K. NASH.

SACHS

Repair Instructions No. 320.8 E/2

SACHS 50/3 LFH
50/3 LF S
50/3 MLF B
50/4 LKH
50/4 LK S
50/4 LF NL
50/4 MLFA NL
50/4 MLF B
50/4 MLKA X

Edition May 1970

FICHTEL & SACHS AG · D-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.

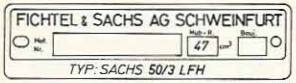
Of course, good maintenance and repair work and efficient service to customers call for good equiment, a well fitted-out workshop, and trained personnel.

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.

IDENTIFICATION PLATES AND ENGINE VERSION



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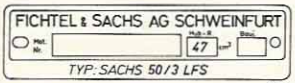
SACHS 50/3 LF H



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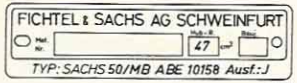

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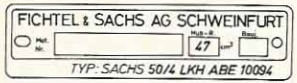
SACHS 50/3 MLF B



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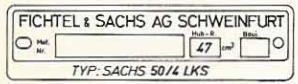

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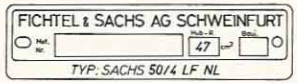

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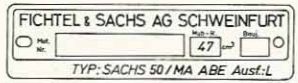

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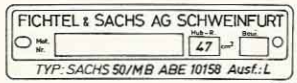
SACHS 50/4 MLFA NL



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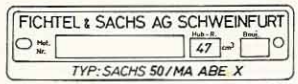

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SACHS 50/4 MLKA X

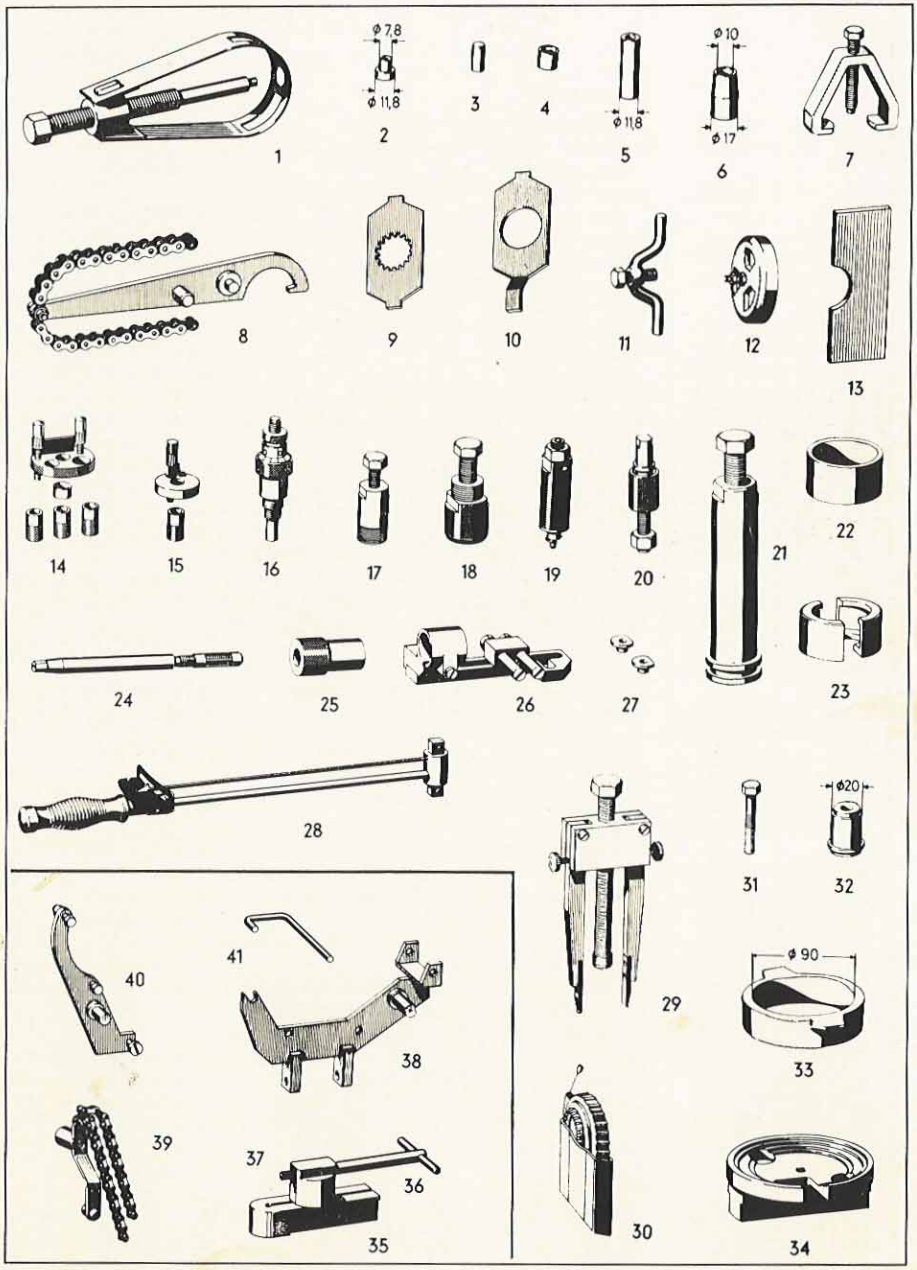
TECHNICAL DATA

Description:	SACHS 50/3 LFH	SACHS 50/3 LFS	SACHS 50/3 MLF B
Type:	Single-cylinder two-stroke petrol engine		
Cooling:	Air cooling by fan		
Piston displacement:	47 cc (2.867 cu. in.)		
Bore:	Ø 38 mm (1.496 in.)		
Stroke:	42 mm (1.654 in.)		
Compression ratio:	9		
Output:	4.3 HP (DIN) at 7250 rpm	1.0 HP (DIN) at 3500 rpm	2.6 HP (DIN) at 5000 rpm
Crankshaft bearings:	2 anti-friction bearings		
Ignition:	BOSCH magneto generator		
	Headlamp 6 V 25 W Rear light 6 V 4 W	Headlamp 6 V 15 W Rear light 6 V 3 W	Stop light 6 V 5 W
	Headlamp 6 V 25 W Rear light 6 V 4 W	Stop light 6 V 5 W	Headlamp 6 V 15 W Rear light 6 V 2 W or 4 W
Ignition timing:	2.8 . . . 3.2 mm before TDC (0.1102 . . . 0.1260 in.)	1.5 . . . 2.0 mm before TDC (0.0591 . . . 0.0787 in.)	
Contact breaker gap:	0.4 ± 0.05 mm (0.015748 ± 0.001968 in.)		
Pole shoe gap:	7 . . . 11 mm (0.2756 . . . 0.4331 in.)		
Spark plug:	BOSCH W 260 T 1	BOSCH W 175 T 1	BOSCH W 225 T 1
Carburettor:	BING single slide carburettor Ø 17 mm BING No. 1/17/49	BING single slide carburettor Ø 9.2 mm BING No. 1/8.5/5 (with main jet 54) or 1/8.5/14 (with main jet 56)	BING single slide carburettor Ø 12 mm BING No. 1/12/168 (with main jet 60 and needle position II) or 1/12/171 (with main jet 70, needle position III and intake silencer
Carburettor setting:	Main jet: 74 — needle jet: 2017 — jet needle: 2 — needle position: III — slide valve: No. 14	Main jet: 54 or 56 — needle jet: 1517 — jet needle: 2 — needle position: II — slide valve: No. 14	Main jet: 60 or 70 — needle jet: 1717 — jet needle: 2 — needle position: II or III — slide valve: No. 14
Engine lubrication:	Petroil lubrication 25:1 ratio		
Clutch:	Multiple disc clutch		
Gear shifting:	Foot-operated		
Transmission ratio engine — gearbox:	3.88		
Gearbox:	Change-speed gearbox, 3 gears in engine block		
Gear ratio:	1st gear: 3.44 — 2nd gear: 2.10 — 3rd gear: 1.40		
Gearbox lubrication:	200 cc (7 fl. oz.) of SACHS gear oil or SAE-80 oil		
Chain to rear wheel:	Roller chain 1 x 12.7 x 4.88 DIN 8180		
	Engine sprocket 12 teeth Rear wheel sprocket 30 teeth for tyre size 23 x 2.5" DIN 7801	Engine sprocket 11 teeth Rear wheel sprocket 35 teeth for tyre size 21 x 2.75" DIN 7801	Engine sprocket 11 teeth Rear wheel sprocket 32 teeth for tyre size 23 x 2,5" DIN 7801
	Engine sprocket 12 teeth Rear wheel sprocket 28 teeth for tyre size 21 x 2.75" DIN 7801	Engine sprocket 12 teeth Rear wheel sprocket 40 teeth for tyre size 21 x 2.75" DIN 7801	Engine sprocket 12 teeth Rear wheel sprocket 32 teeth for tyre size 21 x 2.75" DIN 7801
Method of starting:	Kickstarter		
Exhaust silencer:	Swirl type		
Exhaust pipe:	30 mm I. D. (1.181 in.) Length 300 . . . 330 mm (11.811 . . . 12.992 in.)	26 mm I. D. (1.023 in.) Length 450 mm (17.716 in.)	26 mm I. D. (1.023 in.) Length 350 mm (13.78 in.) + 24 mm I. D. (0.944 in.) Length 200 mm (7.874 in.) (inserted in exhaust silencer)
Speedometer drive:	Attachment according to VDO M 1		

Description:	SACHS 50/4 LKH	SACHS 50/4 LKS	SACHS 50/4 LF NL
Type:	Single-cylinder two-stroke petrol engine		
Cooling:	Air cooling by fan		
Piston displacement:	47 cc (2.867 cu. in.)		
Bore:	Ø 38 mm (1.496 in.)		
Stroke:	42 mm (1.654 in.)		
Compression ratio:	9		
Output:	4.3 HP (DIN) at 7250 rpm	1.0 HP (DIN) at 3500 rpm	1.8 HP (DIN) at 4200 rpm
Crankshaft bearings:	2 anti-friction bearings		
Ignition:	BOSCH magneto generator		
	Headlamp 6 V 25 W / Rear light 6 V 4 W / Stop light 6 V 5 W / Headlamp 6 V 30 W / Rear light 6 V 5 W / Stop light 6 V 18 W / for external ignition coil	Headlamp 6 V 15 W / Rear light 6 V 3 W / Stop light 6 V 5 W	
Ignition timing:	2.8 . . . 3.2 mm before TDC (0.1102 . . . 0.1260 in.)	1.5 . . . 2.0 mm before TDC (0.591 . . . 0.787 in.)	
Contact breaker gap:	0.4 ± 0.05 mm (0.015748 ± 0.001968 in.)		
Pole shoe gap:	7 . . . 11 mm (0.2756 . . . 0.4331 in.)		
Spark plug:	BOSCH W 225 T 1 or W 260 T 1	BOSCH W 95 T 1	BOSCH W 190 M 11 S
Carburettor:	BING single slide carburettor Ø 17 mm, BING No. 1/17/49 (with main jet 74, intake silencer, lateral connection) or 1/17/53 (with main jet 74, connection on top) or 1/17/69 (with main jet 76, round wet air cleaner in filter cap)	BING single slide carburettor Ø 9.2 mm, BING No. 1/8.5/14 (with main jet 56 and needle jet 1517)	BING single slide carburettor Ø 12 mm, BING No. 1/12/189 (with main jet 60 and needle jet 1717)
Carburettor setting:	Main jet: 74 or 76 / needle jet: 2017 / jet needle: 2 / needle position: III / slide valve: No. 14	Main jet: 56 or 60 / needle jet: 1517 or 1717 / jet needle: 2 / needle position: II / slide valve: No. 14	
Engine lubrication:	Petroil lubrication 25:1 ratio		
Clutch:	Multiple disc clutch		
Gear shifting:	Foot-operated		
Transmission ratio engine — gearbox:	3.88		
Gearbox:	Change-speed gearbox, 4 gears in engine block		
Gear ratios:	1st gear 3.88, 2nd gear 2.25, 3rd gear 1.50, 4th gear 1.22		
Gearbox lubrication:	200 cc (0.35 Imp. pints) of SACHS gear oil or SAE-80 oil		
Chain to rear wheel:	Roller chain 1 x 12.7 x 4.88 DIN 8180		
	Engine sprocket 12 teeth / Rear wheel sprocket 28 teeth / for tyre size 21 x 2.75" DIN 7801	Engine sprocket 11 teeth / Rear wheel sprocket 44 teeth / for tyre size 23 x 2.25" DIN 7801	Engine sprocket 11 teeth / Rear wheel sprocket 36 teeth / for tyre size 21 x 2.75" DIN 7801
	Engine sprocket 12 teeth / Rear wheel sprocket 30 teeth / for tyre size 23 x 2.25" DIN 7801		Engine sprocket 11 teeth / Rear wheel sprocket 36 teeth / for tyre size 23 x 2.5" DIN 7801
	Engine sprocket 13 teeth / Rear wheel sprocket 32 teeth / for tyre size 23 x 2,5" DIN 7801		
Method of starting:	Kickstarter		Pedal crank
Exhaust silencer:	Swirl type		
Exhaust pipe:	30 mm (1.181 in.) I. D. / Length 300 . . . 330 mm (11.811 . . . 12.992 in.)	26 mm (1.023 in.) I. D. / Length 400 . . . 450 mm (15.748 . . . 17.716 in.)	26 mm (1.023 in.) I. D. / Length 530 mm (20.866 in.)
Speedometer drive:	Attachment according to VDO M 10 x 1		

Description:	SACHS 50/4 MLFA NL	SACHS 50/4 MLF B	SACHS 50/4 MLKA X
Type:	Single-cylinder two-stroke gasoline engine		
Cooling:	Air cooling by fan		
Piston displacement:	47 cc (2.867 cu. in.)		
Bore:	Ø 38 mm (1.496 in.)		
Stroke:	42 mm (1.654 in.)		
Compression ratio:	9		
Output:	1.8 HP (DIN) at 4200 rpm	2.6 HP (DIN) at 5000 rpm	2.4 HP (DIN) at 5800 rpm
Crankshaft bearings:	2 anti-friction bearings		
Ignition:	BOSCH magneto generator		
	Headlamp 6 V 15 W Rear light 6 V 3 W Stop light 6 V 5 W		
Ignition timing:	1.5 . . . 2.0 mm (0.0591 . . . 0.0787 in.) before TDC		
Contact breaker gap:	0.4 ± 0.05 mm (0.015748 ± 0.001968 in.)		
Pole shoe gap:	7 . . . 11 mm (0.2756 . . . 0.4331 in.)		
Spark plug:	BOSCH W 225 T 1		
Carburettor:	BING single slide carburettor Ø 12 mm BING No. 1/12/168		BING single slide carburettor Ø 12 mm BING No. 1/12/167
Carburettor setting:	Main jet: 60 / needle jet: 1717 / jet needle: 2 / needle position: II / slide valve: No. 14		Main jet: 64 / needle jet: 1717 / jet needle: 2 / needle position: III / slide valve: No. 14
Engine lubrication:	Petroil lubrication 25:1 ratio		
Clutch:	Multiple disc clutch		
Gear shifting:	Foot-operated		
Transmission ratio engine — gearbox:	3.88		
Gearbox:	Change speed gear 4 gears in engine block		
Gear ratios:	1st gear 3.88 2nd gear 2.25 3rd gear 1.50 4th gear 1.22		
Gearbox lubrication:	200 cc (0.35 Imp. pints) of SACHS gear oil or SAE-80 oil		
Chain to rear wheel:	Roller chain 1 x 12.7 x 4.88 DIN 8180		
	Engine sprocket 11 teeth Rear wheel sprocket 37 teeth for tyre size 23 x 2.5" DIN 7801	Engine sprocket 11 teeth Rear wheel sprocket 34 teeth for tyre size 21 x 2.75" DIN 7801	Engine sprocket 11 teeth Rear wheel sprocket 32 teeth for tyre size 23 x 2.5" DIN 7801
	Engine sprocket 12 teeth Rear wheel sprocket 40 teeth for tyre size 23 x 2.5" DIN 7801	Engine sprocket 11 teeth Rear wheel sprocket 37 teeth for tyre size 23 x 2.5" DIN 7801	
Method of starting:	Pedal crank	Kickstarter	
Exhaust silencer:	Swirl type		
Exhaust pipe:	26 mm I. D. (1.023 in.) Length 530 mm (20.866 in.)	26 mm I. D. (1.023 in.) Length 350 mm (13.78 in.) + 24 mm (0.945 in.) I. D.; Length 200 mm (7.874 in.) (inserted in silencer)	26 mm I. D. (1.023 in.) Length 450 mm (17.716 in.)
Speedometer drive:	Attachment according to VDO M 10 x 1		

REPAIR TOOLS AND ASSEMBLY JIG



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Illustr. No.	Part No.	Description	Engine								
			50/3 LF S	50/3 LF H	50/3 MLF B	50/4 LK H	50/4 LK S	50/4 LF NL	50/4 MLFA NL	50/4 MLF B	50/4 MLKA X
		Repair tools									
1	0276 065 101	Gudgeon pin withdrawal tool	x	x	x	x	x	x	x	x	x
2	0277 083 000	Insertion sleeve for gudgeon pin withdrawal tool	x	x	x	x	x	x	x	x	x
3	0278 023 100	Protective cover for gearshift bar, 6 mm dia. bore	x	x	x	x	x	x	x	x	x
4	0276 156 000	Protective cover, 10 mm dia. bore	x	x	x	x	x	x	x	x	x
5	0276 023 001	Fixing bolt for piston	x	x	x	x	x	x	x	x	x
6	0278 022 010	Protective sleeve for crankshaft (p. t. o. side)	x	x	x	x	x	x	x	x	x
7	0277 076 105	Withdrawal tool for chain wheel	x	x	x	x	x	x	x	x	x
8	0277 086 306	Hook spanner	x	x	x	x	x	x	x	x	x
9	0292 022 000	Locking plate	x	x	x	x	x	x	x	x	x
10	0278 008 000	Retaining plate for clutch	x	x	x	x	x	x	x	x	x
11	0276 117 000	Withdrawal tool for clutch housing	x	x	x	x	x	x	x	x	x
12	0276 057 000	Clamping tool for clutch	x	x	x	x	x	x	x	x	x
13	0276 019 101	Intermediate plate	x	x	x	x	x	x	x	x	x
14	0276 140 005	Calibration plate with 3 knurled nuts	x	x	x	x	x	x	x	x	x
15	0276 139 000	Calibration plate for main shaft	x	x	x	x	x	x	x	x	x
16	0276 135 000	Pre-ignition setting gauge	x	x	x	x	x	x	x	x	x
17	0276 150 005	Withdrawal tool for magneto flywheel M 26 x 1.5	x	x	x	x	x	x	x	x	x
18	0676 011 001	Withdrawal tool for clutch hub M 27x1.25	x	x	x	x	x	x	x	x	x
19	0276 145 000	Withdrawal tool for intermediate shaft bush	x	x	x	x	x	x	x	x	x
20	0276 134 100	Tool for removal and replacement of connecting rod small end bushing	x	x	x	x	x	x	x	x	x
21	1476 013 000.8	Withdrawal sleeve assy.	x	x	x	x	x	x	x	x	x
	1476 011 000.8	Threaded sleeve } Spare parts for									
	1440 027 001.8	Hexagon bolt } 1476 013 000.8									
	1476 012 000.8	Thrust bearing }									
22	1447 009 000.8	Clamping ring, 58 mm I. D.	x	x	x	x	x	x	x	x	x
23	1476 014 007.8	Withdrawal shells for inner race of magnet-type ball bearing L 17	x	x	x	x	x	x	x	x	x
24	0276 159 000	Adjustable reamer P 11.5 ... 12.5 mm	x	x	x	x	x	x	x	x	x
25	0276 158 000	Guide sleeve No. 2, 14.7 dia. bore	x	x	x	x	x	x	x	x	x
26	0276 157 000	Guide bar assembly	x	x	x	x	x	x	x	x	x
27	0276 160 000	Fixing sleeve, 6.2 mm dia, bore (2 pieces)	x	x	x	x	x	x	x	x	x
28	0276 170 000	Torque wrench	x	x	x	x	x	x	x	x	x
29	0276 161 101	Extracting tool for crankshaft oil seals	x	x	x	x	x	x	x	x	x
	0276 164 100	Extracting hook 3 mm } Spare parts for									
	1476 012 000.8	Thrust bearing assy. } 0276 161 101									
30	1376 020 000,8	Revolution counter	x	x	x	x	x	x	x	x	x
31	1440 038 001	Hexagon bolt M 8 x 60	x	x	x	x	x	x	x	x	x
32	0277 082 000	Centering piece	x	x	x	x	x	x	x	x	x
33	0277 080 000	Centering ring	x	x	x	x	x	x	x	x	x
34	0276 143 000	Centering plate	x	x	x	x	x	x	x	x	x
		Assembly jig									
35	0276 081 000	Clamping base	x	x	x	x	x	x	x	x	x
36	0276 085 005	Setscrew	x	x	x	x	x	x	x	x	x
37	0276 082 000	Swivel unit	x	x	x	x	x	x	x	x	x
38	0276 088 006	Mounting plate	x	x	x	x	x	x	x	x	x
39	0276 093 205	Clamping arm	x	x	x	x	x	x	x	x	x
40	0276 169 001	Assembly bracket	x	x	x	x	x	x	x	x	x
41	0276 115 000	Holding handle	x	x	x	x	x	x	x	x	x

TAKING DOWN THE ENGINE

Remove all connections from engine to frame (control cables, electric connections etc.).
Remove rubber clamping strap (if fitted) and pull off intake silencer.
For taking off and refitting the clutch cable see page 52.
Remove engine from frame and clean it thoroughly before dismantling.

Draining the gear oil

Fig. 1

Remove kick starter arm or crank respectively, as well as foot change pedal and sealing ring.
Remove cover "S", oil drain plug (1) and oil level control screw (2). Lay engine down on clutch side and drain the gear oil.

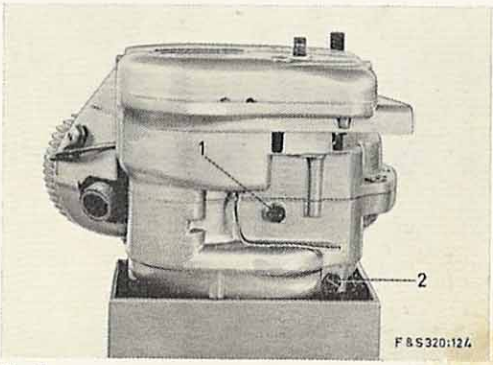


Fig. 1

Mounting the engine

Fig. 2

Screw engine in position on the assembly jig with 2 screws (2) M 8 x 60, as shown in the adjoining illustration.
Unscrew cover (1).
Take care of the two body-fit sleeves.

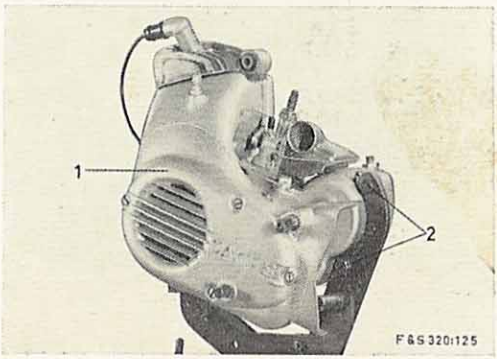


Fig. 2

Fan and fan housing

Fig. 3

Unscrew fan (1) and remove packing washer underneath.
Put on the foot change pedal temporarily and engage first gear while simultaneously turning the sprocket.
Unscrew hexagon nut (4) and crown nut (5).
The complete gearshift assembly should be dismounted only if necessary (see page 30).
Disconnect clutch rod (2) from clutch lever (3).
Remove fan housing (6).
Take care of the two body-fit sleeves.

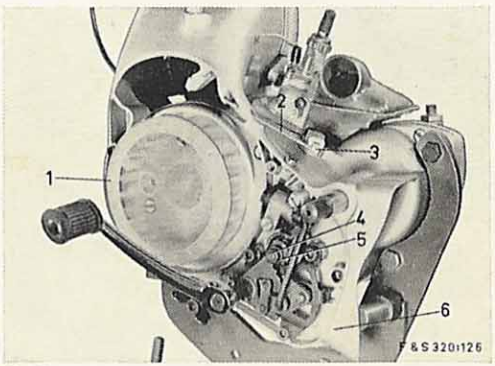


Fig. 3

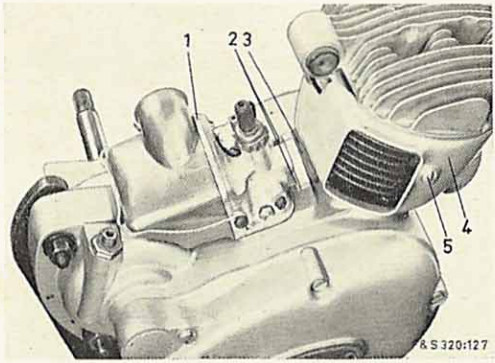


Fig. 4

Cylinder casing and carburettor

Fig. 4

Screw off the cylinder casing (4).

Note:

In the case of SACHS 50/3 LF S, 50/3 MLF B, 50/4 LK S, 50/4 MLFA NL, 50/4 MLF B and 50/4 MLKA X take care of spacer bush under the cylinder casing.

Remove carburettor (1).

Take care of fiber washers (2).

Remove asbestos gasket (3).

Note:

On SACHS 50/3 MLF B, 50/4 MLFA NL, 50/4 MLF B and 50/4 MLKA X unscrew intermediate flange and intermediate plate (diaphragm) only if necessary.

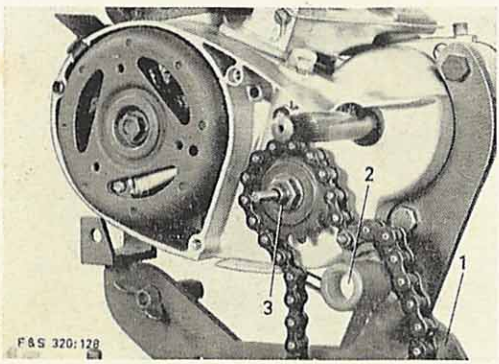


Fig. 5

Driving sprocket

Fig. 5

Place clamping arm (1, repair tool no. 34) with chain on the retaining bolt (2) and lay the chain over the sprocket from right to left.

Unscrew nut (3) and remove washer.

Remove clamping arm (1).

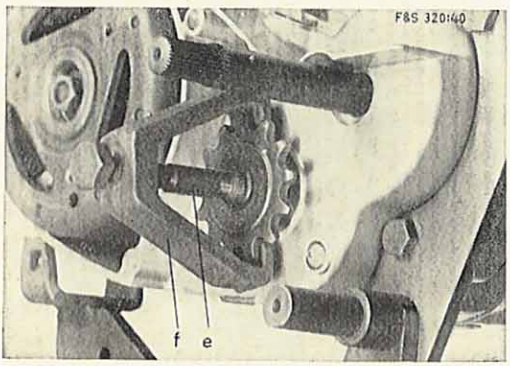


Fig. 6

Fig. 6

Engage gearshift rod into 3rd or 4th gear, while simultaneously turning the sprocket.

Fit protective cover (e, repair tool no. 3) and remove the spocket with the withdrawal tool (f, repair tool no. 12).

Note:

When replacing the sprocket, make sure that the number of teeth and the chain line are correct.

Magneto flywheel

Fig. 7

Insert holding handle (g, repair tool no. 36), as shown in the adjoining illustration.

Unscrew collar nut (h). Hold handle (g) and remove lock washer by tilting the engine.

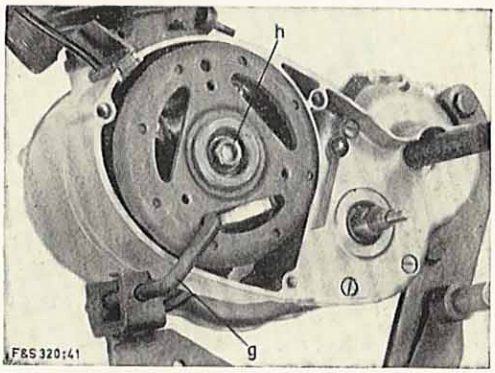


Fig. 7

Fig. 8

Re-position holding handle.
Fit protective cap (repair tool no. 4) on the crankpin, screw in withdrawal tool (i, repair tool no. 17) and remove magneto flywheel.

Take off protective cap and holding handle (g).

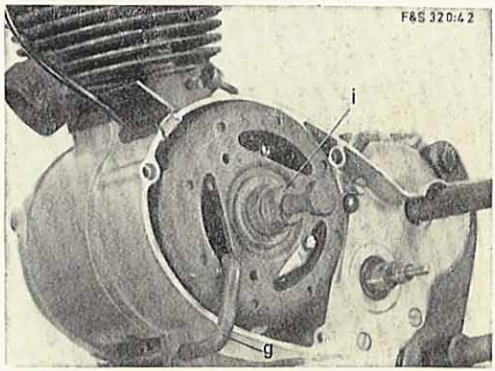


Fig. 8

Armature base plate

Fig. 9

Unscrew 3 recessed head screws (l) with washers. Take out armature base plate (k) with rubber grommet (n and m).

Join up armature base plate with magneto flywheel.

Take out lock washer (o).

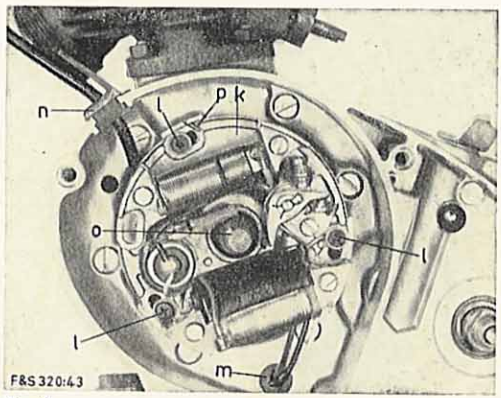


Fig. 9

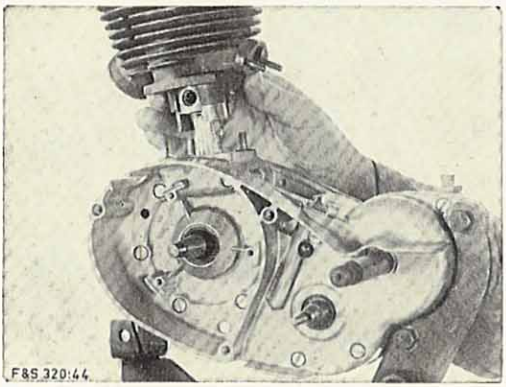


Fig. 10

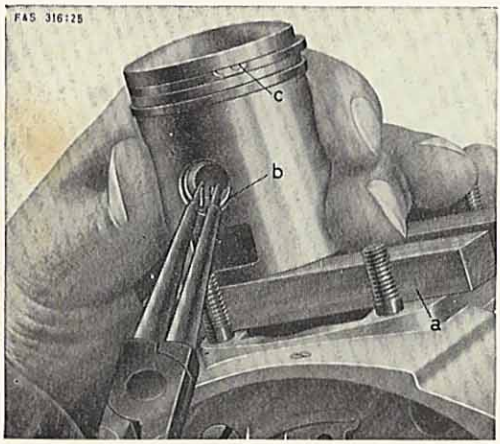


Fig. 11

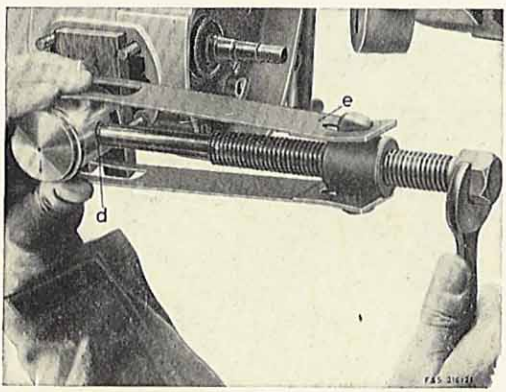


Fig. 12

Cylinder head and cylinder

Fig. 10

Note:

On SACHS 50/4 LF NL and 50/4 MLFA NL a defective decompressor can only be exchanged completely.

Unscrew cylinder head and cylinder.

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

Remove cylinder flange gasket.

Note:

The cylinder can be rebored four times (see spare parts list). When fitting new or replacement cylinders and pistons, care should be taken to ensure that the spot on the piston crown is of the same color as that in the induction port of the cylinder (i. e. red or white).

Piston and gudgeon pin

Fig. 11

Put piston on home-made slotted wooden board (a), cover the crankcase and remove the two circlips (b).

Fig. 12

Press out the gudgeon pin with withdrawal tool (e, repair tool no. 1) and insertion sleeve (d, repair tool no. 2).

When fitting the steel band, make sure that the piston rings are correctly seated in their grooves.
(Danger of breaking piston rings.)

Remove slotted wooden board.

Crankcase cover (clutch side) and clutch

Fig. 13

Note:

On SACHS 50/4 LF NL and 50/4 MLFA NL remove lock ring (s), shime (t), ring (u) and shims (v).

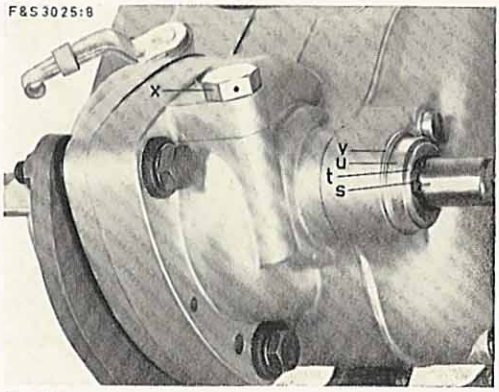


Fig. 13

Fig. 14

Unscrew crankcase cover (3) and remove gasket.

Loosen nut (2) of the clutch adjusting screw (1) and unscrew the adjusting screw.

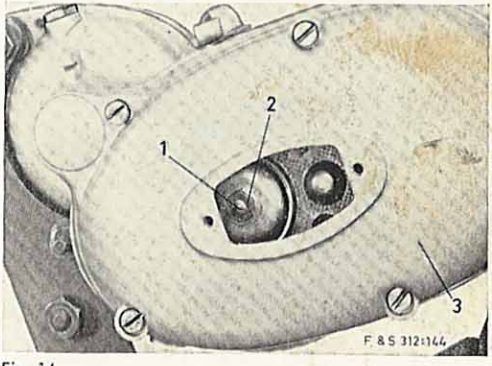


Fig. 14

Fig. 15

Screw the clamping tool (c, repair tool no. 12) into the M 6 thread of the friction plate.

Compress the friction plate, the 9 compression springs and spring retainer by means of the nut (d) until the two locking plates (e) can be withdrawn.

Remove the compressed springs with the clamping tool and take out the clutch plates.

Tilt the engine and take out the two pressure pins and the cylindrical roller.

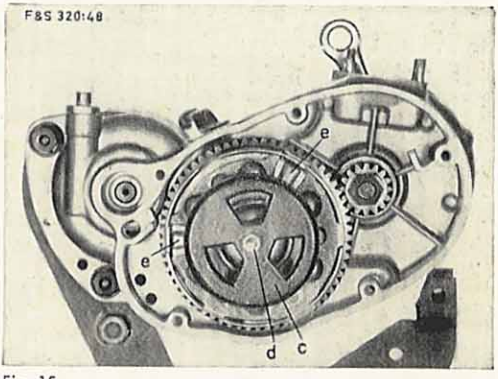


Fig. 15

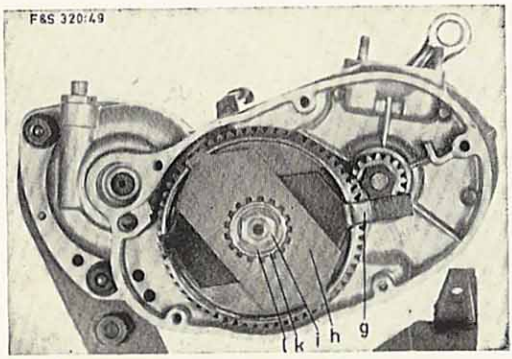


Fig. 16

Fig. 16

Locate the retaining plate (g, repair tool no. 10) and the locking plate (h, repair tool no. 9) in the clutch housing.

Unscrew nut (i) and take out lock washer (l).

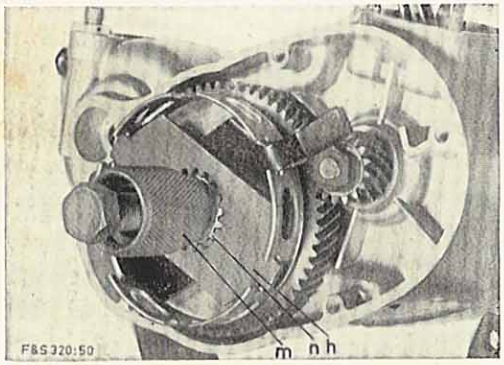


Fig. 17

Fig. 17

Re-position retaining plate (see illustration), screw withdrawal tool (m, repair tool no. 18) into the clutch hub and remove the hub (n).

Remove the locking plate (h).

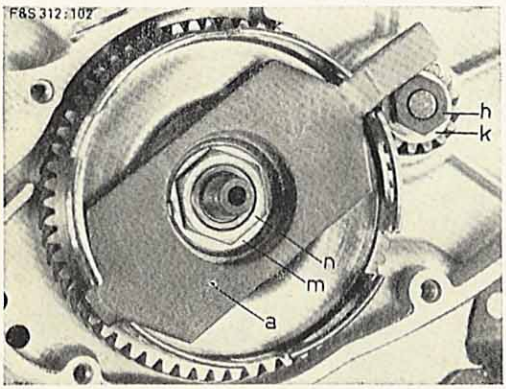


Fig. 18

Fig. 18

Release and unscrew nut (n, left-hand thread) and nut (h, right hand thread).

Remove retaining plate (a) and tab washers (m and k).

Remove main drive pinion.

Fig. 19

Insert withdrawal tool (v, repair tool no. 11) and remove the clutch housing (w).

Note:

If the clutch housing cannot be freed, lightly tap the tightened withdrawal screw.

Remove Woodruff key from intermediate shaft and crankshaft.

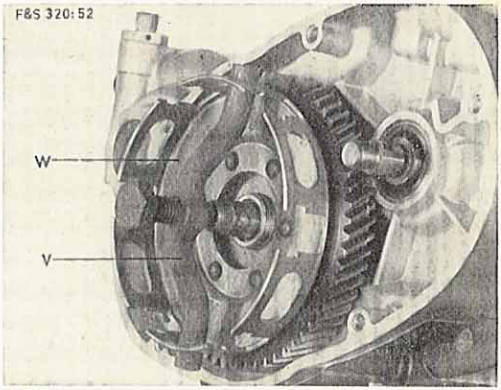


Fig. 19

Crankcase half (magneto side)

Fig. 20

Unscrew 6 fillister head screws (1) and 4 fillister head screws (2).

Screw out 2 screws (3) and remove engine from the assembly jig.

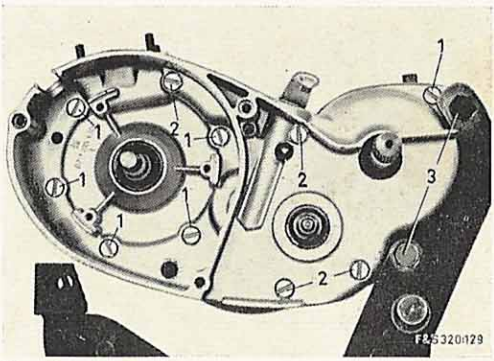


Fig. 20

Mounting the engine block

Fig. 21

Mount the engine block on the assembly jig with 2 fillister head screws (y) M 6 x 20.

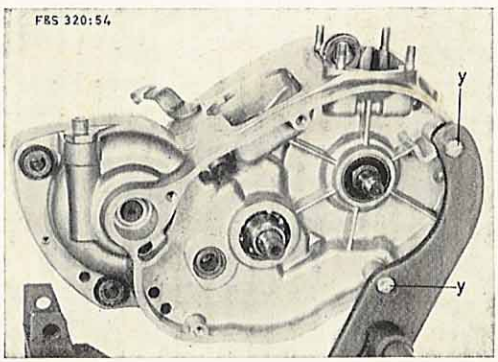


Fig. 21

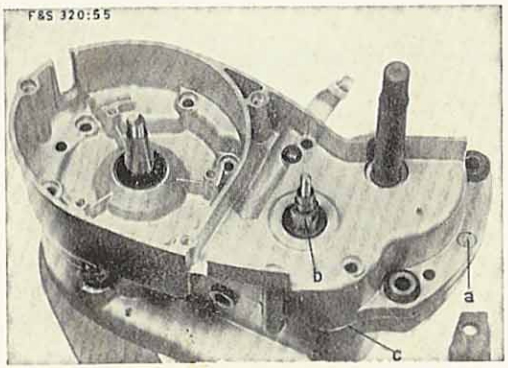


Fig. 22

Taking the engine block apart

Fig. 22

Remove fillister head screw (a). Free the two housing halves by lightly tapping the main shaft (b) and lift off the magneto side of the housing.

Take care of the two locating plates for the rubber suspension, sticking shims of the main and secondary shaft, and the two body-fit sleeves.

Remove the housing gasket (c).

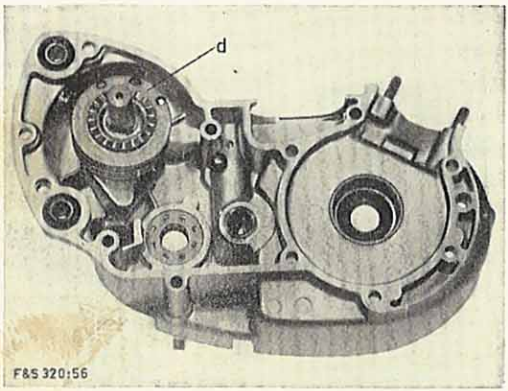


Fig. 23

Starter unit for SACHS 50/3 LF H, 50/3 LF S, 50/3 MLF B, 50/4 LK H, 50/4 LK S, 50/4 MLF B and 50/4 MLKA X.

Fig. 23

When lifting off the magneto side of the crankcase, the tensioned starter unit may remain stuck in the crankcase half.

If this happens, slacken the kickstarter spring by turning the ratched (d) in anti-clockwise direction and remove starter unit.

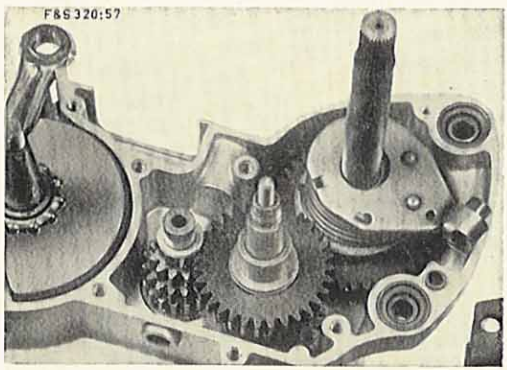


Fig. 24

Fig. 24

If the starter unit remains in the clutch side of the crankcase half, remove starter unit as described under Fig. 23. Relax kickstarter spring.

Starter unit for SACHS 50/4 LF NL and 50/4 MLFA NL.

Fig. 25

Remove washer (3) and shims (4).

Note:

In the case of crank spindle version no. 1, remove shim (l) and washer (k) (Fig. 50).
Remove crank spindle (2) with chain and sprocket (1).
On engines without speedometer drive, remove shims from housing collar.

Note:

In the case of crank spindle version no. 1, remove bush (a, Fig. 50).

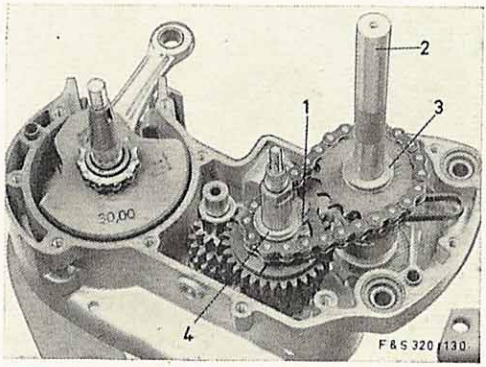


Fig. 25

Crankshaft and gears

Fig. 26

Remove crankshaft (1).

Remove the two washers from the main shaft (3) and the secondary shaft (2).

On engines with kickstarter remove bush (6), washer (7) and shims.

Remove bush from secondary shaft (only in the case of three-speed engines).

Remove shims (5) and starter gearwheel (4).

On engines without speedometer drive, remove two molded washers from housing collar.

Remove main shaft (3) together with gear wheels and secondary shaft (2).

On engines with speedometer drive, take care of 1.5 mm washer under the disc wheel of the main shaft.

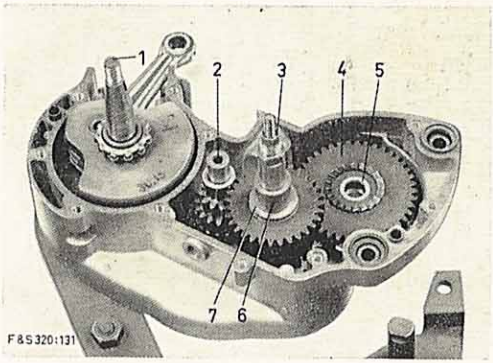


Fig. 26

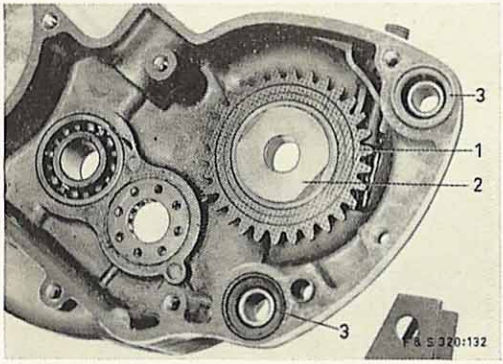


Fig. 27

Speedometer drive

Fig. 27

On engines with kickstarter, remove 2 molded washers (2) and helical gear (1).

Note:

On SACHS 50/4 MLFA NL, remove helical gear and shims underneath.

Take out locating plates (3).

Unscrew the clutch side of the housing from the assembly jig.
Remove the bearing rollers from both halves of the housing.

Clutch lever

If the clutch lever has to be replaced or serviced, remove the notched pin (g, Fig. 37) and take out the clutch lever.

The sealing ring (e) with protective cap (f) (Fig. 37) should be replaced if damaged.

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

When the engine is being given a general overhaul it is advisable to renew all gaskets.

Use only genuine SACHS spare parts.

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

FICHTEL & SACHS AG have developed a special extracting tool (see repair tool No. 17) 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. 28

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.

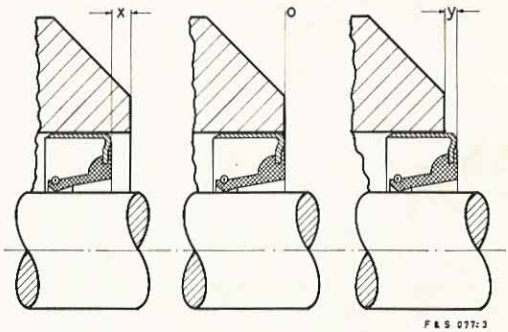


Fig. 28

Fig. 29

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

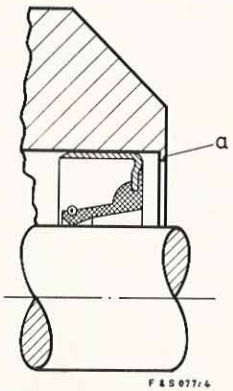


Fig. 29

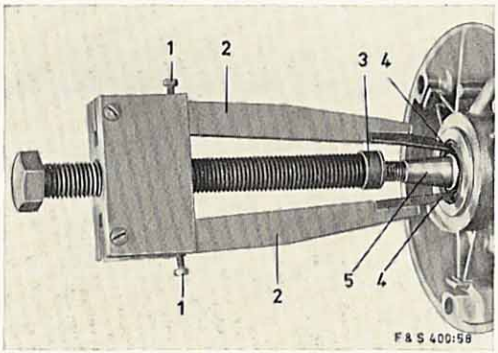


Fig. 30

Fig. 30

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. Pretension 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.

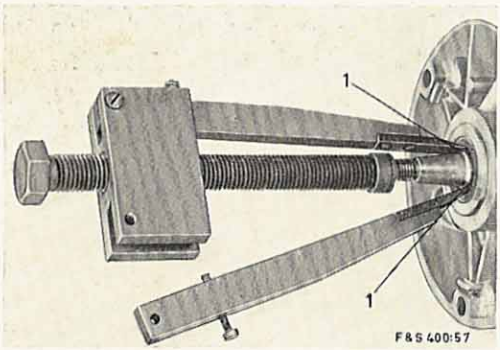


Fig. 31

Fig. 31

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. 30.

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.

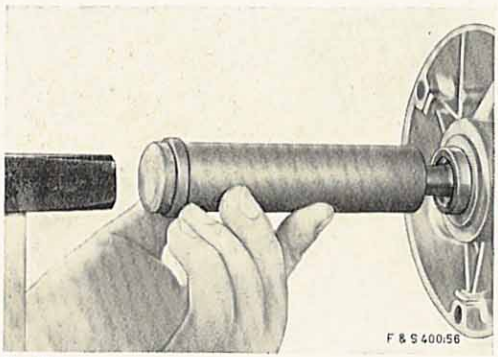


Fig. 32

Fig. 32

Before fitting the oil seal, fill the space around the tension spring with a little heavy-duty bearing 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. 28).

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

Removing the rubber bearings

It is recommended to remove the two rubber bearings (g, Fig. 35) before heating the crankcase halves.

Replacing the bearing bushing, the outer races of the cylindrical roller bearings and magnet-type ball bearings

Fig. 33

Heat the crankcase halves to 70 ... 80° C (158 ... 176° F) on a hot plate and remove the bearings and oil seals by lightly tapping the crankcase with a rubber mallet.

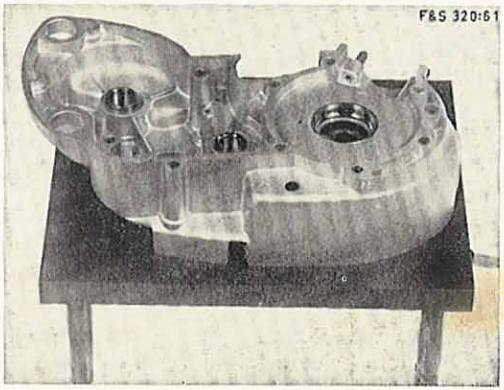


Fig. 33

Note:

Do not mix up the outer and inner races of magnet-type ball bearings.

Pre-assembly of crankcase half (magneto side)

Press the outer races, bronze bushings and oil seals into the crankcase half (magneto side) while it is still warm.

Fig. 34

Crankshaft bearing

Press in radial seal (a, sealing lip pointing inwards) flush with the inner edge of the bore.

Press in the outer race (b) of the magnet-type ball bearing down to the stop.

Main shaft bearing

Press in radial seal (tension spring toward the outside) until it reaches a stop.

Insert shim and press in the outer race (d) of the cylindrical roller bearing down to the stop.

Insert 15 bearing rollers 4x6 mm with heavy-duty bearing grease and cover with cover plate (e).

Press the bearing in again after the crankcase half has cooled down.

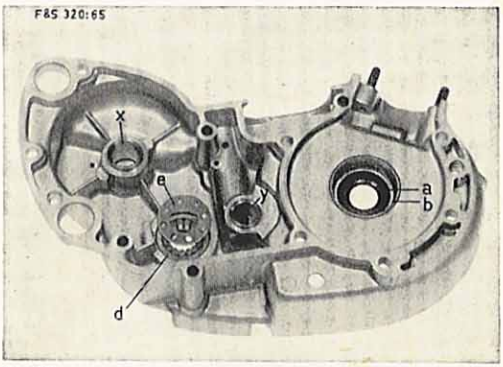


Fig. 34

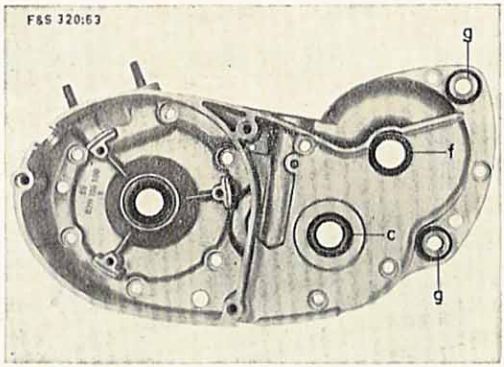


Fig. 35

Fig. 35

Kickstarter or crank spindle bearing

The bronze bushing (x, Fig. 34) is part of the crankshaft on the magneto side.

Insert the sealing ring (f, sealing lip facing inwards) until flush.

Fill the space between the sealing ring (c) and the housing collar with heavy-duty bearing grease.

Secondary shaft bearing

Replacing the bronze bushing of the secondary shaft.

If the bronze bushing (y, Fig. 34) is defective it should be removed with the appropriate withdrawal tool (repair tool no. 19).

Remove clutch lever.

Fig. 36

Using the withdrawal tool

Insert the draw-in attachment (d). Fit in pin (e).

Place the pressure sleeve (f) in position and then withdraw the bronze bushing by tightening the nut (g).

Press the replacement bushing into the crankcase half.

Drill a 4 mm dia. oil hole into the bronze bush and deburr.

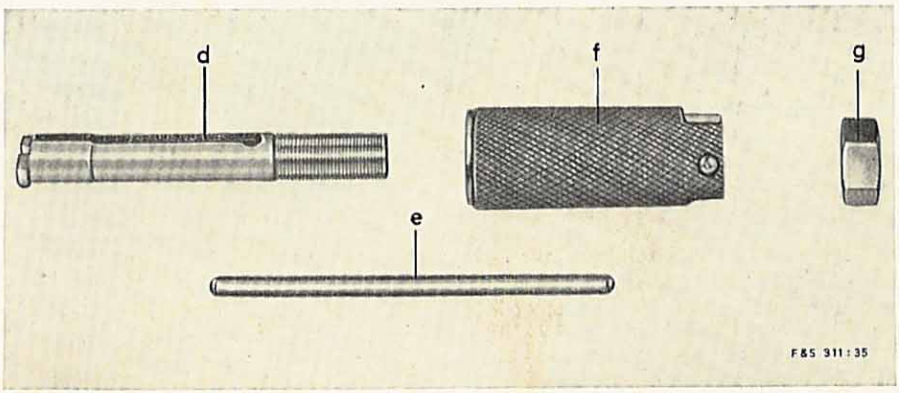


Fig. 36

Clutch lever

Fig. 37

Insert the sealing ring (e, sealing lip facing inwards) together with the protective cap (f).

Oil clutch lever, insert it and secure it with notched pin (g) and rubber washer (h).

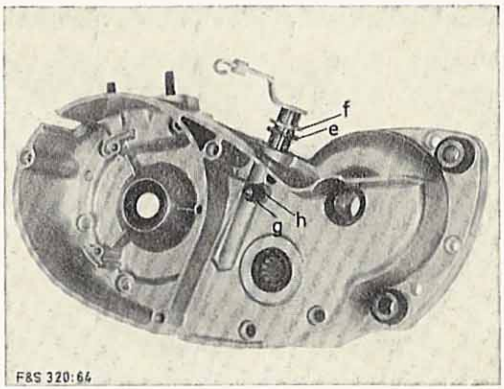


Fig. 37

Pre-assembly of crankcase half (clutch side)

Insert ball race bush, external races of bearing and sealing rings into the warm crankcase half.

Fig. 38

Crankshaft bearing

Press in sealing ring (2, sealing lip facing inwards) until flush with the inner edge of the borehole.

Press in external race (1) of magnet-type ball bearing until it reaches a stop.

Secondary shaft bearing

Press in ball race bush (5) until it reaches a stop.

Main shaft bearing

Insert shim and press in the external race (4) of the cylindrical roller bearing until it reaches a stop.

Insert the 15 bearing rollers 4x6 mm, fill bearing with heavy-duty bearing grease and cover with washer (3).

After the crankcase half has cooled off, re-press the bearing.

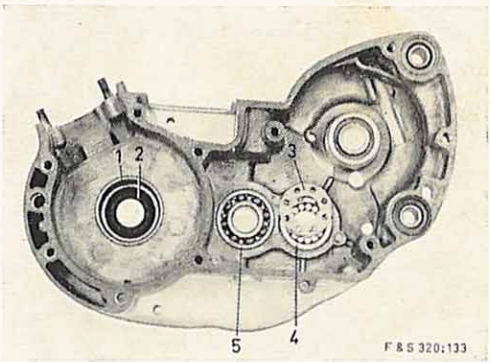


Fig. 38

After work on the crankcase halves has been completed, the rubber bearing blocks (g, Fig. 35) should be fitted again.

Care should be taken to ensure that the large diameter of the steel bushing, which should meet the corresponding support on the chassis frame, faces toward the outside.

The pressing in of the rubber bearing blocks into the crankcase halves and into the cylinder head is a similar process.

Gauging the axial play of the crankshaft

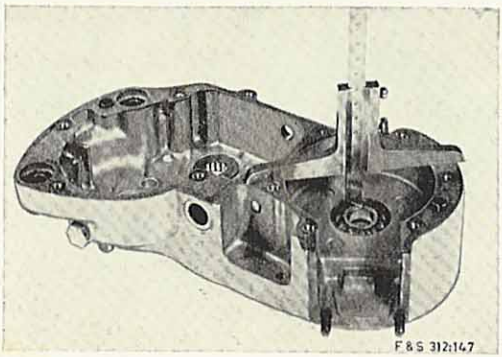


Fig. 39

Permissible axial play
0.05 . . . 0.1 mm.
(0.001968 . . . 0.003937 in.)
Insert inner races of bearing into outer races.

Fig. 39

Example:

Crankcase half clutch side:

Distance from sealing surface (with gasket) to inner race	26.40 mm (1.03937 in.)
Crankcase half magneto side: Distance from sealing surface to inner race	+ 6.50 mm (0.25591 in.)
Dimension in crankcase	32.90 mm (1.29528 in.)
Dimension of crankshaft (measured over both webs)	— 30.40 mm (1.19685 in.)
Axial play	2.50 mm (0.09843 in.)
Permissible axial play	– 0.10 mm (0.00394 in.)
Difference to be taken up	2.40 mm (0.09449 in.)

The difference of 2.40 mm is taken up by shims (3, Fig. 40) which should be placed equally on both sides of the crankshaft behind the inner races of the bearings.

Pre-assembly of the crankshaft

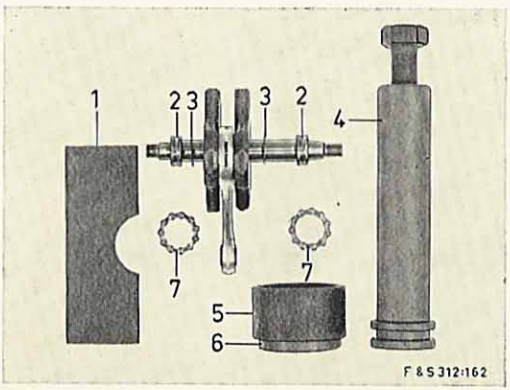


Fig. 40

Fig. 40

Press off the ball cages (7) from the inner races (2) of the bearing.

Remove the inner races (2) with withdrawal shells (6), with withdrawal sleeve (4) and clamping ring (5, repair tool no. 23, 21 and 22).

Heat the inner races (2) before pressing on.

Note:

Do not mix up the outer and inner races of the magnet-type ball bearings.

An intermediate plate (1, Fig. 40, repair tool no. 13) should always be positioned between the crank webs when pressing the inner ball races on to the crankshaft. This plate should be sufficiently large to be supported at both ends, so that the crankshaft rests freely on it.

Never clamp the crankshaft in a vice on one of the crankpins or on the webs and never try to fit inner races in this way. This will compress the webs and damage the connecting rod bearing, which will render the crankshaft unserviceable.

Fitting the diaphragm

on SACHS 50/3 MLF B, 50/4 MLFA NL, 50/4 MLF B and 50/4 MLKA X

Fig. 41

Before fitting the intermediate plate (diaphragm), check if it is perfectly plane.

Replace a damaged intermediate plate by a new one.

Parts of this intermediate plate are not supplied.

Fit diaphragm in the indicated sequence.

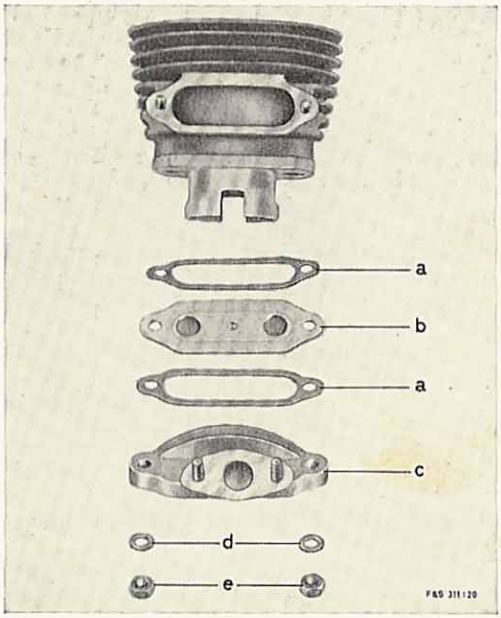


Fig. 41

1. Smear intake flange of cylinder lightly with sealing compound (we recommend the colorless sealing compound no. 40, F&S Part no. 0999 107 000) and fit gasket (a) with the non-graphited side towards the cylinder.
2. Fit intermediate plate (b) with limit stop towards cylinder.
3. Fit second gasket (a) without sealing compound with the graphited side facing outside.
4. Fit intermediate flange (c), two washers (d) and screw on alternately with nuts (e) M 5.
   Tightening torque 0.3 . . . 0.4 kpm (2.2 . . . 2.9 ft. lb.).

Carburettor

The type of carburettor to be fitted to the engine and the choice of jet sizes are determined by means of tests carried out at the factory. The carburettor setting determined in this way represents an optimum setting, and for this reason it is advisable not to make any arbitrary adjustments of your own. If necessary, fine adjustment can be made by varying the jet needle position: raising the needle produces a richer air-fuel mixture, lowering it produces a weaker mixture.

It should be borne in mind that varying the jet needle position alters the richness of the mixture only at low and medium engine speeds.

With correct carburettor setting, the air filter functioning satisfactorily, and a suitable spark plug, the insulator of the spark plug will be stained brown by burning. If carbon collects on the plug or if the plug is wet, this means that the air-fuel mixture is too rich. On the other hand, when the plug becomes white, this is an indication that the mixture is too weak. The spark plug must of course have the thermal value specified by the engine manufacturer.

When the throttle is gradually opened, the engine speed should steadily increase. The engine should not cough, nor should there be a drop in speed at any particular throttle valve position. If the engine splutters or falters or if black fumes are emitted from the exhaust, the mixture is too rich. Repeated short blowbacks or "sneezing", backfiring with a blue flame from the carburettor, and difficult starting are indications that the mixture is too weak.

Always remember that the engine will run economically only if the carburettor is correctly adjusted.

From time to time the carburettor should be rinsed and cleaned with petrol. At the same time it should be checked whether all parts are in good working condition. Worn float needles, needle jets, jet needles and throttle valves must be replaced by new ones as they have a negative effect on engine performance and fuel consumption.

Check also that all seals and gaskets in the carburettor are well fitted and in good condition.

The air filter in the intake silencer or in the filter cap should also be cleaned in petrol from time to time (according to the amount of dust) and the metallic fabric wetted with oil.

Note:

The carburettors fitted before November 1965 have as starting device three bores (port) from the float chamber to the throttle valve housing. The throttle valve has a helical groove which, during starting when the throttle twist grip is closed, forms a connection with the port of the float chamber. The underside of the throttle valve has a recess of 0.8 mm. The needle jet has the number 1517.

The carburettors fitted after November 1965 have a direct bore from the float chamber to the bottom of the mixing chamber. The helical groove on the throttle valve does no longer exist. The underside of the throttle valve has a recess of 3 mm. This requires a shorter insertion nipple (3 mm long) for the throttle control cable. When mounting the throttle control cable this should be borne in mind. The needle jet has the number 1717.

The old throttle valve with the helical groove and the recess of 0.8 mm can not be used on new carburettors.

BING single valve carburettor 1/8.5/ . . . and 1/12/ . . .

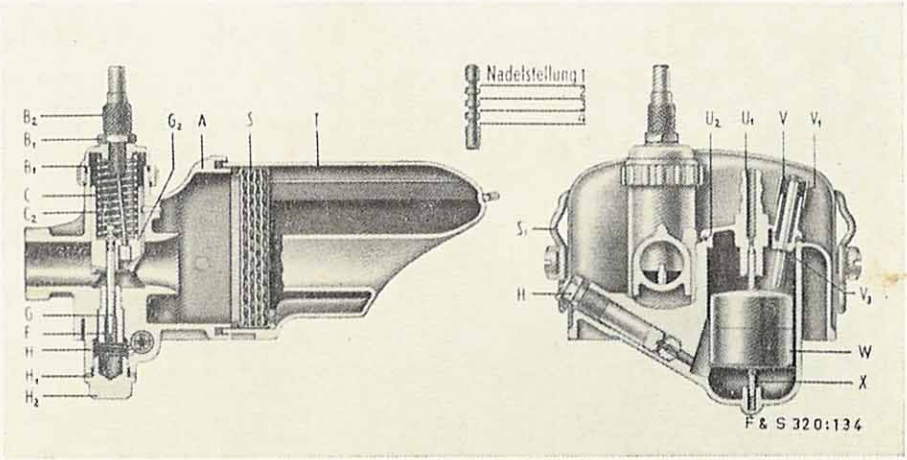


Fig. 42

BING single valve carburettor 1/17/ . . .

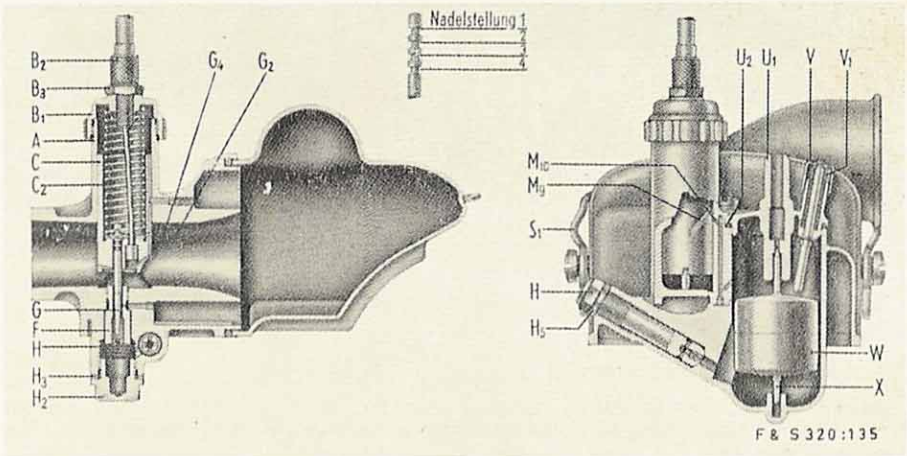


Fig. 43

A Carburettor housing
B_1 Cover screw joint
B_2 Adjusting screw
B_3 Nut
C Throttle valve
C_2 Valve spring
F Needle jet
G Jet needle
G_2 Retaining plate
G_4 Washer
H Jet
H_2 Connecting screw
H_3 Sealing ring
H_5 Rubber sealing ring
M_9 Starting groove
M_{10} Starting bore
S_1 Spring clip
T Filler cap
U Float chamber cover
U_2 Sealing ring
V Priming device
V_1 Spring for priming device
V_3 Cotter pin
W Float
X Float needle

Centering tool for dynamo magneto

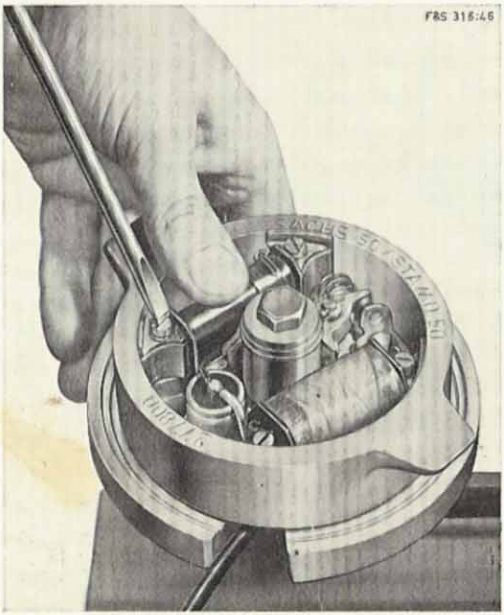


Fig. 44

Replacing the ignition or lighting armature

Fig. 44

1. Pass the leads through a hole in the centering plate and place armature base plate in position in centering plate.
2. Place centering unit in position and tighten hexagon head screw by hand.
3. Remove faulty armatures and replace them 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 (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 packing 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 F 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.

Main shaft

Removing and fitting the selector rod

Fig. 45

Gently clamp the main shaft in a vice, using soft jaws and placing the selector key up against the vice jaws.

Screw on two nuts (1) M 6 and lock them. Unscrew the selector rod as shown in the adjoining illustration and remove the selector key.

After renewal of worn parts, insert selector key (3) in the main shaft in such a manner that the chamfered side of its inner thread points toward the thread of the selector rod (2).

Screw selector rod (2) and selector key (3) tightly together and secure them by tapping with a center punch.

Unscrew the 2 nuts (1).

Make sure that the selector rod moves smoothly.

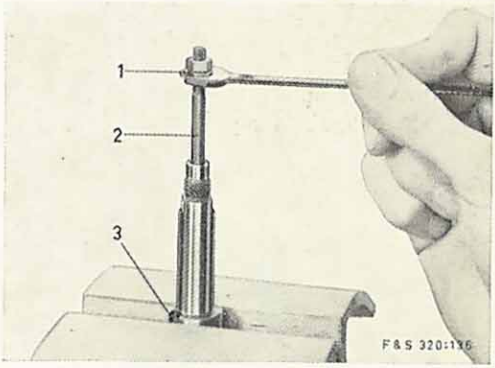


Fig. 45

Gear change assembly

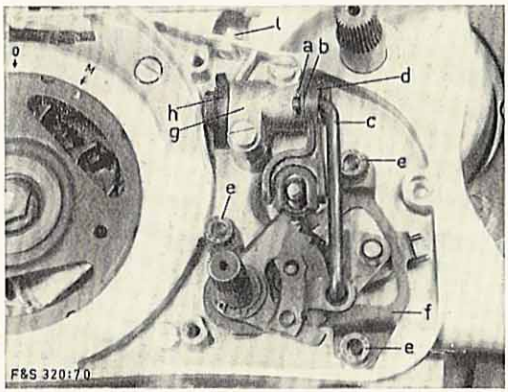


Fig. 46

Removal

Fig. 46

Remove cotter pin (a) and washer (b) Take shifter rod (c) out of the gearshift fork (d).

Unscrew 3 socket head cap screws (e) with lock washers and remove selector mechanism (f).

Unscrew selector bolt bearing (g) and remove it together with selector bolt (h) and gearshift fork (d).

Take care of body-fit sleeves.

Note:

The indexing pawl should be removed only if necessary.

To do so, unlock indexing pawl and withdraw it together with the compression spring and sleeve from the spring cup.

If the sealing ring for the main shaft has to be replaced, the new sealing ring (lip facing towards selector mechanism) should be pressed in until it is flush with the fan housing.

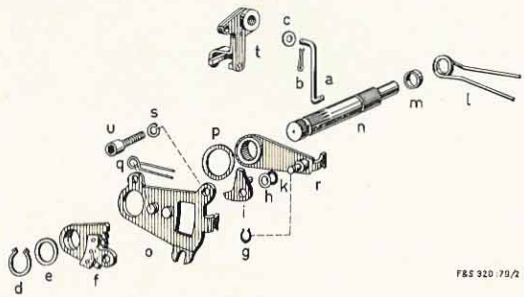


Fig. 47

Disassembly

Fig. 47

Remove cotter pin (b) and washer (c). Take shifter rod (a) out of the link arm (f).

Remove circlip (d), shims (e) and link arm (f).

Remove circlip (g), shims (h), pawl (i) and shims (k).

Remove pawl spring (q) only if necessary.

Relax and remove torsion spring (l). Remove holder plate (o), retaining ring (p) and bush (m).

The arrester arm (r) is pressed on to the gearshift lever shaft (n).

Fig. 48

Unscrew hexagon head screw (1) with lock washer.

Remove gearshift fork (5) and shims (4).

Remove selector bolt (2).

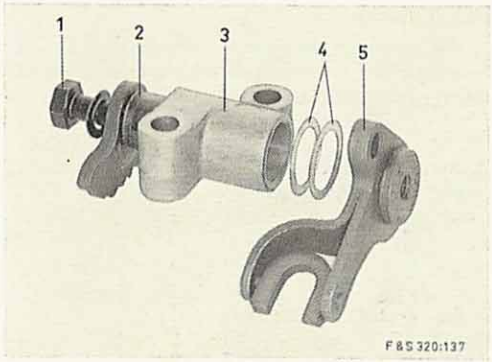


Fig. 48

Selector bolt and link arm

Fig. 49

The parts of the selector mechanism shown in the adjoining illustration differ from each other and belong together as follows:

For SACHS 50/3 = a + b
For SACHS 50/4 = c + d

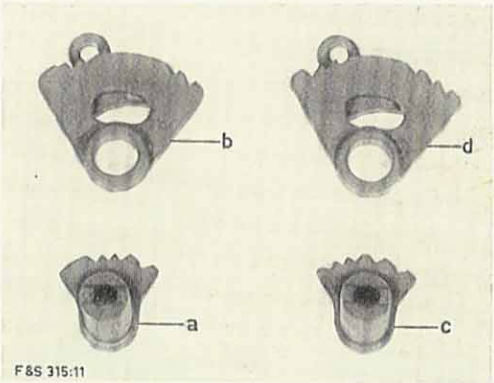


Fig. 49

Assembly

The following text refers to illustration no. 48.

Grease the selector bolt (2) with heavy-duty bearing grease and insert it into the selector bolt bearing (3). Fit shims (4) and selector fork (5) and screw tight with hexagon head screw M 6 x 40 and lock washer.

Axial play of the selector bolt = 0.1 mm (0.0039 in.).

The following text refers to illustration no. 47.

Slide ring (p) – 0.8 mm thick – on the shaft (n) and put on the plate (o) with spring (q).

Place the 0.3 mm thick shim (k) on the pin of the arrester arm (r). Fit pawl (i) so that its projecting pin lies between the two arms of the pawl spring. Fit shims (h) and insert circlip (g).

Axial play of the pawl = 0.1 mm (0.0039 in.).

Place link arm (f) on the gearshift lever shaft (n), insert shims (e) up to the lower edge of the recess and fit circlip (d).

Axial play of the link arm = 0.1 mm (0.0039 in.).

Locate the bush (m) on the gearshift lever shaft. Place the straight arm of the torsion spring (l) against the right side of the angled piece of the holder plate (o), pull the offset arm of the return spring over it and lodge it into place.

Installation

The following text refers to illustration no. 46.
Grease bush, compression spring and indexing pawl with heavy-duty bearing grease, insert them into the spring cup and secure them.

Note:

Approx. every 3000 km the indexing pawl should be lubricated by removing the hexagon head screw (l) and applying 2 . . . 3 cc (0.122–0.183 cu. in.) of heavy-duty bearing grease with a grease gun.

Insert 2 body-fit sleeves.

Insert the pre-assembled gear change assembly. Align longitudinal slots in the holding plate (f) with the thread bores and tighten with 3 socket head cap screws M 6 x 14 and lock washers.

Locate the shifter rod (c) with its longer angled end in the gearshift fork (d) and with its shorter angled end in the link arm.

Position washer and secure with cotter pin.

For adjustment of the gearshift mechanism see page 47.

Crank spindle

for SACHS 50/4 LF NL and 50/4 MLFA NL.

Version no. 1

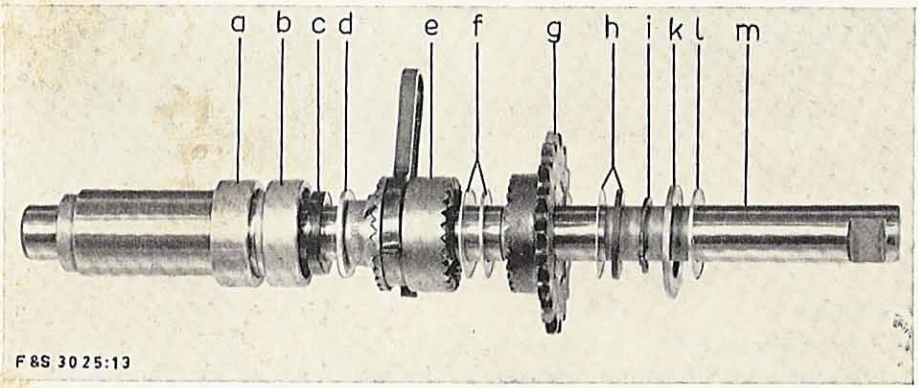


Fig. 50

Disassembly

Remove circlip (i), shims (h), sprocket (g), shims (f) and driver (e) with brake spring.
Remove driver bush (b), sealing ring (c) and washer (d).

Assembly

Fill the recess in the bore of the driver bush (b) with heavy-duty bearing grease.
Insert sealing ring (c, sealing lip facing inwards) into the driver bush (b) and fit washer (d, 1.5 mm thick).

Place crank spindle (m) into the driver bush (b).

Fit driver (e) with brake spring, as shown in the illustration. Place shims (f) and sprocket (g) in position. Insert shims (h) up to the lower edge of the recess and fit circlip (i).

For adjusting the chain line see page 42.

Version no. 2

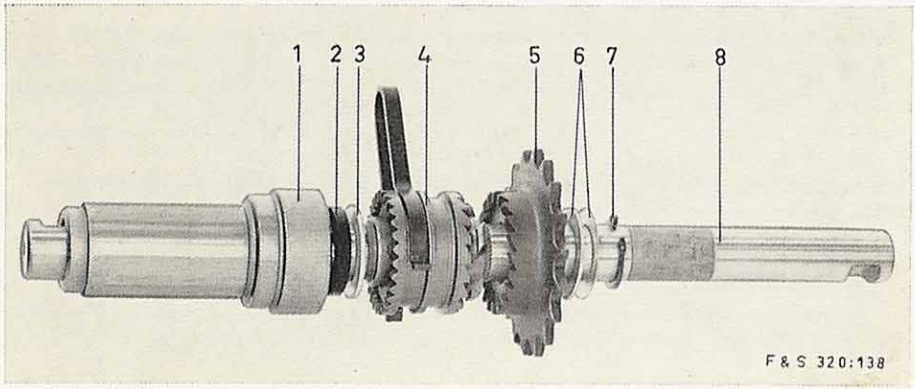


Fig. 51

Disassembly

Remove circlip (7), shims (6) and sprocket (5).

Remove driver bush (1), sealing ring (2), washer (3) and driver (4) with brake spring.

Assembly

Fit driver (4) with brake spring on the crank spindle (8), as shown in illustration.

Fill the recess in the bore of the driver bush (1) with heavy-duty bearing grease.

Insert sealing ring (2, sealing lip facing inwards) into the driver bush (1), put on washer (3, 1.5 mm thick) and fit crank spindle (8) into the driver bush (1).

Fit sprocket (5), insert shims (6) up to the lower edge of the recess and place circlip (7) in position.

For adjusting the chain line see page 42.

Speedometer drive

Fig. 52

Disassembly

Unscrew terminal screw (6) and take helical pinion (1) with bearing bushing (3) out of the housing.

Remove circlip (5), washer (4), bearing bushing (3) and washer (2).

Assembly

Fit washer (2, 1 mm thick), bearing bush (3, lubrication bores upwards) and washer (4, 1 mm thick) on the helical pinion (1) and insert lock ring (5).

Insert helical pinion into the housing and screw in terminal screw (6).

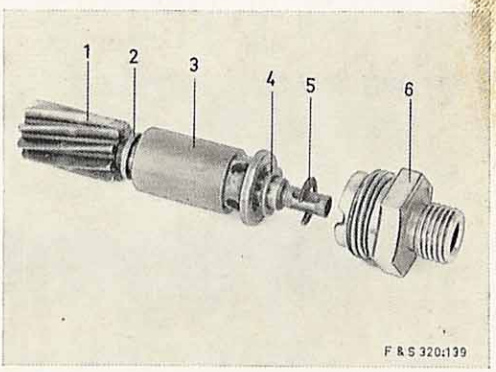


Fig. 52

Decarbonizing the exhaust muffler, the cylinder and the cylinder head

When dealing with repairs and complaints, please note the following points:
A proportion of the lubricant is burnt in every engine, and this forms carbon deposits. In two-stroke engines these deposits tend to form on the piston crown, cylinder transfer port, in the exhaust pipe and exhaust muffler particularly. It should be removed periodically, especially when the engine power dwindles or the engine tends to four-stroke even if the carburettor is adjusted correctly.
Decarbonizing is usually necessary after 3000 to 4000 km. (1864 to 2500 miles).
The engine can remain in the frame during this procedure.

Exhaust equipment

Unscrew cap nut from cylinder and remove exhaust pipe and muffler. Clean the exhaust pipe with an ordinary wire brush by pulling the latter through its interior.

Exhaust muffler

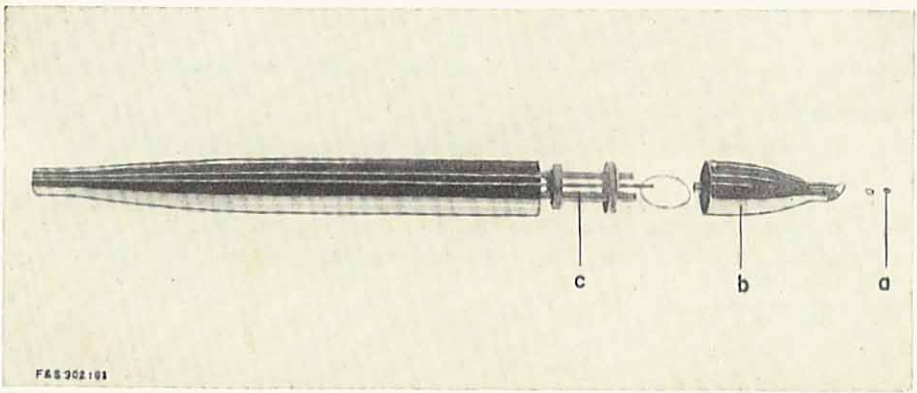


Fig. 53

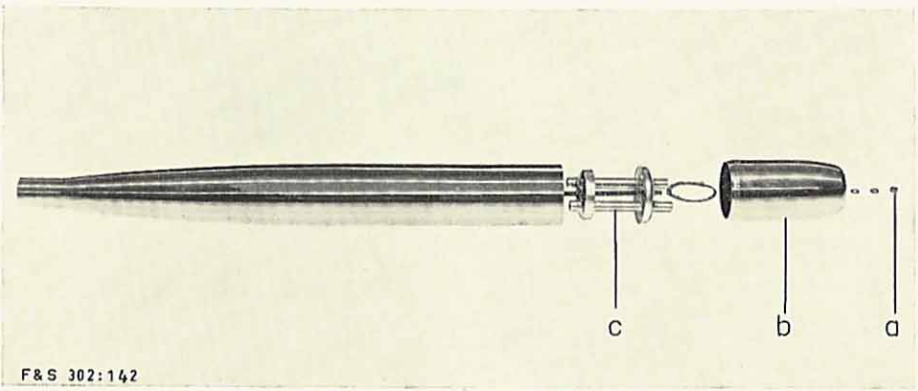


Fig. 54

The exhaust muffler should be disassembled for cleaning.
Unscrew nut (a), pull off end piece (b) and remove interior element (c).
Heat the element to red heat by means of a welding torch or in a forging fire and knock or scrape off the remaining deposits.

The exhaust equipment should by no means be modified or tampered with. Any such modifications will not only adversely affect engine power and fuel consumption as well as increase engine noise, but constitute also a punishable offense.

When reassembling the muffler, a new asbestos cord should be fitted to ensure tightness of the muffler.
The muffler should be mounted in such a manner that the welding seam is at the bottom.

Cylinder head

Unscrew the cylinder head and scrape off the carbon in the combustion chamber with a screwdriver, taking care not to damage the surfaces of the combustion chamber.

Cylinder ports

Place the piston at bottom dead center.
Remove carbon in the exhaust and transfer ports with a screwdriver.
Carefully place piston to top dead center and remove loose carbon.

Piston

Remove only thick deposits (flakes) from the piston crown carefully.
Never attempt to clean the piston crown bright.

Insertion and removal of the connecting rod small end bushing

When repairing engines it may sometimes be necessary to replace the connecting rod small end bushing. A special tool has been developed for this purpose (repair tool no. 20).

A special reaming attachment is required for reaming out a newly inserted bushing. It has been developed in collaboration with the German HUNGER Company (repair tools no. 24, 25, 26 and 27).

When replacing a small end bushing, the following procedure is recommended.

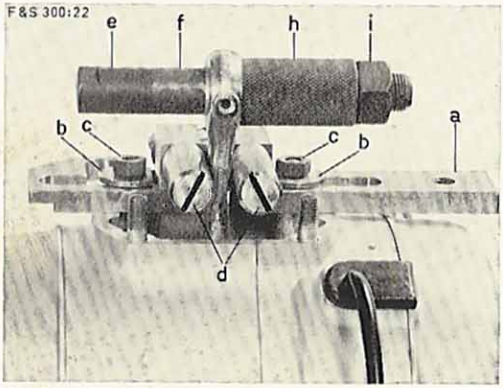


Fig. 55

Removal of small end bushing

Fig. 55

Place the guide bar (a) with the two clamping sleeves (b) in position, as shown in the illustration. Align with connecting rod and screw it on lightly with two nuts (c).

Press guide bar evenly on both bolts and tighten nuts (c).

Clamp the connecting rod with the eccentric bolts (d) and press out the small end bushing as follows:

Insert withdrawal bolt (e) with guide sleeve (f) into the small end bushing.

Position the adapter sleeve (h), screw on nut (i) and press out the small end bushing.

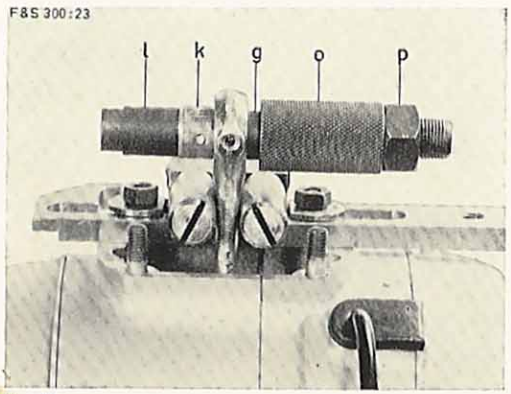


Fig. 56

Inserting the small end bushing

Fig. 56

Locate the new small end bushing (k) in the connecting rod so that the oil holes (bushing – connecting rod) are in alignment.

Carefully insert withdrawal bolt (l) into the small end bushing (k).

Place the guide sleeve (g) in position, locate the adapter sleeve (o), screw on nut (p) and press the small end bushing (k) home until it reaches a stop.

Centering the connecting rod

Fig. 57

Locate the bearing support (r) with guide sleeve (s) on the guide bar (u) and screw it on.
Insert the reaming tool (t), shaft first, into the guide bush (s) and center the connecting rod (v) accurately with the help of the cone.
Care should be taken to ensure that the connecting rod is not displaced either axially or radially.
Gently position eccentric bolt (w) against the connecting rod and tighten it with the nut.
Press eccentric bolt (y) firmly on to the crankshaft and tighten nut.

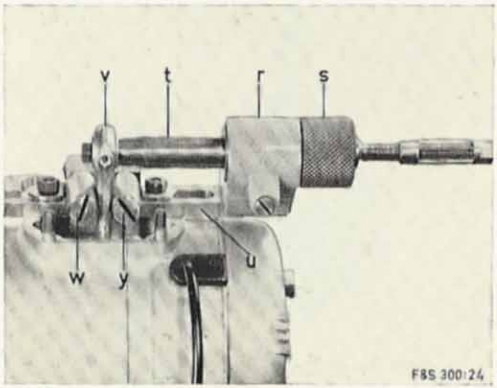


Fig. 57

Reaming out the small end bushing

Fig. 58

Cover the crankcase.
The front adjusting screw (b) of the reamer has marking lines, the adjustable distance between each line being 0.02 mm.
Insert the reaming tool and adjust it to the diameter of the small end bushing by means of the adjusting nuts (b and c).
Take the reamer out of the bushing, release lock nut (c), reset adjusting nut (b) by one marking line and secure the reaming bit with lock nut (c).
The small end bushing can now be reamed out carefully with the adjustable reaming tool (a), using oil or petroleum as a lubricant.
Check the fit with the gudgeon pin.

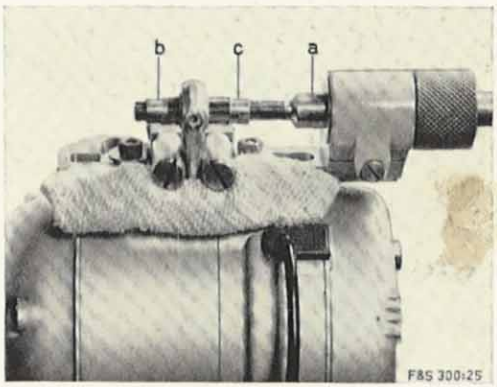


Fig. 58

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

Tolerances for the small end bushing diameter $12\ ^{+0.045}_{+0.035}$ mm $\left(0.47244\ ^{+0.0018}_{+0.0014}\ \text{in.}\right)$

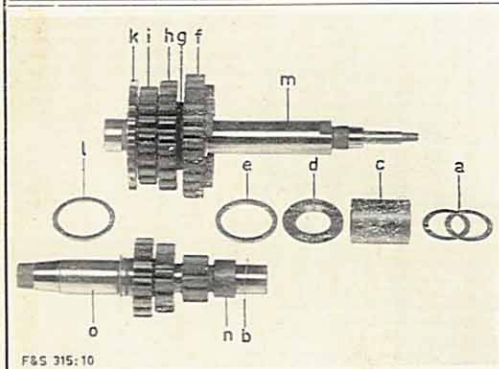
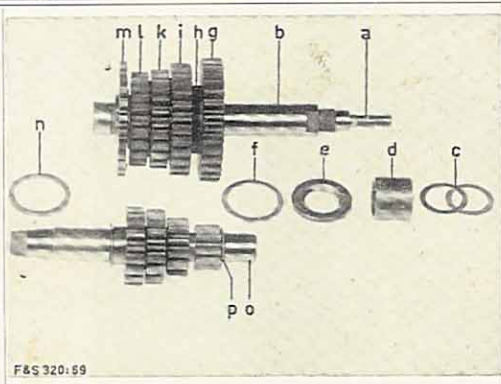
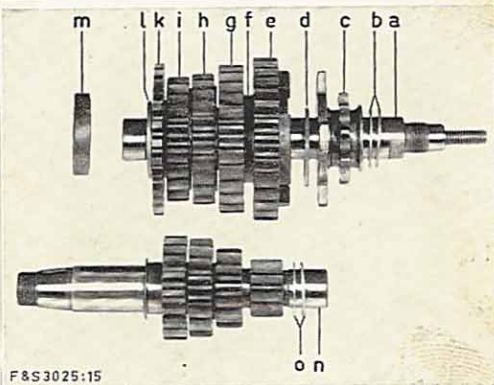
The reaming tool is supplied by Messrs. FICHTEL & SACHS AG, D-8720 SCHWEINFURT, in two versions. Individual parts are supplied upon request.

Relevant pamphlets are available upon request.

ASSEMBLING THE ENGINE

Screw the clutch side of the crankcase half on to the assembly jig with 2 fillister head screws M 6 x 20, as shown in Fig. 21.
Screw in oil drain plug (1, Fig. 1) with sealing washer.
Insert the two locating plates (3, Fig. 27).

Mounting the set of gears

SACHS 50/3 LFH, 50/3 LFS and 50/3 MLFB	SACHS 50/4 LKH, 50/4 LKS, 50/4 MLFB and 50/4 MLKA	SACHS 50/4 LF NL and 50/4 MLFA NL
 Fig. 59	 Fig. 60	 Fig. 61
On engines with speedometer drive, fit washer (1, Fig. 59, n, Fig. 60 and 1, Fig. 61) on the main shaft. On engines without speedometer drive, a pressed on spacer (m, Fig. 61) takes the place of the above-mentioned washers and the disc wheel (k, Fig. 59, m, Fig. 60 and k, Fig. 61).		
Insert main shaft and intermediate shaft together in the crankcase half, clutch side.		
Oil the selector gears and fit them in position as follows: Selector gear for 4th speed (flat side pointing downward)		
Selector gear for 3rd speed (collar facing upward)		
Selector gear for 2nd speed (recess for spacer pointing upward)		
Spacer		
Selector gear for 1st speed (recess for spacer pointing downward)		
Insert shims (e, Fig. 59, f, Fig. 60 and d, Fig. 61) up to the shoulder of the main shaft (m, Fig. 59, b, Fig. 60 and a, Fig. 61)		
Put washer (d, Fig. 59 and e, Fig. 60), 2 mm thick, on the main shaft (counterbore downwards)		Fit sprocket (c).
Put bush (c), 26 mm long, on the main shaft Put bush (n), 10 mm long, on the intermediate shaft	Put bush (d), 16 mm long, on the main shaft	

Gauging the axial play of the main shaft and the secondary shaft

Before gauging the axial play insert both adapter sleeves (a, Fig. 70) and place the housing gasket in position.

Place the magneto side of the crankcase half temporarily in position and screw it on with 4 fillister head screws M 6, tightening the screws diagonally.

The gauging of the axial play of the main shaft and the secondary shaft is carried out by means of the calibration plates (repair tools no 14 and 15).

Permissible axial play of the main shaft: 0.10 mm (0.003937 in.)

Permissible axial play of the secondary shaft: 0.05 mm (0.001968 in.) max.

How to use the calibration plates
Gauging the main shaft

Fig. 62

Before locating the calibration plate (a), turn back the adjusting screw (b).

Position calibration plate (a) and tighten with knurled nut (c).

Press calibration plate with main shaft against the housing and screw in the adjusting screw (b) until it reaches a stop.

Pull back the calibration plate with main shaft from the housing and screw the adjusting screw (b) in again until the stop, at the same time reading off the scale (d).

The scale reading shows the axial play (1 scale division = 0.1 mm).

The difference is taken up by shims which, after removal of the magneto side of the crankcase half, are placed on the main shaft (3, Fig. 26).

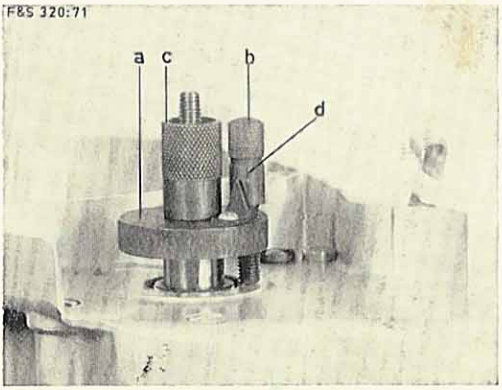


Fig. 62

Gauging the secondary shaft

Fig. 63

The above instructions apply also for the gauging of the secondary shaft.

The difference is taken up by removing the magneto side of the housing and placing shims on the secondary shaft (2, Fig. 26).

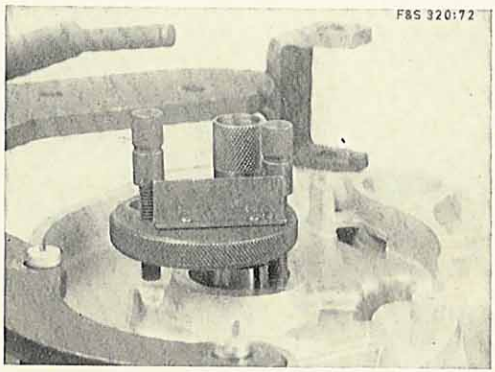


Fig. 63

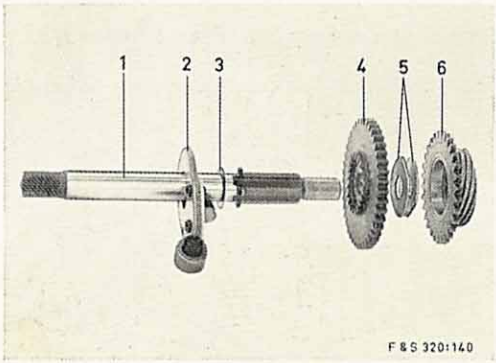


Fig. 64

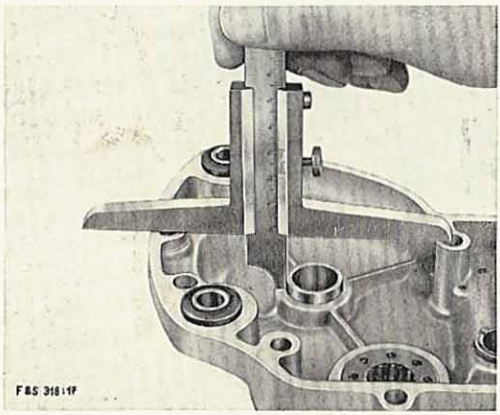


Fig. 65

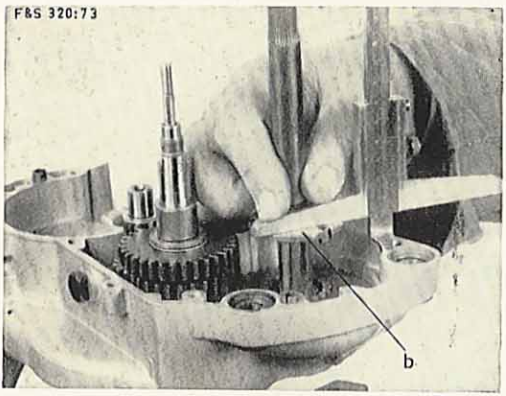


Fig. 66

Gauging the axial play of the starter shaft

Permissible axial play 0.1 mm (0.00394 in.).

Fig. 64

On engines with speedometer drive, insert helical gear (6), 2 molded washers (5) and starter gear (4) into the clutch side of the crankcase half. On engines without speedometer drive, insert 2 molded washers (5) and starter gear (4).
Place washer (3) and starter limit stop (2) on the starter shaft (1) and insert into starter gear (see Fig. 66).

Fig. 65

Crankcase magneto side:

Distance from sealing surface to seating of starter limit stop	22.00 mm (0.86614 in.)

Fig. 66

Crankcase clutch side:

Distance from upper edge of starter limit stop (b) to sealing surface (with gasket)	—21,30 mm (0.83858 in.)
Axial play	0.70 mm (0.02756 in.)
Permissible axial play	—0.10 mm (0.00394 in.)
Difference to be taken up	0.60 mm (0.02362 in.)

This difference of 0.6 mm is taken up by shims on the starter gear.

Installation of the starter equipment

Fig. 67

Insert the double-angled end of the kickstarter spring into the kickstarter stop (k), ensuring that the lower winding of the spring rests outside the guide piece of the kickstarter stop.

Locate the kickstarter shaft with washer (0.5 mm thick) together with ratchet (g) in the starter stop (k) and insert the angled end of the return spring into the central hole of the ratchet (g).

Insert the starter equipment into the magneto side of the crankcase, as shown in Fig. 63, and center the starter stop (k) over sleeve (n).

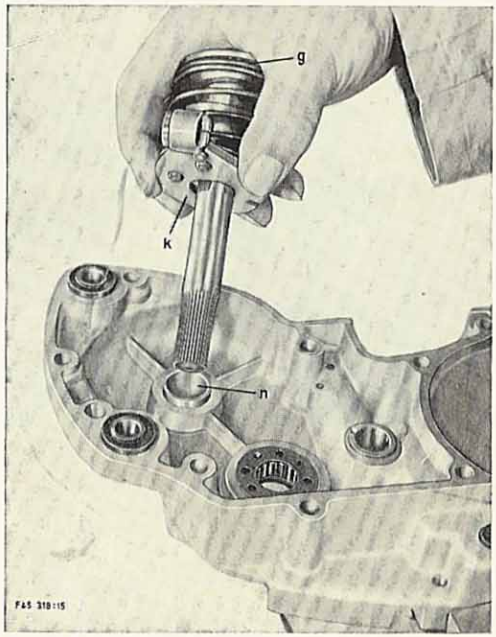


Fig. 67

Fig. 68

Press the ratchet downwards against the pressure of the kickstarter spring and turn it anticlockwise (see arrows), until the lug (r) on the ratchet engages with the recess (s) on the kickstarter stop.

The starter equipment should now be seated tightly in the crankcase half.

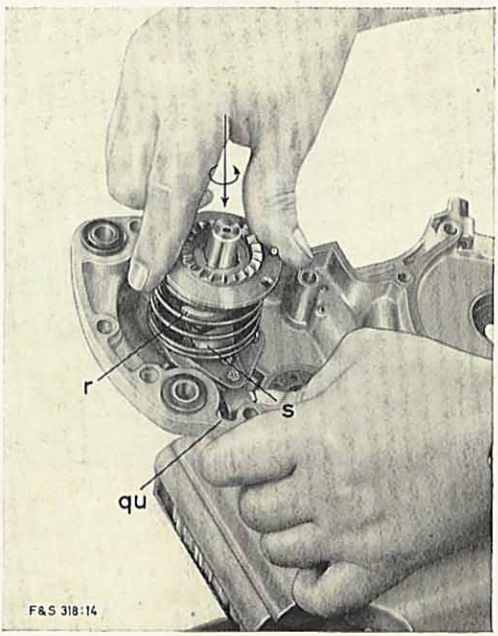


Fig. 68

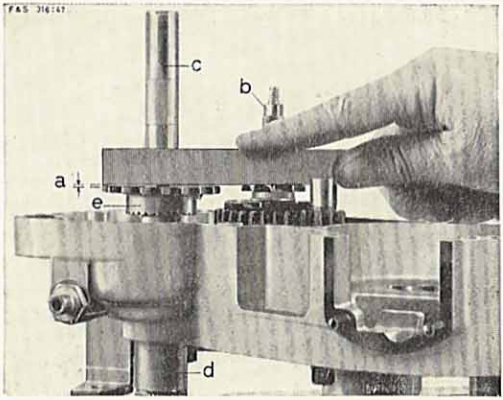


Fig. 69

Measuring the chain line

Fig. 69

In the case of SACHS 50/4 MLFA NL with speedometer drive insert helical gear.

Insert pre-assembled crank spindle (c) without chain.

Check the chain line with a knife edge straight edge or with a slide caliper rule.

Take out crank spindle and sprocket with shims.

Make up the difference (a) by inserting shims under the driver bush (on engines without speedometer drive) or under the helical gear (on SACHS 50/4 MLFA NL with speedometer drive).

Re-insert crank spindle and sprocket together with the chain. Put shims on sprocket and washer (2 mm thick) on crank spindle.

Note:

On engine with crank spindle version no. 1, make up the difference (a) by inserting shims (f, Fig. 50) under the sprocket (e). Place shim (b, Fig. 70, 2 mm thick) over the retaining ring.

Gauging the axial play of the crank spindle version no. 1

Axial play of the crank spindle 0.20 mm (0.00787 in.).

Fig. 70

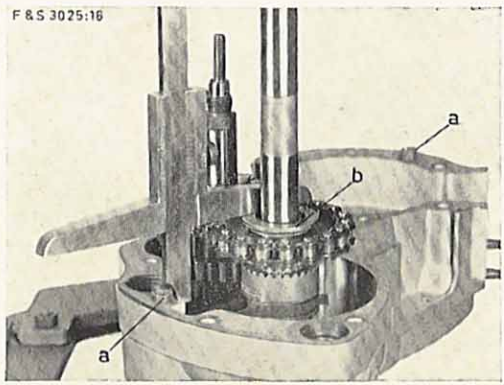


Fig. 70

Crankcase half, magneto side: Distance from sealing surface to bronze bushing for crank spindle	31.50 mm (1.24016 in.)
Crankcase half, clutch side: Distance from upper edge of shim (b) to sealing surface (with gasket)	—30.30 mm (1.19292 in.)
Existing axial play	1.20 mm (0.04724 in.)
Permissible axial play	—0.20 mm (0.00787 in.)
Difference to be taken up	1.00 mm (0.03937 in.)

The difference of 1.00 mm on the crank spindle is taken up by shims.

Crankshaft

Position protective sleeve (repair tool no. 6) on the crankpin (clutch side) and insert the pre-assembled crankshaft into the clutch side of the crankcase.

Smear the sealing surfaces of both crankcase halves with sealing compound.

We recommend the colourless sealing compound No. 40 (F&S ordering no. 0999 107 000).

Place gasket in position.

Crankcase half (magneto side)

Fig. 71

Fit crankcase half (magneto side) with starter equipment (only in the case of engines with kick-starter) and crankcase half (clutch side) together.

Screw the two halves together with:

7 fillister head screws (1) M 6 x 18
2 fillister head screws (2) M 6 x 52
1 fillister head screw (4) M 6 x 56
and
1 fillister head screw (3) M 6 x 35

Tightening torque:
Fillister head screw (1) 0.7 ... 0.9 kpm (5.0 ... 6,5 ft. lb.).

Fillister head screws (2, 3 and 4) 0.8 ... 1.0 kpm (5.8 ... 7.2 ft. lb).

Check the axial play of the main shaft, the secondary shaft, the crankshaft and the starter shaft or crank spindle.

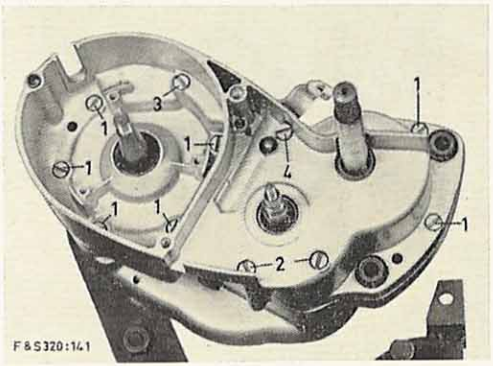


Fig. 71

Screwing on the engine block

Fig. 72

Remove the engine block from the assembly jig and screw it on again as shown in the illustration, using two screws M 8 x 60.

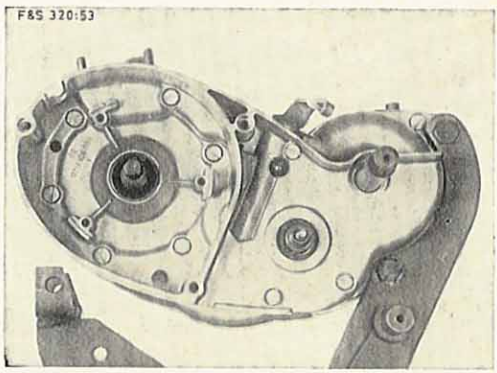


Fig. 72

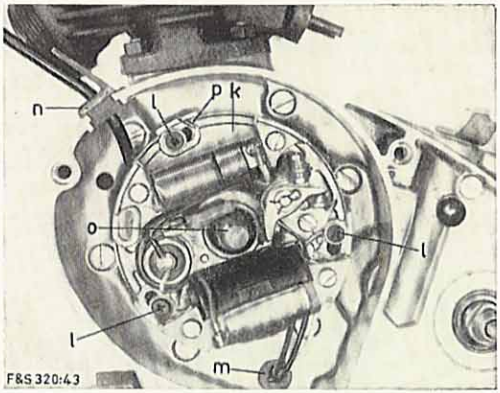


Fig. 73

BOSCH dynamo magneto

Fig. 73

Grease the cone of the crankshaft and of the magneto flywheel.
Insert spring washer (o) into the crankshaft.
Insert rubber grommet (m) with lead and rubber grommet (n) with ignition lead (rounded end first) into the housing.
Insert armature base plate, taking care of marking lines (p), and tighten with 3 recessed head screws (l) M4x14 and washers.
Tightening torque 0.4 ... 0.6 kpm (2.9 ... 4.3 ft. lb.).

Note:

New armature base plates have no markings and should be aligned by means of the longitudinal slots.
Place magneto flywheel in position, taking care that the spring washer lies well in the groove of the magneto flywheel.
Insert holding handle (8, Fig. 8) into the magneto flywheel. Insert spring washer and tighten the collar nut M 10 x 1.
Torque 3.8 ... 4.0 kpm (27.5 ... 28.9 ft. lb.).
Remove holding handle.

Driving sprocket

Grease surfaces of the main shaft and the sprocket.
Mount the sprocket, fit special washer and tighten with nut M 12 x 1.
Use clamping arm (1, Fig. 5).
Tightening torque 5.5 ... 6.0 kpm (39.8 ... 42.4 ft. lb.).

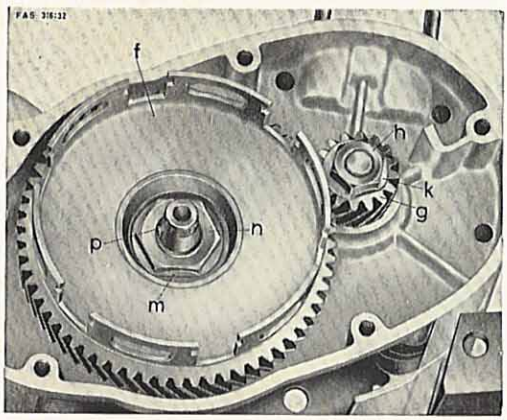


Fig. 74

Drive and clutch

Fig. 74

Degrease tapers of bearing race bush, secondary shaft, clutch housing and clutch hub.
Insert Woodruff key into secondary shaft and crankpin.
Locate clutch housing (f) in position, insert locking washer (m) and screw on nut (n) M 20.8 x 1 (left-hand thread) with the collar facing downwards.
Place driving pinion (g) on the crankpin, insert locking washer (k) and tighten nut (h) M 10 x 1.
Insert the retaining plate (g, Fig. 16), then tighten and secure both nuts.
Tightening torques:
nut (h) 3.7 ... 3.9 kpm (26.8 ... 28.2 ft. lb.).
nut (n) 1.5 ... 1.7 kpm (10.8 ... 12.3 ft. lb.).

Place the clutch hub (n, Fig. 17) on the secondary shaft, put on spring washer (l, Fig. 16) and screw on flat nut (i, Fig. 16) M 12 x 1. Insert locking plate (h, Fig. 16) and tighten nut.

Tightening torque 3.8 ... 4.0 kpm (27.5 ... 28.9 ft. lb.).

Remove retaining plate and locking plate.

Grease pressure pins and intermediate roller and insert them into the intermediate shaft.

Insert the friction plates with intermediate steel plate.

Compress the clutch springs and insert them into the clutch housing, then insert the two locking plates (e, Fig. 15).

Remove the clamping tool.

Take care that both locking plates are correctly seated.

Screw in the clutch adjusting screw (1, Fig. 14) with lock nut (2, Fig. 14).

Crankcase cover (clutch side)

Smear the sealing surface of the crankcase half (clutch side) with sealing compound (we recommend the colourless sealing compound no. 40, F&S ordering no. 0999 107 000) and place gasket in position.

Put on cover plate and tighten with 5 fillister head screws M 6 x 35.

Tightening torque 0.8 ... 1.0 kpm (5.8 ... 7.2 ft. lb.).

Put on cork gasket and tighten cover plate "S" with two lens head countersunk screws M 5 x 7.

Screw in oil level control screw (2, Fig. 1) with sealing washer.

For adjustment of the clutch see page 52.

Adjusting the crank spindle of SACHS 50/4 LF NL and 50/4 MLFA NL

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

Fig. 75

Push pedal crank upwards. Insert shims (v) up to the collar of the driver bush and fit spacer (u).

Insert shims (t) up to the lower edge of the recess and fit lock ring (s).

Check the axial play of the crank spindle.

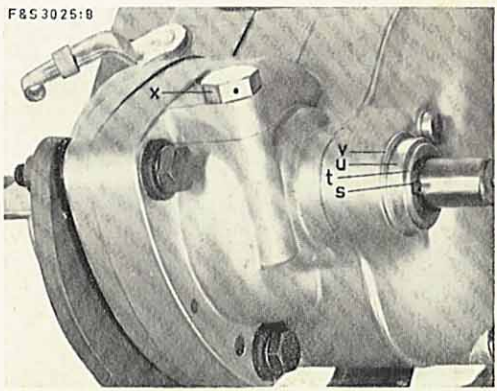


Fig. 75

Piston

Remove projecting parts of the crankcase gasket. Position the cylinder flange gasket, graphited side towards the crankcase, so that it mates with the transfer ports.

Heat the piston to 70 . . . 80° C (158 . . . 176° F) and position it on the connection rod with the fixing bolt. Place the piston on the home-made slotted wooden board (a, Fig. 11), locate the gudgeon pin, if necessary with withdrawal tool (e, Fig. 12) and insertion sleeve (d, Fig. 12).

Note:

Position the piston on the connecting rod in such a manner that the arrow on the piston crown points in the direction of travel and the locking pin of the upper piston ring faces towards the magneto side.

When fitting the steel band, make sure that the piston rings are correctly seated in their grooves (danger of breaking piston rings).

Cover the crankcase, insert the two snap rings (b, Fig. 11), making sure that the latter are properly seated.

Cylinder and cylinder head

Oil cylinder and place it in position. The intake adaptor should point towards the middle of the crankcase halves. (Danger of breaking piston rings.)

Remove slotted wooden board and screw on cylinder lightly with 4 nuts M 6.

Move the piston up and down a few times and tighten the nuts diagonally.

Tightening torque 0.5 . . . 0.7 kpm (3.6 . . . 5.0 ft. lb.).

Mount the cylinder head and screw it on with 4 hexagon head screws M 6 x 30 and washers, tightening the screws diagonally.

Tightening torque 1.1 . . . 1.3 kpm (7.9 . . . 9.4 ft. lb.).

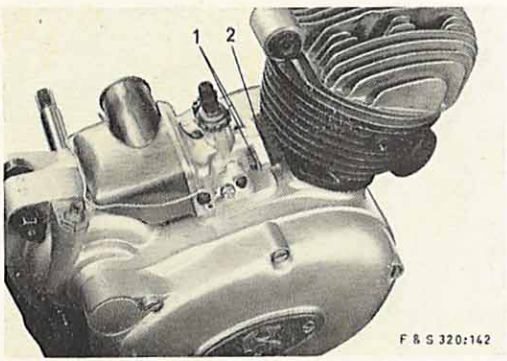


Fig. 76

Carburettor

Fig. 76

Put asbestos gasket (2) and carburettor on the intake flange or intermediate flange respectively (in the case of SACHS 50/3 MLF B, 50/4 MLFA NL, 50/4 MLF B and 50/4 MLKA X).

Fit the two isolating washers (1, hard cloth side towards carburettor) and screw on with 2 nuts M 5, tightening alternately.

Fan cover

Fig. 77

Insert the two body-fit sleeves.

Place the fan cover in position and tighten it with 2 fillister head screws M 6 x 22.

Insert clutch linkage (1) into the clutch lever (2).

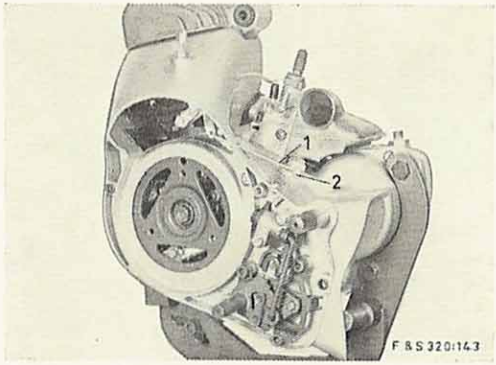


Fig. 77

Adjusting the gear shift mechanism

Fig. 78

Fit foot change pedal (a) temporarily and engage 1st gear.

Low gears are engaged by pushing the foot change pedal downward, high gears are engaged by pushing the pedal upwards.

Insert the crown nut (c) with its thick collar facing upwards into the shifter socket (d), and screw it on to the gearshift bar (e) while simultaneously pressing the foot change pedal downward until the gearshift bar is drawn fully outwards.

Then turn back the crown nut (c) by 8 edges, screw lock nut (f) on to the gearshift bar (e) and lock the crown nut.

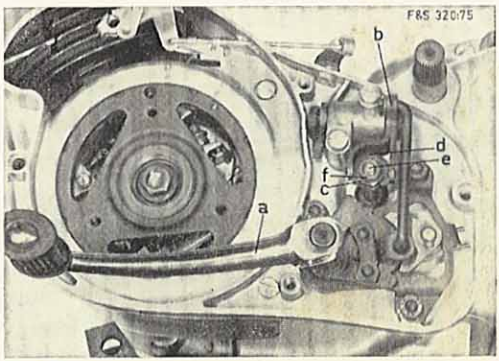


Fig. 78

Fig. 79

In this position the gear shift cotter (x) lies in the 1st gear recess of the main shaft.

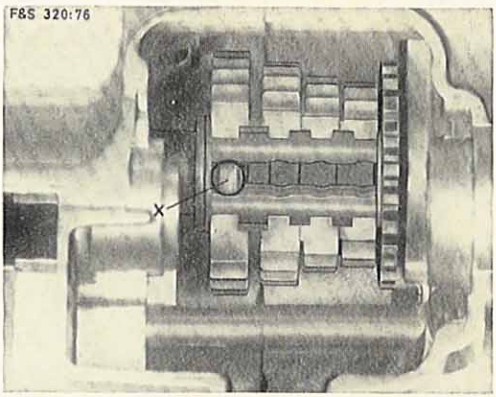


Fig. 79

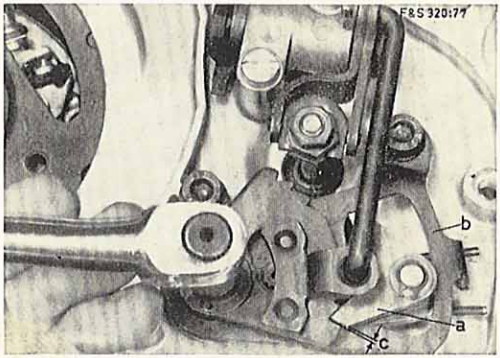


Fig. 80

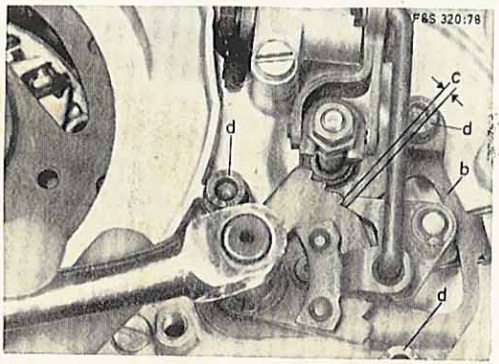


Fig. 81

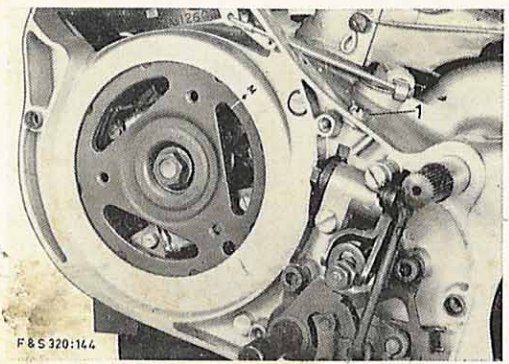


Fig. 82

Fig. 80

Push the foot change pedal towards 2nd gear until the pawl (a) touches the teeth of the transmission lever. Determine the play (c) between the tooth flanks.

Fig. 81

Push the foot change pedal towards 1st gear until the pawl touches the teeth of the transmission lever. Determine the play (c) between the tooth flanks.

The play (c) between the tooth flanks should be the same on both sides. If this is not the case, loosen the 3 hexagon head cap screws (d) and correct the play by swiveling the holder plate (b).

After having carried out the adjustment tighten the 3 hexagon head cap screws (d) again.

Tightening torque 1.0 ... 1.2 kpm (7.2 ... 8.7 ft. lb.).

Remove the foot change pedal.

Ignition timing

Fig. 82

Ignition point:

SACHS 50/3 LFH and 50/4 LKH
2.8 ... 3.2 mm before TDC
(0.1102 ... 0.1260 in.)

SACHS 50/3 LFS, 50/3 MLF B, 50/4 LKS, 50/4 LF NL, 50/4 MLFA NL, 50/4 MLF B, and 50/4 MLKA X
1.5 ... 2.0 mm before TDC
(0.0591 ... 0.0787 in.)

Contact breaker gap:
0.4±0.05 mm (0.0157±0.00197 in.)

Pole shoe gap:
7...11 mm (0.27559...0.43307 in.)

Gauge:
Ignition setting gauge (repair tool no. 20) for spark advance or depth gauge.
Feeler gauge 0.4 mm (0.0157 in.).

The marking "M" on the fan housing in conjunction with the marking line on the magneto flywheel indicates the ignition point position.

The ignition setting is carried out as follows:

1. Adjust contact breaker gap (b, Fig. 83) at highest cam position to 0.4±0.05 mm (0.0157±0.00197 in.).
2. Turn the magneto flywheel back against the direction of rotation until the marking line on the magneto flywheel is in line with the mark "M" on the housing (Fig. 82).
3. In this position the contacts should begin to open. If this is not the case, the ignition point can be adjusted by rotating the armature base plate. This can be done by means of the longitudinal slots.
4. Ignition is advanced by turning against the direction of rotation of the magneto flywheel, whereas turning in the direction of rotation retards the ignition.
5. Always tighten the screws of the armature base plate firmly after carrying out such an adjustment.
6. If the ignition is correctly adjusted, the pole shoe gap (a, Fig. 83) should be 7 . . . 11 mm (0.27559 . . . 0.43307 in.).

If this is not the case, the pole shoe gap can be corrected only by slightly readjusting the contact breakers in the range of 0.4±0.05 mm.

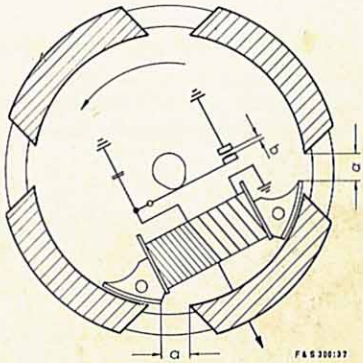


Fig. 83

When a new ignition assembly is fitted, an ignition setting gauge must be used, since new magneto flywheels have no markings.

It is recommended that the ignition setting be checked and adjusted each time the engine is inspected, as the engine performance depends on it and various troubles in the lighting system are caused by an incorrect ignition setting. At the same time the gap between the electrodes of the spark plug should be checked.

(Correct width: 0.5 mm [0.020 in.])

Fan and cover

Fig. 84

Insert packing washer and fan (1) and tighten with 3 cylindrical screws M 6 x 10 and spring washers.

Tightening torque 0.6 . . . 0.8 kpm (4.3 . . . 5.8 ft. lb.).

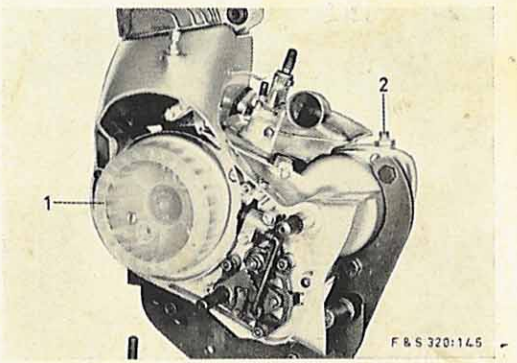


Fig. 84

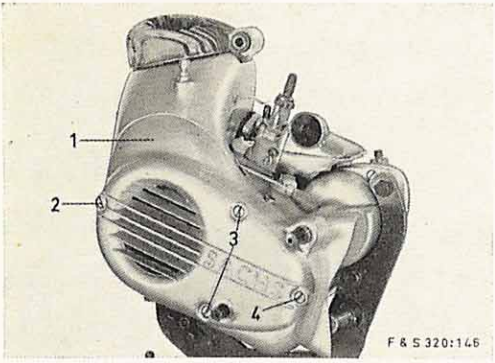


Fig. 85

Fig. 85

Insert the two body-fit sleeves.
Fit cover (1) and tighten with
2 fillister head screws (3)
M 6 x 42,
1 fillister head screw (4)
M 6 x 38 and
1 fillister head screw (2)
M 6 x 65.

Foot change pedal and kickstarter arm

Place the sealing ring – lip first – on the gearshift lever shaft, then mount the foot change pedal to match the shape of the housing and screw tight.
Locate the kickstarter arm flush on its shaft and screw tight.

Cylinder casing

Screw cylinder casing (4, Fig. 4) on to the cylinder with lens head screw (5, Fig. 4) M 6 x 15.

Note:

In the case of SACHS 50/3 LFS, 50/3 MLF B, 50/4 LKS, 50/4 MLFA NL, 50/4 MLF B and 50/4 MLKA X, insert spacer bush between cylinder casing and cylinder and screw on cylinder casing with fillister head screw M 6 x 28.
Remove engine from assembly jig.

Pouring oil into the gearbox

Fill 200 cc (0.35 Imp. pints) of SACHS Gear Oil or SAE-80 oil through the hole for the oil filler plug (x, Fig. 13) or resp. through the terminal screw for the speedometer shaft.

Note:

On new or replacement engines the vent port of the oil filler plug or resp. of the terminal screw for the speedometer shaft is closed with a rubber ring.
This rubber must be removed before the engine is put into service, as otherwise the gearbox will not be vented.

OPERATIONS AND ADJUSTMENTS AFTER ENGINE OVERHAUL

Fitting and lubrication of control cables

Before mounting a repaired or replacement engine in the frame it is advisable to check all control cables and control levers and to replace defective parts.

It is essential to ensure that control cables and joints of levers function smoothly, as otherwise there will be no efficient power transmission and troubles are liable to occur.

Care should also be taken to ensure that the cables run in large curves and are not pinched, in order to eliminate friction losses.

New wires must be greased or oiled before insertion.

Periodic lubrication of control cables

Fig. 86

Control cables with stiff action can be lubricated by means of a special lubricating nipple.

Before fitting the lubrication nipple (a) on the cable (b), the outside plastic sheath must be removed at the point requiring lubrication.

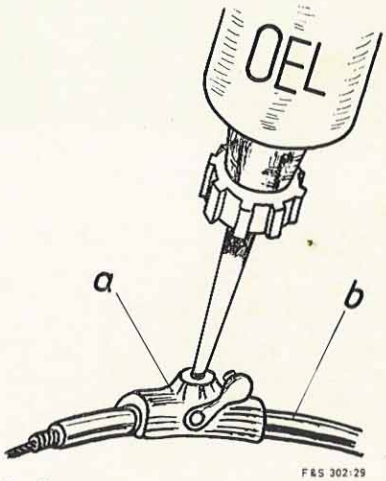


Fig. 86

Installation of engine in frame

Place the engine in the frame and screw it on.

Chain

Lay the chain around the rear wheel sprocket and join it with the connection link. The closed end of the clamping spring on the connection link must point in the direction of travel. Ensure that the chain is correctly tensioned.

Control cables

Fit the control cable for the throttle and for the decompressor (if provided).
Control cable for clutch operation see page 52.

Electrical connections

Put an insulating hose over cables coming from the engine and connect them to cables of the same colour at the terminal (see wiring diagrams page 54 . . . 58).

Speedometer cable

If provided, insert the speedometer cable into the terminal screw on the engine and screw it on.

Exhaust system
Attach the cleaned exhaust assembly with cap nut and new sealing ring to the cylinder. It is best to tighten the cap nut before securing the muffler bracket, in order to avoid stresses within the exhaust assembly.

Fuel line
Attach the fuel line to the carburettor.

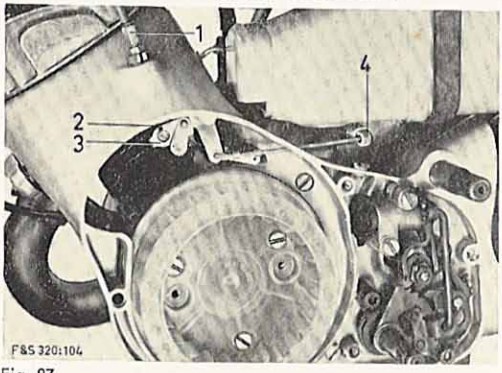


Fig. 87

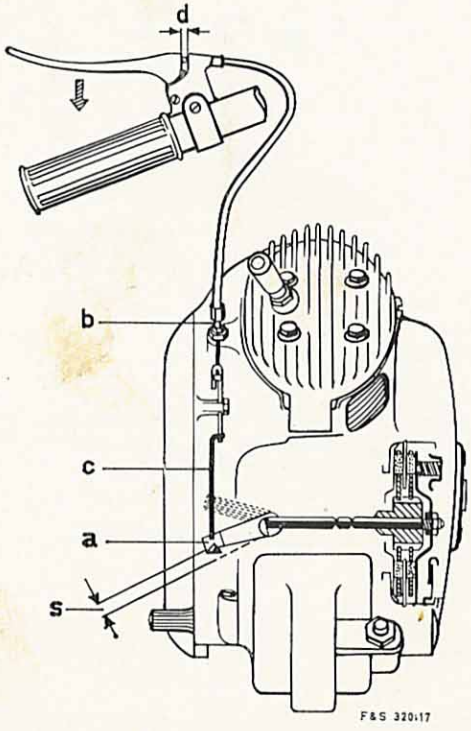


Fig. 88

Clutch adjustment

Removing and fitting the clutch control cable
Fig. 87
Remove kickstarter arm or pedal crank respectively, foot change pedal and sealing ring.
Unscrew cover.
Take care of body-fit sleeves.
Detach the control cable (2) from the angular lever (3) and pull it out.
Insert new control cable and attach it to the angular lever.
Screw on the cover.
Place the sealing ring – lip first – on the gearshift lever shaft, place foot change pedal in position so that it matches the shape of the housing and screw it tight.
Place kickstarter arm flush on the starter shaft and screw it tight.

Clutch adjustment
Fig. 88
When adjusting the clutch proceed as follows:
The clutch can be adjusted by means of the adjusting screw (1, Fig. 14) and the control cable adjusting screw (b).
Detach clutch linkage (c) from the clutch lever (a).
Unscrew cover "S" from engine.
Loosen lock nut (2, Fig. 14) and screw out clutch adjusting screw (1, Fig. 14) until the clutch lever (a) has the required play (s) of 8...10 mm (0.31 496...0.39 370 in.).
After the adjustment has been carried out, lock clutch adjusting screw (1, Fig. 14) with lock nut (2, Fig. 14).
Screw on the cover "S" again.
Re-attach clutch linkage (c) to clutch lever (a).
Adjust the required play (d) of 1...3 mm. (0.03 937... 0.11 811 in.). on the clutch control lever by means of the adjusting screw (b).

Tuning the carburettor

Tune the carburettor while the engine is warm.

Fig. 89

Unscrew throttle valve stop screw (5) and set the control cable in such a position that the throttle slide valve is completely closed.

Screw in the throttle valve stop screw until the warm engine ticks over smoothly when the throttle twist grip is closed. Turn the adjusting screw (1) so that the cable between carburettor and throttle twist grip has a clearance of 1...2 mm (0.03937...0.07874 in.).

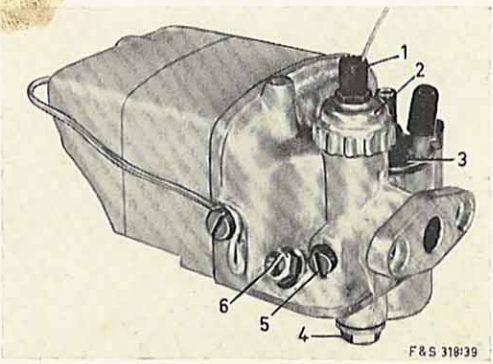


Fig. 89

INSTRUCTIONS AND WIRING DIAGRAM FOR DYNAMO MAGNETO

6 V 17 or 19 W for SACHS 50/3 MLF B

Connections:

On generator armature C_2 (yellow lead)
Main light A_1 6 V 15 W
Rear ligth A_3 6 V 2 or 4 W respectively

With speedometer lighting in the case of 19 W equipment
Main light A_1 6 V 15 W
Rear light A_3 6 V 3 W
Speedometer light 6 V 1.2 W

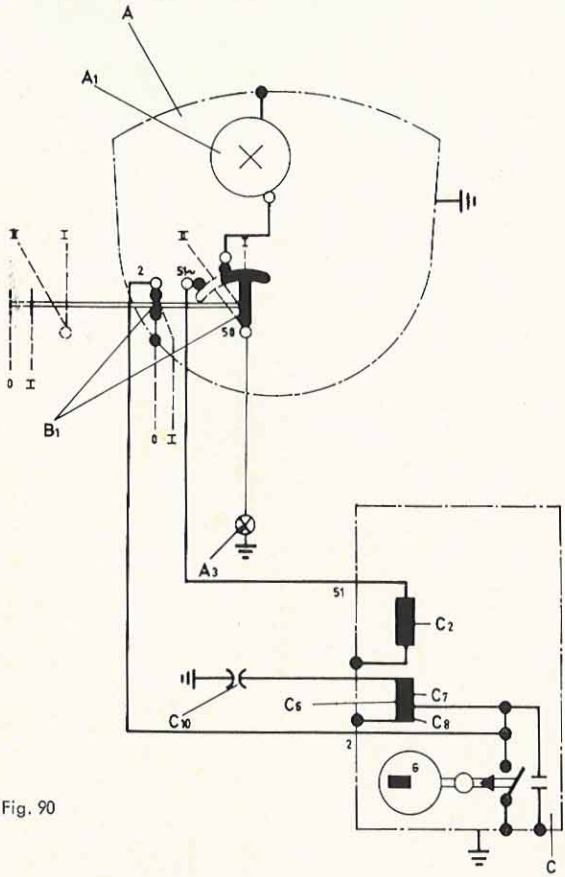


Fig. 90

F & S 320:147

A = Headlamp
A_1 = Main light
A_3 = Rear light
B_1 = Lighting and ignition switch
C = Dynamo magneto

Switch positions
O = Off (ignition short circuited)
I = Daylight driving
II = Driving light

C_2 = Generator armature
C_5 = Ignition armature
C_7 = Secondary winding
C_8 = Primary winding
C_{10} = Spark plug

INSTRUCTIONS AND WIRING DIAGRAM FOR DYNAMO MAGNETO

6 V 23 W with rear light armature

for SACHS 50/3 LF S, 50/3 MLF B, 50/4 LK S, 50/4 LF NL, 50/4 MLFA NL and 50/4 MLKA X

Connections:

On generator armature C_3 und C_4
a) Main light A_1 6 V 15 W (yellow lead)
b) Stop light A_4 6 V 5 W (green lead)
On rear light armature C_5 (gray lead)
Rear light A_3 6 V 3 W

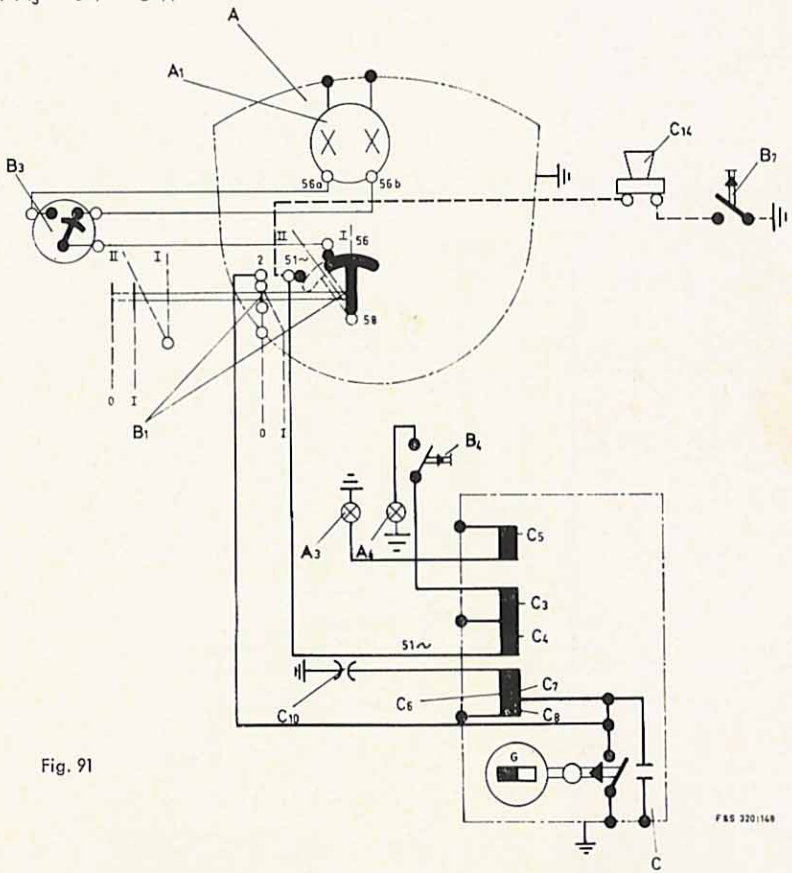


Fig. 91

A = Headlamp
A_1 = Main light
A_3 = Rear light
A_4 = Stop light
B_1 = Lighting and ignition switch
B_3 = Dipper switch
B_4 = Stop light switch
B_7 = Horn push button
C = Dynamo magneto

Switch positions
O = Off (ignition short-circuited)
I = Daylight driving
II = Driving light

C_3 = Stop light winding
C_4 = Main light winding
C_5 = Rear light armature (inductive)
C_6 = Ignition armature
C_7 = Secondary winding
C_8 = Primary winding
C_{10} = Spark plug
C_{14} = A. C. horn

INSTRUCTIONS AND WIRING DIAGRAM FOR DYNAMO MAGNETO

6 V 29 W for SACHS 50/3 LFH and 50/4 LKH

Connections:

On the generator armature

Main light A_1 6 V 25/25 W
Rear light A_3 6 V 4 W

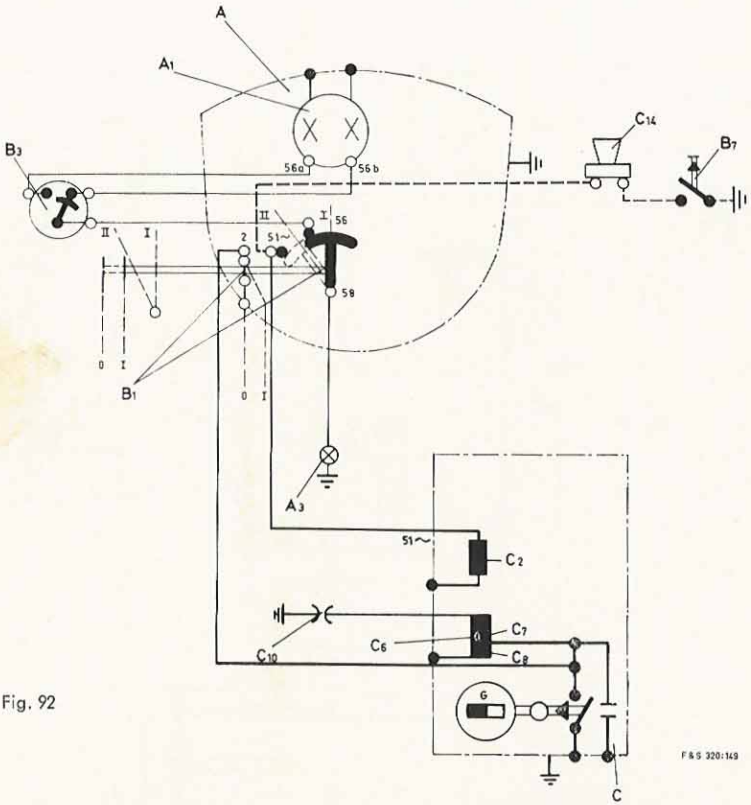


Fig. 92

A = Headlamp
A_1 = Main light
A_3 = Rear light
B_1 = Lighting and ignition switch
B_3 = Dipper switch
B_7 = Horn push button
C = Dynamo magneto

C_2 = Generator armature
C_6 = Ignition armature
C_7 = Secondary winding
C_8 = Primary winding
C_{10} = Spark plug
C_{14} = A. C. horn

Switch positions

O = Off (ignition short-circuited)
I = Daylight driving
II = Driving light

INSTRUCTIONS AND WIRING DIAGRAM FOR DYNAMO MAGNETO

6 V 29 W with stop light armature

for SACHS 50/3 LFH, 50/3 LF S and 50/4 LKH

Connections:

On generator armature C_2 (yellow lead)
Main light A_1 6 V 25/25 W
Rear light A_3 6 V 4 W
On stop light armature C_1 (green lead)
Stop light A_4 6 V 5 W

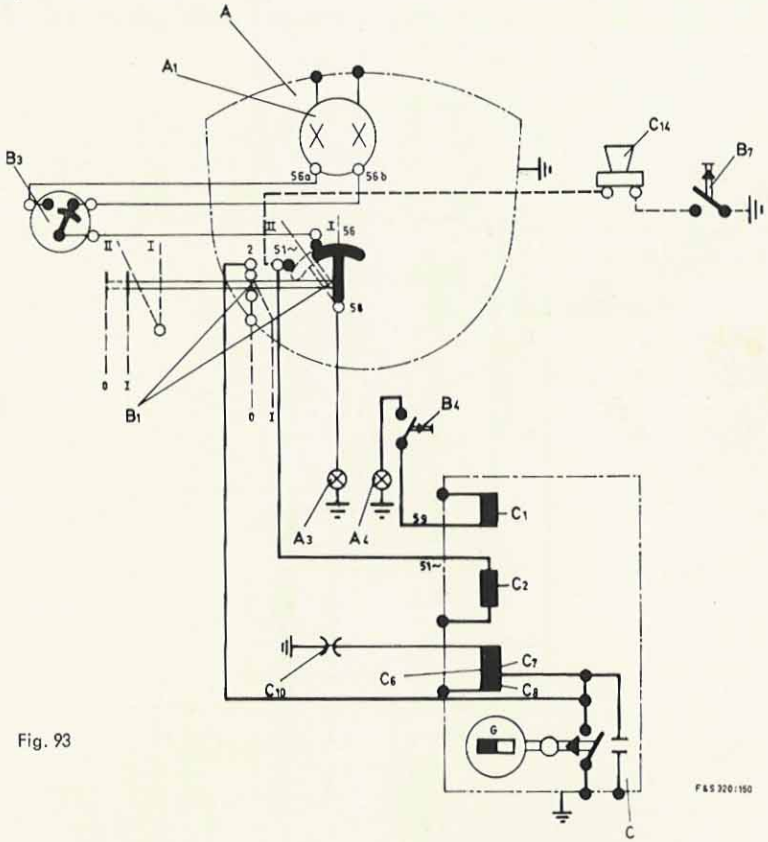


Fig. 93

A = Headlamp
A_1 = Main light
A_3 = Rear light
A_4 = Stop light
B_1 = Lighting and ignition switch
B_3 = Dipper switch
B_4 = Stop light switch
B_7 = Horn push button

C = Dynamo magneto
C_1 = Stop light armature
C_2 = Generator armature
C_6 = Ignition armature
C_7 = Secondary winding
C_8 = Primary winding
C_{10} = Spark plug
C_{14} = A. C. horn

Switch positions

O = Off (ignition short-circuited)
I = Daylight driving
II = Driving light

INSTRUCTIONS AND WIRING DIAGRAM FOR DYNAMO MAGNETO

6 V 35 W with external ignition coil

for SACHS 50/4 LKH

Connections:

On generator armature C_2 (yellow lead)
Main light A_1 6 V 30/30 W
Rear light A_3 6 V 5 W
On stop light armature C_1 (green lead)
Stop light A_4 6 V 18 W
The primary lead (blue) is connected to terminal 1 of the ignition coil.

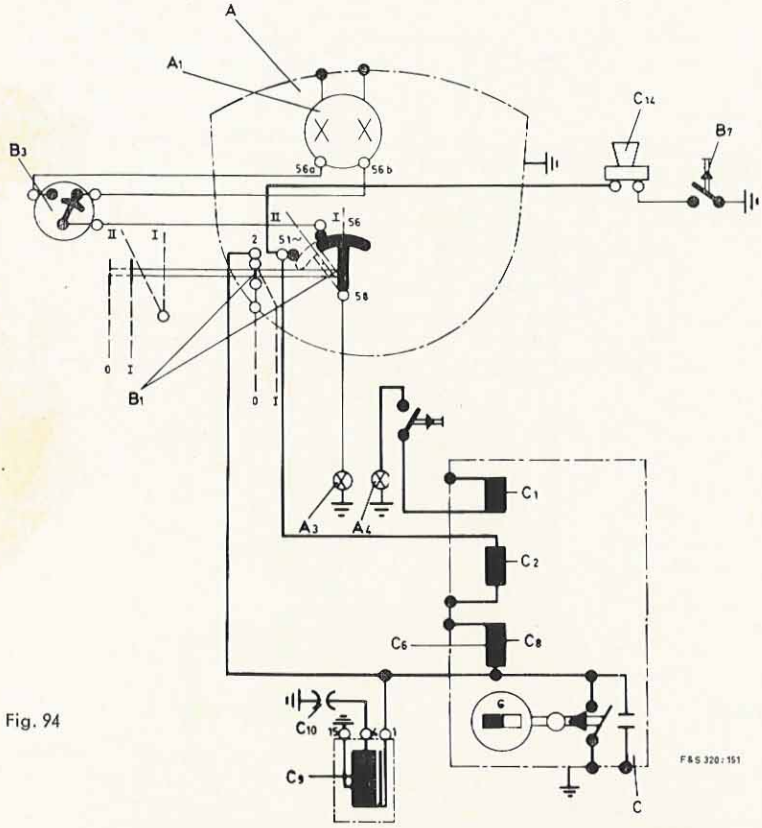


Fig. 94

A = Headlamp
A_1 = Main light
A_3 = Rear light
A_4 = Stop light
B_1 = Lighting and ignition switch
B_3 = Dipper switch
B_7 = Horn push button

Switch positions

O = Off (ignition short-circuited)
I = Daylight driving
II = Driving light

C = Dynamo magneto
C_1 = Stop light armature
C_2 = Generator armature
C_6 = Ignition armature
C_8 = Primary winding
C_9 = Ignition coil
C_{10} = Spark plug
C_{14} = A. C. horn

LAYING UP THE ENGINE

If the engine is not used for a fairly long time (e. g. during the winter), 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 or switch, with the throttle twist grip open. When the engine has stopped, close the fuel tap. These precautions will adequately protect the crankshaft, connecting rod and main bearings against corrosion.

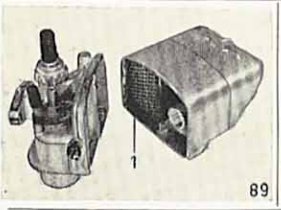
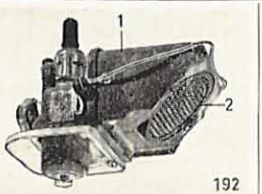
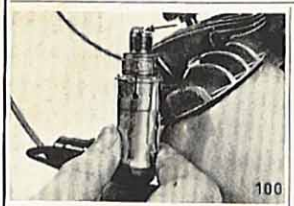
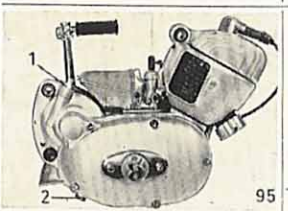
2. To protect the cylinder and the piston, place the piston at top dead center, unscrew the sparking plug and pour 3...5 cc (0.106...0.176 fl. oz.) of anti-corrosion oil through the sparking plug hole. Then turn the engine 15...20 times by means of the starter and screw in the spark plug again.

3. To protect the engine externally, it is recommended that anti-corrosion oils be used as supplied by the leading oil companies;
   for example:

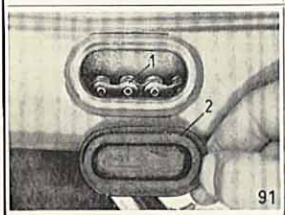
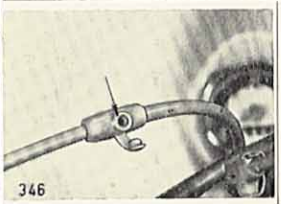
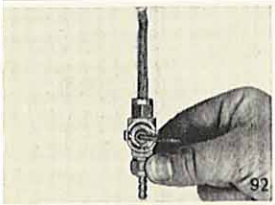
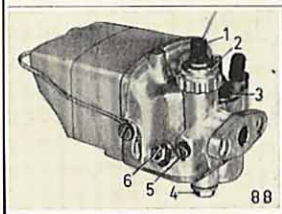
   Anticorit MR 5 supplied by Messrs. FUCHS, D-6800 Mannheim, Germany
   Lubrication Oil MIL-L-644 B supplied by MOBIL OIL
   SHELL ENSIS Fluid 260 supplied by SHELL
   RUST BAN 395 supplied by ESSO.

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 shaking, or that they be replaced.

LUBRICATION AND MAINTENANCE CHART

Maintenance or lubrication point	Lubricant, lubricant quantity and maintenance operations	Maintenance: Every ▶ 621 miles	1864 miles	3728 miles	as required
 89	**Wet air cleaner** If there is a dust deposit on the filter element (1), remove the element (1), clean it in petrol, dip it in motor petrol, dip it in motor oil SAE 40 or 50 and let it drip off.	X			
 192	**Wet air cleaner** As soon as there is a dust deposit on the filter element (2), detach filter cap (1), clean it in petrol, wet the air cleaner with motor oil SAE 40 or 50 and let it drip off.	X			dusty conditions
 175	**Intake silencer** As soon as there is a dust deposit on the filter element (1), remove intake silencer, clean it in petrol and wet the built-in wet air cleaner (1) with motor oil SAE 40 or 50.	X			
 100	**Spark plug** A provisional decarbonization of the spark plug can be made at the insulator and between the electrodes. A correct cleaning can only be achieved by means of a sandblast unit. **Functional check** Remove the spark plug, put on spark plug terminal, hold the plug thread in contact with earth (cylinder head) and work the starter. If the plug is in perfect condition, a strong spark must appear between the electrodes. The electrode gap should be 0.5 mm (0.02 in.), see arrow.	X			when dirty
 95	**Checking the oil** Remove oil level control screw (2). If the oil level in the gearbox is below the lower edge of the control hole, unscrew speedometer shaft and pour into the opening or through the hole of the oil filler plug as much SACHS Gear Oil or SAE-80 oil, until oil is coming out of the oil check hole. If no more oil comes out, screw in speedometer shaft or oil filler plug respectively.	X			
	Oil change Unscrew oil drain plug on the bottom of the engine (ordinary hexagon head). Drain the oil and close the hole again. Unscrew speedometer shaft and pour into the opening or through the hole of the oil filler plug respectively 200 cc (0.35 Imp. pints) of SACHS Gear Oil or SAE-80 oil, as described under checking the oil.			X	

LUBRICATION AND MAINTENANCE CHART

Maintenance or lubrication point	Lubricant, lubricant quantity and maintenance operations	Maintenance: Every ▶ 621 miles	1864 miles	3728 miles	as required
	**Chains** Oil roller chain with thick-bodied motor oil or gear oil. Check chain tension. Sag of chain approx. 1 . . . 2 cm (0.4 . . . 0.8 in.).	X			
	Take off chain and clean it in petrol or paraffin oil. Dip it into heated chain grease, move it to and fro, in order that the joints and rollers are adequately lubricated on all sides. When mounting the chain, the locking spring of the chain lock points with its closed end in running direction.		X		
	**Control cables** If there are lubricating nipples (see arrow) on the control cables, lubricate with thin-bodied oil. If there are no such nipples, detach control cables and grease cables thoroughly.		X		
	**Fuel strainer** Empty the fuel tank. The fuel strainer is connected with the fuel cock. Therefore, remove cock from tank for cleaning, and rinse strainer thoroughly in petrol. Rinse out fuel tank, if necessary. Remount fuel cock and refill fuel tank.				X
	**Carburettor** Unscrew cover bolt (2), float chamber cover (3) and end screw (4). Take out throttle valve with jet needle and float. Unscrew needle jet and main jet (6). Clean carburettor housing and components in petrol. Blow out jet bores only with compressed air.				X
Clutch	Check and adjust if required (see page 52).	X			
Ignition system	Check and adjust contact breaker, after 500 km (310 miles), after 1000 km (621 miles) and then every 3000 km (1864 miles).		X		
	Grease lubricating pad for contact breaker cam with BOSCH special grease Ft 1 v 4.			X	
Indexing pawl for gear change mechanism	Press in 2 . . . 3 cc of heavy-duty bearing grease through the bore of the screw (1, Fig. 82).		X		
Engine and exhaust silencer	Decarbonize (see page 34).		X		
Cylinder barrel, connecting rod bearings	Two-stroke mixture, i. e. SACHS special engine oil in tins F & S Part No 0263 005 100 (tins of 250 cc, premixed, for 5 litres of fuel) or two-stroke oils or, if necessary, other branded oils (SAE 40 or 50) of leading oil companies, mixed with branded petrol in 1:25 ratio.				

TIGHTENING TORQUES FOR BOLTS AND NUTS

Bolts

F & S No.	Qty.	Used on	Dimension	Torque
0 240 104 000	3	Holder plate for gear change mechanism	M 6 x 14	7.2 . . . 8.6 ft. lb.
0240 059 102	7	Crankcase	M 6 x 18	5.0 . . . 6.5 ft. lb.
0940 091 100	1	Crankcase	M 6 x 35	5.7 . . . 7.2 ft. lb.
0640 003 000	1	Crankcase	M 6 x 56	5.7 . . . 7.2 ft. lb.
0240 120 002	2	Crankcase	M 6 x 52	5.7 . . . 7.2 ft. lb.
0240 106 100	3	Armature base plate	M 4 x 14	2.9 . . . 4.3 ft. lb.
0940 091 100	5	Crankcase cover, clutch side	M 6 x 35	5.7 . . . 7.2 ft. lb.
0240 093 001	4	Cylinder head	M 6 x 30	7.9 . . . 9.4 ft. lb.
0941 057 002	3	Fan	M 6 x 10	4.3 . . . 5.7 ft. lb.

Nuts

F & S No.	Qty.	Used on	Dimension	Torque
0242 024 002	2	Intermediate flange	M 5	2.2 . . . 2.9 ft. lb.
0942 072 101	1	Crankshaft, magneto side	M 10 x 1	27.4 . . . 28.9 ft. lb.
0642 005 101	1	Main shaft, chain wheel	M 12 x 1	39.8 . . . 42.3 ft. lb.
0316 057 002	4	Cylinder	M 6	3.6 . . . 5.0 ft. lb.
0242 030 005	1	Ball bearing bush, clutch housing	M 20,8 x 1 L	10.8 . . . 12.3 ft. lb.
0242 000 001	1	Crankshaft, power takeoff side	M 10 x 1	26.8 . . . 28.2 ft. lb.

ENGINE FAULTS

The following is a list of engine faults which may conceivably occur.

A. Engine refuses to start

Plug not sparking because

1. Plug oiled up, damp, shorted or damaged,
2. Spark plug wet (outside),
3. Ignition lead loose or broken,
4. Short-circuiting button or switch jams, or leads from engine are defective,
5. Contact breaker points oiled up, wet or burnt,
6. Ignition armature or capacitor damaged.

No fuel reaching engine because

1. No fuel in tank,
2. Fuel tap closed,
3. Filter in fuel tap clogged,
4. Fuel line jammed,
5. Jets blocked.

Fuel mixture not ignitable because

1. Mixture too rich, due to operating the tickler too long,
2. Water in carburettor,
3. Infiltrated air due to loose carburettor.

Poor compression because

1. Piston rings broken,
2. Piston and cylinder badly worn,
3. Cylinder head or spark plug loose.

B. Drop in engine power

Because of dirt

1. Air filter dirty,
2. Exhaust and transfer ports in cylinder clogged with carbon,
3. Strong carbon deposit in cylinder head,
4. Exhaust tube and exhaust silencer dirty,
5. Fuel tank not vented (filler cap),
6. Spark plug vitrified.

Compression too low

(see section A "Poor compression because").

C. Other engine faults

Engine runs unevenly because

1. Ignition cable loose or damaged,
2. Engine overheating, causing vapour lock which obstructs fuel supply,
3. Contact breaker points oiled up or burnt,
4. Locating pin for contact breaker arm worn,
5. Spark plug or spark plug terminal or ignition armature not in order.

Engine four-strokes and does not reach speed because

1. Carburettor flooded, due to dirty or worn float needle seat,
2. Float leaking,
3. Exhaust duct clogged with carbon,
4. Carburettor wrongly adjusted or jets loose,
5. Air filter clogged.

Engine pinks badly at full speed because

1. Ignition too far advanced,
2. Thick carbon deposits in combustion chamber,
3. Cooling fins dirty,
4. Connecting rod bush worn.

Engine backfires or spits into carburettor because

1. Too little fuel reaching engine,
2. Spark plug glowing because of wrong heat value,
3. Spark plug shorted, dirty or vitrified,
4. Engine getting false air,
5. Water in carburettor.

Engine runs too hot, piston seizes because

1. Engine wrongly decarbonized (piston crown cleaned bright),
2. Engine not getting sufficient fuel,
3. Carburettor wrongly adjusted or wrong oil used,
4. Cooling fins on cylinder and cylinder head dirty,
5. Pre-ignitions.

Engine has no idling speed because

1. Throttle valve stop screw wrongly adjusted,
2. Control cable for throttle valve not correctly adjusted,
3. Ignition armature damaged.

Fuel consumption too high because

1. Fuel tank, fuel line or carburettor leaking,
2. Jet needle or needle jet worn,
3. Jets too large.

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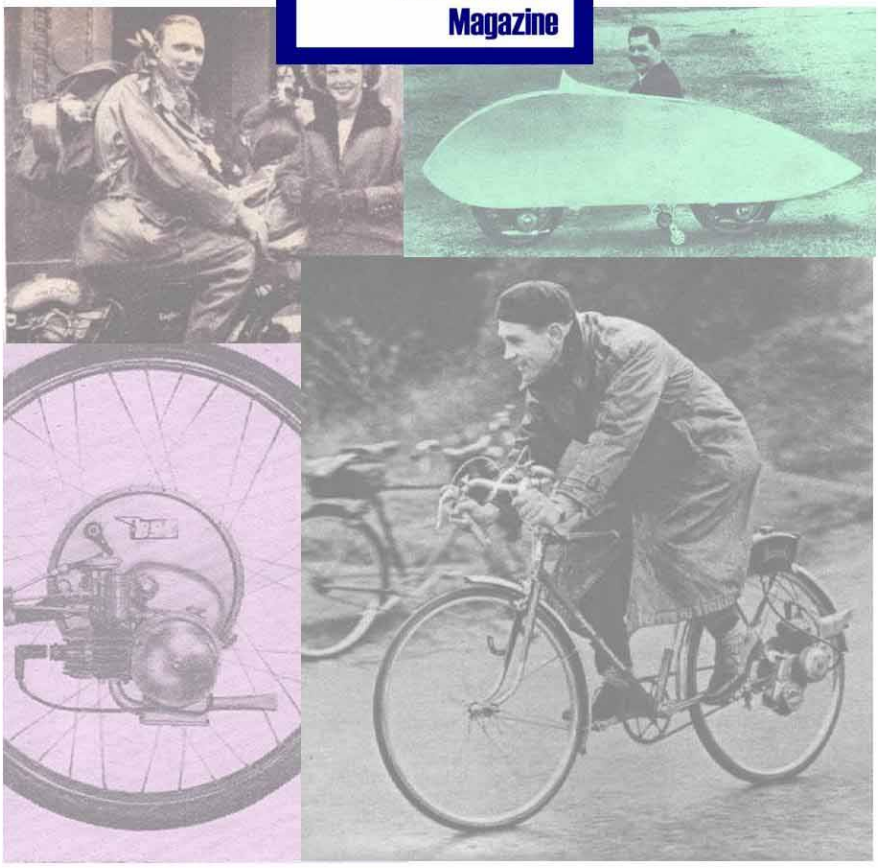

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