

## Article Text

## ARTICLE BEGINNING

### 1. 8L 8-Valve & 2.0L 16-Valve 4-Cylinder

# Passat

1991

**Cabriolet, Corrado, Fox, Golf, GTI, Jetta**

**\* PLEASE READ THIS FIRST \***

**NOTE:** For engine repair procedures not covered in this article, see **ENGINE OVERHAUL PROCEDURES - GENERAL INFORMATION** article in the **GENERAL INFORMATION** section.

## ENGINE IDENTIFICATION

Engine identification number is stamped on a machined pad, left side of engine block, near distributor assembly (1.8L) or over crankcase ventilation area (2.0L). See Fig. 1. The first 2 characters (3 characters on Fox) designate engine code.

## ENGINE IDENTIFICATION CODES TABLE

[illegible]

Appl i cati on	Engi ne Code
----------------	--------------

### 1. 8L 8-Valve 4-Cylinder

**Cabri ol et** ..... **JH**

**Corrado** ..... PG

**Fox** ..... **ABG**

**Gol f & GTI . . . . . RV**

# Jetta

**Carat (Federal) . . . . . PF**

Except Carat (Federal) ..... RV

## 2. 0L 16-Valve 4-Cylinder

**GTI, Jetta GLi & Passat . . . . . 9A**

[illegible]

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 2)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:37PM

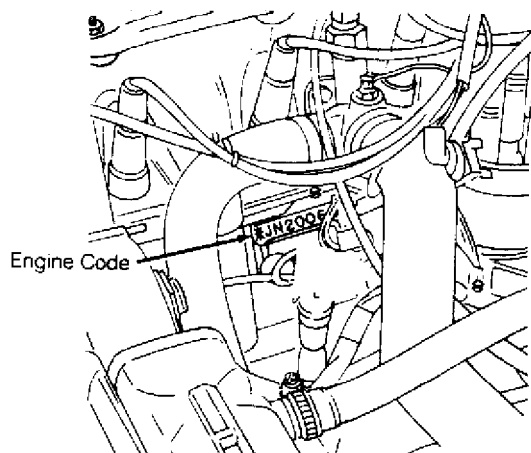


Fig. 1: Locating Engine Identification Number

Courtesy of Volkswagen United States, Inc.

### HYDRAULIC LIFTER (CAM FOLLOWER) TEST ADJUSTMENTS

To determine weak or noisy lifter, position camshaft lobe high point upward. Using a piece of wood, push cam follower down. See Fig. 3 or 4. If cam follower moves down more than .004" (.10 mm), replace cam follower. If cam follower moves less than .004" (.10 mm), cam follower is okay. Repeat procedure for remaining cam followers.

### REMOVAL & INSTALLATION

**NOTE:** Match mark engine mounts to ensure original alignment position after installation. On vehicles with Power Steering (P/S), remove P/S unit with hoses attached and secure out of way.

### FUEL PRESSURE RELEASE

On models with Digifant fuel injection, remove fuel pump relay (located in fuse/relay panel). Crank engine for 5 seconds. Reinstall fuel pump relay. On models with CIS-E fuel injection, apply 12 volts to cold start injector valve for 3-5 seconds.

### ENGINE

#### Removal (Except Fox)

1) Disconnect and remove battery. Open fuel tank fill cap and radiator cap. Remove intake air duct. On 16-valve engines, remove intake manifold assembly. On vehicles with A/C, remove trim panel and lower apron. Remove condenser from crossmember and radiator. Remove all duct work. Mark and disconnect A/C and cooling fan electrical connectors. Remove accessory belts.

2) On Golf, GTI, Jetta and Passat, leave A/C hoses attached and remove A/C compressor. Pivot A/C condenser and compressor to side of vehicle and secure.

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 3)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:37PM

3) On Corrado, remove G-Charger compressor. On Cabriolet and Corrado, remove alternator and timing belt cover. Remove 3 A/C bracket Allen head bolts behind timing belt cover. Remove A/C bracket support brace. Remove A/C compressor bracket bolts. Leave hoses attached and secure A/C compressor with bracket out of way.

4) On all models, open heater controls. Remove cooling hose from thermostat housing flange and drain coolant. Remove thermostat housing flange. Mark and remove all cooling system hoses.

5) On Golf, GTI, Jetta and Passat, remove grille from radiator support. Disconnect electrical connectors at radiator support. Remove radiator-to-support bolts. Remove radiator support using care not damage headlights. Remove radiator, fan and shroud assembly.

6) On all models, remove axle shafts from transaxle. See FWD AXLE SHAFTS article in the DRIVE AXLE Section. Mark and disconnect shift linkage and speedometer cable. Mark and remove electrical connectors and vacuum hoses. Disconnect throttle, cruise and kickdown cables. On Golf, Jetta GLi and Passat, leave fuel lines connected and remove cold start injector and warm-up regulator.

7) On all models, remove fuel injectors. Remove rear engine mount. Remove complete transaxle mount. On Cabriolet and Corrado, remove right front tire assembly. Remove right and left engine mount through bolts.

8) On all models, install engine sling on engine lift hooks. Carefully raise engine and transaxle out of vehicle. Separate transaxle from engine.

### Installation

1) To install, reverse removal procedure. Engine alignment adjustment is necessary whenever engine is removed or mounts are loosened. To adjust, loosen through bolt on engine mount "A". Loosen transmission transaxle mount "B" bolts. Loosen front engine mount and bracket. See Fig. 2.

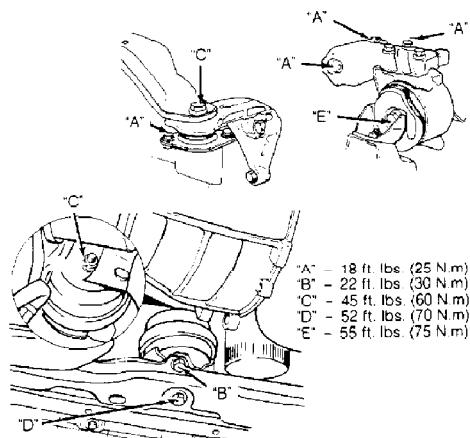


Fig. 2: Aligning Engine/Transaxle Assembly  
Courtesy of Volkswagen United States, Inc.

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 4)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:37PM

2) Lightly rock engine and transaxle to allow position to shift as necessary. Evenly tighten mount bolts in reverse order of loosening. Fill fluids to proper level. Adjust clutch pedal (if equipped). Tighten all bolts and nuts to specification. See TORQUE SPECIFICATIONS TABLE at end of article.

#### Removal (Fox)

1) Disconnect negative battery cable. Open heater valve. Drain radiator. Remove fan, shroud and radiator. Remove M/T clutch cable (if equipped).

2) Mark and disconnect electrical wiring and vacuum hoses. Disconnect throttle, cruise and kickdown linkage. Remove fuel injectors. Remove charcoal canister and set aside.

3) Remove 3 upper engine-to-transaxle bolts. Remove left and right engine mount nuts. Disconnect and remove starter. Remove 2 lower engine-to-transaxle bolts. Remove transaxle inspection cover plate. Disconnect exhaust inlet pipe support and separate inlet pipe from exhaust manifold.

4) Support transaxle. Attach engine sling to engine lifting hooks. Raise engine/transaxle until engine clears engine mounts. Ensure transaxle is supported. Remove remaining engine-to-transaxle bolts. Lift and separate engine from vehicle without transaxle.

#### Installation

Lubricate transaxle main shaft splines and contact area between clutch release bearing and clutch pressure plate with molybdenum disulphide grease. DO NOT lubricate guide sleeve for clutch release bearing. To complete installation, reverse removal procedure. DO NOT reuse self-locking nuts. Ensure engine mounts are installed to original location. Tighten engine mounts and subframe bolts to specification with engine running at idle. See TORQUE SPECIFICATIONS TABLE at end of article.

#### INTAKE MANIFOLD

Removal and installation procedure is not available from manufacturer. See TORQUE SPECIFICATIONS TABLE at end of article.

#### EXHAUST MANIFOLD

Removal and installation procedure is not available from manufacturer. See TORQUE SPECIFICATIONS TABLE at end of article.

#### CYLINDER HEAD

##### Removal

1) Removal and installation procedure is not available from manufacturer. Cylinder head may be removed with engine in vehicle. Match mark all components for installation reference. Remove timing belt. See TIMING BELT under REMOVAL & INSTALLATION. See Fig. 3 or 4.

2) Remove cylinder head bolts in reverse sequence of installation. See Fig. 5. Replace cylinder head bolts after loosening

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 5)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:37PM

or removing.

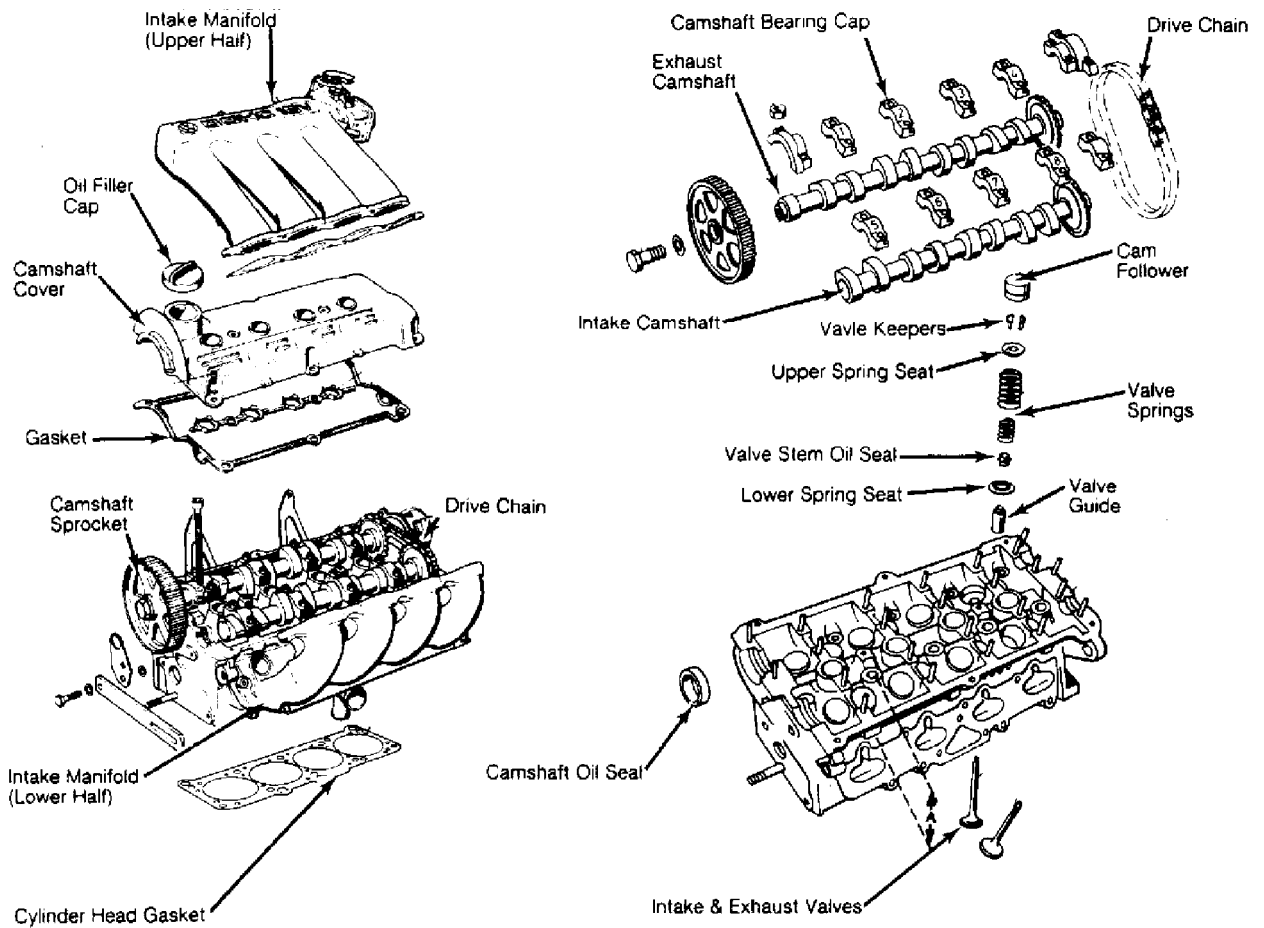


Fig. 3: Identifying 2.0L Cylinder Head (16-Valve)  
Courtesy of Volkswagen United States, Inc.

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 6)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:37PM

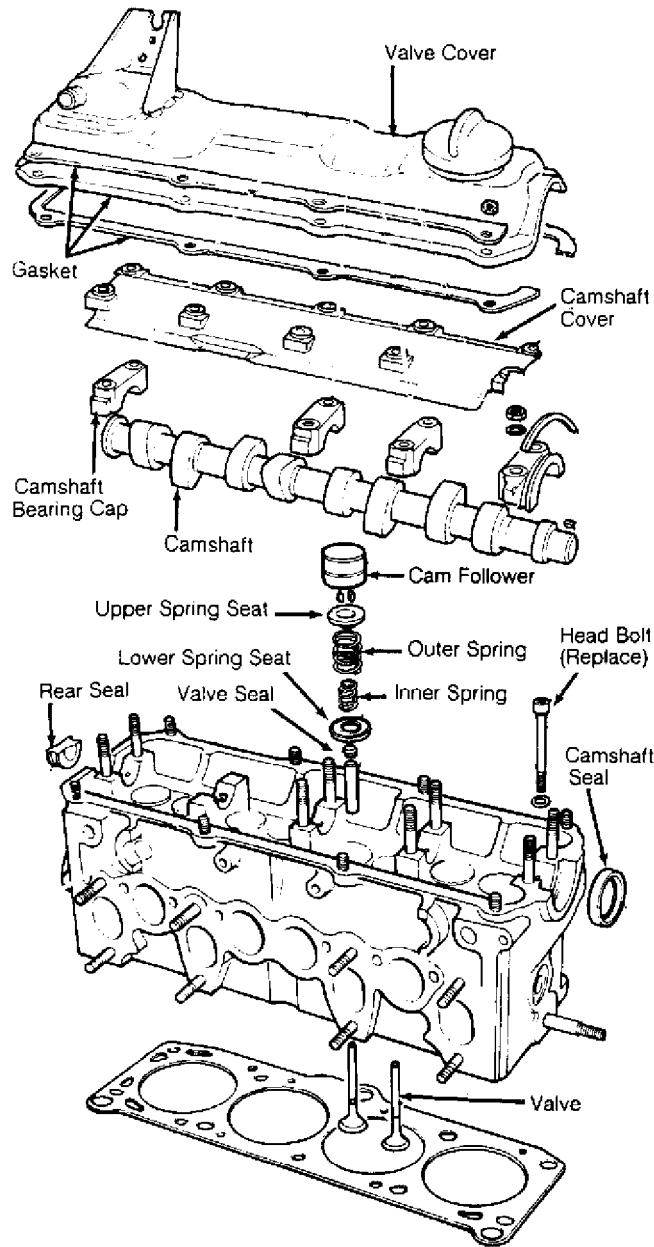


Fig. 4: Identifying 1.8L Cylinder Head (8-Valve)  
Courtesy of Volkswagen United States, Inc.

#### Inspection

Thoroughly clean all gasket mating surfaces. Check cylinder head for warpage. Maximum warpage is .004" (.10 mm). Check minimum head height and replace cylinder (if necessary). The 1.8L cylinder head can be machined. DO NOT machine 2.0L (16-valve) cylinder head.

**NOTE:** DO NOT reuse antifreeze after replacing cylinder block, cylinder head, head gasket, radiator and/or heater core.

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 7)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

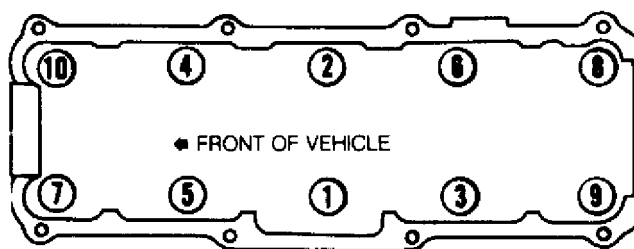
Wednesday, August 25, 1999 07:37PM

#### Installation

1) Ensure "OBEN" marking on cylinder head gasket faces up.

Install gasket on cylinder block. Do not use any type of sealant. Carefully position cylinder head on cylinder. Install head bolts No. 9 and 10 hand tight to ensure cylinder head position. Install remaining head bolts hand tight.

2) Tighten cylinder head bolts (in 3 steps) in sequence to specification. See Fig. 5. See TORQUE SPECIFICATIONS TABLE at end of article. No further information is available from manufacturer.



REMOVE IN REVERSE ORDER

Fig. 5: Cylinder Head Bolts Tightening Sequence  
Courtesy of Volkswagen United States, Inc.

#### FRONT COVER OIL SEAL

##### Removal

Remove timing belt. See TIMING BELT under REMOVAL & INSTALLATION. Rotate inner part of Oil Seal Extractor (2085) outward 2 turns and tighten set screw. See Fig. 12. Lubricate threaded area of extractor and push in as far as possible. Loosen set screw and turn inner part of extractor until oil seal is removed.

##### Installation

Lubricate outer edge and lip of new seal. Place guide sleeve from Seal Installer (3083) onto crankshaft. Push oil seal over guide sleeve. Press seal completely into position. To complete installation, reverse removal procedure.

#### TIMING BELT

##### Removal (All Models)

Information is not available from manufacturer. Match mark all components to ensure reassembly to original position. See Fig. 6. DO Not turn crankshaft without belt attached, valve damage may result.

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

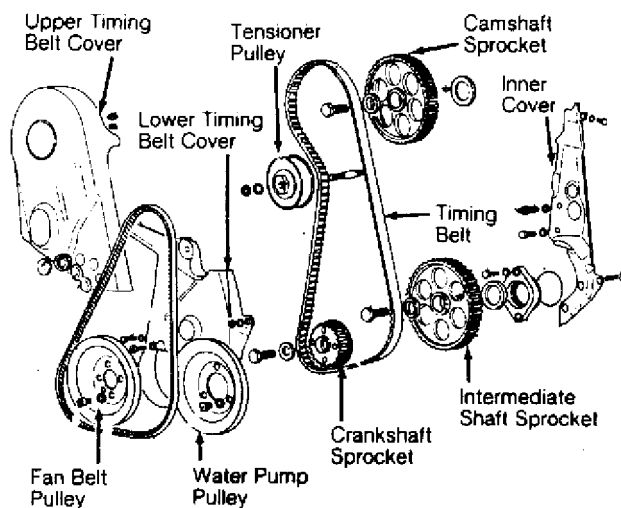
### Article Text (p. 8)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

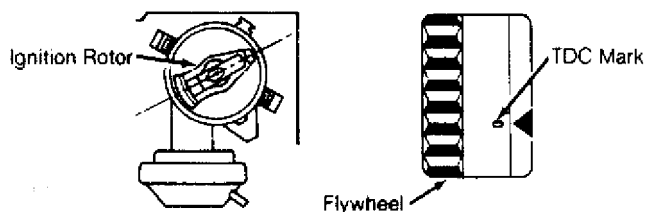
Wednesday, August 25, 1999 07:37PM



**Fig. 6: Removing Timing Belt**  
Courtesy of Volkswagen United States, Inc.

#### Installation (1.8L)

1) Align flywheel/flex plate "0" mark with pointer. This is TDC. Remove distributor cap and check position of ignition rotor. Rotate intermediate shaft and position rotor at No. 1 cylinder mark on housing. See Fig. 7.



**Fig. 7: Aligning Ignition Rotor**  
Courtesy of Volkswagen United States, Inc.

2) With intermediate shaft/ignition rotor positioned, rotate crankshaft and align mark on crankshaft pulley with mark on intermediate shaft sprocket. Position camshaft sprocket mark even with valve cover surface. See Fig. 8. Install timing belt.

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

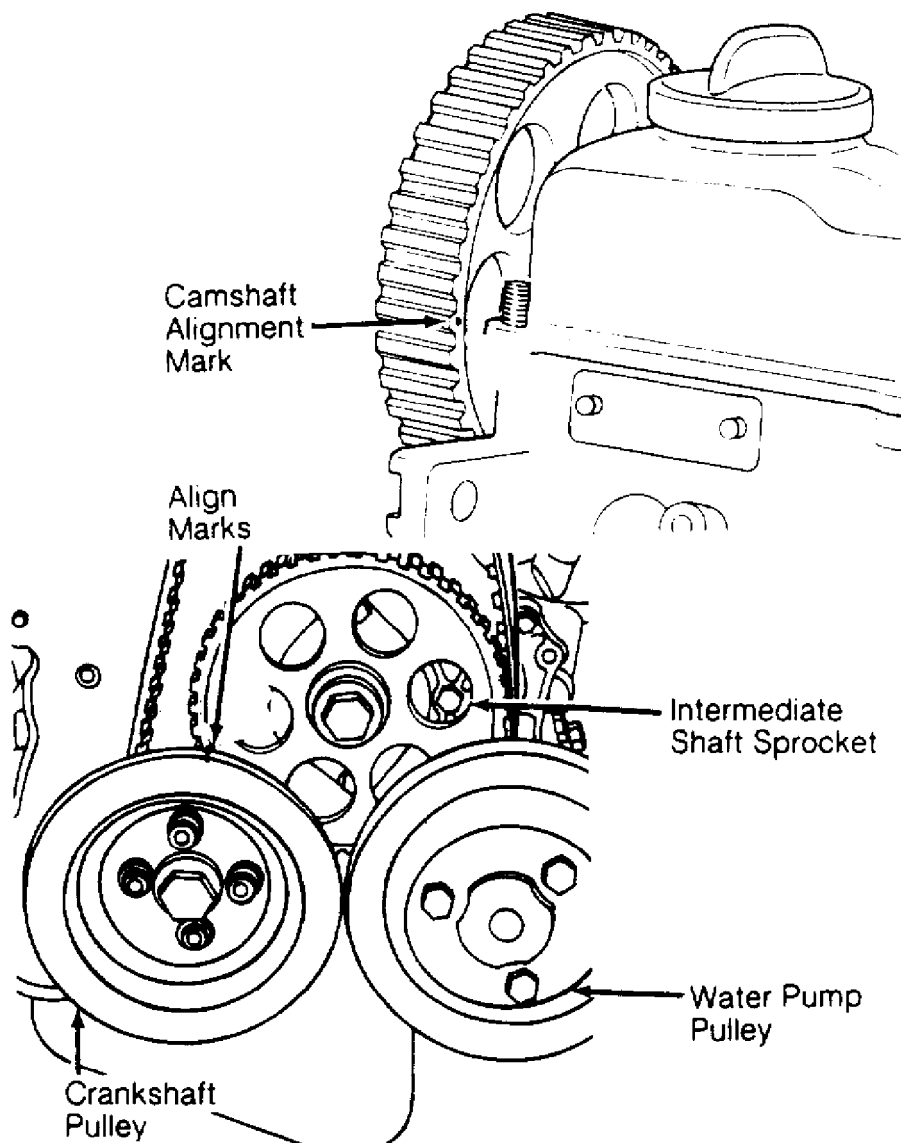
### Article Text (p. 9)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:37PM



50D01567

Fig. 8: Aligning 1.8L Timing Marks (8-Valve)  
Courtesy of Volkswagen United States, Inc.

3) Rotate tensioner clockwise to tighten belt and install lock nut. Proper deflection is achieved when longest span of belt between sprockets can be twisted 90 degrees. See Fig. 9. By hand, rotate crankshaft 2 turns and check timing mark alignment. To complete installation, reverse removal procedure.

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 10)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:37PM

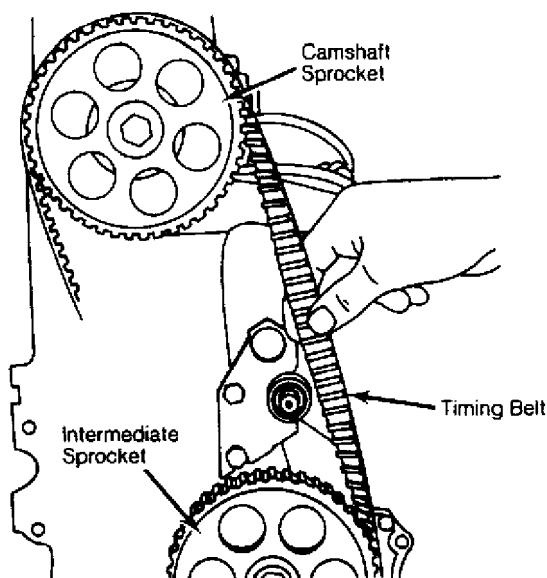


Fig. 9: Checking Timing Belt Tension  
Courtesy of Volkswagen United States, Inc.

#### Installation (2.0L)

1) Install timing belt around crankshaft and intermediate shaft sprockets. Install lower timing belt cover. Install vibration damper, noting offset holes.

2) If valve cover is installed, mark on front of camshaft sprocket must align with mark on valve cover. If valve cover is removed, place camshaft sprocket mark even with valve cover surface. See Figs. 10 and 11.

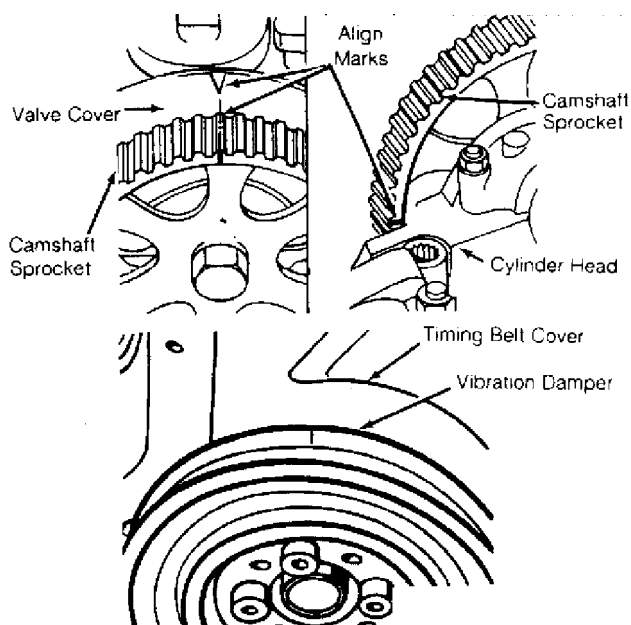


Fig. 10: Aligning 2.0L Camshaft & Crankshaft Pulley Timing Marks  
(16-Valve)  
Courtesy of Volkswagen United States, Inc.

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 11)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:37PM

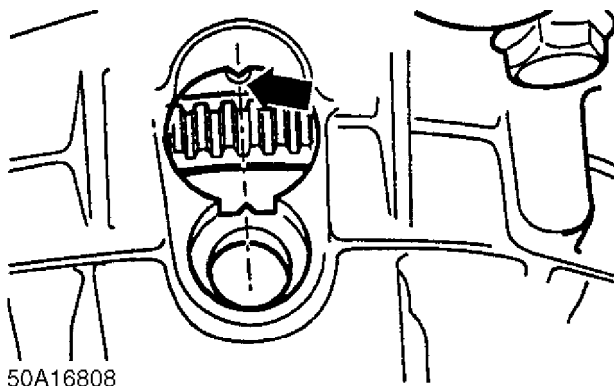


Fig. 11: Aligning 2.0L Flywheel Timing Mark  
Courtesy of Volkswagen United States, Inc.

3) Align vibration damper mark with mark on lower timing belt cover. See Fig. 10. Install timing belt around camshaft sprocket. Install Timing Belt Tension Scale (VW 210). To tension belt, rotate belt tensioner clockwise until tension scale reads 13-14. By hand, rotate crankshaft 2 turns and check timing mark alignment. To complete installation, reverse removal procedure.

### CAMSHAFT OIL SEAL

#### Removal

1) Remove upper timing belt cover. Place crankshaft at TDC with No. 1 cylinder on compression stroke. Remove timing belt from camshaft sprocket. Remove camshaft sprocket. Remove Woodruff key. Install camshaft sprocket bolt and washer until washer is tight against camshaft.

2) Rotate inner part of Oil Seal Extractor (2085) outward 2 turns and tighten set screw. See Fig. 12. Lubricate threaded area of extractor and push in as far as possible. Loosen set screw and turn inner part of extractor until oil seal is removed.

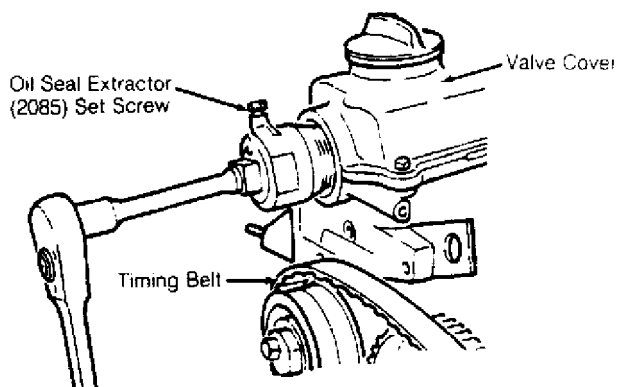


Fig. 12: Removing Camshaft Oil Seal  
Courtesy of Volkswagen United States, Inc.

#### Installation

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 12)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:37PM

Coat new seal seat and lips lightly with engine oil. On 1.8L engines, using Installer (10-203), install seal until flush. On 2.0L engines, use Special Hex Head Bolt (10-203/1) to press seal into place. To complete installation, reverse removal procedure.

#### CAMSHAFT

##### Removal (1.8L)

1) Remove upper timing belt cover. See Fig. 6. Remove valve cover. Place crankshaft at TDC with No. 1 cylinder on compression stroke. Remove timing belt from camshaft sprocket. Remove camshaft sprocket. Remove Woodruff key. Check camshaft end play with cam followers removed and bearing caps No. 1 and 5 installed. See CAMSHAFT TABLE under ENGINE SPECIFICATIONS at end of article.

2) Remove bearing caps No. 1, 3 and 5 evenly a little at a time. Repeat for remaining caps. Remove camshaft.

##### Inspection

Check camshaft bearing oil clearance. See CAMSHAFT TABLE under ENGINE SPECIFICATIONS at end of article. If oil clearance exceeds specification, install new camshaft and recheck clearance. If clearance still exceeds specification, replace cylinder head.

##### Installation

1) On engines with oil spray jets, position spray at right angle to camshaft. Place camshaft in cylinder head with both high points of lobes, for No. 1 cylinder facing upward. Install bearing caps No. 1, 3 and 5.

2) Tighten evenly a little at a time. Repeat procedure for remaining bearing caps. To complete installation, reverse removal procedure. Ensure timing marks are properly aligned. Before starting engine, allow 30 minutes for cam followers to bleed down.

##### Removal (2.0L)

1) Remove upper timing belt cover. Remove camshaft cover. See Figs. 3 and 6. Place crankshaft at TDC with No. 1 cylinder on compression stroke. Remove timing belt from camshaft sprocket. Remove camshaft sprocket. Remove Woodruff key. Check camshaft end play with cam followers removed and bearing caps No. 1 and 4 (exhaust camshaft) or 5 and 8 (intake camshaft) installed. See CAMSHAFT TABLE under ENGINE SPECIFICATIONS at end of article.

2) Remove intake camshaft bearing caps No. 5, 7 and rear cap evenly a little at a time. See Fig. 13. Loosen remaining intake camshaft bearing caps evenly a little at a time. Remove exhaust camshaft bearing caps No. 1, 3, front cap and rear cap evenly a little at a time. Loosen remaining exhaust camshaft bearing caps evenly a little at a time. Remove camshaft bearing caps. Lift both camshafts out of cylinder head together.

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 13)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:38PM

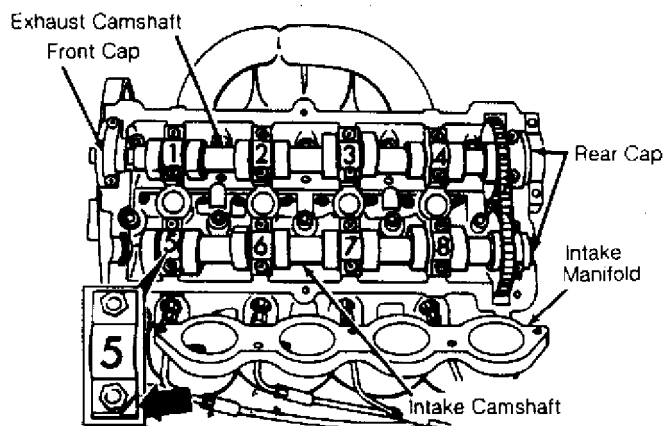


Fig. 13: Identifying Camshaft Bearing Caps (2.0L)  
Courtesy of Volkswagen United States, Inc.

#### Inspection

Check camshaft bearing oil clearance. See CAMSHAFT TABLE under ENGINE SPECIFICATIONS at end of article. If oil clearance is not within specification, install new camshaft and recheck clearance. If clearance still exceeds specification, replace cylinder head.

#### Installation

1) On engines with oil spray jets, position spray at right angle to camshaft. Place drive chain on both camshaft gears. Align matching marks on gears and place both camshafts in cylinder head. See Fig. 14.

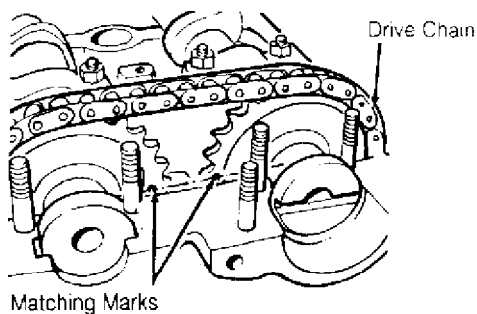


Fig. 14: Aligning Camshaft Gears & Drive Chain (16-Valve)  
Courtesy of Volkswagen United States, Inc.

2) Install intake camshaft bearing caps No. 6 and 8 and tighten evenly a little at a time. See Fig. 13. Repeat procedure for remaining intake camshaft bearing caps. Install exhaust camshaft bearing caps No. 2 and 4. Tighten evenly a little at a time. Repeat procedure for remaining exhaust camshaft bearing caps. To complete installation, reverse removal procedure. Before starting engine, allow 30 minutes for cam followers to bleed down.

INTERMEDIATE SHAFT

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 14)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:38PM

#### Removal & Installation

1) Remove timing belt. See TIMING BELT under REMOVAL & INSTALLATION. Mark distributor assembly for installation reference and remove distributor assembly.

2) Ensure intermediate shaft end play does not exceed .010" (.25 mm). Remove intermediate shaft sprocket. Remove intermediate shaft seal flange. Remove intermediate shaft. Replace seal (if necessary). See Fig. 17. To install, reverse removal procedure.

#### REAR CRANKSHAFT OIL SEAL

##### Removal & Installation

Remove flywheel/flexplate, and discard bolts. See Fig. 17. Remove retaining flange. Remove rear crankshaft oil seal. Use Installer (2003/1) to install seal. To complete installation, reverse removal procedure. Install new flywheel/flex plate bolts.

#### WATER PUMP

**CAUTION:** Coolant/water mixture should be used at all times. Use only ethylene glycol based (phosphate-free) coolant.

##### Removal & Installation

1) Disconnect negative battery cable. Turn heater control to hot. Drain cooling system. Remove accessories and brackets (as necessary).

2) Mark and remove coolant hoses from water pump. Remove water pump pulley. See Fig. 8. Remove bolts and remove water pump assembly. To install, reverse removal procedure. To fill cooling system, remove thermo time switch, located on water flange.

#### OIL PAN

Oil pan can be removed and installed with engine in vehicle. No further information is available from manufacturer.

#### CYLINDER HEAD OVERHAUL

##### CYLINDER HEAD

Clean all gasket mating surfaces. Check cylinder head for warpage. See CYLINDER HEAD TABLE under ENGINE SPECIFICATIONS at end of article. The 1.8L cylinder head can be machined. DO NOT machine 2.0L (16-valve) cylinder head.

##### VALVE STEM OIL SEALS

On 1.8L heads, install seals using Valve Seal Replacer/Sleeve (10-204/A). On 2.0L (16-valve) heads, remove seals using Seal Remover (3047A) and install seals using Valve Seal Replacer/Sleeve (3129). DO NOT install valve seal without using sleeve.



## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 16)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:38PM

3) The difference is **maximum** refacing allowable for valve and seat. If valve installed height is too high, replace cylinder head assembly. If valve installed height is too low or too high, cam followers will not work correctly.

### VALVES

Measure valve stem diameter and valve margin. If not within specification, replace valves. **DO NOT** reface exhaust valves (or intake valves on 2.0L engines) with machine. Lap valves by hand or replace as necessary. See VALVES & VALVE SPRINGS TABLE under ENGINE SPECIFICATIONS at end of article.

### CYLINDER BLOCK ASSEMBLY OVERHAUL

#### PISTON & ROD ASSEMBLY

1) Make sure piston, rod and rod caps are marked with matching cylinder number prior to removal. Ensure engine front arrow is marked on top of piston. See Fig. 16. Pistons and rods are to be replaced in sets of 4. Rod cap bolts and nuts must be replaced after removing or loosening.

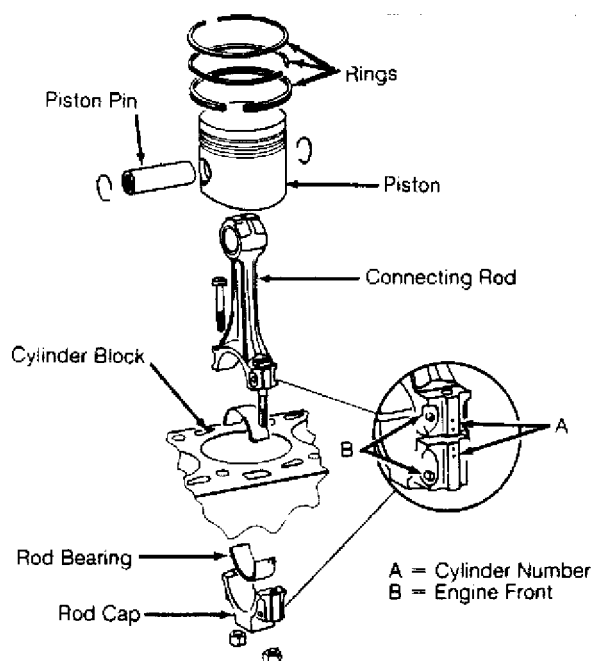


Fig. 16: Assembling Piston & Rod  
Courtesy of Volkswagen United States, Inc.

2) Mark piston in relation to pin. Remove circlips from ends of pin bore. Use Piston Pin Replacer/Installer (VW 207C) to remove and install piston pin. If pin is too tight, heat piston to 140°F (60°C). Ensure rod is properly positioned with piston. See Fig. 16.

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 17)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:38PM

#### FITTING PISTONS

Measure clearances with cylinder block supported on work bench. Check clearance of piston-to-cylinder bore. Piston diameter is stamped on top of piston in millimeters.

#### PISTON-TO-CYLINDER BORE DIMENSIONS TABLE

AA			
Size	Piston Diameter		Cylinder Bore
	In.	(mm)	In. (mm)
1. 8L			
Standard	.....	3. 188 (80. 98)	..... 3. 189 (81. 01)
1st Over	.....	3. 198 (81. 23)	..... 3. 199 (81. 26)
2nd Over	.....	3. 208 (81. 48)	..... 3. 209 (81. 51)
2. 0L			
Standard	.....	3. 245 (82. 43)	..... 3. 248 (82. 51)
1st Over	.....	3. 257 (82. 73)	..... 3. 258 (82. 76)
2nd Over	.....	3. 267 (82. 98)	..... 3. 268 (83. 01)
AA			

#### PISTON RINGS

Measure ring end gap. Measure ring side clearance with piston. If not within specification, replace as necessary. See PISTONS, PINS & RINGS TABLE under ENGINE SPECIFICATIONS at end of article. Install rings on piston with TOP mark facing upward. Recessed edge on outside of center ring must face piston pin (down). Position ring ends. See Fig. 16.

#### ROD BEARINGS

Mark rod caps for reinstallation. Use Plastigage to measure bearing clearances. Measure connecting rod side play. Replace or machine as necessary. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS TABLE under ENGINE SPECIFICATIONS at end of article. Tighten evenly to specification in several steps. See TORQUE SPECIFICATIONS TABLE at end of article.

#### CRANKSHAFT & MAIN BEARINGS

Main bearing caps are marked with matching journal for installation in original position. See Fig. 17. Measure crankshaft end play. See THRUST BEARING below.

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 18)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:38PM

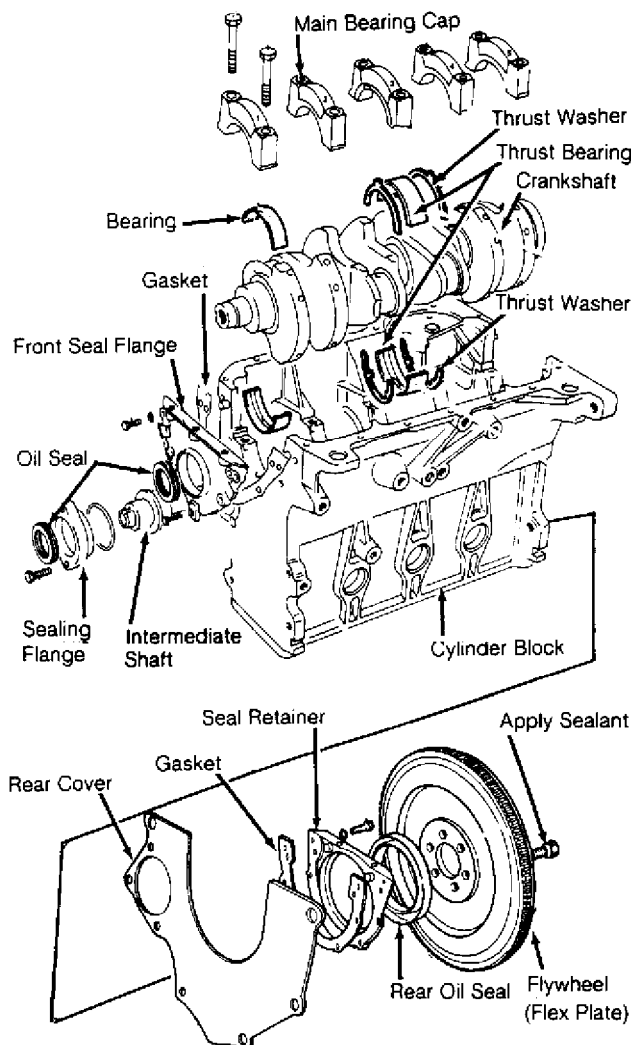


Fig. 17: Crankshaft Assembly  
Courtesy of Volkswagen United States, Inc.

#### THRUST BEARING

Insert feeler gauge between No. 3 main bearing and crankshaft thrust face to measure end play. See Fig. 17. Replace thrust bearing as necessary. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS TABLE under ENGINE SPECIFICATIONS at end of article.

#### CYLINDER BLOCK

Measure cylinder block while supported on work bench. Check cylinder bore for wear, out-of-round and taper. Check cylinder block for warpage. See CYLINDER BLOCK TABLE under ENGINE SPECIFICATIONS at end of article.

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 19)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:38PM

## ENGINE OILING LUBRICATION SYSTEM

### CRANKCASE CAPACITY

See CRANKCASE CAPACITY TABLE.

#### CRANKCASE CAPACITY TABLE

AA			
Model		With Filter Replacement	Without Filter Replacement
Fox .....	3.7 Qts. (3.5L) .....	3.2 Qts. (3.0L)	
All Others .....	4.3 Qts. (4.1L) .....	3.7 Qts. (3.5L)	
AA			

### OIL PRESSURE

Check oil pressure with engine at warm operating temperature.

Minimum oil pressure at idle is 4.3 psi (.3 kg/cm<sup>2</sup>). Minimum oil pressure at 2000 RPM is 29 psi (2.0 kg/cm<sup>2</sup>).

## OIL PUMP

### REMOVAL & INSTALLATION

Remove oil pan. Remove oil pump attaching bolts and remove oil pump assembly. To install, reverse removal procedure.

### INSPECTION

Check oil pump backlash and oil pump axial play. If not within specification, replace oil pump assembly. See OIL PUMP SPECIFICATIONS TABLE.

#### OIL PUMP SPECIFICATIONS TABLE

Application		In. (mm)
Backlash		
New .....	.002 (.05)	
Limit .....	.008 (.20)	
Axial Play Limit .....	.006 (.15)	
AA		

## TORQUE SPECIFICATIONS

#### TORQUE SPECIFICATIONS TABLE

Application		Ft. Lbs. (N.m)
A/C Bracket-To-Engine Bolt .....	22 (30)	

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 20)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:38PM

Axle Shaft-To-Transaxle Drive Flange Bolt .....	33 (45)
Camshaft Bearing Cap Bolt	
8V .....	15 (20)
16V .....	11 (15)
Camshaft Drive Gear Bolt (2.0L)	
GTI & Jetta GLi .....	60 (80)
Passat .....	48 (65)
Clutch Cover Bolt .....	15 (20)
Crankshaft Main Bearing Cap Bolt .....	50 (65)
Crankshaft Timing Sprocket Bolt .....	66 (90) 1/2 Turn
Cylinder Head Nut	
Step 1 .....	30 (40)
Step 2 .....	45 (60)
Step 3 .....	Additional 1/2 (180°) Turn
Engine Bracket-To-Hydraulic Mount Bolt .....	45 (60)
Engine Mount Carrier-To-Frame Bolt .....	(1)
Engine Mounts .....	(1)
Engine-To-Transaxle	
10-mm Bolt .....	33 (45)
12-mm Bolt .....	40 (55)
Exhaust Manifold-To-Cylinder Head Bolt & Nut .....	18 (25)
Exhaust Pipe-To-Manifold Nut .....	22 (30)
Exhaust Pipe-To-Support Bracket Bolt .....	18 (25)
Flywheel or Pressure	
Plate-To-Crankshaft .....	22 (30) 1/4 Turn
Front Exhaust Pipe-To-Manifold Bolt .....	30 (40)
G-Charger Pulley Bolt .....	18 (25)
G-Charger-To-Block .....	25 (35)
Intake Manifold .....	18 (25)
Intermediate Shaft Sprocket Bolt .....	60 (80)
Knock Sensor .....	15-18 (20-25)
Lower Pulley Bolt .....	15 (20)
Oil Pan Bolt .....	15 (20)
Oil Pan Drain Plug .....	22 (30)
Oil Pump Cover Bolt	
Short .....	7 (10)
Long .....	15 (20)
Rod Bearing Cap Nut .....	22 (30) 1/4 Turn
Starter Mount Bolt .....	18 (25)
Timing Belt Tensioner Nut .....	33 (45)
Torque Converter-To-Carrier Plate Bolt .....	22 (30)
Water Pump Pulley Bolt .....	15 (20)
Water Pump Housing-To-Engine Bolt .....	15 (20)

INCH Lbs. (N.m)

Piston Oil Jet Nozzle .....	84 (10)
Transaxle/Engine Cover Plate Bolt .....	84 (10)
Valve Cover Retaining Nut .....	84 (10)
Water Pump-To-Housing .....	84 (10)

(1) - See Fig. 2.

# 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

## Article Text (p. 21)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:38PM

AA

### ENGINE SPECIFICATIONS

#### GENERAL ENGINE SPECIFICATIONS

#### GENERAL SPECIFICATIONS TABLE

AA

Application	Specification
-------------	---------------

#### 1. 8L

Displacement	109 Cu. In. (1.8L)
--------------	--------------------

Bore	3.19" (81.0 mm)
------	-----------------

Stroke	3.40" (86.4 mm)
--------	-----------------

#### Compression Ratio

Cabriolet	8.5:1
-----------	-------

Corrado	8.0:1
---------	-------

Fox	9.0:1
-----	-------

Golf, GTI & Jetta	10.0:1
-------------------	--------

#### Fuel System

Cabriolet	Digifant
-----------	----------

Corrado	CIS-E
---------	-------

#### Fox

California	Digifant I
------------	------------

Federal	Digifant II
---------	-------------

Golf, GTI & Jetta	Digifant
-------------------	----------

#### Horsepower @ RPM

Cabriolet	90 @ 5500
-----------	-----------

Corrado	158 @ 5600
---------	------------

Fox	81 @ 5500
-----	-----------

#### Golf, GTI & Jetta

Engine Code PF	105 @ 5400
----------------	------------

Engine Code RV	100 @ 5400
----------------	------------

#### Torque Ft. Lbs @ RPM

Cabriolet	102 @ 3000
-----------	------------

Corrado	166 @ 4000
---------	------------

Fox	93 @ 3250
-----	-----------

#### Golf, GTI & Jetta

Engine Code PF	114 @ 3800
----------------	------------

Engine Code RV	109 @ 3800
----------------	------------

#### 2. 0L

Displacement	121 Cu. In. (2.0L)
--------------	--------------------

Bore	3.25" (82.5 mm)
------	-----------------

Stroke	3.65" (92.8 mm)
--------	-----------------

Compression Ratio	10.0:1
-------------------	--------

Fuel System	CIS-E
-------------	-------

Horsepower @ RPM	134 @ 5800
------------------	------------

Torque Ft. Lbs @ RPM	133 @ 4400
----------------------	------------

AA

#### CRANKSHAFT, MAIN & CONNECTING

#### ROD BEARINGS SPECIFICATIONS

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 22)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:38PM

#### CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS TABLE

AA

Application In. (mm)

##### Crankshaft

###### End Play

Standard ..... .003-.008 (.07-.17)

Service Limit ..... .010 (.25)

Runout ..... .001 (.03)

##### Main Bearings

Journal Diameter ..... 2.124-2.125 (53.96-53.98)

Journal Out-Of-Round ..... .001 (.03)

Journal Taper ..... .001 (.03)

###### Oil Clearance

Standard ..... .001-.003 (.03-.08)

Service Limit ..... .007 (.17)

##### Connecting Rod Bearings

Journal Diameter ..... 1.880-1.881 (47.76-47.78)

Journal Out-Of-Round ..... .001 (.03)

Journal Taper ..... .001 (.03)

###### Oil Clearance

Except Passat ..... .002-.004 (.05-.10)

Passat ..... .0004-.002 (.01-.06)

AA

#### CONNECTING RODS SPECIFICATIONS

#### CONNECTING RODS TABLE

AA

Application In. (mm)

##### Bore Diameter

Pin Bore ..... .787 (20.00)

Crankpin Bore ..... 1.992 (50.60)

Center-To-Center Length ..... 5.669 (144.00)

##### Side Play

Except Passat ..... .014 (.37)

Passat ..... .002-.012 (.05-.13)

AA

#### PISTONS, PINS & RINGS SPECIFICATIONS

#### PISTONS, PINS & RINGS TABLE

AA

Application In. (mm)

##### Pistons

Clearance ..... .0016 (.040)

###### Diameter

1.8L ..... 3.187 (80.96)

2.0L ..... 3.245-3.247 (82.44-82.48)

# 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

## Article Text (p. 23)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:38PM

### Pins

Diameter	.787 (20.00)
Piston Fit	Interference
Rod Fit	Interference

### Rings

#### No. 1

##### End Gap

Standard .012-.018 (.30-.45)

Service Limit .040 (1.0)

##### Side Clearance

Standard .001-.002 (.02-.05)

Service Limit .006 (.15)

#### No. 2

##### End Gap

Standard .012-.018 (.30-.45)

Service Limit .040 (1.0)

Side Clearance .001-.002 (.02-.05)

#### No. 3 (Oil)

##### End Gap

Standard .010-.018 (.25-.45)

Service Limit .040 (1.0)

Side Clearance .001-.002 (.02-.05)

AA

## CYLINDER BLOCK SPECIFICATIONS

### CYLINDER BLOCK TABLE

AA

Application	In. (mm)
-------------	----------

### Cylinder Bore

#### Standard Diameter

1.8L 3.189 (81.01)

2.0L 3.248 (82.51)

Maximum Taper .0016 (.04)

Maximum Out-of-Round .001 (.03)

AA

## VALVES & VALVE SPRINGS SPECIFICATIONS

### VALVES & VALVE SPRINGS TABLE

AA

Application	Specification
-------------	---------------

#### 1.8L

##### Intake Valves

Face Angle 45°

Head Diameter 1.496" (38.00 mm)

##### Length

Except Corrado 3.58" (91.0 mm)

Corrado 3.60" (91.4 mm)

Minimum Margin (1)

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 24)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:38PM

Stem Diameter	.314" (7.97 mm)
Exhaust Valves	
Face Angle	45°
Head Diameter	1.300" (33.00 mm)
Length	
Cabriolet & Fox	3.57" (90.8 mm)
Corrado	3.60" (91.4 mm)
Minimum Margin	(2)
Stem Diameter	.313" (7.95 mm)

#### 2.0L

Intake Valves	
Face Angle	45°
Head Diameter	1.25" (32.0 mm)
Length	3.76" (95.5 mm)
Minimum Margin	(2)
Stem Diameter	.274" (6.97 mm)
Exhaust Valves	
Face Angle	45°
Head Diameter	1.10" (28.0 mm)
Length	3.87" (98.2 mm)
Minimum Margin	(2)
Stem Diameter	.273" (7.95 mm)

(1) - No information is available from manufacturer.

(2) - DO NOT machine valve; hand lap only.

AA

### CYLINDER HEAD SPECIFICATIONS

#### CYLINDER HEAD TABLE

AA

Application Specification

#### Cylinder Head Height

1.8L (Minimum)	5.22" (132.60 mm)
2.0L (Minimum)	4.65" (118.10 mm)
Maximum Warpage	.004" (1.00 mm)

#### Valve Seats

##### Intake Valve

Seat Angle	45°
Seat Width	
1.8L	.078" (2.00 mm)
2.0L	.060-.070" (1.50-1.80 mm)

##### Exhaust Valve

Seat Angle	45°
Seat Width	
Except Fox	.070-.078" (1.80-2.00 mm)
Fox	.094" (2.40 mm)

#### Valve Guides

##### Intake Valve

Valve Guide Installed Height	(1)
Oil Clearance	(2) .039" (1.0 mm)

## 1.8L 4-CYL 8-VALVE & 2.0L 4-CYL 16-VALVE

### Article Text (p. 25)

1991 Volkswagen Passat

For Volkswagen Technical Site

Copyright © 1998 Mitchell Repair Information Company, LLC

Wednesday, August 25, 1999 07:38PM

#### Exhaust Valve

Valve Guide Installed Height ..... (1)

Valve Stem-to-Guide

Oil Clearance ..... (2) .051" (1.3 mm)

(1) - Valve guide shoulder flush with cylinder head.

(2) - New valve installed in cylinder head. Dial  
indicator used to measure valve rock in guide.

AA

#### CAMSHAFT SPECIFICATIONS

##### CAMSHAFT TABLE

AA

Application ..... In. (mm)

End Play ..... .006 (.15)

Oil Clearance ..... .004 (.01) Maximum

AA

END OF ARTICLE