



ZÜNDAPP

Motorcycle Model KS 601 EL

**Description
and Operation Instructions**

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Contents

	Page
Foreword	6
(A) Technical Details	7
Engine	7
Chassis	8
Vehicle	9
Gasoline and Oil Quantities	10
(B) Description	11
1. Engine	11
(a) Crankcase	11
(b) Crankdrive	11
(c) Cylinders and Cylinder Heads	11
(d) Valve Control	11
(e) Lubrication	12
(f) Oil Air Cleaner	12
(g) Carburettor	12
(h) Electrical Equipment	13
(i) Clutch	14
2. Drive Mechanism	14
(a) Change-Speed Gear Unit	14
(b) Drive Shaft	15
(c) Rear End Drive Gear Unit	15
3. Wheels, Tires etc.	15
(a) Wheels	15
(b) Tires	15
4. Frame Unit	15
5. Front and Rear Wheel Suspensions	16
(a) Front Fork	16
(b) Rear Wheel Suspension	16
6. Brakes	16
(a) Foot Brake	16
(b) Hand Brake	17
7. Hand and Foot Controls	17

	Page
8. Tank, Fuel Tubing	17
9. Electrical Equipment	17
(a) Battery	18
(b) Headlight	18
(c) Taillight	18
(d) Horn	18
10. Storing of the Tool Kit	18
(C) Operation	19
11. Starting-up and Shutting-off	19
(a) Preparing to Take Off	19
(b) Starting-up	19
(c) Shutting the Engine off	20
12. Instructions for Driving	20
(a) Gear Shifting	20
(b) Braking	20
(c) Underway	21
(d) Cross-Country Riding	21
(D) Maintenance	22
13. General	22
14. Engine and Equipment	22
(a) Lubrication	22
(b) Cylinder Heads, Intake and Exhaust Manifolds	23
(c) Valves	23
(d) Oil Sump	23
(e) Oil Air Cleaner	24
(f) Carburettor	24
(g) Electrical Equipment	25
(h) Clutch	25
15. Drive Mechanism	25
(a) Change-Speed Gear Unit (Shift Gear)	25
(b) Drive Shaft	25
(c) Rear End Drive Gear Unit	26

	Page
16. Wheels, Tires etc.	26
(a) Dismounting the Front Wheel	26
(b) Dismounting the Rear Wheel	26
17. Frame	27
18. Front and Rear Wheel Suspensions	27
(a) Front Wheel	27
(b) Rear Wheel Suspension	27
19. Brakes	28
(a) Foot Brake	28
(b) Hand Brake	28
20. Hand and Foot Controls	28
21. Tank, Fuel Tubing etc.	28
22. Electrical Equipment	28
(a) Battery	28
(b) Current Consumers	29
23. More Information on Lubrication	29
24. Survey of Maintenance Works	30
25. Lubrication Diagram	31

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Foreword

ZUNDAPP motorcycles are designed according to the most modern construction principles, and under rigid engineering standards. They are manufactured from top- quality materials and built with utmost precision.

A machine that is properly serviced will obviously retain its value much longer than one which is neglected. It is, therefore, to your advantage if you study this booklet carefully.

The instructions contained herein are meant to acquaint you with your ZUNDAPP model KS 601 El. We have subdivided this booklet into the following chapters:

- (A) Technical Details
- (B) Description
- (C) Operation
- (D) Maintenance

Chapter (A) — Technical Details — contains all data necessary for repair work.

**ZUNDAPP-WERKE G.m.b.H., NURNBERG-MUNCHEN
WERK NURNBERG**

(A) Technical Details

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Engine:

Type of operation	Four-stroke
Stroke	67.6 mm
Bore	75 mm
Number of Cylinders	2
Cubic Capacity	597 c. c.
Compression Ratio	1 : 8
Power Output	35 HP
Engine Torque	max. 4.38 mkg at 3950 R.P.M.
Piston Clearance (with cold engine)	0.08 mm
Valve Play (with cold engine)	Intake 0.20 mm Exhaust 0.25 mm
Valve Cycle (adjust with 1.0 mm valve play)	Intake opens 25° before T.D.C. Intake shuts 51° after L.D.C. Exhaust opens 61° before L.D.C. Exhaust shuts 15° after T.D.C.
Battery-Lighting-Ignition-Set . . .	Set Noris DSa 6/90 L (automatic voltage control) 6 V, 90 W
Ignition Adjustment	automatic
Ignition Timing	Advanced ignition 10 mm (40°) before T.D.C.
Type of Sparkplug	Bosch W 240 T 1 or Beru K 240/14
Distance between Plug Electrodes	0.7 mm
Type of Battery	16 amp/h battery with internal terminals
Cooling System	Air Cooling
Engine Lubrication	Circulating type Lubrication
Oil Pump	Gear Pump (automatic)
Oil Consumption	normally up to 1 liter per 1,000 km (600 miles)

Carburettor	Type Bing 1/25/3 left side 1/25/4 right side
	Port dia. 25 mm
	Main Jet No. 110 left side No. 115 right side
http://www.zundappfool.com	Position of tapered needle: Groove 2 (from top of needle)
	Mixing Chamber Insert No. 5
	Idle Jet No. 40
	Air Adjusting Screw open: 2—2½ turns

Chassis:

Frame	Closed double-tube frame, torsion-proof welding
Front Fork	Tele glide fork
Springing	4 Spring Coils
Shock Absorber	Single-action hydraulic Shock Absorber
Steering Head Bearing	Ball Bearing
Rear Wheel	Swinging Arm Suspension
Clutch	Two-Disc Dry Clutch
Change-Speed Gear	ZUNDAPP type Chain Gear
No. of Speeds	4
Gear Ratios inside Gearbox	
1st speed	1 : 3
2nd speed	1 : 1.625
3rd speed	1 : 1.238
4th speed	1 : 0.962
Starter	1 : 2.96
Total Ratios	
1st speed	1 : 14.625
2nd speed	1 : 7.922
3rd speed	1 : 6.035
4th speed	1 : 4.68
Transmission Agent from Gearbox to Rear End Drive . . .	
	Drive Shaft
Gear Ratio inside Rear End Drive	
Gear Unit	1 : 4.875
Type of Drive	Rear wheel drive

Brakes:

Foot Brake	Cable-type brake acting on rear wheel
Hand Brake	Cable-type brake acting on front wheel

Wheels:

Rim Size	2.15 B x 18
Tire Size	3.50 - 18 (both wheels) for solo-work

Tire Pressures:

Front Wheel	1.5 atü (21.33 lbs/sq.in) solo 1.5 atü (21.33 lbs/sq.in) pillion work
Rear Wheel	1.7 atü (24.17 lbs/sq.in) solo 1.9 atü (26.61 lbs/sq.in) pillion work

Vehicle Dimensions:

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Overall Length	2140 mm (84.31")
Width	815 mm (32.11")
Height	1010 mm (39.79")
Wheelbase	1415 mm (55.75")
Saddle Height	740 mm (29.15")
Turning Circle	4600 mm (181.24")
Weight (full tank, tools, and tire pump)	224 kg (494 lbs.) (with 3.50 - 18 tires)
Peak Load	464 kg (1014 lbs.) (with 3.50 - 18 tires)
Minimum permanent speed . . .	4 - 5 km (3 miles) p.h.
Maximum speed	app. 150 km (100 miles) p.h.
Gasoline Consumption (according to German Norm DIN 70030)	4.8 liters (1.27 gals.) per 100 km (60 miles)
Maximum Range	300 km (180 miles)

Gasoline and Oil Quantities:

Power Fuel:

Fuel Tank	14 liters (3.70 gals.)
	2 liters (0.528 gals.)
	reserve of them

Lubricants:

Engine	2.5 liters (2.65 quarts)
	with new engine
	2.0 liters (2.12 quarts)
	after oil change
Gearbox	0.75 liters (0.81 quarts)
Rear End Drive Gear Unit . . .	0.18 liters (0.19 quarts)
Telescopic Fork	0.15 liters (0.16 quarts)
	per fork leg

German measures converted into:

Quarts (US) liquid
Gals. (US) liquid

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[B] Description

1. Engine (fig. 3)

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(a) Crankcase

The light alloy Crankcase is a one-piece casting and, in combination with the rear Crankshaft Bearing Cap, houses the crank mechanism. On its underpart it carries a detachable Oil Sump.

(b) Crankdrive

The Crankdrive comprises Crankshaft, Connecting Rods, and Pistons. The Crankshaft is a one-piece forging. It is hardened and mounted in three exchangeable Ball and Roller Bearings. The Connecting Rods have split big ends. The pins of the Connecting Rod Bearings on the crankpin are guided in split bronze rings (cages). The small end of the connecting rod holds the Piston Pin Bush. The pistons are provided with three Compression Rings and an Oil Scraper Ring each. The oil grooves in the scraper rings are provided with bypass ducts leading into the piston interior. The Piston Pin floats, and is secured against lateral dislocation.

(c) Cylinders and Cylinder Heads

Both oppositely arranged special cast-iron Cylinders are flanged to the crankcase by means of staybolts. The light alloy Cylinder Heads carry the Rocker Arms for the Valve Control and are oil-sealed by means of removable caps (Rocker Caps).

(d) Valve Control

The Camshaft controls the valve cycle. It lies overhead the Crankshaft and is mounted in a fore and rear Roller Bearing inside the Crankcase. The Camshaft is driven by the helically toothed Crankshaft Gear which engages the noise and vibration-absorbing Camshaft Gear. A camshaft-controlled Rotary Shutter operates the ventilation. The valves are controlled by the camshaft over Valve Tappets, Valve Pushrods, and Rocker Arms provided with Adjusting Screws. The hollow mushroom type Tappets slide in exchangeable Guides. They are made of light alloy with pressed-in cast Tappet Plates, and hardened Ball Sockets. The Pushrods are made of light alloy and have pressed-in hardened steel ends. The mushroom Tappet holds the ball-shaped lower end of the Valve Pushrod. The ball-socket upper end of the pushrod touches the spherical end of the Rocker Arm Adjusting Screw. The Rockers are mounted in Needle Bearings on the Cylinder Heads.

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The tulip-shaped overhead Valves are arranged in inclined position. This renders the Combustion Chamber almost semi-spherical. Valves are shut by Valve Springs (two for each valve). The Valve Guides are forced into the Heads. The Valve Seat Rings are shrunk into the Heads.

(e) Lubrication (fig. 5)

The Circulating Lubrication is operated by a Gear Oil Pump driven by the crankshaft over a Spur Gear. The Oil Pump sucks the oil, through a Filter Unit, out of the Oil Sump and forces it, through a system of oil ducts in the crankcase, towards the nozzles. Through the nozzles the oil is sprayed against the Crank Journals which are provided with oil grooves. The hollow crankpins receive the oil for the Connecting Rod Needle Bearings from one of these grooves. Crankshaft and Camshaft Bearings, Cylinder Barrels, and Tappets are lubricated by oil splash. Through the hollow Tappets and Pushrods the oil travels towards the hollow Rocker Arms, the Rocker Arm Bearings, and the Valve Guides. Driving Gears for Camshaft and Oil Pump are lubricated by fine oil spray in the front Crankcase Cover. Surplus oil from the Valve-Chambers flows back to the Oil Sump through oil bypass ducts.

(f) Oil Air Cleaner

The Oil Air Cleaner consists of a Vortex-Action Filter Jacket made of sheet metal, a Filter Bottom, and a perforated Filter Cap. It is fastened to the Crankcase with a winged screw. The oil film on the filter jacket absorbs all dust, grit, or other foreign matter.

(g) Carburettor (fig. 6)

With Bing Downdraft Carburettors, Mixing Chamber and Float Chamber form a one-piece unit. A compensating bore beside the Mixing Chamber guarantees a uniform fuel level at the Main Jet, regardless of the motorcycle's position.

The carburettor's task is to provide the engine, under varying degrees of load, with a rich, and correctly measured, fuel-air mixture. The mixing operation is done by an Idle-and-Main-Jet System. Within the lower speed range the engine receives the fuel-air mixture from the Idling System which consists of Idle Jet (for fuel supply), Idle Air Jet, and Air Screw.

Throttling down the air admission by means of the Air Screw means richer mixture. Admitting more air renders the mixture leaner. The Idle Jet is interchangeable.

With increasing speed, the Main Jet System starts working. It comprises Main Jet, Mixing Chamber Insert, and Needle Jet. The

interchangeable Main Jet is situated at the lower needle jet end. The Needle Jet is screwed into the Carburettor Housing from below. When the Main Jet System starts operating, the fuel passes through the Main Jet towards the Needle Jet. The needle jet opening points into the Mixing Chamber where fuel and air are subjected to a premixing process. The area of the needle jet opening is varied by a Tapered Needle affixed to the Gas Slide. Whenever the Gas Slide is actuated the needle will dive into the Jet Body and the area of the jet opening will be reduced; whenever the needle is withdrawn the opening area will increase. The Needle Body is provided with grooves for needle adjustment in the Gas Slide. Whenever the needle is set so that it, in its initial position, enters the opening deeper, the engine will receive a leaner mixture. Whenever it is set higher, the mixture will become richer. The Jet Needle, however, can only influence fuel consumption while the engine is throttled down. With Gas Slide fully open, fuel consumption is exclusively governed by the Main Jet.

(h) Electrical Equipment

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The Electrical Equipment of the engine comprises the Magdyno (Battery-Generator Set), the Ignition Coil, and the Sparkplugs. The D. C. Shunt-wound Generator with automatic voltage control has a capacity of 50/90 Watts at 6 Volts. It is flanged to the front Crank-case Cover. The Armature Shaft, on its fore end, terminates into a Breaker Cam. The adjustable Contact Breaker is situated at the front end of the casing. It is protected by a cap. The Plugs are screwed into the Cylinder Heads in inclined position. Voltage Regulator and Reserve-Current Cut-Out are situated on top of the casing under a sheet-metal cap. The Armature Shaft slides on the Crankshaft.

The Voltage Regulator balances the generator's terminal voltage and keeps it practically constant regardless of load and speed. The battery is automatically charged with high primary tension. There is no danger of overcharging it.

The Reverse Current Cut-Out serves to connect battery and generator parallel whenever the tensions of both are equal.

With increasing speed, the Voltage Regulator completes, or closes, the circuit between battery and generator; the battery is being charged.

With decreasing speed, as soon as a certain amount of reverse current flows back from the battery, the Voltage Regulator breaks

the circuit, thereby preventing the battery from discharging via the generator. The red Control Light in the Headlight Cowl will then light up.

(i) Clutch

The engine's torque is transmitted to the Change-Speed Gear Unit over a Dry Multiple Disc Clutch. It comprises Flywheel, Pressure Springs, Clutch Pressure Plate, Clutch Discs, Clutch Center Plate, and Clutch Cover Plate. (Plates = driving members; Discs = driven members.)

Clutch Pressure Plate, Center Plate, and Cover Plate are guided by the flywheel's internal Spline. The Clutch Discs are provided with bilateral Lining, and are guided in the Main Shaft's female Spline. 12 Pressure Springs supply the necessary contact pressure.

Clutch Action: The Clutch Hand Control, when pulled towards the handlebar, operates the Clutch lever situated at the Starter Cover. The latter exerts pressure over a Thrust Rod, onto the Pressure Plate, thereby compressing the springs, and relieving the discs. (Declutching.)

When the Hand Control is released ("in"-position), discs and plates are pressed together by the Pressure Plate (which is under constant spring load), and the main shaft is being driven.

2. Drive Mechanism

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(a) Change-Speed Gear Unit (fig. 4)

The Change-Speed Gear Unit is a chain-type transmission with four forward speeds. The one-piece Engine-Gear Unit has shockproof rubber cushioned suspension. The gearbox is flanged to the crankcase. It contains the Shafts, Chains, and Gears, the Gearshift Mechanism, and the Starter System. The speeds are shifted by means of sliding jaws. Gears and chains are constantly in mesh and do not slide during the gearshifting process. The Lay Shaft (Counter Shaft) is driven by the Sliding Jaws which mate with the holes in the gears on the Lay Shaft. Main and Lay Shafts are mounted in Ball Bearings in the Gearbox. The Shifting Mechanism with the Shifting Forks is situated at the right-hand Gearbox side. The elastically affixed Shifting Forks allow all four speeds to be engaged even when the engine is not running. The Gearshifting Mechanism is operated by the Foot-Change Control. The Starter is situated at the left-hand gearbox side. The Starter, when de-

pressed, transmits the power to the Main Shaft over Bevel Gears and a big and a small sliding Spur Gear. The small Spur Gear's face is provided with driver toothing, and meshes with a corresponding gear on the Main Shaft. The latter gear can be driven in one direction only; thus the Spur Gear has been made slideable on the Main Shaft.

The Lay Shaft's end is joined with the Drive Shaft fore end.

(b) Drive Shaft

The Drive Shaft acts as transmission agent from engine to Rear End Drive Gear Unit. It is provided at one end with a Universal Joint mounted in Pin Bearing or with an Elastic Connecting Disc (make Vulkollan) and is slideable at the final drive end.

(c) Rear End Drive Gear Unit

Rear End Drive Gear Unit and rear right-hand Swinging Arm are a one-piece unit. The former contains the helically toothed Bevel Pinion and Ring Gear for the Final Drive, as well as helically toothed gears for the Speedometer Drive. The Drive Shaft is joined with the Bevel Pinion's fore end. The Ring Gear is fixed to the Connecting Member for the Rear Wheel.

3. Wheels, Tires etc.

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(a) Wheels

The motorcycle's wheels are equipped with Deep-Center Safety Rims 2.15B x 18 (3 x 18) and Re-enforced-End Spokes. The wheels are interchangeable. Wheels and Hub Shells are joined with the motorcycle by means of Left-Hand Thread Hollow Screws.

(b) Tires

For solo machines generally Steel Wire-Re-enforced Low-Pressure Tires 3.50 — 18 are used for all wheels.

4. Frame Unit

The motorcycle's closed frame consists of drawn steel tubes welded to the steering head and made twist-proof by means of cross stays.

5. Front and Rear Wheel Suspensions

(a) Front Fork (fig. 7)

The Telescopic Fork, in the steering head of the frame, is held in position in ball bearings by the upper as well as the lower Fork Connecting Member with Fork Shank. The lower Fork Guide Tubes slide on the hardchromed Fork Tubes which are mounted in the two Fork Connecting Members. Each of the Fork Guide Tubes, at its lower end, has a shoe which permits easy and effortless assembling and disassembling of the front wheel without the set screws having to be removed.

In order to obtain especially soft cushioning effect, a Coil Spring Unit consisting of a pre-loaded, short lower spring and, on top of it, a stronger long spring, has been inserted into each of the two Fork Guide Tubes. The Coil Spring Unit, at its lower end, is mounted in the Fork Guide Tube and at its upper end inside the Fork Tube. Both springs are connected by means of a Spring Carrier and a Tension Bolt in such a way that the two short springs, under normal load, will iron out smaller irregularities, and the two stronger springs will only come into action alone at higher loads. A Hydraulic Shock Absorber, arranged between the Fork Guide Tubes and the upper Fork Connecting Member, exercises a dampening effect while the fork extends. A Steering Damper that can be adjusted manually has been provided at the Fork Shank in order to eliminate fork "whip" in motorcycles with sidecar, or on rough roads. Adjusting Screws permit readjusting the damper free of play at any time. 150 c.c. of oil are filled into each Fork Leg in order to prevent the sliding tubes from seizing. (See Lubrication Diagram)

(b) Rear Wheel Suspension

is a pivoted-fork springing. The fork with the rear wheel swings around a fulcrum located in the frame. Shocks are absorbed by 2 Springs and damped by two Hydraulic Shock Absorbers. The pivoted fork is mounted in taper bearings which permit readjusting free of play.

6. Brakes

(a) Foot Brake (fig. 9)

The Foot Brake is an internally acting cable-type brake acting on the rear wheel. The Brake Pedal is adjustable.

(b) Hand Brake

The Hand Brake is an internal-type brake within the Front Wheel Hub. It can be applied by pulling the Brake Hand Control at the right handlebar side which again actuates Control Cable and Brake Lever.

When brake is applied, Brake Shoes are forced apart by the Brake Cam. The Brake Shoes are mounted on the Brake Cover. When brake is released, the Brake Shoes are retracted to their initial positions by the Brake Release Springs.

7. Hand and Foot Controls (fig. 8)

The motorcycle is equipped with the following hand and foot controls:

Hand Clutch Control and Dipper with Horn Button are mounted at the left handlebar side. The handlebar's right hand side carries Hand Brake Control and Twist-Grip.

Starter and Foot-Change Control are mounted at the left-hand side of the Engine-Gear Unit. On the right side of the frame is the Foot Brake Pedal which is connected with the Rear Wheel Brake Lever by means of a rod.

8. Tank, Fuel Tubing, etc. <http://www.zundappfool.com>

The Fuel Tank is suspended at the upper part of the Frame Unit. It contains 14 liters (3.70 gals.) and has two Three-Way Taps provided with Fuel Strainers. The strainers are manufactured of fine-mesh wire sieve which collects all impurities contained in the fuel. The strainer can be easily detached and cleaned. With both Three-Way Tap Levers pointing towards "Auf" (Open), only 12 liters (3.20 gals.) can be consumed. For Fuel Reserve (about 2 liters) turn Tap Levers towards "Rest" (Reserve).

The Reserve has been installed with the intention to remind the driver to refuel the motorcycle in time. Keep Fuel Taps closed while the engine is not running. Fuel Tank and Carburettor are connected by means of Fuel Tubing.

9. Electrical Equipment (fig. 11)

The motorcycle is equipped with a 6 Volt Battery-Lighting-Ignition Set.

(a) Battery

The Battery is situated at the left-hand gearbox side, out of harm's way. It is kept in place by an elastic clamp. Battery capacity is 16 ampere-hours.

(b) Headlight

The Headlight is fastened to the Tele-Glide Fork. It contains a Bilux Bulb for bright and dimmed light, a Parking Lamp, a red Charge-Control Light, a built-in Speedometer with lighting, and a Switch for the Lighting Set which also contains the Electrolock with removable Ignition Key for switching on, or off, the ignition. The Headlight Shell is completely sealed. The reflector inside is protected from dust and water spray. The lamps are securely fastened to the reflector, making adjusting unnecessary. Lights are dimmed by the Dip Switch at the left handlebar side which also bears the Horn Button.

(c) Taillight

The Taillight is situated at the lower part of the Rear Fender and illuminates the license plate.

(d) Horn

The Horn is elastically fastened to the frame below the dual seat. It is sounded by pressing a button at the Dip Switch at the left handlebar side.

10. Storing of the Tool Kit

The tools are stored in a locked toolbox under the dual seat.

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[C] Operation

11. Starting-up and Shutting-off

(a) Preparing to Take Off

Before taking off, check whether

1. there is the correct amount of the right type of oil in the engine, the gearbox, and the rear end drive gear unit,
2. the fuel tank is filled up,
3. the battery is charged,
4. tire pressure is correct,
5. the whole motorcycle is thoroughly greased,
6. the brakes are in good working condition.

(b) Starting-up

1. Move Foot-change Control into "Neutral".
2. Open fuel taps. (Position "Auf")
3. Flood carburettors by depressing both ticklers simultaneously.
4. Open throttle twist-grip about one-fourth. Depress kickstarter one to three times with clutch engaged and ignition switched off (red charge control lamp must not light up).
5. Switch on Ignition (charge-control lamp lights up). Open throttle twist-grip slightly, then start up by depressing the starter.
6. Lower engine's speed by closing the throttle. High speed with insufficient operating temperature is extremely harmful to the engine. Especially under temperatures below $+10^{\circ}\text{C}$ ($+50^{\circ}\text{F}$) the engine should be allowed to warm up while running idle.

Note: Starting-up without, or with defective, battery.

An almost discharged, or defective, battery will render starting-up difficult. In this case it is best to disconnect the battery by removing the connection from the negative pole to the ground (ground terminal cable).

If the battery is disconnected or missing, the vehicle has to be pushed for starting. Pushing is made easier by connecting the generator terminals No. 6 and 9 by means of a wire hoop (after having removed the rubber filler above the regulator). The cables already connected to these terminals must, however, be left in place.

After remounting the battery, the wire hoop has naturally to be removed.

(c) Shutting the Engine off

1. Move foot-change control into "Neutral".
2. Close fuel taps.
3. Increase speed of the engine by accelerating.
4. Remove ignition key and close throttle twist-grip simultaneously.

12. Instructions for Driving

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(a) Gear Shifting

Always start with 1st speed and change — whether up or down — in strict sequence only.

1. Declutching: Pull clutch control closely towards handlebar. Move in 1st speed by depressing the foot-change control. Release clutch control gradually, and accelerate.
2. Changing up: Close twist grip — declutch — press foot-change control upward — release clutch control — accelerate.
3. Changing down: Declutch — depress foot-change control — engage clutch.

(b) Braking

Try to regulate your speed with a minimum of brake use. Reduction of speed can, in most cases, be achieved by closing the throttle in time.

1. Foot Brake

When operating the foot brake, start off pressing the pedal slightly, and gradually increase pressure.

2. Hand Brake

It is advisable to apply the hand brake carefully, even when riding solo on rougher roads.

In case of danger: Decelerate, depress foot brake pedal swiftly, (not abruptly) and pull hand brake. Avoid blocking the wheels as this usually results in skidding and damage to the tires. When driving on wet and slippery roads, apply brakes very carefully. On prolonged downhill drives always move in lower gear. Your four-stroke engine is the best and most dependable brake with a minimum of wear!

(c) Underway

Drive carefully while going through built-up areas, over bridges, on slippery roads, and through curves. Avoid abrupt braking by decelerating, and changing-down, before reaching dangerous places. Pay attention to clutch slippage, for it means excessive clutch wear. Always make use of the engine's braking power. Avoid high speed in low gear. Change down in time. Use the same gear going down a hill that you would use climbing it. Never try to change gear while driving downhill. Better do it before!

While the motorcycle is driving along smoothly, the twist-grip should be closed shortly from time to time. This will create a vacuum in the combustion chamber and the oil film in the cylinders will be renewed. No overheating the engine can occur.

(d) Cross-Country Riding

During cross-country riding the correct operation of steering mechanism, brakes, clutch, and change-speed gear is of the utmost importance. On sand or other loose soil, a minimum of steering is advisable. Swinging the front-wheel too much will make the motorcycle skid whenever it hits solid ground again. Enter all curves carefully. Also during cross-country riding, clutch slippage must be avoided.

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[D] Maintenance

13. General

Careful maintenance and operating your motorcycle according to instructions will keep it in good working condition. Each machine leaving our factory is equipped with accessories and tools for maintenance.

Once or twice a year the motorcycle should be thoroughly cleaned. All parts where access is difficult should be greased. Rims, if damaged, must be derusted and revarnished. Retightening of screws and bolts, especially on the cylinder heads, cylinders, oil sump, and oil drain plugs, is very important. New, or overhauled, engines should be run-in carefully according to instructions below.

Running-in speed limits:

0—1000 km (0—600 miles)	1st speed 25 km/h (15 miles)
	2nd speed 35 km/h (20 miles)
	3rd speed 60 km/h (36 miles)
	4th speed 75—85 km/h (45—50 miles) - varying -
1000—2000 km	1st speed 30 km/h (18 miles)
(600—1200 miles)	2nd speed 40 km/h (24 miles)
	3rd speed 75 km/h (45 miles)
	4th speed 90—95 km/h (55—58 miles) - varying -

Maintenance works referred to on page 23, and marked by a vertical line on the page margin should be performed by a workshop. All other maintenance work may be performed by the motorcycle's owner. The vehicle is equipped with the necessary tools.

14. Engine and Equipment

(a) Lubrication

With new engine, oil should be changed

after	500 km (300 miles)
after the next	500 km (300 miles)
after another	1000 km (600 miles).
From then on change oil every	1500 km (900 miles).

The oil (re types of oil consult Lubrication Diagram page 31) is drained out by loosening the Oil Drain Plugs on the Oil Sump's underpart. It is best to change oil immediately after a prolonged

drive when the oil is still warm and fluid enough. In tropical and dusty areas oil should be changed every 1000 km (600 miles) regularly. Oil consumption is abt. 1 liter per 800 km (480 miles).

From time to time the oil level should be checked by means of the Oil Dip Stick. The latter is situated near the Filler Screw behind the left-hand cylinder. It carries two marks, the upper mark indicating "ZU VIEL" (too much), and the lower "ZU WENIG" (too little). Before measuring the oil level clean area around the filler. Insert stick into the Filler Hole, but don't screw it in! If the oil level registers at, or below, the ZU WENIG mark, more oil should be added. A correct oil level will register midway between the two marks, provided the motorcycle stands evenly.

(b) Cylinder Heads, Intake and Exhaust Manifolds

With new, or overhauled, engine the Cylinder Flange Nuts and the nuts on the cylinder heads should be retightened in diagonal order and with cold engine after the first 300 km (180 miles). After another 500 km (300 miles) retighten Intake and Exhaust Manifold Nuts.

(c) Valves

With new, or overhauled, engine, valve play should be checked after the first 500 km (300 miles), then again regularly after every 2000 km (1200 miles). For better rocker accessibility remove Rocker Caps (without damaging the gaskets!). Depressing the Starter slowly will turn the crankshaft until both valves in one cylinder intersect. This constitutes Dead Center Position for the opposite cylinder. Valve play is generally measured with cold engine in **D.C.P.** Correct valve play, between Valve Shaft and Rocker, should measure 0.20 mm at the Intake, and 0.25 mm at the Exhaust. For measuring use gauge contained in the Tool Kit. Loosen Lock Nuts and adjust Rocker Screws with gauge inserted rigidly, as valve play will again increase after the Lock Nuts have been retightened.

After having adjusted the valve play, retighten Lock Nuts and grease rockers generously. Before screwing down the Rocker Caps, check whether the gaskets are in correct position, and no loss of oil can occur.

(d) Oil Sump

Every 10000 km (6000 miles) the Oil Sump should be dismantled and thoroughly cleaned. Remove residues at the packing surfaces. Replace Oil Strainer. Renew Gasket. Retighten Oil Sump Screws in correct (diagonal) order. As to correct amount of oil, consult Lubrication Diagram, page 31).

(e) Oil Air Cleaner

The Air Cleaner should be cleaned as often as possible. Loosen wing screw and take out filter. Rinse it in gasoline and blow it through with a tire pump. Dip it into motor oil. Screw it in place by means of the wing screw.

(f) Carburettor

Every time the engine shows a tendency towards irregular running the Carburettor should be cleaned and readjusted. For access to Main Jet loosen Union Screw. Gas Slide and Jet Needle can be easily detached after the Mixing Chamber Cover has been removed. Take out the Needle Jet. The Mixing Chamber Insert is then accessible. Float and Float Needle can be taken out after the Float Chamber Cover has been taken off the Float Chamber.

Before reassembling the Carburettor, it should be thoroughly cleaned with gasoline. The same applies to the Air Filter. All data necessary for adjustment are contained in "Technical Details" (page 7).

Adjusting the engine is done in the following way:

Warm up the engine to proper working temperature. Control Cable Adjusting Screws in the Mixing Chamber Cover should be screwed in completely. Detach Ignition Cable from the nearside cylinder and adjust the offside carburettor. Screw in Gas Slide Stop Screw until engine continues running with twist-grip closed. Unscrew Idle Air Adjusting Screw until engine runs with highest possible speed. Then unscrew Gas Slide Stop Screw as far as it is necessary for smooth and balanced idling. Adjust the second Carburettor in the same way, attaching the Ignition Cable to the nearside cylinder and detaching it from the offside one.

The Idle Air Adjusting Screw's setting range is 2-2½ turns from closed position, depending on temperature conditions.

Control Cables on both carburettors should be adjusted in such a way as to make both Gas Slides open simultaneously. Also, both wires should have exactly the same amount of slackness.

Adjust Gas Slide Stop Screws in exactly the same manner so that both cylinders show smooth, uniform, and balanced idling.

It is recommended to have the engine run with two cylinders (both Ignition Cables connected), each time one of the cylinders has been adjusted, so that the fuel which has collected in the other (not adjusted) cylinder during the regulation, may be consumed.

(g) Electrical Equipment <http://www.zundappfool.com>

Every 10000 km (6000 miles), or every time the red Charge-Control Light fails to go out, the Carbon Brushes of the generator should be checked, with Protective Cap removed. If the springs are found to touch the Brush Holders the brushes are worn out and must be replaced. Check Breaker Contacts every 5000 km (3000 miles) and clean Contact Faces. Oxydized spots should be cleaned with a fine file, and smoothed. Do not use emery cloth or paper because it will disintegrate and leave tufts of paper fibre behind.

With contacts fully open, the gap between them should measure 0.3—0.4 mm (0.12—0.16 in.). Measure the gap by means of an appropriate gauge every time you clean the contact faces, and adjust in the following way:

Loosen both Clamping Screws. Turn Eccentric until gap is correct. Retighten screws. Provide Grease Felt with new oil. Plugs should be cleaned with a steel brush or gasoline. Check gap between Plug Electrodes according to Chapter "A" (page 7).

(h) Clutch

The Clutch must be completely engaged without clutch slippage. With Clutch correctly adjusted, the Clutch Hand Control on the handlebar should show a small amount of slackness. Adjust clutch by means of the Knurled Edge Nut on the Clutch Control Cable.

15. Drive Mechanism

(a) Change-Speed Gear Unit (Shift Gear)

Check oil level every 1000 km (600 miles) and refill if necessary. Every 10000 km (6000 miles) the oil in the gearbox should be changed. If possible, change oil immediately after a prolonged drive, as long as it is still warm and fluid enough. The Oil Drain Plug is situated at the underpart of the gearbox. The Oil Filler Screw is at the right-hand side of the gearbox. Correct oil level will register at 15 mm underneath the Filler Cap (supporting face of the Filler Screw). With new, or overhauled, gear, oil should be changed after 2000 km (1200 miles).

(b) Drive Shaft

If equipped with Universal Joint, lubricate grease Pressure Nipple on Drive Shaft every 10000 km (6000 miles).

(c) Rear End Drive Gear Unit

Check oil every 1000 km (600 miles) and refill, if necessary. As to correct type of oil, consult Lubrication Diagram (page 31). Change oil every 10000 km (6000 miles), if possible, immediately after a prolonged drive, as long as the oil is still warm and fluid. The Oil Drain Plug is at the Gear Unit's underpart. Correct oil level will register at the height of the Filler Cap. With new, or overhauled, Rear Drive Gear Unit, oil should be changed after 2000 km (1200 miles).

Attention! In case of noisy gear operation check oil level immediately. Loose Oil Drain Plugs may cause loss of oil.

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16. Wheels, Tires etc.

(a) Dismounting the Front Wheel

Prop up the motorcycle on Front and Center Stand. Lift Brake Lever and detach Brake Cable. Loosen hexagonal screw on front axle (right-hand side). Loosen big hexagonal screws on Leg Ends only until Shoes open, and front wheel together with axle is easily detachable.

(b) Dismounting the Rear Wheel

Three hexagonal Nuts on the rear Fender Tip should be loosened only, not completely detached, and Fender Tip detached. The Center hexagonal Nut also holds the Taillight Connection. Attention when reassembling!

1. Loosen Clamping Bush on left-hand side
(Attention! Left-hand thread!)
2. Prop up motorcycle on Center Stand
3. Loosen hexagonal screw at Left Swinging Arm's end.
Take out Stub Axle (Right-hand thread)
4. Pull out Rear Axle until Clamping Bush can be taken out. Then detach wheel.

The tires must always be in good condition and should be interchanged in time. If possible, check tire pressure every time the fuel tank is refilled.

Correct tire pressures are:

	solo	pillion work
for Front Wheel	1.5 atm. = 21 p. s. i.	1.5 atm. = 21 p. s. i.
for Rear Wheel	1.7 atm. = 24 p. s. i.	1.9 atm. = 27 p. s. i.

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17. Frame

Every 5000 km (3000 miles) the Pressure Nipples in the Frame Unit should be greased. As to the types of lubricants, consult Lubrication Diagram (page 31). Retighten Fixing Bolts.

18. Front and Rear Wheel Suspensions

(a) Front Wheel

Drain out the oil in the Telescopic Fork after every 10 000 km (6000 miles), by loosening the oil drain plugs at the lower end of the two Fork Legs. After retightening these screws, refill into each Leg (after having taken off the two Rubber Stoppers at the upper Fork End) 150 c.c. (1.6 qts.):

Motor Oil SAE 40 at ambient temperatures
above + 15° C (+ 60° F)

Motor Oil SAE 20 at ambient temperatures
below + 15° C (+ 60° F).

Use correct type of oil corresponding with ambient temperatures, since the type of oil used will influence the running properties of the Fork Tubes. Thin oil will result in softer springing, thick oil in harder springing.

(b) Rear Wheel Suspension

Lubricate the two lateral Bearings of the Pivoted Fork abt. every 5000 km (3000 miles) at the Greasing Points provided therefor, with Shell-Retinax G (= Ambroleum). On this occasion, check the Taper Bearings also for play. If necessary, eliminate play by means of the adjusting facilities on the left-hand side.

As to machines with Elastic Connecting Disc at the Drive Shaft, check tightness of all screws and nuts every 5000 km (3000 miles) and, if necessary, retighten them and lock them again.

19. Brakes

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The Brake Linings must be kept free of water and oil. If, by driving on wet roads, or by washing down the motorcycle, water should succeed in entering the brakes, it is best to drive for a short stretch with brakes applied slightly until brake operation is satisfactory. Brake Shoes must never scrape while brakes are in "off" position.

(a) Foot Brake

The Foot Brake can be adjusted by turning the Circular Nut at the Brake Cable.

(b) Hand Brake

The Hand Brake can be adjusted by turning an Adjusting Screw with Lock Nut at the lower Fork End.

20. Hand and Foot Controls

Every 1000 km (600 miles), and every time the motorcycle is cleaned, the Fulcrums of all Hand Controls should be oiled. Also the Foot-Change Gear Rigging Joints should be provided with a few drops of oil.

21. Tank, Fuel Tubing etc.

Every 5000 km (3000 miles), retighten the Fixing Bolts at the Fuel Tank Suspension and check whether the Fuel Tap Fixing Nuts have close fit. The Fuel Strainer is situated at the Three-Way Tap.

Move Fuel Tap into "closed" position and unscrew the Strainer Cup which, at the same time, serves as water collector.

Loosen Eye Nut, detach Strainer Insert from below, and clean it with a soft brush. When reassembling, check whether the Packing Washer is in correct position.

22. Electrical Equipment

(a) Battery

Every 1000 km (600 miles), or every time the light fades rapidly during night rides, the battery at the left-hand gearbox side should be checked. The acid level should be not higher than 8 mm above the Plates; otherwise the battery will lose acid through the plugs. For refilling use distilled water from a clean receptacle. Never use acid.

Screw in Plugs tightly. Keep battery clean and dry, and wipe off exuded acid on the outside. Terminals and Pole Tops must be greased.

When testing the battery, check acid level by means of an acidometer.

Especially during wintertime the battery should be kept in a good state of charge. Any battery will freeze at about

- 18° C (— 0.4° F) when three-fourths discharged
- 8° C (+ 17.6° F) when completely discharged.

(b) Current Consumers

Check Lighting Set every 5 000 km (3 000 miles). All connections must have good contact. Repair frayed wires with insulating tape. Prior to any repair work on the battery or on any other electrical equipment the positive pole should be disconnected. Check (with correct tire pressure and motorcycle loaded to full capacity) whether the Headlight is correctly adjusted.

23. More Information on Lubrication

All Grease Nipples, Oil Filler Screws etc. on engine and frame are indicated in the Lubrication Diagram (page 31). Make sure that only the type of oil indicated is used for the individual lubrication points. Clean Nipples, Oil Filler Screws etc. carefully before lubricating.

In addition to the Nipples, Oil Filler Screws etc. indicated in the Lubrication Diagram the following parts must be provided with a few drops of oil every 1 000 km (600 miles):

the fulcrums of Hand Controls on Handlebar,
and Gear Rigging.

Every time when mounting a wheel, grease the tothing as well.

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24. Survey of Maintenance Works

In addition to the Lubrication works indicated in the Lubrication Diagram the following maintenance works must be performed regularly.

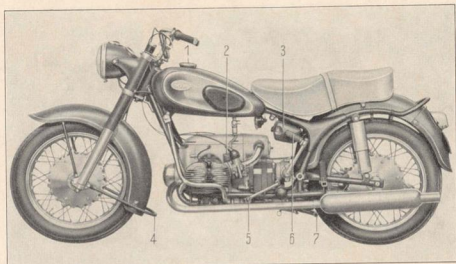
The right-hand column indicates the pages on which you will find more information on maintenance works specified in the center column.

mileage	Type of work	Page
1000 km = 600 miles	Service Oil Air Cleaner	24
	Retighten Cylinder Flange and Head Nuts . .	23
	Check Front Fork and Steering	27
	Check Battery	28
2000 km = 1200 miles	Adjust Valve Play	23
	Service Carburettor	24
5000 km = 3000 miles	Retighten Frame Fixing Screws	27
	With machines equipped with Elastic Connecting Disc at Drive Shaft, check Tightness of Screws and Nuts	27
	Clean Breaker Contacts and Plugs	25
	Check gap between Plug Electrodes	25
10000 km = 6000 miles	Service Oil Sump and Oil Strainer	23
	Check Battery-Ignition-Lighting Set and Grease Felt	25
	Check Brakes	28
	Check Lighting Equipment	29

25. Lubrication Diagram

mileage	type of lubricating point	No.	type of lubricant	type of work
500 km or 300 miles	Oil Filler Screw on Crankcase	1	Mobiloil AF = SAE 40 above + 15° C (+ 60° F)	Check Oil Level. If necessary, refill
	Oil Filler Screw on Gearbox	1	Mobiloil Artic = SAE 20 below + 15° C (+ 60° F)	
	Oil Filler Screw on Rear End Drive Gear Unit	1	Mobiloil CW = SAE 90	
1000 km or 600 miles	Universal Joint	1	Mobilcompound No. 4	Clean Pressure Nipple and inject
1500 km or 900 miles	Oil Filler Screw on Crankcase	1	Motor Oil	Oil Change: Take off Oil Drain Plug, drain out oil with Engine still warm, screw in Drain Plug. Fill in 2 liters of Oil
5000 km or 3000 miles	Front Wheel Brake Flange	1	Mobilcompound No. 4	Clean Pressure Nipples and inject
	Foot Brake Lever Foot-Change Shaft	2		
	Swinging Arm Bearings	2	Shell Retinax G	Oil Change: Detach Drain Plugs. Drain out oil. Screw in Plugs again. Refill 150 c. c. of Oil into each Fork Leg.
	Tele-Glide Fork	2	Mobiloil AF = SAE 40 above + 15° C (+ 60° F) Mobiloil Artic = SAE 20 below + 15° C (+ 60° F)	
10000 km or 6000 miles	Oil Filler Screw on Gearbox	1	Motor Oil	Oil Change: Take out Oil Drain Plug, drain out Oil with Engine still warm, screw in Oil Drain Plug, and refill 0.75 liters of Oil
	Oil Filler Screw on Rear End Drive Gear Unit	1	Mobiloil CW = SAE 90	Oil Change: Take out Oil Drain Plug, drain out Oil with Engine still warm, screw in Plug, and refill 0.18 liters of Oil

Fig. 1



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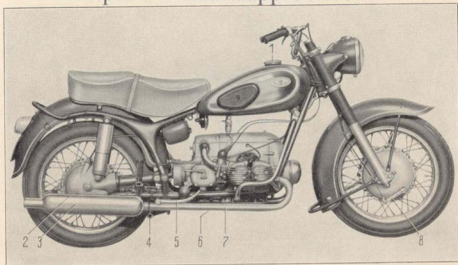
Motorcycle, left-hand view

- 1 Fuel Tank Cap
- 2 Oil Filler Screw on Engine
- 3 Toolbox
- 4 Front Stand

- 5 Foot-Change Lever
- 6 Starter
- 7 Center Stand

Fig. 2

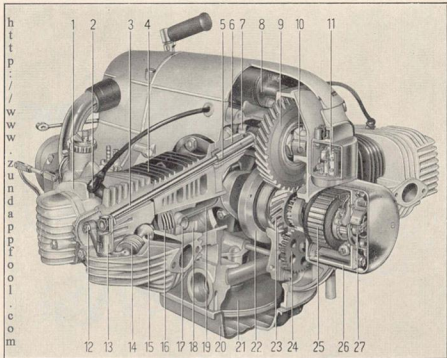
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Motorcycle, right-hand view

- | | |
|---|---|
| 1 Fuel Tank Cap | 5 Brake Pedal |
| 2 Oil Filler Screw for Rear End Drive Gear Unit | 6 Oil Drain Plug for Change Speed Gear Unit |
| 3 Oil Drain Plug for Rear End Drive Gear Unit | 7 Oil Drain Plug for Engine |
| 4 Center Stand | 8 Front Wheel Brake Lever |

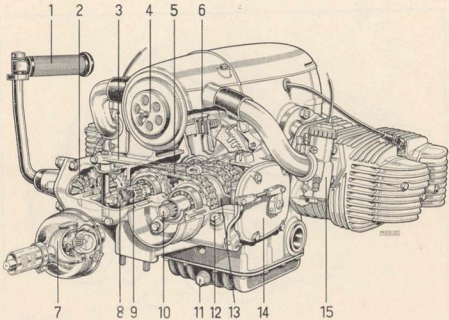
Fig. 3



Engine, sectional view

- | | |
|--|----------------------|
| 1 Right-hand Cylinder Head | 14 Valve Spring |
| 2 Sparkplug with Cap | 15 Valve |
| 3 Pushrod | 16 Compression Rings |
| 4 Right-hand Cylinder | 17 Piston Pin |
| 5 Mushroom Tappet | 18 Piston |
| 6 Tappet Guide | 19 Connecting Rod |
| 7 Camshaft | 20 Oil Sump |
| 8 Ignition Coil | 21 Oil Filter |
| 9 Camshaft Gear | 22 Crankshaft |
| 10 Breather | 23 Crankshaft Gear |
| 11 Voltage Regulator with
Reserve Current Cut-Out | 24 Oil Pump |
| 12 Valve Adjusting Screw | 25 Armature |
| 13 Rocker Arm | 26 Generator |
| | 27 Contact Breaker |

Fig. 4

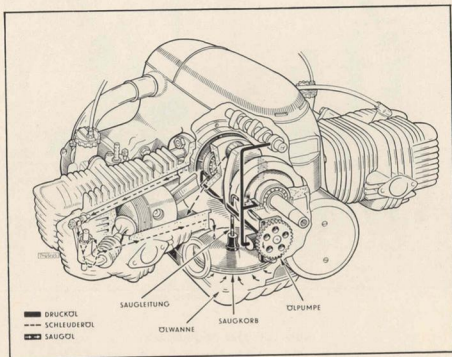


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Engine with Change Speed Gear, sectional view

- | | |
|-------------------------|---|
| 1 Starter | 9 Main Shaft |
| 2 Starter Bevel Gears | 10 Lay Shaft |
| 3 Clutch Lever | 11 Oil Drain Plug for Engine |
| 4 Air Cleaner | 12 Oil Filler Screw for Change
Speed Gear Unit |
| 5 Duplex Chain Drive | 13 Shifting Fork |
| 6 Multiple Disc Clutch | 14 Gearshifting Mechanism |
| 7 Drive Shaft | 15 Carburettor |
| 8 Clutch Thrust Bearing | |

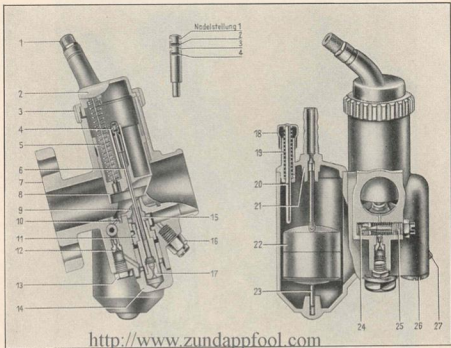
Fig. 5



Oil Circulation within Engine

Saugleitung	= Suction Pipe
Ölwanne	= Oil Sump
Saugkorb	= Oil Filter
Ölpumpe	= Oil Pump
Drucköl	= Pressure Oil
Schleuderöl	= Splash Oil
Saugöl	= Suction Oil

Fig. 6



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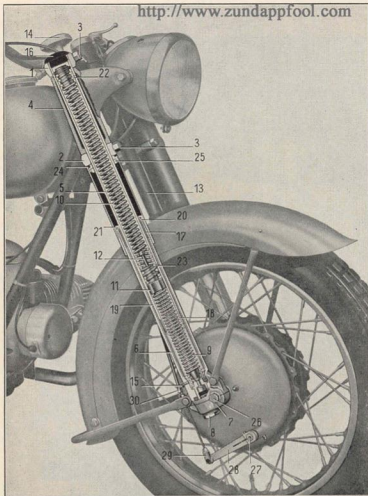
Nadelstellung = position of needle

Carburettor, sectional view

- | | |
|-------------------------|-------------------------|
| 1 Cable Adjusting Screw | 15 Needle Jet |
| 2 Cover Plate | 16 Protective Screw |
| 3 Cover Screwing | 17 Main Jet |
| 4 Clip | 18 Tickler |
| 5 Slide Spring | 19 Tickler Spring |
| 6 Jet Needle | 20 Split Pin |
| 7 Carburettor Housing | 21 Float Chamber Cover |
| 8 Gas Slide | 22 Float |
| 9 Mixing Chamber Insert | 23 Float Needle |
| 10 Compensator Bore | 24 Idle Air Jet |
| 11 Thread | 25 Air Adjusting Screw |
| 12 Idle Jet | 26 Screw Plug |
| 13 Screw Plug | 27 Idle Adjusting Screw |
| 14 End Screw | |

Fig. 7

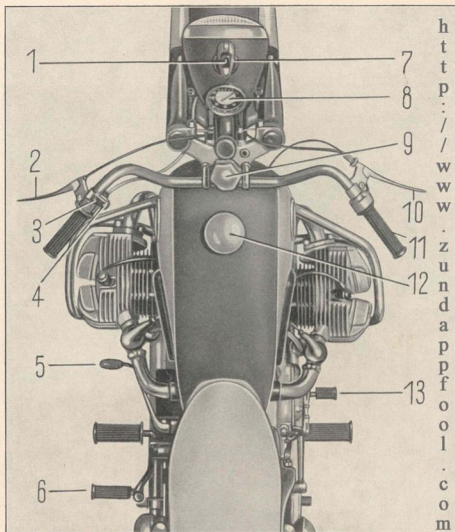
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Telescopic Front Fork and Front Wheel Brake

- | | |
|--------------------------------|-----------------------|
| 1 Upper Fork Connecting Member | 16 Rubber Stopper |
| 2 Lower Fork Connecting Member | 17 Upper Sliding Bush |
| 3 Clamping Screw | 18 Lower Sliding Bush |
| 4 Headlight Carrier | 19 Guiding Bush |
| 5 Fork Tube | 20 Spring Nut |
| 6 Fork Guide Tube | 21 Packing Ring |
| 7 Shoe | 22 Air Vent |
| 8 Clamping Bolt | 23 Lubrication Point |
| 9 Short Spring | 24 Rubber Ring |
| 10 Long Spring | 25 Rubber Stopper |
| 11 Spring Carrier | 26 Lock Bolt |
| 12 Tension Bolt | 27 Brake Cam |
| 13 Hydraulic Shock Absorber | 28 Brake Lever |
| 14 Steering Damper | 29 Clip |
| 15 Oil Drain Plug | 30 Adjusting Screw |

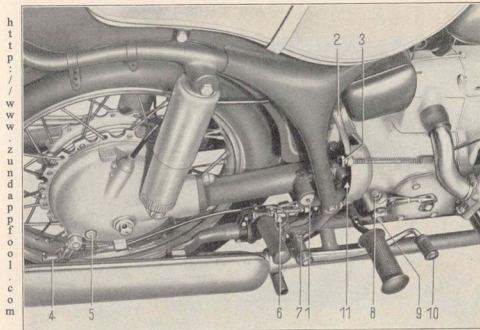
Fig. 8



Hand and Foot Controls

- | | |
|---------------------------------------|------------------------|
| 1 Ignition-Light-Switch (Electrolock) | 7 Charge Control Light |
| 2 Clutch Hand Control | 8 Speedometer |
| 3 Dipper | 9 Steering Damper |
| 4 Horn Button | 10 Hand Brake Lever |
| 5 Foot-Change Lever | 11 Twist Grip |
| 6 Starter | 12 Fuel Tank Cap |
| | 13 Brake Pedal |

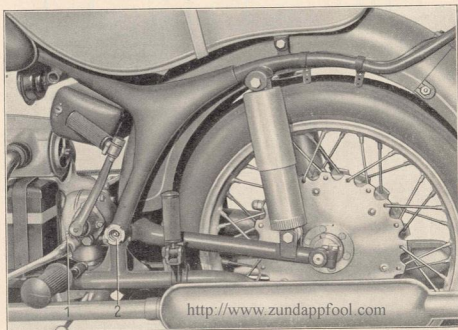
Fig. 9



Brake and Clutch Controls, Lubricating Points (right-hand side)

- | | |
|---|--|
| 1 Pressure Grease Nipple for Rear Pivoted Fork | 7 Pressure Grease Nipple for Foot Brake Shaft |
| 2 Clutch Lever | 8 Oil Filler Screw for Change Speed Gear Unit |
| 3 Knurled Edge Nut (for Clutch adjustment) | 9 Pressure Grease Nipple for Foot-Change Shaft |
| 4 Toggle Nut (for Foot Brake adjustment) | 10 Brake Pedal |
| 5 Oil Filler Screw for Rear End Drive Gear Unit | 11 Pressure Grease Nipple for Universal Joint |
| 6 Stop Screw for Brake Pedal | |

Fig. 10



Lubricating Points (left-hand side)

- | | |
|---|---|
| 1 Pressure Grease Nipple for
Foot-Change Shaft | 2 Pressure Grease Nipple for
Rear Pivoted Fork |
|---|---|

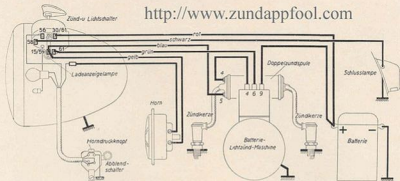


Fig. 11

Wiring Diagram for Electrical Equipment

Zünd- und Lichtschalter

Ladearzeigelampe

Horn

Abblendschalter

Horn

Zündkerze

Batterie-Lichtzünd-Maschine

Batterie

Schlußlampe

Doppelzündspule

= Ignition-Light-Switch (Electrolock)

= Charge Control Light

= Horn Button

= Dipper

= Horn

= Sparkplug

= Generator

= Battery

= Taillight

= Double Ignition Coil

gelb = yellow

grün = green

blau = blue

schwarz = black

rot = red