

MANUAL TRANS OVERHAUL - TYPE 02J

Article Text

1999 Volkswagen Golf

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ARTICLE BEGINNING

1998-99 MANUAL TRANSMISSIONS
Volkswagen/Audi V.A.G. Type 02J

1998-99; Beetle
1999; Golf, Jetta

APPLICATION

TRANSAXLE APPLICATIONS

AA
Vehicle Application Transaxle Model & Code

1998	
Beetle (2.0L 4-Cyl. Gas)	02J.CZM
Beetle (1.9L 4-Cyl. Turbo Diesel)	02J.DQY
1999	
Beetle (2.0L 4-Cyl. Gas)	02J.CZM
Beetle (1.9L 4-Cyl. Turbo Diesel)	02J.DQY
Golf & Jetta (2.8L V6)	02J.EGF
Golf & Jetta (2.0L 4-Cyl.)	02J.DZQ
Golf & Jetta (1.9L 4-Cyl. Turbo Diesel)	02J.DQY

IDENTIFICATION

Volkswagen Audi Group (VAG) transaxle is identified by a type number cast into transaxle case. Three letter suffix identifies model. Code letter and production date information is stamped on a machined surface located inside the start mounting area and on upper portion of transaxle clutch housing surface.

DESCRIPTION

Type 02J is a 5-speed transaxle consisting of an input shaft, mainshaft/drive pinion and a differential assembly which transfers power to front wheels.

LUBRICATION

Place vehicle on level surface. Remove sound insulation below transmission, if equipped. Remove filler plug. Oil level should be to bottom of filler opening. Add fluid as needed. Use synthetic gear oil (G50, SAE 75W/90). Capacity is 2.1 qts. (2.0L).

ON-VEHICLE SERVICE

AXLE SHAFTS

See appropriate AXLE SHAFTS article in AXLE SHAFTS & TRANSFER

CASES.

TROUBLE SHOOTING

See GENERAL TROUBLE SHOOTING article.

REMOVAL & INSTALLATION

See appropriate MANUAL TRANSMISSION REMOVAL article in MANUAL TRANSMISSION SERVICING.

TRANSAXLE DISASSEMBLY

1) Mount transmission on Repair Stand (VW 309 and 353). Drain transmission oil. Remove clutch release lever and bearing. Remove guide sleeve. Remove transmission housing cover. Remove 5th gear selector fork bolts and remove fork. Use selector lever to select 5th gear and then 1st gear to lock input and output shafts. Then, remove synchronizer hub bolt and 5th gear bolt.

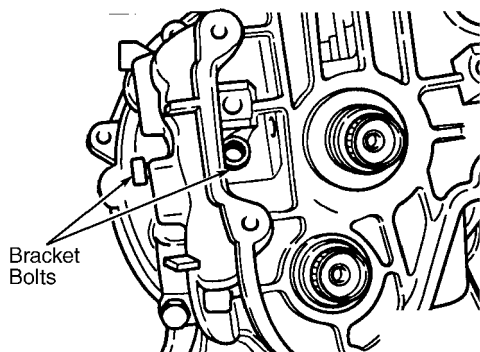
2) Remove operating sleeve. Use Puller "A" (Kukko 20/10 or Matra V/170) and hex bolt M10x20 "B" to remove 5th gear synchronizer hub with needle roller bearing. Use same puller assembly to remove 5th gear.

NOTE: Apply heat, with heat gun, to assist removal of 5th gear.

3) Remove both flange shafts, along with springs, thrust washers and tapered rings. Remove both reverse shaft support bracket bolts. See Fig. 1. Place selector shaft in neutral position, then remove retaining bolts and pull selector shaft out of transmission housing. Remove cover plate near underside pivot pins, then remove pivot pins.

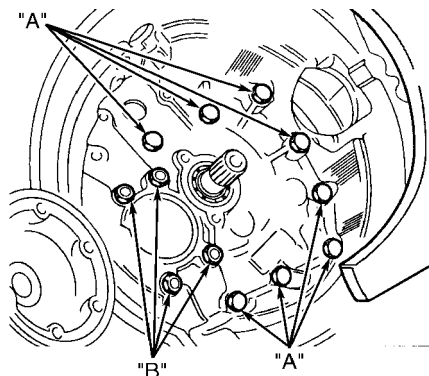
4) Remove pivot pins from top side of transmission. Remove transmission housing-to-clutch housing bolts at differential. Remove clutch housing-to-transmission housing bolts "A" from inside clutch housing (do not remove 4 output shaft bearing support bolts "B"). See Fig. 2. Remove transmission housing.

5) Remove selector forks and rails "A". Remove reverse gear selector mechanism bolt "B". See Fig. 3. Remove nuts for output shaft bearing support. Remove reverse gear, input shaft and output shaft from clutch housing, in that order. Remove differential.



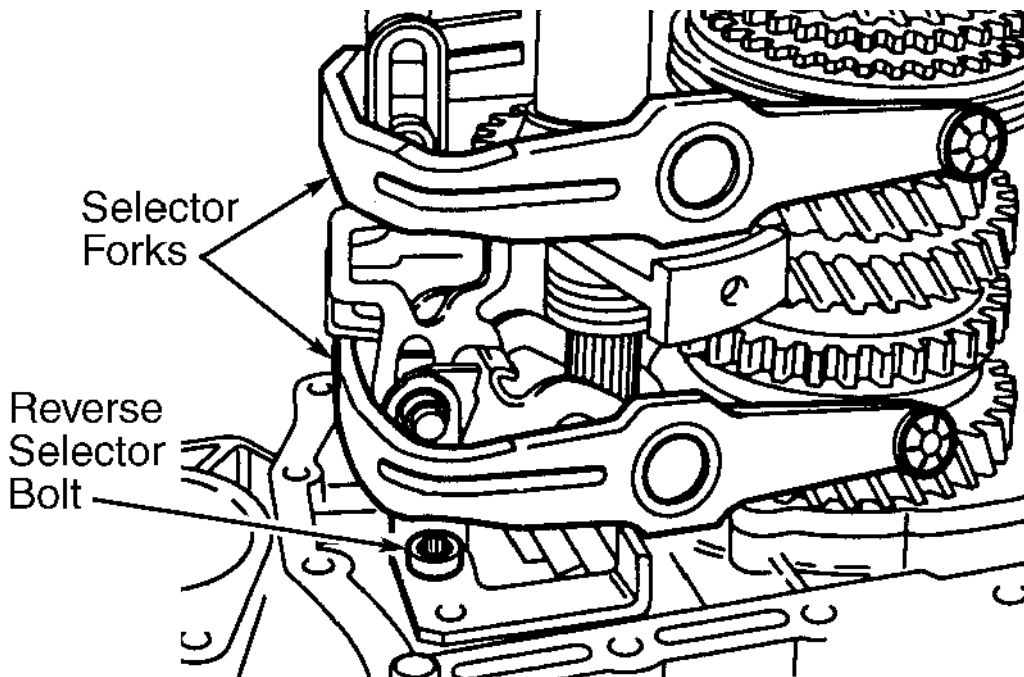
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Fig. 1: Location Of Reverse Shaft Support Bracket Bolts
 Courtesy of Volkswagen United States, Inc.



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Fig. 2: Removing Clutch Housing-To-Transmission Housing Bolts
 Courtesy of Volkswagen United States, Inc.



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Fig. 3: Removing Selector Forks & Reverse Gear Selector Mechanism Bolt
 Courtesy of Volkswagen United States, Inc.

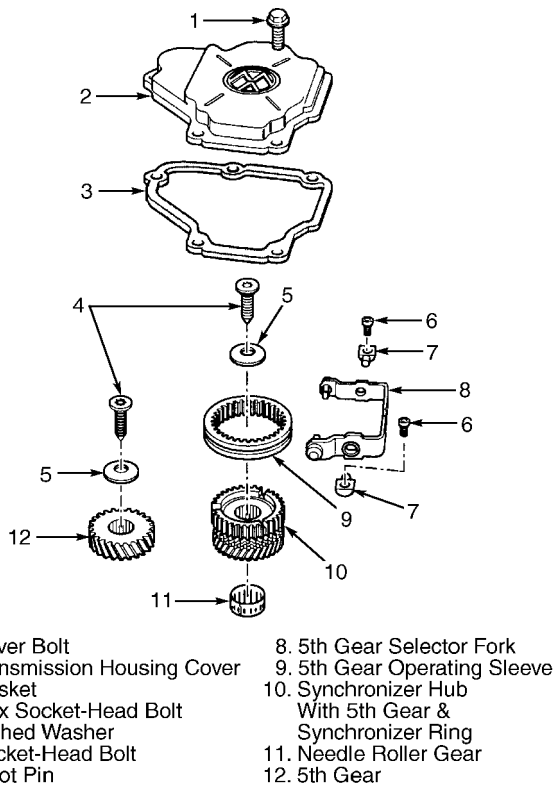
TRANSMISSION HOUSING COVER & 5TH GEAR ASSEMBLY

Disassembly

Drain transmission fluid. Remove transmission cover bolts and remove cover. Remove Torx socket-head bolt from 5th gear and remove washer. Remove pivot pin-to-transmission housing socket-head bolt, then remove 5th gear selector fork. Remove 5th gear operating sleeve, then remove synchronizer hub with 5th gear and synchronizer ring. Remove springs and disassemble unit. Note position of locking pieces. Remove needle roller bearing, if necessary. Remove 5th gear. See Fig. 4.

Reassembly

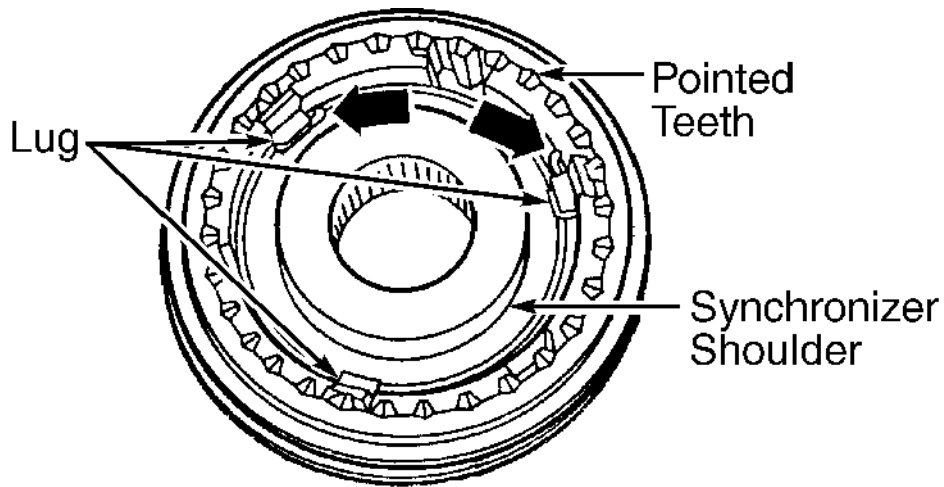
Install 5th gear should groove around circumference of gear faces toward transmission housing. Install needle bearing. Assemble 5th gear synchronizer ring, hub and operating sleeve with thin extension of locking pieces facing outward, pointed teeth "A" of sleeve and shoulder "B" of hub facing in same direction. Be sure recesses for locking pieces in sleeve and in hub are aligned. Set angled end of spring directly behind locking pieces and offset springs by 120° and beneath lug "C". See Fig. 5.



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Fig. 4: Exploded View Of Transmission Housing Cover & 5th Gear Assembly

Courtesy of Volkswagen United States, Inc.



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Fig. 5: Assembled View Of 5th Gear Operating Sleeve & Synchronizer Hub

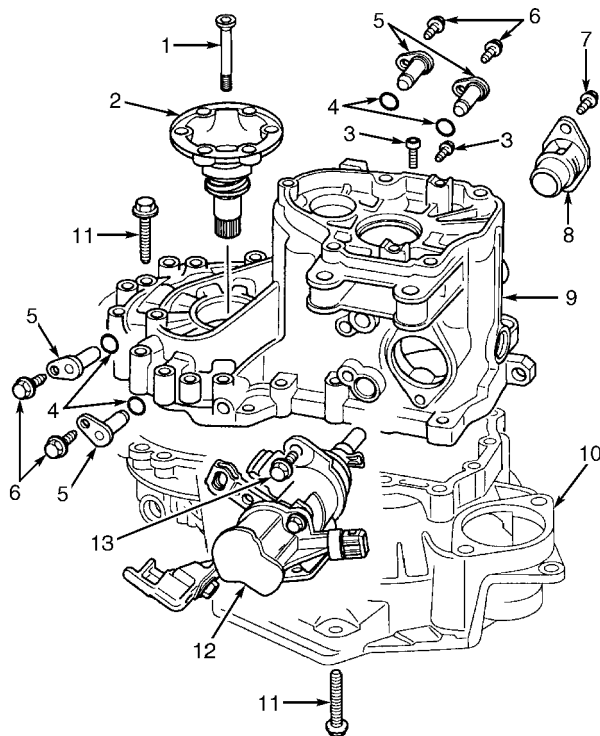
Courtesy of Volkswagen United States, Inc.

TRANSMISSION HOUSING & SELECTOR MECHANISM

NOTE: If transmission housing is replaced, adjust input shaft and differential.

Disassembly & Reassembly

Remove axle shaft from flange and tie axle up as high as possible. Watch for fluid drainage. Remove cone-head bolts retaining flange shaft. Remove flange, with spring. Remove Torx bolts holding reverse shaft support. Remove and discard "O" rings when shift linkage pivot pins are removed. See Fig. 6. Remove cover plate retaining bolt and remove cover plate. Remove bolts and remove transmission housing. Remove 2 retaining bolts and remove selector mechanism. Reverse disassembly procedure to reassemble.



- | | |
|-----------------------------|-------------------------|
| 1. Cone Head Bolt | 8. Cover Plate |
| 2. Flange Shaft With Spring | 9. Transmission Housing |
| 3. Torx Bolt | 10. Clutch Housing |
| 4. "O" Ring | 11. Bolt |
| 5. Shift Linkage Pivot Pin | 12. Selector Mechanism |
| 6. Bolt | 13. Bolt |
| 7. Bolt | |

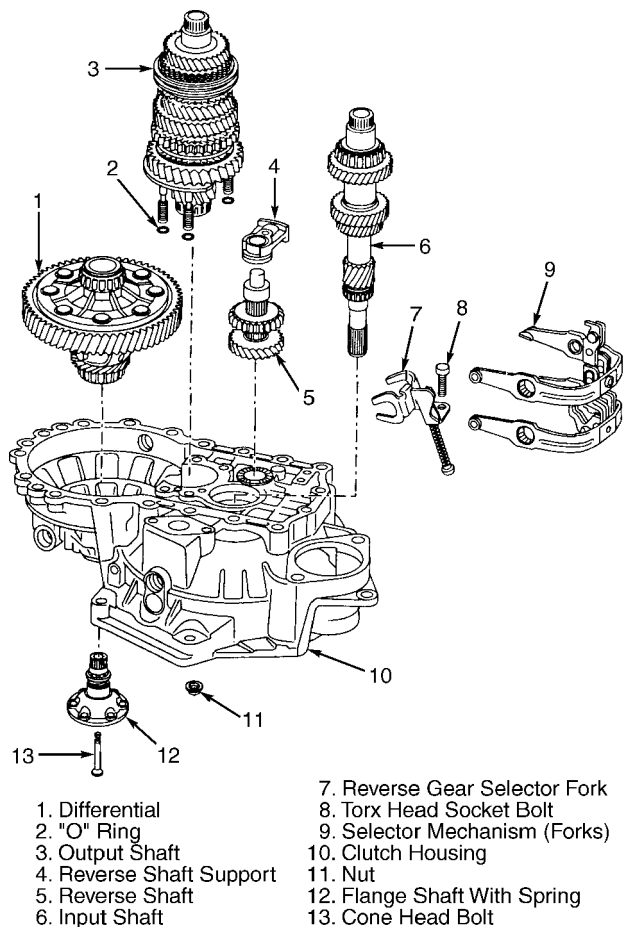
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Fig. 6: Exploded View of Transmission Housing & Selector Mechanism
 Courtesy of Volkswagen United States, Inc.

INPUT SHAFT, OUTPUT SHAFT, DIFFERENTIAL & SELECTOR FORKS ASSEMBLY

Disassembly & Reassembly

Remove cone-head bolts, remove flange shaft with spring and remove differential. If further disassembly of differential is needed, see DIFFERENTIAL under COMPONENT DISASSEMBLY & REASSEMBLY. Remove output shaft assembly nuts, remove assembly, then remove and discard 4 "O" rings from mounting studs on output shaft. Remove reverse shaft support. Remove reverse shaft assembly. For further disassembly of reverse shaft, see REVERSE SHAFT ASSEMBLY under COMPONENT DISASSEMBLY & REASSEMBLY. See Fig. 7. Remove selector mechanism and forks. If further disassembly of selector mechanism is needed, see SELECTOR MECHANISM under COMPONENT DISASSEMBLY & REASSEMBLY.



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Fig. 7: Exploded View Of Input Shaft, Output Shaft, Differential & Selector Forks Assemblies
 Courtesy of Volkswagen United States, Inc.

CLUTCH HOUSING

NOTE: If transmission housing is replaced, adjust input shaft and differential.

Disassembly & Reassembly

1) Remove bolts and remove transmission housing. Do not remove 4 bolts for output shaft (mainshaft) bearing support. Use proper Driver (VW 295 and 447h) to remove needle bearing. Remove oil filler plug. Using Puller (Kukko 21/6 and 22/2), remove output shaft (mainshaft) outer bearing race and tapered roller bearing. See Fig. 8.

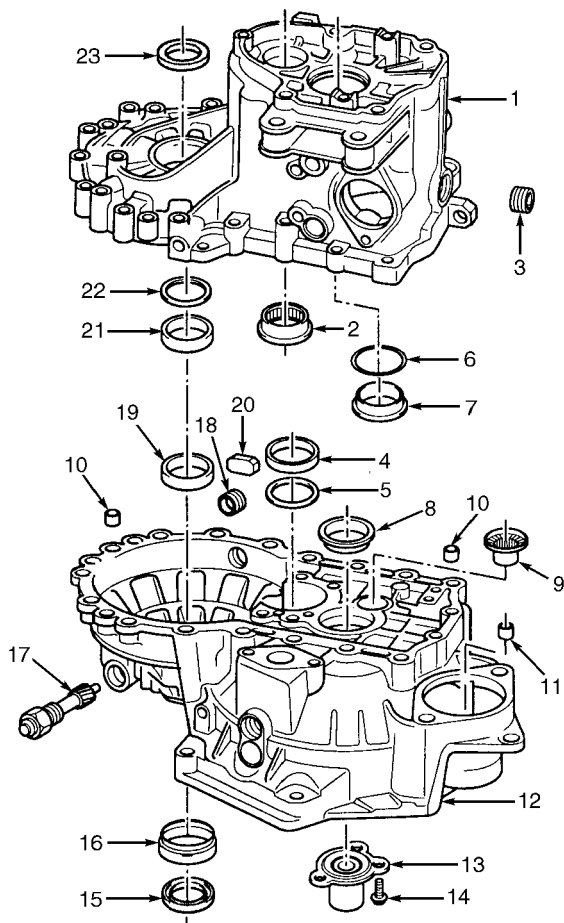
NOTE: If bearing assembly is replaced during assembly, adjust output shaft (mainshaft) preload.

2) Remove shims for output shaft and for input shaft. With proper Driver (VW 407 and 477h), drive out input shaft outer bearing race and tapered roller bearing. Using Puller (Kukko 22/1 and 21/2), remove needle bearing.

3) Remove both dowel sleeves. Pull out starter bushing. Remove clutch housing. Remove 3 bolts and remove guide sleeve with input shaft seal and "O" ring. Remove oil seal and sleeve from bottom

of clutch housing. Remove speedometer drive. Remove oil drain plug. Remove differential roller bearing and race.

4) Remove magnet from clutch housing. Remove differential shim. Remove oil seal from transmission housing. Reverse disassembly procedure to reassemble.



- | | |
|---|--|
| 1. Transmission Housing | 12. Clutch Housing |
| 2. Needle Roller Bearing | 13. Guide Sleeve |
| 3. Oil Filler Plug | 14. Socket Head Bolt |
| 4. Output Shaft Tapered Roller Bearing & Race | 15. Oil Seal Sleeve |
| 5. Shim | 16. Speedometer Drive |
| 6. Shim | 17. Oil Drain Plug |
| 7. Input Shaft Tapered Roller Bearing & Race | 18. Differential Tapered Roller Bearing & Race |
| 8. Input Shaft Tapered Roller Bearing & Race | 19. Magnet |
| 9. Needle Bearing | 20. Differential Tapered Roller Bearing & Race |
| 10. Dowel Sleeve | 21. Shim |
| 11. Starter Bushing | 22. Oil Seal |
| | 23. Oil Seal |

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Fig. 8: Exploded View Of Transmission & Clutch Housing Assembly
Courtesy of Volkswagen United States, Inc.

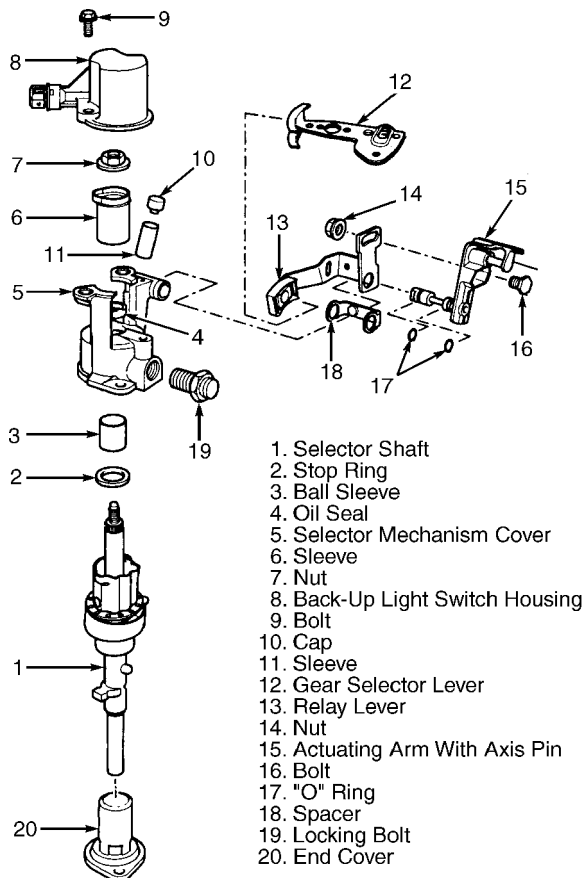
SELECTOR MECHANISM

Disassembly

1) Remove selector shaft. Destroy plastic sleeve of ball sleeve and remove ball bearings, then use an Internal Extractor (Kukko 21/3) to remove ball sleeve. Gently pry oil seal out of selector mechanism cover, using care not to score mating surface of cover. Remove selector mechanism cover. Remove sleeve from backup light

switch housing, then remove self-locking nut and remove backup light switch housing. See Fig. 9.

2) Remove transmission breather cap and sleeve. Remove gear selector lever. Remove relay lever and nut. Remove selector actuating arm with axis pin. Remove "O" ring from actuating arm, then remove spacer. Remove bolt and end cover.



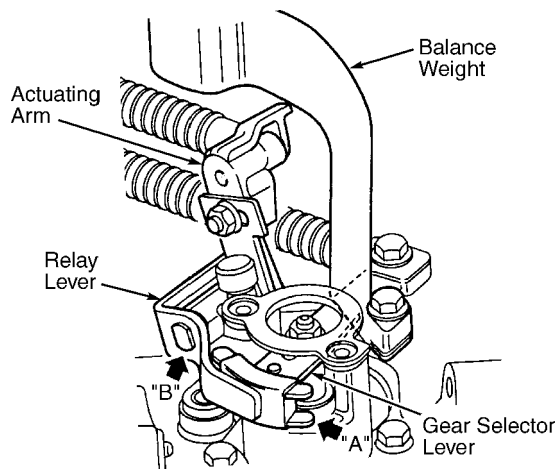
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Fig. 9: Exploded View Of Selector Mechanism
 Courtesy of Volkswagen United States, Inc.

Reassembly

1) Assemble end cover with new locking bolt. Tighten to 30 ft. lbs. (40 N.m). Press spacer into relay lever. Pull new "O" ring onto actuating arm axis pin. Press bolt into actuating arm.

2) Install actuating arm by positioning gear selector lever as shown. See Fig. 10. Install relay lever in guide rail of gear shift lever, position "A" (lubricate with MoS2 grease). Position actuating arm with flats, "B", of axis face mounting in proper position, since relay lever only fits in one position. Install balance weight on gear selector lever.



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Fig. 10: Installing Selector Lever, Relay Lever, Actuating Arm & Balance Weight

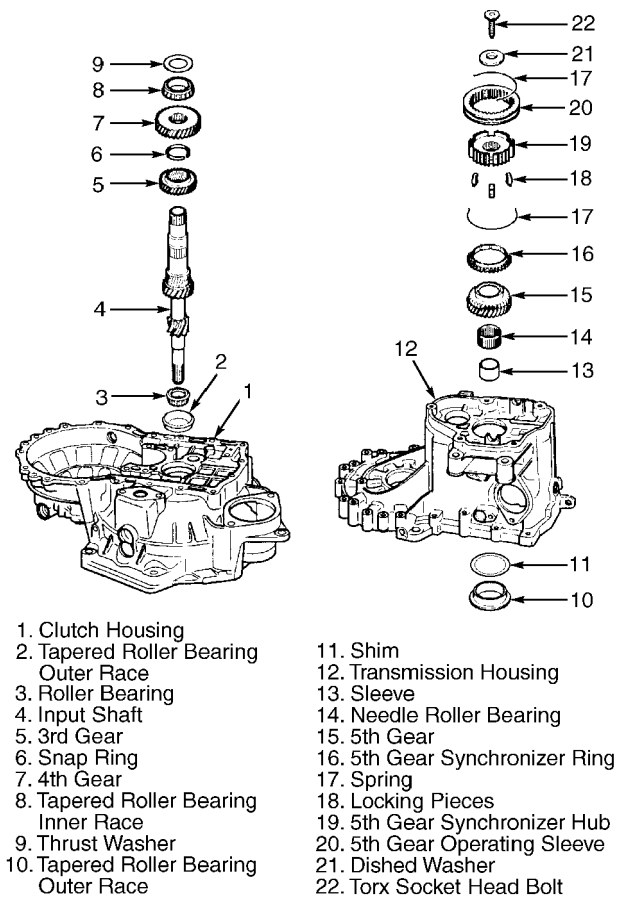
Courtesy of Volkswagen United States, Inc.

INPUT SHAFT ASSEMBLY

Disassembly

1) Remove Torx socket-head bolt from input shaft end in transmission housing. Remove dished washer. Use a gear puller to remove 5th gear operating sleeve and synchronizer hub. Remove 5th gear synchronizer ring with cast locking pieces. Disassembly spring and locking pieces. With puller, remove 5th gear. Remove needle roller bearing and press off sleeve. See Fig. 11. Remove transmission housing from clutch housing.

2) With suitable Drivers (VW 407 and 477h), remove tapered roller bearing outer race from end of input shaft. Using press and Drivers (VW 412, 422 and 401), press off tapered roller bearing inner race from input shaft. Remove thrust washer from end of input shaft. Press off tapered roller bearing inner race, along with 4th gear and sleeve. Press off 4th gear, with tapered bearing outer race and sleeve, using press and Drivers (VW 407, 421 and 401). Remove and discard snap ring. Press off 3rd gear, using suitable press and Drivers (VW 408a, 447h and 401).



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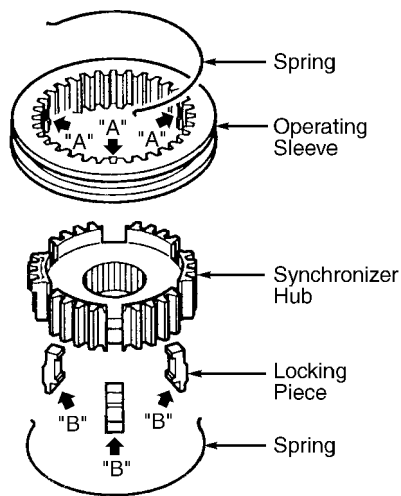
Fig. 11: Exploded View Of Input Shaft Assembly
 Courtesy of Volkswagen United States, Inc.

Reassembly

1) Install shim into bottom of transmission housing and press in tapered roller bearing outer sleeve. Press on sleeve for needle bearing, using Drivers (VW 41-501 and 401). Install tapered roller bearing outer race into clutch housing, using drift. Install inner races into clutch housing, using suitable Drivers (VW 412, 422 and 401).

2) Press 3rd gear onto input shaft, ensuring shoulder point toward 4th gear. Install new snap ring. Press on 4th gear. Press on tapered roller bearing inner race, install thrust washer and press on outer race. Install new shim into bottom of transmission housing, adjusting thickness as needed. See ADJUSTING INPUT SHAFT PRELOAD.

3) Insert input shaft into clutch housing and position transmission housing in place, tighten retaining bolts. Press on needle roller bearing sleeve, 5th gear, synchronizer ring, and spring. Assemble 5th gear operating sleeve and synchronizer hub. Note proper location of locking pieces "B", in recesses "A" in operating sleeve. See Fig. 12. Install dished washer. Install Torx bolt into end of input shaft and tighten to 59 ft. lbs. (80 N.m).



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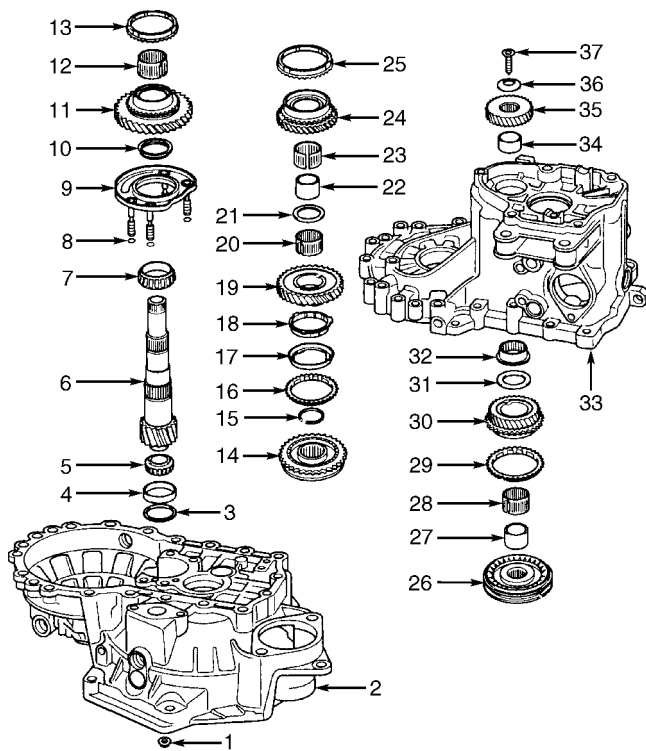
Fig. 12: Assembling 5th Gear Synchronizer Hub & Locking Pieces
 Courtesy of Volkswagen United States, Inc.

OUTPUT SHAFT

NOTE: Output shaft is paired with final drive gear. Always replace these as a set. Perform adjustment following replacement.

Disassembly

1) Position Separating Device (Kukko 17/2) under 2nd gear and press off 3rd and 4th gear synchronizer hub and operating sleeve, 2nd gear, 3rd gear and 4th gear with transmission housing needle roller bearing sleeve. Ensure device is supported so 1st and 2nd gear operating sleeve is not pulled off at same time. See Fig. 13.



- | | |
|---|---|
| 1. Nut | 18. Synchronizer Ring |
| 2. Clutch Housing | 19. 2nd Gear |
| 3. Shim | 20. Needle Roller Bearing |
| 4. Small Tapered Roller Bearing Outer Race | 21. Thrust Washer |
| 5. Small Tapered Roller Bearing Inner Race | 22. Sleeve For 3rd Gear Needle Roller Bearing |
| 6. Output Shaft (Mainshaft) | 23. Needle Roller Bearing |
| 7. Large Tapered Roller Bearing Inner Race | 24. 3rd Gear |
| 8. "O" Ring | 25. 3rd Gear Synchronizer Ring |
| 9. Bearing Support | 26. Operating Sleeve With 3rd & 4th Gear Synchronizer Hub |
| 10. Thrust Washer | 27. Sleeve |
| 11. 1st Gear | 28. Needle Roller Bearing |
| 12. Needle Roller Bearing | 29. 4th Gear Synchronizer Hub |
| 13. 1st Gear Synchronizer Ring | 30. 4th Gear |
| 14. 1st & 2nd Gear Operating Sleeve With Synchronizer Hub | 31. Thrust Washer |
| 15. Snap Ring | 32. Needle Roller Bearing |
| 16. 2nd Gear Synchronizer Ring | 33. Transmission Housing |
| 17. Outer Ring | 34. Sleeve |
| | 35. 5th Gear |
| | 36. Dished Washer |
| | 37. Torx Socket Head Bolt |

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Fig. 13: Exploded View Of Output Shaft (Mainshaft)
 Courtesy of Volkswagen United States, Inc.

2) Use Puller (Kukko 21/6) to extract small tapered roller bearing outer race. Clamp output shaft in soft-jawed vise, with grip piece behind bearing rollers, and use Puller (VAG 1582 and 1582/5) to pull off small tapered roller bearing inner race. With 2-arm Puller (Kukko 20/10), remove operating sleeve with synchronizer hub. Remove and discard snap rings as components are removed.

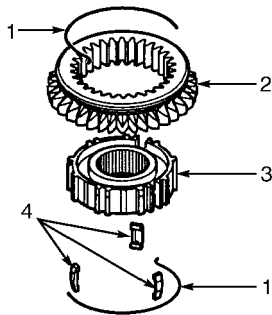
3) Use Puller (VAG 1582 and 1582/4) to remove large tapered roller bearing inner race, after mounting output shaft in soft-jawed vise and installing M20x10 bolt into output shaft bore.

4) Disassemble 1st and 2nd gear operating sleeve and synchronizer hub by removing the springs and sliding operating sleeve from the synchronizer hub. Watch for locking pieces so they are not lost. See Fig. 14. Follow same procedure for disassembly 3rd and 4th gear operating sleeve and synchronizer hub.

NOTE: Wide shoulder ("A") of synchronizer hub and outer splines ("B") of operating sleeve face opposite directions after assembly. Recesses for locking pieces on synchronizer hub and operating sleeve must align.

Inspection

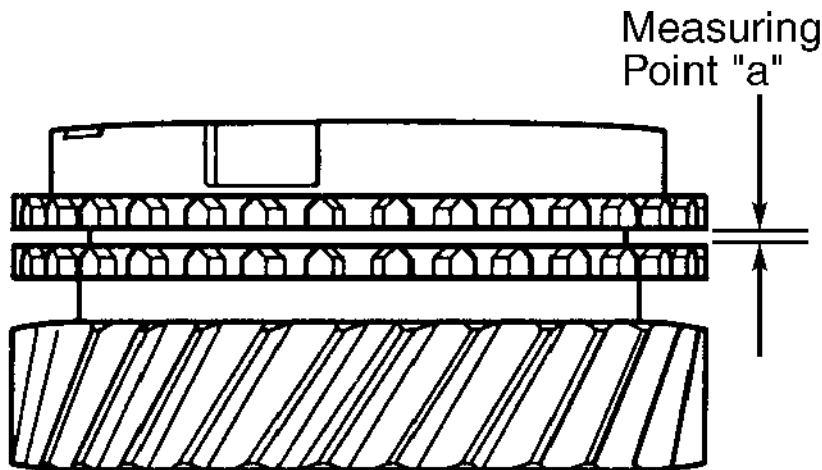
Check synchronizer gear for wear by pressing ring onto gear cone and measuring gap "a" with a feeler gauge. Normal dimension is .04-.06" (1.0-1.7 mm) and acceptable wear limit is .02" (.5 mm). See Fig. 15. Check inner ring for wear by pressing ring onto 2nd gear cone and measuring gap "a" with feeler gauge. Normal dimension is .03-.05" (.75-1.25 mm). Wear limit is .01" (.3 mm). See Fig. 16.



- 1. Spring
- 2. Operating Sleeve
- 3. Synchronizer Hub
- 4. Locking Pieces

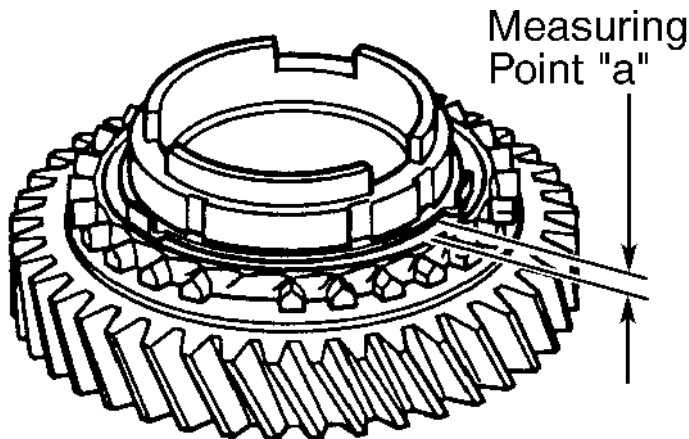
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Fig. 14: Exploded View Of Operating Sleeve & Synchronizer Hub
Courtesy of Volkswagen United States, Inc.



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Fig. 15: Checking Synchronizer Ring For Wear
Courtesy of Volkswagen United States, Inc.



99D04250

Fig. 16: Checking Inner Ring For Wear
 Courtesy of Volkswagen United States, Inc.

Reassembly

1) Press small tapered roller bearing outer race into clutch housing, using appropriate Press Tools (VW407 and 512). Press on large tapered roller bearing inner race, using Press Tool (VS 402, 409 and 519). Place 1st gear synchronizer ring on 1st gear, then press 1st and 2nd gear operating sleeve and synchronizer hub into place on output shaft, using appropriate Press Tools (VW 402, 412, 415A, 429 and 477h). Install outer 2nd gear ring with lugs facing toward 1st gear.

NOTE: Operating sleeve splines of 1st and 2nd gear operating sleeve should point to splines for 3rd and 4th gear synchronizer hub. Wide shoulder of synchronizer hub faces toward 1st gear.

NOTE: Identify 1st gear synchronizer ring by 3 teeth that are ground down half way and inside of ring have no recesses. The 2nd gear synchronizer ring may have 2 or 3 teeth ground down half way and inside of ring has 3 recesses.

2) Install synchronizer ring (inner ring with lugs located in recesses of 2nd gear synchronizer ring. Install 2nd gear with higher shoulder facing 1st gear. Ensure recesses in shoulder align with lugs of outer ring. Using press (VW402, 545, 544 and 447h), press needle roller bearing sleeve for 3rd gear into position on output shaft.

3) Ensure 3rd and 4th gear operating sleeve and synchronizer hub is properly assembled by pushing sleeve over hub with locking pieces in place and springs offset 120°. Ensure angled end of spring is in hollow locking piece. Install 3rd and 4th gear operating sleeve and synchronizer hub so chamfer of inner splined areas is toward 4th gear. Press into position using Press Tools (VW402, 412, 447h, and 519).

4) Press 4th gear needle roller bearing onto output shaft using appropriate Press Tools (VW 402, 412, 454 and 447h), then press on sleeve for output shaft needle roller bearing with Press Tools (VW 402, 412, 447h and 41-501). Press on small tapered roller bearing inner race with Press Tools (VW 402, 412 and 32-111).

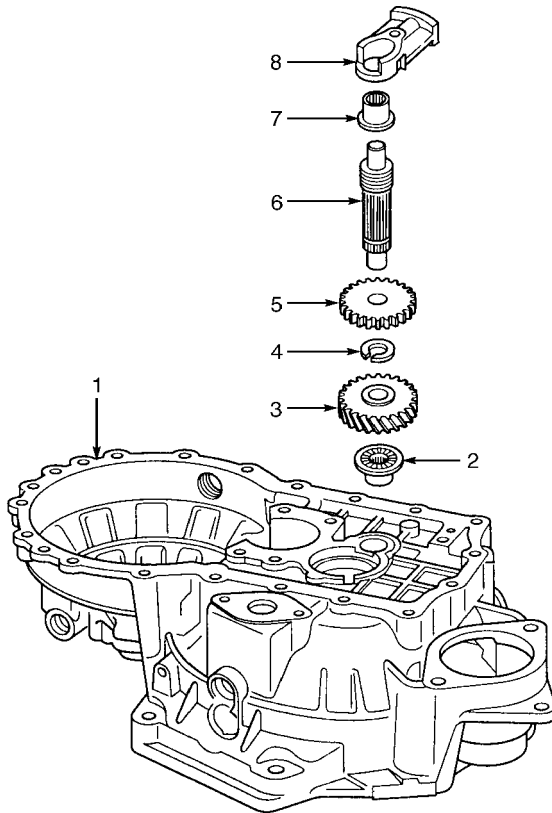
REVERSE SHAFT ASSEMBLY

Disassembly

Remove reverse shaft. See GEAR ASSEMBLY. Remove reverse shaft support and reverse shaft. Press needle roller bearing out of reverse shaft support. Remove snap ring and remove reverse sliding gear. Remove reverse gear. Press needle roller bearing out of clutch housing. See Fig. 17.

Reassembly

Press new needle roller bearings into clutch housing and into reverse shaft support. Ensure new snap ring is installed, with snap ring shoulder facing reverse gear.



- | | |
|--------------------------|--------------------------|
| 1. Clutch Housing | 5. Reverse Sliding Gear |
| 2. Needle Roller Bearing | 6. Reverse Shaft |
| 3. Reverse Gear | 7. Needle Roller Bearing |
| 4. Snap Ring | 8. Reverse Shaft Support |

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Fig. 17: Exploded View Of Reverse Shaft Assembly
Courtesy of Volkswagen United States, Inc.

DIFFERENTIAL ASSEMBLY

Disassembly

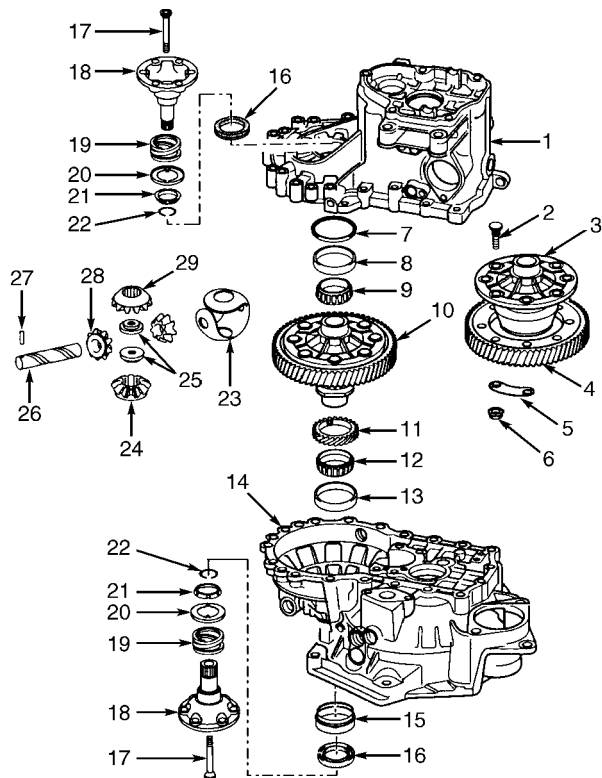
1) Remove cone-head bolts retaining flange shaft in transmission housing. Remove flange shaft with springs, thrust washers, tapered rings and snap rings. Remove one-piece thrust washer. Remove differential side gear and threaded piece. Drive differential pinion shaft out of side gear. Repeat for side gear on clutch housing

side. See Fig. 18.

2) Remove retaining bolts and separate clutch housing from transmission housing. Remove retaining bolts and remove differential cage, note positions of plates under retaining nuts.

NOTE: Final drive gear is production-riveted and must be replaced with output shaft, if either requires replacement.

3) Remove adjusting shim for differential from transmission housing. Use puller to extract tapered roller bearing outer race and inner race. Remove differential housing. Remove speedometer drive gear. Pull off lower tapered roller bearing inner race then drive tapered roller bearing outer race out of clutch housing. Remove oil seal sleeve. Remove oil seal.



- | | |
|--|-------------------------------|
| 1. Transmission Housing | 14. Clutch Housing |
| 2. Bolt | 15. Sleeve |
| 3. Differential Cage | 16. Oil Seal |
| 4. Final Drive Gear | 17. Cone Head Bolt |
| 5. Plate | 18. Flange Shaft |
| 6. Nut | 19. Spring |
| 7. Shim | 20. Thrust Washer |
| 8. Tapered Roller Bearing
Outer Race | 21. Tapered Ring |
| 9. Tapered Roller Bearing
Inner Race | 22. Snap Ring |
| 10. Differential Housing | 23. One-Piece Thrust Washer |
| 11. Speedometer Drive Gear | 24. Differential Side Gear |
| 12. Tapered Roller Bearing
Inner Race | 25. Threaded Piece |
| 13. Tapered Roller Bearing
Outer Race | 26. Differential Pinion Shaft |
| | 27. Spring Pin |
| | 28. Differential Pinion Gear |
| | 29. Differential Side Gear |

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Fig. 18: Exploded View Of Differential Assembly
Courtesy of Volkswagen United States, Inc.

Reassembly

1) Position sleeve, then drive in new oil seal. Press in new lower tapered roller bearing inner and outer races. Install speedometer drive gear and install differential housing. When installing final drive gear, ensure circular groove faces toward bolt-on side of differential. Heat final drive gear to about 212°F (100°C) to install. Press in upper tapered roller bearing races. Select shim for differential. See ADJUSTING DIFFERENTIAL PRELOAD.

2) Install differential cage and install plates, nuts and bolts. Install transmission housing and clutch housing and install retaining bolts. Install side gears in reverse of removal procedure. Install flange shafts. See Fig. 18.

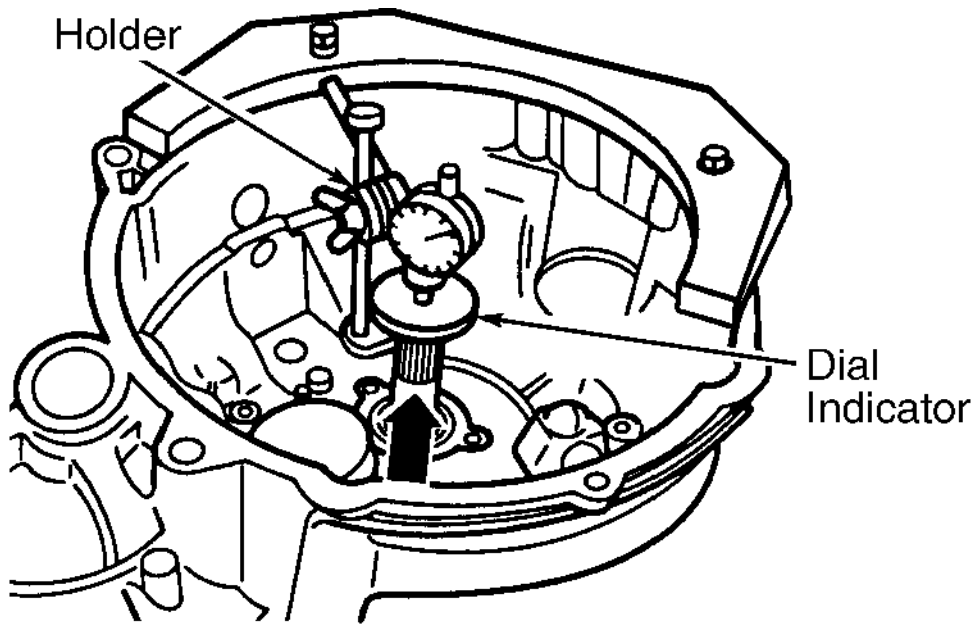
ADJUSTING INPUT SHAFT PRELOAD

NOTE: It is only necessary to readjust input shaft when transmission housing, clutch housing, input shaft, 4th gear or tapered roller bearing has been replaced.

1) Press tapered roller bearing outer race (without shim) into transmission housing to its stop. Install input shaft into clutch housing. Install transmission housing. Tighten housing bolts to 18 ft. lbs. (25 N.m), plus 90 degrees.

2) Mount dial indicator and Holder (VW 353, 387 and 385-17) to clutch housing for small tapered roller bearing or to transmission housing for large tapered roller bearing. See Fig. 19. Rotate input shaft several times in both directions to seat roller bearing. Set dial indicator to "0" with .04" (1 mm) preload. Press input shaft toward dial indicator. Read and record clearance indicated. Select appropriate size shim. See INPUT SHAFT SHIM SELECTION CHART.

3) Remove input shaft and press tapered roller bearing outer race from housing. Press shim and roller bearing race into position. Reassemble housing. Tighten housing bolts to 18 ft. lbs. (25 N.m), plus 90 degrees.



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Fig. 19: Positioning Dial Indicator Assembly To Measure Input Shaft Clearance

Courtesy of Volkswagen United States, Inc.

4) Mount holder and dial indicator in clutch housing after separating the housings. Rotate input shaft several times in both directions to seat tapered roller bearing. Press input shaft toward dial indicator and check dial indicator. Bearing play should be .0004-.0035 in. (.01-.09 mm). If not, repeat adjustment

INPUT SHAFT SHIM SELECTION CHART

AA

Measured Clearance In. (mm)	Shim Size - In. (mm)	Part No.
.026-.028 (.671-.699)	.026 (.650)	02A311140
.028-.029 (.700-.724)	.027 (.675)	02A311140A
.029-.030 (.725-.749)	.028 (.700)	02A311140B
.030-.031 (.750-.774)	.029 (.725)	02A311140C
.031-.0315 (.775-.799)	.030 (.750)	02A311140D
.0315-.032 (.800-.824)	.031 (.775)	02A311140E
.032-.033 (.825-.849)	.031 (.800)	02A311140F
.033-.034 (.850-.874)	.032 (.825)	02A311140G
.034-.035 (.875-.899)	.033 (.850)	02A311140H
.035-.036 (.900-.924)	.034 (.875)	02A311140J
.036-.037 (.925-.949)	.035 (.900)	02A311140K
.037-.038 (.950-.974)	.036 (.925)	02A311140L
.038-.039 (.975-.999)	.037 (.950)	02A311140M
.039-.040 (1.000-1.024)	.038 (.975)	02A311140N
.040-.041 (1.025-1.049)	.039 (1.000)	02A311140P
.041-.042 (1.050-1.074)	.040 (1.025)	02A311140Q
.042-.043 (1.075-1.099)	.041 (1.050)	02A311140R
.043-.044 (1.00-1.124)	.042 (1.075)	02A311140S
.044-.045 (1.125-1.149)	.043 (1.100)	02A311140T

.045-.046 (1.150-1.174)044 (1.125) 02A311140AA
 .046-.047 (1.175-1.199)045 (1.150) 02A311140AB
 AA

ADJUSTING OUTPUT SHAFT PRELOAD

1) Press small tapered roller bearing outer race and .026" (.65 mm) thick shim into clutch housing. Insert output shaft and tighten bearing support bolts to 18 ft. lbs. (25 N.m), plus 90 degrees. Mount dial indicator on end of output shaft, with proper Mount Device (VW 385/17, 387 and 3114/2). Set dial indicator to "0" with .04" (1 mm) preload.

2) Move output shaft up and down and note dial indicator reading. To determine specified bearing preload, add constant preload figure to reading obtained on dial indicator, plus the thickness of the shim installed for this adjustment. See OUTPUT SHAFT SHIM BEARING PRELOAD table.

3) Remove equipment, remove output shaft, pull out small tapered roller bearing outer race. Install selected shim and reassemble. Adjustment shims are available in sizes from .0255-.055" (.65-1.40 mm) in .002" (.05 mm) increments.

OUTPUT SHAFT SHIM BEARING PRELOAD

AAA
 Application/Item Specification In. (mm)

Installed Shim026 (.65)
Dial Reading012 (.30)
Preload Constant008 (.20)
Shim Thickness045 (1.15)

AAA

ADJUSTING DIFFERENTIAL PRELOAD

1) Press tapered roller bearing outer race into clutch housing. Press tapered roller bearing outer race, without shim, into transmission housing. Mount differential in clutch housing, install transmission housing and tighten bolts to 18 ft. lbs. (25 N.m). Mount dial indicator on end of differential, with proper Mounting Device (VW 385/17 and 387). Set dial indicator to "0" with .04" (1 mm) preload.

2) Move differential up and down and note dial indicator reading. To determine specified bearing preload, add constant preload figure to reading obtained on dial indicator. See DIFFERENTIAL BEARING PRELOAD table.

3) Remove equipment. Remove transmission housing and pull out tapered roller bearing outer race. Install selected shim. Drive outer race into transmission housing. Complete reassembly of components. Adjustment shims are available in sizes from .0255-.055" (.65-1.40 mm) in .002" (.05 mm) increments.

DIFFERENTIAL BEARING PRELOAD

AAA
 Application/Item Specification In. (mm)

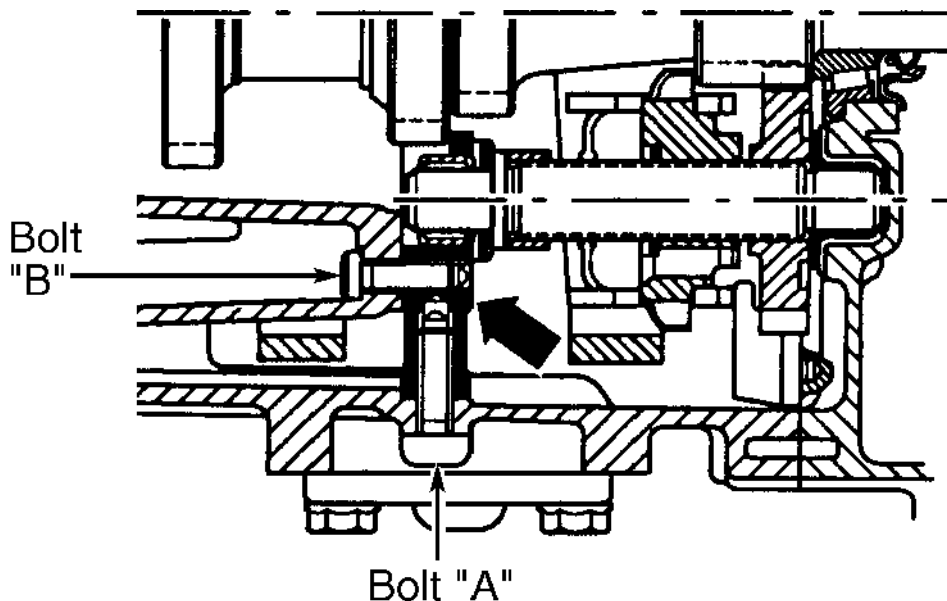
Dial Reading028 (.70)
Preload Constant016 (.40)
Shim Thickness043 (1.10)
AA	

TRANSAXLE REASSEMBLY

1) Install differential. Install input shaft, output shaft and reverse shaft, using new "O" rings on output shaft studs. Install and tighten nuts for output shaft bearing support.

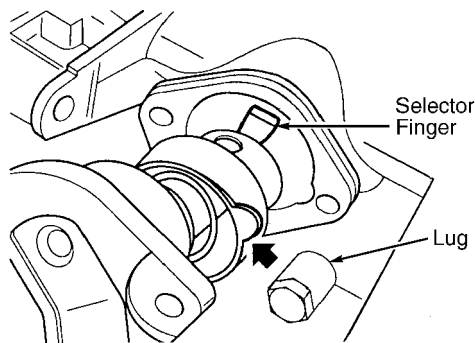
2) Clean any remaining thread locking compound from reverse shaft support threads. Install reverse gear selector mechanism. Install selector forks with rails. See Fig. 3. Install M8x100 mm stud into reverse shaft support so shaft will be aligned after installing transmission housing. Align selector rails with selector segments positioned in grooves on operating sleeves. Install transmission housing.

3) Install reverse shaft support bolts by inserting bolt "a", removing M8x100 mm stud, then inserting and hand-tightening bolt "b". Tighten both bolts to 22 ft. lbs. (30 N.m). See Fig. 20.



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 Fig. 20: Installing Reverse Shaft Support Bolts
 Courtesy of Volkswagen United States, Inc.

4) Align selector mechanism with screwdriver and install pivot pin for selector forks. Install selector shaft by first placing selector rails in Neutral position. Set locating lug "1" in recess in transmission housing. Position selector shaft so selector finger "2" is inserted in selector rails. See Fig. 21.



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Fig. 21: Installing Selector Shaft
 Courtesy of Volkswagen United States, Inc.

5) Install 5th gear so groove around circumference faces toward transmission housing. Use suitable driver to seat 5th gear. Assemble 5th gear synchronizer hub and operating sleeve. Install assembly with pointed teeth of operating sleeve and high shoulder of synchronizer hub facing transmission housing. Drive on 5th gear synchronizer hub assembly. Install washers, then hand-tighten bolts for synchronizer hub and 5th gear.

6) Engage 2 gears and tighten 5th gear synchronizer hub and gear retaining bolts. Install 5th gear selector fork. Engage 5th gear. Loosen bolt "1". Press operating sleeve and selector fork jaws in direction of arrows, then retighten bolt to 18 ft. lbs. (25 N.m). Clearance must be less than .008" (.2 mm) between operating sleeve and gear. Disengage 5th gear so operating sleeve is in Neutral position. Synchronizer ring must move freely. Check selection of all gears. If okay, install transmission housing cover.

7) Install flange shafts with springs, thrust washers and tapered rings. Install release clutch release bearing guide sleeve. Install clutch release lever and bearing.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

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Application	Ft. Lbs. (N.m)
5th Gear Torx Bolt	59 (80)
5th Gear Selector Fork Bolts	18 (25)
Axle Shaft Heat Shield Bolts	24 (33)
Axle Shaft-to-Flange Shaft Bolts	30 (40)
Final Drive Retaining Nuts	52 (70)
Flange Cone-Head Bolts	18 (25)
Input Shaft Torx Bolt	59 (80)
Oil Filler Plug	18 (25)
Oil Drain Plug	18 (25)
Output Shaft Retaining Nuts (1)	18 (25)
Pivot Pin Torx Bolts	18 (25)
Reverse Gear Selector Fork Torx Bolt	18 (25)
Reverse Shaft Support Bolts	22 (30)
Selector Mechanism Locking Bolt	30 (40)

Speedometer Drive	22 (30)
Transmission Housing Cover Plate Bolt	18 (25)
Transmission Housing Cover Bolt	7 (10)
Transmission Housing Guide Sleeve Bolts	15 (20)

(1) - Plus an additional 90 degrees.

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END OF ARTICLE