 °C (212...302 °F). Remove outer race of bearing and crankshaft oil seals.

Insert new outer race of roller bearing into the warm crankcase half until they strike a stop. Press in oil seal (with sealing lip inwards) until they are flush.

Press in new grooved ball bearing into the warm crankcase half on the magneto side until it strikes a stop. Press in crankshaft oil seal until flush only after the crankcase halves have been screwed together.

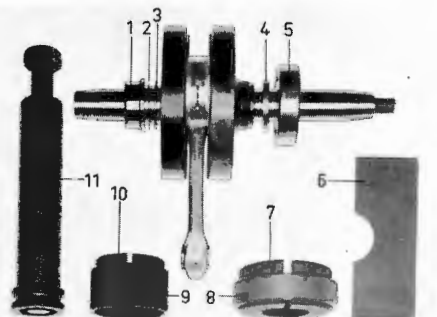
Have a look at the table of crankshaft bearings on page 10.

Removal of inner race of roller bearing and grooved ball bearing

Fig. 13

Pull off inner race (1) and grooved ball bearing (5) by means of the appropriate extractor shells (10 and 7), clamping rings (9 and 8) and withdrawal tool (11; repair tool no. 17 to 23).

Remove compensating washers (2), shim (3), spacer (4) or spacer bush.



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Fig. 13

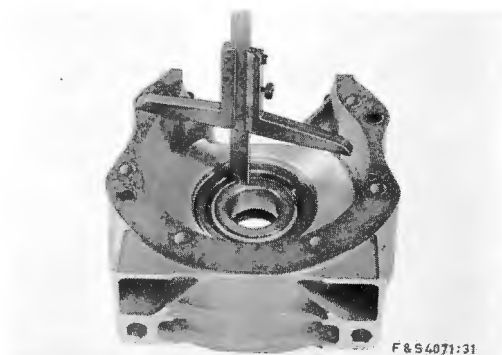


Fig. 14

Gauging axial play of crankshaft

Fig. 14

Permissible axial play 0.1...0.2 mm (0.0039...0.0079 in.).

Example (according to Fig. 17 page 15):

Insert inner race of cylindrical roller bearing into outer race.

Crankcase power takeoff side: sealing surface (with gasket) to inner race of bearing 31.10 mm

Crankcase magneto side: sealing surface to inner race of bearing + 49.00 mm

Crankcase gap 80.10 mm

Dimension a, Fig. 17 (or, according to the engine version, Fig. 15 or 16) - 79.50 mm

0.60 mm

Permissible axial play - 0.20 mm

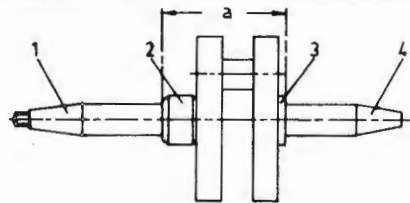
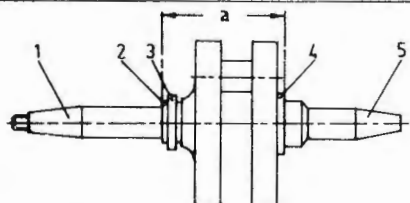
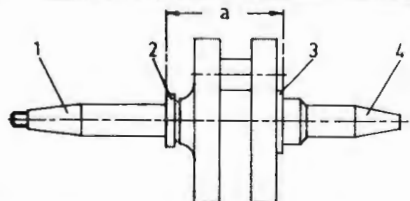
Difference to be taken up 0.40 mm

The difference of 0.40 mm is taken up by inserting shims (2, Fig. 13) between the spacer (3, Fig. 13) and the inner race of the cylindrical roller bearing (1, Fig. 13) on the crankpin power takeoff side.

Fitting the inner race of the cylindrical roller bearing

When fitting the inner race of the cylindrical roller bearing (do not forget, according to engine version: spacer bush 2, Fig. 15, washer 2 and crankpin 3, Fig. 16, and spacer 2, Fig. 17), an intermediate plate (6, Fig. 13) should always be positioned between the two crank webs. This plate must be of such a size that it can be supported at both ends, thereby permitting the crankshaft to lie freely in position.

Never clamp the crankshaft in a vice at a crankpin or at the webs and never try to fit the inner race by striking it. This will crush the webs and render the crankshaft unserviceable.

Type of engine	Crankshaft	Version
SACHS SA 280 A 280 290		Fig. 15 5-piece crankshaft (with cover plates) 1 magneto side crank pin 2 spacer bush (21.4 mm long, with electric starter, 23.4 mm long, without electric starter) 3 washer (2 mm thick; only for measuring, then to be removed) 4 power takeoff side crank pin
SACHS SA 280 290		Fig. 16 3-piece crankshaft for engine with cylindrical roller bearing (NJ 205 EC3 ZS) on magneto side 1 magneto side crank pin 2 washer (2 mm thick) 3 spacer (5 mm thick, bevel pointing towards crankshaft web) 4 washer (1.5 mm thick, bevel pointing towards crankshaft web) 5 power takeoff side crank pin
SACHS SA 280 290 340 C		Fig. 17 3-piece crankshaft for engine with grooved ball bearing (6305 C3) on magneto side 1 magneto side crank pin 2 spacer (5 mm thick, bevel pointing towards crankshaft web) 3 washer (1.5 mm thick, bevel pointing towards crankshaft web) 4 power takeoff side crank pin

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Note:

For the engines SACHS SA 280, SA 290 and SA 340 C only the 3-piece crankshaft and for SACHS SA 280 A only the 5-piece crankshaft will be supplied for replacement purposes. Pay attention to the above table when mounting the crankshaft.

Removal and replacement of small end bushing

When carrying out repairs to engines it will sometimes be necessary to replace the small end bushing of the connecting rod. A special tool has been designed for this purpose (repair tool no. 9).

A special reaming attachment is required when reaming out a newly fitted bushing, and this has been developed in collaboration with the German firm of Hunger (repair tools no. 10, 11, 12 and 13).

The following procedure should be adopted when replacing a small end bushing:

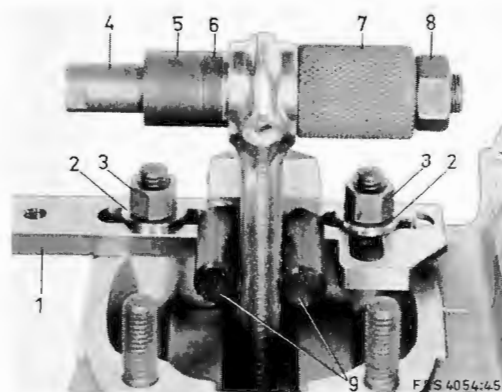


Fig. 18

Removing small end bushing

Fig. 18

Fix the guide rail (1), as illustrated, adjust it in relation to the connecting rod, and lightly secure it by means of two washers (2) and two nuts (3).

Press guide rail uniformly against the two studs and tighten nuts (3).

Clamp the connecting rod by means of eccentric pins (9) and press out the small end bushing as follows:

Insert withdrawal bolt (4) with guide bush (5) and pressure bush (6) into the small end bushing.

Fit holding sleeve (7), screw the nut (8) and press out the small end bushing.

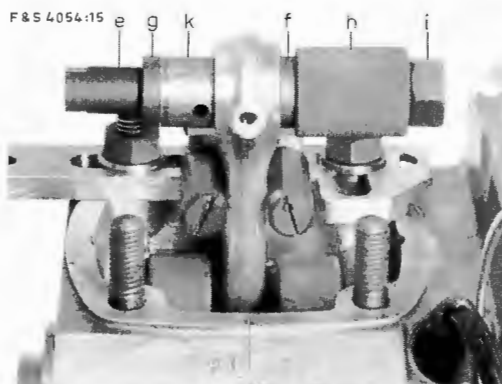


Fig. 19

Inserting replacement bushing

Fig. 19

When inserting the replacement bushing (k), care should be taken to ensure that both oil holes (in the bushing and in the connecting rod) are in alignment.

Carefully insert withdrawal tool (e) with pressure bush (g) into small end bushing (k).

Fit guide bush (f) and holding sleeve (h), screw the nut (i) and press in the bushing (k) so that it projects equally on both sides.

Centering the connecting rod

Fig. 20

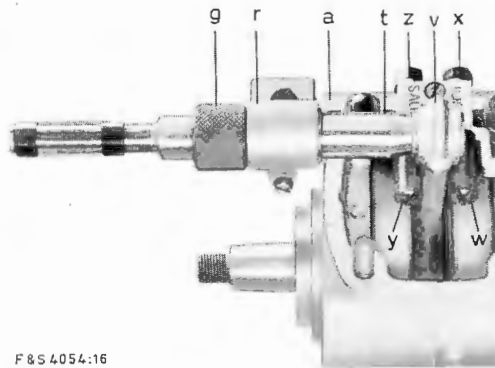
Mount support (r) with guide bush (g) on guide rail (a) and screw it tight.

Insert reamer (t), shank foremost, into the guide bush (g) and accurately center the connecting rod (v) with the aid of the taper.

Care should be taken not to displace the connecting rod axially or radially.

Then bring eccentric pin (w) lightly into contact with the connecting rod and secure it with nut (x).

Press eccentric pin (y) firmly against connecting rod and tighten nut (z).



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Fig. 20

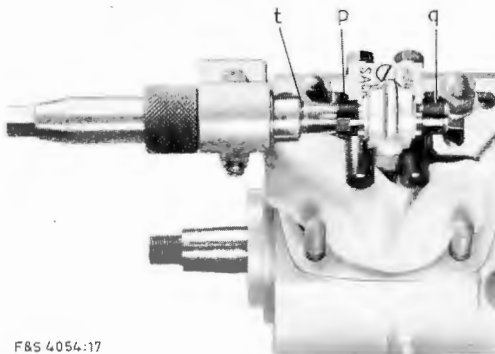
Reaming the small end bushing

Fig. 21

Cover the crankcase.

The front adjusting nut (q) of the reamer is provided with markings: each division corresponds to 0.02 mm (0.00079 in.).

Insert reamer and, with the aid of adjusting nuts (q and p), adjust it to the diameter of the bore of the small end bushing.



F&S 4054:17

Fig. 21

Remove reamer from the bushing, slacken lock nut (p), alter position of adjusting nut (q) by one division, and secure the blades with lock nut (p).

The small end bushing can now be reamed carefully with the aid of the adjustable reaming tool (t) and the addition of oil or paraffin.

Check the fit with the aid of the gudgeon pin.

Reaming should be continued until the oiled gudgeon pin slides with a close "sucking" fit through the reamed small end bushing.

Bore tolerance for the bushing = $\phi 18 \begin{matrix} + 0.050 \\ + 0.030 \end{matrix} \text{ mm}$

$0.70866 \begin{matrix} + 0.00078 \\ + 0.00118 \end{matrix} \text{ in. dia.}$

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supply this special reaming tool in two versions or individual components if required.

Relevant prospectuses are available from us on request.

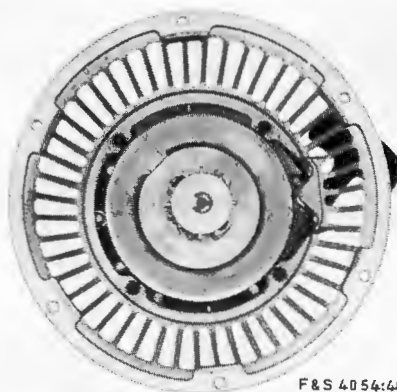
Fairbanks recoil starter

The recoil starter is available for clockwise or anti-clockwise starting direction. It can also be subsequently converted for the other starting direction. The illustration below shows the two starting directions.



Fig. 22

Recoil starter for engine running in clockwise direction

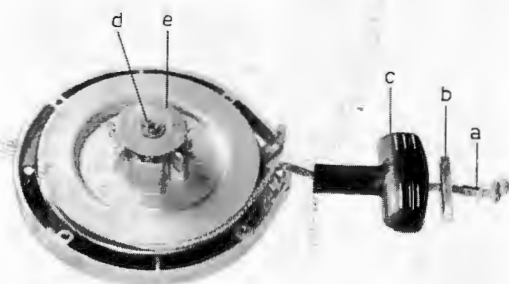


F & S 4054:46

Recoil starter for engine running in anti-clockwise direction

(as seen on the power take-off side of the crankshaft)

W



F & S 4054:18

Fig. 23

Dismantling

Fig. 23

Unscrew the housing.

Pull out the cord as shown in the illustration. Withdraw knot from starter handle and undo it.

Remove tubular rivet (a), bearing plate (b) and starter handle (c), and let cord run back completely. Remove retainer (d) and cover plate (e).

Fig. 24

Remove compression spring (f), friction disc (g), drive assembly (h), and second friction disc.

Carefully take out pulley (i). Take care not to let the coil spring under it jump out.

Detach starter cord from pulley. Take out coil spring by hand.



F&S 4054:19

Fig. 24

Assembly

Fig. 25

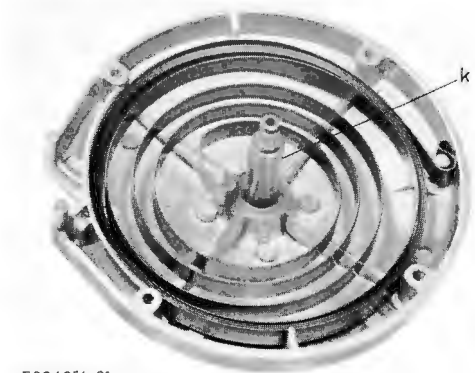
Lubricate the coil spring and the pivot pin (k) lightly with Moly-cote before assembling.

Note:

For clockwise starting direction, insert coil spring as shown in illustration. For anti-clockwise starting direction insert coil spring the other way round.

Check if coil spring lies flat and even.

Bend the end of the spring upwards a little.



F&S 4054:21

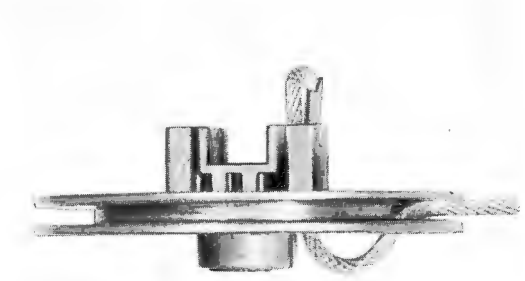
Fig. 25

Fig. 26

Fit the cord into the pulley, as shown in the illustration, and wind it on, according to the starting direction.

Fit pulley on to pivot pin and engage the end of the spring in the pulley according to the starting direction.

Replace starter handle, bearing plate and tubular rivet (see Fig. 23) in position on the starter cord, knot the end of the cord and pull it into the handle.



F&S 4054:22

Fig. 26



F&S 4054:20

Fig. 27

Fig. 27

Fit friction disc, drive assembly (with projections in starting direction for clockwise starting direction, see arrow in illustration; for anti-clockwise starting direction fit drive assembly counter-wise), second friction disc and compression spring on to pivot pin.

Place cover plate in position and insert retainer.

With the aid of the cord, tension the pulley 1...2 turns so that the starter grip is pulled back until it encounters the stop.

Let cord run back.

Fit the housing in position and screw tight.

Recoil starter with friction jaws

The recoil starter is available for clockwise or anti-clockwise starting direction. It can be subsequently converted for the other starting direction, if the driving levers are exchanged for the required direction of rotation. The illustration below shows both starting directions.



F&S 430:121

Fig. 28

Recoil starter for engine running in clockwise direction

Recoil starter for engine running in anti-clockwise direction

(as seen on the power take-off side of the crankshaft)

Dismantling

Fig. 29

Screw off cover plate (b).
Remove retaining ring (g), packing discs, spring disc, friction disc, bearer (x) with drive levers and packing discs.

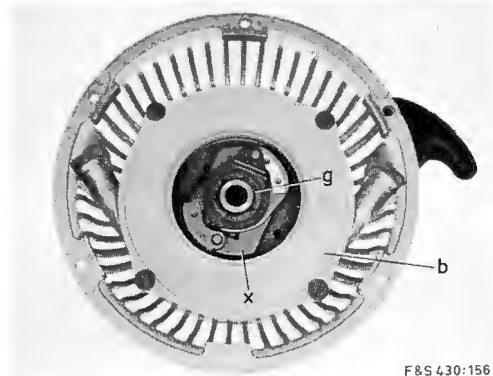


Fig. 29

Fig. 30

Pull out cord approx. 50 cm (19.7 in.) and hold the pulley with a home-made retaining clip (see adjoining illustration).



Fig. 30

Fig. 31

Remove retaining bolt from starter handle and open clamping sleeve (m) by tapping with hammer. Pull off retaining bolt and starter handle from starter cord. Remove retaining clip again and let cord run back completely.

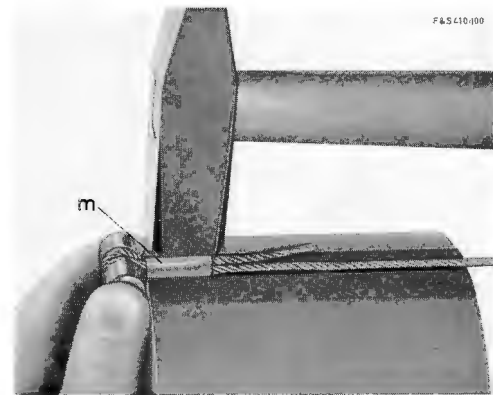


Fig. 31

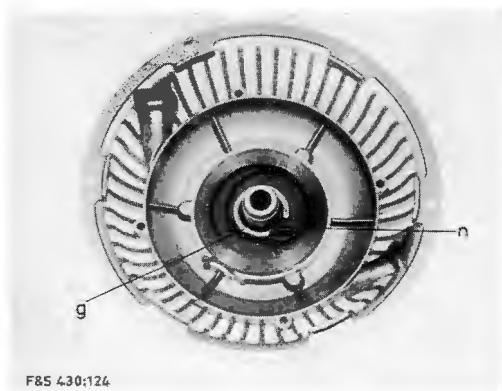


Fig. 32

Fig. 32

Carefully take out the pulley, taking care that the coil spring under it does not jump out.

Detach starter cord from pulley. Take out spacer ring (n) and ring (g).

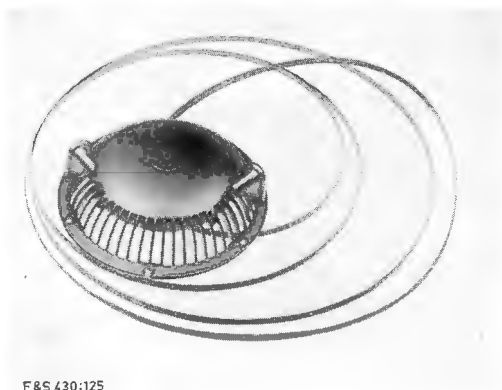


Fig. 33

Fig. 33

The best way to take out the coil spring is to strike the starter housing with the open side downwards on the work bench. Brake the ejecting coil spring with the starter housing.

Note:

If the starting disc must be replaced or inserted for the other starting direction heat the bush well, let it cool and then remove it.

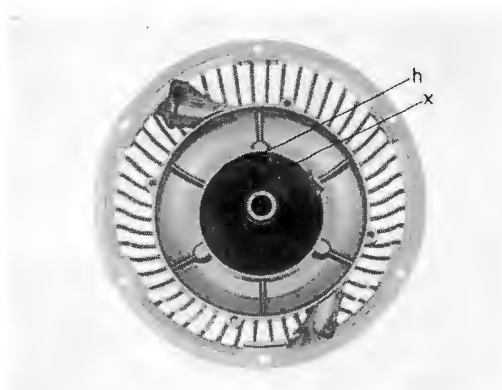


Fig. 34

Assembly

Fig. 34

Fit the starting disc so that the bent-up clip (h) lies in the starting direction shortly after inserting the spring, and the recesses (x) clip into place in the corresponding rib on the bottom of the starter housing.

Press bush up against stop (use only new bushes).

Fig. 35

Lubricate the coil spring with Molycote before assembling.

Note:

For clockwise starting direction (B) insert coil spring as shown in (b), and for anti-clockwise starting direction (A) as in (a) with the tubular rivet (collar facing downwards).

The first coil of the coil spring must lie outside the plate (h, Fig. 34), whereas all other coils must fit inside.

Ensure that coil spring lies perfectly even.

Insert spacer ring (n, Fig. 32).

Insert contact ring (g, Fig. 32) so that the riveting of the spring lies snugly in the groove of the contact ring.

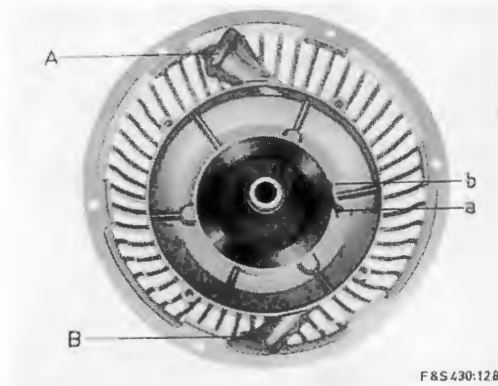


Fig. 35

Fig. 36

When fitting the pulley, attach the end of the spring to the driving pin of the pulley.

Tension pulley/coil spring in direction of cord exit until stop is encountered. Release coil spring 1...2 turns until the recess for the soldering nipple in the pulley rests near the cord duct of the housing.

Lubricate the cord lightly with Molycote before assembling.

Fit rubber grip on to clamping sleeve, lay double loop of cord around retainer bolt (see Fig 31) and secure with clamping sleeve.

Pull retainer bolt into rubber grip and let starter cord run back.

Fit on packing rings, bearer with driving lever, and insert the angled ends of the driving levers into the recesses of the pulley.

Fit friction disc, spring disc, packing rings and retainer ring.

Remove packing rings from under the bearer, should the driving levers not move outwards when starting.

The bearer should have a tolerance of 0.1...0.2 mm (0.0039...0.0079 in.).

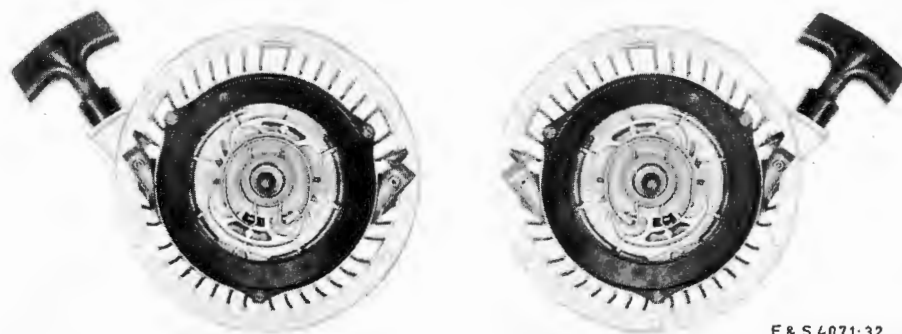
Screw on cover plate (b, Fig. 29) with 4 cylindrical screws M 5 x 12 and washers.



Fig. 36

Recoil starter with pawls

The recoil starter is available for clockwise or anti-clockwise starting direction. It can also be subsequently converted for the other starting direction. The illustration below shows the two starting directions.



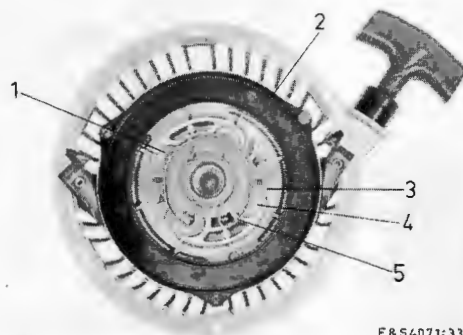
F & S 4071:32

Fig. 37

Recoil starter for engine running
in clockwise direction

Recoil starter for engine running
in anti-clockwise direction

(as seen on the power take-off side of the crankshaft)



F & S 4071:33

Fig. 38

Dismantling

Fig. 38

Take out brake spring (5), shims, spring ring, friction plate (3), washer 0.1 mm (0.0039 in.) thick and starter pawls (1 and 4). Screw off labyrinth ring (2).

Fig. 39

Pull out starter cord approx. 50 cm (19 in.) and hold pulley with home-made retaining clip (1).

Take clamping ring with clamping taper out of starter handle.

Withdraw clamping taper from clamping ring and detach cord.

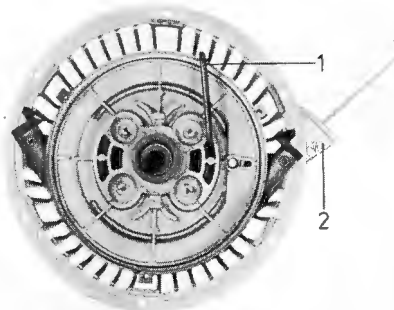
Remove clamping ring and starter handle with stop from cord.

Remove retaining clip (1) and let starter cord run back completely.

Carefully take out pulley with coil spring, taking care not to let coil spring jump out.

Take care of disc (3, Fig. 41).

Remove cord from pulley.



F & S 4071:34

Fig. 39

Fig. 40

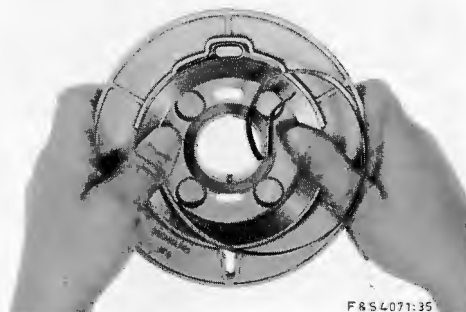
Raise spring end to take out coil spring.

Hold coil spring firmly with both thumbs (see illustration) and, by raising each thumb, let out spring on alternate sides.

Note:

Replace bush (2, Fig. 42) only if necessary, using the extractor shells (repair tool no. 19).

Take care of tolerance ring in bush (2, Fig. 42).



F & S 4071:35

Fig. 40

Assembly

Fig. 41

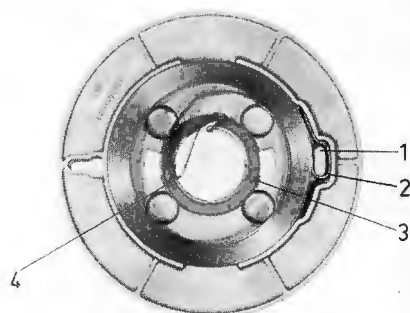
Before assembling, grease coil spring with Aero-SHELL-Grease 14 and fill the 4 lubricating grooves in the pulley with the same lubricant.

Insert coil spring with end of spring (2) in stud (1) and fit in coil by coil.

Ensure that the coil spring lies flat and even.

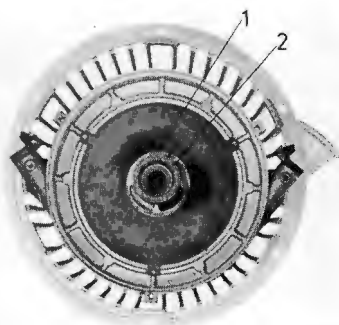
Note:

For clockwise starting direction, insert coil spring as shown in illustration, for anti-clockwise direction insert coil spring reversely.



F & S 4071:36

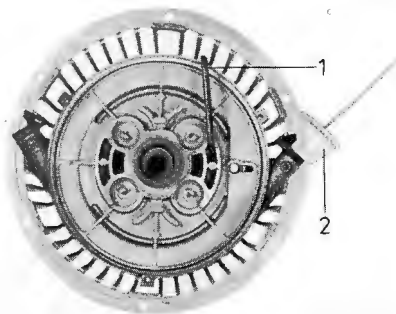
Fig. 41



F & S 4071:37

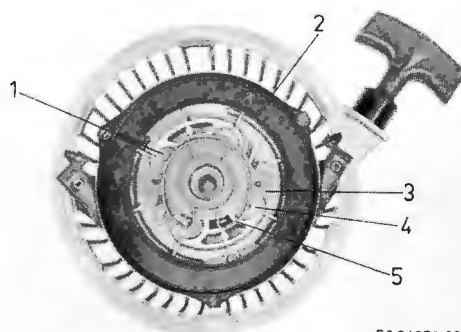
Fig. 42

Again hold the pulley firmly with home-made retaining clip (1, Fig. 43).
Pull the starter cord through a rag soaked with SAE 10 oil before assembling.



F & S 4071:34

Fig. 43



F & S 4071:33

Fig. 44

After mounting the brake spring, the friction plate should have an axial play of 0.1...0.2 mm (0.0039...0.0079 in.).
Correct this play by putting shims under the brake spring.

Fig. 42

Before inserting pulley, stick disc (3, Fig. 41) 0.8 mm thick (0.032 in.) with a little grease into recess of pulley.

Fit pulley on to bearing bolt and insert end of spring (4, Fig. 41) at stud (1).

Tension pulley/coil spring in direction of cord exit until stop is encountered.

Release coil spring approx. $\frac{1}{2}$... 1 turn until the recess for the soldering nipple in the pulley rests near the cord duct of the housing.

Fig. 43

Note:

When converting starting direction, reposition cord guide (2) also.

Fit starter handle with stop and clamping ring on to cord.

Lay starter cord around clamping taper and pull it into clamping ring.

Pull clamping ring into starter handle and let starter cord run back.

Fig. 44

Screw labyrinth ring (2) tight.

Lubricate starter pawl bed and starter pawls lightly with SAE 10 oil.

Fit starter pawls (1 and 4).

The open side of the starter pawl seating and the long side of the starter pawl face in starting direction.

Fit washer 0.1 mm (0.0039 in.) thick, friction plate (3), spring ring and shims as required.

Insert brake spring (5).

Flywheel dynamo magneto centering tool

Replacing the ignition or lighting armature

Fig. 45

1. Pass the leads through a hole in the centering plate and in position in centering plate.
2. Place centering unit in position and tighten hexagon head screw by hand.
3. Remove faulty armatures and replace by new ones.
4. Place centering ring in position, press newly fitted armature against this ring and tighten both screws. After removal of the centering ring the gap between armature core and magneto flywheel will be of the correct width.

Note:

The F & S centering tool will not be supplied any more when the present stock is exhausted.

New ignition or lighting armatures have to be fitted according to the installation instructions which are attached to BOSCH spare parts.

In order to obtain the maximum ignition and lighting power it is recommended to maintain the gap of 0.25...0.35 mm (0.0098...0.0138 in.) between the armature poles and the flywheel under any circumstances.

Replacing the contact breaker

The contact breaker should be changed when the contacts, the slider or the pivot pin are badly worn; also when the bearing bush is worn or if the contact arm or the spring is damaged.

1. Unscrew cutout lead, and, if fitted, noting correct sequence of insulating washers for connector angle bracket in contact carrier.
2. Remove retainer and contact arm from pivot pin (take care of shimming washers).
3. Unscrew fillister head screw and remove contact carrier.
4. Unscrew pivot pin from armature base plate.

New parts should be fitted in reverse order, proceeding as follows:

Caulk the pivot pin after screwing in.

Use only the contact breaker assembly specified for this engine.

When fitted in position, the contacts on the contact arm must not be displaced or tilted.

Apply BOSCH Ft 1 v 8 grease to bearing before fitting.

Smear BOSCH Ft 1 v 4 grease on the felt lubricating pad and greaser wedge in the slider. (BOSCH grease is obtainable in tubes from all BOSCH suppliers.)
Do not allow any grease or oil to reach the contacts.

Replacing the condenser

1. Unsolder both leads.
2. Push the defective condenser out of the armature base plate with a wooden dowel.
3. Remove the sealing caulk from the hole with a triangular scraper.
4. Insert new condenser and carefully caulk again.
5. Solder both cables to their terminals.

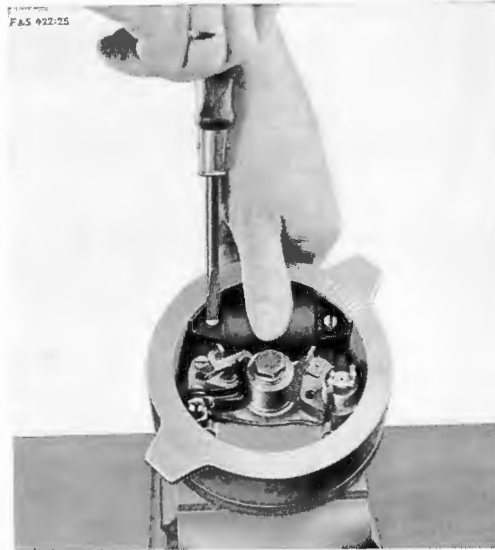


Fig. 45

Replacing the magneto housing or the flywheel

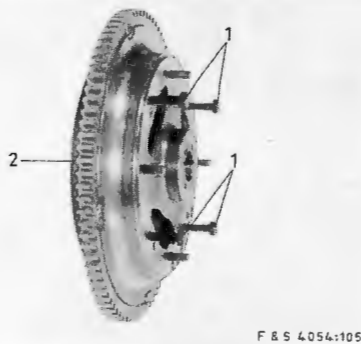


Fig. 46

Fig. 46

Screw out 4 recessed head screws in flywheel.

Screw in 4 hexagon head screws (1) alternately (with equipments without gear ring for electric starter the 4 staybolts must be removed before) and press out flywheel (2).

Note:

When replacing the magneto housing of the 6 V 36 W equipment, screw out contact-breaker hub and insert it again into the new housing, as described under Fig. 53.

Torque: 0.6...0.8 kpm (4.3...5.8 ft. lb.).

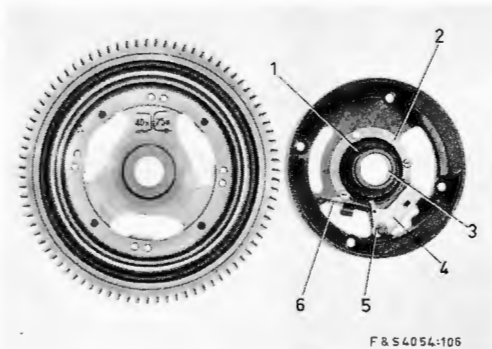


Fig. 47

Fig. 47

Unscrew retaining strip (2) and take out cam (1).

Fill annular groove (3) with heat-resisting grease and grease cam support in flywheel.

Insert cam (1), fit retaining strip (2) and screw tight with 3 cylinder head screws M 4 x 5 and washers.

Take retaining ring (5), flyweight (4) and thrust ring below off bearing pin.

Grease bearing pin and bearing surface for flyweight in flywheel with heat-resisting grease.

Fit thrust washer (0.3 mm thick) on bearing pin, hang spring (6) into place in flyweight. Fit flyweight on bearing pin (must engage with cam) and secure with retaining ring (5). Cam and flyweight must always be free-moving.

Note:

On equipments with gear ring for electric starter there are two markings in the magneto housing: "40x" (for 40 W equipment) and "75x" (for 75 W equipment).

The flywheel should be fitted in such a way that the bores in the flywheel are perfectly in line with the bores in the housing.

On engine without electric starter, fit appropriate magneto housing (see Spare Parts List) according to equipment (40 W or 75 W) in such a way that the bores in the housing are perfectly in line with the bores in the flywheel.

Press in the flywheel.

Degrease 4 Philips screws M 6 x 10 with Tri, apply LOCTITE to them and screw them in. Tightening torque 0.9...1.1 kpm (6.5...8.0 ft. lb.).

Carburettor

The type of carburettor, the jet size and the jet adjustment are determined by means of tests in the factory. The adjustment determined in this way gives the best results, and it is therefore not advisable to alter it.

No alteration of the carburettor setting should be made as long as the engine turns over quietly and smoothly when idling, accelerates steadily when the throttle is opened, and gives its full output at full revs without choking. If the engine pounds or runs unevenly, or the exhaust gas is black, the mixture is too rich. Repeated spitting or coughing, or backfiring with a blue flame stabbing from the carburettor coupled with difficult starting, indicates that the mixture is too weak.

When running with the correct carburettor adjustment, a clean air filter and a suitable sparking plug with the correct thermal value, the insulator of the sparking plug should be brown in colour. Sooty or wet plugs indicate rich mixture, whereas white insulator points to the mixture being too weak.

Special care should be taken to ensure that the carburettor setting is never too low, as at low throttle insufficient lubricant will be conveyed to the moving parts of the engine. With a two-stroke engine the carburettor setting should always be sufficient to provide adequate lubrication.

Correct carburettor settings will help to ensure economic and trouble-free running of the engine.

Adjusting the carburettor for special climatic conditions

When using the engine at altitudes above 1000 metres (3280 ft.), adjustments of the carburettor setting will be required. As the air density is reduced at high altitudes, the supply of gasoline to the carburettor should be restricted by changing the main jet.

Starting

On Tillotson diaphragm carburettors the choke is incorporated in the carburettor itself.

The choke should be used to facilitate starting from cold. It should not be used for starting when the engine is warm and it should be partially or fully closed only for starting the cold engine.

When the choke is closed, a higher vacuum is caused in the mixing chamber, so that a richer fuel/air mixture is obtained. Once the engine has started, the choke should be slowly opened.

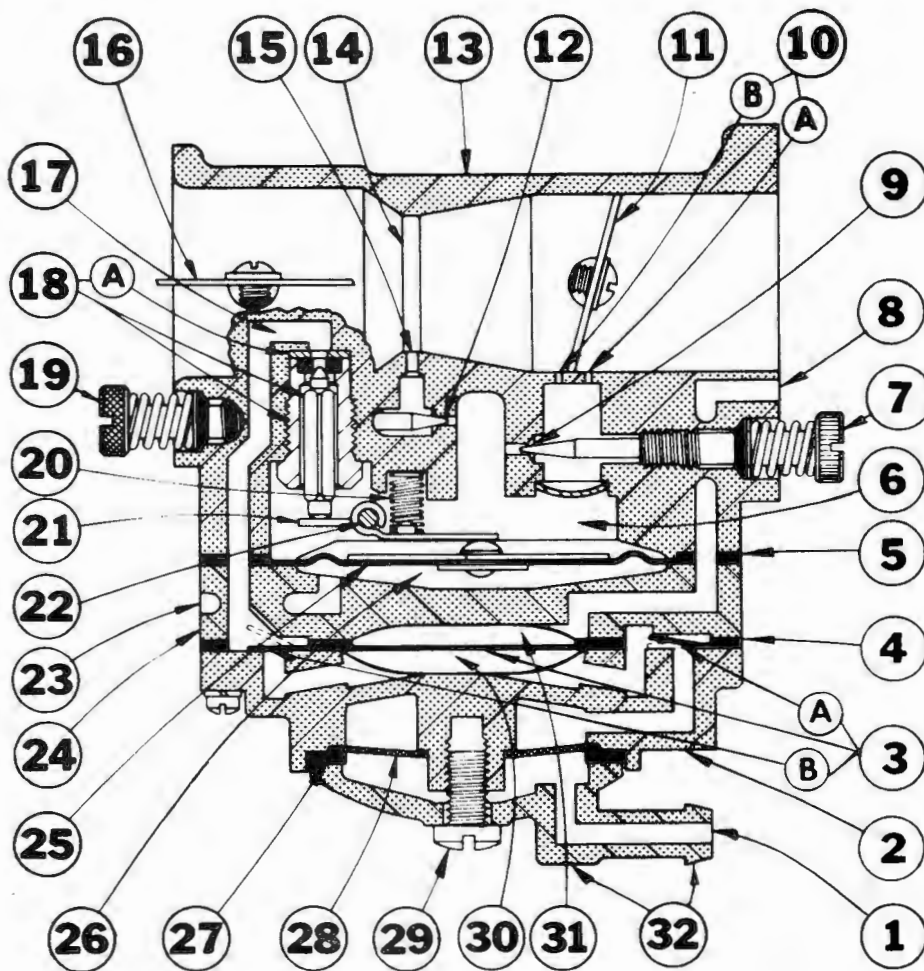
The Tillotson diaphragm carburettor can function in any position and has two diaphragms (the HD-7 A type and the HD-13 A type have three diaphragms): a control diaphragm for proportioning the fuel feed to the engine and a pump diaphragm (HD-7 A and HD-13 A have two pump diaphragms) for drawing the fuel from the tank.

Carburettor adjustment

The Tillotson carburettor is the first carburettor used for SACHS engines which has adjustable jets. If engine troubles occur and the jets have to be readjusted, the following points should be noted:

1. To adjust the carburettor correctly for maximum output (full load), the engine should be thoroughly warmed up.
2. With adjustable jets, care should be taken not to use too lean a fuel/air mixture (see also page 41).
3. The adjusting screws for the jets must never be screwed too tightly to the right (i. e. closed) in the jet seat, as this will deform the seat.
4. The main jet is marked "H" and the idling jet is marked "L" on the carburettor housing.

Tillotson diaphragm carburettor



F&S 430-152

Fig. 48

- | | | |
|-----------------------------------|--|-----------------------------|
| 1 Hose nipple | 10A Idling outlet passage | 20 Inlet compression spring |
| 2 Fuel pump body | 10B By-pass passage | 21 Inlet control lever |
| 3 Fuel pump diaphragm | 11 Butterfly valve | 22 Pivot pin |
| 3A Inlet valve on pump diaphragm | 12 Main jet orifice | 23 Vent hole |
| 3B Outlet valve on pump diaphragm | 13 Carburettor housing | 24 Diaphragm housing |
| 4 Fuel pump gasket | 14 Throat of carburettor (venturi) | 25 Diaphragm |
| 5 Diaphragm housing gasket | 15 Main fuel outlet | 26 Air chamber |
| 6 Control chamber | 16 Choke | 27 Filter gasket |
| 7 Adjusting screw for idling jet | 17 Fuel passage from pump to control chamber | 28 Fuel strainer |
| 8 Impulse passage | 18 Inlet needle and seat | 29 Filter housing screw |
| 9 Idling jet orifice | 18A Copper seal | 30 Fuel chamber |
| | 19 Adjusting screw for main jet | 31 Pulsation chamber |
| | | 32 Fuel filter housing |

Initial adjustment

Jet adjustment should first be done when the engine is cold. Proceed as follows: Close both jets and open the adjusting screw of the main jet and the adjusting screw of the idling jet again to the values given in the carburettor chart (see technical data). Turn the idling adjustment screw so far back that it is no longer in contact with the butterfly valve lever; then turn the screw in again about one whole turn, so that the butterfly valve is slightly open.

Now start the engine and allow it to warm up (open the choke as soon as the engine starts up).

Final adjustment: see section "Test-running the engine".

Maintenance of the carburettor

At certain intervals every carburettor must be disassembled, cleaned and overhauled. All exterior dirt should be cleaned off with gasoline before disassembly. The holes, ducts, passages and jets must not be cleaned with hard objects (e. g. wire or drill), but should only be rinsed with gasoline and cleaned with compressed air (remove diaphragms before blowing through). Before assembly, check that all carburettor components (especially jet seats and diaphragms) are in proper working order.

Checking and cleaning the fuel filter in good time helps to achieve satisfactory functioning of the carburettor and longer engine service life.

Special maintenance instructions

1. If pump failure occurs, always check (before removing the pump diaphragm) the impulse pipeline for leakage and blockage.
2. When fitting the inlet control lever and the compression spring (see illustration), take care that both ends of the spring are bedded in the spring seats.
3. The compression spring must not be stretched, as the spring pressure is accurately adjusted to the carburettor.
4. The inlet control lever is correctly inserted when it is at the same level as the bottom of the diaphragm chamber (see arrows on illustration).
5. The inlet needle should close just when the inlet control lever is flush with the bottom of the chamber. If not, the lever should be adjusted by bending it a little (on the inlet needle side).
6. When assembling the carburettor, make sure that main diaphragm, gasket and casting of the housing are carefully inserted into the cast-on centering pins; similarly, the gasket, fuel diaphragm and fuel pump body are adjusted by means of the same kind of centering pins.

The gaskets at both diaphragms are in each case positioned on that side of the diaphragm which faces the carburettor housing.

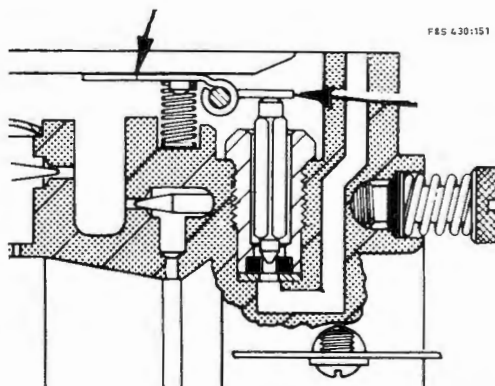


Fig. 49

Decarbonizing the exhaust muffler, cylinder and cylinder head

When dealing with complaints and repairs, the following should be borne in mind:

In every engine a proportion of the lubrication oil is burnt and forms carbon which, in a two-stroke engine, is deposited chiefly on the piston crown, in the transfer port of the cylinder and in the exhaust muffler. The carbon should be removed after every 200 running hours, at the latest when the engine performance drops or when, even with correct carburettor setting, the engine tends to four-stroke.



Fig. 50

Exhaust muffler

Fig. 50

The exhaust muffler cannot be dismantled for cleaning.

Carbon deposits may be burnt off by heating the muffler to red heat by means of a welding torch or in a forge fire.

No modifications should be made to the exhaust muffler, as any such alterations will be detrimental to performance, fuel consumption and will increase engine noise. Modifications of any kind to the exhaust muffler are in any case illegal and constitute a punishable offence.

Cylinder head

Unscrew the cylinder head and remove the carbon deposits from the inside of the combustion chamber with a screwdriver. Take care not to damage the surface of the chamber.

Cylinder ports

Place piston at bottom dead center.

Remove carbon deposits in exhaust port and transfer ports with a screwdriver.

Carefully place piston at top dead center and remove loose carbon.

Piston

Carefully remove only the thicker carbon deposits (flakes) from the piston crown.

Do not try to scrape the piston crown to a bright metallic condition.

ASSEMBLING THE ENGINE

Crankcase and crankshaft

Fig. 51

Before assembling, fill the grooves of the shaft seals with grease (Alvania 3).

Note:

When assembling crankcase halves, have a look at the table on crankshaft bearings on page 15.

On engines equipped with grooved ball bearing on the magneto side, heat the inner race of the grooved ball bearing and insert crankshaft into the crankcase half.

Insert both dowel tubes and place gasket in position.

Fit the p. t. o. crankcase half (heat up inner ring on engines equipped with grooved ball bearing) and screw the two halves together by means of 4 hexagon socket head screws M 8 x 35 and 2 hexagon socket head screws M 8 x 60 (on SACHS SA 340 C, 2 hexagon socket head screws M 8 x 65) and spring washers.

Tightening torque 2.2...2.4 kpm (15.9...17.4 ft. lb.).

Screw magneto side crankcase half to assembly jig with two hexagon head screws M 10 x 40.

Screw in screwed nipple (1) and oil drain cock (2) with seal.

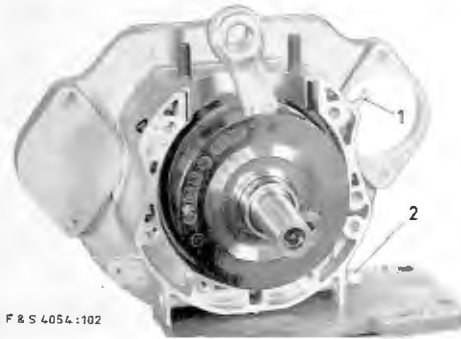


Fig. 51

Fig. 52

After having screwed the crankcase halves together, press in crankshaft oil seals on power takeoff and on magneto side from outside until flush (see illustration).

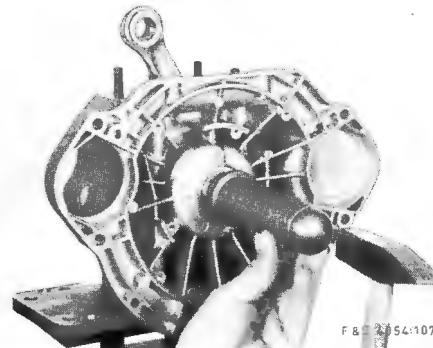


Fig. 52

Piston

Note:

In case there are pistons with square-profiled and L-profiled rings, fit the latter into the upper recess (leg points upward).

Heat piston to 70...80 °C (158...176 °F) and fit it in position on the connecting rod by means of the fixing bolt. Arrow on piston crown must point to the exhaust.

Insert gudgeon pin – with the aid of withdrawal tool (3, Fig. 6) and insertion bush (2, Fig. 6), if necessary.

Use slotted board (1, Fig. 6).

Cover the crankcase, fit the two wire circlips, making sure that they are correctly seated.

Cylinder and cylinder head

Scrape off the projecting ends of the gasket.

Locate the cylinder flange gasket with the graphited side facing the crankcase.

Put piston on slotted wooden board (1, Fig. 6), lightly oil the cylinder and place it in position over the piston, taking care not to rotate the cylinder, otherwise it might damage the piston rings.

Remove slotted board and secure cylinder with 4 nuts M 10. These nuts should be tightened diagonally, with a torque of 4.6...4.8 kpm (33.3...34.7 ft. lb.) for SW 14 (14 mm across flats) and a torque of 2.0...2.2 kpm (14.7...15.9 ft. lb.) for SW 17 (17 mm across flats).

Fit the cylinder head (decompressor towards power takeoff side) and secure it with 4 hexagon head bolts M 10 x 55 (in the case of the SACHS SA 340 C with 6 screws M 8 x 60). Tighten bolts diagonally with a torque of 4.6...4.8 kpm (33.3...34.7 ft. lb.) for M 10 x 55 and with a torque of 2.2...2.6 kpm (15.9...18.8 ft. lb.) for M 8 x 60.

Armature base plate and labyrinth ring

Insert Woodruff key into crankshaft.

Pass the insulating tube with lead and the ignition lead (not in the case of 75 W equipment) through the holes in the crankcase. Place armature base plate (4, Fig. 5) in position so that the marks (3, Fig. 5) are lined up, and secure it with 3 fillister head screws M 5 x 12 and washers.

Torque 0.4...0.5 kpm (2.9...3.6 ft. lb.).

Note:

New armature base plates have no timing mark and should be adjusted by means of the longitudinal slots.

Put socket with rubber cap (2, Fig. 5) on ignition lead and screw it into the crankcase.

Fit rubber sleeve (1, Fig. 5) on the ignition lead. Hang spring into ignition lead (taking care that the spring gets into contact with the core of the ignition lead) and insert into spark plug terminal.

Insert labyrinth ring (5, Fig. 5) and secure it with 4 fillister head screws M 5 x 4.

Magneto flywheel

On equipments 12 V 40 W and 12 V 75 W, check flyweight for ignition setting and cam for free movement and fill annular groove in cam bore with heat-resisting grease.

Degrease the taper of the crankshaft and the magneto flywheel (on equipments 12 V 40 W and 12 V 75 W take care of lubricant applied).

Fit on magneto housing with screwed in flywheel, making sure that the Woodruff key engages accurately with the groove in the flywheel.

Note:

Fig. 53

The contact-breaker hub of magneto flywheel with screwed in contact-breaker hub must be so positioned that the mark "L" on anti-clockwise rotating magneto flywheel and the mark "R" on clockwise rotating magneto flywheel is lined up with the hole marked "RL" in the magneto housing.

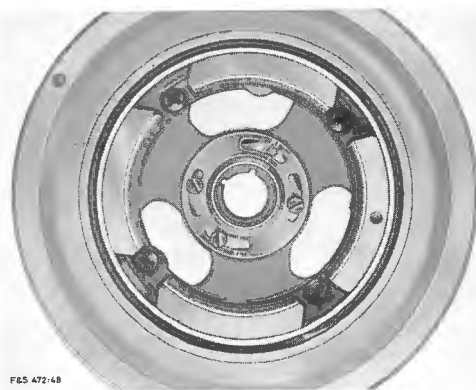


Fig. 53

Fig. 54

Take care when fitting magneto flywheel on to keyway that the grooves marked "R" and "L" engage correctly, i. e. use groove marked "L" for magneto flywheel rotating anti-clockwise.

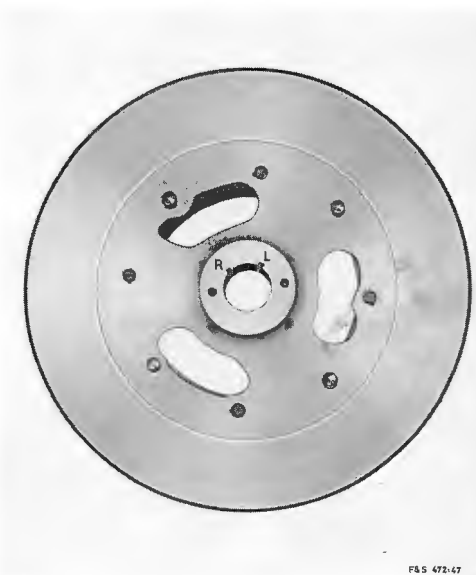


Fig. 54



Fig. 55

Ignition setting

Fig. 55

Ignition timing:

6 V 36 W equipment
4.0...4.5 mm before TDC
(0.15748...0.1771 in.)
12 V 40 or 75 W equipment
Stopped engine:
0.3...0.5 mm before TDC
(0.0118...0.0197 in.)
0.2...0.4 mm before TDC
(0.0079...0.0157 in.)
(SACHS SA 340 C)
Running engine:
4.1...4.7 mm before TDC
(0.1969...0.2205 in.)

Contact-breaker gap:

0.4 ± 0.05 mm
(0.01575 ± 0.00196 in.)

Pole shoe gap:

6 V 36 W equipment
16...19 mm
(0.62992...0.74803 in.)
12 V 40 W equipment
Stopped engine: 32...36 mm
(1.2598...1.4173 in.)
Running engine: 14...18 mm
(0.5512...0.7087 in.)
12 V 75 W equipment
Stopped engine: 25...29 mm
(0.9843...1.1417 in.)
Running engine: 7...11 mm
(0.2756...0.4331 in.)

Gauge:

Ignition timing gauge or depth
gauge, 0.4 mm (0.016 in.),
feeler gauge.

The magneto flywheel is provided with two punched marks.

"O" is in line with the mark on the housing when the piston is at top dead center.

"M" indicates the firing position.

When fitting new ignition systems or systems without marks, the top dead center and firing position should be determined with the aid of the ignition timing gauge and suitably marked.

It is advisable to check the ignition setting every time the engine is inspected, since the performance of the engine depends on this and trouble with the lights is not infrequently due to faulty ignition setting.

At the same time also check the spark gap of the sparking plug (0.5 mm) (0.020 in.).

Adjustment procedure for ignition setting:

Magneto flywheel with ignition control

Stopped engine:

1. When cam is in its highest position, adjust contact-breaker clearance (b, Fig. 56 or 57) to 0.4 ± 0.05 mm (0.016 ± 0.002 in.).
2. Turn the magneto flywheel in the reverse direction of rotation and determine the firing position with the aid of the ignition timing gauge.
3. In this position the contacts should now begin to open. If not, then the firing time can be adjusted by turning the armature base plate. This can be done by means of the longitudinal slots.
4. Turning the armature base plate in reverse direction of rotation advances the ignition, and in the direction of rotation retards the ignition.
5. When the setting is adjusted, screw the armature base plate firmly into position.
6. If the ignition setting is correctly carried out, the pole shoe gap (a, Fig. 56) should measure between 32...36 mm (1.2598...1.4173 in.), and the pole shoe gap (a, Fig. 57) between 25...29 mm (0.9843...1.1417 in.).

Magneto flywheel with screwed on contact breaker hub

1. When cam is in its highest position, adjust contact-breaker clearance (b, Fig. 56) to 0.4 ± 0.05 mm (0.016 ± 0.002 in.).
2. Turn the magneto flywheel in the reverse direction of rotation until the mark (M) on the magneto flywheel is in line with the mark on the housing.
3. Rotate armature base plate until gap between pole shoe and armature core (a, Fig. 56) is adjusted to 16...19 mm (0.62992...0.74803 in.).
4. When the setting is adjusted, screw the armature base plate firmly into position.
5. In this position the contacts should begin to open. If not, the firing time can be adjusted by turning the contact-breaker hub (Fig. 53). This can be done by means of the longitudinal slots.
6. Turning the contact-breaker hub in the opposite direction of rotation retards the ignition, and in the direction of rotation advances the ignition.

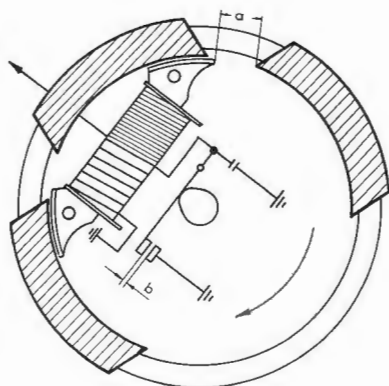


Fig. 56

F 8 S 4071:20

6 V 36 W equipment
(with 4 magnetos)
12 V 40 W equipment

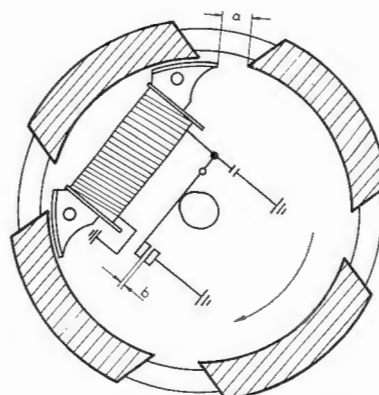


Fig. 57

F 8 S 4071:21

12 V 75 W equipment
(with external ignition coil)

Should the pole shoe gap be incorrect, it can be corrected by slightly adjusting the breaker contacts in the range of 0.4 ± 0.05 mm (0.016 ± 0.002 in.).

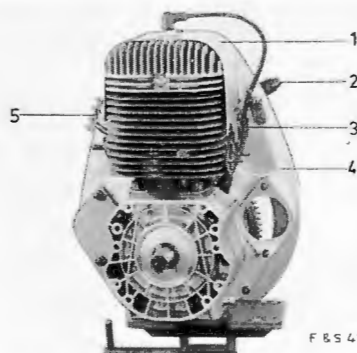


Fig. 58

F 8 S 4054:98

Fan housing and cover

Fig. 58

Insert the two dowel tubes into the fan housing (4), place it in position and screw it tight with 2 nuts M 8, 2 nuts M 6 and spring washers.

Note:

Fit also cover flanges for electric starter connection, if provided.

Connect leads to screw terminal (5) as follows:

Connect lighting lead (yellow) to terminal 1 and 2.

Connect short-circuiting lead (black) from short-circuiting button (2) and from dynamo magneto to terminal 3.

Note:

With the 12 V 75 W equipment, connect primary lead (blue) from dynamo magneto and short-circuiting lead from short-circuiting button to terminal 3.

Connect earth wire (brown) in case of left-hand carburettor from supporting nipple to terminal 4, in case of right-hand carburettor from cover cap to terminal 4.

Fig. 59

Connect leads to terminal block (5) as shown in the illustration.

Connect earth wire (brown) from angle support of Bowden cable to terminal 1.

Connect short-circuiting lead (black) from dynamo magneto to terminal 2 and to short-circuiting button (2).

Connect lighting lead (yellow) to terminals 3 and 4.

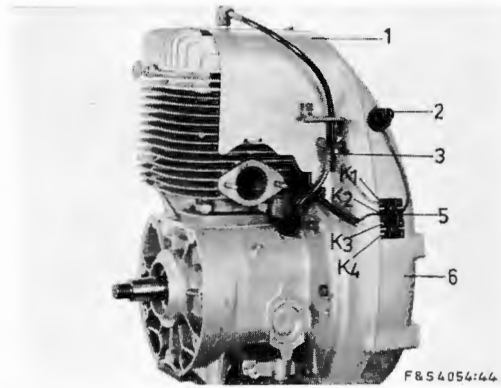


Fig. 59

Fig. 60

On engines without terminal block, pass short-circuiting lead through rubber grommet (u) and hole in fan housing and screw the fan housing tightly into place.

Make sure that short-circuiting lead is correctly fitted. If the lead is too long, there is a risk that it will rub against the fan or touch the cylinder.

Fit short-circuiting lead to insulator. Insert short-circuiting button and place rubber cap in position.



Fig. 60

Secure cover (1, Fig. 59), ignition lead with rubber sleeve (1, Fig. 5) and fixing clip (3, Fig. 59) and earth lead (brown, in case of right-hand carburettor) with 3 fillister head screws M 6 x 10 and spring washers.

Fan, starter hub, recoil starter

Place fan with gasket in position and secure it with 4 nuts M 6 and spring washers.

Torque 0.5...0.6 kpm (3.6...4.3 ft. lb.).

Place the cover plate (3, Fig. 2) in position.

Insert two bearing rollers 4 dia. x 8 mm into magneto flywheel.

Note:

On engines with Fairbanks recoil starter fit bearing roller 4 dia. x 8 mm (0.032 in.) and cylindrical pin 4 dia. x 11.5 mm (0.4527 in.). For recoil starter with friction jaws insert two bearing rollers 4 dia. x 8 mm.

Fit starter hub (1, Fig. 2), insert washer and retaining plate.

Place retaining lever (2, Fig. 2) in position and secure starter hub with hexagon nut (with collar) M 14 x 1.5.

Torque 9.0...9.5 kpm (65.1...68.7 ft. lb.).

Note:

For Fairbanks recoil starter, place starter hub with washer and retaining plate in position, hold it with strap spanner and secure it with nut M 14 x 1.5.

Torque 5.4...6.0 kpm (39.1...43.4 ft. lb.).

For recoil starter with friction jaws, place starter hub and washer in position, hold it with pin spanner (repair tool no. 7) and secure it with collar nut M 14 x 1.5.

Torque 5.4...6.0 kpm (39.1...43.4 ft. lb.).

Secure recoil starter with 6 nuts M 6 and spring washers.

Electric starter, carburettor and intake silencer

Screw on electric starter.

Screw on inertia-pinion type starter with 2 nuts M 8 and spring washers.

Screw on solenoid-controlled starter with 2 nuts M 8 and spring washers. Screw additional supporting plate on to crankcase p. t. o. side with two hexagon head screws M 8 x 20 and washers.

Connect impulse pipe (4, Fig. 1) to connection on crankcase.

Place on both insulating bushes, insulating flange, carburettor (fit impulse pipe to connection on carburettor) and both fibre washers (hard cloth side towards carburettor) and screw carburettor firmly into place with 2 self-locking nuts M 6.

Note:

On SACHS SA 280 A there is an intake stack between carburettor and cylinder.

Secure cover plate (2, Fig. 1) and adapter flange with 3 cylindrical screws $\frac{1}{4}$ " x 15 and spring washers to carburettor and secure intake silencer (1, Fig. 1).

On engines with intake silencer (Fig. 302, page 53), secure cover plate and intake manifold with 2 cylindrical screws $\frac{1}{4}$ " x 55 and 1 cylindrical $\frac{1}{4}$ " x 30 and spring washers to carburettor. Secure intake silencer with 2 hexagon screws M 6 x 15 and spring washers to fan housing.

Exhaust muffler

Screw on exhaust muffler or manifold and bracket respectively.

TEST-RUNNING AND RUNNING-IN THE ENGINE

Test-running

Start the engine and let it warm up (open the choke as soon as the engine starts up).

Final adjustment

Adjust the desired idling speed of the engine by means of the idling adjustment screw. Then slowly vary the setting of the adjusting screw of the idling jet so that the engine speed increases smoothly when the throttle is opened. The main jet is correctly adjusted when the engine gives satisfactory two-stroke operation under load and only slight fumes are discharged from the exhaust (HL 242 A with fixed main jet). If there is excessive exhaust smoke under load, turn main jet adjusting screw clockwise (closing) until smoking stops and engine runs satisfactorily.

If the idling speed fluctuates too much or is too high, turn the idling jet adjusting screw anti-clockwise (to open the jet) until the engine runs smoothly at lower speed without beginning to discharge more smoke from the exhaust.

Running-in period

Even the finely machined surfaces of pistons and cylinders are not so smooth as the surfaces of parts which have been sliding against one another for some time. For this reason every piston requires to be run in during the initial period of operation. This does not call for any special precautions, however, but simply means that the engine should not be required to give its maximum output during the first 20...30 running hours.

No special gasoline/oil mixture is required during the running-in period, and consequently there is no need to add any special oils.

ENGINE WITH BOSCH SOLENOID-CONTROLLED STARTER (Type DD)



Fig. 61

To remove starter, unscrew 2 nuts (3) M 8 with spring washers and two screws (1) M 8 x 20 with washers.

Fig. 61

The pinion of the solenoid-controlled starter (Fig. 61) slides on a coarse thread on the armature shaft and is first pressed up against the gear rim by means of a shift lever until it engages with it. The lever is electro-magnetically operated. Shortly after engagement of the pinion, the switch mounted on the starter automatically closes – on mechanically operated starters by means of the engaging lever – the armature revolves and the pinion screws itself further forward on the coarse thread until it is fully engaged. Even if tooth on tooth engagement occurs, the switch will close, as the spring is spring-connected to the guide ring and the lever is therefore not hindered in its movement; when starting, the armature turns the pinion until it can engage. As soon as the pinion runs up against its counterpart, firm contact is established between it and the armature, and the engine is being started.

If, after starting, the engine begins to overtake the starter, the pinion is uncoupled from the armature shaft by an overrunning roller clutch, but remains engaged with the gear rim until the engaging lever is returned to its initial position by a return spring.

To enable the starter to come to rest as soon as possible after being switched off, and to enable a new start to be made shortly afterwards, an armature brake is installed on the commutator bearing of the starter.

ENGINE WITH BOSCH INERTIA-PINION TYPE STARTER (Type DG)

Fig. 62

To remove starter, unscrew 2 nuts (3) M 8 with spring washers.

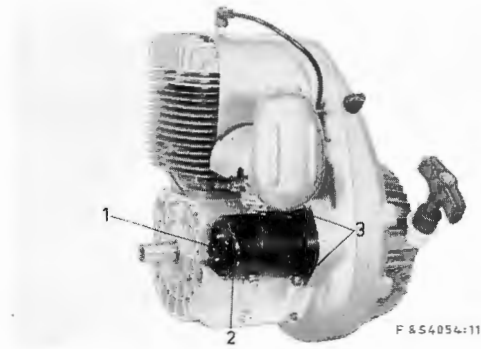


Fig. 62

The pinion of the inertia-pinion type starter (Fig. 62) slides on a coarse thread on the armature shaft. In rest position the gear is held back by spring tension and the pinion is not engaged. When the starter is operated, the acceleration of the starter and the inertia of the pinion result in a force which causes the pinion to run along the shaft and engage with the gear rim. When the pinion has reached the stop on the armature shaft the drive becomes positive and the engine is turned by the starter.

If, after starting, the engine begins to overtake the starter, the pinion is uncoupled from the armature shaft by an overrunning roller clutch and is spun back by spring pressure into rest position.

Note:

On subsequent installation of an inertia-pinion type starter, only the magneto housing with steel rim (F & S Part No. 1471 007 000) can be used.

Operation, maintenance and lubrication of electric starters

Operating instructions

Do not leave the starter switched on longer than 10 seconds without interruption. Before switching on again, wait 1 minute to allow the starter to cool and the battery to recover. If there is a grating of teeth, switch off starter immediately and repeat starting attempt. Let go the starter as soon as the engine runs under its own power. Should the system not be provided with a starter safety device, never switch on the starter until the engine or the pinion have come to rest, as otherwise damage will be caused to pinion and gear rim.

If the engine does not start after some starting attempts, further starting attempts will serve no purpose and will only lead to exhaustion of the battery. The fault should be sought and remedied (check the fuel supply in particular).

Maintenance

Danger of short circuits arises when work is carried out on the electrical components of the built-in starter. It is therefore strongly recommended, before carrying out such work, that the earth lead be disconnected from the battery. Do not place tools on the battery!

Carbon brushes

The condition of the carbon brushes should be checked periodically. After removing the retaining strap (2, Fig. 61) of the sliding gear starter or screwing off the cap (1, Fig. 62) and taking out the fuse, the compensating washers and the cap (2, Fig. 62) of the inertia pinion type starter, the spring which presses the relevant carbon brush on to the commutator should be raised, preferably with a hook (take care not to bend spring to one side and not to raise it longer than necessary). Now check that the carbon brushes can easily be moved in their guides in the brush holder.

The carbon brushes and brush holders must be kept free of dust, oil and grease. If these parts are dirty or jam, they should be cleaned with a clean gasoline-damped rag (not with waste wool, as this easily sheds fibres) and well dried.

Do not sandpaper, file or use knives on the bright ground surface of the carbon brushes. Blow out the brush holders well. If a carbon brush is broken, unsoldered or so worn that the spring or the soldered-in strand in the brush is in danger of striking against the brush holder, then it should be replaced. (Use only BOSCH carbon brushes.) When fitting the carbon brushes, care should be taken that the spring does not strike against the brush.

When fitting the cover strap (2, Fig. 61) of the sliding pinion starter, care should be taken to ensure that the locking clasp lies on the middle of a web; the sealing strip glued into the strap should closely fit everywhere.

When fitting the cap (2, Fig. 62) of the inertia pinion type starter, care should be taken to ensure that the armature shaft is seated correctly in the housing and that the carbon brushes are in close contact with the commutator. Fit compensating washers and fuse and screw on cap (1, Fig. 62).

The carbon brushes should at all events be renewed when the engine is given a general overhaul.

Commutator

The commutator should have an even, grey-black surface, and must be free of dust, oil and grease. Soiled commutators should be cleaned with a clean gasoline-damped rag (not with waste wool) and well dried. Commutators which have become scored and eccentric must be re-turned in a suitably equipped workshop. By no means should a commutator be worked on with sandpaper or a file.

Lubrication

Both bearings of the starter are provided with a self-lubricating bearing (Compo-bush). These bearings must not be greased or treated with grease-dissolving cleaners. To increase their service life, the pinion and the gear rim should be cleaned periodically with a brush dipped in gasoline and then re-greased (graphite grease, e. g. BOSCH Ft 1 v 13). If necessary, remove burrs from gear rim and pinion.

Starter faults

When faults arise it should be borne in mind that their cause need not necessarily lie with the starter itself, nor in the poor electrical connection of the vehicle earthing points, but also in the fuel supply. The following remedial hints are limited to the actual starter system.

A. When the ignition is switched on, the armature shaft does not rotate, or only slowly:

1. Battery exhausted.
2. Battery defective.
3. Battery terminals loose, oxidized, earth connection poor.
4. Starter brushes or terminals have ground contact.
5. Carbon brushes of the starter do not lie on the commutator, are jammed in their guides, are worn, broken, oil-smeared or soiled.
6. Starter switch damaged (parts loose, so that switch is not on, burnt out).
7. Magnetic switch of starter damaged (only with solenoid-controlled starter).
8. Loss of current in leads too great, leads damaged, lead connections loose.

B. Armature rotates, but pinion does not engage:

1. Pinion soiled.
2. Burr on pinion or gear rim.

C. When the ignition is switched on, the starter armature rotates until the pinion connects, then stops:

1. Battery insufficiently charged.
2. Pressure of carbon brushes insufficient.
3. Magnetic switch of starter (only with solenoid-controlled starter) not in order.
4. Loss of current in leads too great.

D. Starter keeps running after switch is released:

1. Starter switch does not switch off or magnetic switch (only with solenoid-controlled starter) sticks.

E. Pinion does not disengage after engine starts:

1. Pinion or flywheel toothing badly soiled or damaged; return spring weak or broken.

INSTRUCTIONS AND WIRING DIAGRAM FOR DYNAMO MAGNETO 6 V 36 W

(without center point wiring)

The dynamo magneto generates alternating current with a lighting power of 36 W at 6 V.

The bulbs should be so selected that the total load of the dynamo magneto is 36 Watt, as otherwise the bulbs may fuse.

Care should be taken to ensure a good earth connection from the engine via the chassis to the lamps.

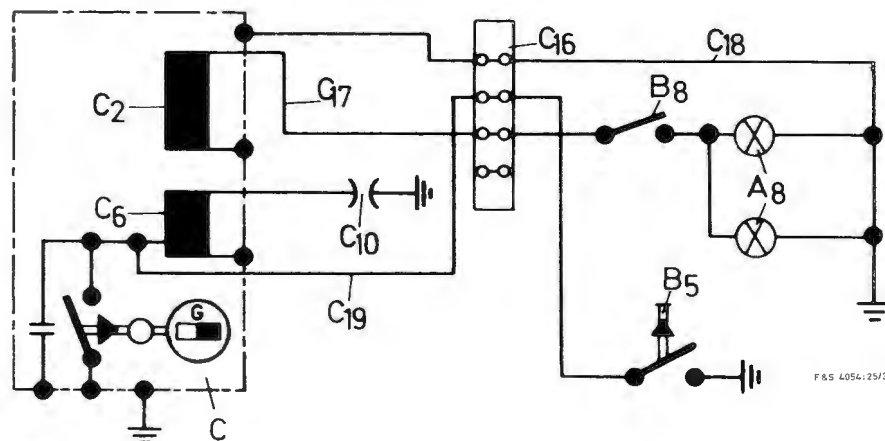


Fig. 63

A₈ = Load (6 V 36 W)
B₅ = Short-circuiting switch
B₈ = Light switch
C = Dynamo magneto
C₂ = Dynamo armature
C₆ = Ignition armature

C₁₀ = Spark plug
C₁₆ = Terminal carrier
C₁₇ = Lighting lead (yellow)
C₁₈ = Additional earth lead (brown)
C₁₉ = Short-circuiting lead (black)

INSTRUCTIONS AND WIRING DIAGRAM FOR DYNAMO MAGNETO 12 V 40 W

The dynamo magneto generates alternating current with a lighting power of 40 Watt at 12 Volt.

Only one of the yellow lighting leads should be connected up (see wiring diagram). The second yellow lighting lead remains blind and may be used later for connecting up a rectifier to charge a battery.

The bulbs should be so selected that the total load of the dynamo magneto is 40 Watt, as otherwise the bulbs may fuse.

Care should be taken to ensure a good earth connection from the engine via the chassis to the lamps.

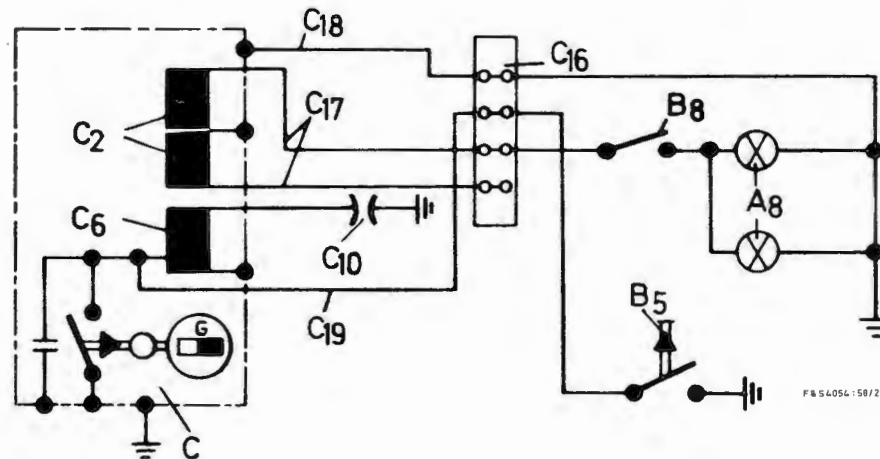


Fig. 64

- | | |
|--|---|
| A ₈ = Load (12 V 40 W) | C ₁₀ = Sparking plug |
| B ₅ = Short-circuiting switch | C ₁₆ = Terminal carrier |
| B ₈ = Light switch | C ₁₇ = Lighting lead (yellow) |
| C = Dynamo magneto | C ₁₈ = Additional earth lead (brown) |
| C ₂ = Dynamo armature | C ₁₉ = Short-circuiting lead (black) |
| C ₆ = Ignition armature | |

INSTRUCTIONS AND WIRING DIAGRAM FOR DYNAMO MAGNETO 12 V 75 W

The dynamo magneto generates alternating current with a lighting power of 75 Watt at 12 Volt.

Only one of the yellow leads should be connected up (see wiring diagram).

The second yellow lighting lead remains blind and may be used later for connecting up a rectifier to charge a battery.

The bulbs should be so selected that the total load of the dynamo magneto is 50 Watt.

For reaching the 75 Watt a resistance of 25 Watt must be added.

Care should be taken to ensure a good earth connection from the engine via the chassis to the lamps.

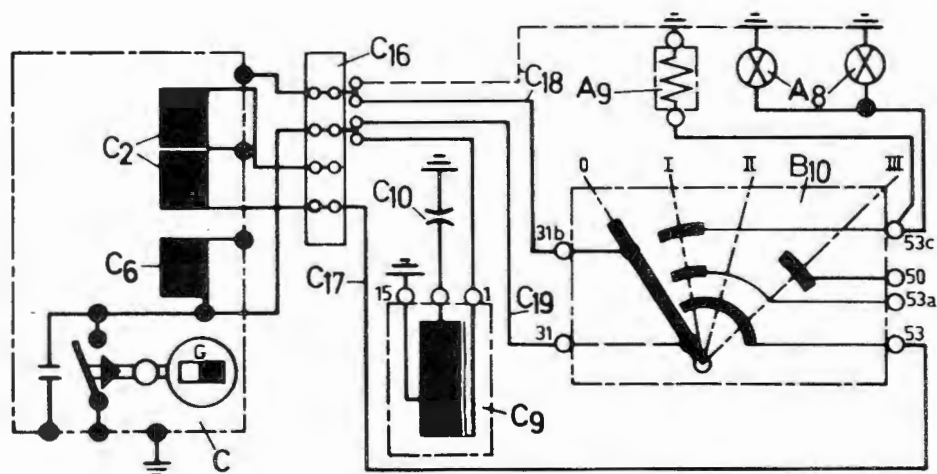


Fig. 65

- A₈ = Load (12 V 50 W)
- A₉ = Resistance (12 V 25 W)
- B₁₀ = Ignition light switch
- C = Dynamo magneto
- C₂ = Dynamo armature
- C₄ = Ignition armature

- C₉ = Ignition coil (lying outside)
- C₁₀ = Sparking plug
- C₁₆ = Terminal carrier
- C₁₇ = Lighting lead (yellow)
- C₁₈ = Additional earth lead (brown)
- C₁₉ = Short-circuiting lead (black)

Switching positions:

- 0 = Off (Ignition short-circuited)
- I = Night operation
- II = Day operation
- III = Intended for starting

INSTRUCTIONS AND WIRING DIAGRAM FOR DYNAMO MAGNETO 12 V 40 W AND BOSCH SOLENOID-CONTROLLED STARTER (Type DD)

The dynamo magneto generates alternating current with a lighting power of 40 Watt at 12 Volt.

The two yellow lighting leads are to be connected up to the rectifier for charging a 12 Volt 38 (or 32) Ah battery for lighting and for operating the electric starter (see wiring diagram).

The bulbs should be so selected that they give a total load of 40 Watt.

Care should be taken to ensure proper wire cross sections for starter operation and a good earth connection between battery, chassis and lamps.

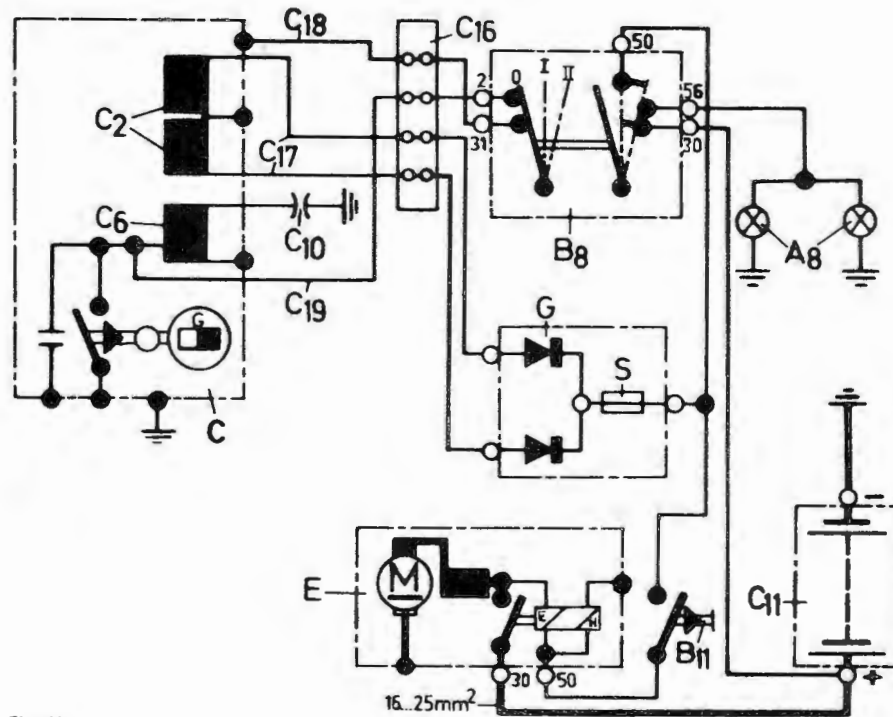


Fig. 66

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- | | |
|------------------------------------|---|
| A ₈ = Load (12 V 40 W) | C ₁₆ = Terminal carrier |
| B ₈ = Light switch | C ₁₇ = Lighting lead (yellow) |
| B ₁₁ = Starter switch | C ₁₈ = Additional earth lead (brown) |
| C = Dynamo magneto | C ₁₉ = Short-circuiting lead (black) |
| C ₂ = Dynamo armature | E = Electric starter |
| C ₆ = Ignition armature | G = Rectifier |
| C ₁₀ = Sparking plug | S = Fuse (4 Amps) |
| C ₁₁ = Battery | |
- Switching positions:**
- | | |
|----|--------------------------------------|
| 0 | = Off (Ignition short-circuited) |
| I | = Start (by means of starter switch) |
| II | = Lights |

INSTRUCTIONS AND WIRING DIAGRAM FOR DYNAMO MAGNETO 12 V 75 W AND BOSCH SOLENOID-CONTROLLED STARTER (Type DD)

The dynamo magneto generates alternating current with a lighting power of 75 Watt at 12 Volt.

The two yellow lighting leads are to be connected up to the rectifier for charging a 12 Volt 38 (or 32) Ah battery for lighting and for operating the electric starter (see wiring diagram).

During day operation, because of overcharging the battery, only one circuit is connected up, during night operation both circuits are connected up.

The bulbs should be so selected that they give a total load of 50 Watt.

Care should be taken to ensure proper wire cross sections for starter operation and a good earth connection between battery, chassis and lamps.

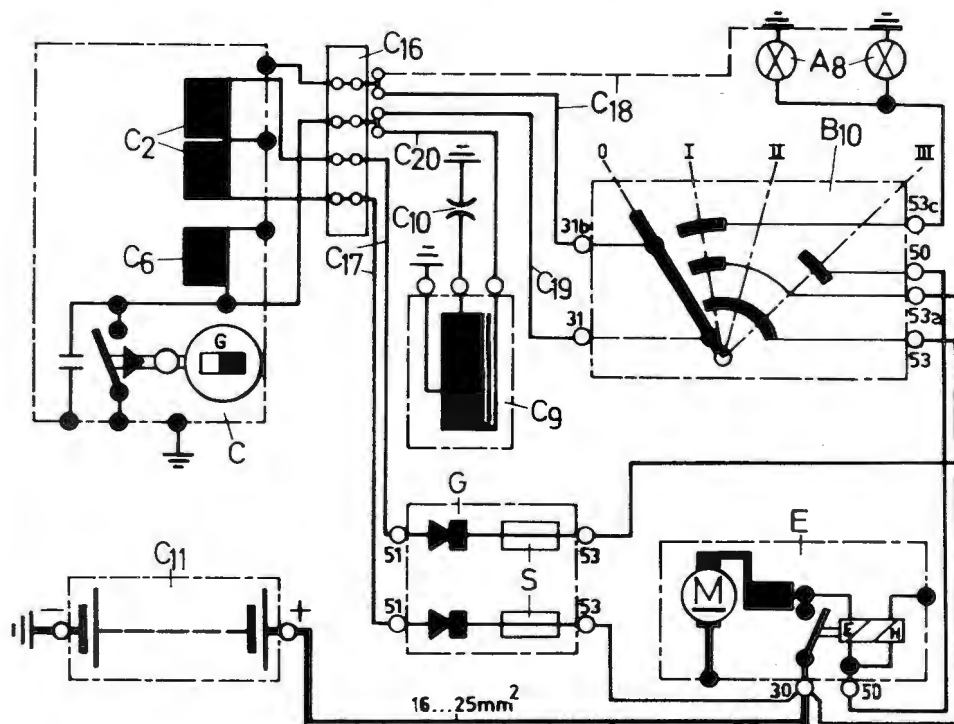


Fig. 67

F&S 4054:95

- | | |
|--|---|
| A ₈ = Load (12 V 50 W) | C ₁₇ = Lighting lead (yellow) |
| B ₁₀ = Ignition light switch | C ₁₈ = Additional earth lead (brown) |
| C = Dynamo magneto | C ₁₉ = Short-circuiting lead (black) |
| C ₂ = Dynamo armature | C ₂₀ = Ignition lead (blue) |
| C ₆ = Ignition armature | |
| C ₉ = Ignition coil (lying outside) | E = Electric starter |
| C ₁₀ = Sparking plug | G = Rectifier |
| C ₁₁ = Battery | S = Fuse (4 Amps) |
| C ₁₆ = Terminal carrier | |

- Switching positions:**
- | | |
|-----|----------------------------------|
| 0 | = Off (Ignition short-circuited) |
| I | = Night operation |
| II | = Day operation |
| III | = Start (electric) |

INSTRUCTIONS AND WIRING DIAGRAM FOR DYNAMO MAGNETO 12 V 75 W AND BOSCH INERTIA PINION TYPE STARTER (Type DG)

The dynamo magneto generates alternating current with a lighting power of 75 Watt at 12 Volt.

The two yellow lighting leads are to be connected up to the rectifier for charging a 12 Volt 38 (or 32) Ah battery for lighting and for operating the electric starter (see wiring diagram).

During day operation, because of overcharging the battery, only one circuit is connected up, during night operation both circuits are connected up.

The bulbs should be so selected that they give a total load of 50 Watt.

Care should be taken to ensure proper wire cross sections for starter operation and a good earth connection between battery, chassis and lamps.

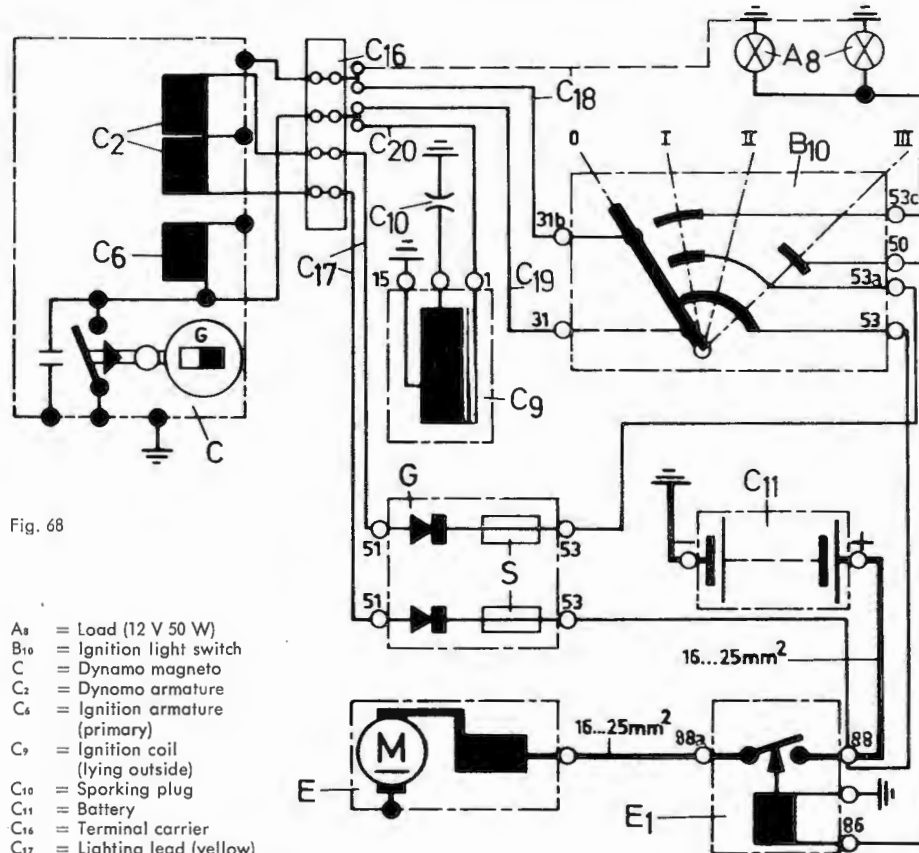


Fig. 68

- A₈ = Load (12 V 50 W)
- B₁₀ = Ignition light switch
- C = Dynamo magneto
- C₂ = Dynamo armature
- C₆ = Ignition armature (primary)
- C₉ = Ignition coil (lying outside)
- C₁₀ = Sparking plug
- C₁₁ = Battery
- C₁₆ = Terminal carrier
- C₁₇ = Lighting lead (yellow)
- C₁₈ = Additional earth lead (brown)
- C₁₉ = Short-circuiting lead (black)
- C₂₀ = Ignition lead (blue)
- E = Electric starter
- E₁ = Starter relay
- G = Rectifier
- S = Fuse (4 Amps)

Switching positions:

- 0 = Off (Ignition short-circuited)
- I = Night operation
- II = Day operation
- III = Start (electric)

LAYING-UP THE ENGINE

If the engine is not used for a fairly long time (e. g. in summer), there is a danger of rusting. In such cases the following precautions should be taken to protect the engine:

1. Mix the fuel with a running-in and anti-corrosion oil in 25 : 1 proportion and run the engine on this mixture for a short time. Use oils with a viscosity grade SAE 30 as supplied by leading oil companies (e. g. ENSIS Oil 30 available from SHELL).

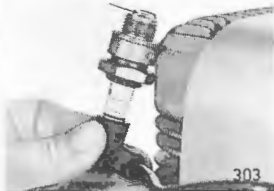
After the last run before laying-up, the engine should be stopped at full operating speed by means of the short-circuiting button, while the choke on the carburettor should be kept closed. When the engine has stopped, close the fuel tap. These precautions will adequately protect the crankshaft, connecting rod and main bearings against corrosion.

2. To protect the cylinder and the piston, place the piston at top dead center, unscrew the sparking plug and pour 3...5 cc (0.106...0.176 fl. oz.) of anti-corrosion oil through the sparking plug hole. Then turn the engine 15...20 times by means of the starter and screw in the spark plug.
3. To protect the engine externally, it is recommended that anti-corrosion oils be used as supplied by the leading oil companies;

for example:

Anticorit MR 5 supplied by Messrs. FUCHS, 6800 MANNHEIM, GERMANY
Lubrication Oil MIL-L-644 B supplied by MOBIL OIL
Shell ENSIS Fluid 260 supplied by SHELL
RUST BAN 395 supplied by ESSO

If the engine is laid up for more than six months with fuel in the tank, separation of the gasoline and oil in the fuel mixture may occur. In such cases we strongly recommend mixing the two constituents anew by stirring, or that they be replaced.

LUBRICATION AND MAINTENANCE CHART		Maintenance time schedule				
		Daily	Every 100 hours	Every 200 hours	When required	On assembly
 301	Intake silencer Remove intake silencer, clean in gasoline and blow out with compressed air.	If very dirty			X	
 302	Intake silencer Remove intake silencer with manifold and pull it out of the intake adaptor. Clean intake silencer and manifold in gasoline and blow out with compressed air.				X	
 303	Spark plug A provisional cleaning of the spark plug from carbon residue can be made on the insulator foot between the electrodes. An efficient cleaning can only be achieved by means of a sandblast unit. Functional check Unscrew spark plug, fit spark plug terminal, put spark plug thread in ground contact (cylinder head) and operate starter. If the spark plug is in good order, a strong spark must flash across the electrodes. Gap between electrodes 0.5 mm (0.020 in.), see arrow.				X	
Carburettor	Clean and adjust.				X	
Ignition system	Check and, if necessary, adjust contact-breaker. Apply BOSCH Ft 1 v 4 special grease to felt lubricator for contact-breaker cam.	X		X		
Engine and exhaust muffler	Decarbonize (see page 32).			X		X
Recoil starter	Smear coil spring with Aero-SHELL-Grease 14. Fill the 4 oil grooves in the pulley with the same lubricant. Lubricate starter cord and pawls lightly with SAE 10 oil.					X
Pinion on sliding pinion starter, pinion on inertia-pinion type starter and toothed rim on magneto flywheel	Clean with gasoline and lubricate with graphite grease (e. g. BOSCH special grease Ft 1 v 13).					X
Cylinder, connecting rod bearings, crankshaft bearings	By two-stroke mixture, i. e. commercial HD grades SAE 40 or 50 of leading oil companies (which correspond to the API classification MS and MIL-L 2104 A) with commercial brands of gasoline mixed at a ratio of 1 : 25. Or use SACHS Special Motor Oil (F & S Part No. 0263 005 100) which is available in cans. For SACHS engines SA 340 C, use only: SACHS Motor Sport Oil (F & S Part No. 0263 013 000) or SPECIAL FORMULA SAE 30 - W 50 or BARDAHL VBA SAE 40.					

TIGHTENING TORQUES FOR BOLTS AND NUTS

Bolts

F & S-No.	Qty.	Used on	Dimension	Tightening torque
0940 099 001	4	Contact-breaker hub . .	M 5 x 6	0.6... 0.8 kpm (4.3... 5.8 ft. lb.)
0940 120 200	4	Magneto ring in magneto housing . . .	M 6 x 10	0.9... 1.1 kpm (6.5... 8.0 ft. lb.)
1940 039 000	4	Crankcase	M 8 x 35	2.2... 2.4 kpm (15.9...17.4 ft. lb.)
1440 044 001	2	Crankcase	M 8 x 60	2.2... 2.6 kpm (15.9...18.8 ft. lb.)
1440 056 001	2	Crankcase (only SA 340 C)	M 8 x 65	2.2... 2.6 kpm (15.9...18.8 ft. lb.)
0940 056 000	4	Cylinder head	M 10 x 55	4.6... 4.8 kpm (33.3...34.7 ft. lb.)
1440 038 001	6	Cylinder head (only SA 340 C)	M 8 x 60	2.2... 2.6 kpm (15.9...18.8 ft. lb.)
0240 056 001	3	Armature base plate . .	M 5 x 12	0.4... 0.5 kpm (2.9... 3.6 ft. lb.)

Nuts

F & S-No.	Qty.	Used on	Dimension	Tightening torque
1942 001 000	4	Cylinder	M 10 (14 mm across flats)	4.6... 4.8 kpm (33.3...34.7 ft. lb.)
0242 009 000	4	Cylinder (only SA 340 C)	M 10 (17 mm across flats)	2.0... 2.2 kpm (14.4...15.9 ft. lb.)
0316 057 002	4	Fan	M 6	0.5... 0.6 kpm (3.6... 4.3 ft. lb.)
1442 007 000	1	Crankshaft, magneto side (recoil starter with friction jaws)	M 14 x 1.5	5.4... 6.0 kpm (39.1...43.1 ft. lb.)
1442 001 101	1	Crankshaft, magneto side (Fairbanks recoil starter)	M 14 x 1.5	5.4... 6.0 kpm (39.1...43.1 ft. lb.)
1442 005 001	1	Crankshaft, magneto side (recoil starter with pawls)	M 14 x 1.5	9.0... 9.5 kpm (65.1...68.7 ft. lb.)

REPAIR DIMENSIONS

SACHS SA 280 A and SA 280

Cylinder assy. No.		standard 1487 005 120		1st rebore 1487 005 121		2nd rebore 1487 005 122		3rd rebore 1487 005 123		
Cylinder	dia. white	mm $71 + 0.039$ $+ 0.033$	ins. $2.795 + 0.00153$ $+ 0.00129$	mm $71.5 + 0.039$ $+ 0.033$	ins. $2.814 + 0.00153$ $+ 0.00129$	mm $72 + 0.039$ $+ 0.033$	ins. $2.834 + 0.00153$ $+ 0.00129$	mm $72.5 + 0.039$ $+ 0.033$	ins. $2.853 + 0.00153$ $+ 0.00129$	
	dia. red	$71 + 0.033$ $+ 0.020$	$2.795 + 0.00129$ $+ 0.00078$	$71.5 + 0.033$ $+ 0.020$	$2.814 + 0.00129$ $+ 0.00078$	$72 + 0.033$ $+ 0.020$	$2.834 + 0.00129$ $+ 0.00078$	$72.5 + 0.033$ $+ 0.020$	$2.853 + 0.00129$ $+ 0.00078$	
Piston assy. No.		1486 029 015		1486 029 016		1486 029 017		1486 029 018		
Punched in measure	dia. white dia. red	71		71.5		72		72.5		
Piston ring No.		1415 001 005		1415 001 006		1415 001 007		1415 001 008		
Piston pin No.		0916 011 000								
Connecting rod bush No.		0932 059 005		Bore 18 mm $+ 0.020$ $- 0.030$		0.70866 in. $+ 0.00078$ $- 0.00118$		ream to 18 mm $+ 0.050$ $+ 0.030$		0.70866 in. $+ 0.00196$ $+ 0.00118$

The cylinders and pistons are sorted into two tolerance groups (+ and -) and correspondingly marked white or red. Care must be taken to ensure that only cylinders and pistons are assembled which bear identical color markings.

SACHS SA 290

Cylinder assy. no.		1487 015 110		1487 015 000/100		1487 015 001/101		1487 015 002/102	
293 cc		standard		1st rebore		2nd rebore			
297 cc				standard		1st rebore		2nd rebore	
Cylinder	dia. white	mm 73 + 0.019 + 0.013	ins. 2.874 + 0.00074 + 0.00051	mm 73.5 + 0.019 + 0.013	ins. 2.8937 + 0.00074 + 0.00051	mm 74 + 0.019 + 0.013	ins. 2.9134 + 0.00074 + 0.00051	mm 74.5 + 0.019 + 0.013	ins. 2.9331 + 0.00074 + 0.00051
	dia. red	73 + 0.013 0	2.874 + 0.00051 0	73.5 + 0.013 0	2.8937 + 0.00051 0	74 + 0.013 0	2.9134 + 0.00051 0	74.5 + 0.013 0	2.9331 + 0.00051 0
Pistan assy. no.		1487 030 015		1486 030 005		1486 030 006		1486 030 007	
293 cc		standard		1st rebore		2nd rebore			
297 cc				standard		1st rebore		2nd rebore	
Punched in measure }	dia. white	73		73.5		74		74.5	
	dia. red								
Piston ring no.		1415 002 105		1415 002 100		1415 002 101		1415 002 102	
293 cc		standard		1st rebore		2nd rebore			
297 cc				standard		1st rebore		2nd rebore	
Piston pin no.		1416 001 000							
Connecting rod bush no.		0932 059 005	Bore 18 mm + 0.020 - 0.030		0.70866 in. + 0.00078 - 0.00118	ream to 18 mm + 0.050 + 0.030		0.70866 in. + 0.00196 + 0.00118	

The cylinders and pistons are sorted into two tolerance groups (+ and -) and correspondingly marked white or red.
Care must be taken to ensure that only cylinders and pistons are assembled which bear identical color markings.

SACHS SA 340 C

Cylinder assy. no.		standard 1487 030 000		1st rebore 1487 030 001		2nd rebore 1487 030 002	
Cylinder	dia. white	$78 \begin{smallmatrix} + 0.039 \\ + 0.033 \end{smallmatrix} \text{ mm}$	$3.071 \begin{smallmatrix} + 0.00153 \\ + 0.00129 \end{smallmatrix} \text{ ins.}$	$78.25 \begin{smallmatrix} + 0.039 \\ + 0.033 \end{smallmatrix} \text{ mm}$	$3.081 \begin{smallmatrix} + 0.00153 \\ + 0.00129 \end{smallmatrix} \text{ ins.}$	$78.5 \begin{smallmatrix} + 0.039 \\ + 0.033 \end{smallmatrix} \text{ mm}$	$3.091 \begin{smallmatrix} + 0.00153 \\ + 0.00129 \end{smallmatrix} \text{ ins.}$
	dia. red	$78 \begin{smallmatrix} + 0.033 \\ + 0.020 \end{smallmatrix} \text{ mm}$	$3.071 \begin{smallmatrix} + 0.00129 \\ + 0.00078 \end{smallmatrix} \text{ ins.}$	$78.25 \begin{smallmatrix} + 0.033 \\ + 0.020 \end{smallmatrix} \text{ mm}$	$3.081 \begin{smallmatrix} + 0.00129 \\ + 0.00078 \end{smallmatrix} \text{ ins.}$	$78.5 \begin{smallmatrix} + 0.033 \\ + 0.020 \end{smallmatrix} \text{ mm}$	$3.091 \begin{smallmatrix} + 0.00129 \\ + 0.00078 \end{smallmatrix} \text{ ins.}$
Piston assy. no.		1486 037 005		1486 037 006		1486 037 007	
Punched in measure	dia. white	78		78.25		78.5	
	dia. red						
Piston ring no.		1415 008 000		1415 008 001		1415 008 002	
Piston pin no.		1416 005 000					
Connecting rod bush no.		0932 059 005	Bore 18 mm $\begin{smallmatrix} + 0.020 \\ - 0.030 \end{smallmatrix}$	$0.70866 \text{ in.} \begin{smallmatrix} + 0.00078 \\ - 0.00118 \end{smallmatrix}$	ream to 18 mm $\begin{smallmatrix} + 0.050 \\ + 0.030 \end{smallmatrix}$	$0.70866 \text{ in.} \begin{smallmatrix} + 0.00196 \\ + 0.00118 \end{smallmatrix}$	

The cylinders and pistons are sorted into two tolerance groups (+ and -) and correspondingly marked white or red.
Care must be taken to ensure that only cylinders and pistons are assembled which bear identical color markings.

ENGINE FAULTS

A number of possible faults are listed below, together with likely causes.

A. Engine refuses to start

a) Plug not sparking, because

1. Plug oiled up, damp, shorted or damaged,
2. Exterior of plug wet,
3. Ignition lead loose or broken,
4. Short-circuit button jams, or leads from engine are damaged,
5. Breaker-contacts oiled up, damp or burnt,
6. Ignition armature or condenser damaged.

b) No fuel reaching engine, because

1. No fuel in tank,
2. Fuel cock closed,
3. Fuel strainer clogged,
4. Fuel line blocked,
5. Jets clogged.

c) Fuel mixture not ignitable, because

1. Carburettor flooded,
2. Water in carburettor,
3. Infiltrated air due to loose carburettor.

d) Lack of compression, because

1. Piston rings broken,
2. Piston and cylinder worn,
3. Vent cock on crankcase open,
4. Cylinder head or spark plug loose.

B. Engine lacks power

a) Due to dirty components, because

1. Intake silencer soiled,
2. Exhaust and transfer ports in cylinder clogged with carbon,
3. Thick carbon deposit in cylinder head,
4. Fuel tank gets no air (filler cap),
5. Spark plug vitrified.

b) Due to lack of compression, because (see under "Lack of compression, because").

C. Other engine faults

a) Engine runs unevenly, because

1. Ignition lead loose or damaged,
2. Engine overheats; fuel vapor lock in carburettor interrupts fuel supply,
3. Contact-breaker points oiled up or fused,

4. Locating pin for contact-breaker arm worn,
5. Spark plug or spark plug terminal or ignition armature not in order.

b) Engine four-strokes and does not reach speed, because

1. Choke closed,
2. Carburettor floods due to clogged or damaged inlet needle seating,
3. Exhaust duct clogged with carbon,
4. Carburettor setting incorrect or jets loose,
5. Intake silencer soiled.

c) Engine pinks at full speed under load, because

1. Ignition too far advanced,
2. Combustion chamber needs decarbonizing,
3. Cooling fins soiled,
4. Small end bushing worn.

d) Engine backfires or spits into carburettor, because

1. Engine not getting adequate fuel,
2. Spark plug glows due to incorrect heat value,
3. Spark plug shorted, dirty or vitrified,
4. Engine getting infiltrated air,
5. Water in carburettor.

e) Engine gets too hot and piston seizes, because

1. Engine badly decarbonized (piston crown polished clean),
2. Engine not getting sufficient fuel,
3. Carburettor adjusted incorrectly or wrong oil used,
4. Cooling fins on cylinder and cylinder head soiled,
5. There are pre-ignitions.

f) Engine has no idling speed, because

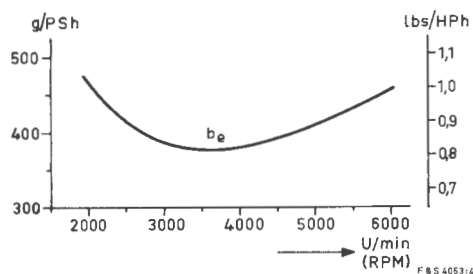
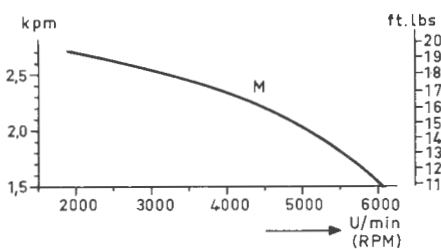
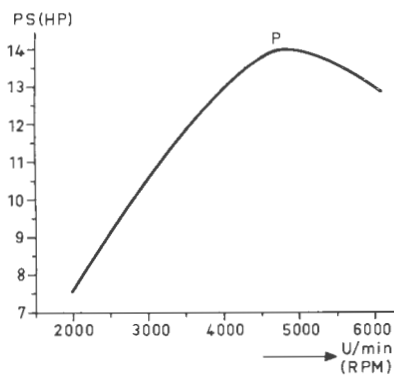
1. Idling adjustment screw or idle stop screw incorrectly adjusted,
2. Control cable for butterfly valve wrongly adjusted,
3. Ignition armature damaged.

g) Fuel consumption of engine is too high, because

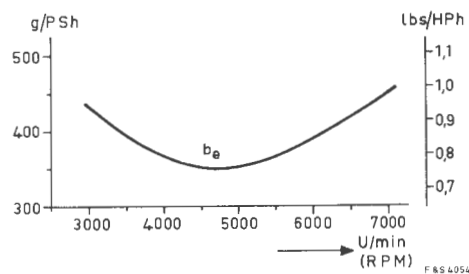
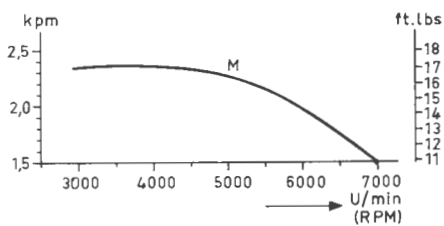
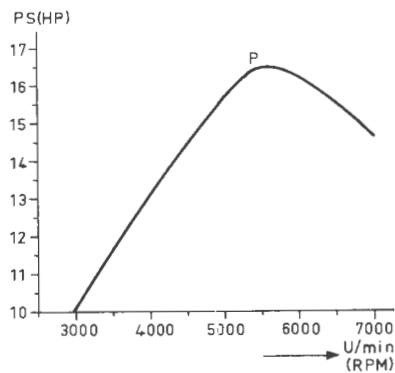
1. Fuel tank, fuel line or carburettor leaking,
2. Jets too large.

TECHNICAL DATA

SACHS SA 280 A



SACHS SA 280

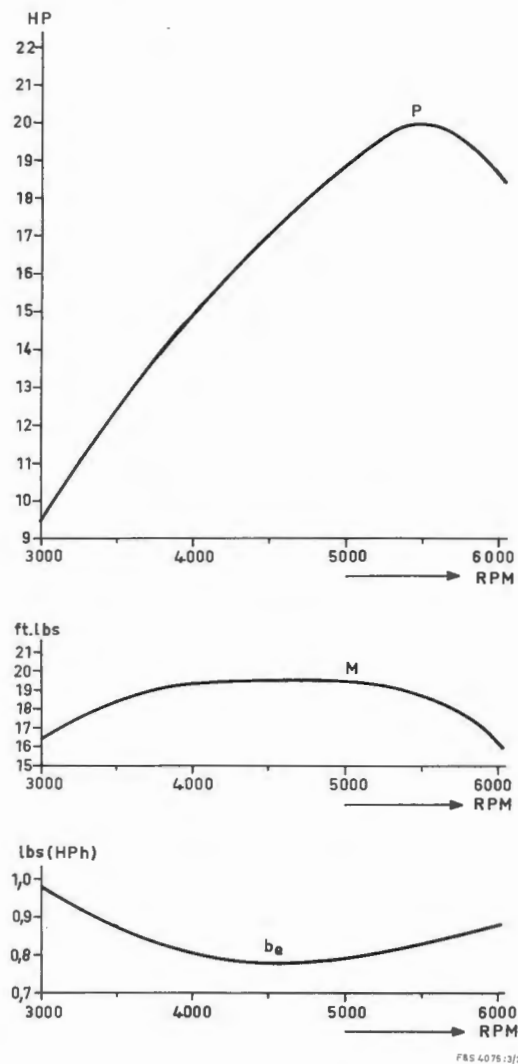


The indicated engine performance is valid for barometric reading $b_0 = 760$ mm Hg and air temperature $t_L = 20^\circ \text{C}$ for the fully run-in engine with a tolerance of $\pm 5\%$.

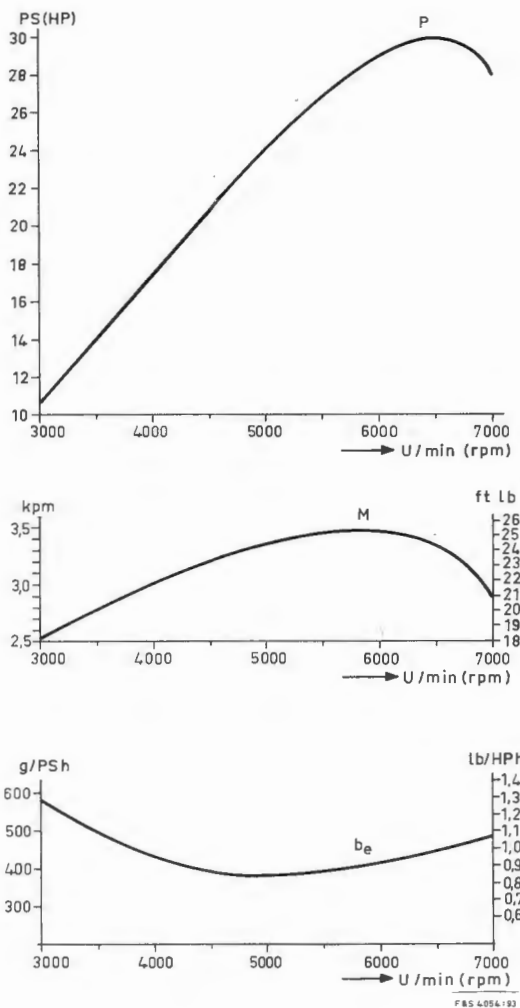
To obtain the performance according to DIN 6270 ($b_0 = 736$ mm Hg and $t_L = 20^\circ \text{C}$) the performance given above must be multiplied by the correction factor 0.97.

In the interest of technical progress we reserve the right to introduce modifications without notice.

SACHS SA 290



SACHS SA 340 C (competition)

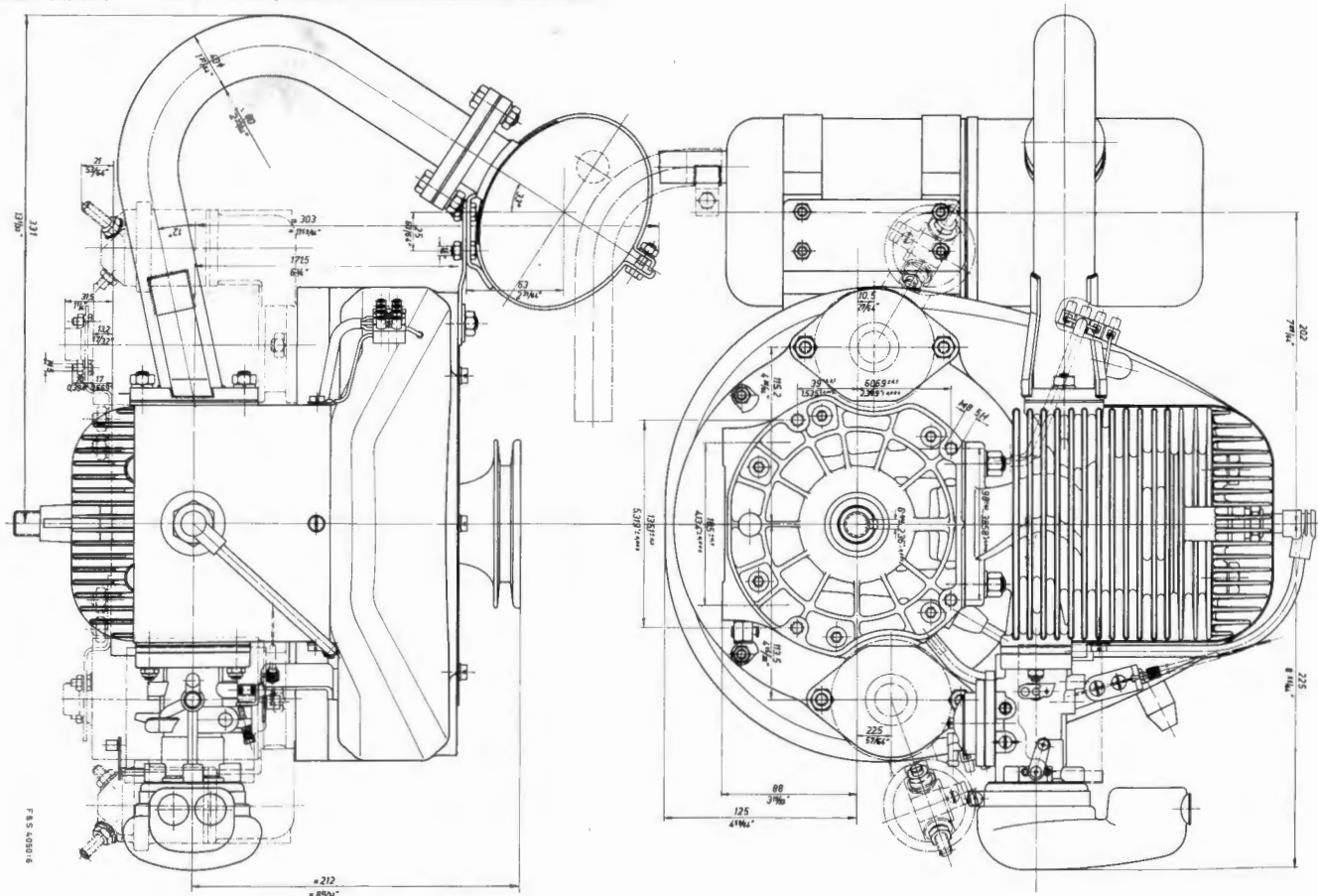
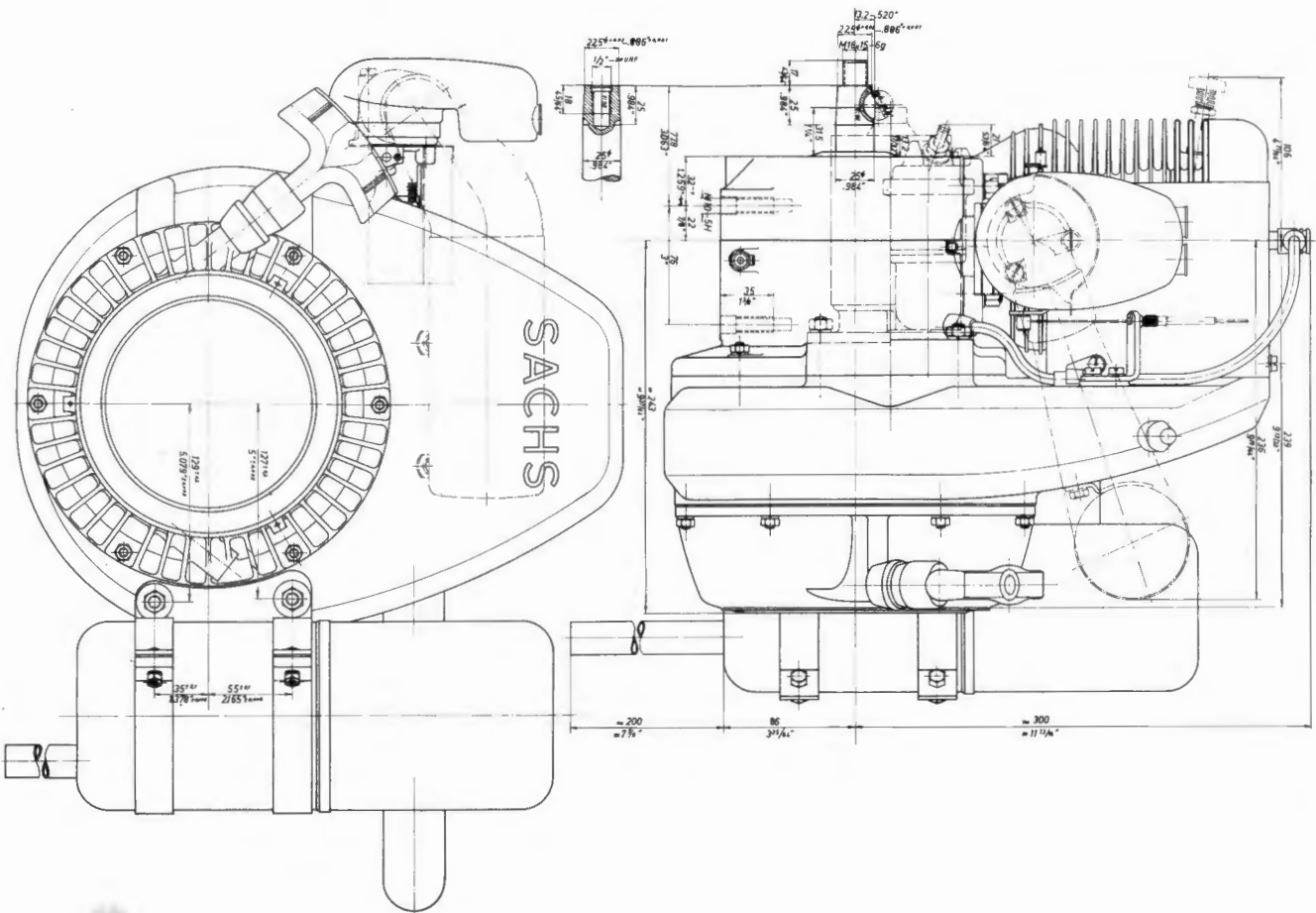


The indicated engine performance is valid for barometric reading $b_0 = 760$ mm Hg and air temperature $t_L = 20^\circ \text{C}$ for the fully run-in engine with a tolerance of $\pm 5\%$.

To obtain the performance according to DIN 6270 ($b_0 = 736$ mm Hg and $t_L = 20^\circ \text{C}$) the performance given above must be multiplied by the correction factor 0.97.

In the interest of technical progress we reserve the right to introduce modifications without notice.

INSTALLATION DIMENSIONS FOR SACHS SA 280 A, SA 280, SA 290



INSTALLATION DIMENSIONS FOR SACHS SA 340 C

