

# 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 $-30 \dots +140^{\circ}\text{C}$ ( $-22 \dots +284^{\circ}\text{F}$ ), drip point $150 \dots 230^{\circ}\text{C}$ ( $300 \dots 450^{\circ}\text{F}$ ), 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	$47^{\circ}$
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 $0^{\circ}\text{C}$ ); 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.	$28 \pm 0.15$ 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.

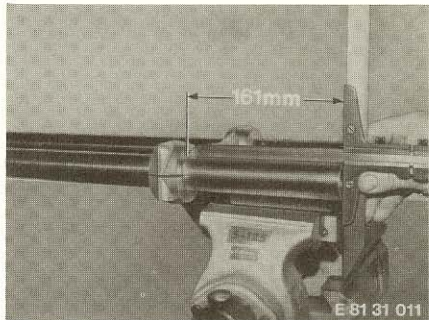
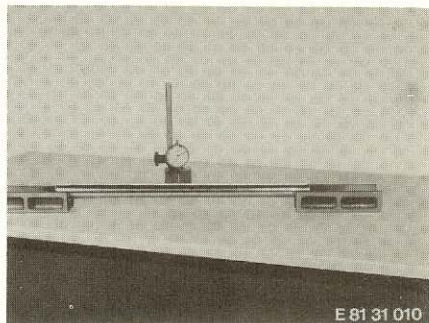
Check removed spacer tubes resting on both ends in blocks or similar for runout.

See Specifications for permissible runout.

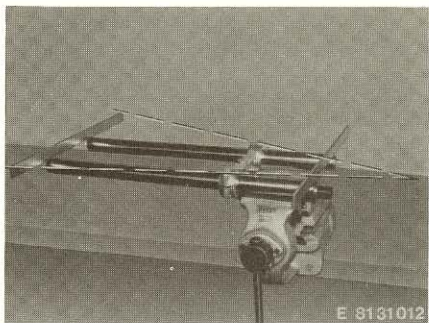
#### *Important!*

Never straighten bent spacer tubes — danger of breaking!

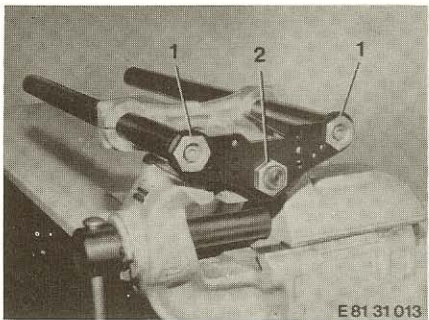
Push in two new spacer tubes to inspect the lower fork bridge (161 mm/6.339" test installed length for tubes, as measured from spacer tube upper edge to lower fork bridge).



Place two steel rulers, BMW No. 31 4 620, on ends of 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 Telescop Fork

Remove and install handlebar 32 71 000.

Remove and install headlight/instrument assembly 62 11 200.

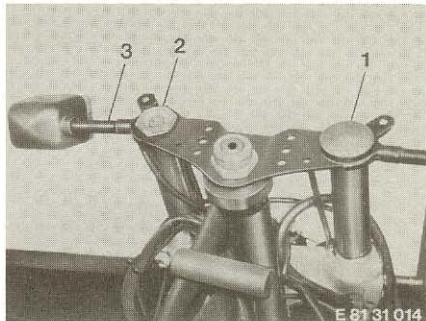
Remove and install front wheel 36 30 300.

Remove and install front fender.

Remove 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.

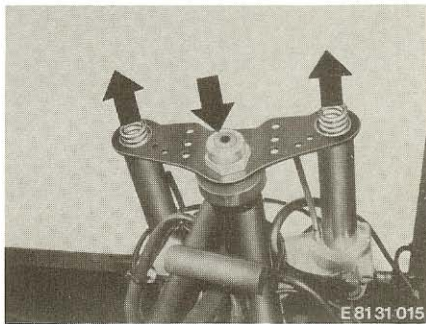


Unscrew cap nut (arrow) of upper fork bridge, take off fork bridge and remove supporting springs.

#### 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.



Remove strap on top of left spacer tube, push rubber cap 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.

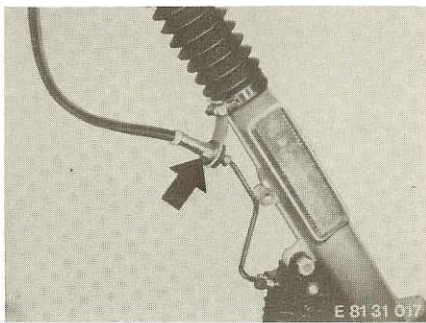
See Specifications for tightening torque of mounting bolt.



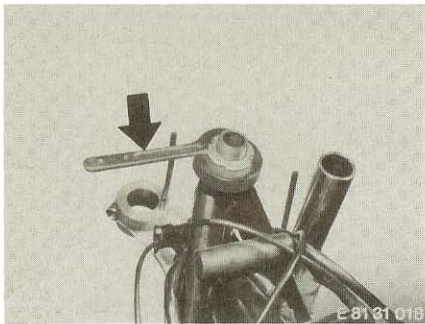
Disconnect brake hose and brake line connection (arrow) on right fork sliding tube.

Pull brake hose up out of rubber sleeve.

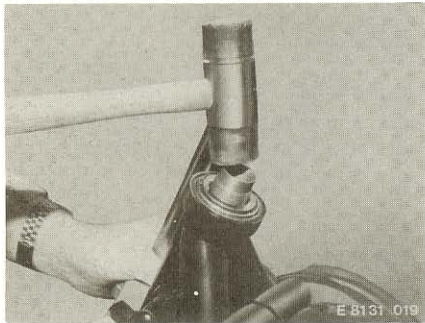
See page 00-0/8 for tightening torque.





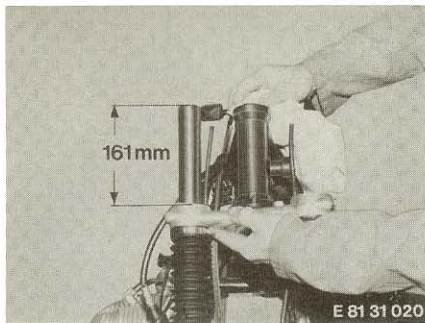


Unscrew slotted nut with special wrench (arrow).



Pull lower fork bridge out of steering head while applying light knocks with a plastic hammer on the steering tube.

Turn fork upsidedown to drain oil.



*Installation:*

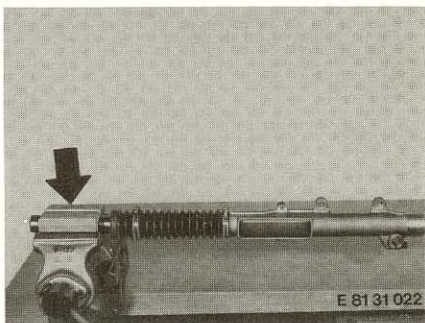
Heat upper taper roller bearing to about 50°C (120) and insert before installing lower fork bridge. Push lower fork bridge into steering head from below with the steering tube. Install cap and screw on cap nut. Both spacer tubes must have uniform protrusion (161 mm/6.339") over the lower fork bridge.

After complete installation including front wheel loosen the left and right mounting bolts for the lower fork bridge as well as those of the sliding tubes. Then push motorcycle off of kick stand and bottom fork suspension several times. Finally tighten all bolts again.

Adjust steering — see 32 00 454.

### 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).

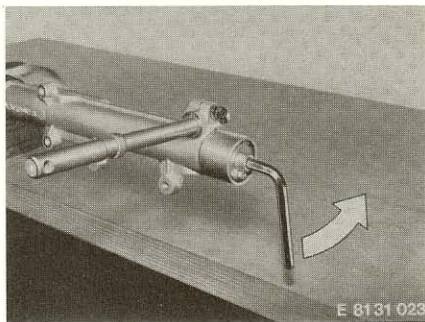


Loosen strap of rubber covers on sliding tube and push cover down.

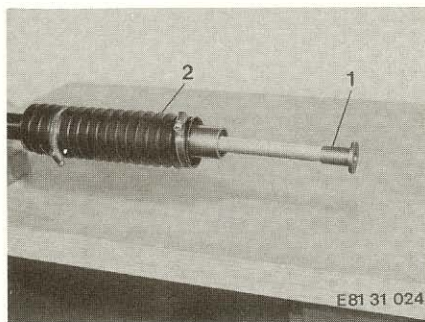
Unscrew socket head bolt of damper in sliding tube and pull off sliding tube.

*Note:* Counterhold on stub axle.

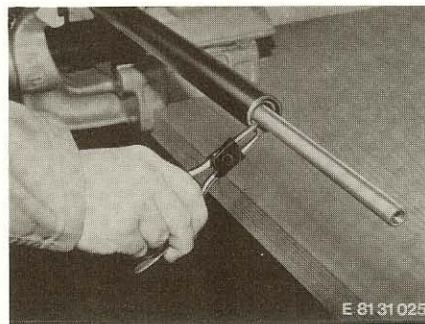
See Specifications for tightening torque.



Remove 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.

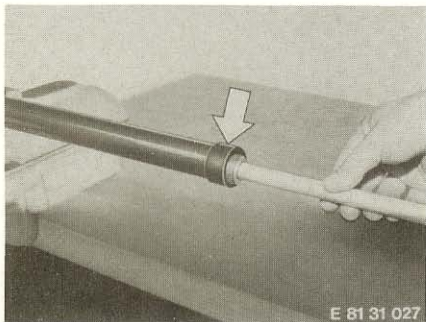


- 1 Piston with absorber tube
- 2 Spring
- 3 Perforated washer
- 4 Distributor washer
- 5 Valve housing



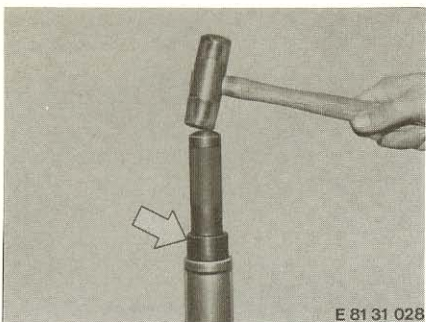
E 81 31 026

Use guide sleeve, BMW No. 31 4 720, (arrow) to compress piston ring when installing absorber in the spacer tube.



E 81 31 027

Remove seal from sliding tube carefully with a screw driver. Knock in new seal with impact mandrel, BMW No. 31 4 650, (arrow) and grip, BMW No. 00 5 500.

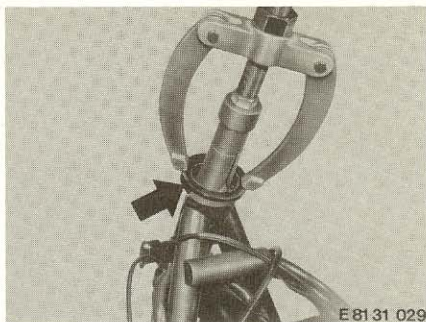


E 81 31 028

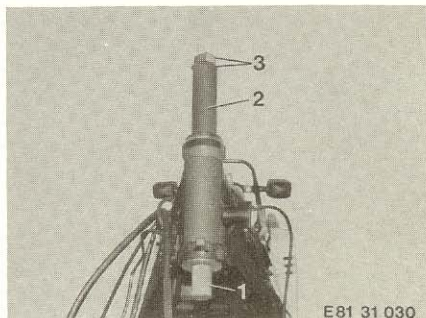
### 31 42 321 Removing and Installing Taper Roller Bearing of Telescope Fork

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).



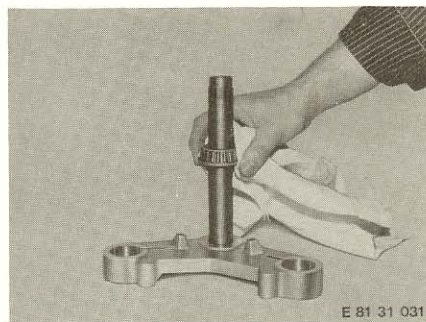
Pull in upper and lower outer races for taper roller bearings one after the other with the spindle of frame testing gauge (1) in conjunction with spacer (2), BMW No. 31 4 820 with washer and hexagon nut (3).



Replace the lower taper roller bearing, heat lower 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