

2002-05 MANUAL TRANSMISSION

Overhaul - MINI Cooper

APPLICATION

MANUAL TRANSMISSION APPLICATION

Application	Transmission
Cooper (W10)	R65

DESCRIPTION

For description and overview of MINI Cooper manual transmission and components, see **MANUAL TRANSMISSION - OVERVIEW** article.

LUBRICATION

For lubrication specifications, see **LUBRICATION** .

ON-VEHICLE SERVICE

For components that are serviceable with transmission in vehicle, see **MANUAL TRANSMISSION - ON-VEHICLE SERVICING** article.

TROUBLESHOOTING

See **MANUAL TRANSMISSION - OVERVIEW** article.

REMOVAL, INSTALLATION, DISASSEMBLY & REASSEMBLY

For transmission removal and installation, see **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article.

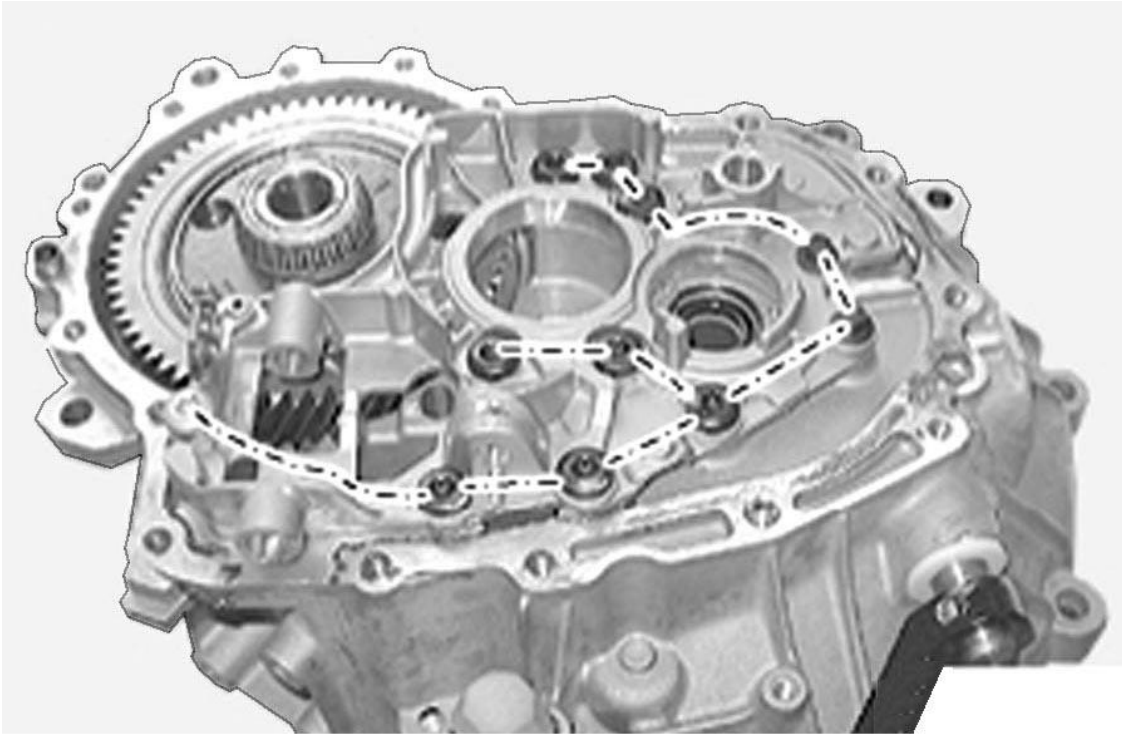
CLUTCH HOUSING

NOTE: Numbers in text refer to numbers in figures.

Removal & Installation

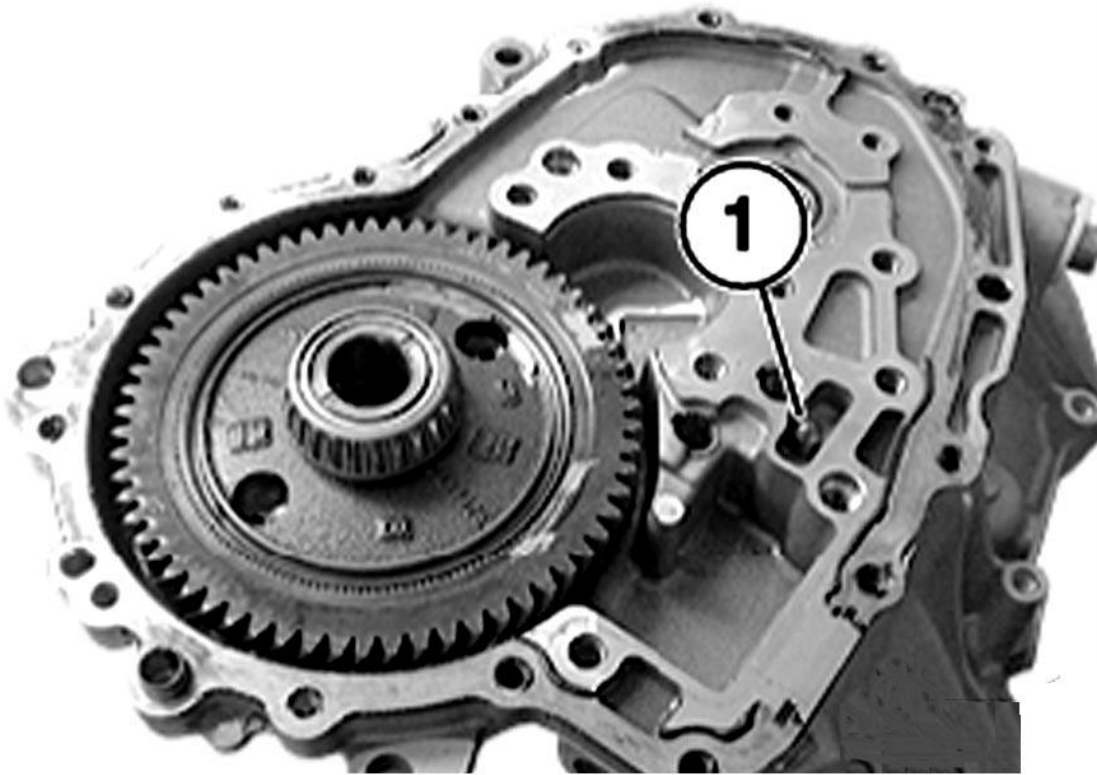
Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove **CLUTCH RELEASE UNIT** . Remove **CLUTCH LEVER** . Remove **SHIFT SHAFTS/SHIFT FORKS** . Remove bolts along marked line and remove intermediate plate. See **Fig. 1** . During installation, note installation position of bolts. Apply Loctite 5999 sealing compound. Replace clutch housing and intermediate plate as a single unit only. Remove locking piston (1) and spring. See **Fig. 2** . Lift differential (1) out of clutch housing. See **Fig. 3** . Differential must be fitted with new bearings when clutch housing is replaced. See

DIFFERENTIAL TAPER ROLLER BEARING .



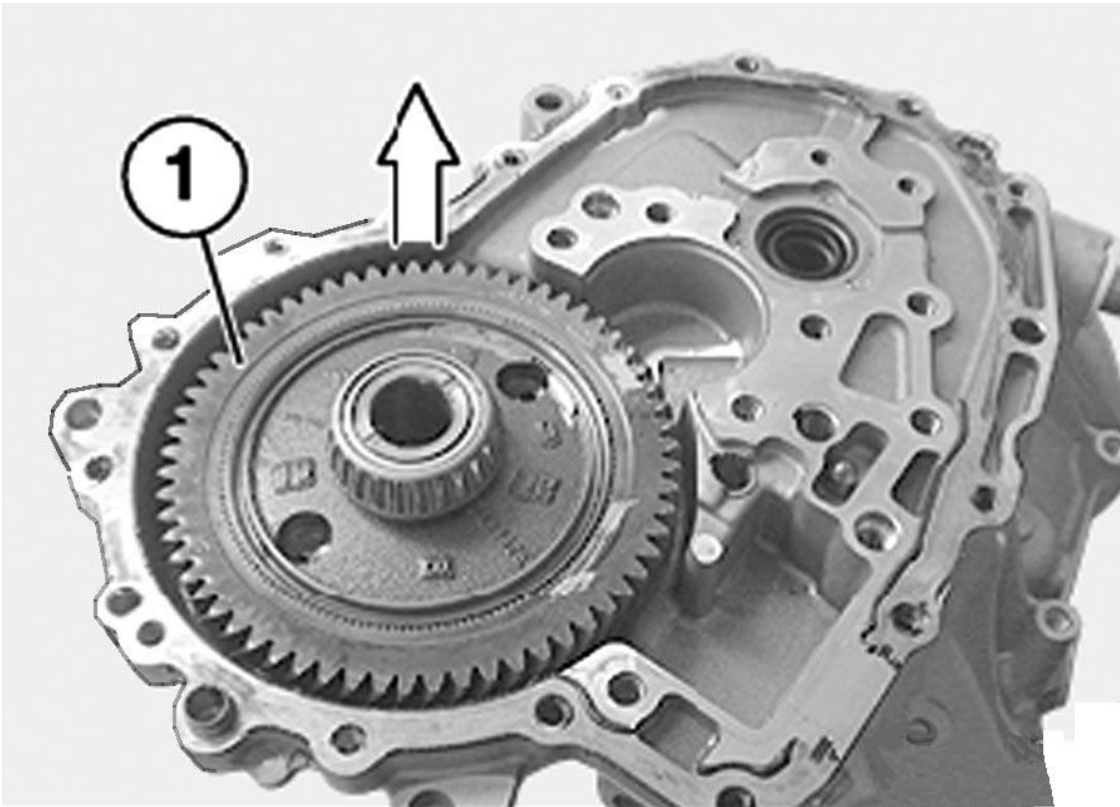
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Fig. 1: Removing Bolts Along Marked Line
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 2: Removing Locking Piston & Spring
Courtesy of BMW OF NORTH AMERICA, INC.



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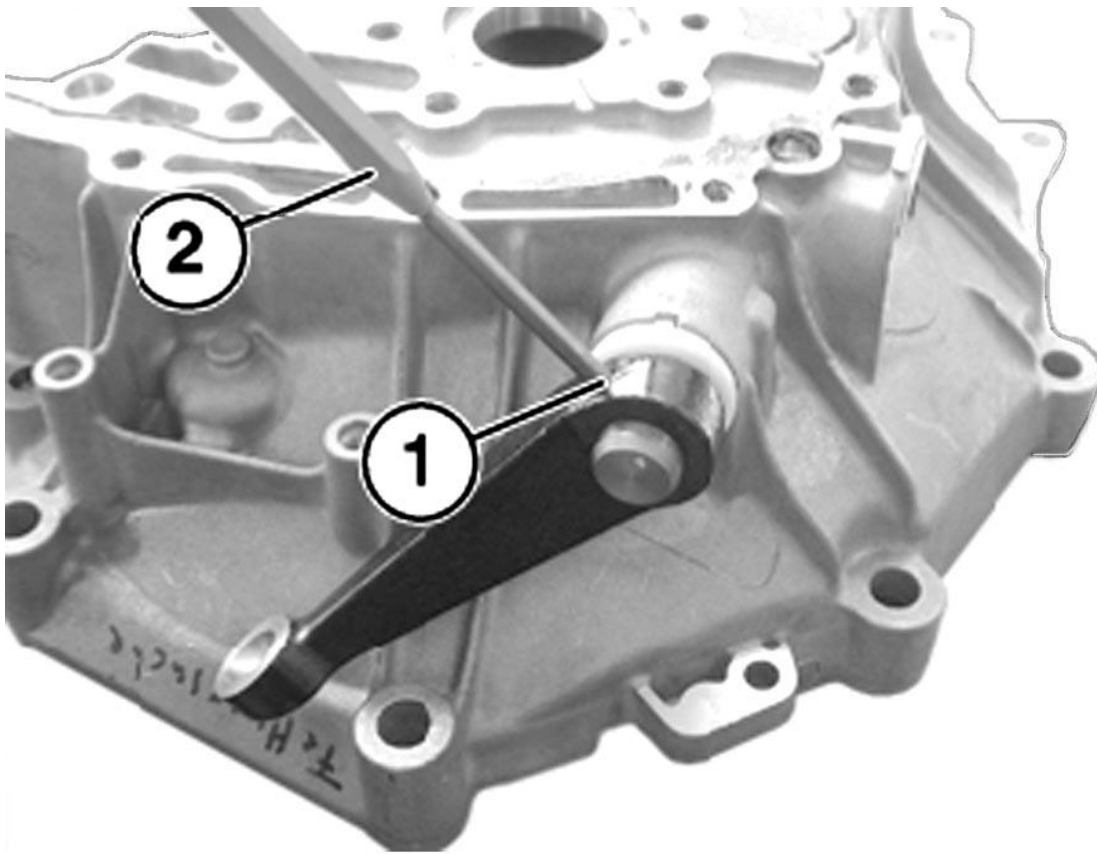
Fig. 3: Lifting Differential Out Of Clutch Housing
Courtesy of BMW OF NORTH AMERICA, INC.

CLUTCH LEVER

NOTE: Numbers in text refer to numbers in figures.

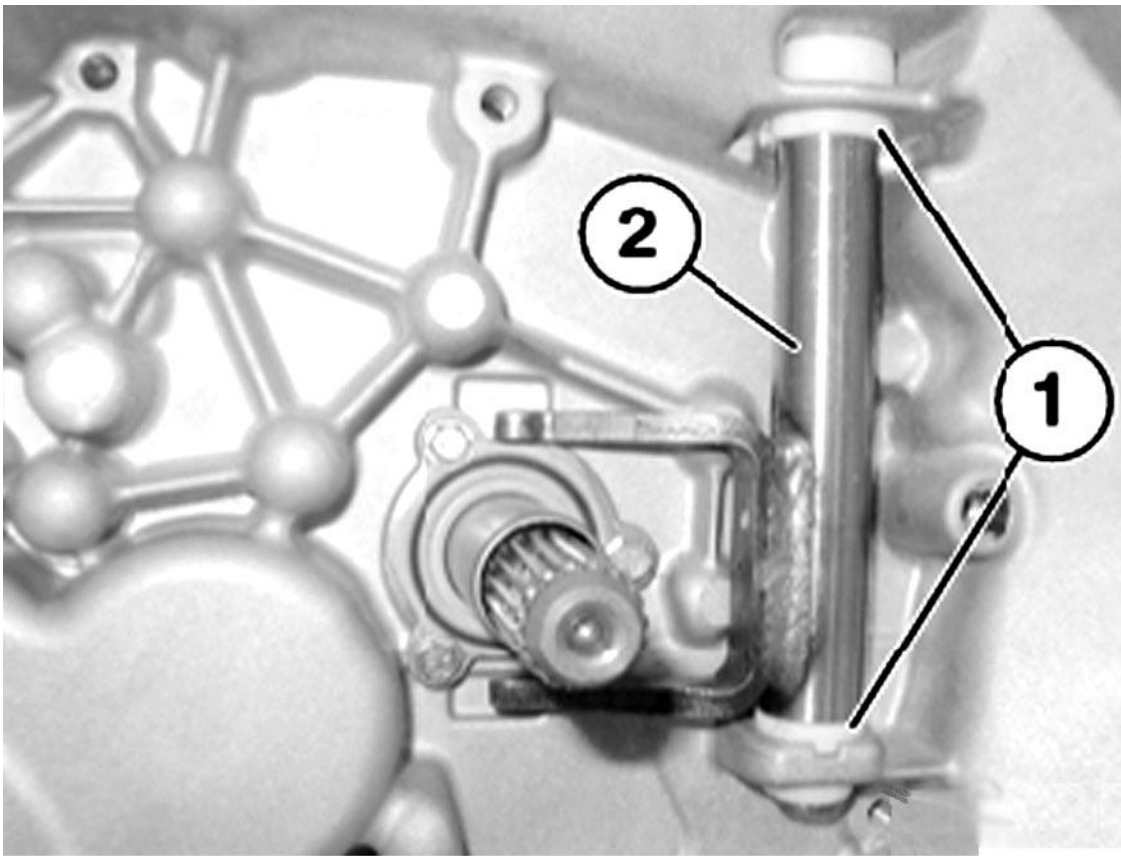
Removal & Installation

Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove **CLUTCH RELEASE UNIT**. Drive out locating pin (1) with punch (2). See **Fig. 4**. To install, replace locating pin. Unlock bearing bushings (1). Remove clutch lever (2). See **Fig. 5**.



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Fig. 4: Driving Out Locating Pin With Punch
Courtesy of BMW OF NORTH AMERICA, INC.



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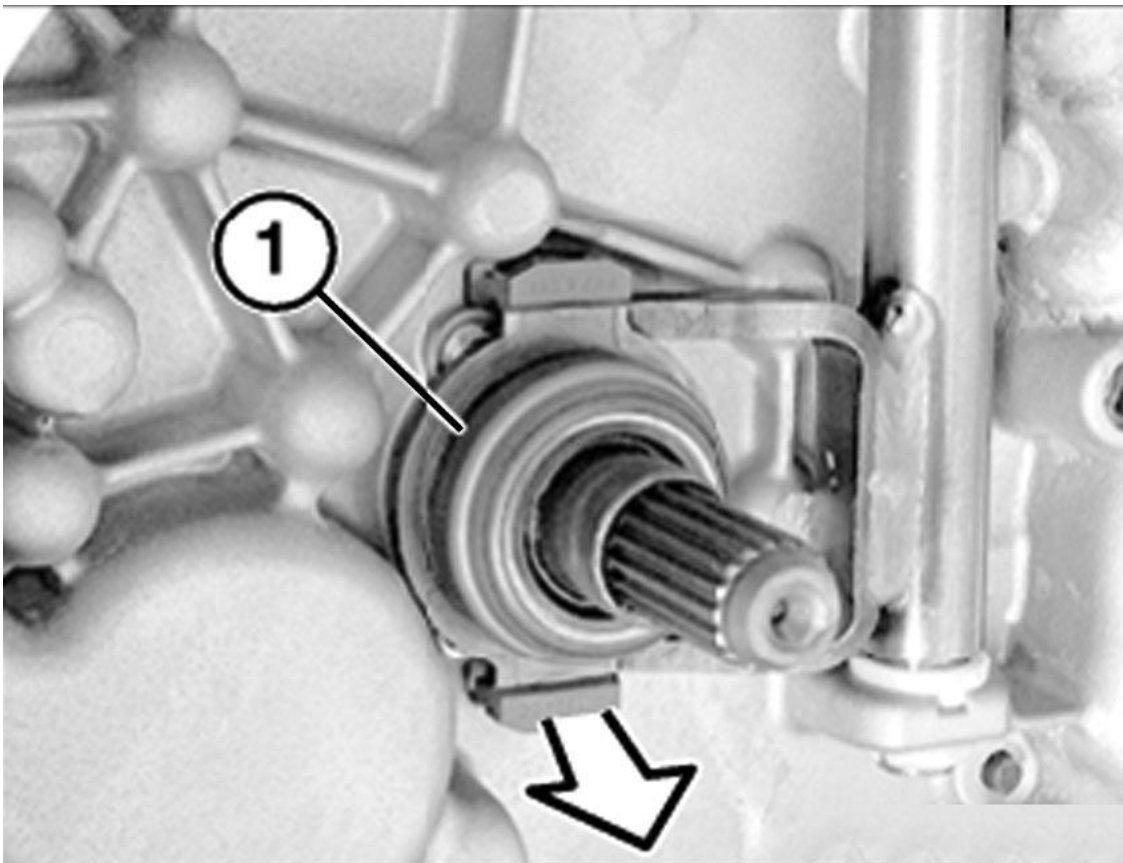
Fig. 5: Unlocking Bearing Bushings & Removing Clutch Lever
Courtesy of BMW OF NORTH AMERICA, INC.

CLUTCH RELEASE UNIT

NOTE: Numbers in text refer to numbers in figures.

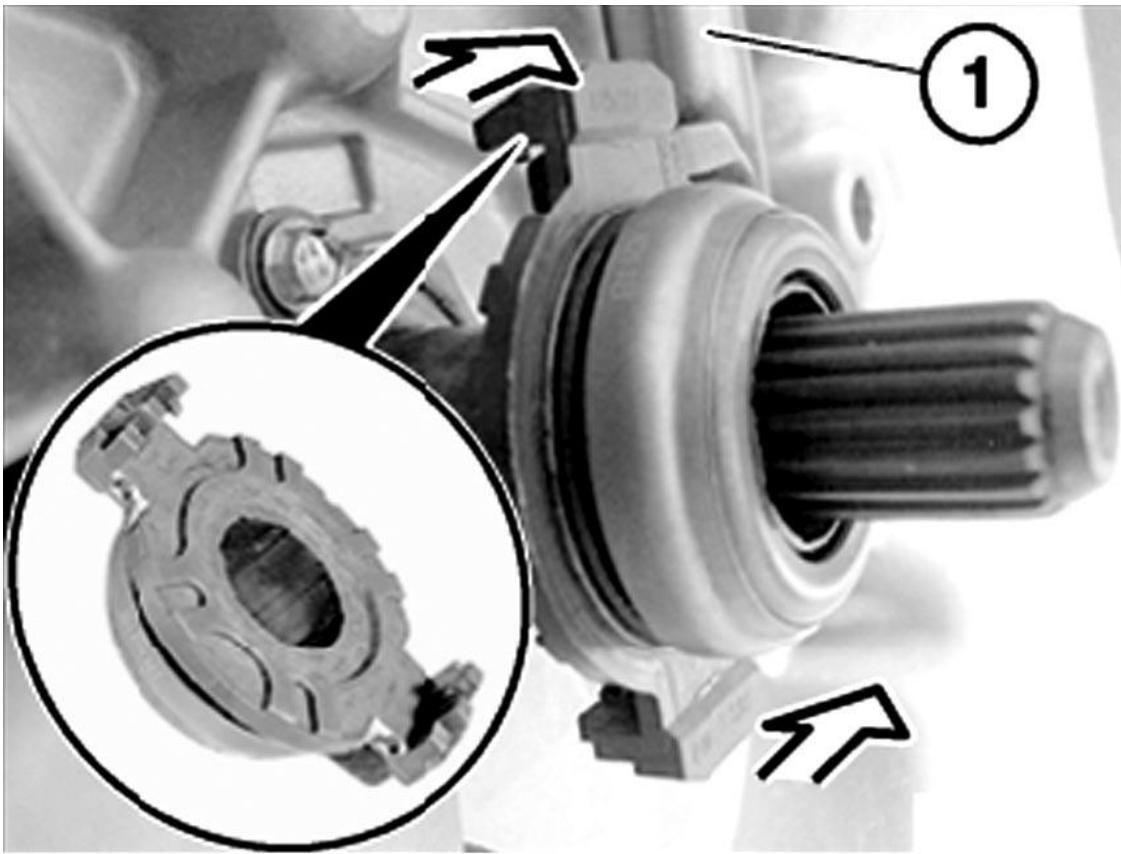
Removal & Installation

Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. When installing a new clutch, you must also replace the release bearing. Remove release bearing (1) from release lever. See **Fig. 6** . During installation, clean all sliding surfaces. Apply a thin film of Unirex S2 lubricant to inner sleeve of bearing on GS 5-65 BH/SH Midland 5-speed up to 07-04. Clip bearing onto release lever (1). See **Fig. 7** .



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Fig. 6: Removing Release Bearing From Release Lever
Courtesy of BMW OF NORTH AMERICA, INC.



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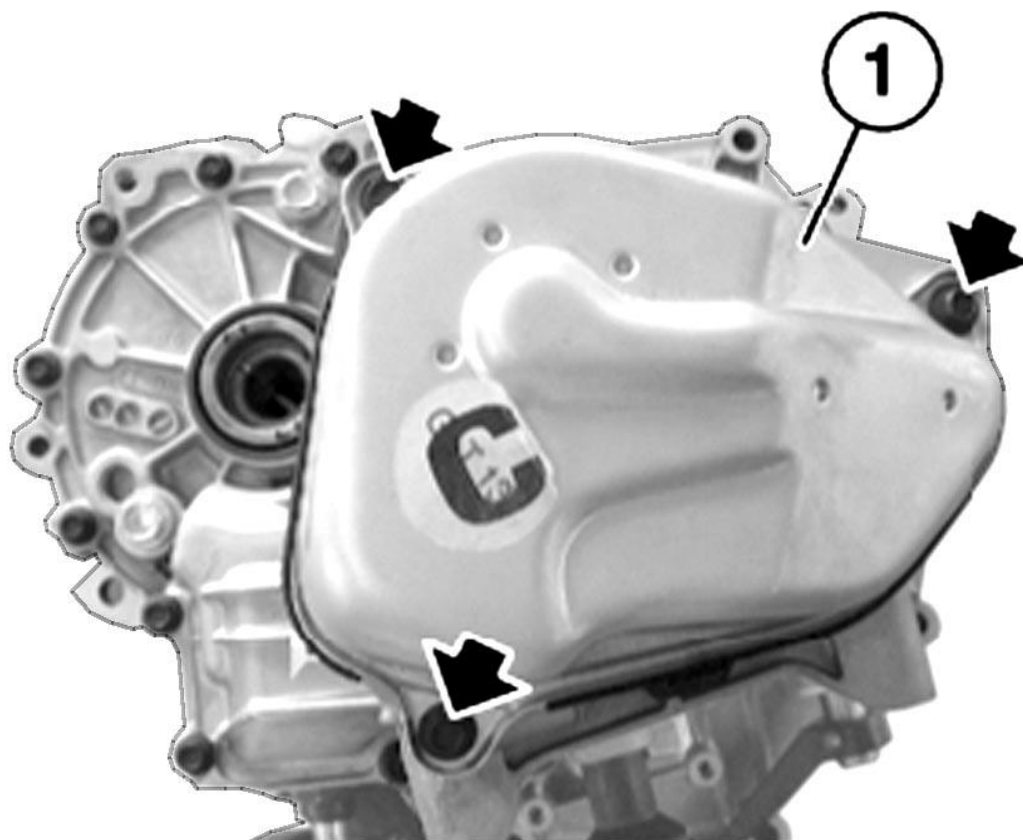
Fig. 7: Clipping Bearing Onto Release Lever
Courtesy of BMW OF NORTH AMERICA, INC.

COVER/5TH GEAR

NOTE: Numbers in text refer to numbers in figures.

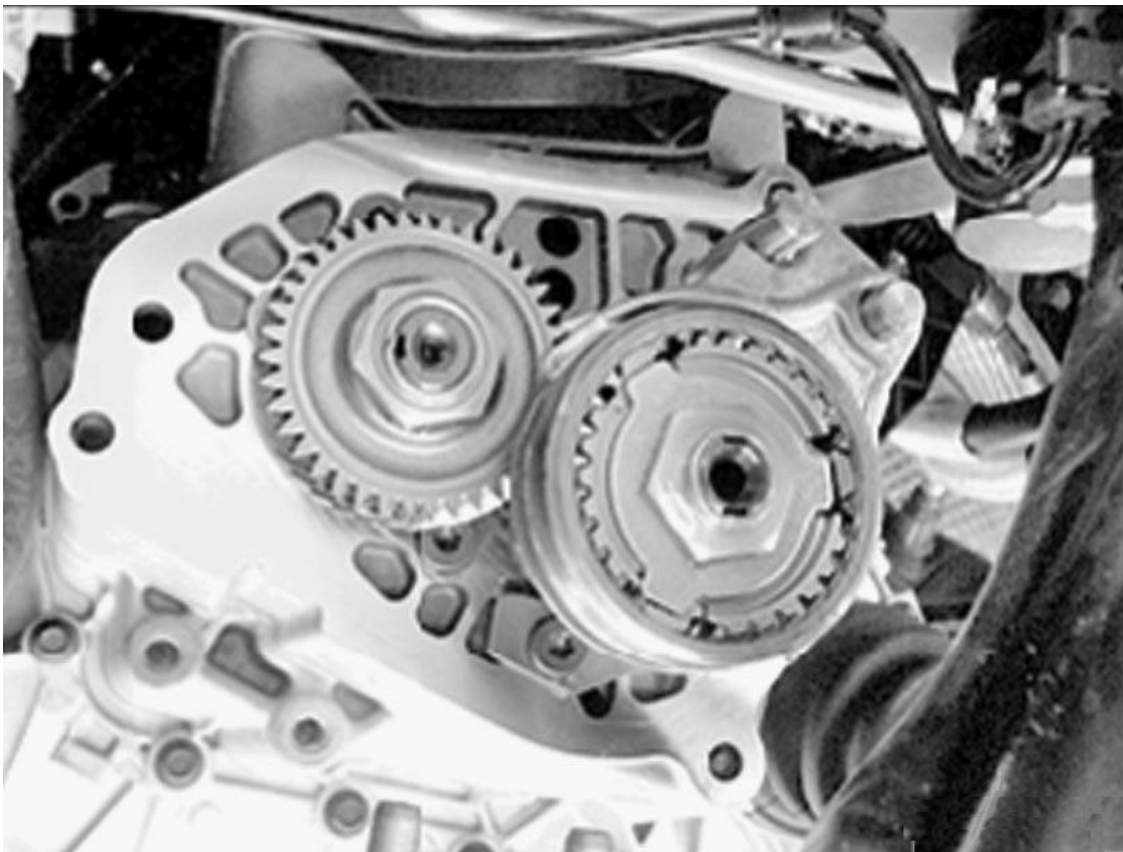
Removal & Installation

Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove engine protection. Drain off transmission oil. Remove wheel arch trim for front left wheel. Remove front left ABS sensor from front end module. See ANTI-LOCK BRAKES. Remove mounting bolts (1) from cover/5th gear. See **Fig. 8** . Remove cover/5th gear (2). Clean sealing surface. Examine sealing face for damage. Examine cover/5th gear for damage. See **Fig. 9** . Replace seal (1) for cover/5th gear. See **Fig. 10** . Reinstall cover/5th gear. See **TORQUE SPECIFICATIONS** . Refill transmission. Check for leaks.



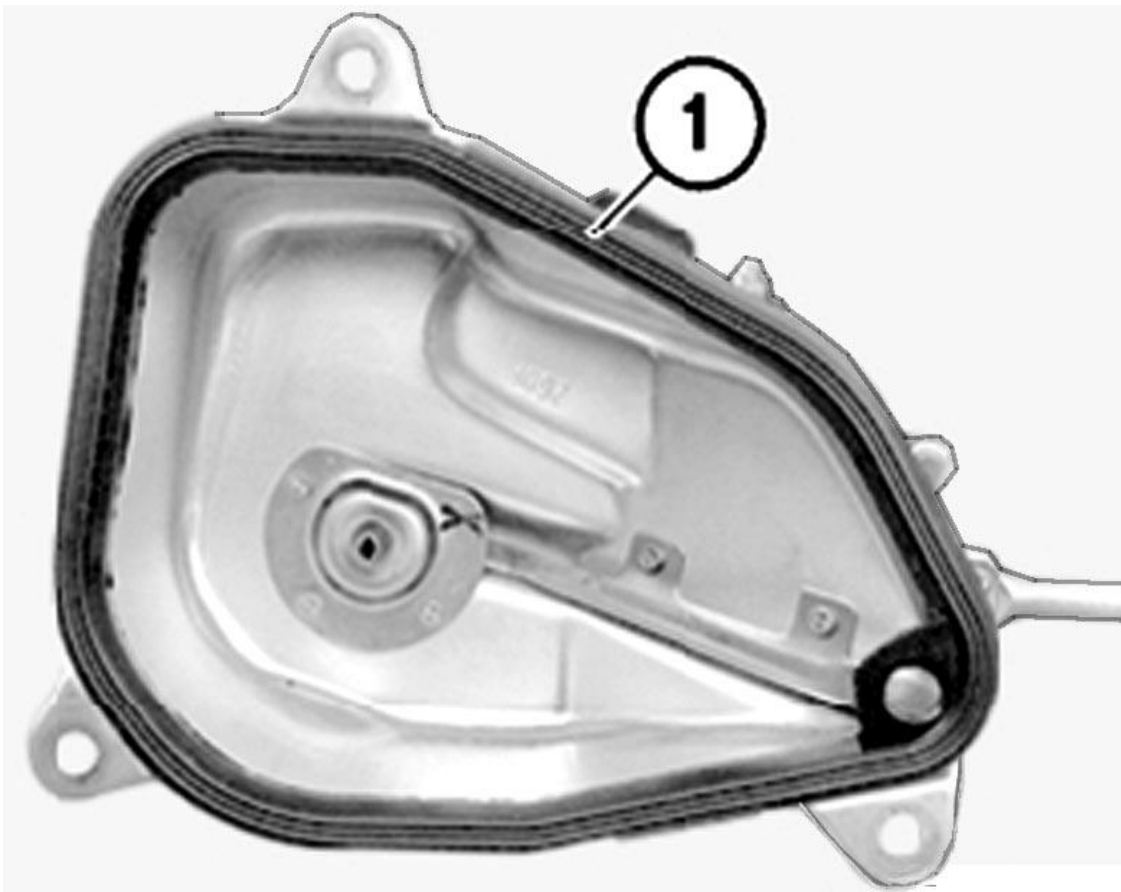
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Fig. 8: Removing Transmission Cover
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 9: Cleaning Sealing Face & Checking For Damage
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 10: Replacing Gasket

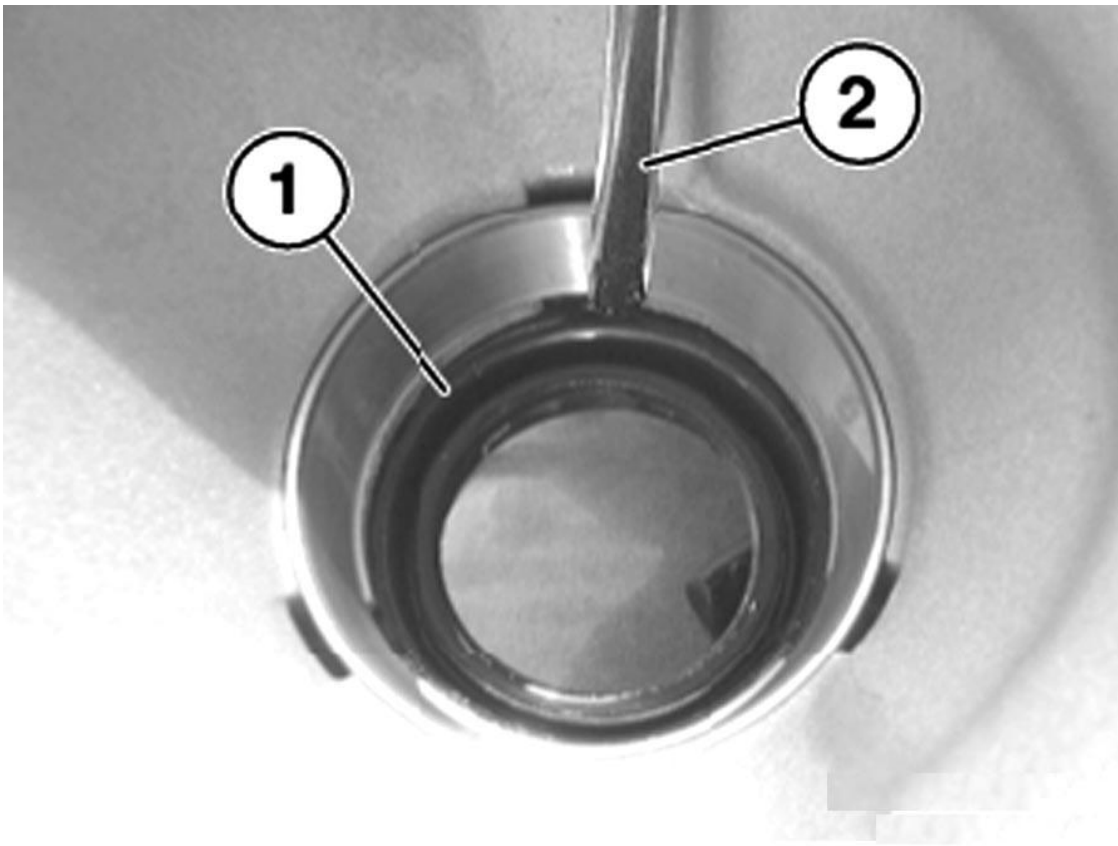
Courtesy of BMW OF NORTH AMERICA, INC.

DIFFERENTIAL SHAFT SEAL

NOTE: Numbers in text refer to numbers in figures.

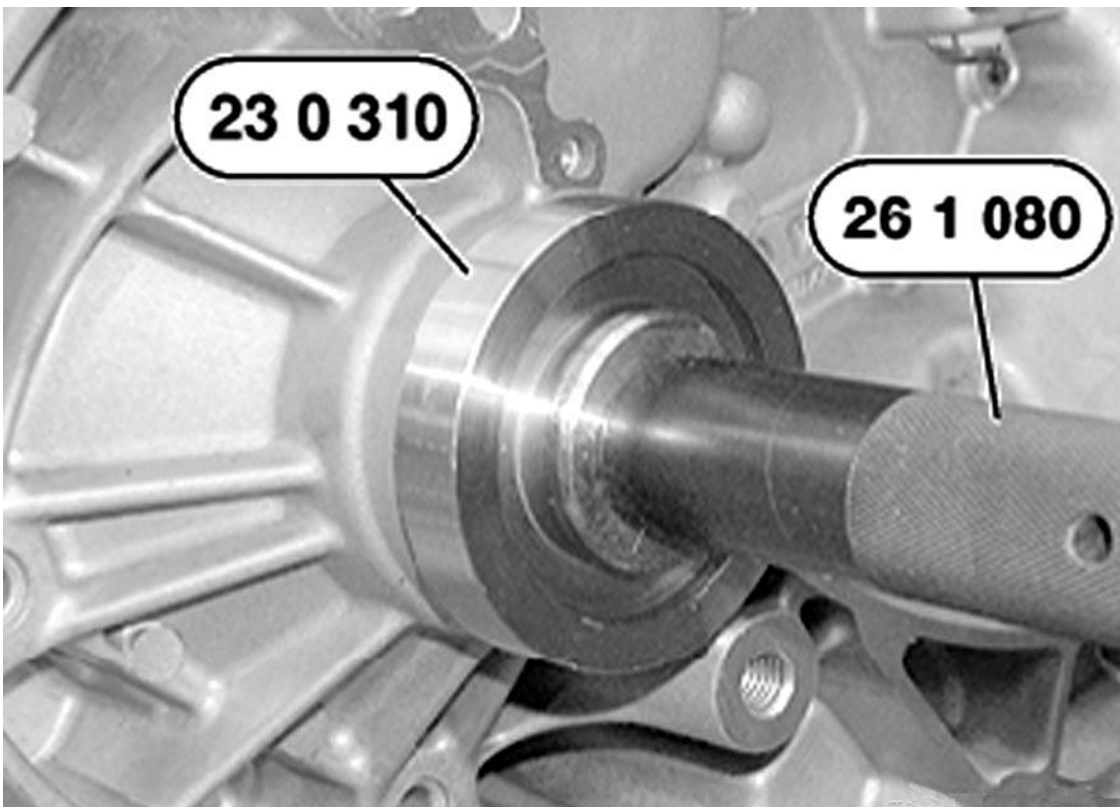
Removal & Installation

Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove differential. See DIFFERENTIALS & AXLE SHAFTS . Drive out shaft seal (1) with punch (2). See **Fig. 11** . To install, lubricate seal with clean gear oil. Drive shaft seal into housing with special tools (23 0 310) and (26 1 080). See **Fig. 12** . Installation is reverse of removal.



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Fig. 11: Driving Out Shaft Seal With Punch
Courtesy of BMW OF NORTH AMERICA, INC.



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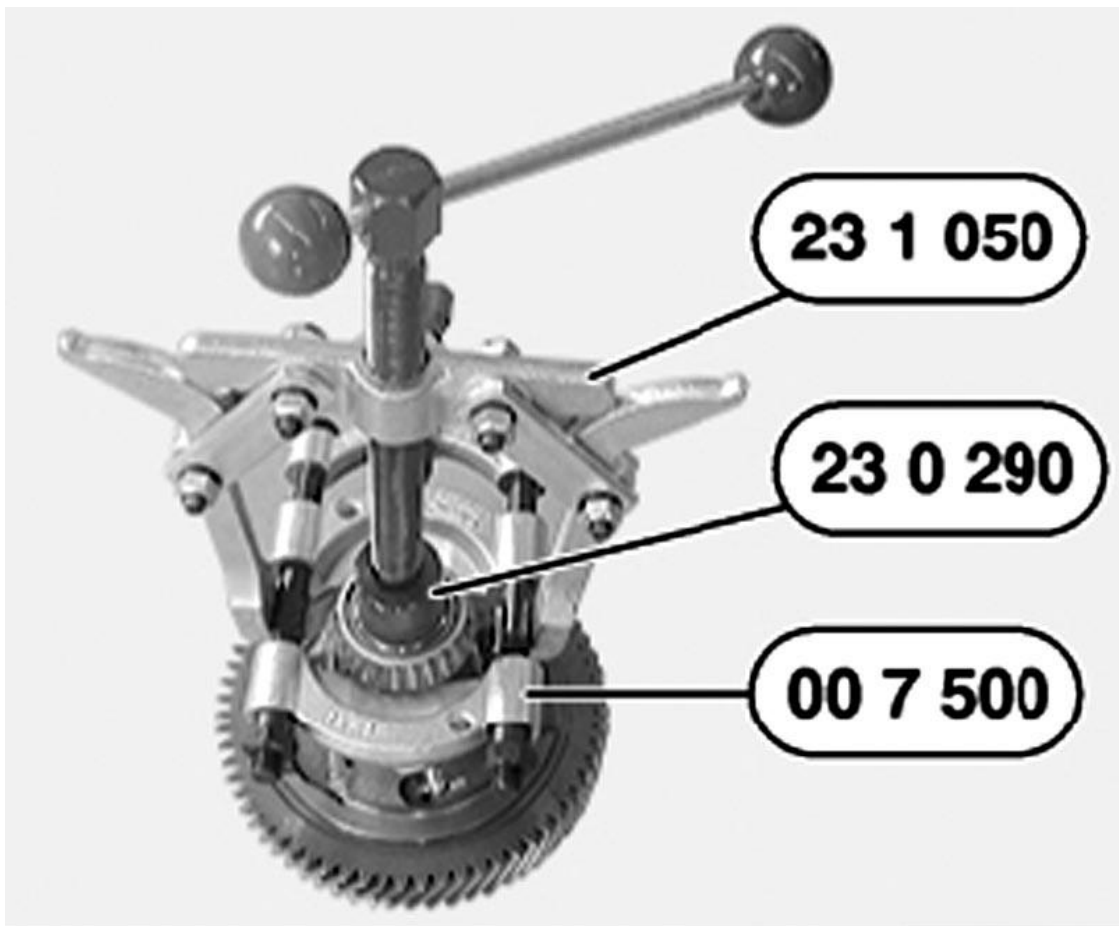
Fig. 12: Driving Shaft Seal Into Housing
Courtesy of BMW OF NORTH AMERICA, INC.

DIFFERENTIAL TAPER ROLLER BEARING

NOTE: Numbers in text refer to numbers in figures.

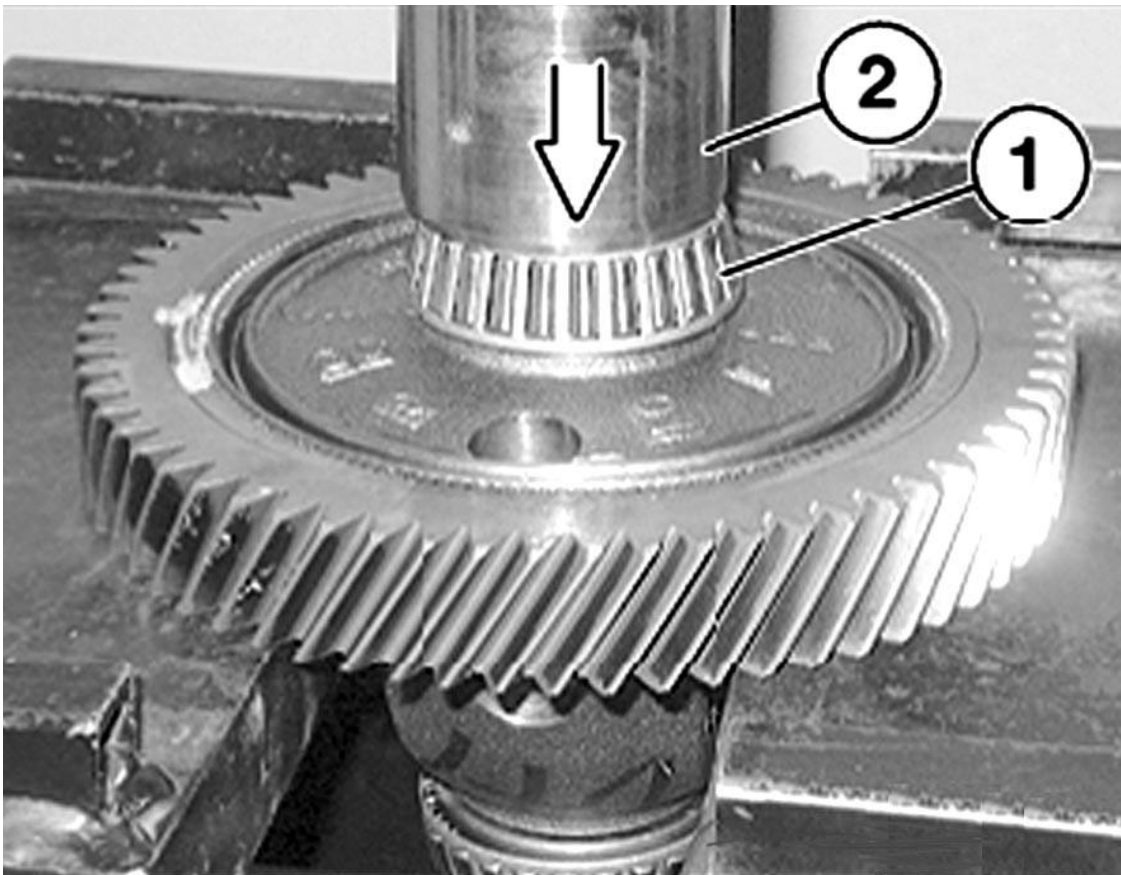
Removal & Installation

1. Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove differential. See DIFFERENTIALS & AXLE SHAFTS . Install special tool (00 7 500) between differential housing and taper roller bearing. Detach taper roller bearing with thrust piece (23 0 290) and extractor tool (23 1 050). See **Fig. 13** . **Note:** Replace taper roller bearings in pairs only with bearing outer races and shaft seals.
2. Press taper roller bearing (1) onto differential housing with hydraulic press (2). See **Fig. 14** . During installation, lubricate components with clean gear oil. Drive out differential shaft seal (1) with punch (2). See **Fig. 15** . Drive out bearing outer race (1) with punch (2). During installation, ensure larger race diameter points upward. Using a soft metal driver, gradually drive bearing outer race into housing. See **Fig. 16** .



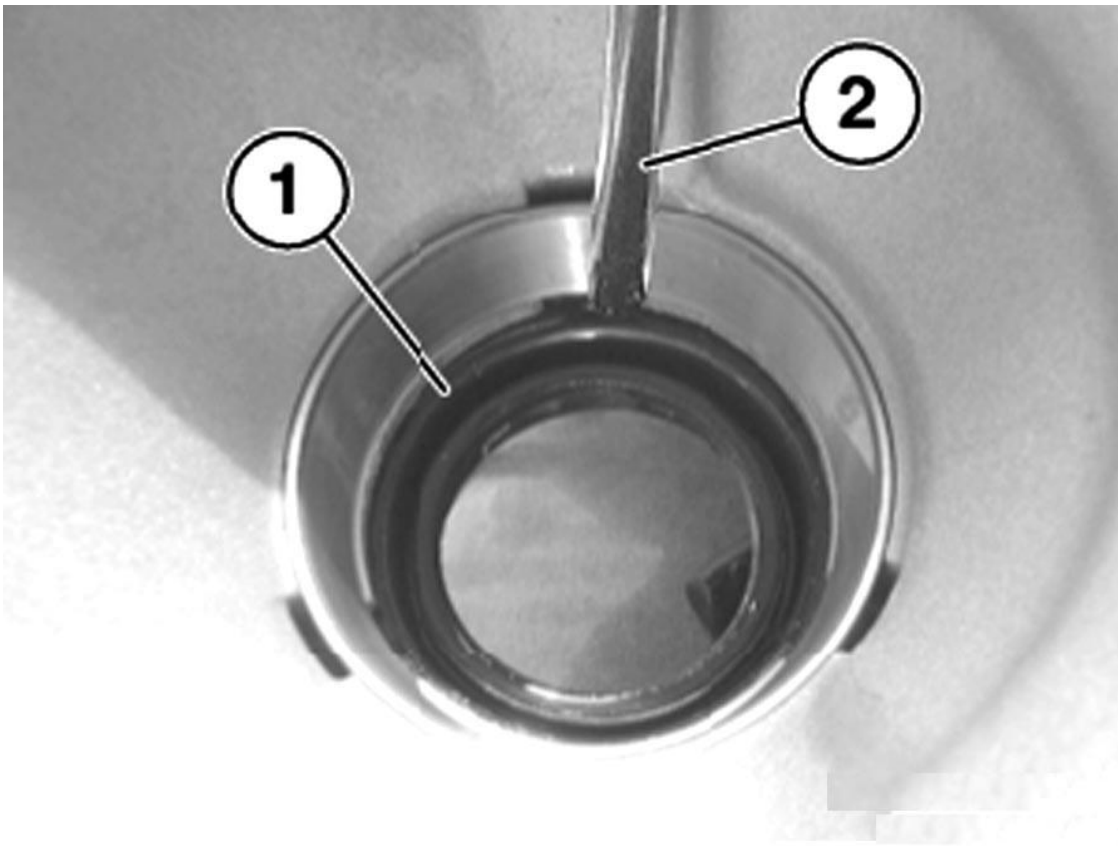
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Fig. 13: Installing Special Tools On Differential Housing
Courtesy of BMW OF NORTH AMERICA, INC.



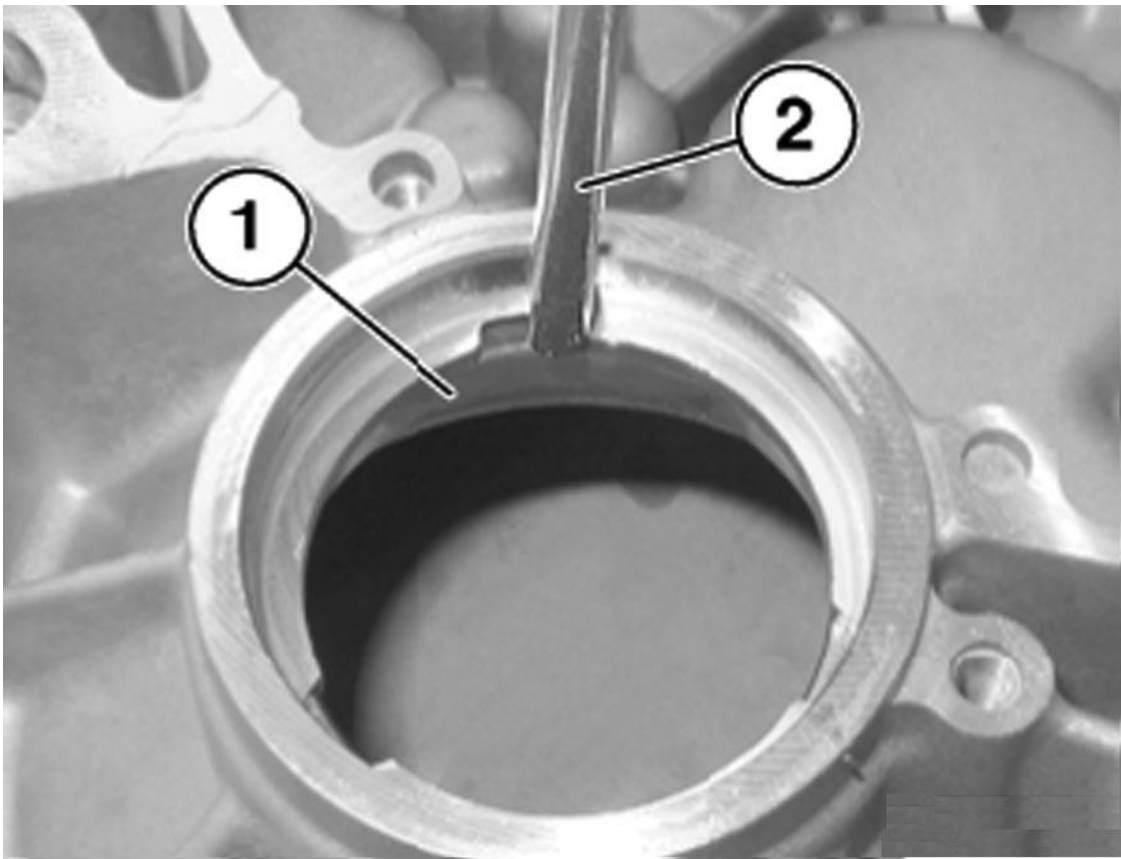
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Fig. 14: Pressing Taper Roller Bearing Onto Differential Housing
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 15: Driving Out Differential Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.



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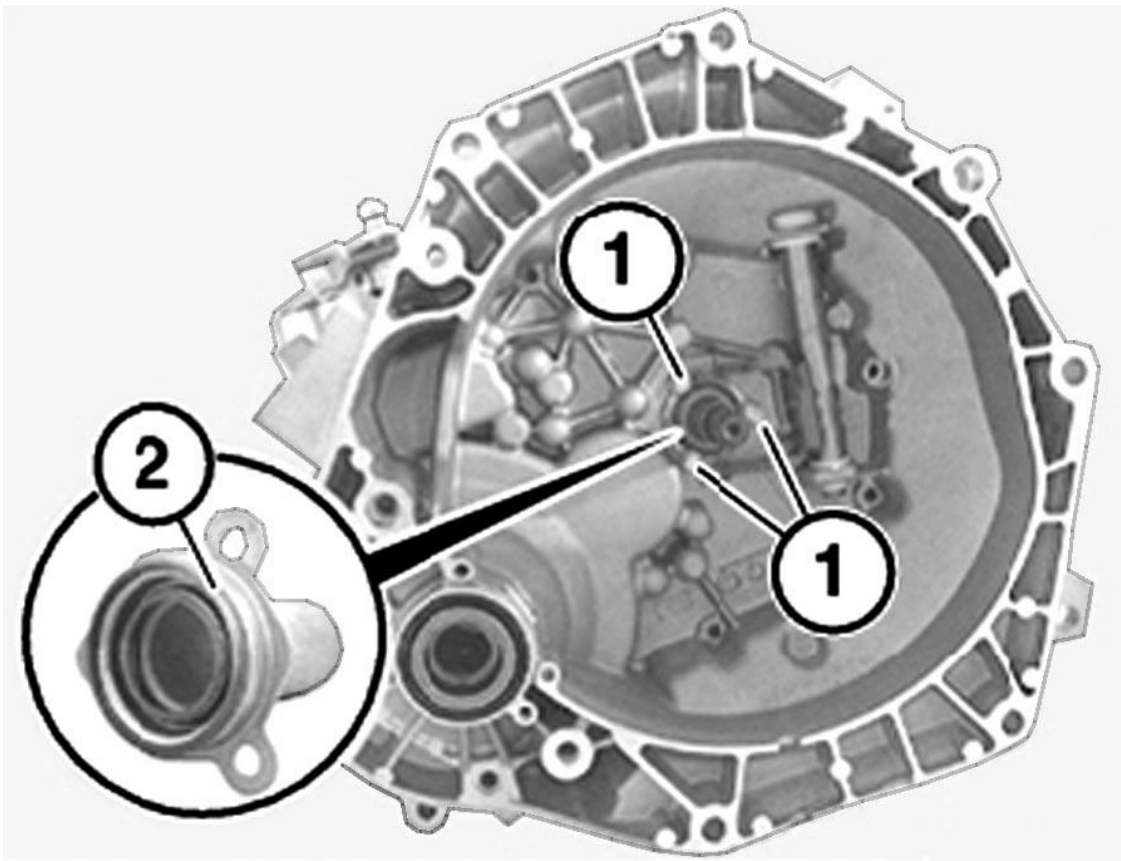
Fig. 16: Driving Bearing Outer Race Into Housing
Courtesy of BMW OF NORTH AMERICA, INC.

DRIVE (INPUT) SHAFT RADIAL SEAL

NOTE: Numbers in text refer to numbers in figures.

Removal & Installation

Remove transmission . See **MANUAL TRANSMISSION** article. Remove clutch release bearing. Release bolts (1) and remove guide tube (2). See **Fig. 17** . Shaft seal and guide tube are replaced together. During installation, wrap adhesive tape around keyway splines of drive shaft to avoid damaging the sealing ring while it is being installed. Lubricate sealing lip of sealing ring. Replace retaining screws of guide bushing.



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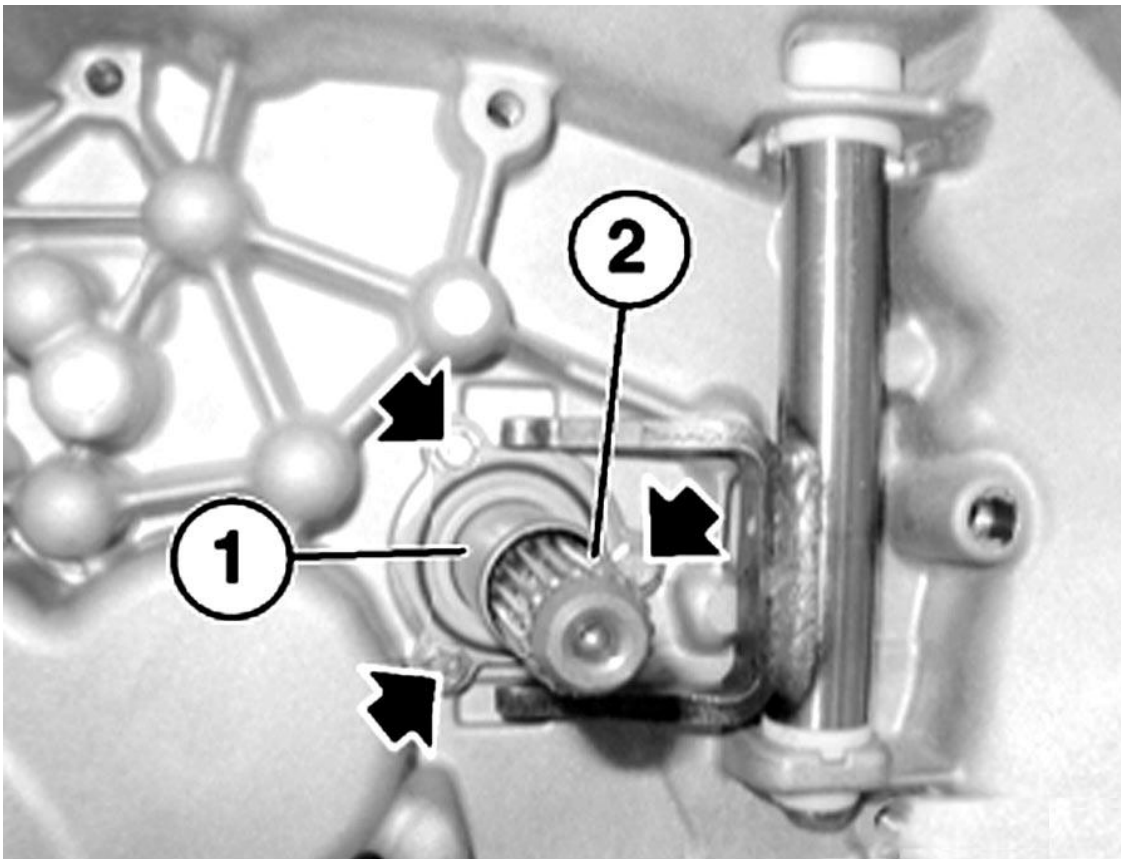
Fig. 17: Removing Bolts & Guide Tube
Courtesy of BMW OF NORTH AMERICA, INC.

GUIDE TUBE FOR CLUTCH RELEASE UNIT

NOTE: Numbers in text refer to numbers in figures.

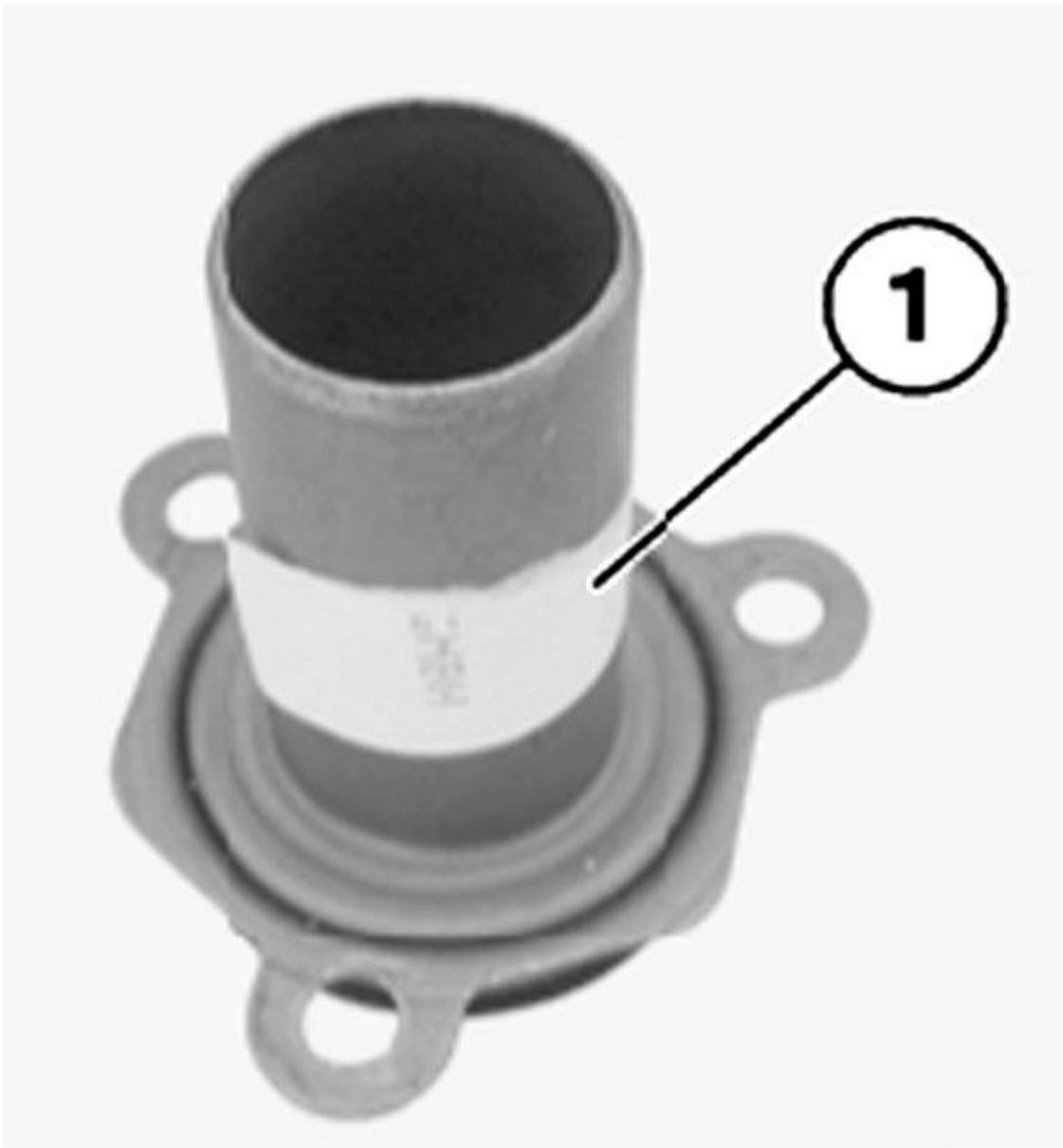
Removal & Installation

1. Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove **CLUTCH RELEASE UNIT**. Unfasten screws. Remove guide tube (1).
2. During installation, wrap spline teeth (2) of input shaft in adhesive tape to protect seal. See **Fig. 18**. Lubricate seal with gear oil. Clean thread. Replace screws. Insert with Loctite 243. Remove sticker (1) and all adhesive residue with a suitable solvent. See **Fig. 19**.



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Fig. 18: Removing Guide Tube & Wrapping Spline Teeth
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 19: Removing Sticker

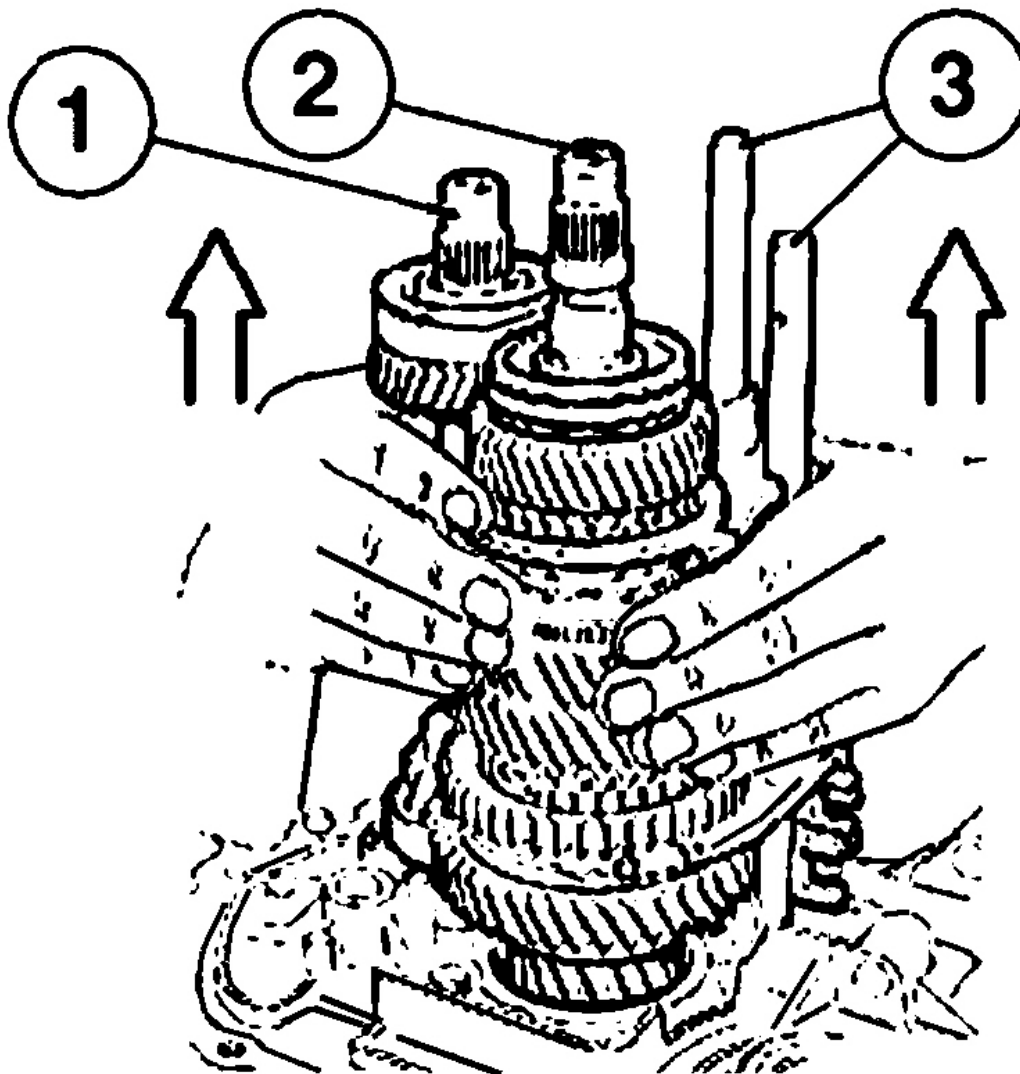
Courtesy of BMW OF NORTH AMERICA, INC.

INPUT SHAFT

NOTE: Numbers in text refer to numbers in figures.

Removal & Installation

Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove **LOCKING BODY/REVERSE GEAR FORK** . Lift input shaft (1) and output shaft (2) together with shift shafts (3) and shift forks out of clutch housing. See **Fig. 20** . When installing, check parts for damage/wear and replace if necessary. Bearings must be replaced in pairs. See **INPUT & OUTPUT SHAFT BEARINGS** .



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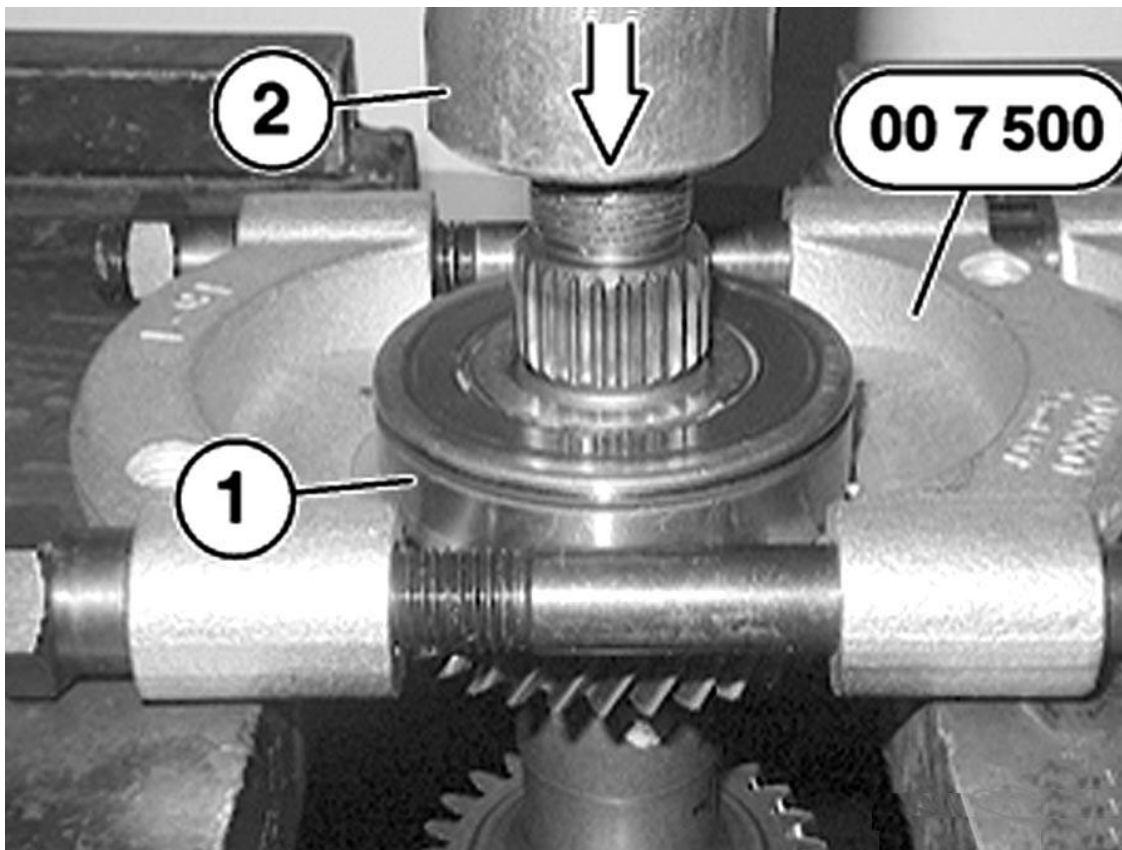
Fig. 20: Lifting Input Shaft, Output Shaft, Shift Shafts & Shift Forks
Courtesy of BMW OF NORTH AMERICA, INC.

INPUT & OUTPUT SHAFT BEARINGS

NOTE: Numbers in text refer to numbers in figures.

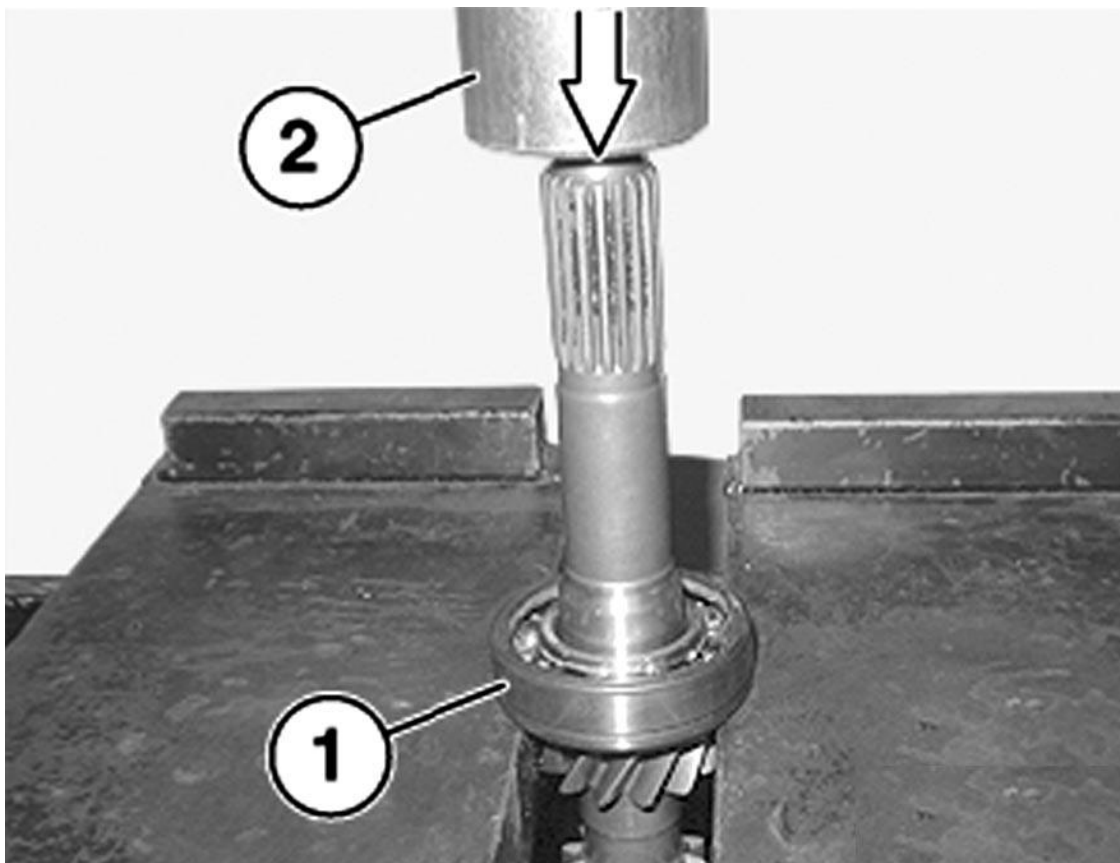
Removal & Installation

1. Remove transmission. For transmission removal and installation, see **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove **SHIFT SHAFTS/SHIFT FORKS** . Install special tool (00 7 500) between gear wheel/4th gear and input shaft bearing. Press off bearing (1) with hydraulic press (2). See **Fig. 21** . During installation, note installation position of bearings. Wide groove must point upwards. Bearing and snap rings must be replaced. Bearings may only be replaced in pairs. Position input shaft group on press so that sides of bearing are supported by press. Press off bearing (1) with hydraulic press (2). See **Fig. 22** .
2. Note installation position of bearings. Bearings must be replaced in pairs. Install special tool (00 7 500) between gear wheel/4th gear and output shaft bearing. Press off bearing (1) with hydraulic press (2). See **Fig. 23** . Note installation position of bearings. Wide groove must point upward. Bearing and snap rings must be replaced. Bearings may only be replaced in pairs. Position output shaft group on press so that sides of bearing are supported by press. Press off bearing (1) with hydraulic press (2). See **Fig. 24** . Note installation position of bearings. Bearings must be replaced. Place a sleeve between output shaft and press so as not to damage the nylon insert for lubrication. Bearings may only be replaced in pairs.



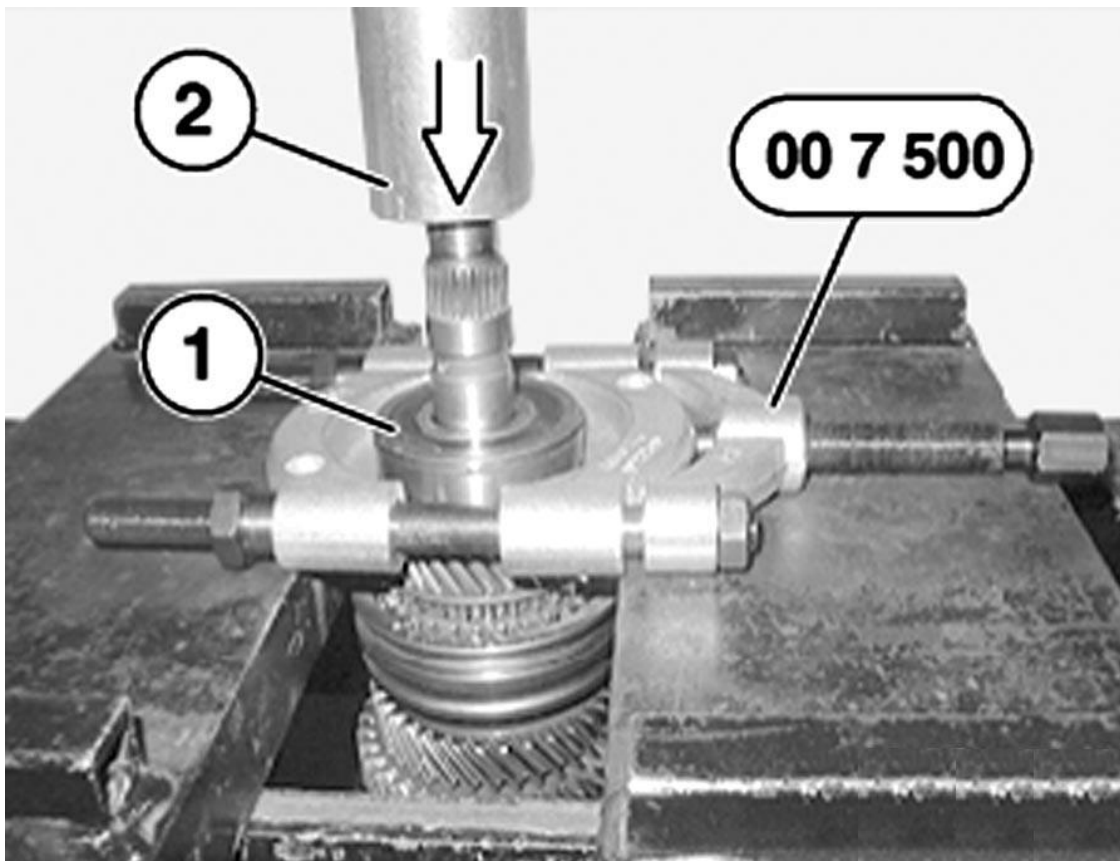
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Fig. 21: Pressing Off Bearing With Hydraulic Press
Courtesy of BMW OF NORTH AMERICA, INC.



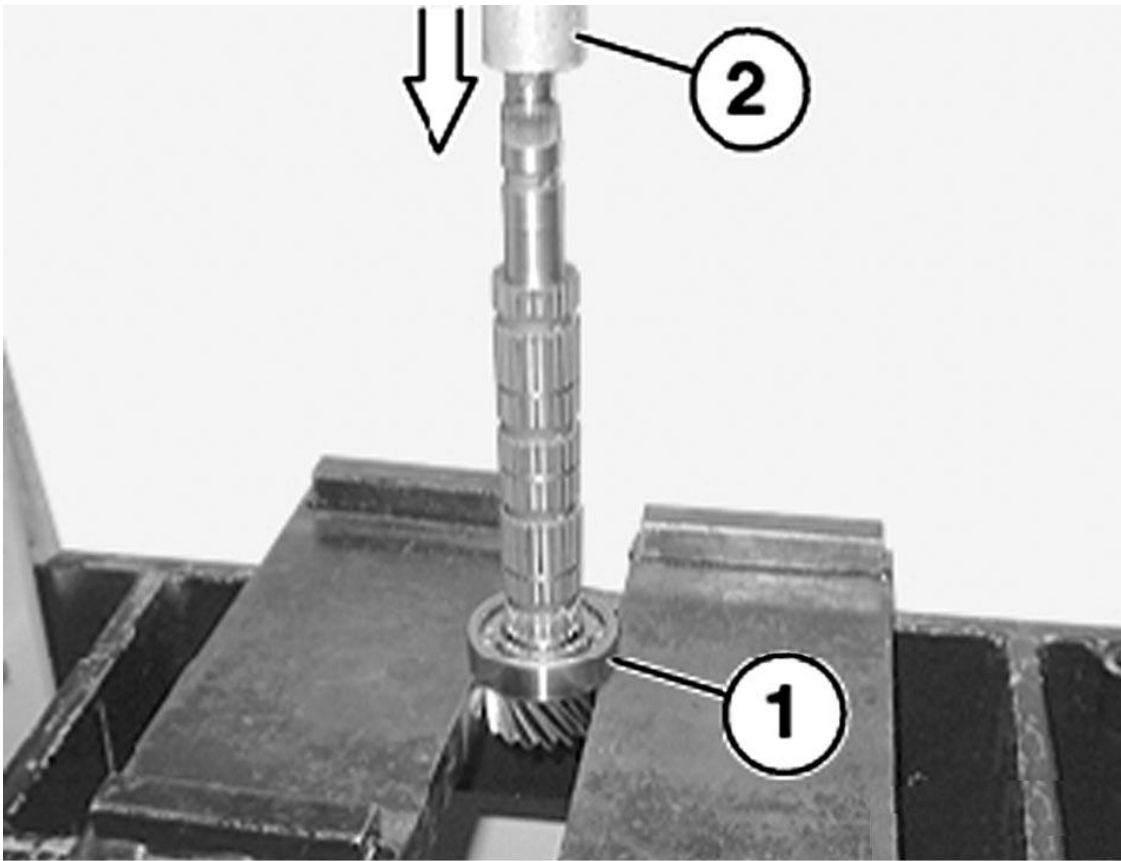
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Fig. 22: Pressing Off Bearing With Hydraulic Press
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 23: Pressing Off Bearing With Hydraulic Press
Courtesy of BMW OF NORTH AMERICA, INC.



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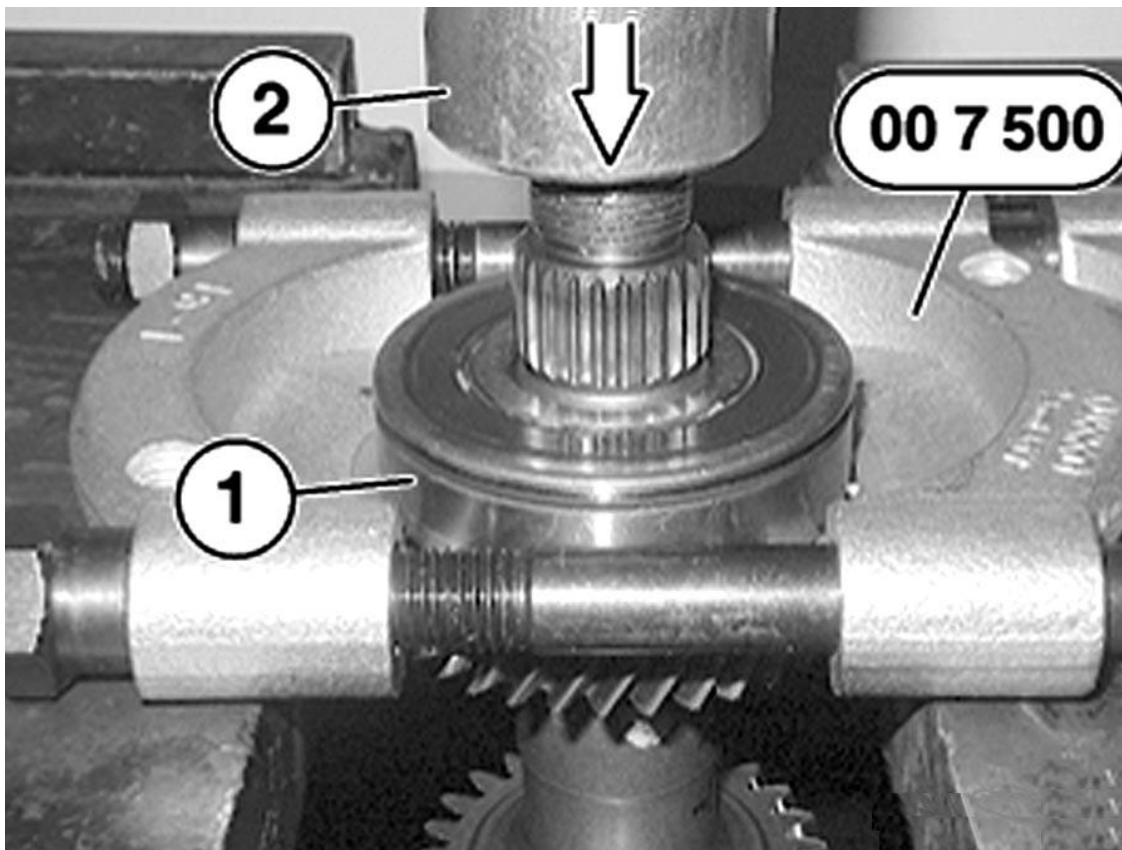
Fig. 24: Pressing Off Bearing With Hydraulic Press
Courtesy of BMW OF NORTH AMERICA, INC.

INPUT SHAFT BEARINGS

NOTE: Numbers in text refer to numbers in figures.

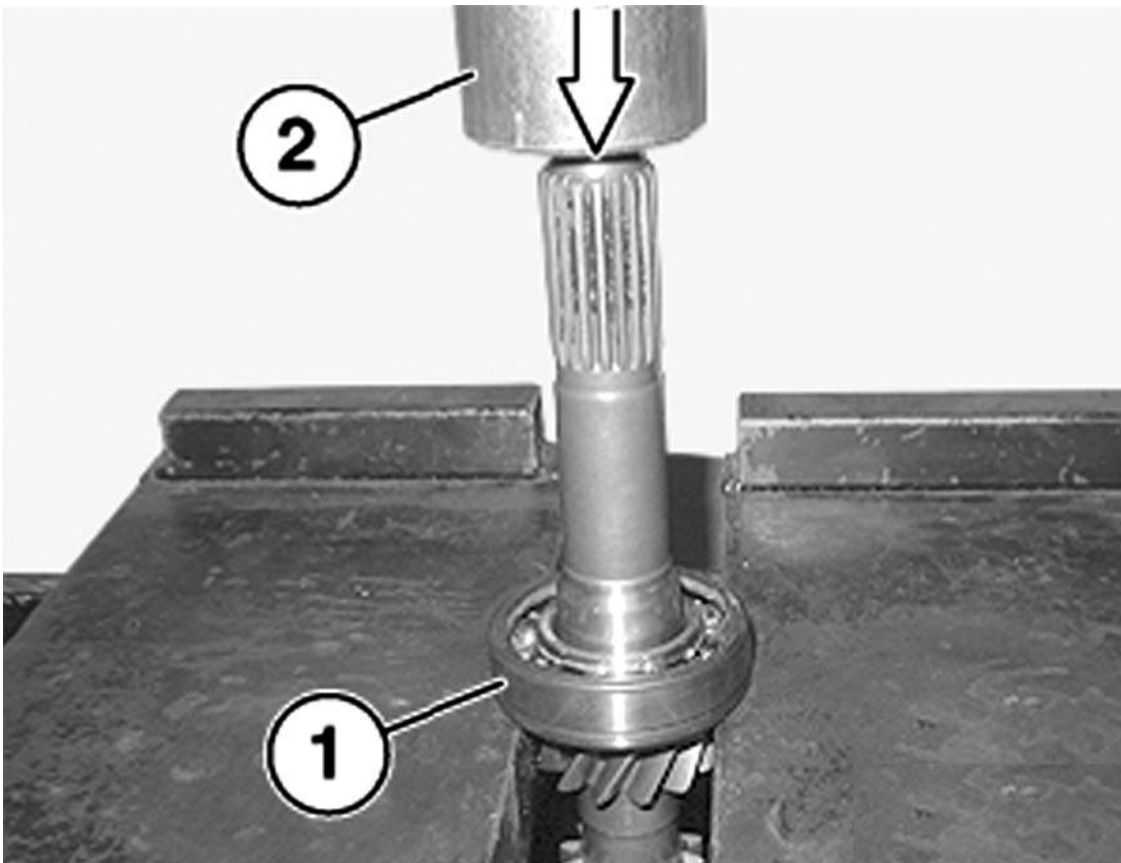
Removal & Installation

1. Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove **SHIFT SHAFTS/SHIFT FORKS** . Press off bearing (1) with hydraulic press (2). See **Fig. 25** . During installation, note installation position of bearings, ensuring wide groove points upwards. Bearing and snap rings must be replaced.
2. Bearings can only be replaced in pairs. Position input shaft group on press so that sides of bearing are supported by press. Press off bearing (1) with hydraulic press (2). See **Fig. 26** . During installation, note installation position of bearings. Bearings must be replaced in pairs.



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Fig. 25: Pressing Off Bearing With Hydraulic Press
Courtesy of BMW OF NORTH AMERICA, INC.



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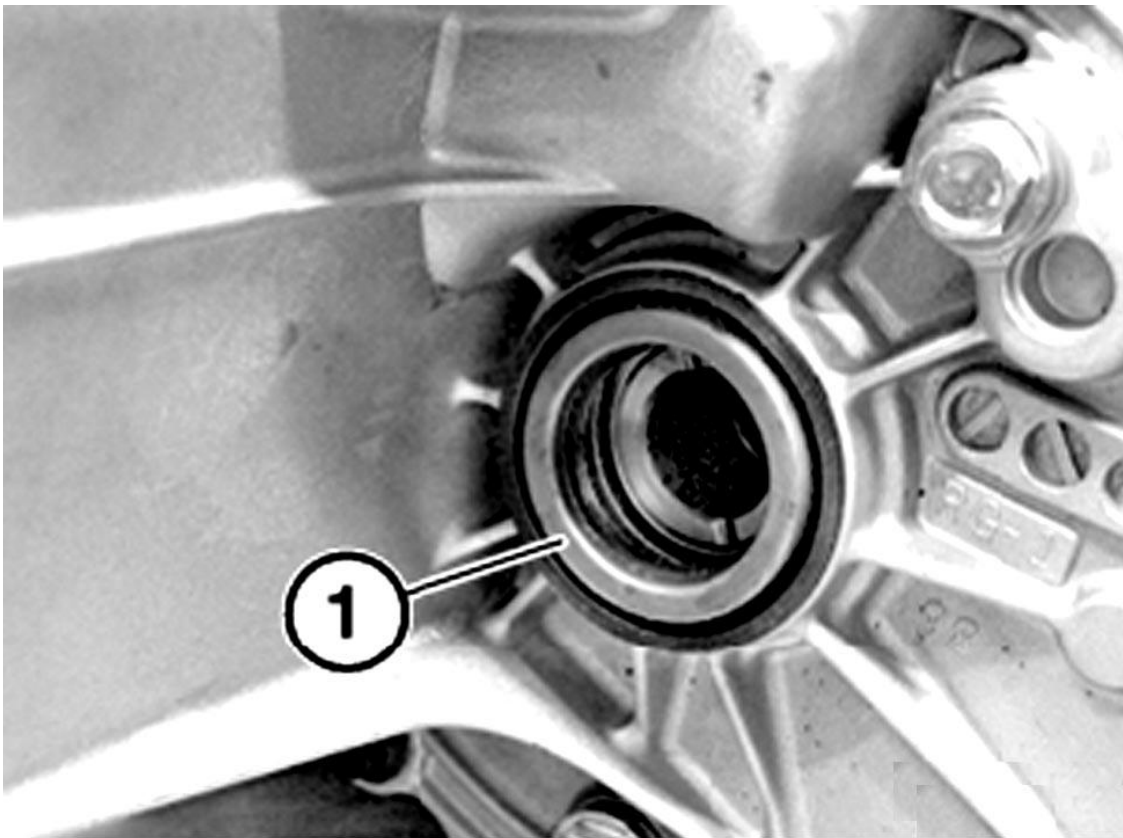
Fig. 26: Pressing Off Bearing With Hydraulic Press
Courtesy of BMW OF NORTH AMERICA, INC.

LEFT DRIVE SHAFT SEALING RING (5TH GEAR)

NOTE: Numbers in text refer to numbers in figures.

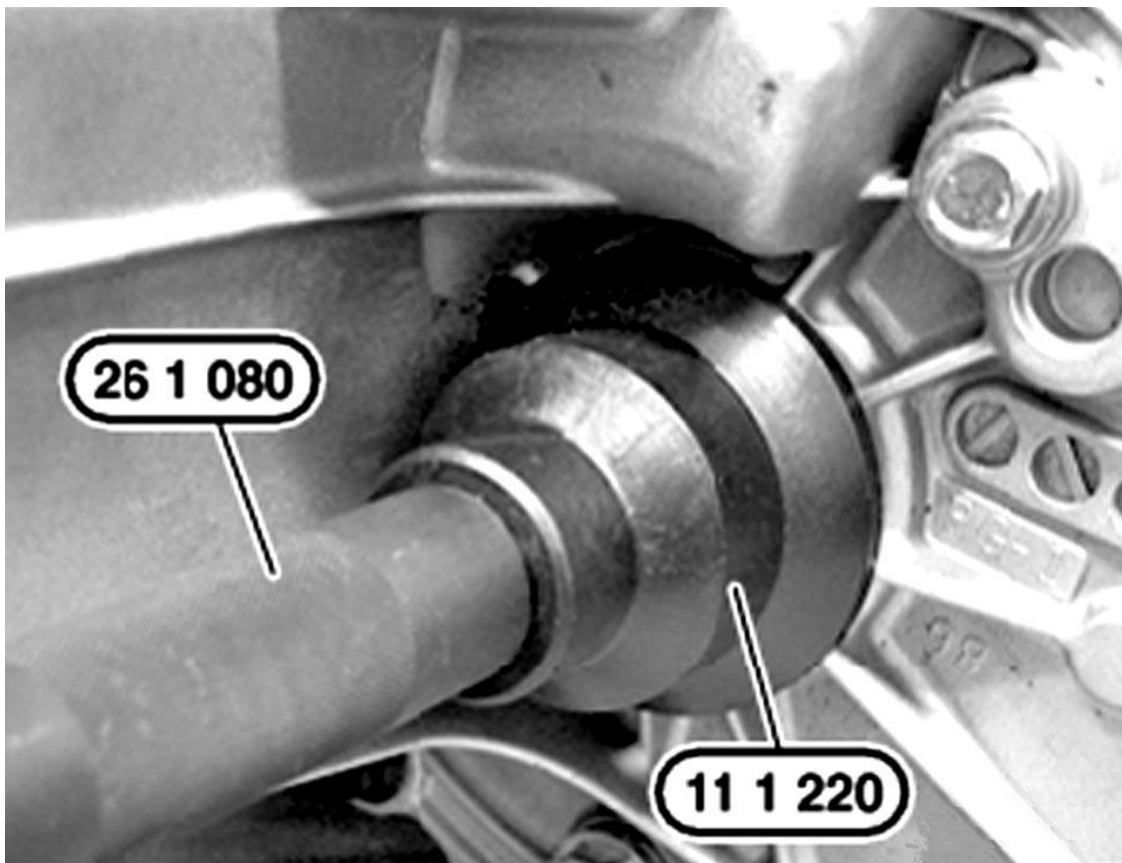
Removal & Installation

Drain off transmission oil. Remove left axle shaft. See DIFFERENTIALS & AXLE SHAFTS . Lever radial seal (1) with a screwdriver out of transmission case. See **Fig. 27** . Ensure transmission case is not damaged. Using special tools (2 61 080) and (1 11 220), drive the sealing ring into the transmission case until it is flush on the outside with the transmission case. See **Fig. 28** . During installation, push drive shaft over resistance of snap ring. The drive shaft must snap audibly into place. Fill transmission with oil and check for leaks.



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Fig. 27: Removing Left Drive Shaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.



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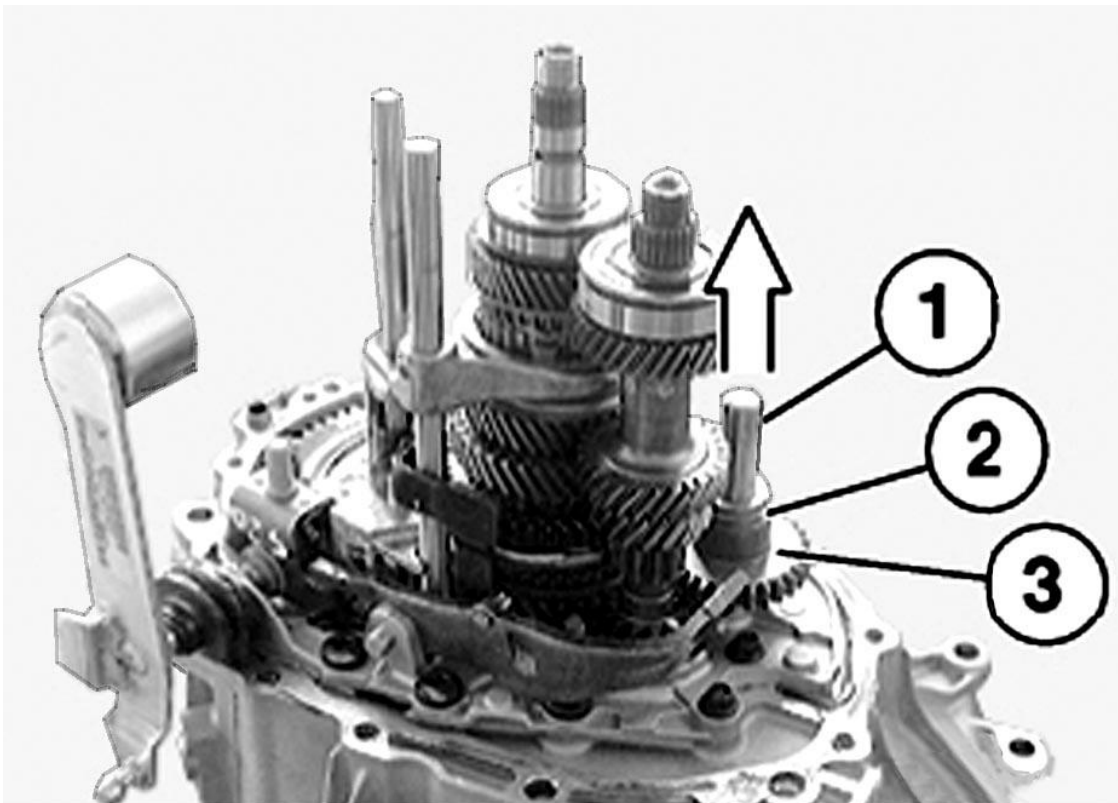
Fig. 28: Driving Drive Shaft Radial Seal Into Transmission Case
Courtesy of BMW OF NORTH AMERICA, INC.

LOCKING BODY/REVERSE GEAR FORK

NOTE: Numbers in text refer to numbers in figures.

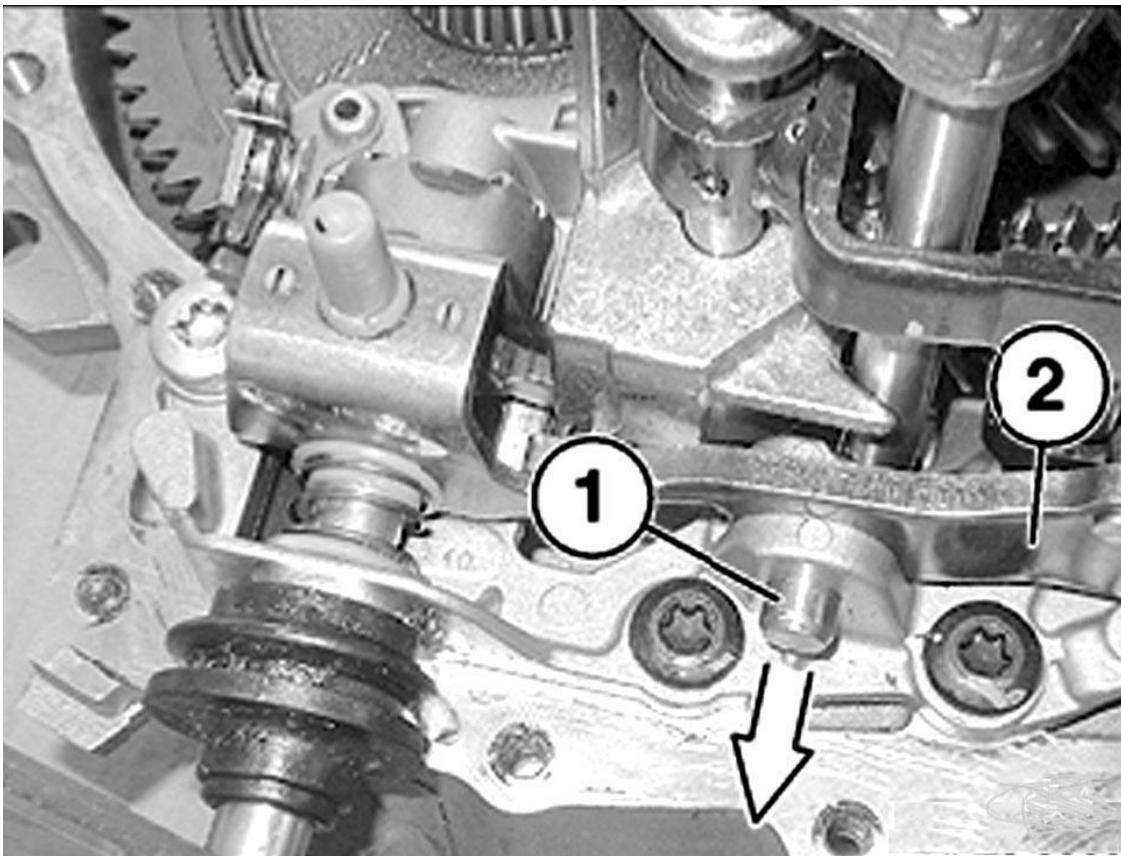
Removal & Installation

1. Remove transmission. For transmission removal and installation, see **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Pull reverse shaft (1) out of clutch housing. Remove reverse thrust bearing (2) together with reverse idler gear (3) and needle bearing. Narrow end of reverse thrust bearing (2) must point upwards. See **Fig. 29** . Remove load from rotary pin (1) by pressing on reverse gear shift fork (2) and pull out. See **Fig. 30** . Drive locating pin out of block and locking body (2) with punch (1). See **Fig. 31** .
2. Remove shift lever. Replace locating pin. Replace block and locking body as a single unit only. Replace shift shaft seal (1). See **Fig. 32** . Remove curved rings (1) and spring (2). Move locking body (3) sideways and remove. During installation, check curved rings (1) and spring (2) for damage/wear and replace if necessary. See **Fig. 33** .



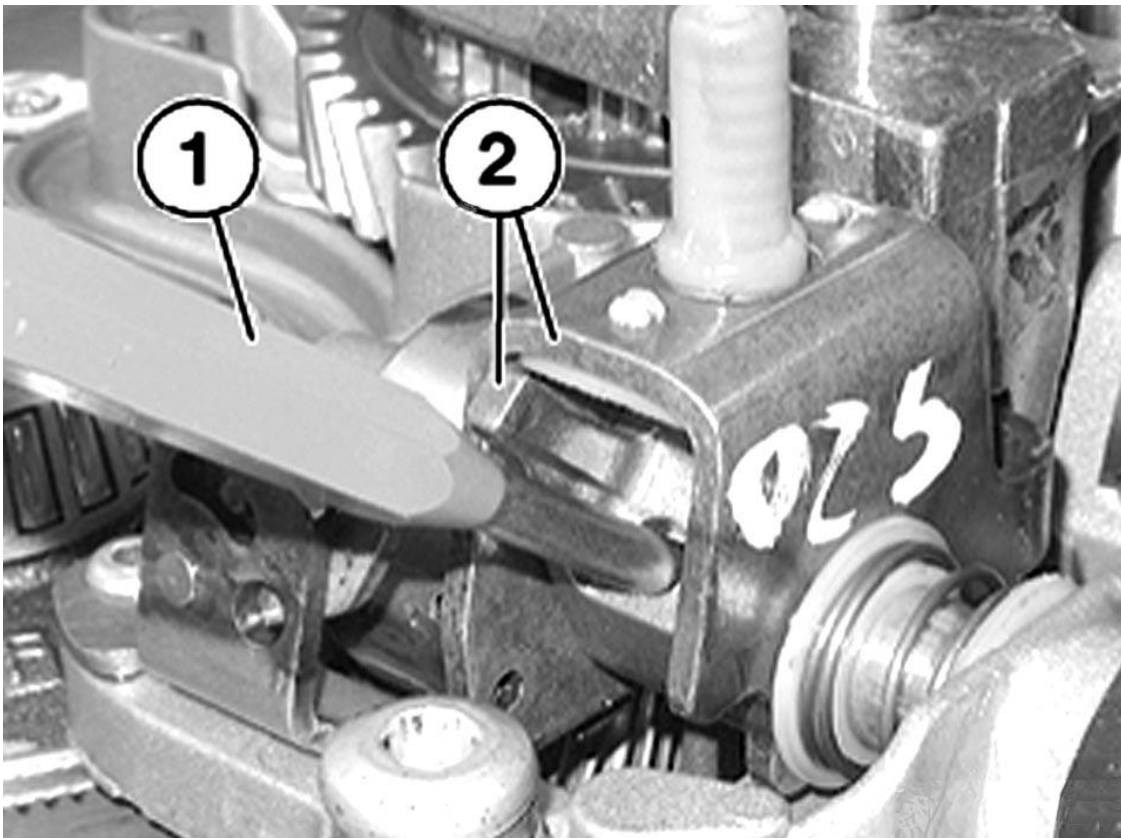
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Fig. 29: Removing Locking Body/Reverse Gear Fork
Courtesy of BMW OF NORTH AMERICA, INC.



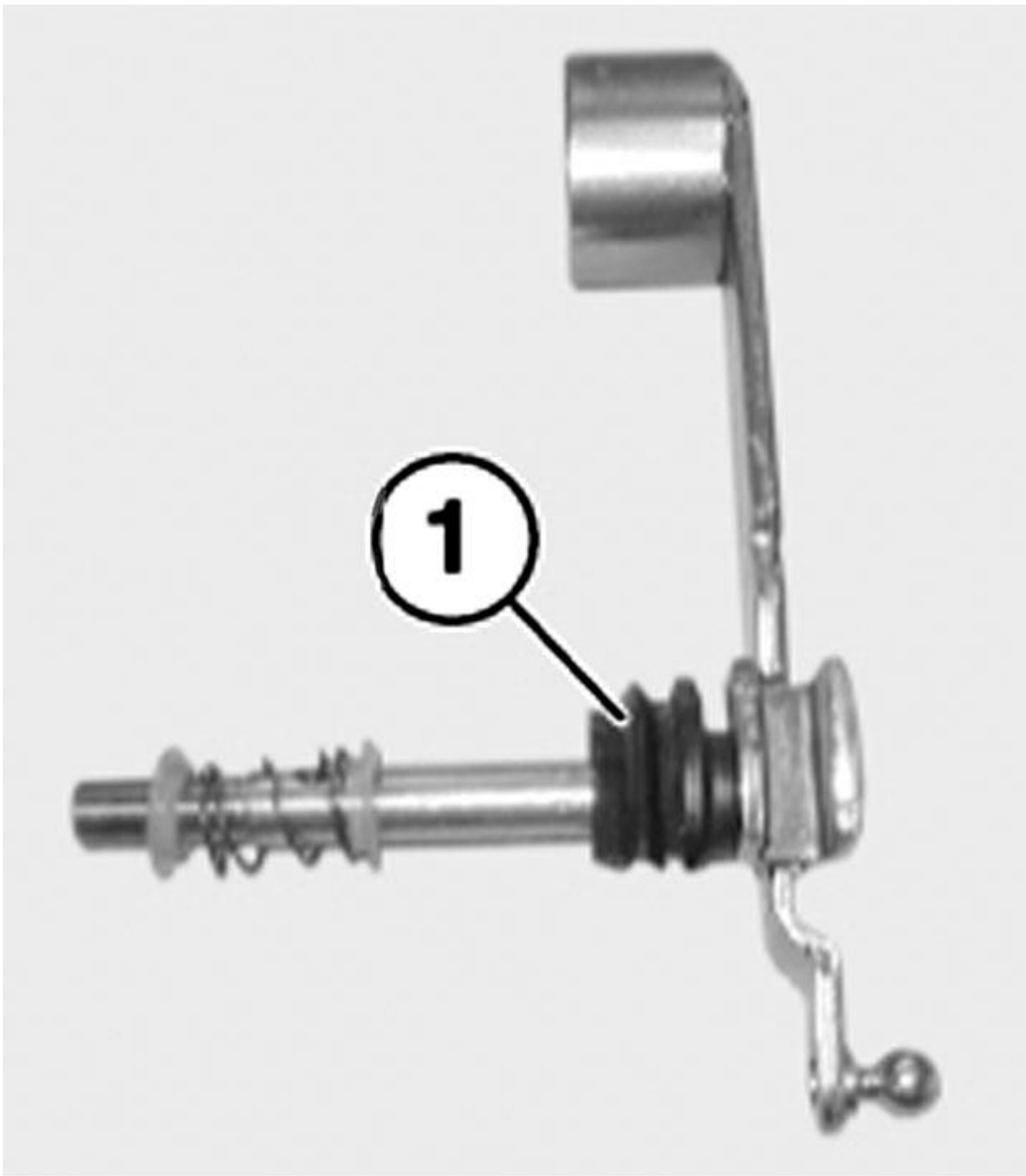
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Fig. 30: Removing Rotary Pin
Courtesy of BMW OF NORTH AMERICA, INC.



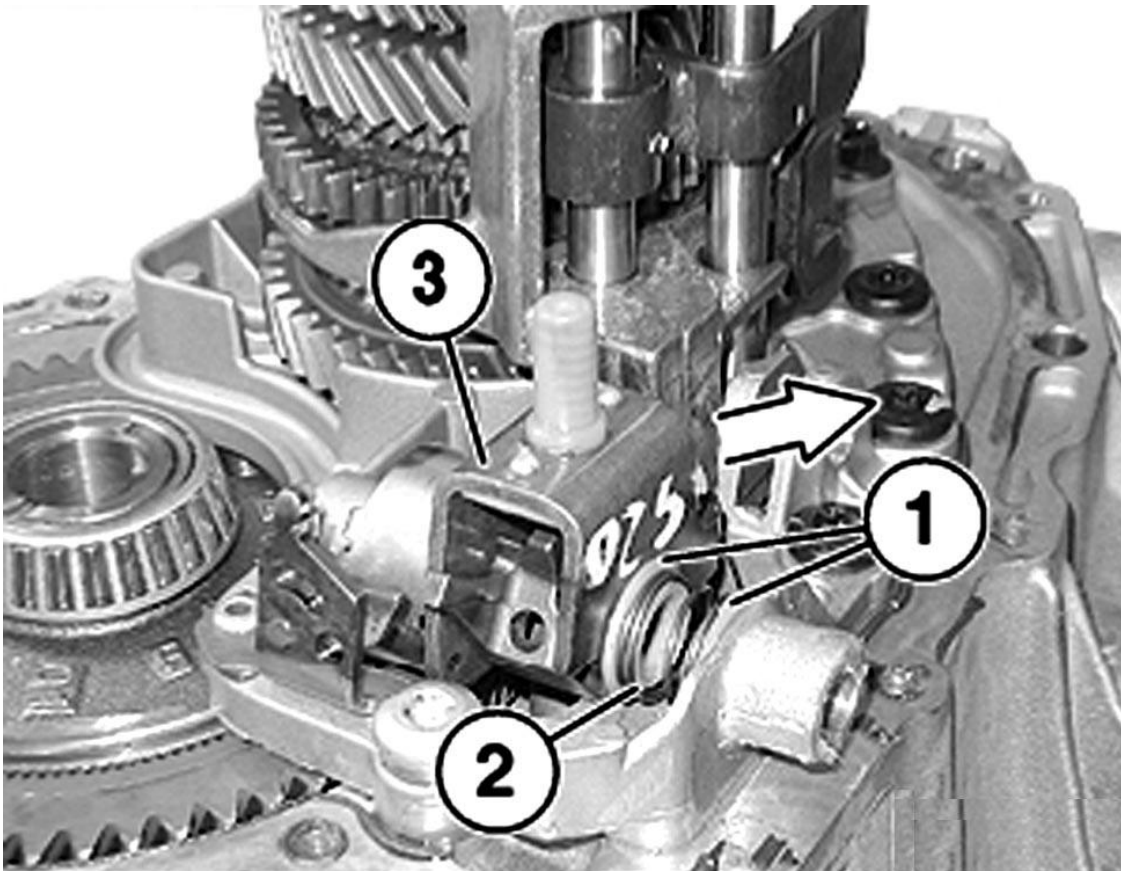
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Fig. 31: Removing Locating Pin
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 32: Identifying Shift Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.



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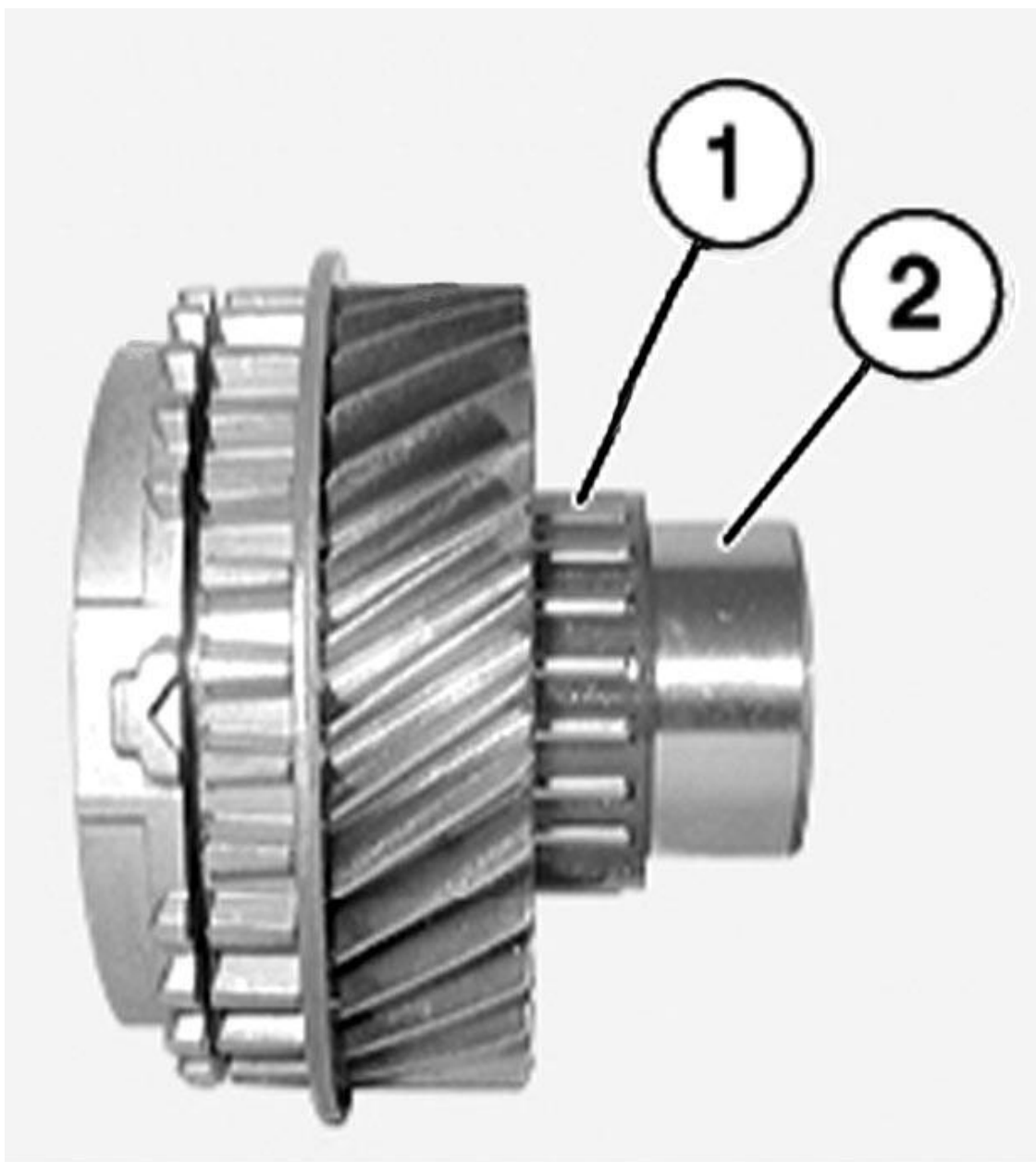
Fig. 33: Checking Curved Rings & Spring
Courtesy of BMW OF NORTH AMERICA, INC.

NEEDLE BEARING/5TH GEAR

NOTE: Numbers in text refer to numbers in figures.

Removal & Installation

Remove transmission. See [MANUAL TRANSMISSION - REMOVAL & INSTALLATION](#) article. Remove [5TH GEAR DRIVE](#) . Remove needle bearing (1) with bearing bushing (2). See [Fig. 34](#) .



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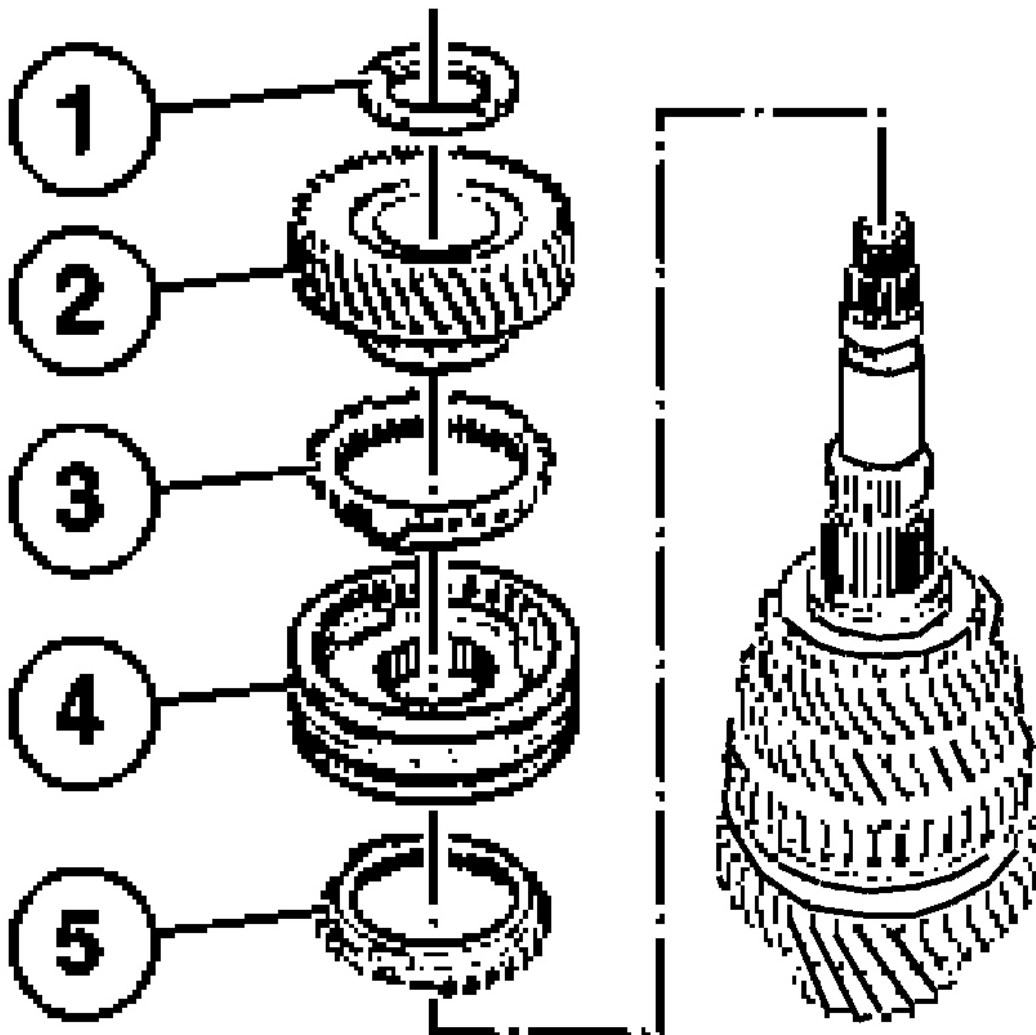
Fig. 34: Removing Needle Bearing With Bearing Bushing
Courtesy of BMW OF NORTH AMERICA, INC.

OUTPUT SHAFT

NOTE: Numbers in text refer to numbers in figures.

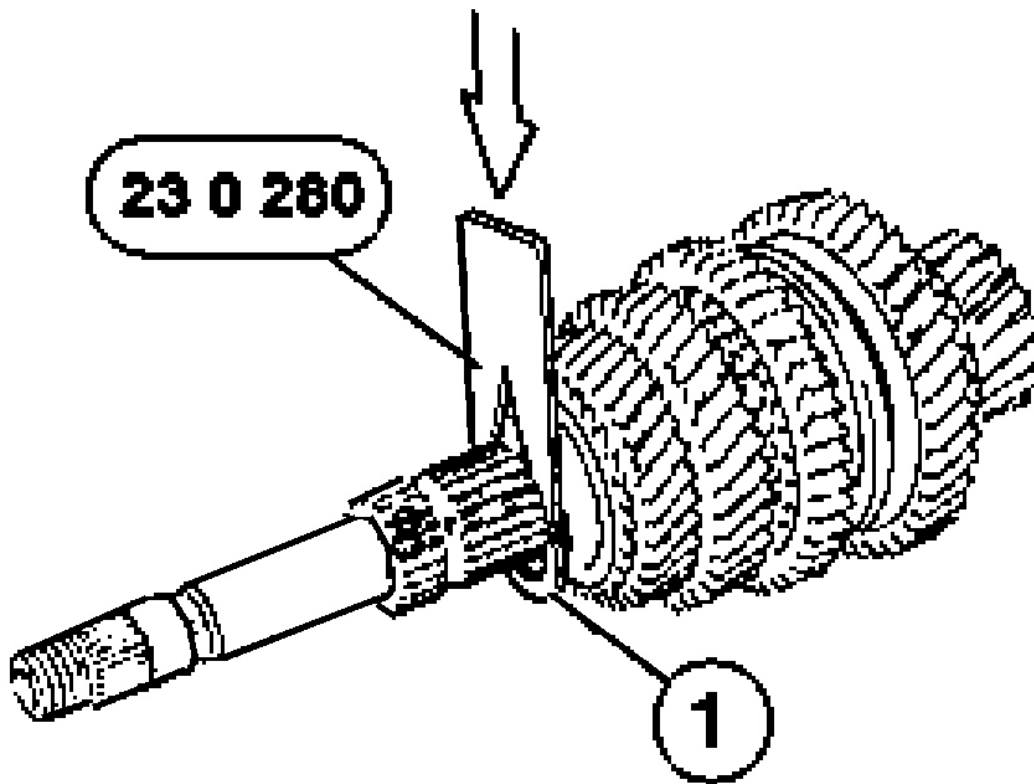
Disassembly & Reassembly

Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove output shaft. See **SHIFT SHAFTS/SHIFT FORKS** . Do not separate the synchronizer hub from the selector sleeve when disassembling the output shaft. Make sure that the projections of both synchronizer rings of the relevant synchronizer hub assembly engage in the slide sections. Remove shim (1). Remove gear wheel for 4th gear (2). Remove 3rd/4th gear synchronizer rings (3/5) together with 3rd/4th gear synchronizer hub assembly (4). See **Fig. 35** . During installation, replace shim. Release segments from output shaft with special tool (23 0 280). See **Fig. 36** . Segments must be replaced. Remove gear wheel for 3rd gear (1). Remove segment (2). Remove gear wheel for 2nd gear (3). Remove 1st/2nd gear synchronizer rings (4/6) together with 1st/2nd gear synchronizer hub assembly (5). Remove segment (7). Remove gear wheel for 1st gear (8). Remove segment (9). Output shaft bearings must be replaced in pairs. See **Fig. 37** .



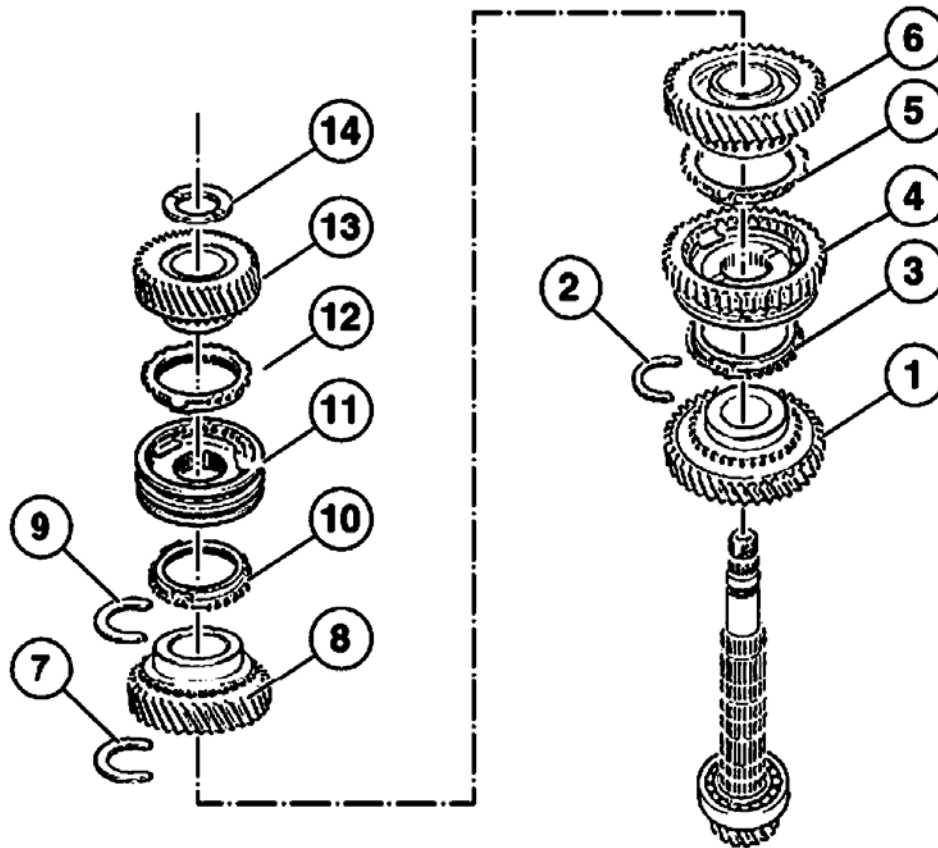
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Fig. 35: Removing Output Shaft Components
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 36: Releasing Segments From Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.



- | | |
|--------------------------------------|---------------------------------------|
| 1 Gear wheel for 1st gear | 8 Gear wheel for 3rd gear |
| 2 Segment | 9 Segment |
| 3 1st/2nd gear synchronizer ring | 10 3rd/4th gear synchronizer ring |
| 4 1st/2nd gear synchronizer assembly | 11 3rd/4th gear synchronizer assembly |
| 5 1st/2nd gear synchronizer ring | 12 3rd/4th gear synchronizer ring |
| 6 Gear wheel for 2nd gear | 13 Gear wheel for 4th gear |
| 7 Segment | 14 Thrust ring |

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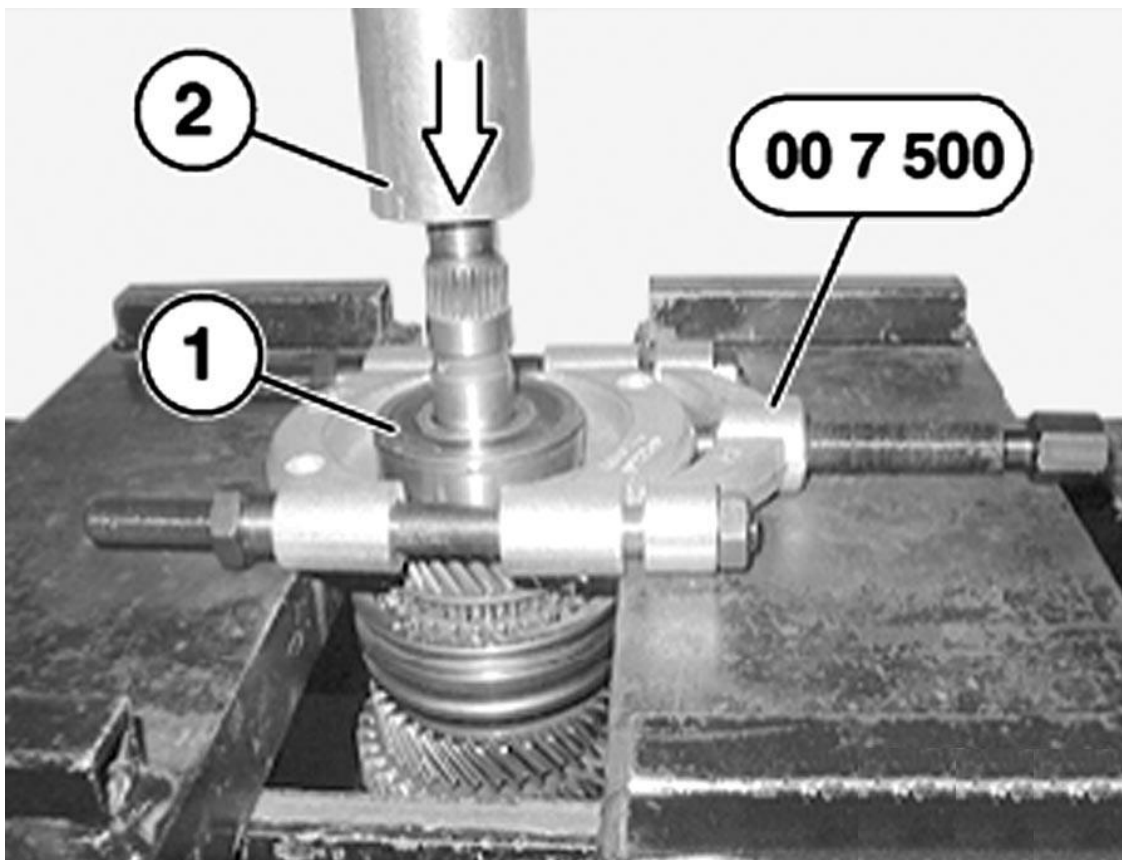
Fig. 37: Identifying Output Shaft Components
Courtesy of BMW OF NORTH AMERICA, INC.

OUTPUT SHAFT BEARINGS

NOTE: Numbers in text refer to numbers in figures.

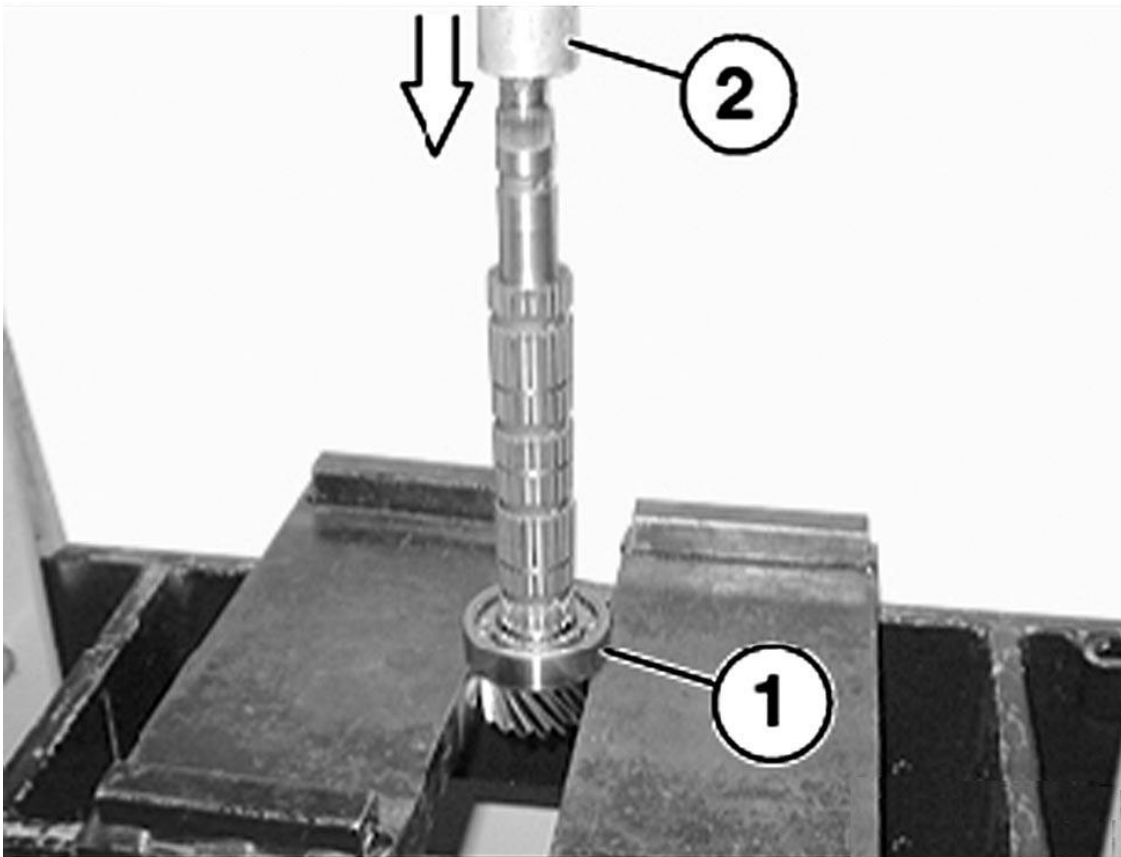
Removal & Installation

1. Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove shift shafts. See **SHIFT SHAFTS/SHIFT FORKS** . Install special tool (00 7 500) between gear wheel/4th gear and output shaft bearing. Press off bearing (1) with hydraulic press (2). See **Fig. 38** . When installing, note installation position of bearings - wide groove must point upwards. Bearing and snap rings must be replaced.
2. Bearings may only be replaced in pairs. For disassembly/assembly of output shaft, see **OUTPUT SHAFT** . Position output shaft group on press so that sides of bearing are supported by press. Press off bearing (1) with hydraulic press (2). See **Fig. 39** . During installation, note installation position of bearings. Bearings must be replaced. Place a sleeve between output shaft and press so as not to damage the nylon insert for lubrication. Bearings may only be replaced in pairs.



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Fig. 38: Pressing Off Bearing With Hydraulic Press
Courtesy of BMW OF NORTH AMERICA, INC.



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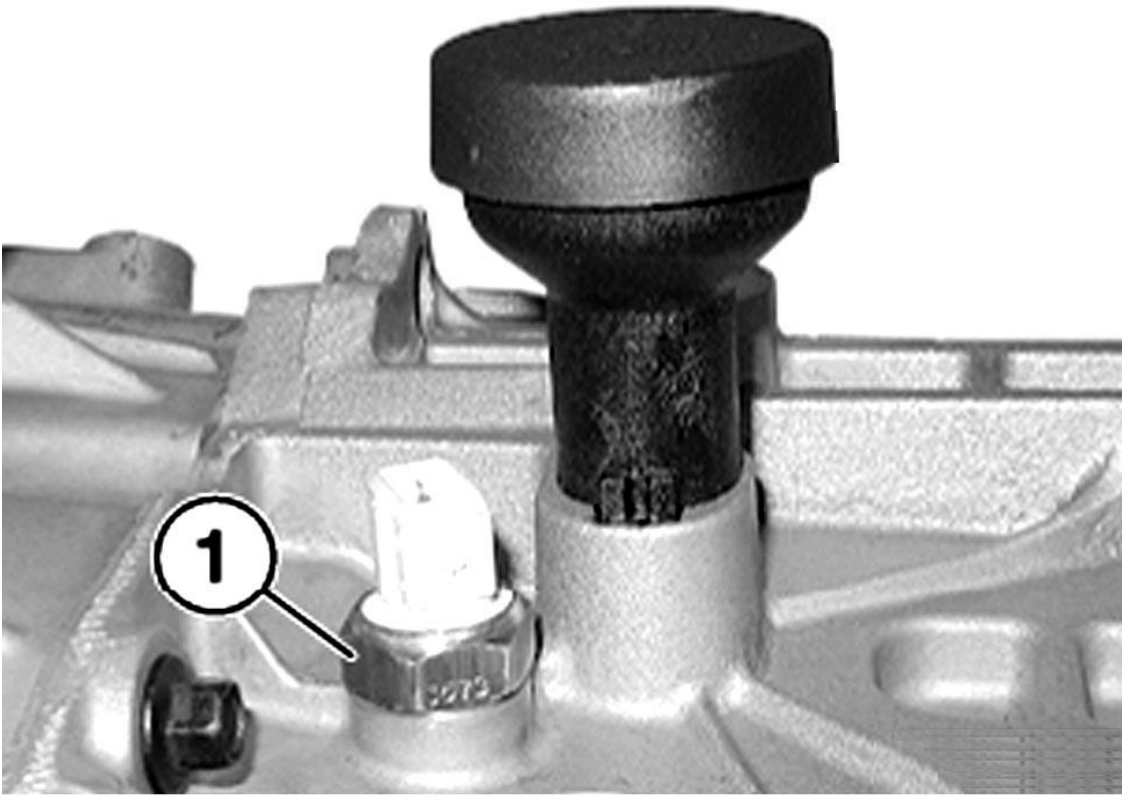
Fig. 39: Pressing Off Bearing With Hydraulic Press
Courtesy of BMW OF NORTH AMERICA, INC.

REVERSING LIGHT SWITCH

NOTE: Numbers in text refer to numbers in figures.

Removal & Installation

Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove reverse gear switch (1). See **Fig. 40** .



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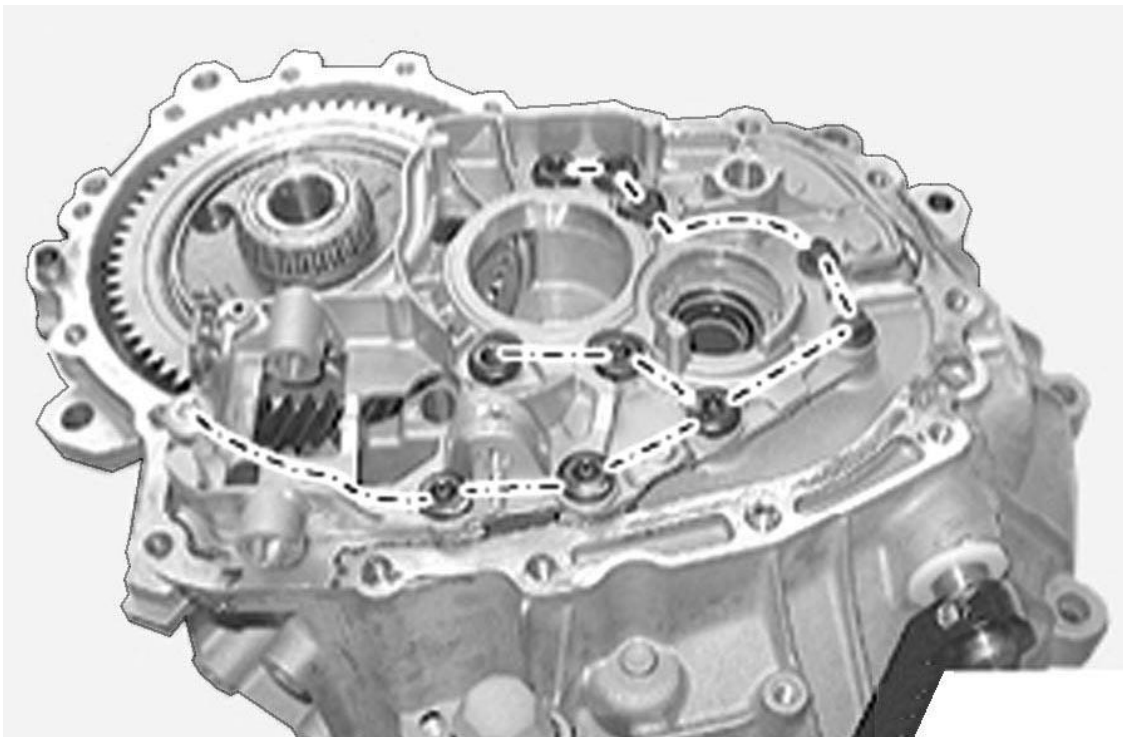
Fig. 40: Removing Reverse Gear Switch
Courtesy of BMW OF NORTH AMERICA, INC.

REVERSE GEAR LOCKING PISTON

NOTE: Numbers in text refer to numbers in figures.

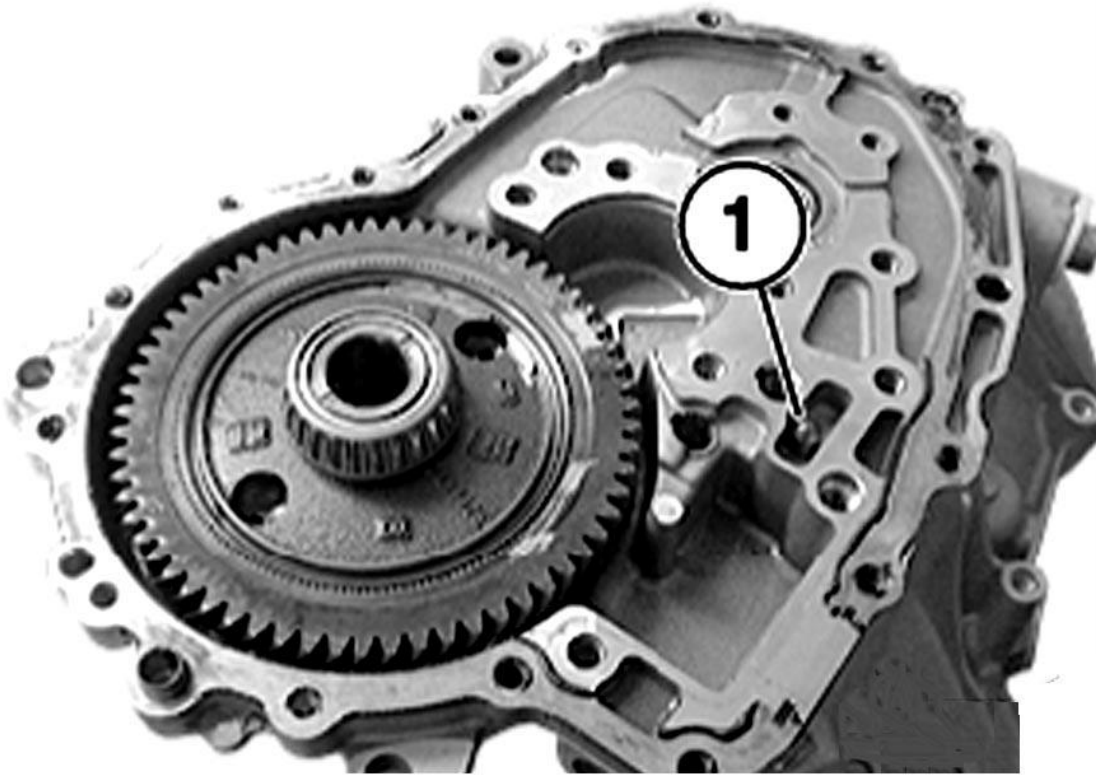
Removal & Installation

Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove shift shafts. See **SHIFT SHAFTS/SHIFT FORKS** . Remove bolts along marked line and remove intermediate plate. See **Fig. 41** . Note installation position of bolts. Apply Loctite 5999 sealing compound. Remove locking piston (1) with spring. See **Fig. 42** .



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Fig. 41: Removing Intermediate Plate Bolts
Courtesy of BMW OF NORTH AMERICA, INC.



G00383903

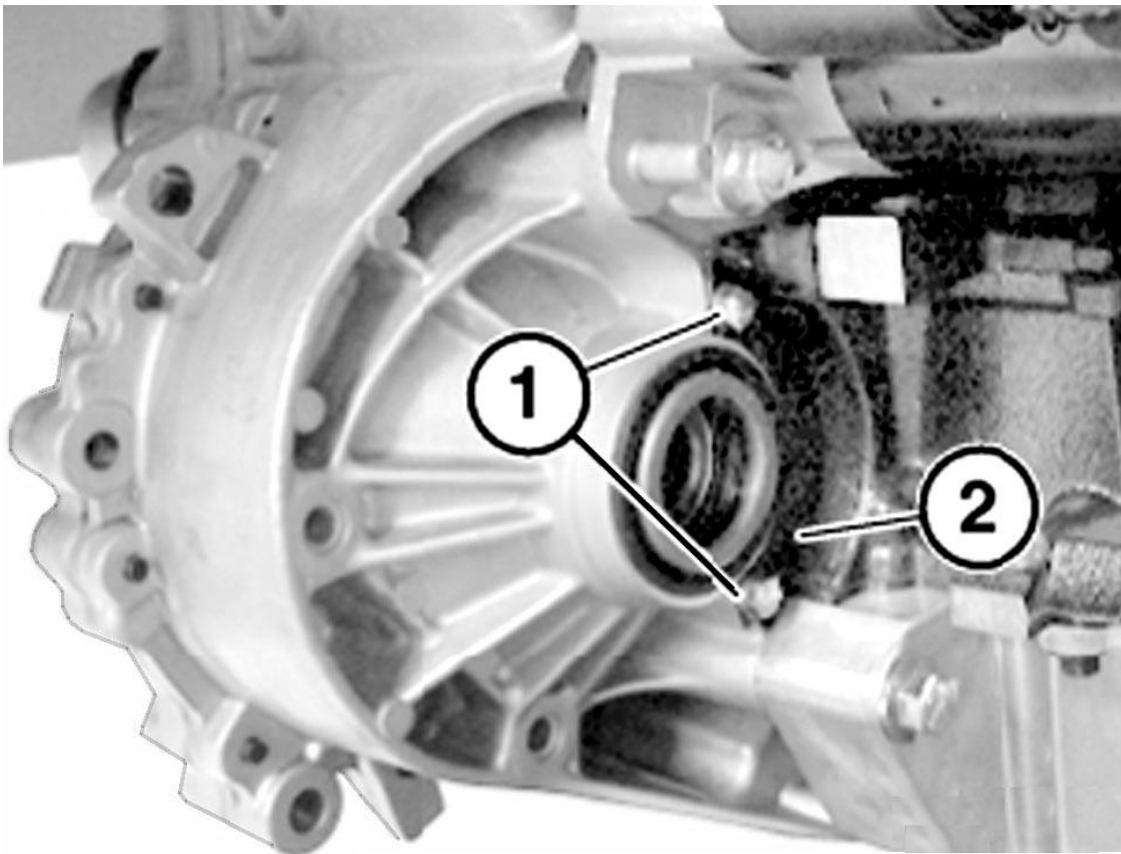
Fig. 42: Removing Locking Piston With Spring
Courtesy of BMW OF NORTH AMERICA, INC.

RIGHT AXLE SHAFT SEAL (5TH GEAR)

NOTE: Numbers in text refer to numbers in figures.

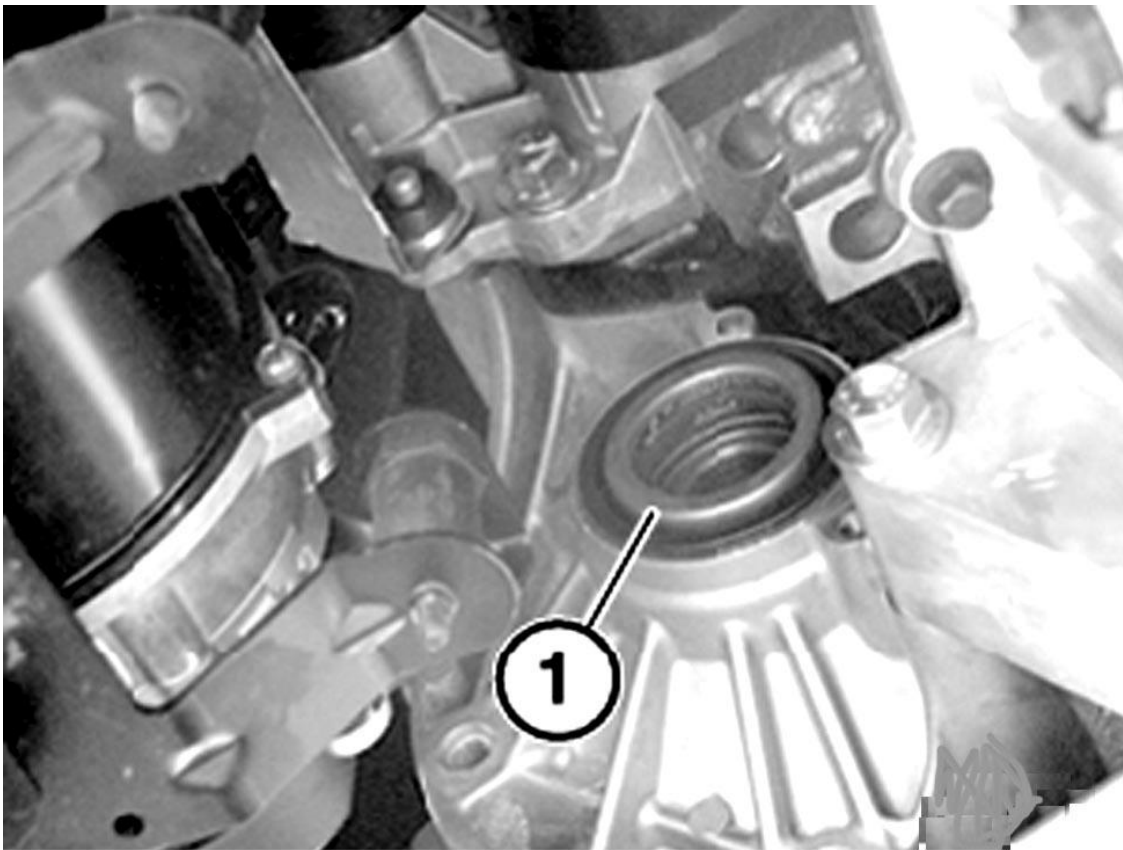
Removal & Installation

Drain transmission oil. Remove right axle shaft. See DIFFERENTIALS & AXLE SHAFTS . Unscrew mounting bolts (1) for closing plate and remove closing plate (2). See **Fig. 43** . Remove lower engine stabilizer. Lever radial seal (1) with a screwdriver out of transmission case. See **Fig. 44** . Make sure the transmission case is not damaged. Using special tools (26 1 080) and (11 1 220), drive the sealing ring into the transmission case until it is flush on the outside with the transmission case. See **Fig. 45** . Fill transmission with oil and check for leaks.



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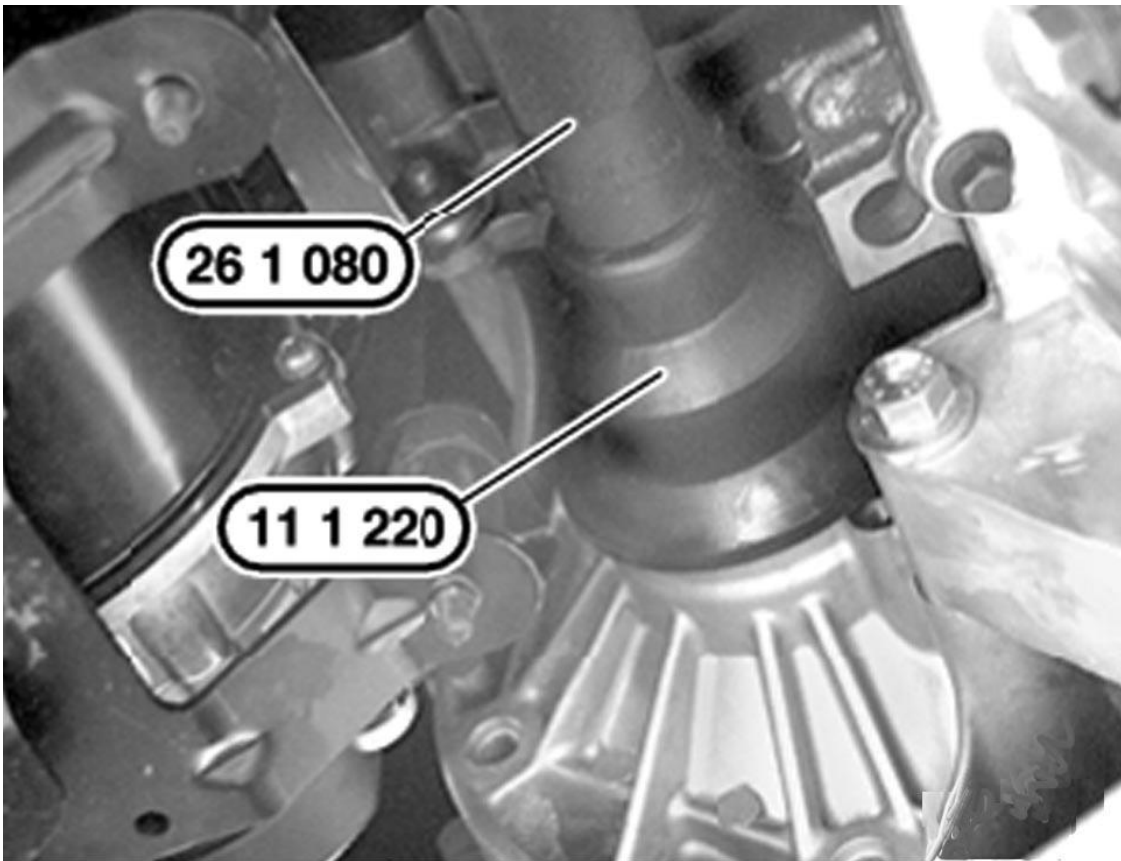
Fig. 43: Removing Mounting Bolts & Closing Plate
Courtesy of BMW OF NORTH AMERICA, INC.



G00386875

Fig. 44: Removing Radial Seal

Courtesy of BMW OF NORTH AMERICA, INC.



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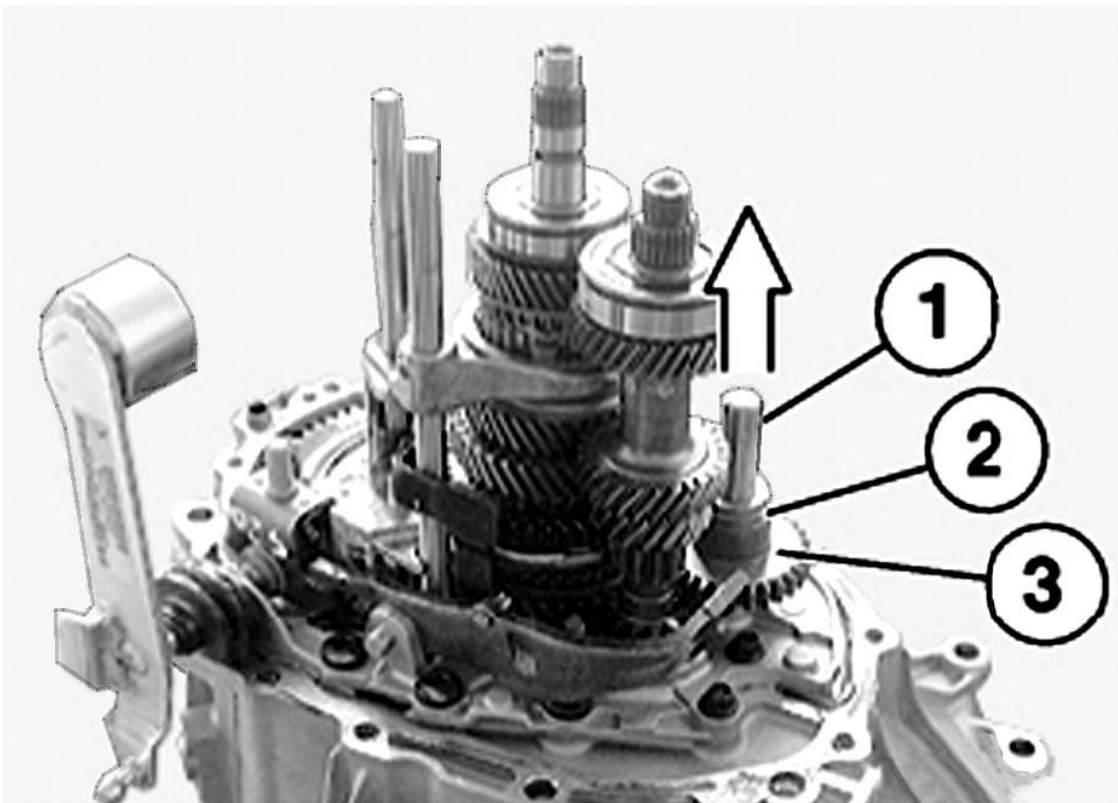
Fig. 45: Driving Sealing Ring Into Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

SHIFT LEVER

NOTE: Numbers in text refer to numbers in figures.

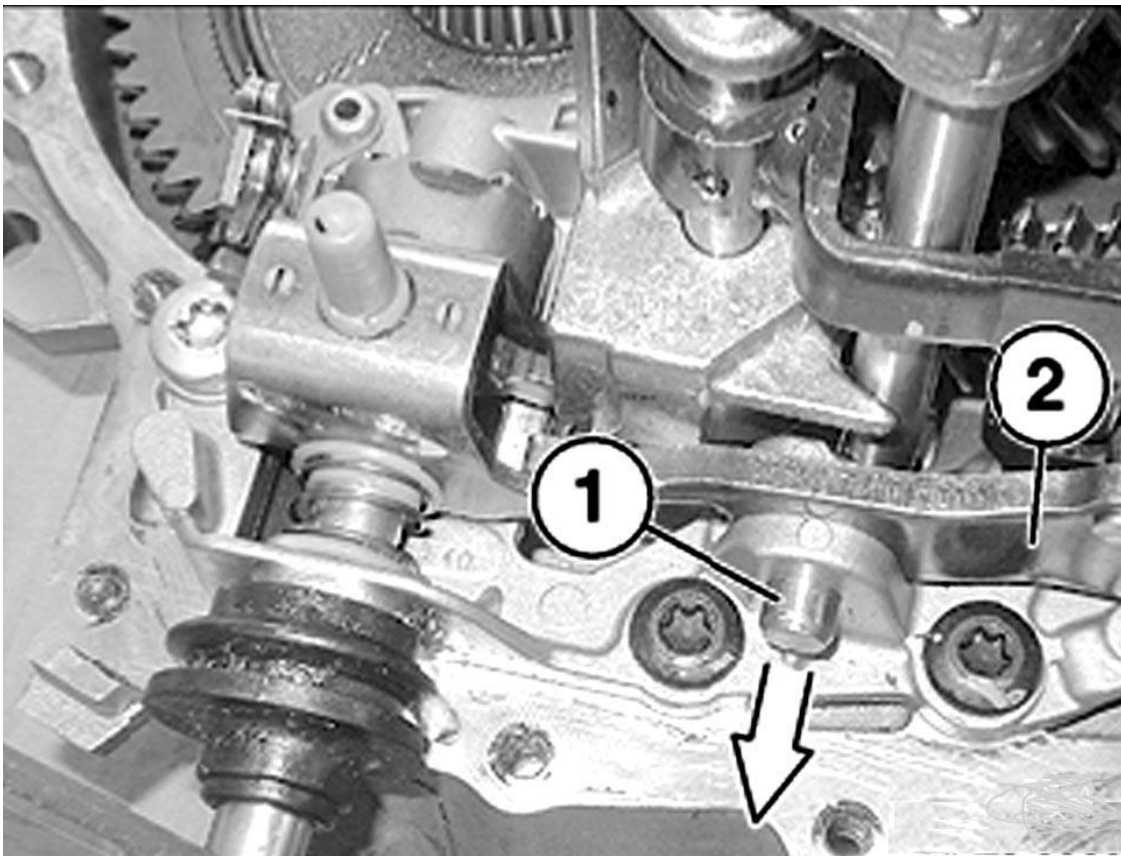
Removal & Installation

1. Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove **TRANSMISSION HOUSING** .
2. Pull reverse shaft (1) out of clutch housing. See **Fig. 46** . Remove reverse thrust bearing (2) together with reverse idler gear (3) and needle bearing. During installation, narrow end of reverse thrust bearing (2) must point upwards. Remove load from rotary pin (1) by pressing on reverse gear shift fork (2) and pull out. See **Fig. 47** . Drive locating pin out of block and locking body (2) with punch (1). See **Fig. 48** . Remove shift lever. During installation, replace locating pin. Replace shift shaft seal (1). See **Fig. 49** . Check spring (2) and curved rings (3) for damage and wear. Replace as necessary.



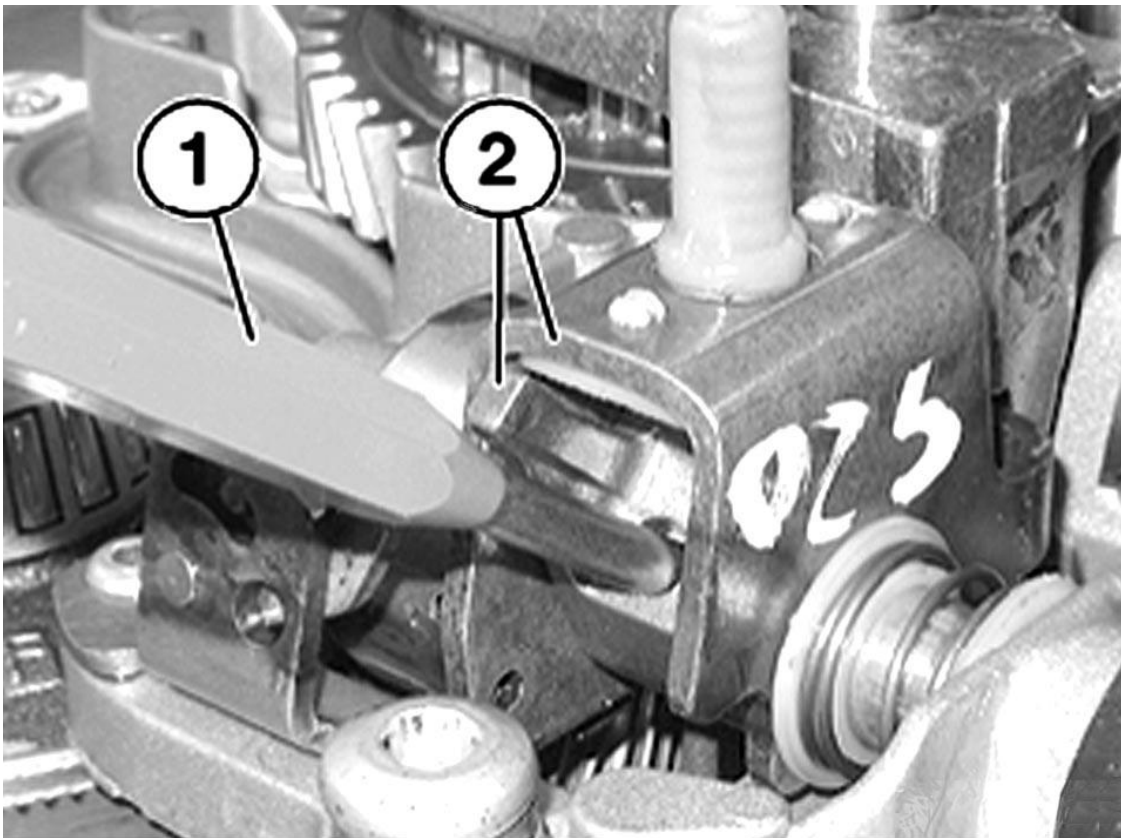
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Fig. 46: Pulling Reverse Shaft Out Of Clutch Housing
Courtesy of BMW OF NORTH AMERICA, INC.



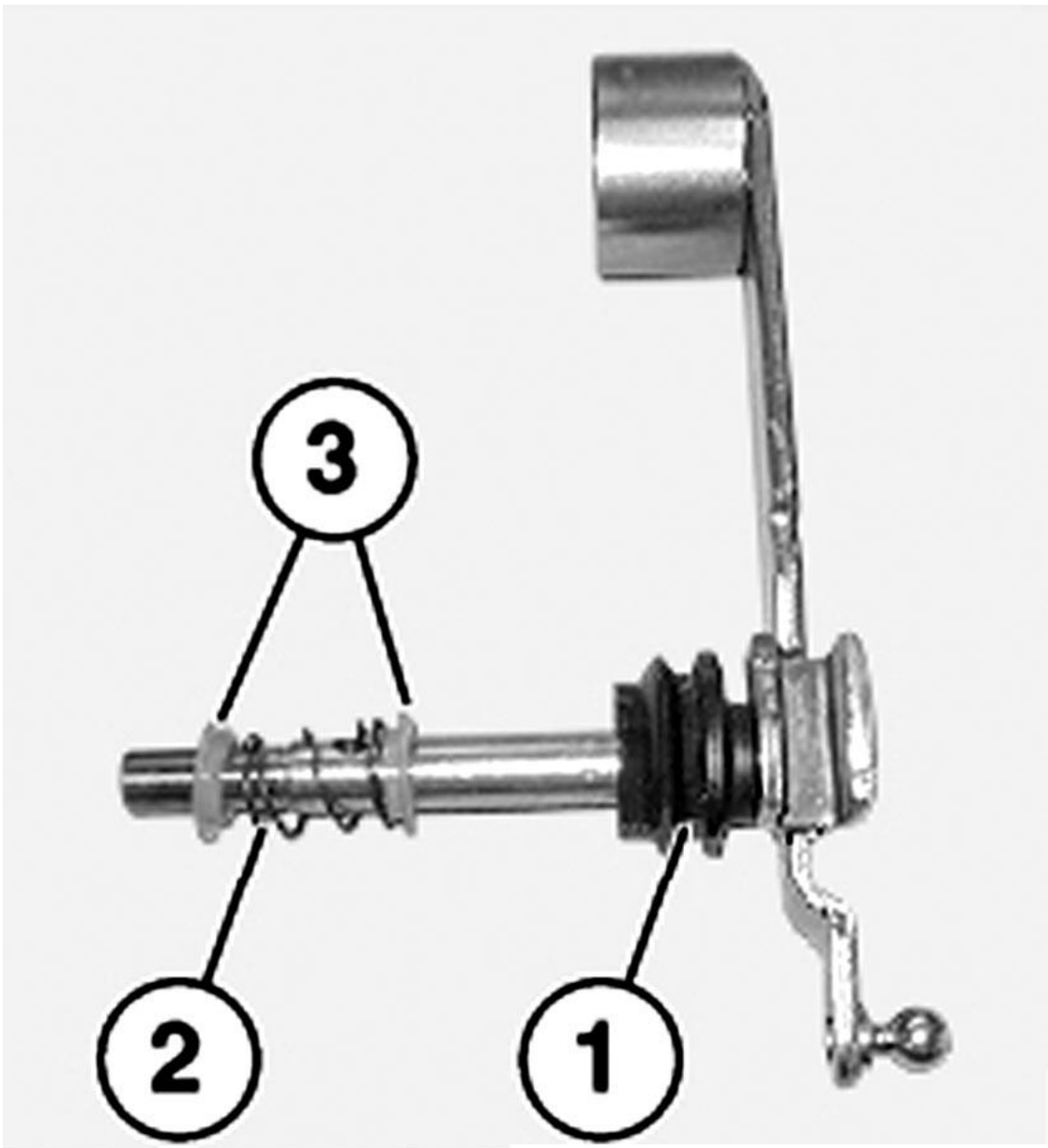
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Fig. 47: Pressing On Reverse Gear Shift Fork
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 48: Driving Locating Pin Out Of Block
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 49: Replacing Shift Shaft Seal

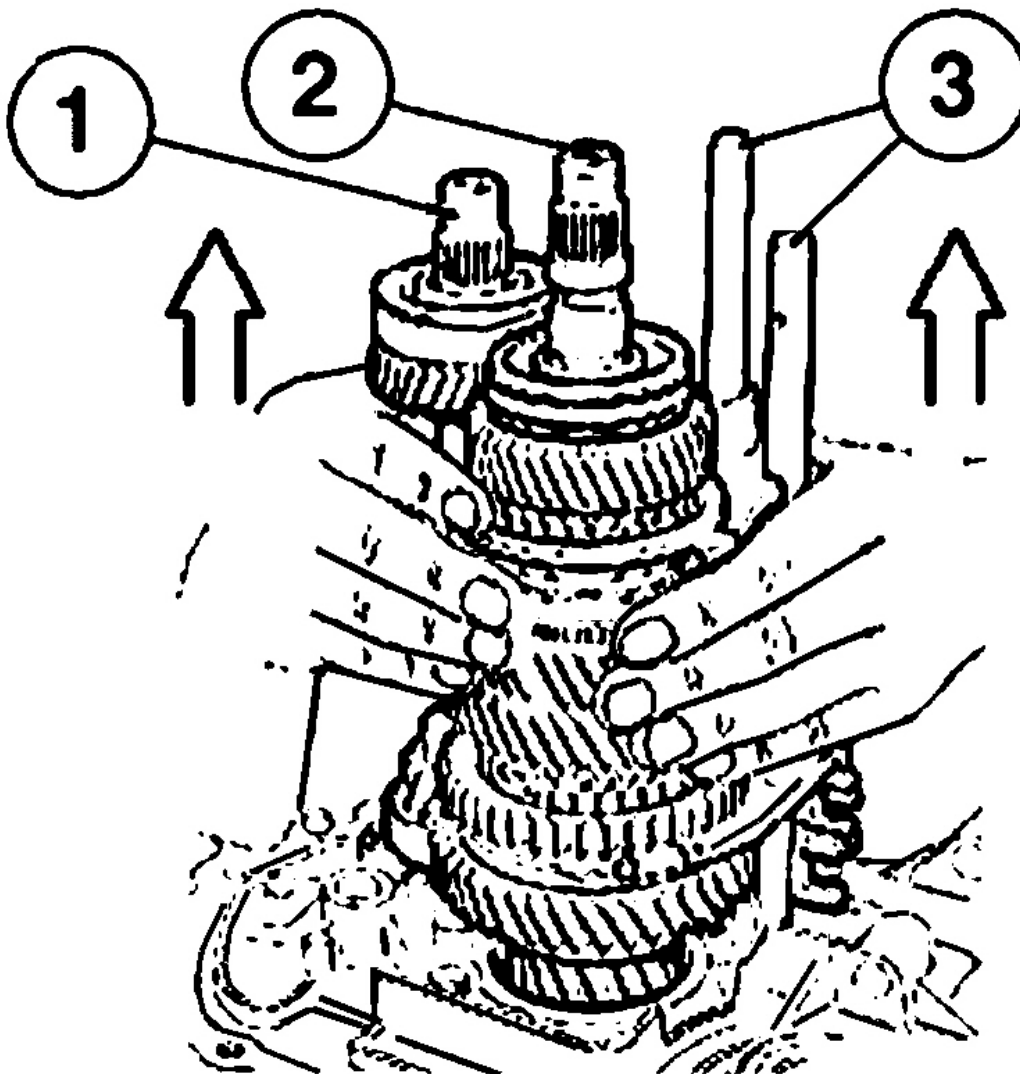
Courtesy of BMW OF NORTH AMERICA, INC.

SHIFT SHAFTS/SHIFT FORKS

NOTE: Numbers in text refer to numbers in figures.

Removal & Installation

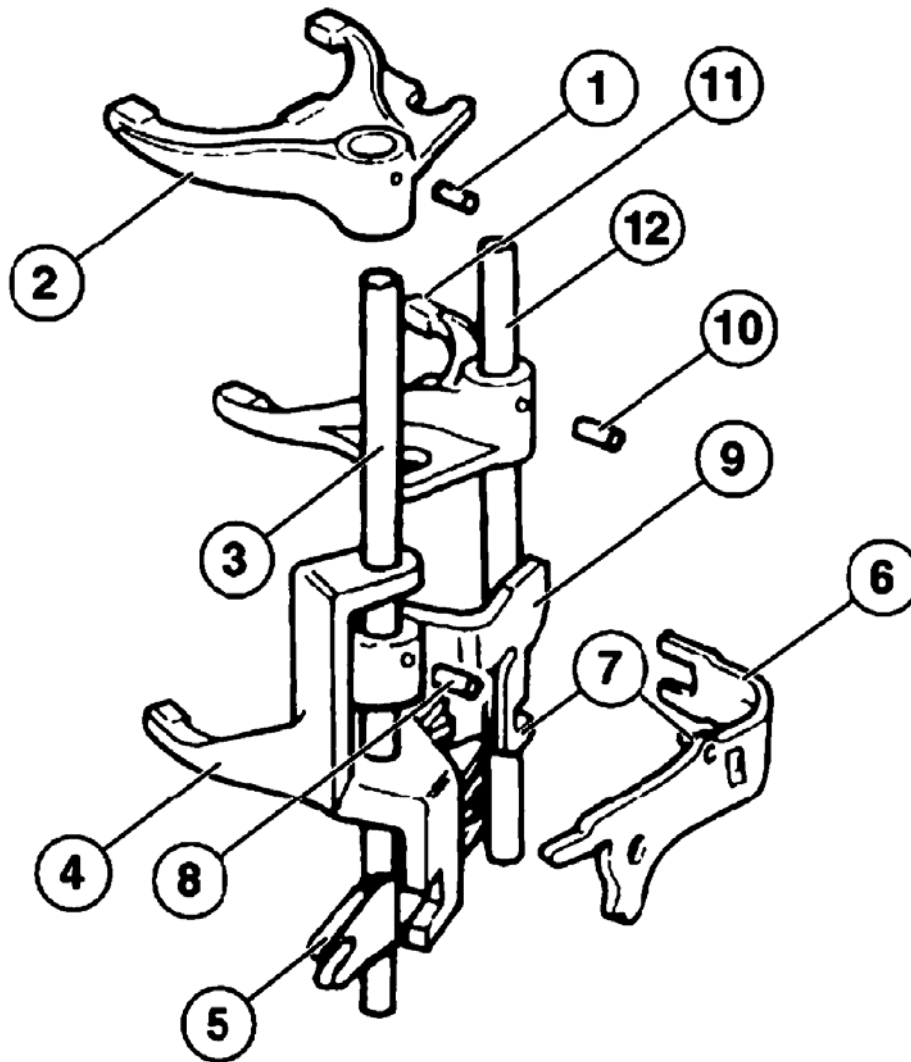
Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove **LOCKING BODY/REVERSE GEAR FORK** . Lift input shaft (1) and output shaft (2) together with shift shafts (3) and shift forks out of clutch housing. See **Fig. 50** . Check parts for damage/wear, replace if necessary. See **Fig. 51** .



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Fig. 50: Removing Shift Shafts

Courtesy of BMW OF NORTH AMERICA, INC.



- | | |
|---|---|
| 1 Locating pin | 7 Shift fork guide journal and reverse gear fit |
| 2 5th gear shift fork | 8 Locating pin |
| 3 5th gear, 1st/2nd gear and reverse gear shift shaft | 9 Reverse gear shift lever assembly |
| 4 1st/2nd gear shift fork assembly | 10 Locating pin |
| 5 1st/2nd gear shift fork guide body | 11 3rd/4th gear shift fork |
| 6 Reverse gear shift fork | 12 3rd/4th gear shift shaft |

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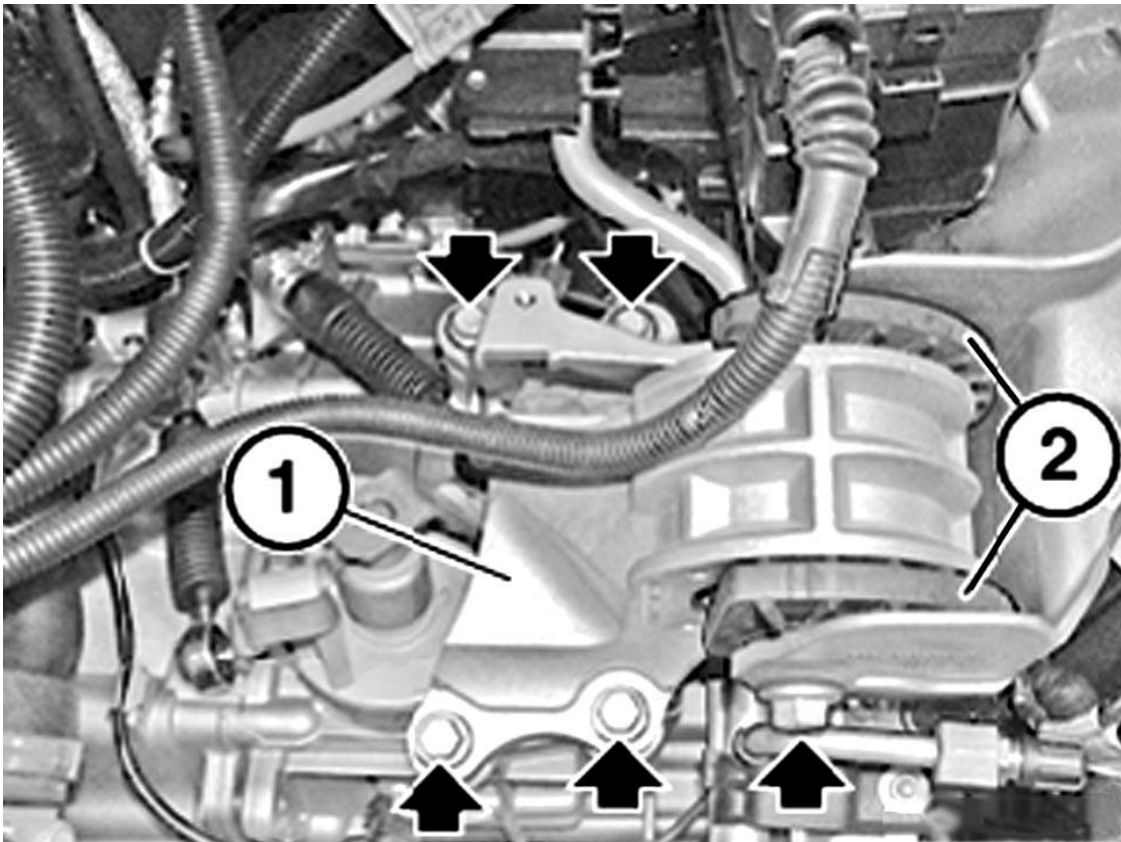
Fig. 51: Identifying Shift Shafts/Shift Forks
 Courtesy of BMW OF NORTH AMERICA, INC.

SHIFTING UNIT

NOTE: Numbers in text refer to numbers in figures.

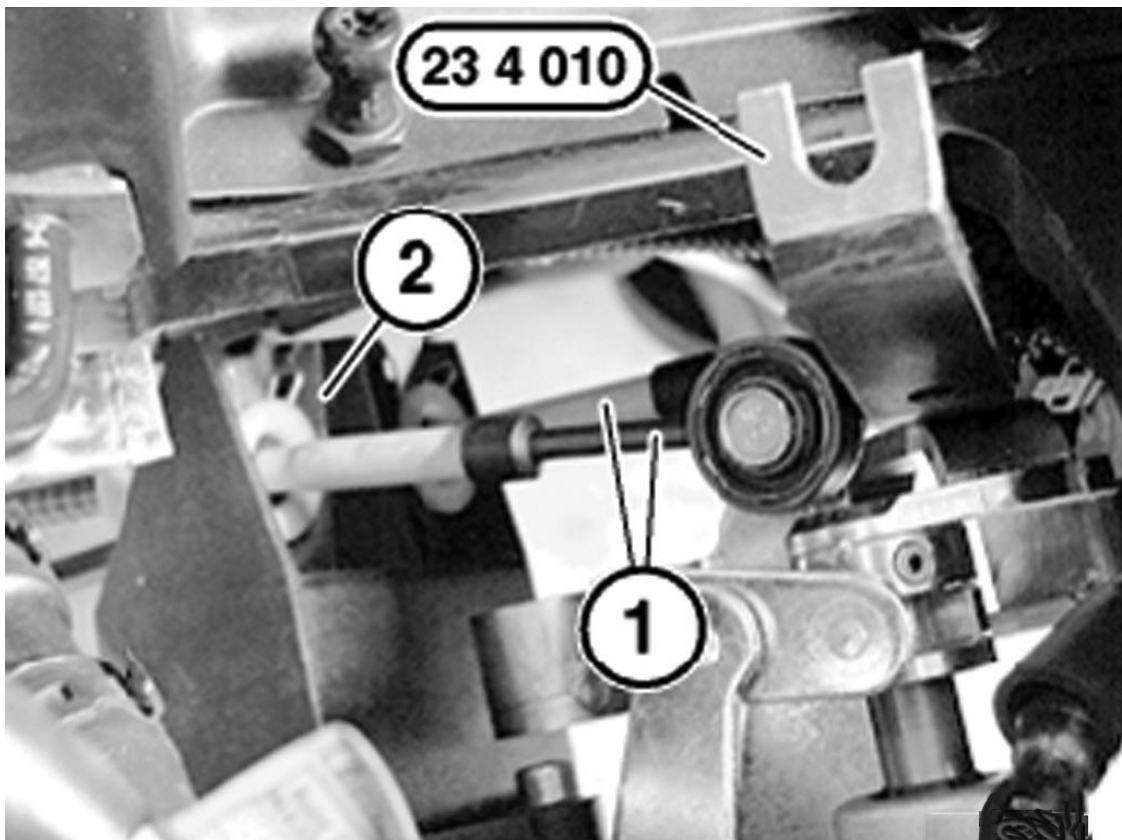
Removal & Installation

Shift gears to neutral. Remove battery housing. Release load on left transmission support block with jack. During installation, replace nut. Release bolts. Remove transmission support block (1) and bump stops (2). See **Fig. 52** . Remove cables (1) with special tool (23 4 01 0) from ball pins and disengage from brackets (2). See **Fig. 53** . Clean thread pitches. Replace micro-encapsulated screws. See **Fig. 54** . Apply Loctite 5203 sealing compound. Unfasten screws. Pull shifting unit up and out of transmission. Note installation position.



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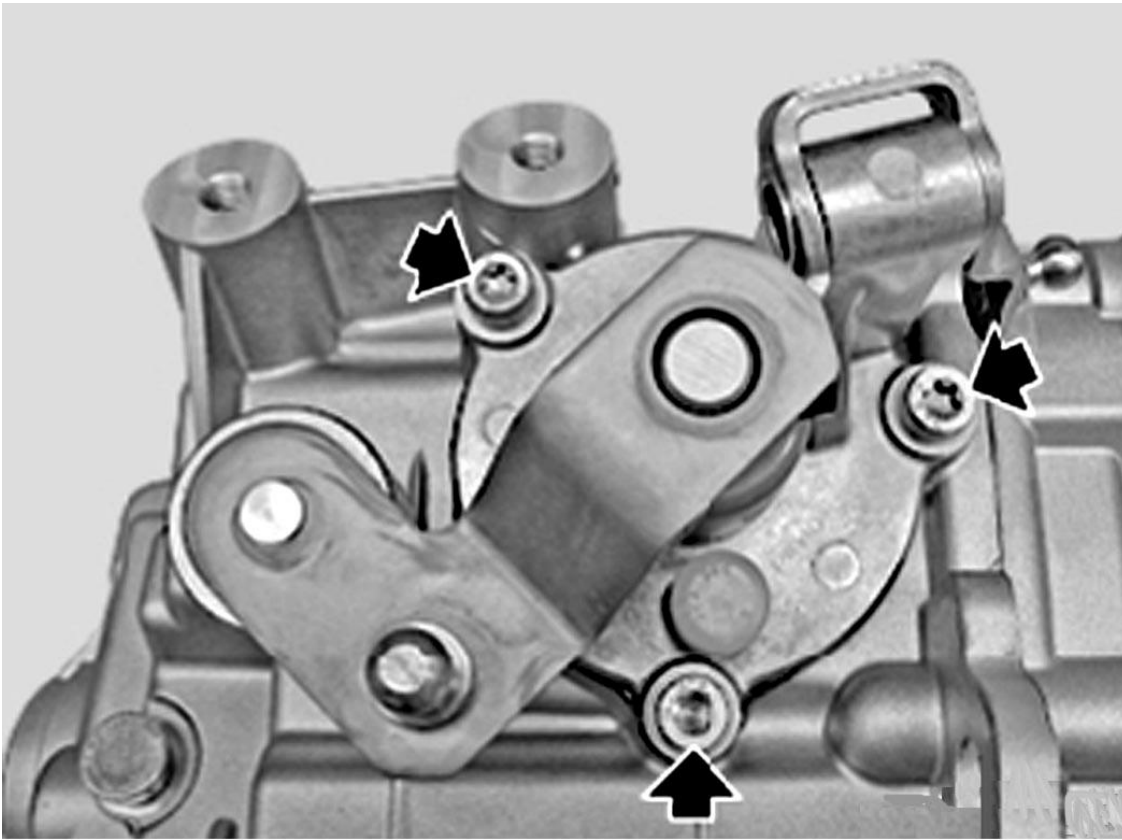
Fig. 52: Removing Transmission Support Block & Bump Stops
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 53: Removing Cables

Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 54: Identifying Screws

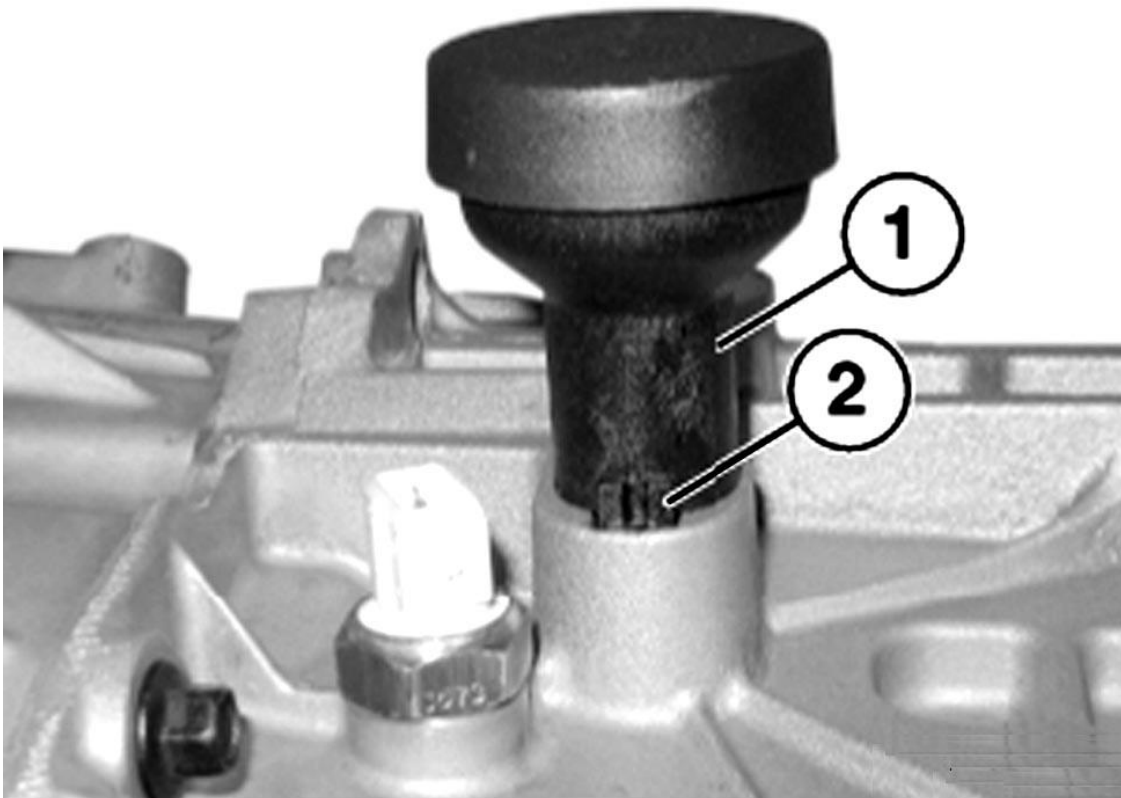
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION BREATHER

NOTE: Numbers in text refer to numbers in figures.

Removal & Installation

Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Lever vent pipe (1) at lugs (2) out of transmission using a screwdriver. See **Fig. 55** .



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Fig. 55: Levering Vent Pipe At Lugs

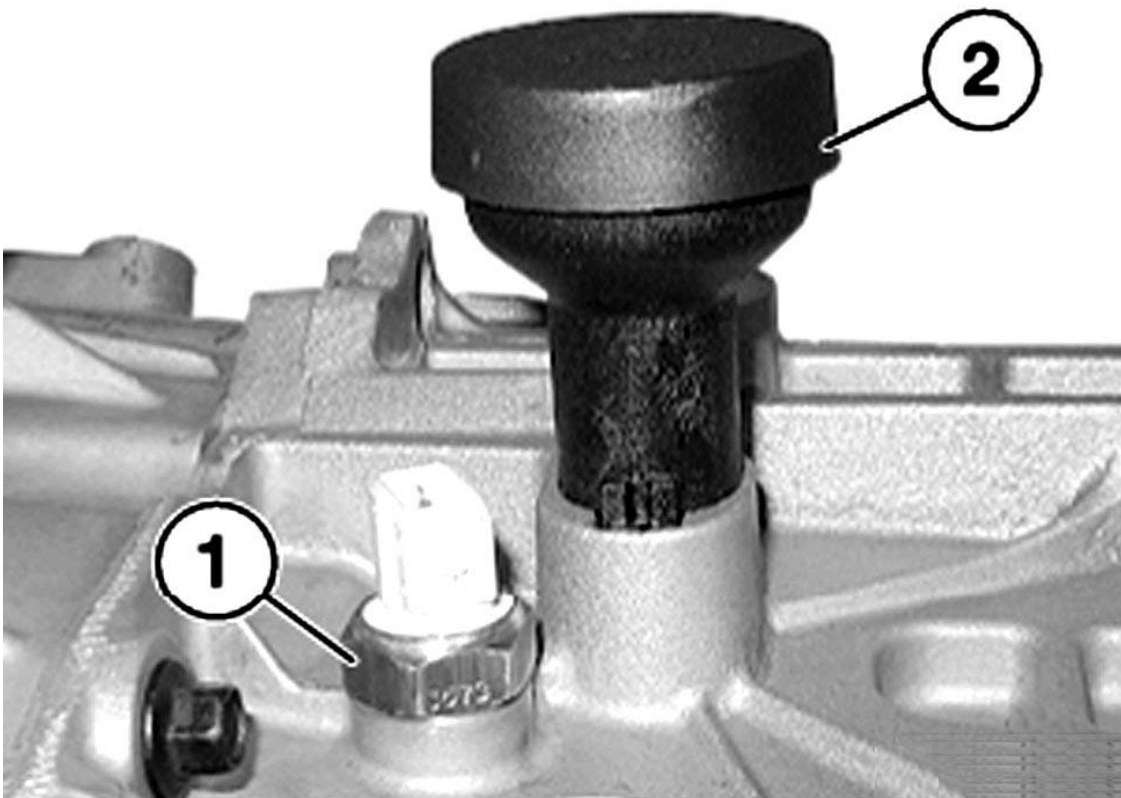
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION HOUSING

NOTE: Numbers in text refer to numbers in figures.

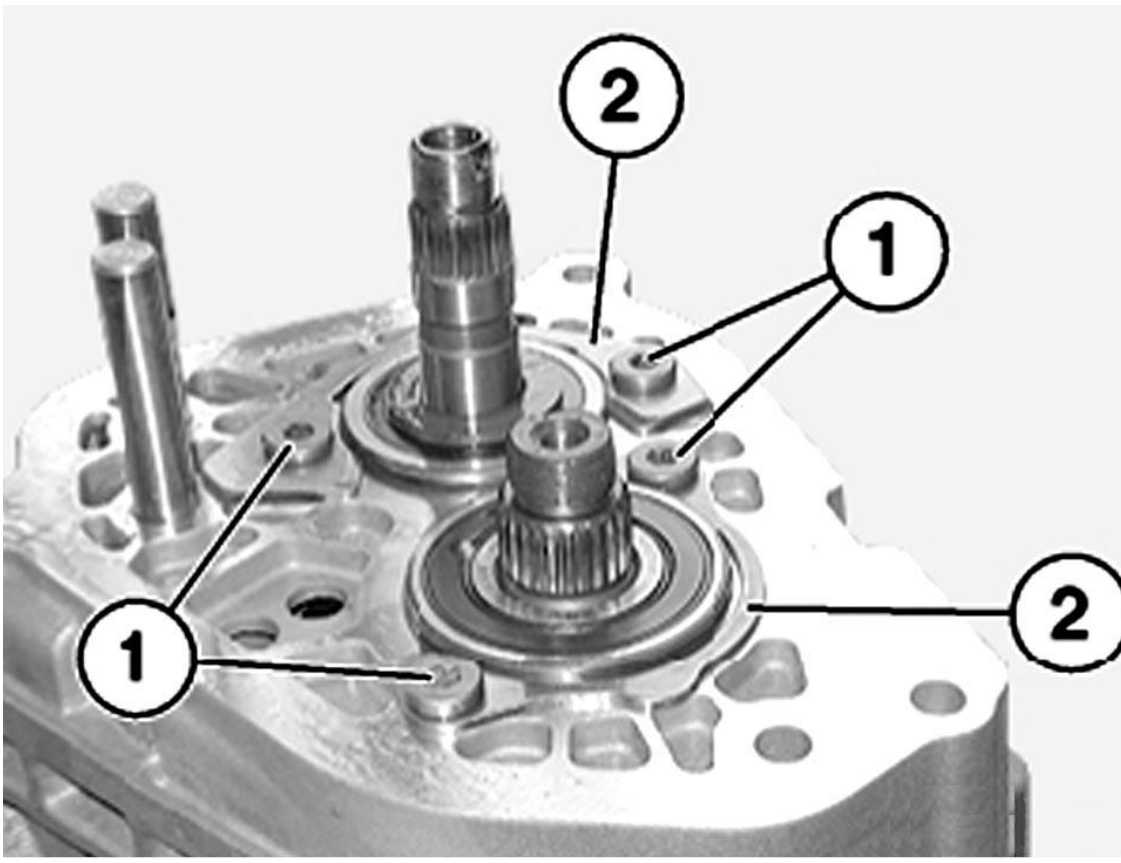
Removal & Installation

1. Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove **5TH GEAR DRIVE** . Remove reversing light switch (1) and transmission breather (2). See **Fig. 56** . Release bolts (1) and remove snap rings (2). See **Fig. 57** . **NOTE:** During installation, replace bolts. Make sure snap rings are in correct installation positions. Chamfer of snap rings must point ahead during installation of bearings. Release bolts along marked line and lift transmission housing off clutch housing. See **Fig. 58** .
2. **NOTE:** Installation position of 4 longer bolts. Tighten down bolts in diagonal sequence from middle working outwards. Check that adapter sleeves (1) are correctly seated. Replace damaged adapter sleeves. See **Fig. 59** . Apply Loctite 5999 sealing compound. Do not allow sealing compound to come into contact with seat of shift shaft seal (2).



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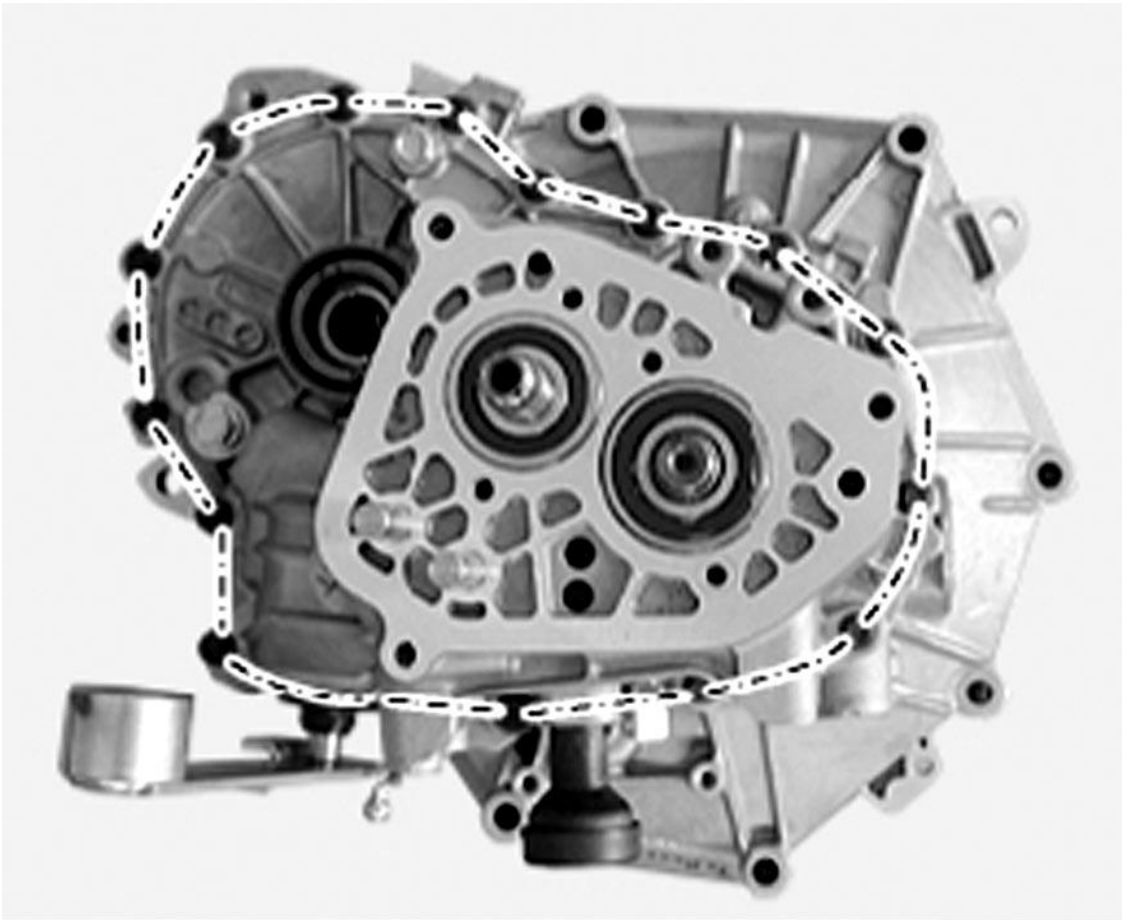
Fig. 56: Removing Reversing Light Switch & Transmission
Courtesy of BMW OF NORTH AMERICA, INC.



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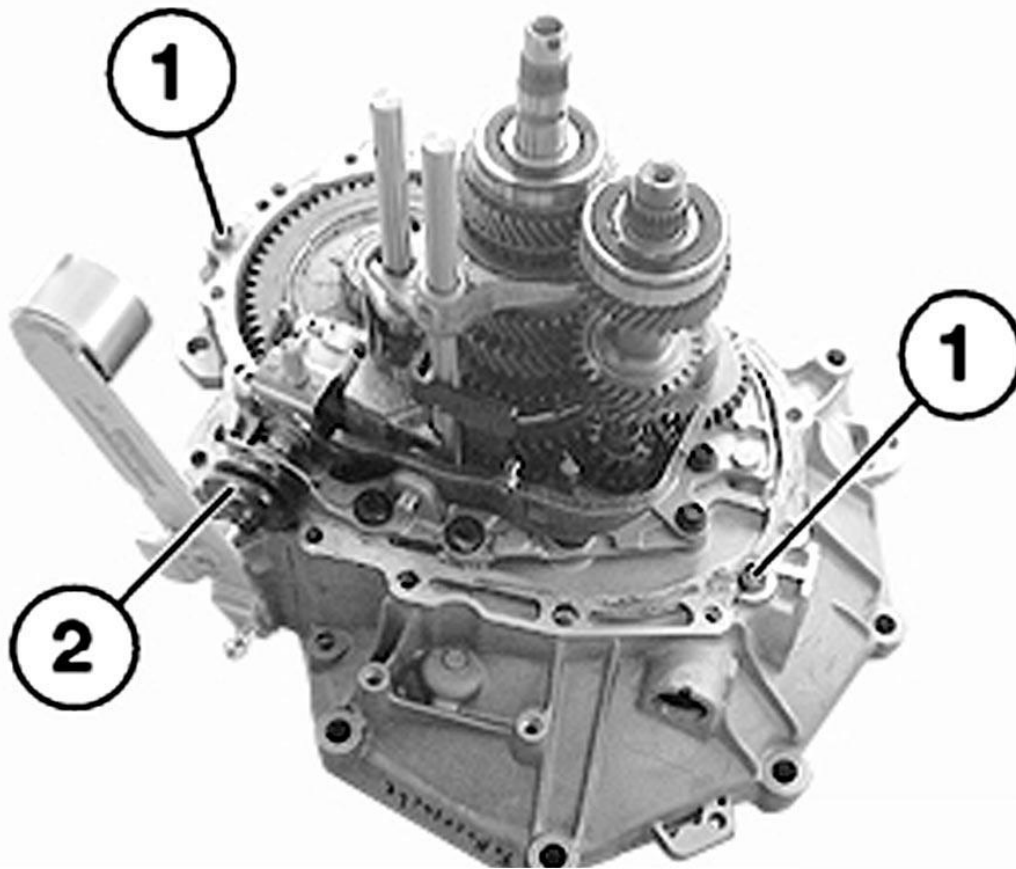
Fig. 57: Removing Snap Rings

Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 58: Removing Transmission Housing Bolts (Identifying Marked Line)
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 59: Checking Adapter Sleeves

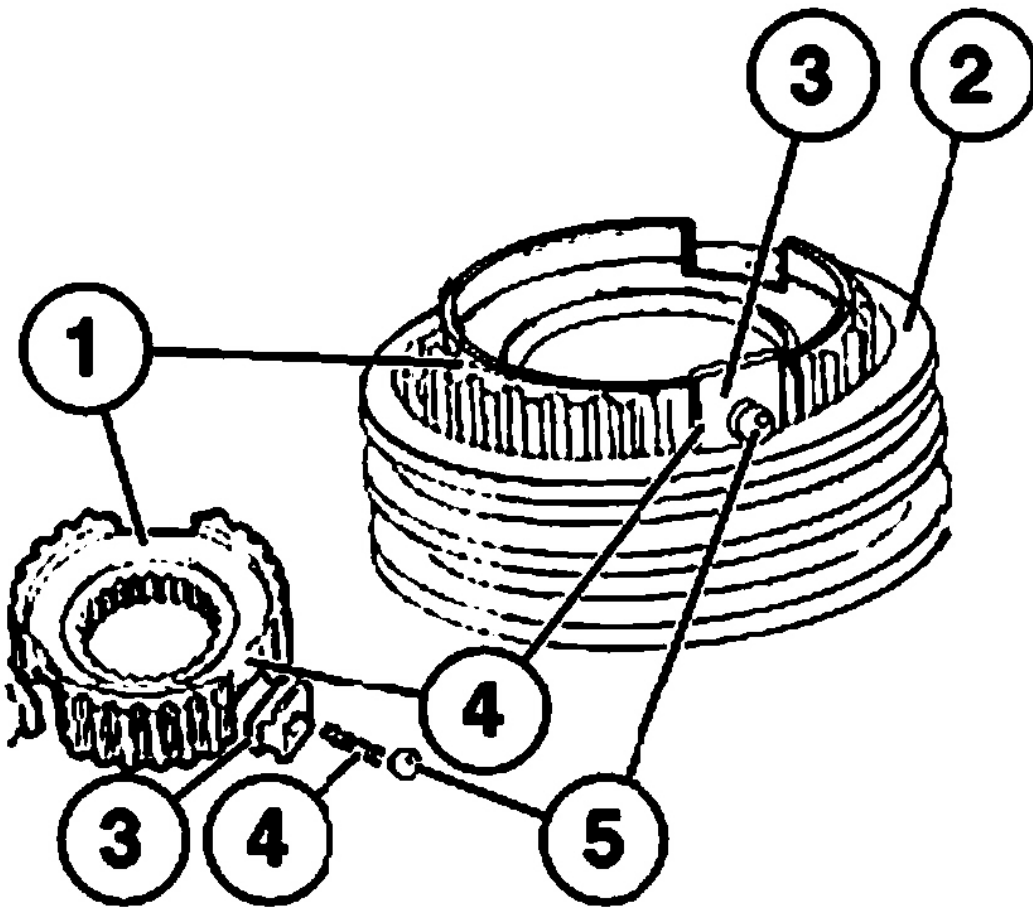
Courtesy of BMW OF NORTH AMERICA, INC.

1ST/2ND & 3RD/4TH GEAR SYNCHROMESH**NOTE:** Numbers in text refer to numbers in figures.**Removal & Installation**

Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove **OUTPUT SHAFT**. Synchronizer assembly may only be exchanged as a complete unit. Insert synchronizer hub (1) in selector sleeve (2). See **Fig. 60**. Insert sliding sections (3) in synchronizer hub. Push springs (4) fully into sliding section holes. Press springs (4) together and fit balls (5). Be sure to mark installation position of synchronizer hub to selector sleeve prior to disassembly. Ensure balls move into the selector sleeve holes when springs are released.

Observe the following when assembling synchronizer assemblies:

- The 5th gear synchronizer hub is symmetrical and can be installed in both positions.
- The groove in the 3rd/4th gear synchronizer hub must be located in the selector sleeve on the other side of the shift fork guide groove.
- The groove in the 1st/2nd gear synchronizer hub must be located in the selector sleeve on the other side of the shift fork guide groove.
- The selector sleeves of the 3rd/4th and 5th gear synchronizer assemblies are identical.
- All balls and springs are identical
- The sliding sections of the 1st/2nd gear synchronizer assembly are different from the sliding sections of the 3rd/4th and 5th gear synchronizer assembly.



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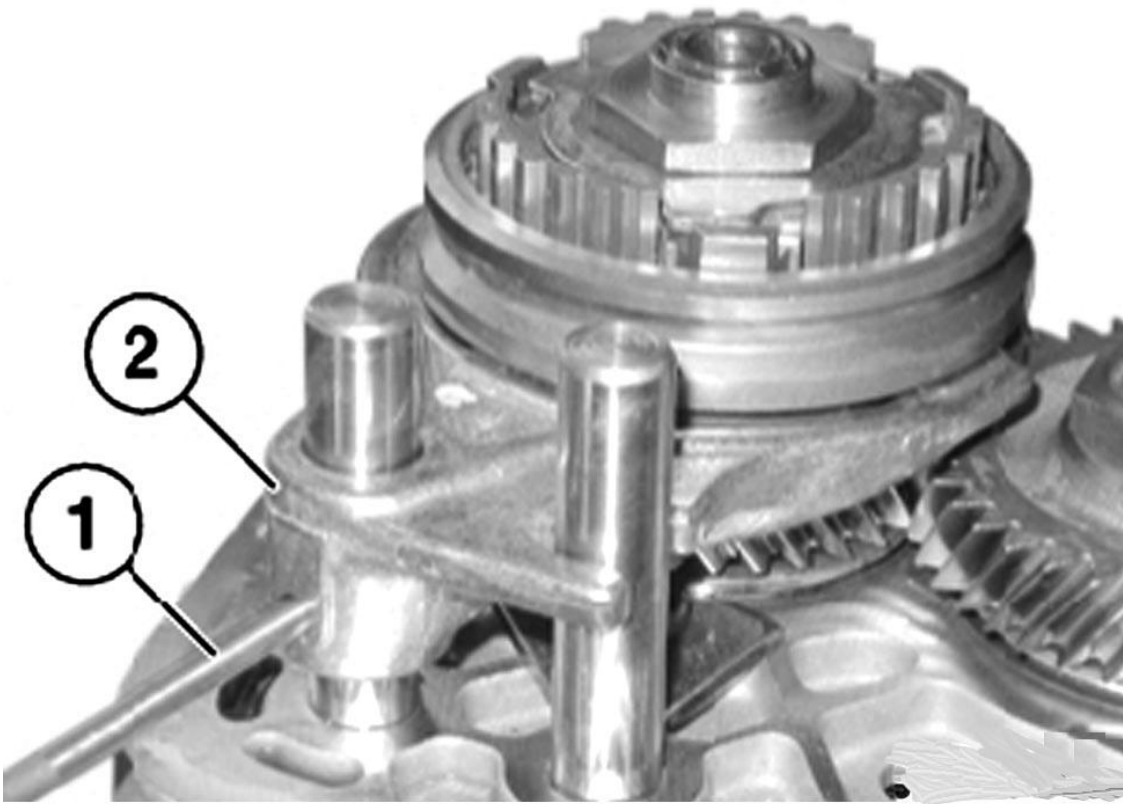
Fig. 60: Inserting Synchronizer Hub In Selector Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

5TH GEAR DRIVE

NOTE: Numbers in text refer to numbers in figures.

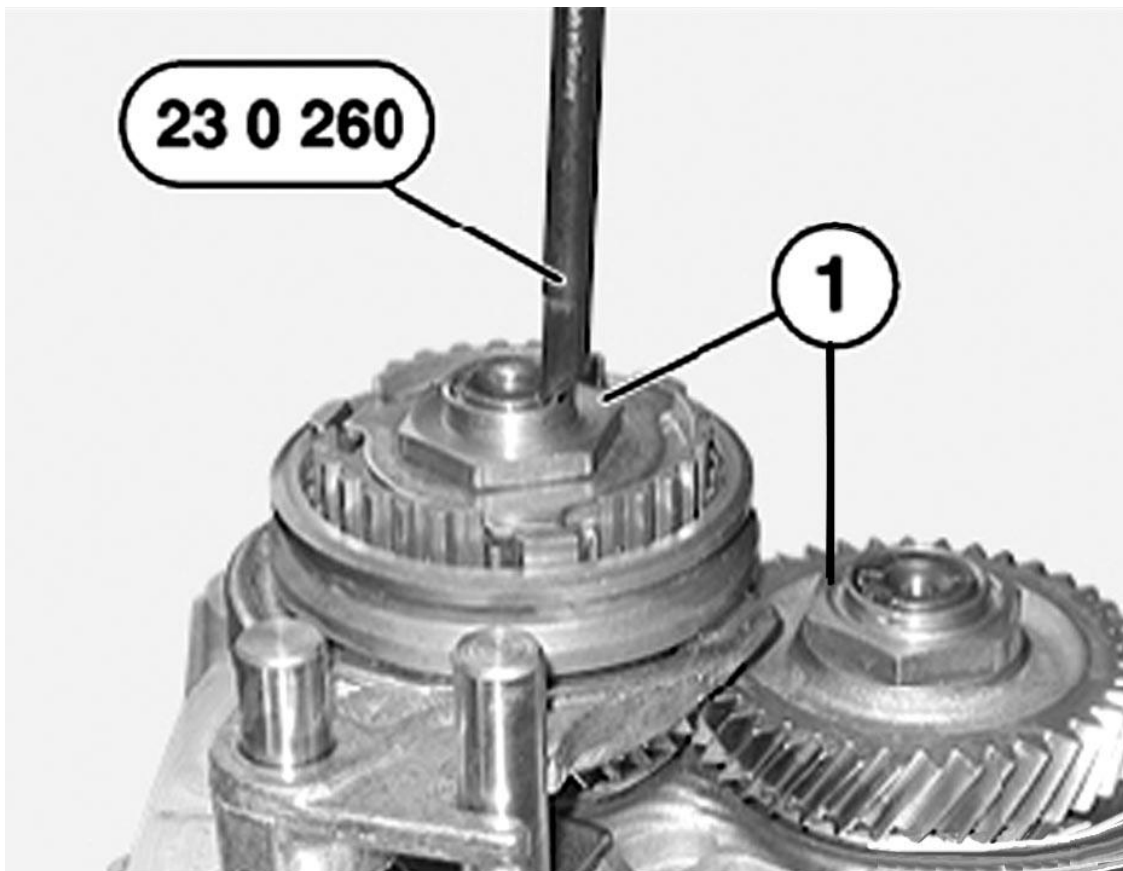
Removal & Installation

1. Remove transmission. See **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove transmission cover/5th gear. See **COVER/5TH GEAR** . Drive locating pin out of shift fork (2) with punch (1). See **Fig. 61** . Engage 1st gear. Press shift fork down and simultaneously engage 5th gear with selector sleeve. During installation, replace locating pin. Release clamping nuts (1) with special tool (2311 12AZ). See **Fig. 62** . Slacken clamping nuts. Disengage gear wheels for 1st and 5th gears. Remove clamping nuts and stop discs. During installation, replace clamping nuts. Slide shift fork (1) and synchronizer assembly (2) from shift shaft. See **Fig. 63** . Do not separate the synchronizer hub from the selector sleeve at this stage.
2. Pull synchronizer ring (1) together with gear wheel (2), needle bearing (3) and bearing bushing (4) off output shaft. See **Fig. 64** . To install, replace shim under output shaft gear wheel. Fit special tool (23 0 275) on input shaft. See **Fig. 65** . Detach gear wheel from input shaft with special tools (23 0 271, 23 0 272, 23 0 273 and 23 0 274). See **Fig. 66** . Mount special tool (23 0 300) to clutch housing. See **Fig. 67** . Place gear wheel (1) on input shaft and drive on with special tool (23 0 290). See **Fig. 68** . Remove special tools (23 0 300) and (23 0 290). Mount gear wheel (1) with bearing bushing, Attach synchronizer assembly (2) with 5th gear shift fork. See **Fig. 69** . Fit stop disc (1) and clamping nuts (2). Engage 1st gear with shift lever. Press 5th gear shift fork down and simultaneously engage 5th gear with selector sleeve. Tighten down clamping nuts (2) and lock nut flange. See **Fig. 70** . Disengage gear wheels for 1st and 5th gears. Drive in locating pin (3). Replace locating pin.



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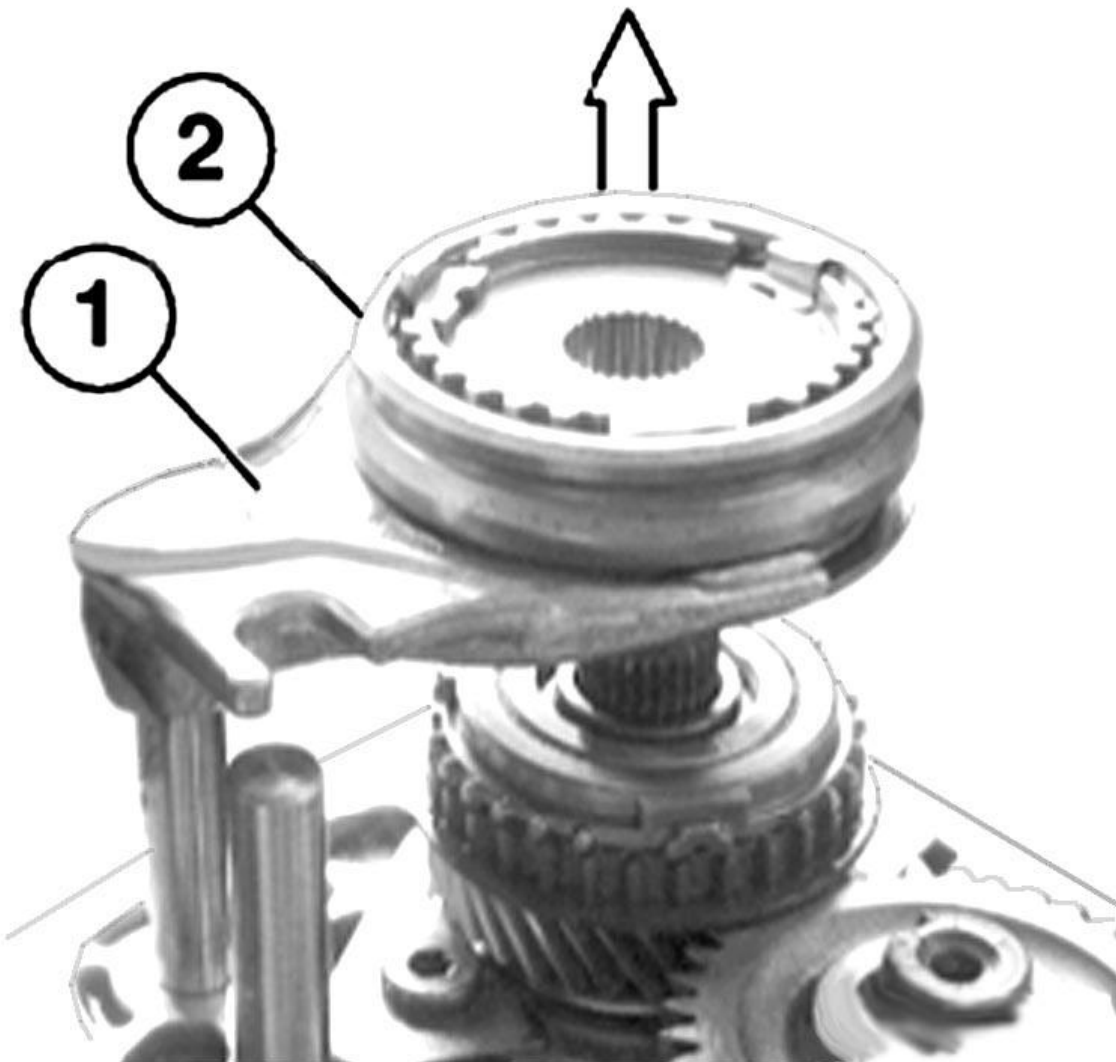
Fig. 61: Driving Locating Pin Out Of Shift Fork With Punch
Courtesy of BMW OF NORTH AMERICA, INC.



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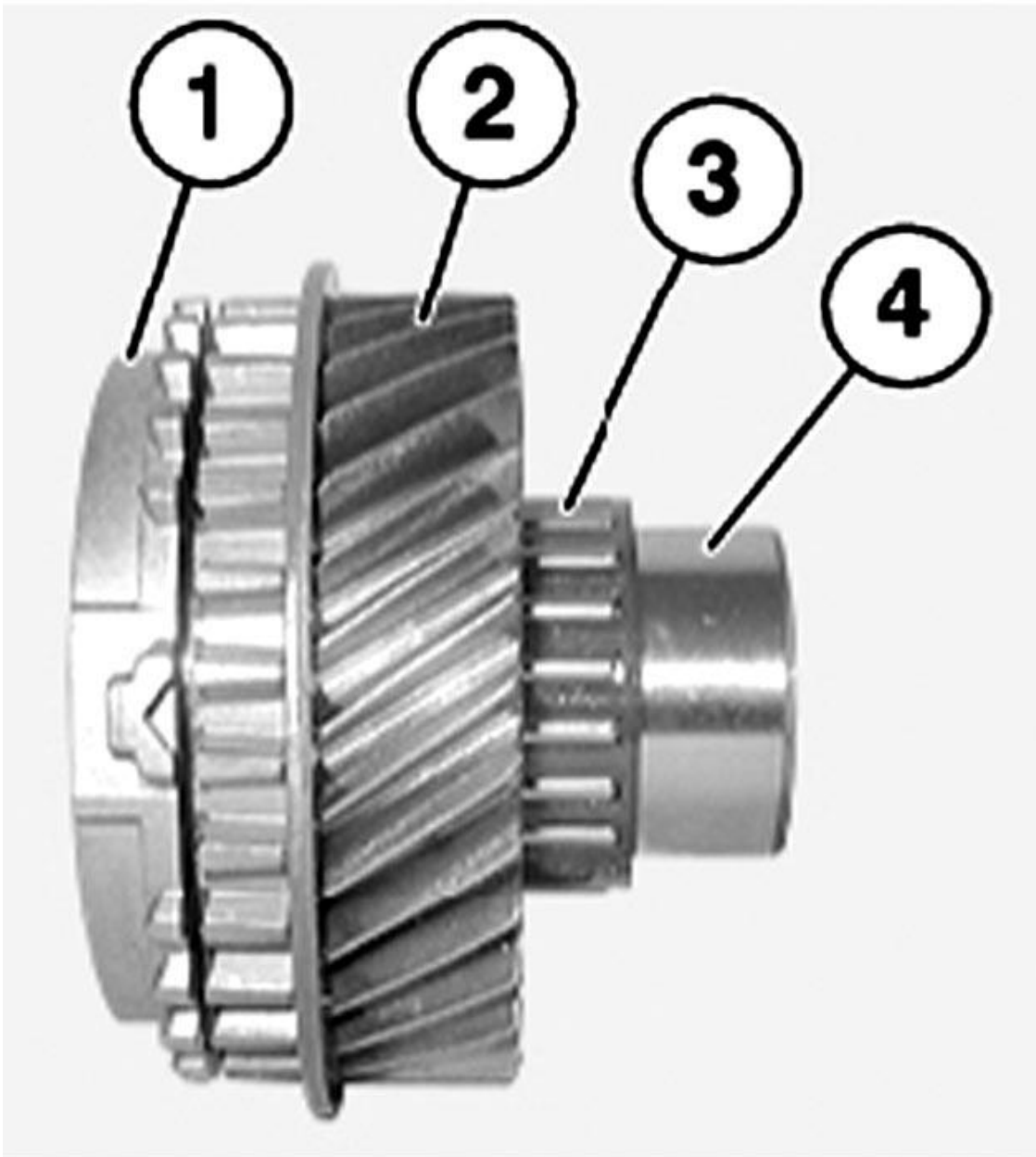
Fig. 62: Releasing Clamping Nuts

Courtesy of BMW OF NORTH AMERICA, INC.



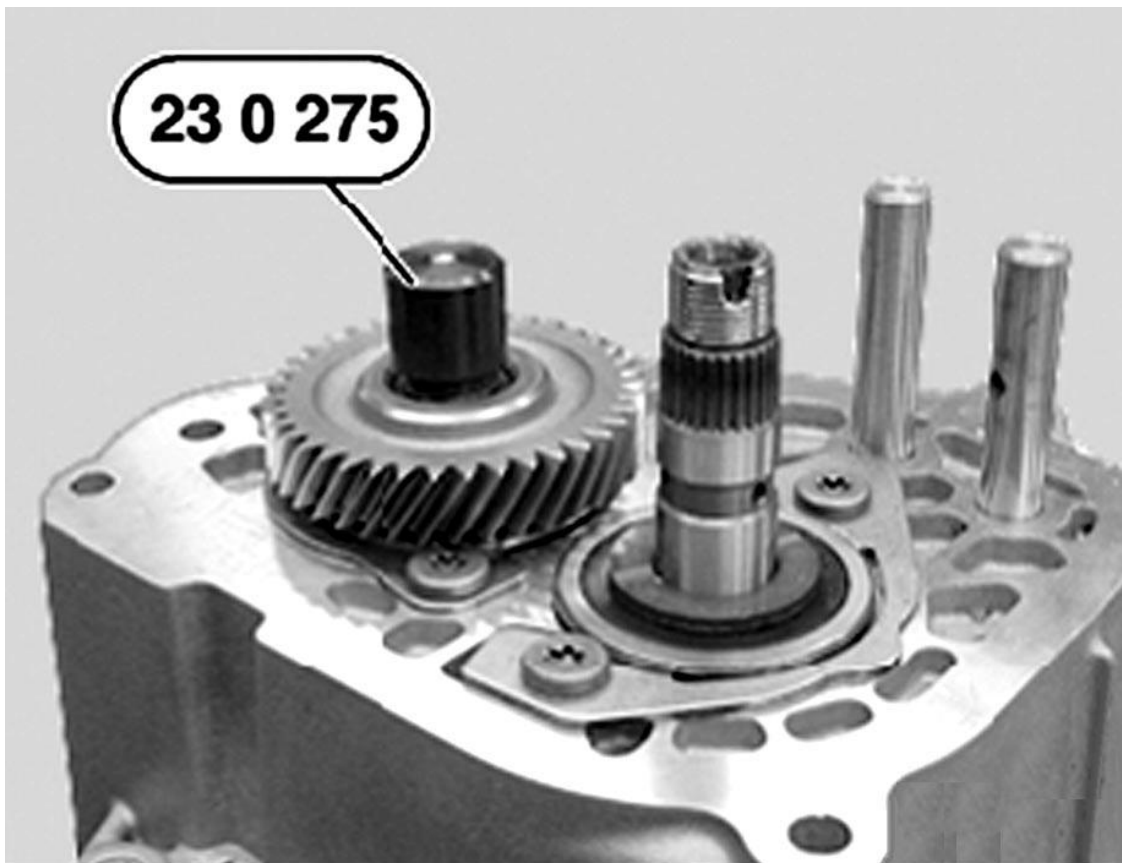
G00383858

Fig. 63: Sliding Shift Fork & Synchronizer Assembly From Shaft
Courtesy of BMW OF NORTH AMERICA, INC.



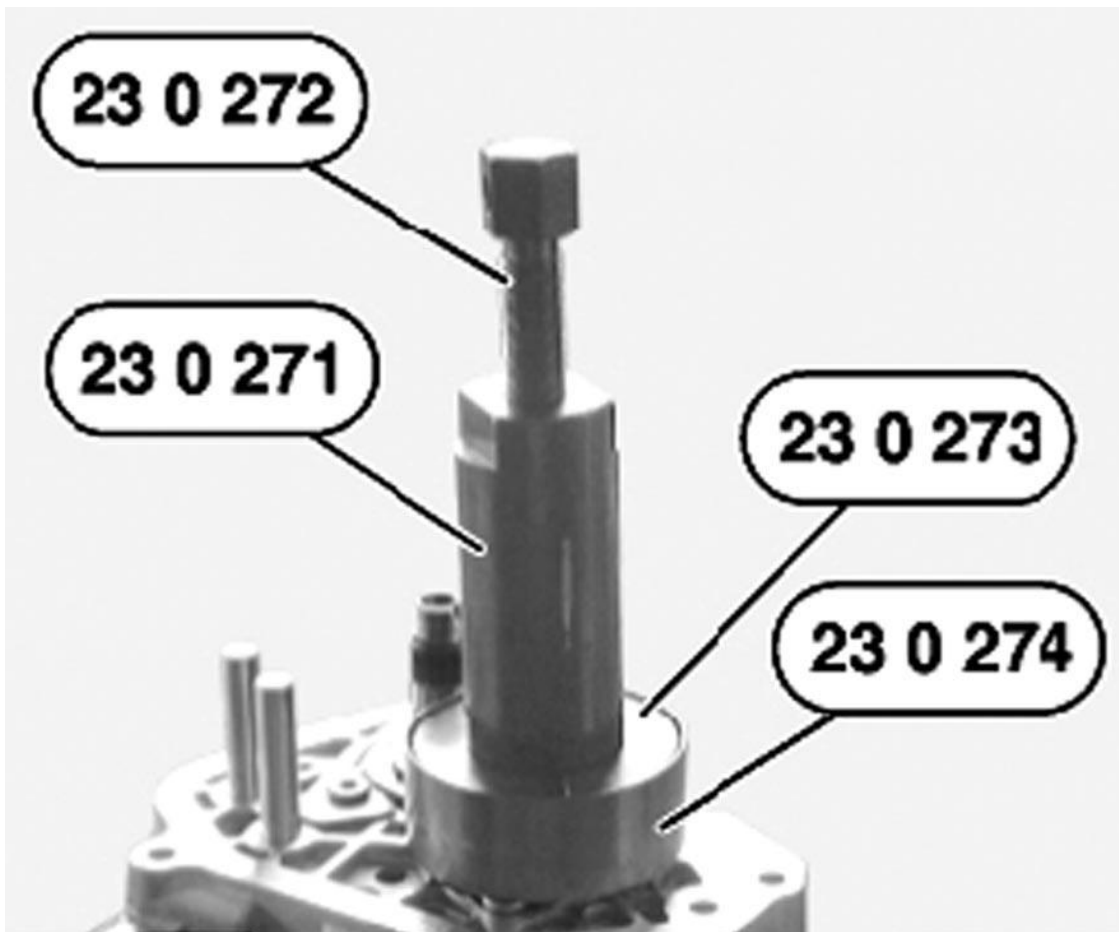
G00383859

Fig. 64: Removing Synchronizer Ring & Components
Courtesy of BMW OF NORTH AMERICA, INC.



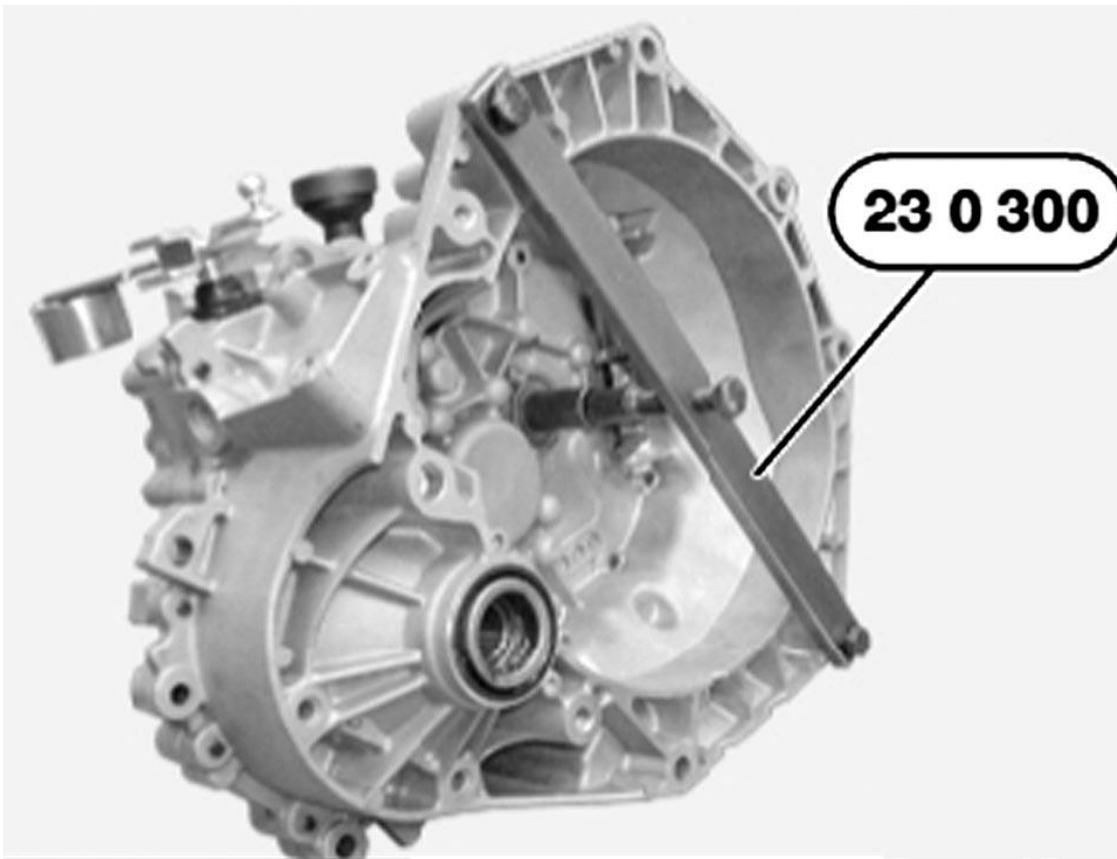
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Fig. 65: Installing Special Tool On Input Shaft
Courtesy of BMW OF NORTH AMERICA, INC.



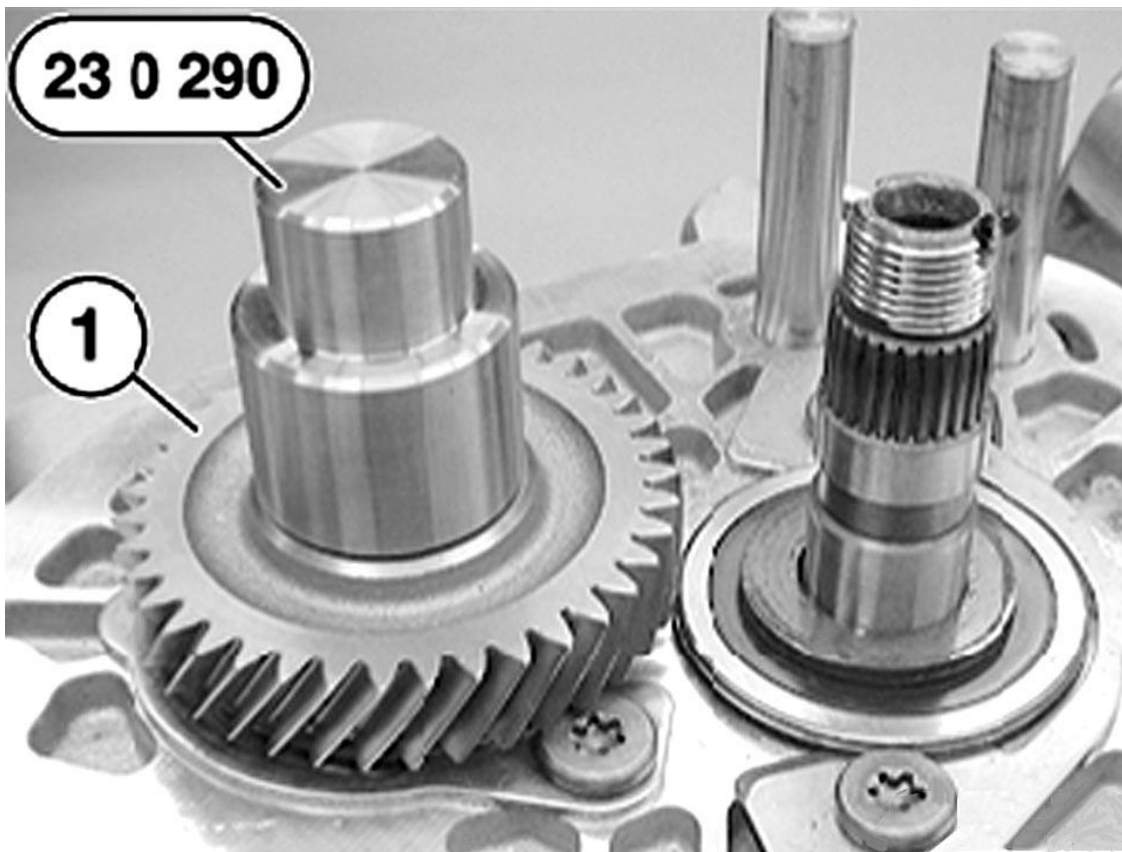
G00383861

Fig. 66: Detaching Gear Wheel From Input Shaft
Courtesy of BMW OF NORTH AMERICA, INC.



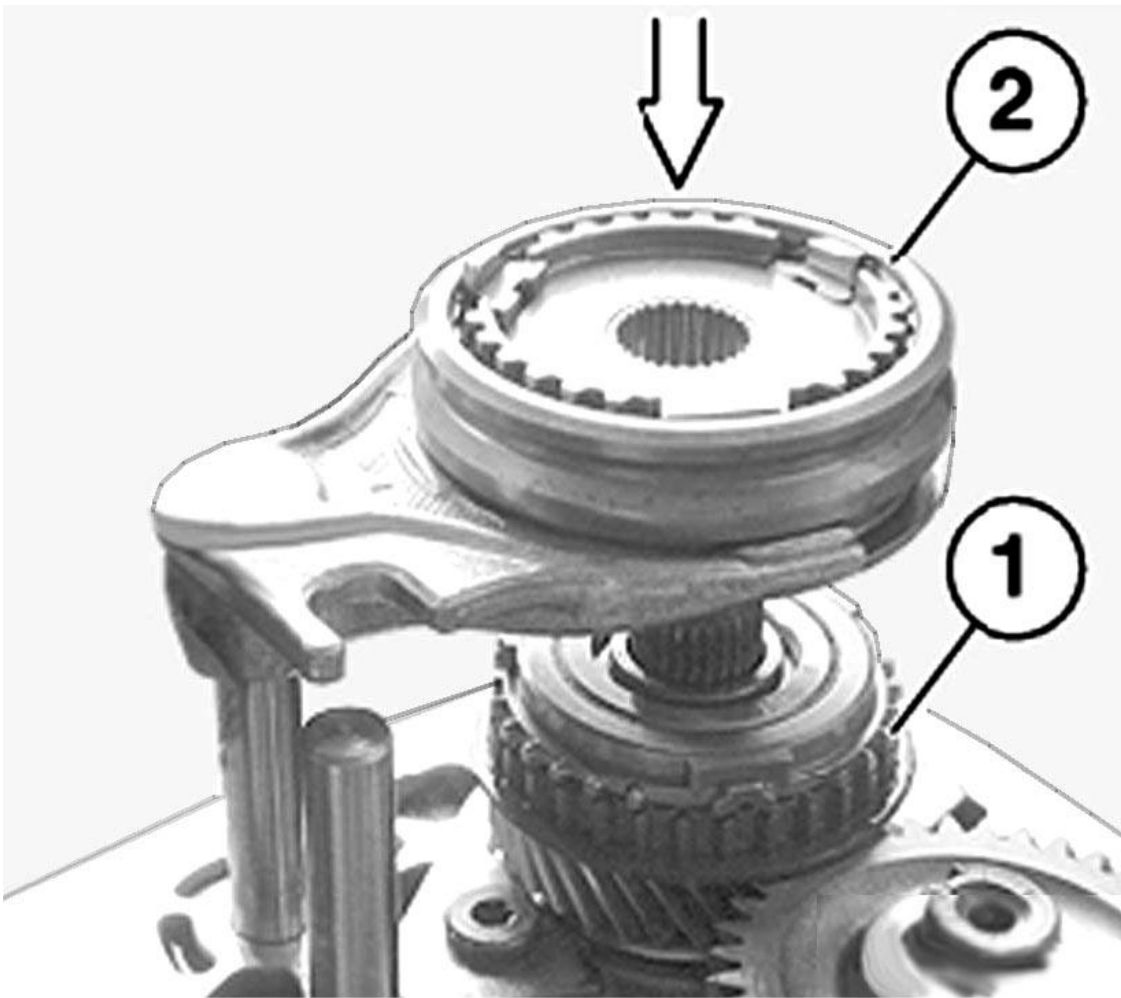
G00383862

Fig. 67: Mounting Special Tool On Clutch Housing
Courtesy of BMW OF NORTH AMERICA, INC.



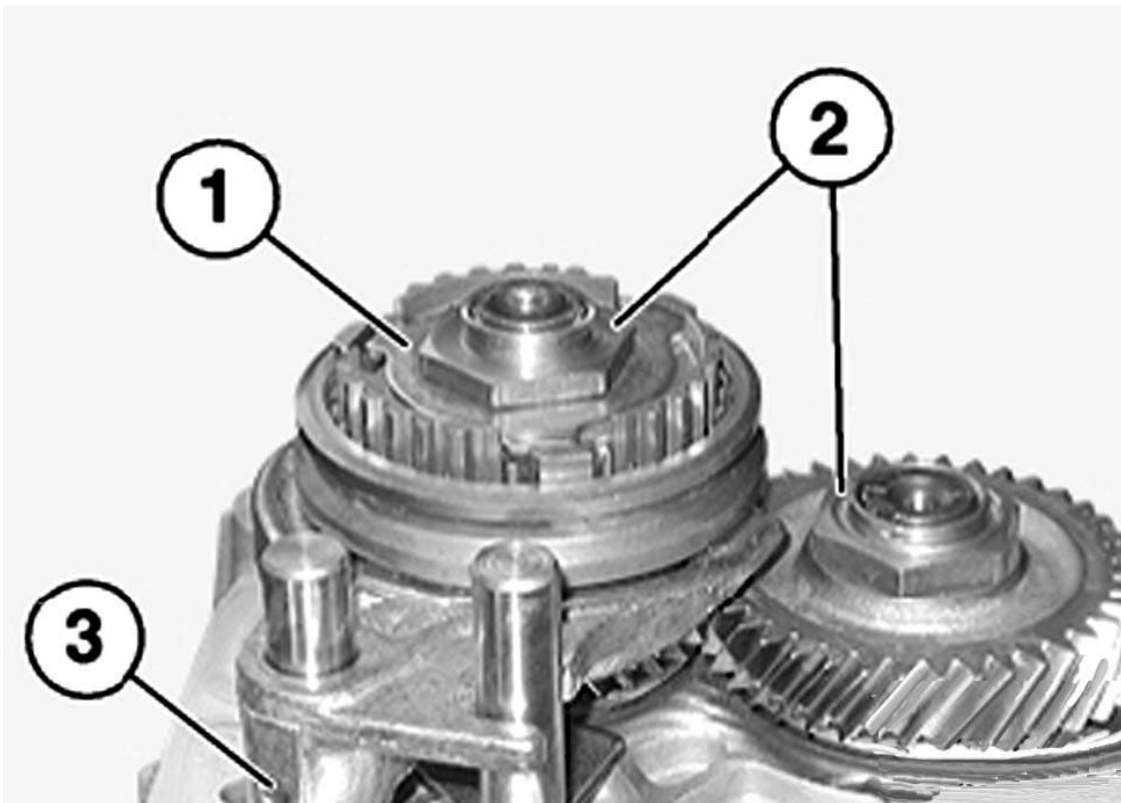
G00383863

Fig. 68: Placing Gear Wheel On Input Shaft
Courtesy of BMW OF NORTH AMERICA, INC.



G00383864

Fig. 69: Mounting Gear Wheel and Synchronizer Assembly
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 70: Installing Stop Disc & Clamping Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

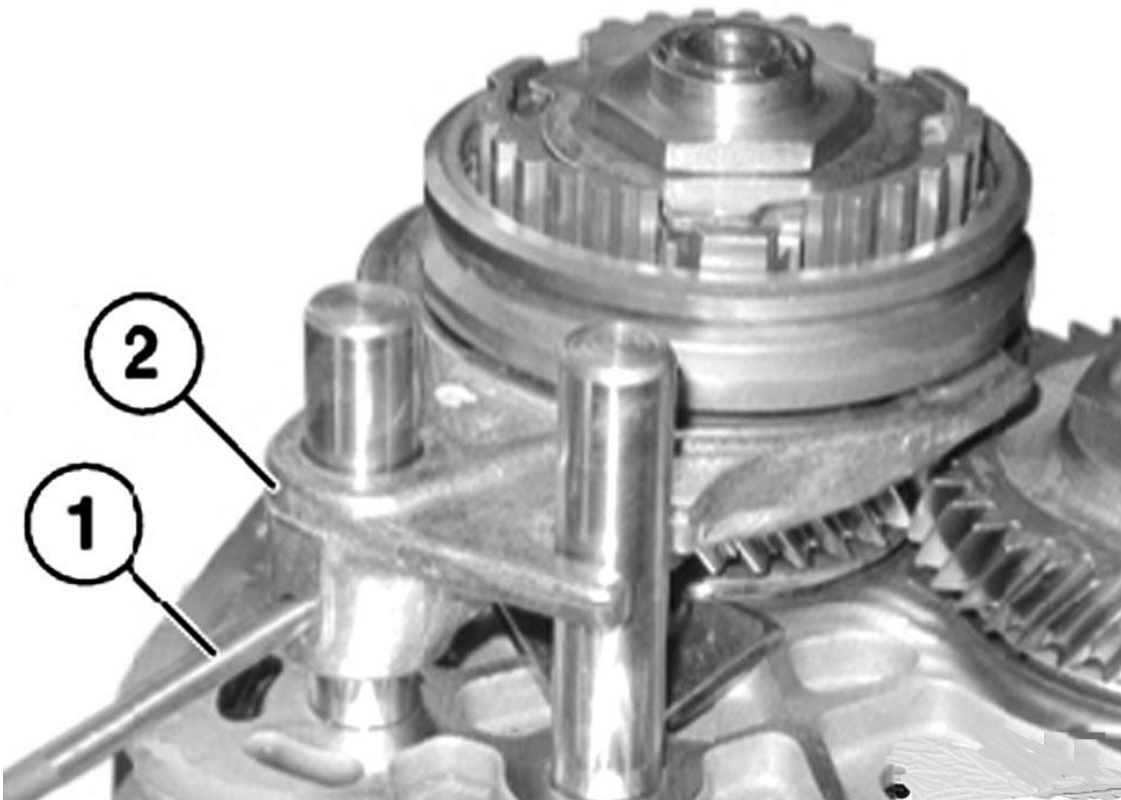
5TH GEAR SYNCHROMESH

NOTE: Numbers in text refer to numbers in figures.

Removal & Installation

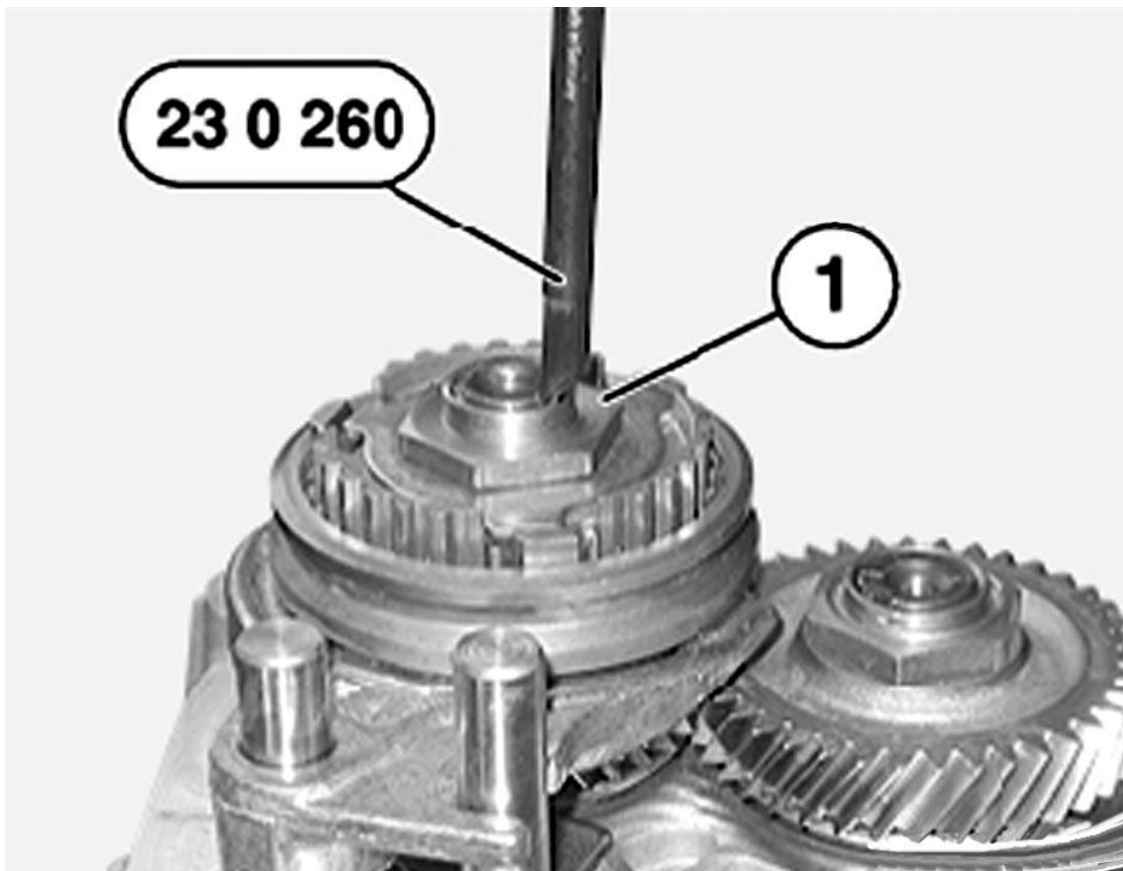
1. Remove transmission. For transmission removal and installation, see **MANUAL TRANSMISSION - REMOVAL & INSTALLATION** article. Remove **COVER/5TH GEAR** . Drive locating pin out of shift fork (2) with punch (1). See **Fig. 71** . Engage 1st gear. Press shift fork down and simultaneously engage 5th gear with selector sleeve. During installation, replace locating pin. Release clamping nut (1) with special tool (23 0 260). See **Fig. 72** . Slacken clamping nut. Disengage gear wheels for 1st and 5th gears.
2. Remove clamping nut and stop disc. During installation, replace clamping nut. Slide shift fork (1) and synchronizer assembly (2) from shift shaft. See **Fig. 73** . Do not separate the synchronizer hub from the selector sleeve at this stage. Synchronizer assembly may only be exchanged as a complete unit.
3. System layout: insert synchronizer hub (2) in selector sleeve (1). Insert sliding sections (3) in synchronizer hub. Push springs (4) fully into sliding section holes. Press springs (4) together and fit balls

(5). See **Fig. 74** . Mark installation position of synchronizer hub to selector sleeve prior to disassembly. Make sure the balls move into the selector sleeve holes when the springs are released.



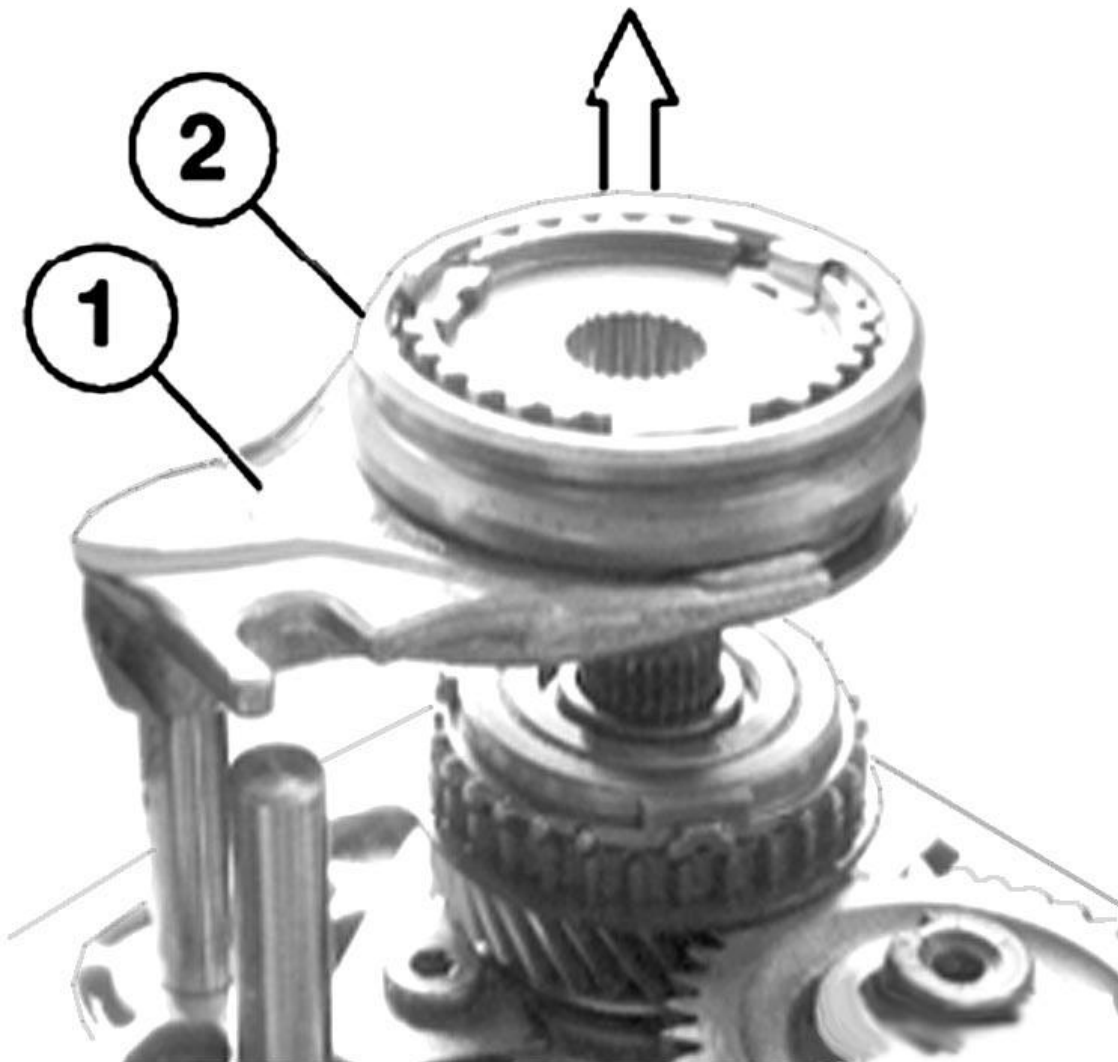
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Fig. 71: Driving Locating Pin Out Of Shift Fork With Punch
Courtesy of BMW OF NORTH AMERICA, INC.



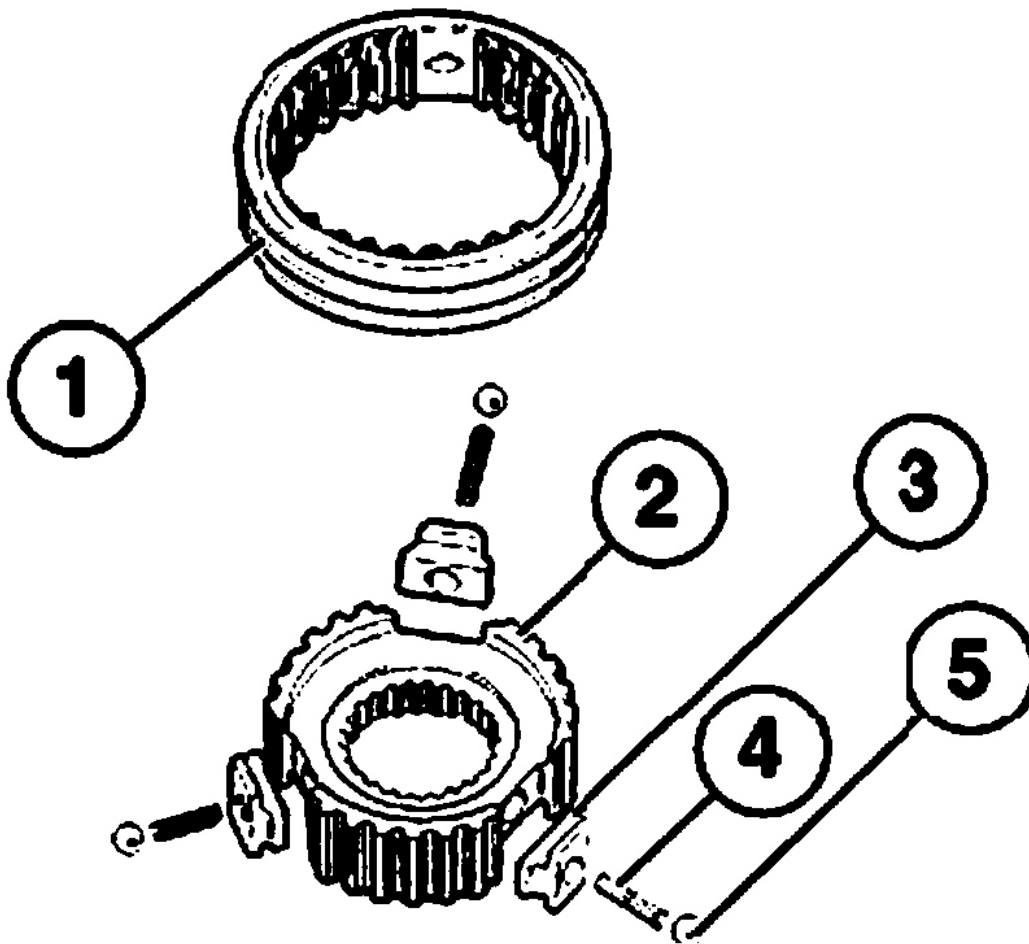
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Fig. 72: Releasing Clamping Nut
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 73: Sliding Shift Fork & Synchronizer Assembly
Courtesy of BMW OF NORTH AMERICA, INC.



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Fig. 74: Synchronizer Hub Layout

Courtesy of BMW OF NORTH AMERICA, INC.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Clamping Nut, Input & Output Shafts	96 (130)
Cover/5th Gear To Transmission	20 (28)
Intermediate Plate Screw	20 (28)
Reversing Light Switch	18 (25)
Screw With Torx Head/Bearing Snap Ring	22 (30)

2005 MINI Cooper

2002-05 MANUAL TRANSMISSION Overhaul - MINI Cooper

Screw With Torx Head, Intermediate Plate	44 (60)
Stop/Shift Cable Bracket	16 (22)
Transmission Housing Bolt	21 (28)
Transmission To Engine Bolt	63 (85)
Transmission Mount To Transmission	28 (38)
Transmission Support Bracket To Body	50 (68)
Transmission Support Bracket To Transmission Mount	50 (68)
5th Gear Cover To Gearbox	20 (27)
INCH Lbs. (N.m)	
Cover Plate Screws	80 (9)
Guide Bushing/Clutch Release Bearing	44 (5)
Guide Sleeve Retaining Bolts	53 (6)