

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

Article Text

1990 Volkswagen Corrado

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Thursday, March 23, 2000 09:40PM

ARTICLE BEGINNING

1989-90 VOLKSWAGEN ENGINES

1.8L 8-Valve & 1.8L 16-Valve 4-Cylinder

1989-90

Cabriolet, Fox, Golf, GTI, Jetta, Jetta GLI

1990

Corrado

* 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. See Fig. 1. The first 2 characters designate engine code.

ENGINE IDENTIFICATION CODES TABLE

AA

Application	Engine Code
-------------	-------------

1.8L 8-Valve 4-Cylinder

Cabriolet	JH
-----------------	----

Fox	UM
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Golf, Golf GT & Jetta	(1) GX, RV or PF
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1.8L 16-Valve 4-Cylinder

GTI & Jetta GLI	PL
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(1) - Code GX is a 1.8L with 85 HP. Code RV is a 1.8L with 100 HP. Code PF is a 1.8L with 105 HP.

AA

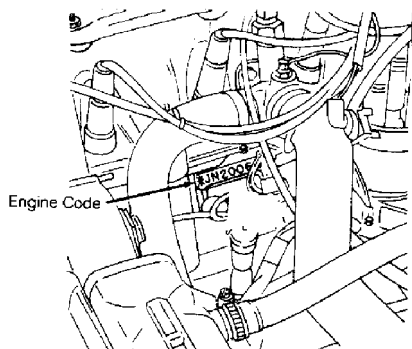


Fig. 1: Engine Identification Number Location
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NOTE: Match mark engine mounts to ensure original alignment is achieved after installation. On vehicles with A/C and power steering, remove components with hoses attached and secure out of way.

ENGINE R & I (EXCEPT FOX)

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 and Jetta models, leave A/C hoses attached and remove A/C compressor. Pivot A/C condenser and compressor to side of vehicle and secure.

3) On Cabriolet and Scirocco models, 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 flange. Mark and remove all cooling system hoses (as necessary).

5) On Golf, GTI and Jetta models, 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 AXLES section. Mark and disconnect shift linkage and speedometer cable. Mark and remove electrical connectors and vacuum hoses (as necessary). Disconnect throttle, cruise and kickdown cables (if equipped). Leave fuel lines connected and remove cold start injector and warm-up regulator.

7) Remove fuel injectors and install protective caps and plugs. Remove rear engine mount. Remove complete transaxle mount. On Cabriolet models, 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 (if necessary).

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.

2) Lightly rock engine and transaxle to allow position to

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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 specifications.

ENGINE R & I (FOX)

REMOVAL (FOX)

1) Disconnect negative battery cable. Open heater valve, coolant expansion tank and drain radiator through lower radiator hose. Mark and disconnect all heater hoses. Disconnect electric cooling fan and thermo switch. Remove lower and side radiator mounting bolts. Remove fan, shroud and radiator. Remove M/T clutch cable (if equipped).

2) Mark and disconnect electrical wiring and vacuum hoses (as necessary). Disconnect throttle, cruise and kickdown linkage (if equipped). Remove fuel injectors and install protective caps and plugs. Leave fuel lines attached and remove cold start valve. Remove charcoal canister and set aside.

3) Remove 3 upper engine-to-transaxle bolts. Remove intake air duct. Remove left and right engine mount nuts. Disconnect and remove starter assembly. 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 MoS2 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 with engine running at idle.

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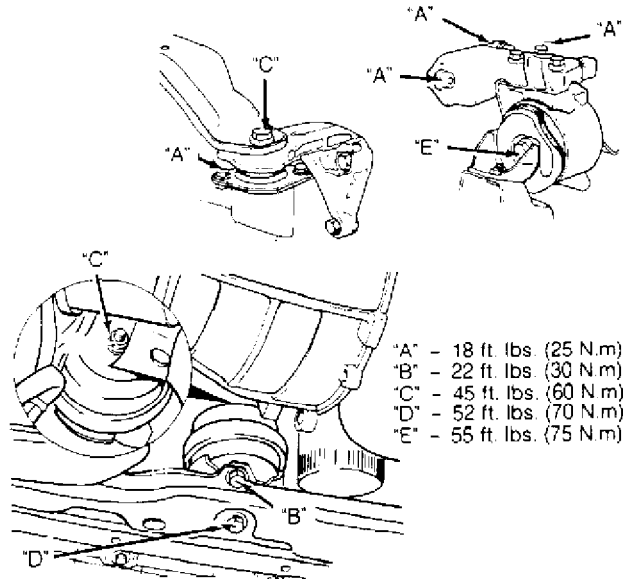


Fig. 2: Engine/Transaxle Alignment
Courtesy of Volkswagen United States, Inc.

INTAKE MANIFOLD R & I

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

EXHAUST MANIFOLD R & I

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

CYLINDER HEAD R & I

REMOVAL

No removal procedure available from manufacturer. Cylinder head may be removed with engine in vehicle. Match mark all components for installation reference. Timing belt must be removed. See TIMING BELT R & I in this article. See Fig. 3 or 4. Remove cylinder head bolts in reverse sequence of installation. See Fig. 5. Replace cylinder head bolts after loosening or removing.

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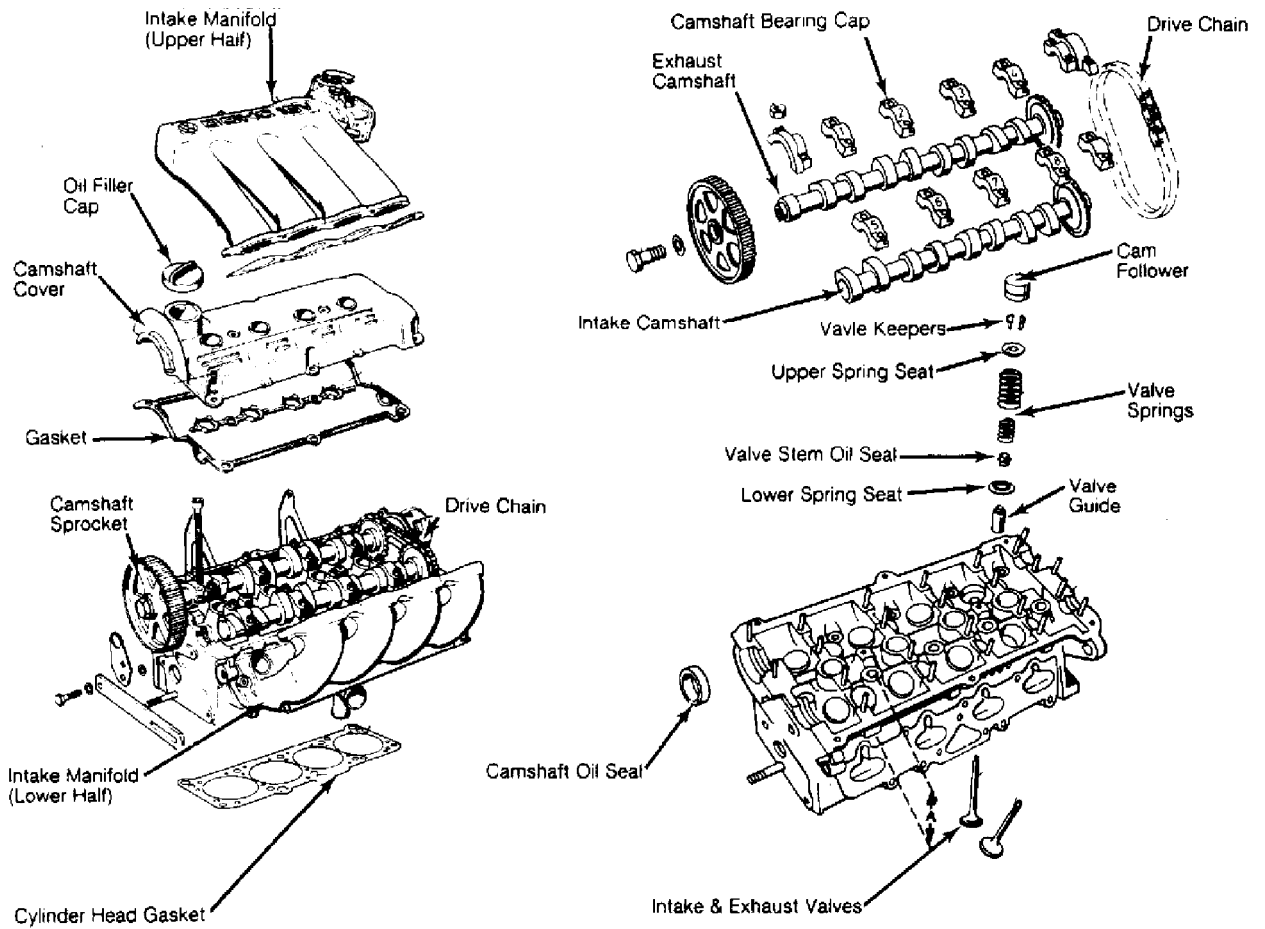


Fig. 3: Exploded View of 16-Valve Cylinder Head
Courtesy of Volkswagen United States, Inc.

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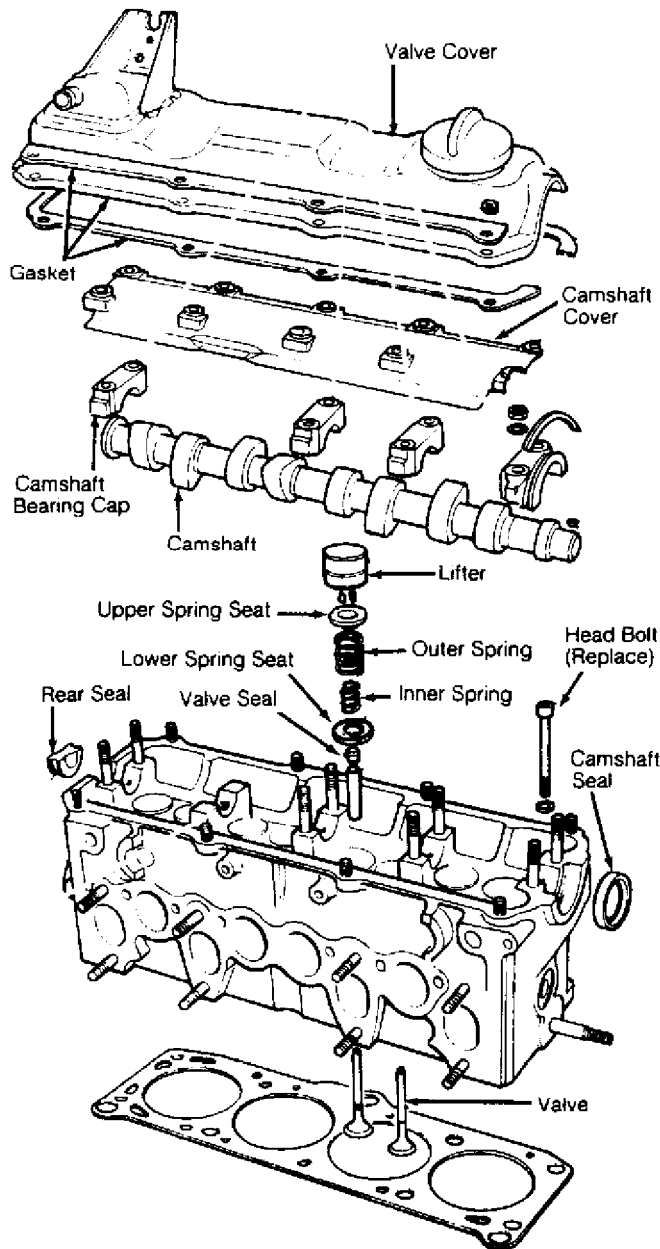


Fig. 4: Exploded View of 8-Valve Cylinder Head
Courtesy of Volkswagen United States, Inc.

INSPECTION

Thoroughly clean all gasket mating surfaces. Check cylinder head for warpage. The 8-valve cylinder head can be machined and 16-valve cylinder head cannot be machined. Check camshaft(s). See INSPECTION under CAMSHAFT R & I in this article. See ENGINE SPECIFICATIONS at end of this article.

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

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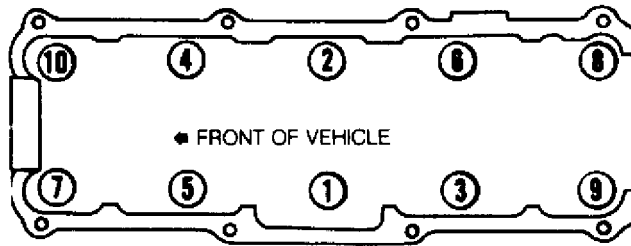
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INSTALLATION

1) Ensure marking on cylinder head gasket is properly positioned and install gasket on cylinder block. Do not use any type of sealant. Carefully position cylinder head on cylinder. Install head bolt Nos. 9 and 10 hand tight to ensure cylinder head position. Install remaining head bolts hand tight.

2) Tighten cylinder head bolts in sequence to specifications. See Fig. 5. See TORQUE SPECIFICATIONS table at end of this article. No further information is available from manufacturer.



REMOVE IN REVERSE ORDER

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

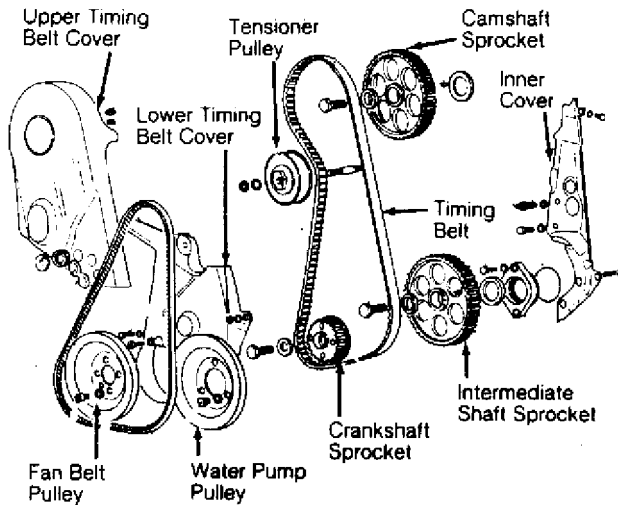


Fig. 6: Exploded View of Timing Belt Components
Courtesy of Volkswagen United States, Inc.

TIMING BELT R & I

REMOVAL

Information not available from manufacturer. Use exploded view for component locations. See Fig. 6. Match mark all components to ensure reassembly to original position.

INSTALLATION (8-VALVE)

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

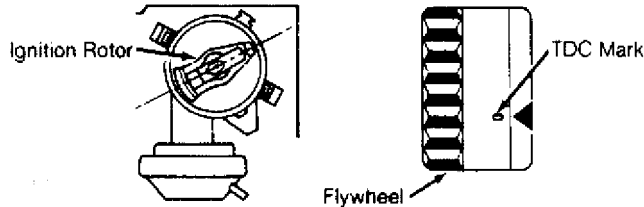


Fig. 7: Aligning Ignition Rotor
Courtesy of Volkswagen United States, Inc.

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.

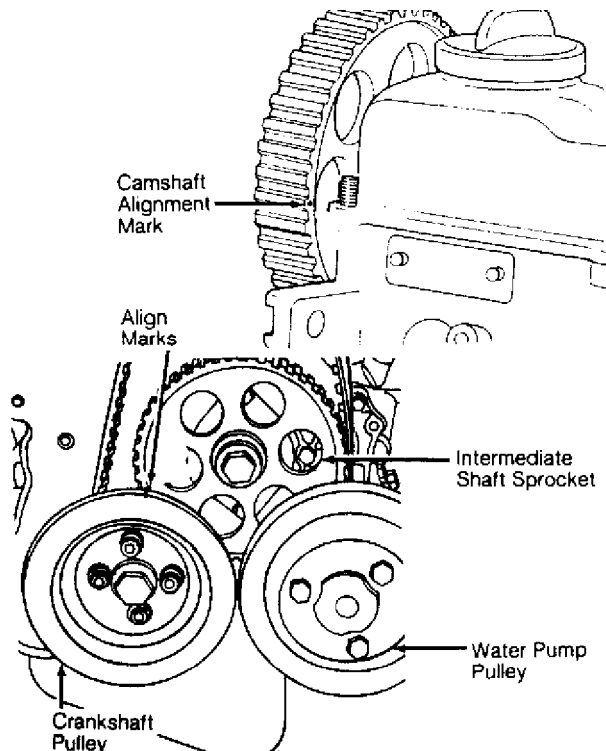


Fig. 8: 8-Valve Timing Mark Alignment
Courtesy of Volkswagen United States, Inc.

3) Rotate tensioner clockwise to tighten belt and install lock nut. Proper tension is achieved when belt can be twisted 90 degrees. See Fig. 9. Rotate crankshaft 2 revolutions and check timing mark alignment. To complete installation, reverse removal procedure.

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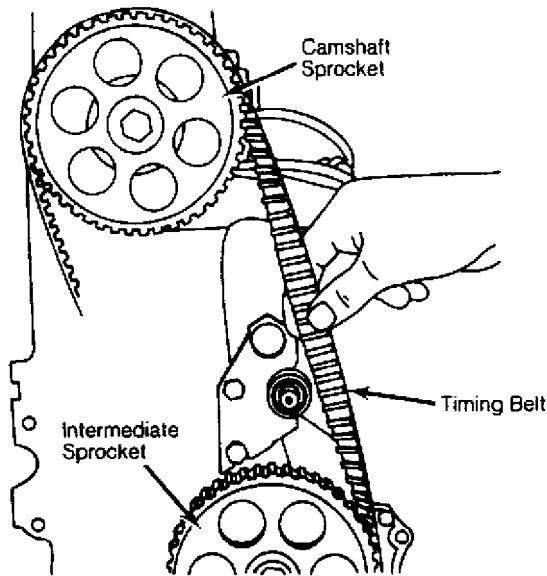


Fig. 9: Proper Timing Belt Tension
Courtesy of Volkswagen United States, Inc.

INSTALLATION (16-VALVE)

1) Install timing belt around crankshaft and intermediate shaft sprockets. Install lower timing belt cover. Install vibration damper, noting offset holes. 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 Fig. 10.

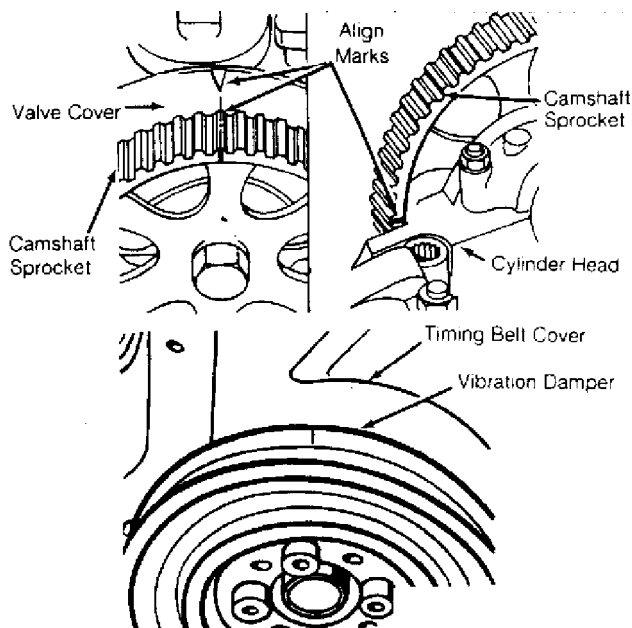


Fig. 10: 16-Valve Timing Mark Alignment
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2) Align crankshaft sprocket mark with mark on lower timing belt cover. See Fig. 10. Install timing belt around camshaft sprocket. Rotate tensioner clockwise until Timing Belt Tension Scale (VW 210) reads 13-14. Rotate crankshaft 2 revolutions and check timing mark alignment. To complete installation, reverse removal procedure.

CAMSHAFT OIL SEAL R & I

REMOVAL

1) Remove upper timing belt cover. Place crankshaft at TDC with No. one 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. 11. 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

Coat new seal seat and lips lightly with engine oil. Using Installer (10-203), install seal until flush. On 16-valve engines, use Special Hex Head Bolt (10-203/1). To complete installation, reverse removal procedure.

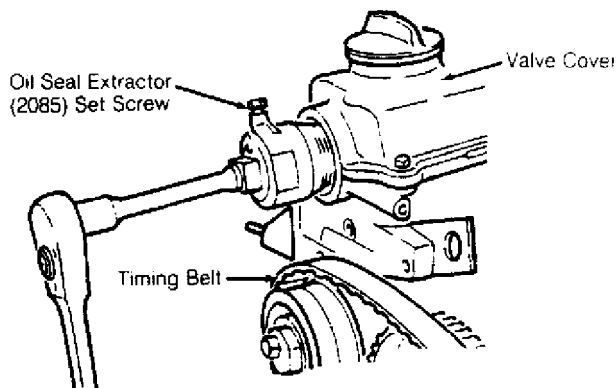


Fig. 11: Removing Camshaft Oil Seal
Courtesy of Volkswagen United States, Inc.

CAMSHAFT R & I (8-VALVE)

CAUTION: Mark components to ensure installation to original location and position. Components are not interchangeable.

REMOVAL (8-VALVE)

1) Remove upper timing belt cover. See Fig. 6. Remove valve cover. Place crankshaft at TDC with No. one cylinder on compression

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stroke. Remove timing belt from camshaft sprocket. Remove camshaft sprocket. Remove Woodruff key. Check camshaft end play with cam followers removed and bearing cap Nos. 1 and 5 installed. See CAMSHAFT table at end of this article.

2) Remove bearing cap Nos. 1, 3 and 5 evenly a little at a time. Repeat for remaining caps. Lift camshaft out of cylinder head. See INSPECTION below.

INSPECTION

1) Check camshaft bearing oil clearance. See ENGINE SPECIFICATIONS at end of this article. If oil clearance is greater than specifications, install new camshaft and recheck clearance.

2) If clearance is still greater than specifications, replace cylinder head. If replacing camshaft(s), ensure identification number between lobes of cylinder No. one, are the same.

INSTALLATION (8-VALVE)

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. one cylinder facing upward. Install bearing cap Nos. 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. Allow lifters to bleed down for 30 minutes before starting engine.

CAMSHAFT R & I (16-VALVE)

REMOVAL (16-VALVE)

1) Remove upper timing belt cover. See Fig. 6. Remove valve cover. Place crankshaft at TDC with No. one 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 cap Nos. 1 and 4 (exhaust cam) or 5 and 8 (intake cam) installed. See CAMSHAFT SPECIFICATIONS table at the end of this article.

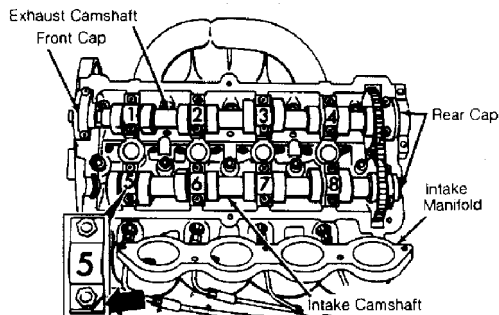


Fig. 12: 16-Valve Camshaft Bearing Caps
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2) Remove intake camshaft bearing cap Nos. 5, 7 and rear evenly a little at a time. See Fig. 12. Loosen remaining intake camshaft bearing caps evenly a little at a time. Remove exhaust camshaft bearing cap Nos. 1, 3, front and rear evenly a little at a time. Loosen remaining exhaust camshaft bearing caps evenly a little at a time. Remove loosened caps. Lift camshafts out of cylinder head together.

INSPECTION

1) Check camshaft bearing oil clearance. See ENGINE SPECIFICATIONS at end of this article. If oil clearance is greater than specifications, install new camshaft and recheck clearance.

2) If clearance is still greater than specifications, replace cylinder head. If replacing camshaft(s), ensure identification number between lobes of cylinder No. one, are the same.

INSTALLATION (16-VALVE)

1) On engines with oil spray jets, position spray at right angle to camshaft. Place chain on both camshaft gears. Align marks on gears and place both camshafts in cylinder head as shown. See Fig. 13.

2) Install intake camshaft bearing cap Nos. 6 and 8 and tighten evenly a little at a time. See Fig. 12. Repeat procedure for remaining intake camshaft bearing caps. Install exhaust bearing cap Nos. 2 and 4 and tighten evenly a little at a time. Repeat procedure for remaining exhaust bearing caps. To complete installation, reverse removal procedure. Allow 30 minutes before starting engine for lifters to bleed down.

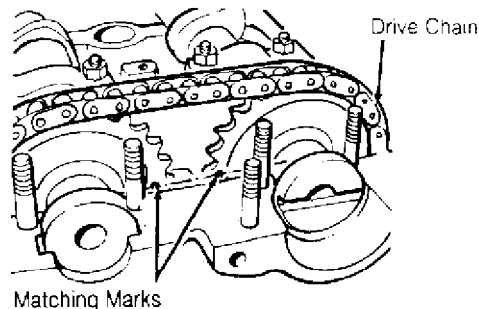


Fig. 13: 16-Valve Camshaft Gear Position
Courtesy of Volkswagen United States, Inc.

VALVE ARRANGEMENT

8-Valve Engines

E-I-E-I-I-E-I-E (Front-to-Rear).

16-Valve Engines

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Right Side - Exhaust Valves.

Left Side - Intake Valves.

NOTE: "Right" and "Left" refer to right and left side of engine NOT vehicle.

VALVE SEALS & SPRINGS R & I

Valve seals and springs may be removed with cylinder head installed in vehicle. Remove camshaft as previously described. Mark and remove lifters. Use compressed air to hold valves closed. Installation Bar (2036), Spring Compressor (VW 541/1) and Valve Seal Replacer/Sleeve (10-204/A) are necessary tools for replacing. DO NOT install valve seal without using sleeve.

VALVE GUIDE R & I

If valve-to-guide clearance is not within specifications, replace guide(s). See ENGINE SPECIFICATIONS tables at end of this article. To replace valve guide, press guide out from combustion chamber side. Press guide in cold cylinder head as far as guide will go. DO NOT exceed one ton pressure. Ream guides by hand to achieve proper valve-to-guide clearance.

VALVE SEATS

1) Check valve seats prior to any other cylinder head service. If valve seats are less than specifications, cylinder head must be replaced. Insert the valve and hold firmly against the valve seat. Measure distance of valve stem tip to valve cover mounting surface. See Fig. 14.

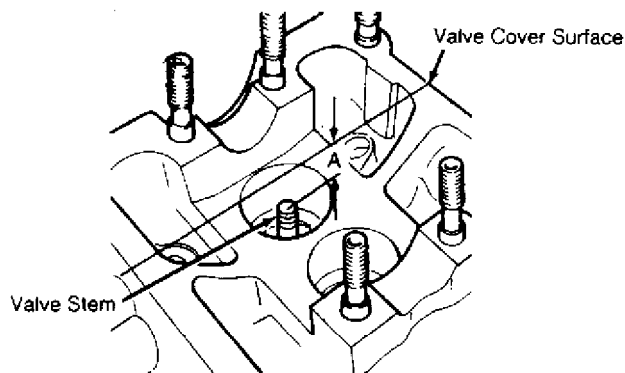


Fig. 14: Measuring For Refacing Dimension
Courtesy of Volkswagen United States, Inc.

2) Subtract measured distance from minimum specifications. See MINIMUM VALVE-TO-CYLINDER HEAD DIMENSION following this paragraph. The total is maximum refacing allowable for both valve and seat. If more is required, replace cylinder head assembly or machine valve stem

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(Cabriolet only). If less than minimum dimension is used, valve lifters will not function.

MINIMUM VALVE-TO-CYLINDER HEAD DIMENSION

AA

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

8-Valve

Intake Valve 1.330 (33.78)
--------------	---------------------

Exhaust Valve 1.342 (34.09)
---------------	---------------------

16-Valve

Intake Valve 1.354 (34.39)
--------------	---------------------

Exhaust Valve 1.366 (34.70)
---------------	---------------------

AA

VALVES

1) With valves removed, measure dimension of valves. If not within specifications, replace valves. DO NOT reface exhaust valves with machine. Lap valves by hand or replace as necessary. See ENGINE SPECIFICATIONS at end of this article.

CAUTION: On 16-valve engines, exhaust valves are sodium filled. Use following procedure to dispose of valves properly.

2) To dispose of sodium filled valves, cut valve stem off near head of valve with hacksaw. DO NOT allow water to contact valve during cutting. Throw valve stem in bucket of water and move quickly away. Once reaction with water has ceased, discard valve. Repeat procedure as necessary.

VALVE CLEARANCE ADJUSTMENT

NOTE: Cylinder heads without shims between camshaft(s) and lifters are not adjustable. See LIFTERS under VALVES in this article.

1) After any cylinder head repair, check and adjust valves with engine cold. After 1000 miles (after repair) or at normal service interval, adjust with engine warm. Shims are available in different thicknesses. Etched side of shim must be installed away from camshaft.

2) Position camshaft lobes of cylinder to be check with high points facing upward (valves closed). Measure clearance. See VALVE ADJUSTMENT SPECIFICATIONS table in this article. If clearance cannot be achieved with thinnest shim, shorter valves may be installed. If clearance is greater than specifications, use appropriate shim to acquire proper clearance.

3) To remove shim, rotate lifter (follower) so grooves face inward towards each other (one cylinder at a time). Using Lifter Compressor (2078) and Pliers (10-208), remove shim. To install, reverse removal procedure.

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VALVE ADJUSTMENT SPECIFICATIONS TABLE

AA

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

Cold

Intake006-.010 (.15-.25)
--------------	---------------------

Exhaust014-.018 (.35-.45)
---------------	---------------------

Warm

Intake008-.012 (.20-.30)
--------------	---------------------

Exhaust016-.020 (.40-.50)
---------------	---------------------

AA

LIFTERS

1) If equipped with hydraulic lifters, no adjustment is possible. If lifter noise is present, start engine and allow to warm until cooling fan engages. Increase engine speed to 2500 RPM for 2 minutes. If lifter noise is intermittent or continues, replace necessary lifters.

2) To determine weak or noisy lifter, position camshaft so No. 1 cylinder lobes high point faces upward. Using a piece of wood, push down on lifter. If lifter can be pushed down more than .004" (.10 mm), replace lifter. Repeat procedure for remaining lifters (as necessary).

PISTON & ROD ASSEMBLY

Ensure 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. 15. Pistons and rods are to be replaced in sets of 4. Rod cap bolts and nuts must be replaced after removing or loosening.

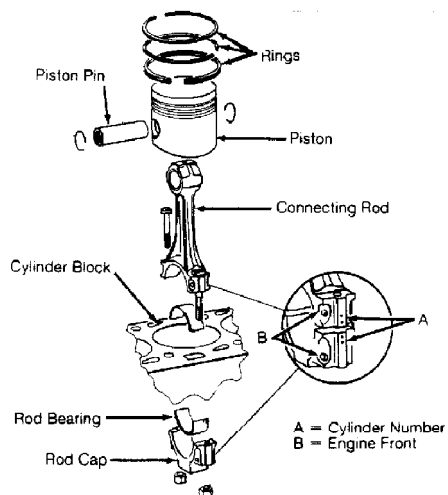


Fig. 15: Piston, Rod & Rings
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FITTING PISTONS & RINGS

1) DO NOT measure clearances with cylinder block mounted on an engine stand. Check clearance of piston-to-cylinder bore. Piston diameter is stamped on top of piston in millimeters. Arrow on top of piston faces front of engine.

PISTON-TO-CYLINDER BORE DIMENSIONS

AA					
Size		Piston Diameter In. (mm)		Cylinder Bore In. (mm)	
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)
AA					

2) Measure ring end gap. Measure ring side clearance with piston. If not within specifications, replace as necessary. See ENGINE SPECIFICATIONS at end of this 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 as shown. See Fig. 15.

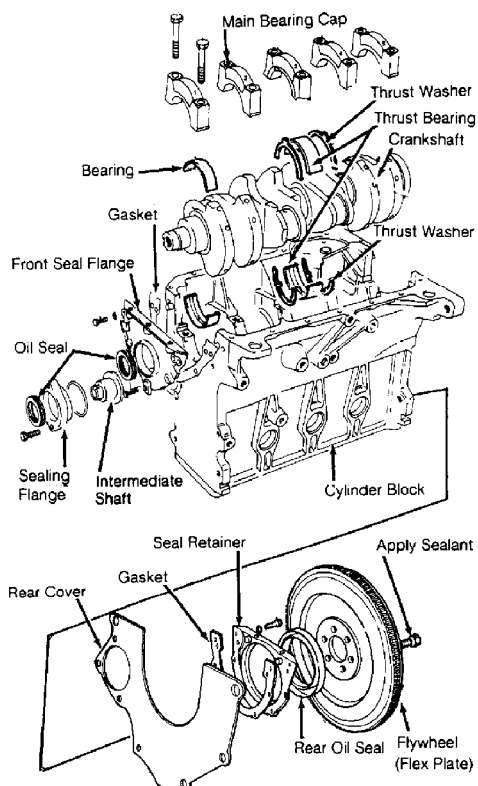


Fig. 16: Exploded View of Crankshaft Assembly
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PISTON PIN REPLACEMENT R & I

Ensure piston and rod are properly marked. Remove both circlips from pin bore groove. Use Piston Pin Replacer (VW 207C) to remove and install the piston pin. If pin is too tight, heat piston to 140°F (60°C). To install, reverse removal procedure. Ensure rod is properly positioned with piston. See Fig. 15.

CRANKSHAFT R & I

1) Using flywheel Holder (10-201), remove flywheel bolts. Remove flywheel. Remove front and rear oil seals and covers. Remove connecting rod bearing caps.

2) Measure crankshaft end play. See CRANKSHAFT END PLAY CHECK in this article. Remove main bearing cap bolts. Remove main bearing caps. Remove crankshaft. To install, reverse removal procedure.

MAIN BEARING INSTALLATION

Main bearing caps are marked with matching journal and must be installed to original position. See Fig. 16. Thrust bearing is located at No. 3 main bearing cap. Use Plastigage method to check clearance. Machine or replace as necessary. See ENGINE SPECIFICATIONS at end of this article. Tighten evenly to specifications in several steps.

CONNECTING ROD BEARING INSTALLATION

Ensure rod caps are marked to ensure installation to original position and location. Use Plastigage to measure bearing clearances. Measure connecting rod side play. Replace or machine as necessary. See ENGINE SPECIFICATIONS at end of this article. Tighten evenly to specifications in several steps.

CRANKSHAFT END PLAY CHECK

Insert feeler gauge between No. 3 main bearing and crankshaft thrust face to measure end play. See Fig. 16. Replace thrust bearing as necessary. See ENGINE SPECIFICATIONS at end of this article. Original thrust bearing uses plain shell with 4 separate washers and replacements have attached collar.

REAR MAIN BEARING OIL SEAL R & I

Remove flywheel/flex plate and discard retaining bolts. Oil seal may be removed without removing retaining flange by prying seal out. Remove retaining flange if gasket is leaking. See Fig. 16. If installing without removing retaining flange, use Centering Tool (2003/2A) to center seal and Installer (2003/1) to install seal.

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

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Install new flywheel bolts.

FRONT COVER OIL SEAL R & I

REMOVAL

Remove timing belt. See REMOVAL under TIMING BELT R & I in this article. Rotate inner part of Oil Seal Extractor (2085) outward 2 turns and tighten set screw. See Fig. 11. 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.

INTERMEDIATE SHAFT ASSEMBLY

Remove timing belt. See REMOVAL under TIMING BELT in this article. Mark distributor assembly for installation reference and remove distributor assembly. Check intermediate shaft end play. See INTERMEDIATE SHAFT END PLAY SPECIFICATION table following this paragraph. Remove intermediate shaft sprocket. Remove intermediate shaft seal flange. Replace seal (if necessary). To install, reverse removal procedure. See ENGINE SPECIFICATIONS at end of this article.

INTERMEDIATE SHAFT END PLAY SPECIFICATION

Application In. (mm)

1.8L .010 (.25)

CYLINDER BLOCK INSPECTION

DO NOT measure cylinder block while mounted on an engine stand. Inaccurate measurements may be achieved. Check cylinder bore for wear, out-of-round and taper. Pistons are available in oversize. Cylinder block bore may be machined. Check cylinder block for warpage. See ENGINE SPECIFICATIONS at end of this article.

ENGINE OILING SYSTEM SPECIFICATIONS

CRANKCASE CAPACITY

CRANKCASE CAPACITY TABLE

With Filter Without Filter

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

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Model	Replacement	Replacement
Fox	3.7 Qts. (3.5L)	3.2 Qts. (3.0L)
All Others	4.3 Qts. (4.1L)	4.7 Qts. (4.5L)
AA		

OIL PRESSURE

Minimum oil pressure at idle is 4.3 psi (.3 kg/cm²). Oil pressure at 2000 RPM is 29 psi (2.0 kg/cm²).

OIL PAN REMOVAL

REMOVAL

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

OIL PUMP R & I

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 specifications, replace oil pump assembly. See OIL PUMP SPECIFICATIONS table in this article.

OIL PUMP SPECIFICATIONS

AA

Application	In. (mm)
Backlash	
New002 (.05)
Limit008 (.20)
Axial Play Limit006 (.15)
AA	

ENGINE COOLING SYSTEM

CAUTION: Coolant/water mixture should be used at all times. Only ethylene glycol based (phosphate-free) antifreeze may be used, as it protects aluminum/iron engines from corrosion.

BELT TENSION

Belt deflection with 22 lbs. (10 kg) pressure applied at midpoint of longest belt run should be 3/8-9/16" (10-15mm).

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

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PRESSURE CAP

Pressure cap rating is 17-21 psi (1.2-1.5 kg/cm²).

COOLANT CAPACITY

AA

Application	Qts. (L)
-------------	----------

Cabriolet	5.1 (4.8)
-----------------	-----------

Fox	6.9 (6.5)
-----------	-----------

Golf & Golf GT	7.3 (7.0)
----------------------	-----------

Jetta	6.8 (6.5)
-------------	-----------

AA

THERMOSTAT RATING

All engines use a 185°F (94°C) rated thermostat.

WATER PUMP R & I

1) Disconnect negative battery cable. Turn heater control to hot. Drain cooling system by disconnecting lower radiator hose at thermostat housing. Remove accessories and brackets (as necessary).

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

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

AA

Application	Ft. Lbs. (N.m)
-------------	----------------

Camshaft Bearing Cap Nut

8-Valve	15 (20)
---------------	---------

16-Valve	11 (15)
----------------	---------

Camshaft Sprocket Bolt

8-Valve	59 (80)
---------------	---------

16-Valve	48 (65)
----------------	---------

Connecting Rod Cap Nut

1st Step	22 (30)
----------------	---------

2nd Step	Tighten Additional 90 Degrees
----------------	-------------------------------

Crankshaft Pulley Nut	15 (20)
-----------------------------	---------

Crankshaft Sprocket Bolt

8-Valve	(1) 66 (89)
---------------	-------------

16-Valve	148 (200)
----------------	-----------

Cylinder Head Bolt (2)

Step 1	29 (39)
--------------	---------

Step 2	44 (60)
--------------	---------

Step 3	(3)
--------------	-----

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

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Engine Mounts (4)		
A Bolt/Nut	18 (24)
B Bolt	22 (30)
C Bolt	44 (60)
D Bolt	53 (72)
E Bolt	59 (80)
Engine-to-Transaxle Bolt		
M10	.....	33 (45)
M12	.....	55 (75)
Exhaust Manifold Nut	.....	18 (24)
Flywheel-to-Crankshaft Bolt (5)	.....	74 (100)
Intake Manifold Bolt	.....	18 (24)
Intermediate Shaft Sprocket Bolt		
8-Valve	.....	59 (80)
16-Valve	.....	48 (65)
Main Bearing Cap Bolt (6)	.....	48 (65)
Oil Pan Bolt	.....	15 (20)
Oil Pump		
Short Bolt	.....	7 (10)
Long Bolt	.....	15 (20)
Power Steering Pump-to-Bracket Nut	.....	14 (19)
Timing Belt Tensioner Pulley Nut	.....	33 (45)
Water Pump Housing-to-Block	.....	15 (20)
Water Pump Pulley	.....	15 (20)

INCH Lbs. (N.m)

Piston Oil Spray		
Nozzle Bolt	.....	84 (10)
Thermostat Housing-to-Water		
Pump Housing	.....	84 (10)
Upper & Lower Timing Belt Cover Bolt	.....	53 (6)
Water Pump-to-Housing	.....	84 (10)

- (1) - Tighten an additional 180 degrees. Ensure a new bolt is used.
- (2) - Tighten in sequence. See Fig. 5.
- (3) - Turn bolts 180 degrees further in one continuous movement. Two separate 90 degree turns may be used.
- (4) - See Fig. 2.
- (5) - Apply sealant to threads and tighten evenly and diagonally.
- (6) - Tighten in several steps evenly.

AA

ENGINE SPECIFICATIONS

GENERAL ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS TABLE

AA

Application	Specifications
-------------	----------------

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

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Displacement

Cubic Inches	109
Liters	1.8L

Fuel System

Cabriolet	CIS Fuel Inj.
Fox	CIS-E Fuel Inj.
Golf & Jetta	Digifant II
Jetta GLI & GTI	CIS-E Fuel Inj.

HP @ RPM

Cabriolet	90 @ 5500
Fox	810 @ 5500
Golf & Jetta (1)	85 @ 5250
Jetta GLI & GTI	123 @ 5800

Torque Ft. @ RPM

Cabriolet	102 @ 3000
Fox	93 @ 3250
Golf & Jetta (2)	96 @ 3000
Jetta GLI & GTI	120 @ 4250

Compression Ratio

Cabriolet	8.5:1
Fox, Golf & Jetta	9.0:1
Jetta GLI & GTI	10.0:1

Bore 3.19 (81.0)

Stroke 3.40 (86.4)

(1) - Engine code GX listed. Engine code RV is 100 @ 5400.

Engine code PF is 105 @ 5400.

(2) - Engine code GX listed. Engine code RV is 109 @ 3800.

Engine code PF is 114 @ 3800.

AA

PISTONS, PINS & RINGS SPECIFICATIONS

PISTONS, PINS & RINGS SPECIFICATIONS TABLE

AA

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

1.8L

Piston

Clearance	.0016 (.040)
Diameter	3.188 (81.97)

Pins

Diameter	.787 (19.98)
Piston Fit	Interference
Rod Fit	Interference

Rings

Ring No. 1

End Gap (1)	.012-.018 (.30-.45)
Side Clearance (2)	.001-.002 (.02-.05)

Ring No. 2

End Gap	.012-.018 (.30-.45)
Side Clearance	.001-.002 (.02-.05)

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

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Oil Ring

End Gap010-.018 (.25-.45).

Side Clearance001-.002 (.02-.05)

(1) - Wear limit is .04" (1.0mm).

(2) - Wear limit is .006" (.15mm).

AA

CRANKSHAFT MAIN & CONNECTING

ROD BEARINGS SPECIFICATIONS

CRANKSHAFT MAIN & CONNECTING

ROD BEARINGS SPECIFICATIONS TABLE

AA

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

1.8L

Crankshaft

Crankshaft End Play (1)003-.007 (.07-.17)
-------------------------	---------------------------

Runout
--------	-------

Journal Taper
---------------	-------

Journal Out-Of-Round001 (.03)
----------------------	------------------

Main Bearings

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

Oil Clearance (2)001-.003 (.02-.07)
-------------------	---------------------------

Connecting Rod Bearings

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

Oil Clearance (3)0049 (.124)
-------------------	--------------------

(1) - Wear limit is .010" (.25mm).

(2) - Wear limit is .007" (.17mm).

(3) - Maximum allowable clearance.

AA

CONNECTING ROD SPECIFICATIONS

CONNECTING ROD SPECIFICATIONS TABLE

AA

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

1.8L

Side Play (1)015 (.38)
---------------	------------------

Maximum Bend & Twist
----------------------	-------

Pin Bore Diameter787 (19.98)
-------------------	--------------------

Large Bore Diameter 1.992 (50.59)
---------------------	---------------------

Center-to-Center Length 5.669 (143.99)
-------------------------	----------------------

(1) - Maximum allowable limit.

AA

CYLINDER HEAD SPECIFICATIONS

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

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CYLINDER HEAD SPECIFICATIONS TABLE

Application

In. (mm)

1.8L

Valve Seats

Maximum Cylinder Head Warp004 (.10)

Seat Angle 45°

Maximum Runout004 (.10)

Seat Width

Engine Code GX, RV, PF, JH, UM

Intake078 (1.98)

Exhaust094 (2.38)

Engine Code PL

Intake06-.07 (1.5-1.7)

Exhaust07 (1.7)

Seat Bore Diameter

Engine Code GX, RV, PF, UM

Intake 1.46 (37.0)

Exhaust 1.27 (32.3)

Engine Code JH

Intake 1.54 (39.1)

Exhaust 1.27 (32.2)

Engine Code PL

Intake 1.23 (31.2)

Exhaust 1.09 (27.7)

CYLINDER BLOCK SPECIFICATIONS

CYLINDER BLOCK SPECIFICATIONS TABLE

Application

In. (mm)

Cylinder Bore

Standard Diameter 3.189 (81.01)

Maximum Out-of-Round (1)0016 (.040)

(1) - Do not measure with engine mounted on an engine stand.

VALVES & VALVE SPRINGS SPECIFICATIONS

VALVES & VALVE SPRINGS SPECIFICATIONS TABLE

Application

In. (mm)

1.8L

Valves

Head Diameter

8-Valve Intake (1) 1.496 (37.99)

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

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8-Valve Exhaust	1.300 (33.02)
8-Valve Intake (2)	1.575 (40.00)
8-Valve Exhaust	1.229 (31.21)
16-Valve (3)	1.102 (27.99)
Stem Diameter	
8-Valve .....	.314 (7.97)
16-Valve .....	.273 (6.93)
Face Angle	45°
Maximum Refinish	
8-Valve Intake (4)	3.583 (91.00)
8-Valve Exhaust (4)	3.574 (90.77)
8-Valve Intake (4)	3.886 (98.70)
8-Valve Exhaust (4)	3.878 (98.50)
16-Valve (4)	3.866 (98.19)

- (1) - These specifications apply to engines with code UM.
- (2) - These specifications apply to engines with codes GX, JH, PF and RV.
- (3) - These specifications apply to engines with code PL. Specifications apply to both intake and exhaust valves.
- (4) - Specification is standard valve length.

AA

CAMSHAFT SPECIFICATIONS

CAMSHAFT SPECIFICATIONS TABLE

AA

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

Oil Clearance004 (.10)
---------------------	------------

End Play006 (.15)
----------------	------------

AA

END OF ARTICLE