

Volkswagen Engines

VANAGON 4-CYLINDER

ENGINE CODING

ENGINE IDENTIFICATION

Engine code number is stamped on crankcase below breather, near coil. First 2 digits of cast number are engine code.

ENGINE IDENTIFICATION

Application	Engine Code
Vanagon (1970 cc)	CV

ENGINE, MANIFOLD & CYLINDER HEAD

ENGINE

Removal

1) Disconnect battery. Remove air cleaner with air flow sensor and air intake duct. Remove rubber boot to heater booster. Disconnect electrical wiring from the following components: Alternator, distributor and oil pressure sending unit. Disconnect plug at control unit. Pull oil dipstick.

2) Disconnect vacuum hose from brake booster. Disconnect remaining vacuum hoses and electrical wiring leads running between engine and engine compartment. Remove nuts of upper engine mounting bolts and disconnect accelerator cable.

3) On automatic transaxle models, remove plug on top of transaxle housing, pull ATF dipstick and remove ATF filler tube grommet. Remove three 8 mm bolts of torque converter through hole on top of transaxle housing.

NOTE: To gain access to bolts of torque converter, engine must be rotated until each bolt appears in hole in top of transmission housing. Use adapter (3052) to turn engine crankshaft.

4) On all models, remove heater flap housing bolt. Clamp fuel line and detach. Also clamp fuel line from pressure regulator and detach. Disconnect wiring from starter. On manual transaxle models, loosen transaxle mount bolt at front of transaxle.

5) On automatic transaxle models, loosen accelerator cable at selector lever and detach. Loosen transaxle mount bolt at front of the transaxle. On all models, place a support (VW785/1) under the transaxle. Place a floor jack under engine. Raise the jack until the engine is just supported.

6) Remove nuts from lower engine mounting bolts. Remove bolts from engine carrier. Lower engine/transaxle assembly until transaxle rests on support (VW785/1). Slide engine assembly slightly to rear until it clears input shaft. Remove engine from transaxle and lower engine with floor jack.

Installation

1) To install, reverse removal procedure and note the following: Replace all self-locking nuts. On manual transaxle models, check clutch release bearing for wear, lubricate splines on main drive shaft, contact points of clutch release bearing and clutch release lever.

2) Adjust accelerator cable at full throttle position. On automatic transaxle models, adjust accelerator cable.

INTAKE MANIFOLD

Removal

1) Fuel injection manifold can be removed with engine in vehicle. Remove air cleaner, hoses, and pressure switch. Disconnect wires on fuel injectors and remove 2 screws. Pull injectors off with plate and retainer.

2) Make sure locating bushings are removed from manifold. Disconnect hoses on injectors and remove. Remove intake manifold cover plate. Remove nuts and washers securing manifold to cylinder head. Lift up on manifold and pull from tubes on air distributor.

Installation

To install manifold, reverse removal procedure. Use new gaskets and tighten intake manifold mounting nuts uniformly. Make sure Gray protective cap on injector is to rear and cap is to front.

CYLINDER HEAD

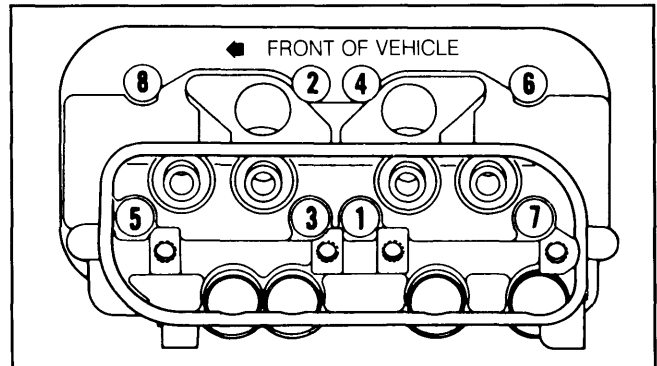
NOTE: Engine must be removed from vehicle and manifolds removed before removing cylinder heads. If cylinders are not to be removed, use retaining device to keep cylinders from pulling free.

Removal

1) Remove rocker arm cover and gasket. Remove rocker arm shaft retaining nuts, loosening gradually 1 at a time to relieve spring tension evenly. Remove rocker arm assemblies.

2) Remove push rods, keeping in order for reassembly. Loosen cylinder head nuts gradually working in sequence from outside toward center.

Fig. 1: Cylinder Head Bolt Tightening Sequence



Loosen in reverse order.

Installation

1) Place new metal gasket rings in outside edges of combustion chambers. Install head over cylinder studs. Tighten nuts lightly by hand and then to specifications in 2 steps following sequence in Fig. 1.

2) Install push rod through top of cylinder head with Black sealing ring at bottom and White ring at top. Install remaining components in reverse order of removal. Ensure push rod tube retaining wire bears against end of tubes. Engage slots in rocker arm supports before installing cylinder head cover.

VANAGON 4-CYLINDER (Cont.)

VALVES

VALVE ARRANGEMENT

E-I-I-E (Both banks, front-to-rear).

VALVE GUIDE SERVICING

1) Mount head in VA 4401A. Place new valve in guide with stem flush with end of guide. With dial indicator, measure valve rock at valve head. If rock exceeds .047" (1.20 mm), replace valve and/or guide. Guides must be removed by drilling out with shouldered drill to a depth of 1.575-1.968" (40.00-50.00 mm).

2) Drive out remaining part of guide. To install, coat new guide with engine oil and press in using US 4410. DO NOT use a hammer and drift to replace guides due to the danger of damage to the cylinder head. Ream to proper clearance after installation.

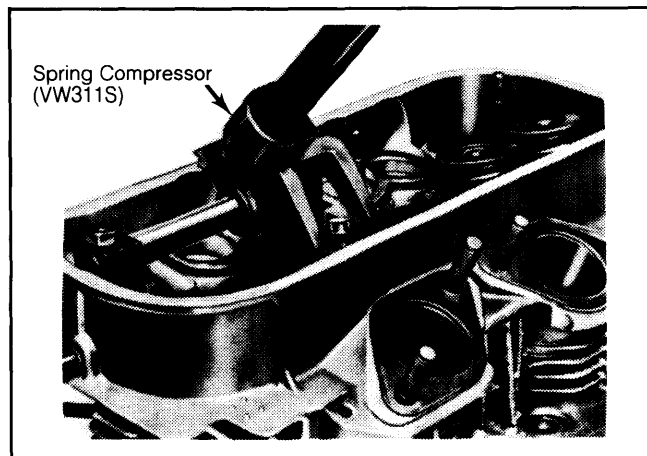
VALVE SPRINGS

NOTE: Valve spring may be removed with cylinder head installed. Apply a minimum of 85 psi (6.0 kg/cm²) air pressure to cylinder through spark plug hole to hold valve in place while compressing spring.

Removal

Remove cylinder head cover and rocker arm shaft. Install valve spring compressor tool (VW311s with cylinder head removed, VW653/2 with cylinder head installed). Compress spring retainer and spring and remove valve keepers. Release compressor and remove spring retainer and spring.

Fig. 2: Using Spring Compressor to Remove Valve Spring



Use compressed air to hold valve shut.

Installation

Install valve, valve spring, and valve spring retainer. Install spring with closely spaced coils against cylinder head. Compress spring and install valve keepers.

ROCKER ARM ASSEMBLY

Removal

Disengage wire valve cover clip. Remove valve cover. Remove 4 rocker shaft retaining nuts. Each side has 2 separate shafts. Make sure the mounting nuts are gradually and evenly loosened until the spring tension is completely relieved.

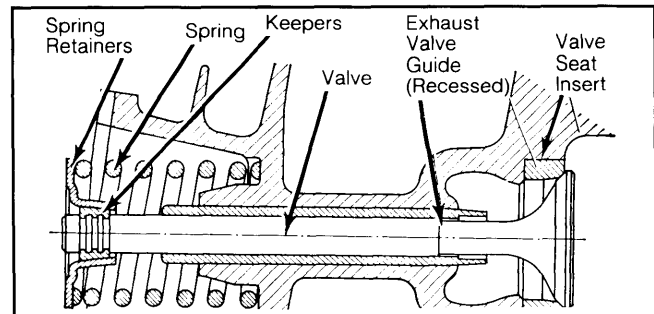
Inspection

Check rocker arms and shafts for wear. If inside diameter of rocker arm is worn more than .789" (20.0 mm), replace rocker arm. If diameter of rocker shaft is worn to less than .783" (19.9 mm), replace rocker shaft.

Installation

To install, reverse removal procedure. Make sure push rod tube retaining wire is reinstalled. Adjust valve clearance.

Fig. 3: Sectional View of Valve with Related Parts



HYDRAULIC VALVE LIFTERS

Removal

Valve lifters may be removed and installed without removing or disassembling engine. Remove valve covers, rocker arms, push rods and push rod covers from engine. Remove lifters by withdrawing with a magnetic tool. Mark all lifters for installation in original position.

Installation

Ensure that lifters are filled with oil and reverse removal procedure. Back off adjusting screws in rocker arms until threaded part is flush with bottom of rocker arm. Adjust valve clearance as described below.

VALVE CLEARANCE ADJUSTMENT

1) Loosen all adjusting screws until flush with bottom of rocker arm. Hand turn crankshaft until number 1 cylinder is in firing position (number 1 firing mark on distributor body and rotor aligned). Turn adjusting screws for both rocker arms of number 1 cylinder until tips just touch valve stems (zero clearance).

2) Tighten screws 2 additional turns and tighten lock nuts. Turn crankshaft so rotor moves counterclockwise in 90° increments and repeat adjustment for number 2, 3 and 4 cylinders.

PISTONS, PINS & RINGS

CYLINDERS

Removal

Remove engine from vehicle. Remove cylinder head attaching nuts from studs and remove cylinder head. Mark cylinders for reassembly reference. Remove deflector plates from bottom of the cylinders and pull the cylinders from pistons.

Installation

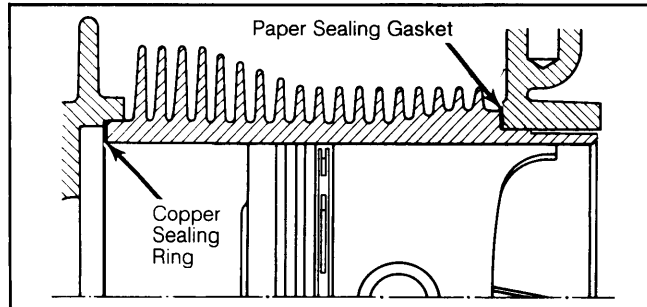
1) Check seating surfaces of cylinders on both ends. Make sure seating areas are perfectly clean and true before installing cylinders. Stagger ring gaps 120° apart so that the oil ring gap faces upward when the cylinder is installed.

Volkswagen Engines

VANAGON 4-CYLINDER (Cont.)

2) Apply oil to cylinder, piston rings and piston pin. Compress rings with ring compressor (US 1008A). Install new sealing gasket on crankcase side and slide cylinder over piston.

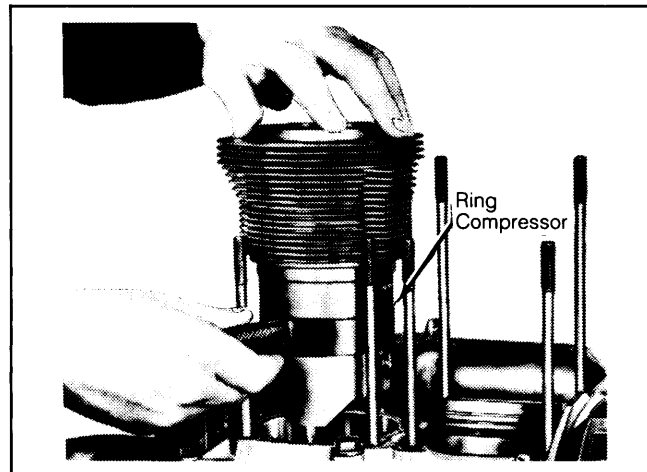
Fig. 4: Location and Seating of Cylinder Seal



Install new seal when installing cylinder.

3) Make sure studs do not contact cooling fins when cylinder is completely seated against crankcase. Install cylinder deflector plates and remaining components in reverse of removal.

Fig. 5: Installing Cylinder Assembly into Case



Make sure studs do not contact cooling fins.

FITTING PISTONS

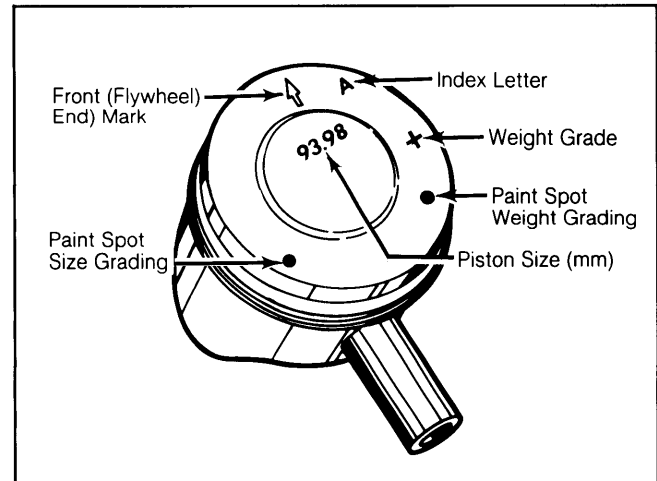
1) With piston and cylinder removed, measure clearance between piston and cylinder. Check piston size at bottom of skirt and 90° to piston pin. Check cylinder size at several points throughout cylinder, using largest reading to determine clearance.

2) If clearance exceeds .008" (.20 mm) replace piston and cylinder as a set. New piston must be of the same weight grade as original or within 10 g of original piston weight.

3) Piston size, weight and installation position are marked on top of piston. Pistons and cylinders are available in .020" (.50 mm) and .040" (1.00 mm) oversizes. See Fig. 6.

NOTE: Piston alone may be replaced with one of matching size. Only pistons of same size and weight grade should be installed in same engine.

Fig. 6: Top View of Piston with Detail of Piston Markings

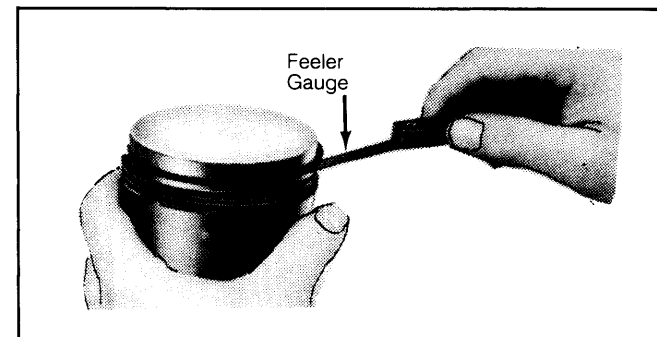


Oversizes of .020" (.50 mm) and .040" (1.0 mm) available.

4) New piston rings are size graded to match piston/cylinder sets. Measure ring gap with ring installed approximately 3/16" in cylinder. If ring end gap exceeds .035" (.90 mm) for compression rings or .037" (.95 mm) for oil scraper, replace.

5) Install rings on piston and measure ring side clearance using feeler gauge. If clearance exceeds .005" (.12 mm) on upper and middle rings or .004" (.10 mm) on oil scraper ring, piston must be replaced.

Fig. 7: Measuring Piston Ring Side Clearance with Feeler Gauge



If limits are exceeded, replace piston.

PISTON PINS

Removal

Remove cylinders and mark pistons before removing for proper installation. Using pliers (VW122b), remove the piston pin circlips and push the piston pin out of the piston.

Installation

1) Check fit of pin in piston. At room temperature piston pin should be light push fit. If pin is too loose, both pin and piston must be replaced.

2) Install 1 circlip in piston on side facing flywheel. Position piston on connecting rod and push piston pin through piston. Replace remaining circlip. Replace remaining components in reverse of removal.

NOTE: Piston may be heated to ease pin installation.

VANAGON 4-CYLINDER (Cont.)

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

CRANKCASE

Crankcase must be taken apart to replace connecting rods, connecting rod bearings and main bearings. It is also necessary to disassemble crankcase to remove crankshaft, camshaft, and camshaft bearings.

Disassembly

1) Remove engine from vehicle and remove cylinder heads, cylinders, and pistons. Remove flywheel or drive plate, and crankshaft pulley. Remove distributor, distributor drive shaft and fuel pump.

2) Remove oil cooler, oil filter and bracket, and oil pump assembly. See Oil Pump Removal. Remove rear engine carrier crossmember, bonded rubber mountings, and fan hub. Remove oil pan and oil filler pipe mounting bracket bolt.

3) Remove six 10 mm main bearing nuts and bolts and five 8 mm nuts and bolts from crankcase flange. Using spring clips, clamp tappets in right half of crankcase and lift off right hand crankcase half. DO NOT insert tools between crankcase flanges to separate halves. If stuck together, use rubber hammer to loosen right half from left.

Reassembly

1) Thoroughly clean and inspect both crankcase halves. Remove oil sealing compound from mating surfaces and from all bolts, studs and washers. Blow out oil passages with compressed air. Check studs for tightness and check oil suction pipe for tightness.

2) Install crankshaft with connecting rods, in left side crankcase half, making sure dowel pins are properly seated in bearings. Install camshaft. See Camshaft Installation. Install camshaft plug using liquid sealer all around plug. Spread liquid sealer over mating surfaces of crankcase halves.

3) Using spring clips, clamp tappets in right half of crankcase to join crankcase halves. Coat main bearing bolt heads (10 mm) with sealer and install in crankcase.

NOTE: Install plastic dampers (part No. 021 101 107) on shank of main bearing bolts whether or not originally equipped.

4) Coat the sealing nuts for main bearing bolts with sealer. Install nuts with sealing rings outward. Tighten main bearing nuts and bolts and hand turn the crankshaft to check for free movement. Coat bolt heads and nuts of 8 mm bolts with sealer. Install bolts and tighten.

5) Check crankshaft end play. See Crankshaft End Play. Install new crankshaft oil seals. See Front Crankshaft Oil Seal Replacement and Rear Crankshaft Oil Seal Replacement. Install remaining components in reverse of removal procedure.

MAIN & CONNECTING ROD BEARING SERVICE

1) With crankshaft and connecting rod assembly removed, remove snap ring securing distributor drive gear and crankshaft gear to crankshaft. Remove distributor drive gear and crankshaft gear by pressing or using mandrel (VW457). Remove number 3 bearing. Remove connecting rods.

2) Thoroughly clean and inspect crankshaft. Blow out oil passages with compressed air. Check runout

of crankshaft. If runout exceeds .0008" (.020 mm), regrind crankshaft to next undersize.

3) Check crankshaft journals for wear. If journals are worn more than .0012" (.030 mm), regrind crankshaft to next undersize. Lubricate and install the number 3 bearing.

4) Heat crankshaft gear to approximately 176°F (80°C) in an oil bath and install on crankshaft over Woodruff key. Chamfer on gear bore must face number 3 main bearing journal. Install spacer, distributor drive gear and lock ring (circlip).

5) Using Plastigage, check main and connecting rod bearings. If main bearing clearance exceeds .007" (.18 mm) on No. 1 and 3, .0067" (.170 mm) on No. 2, or .0075" (.19 mm) on No. 4, replace bearing. If clearance on any connecting rod bearing exceeds .007" (.15 mm), replace bearing.

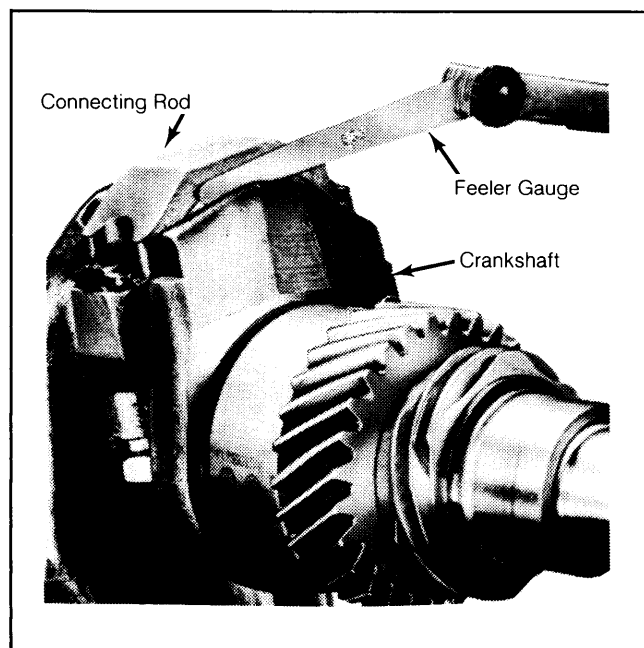
6) Install numbers 1, 3 and 4 main bearings on crankshaft. See Step 4) for number 3 main bearing installation. Install lower bearing half of number 2 in crankcase, ensuring that dowel in crankcase engages hole in bearing half. Turn bearings on crankshaft to properly position oil holes and dowel holes.

7) Install bearing halves in cap and rod so that tangs in shells engage notches in rod bore. Fit to crankshaft with numbers on rod and cap on same side. Forged mark on rod must face UP when crankshaft is installed.

NOTE: Lightly tap both sides of connecting rod with hammer to eliminate slight pinching of bearing shells when installing connecting rod.

8) Check connecting rod side play with feeler gauge. If side play exceeds .0275" (.70 mm), replace connecting rod. Install crankshaft and connecting rod assembly as previously outlined. Check crankshaft end play. See Crankshaft End Play.

Fig. 8: Using a Feeler Gauge to Check Connecting Rod Side Clearance



Side play limit is .0275" (.70 mm).

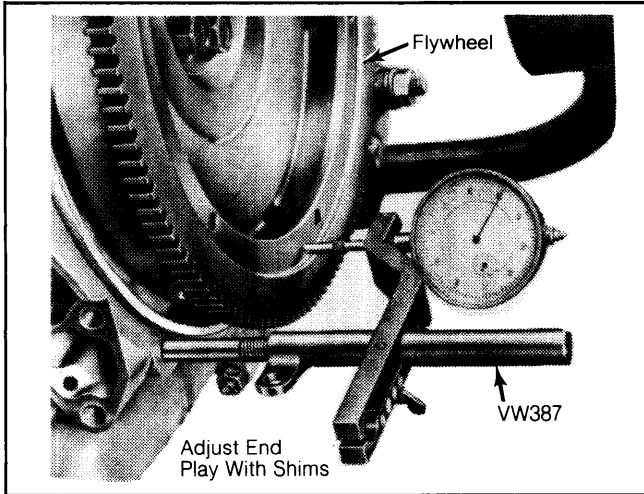
Volkswagen Engines

VANAGON 4-CYLINDER (Cont.)

CRANKSHAFT END PLAY

1) Crankshaft end play is checked with engine assembled. Install flywheel with 2 shims, but do not install "O" ring and crankshaft oil seal. Attach dial indicator to crankcase and measure back and forth movement of crankshaft.

Fig. 9: Using Dial Indicator to Check Crankshaft End Play



End play limit is .005" (.13 mm).

2) Calculate necessary thickness of third shim. Install third shim and recheck end play. Thickness of shim is etched on face of shim. Always use 3 shims to obtain correct end play.

END PLAY SHIMS

Markings on Shim (mm)	Inch Equivalent
.24	.0095
.30	.0118
.32	.0126
.34	.0134
.36	.0142
.38	.0150

3) With correct shim thickness determined, remove flywheel. Install O-ring, oil seal and 3 shims. Install flywheel, tighten bolts as required, and recheck crankshaft end play.

CRANKSHAFT REAR OIL SEAL

Removal & Installation

1) Remove blower impeller and pull impeller hub off crankshaft with puller (VW 185). Pry the old seal out, using caution to avoid scratching the shaft or crankcase. Clean recess and chamfer the edges of the seal seat, if necessary.

2) Coat outside of seal lightly with sealer and start into position by hand. Press into final position with special tool (VW190) and lightly lubricate fan hub before completing installation.

CRANKSHAFT FRONT OIL SEAL

Removal & Installation

1) Remove flywheel and carefully pry out old seal. Clean seat and chamfer edges if necessary. Apply thin film of sealer to outside edges and start seal into recess by hand.

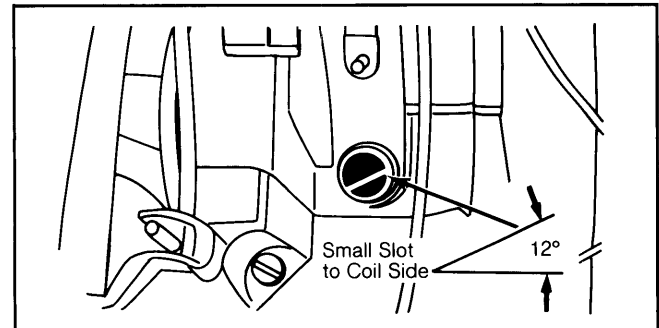
2) Seal lip must point toward crankcase. Complete installation with special tool (VW191). Lubricate contact surface on flywheel and install flywheel.

DISTRIBUTOR DRIVE INSTALLATION

1) When crankcase has been assembled and remaining components installed, distributor drive must be installed. Rotate crankshaft until No. 1 piston is at TDC of compression stroke.

2) Align timing mark on pulley with 0° mark on ignition timing scale. Insert distributor drive with slot at a 12° angle to center line of engine. Small segment of slot faces coil side. See Fig. 10.

Fig. 10: Engine Distributor Drive Installation Position



Insert with slot at 12° to engine centerline.

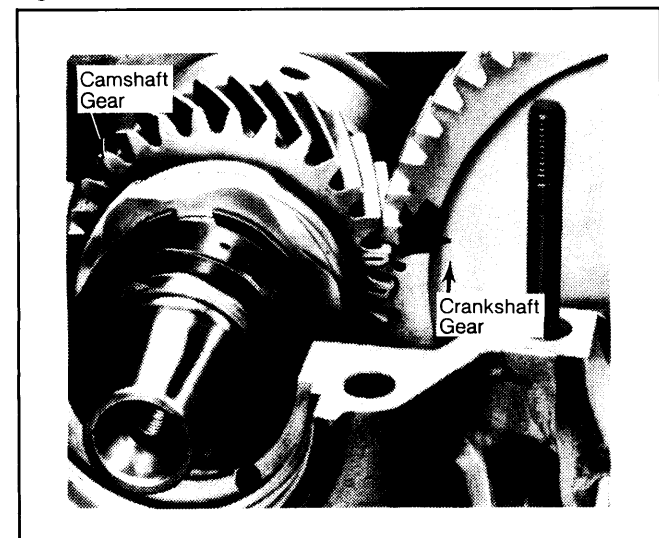
CAMSHAFT

CAMSHAFT INSTALLATION

1) With camshaft removed, check riveting of camshaft gear to camshaft. Check the camshaft for maximum allowable runout of .0015" (.040 mm). If beyond the limit, replace the camshaft.

2) Check gear backlash with camshaft and crankshaft installed in crankcase half. Correct backlash is .002" (.05 mm). Gears have correct fit when crankshaft is rotated backwards and camshaft does not try to lift out of bearings.

Fig. 11: Position of Camshaft Timing Gear



"O" must be between punch marks.

VANAGON 4-CYLINDER (Cont.)

3) If camshaft rises out of bearings, teeth on camshaft gear have the wrong pitch radius for crankshaft gear. Camshafts with gears that have various pitch radii are available. Pitch radius is stamped on inner face of the timing gear.

4) Install camshaft with "O" stamped in tooth on outside of camshaft gear between 2 teeth with punch marks on crankshaft gear. Assemble crankcase halves as previously outlined. See Fig. 11.

CAMSHAFT END PLAY

Camshaft end play is checked with camshaft installed in crankcase half. Measure back and forth movement of the camshaft with a dial indicator. If measured end play exceeds .006" (.16 mm), replace the camshaft and/or bearings.

VALVE TIMING

Install camshaft with "O" stamped in tooth on outside of camshaft gear between 2 teeth with punch marks on crankshaft gear. See Fig. 11.

ENGINE OILING

OIL CAPACITY

Oil capacity is 3.2 qts. (3.0L) without filter change, 3.7 qts. (3.5L) with filter change.

OIL PRESSURE

Oil pressure should be 29 psi (2.04 kg/cm²) at 2000 RPM with engine at 176°F (80°C).

OIL FILTER

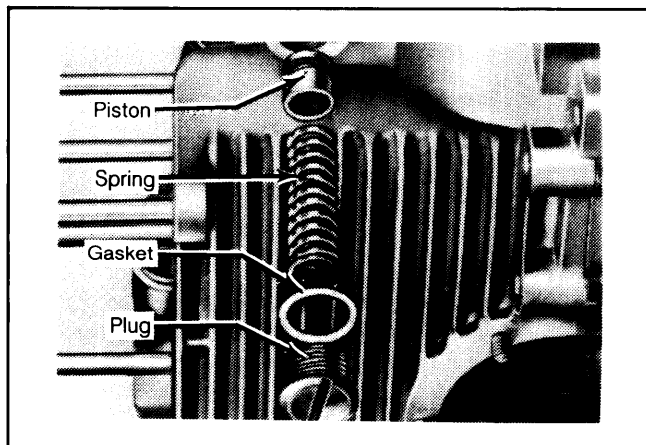
Oil filter is a full-flow, throw-away type.

PRESSURE REGULATOR VALVES

Oil pressure relief valve, used to protect oil cooler from excessive pressure, is located in crankcase under oil filter. Oil pressure control valve, used to control oil pressure to bearings, is located in the crankcase below the oil breather.

Oil pressure relief spring should have length of 1.54" (39 mm) at 15-19 lbs. (6.8-8.8 kg) load. Oil pressure control valve spring should have a length of 1.02" (26 mm) at 3 3/4-4 3/8 lbs. (1.7-2.0 kg) load.

Fig. 12: Exploded View of Relief Valve Components



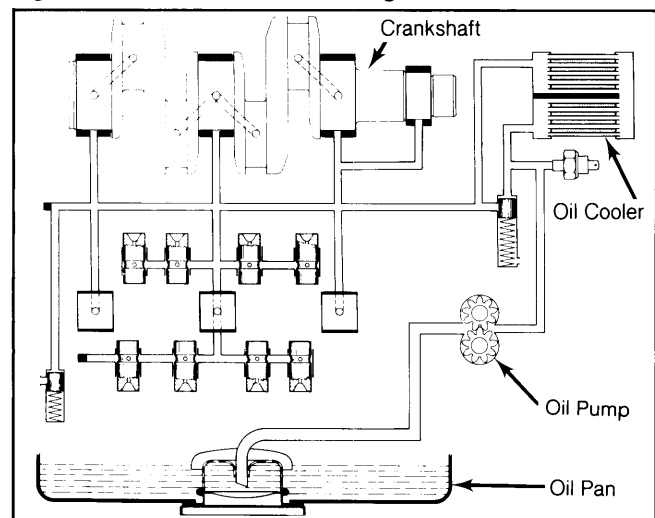
ENGINE OILING SYSTEM

Full pressure lubrication system utilizes a gear-type oil pump and is installed in rear of engine and driven by camshaft. Oil is pumped through oil filter, oil cooler and into main oil passages in crankcase.

Crankshaft main and connecting rod journals are oiled through cross-drilled oil passages in the crankcase. Oil is pumped to camshaft through oil passages that also lubricate valve tappets. Oil flows through push rods to lubricate rocker arms and shafts.

Valve stems are lubricated by splash oil from rocker arms. Excess oil flows back into crankcase through push rod tubes. Cylinder walls and piston pins are lubricated by splash oil.

Fig. 13: Distribution of Oil For Engine Lubrication



OIL COOLER

Removal

To remove oil cooler, remove cooling air fan housing, three 6 mm nuts with washers attaching oil cooler to rear of crankcase, and bolts attaching oil cooler support strap. Remove the support strap and the oil cooler as a unit.

Installation

To install, reverse removal procedure. Always use new rubber seals when installing oil cooler.

OIL PUMP

Removal

Remove engine. Remove 4 nuts holding oil pump housing. Using 2 levers, pry oil pump out of crankcase. Remove oil pump insert with puller (VW803).

Inspection

Check housing for excessive wear, mainly in gear seating portions. Measure gear backlash for wear. Backlash must not exceed .008" (.20 mm). Replace bearing plate if scored.

Installation

Hand turn oil pump drive shaft until fully engaged in camshaft. Rotate crankshaft 2 revolutions. Pump plate should now be aligned with camshaft. Refit new gasket and reverse removal procedure for remaining components.

Volkswagen Engines

VANAGON 4-CYLINDER (Cont.)

ENGINE COOLING

THERMOSTAT

At 185-194°F (85-90°C), thermostat length should be at least 1 13/16" (46 mm) measured from shoulders on bellows shaft.

COOLING SYSTEM

Engine is cooled by a radial blower mounted to rear end of crankshaft. Blower draws air through opening in blower shroud at rear of engine. Blower shroud is a 2-piece unit, mounted around the blower and attached to the crankcase.

As air is drawn in, it is directed over finned cylinders and cylinder heads by deflector plates. As engine warms up, thermostat opens flaps completely to allow total flow of air.

BLOWER SHROUD

Removal

1) Remove engine as previously outlined. Remove ignition timing scale, fan with crankshaft pulley and alternator belt. Disconnect the cooling air control cable from control flap shaft. Remove 4 nuts attaching blower shroud to crankcase and pull assembly to rear and off engine.

Installation

1) To install, reverse removal procedure. Adjust air flap control cable by pushing flaps into closed

position and tighten cable. Adjust the air flap control by pushing flaps into the closed position and tightening the cable control.

2) Install drive belt and tighten alternator into proper belt tensioning position. Belt should have .4-.6" (10-15 mm) deflection when pressed firmly in middle with thumb. Install cover plates and engine.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Connecting Rod Nut	25 (34)
Crankcase Half Nuts (8 mm)	14 (19)
Crankcase Half Sealing Nuts (10 mm)	25 (34)
Cylinder Head Nuts	22 (30)
Rocker Shaft-to-Cylinder Head Nuts	11 (15)
Heat Exchanger-to-Cylinder Head	16 (22)
Oil-Pan-to-Crankcase Nuts	9 (12)
Drive Plate-to-Crankshaft	65 (90)
Hub-to-Crankshaft Bolt	22 (30)
Fan-to-Hub	14 (19)
Engine-to-Transmission	22 (30)
Oil Pump-to-Crankcase	18 (25)
Oil Cooler-to-Crankcase	14 (19)
Flywheel-to-Crankshaft	80 (110)
Torque Converter-to-Drive Plate	18 (25)
Pressure Plate-to-Flywheel	18 (25)

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Year	Displacement		Fuel System	HP@RPM	Torque Ft. Lbs.@RPM	Compr. Ratio	Bore		Stroke	
	Cu. In.	cc					In.	mm	In.	mm
1982	120	1970	Fuel Injection	67@4200	101@3000	7.3:1	3.70:1	94	2.80	71

VALVES

Engine Size & Valve	Head Diam. In. (mm)	Face Angle	Seat Angle	Seat Width In. (mm)	Stem Diameter In. (mm)	Stem Clearance In. (mm)	Valve Lift In. (mm)
1970 cc Intake	1.547 (39.3)	29.5	30°	.070-.086 (1.80-2.20)	.313 (7.95)	.018 (.46)
Exhaust	1.299 (33.0)	45°	45°	.070-.098 (2.00-2.50)	.351 (8.92)	.014 (.35)

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (Kg @ mm)	
		Valve Closed	Valve Open
1970 cc Int. & Exh.	168-186@1.14 (76-84@29)

CAMSHAFT

Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
1970 cc	.9839-.9843 (24.991-25.001)	.0008-.0020 (.020-.051)

Volkswagen Engines

6-363

VANAGON 4-CYLINDER (Cont.)

ENGINE SPECIFICATIONS (Cont.)

PISTONS, PINS, RINGS

Engine	PISTONS	PINS		RINGS		
	Clearance In. (mm)	Piston Fit In. (mm)	Rod Fit In. (mm)	Ring No.	End Gap In. (mm)	Side Clearance In. (mm)
1970 cc	.001-.002 (.02-.05)	1 ¹	.0004-.0012 (.010-.030)	1	.016-.026 (.40-.65)	.002-.003 (.04-.07)
				2	.016-.026 (.40-.65)	.002-.003 (.04-.07)
				3	.010-.016 (.25-.40)	.001-.002 (.02-.05)

¹ — Push fit with light thumb pressure at room temperature.

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam. In. (mm)	Clearance In. (mm)	Thrust Bearing	Crankshaft End Play In. (mm)	Journal Diam. In. (mm)	Clearance In. (mm)	Side Play In. (mm)
1970 cc No. 1	2.3609-2.3617 (59.967-59.987)	.0016-.0039 (.041-.099)	No. 1	.0027-.0050 (.07-.13)	1.9677-1.9685 (49.98-50.00)	.0008-.0027 (.020-.069)	.004-.016 ¹ (.10-.41)
No. 2	2.3609-2.3617 (59.967-59.987)	.0012-.0035 (.030-.089)					
No. 3	2.3609-2.3617 (59.967-59.987)	.0016-.0039 (.041-.099)					
No. 4	1.5739-1.5748 (39.977-40.025)	.0020-.0039 (.051-.099)					

¹ — Limit .028" (.7 mm).