

MANUAL TRANS OVERHAUL - TYPE 020

Article Text

1996 Volkswagen Golf

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ARTICLE BEGINNING

MANUAL TRANSMISSIONS

Volkswagen Type 020

Cabrio, Golf III, GTI, Jetta III

APPLICATION & LABOR TIMES

APPLICATION & LABOR TIMES

AA

Vehicle	Labor Times		Series
Application	(1) R & I	(2) Overhaul	

1995

Cabrio & Golf III	...	3.8 4.9		020 (CHE)
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Jetta III				
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4-Cylinder		3.8 4.9		020 (CHE)
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1996

Cabrio		3.8 4.9		020 (DFQ)
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Golf & Jetta				
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4-Cylinder				
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Gas Engine		3.8 4.9		020 (DFQ)
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(1) - Removal and installation of transmission from vehicle chassis.

(2) - Bench overhaul time for transaxle and differential. DOES NOT include removal and installation.

AA

IDENTIFICATION

Transaxles are identified by a type number as well as a 2 letter suffix. Transmission type is cast into transmission case. Code letter and production date information is stamped on a machined surface located on upper portion of engine-to-transaxle mating surface.

DESCRIPTION

Type 020 is a 5-speed transaxle consisting of an input shaft, mainshaft/drive pinion shaft and a differential assembly which transfers power to front wheels.

LUBRICATION & ADJUSTMENTS

Use hypoid oil API GL4, MIL-L2105 SAE 75 or G50 SAE 75W90 synthetic lubricant. See appropriate MANUAL TRANSMISSION SERVICING article in TRANSMISSION SERVICING section for adjustments.

TROUBLE SHOOTING

See TROUBLE SHOOTING - BASIC PROCEDURES article in this section.

ON-VEHICLE SERVICE

CHECKING SHIFT LINKAGE ADJUSTMENT

Shift into 1st gear, push gearshift lever to left stop. Release lever. Lever should spring back to right. Shift lever should rest in 3rd/4th gear plane. To adjust position, transmission in neutral and loosen clamp at selector shaft. Insert Position Gauge (VW 3104) on shift lever housing. Align selector rod/lever. Retighten clamp. If gear fails to engage smoothly during repeated shifting, engage 1st gear. Press shift lever gently to left to remove play. Distance between gearshift housing to travel stop must be .04-.06" (1-1.5 mm). Adjust by turning eccentric adjuster in shifter housing. Torque clamping bolt to 18 INCH lbs. (2 N.m).

DRIVE FLANGE OIL SEAL

Remove axle shaft from mounting flange. Remove drive flange cover, circlip and dished washer. Remove axle flange using puller. Pry seal out of transaxle case. To install, drive new seal in using Driver (30-212). Fill lips of new seal with lubricant. Install flange into differential case. Install dished washer, circlip and flange cover. Install axle shaft and tighten to 30 ft. lbs. (40 N.m). Check transaxle oil level.

DRIVE AXLE SHAFTS

See appropriate AXLE SHAFTS article in AXLE SHAFTS & TRANSFER CASES section.

REMOVAL & INSTALLATION

See appropriate MANUAL TRANSMISSION REMOVAL article in TRANSMISSION SERVICING section.

TRANSAXLE DISASSEMBLY

DISASSEMBLY

1) Mount transaxle in Mounting Fixture (VW 309 and 353), if available. Install input shaft support bridge Special Tool (VW 295a and 30-211a), if available. Drain gearbox oil. Remove clutch push rod from input shaft.

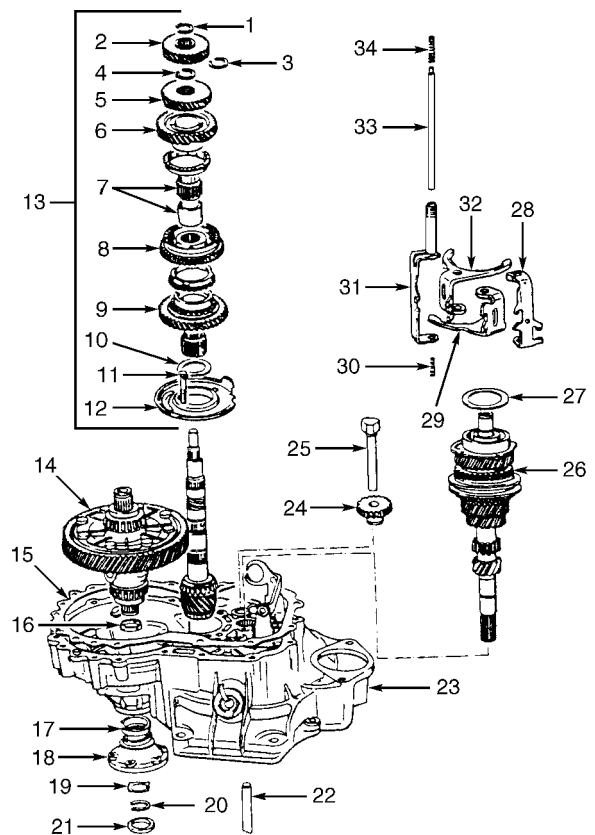
2) Remove bolts from transmission housing cover. Remove entire assembly. Remove selector shaft lock nut and vehicle speed sensor. Remove selector shaft cover together with spring. Bring shift forks to neutral position and remove selector shaft. Remove Torx bolt to remove reverse idler gear shaft.

3) From gearbox side of transaxle, remove drive flange cover, circlip, and dished washer. Using a puller, remove drive flange. See Fig. 1.

4) Engage 5th gear and reverse gear. Remove synchronizer hub retaining bolt. Remove selector tube securing plate. Turn selector tube counter-clockwise, DO NOT pull, to remove from shift fork. Remove synchronizer hub together with 5th gear and shift fork using 2 levers to pry free. Use caution to avoid damage to housing sealing surfaces. Remove circlip and thrust washer for 5th gear. On vehicles with 2.0L engine, 5th gear circlip is replaced by a securing plate. Remove 5th gear using puller if necessary.

5) Remove tension bracket on input shaft deep groove ball bearing. Pull off transmission housing. Pull selector rod from bore and remove shift fork. Remove 4th gear circlip from output shaft. Vehicles using 2.0L engine are equipped with a second circlip. Remove 4th gear using puller if necessary. Ensure reverse gear is not engaged, remove input shaft assembly. Remove 3rd and 2nd gear, using puller if necessary. Remove synchronizer ring and needle bearings. Drive out reverse gear shaft with bolt using plastic hammer. Remove reverse gear from relay lever. Pull off synchronizer hub and 1st gear together with 2nd gear needle bearing inner race. See Fig. 2.

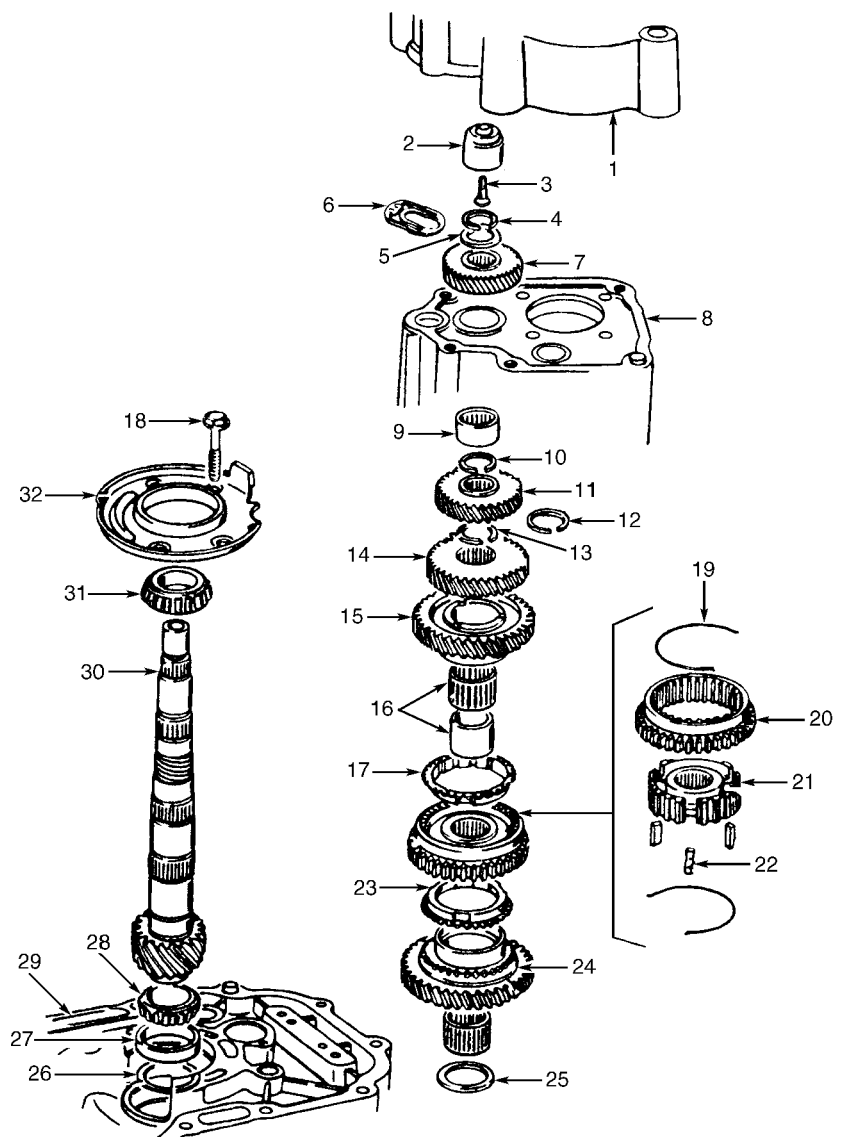
6) Remove bearing cover bolts, thrust washer and cover. Remove output shaft. Remove right side drive flange, thrust washer, tapered ring and differential assembly.



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|-------------------------------|-------------------------------------|
| 1. Circlip | 19. Dished Washer |
| 2. 4th Gear | 20. Circlip |
| 3. 4th Gear Circlip | 21. Cover |
| 4. 3rd Gear Circlip | 22. Clutch Push Rod |
| 5. 3rd Gear | 23. Clutch Housing |
| 6. 2nd Gear | 24. Reverse Idler Gear |
| 7. 2nd Gear Needle Bearing | 25. Reverse Gear Shaft |
| 8. 1st/2nd Gear Synchronizer | 26. Input Shaft |
| 9. 1st Gear | 27. Adjustment Shim |
| 10. Thrust Washer | 28. Reverse Gear Shift Fork |
| 11. Bolt | 29. 1st/2nd Gear Shift Fork |
| 12. Bearing Cover | 30. Spring |
| 13. Output Shaft Assembly | 31. 5th Gear Selector Bridge & Tube |
| 14. Differential | 32. 3rd/4th Gear Shift Fork |
| 15. Gasket | 33. Selector Rod |
| 16. Tapered Ring | 34. Spring |
| 17. Spring With Thrust Washer | |
| 18. Drive Flange | |

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Fig. 1: Identifying Internal Components
Courtesy of Volkswagen United States, Inc.



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|--------------------------|--------------------------------|-----------------------|
| 1. Gearbox Housing Cover | 12. Circlip | 22. Locking Key |
| 2. Needle Bearing | 13. Circlip | 23. Synchronizer Ring |
| 3. Bolt | 14. 3rd Gear | 24. 1st Gear |
| 4. Circlip | 15. 2nd Gear | 25. Thrust Washer |
| 5. Thrust Washer | 16. Needle Bearing & Race | 26. Shim |
| 6. Retainer Plate | 17. 2nd Gear Synchronizer Ring | 27. Outer Race |
| 7. 5th Gear | 18. Hex Head Bolt | 28. Inner Race |
| 8. Gearbox Housing | 19. Spring | 29. Clutch Housing |
| 9. Needle Bearing | 20. Synchronizer Sleeve | 30. Output Shaft |
| 10. Circlip | 21. Synchronizer Hub | 31. Bearing |
| 11. 4th Gear | | 32. Bearing Retainer |

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Fig. 2: Exploded View Of Output Shaft
 Courtesy of Volkswagen United States, Inc.

REASSEMBLY

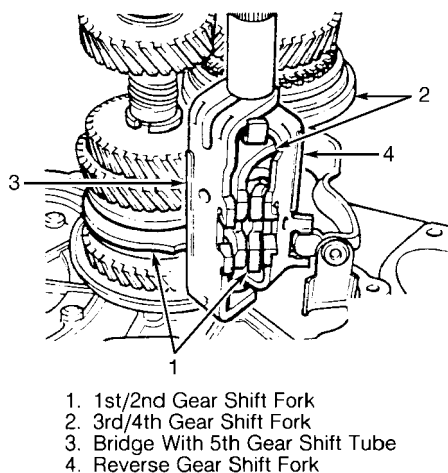
1) Install differential assembly into clutch housing. Install output shaft and bearing cover. Torque to specifications. See **TORQUE SPECIFICATIONS**. With shoulder on inner diameter facing bearing cover, install thrust washer. Install synchronizer hub, 1st gear with 2nd gear needle bearing inner race, to output shaft with groove on face and outside teeth on operating sleeve facing 1st gear. Heat 1st/2nd gear synchronizer hub to approximately 212(0) F (100(0) C),

drive firmly into place aligning grooves in synchronizer ring with keys. Install reverse idler gear.

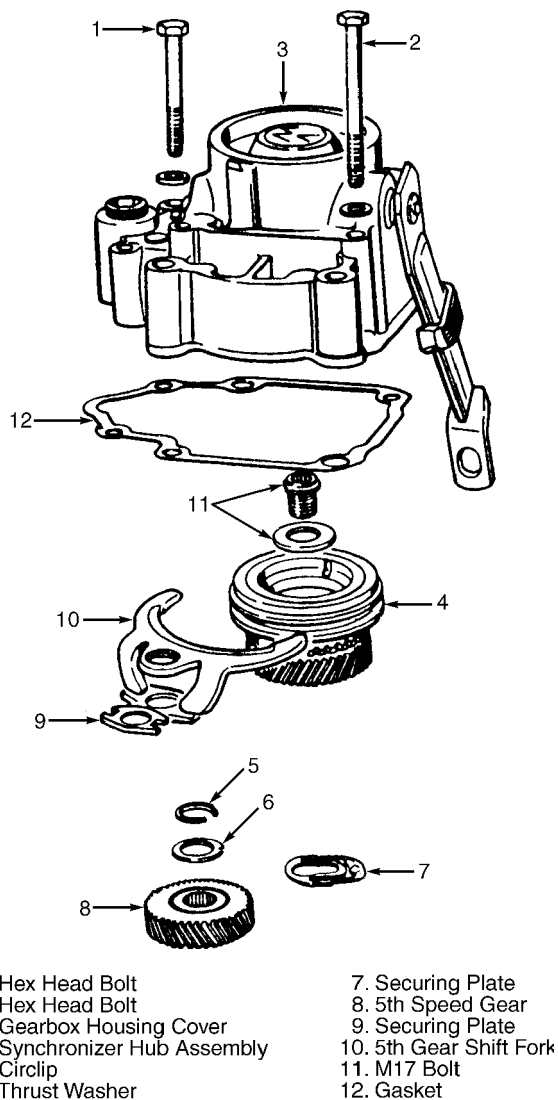
2) Install 2nd gear needle bearing race. Ensure race is firmly seated. Install needle bearings, synchronizer ring, 2nd gear and 3rd gear with shoulder facing 2nd gear. Install new circlip which allows for minimal amount of axial play. Circlips are available in sizes from .098" (2.5 mm) to .0118" (3.0 mm) in increments of .004" (.1 mm).

3) Install input shaft, without bearing, into clutch housing. Install 4th gear, with shoulder facing toward spline of 5th gear, and install circlip(s). Press in deep groove ball bearing with wide shoulder facing outward. Install tension bracket. Insert selector rod lower spring into clutch housing. Install 3rd/4th gear shift fork, 1st/2nd gear shift fork, reverse gear shift fork and 5th gear selector bridge and tube. 1st/2nd gear shift fork is recessed to clear bridge. Slide selector rod into position. Align reverse idler gear shaft. See Figs. 1 and 3.

4) Install transmission housing making sure Support Bridge (30-211a) and (VW 295a) Needle Bearing Drift provide input shaft with satisfactory support. Install torx bolt to idler gear shaft. Torque to 15 ft. lbs (20 N.m). Install hex head bolts to secure housing. Torque to 18 ft. lbs. (25 N.m). Torque bolts to deep groove bearing tension bracket to 11 ft. lbs. (15 N.m). Heat 5th gear to approximately 212(0) F (100(0) C) and install (circular groove facing upward on vehicles with 2.0L engines). Install thrust washer and circlip. On vehicles with 2.0L engines securing plate is used in place of circlip. See Fig. 4.



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Fig. 3: Shift Fork Alignment
Courtesy of Volkswagen United States, Inc.



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Fig. 4: Exploded View Of 5th Gear Cover
 Courtesy of Volkswagen United States, Inc.

5) Using Tube Wrench (VW 3059), screw shift tube clockwise into shift lock. Thread shift tube back out to adjust shift tube height "A". See Fig. 5.

CAUTION: Do not extract selector rod from shift tube. It may cause shift fork to come apart inside, making it necessary to disassemble transmission again. If necessary, insert screwdriver through slot to hold selector rod while removing tube wrench.

6) Engage 5th gear and reverse. Coat threads of new synchronizer hub bolt (M17) with loctite, install, torque to 111 ft. lbs (150 N.m). Move shift fork to neutral position. Insert selector shaft, selector shaft spring and cover with new seal ring. Torque to 47 ft lbs. (50 N.m). Install selector shaft lock bolt with sealant. Torque to 30 ft. lbs. (40 N.m).

7) Adjust 5th gear selector fork. Use caution in performing this adjustment to prevent transmission from jumping out of gear.

Check height "A" of shift tube. See Fig. 5. Adjust if necessary. Bolt gear selector shaft lever onto selector shaft and engage 5th gear. Raise operating sleeve together with shift fork to compensate for free play in linkage components. Align operating sleeve with selector fork so there is no free play to 5th gear. Clearance between 5th gear and synchronizer hub should be .197" (5.0 mm). If necessary, adjust clearance by turning selector tube. Ensure synchronizer ring moves freely. Support shift fork, drive on new securing plate.

8) Release tension on input shaft support bridge. Starting at 5th gear end, install clutch pushrod into input shaft. Install clutch release bearing on clutch push rod. Install new gasket to housing cover. Install cover. Shift through all gears to ensure correct engagement. Install drive flanges, dished washers, circlips, and new drive flange covers.

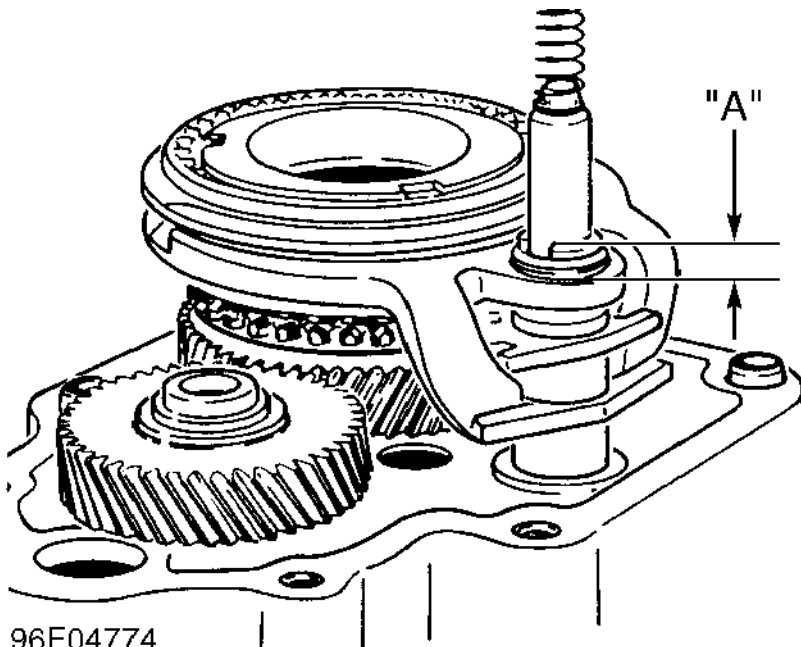


Fig. 5: Adjusting Shift Tube Height
Courtesy of Volkswagen United States, Inc.

COMPONENT DISASSEMBLY & REASSEMBLY

CLUTCH HOUSING

Disassembly

1) Remove oil drain plug, locating dowels, differential bearing outer race and shim .04" (1.0 mm) thick, magnet, output shaft outer bearing race and adjusting shim. Using puller, extract input shaft needle bearing.

2) Unbolt relay lever brackets, relay lever and springs. Extract bushing for starter shaft. Remove threaded plug (color coded), input shaft oil seal, drive flange sleeve and oil seal. See Fig. 6.

Inspection

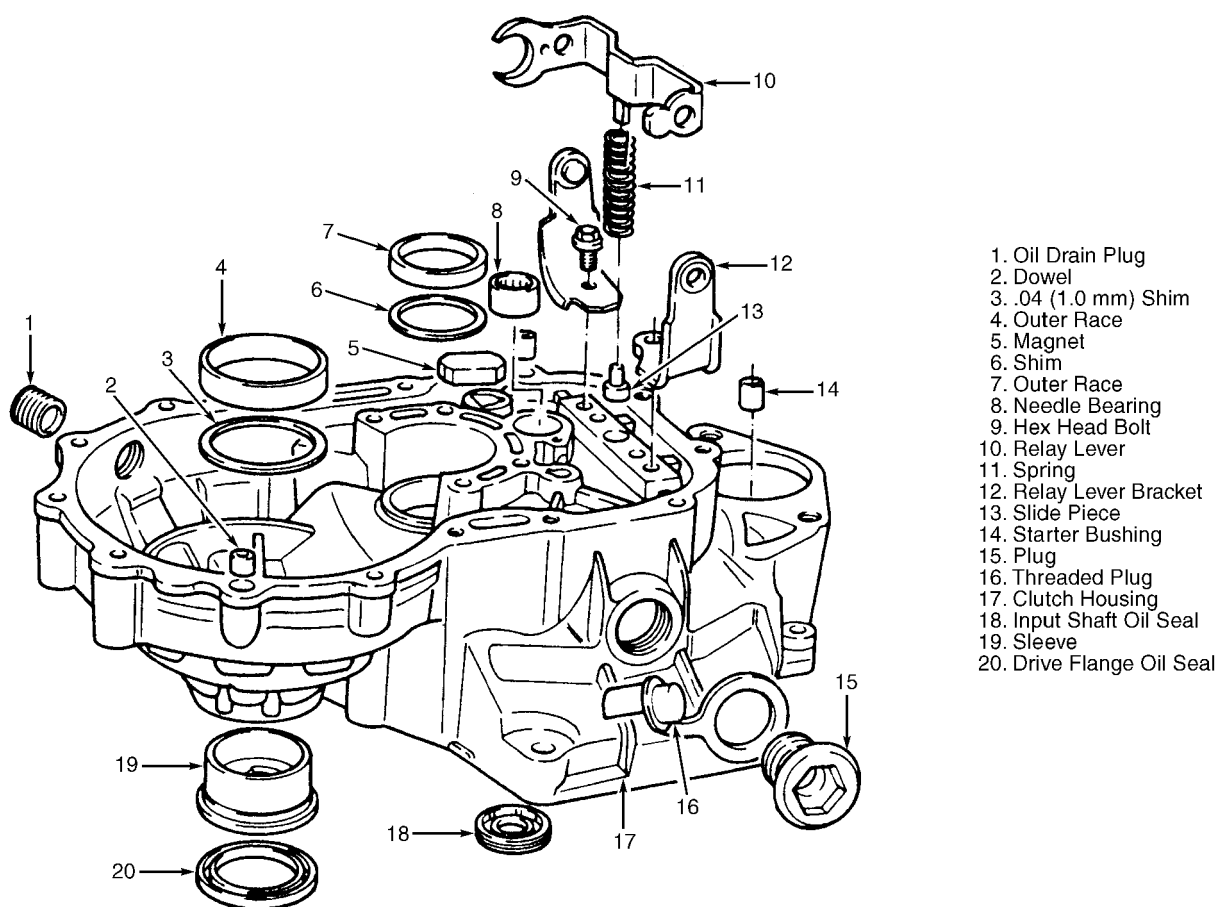
Inspect clutch housing for cracks, worn or galled bearing race bores, stripped threads or damaged case machine surfaces.

Reassembly

1) Install drive flange sleeve and oil seal. Install threaded plug (Green) and bushing for starter. Install relay lever, brackets and springs.

CAUTION: It is essential that threaded plug installed is correct for specific application. Green: for 1.8L, 1.9L Turbo Diesel and 2.0L engine with 210 mm clutch. White plug available for engines with 200 mm clutch. (not applicable for U.S.A./Canada). If White plug is installed in place of Green, damage to TDC sensor and flywheel markings will result.

2) Install input shaft needle bearing using bearing driver. Install shim and bearing outer race for differential assembly. Install selected adjusting shim and outer bearing race for output shaft. Install locating dowels and oil drain plug. Install magnet on case using Sealant (AMV 188 200 03 or equivalent).



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Fig. 6: Exploded View Of Clutch Cover
Courtesy of Volkswagen United States, Inc.

GEARBOX HOUSING

Disassembly

Remove locating dowels, backup light switch, vent sleeve and

plug, needle bearing and bearing retainer bolt. See Fig. 8.

Inspection

Inspect clutch housing for cracks, worn or galled bearing race bores, stripped threads or damaged case machine surfaces.

Reassembly

Install oil filler plug, needle bearing and bearing retainer bolt. Install release bearing, release shaft oil seal, release shaft and shaft clip. Install clutch lever, clutch lever return spring, and lever retaining clip.

INPUT ASSEMBLY

Disassembly

Using a press, remove bearing, being careful not to damage tension bracket. Remove tension bracket, 4th gear, 4th gear needle bearing and 4th gear synchronizer ring. Remove 3rd/4th synchronizer circlip and press 3rd/4th synchronizer off input shaft. Remove 3rd gear synchronizer ring, 3rd gear and 3rd gear needle bearing. Remove seal and bushing for clutch pushrod. See Fig. 9.

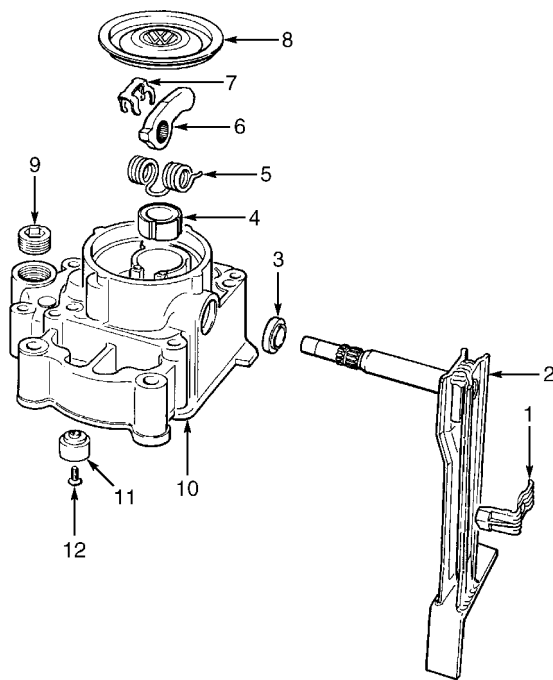
Inspection

Inspect all bearing surfaces for wear. Inspect gears for damage to teeth, bearing surfaces and synchronizer tabs. Check synchronizer rings for wear. Wear limit minimum is .02 (.5 mm). See Fig. 10.

Reassembly

1) Install bushing and seal for clutch rod into input shaft. Install 3rd gear needle bearing, 3rd gear and 3rd gear synchronizer ring.

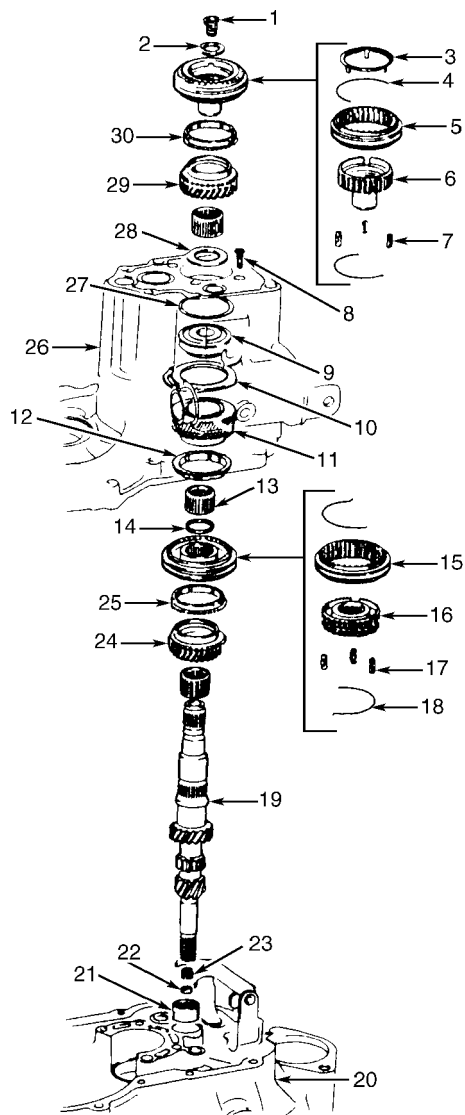
2) Press 3rd/4th gear synchronizer assembly onto input shaft. Install 4th gear synchronizer ring, 4th gear needle bearing and 4th gear. Install tension bracket



- | | |
|-----------------------|-----------------------------------|
| 1. Release Lever Clip | 7. Clip |
| 2. Release Shaft | 8. Cover |
| 3. Oil Seal | 9. Oil Filler Plug |
| 4. Release Bearing | 10. Transmission Housing Cover |
| 5. Return Spring | 11. Needle Bearing |
| 6. Clutch Lever | 12. Needle Bearing Retaining Bolt |

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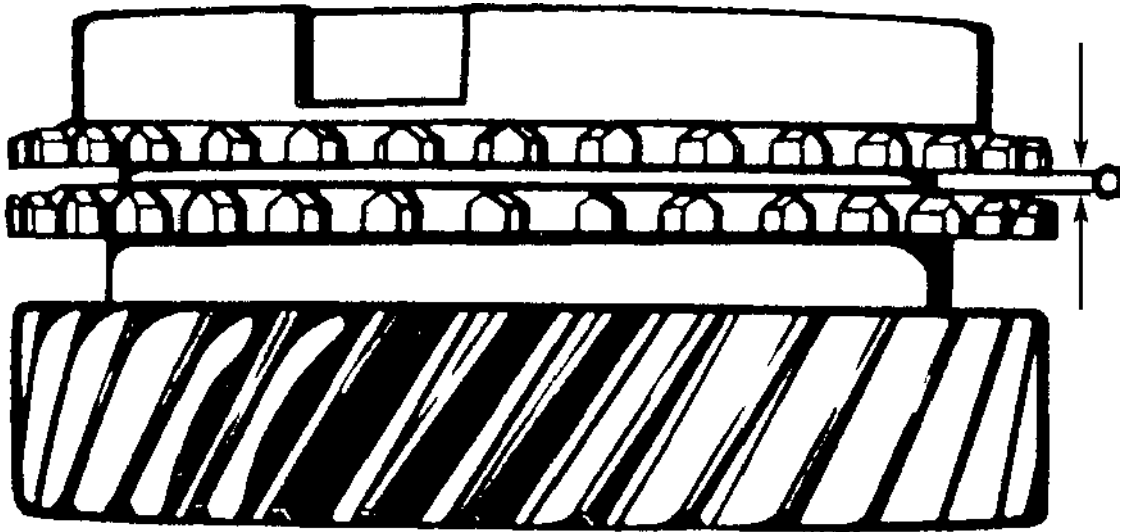
Fig. 8: Exploded View Of Transmission Housing Cover
Courtesy of Volkswagen United States, Inc.



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|--------------------------------|--------------------------------|
| 1. M17 Bolt | 16. Synchronizer Hub |
| 2. Dished Washer | 17. Locking Key |
| 3. Stop Ring | 18. Spring |
| 4. Spring | 19. Input Shaft |
| 5. Synchronizer Sleeve | 20. Clutch Housing |
| 6. Synchronizer Hub | 21. Input Shaft Needle Bearing |
| 7. Locking Key | 22. Clutch Push Rod Seal |
| 8. Fillister Head Bolt | 23. Clutch Push Rod Bushing |
| 9. Ball Bearing | 24. 3rd Speed Gear |
| 10. Tension Bracket | 25. 3rd Gear Synchronizer Ring |
| 11. 4th Gear | 26. Gearbox Housing |
| 12. 4th Gear Synchronizer Ring | 27. Input Shaft Shim |
| 13. Needle Bearing | 28. Thrust Washer |
| 14. Circlip | 29. 5th Gear |
| 15. Synchronizer Sleeve | 30. 5th Gear Synchronizer Ring |

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Fig. 9: Exploded View Of Input Shaft
Courtesy of Volkswagen United States, Inc.



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Fig. 10: Measuring Synchronizer Ring Clearance
 Courtesy of Volkswagen United States, Inc.

DIFFERENTIAL ASSEMBLY

Disassembly

- 1) Press tapered roller bearings off both ends of differential housing. Remove rivets from differential ring gear assembly only if ring gear is to be replaced. Rivets can be removed using either a hacksaw to cut off rivet heads and then driving them out with a punch or by drilling them out using a 12 mm drill bit.
- 2) Remove circlips that hold differential pinion shaft inside carrier. Remove pinion gears and one piece thrust washer.

Inspection

Inspect gears for wear, chipped teeth or galling. Inspect thrust washer for wear. Replace components as needed.

Reassembly

- 1) If differential ring gear is being replaced, heat gear to approximately 212°F (100°C) and press onto differential housing using several bolts as guide pins during installation. Install special retaining bolts and nuts from Repair Kit (171 498 088 A).
- 2) Install one piece thrust washer, pinion gears and pinion shaft into differential case. Attach circlips to pinion gear shaft. Press tapered bearings onto each end of differential carrier.

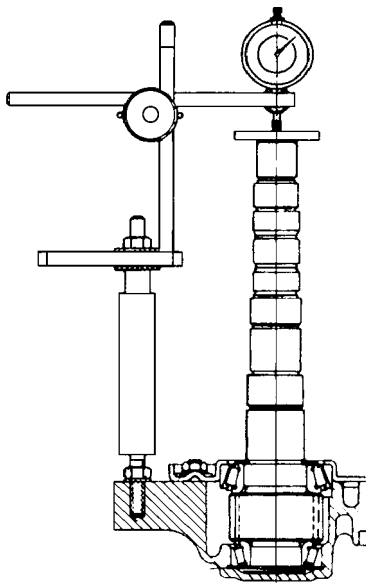
NOTE: If installing a new ring gear or pinion, be sure both components are a matched set. Always use NEW ring gear retaining bolts.

ADJUSTING OUTPUT SHAFT PRELOAD

NOTE: Adjustment is not necessary unless any of the following parts have been replaced: output shaft bearings, differential or pinion gears.

1) Install roller bearing outer race into clutch housing with a .025" (.65 mm) shim. Install output shaft and bearing retainer plate. Torque plate to 18 ft. lbs. (25 N.m) plus an additional 1/4 turn (90 degrees). Set up a dial indicator and measure up and down movement of output shaft. See Fig. 11.

2) The specified .008" (.20 mm) bearing preload is obtained by adding .008" (.20 mm) to recorded dial indicator reading and .025" (.65 mm) shim value. The sum of these three figures will determine size of shim to be installed behind output shaft bearing race in clutch housing. Shims are available in sizes from .025" (.65 mm) to .055" (1.40 mm) in increments of .002" (.05 mm).



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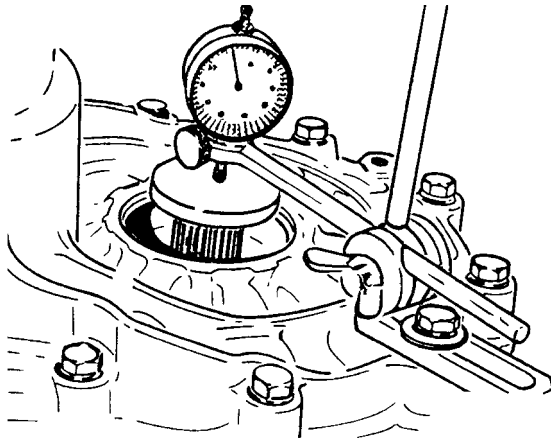
Fig. 11: Measuring Output Shaft End Play
Courtesy of Volkswagen United States, Inc.

ADJUSTING DIFFERENTIAL PRELOAD

NOTE: Adjustment is not necessary unless any of the following parts have been replaced: final drive housing, final drive cover, differential bearings, differential housing and/or ring gear/pinion.

1) Install differential outer bearing race and .04" (1.0 mm) shim into clutch housing. Install other differential outer bearing race into bearing housing without shim. Install differential into clutch housing case and install gearbox housing with seal. Torque gearbox bolts to 18 ft. lbs. (25 N.m).

2) Set up dial indicator and measure differential side play. See Fig. 12. The specified .015" (.4 mm) bearing preload is obtained by adding a preload of .015" (.4 mm) to dial indicator measurement. The needed bearing preload shim height is determined by this calculation. Shims are available in various increments from .006" (.15 mm) to .040" (1.0 mm).



95F20953
Fig. 12: Measuring Differential Side Play
 Courtesy of Volkswagen United States, Inc.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS	
AA	
Application	Ft. Lbs. (N.m)
Back-Up Light Switch	15 (20)
Deep Groove Bearing Tension	11 (15)
Fifth Gear Cover Bolts	18 (25)
Fillister Head Screws	18 (25)
Gearbox To Clutch Housing	18 (25)
Idler Gear Shaft Bolt	15 (20)
Oil Fill and Drain Plugs	18 (25)
Output Shaft Bearing Cover	30 (40)
Shift Relay Bracket	18 (25)
Shift Shaft Cover	37 (50)
Shift Shaft Lock Bolt	30 (40)
Synchronizer Hub Bolt (M17)	111 (150)
	INCH lbs. (N.m)
Needle Bearing Retainer Bolt	44 (5)
Shifter Housing Clamp Bolt	18 (2)
Speedometer Drive Retainer Bolt	44 (5)
Vehicle Speed Sensor	44 (5)
AA	

END OF ARTICLE