27 Transfer Box

7	10	000	Visco central lock – check in car	1
		010	Transfer box – remove and install (manual transmission)	4
		010	Transfer box – remove and install (automatic transmission)	7
			Transfer box gear wheel set layout drawing	1
			Transfer box – disassemble and assemble	12
23	71	003	Rubber mounts for transmission suspension – replace	
		503	Rubber mounts for transmission suspension – replace 27 - 3	

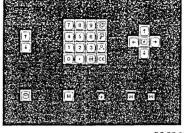
27 10 000 CHECKING CENTRAL LOCK IN CAR

The condition of a central lock can be checked on a brake test stand with help of the BMW service tester Caution!

If only one axle turns in a test on the brake test stand, the central lock will be subjected to strong loads and could be destroyed from excessive heat.

Never exceed the total running time = warmup time + test time of 60 seconds on the brake test stand.

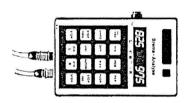
Make a break of at least 30 minutes after each test cycle. These times are applicable to cold and warm operated cars. The roller speed of the brake test stand must not exceed 7.5 km/h (4.5 mph). If the roller speed of the brake test stand without load is not known, it can be determined with a '3' series car with ABS, but without all wheel drive, to the methods described in the testing procedures. In so doing the warm-up phase and measuring the braking force are omitted.



Select test program 03 ABS on BMW service tester. Select ABS test step 03.

Turn on ignition.

30 27 004

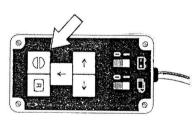


Switch on both rollers of brake test stand. Run brake test stand approx. 40 seconds (warm-up phase).

30 27 005

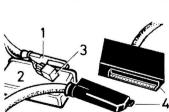


Check tire inflation pressure and tire size. Park rear wheels of car in test stand rollers. Front wheels are on floor. Shift lever in neutral.

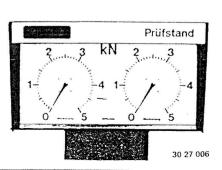


Press reset button on BMW service tester after the warm-up time. The value in ms now appearing at rear left or right is equal to the roller speed. See diagram.

30 27 008



Car must be connected on the BMW service tester, to determine test stand speed (wheel speed) under load. Swith off electric equipment and ignition. Connect T-plug (4) between ABS control unit (2) and ABS wire harness (1).



Read braking force of both wheels on brake test stand and add.

Caution!

Total running time: max. 60 seconds.

30 27 003

Transfer period of time (ms) in diagram.

Transfer sum of braking force of both front wheels in diagram.

The condition of the visco central lock is evident from the point of intersection of both lines.

Example:

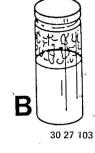
Pulse wheel period of time: 22 ms.

Braking force of left wheel 300 N (66 lbs.) Braking force of right wheel 350 N (77 lbs.)

Total braking force

650 N (143 lbs.)

Intersection point of both lines in shaded Visco central lock is faulty.



Additional Testing Method:

Normally insufficient locking effect of a visco clutch will be caused by escaping visco liquid.

Visco liquid can be detected in gear lube as described below.

Take an oil sample and pour this oil into a pluggable lab glass or something similar. Now shake the glass and observe the oil running down the side of the glass after waiting about one minute. Visco liquid will not mix completely with oil

and will run down cloudy due to its greater viscosity.

A = Without visco liquid B = With visco liquid

 \mathbf{z} 1200 1100 1000 900 800 700 600 500 [km/h] [min-1] 60 55 35 45 [ms] 27,7 20,8

22,9

35,7

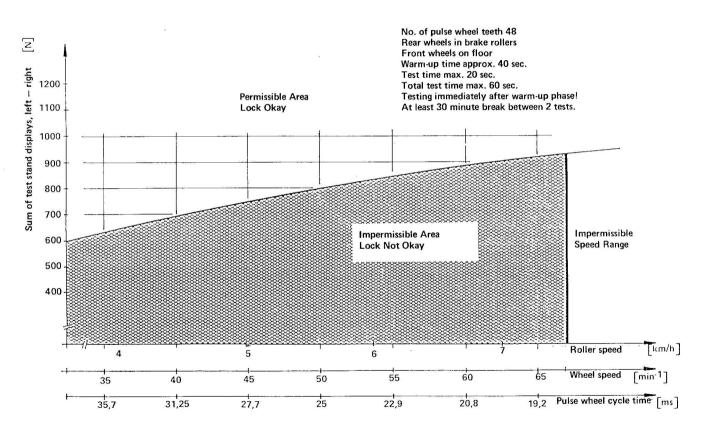
31,25

30 27 007

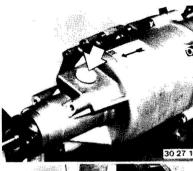
19,2

VISCO CENTRAL LOCKS DIAGNOSIS

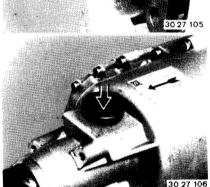
Number of pulse wheel teeth: 48.
Rear axle in brake cylinder.
Front axle standing.
Warm-up time: approx. 40 sec..
Testing time: max. 20 sec..
Total testing time: max. 60 sec..
Test immediately after warm-up phase!
Time between 2 tests: at least 30 minutes.



30 27 001



30 27 104





27 10 010 REMOVING AND INSTALLING TRANSFER BOX - Four Wheel Drive and Manual Transmission -

Note:

Lift out plug.

tion.

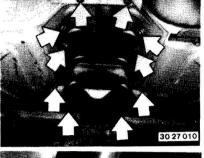
Press in vent.

This information is important when installing a new or exchange transmission. The transfer box in manual transmission version is filled with oil in the factory. The vent bore is sealed with a plug.

Knock vent off of the protective sleeve of the output shaft.

Check oil level after finishing installa-

Also refer to information on the label.

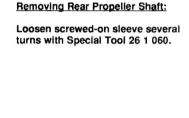


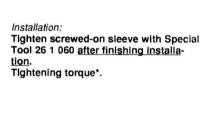




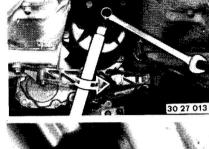




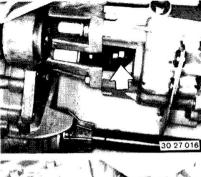




Unscrew propeller shaft on transfer box.



Tightening torque*. Important! Only tighten nuts or bolts on the flange end. whenever possible by design, to avoid tension in the joint disc.



Installation:

manual transmission.

Unscrew joint disc between manual transmission

and transfer box on the output flange of the

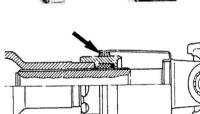


centering pin on the transfer box. Propeller shaft was balanced in assembled state and therefore may only be replaced complete. Never unscrew propeller shaft on the slide.

Push propeller shaft together and pull out of



Replace stop nuts. Tightening torque*. Important! Only tighten nuts or bolts on the flange end, whenever possible by design, to avoid tension in the joint disc.



Installation:

Installation:

Replace stop nuts.

The seal could slip out of the protective cap while pulling the propeller shaft apart. Prevent this by holding the seal on the bearing

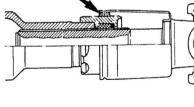
surface of the screwed-on sleeve with grease.

Note:

Unscrew cross member.

Bolts differ in length.

Support transmission from underneath.



30 27 101

30 27 015

tank connecting pipe.

Important!

Don't let the propeller shaft bear on the fuel

Lower transmission. Unscrew bolts.

The upper bolts are accessible with a 17 mm

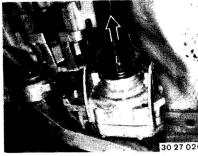
Note:

wrench socket, joint and extension in 3/8"

version.

* See Specifications

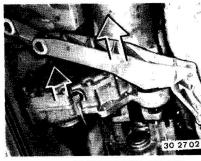
30 27 018



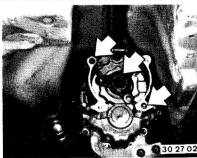
Push protective cap forward.

Caution!

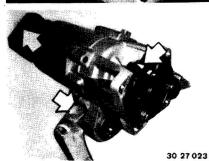
Danger of breaking.



Pull transfer box off of manual transmission and front propeller shaft section (transfer box weighs approx. 25 kg = 55 lbs.).



Installation:
Check dowel sleeves.
Check guide sleeve for output shaft in the transfer box.
Lubricate guide pins and splines of front propeller shaft section with grease*.
Check position of output flange on the transmission to the joint disc.



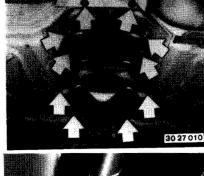
and vibration damper.

Installation:
Install joint disc in such a manner, that arrows point to the flange arms.

Tightening torque*.

Check oil level after finishing installation, correcting if necessary.

If necessary, unscrew cross member, joint disc



27 10 010 REMOVING AND INSTALLING TRANSFER BOX - All Wheel Drive Cars with Automatic Transmission -Remove exhaust assembly - see 18 00 020. Unscrew heat shields.



Tightening torque*. Important! Only tighten nuts or bolts on the flange end, whenever possible by design, to avoid tension in the joint disc.



Unscrewing Rear Propeller Shaft Section: Loosen screwed-on sleeve several turns with Special Tool 26 1 060.



Never unscrew propeller shaft on the slide.

Push propeller shaft together and pull out of

Propeller shaft is balanced in assembled state and therefore may only be replaced complete.

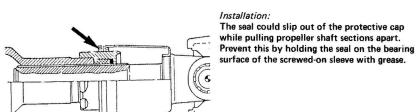
centering pin on the transfer box.



Installation:

* See Specifications

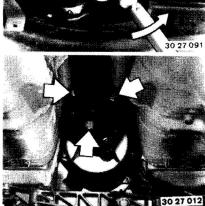
Tighten screwed-on sleeve with Special Tool 26 1 060 after finishing installation. Tightening torque*.



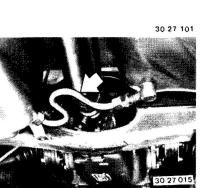
Installation: The seal could slip out of the protective cap while pulling propeller shaft sections apart.

Installation:

Replace stop nuts.



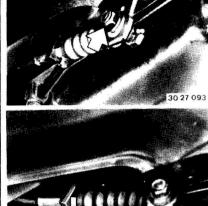
Unscrew propeller shaft on transfer box.



Caution!

Don't let the propeller shaft bear on the fuel

tank connecting pipe.



Important! Don't bend the steel wire.

Disconnecting Cable for Range Selector Lever:

Loosen nuts.

Unscrew nuts.

Front Propeller Shaft Section:

Push protective cab forward.





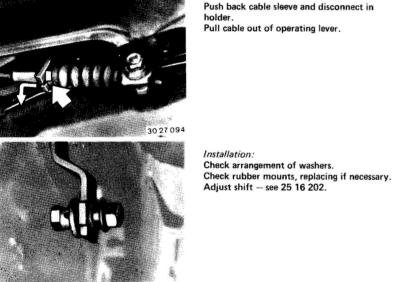


Installation:

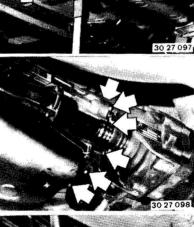


Drain oil in automatic transmission.

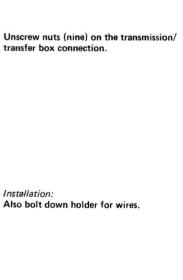
Fill transmission with ATF - see Group 24.



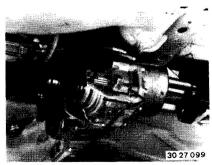








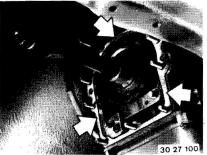
20 25 049



Pull off transfer box toward rear.

Installation:

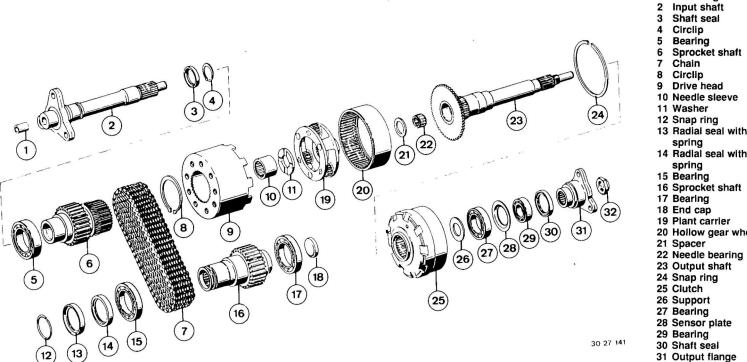
Mesh splines of front propeller shaft section by turning.



Installation:

Check sealing surfaces.
Replace gasket.
Check dowel pins in transfer box.
Check oil level after finishing installation, correcting if necessary.
Fill automatic transmission with ATF.

TRANSFER BOX GEAR SET LAYOUT DRAWING

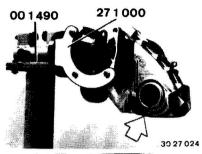


- Centering sleeve

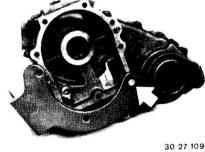
- 13 Radial seal without
- 14 Radial seal with

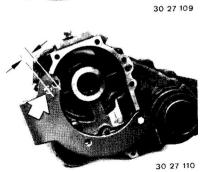
- 20 Hollow gear wheel

- 31 Output flange 32 Collar nut









27 10 ... DISASSEMBLING AND ASSEMBLING TRANSFER BOX

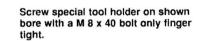
Disassembling Transfer Box:

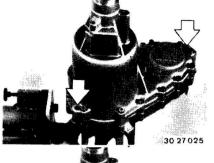
Mount Special Tool 27 1 000 on Special Tool 00 1 490. Bolt transfer box on Special Tool 27 1 000. Manual Transmission: Three M 10 x 4 bolts with nuts.

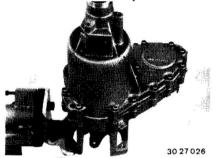
Automatic Transmission: Two M 8 x 40 bolts with nuts. Drain oil.

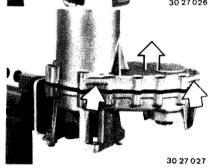
Old Special Tool 27 1 000 has to be machined for automatic transmission versions.

Drive out the dowel pin.









Drive dowel pins out of case at rear.

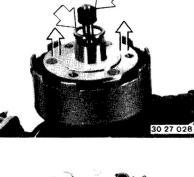
Unscrew all bolts.

Knock off rear case with uniform knocks from a nylon hammer on the webs. Lift off rear case.

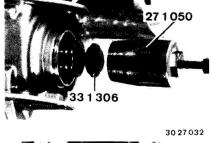
Remove gasket.

Position holder in such a manner, that a new 10 mm (0.394") dia. hole can be drilled about 5 mm (0.197") away from the old hole.

Mark center point, drill 10 mm (0.394") dia. hole and deburr edges of hole.

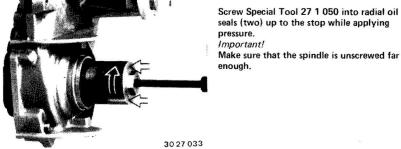


Lift off needle bearing (only manual transmissions), spacer and planet gear set.



Apply Special Tools 33 1 306 and 27 1 050.

Note: Check thrust washer in planet gear set. Oil grooves face the drive shell.



Make sure that the spindle is unscrewed far

Pull out both radial oil seals by screwing in the

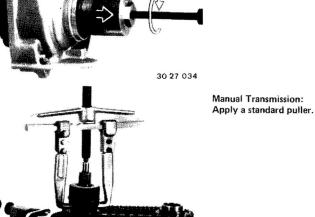
pressure. Important!

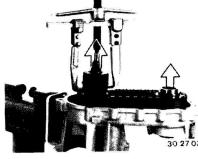
spindle.



Lift off drive shell.

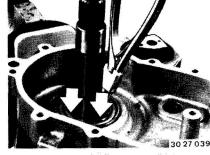
Lift out circlip and O-ring.



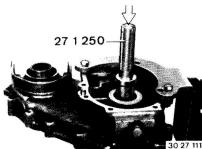


Pull off sprocket, driving off the front drive sprocket with a plastic hammer at the same time. Important!

Don't cant the chain.



Manual Transmission: Lift out circlip. Pull out drive shaft.



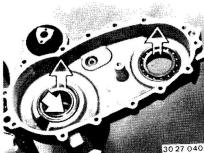
Automatic Transmission:

Insert Special Tool 27 1 250 in the sprocket main shaft.

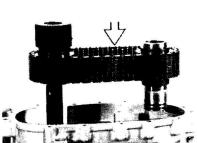
Drive out both shafts uniformly with a plastic hammer.

Important!

Don't cant the chain.

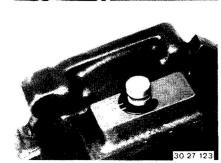


Pull out grooved ball bearing, if applicable. Remove shaft seal (two for automatic transmissions).



Lift off sprockets with chain.

Mark running direction of chain, if it can be reused.



Automatic Transmission: Pull off clamp.

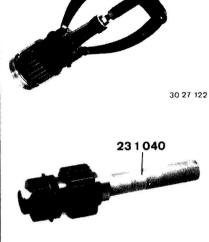


Note: Grooved ball bearing will remain on the sprocket or in the case, depending on

30 27 038

tolerances. Pull off grooved ball bearing, if necessary. 30 27 124

Pull off cap. Remove vent. Check O-ring.



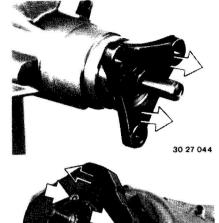
00 8 510

008550

Manual Transmission:
Drive out needle bearing with Special Tool

Pull out needle bearing with Special Tool

Automatic Transmission:





Pull off output flance.

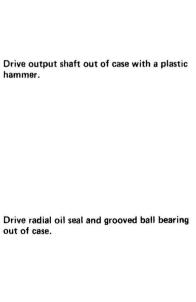
Manual Transmission:
Pull out centering sleeve with Special Tool
00 8 510 together with an expanding sleeve
for 14 mm (0.551") diameters.

Apply Special Tool 23 1 200.

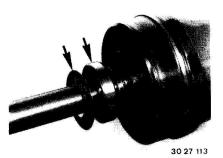
Hold output flange with Special Tool 23 0 020.

Unscrew collar nut with Special Tool 23 1 210.

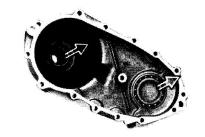




30 27 041



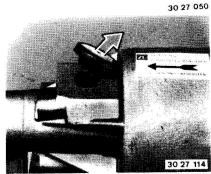
Note:
Grooved ball bearing remains on shaft or in case, depending on tolerances.
Lift off washer, if applicable.
Pull off grooved ball bearing.
Curved surface of washer faces the output flange.



Remove both grooved ball bearings in case.



Lift off washer and visco clutch.



Lift out vent.



Lift out circlip.



Unscrew oil baffle plate.



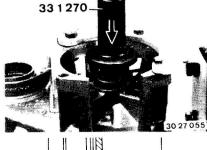
Lift output shaft off of hollow gear wheel.



Assembling:

Transfer Box Front Section: Lubricate all sliding surfaces and seals with the approved grade of oil* when assembling.

Drive in centering sleeve flush with Special Tool 27 1 160.



Drive in radial oil seal with Special Tool 33 1 270.

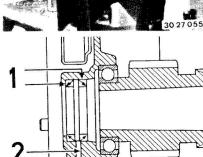
Manual Transmission:



331308

Tool 33 1 308.

Press in needle bearing with Special



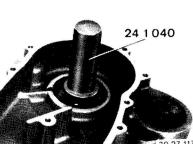
Automatic Transmission:

Two radial oil seals (1) are installed in the version for automatics, one each with its sealing lip facing out and in. Make sure that leak oil bore (2) is not covered. Radial oil seals can only be installed after disassembling the transfer box.





Automatic Transmission: Place O-ring on vent. Insert vent.



30 27 116

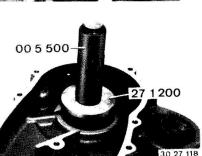
Automatic Transmission: Drive in radial oil seal (1) against the stop with Special Tool 24 1 040 - the

sealing lip faces out.

sealing lip faces in.

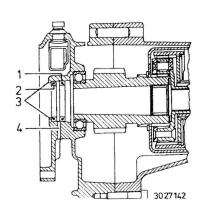


Install clamp. Install cap.



Automatic Transmission: Drive in radial oil seal (2) with Special Tools 27 1 200 and 00 5 500 - the

* See Operating Fluid Specifications * See Specifications



Automatic Transmission:

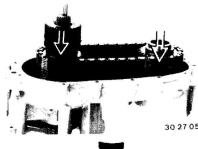
Bearing collar (3) is omitted on the case since 11.87 for assembling reasons.

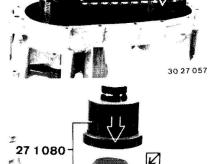
Radial oil seals can be installed from the outside.

Check installed position. Drive in radial oil seal (1) with Special

Tools 27 1 270 and 27 1 271 - sealing lip facing IN.

Drive in radial oil seal (2) with Special Tool 27 1 270 - sealing lip faces OUT. Leak oil bore (4) must not be covered.



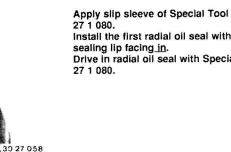


a plastic hammer at the same time. Important! Don't cant the chain.

Mount sprockets complete with chain

(check running direction if applicable).

Drive both sprockets into bearings with



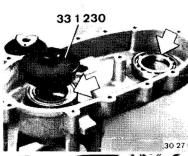
27 1 080. Install the first radial oil seal with the sealing lip facing in. Drive in radial oil seal with Special Tool 27 1 080.

Install the second radial oil seal with

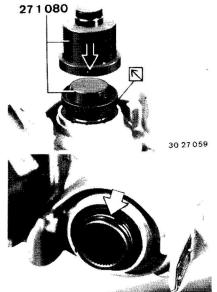
Drive in both radial oil seals with

the sealing lip facing out.

Special Tool 27 1 080.



Install both grooved ball bearings with Special Tool 33 1 230.

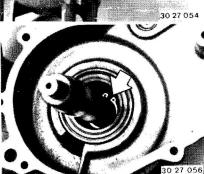


Note: The second radial oil seal is installed without a spiral spring. Parts only supplies radial oil seals with spiral springs. When replacing, it is therefore necessary to remove the spiral spring

30 27 060

Install circlip and O-ring.

for the outside radial oil seal.

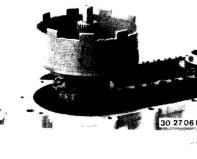


Manual Transmission: Place input shaft in case. Install circlip.

Note:

Heat case.

Input shaft is guided only by the radial oil seal or guide pin on the manual transmission.



Mount drive shell.

Oil grooves face the drive shell.



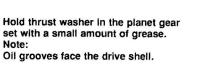
Install oil baffle plate.

Transfer Box Rear Section:

Install bolt with a bolt cement* for locking and sealing. Note: The vent is installed only after finishing

the main shaft.

the assembling procedures and filling some of the oil.



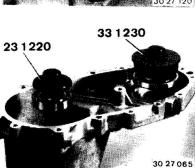


Install washer with curved surface facing down in the ball bearing seat for



Mount planet gear set.

Note:

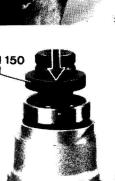


Heat rear case section. Install grooved ball bearing with Special Tool 33 1 230 or 23 1 220.



30 27 064

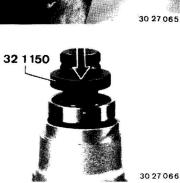
Install spacer and needle bearing.



Install grooved ball bearing with

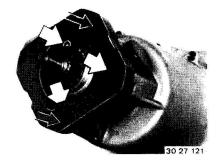
Special Tool 32 1 150.

* Source of Supply: HWB

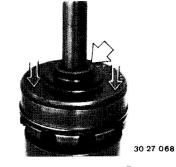




Insert output shaft in hollow gear wheel.
Install circlip.



Mount and screw on damper.



Mount visco clutch and washer.

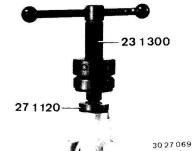


Coat threads with a bolt cement**. Important!
Use a new collar nut.

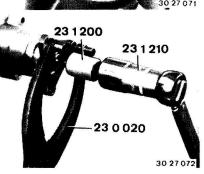
Screw on new collar nut.

Apply Special Tool 23 1 200.

Mount output flange.



Insert output shaft in case. Apply Special Tools 27 1 120 and 23 1 300. Pull output shaft into case.



23 0 020.
Tighten collar nut with Special Tool 23 1 210.
Tightening torque*.

Hold output flange with Special Tool



Install radial oil seal with Special Tool 27 1 090.



Lock collar nut in the provided recess.



See Specifications Source of Supply: HWB



unit (such as case, bearings, shafts, sprocket, planet gear set, visco clutch or shims) had been replaced.

The thickness of shim (1) has to be determined

again, if parts of the input/rear output shaft

Note:

Install gasket.

Install old shim.

on front case section.

Note: The distance on the rear case section must always be larger than that on the front case section, in order to have play between the input and output shafts. Adjust gap to 0.4 ... 0.6 mm (0.016 to 0.024")

Determine size of gap*.

Distance on rear section

Distance on front section - 100.9 mm (3.972")

101.5 mm (3.996")

0.6 mm (0.024")

Example:

Size of gap

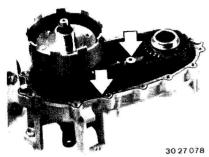
by replacing shim (1). Shims are available from 1.5 to 3.0 mm (0.059 to 0.118") thick in steps of 0.3 mm (0.012").

* See Specifications

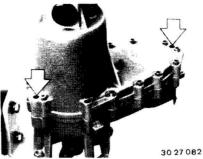
30 27 075

Measure distance from bearing surface for shim to sealing surface on rear case section.

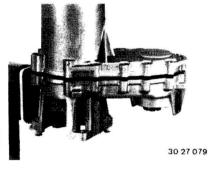
Measure distance from shim to sealing surface



Install gasket and seal.



Drive in dowel pins.



Mount rear case on front case section.



Tighten bolts in several steps.
Tightening torque*.

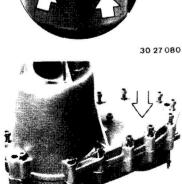


Turn the output flange (while holding the input flange) to have the planet gear set mesh.

Pins on the drive shell must engage in recesses of the visco clutch.



Pour in oil*.

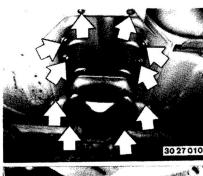


30 27 081

Insert bolts (bolts have different lengths).

Drive the case sections together by applying light knocks with a plastic hammer in the front output shaft end area.

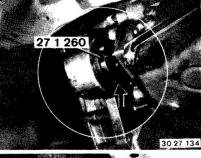
Pour part of the oil (0.06 dm³) into the vent bore after removing the vent of a removed transmission in case of a completely drained transmission, e.g. after disassembling a transmission. This will guarantee the supply of oil to the rear transmission section when operated initially. The remaining amount of oil should be poured in through the filler neck after installation of the transmission. If too much oil is poured in through the vent, it will flow via the baffle plate to the front axle drive and does not have to be compensated there. Always replace a vent, which has been removed.



23 71 003 REPLACING RUBBER MOUNTS FOR TRANSMISSION SUSPENSION

- Transfer Box Installed -(Cars with Manual or Automatic Transmission)

Remove exhaust assembly and heat shields.



Removal:

Apply plate from Special Tool 27 1 260.

and plate against stop.



Support transmission from underneath. Unscrew cross member. Installation: Bolts differ in length. Tightening torque*.



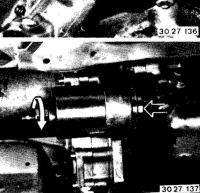
Screw spindle into threads of rubber mount



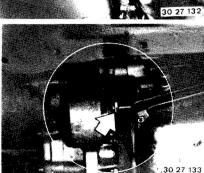
Lower transmission. Important! Lower an automatic transmission only enough that the shift operating cable is without tension.



Apply bushing and spindle nut.



Pull out rubber mount.



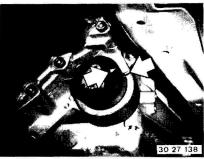
Installation: Screw on nut again before pressing in a new rubber mount.

* See Specifications

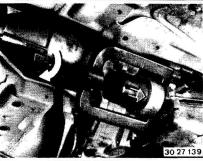
Cars with Automatic Transmission:

transmission connection.

Unscrew nut on transfer box/automatic



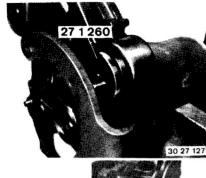
Installation:
Mount new rubber mount.
Arrow on case must be aligned with mark (bead) on rubber mount.
Protruding inner bushing faces toward



Apply Special Tool 27 1 190.



Press in rubber mount flush with transmission case



23 71 503 REPLACING RUBBER MOUNT FOR TRANSMISSION SUSPENSION - Transfer Box Removed -(Cars with Manual or Automatic

Transmission)

Removal:

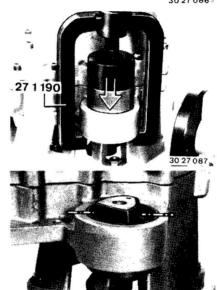
Apply plate from Special Tool 27 1 260.



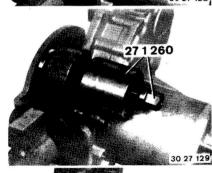
Installation: Mount new rubber mount. Arrow on case must be aligned with mark (bead) on rubber mount. Protruding inner bushing faces back.



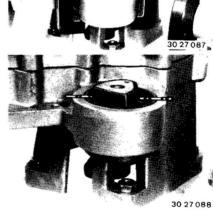
Screw spindle into threads of rubber mount AND plate against the stop.



Apply Special Tool 27 1 190.



Apply bushing and spindle nut.



Press in rubber mount flush with transmission

30 27 130

Pull out rubber mount.