Repair Manual
BMW R 80 G/S

BMW Motorrad GmbH + Co.
Service Division

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Service and General Information

00 Service and General Information

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Introduction

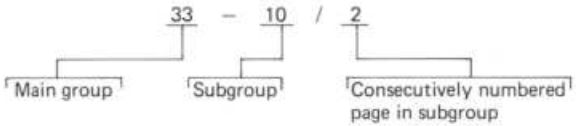
This repair manual on microfilm will help to make sure that all of the most important repair and service procedures are carried out correctly. It should be used everyday by shop foremen and mechanics to supplement the practical and theoretical knowledge which they have acquired in our service training school. This will even further improve the quality of service.

This edition will be replaced when changes or additions (supplements) are necessary. Both the headings and the pertinent lists of contents will have the new edition date. Old microfilms should be destroyed.

All pictures and texts refer to a motorcycle with standard or original BMW equipment and accessories, and not to motorcycles converted in some manner or other.

Application Notes:

- The manual has the same group system (00 . . . 63) as used in flat rate catalogs.
- Meaning of page numbering system: e.g.



- In addition to other important information, the necessary BMW special tools are described and illustrated in Group 00. Their application is described in repair job texts.
- Normally a job text will describe the removal or disassembly procedures. There are appropriate installation notes when assembly or installation cannot be completed in reverse sequence.

Repair instructions will also be published in service information bulletins if necessary. They will, of course, be included in the next edition of the microfilm. We also recommend using the spare part microfilms for additional help.

BMW Motorrad GmbH & Co.
Service Division

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Tightening Torque

for self-locking hexagon nuts

BMW N
113 49.0

Applicable only to nuts according to BMW N 113 48.0 and DIN 985.

Surface condition: Phosphate treated or galvanized bolt/screw, galvanized or unwaxed nut.
Lubricated condition: of bolt/screw: either non-lubricated or lubricated with light coat of oil.

For cadmium plated bolts/screws or nuts the tightening torque must be ≈ 30% less than the value given in the table when utilization factor of bolt material is the same.

Not applicable when surface or lubricated condition of threads is different, property class of bolt/screw is less than 8.8 (e.g. 6.9), in conjunction with expansion bolts/screws.

In such cases values will have to be determined separately.

Threads	Tightening Torque M_A (kpm)					
	Nuts acc. BMW N 113 48.0 Property Class			Nuts acc. DIN 985 Property Class		
	8	10	12	8	10	12
M 6	$1{,}1^{+0{,}1}$	$1{,}5^{+0{,}2}$	$1{,}8^{+0{,}2}$	$1{,}0^{+0{,}1}$	$1{,}3^{+0{,}2}$	$1{,}6^{+0{,}2}$
M 8 M 8 x 1	$2{,}5^{+0{,}3}$	$3{,}4^{+0{,}4}$	$4{,}0^{+0{,}5}$	$2{,}5^{+0{,}2}$	$3{,}3^{+0{,}3}$	$3{,}9^{+0{,}4}$
M 10 M 10 x 1,25	$4{,}9^{+0{,}5}$	$6{,}8^{+0{,}8}$	$8{,}0^{+0{,}9}$	$4{,}7^{+0{,}5}$	$6{,}4^{+0{,}7}$	$7{,}7^{+0{,}8}$
M 12 M 12 x 1,5	$8{,}1^{+0{,}9}$	$11{,}4^{+1{,}3}$	$13{,}5^{+1{,}5}$	$7{,}8^{+0{,}8}$	$10{,}9^{+1}$	$12{,}6^{+1{,}5}$
M 14 M 14 x 1,5	$13{,}0^{+1{,}5}$	$18{,}0^{+2}$	$22{,}0^{+2}$	$12{,}7^{+1{,}5}$	$17{,}0^{+2}$	$21{,}0^{+2}$
M 16 M 16 x 1,5	$22{,}5^{+2}$	$28{,}0^{+3}$	$33{,}0^{+4}$	$19{,}5^{+2}$	$26{,}0^{+3}$	$31{,}0^{+4}$
M 18 M 18 x 1,5	$27{,}0^{+3}$	$38{,}0^{+4}$	$44{,}0^{+5}$	$26{,}0^{+3}$	$36{,}0^{+4}$	$42{,}0^{+5}$

Pertinent preload forces Pv (kp), corresponding with different property classes, are shown in "Tightening Torques and Preload Forces" table of BMW N 600 02.0.

Values given in this table shall apply to bolts/screws or nuts having the above mentioned properties. The tightening torque values including tolerances will only be given on layout or assembly drawings if operations require a value deviating from standards.

Bolts/screws or nuts subjected to high dynamic loads will have their tightening torque value determined by exact calculations and tests.

Tightening Torque Summary for R 80 G/S

Engine	Nm	ft. lbs.
Cylinder head nuts (in 3 steps: 15/25/35 Nm)	35 + 4	25 + 3
Conrod bolts	50 ± 2	36 ± 1
Clutch housing (flywheel)	100 + 5	72 + 4
Nut on valve adjusting screw	20 ± 2	14 ± 1
Adapter for carburetor connection	50	36
Engine Electrical Equipment		
Mounting bolt for alternator rotor	25 ± 2	18 ± 1
Spark plugs	20 + 5	14 + 4
Exhaust System		
Spider nuts for exhaust pipes	200 + 20	145 + 14
Clutch		
Clutch housing cover	20 + 2	14 + 1
Manual Transmission		
Transmission to engine	33	24
Console	19	14
Output flange to transmission output shaft	221.5	160
Transmission cover to transmission case	8	6
Nut (wedge bolt) on kick start lever	22.5	16
Oil filler plug	31	22
Oil drain plug	26	19
Propeller Shaft		
Twelve-sided head bolts	40	29
Front Wheel Fork		
Fork bridge mounting bolts	40	29
Absorber mounting bolts in slide tube	35	25
Axle mounting bolts	14 + 2	10 + 1
Upper suspension mount	120	87
Oil filler plugs	9	6.5
Oil drain plugs	8	6
Steering		
Steering mount cap nut	120	87
Slotted nut	without play	

Bolts

Description	Head Shape	DIN No.	Property Class
Hexagon bolts		931 933 960 961 70614	8.8 10.9 12.9
		561	8.8
Fillister head bolts		84	4.8 8.8
		912 6912	8.8 10.9
Round head bolts		7986	4.8
Flat head bolts		603	4.6 8.8
Ctsk. bolts		63	4.8 8.8
		7987	4.8 8.8
Oval head bolts		920 921	5.6[4]
		7985	4.8
Oval head ctsk. bolts		91	4.8 8.8
		7988	4.8
Fillister head metal screws		7971	[1]
Hexagon metal screws		7976	[1]

Description	Head Shape	DIN No.	Property Class
Ctsk. metal screws		7982	[1]
Oval head metal screws		7981	[1]
Oval head ctsk. metal screws		7983	[1]
Studs	–	833 835 836 838 939 940	8.8
Setscrews		417 551 553	[2] [4]
		438	4.8[4]
Headless screws		427	5.8
Thumb screws		316	4.6
Plugs		906 908	4.6
		910 7604	5.6[4]
Hollow bolts		7623 71436	6.8
Coupling bolts		3871	5.6[4]
Slotted head plugs		71022	5.6[4]

Nuts

Description	Shape	DIN No.	Property Class
Hexagon nuts		439	[5]
		985	8 10[4]
		934	[3]
		936	6G 8G
		70615 70616	8/10[4] 6G/8G[4]
Castle nuts		935 937	8/10 6S/8G
Thumb nuts		315	GTS

Description	Shape	DIN No.	Property Class
Square nuts		557	5–2
		562	4D–2
Cap nuts		986	8[4]
		1587	6–2
Slotted nuts		70851 70852	6G[4]
Coupling nuts		3870 7606	5D–2[4]
Knurled nuts		466 467	5–2
Spherical collar nuts Flat collar nuts		74361	8/10

1) Case hardened steel, file-hard, hardening depth 0.1 . . . 0.2 mm
2) Up to M 10: 4.8; from M 12: 4.6
3) Up to M 4: 5-2; from M 5: 8 and 10
4) Specified tensile strength deviates from DIN standards
5) Up to M 8: 4D-2; for M 10: 5S-2

Determining Engine Oil Consumption

Oil consumption measurement can be made after motorcycle has been riden about 7500 km.
This distance is required before the oil consumption will be steady.
Engine must not leak oil.
Drain engine oil at operating temperature.
Replace filter cartridge.
Fill engine with new oil.
Ride motorcycle under normal conditions until oil level has dropped to lower mark on oil dipstick.
Difference between MIN and MAX marks = 0.85 liter.
If necessary determine oil consumption by measuring consumed volume by weight.
Permissible oil consumption: 0.1 ltr./100 km.

Possible Causes for Excessive Oil Consumption:

1. Breaking-in process not concluded.
2. Valve guides leak.
3. Pistons seized.
4. Piston rings installed wrong, broken or worn.
5. Excessive clearance between valve stem and valve guide.

Determining Fuel Consumption acc. DIN 70030

Engine tuning and ignition timing[1)] of motorcycle must conform with standard version.
Tire size must agree with data in vehicle's registration papers.
Correct tire inflation pressure as specified.
Brakes released completely.
Engine operated at least 7500 km and at operating temperature.
For fuel consumption test motorcycle weight must be half that between maximum total weight and curb weight.
The speed must be kept as constantly as possible and about 3/4 of the maximum speed over the entire test stretch.
Testing speed, however, should not exceed 110 km/h.
The test stretch chosen should have a level as possible surface, be dry and about 10 km long, which must be driven in both directions.
Uphill and downhill gradients up to 1.5% are permissible. The air temperature must be between +10 and 30°C and the wind velocity can be maximum 3 meters per second. The motorcycle tank must be filled with commercial brand name gasoline as called for in plant specifications.

The fuel consumption is measured with a standard tester or by the following formula, whereby 10% is added to cover any unfavorable conditions.

$$\frac{\text{consumed fuel} \times 100}{\text{driven km}} = \text{normal fuel consumption}$$

[1)] See Specifications

Group 00

Special tool board

with holders and set of tool silhouette labels (size 2 x 1 m)

Order No. 00 0 600



00 0 600

Assembly stand

to take engine, transmission and rear wheel drive for disassembly and assembly

Order No. 00 1 490



00 1 490

Gauge holder

to take dial gauge

Order No. 00 2 500

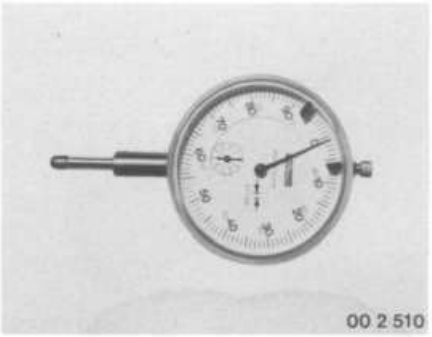


00 2 500

Dial gauge

to measure installed clearances, lateral and radial runout

Order No. 00 2 510

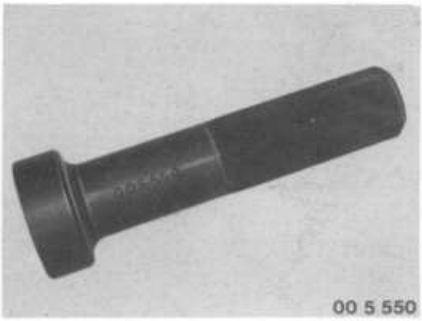


00 2 510

Impact mandrel

to knock in wheel bearing outer races

Order No. 00 5 550

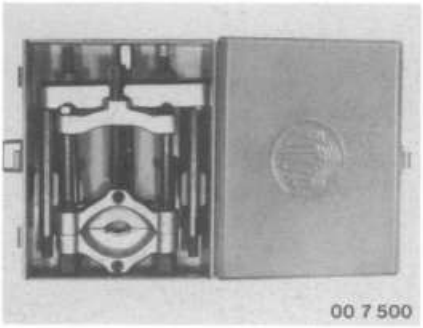


00 5 550

Universal puller Kukko 17/K

to pull ball bearing off of input shaft (manual transmission) as well as install circlip in conjunction with assembly sleeves No. 23 2 655/1–4 and pressure pad included with Kukko 16/K

Order No. 00 7 500



00 7 500

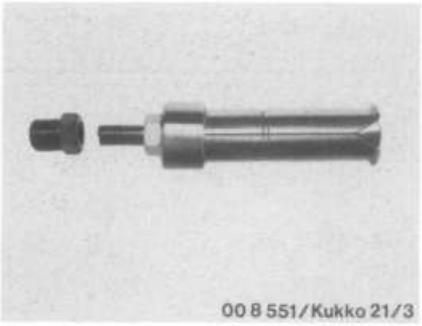
Internal puller (with adapter)

to pull out wheel bearing outer races (in conjunction with support from 00 8 560)

Order No. 00 8 551

to pull out swinging arm bearing (in conjunction with support from 00 8 560)

Order No. Kukko 21/3

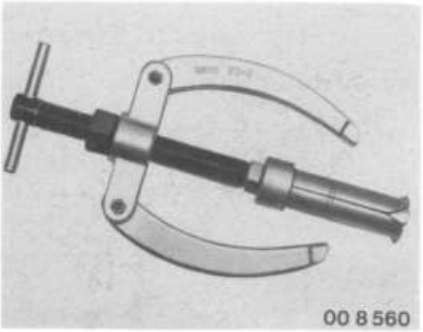


00 8 551/Kukko 21/3

Kukko puller

to pull bearing shells out of control head

Order No. 00 8 560

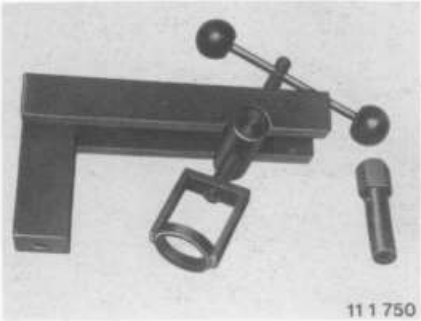


00 8 560

Valve spring lifter

to remove and install valves of a disassembled cylinder head

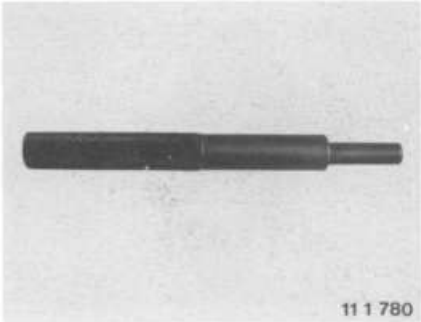
Order No. 11 1 750



Mandrel

to knock out valve guides from cylinder head (8 mm valve stem dia.)

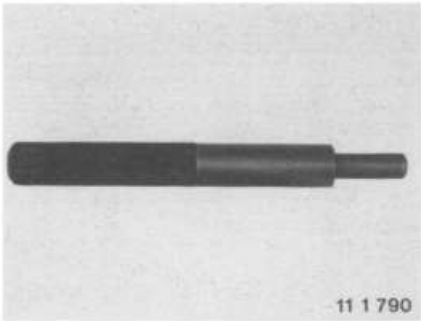
Order No. 11 1 780



Mandrel

to knock valve guides into cylinder head

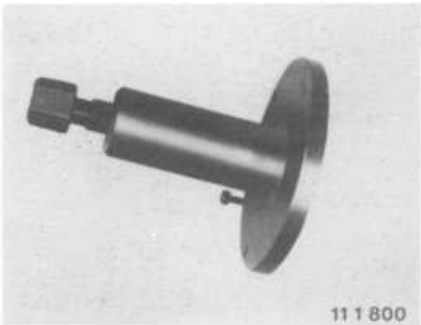
Order No. 11 1 790



Puller

to pull off timing chain case cover

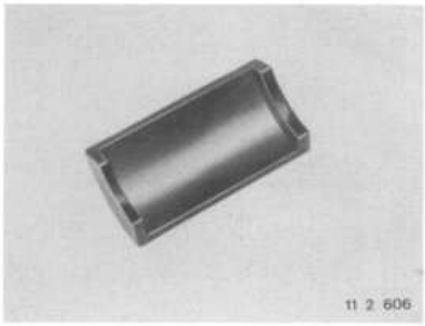
Order No. 11 1 800



Auxiliary shell

to pull off sprocket on crankshaft (simplex chain)

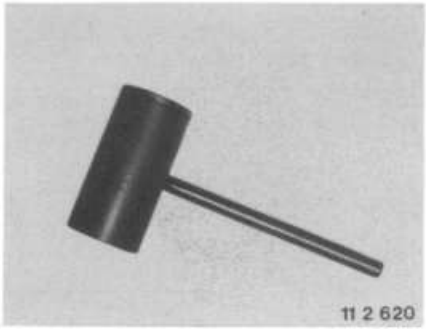
Order No. 11 2 606



Press-on bush

to press sprocket on to crankshaft (in conjunction with 11 2 630)

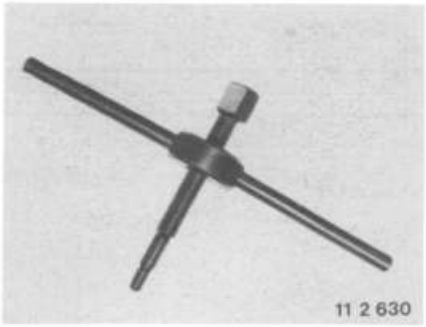
Order No. 11 2 620



Pressing on tool

to press sprocket on to crankshaft

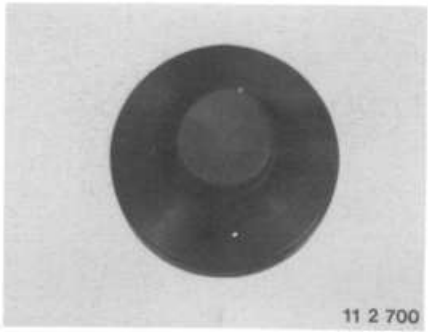
Order No. 11 2 630



Pressing mandrel

to press out main bearings (in conjunction with 11 2 710)

Order No. 11 2 700



Piston ring compressor

to compress piston rings when guiding pistons into cylinders

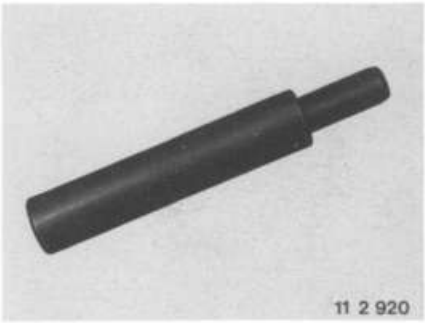
Order No. 11 2 905



Mandrel

to knock out piston pins

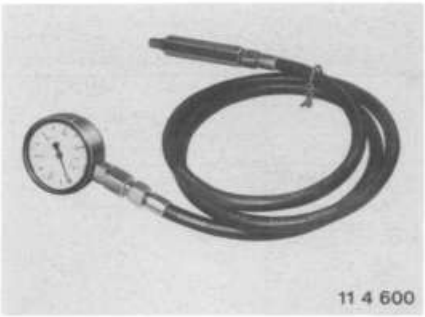
Order No. 11 2 920



Oil pressure tester

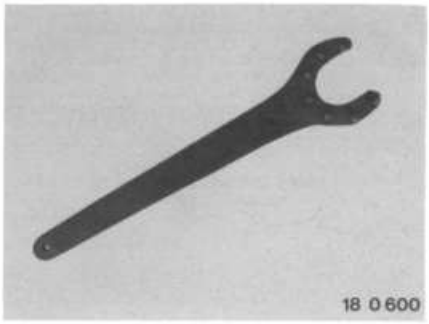
to measure oil pressure of running engine in a stationary or moving motorcycle

Order No. 11 4 600



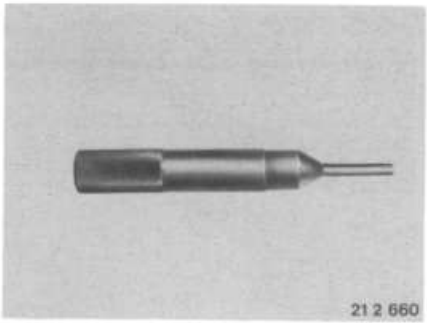
Group 18

Exhaust wrench
to loosen and tighten exhaust pipe nuts
Order No. 18 0 600



Group 21

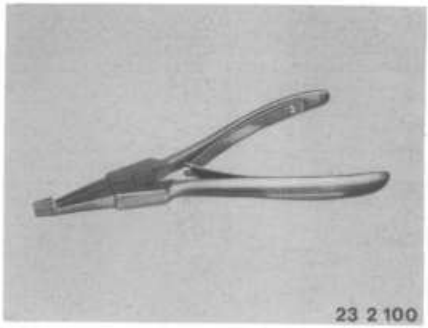
Centering mandrel
to center clutch drive plate
Order No. 21 2 660



Special pliers

for removal of circlip on spring strut (Group 33)

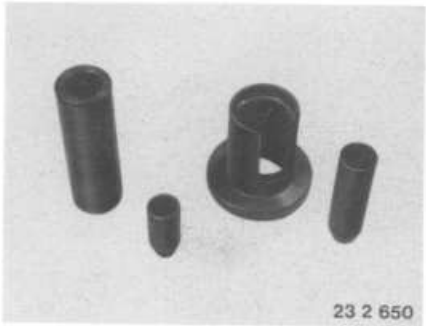
Order No. 23 2 100



Assembly sleeves

for removal and installation of circlip on input shaft (pressure sleeve omitted)

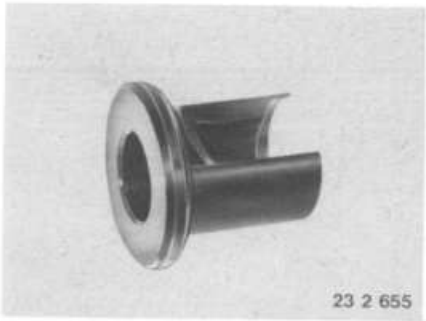
Order No. 23 2 650



Pressure sleeve

for removal and installation of circlip on input shaft (in conjunction with 23 2 650)

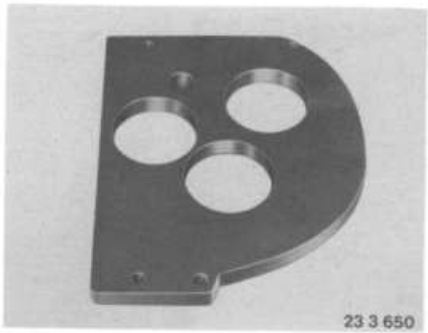
Order No. 23 2 655



Master gauge

to space transmission shaft when assembling transmission

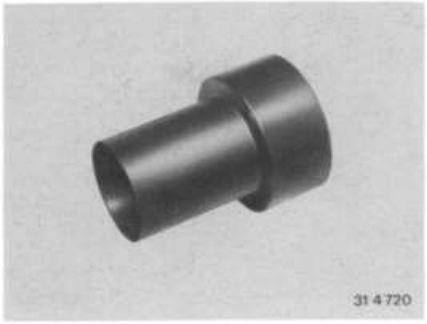
Order No. 23 3 650



Assembly sleeve

to compress piston rings for installation of complete damper in stand tube

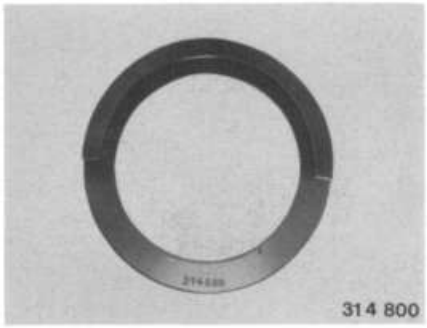
Order No. 31 4 720



Coupling ring

to enlarge support area for pulling out steering head bearing

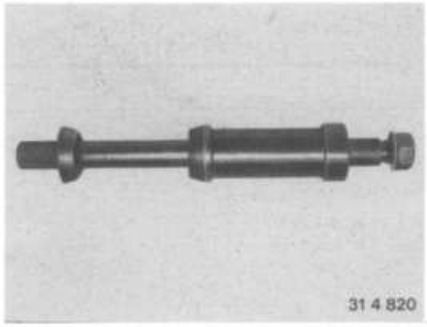
Order No. 31 4 800



Spacer

to pull in steering head bearing (in conjunction with spindle of frame gauge 46 5 600)

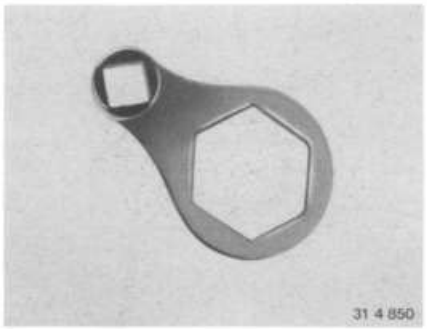
Order No. 31 4 820



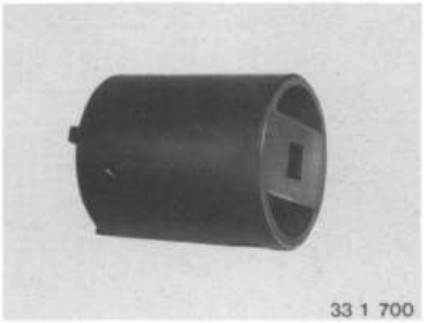
Hexagon ring wrench

to tighten upper spring mount as well as cap nut on upper fork bridge

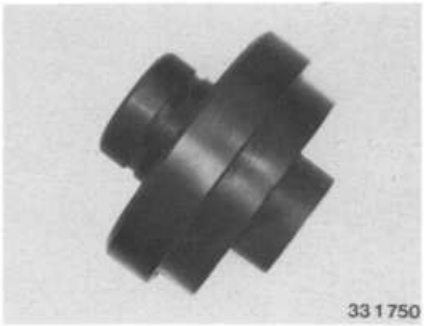
Order No. 31 4 850



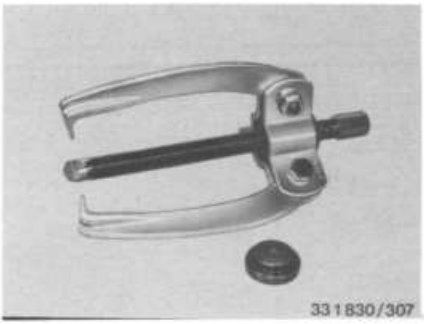
Special wrench
to loosen and tighten threaded ring (drive pinion)
Order No. 33 1 700



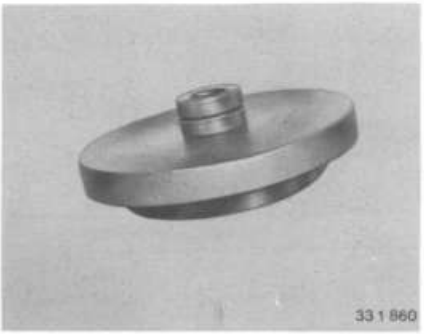
Impact mandrel
to knock in radial oil seal (drive pinion threaded ring)
Order No. 33 1 750



Triple-arm puller
to pull off ball bearing on ring gear
Order No. 33 1 830/307



Impact mandrel
to knock radial oil seal into final drive housing cover
Order No. 33 1 860

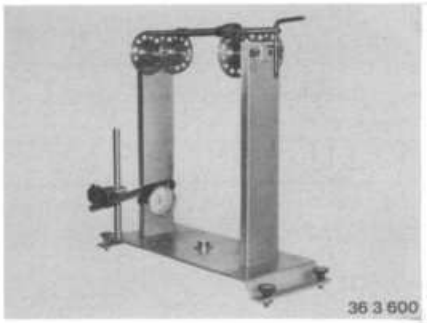


Group 36

Balancer

for balancing wheels as well as measuring lateral and radial runout

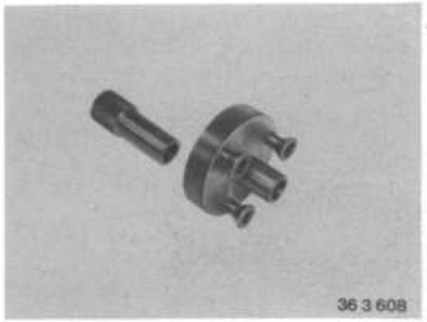
Order No. 36 3 600



Balance holder

for rear wheel (in conjunction with 17 mm dia. take-up shaft from 36 3 600)

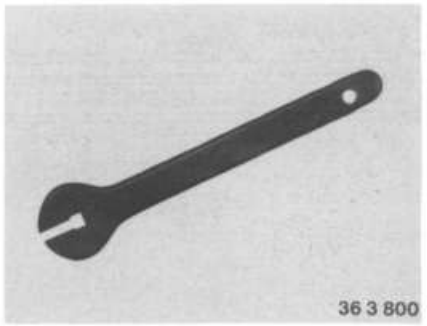
Order No. 36 3 608



Nipple wrench

to reel in wheels

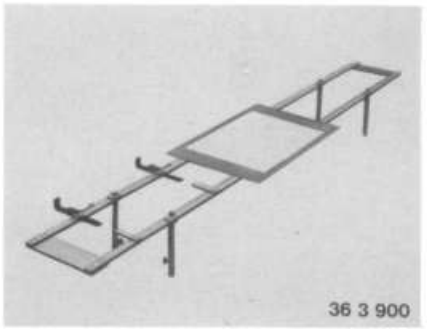
Order No. 36 3 800



Toe offset gauge

to measure toe offset difference between front wheel and rear wheel

Order No. 36 3 900



Model		R 80 G/S
Dimensions and Weights		
Max. length	mm	2230 (87.795")
Wheelbase	mm	1465 (57.677")
Max. width (engine)	mm	746 (29.370")
Max. width (handle-bar without mirror)	mm	820 (32.283")
Max. height without mirror (motorcycle unloaded)	mm	1150 (45.275")
Seat height (unloaded)	mm	860 (33.858")
Ground clearance with load (rider weighing 75 kg/165 lbs.)	mm	175 (6.890")
Ground clearance at curb weight	mm	218 (8.583")
Dry weight	kg	167 (368 lbs.)
Weight of ready-to-ride motorcycle with full fuel tank and tools (DIN curb weight)	kg	186 (410 lbs.)
Permissible total weight = curb weight + weight of persons and luggage	kg	398 (877 lbs.)
Power weight, ready-to-ride + 75 kg (165 lbs.) rider	kg/kW	7.05
Permissible wheel load		
Front with 2.1 bar pressure (30 psi)	kg	178 (392 lbs.)
Rear with 2.2 bar pressure (31 psi)	kg	270 (595 lbs.)
Max. no. of persons incl. rider		2

Model		R 80 G/S
Capacities		
Fuel tank	19.5 liters of which 2 liters in reserve	Regular grade gasoline acc. DIN 51 600, min. 91 RON or 82 MON
Engine oil	2 ltr. + 0,25 ltr. when replacing oil filter	Brand name heavy duty oil for internal combustion engines, see page 00–0/12 for oil grades
Transmission Rear wheel swinging arm Final drive	0.80 ltr. 0.15 ltr. 0.35 ltr.	Brand name hypoid gear oil, API Classification GL 5 above 5°C = SAE 90 below 5°C = SAE 80
Telescope fork	0.22 + 0.01 ltr. per fork member	See page 31–0/3 for oil grades
Brakes	approx. 0.3 ltr. (new filling with bleeding)	DOT 4: brake fluid "SL"

00 00 009 Free Delivery Inspection

Important information on transport damage
1. Unpacking motorcycle
2. Assembling motorcycle
3. Checking/correcting engine oil level
4. Checking/correcting transmission oil level
5. Checking/correcting rear wheel swinging arm oil level
6. Checking/correcting final drive oil level
7. Checking/correcting brake fluid level
8. Checking/correcting tightness of bolts and nuts
9. Checking/correcting tire inflation pressure
10. Checking lights and horn
11. Checking/aiming headlight
12. Checking tools
13. Checking function
14. Cleaning motorcycle

Final remarks

Important Information!

After receipt of new motorcycles check packaging crates and their contents for possible damage, which could have resulted during transportation. Findings must be reported to the supplier without delay, in order to make sure that costs involved will be accepted by their insurance agency.

1. Unpacking Motorcycle

Use skilled personell for this work and proceed in the specified order.

Pry off crate cover.



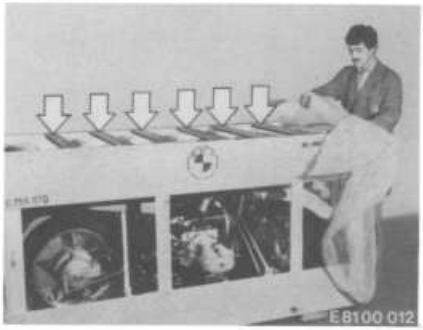
Cut open plastic bag and remove contents (mirror, literature).



Cut out plastic sheet on narrow side of crate and pull plastic sheet off of crate.

Pry the six wooden braces (arrows) off of sides of crate.

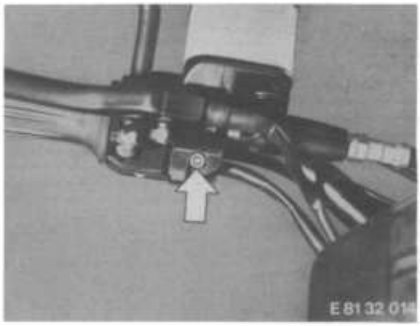
Remove carton (contents: fuel tank, battery covers) after loosening the mounting strap.



2. Assembling Motorcycle

Adjust left and right handle-bar fittings (installed loosely) ergonomically and bolt on handle-bar with one each socket head screw (arrow).

Mount and adjust both mirrors on left and right handle-bars.



Removing and installing, servicing battery:

- Lift off seat after releasing lock.
- Remove upper spring strut mounting bolt and swing spring strut toward rear (arrow).
- Disconnect battery straps.
- Lift battery, swing diagonally and take out with narrow side facing up.



Fill battery to specified height with pure battery acid (acc. VDE 0510, density = 1.28 kg/l or 1.25 kg/l for tropical countries, in reference to 20°C acid temperature). Specified height = acid level mark or 6 mm above upper edge of plates.

Leave battery alone about 1 hour, then shake slightly or tilt (to bleed) and, if necessary, correct acid level as specified. Charge battery (only about 60% of the nominal capacity is reached after filling).

Refer to Service Information No. 61 006 81 (178R) for other information. Install battery in reverse order.

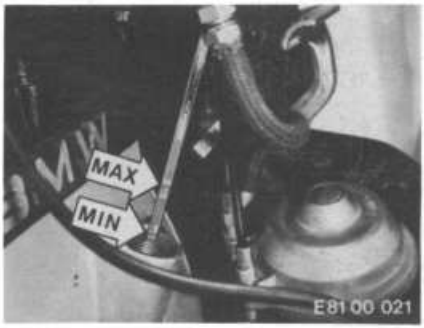
Lubricate battery poles with an acid protection grease (e.g. Bosch Ft 40 V1).

3. Checking/Correcting Engine Oil Level

Check oil level with an inserted (not screwed) oil dipstick and, if necessary, correct to MAX mark.

Amount of oil between MIN and MAX marks = 0.85 ltr. .

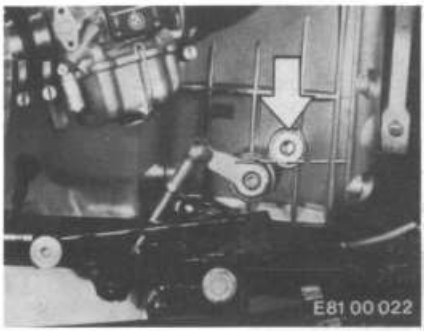
See Specifications for oil grades and volume.



4. Checking/Correcting Transmission Oil Level

Unscrew oil filler plug and check whether oil level reaches lower edge of filler opening, correcting if necessary.

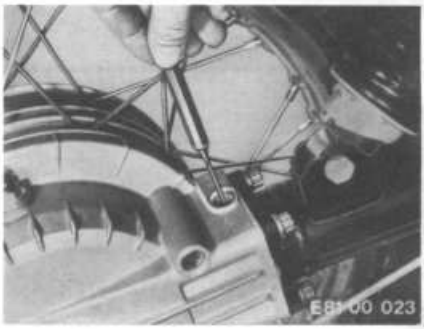
See Specifications for oil grades and volume.



5. Checking/Correcting Rear Wheel Swinging Arm Oil Level

Unscrew oil filler plug. Guide in mandrel vertically and rest it on clutch bell housing. Mandrel must be covered with oil up to 2 mm. Correct oil level if necessary.

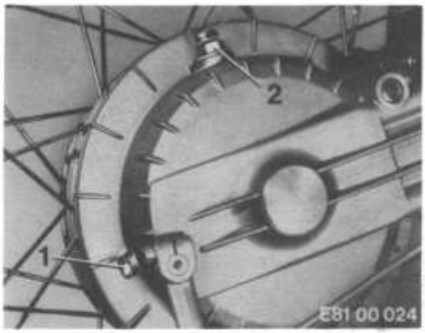
See Specifications for oil grades and volume.



6. Checking/Correcting Final Drive Oil Level

Oil level must reach inspection bolt opening (1). If necessary, remove oil filler/bleeder screw (2) and correct oil level.

See Specifications for oil grades and volume.

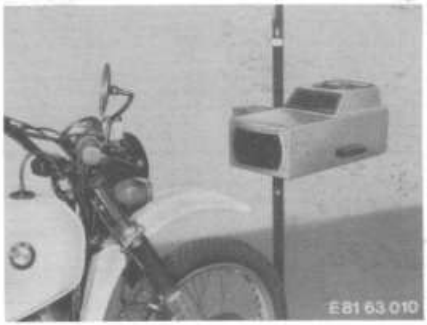


11. Checking/Correcting Aiming of Headlight

Requirements: correct tire inflation pressure, spring struts adjusted for single person, motorcycle resting on wheels and rider sitting on motorcycle.

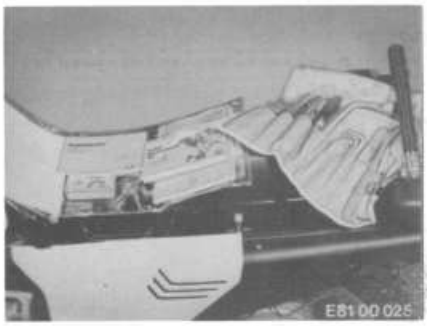
Check aiming of headlight with low beam switched on with optical equipment and, if necessary, correct headlight angle by pressing lens up or down.

Refer to page 63–10/1 of Group 63 if optical equipment is not available!



12. Checking Tools and Other Items Supplied with Motorcycle

Check that following items are not missing: manual, list of dealers, first aid instructions, accessory pocket book, tools, repair kit, air pump (in upper frame section), 3 keys (one foldable, two rigid).



13. Final Function Test

Check function of clutch, shift, steering, foot and hand-operated brakes, instruments (test drive if necessary). Check idle speed/CO of engine, correcting if necessary (engine at operating temperature). See page 11–0/3 of Group 11 for idle speed.

Check engine, transmission, rear wheel swinging arm, final drive housing, telescope fork and fuel system for leaks.

00 00 119 First Inspection at 1 000 km (600 miles)

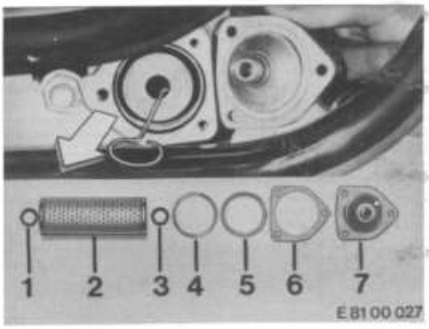
1. Changing oil in engine and oil filter; replacing oil filter cartridge
2. Changing oil in transmission
3. Changing oil in rear wheel swinging arm
4. Changing oil in final drive
5. Changing oil in telescope fork
6. Cleaning carburetor float chambers
7. Checking/adjusting clutch play
8. Checking/adjusting dead travel of rear wheel brake
9. Checking/correcting brake fluid level; checking brakes for leaks
10. Tightening cylinder heads; adjusting valve play
11. Checking/adjusting ignition timing
12. Checking/correcting tightness of bolts and nuts
13. Synchronizing carburetors; adjusting cables
14. Final inspection with traffic safety test

00 00 119 First Inspection at 1000 km (600 miles)

1. Changing Oil in Engine and Oil Filter; Replacing Oil Filter Cartridge

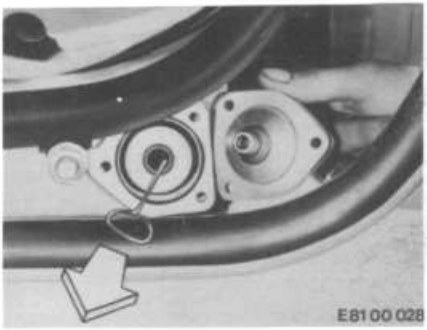
Engine at operating temperature. First replace oil filter cartridge.

1981 Model: Remove end cover (7) with both O-rings (3/5) and steel washer (4). Pull out filter cartridge (2) with wire hooks. Install new filter cartridge with **new** O-rings and paper gasket (6).



1982 Model: Remove end cover with O-ring (5). Parts 1, 3, 4 and 6 are omitted in comparison to 1981 model. Pull out filter cartridge with wire hooks. Install new filter cartridge with **glued** seals.

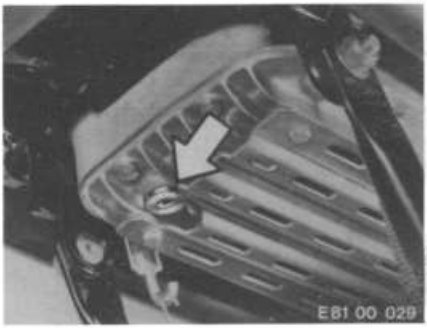
Important!
When using a filter cartridge without glued seals, the O-rings (1/3) shown above must be installed again.



Unscrew oil drain plug on rear of oil pan and drain old oil.

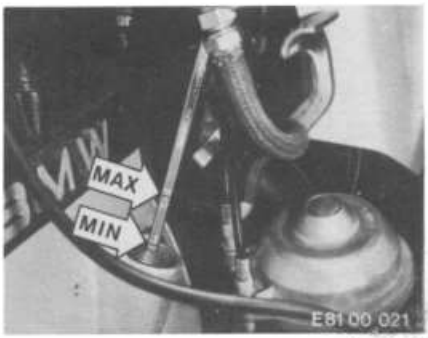
Add new oil.

See Specifications for oil grades and volume.



Check oil level with an inserted (not screwed) oil dipstick, correcting to MAX mark at most if necessary.

Amount of oil between MIN and MAX marks = 0.85 ltr. .

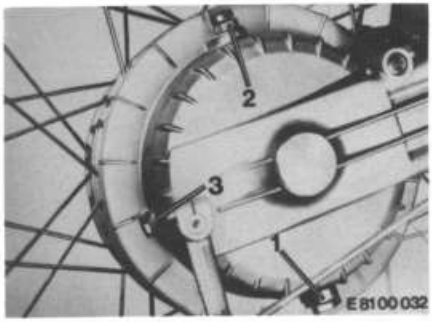


4. Changing Oil in Final Drive

Final drive at operating temperature.

Unscrew oil drain plug (1) and then oil filler/bleeder screw (2). Drain old oil. Add new oil until level reaches inspection bore (3).

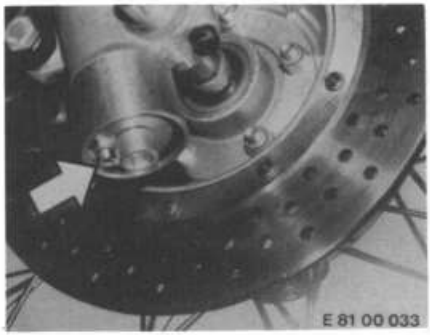
See Specifications for oil grades/volume.



5. Changing Oil in Telescope Fork

Unscrew drain plugs in bottom of slide tubes.

Installation:
Tighten drain plugs carefully to avoid damaging the threads!

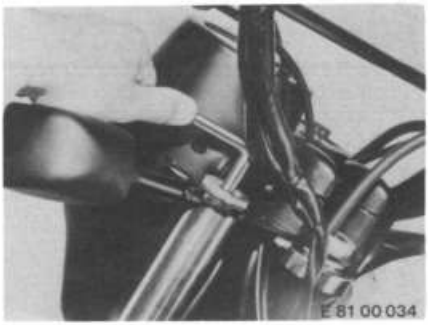


Unscrew upper filler plugs to discharge the fork tubes.

Drain oil while moving telescope fork down and up (5 to 10 times). Add new oil.

See page 31–0/3 of Group 31 for oil grades and volume.

Important!
Bleed shock absorbers after filling telescope fork by moving up and down (5 to 10 times) – full absorbing force must be noticed!



9. Checking/Correcting Brake Fluid Level, Checking Brakes for Leaks

Brake fluid level in transparent tank on right handlebar should reach top or "MAX" mark. Correct if necessary.
To add brake fluid unscrew 3 Phillips screws and take off cover with gasket and dust cover.

See Specifications for brake fluid type and volume.

Check brake line and brake hose for correct routing and leaks.



10. Tightening Cylinder Heads; Adjusting Valve Play

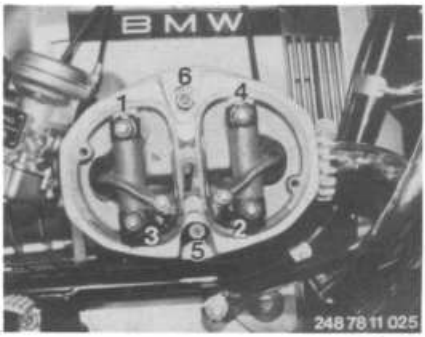
Take off left and right cylinder head covers after unscrewing one cap nut and two nuts on sides (arrows) of each cover. Catch escaping oil.

Installation:
Only reuse gaskets when in perfect condition!

Unscrew spark plugs.



Tighten the four collar nuts and two hexagon nuts according to tightening order plan.
Tightening torque: see page 00–0/7.



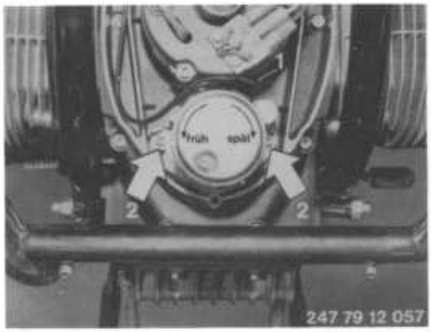
Crank engine, of which spark plugs have been removed, clockwise (opposite forward direction) on socket head bolt used to mount the alternator rotor, or crank engine slowly with the kick starter.



Center white stripe of flywheel mark "S" must be aligned with inspection hole mark on engine block when diode of ignition tester lights up.

If necessary, turn ignition box after loosening the mounting bolts (arrows).

- Clockwise = "retard"
- Counterclockwise = "advance"



Dynamic Test:

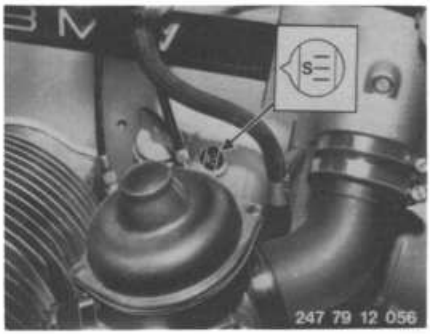
Connect stroboscope lamp according to supplied instructions (trigger clip on **right** ignition lead). Start engine and accelerate to speed of 3500 rpm. When aiming lamp on clutch housing (flywheel) the white dot "F" must appear in the inspection hole (full advance ignition).

To check the advance ignition control the adjusting wheel of the stroboscope lamp must be turned until the "TDC" mark appears. The effective control angle can now be read on the lamp's scale.

See page 12–0/3 of Group 12 for specifications.

With engine running at idle speed (950 ± 150 rpm) the center white stripe of flywheel mark "S" must be aligned with the inspection hole mark. If stripe is below center, ignition timing is retarded too much. If stripe is above center, timing is advanced too much.

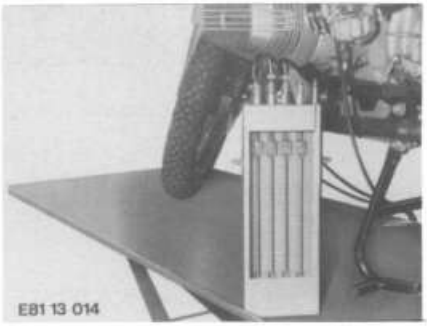




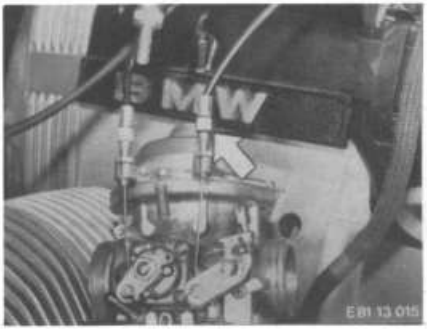
Use tester, BMW No. 13 0 700, to synchronize carburetors. Connect rubber hoses of tester on pertinent vacuum connections of carburetors (arrow) after removing plugs.

Turn throttle stop screw and idle mixture control screw alternately until carburetors are synchronized. Adjust maximum speed with the control screw after each stop screw adjustment.

See page 11–0/3 of Group 11 for idle speed.



Boost engine speed slightly with the throttle twist grip to adjust the throttle cables. Adjust throttle cables with adjusting screws (arrow) that mercury gauges in tester show the same level.



14. Final Inspection with Traffic Safety Test

Condition test: wheels and tires, tire inflation pressure – see Specifications.

Function test: high beam, low beam, parking light, stop light, license plate light, turn signals, high beam indicator lamp, battery charge indicator lamp, idle speed and oil pressure indicator lamps, horn, special equipment if applicable.

Clutch, shift, steering, foot and hand-operated brakes, instruments (test drive if necessary).

Leak test: engine, transmission, rear wheel swinging arm, final drive housing, telescope fork, fuel system.

00 00 139 BMW Service at 7500 km (5000 miles) and 15000 km (10000 mile) Intervals

1. Changing oil in engine and oil filter; replacing oil filter cartridge
2. Lubricating bearings of rear wheel swinging arm and clutch cable nipple
3. Cleaning carburetor float housing
4. Tightening cylinder heads; adjusting valve play
5. Checking spark plugs
6. Synchronizing carburetors; adjusting cables
7. Checking/cleaning oil pan/skid guard cavity and cylinder cooling ribs
8. Final inspection with traffic safety test

00 00 139 BMW Service at 7500 km (5,000 miles) and 15000 km (10,000 mile) Intervals

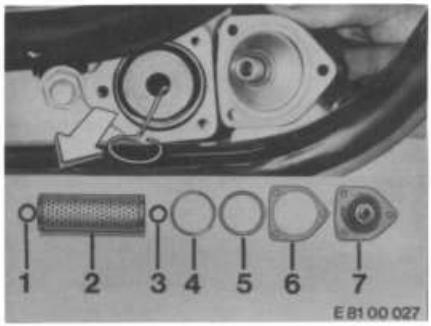
1. Changing Oil in Engine and Oil Filter; Replacing Oil Filter Cartridge

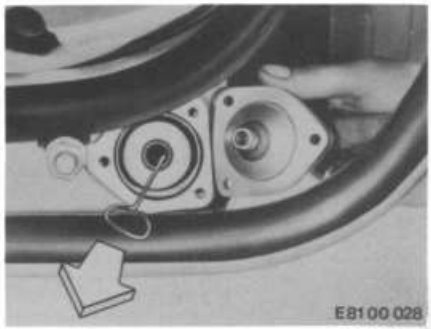
Engine at operating temperature. First replace oil filter cartridge.

1981 Model: Remove end cover (7) with both O-rings (3/5) and steel washer (4). Pull out filter cartridge (2) with wire hooks. Install new filter cartridge with **new** O-rings and paper gasket (6).

1982 Model: Remove end cover with O-ring (5). Parts 1, 3, 4 and 6 are omitted in comparison to 1981 model. Pull out filter cartridge with wire hooks. Install new filter cartridge with **glued** seals.

Important!
When using a filter cartridge without glued seals, the O-rings (1/3) shown above must be installed again.

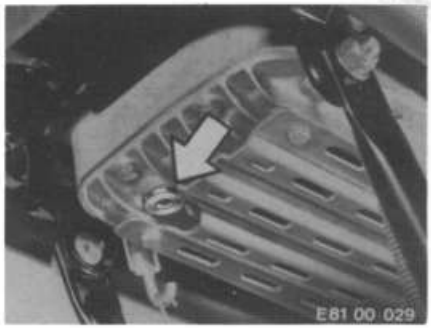




Unscrew oil drain plug on rear of oil pan and drain old oil.

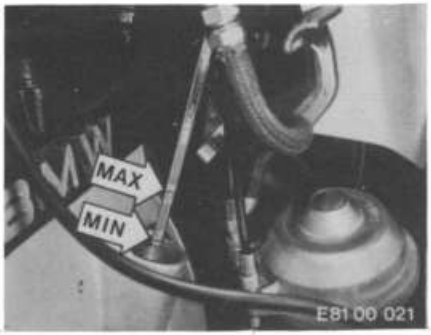
Add new oil.

See Specifications for oil grades and volume.



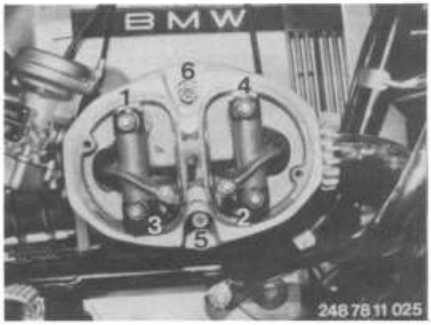
Check oil level with an inserted (not screwed) oil dipstick, correcting to "MAX" mark at most if necessary.

Amount of oil between MIN and MAX marks = 0.85 ltr. .



Tighten the four collar nuts and two hexagon nuts according to tightening order plan.

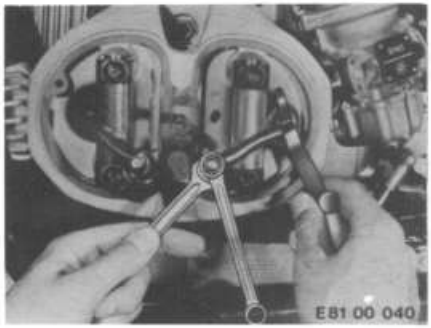
Tightening torque: see page 00–0/7.



Check valve play on a stopped, cold engine with a feeler gauge blade inserted between the valve stem and rocker arm.

This requires cranking engine until piston of cylinder being adjusted is at compression TDC – both valves are closed!
If necessary, correct valve play with the adjusting screw after unscrewing lock nut. Tighten lock nut again.
Recheck valve play.

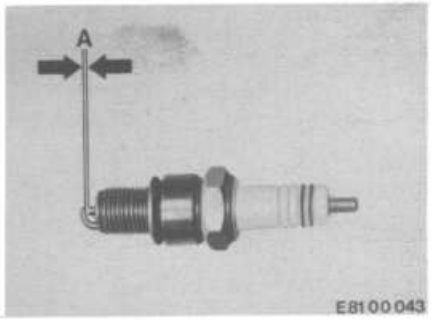
See page 11–0/4 of Group 11 for specifications.



5. Checking Spark Plugs

Check electrode gap with a feeler gauge blade, correcting if necessary by bending the ground electrode to distance A = 0.6 + 0.1 mm.

Installation:
Give spark plugs threads a light coat of graphite grease before installing.

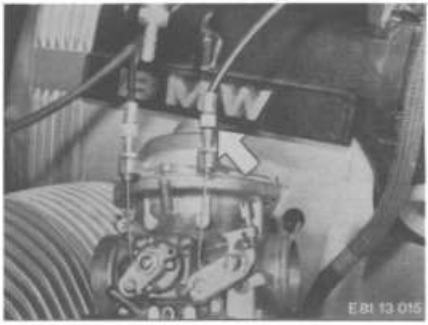


6. Synchronizing Carburetors; Adjusting Cables

Important!
Carburetors have been detached on cylinder heads and shown from the side to improve clarity!

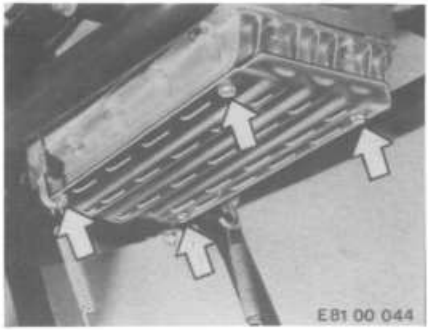
Adjust idle speed with engine running and having operating temperature (80° C oil temperature) and throttle twist grip closed.

Boost engine speed slightly with the throttle twist grip to adjust the throttle cables. Adjust throttle cables with adjusting screws (arrow) that mercury gauges in tester show the same level.



7. Checking Oil Pan/Skid Guard Cavity and Cylinder Cooling Ribs for Dirt, Cleaning if Necessary

Oil pan skid guard can be removed after unscrewing four hexagon head bolts.



8. Final Inspection with Traffic Safety Test

Condition test: wheels and tires, tire inflation pressure – see Specifications.

Function test: high beam, low beam, parking light, stop light, license plate light, turn signals, high beam indicator lamp, battery charge indicator lamp, idle speed and oil pressure indicator lamps, horn, special equipment if applicable.

Clutch, shift, steering, foot and hand-operated brakes, instruments (test drive if necessary).

Leak test: engine, transmission, rear wheel swinging arm, final drive housing, telescope fork, fuel system.

00 00 149 BMW Inspection after 15000 km (10000 miles) and then 15000 km (10000 mile) Intervals

1. Changing oil in engine and oil filter; replacing oil filter cartridge
2. Changing oil in transmission
3. Changing oil in rear wheel swinging arm
4. Changing oil in final drive
5. Changing oil in telescope fork
6. Lubricating bearings of rear wheel swinging arm and clutch cable nipples
7. Replacing air filter cartridge
8. Cleaning carburetor float housing
9. Cleaning fuel valve
10. Front wheel: Checking bearing play, inspecting brake parts
11. Rear wheel: Checking tilt play, inspecting brake parts
12. Checking/adjusting clutch play
13. Checking/adjusting dead travel of rear wheel brake
14. Tightening cylinder heads; adjusting valve play
15. Replacing spark plugs
16. Checking/adjusting ignition timing
17. Checking steering bearing play
18. Adjusting swinging arm bearing play
19. Checking/correcting brake fluid level; checking brakes for leaks
20. Servicing battery
21. Checking/correcting tightness of bolts and nuts
22. Synchronizing carburetors; adjusting cables
23. Checking/cleaning oil pan/skid guard cavity and cooling ribs of cylinders
24. Final inspection with traffic safety test

00 00 149 **BMW Inspection After 15000 km (10,000 miles) and Then 15000 km (10,000 mile) Intervals**

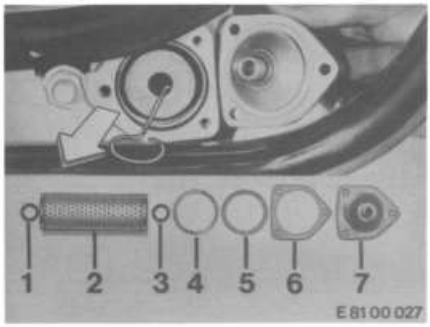
1. Changing Oil in Engine and Oil Filter; Replacing Oil Filter Cartridge

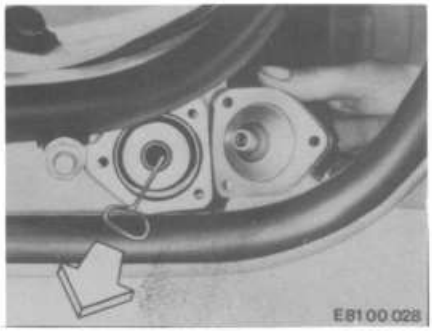
Engine at operating temperature. First replace oil filter cartridge.

1981 Model: Remove end cover (7) with both O-rings (3/5) and steel washer (4). Pull out filter cartridge (2) with wire hooks. Install new filter cartridge with **new** O-rings and paper gasket (6).

1982 Model: Remove end cover with O-ring (5). Parts 1, 3, 4 and 6 are omitted in comparison to 1981 model. Pull out filter cartridge with wire hooks. Install new filter cartridge with **glued** seals.

Important!
When using a filter cartridge without glued seals, the O-rings (1/3) shown above must be installed again.

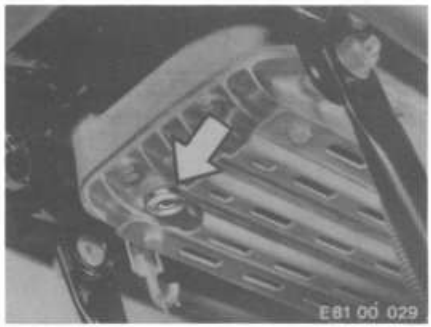




Uscrew oil drain plug on rear of oil pan and drain old oil.

Add new oil.

See Specifications for oil grades and volume.



Check oil level with an inserted (not screwed) oil dipstick, correcting to "MAX" mark at most if necessary.

Amount of oil between MIN and MAX marks = 0.85 ltr. .

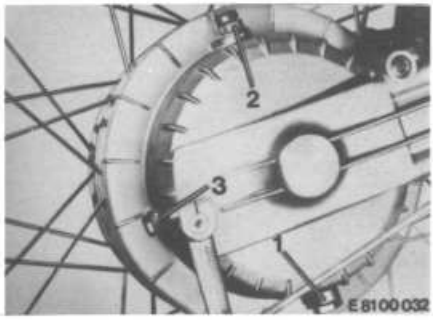


4. Changing Oil in Final Drive

Final drive at operating temperature.

Unscrew oil drain plug (1) and then oil filler/bleeder screw (2). Drain old oil. Add new oil until level reaches inspection bore (3).

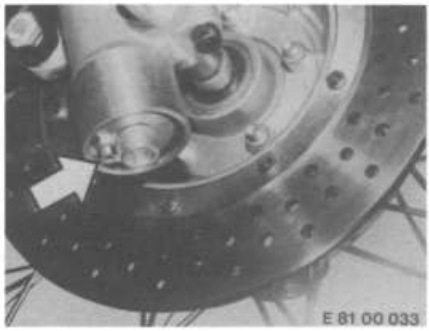
See Specifications for oil grades and volume.



5. Changing Oil in Telescope Fork

Unscrew drain plugs in bottom of slide tubes.

Installation:
Tighten drain plugs carefully to avoid damaging the threads!

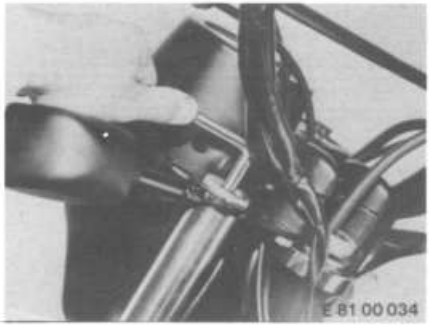


Unscrew upper filler plugs to discharge the fork tubes.

Drain oil while moving telescope fork down and up (5 to 10 times). Add new oil.

See page 31–0/3 of Group 31 for oil grades and volume.

Important!
Bleed shock absorbers after filling telescope fork by moving up and down (5 to 10 times) – full absorbing force must be noticed!



9. Cleaning Fuel Valve

Remove filter screen from fuel valve by loosening coupling nut on hose adapter and pulling screen out of valve housing.



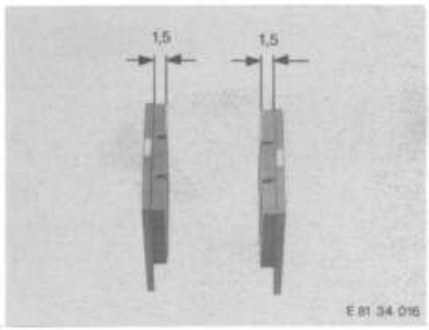
10. Front Wheel: Checking Wheel Bearing Play and Inspecting Brake Parts

Remove and install front wheel 36 30 300.

Check wheel bearing play (friction torque), adjusting if necessary*) 36 31 371.

Check brake disc for wear and thickness of brake pads, replacing worn/damaged parts if necessary*).

Wear limits: see page 34–0/1.



11. Rear Wheel: Checking Wheel Tilt Play and Inspecting Brake Parts

Rear wheel stands free. Place suitable magnet stands on muffler and apply dial gauge in holder – dial gauge tester is on outermost rim flange edge!

Tilt wheel past the perpendicular – max. tilt play = 0.5 mm. If necessary repair bearings*).

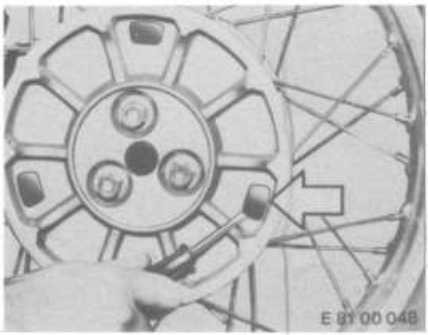


Remove and install rear wheel 36 30 320.

Clean brake drum and shoes; give brake cams a light coat of grease.
Check brake drum for wear, grinding if necessary*).
Check thickness of pads, replacing brake shoes if necessary*).

Pad thickness can be checked through 3 inspection holes.

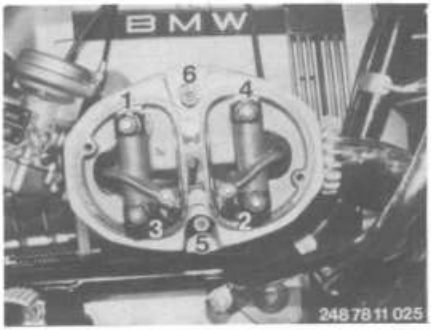
Wear limits: see page 34–0/1.



*) Against extra charge

Tighten the four collar nuts and two hexagon nuts according to tightening order plan.

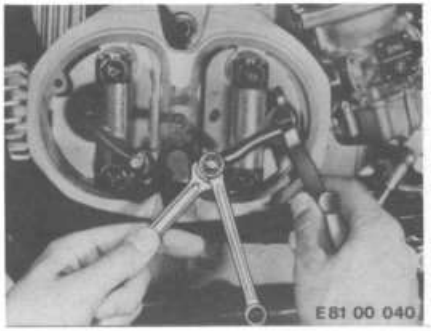
Tightening torque: see page 00–0/7.



Check valve play on a stopped, cold engine with a feeler gauge blade inserted between the valve stem and rocker arm.

This requires cranking engine until piston of cylinder being adjusted is at compression TDC – both valves are closed!
If necessary, correct valve play with the adjusting screw after unscrewing lock nut. Tighten lock nut again. Recheck valve play.

See page 11–0/4 of Group 11 for specifications.

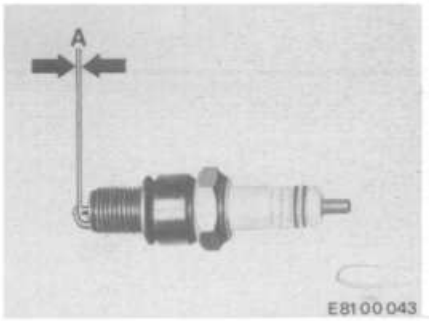


15. Replacing Spark Plugs

Before installing new spark plugs check their electrode gap with a feeler gauge blade, correcting by bending ground electrode to distance A = 0.6 + 0.1 mm if necessary.

See page 12–0/3 for approved spark plugs.

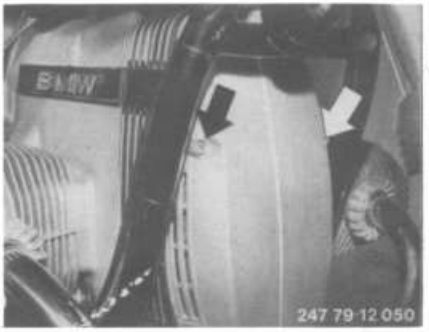
Installation:
Give spark plug threads a light coat of graphite grease.



16. Checking/Adjusting Ignition Timing

Important!
Never touch power carrying parts of a high voltage transistor ignition system while engine is running – DANGER!

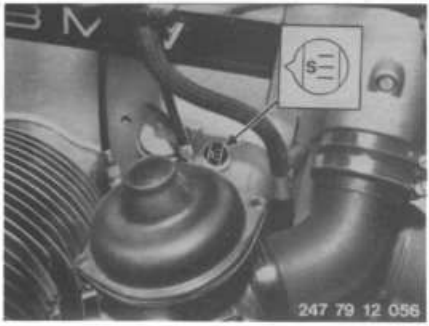
Static Test:
Take off engine cover after loosening both socket head screws (arrows).



To check the advance ignition control the adjusting wheel of the stroboscope lamp must be turned until the "TDC" mark appears. The effective control angle can now be read on the lamp's scale.

See page 12–0/3 of Group 12 for specifications.

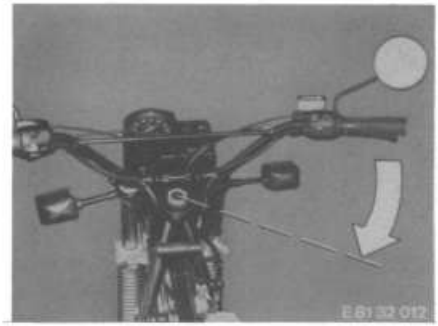
With engine running at idle speed (950 ± 150 rpm) the center white stripe of flywheel mark "S" must be aligned with the inspection hole mark. If stripe is below center, ignition timing is retarded too much. If stripe is above center, timing is advanced too much.



17. Checking Steering Bearing Play

When steering bearing adjustment is correct, the handlebar of a jacked up motorcycle should **slowly "fall" from "straight ahead position" to the right stop.**

Adjust steering*), see 32 00 454.

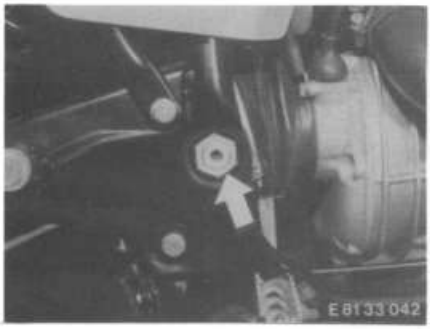


18. Adjusting Swinging Arm Bearing Play

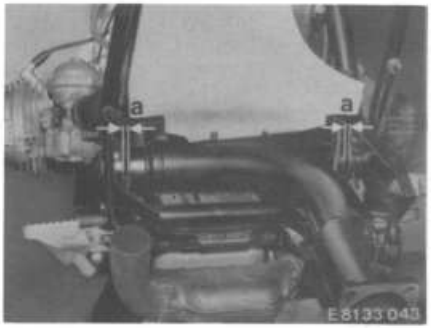
Pry off caps on swinging arm bearings. Unscrew lock nuts on left and right bearing bolts (arrow). To have correct bearing preload tighten both bearing bolts to 20 Nm, loosen again and tighten to 10 + 2 Nm.

Torque lock nuts to 100 + 20 Nm (without turning the bearing bolts).

Tightening torque: see page 00–0/8.



Important!
Distance "a" from frame on both sides of the rear wheel swinging arm must be maintained when adjusting the swinging arm bearing play.



22. Synchronizing Carburetors; Adjusting Cables

Important!
Carburetors have been detached on cylinder heads and shown from the side to improve clarity!

Adjust idle speed with engine running and having operating temperature (80°C oil temperature) and throttle twist grip closed.

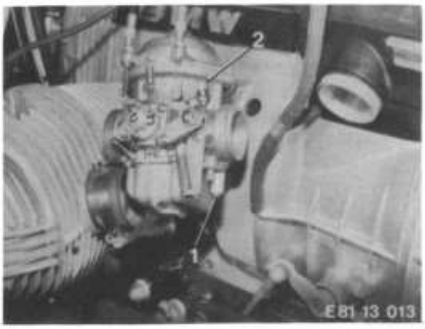
Adjust throttle cable play to 4 mm at first to prevent throttles from "seizing" on the cables.



Adjust choke cables that choke levers (arrow) are pressed into their final position when choke control is switched off.



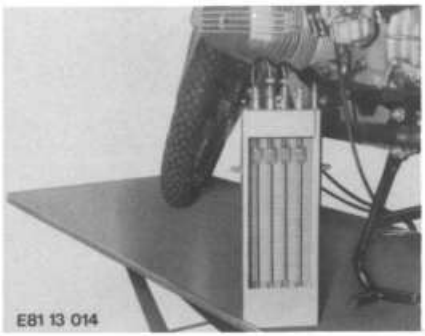
Make basic setting on both carburetors with idle mixture control screw (1) and throttle stop screw (2) as follows.
Screw in mixture control screw against stop carefully and then loosen by the correct number of turns (see Specifications). Screw in stop screw far enough that it just touches the throttle lever and then screw in one full turn.



Use tester, BMW No. 13 0 700, to synchronize carburetors. Connect rubber hoses of tester on pertinent vacuum connections of carburetors (arrow) after removing plugs.

Turn throttle stop screw and idle mixture control screw alternately until carburetors are synchronized. Adjust maximum speed with the control screw after each stop screw adjustment.

See page 11–0/3 of Group 11 for idle speed.



00 00 199 Engine Inspection after 1 000 km (600 miles)

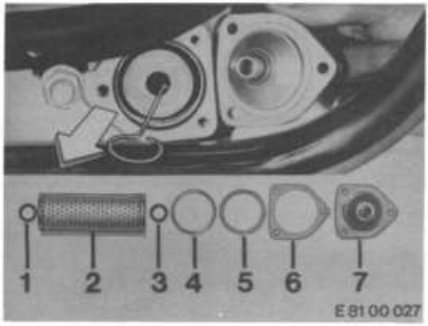
1. Changing oil in engine and oil filter; replacing oil filter cartridge
2. Cleaning carburetor float housing
3. Checking/adjusting clutch play
4. Tightening cylinder heads; adjusting valve play
5. Checking/adjusting ignition timing
6. Checking tightness of bolts
7. Synchronizing carburetors; adjusting cables
8. Final inspection with function test

00 00 149 **Engine Inspection After 1000 km (600 miles)**

1. Changing Oil in Engine and Oil Filter, Replacing Oil Filter Cartridge

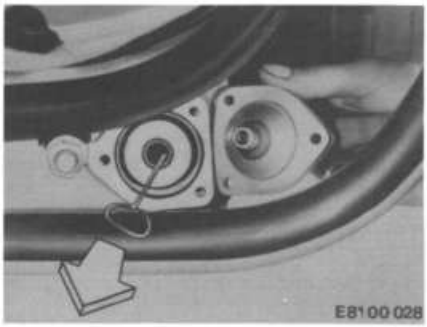
Engine at operating temperature. First replace oil filter cartridge.

1981 Model: Remove end cover (7) with both O-rings (3/5) and steel washer (4). Pull out filter cartridge (2) with wire hooks. Install new filter cartridge with **new** O-rings and paper gasket (6).



1982 Model: Remove end cover with O-ring (5). Parts 1, 3, 4 and 6 are omitted in comparison to 1981 model. Pull out filter cartridge with wire hooks. Install new filter cartridge with **glued** seals.

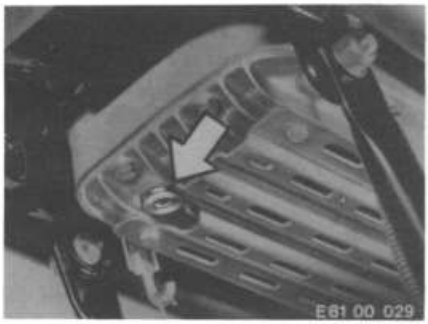
Important!
When using a filter cartridge without glued seals, the O-rings (1/3) shown above must be installed again.



Unscrew oil drain plug on rear of oil pan and drain old oil.

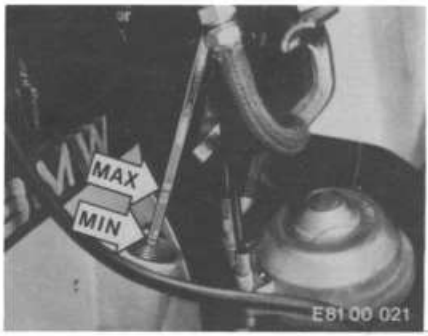
Add new oil.

See Specifications for oil grades and volume.



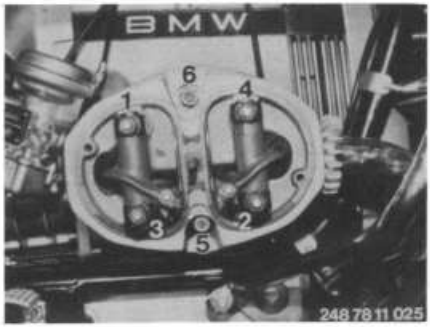
Check oil level with an inserted (not screwed) oil dipstick, correcting to "MAX" mark at most if necessary.

Amount of oil between MIN and MAX marks = 0.85 ltr. .



Tighten the four collar nuts and two hexagon nuts according to tightening order plan.

Tightening torque: see page 00–0/7.

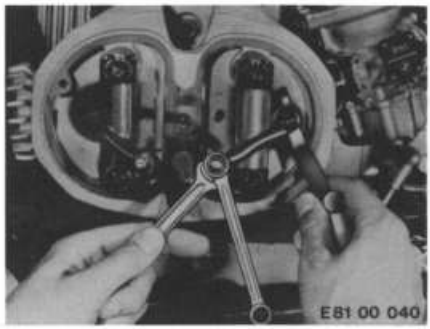


Check valve play on a stopped, cold engine with a feeler gauge blade inserted between the valve stem and rocker arm.

This requires cranking engine until piston of cylinder being adjusted is at compression TDC – both valves are closed!

If necessary, correct valve play with the adjusting screw after unscrewing lock nut. Tighten lock nut again. Recheck valve play.

See page 11–0/4 of Group 11 for specifications.



5. Checking/Adjusting Ignition Timing

Important!

Never touch power carrying parts of a high voltage transistor ignition system while engine is running – DANGER!

Static Test:

Take off engine cover after loosening both socket head screws (arrows).



Disconnect 3-pin plug and connect ignition tester, BMW No. 12 3 650.

Note:

Remove wire clip of plug connection!



6. Checking/Correcting Tightness of Bolts

Front and rear engine mounts, hose clamps on carburetors and dust cover of propeller shaft.

Tightening torque: see page 00–0/7.

7. Synchronizing Carburetors; Adjusting Cables

Important!
Carburetors have been detached on cylinder heads and shown from the side to improve clarity!

Adjust idle speed with engine running and having operating temperature (80°C oil temperature) and throttle twist grip closed.

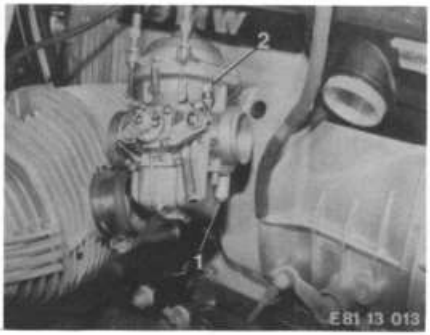
Adjust throttle cable play to 4 mm at first to prevent throttles from "seizing" on the cables.



Adjust choke cables that choke levers (arrow) are pressed into their final position when choke control is switched off.



Make basic setting on both carburetors with idle mixture control screw (1) and throttle stop screw (2) as follows.
Screw in mixture control screw against stop carefully and then loosen by the correct number of turns (see Specifications). Screw in stop screw far enough that it just touches the throttle lever and then screw in one full turn.



Engine

11 Engine

Specifications		Page 11– 0/3
11 00 039	Compression – check	11–00/1
11 00 050	Engine – remove and install	11–00/2
11 11 050	Cylinder – remove and install	11–11/1
11 12 080	Cylinder head – remove and install	11–12/1
11 12 513	Cylinder head – disassemble and assemble and grind in valves	11–12/3
11 12 561	Valve guides – replace	11–12/5
11 14 060	Timing case cover – remove and install	11–14/1
11 14 151	Radial oil seal for crankshaft (clutch end) – replace	11–14/2
11 14 651	Radial oil seal for crankshaft (alternator end) – replace	11–14/2
11 15 101	Engine vent hose – replace	11–15/1
11 21 001	Crankshaft – replace	11–21/1
11 21 531	Main bearing bushings – replace	11–21/3
11 22 000	Flywheel – remove and install (clutch housing)	11–22/1
11 24 000	Connecting rod – remove and install	11–24/1
11 25 000	Piston – remove and install	11–25/1
11 31 061	Set of sprockets – replace	11–31/1
11 34 504	Valve play – adjust	11–34/1
11 41 000	Oil pump – remove and install	11–41/1
	Engine – troubleshoot	11–42/3

Engine	
Model	R 80 G/S
Engine design	4 stroke opposed cylinder engine with V-suspended valves
Cylinder bore	84.8 mm (3.339")
Piston stroke	70.6 mm (2.779")
Number of cylinders	2
Cylinder arrangement	Opposite
Stroke/bore ratio	0.83
Displacement – fiscal	785 cc
Displacement – effective	797.5 cc
Compression ratio	8.2 : 1
Max. output KW (DIN HP)	37 (50) at 6500 rpm
Max. constant speed	7200 rpm
Max. top speed	7400 rpm
Idle speed	950 ± 150 rpm
Max. engine speed during break-in up to 1000 km (600 miles) up to 2000 km (1200 miles)	 4000 rpm 4500 rpm
Direction of rotation	Clockwise looking at alternator
Max. torque	56.7 Nm (42 ft. lbs.) at 5000 rpm
Mean piston velocity	17.1 meters/sec. at 7250 rpm
Compression pressure – good – normal – poor	above 9.0 bar (128 psi) 7.5 to 9.0 bar (107 to 128 psi) below 7.5 bar (107 psi)
Testing instructions for compression pressure (motorcycle with starter)	see 11 00 039
Fuel	Regular grade gasoline DIN 51600 octane at least 91 (RON) or 82 (MON)
Normal fuel consumption acc. DIN 70030 at 110 km/h (68 mph)	5.0 ltr./100 km (47 mpg)
Engine lubrication: Lubricating system	 Forced oil circulation
Oil filter	Full flow
Pressure difference to open bypass valve	1.5 bar (21 psi)
Oil pressure indicator lamp comes on with pressure below	0.2 to 0.5 bar (3 to 7 psi)

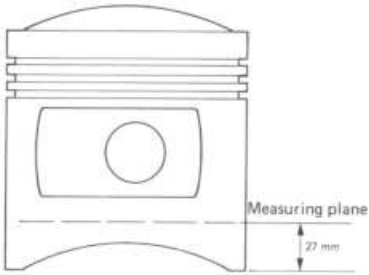
Engine	
Model	R 80 G/S
Valve stem dia. Intake	$8^{-0.050}_{-0.065}$ mm
Exhaust	$8^{-0.050}_{-0.065}$ mm
Min. valve head edge thickness Intake Exhaust	 0.8 mm 0.8 mm
Max. valve seat to stem runout	0.02 mm
Valve Seat Insert: Outside dia. Intake	 $43.2^{0}_{-0.025}$ mm
Exhaust	$43.2^{-0.050}_{-0.066}$ mm
Valve seat insert bore in cyl. head Intake	$43^{+0.025}_{0}$ mm
Exhaust	$43^{+0.025}_{-0}$ mm
Valve seat angle	$90^{\circ}-20'$
Valve seat width Intake	 1.2 + 0.3 mm
Exhaust	1.4 + 0.3 mm
Oversize of valve seat inserts	0.2 mm
Valve Guides: Intake Total length Exhaust	 44 mm 44 mm
Outside dia.	$14^{+0.061}_{+0.050}$ mm
Inside dia.	$8^{+0.015}_{0}$ mm
Bore in cylinder head	$14^{+0.018}_{0}$ mm
1st oversize dia	$14.1^{+0.061}_{+0.050}$ mm
2nd oversize dia.	$14.2^{+0.061}_{+0.050}$ mm
Valve Stem Play: Intake	 0.050 to 0.080 mm
Exhaust	0.050 to 0.080 mm
Max. wear clearance	0.15 mm (measured on top end of valve guide)
Valve Drive: Valve operation	Hard cast tappets from camshaft Push rod and rocker arm
Camshaft drive	Single roller chain 3/8 x 7/32" connector link
Number of links	50
Valve Springs: Wire gauge thickness	 4.25 mm
Outside coil dia.	31.9 mm
Relaxed spring length	brown 46 mm/blue 43.5 mm

Engine

Model			R 80 G/S	
Crankshaft and Bearings:			Main Bearing Journal Dia. in mm	
Crankshaft			Alternator End	Flywheel End
Crankshaft code		red/red	59.980 . . . 59.990	59.980 . . . 59.990
Standard size	0	red/blue	59.980 . . . 59.990	59.971 . . . 59.980
		blue/red	59.971 . . . 59.980	59.980 . . . 59.990
		blue/blue	59.971 . . . 59.980	59.971 . . . 59.980
1st undersize	0.25	red/red	59.730 . . . 59.740	59.730 . . . 59.740
		red/blue	59.730 . . . 59.740	59.721 . . . 59.730
		blue/red	59.721 . . . 59.730	59.730 . . . 59.740
		blue/blue	59.721 . . . 59.730	59.721 . . . 59.730
2nd undersize	0.50	red/red	59.480 . . . 59.490	59.480 . . . 59.490
		red/blue	59.480 . . . 59.490	59.471 . . . 59.480
		blue/red	59.471 . . . 59.480	59.480 . . . 59.490
		blue/blue	59.471 . . . 59.480	59.471 . . . 59.480
3rd undersize	0.75	red/red	59.230 . . . 59.240	59.230 . . . 59.240
		red/blue	59.230 . . . 59.240	59.221 . . . 59.230
		blue/red	59.221 . . . 59.230	59.230 . . . 59.240
		blue/blue	59.221 . . . 59.230	59.221 . . . 59.230
Crankshaft main bearing bushing dia. in crankcase			$65^{+0.019}_{0}$ mm	
Crankshaft main bearing bushing dia. in bearing cap			$65^{+0.019}_{0}$ mm	
Main bearing journal radial play at 20°C (68°F)		red	0.017 . . . 0.066 mm	
		blue	0.019 . . . 0.067 mm	
Grooved ball bearing seat dia. on front end of crankshaft			$35.003^{+0.020}_{+0.009}$ mm	
Grooved ball bearing seat dia. in timing case cover			$62^{-0.009}_{-0.39}$ mm	
Main Bearing Bushing				
Wall thickness				
Standard size	0	red	2.500 . . . 2.510 mm	
		blue	2.504 . . . 2.514 mm	
1st step	0.25	red	2.625 . . . 2.635 mm	
		blue	2.629 . . . 2.639 mm	
2nd step	0.50	red	2.750 . . . 2.760 mm	
		blue	2.754 . . . 2.764 mm	
3rd step	0.75	red	2.875 . . . 2.885 mm	
		blue	2.879 . . . 2.889 mm	
Crankcase			A Dia. (Crksh. Bearing Bore)	B Dia. (Bearing Cap Bore)
			65 H 6 mm	$130^{+0.026}_{-0.007}$ mm
			65.000 . . . 65.019	129.993 . . . 130.026
Bearing Cap			65.000 . . . 65.019	130.003 . . . 130.028
Crankshaft bearing dia. with press fit bearing			red = 60.007 . . . 60.046 mm blue = 59.999 . . . 60.038 mm	
Crankshaft dia. for sprocket			$35.003^{+0.020}_{+0.009}$ mm	
Sprocket take-up bore dia.			$35.003^{+0.003}_{-0.013}$ mm	

Engine

Model	R 80 G/S
Cylinders:	
Standard bore dia. A	84.795 to 84.805 mm
B	84.805 to 84.815 mm
C	84.815 to 84.825 mm
Surface finish	1.5 micron/m
Permissible cylinder bore out-of-true	Measured from upper edge distance 20 mm = 0.005 mm distance 115 mm = 0.01 mm
Pistons:	
Piston shape	spherical to oval
Complete piston weight group	+ or – stamped (only install pistons of one weight group)
Standard piston dia. A	84.765 mm
B	84.775 mm
C	84.785 mm
Piston installed clearance	0.030 to 0.040 mm
Total permissible wear on piston and cylinder	max. 0.08 mm
Installed direction of piston	Arrow and word "front" facing forward

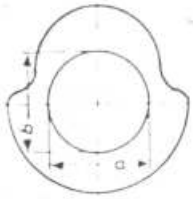


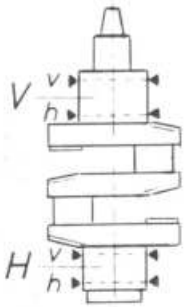
Test Report for Crankshaft Main Bearing Clearances
(also refer to Service Information, Gr. Engine, No. 11 015 80 (146 R)

Model _____ Chassis No. _____ Mileage _____

Order No. _____ Enclosure for GA No. _____

Measuring
Main Bearing Journals:

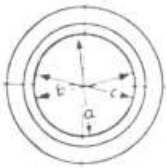




Measure front main bearing journals V and rear main bearing journals H in directions a and b (each 3 times at same point), transferring to planes Vv, Vh, Hv, Hh, with an external micrometer. This provides 24 different values, which must be entered in following table. Calculate mean values as shown.

Planes		a	b	Cross Additions : 6 = Mean Value Main Bearing Journals
59, . . .	AV av			: 6 = 59, . . . mm
	AV ar			: 6 = 59, . . . mm
	AR av			: 6 = 59, . . . mm
	AR ar			: 6 = 59, . . . mm

Measuring
Main Bearing Shells:



Measure main bearing shells in directions a, b and c. Make marks on crankcase and bearing caps with a felt tip marker as shown in illustration. Otherwise proceed as described above. This produces 36 different values, which must be entered in following table. Calculate mean values as shown.

Planes		a	b	c	Cross Addition: 9 = Mean Value Main Bearing Shells
60,0 . .	AV av				: 9 = 60,0 . . mm
	AV ar				: 9 = 60,0 . . mm
	AR av				: 9 = 60,0 . . mm
	AR ar				: 9 = 60,0 . . mm

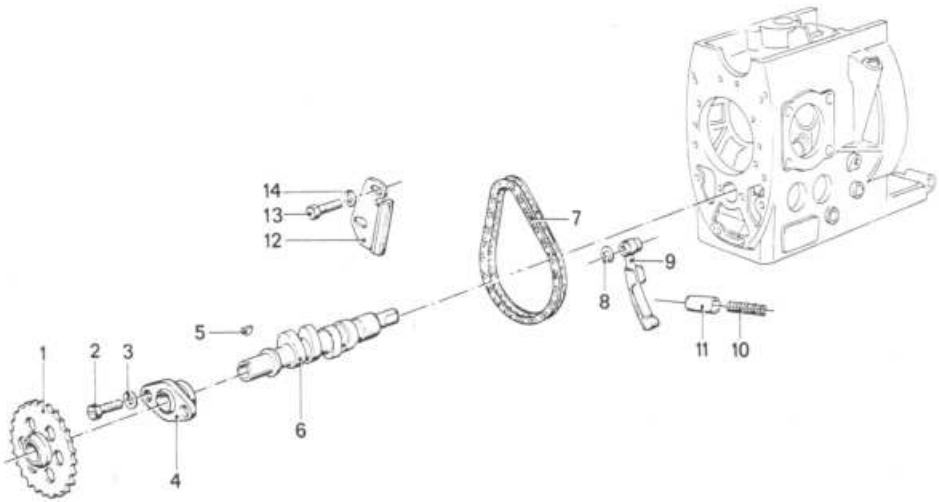
Calculating Main Bearing Play:

Nominal Value = 0.020 . . . 0.065

Test Results		Bearing Shell Dia.	Bearing Journal Dia.	Bearing Play
	AV av	minus	=	mm
	AV ar	minus	=	mm
	AR av	minus	=	mm
	AR ar	minus	=	mm

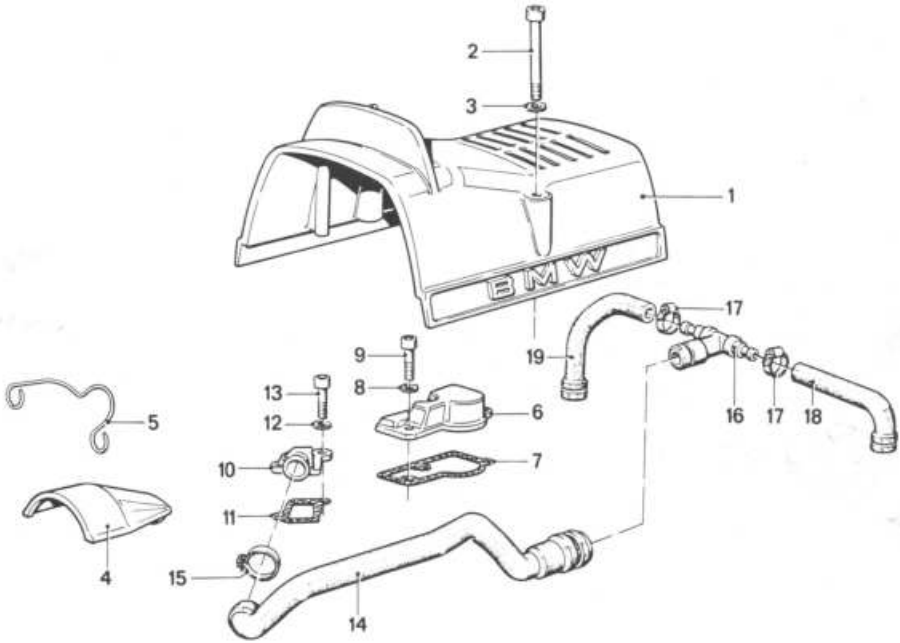
Date _____ Signature of Tester _____

Camshaft and Timing Chain



1) Camshaft sprocket
2) Bolt
3) Lock washer
4) Flange bearing
5) Woodruff key
6) Camshaft
7) Timing chain
8) Lock washer
9) Chain tensioner
10) Spring
11) Piston
12) Guide rail
13) Bolt
14) Lock washer

Crankcase Vent

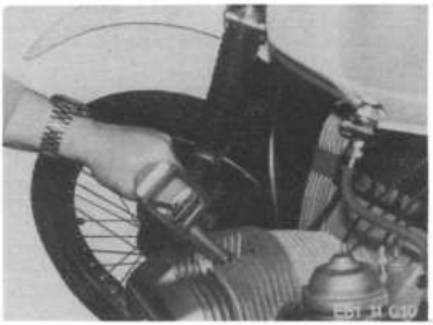


1) Cover
2) Bolt
3) Washer
4) Cover
5) Wire clamp
6) Cover
7) Gasket
8) Washer
9) Bolt
10) Cover
11) Gasket
12) Washer
13) Bolt
14) Vent hose
15) Hose clamp
16) Branch
17) Hose clamp
18) Vent hose, left
19) Vent hose, right

11 00 039 Checking Compression of All Cylinders

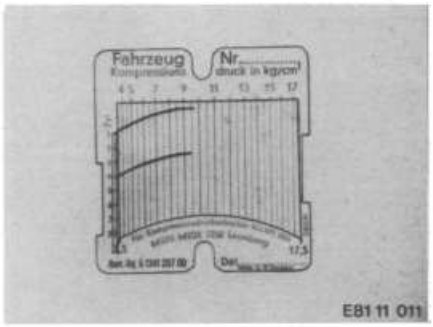
1. Unscrew spark plugs.
2. Check compression with a calibrated compression pressure tester, fully charged battery, engine having operating temperature, throttle twist grip at full throttle and engine running at idle speed.

Important!
Make sure ignition is interrupted (plug on ignition box – see 12 11 004), since otherwise ignition coil would be destroyed.



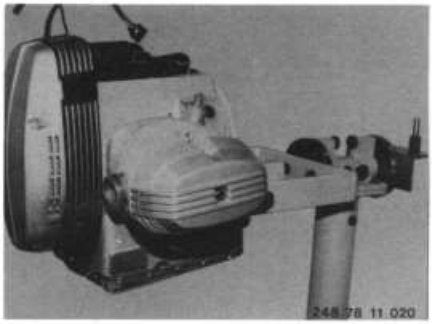
Test sheet for compression recorder.

See Specifications for compression values.



Lift engine out of frame, tilting slightly to left or right.

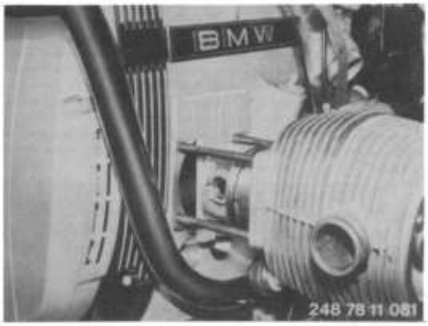
Place engine on assembly stand, BMW No. 00 1 490, in holder, BMW No. 11 0 600, and secure with two bolts.



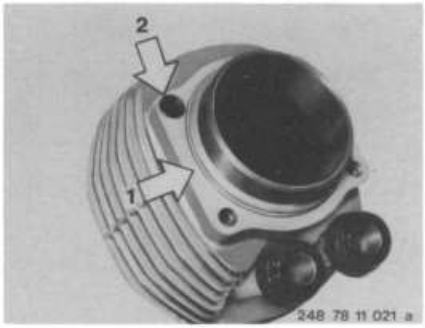
11 11 050 Removing and Installing Cylinder

Remove and install cylinder head 11 12 080.
Loosen cylinder with several knocks from a plastic hammer and take off of crankcase.

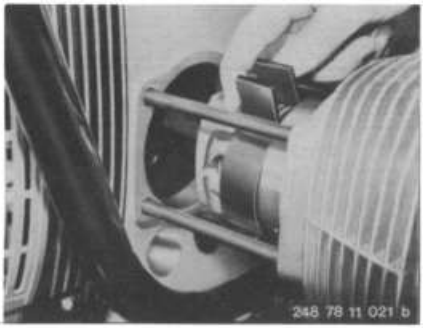
Note:
Be careful not to knock piston against crankcase when taking off cylinder!



Replace O-ring on cylinder base (1) as well as O-rings on upper staybolts (2) each time unit is disassembled.



Use piston ring compressor, BMW No. 11 2 905, to guide piston into cylinder.



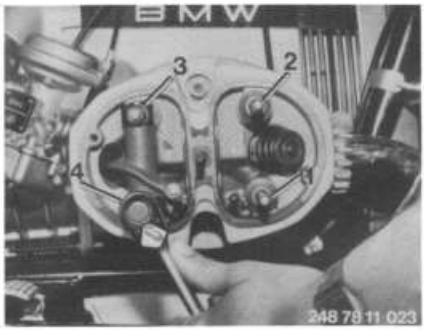
11 12 080 Removing and Installing Cylinder Head

Remove and install intake line 13 72 080.
Engine removed (11 00 050) or installed.
Remove exhaust assembly when engine is installed — see 18 00 020.

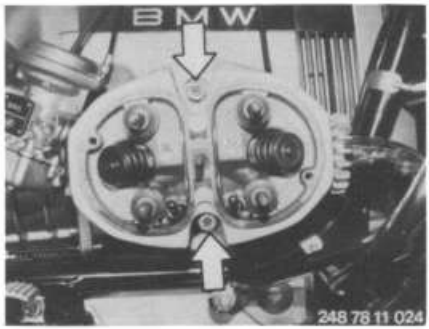
Unscrew cap nut and both nuts (arrows), remove cylinder head cover and gasket.



Remove both rocker arms after unscrewing 4 collar nuts on staybolts and pull out push rods.

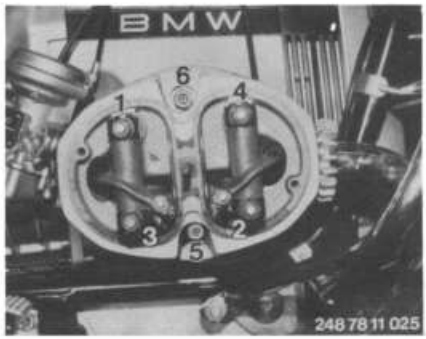


Unscrew two hexagon nuts (arrows). Loosen cylinder head from cylinder with knocks from a plastic hammer and pull off of staybolts.



Installation note for cylinder head

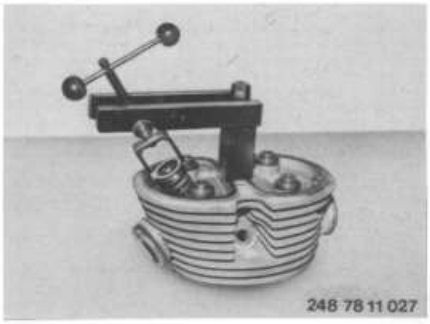
Tighten cylinder head mounting nuts on cold engine in three steps in the order shown in the sketch.
Refer to Specifications for tightening torque values.



11 12 513 Disassembling and Assembling Cylinder Head and Grinding Valves

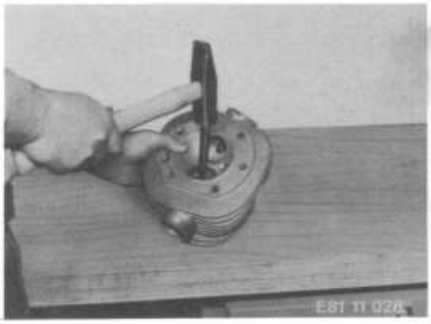
Remove and install cylinder head 11 12 080.

Apply valve spring compressor, BMW No. 11 1 750, compress valve springs, remove valve collets and pull out valve.



Check cylinder head for

a) cracks and damage on mating surfaces,
b) tightness of valve guides (figure) and valve seat inserts,
c) wear on valve guides,
d) damage on surface of bearing surfaces and ball sockets,
e) radial play of rocker arms,
f) length of valve springs and force of same (see Specifications), and
g) tightness of adapters for carburetor connection. If necessary, install cleaned threaded inserts with Loctite No. 241.

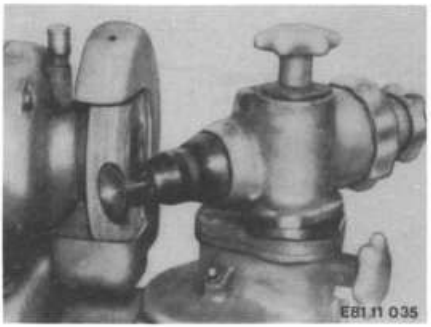


Machining Valve Seats

Machine valve seat inserts in cylinder head with a Hunger valve seat machining tool. Seat angle: 45° +20', intake valve seat width: 1.5 mm; for exhaust valve: 45° and 2.0 mm width. Chamfer of 15° faces combustion chamber; 75° inclination faces intake or exhaust port. Seal seat should close to largest valve seat diameter.



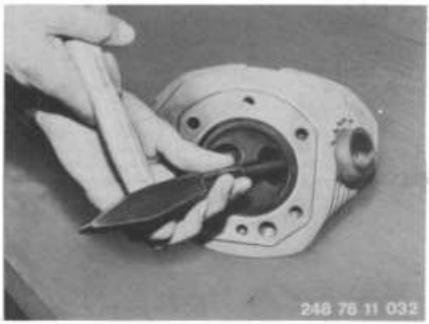
Grind seat on valve to 45° 20' in a grinder. Max. permissible grinding: up to 1 mm valve head edge thickness.
Ground valve cones and valve seat insert ground with a Hunger tool do not require grinding of the valves, but a leak test (gasoline poured into valve chambers) has to be made after installation of valves.



11 12 561 Replacing Valve Guides

Remove and install cylinder head 11 12 080. Disassemble and assemble cylinder head and grind valves 11 12 513.

Heat cylinder head to 240 ... 260°C (465 ... 500°F) and knock out valve guide from the combustion chamber side with a mandrel, BMW No. 11 1 780.



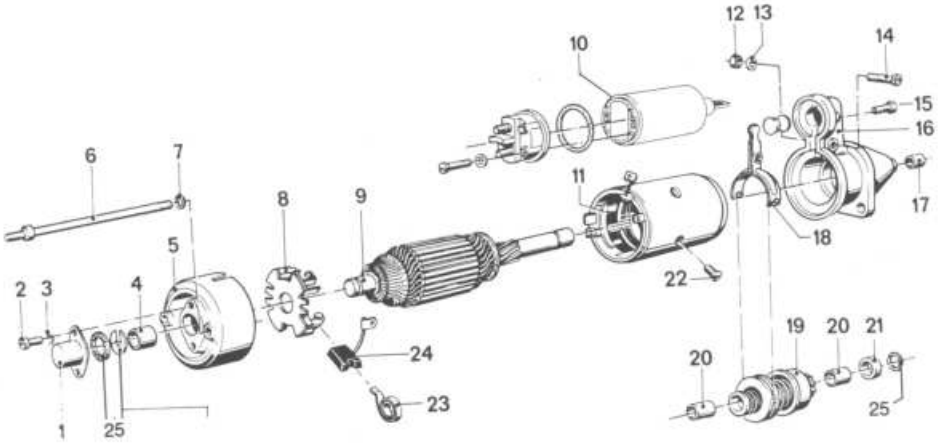
Knock in new valve guides (see Specifications for oversizes and standard bores in cylinder head) fitted with circlips in a warm cylinder head (240 ... 260°C/ 465 ... 500°F) with a mandrel, BMW No. 11 1 790. Ream out cold valve guide with a fixed 8 H 7 reamer.



Engine Electrical Parts

Model	R 80 G/S
Starter: Type	DF 12 V
Starting bypass current	320 A
Output	0.7 KW
Torque	0.750 mkp
Starter relay	Bosch
Armature axial play	0.10 . . . 0.15 mm (0.004 . . . 0.006")
Alternator: Type	Bosch G1 14V 20 A 21/280 W
Alternator drive	Direct off of crankshaft
Max. power	280 W/14 V
Max. current	20 A
Resistance betw. phase outlets	0.62 ohm
Charging begins at	980 rpm
Max. speed	10 000 rpm
Max. runout on slip rings	0.06 mm (0.0024")
Min. slip ring dia.	26.8 mm (1.055")
Max. resistance betw. slip rings	3.4 + 0.34 ohm
Voltage Regulator: Type	Wehrle E 1051 B/14 V
Regulating voltage on engine having operating temperature, ambient temperature 20°C (68°F), 5000 rpm	13.5 . . . 14.2 V
Diode Carrier: Type (Bosch)	D 120 915 158 14V 20A
Ignition Coil: Type (Bosch)	Dual spark ignition coil 12 V
Spark Plugs: Threads	M 14 x 1.25
Bosch	W 7 D
Beru	14 – 7 D
Champion	N 10 Y
Electrode gap	0.6 + 0.1 mm (0.024 + 0.004")
Distributor: Type (Bosch)	Breakerless ignition pulse transmitter (Hall sensor) with integrated centrifugal advance control
Control begins at	1500 rpm
Control ends at	3000 rpm

Starter



1) Cap
2) Screw
3) Washer
4) Bearing bush
5) Commutator bearing
6) Screw
7) Washer
8) Brush holder
9) Armature
10) Solenoid
11) Exciter coil
12) Nut
13) Circlip
14) Screw
15) Ctsk. screw
16) Drive bearing
17) Bearing bush
18) Operating lever
19) Starter gear
20) Bearing bush
21) Stop ring
22) Ctsk. screw
23) Spring
24) Carbon brush set
25) Washers

12 11 004 Adjusting Ignition Timing (Static)

Important!
This motorcycle is equipped with a high voltage transistor ignition system. Touching power carrying parts of system while engine is running is dangerous!

Remove engine guard after unscrewing both socket head screws (arrows).



Disconnect 3-pin plug and connect ignition tester, BMW No. 12 3 650.

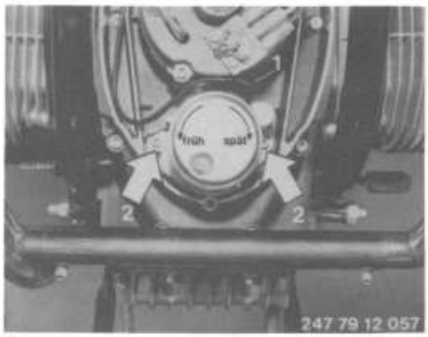
Note:
Remove wire clamp of plug connection!



Unscrew spark plugs and crank engine clockwise (opposite forward direction) with socket head screw for rotor, or crank engine with kick starter.



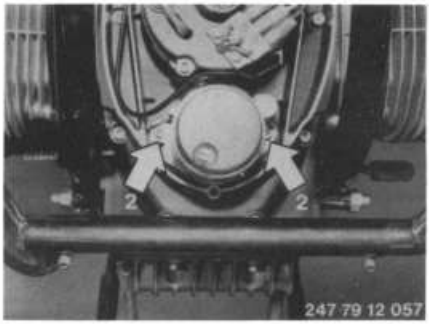
Center white stripe of flywheel mark "S" must be aligned with inspection hole mark on engine block (second picture on page 12–11/2) when diode on ignition tester comes on.
Turn ignition box as shown if necessary.



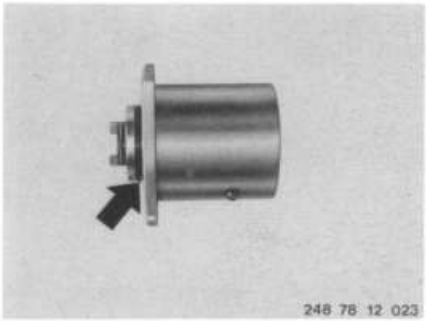
12 11 060 Removing and Installing Spark Trigger

Remove engine cover.
Pull off flat female plug (1). Unscrew socket head bolts (2) and pull spark trigger out of timing case cover.

Note:
Don't disassemble a spark trigger. Only replace as a complete part.



Replace seal (arrow) after each removal of the spark trigger.

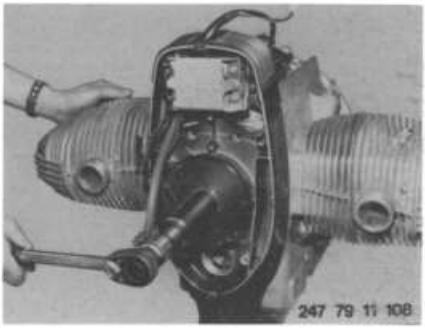


11 14 060 Removing and Installing Timing Case Cover

Engine removed (11 00 050) or installed.
Remove and install alternator 12 31 020.
Remove and install spark trigger 12 11 060.
Unscrew nine socket head screws and three socket nuts.

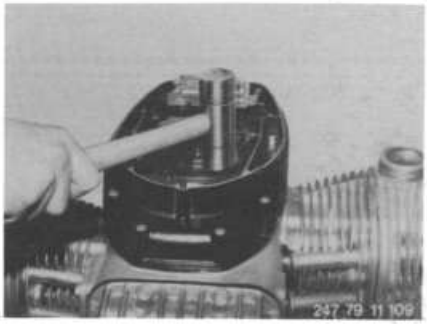


Mount puller, BMW No. 11 1 800, at tapped holes for alternator housing with three M 5 socket head screws.
Apply pressure pad for puller and pull off cover.



Attaching Timing Case Cover

Heat cover at seat of ball bearing to approx. 80°C (175°F) and mount on engine.
Tighten socket head screws and nuts, starting from the center. Settle grooved ball bearing with several knocks against bearing seat with a plastic hammer.



11 15 101 Replacing Engine Vent Hose

Remove fuel tank 16 11 030.

Remove air cleaner housing upper section and pull out filter cartridge.

Unscrew socket head screws in starter cover and remove cover. Disconnect clamp on breather dome (arrow) with a screwdriver.



11 21 001 Removing and Installing Crankshaft

Remove and install timing case cover 11 14 060.

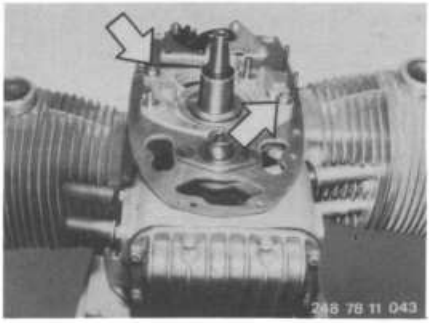
Remove and install sprockets 11 31 061.

Remove and install pistons 11 25 000.

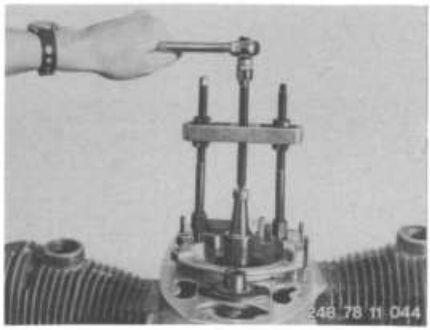
Remove and install connecting rod 11 24 000.

Remove and install clutch housing 11 22 000.

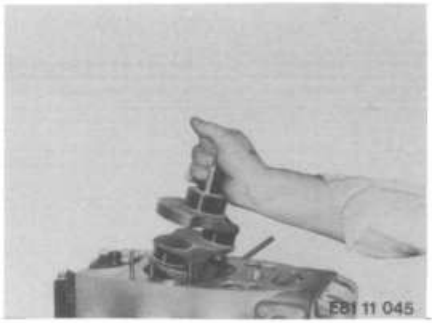
Unscrew bearing cap mounting nuts.



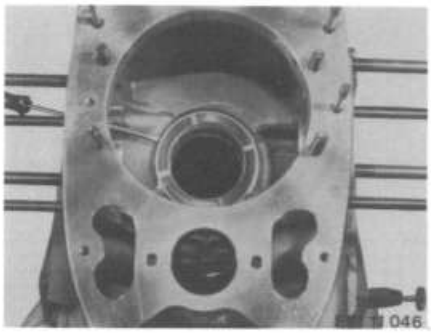
Position engine upright. Screw two bolts from puller, BMW No. 00 7 500, in tapped holes of main bearing cap provided for this purpose. Install pulling bar parallel to main bearing cap. Don't forget pressure pad for puller. Pull off main bearing cap.



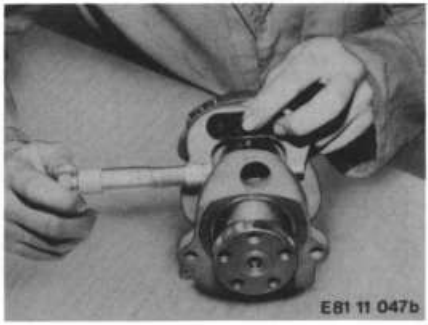
Pull out crankshaft from crankcase.



Knock off both thrust washers from locating pins with a screwdriver.

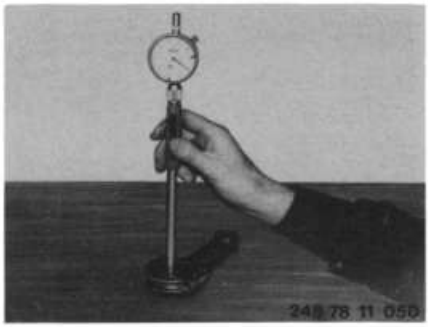


Measure thrust bearing journals of crankshaft . . .

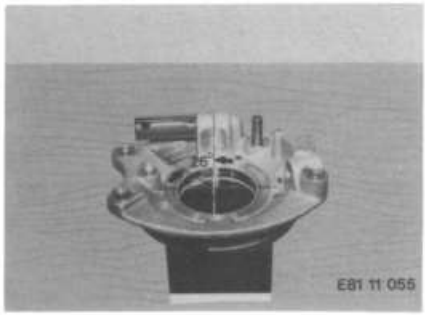


. . . and conrod bearings in same manner as described for the crankshaft and bearing bushings.

See Specifications for bearing play values.

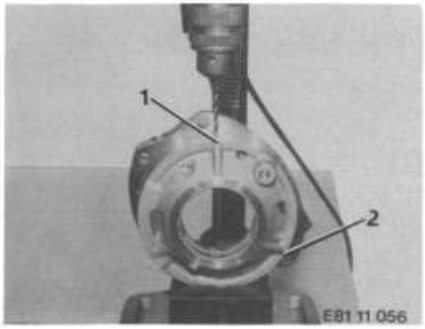


Press new bearing bushing into bearing cap heated to 100 ... 120°C (215 ... 250°F), that bearing bushing gap is located top left as seen on installed bearing cap and oil bores are positioned vertical. Offset bearing bushing gap from vertical by approx. 26° (see arrows).



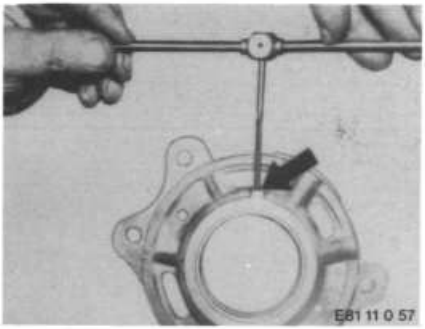
Clamp bearing cap in a vise fitted with soft jaws. Drill two additional oil bores, pos. 1 and 2, in bearing bushing through both 3.2 mm (0.126") dia. holes already provided in bearing cap. Deburr holes in bearing bushing carefully.

Lock bearing bushing! Drill a center in bearing bushing through the (4H8) locating pin hole in bearing cap with a 3.9 mm (0.153") dia. drill bit. Then drill through bearing bushing with 3.8 mm (0.150") dia. drill bit (basic ream size bore).

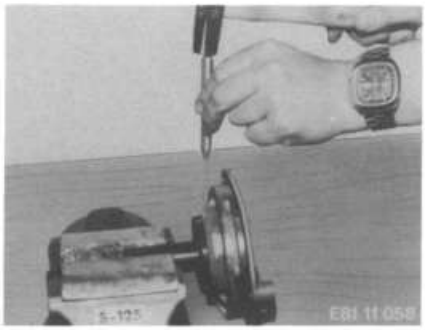


Do not ream through bearing bushing with hand reamer (4H8), to prevent lockpin from moving in.

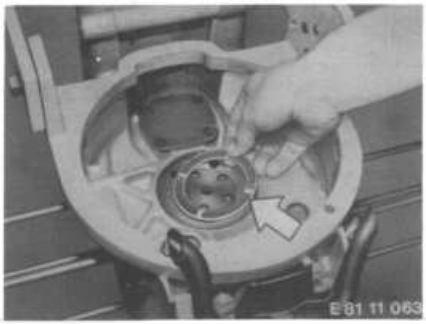
Deburr hole carefully.



Clamp mandrel, BMW No. 11 2 710, in a vise. Install bearing cap. Knock in lockpin only so far, that it stands back from bearing bushing bore by 0.5 to 1.0 mm (0.020 to 0.040"). Lock pin with three notches.

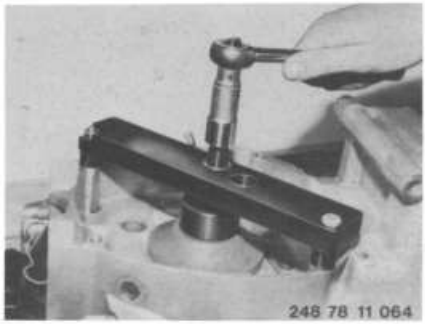


Select a thrust washer, whose thickness is as close as possible to the determined value and does not deviate from it by more than +0.03 mm (0.0012") or −0.04 mm (0.0016"). Install thrust washer of determined thickness on locating pins.



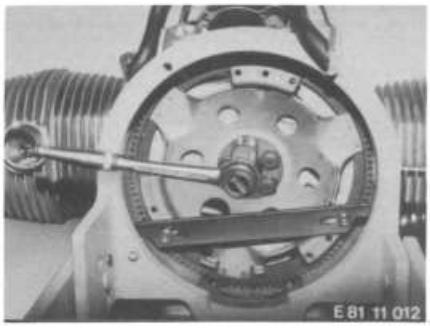
Press shaft seal into crankcase with special tool, BMW No. 11 1 890, in conjunction with impact mandrel, BMW No. 11 1 880. Press in impact mandrel until it is against the thrust washer.

Note:
Place seal in oil about 2 hours before installing.

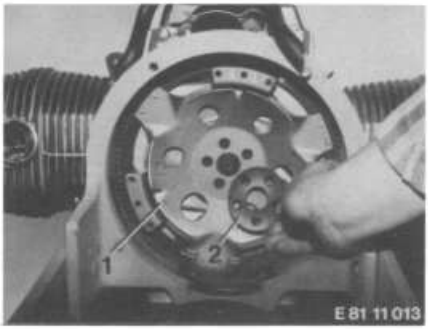


11 22 000 Removing and Installing Clutch Housing (Flywheel)

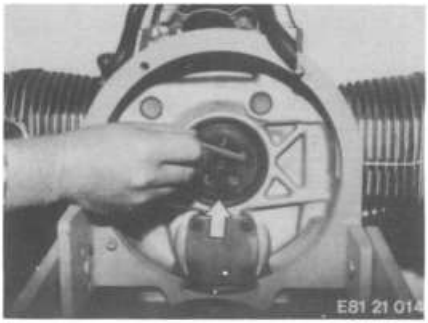
Remove and install clutch 21 21 000.
Mount holder, BMW No. 11 2 800, on clutch housing and unscrew bolts in crankshaft.
See Specifications for tightening torque.



Remove clutch housing (1) and steel disc (2).



Turn race (arrow) by one half a hole as compared to the crankshaft and pull off of crankshaft stub with 2 hooks (angled screwdrivers).



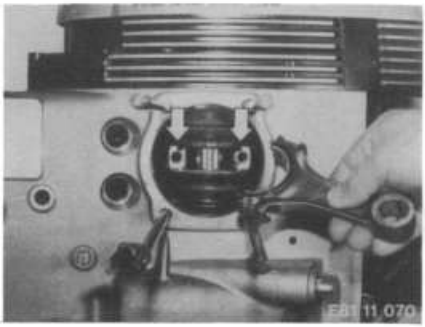
11 24 000 Removing and Installing Connecting Rod

Remove and install engine 11 00 050.
Remove and install cylinder head 11 12 080.
Remove and install pistons 11 25 000.
Only perform all testing and repairing procedures described in the preliminary work when absolutely necessary.

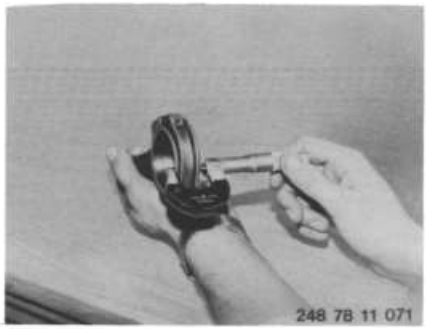
Connecting rod is removed and installed with crankshaft in TDC. Unscrew conrod bolts with a multiple socket wrench, BMW No. 11 2 860. Remove connecting rods and conrod bearing caps together with bearing shells.



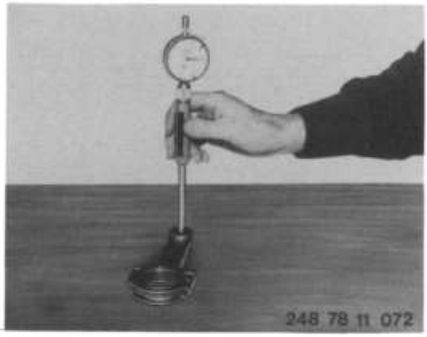
Installation: Install both connecting rods that locating pins of connecting rods are arranged on alternator side.



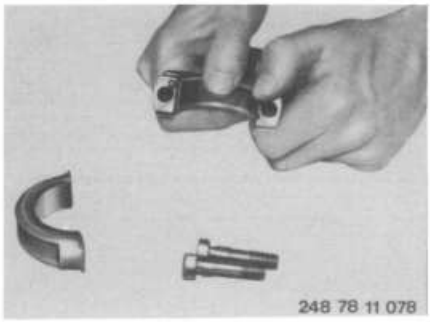
Inspecting and Repairing:
Measure connecting rod thickness at thrust bearing with a micrometer. Refer to Specifications for dimensions.
Both connecting rods in one engine must have the same weight class or color code.
Check tightness and size of piston pin bushing.



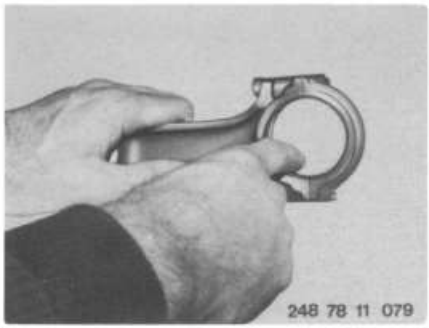
If inside diameter of piston pin bushing is worn beyond limits, press out piston pin bushing. Refer to Specifications for dimensions.



Install bearing shells in a clean, round connecting rod bearing bore.

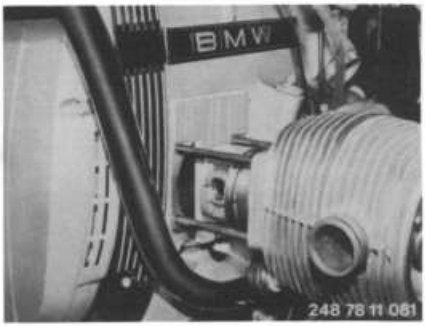


Prior to installation of crankshaft, apply a light coat of Molykote Paste G on main and conrod bearing shells.

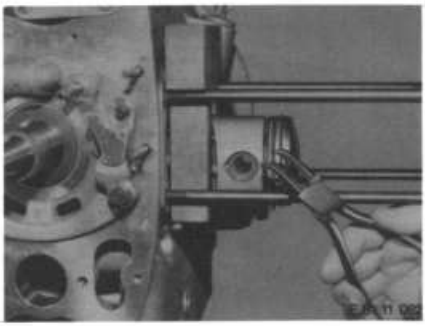


11 25 000 Removing and Installing Piston

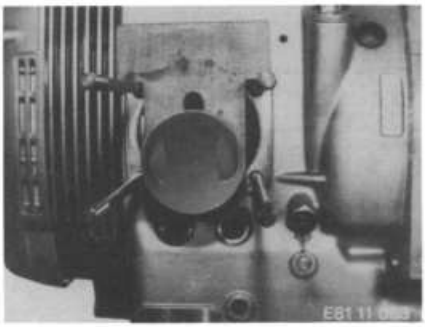
Remove and install cylinder head 11 12 080.
Pull off cylinder from 4 anchor bolts. Be careful not to damage piston when piston leaves cylinder. Install a piece of wood behind the piston, between the anchor bolts, to protect the piston.



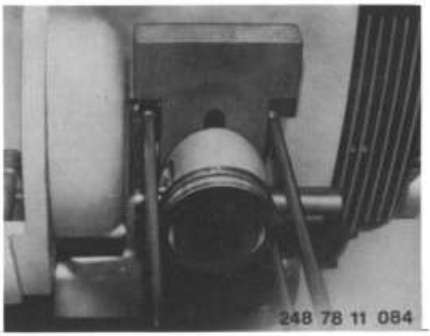
Remove piston pin circlip with a special circlip pliers. Press out piston pin by hand or with a mandrel, BMW No. 11 2 920.



Installation: Install piston that "vorn" (= front) on piston crown faces forward. This guarantees correct installation of piston with an offset axis.
The piston need not be heated to install the piston pin. Only use pistons of same weight classification in one engine.



Installation: Prior to installation of cylinder, clean cylinder base and cylinder sealing surfaces on engine block with nitro thinner. Be careful not to pinch round cord seals on upper staybolts.
If cylinder base sealing problems are experienced, use "oversize" round cord seals (see spare part microfilm).

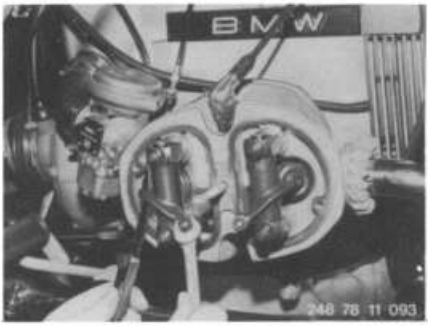


11 34 504 Adjusting Valve Clearance

Unscrew cap nut and both nuts (arrows). Remove cylinder head cover and gasket.

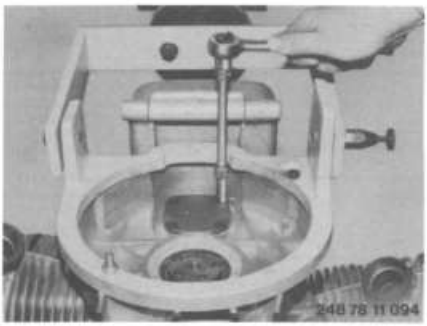


Adjust valve clearance between the valve stem and rocker arm on a cold, stopped engine with a gauge blade. For this purpose unscrew the spark plugs and turn engine until the cylinder being adjusted is at compression TDC. Both valve are closed. If necessary, correct adjusting screw after unscrewing the lock nut. Tighten lock nut. Recheck valve clearance. See Specifications for valve clearance.

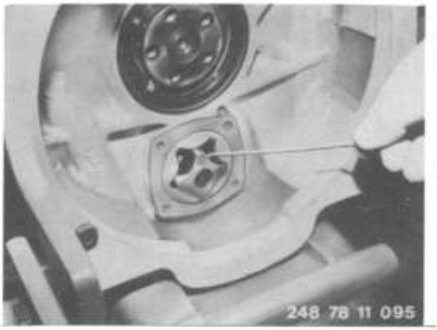


11 41 000 Removing and Installing Oil Pump

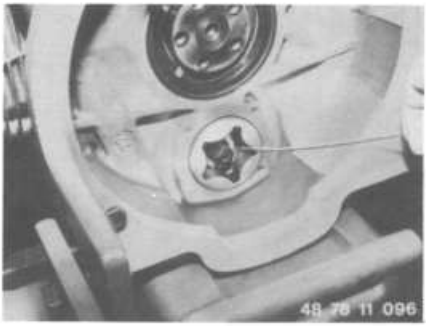
Remove and install clutch 21 21 000.
Remove and install flywheel 11 22 000.
Remove end cover on oil pump housing after unscrewing the four hexagon head bolts.



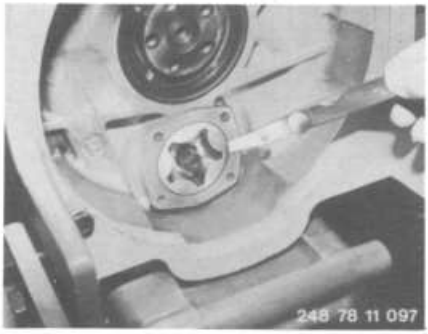
Take inner rotor out of housing with wire hooks.



Remove outer rotor in same manner.



Checking:
See Specifications for play between outer rotor and pump housing.



Troubleshooting Engine

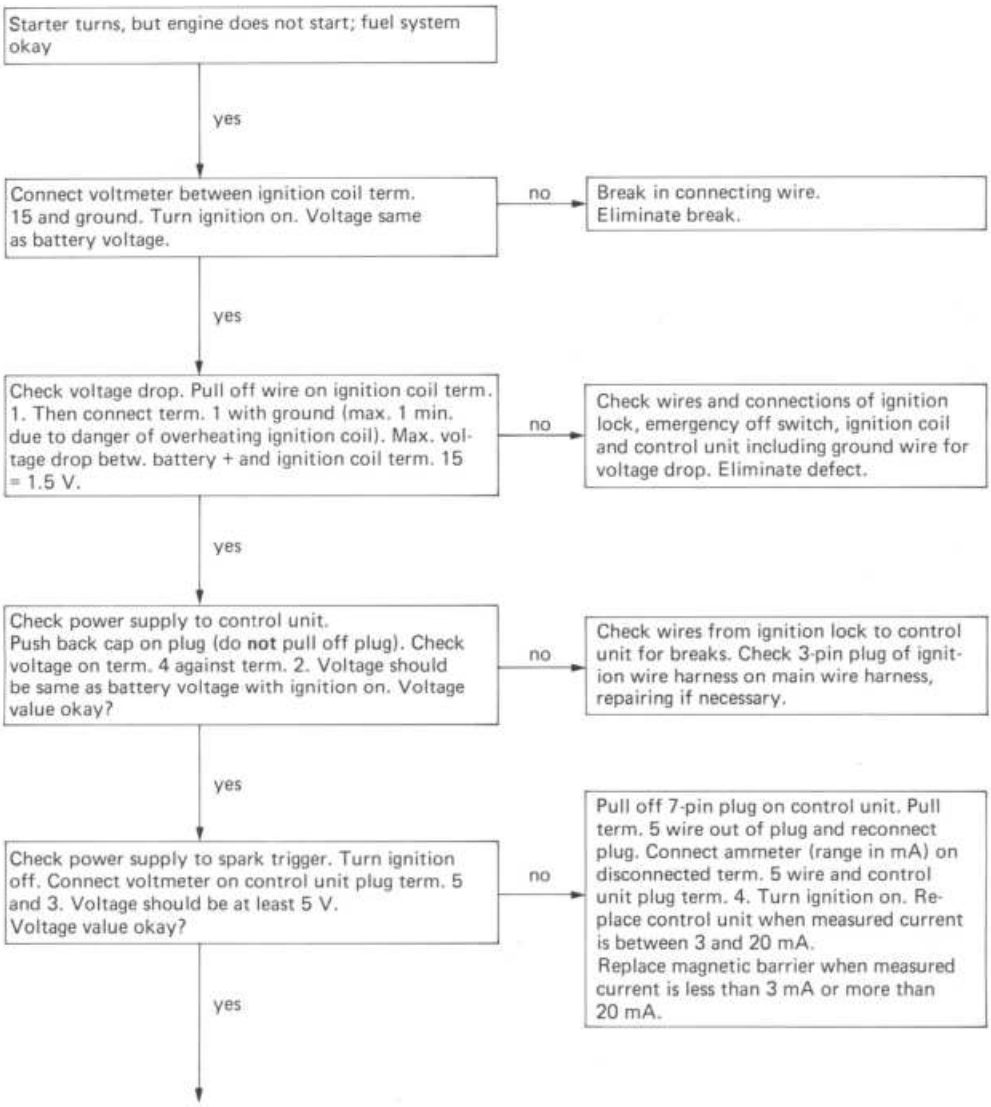
Condition	Cause	Correction
Compression pressure insufficient	Valve leaks or bent	Grind or replace
	Piston ring tension too weak, excessive end clearance	Check or replace
	Piston rings broken	Replace
Insufficient power	Ignition timing wrong	Check, adjust
	Float level too low	Check, adjust
	Air filter clogged	Replace
	Fuel valve dirty	Clean, check flow rate
Engine hard to start or won't start	Valves maladjusted	Check valve play, adjust
	Choke will not close	Check choke setting
	Ignition maladjusted	Check setting
	Electrode gap of spark plugs wrong	Adjust
	Spark plugs wet	Dry
Engine acceleration not good	Insufficient or no centrifugal control	Replace centrifugal governor
	Electrode gap of spark plugs wrong	Adjust
Engine misfires – high fuel consumption	Ignition wiring defective, plug caps defective	Replace
	Shielded resistors defective	Replace
Engine knocks	Ignition timing wrong	Adjust ignition
	Needles positioned incorrectly in carburetor	Position needles correctly
Oil pressure insufficient	Crankshaft main bearing play excessive	Check crankshaft and bearings
	Suction bell clogged	Check or replace
	Pressure relief valve stuck in open position	Remove and repair valve

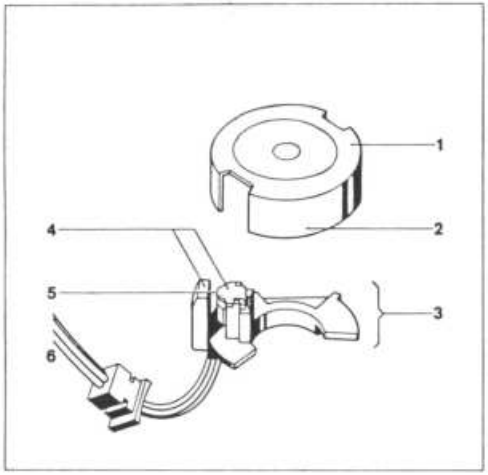
Engine Electrical Equipment

12 Engine Electrical Equipment

Specifications			Page 12– 0/3
12 11 004	Ignition timing – adjust	Static	12–11/1
		Dynamic	12–11/2
12 11 060	Spark trigger – remove and install		12–11/3
	Ignition system – troubleshoot		12–11/5
12 31 020	Alternator – remove and install		12–31/1
	Alternator – troubleshoot		12–31/5
12 41 009	Starter in motorcycle – check		12–41/1
12 41 020	Starter – remove and install		12–41/1
	Starter – troubleshoot		12–41/7

Troubleshooting Ignition System





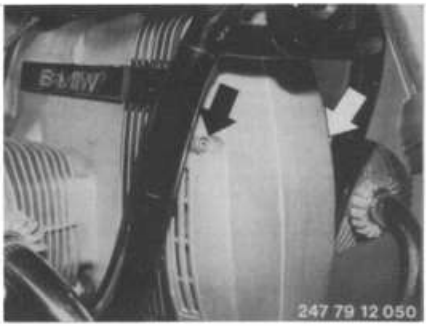
Parts of Hall Sensor:

1 Mask rotor with openings
2 Mask
3 Magnetic barrier
4 Guide
5 Clearance
6 Three-wire sensor lead

Important!
Control unit switches off again 5 seconds after switching in on the ignition lock. The ignition lock must be turned off and on again for testing on terminal 1!

12 31 020 Removing and Installing Alternator

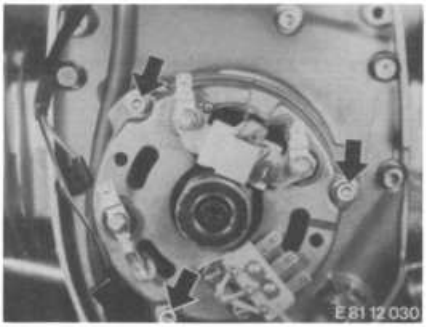
Engine removed 11 00 050 or installed.
Remove engine cover after unscrewing 2 socket head bolts (arrows).



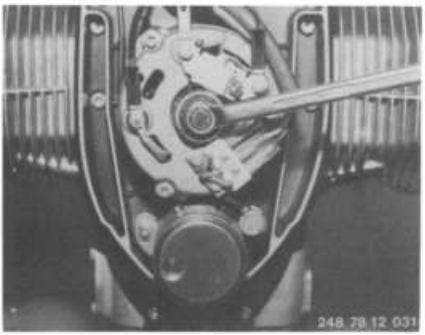
Pull three-pin flat male plug out of pole housing.
Pull up carbon brushes slightly and hold in this position with springs.



Unscrew three socket head bolts (arrows) on pole housing and take off pole housing.



Unscrew rotor mounting bolt and press rotor off of crankshaft stub with pressing-off bolt, BMW No. 12 3 600.



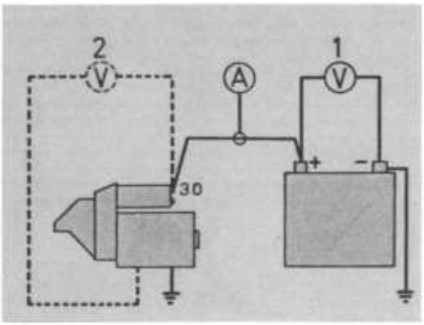
Troubleshooting Alternator

Condition	Cause	Correction
Alternator producing noise	Carbon brushes whistling	Pull off slip rings, replace carbon brushes
Indicator lamp on half bright with engine running	Poor contact fo wire connections	Check wire connections and connecting wires
	Regulator defective	Replace regulator
	Carbon brushes damaged	Replace carbon brushes
	Rectifier diode defective or grounded	Replace rectifier diode
	Stator grounded	Replace stator
	Rotor partially grounded	Replace rotor
Battery gases excessively	Poor contact between regulator and generator	Check wire connections on regulator and generator
	Regulator damaged	Replace regulator
Indicator lamp on half or fully bright with engine running	Regulator damaged	Replace regulator
	Break or short in supply wires	Check wire connections and wires
	Carbon brushes defective	Replace carbon brushes
	Rotor coil defective	Replace rotor
	Break in exciter circuit	Check wire connections
	Diodes or diode carrier defective	Check or replace diodes or diode carrier
	Wires D +/61 grounded	Eliminate short circuit or replace wires
Indicator lamp not on with engine running	Indicator lamp defective	Install 3 watt lamp
	Break in wire 61	Eliminate break
Indicator lamp not on with engine stopped/ignition on	Indicator lamp defective	Install 3 watt lamp
	Battery dead	Charge battery
	Battery defective	Replace battery
	Wires loose or damaged	Replace wires or tighten connections
	Regulator damaged	Replace regulator
Indicator lamp not on with engine stopped/ignition on	Shorted plus diode in generator	Disconnect charge wire immediately to prevent discharging battery; repair generator
	Carbon brushes worn	Replace carbon brushes
	Oxidation on slip rings	Repair generator
	Break in rotor coil	Replace rotor

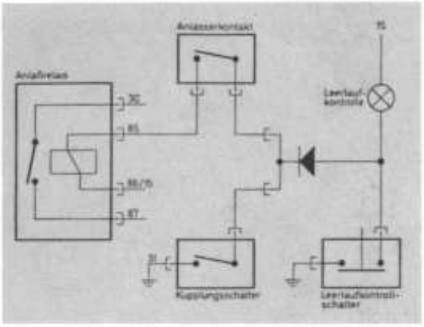
12 41 009 Checking Starter in Motorcycle

Check battery charge condition. See Specifications for data.

To check, engage 4th gear and operate brake pedal. Operate starter 2 to 3 seconds. Starting voltage must not drop below 8 volts with load and should be same for voltmeter positions 1 and 2. If not, ground connection on engine or battery is poor. Also read current input (see Specifications) on ammeter.



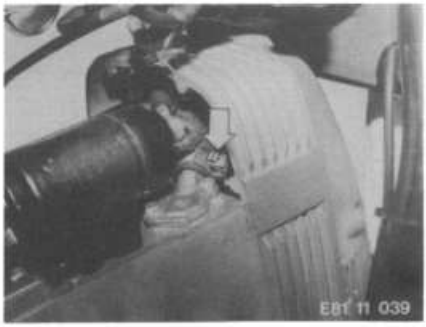
Important!
Should the engine die with an engaged gear, it is possible to start it again with the clutch without taking out the gear.



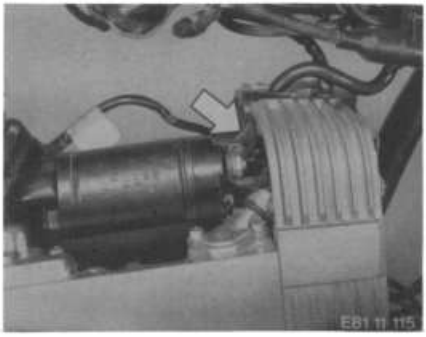
12 41 020 Removing and Installing Starter

Remove fuel tank 16 11 030.
Take off air cleaner upper section and pull out filter element.

Unscrew socket head screws in starter cover and take off cover. Detach clamp on vent dome (arrow) with a screwdriver. Pull off vent hose.



Disconnect battery ground. Then detach positive lead on starter (arrow).



Troubleshooting Starter

Condition	Cause	Correction
Starter does not turn when operating ignition switch	Lights turned on:	
	a) Lights not on, battery dead, break in circuit	a) Check battery voltage and wire connections
	b) Lights on, become darker when operating starter, battery dead	b) Charge battery
	c) Lights on, but go out when operating starter, battery terminals or ground connection on body oxidized.	c) Clean battery terminals and ground connection on body
	d) Lights on as normal. Bridge 50 and 30 on starter. Starter turns. Ignition switch defective or break in wire.	d) Replace ignition switch, eliminate break.
	e) Lights on as normal. Solenoid activated, but starter does not turn. Bridge battery + and 30 on starter with a piece of wire. Starter turns. Contacts of solenoid dirty or burnt.	e) Replace solenoid
Starter does not turn with battery + and 30 bridged	a) Carbon brushes too short	a) Replace carbon brushes
	b) Carbon brushes stuck	b) Service carbon brushes.
	c) Insufficient spring force on carbon brushes	c) Replace springs
Starter turns too slowly, does not turn engine	a) Battery voltage insufficient	a) Charge battery
	b) Battery terminals loose, oxidized	b) Clean poles and terminals
	c) Solenoid defective	c) Replace solenoid
	d) Wire connections loose	d) Tighten wire connections
	e) Commutator dirty	e) Clean commutator
	f) Armature or exciter coil defective	f) Repair starter
Starter turns fast, engine stalls or turns hesitantly	a) Drive pinion defective	a) Replace drive pinion
	b) Gear ring defective	b) Replace gear ring
	c) Drive pinion does not mesh, threads dirty or damaged	c) Repair starter
Drive pinion does not mesh, starter slips at high speed	a) Drive pinion dirty	a) Replace drive pinion
	b) Spring in solenoid defective	b) Replace solenoid
	c) Flywheel spline damaged	c) Replace gear ring
Drive pinion meshes, starter slips	a) One-way clutch in drive pinion slips	a) Replace drive pinion

Fuel Supply

13 Fuel Supply

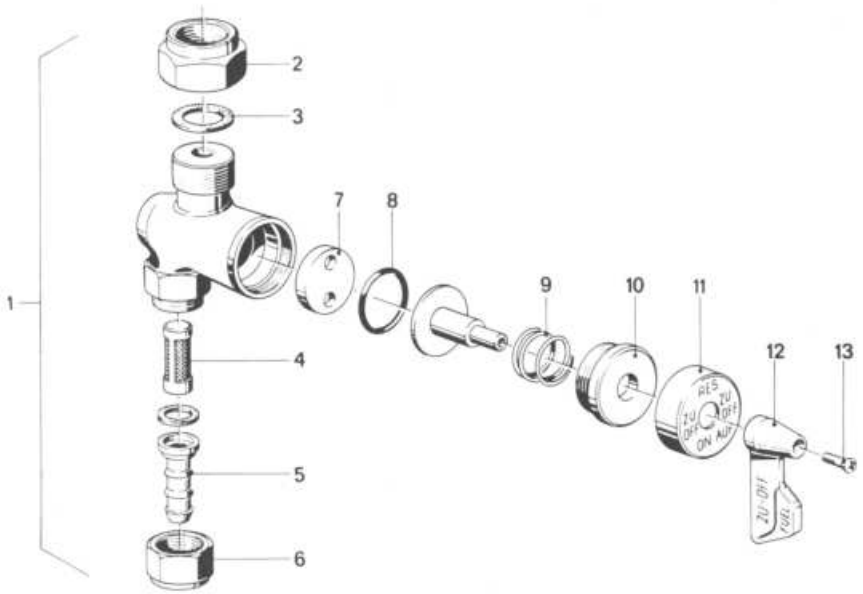
Specifications ..... Page 13– 0/3

13 00 004	Engine idle speed and fuel/air mixture – adjust	13–00/1
13 10 004	Fuel level – check and adjust	13–00/2
13 23 080	Cold start lever – remove and install	13–23/1
13 23 021	Cold start cable – remove and install	13–23/2
13 72 000	Air cleaner filter cartridge – remove and install	13–72/1
13 72 110	Intake neck – remove and install	13–72/3
13 72 130	Air cleaner – remove and install	13–72/4

Fuel Supply

Model	R 80 G/S
Carburetor: Design	two inclined Bing constant pressure carburetors with needle jet, vacuum valve, throttle and central lever float
Carburetor type BING V 64 II Left carburetor Right carburetor	 64/32/305 64/32/306
Carburetor opening	32 mm
Main jet	150
Needle jet	2.64
Jet needle no.	46 – 241
Needle position	3
Choke jet	60
Choke air jet dia. (choke tank vent)	2 mm
Mixture bore dia. in rotary valve	2.0, 1.2, 0.7, 0.6 mm
Idle jet	40
Idle air jet dia.	1 mm
Idle mixture control screw opened (no. of turns)	3/4
CO level at idle speed	2 ± 0.5% by volume
Bypass bore 1 dia.	0.7 mm
Bypass bore 2 dia.	0.65 mm
Float valve dia.	2.5 mm
Float chamber vent bore	2 bores outside
Idle outlet bore dia.	1 mm
Air cleaner	one mutual plate filter
Fuel System: Fuel grade	 regular grade gasoline
Min. octane (RON) acc. DIN 51600	91
MON	82
Fuel tank volume	19.5 liters (5.15 gal.) of which 2.0 (0.5) in reserve

Fuel Valve



1) Fuel valve
2) Coupling nut
3) Seal
4) Fuel filter
5) Nipple
6) Coupling nut
7) Gasket
8) O-ring
9) Spring
10) Cap
11) Cap
12) Lever
13) Screw

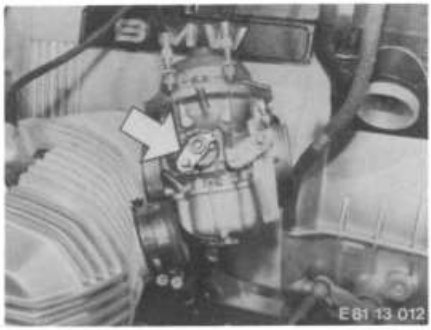
13 00 004 Adjusting Engine Idle Speed/CO

Important!
Carburetors are shown detached from cylinder heads and turned to side for better clarity!

Adjust idle speed on engine having operating temperature (oil temperature 80°C/175°F) with engine running and throttle twist grip shut.
Adjust accelerator cable play to 4 mm (0.157") provisionally to prevent throttles of both carburetors from catching on cables.
Refer to Specifications for idle speed.

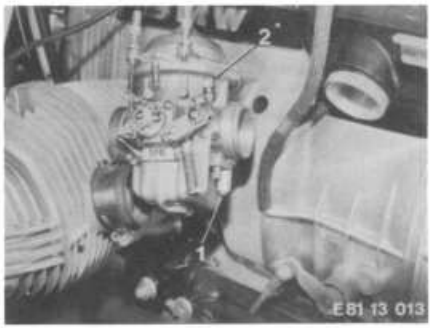

E81 13 010

Adjust cables of chokes that choke levers (arrow) are pressed to their final position with the choke control switched off.



E81 13 012

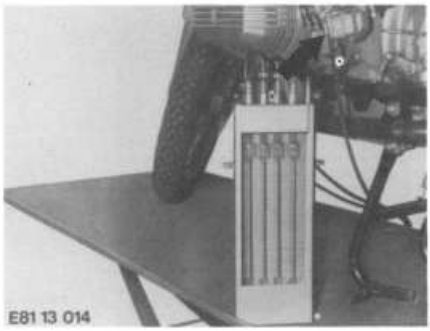
Adjusting idle mixture control screw (1) and throttle stop screw (2) of both carburetors to basic setting position:
Tighten control screw fully and then loosen by specified number of turns (see Specifications). Tighten stop screw until it just touches the throttle lever, and then tighten by one more turn.



E81 13 013

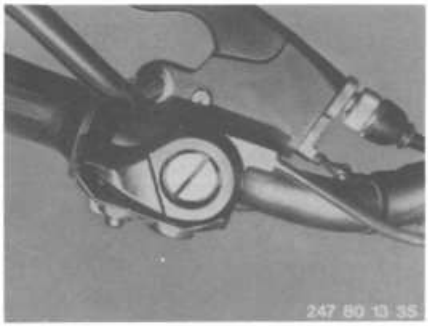
Use synchronizer, BMW No. 13 0 700, to synchronize carburetors. Connect rubber hoses of synchronizer on vacuum connection bores of carburetors. Synchronize the carburetors by turning the throttle stop screw and idle mixture control screw alternately.
Readjust maximum speed with the control screw each time the stop screw is turned.
In conjunction with this, the CO level must be adjusted to 2 ± 0.5% with the idle mixture control screw. The level has to be checked with a CO tester (NDIR) whose sensor is inserted alternately in the left and right mufflers to a depth of approx. 50 cm (20").

Spark plugs must be clean for CO level tests!

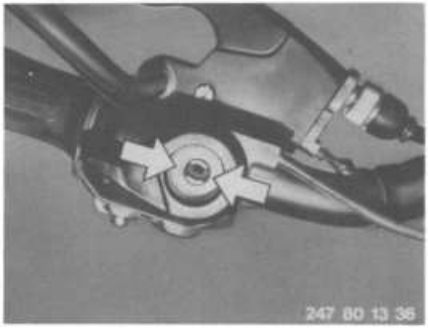

E81 13 014

13 23 080 Removing and Installing Cold Start Lever

Press out plastic cover with a small screwdriver.
Unscrew and remove mounting bolt.



Remove lever, guiding cable through slot in housing.
Installation: Tabs of washer must fit in slots of housing (arrows).



Disconnect cable on lever.
Installation: Make sure stepped plate (arrow) fits correctly.



13 72 000 Removing and Installing Air Cleaner Filter Cartridge

Press off fasteners with a screwdriver.



Pull out plate filter and push in new filter element. Mount air cleaner cover with fasteners making sure filter is positioned correctly.

Installation:
Note installed position of filter element – lettering in "rear" direction and arrow mark "TOP"!

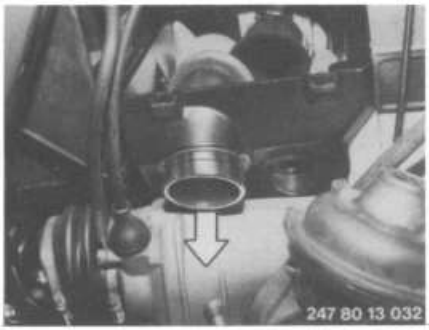


13 72 110 Removing and Installing Intake Neck

Remove and install air cleaner 13 72 000.
Loosen hose clamps on air line and remove air line after pushing back rubber sleeve.



Press out neck from inside with a screwdriver, then pull out intake neck.



Fuel Tank and Lines

16 Fuel Tank and Lines

Specifications ..... Page 16– 0/3
16 11 030 Fuel tank – remove and install 16–11/1

Fuel Tank and Lines

Model	R 80 G/S
Tank volume	19.5 liters (5.15 gal.)
of which for reserve	2.0 liters (0.5 gal.)

16 11 030 Removing and Installing Fuel Tank

Shut fuel valve and pull off fuel line.
Remove seat and take out tool tray.
Press fuel tank down with left hand and pull back retainer with right hand. Pull back fuel tank slightly and remove.



Exhaust System

18 Exhaust System

Specifications ..... Page 18– 0/3
18 00 020 Exhaust assembly – remove and install 18–00/1
18 11 321 Muffler – replace 18–00/1

Specifications

Exhaust System

Model	R 80 G/S
Front exhaust pipe dia.	38.05 mm (1.498")
Rear exhaust pipe dia.	36.20 mm (1.425")

Tightening Torque

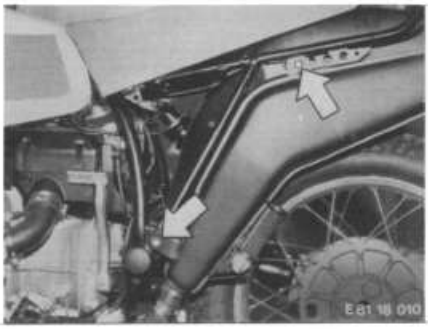
Face nut for exhaust system	200 + 20 Nm (145 + 14 ft. lbs.)

Tighten all other bolts and nuts to common torque values as listed in tables from bolt/nut suppliers or the new BMW Standard 60002.0.

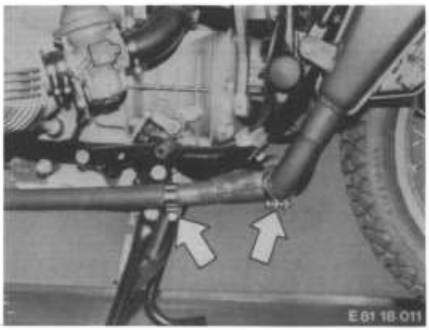
18 00 020 Removing and Installing Exhaust Assembly

Remove left battery plate (first pull back out of two rubber catches and then push forward out of guide pin).

Loosen muffler mounting bolts considerably (arrows).



Loosen all three clamps and push away from clamped position (arrow).



Unscrew both exhaust nuts with exhaust wrench, BMW No. 18 0 600. Pull exhaust manifold out of primary muffler and cylinder.

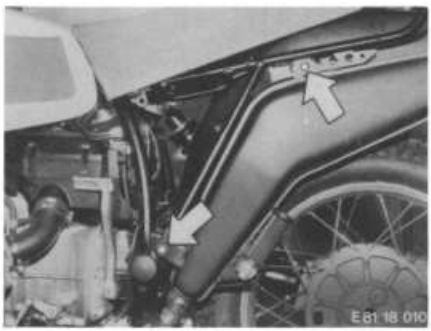
Installation:
Lubricate clamped positions thoroughly with anti-corrosion paste.



18 11 321 Replacing Muffler

Loosen clamp on primary muffler and unscrew mounting bolts (arrows).

Pull muffler off of primary muffler.



Clutch

21 Clutch

Specifications		Page 21– 0/3
21 00 004	Clutch play – adjust	21–00/1
21 21 000	Clutch – remove and install	21–21/1
21 51 020	Clutch release lever – remove and install	21–51/1
	Clutch – troubleshoot	21–51/3

Specifications

Clutch

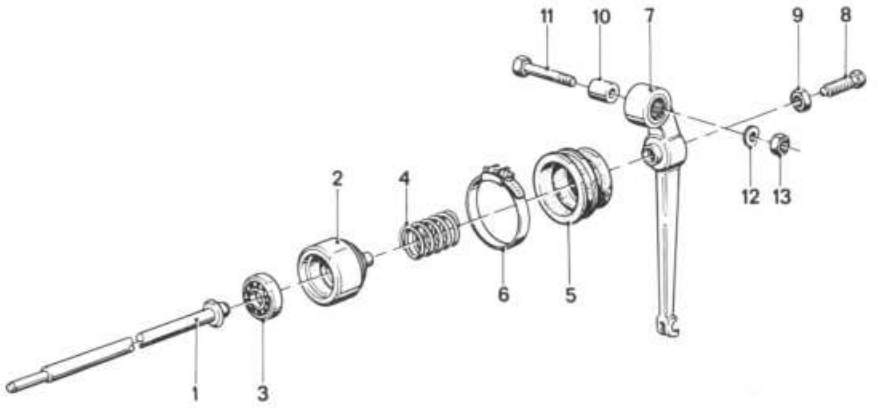
Model	R 80 G/S
Type	single plate, dry clutch with offset diaphragm spring
Total clutch disc thickness (plate and liner)	5.5 ± 0.25 mm (0.216 ± 0.010")
Clutch disc outside dia.	165 ± 1 mm (6.496 ± 0.040")
Play on hand lever (cable)	2 ± 0.5 mm (0.080 ± 0.020")

Tightening Torque

Lock nut for clutch lever adjusting screw	20 + 2 Nm (15 + 1 ft. lbs.)

Tighten all other bolts and nuts to common torque values as listed in tables from bolt/nut suppliers or the new BMW Standard 60002.0.

Clutch Controls

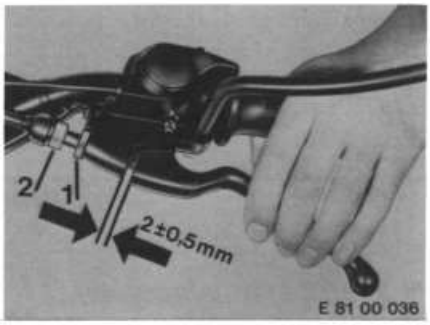


1) Push rod
2) Piston
3) AX bearing
4) Spring
5) Dust cover
6) Clamp
7) Clutch lever
8) Bolt
9) Nut
10) Bushing
11) Bolt
12) Washer
13) Nut

21 00 004 Adjusting Clutch Play

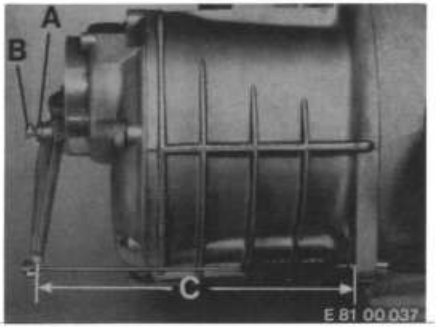
The clutch play on the hand lever should be 2 + 0.5 mm (0.080 + 0.020"); adjust as follows if necessary.

- Unscrew lock nut (1) of cable adjusting screw.
- Turn adjusting screw (2) until . . .



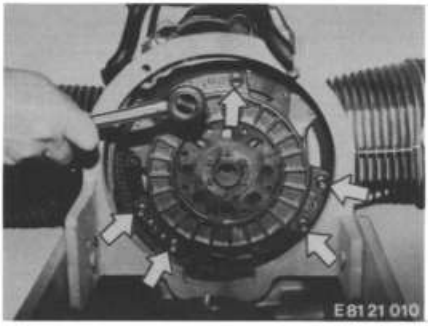
. . . distance "C" = 201 + 2 mm (7.913 + 0.080") is reached on transmission end clutch lever (lever is inclined toward rear by about 4°). Tighten lock nut (1).

- Unscrew lock nut "A" of transmission end adjusting screw.
- Turn adjusting screw "B" until clutch hand lever play is 2 + 0.5 mm (0.080 + 0.020"). Then tighten lock nut "A".

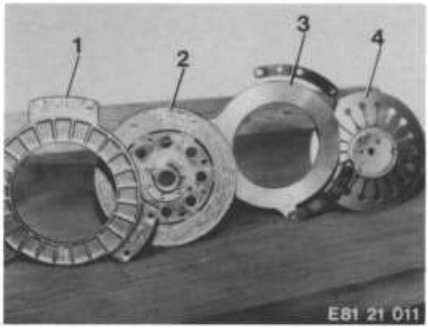


21 21 000 Removing and Installing Clutch

Remove and install transmission 23 00 020.
Engine need not be removed.
Unscrew six mounting bolts of case cover.

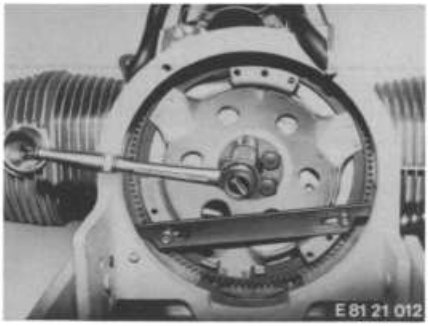


Take off cover (1), drive plate (2), plate (3) and diaphragm spring plate (4).

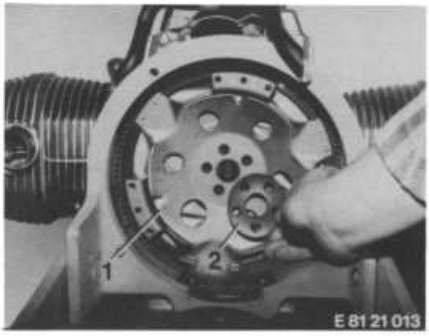


Mount holder, BMW No. 11 2 800, on clutch housing and unscrew bolts in crankshaft.

See Specifications for tightening torque.



Remove clutch housing (1) and washer (2).

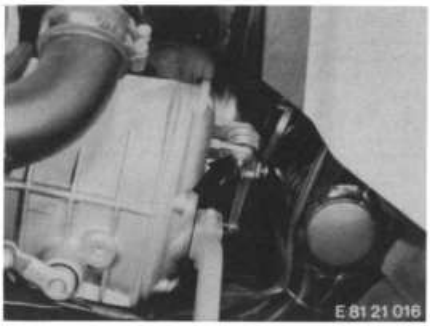


21 51 020 Removing and Installing Clutch Release Lever

Disconnect clutch cable on release lever.

Unscrew mounting nut (arrow) on base, pull out bolt and take off release lever.

Adjust clutch play – see 21 00 004.



Troubleshooting Clutch

Condition	Cause	Correction
Clutch grabs	Input shaft spaced incorrectly	Space new (see page 23--21/5 .../6)
Clutch operation too sluggish, clutch grabs	Clutch disc/input shaft spline without grease	Clean and lubricate spline

Transmission

23 Transmission

Specifications		Page 23– 0/3
23 00 020	Transmission – remove and install	23–00/1
23 11 040	Case cover – remove and install/seal	23–12/1
23 22 001	Gear assembly – replace	23–21/1
23 31 001	Selector forks – replace	23–31/1
23 31 210	Base for shift plates – remove and install	23–31/1
23 31 861	Shift plates – replace	23–31/2
23 31 881	Shift controls – replace	23–31/2
23 31 401	Electric idle gauge – replace	23–31/3
23 51 010	Kickstarter – remove and install	23–31/4
	Transmission – troubleshoot	23–31/5

Specifications

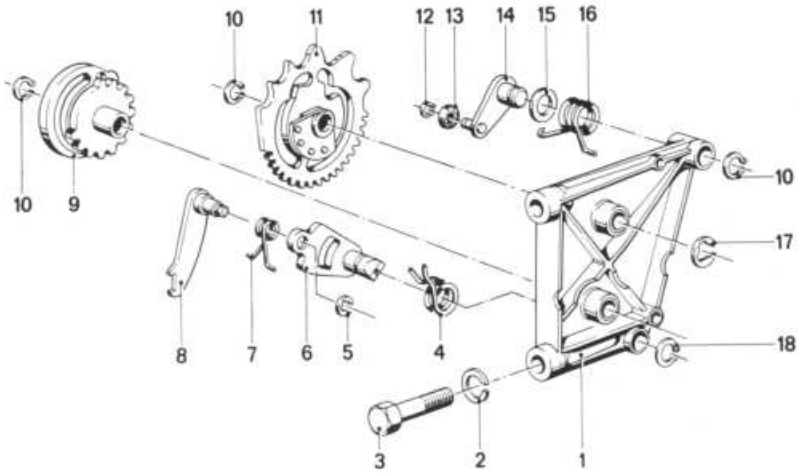
Transmission

Model		R 80 G/S
Type		5-speed manual transmission with claw-type shift, bolted on engine
Type of shift		
Ratios		
1st gear		4.4
2nd gear		2.86
3rd gear		2.07
4th gear		1.67
5th gear		1.50
Oil grade	above 5°C (41°F)	brand name hypoid gear lube SAE 90, API Cl. GL 5
	below 5°C (41°F)	brand name hypoid gear lube SAE 80, API Cl. GL 5
Volume		0.8 liters (1.7 pints)
Input shaft axial play		0 ... 0.1 mm (0 ... 0.004") (adjusted with shims)
Auxiliary shaft axial play		0 ... 0.1 mm (0 ... 0.004") (adjusted with shims)
Output shaft axial play		0 ... 0.1 mm (0 ... 0.004") (adjusted with shims)
Ball bearing fit in case		press fit (case heated to about 100°C/212°F for installing)
Axial play of free-running gears on shaft		0.15 ... 0.30 mm (0.006 ... 0.012")
Play of bushings on output shaft		0.005 ... 0.035 mm (0.002 ... 0.014")
Drive flange radial runout		± 0.05 mm (0.002")
axial runout		± 0.05 mm (0.002")
Power flow from transmission to rear wheel		sealed propeller shaft with torsional absorber, universal joint on transmission end, hypoid tooth clutch bell housing on final drive end
Axial play of foot-operated selector lever shaft		0.1 (0.004")

Tightening Torque

Transmission to engine	33 Nm (24 ft. lbs.)
Output (drive) flange to transmission output shaft	221.5 Nm (160 ft. lbs.)
Base	19 Nm (14 ft. lbs.)
Transmission case/cover	8 Nm (6 ft. lbs.)
Nut for kickstarter lever	22.5 Nm (16 ft. lbs.)
Oil filler plug	31 Nm (22 ft. lbs.)
Oil drain plug	26 Nm (19 ft. lbs.)

Bearing Bracket



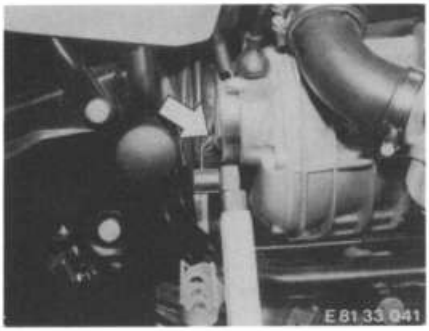
1) Bearing bracket
2) Washer
3) Bolt
4) Spring
5) Lock washer
6) Sector shaft
7) Spring
8) Pawl
9) Switch
10) Circlip
11) Operating sleeve
12) Circlip
13) Roller
14) Lever
15) Spacer
16) Spring
17) Lock washer
18) Circlip

23 00 020 Removing and Installing Transmission

Unglue frame covers (protective sheet) in area of push rod protective tubes.
Remove and install air cleaner 13 72 000.
Remove and install muffler 18 11 321.
Disconnect clutch control cable on transmission end.
Remove circlip (arrow) on ball socket of transmission shift lever and pull selector linkage off of shift lever.



Disconnect rubber cover between arm and transmission on transmission end. Unscrew twelve-sided bolts on universal joint. When reinstalling, tighten bolts with torque wrench and special ring wrench, BMW No. 00 2 560.
See Specifications for tightening torque.



Loosen left and right clamps on primary muffler.
Unscrew left exhaust nut and pull out exhaust manifold.
Pull off primary muffler on right exhaust manifold.

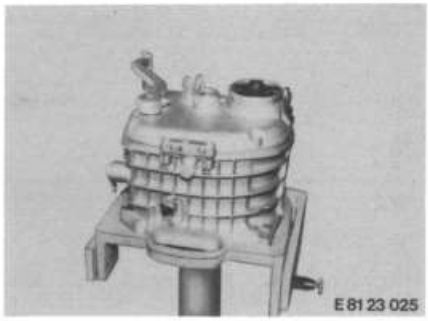


Loosen hose clamps on air line and remove air line after pushing back the rubber sleeve.
Detach left carburetor on cylinder head.
Disconnect battery ground wire on transmission cover at top right (remove screw, which also secures the speedometer drive cable) and pull cable out of transmission cover.



23 11 040 Removing and Installing/Sealing Transmission Case Cover

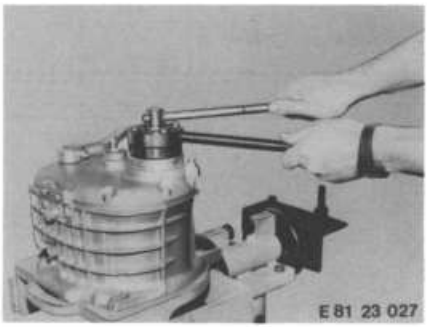
Remove and install transmission 23 00 020.
Place transmission on assembly stand and mount crosswise with two bolts.



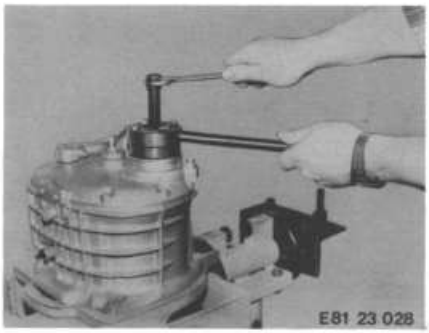
Unscrew mounting bolt and pull out guide sleeve for speedometer drive gear and remove drive gear.



Mount holder, BMW No. 23 1 700, without pressing off spindle on drive flange of output shaft with four bolts. Unscrew mounting nut.
See Specifications for tightening torque.



Unscrew holder, BMW No. 23 1 700, and press off drive flange with the pressing off spindle. If necessary, loosen tapered seat with a light knock on the spindle.
Installation: Clean tapered seats with a greaseless cleaning solution and dry when installing the drive flange.
Coat mounting nut with a viscous oil.

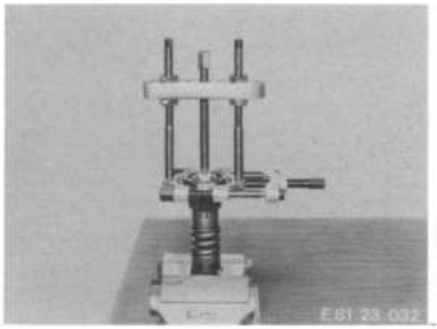


23 22 001 Replacing Gear Assembly

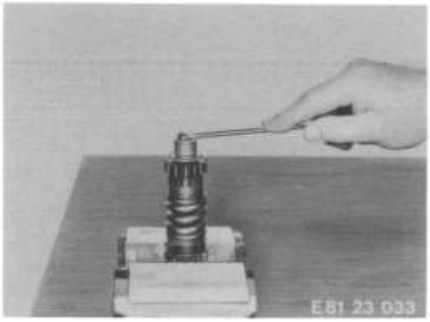
Remove and install transmission 23 00 020.
Remove and install/seal case cover 23 11 040.
Pull input shaft out of case while applying light knocks on front end of shaft with a plastic hammer.



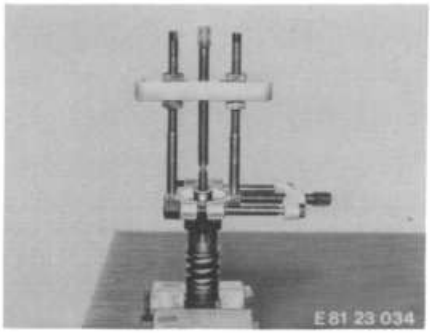
Pull off ball bearing of input shaft with cover, but without bearing bushing, with universal puller, BMW No. 00 7 500 (use pressure pad for crankshaft).



Lift out small shaft seal with a small screwdriver.

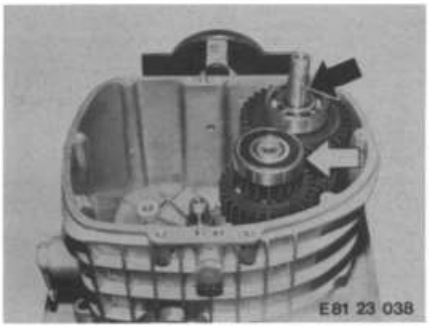


Pull off bearing bushing with universal puller, BMW No. 00 7 500, and a small pressure pad.



Heat transmission at bearing seat of output and intermediate shafts to 100°C (212°F) and remove both shafts with 3rd/4th gear selector fork.

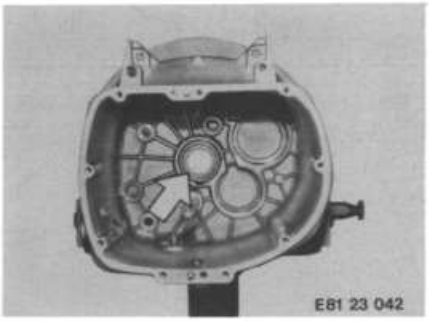
Installation: Install selector fork in case with long guide end facing down.



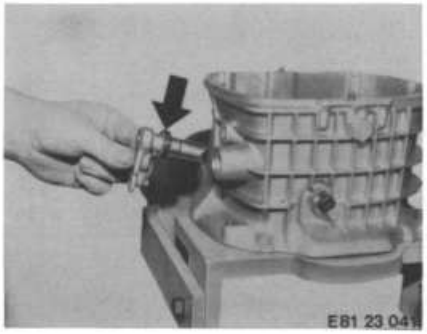
Replace radial oil seal for input shaft.
Lift out seal with screwdriver.
Knock in new seal with mandrel, BMW No. 23 1 650, and handle, BMW No. 00 5 500.



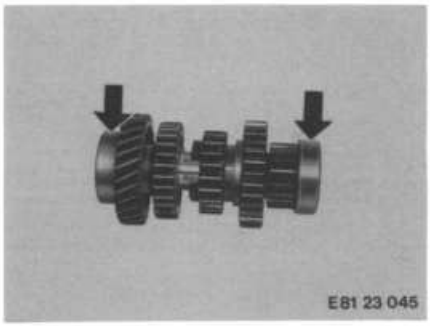
Replace roller bearing of input shaft. Heat transmission case to about 100°C (212°F) and pull out bearing (arrow). Install new bearing in heated case.



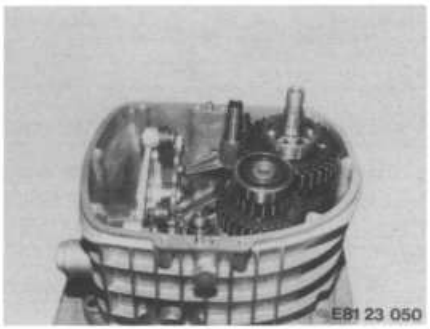
Replace radial oil seal for shift lever.
Lift out seal with a screwdriver. Push new seal (arrow) on shift lever and press into case by applying light knocks.



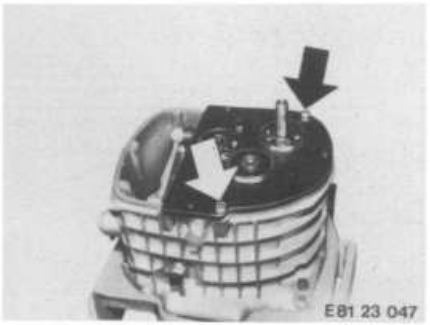
If defective, replace complete intermediate shaft. Pull off bearings (arrows) with Kukko puller, BMW No. 00 7 500.


E81 23 045

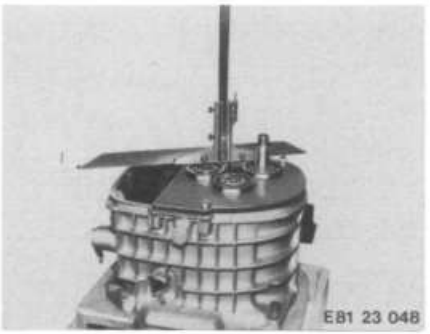
Heat transmission case to about 80 ... 100°C (175 ... 210°F).
Place oil baffle plate in ball bearing bore of case prior to installing the output shaft.
Install output shaft and intermediate shaft in case together with 3rd and 4th gear selector fork. Make sure that the selector fork does not jam. Then insert 1st, 2nd and 5th gear selector forks with their short ends facing each other and lock on shaft.
Mount shift base in neutral position and install input shaft.


E81 23 050

To guide the shafts, place measuring plate, BMW No. 23 3 650, on case and bolt down with two screws (arrows) to have plate fit tight.

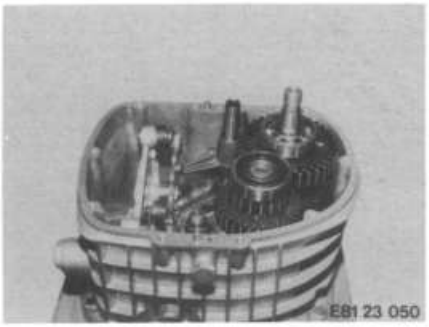

E81 23 047

To adjust axial play of the three transmission shafts, measure distance between ball bearing outer race and measuring plate with a depth gauge, BMW No. 00 2 550. Measured distance + material thickness + paper gasket (0.2 mm/0.008") = actual distance.


E81 23 048

23 31 001 Replacing Selector Forks

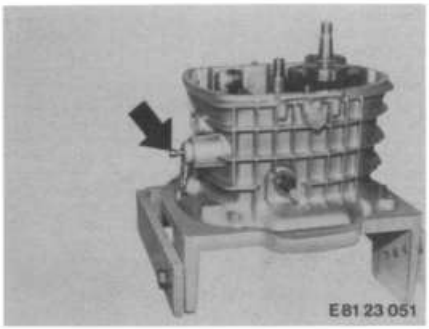
Remove and install transmission 23 00 020.
Remove and install/seal case cover 23 11 040.
Remove and install shift base.
Pull shaft for 1st/2nd/5th gear selector forks out of case while still warm and lay selector forks aside.
Remove gear assembly to be able to replace 3rd/4th gear selector forks, see 23 22 001.



23 31 210 Removing and Installing Base for Shift Plates

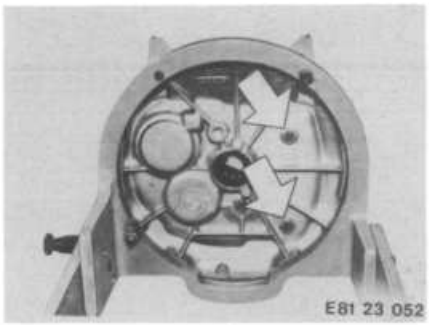
Remove and install transmission 23 00 020.
Remove and install/seal case cover 23 11 040.

Unscrew socket head screw with a screwdriver and pull out shift lever.

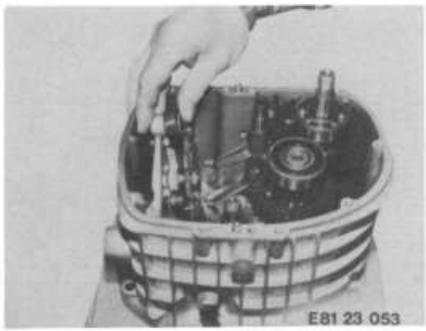


Unscrew two base mounting setscrews (arrows).

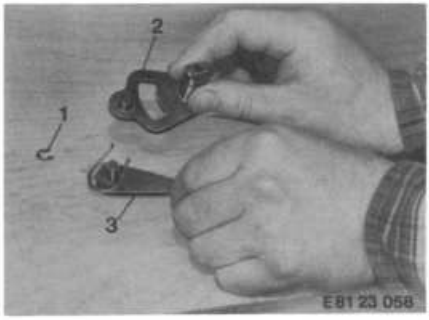
See Specifications for tightening torque.



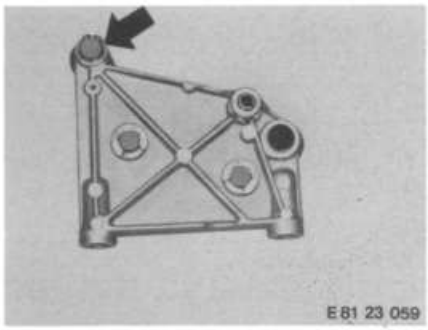
Tilt base that selector forks are cleared.
Remove base.



Remove circlip (1) for pawl. Pull segment (2) off of pawl (3).

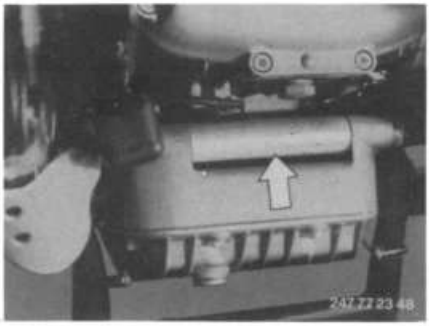


Remove circlip (arrow) for gear arrest. Pull arrest out of base.



23 31 401 Replacing Electric Idle Gauge

Transmission installed.
Remove primary muffler. Unscrew left and right nuts on rear engine bolts. Pull out engine bolts.
Knock spacer (arrow) out of engine block with a plastic hammer.
Pull off wires and unscrew idle switch.



Troubleshooting Transmission

Condition	Cause	Correction
Transmission making noise	Bearings defective	Replace
	Selector forks grind	Inspect selector forks for signs of grinding, machine or replace
	Transmission shaft spacing incorrect	Re-space
	Gears making noise – incorrect axial or radial play	Check axial and radial play
Difficult shifts	Transmission shaft spacing insufficient	Re-space
	Pawl on large shift plate (from 1st, 2nd and 5th gears)	Align pawl
Difficult shifts when coasting	Transmission shafts wander	Re-space
Shift sticks	Burrs on shift cam, rough finish in journal guide	Machine or replace shift cam
	Selector fork seized on selector shaft, excessive play	Check or replace selector fork and shaft
Overshifting	Roller for arrest worn	Replace
	Spring preload for arrest insufficient	Check preload, replace spring if necessary
	Pawl bent	Straighten pawl
Clutch grabs	Input shaft spacing incorrect	Re-space

Propeller Shaft

26 Propeller Shaft

Specifications ..... Page 26– 0/3
26 11 000 Propeller shaft – remove and install 26–11/1

Propeller Shaft

Model		R 80 G/S
Arrangement		Sealed propeller shaft with torsional damper, universal joint at transmission end, hypoid tooth clutch bell housing on final drive end
Oil grade	above 5°C (41°F) below 5°C (41°F)	brand name hypoid gear lube SAE 90 brand name hypoid gear lube SAE 80 } API GL 5
Oil volume		0.15 liters (0.32 pints)

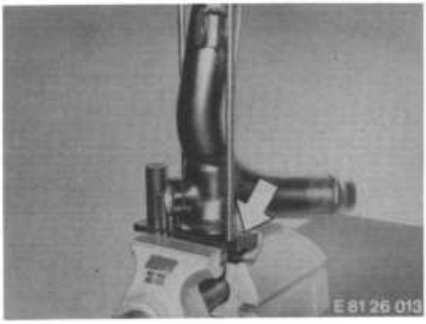
Tightening Torque

Twelve-sided head bolt	40 Nm (29 ft. lbs.)

Tighten all other bolts and nuts to common torque values as listed in tables from bolt/nut suppliers or the new BMW Standard 60002.0.

26 11 000 Removing and Installing Propeller Shaft

Remove rear wheel arm 33 17 350.
Clamp assembly tool, BMW No. 26 1 700, in a vise and place arm in tool.



Place collar on tool and clamp tool.

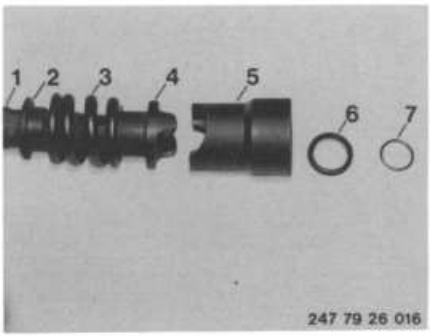


Run mandrel along groove and lift out circlip.



Remove arm from tool.
Pull propeller shaft and loose parts out of arm.

1 Propeller shaft
2 Pressure piece
3 Spring
4 Counterpiece
5 Clutch bell housing
6 Ring
7 Circlip



Front Wheel Fork

31 Front Wheel Fork

Specifications		Page 31– 0/3
31 42 009	Telescope fork – check	31–42/1
31 42 100	Telescope fork – remove and install	31–42/3
31 42 103	Telescope fork – disassemble and assemble	31–42/5
31 42 321	Taper roller bearing for telescope fork – remove and install	31–42/7
	Telescope fork – troubleshoot	31–42/9

Specifications

Front Axle

Model	R 80 G/S
Wheel bearing lubrication	brand name bearing grease, eff. temp. range −30 ... +140°C (−22 ... +284°F), drip point 150 ... 230°C (300 ... 450°F), good corrosion protection, good water/oxidation resistance, e.g. Shell Retinax A
Front wheel caster	114 mm (4.488") (not adjustable)
Front wheel fork lock angle	47°
Spring travel	200 mm (7.874")
Testing installed length (measured from upper edge of support tube to machined surface on lower fork guide)	approx. 161 mm (6.339")
Fork spacer tube	hard chrome-plated
Fork sliding tube	cast light alloy
Lower fork bridge	forged light alloy
Oil volume per fork beam (when changing oil)	0.220 + 0.010 ltr. (0.46 + 0.02 pints)
Oil grade	Shell 4001; Shell Aero Fluid 4; Castrol DB Hydraulic Fluid; Castrol Shock Absorber Oil 1-318; Castrol Fork Oil Extra Light; Castrol LHM (preferred below 0°C); Shock Absorber Oil Aral P 3441; Aral 1010; Mobil Aero HFA; Mobil DTE 11; Esso UNIVIS J 13; BP Aero Hydraulic; PB Olex HLP 2849
Telescope fork spacer tube (hard chrome-plated) outside dia.	$36^{-0.050}_{-0.075}$ mm
Fork sliding tube inside dia.	36 + 0.025 mm
Max. clearance of fork sliding tube on fork spacer tube	0.050 ... 0.100 mm (0.002 ... 0.004")
Piston on absorber tube, outside dia.	27.7 − 0.17 mm
Fork spacer tube, inside dia.	28 ± 0.15 mm
Clearance of piston in fork spacer tube	0.15 ... 0.62 mm (0.006 ... 0.024")
Relaxed fork spring length	539 + 12 mm (21.220 + 0.472")
Fork spring wire gauge dia.	4.25 mm

Tightening Torque

Cap nut	120 Nm (87 ft. lbs.)
Slotted nut	tightened without play
Fork bridge mounting bolts	40 Nm (29 ft. lbs.)
Upper spring mount	120 Nm (87 ft. lbs.)
Mtg. bolt (damper in sliding tube)	35 Nm (25 ft. lbs.)
Axle mounting bolts	14 + 2 Nm (10 + 1 ft. lbs.)
Oil drain plug	8 Nm (6 ft. lbs.)
Oil filler plug	9 Nm (7 ft. lbs.)

Tighten all other bolts and nuts to common torque values as listed in tables from bolt/nut suppliers or the new BMW Standard 60002.0.

31 42 009 Checking Telescope Fork

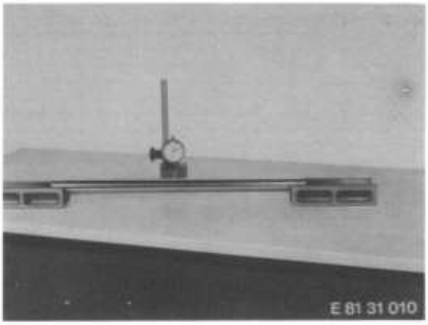
Remove and install telescope fork 31 42 100. Disassemble telescope fork 31 42 103.

A thorough inspection of the fork bridge at bottom, stand tubes and sliding tubes for cracks will be necessary in particular when the fork is damaged.

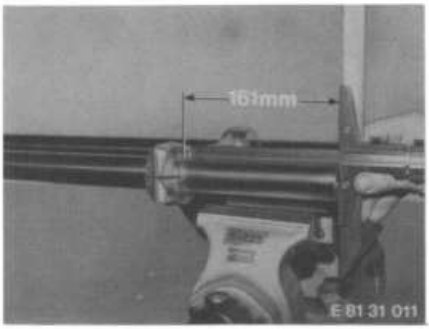
Check removed spacer tubes resting on both ends in vee-blocks or similar for runout.

See Specifications for permissible runout.

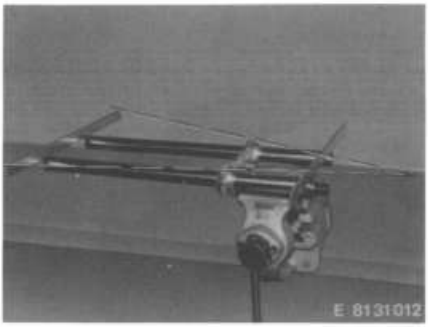
Important!
Never straighten bent spacer tubes – danger of breaking!



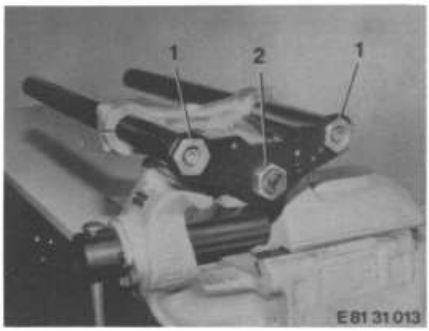
Push in two new spacer tubes to inspect the lower fork bridge (161 mm/6.339" test installed length for tubes, as measured from spacer tube upper edge to lower fork bridge).



Place two steel rulers, BMW No. 31 4 620, on ends of fork spacer tubes and check for distortion.



Check spacer tubes for deviation from parallel with a caliper gauge. Check alignment between fork guide tube and spacer tubes, mounting the upper fork bridge for this purpose. First bolt on spring mount (1) and then screw cap nut (2) on the fork guide tube. It should be easy to screw the centering collar in the fork bridge.

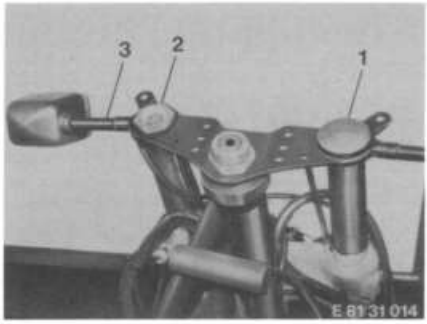


31 42 100 Removing and Installing Telescope Fork

Remove and install handlebar 32 71 000.
Remove and install headlight/instrument assembly 62 11 200.
Remove and install front wheel 36 30 300.
Remove and install front fender.

Pry off caps (1) with a screwdriver, disconnect spring mount (2) and take off turn signal holder (3).
Remove plastic spring mount.

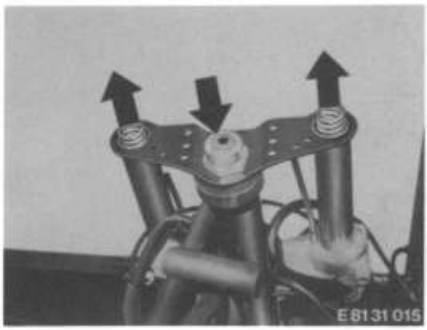
See Specifications for tightening torque of spring mount.



Unscrew cap nut (arrow) of upper fork bridge, take off fork bridge and remove supporting springs.

Installation:
Note routing of cables and electric wires before installing the upper fork bridge. Cables and brake line as well as turn signal wires must be in front of fork spacer tubes and other electric wires behind.

See Specifications for tightening torque of cap nut.



Unscrew strap on top of left spacer tube, push rubber cover down and unscrew bolt (arrow). Spread fork bridge apart on side slightly with a suitable wedge (screwdriver) and pull out spacer tube from below.
Turn spacer tube upsidedown to drain oil.

See Specifications for tightening torque of mounting bolt.



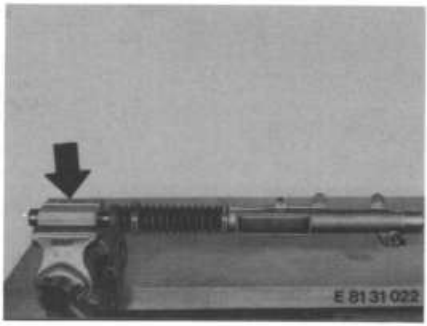
Disconnect brake hose and brake line connection (arrow) on right fork sliding tube.
Pull brake hose up out of rubber sleeve.

See page 00–0/8 for tightening torque.



31 42 103 Disassembling and Assembling Telescope Fork

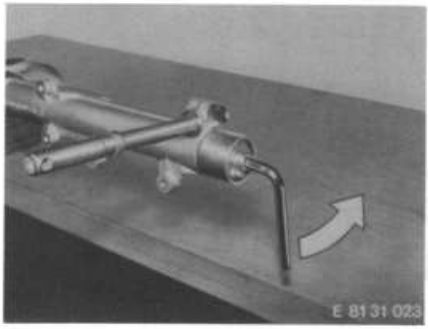
Clamp fork spacer tube with sliding tube in a vise with help of wood clamp, BMW No. 31 4 600 (arrow).



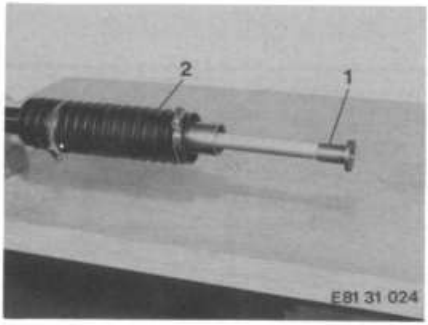
Loosen strap of rubber covers on sliding tube and push cover down.
Unscrew socket head bolt of damper in sliding tube and pull off sliding tube.

Note: Counterhold on stub axle.

See Specifications for tightening torque.



Pull absorber guide (1) off of absorber and rubber cover (2) off of spacer tube.



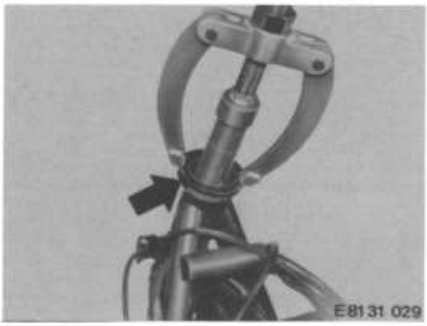
Remove circlip with circlip pliers and pull entire absorber out of spacer tube.



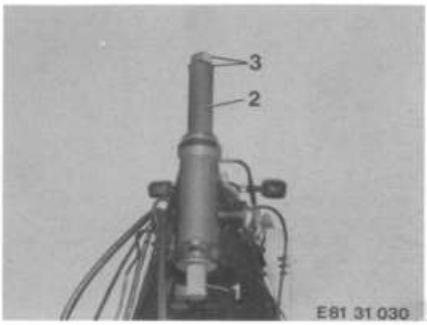
31 42 321 Removing and Installing Taper Roller Bearing of Telescope Fork

Remove and install telescope fork 31 42 100.

Remove upper taper roller bearing from steering head. Pull out outer races with Kukko puller, BMW No. 00 5 560, in conjunction with support, BMW No. 31 4 800, (arrow).



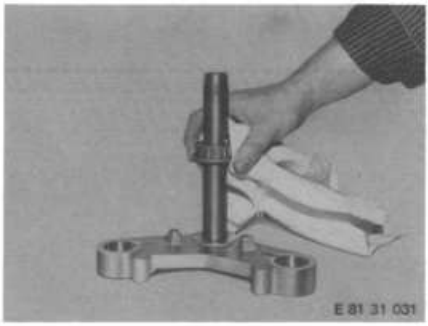
Pull in upper and lower outer races for taper roller bearings one after the other with the spindle of frame testing gauge (1) in conjunction with spacer (2), BMW No. 31 4 820 with washer and hexagon nut (3).



To replace the lower taper roller bearing, heat lower fork bridge to about 100°C (210°F), knock out guide tube downwards and install immediately afterwards.

Note: Make marks (paint stripe or punch mark) on guide tube and fork bridge – slot position to guard against theft!

Heat bearing to about 80°C (175°F) for installation.



Troubleshooting Front Wheel Fork

Condition	Cause	Correction
Excessive breakaway torque – seized	Tension in fork	Loosen right shaft mounting bolt and bottom fork suspension firmly several times
Insufficient absorption	Oil level not uniform, too low, too high	Check or correct amount of oil

Steering

32 Steering

Specifications ..... Page 32– 0/3
32 00 454 Steering – adjust 32–00/1
32 71 000 Handlebars – remove and install 32–71/1
32 73 030 Accelerator cable – remove and install 32–73/1

Specifications

Steering

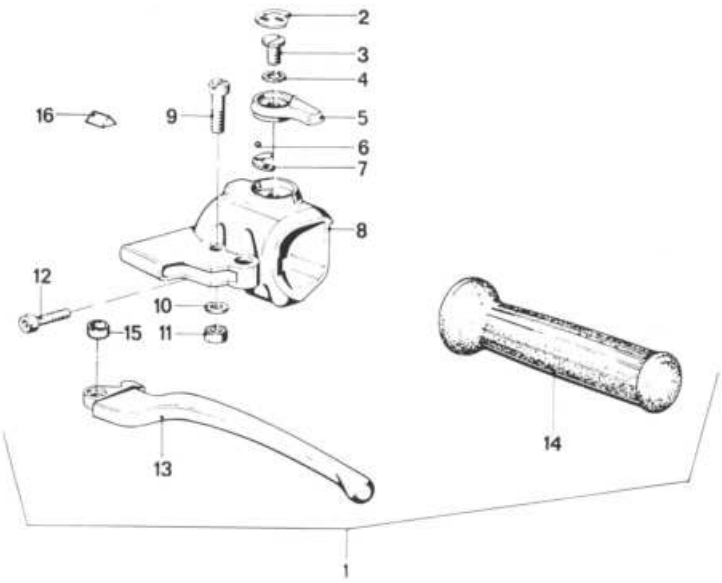
Model	R 80 G/S
Steering lock	47°
Handlebar width	820 mm (32.283")
Steering tube dia.	22 mm (0.866")

Tightening Torque

Cap nut	120 Nm (87 ft. lbs.)
Slotted nut	tightened without play

Tighten all other bolts and nuts to common torque values as listed in tables from bolt/nut suppliers or the new BMW Standard 60002.0.

Left Handlebar Grip Assembly

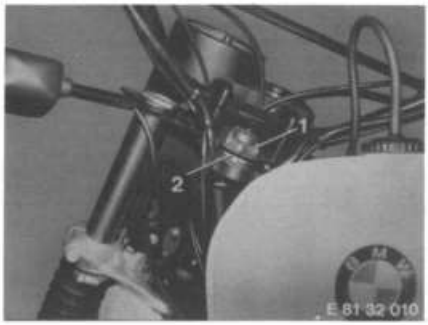


1) Left grip assembly
2) Cap
3) Oval head screw
4) Washer
5) Lever
6) Ball
7) Plate
8) Left housing
9) Bolt
10) Washer
11) Nut
12) Fillister head screw
13) Left lever
14) Left grip
15) Bushing
16) Wedge

32 00 454 Adjusting Steering

Remove fuel tank 16 11 030.

Loosen cap nut (1) and slotted nut (2) (special wrench). Relax bearing by applying a knock on the cap nut (plastic hammer).



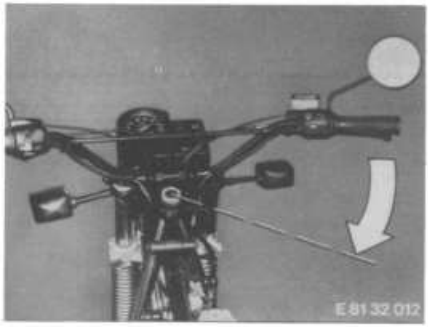
Taper roller bearings are adjusted to remove play by turning the slotted nut with a special wrench.

When tightening the hexagon nut, use hexagon ring wrench, BMW No. 31 4 850, and hold slotted nut.

See Specifications for tightening torque.



Note:
When steering head bearings have been adjusted correctly, the handlebars will fall lightly toward the right stop from neutral position (motocycle jacked up).



32 71 000 Removing and Installing Handlebars

To avoid damage, remove fuel tank 16 11 030.

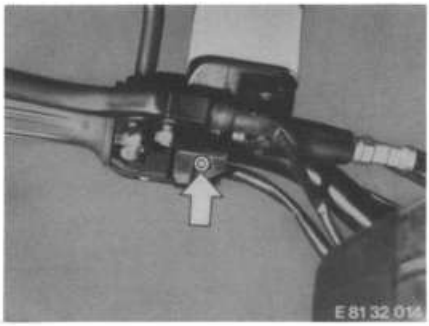
Unscrew left and right clamps (arrows). Cut through wire straps in area of handlebars on left and right sides.



Loosen bolt (arrow) of right instrument housing and pull off entire housing, watching out for wedge clamp.

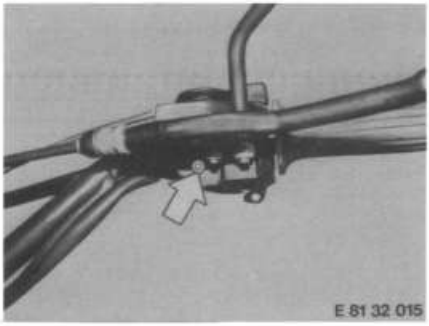
Pull handlebars left as far as possible and push headlight housing forward, in order to be able to utilize the full length of cables.

Note:
Watch out for correct cable routing when assembling.



Press off left rubber grip with "compressed air" from right handlebar side.

Loosen bolt (arrow) on instrument housing and pull off entire housing, watching out for wedge clamp.



Installation:
The punch mark on the steering tube (arrow) must be located on the inside of the right clamp exactly between the upper and lower sections of the clamp. The knurled surface on the handlebars must protrude from the clamps to the same amount on left and right sides.



32 73 030 Removing and Installing Accelerator Cable

Remove seat and fuel tank 16 11 030.

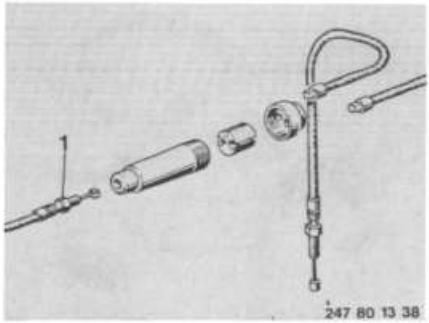
Push back water protection cap on cable, unscrew cover of accelerator cable control and disconnect cable on chain (arrow).



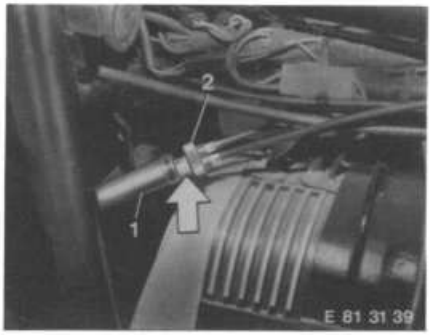
Installation:
Lubricate adjusting cam and spline on throttle twist grip with grease before assembling. When assembling, make sure mark on tooth of throttle twist grip is aligned with mark on adjusting cam.



Unscrew lock nut (1) of adjusting screw on distributor and tighten adjusting screw fully.



Turn sleeve of distributor (1) while holding on knurled section (2).
Disconnect cables on distributor (arrow).



Rear Wheel Drive

33 Rear Wheel Drive

Specifications		Page 33– 0/3
33 10 050	Rear wheel drive – remove and install	33–10/1
33 10 113	Rear wheel drive – disassemble and assemble	33–10/2
33 12 051	Drive pinion and ring gear – remove and install	33–12/1
33 17 350	Rear wheel swinging arm – remove and install	33–17/1
33 17 381	Taper roller bearings of rear wheel swinging arm – replace	33–17/2
33 52 131	Shock absorber – remove and install	33–52/1
	Rear wheel drive – troubleshoot	33–52/3

Specifications

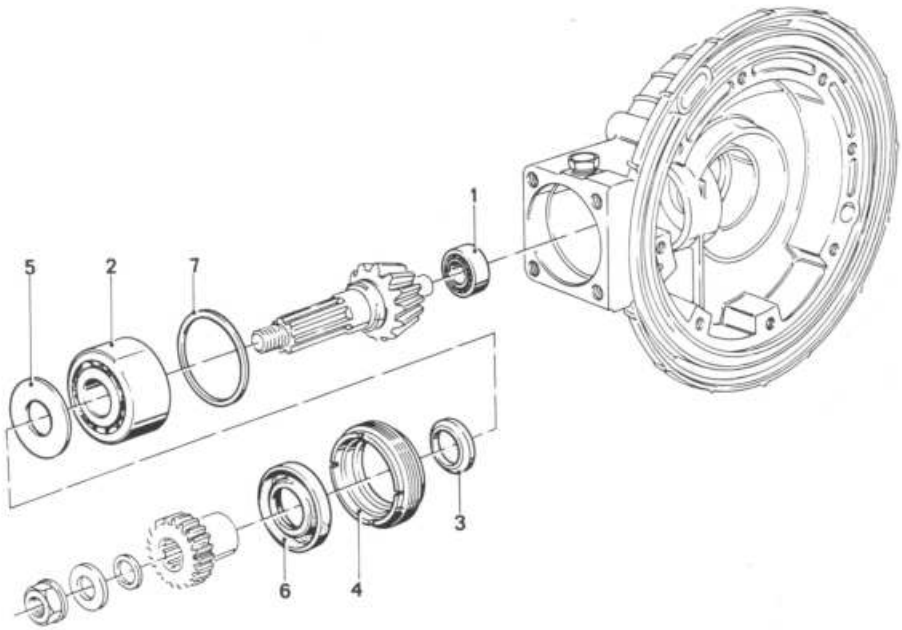
Rear Wheel Drive	
Model	R 80 G/S
Type of teeth	Klingelnberg palloid spiral
No. of teeth	11/37
Ratio	1 : 3.36
Oil grade Initial filling	brand name breaking-in hypoid gear oil SAE 90, API GL 5
After first oil change above 5°C (41°F) below 5°C (41°F)	brand name hypoid gear oil SAE 90, API GL 5 SAE 80, API GL 5
Oil volume	0.35 ltr. (0.74 pint) (max. to inspection plug)
Backlash	0.08 ... 0.14 mm (0.003 ... 0.005") (before installing cover)
Lateral ring gear play	at least 0.1 mm (0.004")
Rear Wheel Suspension	light alloy swinging arm with 3-way adjustable spring strut and double-action, hydraulic shock absorber (gas support)
Spring travel	170 mm (6.693")
Support Springs	
Relaxed length	274 ± 2 mm (10.787 ± 0.079")
Spring outside dia.	68 mm (2.677")
Spring inside dia.	46 mm (1.811")
Wire gauge dia.	11 mm (0.431")
Swinging (Control) Arm Oil grade above 5°C (41°F) below 5°C (41°F)	 brand name hypoid gear oil SAE 90 } API GL 5 SAE 80 }
Oil volume	0.15 ltr. (0.32 pints)

Tightening Torque

Final drive oil drain plug	25.5 Nm (18 ft. lbs.)
Swinging arm oil filler plug	finger tight
Swinging arm oil drain plug	15.7 Nm (11 ft. lbs.)
Final drive cover nuts	17.7 Nm (13 ft. lbs.)
Spring strut eye to piston rod	15 Nm (11 ft. lbs.)
Final drive case/swinging arm twelve-sided nuts	65 Nm (47 ft. lbs.)
Drive pinion nut	165 Nm (119 ft. lbs.)
Threaded ring on final drive case	118 Nm (85 ft. lbs.)
Final drive oil level inspection bolt	10 Nm (7 ft. lbs.)
Swinging arm shaft bolt	10 + 2 Nm (7 + 1 ft. lbs.)
Lock nut for swinging arm shaft bolt	100 + 20 Nm (72 + 14 ft. lbs.)
Spring strut mounting bolts	43 + 5 Nm (31 + 4 ft. lbs.)

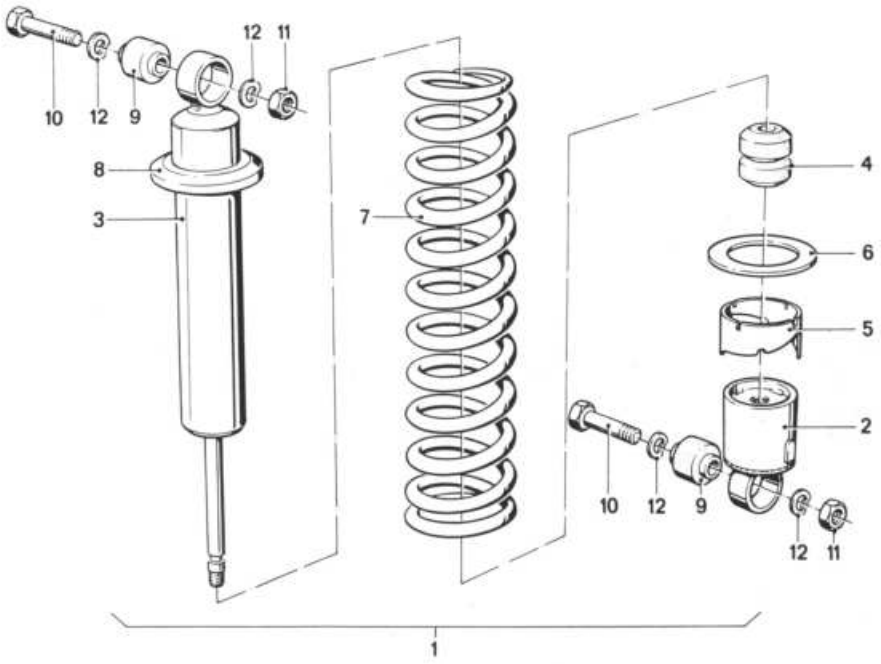
Tighten all other bolts and nuts to common torque values as listed in tables from bolt/nut suppliers or the new BMW Standard 60002.0.

Final Drive



1) Needle bearing
2) Angular ball bearing
3) Spacer
4) Threaded ring
5) Washer
6) Shaft seal
7) Spacer

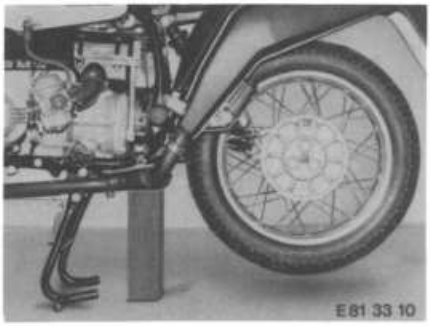
Rear Spring Strut



1) Rear spring strut
2) Spring strut eye
3) Shock absorber
4) Rubber damper
5) Ring
6) Washer
7) Coil spring
8) Spring retainer
9) Rubber mount
10) Bolt
11) Nut
12) Washer

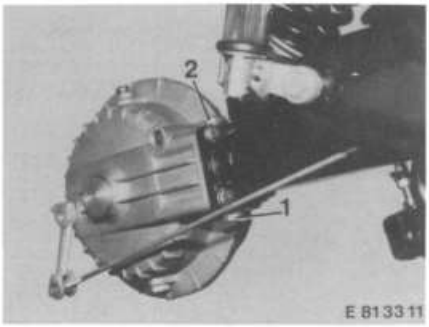
33 10 050 Removing and Installing Rear Wheel Drive

Remove and install rear wheel 36 30 320.
Place motorcycle on kickstand and support primary muffler from underneath that rear wheel can be turned freely, or clamp front wheel on lifting platform.

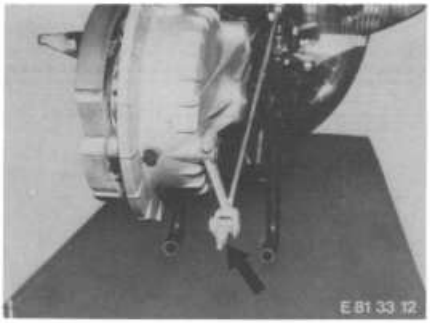


To drain oil unscrew plug (1) in control arm and loosen bolt (2).

Installation: Refer to Specifications for oil volume and oil grade.



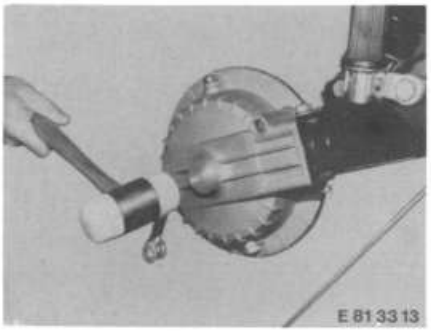
Unscrew hexagon or thumb nut (arrow) and pull brake rod out of brake lever.



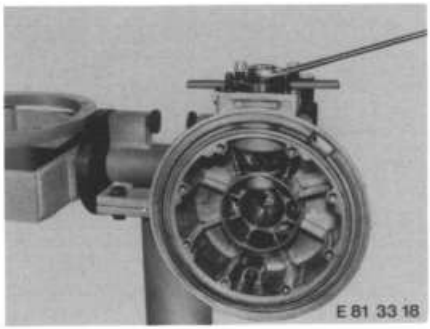
Unscrew 4 twelve-sided nuts on control arm flange and knock rear wheel drive off of control arm with a plastic hammer.

Installation: Use Loctite No. 638 as a sealant. Tighten bolts/nuts with special wrench, BMW No. 33 1 620.

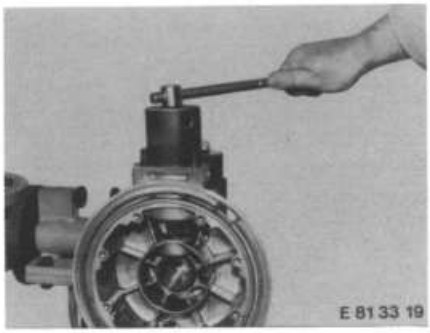
See Specifications for tightening torque value.



Position assembly fixture vertical. Unscrew nut on drive pinion and pull off washer with plastic ring and pinion.



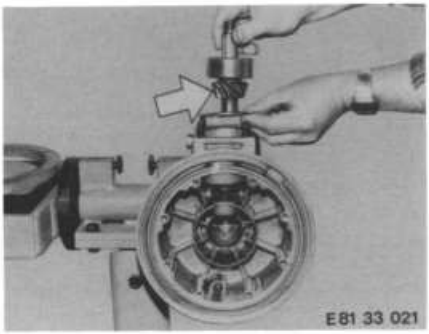
Unscrew threaded ring including shaft seal with special wrench, BMW No. 33 1 700.
Also remove spacer and washer.



Knock out shaft seal from threaded ring with a mandrel.
Knock in new seal with impact mandrel, BMW No. 33 1 750, and handle, BMW No. 00 5 500.



Heat case to about 120°C (250°F) (checking temperature with a thermocolor pencil) and remove pinion (arrow) with angular ball bearing and shim.

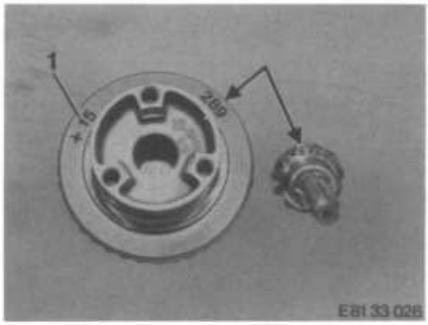


33 12 051 Removing and Installing Drive Pinion and Ring Gear

Disassemble and assemble rear wheel drive 36 10 113.

Pinion and ring gear always belong together. Note pair code (arrow).

The pair code supplys information on the matching of pinion and ring gear. Both parts are given tolerances during test stand inspection, to provide smooth running and correct backlash when installed.

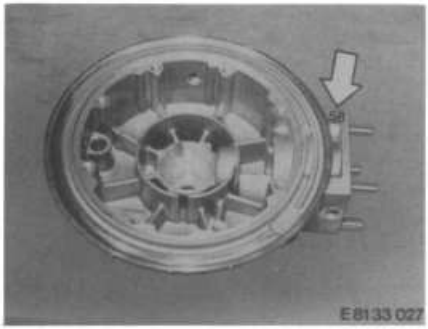


E8133 026

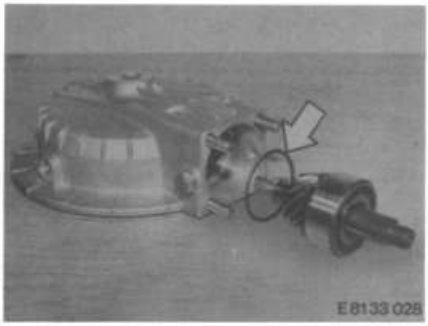
The basic case size is 75.50 ± 0.05 mm (2.972 ± 0.002"), as measured from angular ball bearing shoulder on pinion to center of ring gear axis.

The basic size is not stamped in the case. If the case has a different size, the two digits after the point are stamped on the inside (arrow).

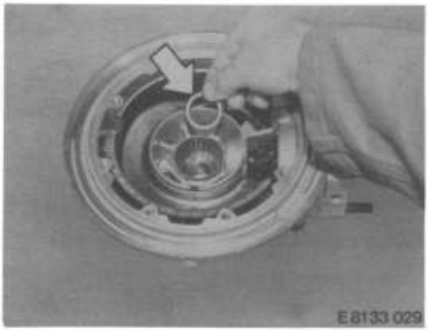
The basic size of the pinion is 77.50 mm (3.051"). A deviation from this size is provided on the ring gear with pertinent + or – sign (see picture above).


E8133 027

The case size must be subtracted from the basic pinion size (plus or minus the deviation specified on the ring gear). The difference is the thickness of the shim (arrow) required between the angular ball bearing shoulder and seat in the case.
If there is no deviation on the ring gear and no size stamping on the case, this means that the case and pinion both have the basic size. In this case the thickness of the shim would be: 77.50 – 75.50 mm = 2 mm (3.051 – 2.972" = 0.079").
If deviation is specified on the ring gear, e.g. +15, the shim thickness would be: 2.0 + 0.15 mm = 2.15 mm (0.079 + 0.006" = 0.085").

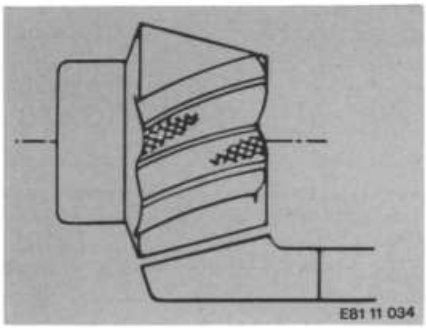

E8133 028

Place an appropriately thick bronze ring (arrow) in the case to reach the backlash provisionally.

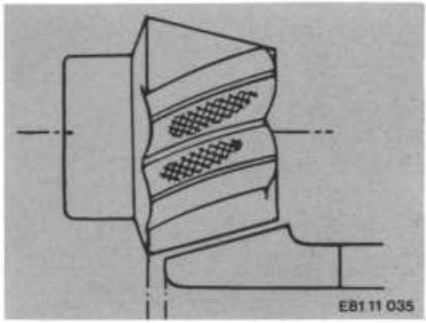

E8133 029

To check the tooth contact pattern, coat one pair of pinion teeth with "paris blue" or a light colored paint. Place ring gear in case and turn back and forth several times under firm pressure.

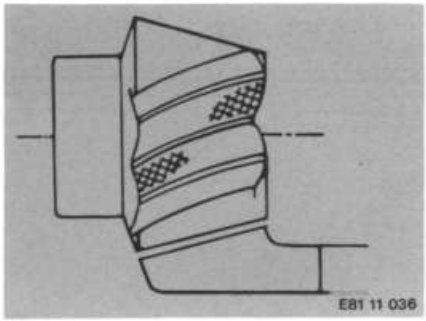
If this tooth contact pattern is produced, the pinion must be taken out of the case further, i.e. a thicker spacer must be installed.



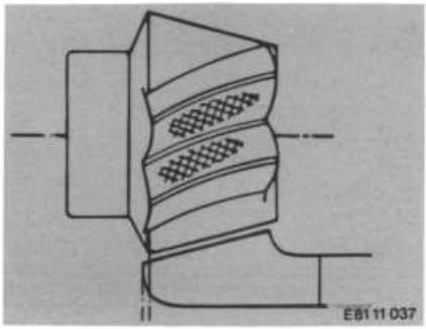
This will then be the tooth contact pattern.



If this tooth contact pattern is produced, the pinion must be moved further toward the case center point, i.e. a thinner spacer must be installed.

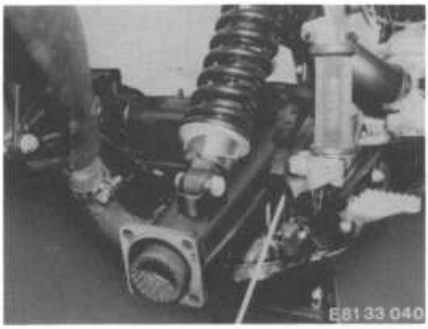


This will then be the tooth contact pattern.

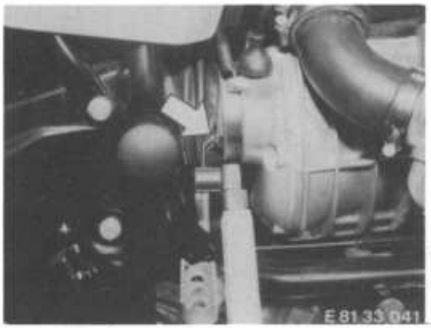


33 17 350 Removing and Installing Rear Wheel Control Arm

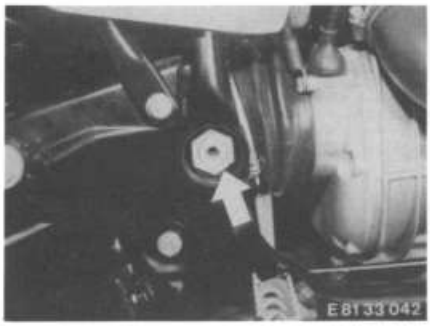
Remove and install rear wheel 36 30 320.
Remove and install rear wheel drive 33 10 050.
Disconnect spring strut mount on control arm.



Disconnect rubber cover between control arm and transmission on transmission end. Unscrew twelve-sided head bolts on universal joint. When reinstalling, tighten bolts with special wrench, BMW No. 00 2 560, and a torque wrench. Refer to page 00–0/7 for tightening torque.



Remove covers of control arm mount, loosen lock nut (arrow) and unscrew bearing pin. Remove control arm from frame.



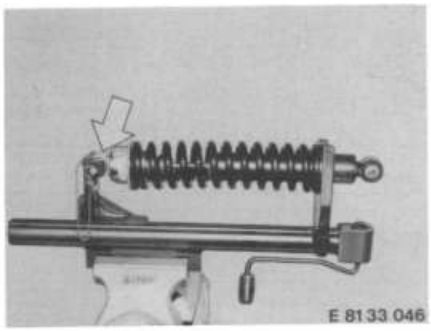
Installation:
Screw in bearing pin that clearance "a" between control arm and frame is equal for left and right sides. Propeller shaft centered on control arm tube. To preload bearing, tighten both bolts to 20 Nm (14 ft. lbs.), loosen and tighten again to 10 + 1 Nm (7 + 1 ft. lbs.). See Specifications for tightening torque of lock nut.



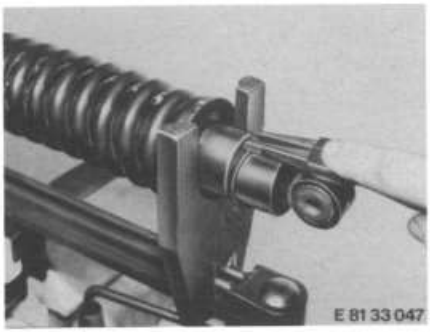
33 52 131 Removing and Installing Shock Absorber

Unscrew upper and lower spring strut mounts and pull out spring strut from below.

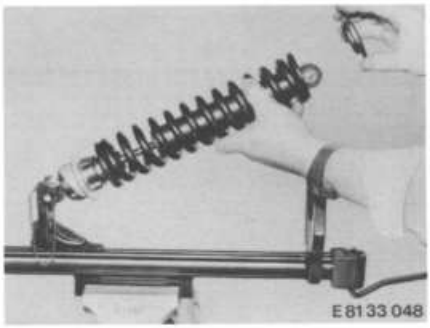
Clamp fixture, BMW No. 33 5 600, in a vise.
Secure bottom spring strut eye in compressing fixture (arrow).



Compress assembly by turning crank until circlip is accessible.
Remove circlip with special pliers, BMW No. 23 2 100.

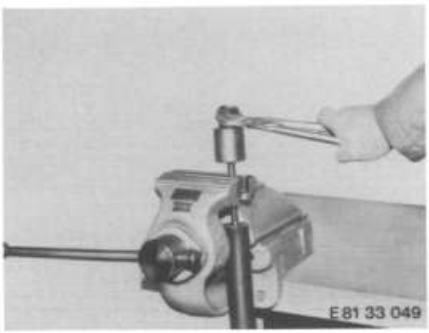


Release compressing fixture, lift top end of spring strut out of fixture and pull off spring retainer and coil spring.
Remove lower spring retainer and adjusting ring.



To unscrew the spring strut eye, clamp piston rod in a vise and unscrew spring strut eye from piston rod with a mandrel or pliers.

Installation:
Lock spring strut eye on piston rod with Loctite No. 270.
See Specifications for tightening torque.



Troubleshooting Rear Wheel Drive

Condition	Cause	Correction
Noise	Bearings defective	Replace
	Backlash excessive	Adjust
	Excessive clutch hub play in clutch bell housing	Replace
	Insufficient oil in final drive or swinging arm	Check and add oil
Excessive tilt play of rear wheel	Excessive play of grooved ball bearing or bearing seat in case cover damaged	Correct spacing Replace cover
	Needle bearing defective	Replace

Brakes

34 Brakes

Specifications		Page 34– 0/3
34 00 046	Front wheel brake – bleed	34–00/1
34 11 000	Front brake pads – remove and install	34–11/1
34 21 150	Rear wheel brake shoes – remove and install	34–21/1
34 31 000	Brake master cylinder – remove and install	34–31/1
	Brakes – troubleshoot	34–31/3

Specifications

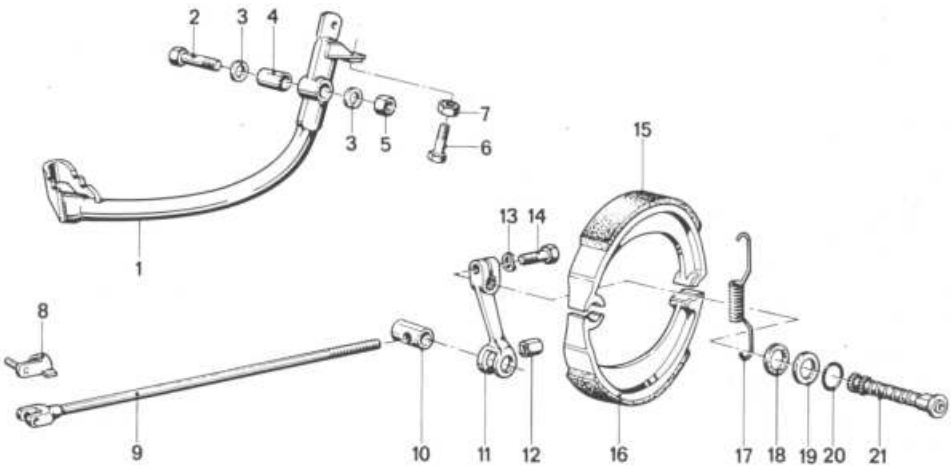
Brakes

Model	R 80 G/S
Front wheel	hydraulically operated single disc brake with caliper
Brake disc dia.	260 mm (10.236")
Min. brake disc thickness	4.6 mm (0.181")
Effective brake pad area	37 cm^2 (5.7 $in.^2$)
Min. brake pad thickness	1.5 mm (0.060")
Max. permissible runout of brake surface to wheel hub	0.03 mm (0.0012")
Brake master cyl. piston dia.	13 mm (0.512")
Wheel brake cyl. piston dia.	38 mm (1.496")
Brake disc lateral runout	0.1 mm (0.004")
Disc brake fluid	DOT 4; ATE brake fluid "SL"
Rear Wheel	
Brake drum dia.	200 mm (7.874")
Max. permissible brake drum wear dia.	201.5 mm (7.933")
Liner width	25 mm (0.984")
Effective brake liner area	89 cm^2 (13.8 $in.^2$)
Min. brake liner thickness	1.5 mm (0.060")

Tightening Torque

Brake line to brake master cylinder	8 + 3 Nm (6 + 2 ft. lbs.)
Brake line to brake caliper	8 + 3 Nm (6 + 2 ft. lbs.)
Brake line to brake hose	12 + 3 Nm (9 + 2 ft. lbs.)

Rear Wheel Brake



1) Brake lever
2) Bolt
3) Washer
4) Bushing
5) Nut
6) Bolt
7) Nut
8) Pivot socket
9) Pull rod
10) Connector
11) Brake lever
12) Washer
13) Bolt
14) Brake shoe
15) Brake shoe
16) Spring
17) Seal
18) Washer
19) Seal
20) Brake cam
21) Nut

34 00 046 Bleeding Front Wheel Brake

Brake fluid must be replaced annually!

Brake fluid is hygroscopic and consequently absorbs moisture in the air through the air hole in the brake fluid tank. This could reduce the boiling point of brake fluid from 240°C (464°F) to 160 ... 180°C (320 ... 355°F).

Important!
Keep brake fluid off of painted surfaces. Brake fluid destroys paint.
To add brake fluid, unscrew tank cover screws, remove diaphragm and add fluid until level reaches "MAX" mark. Install tank cover again.

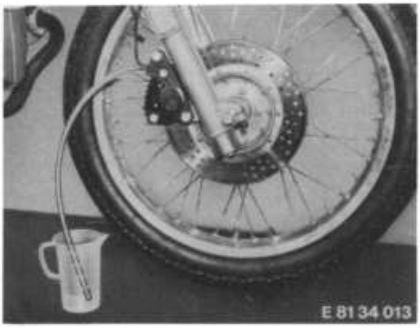


Apply hand brake lever several times until brake pressure is noticed.

Keep lever under pressure and unscrew bleeder screw while pulling tight on lever at same time. Release lever only after tightening the bleeder screw.

Keep repeating this step until the escaping brake fluid is without air bubbles. Tighten bleeder screw.

Important!
Brake fluid tank must not be pumped empty, since then air would be drawn into brake system!

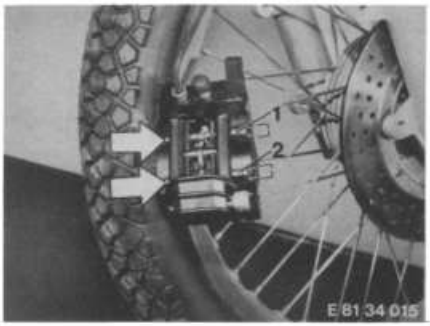


34 11 000 Removing and Installing Front Brake Pads

Note:
The brake caliper has been detached on the fork sliding tube for clearer illustration!

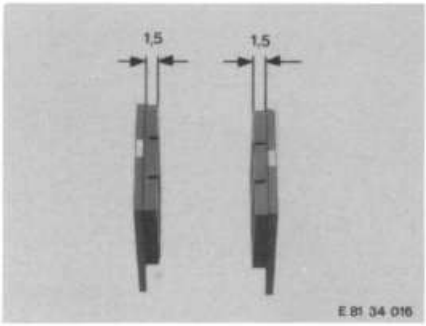
Pry off plastic cap on brake caliper with a screwdriver.

Knock out lockpins (1 and 2) from left to right with a punch. Remove cross spring and brake pads.



To avoid scoring on brake disc, brake pads must be replaced in good time (minimum pad thickness is shown in picture in mm).

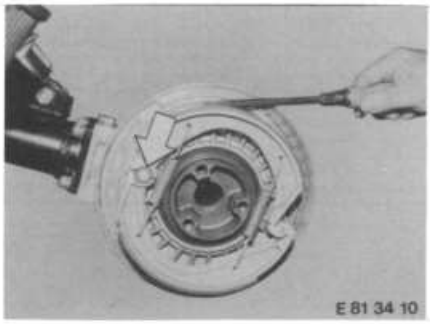
Installation:
Push back piston of brake cylinder before installing new brake pads.



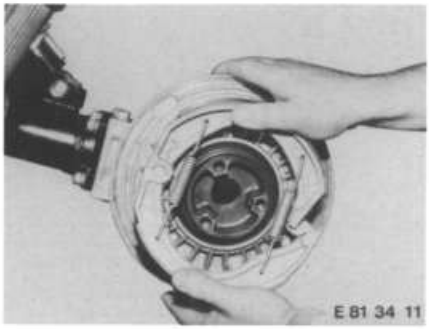
34 21 150 Removing and Installing Rear Wheel Brake Shoes

Remove rear wheel 36 30 320.

Remove circlip (arrow).
Press upper brake shoe off of rear wheel drive with a screwdriver.



Installation:
Connect brake shoes with springs (springs located outside) and push both shoes simultaneously on to brake anchor and brake key.
Give anchor and key a light coat of Molykote grease!
Install circlip.



34 31 000 Removing and Installing Brake Master Cylinder

Loosen brake hose on brake master cylinder (arrow).

Unscrew socket head bolts (1 and 2) and remove brake fluid tank with brake master cylinder.



Let brake fluid tank hang down and unscrew on brake hose.



Troubleshooting Brakes

Condition	Cause	Correction
Hand Operated Brake		
Brake lever vibrates	Brake disc has excessive lateral runout	Replace brake disc
Poor retardation	Brake pads worn	Replace brake pads
	Air in brake line	Bleed
Diminishing brake effect under heavy load	Excessively old brake fluid	Replace brake fluid, also see page 34–00/1
Foot Operated Brake		
Brake pedal wips	Brake drum out-of-true	Grind brake drum
Poor retardation	Brake liners oil splattered	
	Brake liners worn	Replace liners

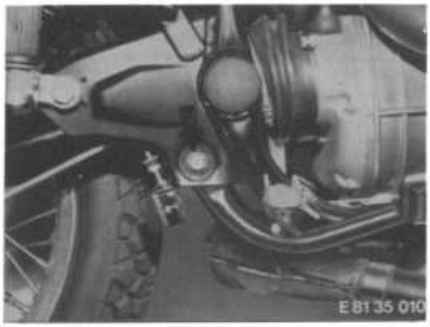
Pedals

35 Pedals

35 21 000 Brake pedal – remove and install ..... Page 35–21/1

35 21 000 Removing and Installing Brake Pedal

Unscrew hexagon or thumb nut on end of pull rod. Unscrew and pull out shaft bolt for brake pedal (arrow).

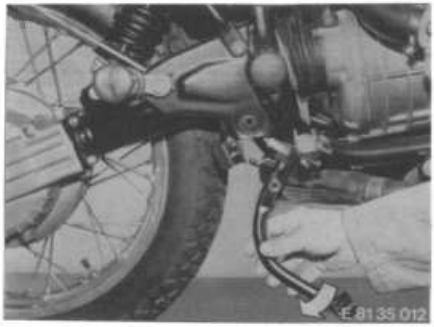


Unscrew stop light switch adjusting screw (arrow).

Installation:
Screw in adjusting screw only far enough that stop light switch is pushed in off position.

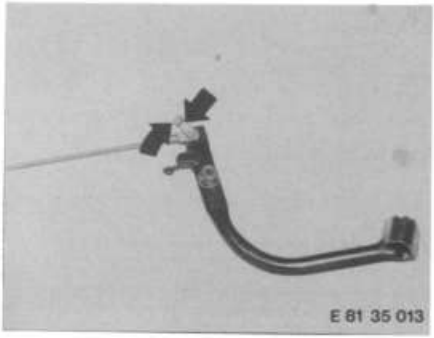


Pull out brake pedal with pull rod from below, while turning brake pedal to the right slightly.



Detach lockpin (arrow) on pull rod and take pull rod off of brake pedal.

Adjusting Brake Pedal:
Brake pedal must not have more travel than 25 mm (1"). Make adjustments with hexagon or thumb nut on pull rod.



Wheels and Tires

36 Wheels and Tires

Specifications ..... Page 36– 0/3
36 30 008 Front wheel – static balance 36–30/1
36 30 018 Rear wheel – static balance 36–30/1
36 30 300 Front wheel – remove and install 36–30/3
36 30 320 Rear wheel – remove and install 36–30/3
36 31 371 Bearings of front wheel – remove and install 36–31/1

Specifications

Wheels and Tires

Model	R 80 G/S
Rim type	hardened aluminum in WM profile version
Rim size, front	1.85 B x 21
Rim size, rear	2.15 B x 18
Max. radial runout	0.9 mm (0.035") measured on rim flange without tire
Max. lateral runout	0.5 mm (0.020") measured on rim flange without tire
Tire size, front	3.00 – 21 48 R
Tire size, rear	4.00 – 18 64 R
Max. tire imbalance, measured on inside rim diameter	1.7 Ncm (0.15 in. lbs.) = 8 ... 9 g (0.28 ... 0.32 oz.)
Max. runout on side wall	1.7 mm (0.067")
Tire inflation pressure: Front wheel – one person two persons	 1.9 bar (27 psi) 2.1 bar (30 psi)
Rear wheel – one person two persons	1.8 bar (26 psi) 2.2 bar (31 psi)
Rear wheel tilt play (integrated bearings in rear wheel drive)	0.5 mm (0.020") (measured on rim flange in cold state)
Front wheel bearing lubrication	brand name bearing grease, eff. temp. range –30 ... +140°C (–22 ... +284°F), drip point 150 ... 230°C (300 ... 455°F), good corrosion inhibition, good water/oxidation resistance, e.g. Shell Retinax A
Grease volume	10 g (0.35 oz)

Tightening Torque and Friction Torque

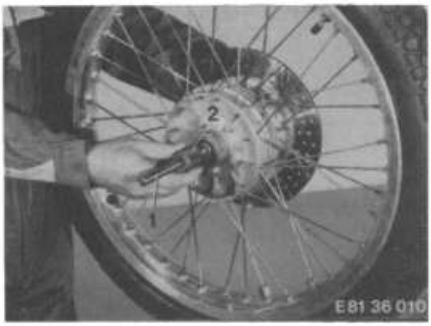
Friction torque of wheel bearings with axle nut tightened to specified torque	150 ... 300 Ncm (13 ... 26 in. lbs.)
Nut on stub axle	44 + 3 Nm (32 + 2 ft. lbs.)
Stub axle bolts	14 + 2 Nm (10 + 1 ft. lbs.)
Rear wheel nuts	85 Nm (61 ft. lbs.)

Tighten all other bolts and nuts to common torque values as listed in tables from bolt/nut suppliers or the new BMW Standard 60002.0.

36 30 008 Balancing Front Wheel Statically

Remove and install front wheel 36 30 300.

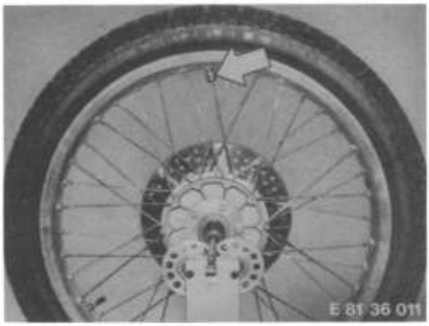
Insert balance shaft (1) through wheel bearings and preload bearings slightly with knurled nut (2).



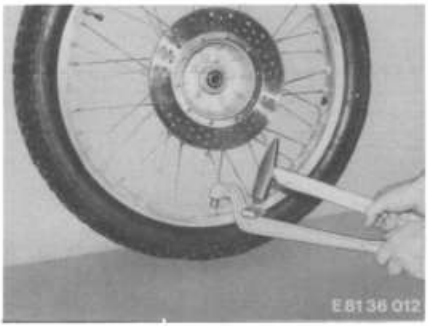
Dress fixture, BMW No. 36 3 600, before balancing (water level in baseplate).
Place wheel on balancing fixture and let it rotate until it stops on its own. Install weight (arrow) opposite the heaviest point.

Never knock weights on balance base!
A correctly balanced wheel will stop in any position.

Important!
Max. balance weight = 60 g (2.12 oz.).

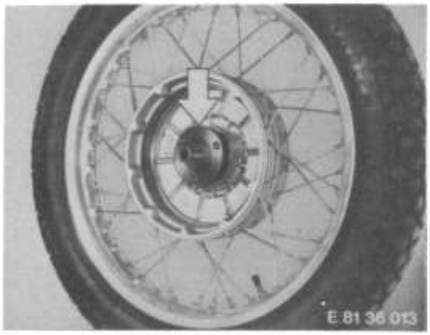


Fasten balance weights on spoke nipples with an impact tool.
Supplier of impact tools = e.g. Hofmann in Darmstadt, West Germany.



36 30 018 Balancing Rear Wheel Statically

Place balancing holder (arrow), BMW No. 36 3 608, on centering collar (brake drum side) and secure with supplied socket head bolts.



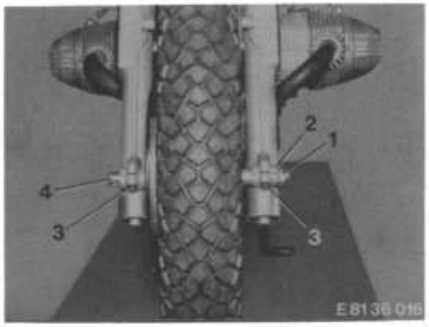
36 30 300 Removing and Installing Front Wheel

Set motorcycle on kick stand and support front end on oil pan.



Unscrew axle nut (1) and remove with washer (2). Loosen bolts (3) and pull out stub axle (4) with a mandrel. Remove wheel forward. Never use hand operated brake while front wheel is removed.
See Specifications for tightening torque.

Installation:
Install short spacer on brake disc side and long version on opposite side.
When reinstalling a lightly lubricated front wheel axle, first tighten the axle nut (holding with a mandrel if necessary), then bottom fork suspension firmly several times and finally tighten the bolts.
This measure will prevent tension on the fork sliding tubes.



36 30 320 Removing and Installing Rear Wheel

Set motorcycle on kick stand and support underneath the primary muffler.



Unscrew wheel nuts and remove rear wheel.

See Specifications for tightening torque.

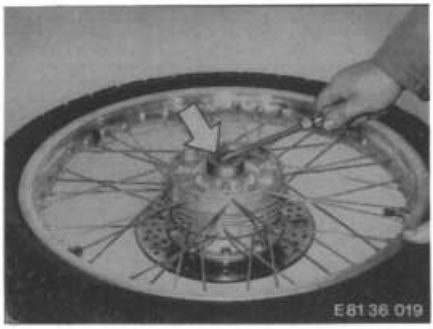


36 31 371 Removing and Installing Front Wheel Bearings

Remove and install front wheel 36 30 300.

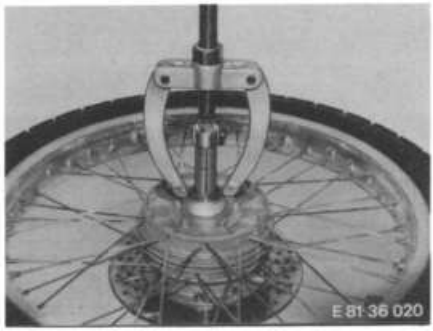
Pry out pressure pad and seal (arrow) with a screwdriver, if necessary heating hub to about 80°C (175°F). Remove taper roller bearings.

Installation:
Knock in seal flush with hub.

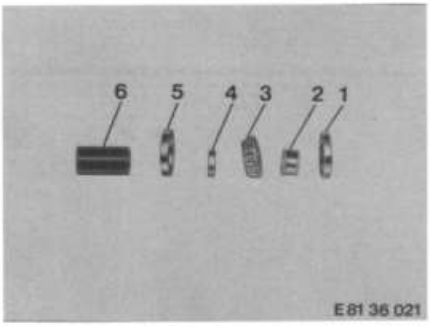


Pull outer race out of hub with Kukko puller, BMW No. 00 8 551.

Installation:
Heat hub to about 80°C (175°F) and knock in outer race with impact mandrel, BMW No. 00 5 550.



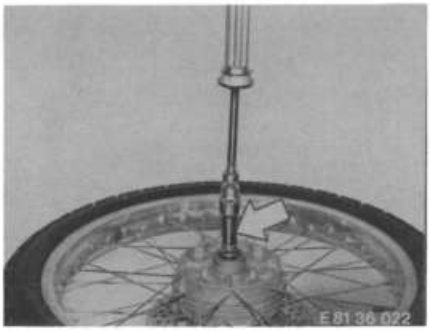
1 Seal
2 Pressure pad
3 Taper roller bearing
4 Shim
5 Outer race
6 Spacer



Insert stub axle through hub and preload wheel bearings with 59 mm (2.323") long spacer (arrow) and axle nut.

See Specifications for tightening torque.

Apply friction torque meter with adapter and wrench socket on axle nut and check bearing friction torque. See Specifications for friction torque.
Try different size shims until correct friction torque is reached.



Frame

46 Frame

Specifications ..... Page 46– 0/3
46 51 040 Toe offset – measure (with gauge) 46–51/1
46 51 509 Frame front section – check (a in swinging arm bearing area) 46–51/2
Frame front section – check (b in steering head area) 46–51/3

Specifications

Frame	
Model	R 80 G/S
Frame	double cradle tubular frame welded on bolted frame rear section
Location of make plate	on steering head, right gusset plate
Location of chassis number	on steering head, right gusset plate
Max. toe offset	4 mm (0.157")

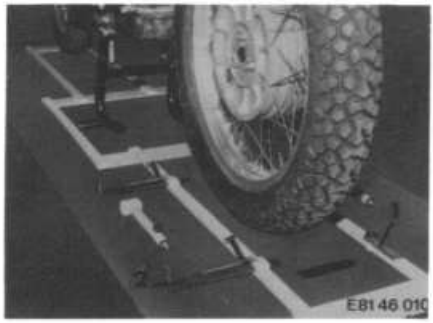
Tightening Torque

Frame rear section mounting bolts	22 + 2 Nm (16 + 1 ft. lbs.)
Kick stand mounting bolts	43 + 5 Nm (31 + 4 ft. lbs.)

Tighten all other bolts and nuts to common torque values as listed in tables from bolt/nut suppliers or the new BMW Standard 60002.0.

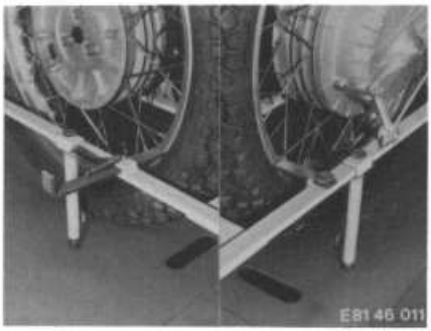
46 51 040 Measuring Toe Offset (with Gauge)

Run motorcycle into toe offset gauge, BMW No. 36 3 900. For this purpose place gauge on floor or lifting platform. Fold off stops (1) and slide (2), or pull in, and push motorcycle into gauge and set on kick stand.



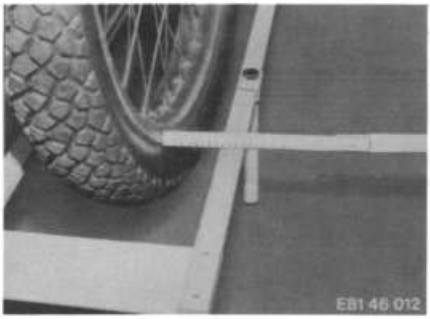
Place toe offset gauge on supports, positioned approximately at height of stub axle or center of wheel; adjustable supports at rear. Fold out stops and adjust height with help of adjustable supports so that stops only rest on the rim. To make adjustments easier lift front end of gauge slightly and briefly. Release slide lock (don't let it accelerate forwards!).

Press gauge firmly against rear wheel from the right side so that both stops are on the rim.



The front wheel must be parallel to one of both measuring rails to be able to measure the toe offset. The distance of the front wheel rim to the measuring rail front and rear, left and right is measured with a ruler. The difference of both distances divided by two is the toe offset.
The toe offset can be corrected slightly by moving the swinging arm to the left or right.

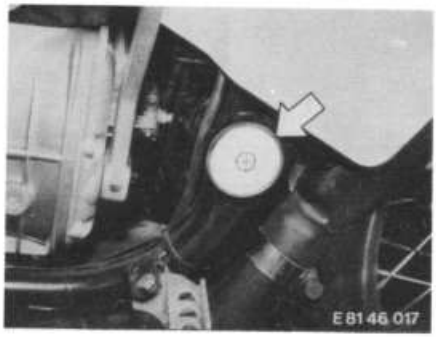
See Specifications for toe offset.



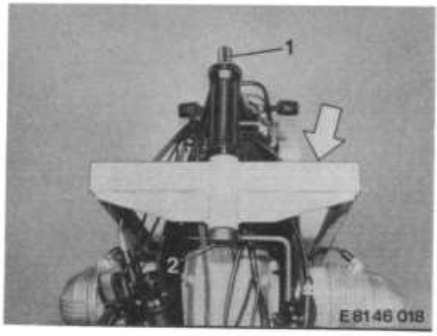
b) In Steering Head Area

Remove and install front wheel fork 31 42 100.

Outer races remain in steering head. Remove and install left and right carburetors.
Unscrew left and right swinging arm bolts 13 10 100.
Screw in measuring plates in place of bearing bolts (arrow).

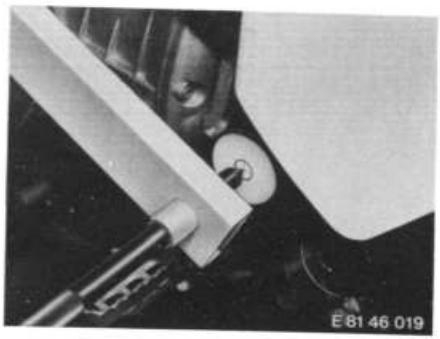


Apply frame testing gauge II (arrow), BMW No. 46 5 600, on steering head from below and clamp frame and gauge together with spindle (1) and nut (2).



Insert measuring mandrels in frame testing gauge and align gauge that distance to measuring plates is the same on left and right sides.

The frame is okay, if the tips of both measuring mandrels are approximately at the same point within the tolerance range on the left and right sides.
Max. deviation = 1 mm (0.040").



Service and General Information

61 General Electrical System

Specifications ..... Page 61– 0/3
61 21 010 Battery – remove and install 61–21/1
61 31 350 Turn signal control – remove and install 61–31/1
61 31 400 Starting relay – remove and install 61–31/1

General Electrical System

Model	R 80 G/S
Horn	Bosch electromagnetic striking horn 335 Hz ± 20 Hz (Type 0320 043 029)
Battery Voltage	12 volts
Capacity	9 Ah (16 Ah for special equipment in conjunction with electric starter)
Ground pole	negative
Turn signal control	Bosch 0335 200 043 12 V 2 (4) x 21 W 13 ... 7 W
Fuses (two)	8 amps

61 21 010 Removing and Installing Battery

Remove seat and lift out tool tray. Unscrew upper spring strut mount and swing spring strut towards rear.

Disconnect battery straps. Remove cover. Disconnect leads on battery poles and turn battery diagonally. Pull off battery vent.
Pull out battery from left narrow side.

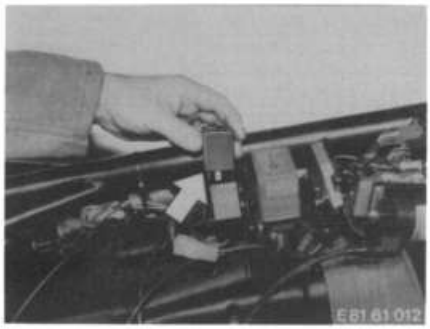
Installation:
Clean battery poles and lubricate poles with acid protection grease (e.g. Bosch Ft 40 V1) after connecting battery leads.

See page 00–00/5 for other service information.



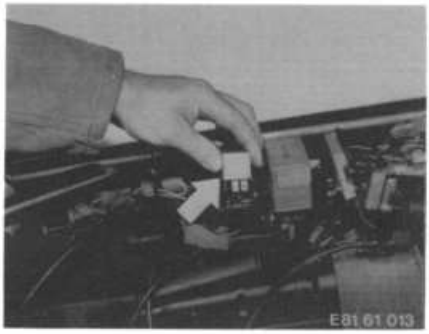
61 31 350 Removing and Installing Turn Signal Control

Remove seat and fuel tank.
Pull out turn signal control (arrow) from socket upwards.



61 31 400 Removing and Installing Starting Relay

Remove seat and fuel tank.
Pull out starting relay (arrow) from socket upwards.



Instruments

62 Instruments

Specifications ..... Page 62– 0/3
62 11 200 Instrument cluster – remove and install 62–11/1
62 12 000 Speedometer – remove and install 62–12/1

Instruments

Model	R 80 G/S
Constant W for km speedometer	0.773
Constant W for mile speedometer	1.244
Gauge range	10 ... 180 km/h
Gauge range	0 ... 80 mph

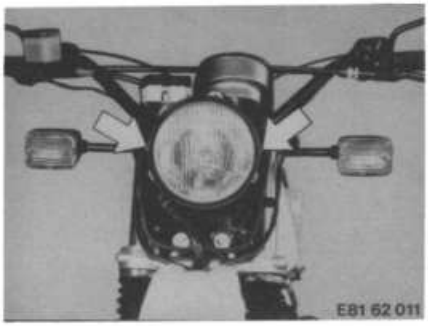
62 11 200 Removing and Installing Instrument Cluster

Unscrew two Phillips screws (arrows) each on left and right sides of back of instrument housing and take off housing front section. Pull off left and right hoses (1) for fork discharging.

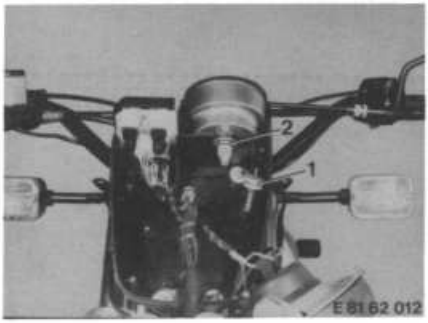
Installation:
Mount extraction hoses before installing housing front section.



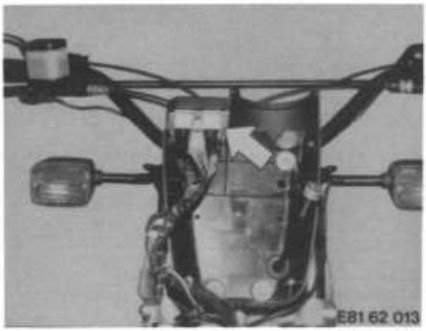
Loosen left and right headlight screws (arrows) and pull out headlight forward.



Unscrew speedometer drive cable bolt (1) and speedometer hexagon nut (2) in housing. Pull out speedometer forward.

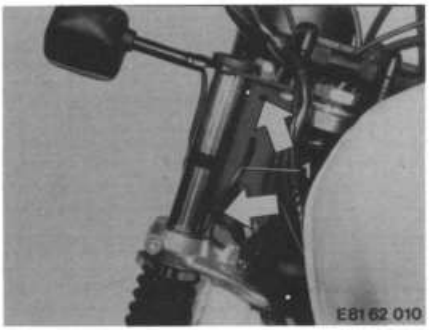


Remove indicator lamp unit (arrow) forwards, pulling off wire plugs if necessary.

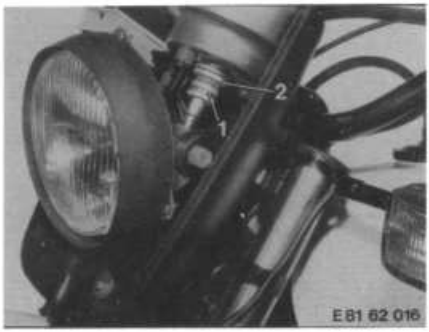


62 12 000 Removing and Installing Speedometer

Unscrew two Phillips screw (arrows) each on left and right sides of back of instrument housing and take off housing front section.



Unscrew speedometer drive cable bolt (1) as well as speedometer hexagon nut (2) in housing. Pull out bulb holder downwards.
Remove speedometer forwards.



Lights

63 Lights

Specifications ..... Page 63– 0/3
63 10 004 Headlight – aiming 63–10/1
63 21 380 Tail light – remove and install 63–21/1
63 23 150 Turn signal (front or rear) – remove and install 63–23/1
63 99 241 Headlight bulb – replace 63–99/1
63 99 271 Turn signal bulb (front or rear) – replace 63–99/1
63 99 381 Tail light bulb – replace 63–99/2

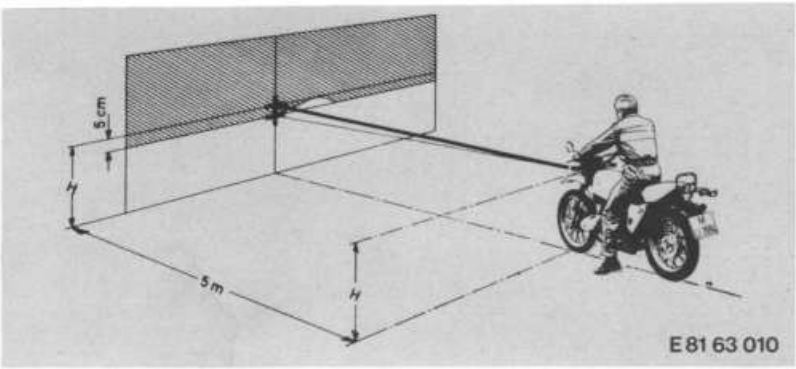
Lights

Model	R 80 G/S	
Headlight (Bosch)	Type 0301 302 106	
High and low beams	12 V/60/55 W	asym. light bulb H 4
Parking light	12 V/4 W	light bulb
Idle ind. lamp (green)	12 V/3 W	indicator lamp
Charge ind. lamp (red)	12 V/3 W	indicator lamp
Oil press. ind. lamp (red)	12 V/3 W	indicator lamp
High beam ind. lamp (blue)	12 V/3 W	indicator lamp
Turn signal ind. lamp (green)	12 V/3 W	indicator lamp
Speedometer light	12 V/3 W	indicator lamp
Tail/stop light	12 V/21/5 W	light bulb
Turn signals (2 each yellow front and rear)	12 V/21 W	light bulb

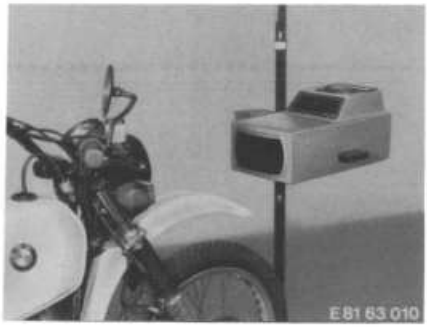
63 10 004 Aiming Headlight

Check aiming of headlight each time work is performed on the headlight. If an aimer is not available, headlight can be checked and aimed according to the following procedures.
Check and, if necessary, correct tire inflation pressure of both wheels.

Park motorcycle on its wheels on a level surface 5 meters (16 feet) away from a light colored wall and load down motorcycle with the rider. Rear spring strut must be set for single person operation. Measure distance from floor to center of headlight, transfer this height to wall, mark with a cross and make a second cross 5 cm (2") lower. Turn on low beam and adjust headlight that the light/dark border runs at height of bottom cross left of it and rises from center of cross to the right to height of upper cross and then descends again.

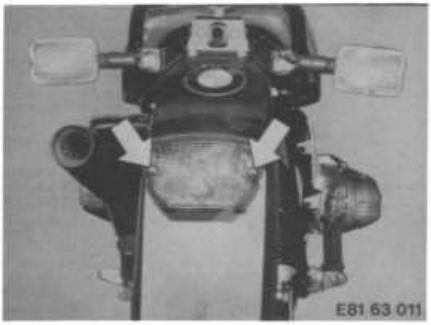


Aim headlight with aimer according to instructions supplied with equipment.

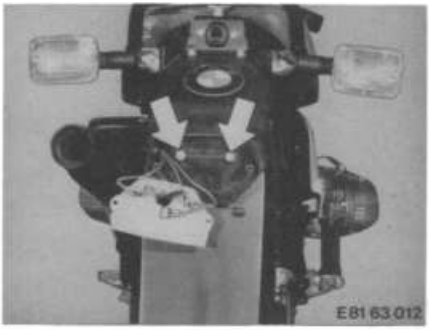


63 21 380 Removing and Installing Tail Light

Disconnect battery ground lead. Unscrew two Phillips screws (arrows) and take off lens.



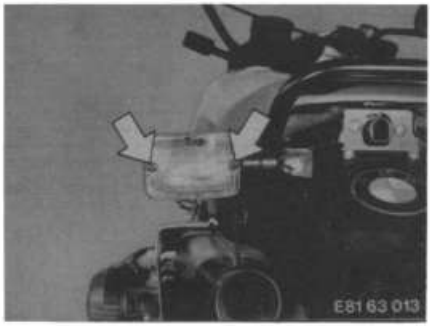
Pull off wires on back of reflector, unscrew hexagon bolts (arrows) in housing and remove tail light housing.



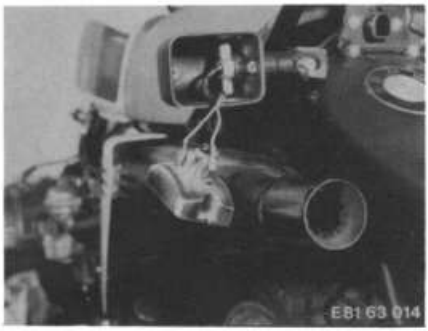
63 23 150 Removing and Installing Turn Signal (Front or Rear)

Disconnect battery ground lead. Unscrew Phillips screws (arrows) and take off lens.

Installation:
Make sure "Top" faces up when installing lens.



Pull off wires on back of reflector.



Loosen both hexagon screws (arrows) and pull off turn signal housing.

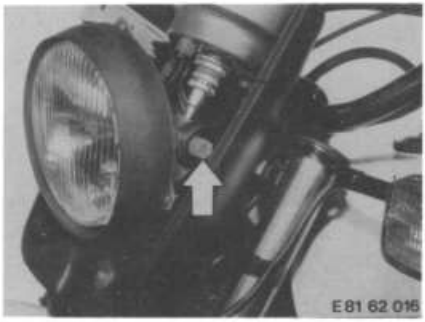


63 99 241 Replacing Headlight Bulb

Unscrew two each Phillips screws (arrows) on left and right sides, and take off instrument housing front section.



Loosen left and right headlight housing screws (arrow) and pull entire headlight forward.



Pull off multiple-pin plug (1) as well as ground wire (brown) (2) and cap (3) with parking light (4). Disconnect wire holder (5) and remove H 4 bulb (6) from the reflector.

Installation:
When inserting halogen bulb make sure that twist tab engages in reflector. Never touch glass of halogen bulb with bare fingers!

Aim headlight – see 63 10 004.



63 99 271 Replacing Turn Signal Bulb (Front or Rear)

Unscrew both Phillips screws and take off lens.

Installation:
Make sure "Top" faces up when installing lens.

