VANAGON 4 CYLINDER

ENGINE CODING

ENGINE IDENTIFICATION

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

Engine Identification

Application	Engine Code
Vanagon (1970 cc)	CV

ENGINE, CYLINDER HEAD & MANIFOLD

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. Disconnect vacuum hose from brake booster. Disconnect all remaining vacuum hoses and electrical wiring leads running between engine and engine compartment.

2) Remove nuts of upper engine mounting bolts and disconnect accelerator cable. 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 off transaxle housing.

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

3) 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. On automatic transaxle models, loosen accelerator cable at selector lever and detach. Loosen transaxle mount bolt at front of transaxle.

4) On all models, place a support (VW785/1) under transaxle. Place a floor jack under engine. Raise jack until engine is just supported. 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 – 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. 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.

2) Disconnect wires on fuel injectors and remove two screws. Pull injectors off with plate and retainer. Make sure locating bushings are removed from manifold. Disconnect hoses on injectors and remove.

3) Remove intake manifold cover plate. Remove nuts and washers securing manifold to cylinder heads. Lift up on manifold and pull from tubes on air distributor.

Installation – To install manifold, reverse removal procedure and note the following: 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 one 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.

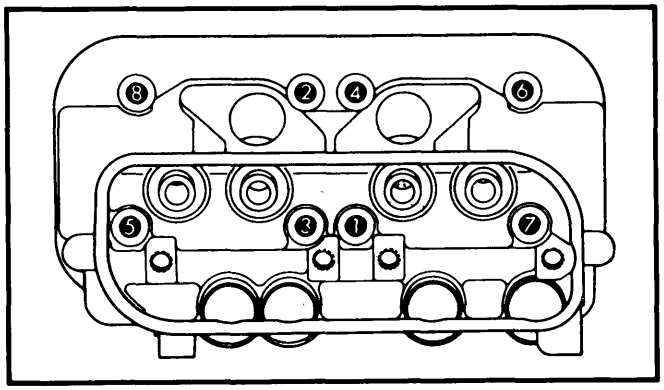

Fig. 1 Cylinder Head Bolt Tightening Sequence

Installation – 1) Remove metal gasket rings from combustion chambers and inspect head. Place new metal gasket rings in peripheries of combustion chambers and install head over cylinder studs. Tighten head to specifications in 2 steps according to sequence shown 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 that push rod tube retaining wires bear against ends of tubes and engage slots in rocker arm supports before installing cylinder head cover.

VALVES

VALVE ARRANGEMENT

E-I-I-E (both banks)

VANAGON 4 CYLINDER (Cont.)

VALVE GUIDE SERVICING

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" (1.2 mm), replace valve and/or guide. Guides must be removed and replaced using a press with adapters. Ream to proper clearance after installation.

CAUTION – *DO NOT use a hammer and drift to replace guides due to the danger of damage to the cylinder head.*

VALVE SPRINGS

NOTE – *Valve spring may be removed with cylinder head installed. Apply constant air pressure (minimum 85 psi) to cylinder through spark plug hole to hold valve in place while compressing spring.*

Removal – Remove cylinder head cover and rocker arm shaft. Install suitable 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.

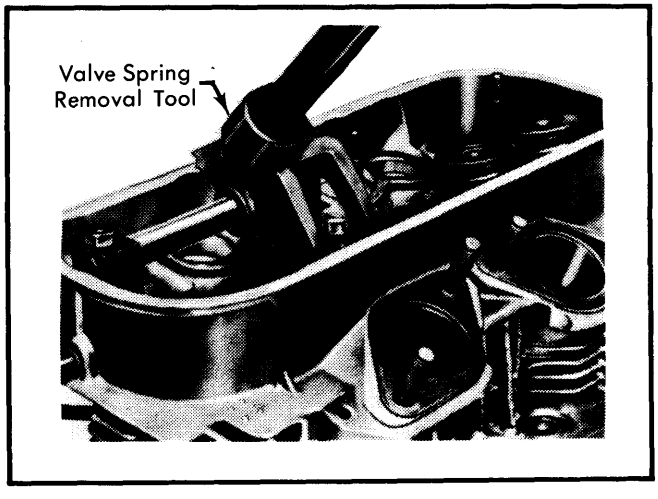

Fig. 2 Using Special Tool VW311s to Remove Valve Spring

Installation – Install valve, valve spring, and valve spring retainer. NOTE – *Install spring with closely spaced coils against cylinder head.* Compress spring with suitable compressor 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 two separate shafts. Make sure mounting nuts are gradually and evenly loosened until spring tension is 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 and note: Make sure push rod tube retaining wire is reinstalled. Adjust valve clearance.

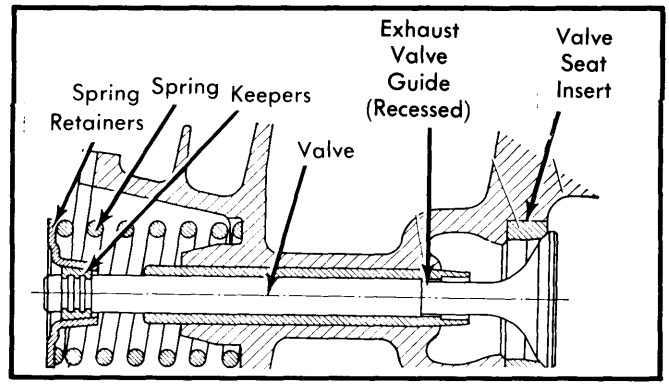

Fig. 3 Sectional View of Valve with Related Parts

HYDRAULIC VALVE LIFTERS

NOTE – *Valve lifters may be removed and installed without removing or disassembling engine.*

Removal – Valve covers, rocker arms, push rods and push rod covers must be off of 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. Proceed as in *Valve Clearance Adjustment.*

VALVE CLEARANCE ADJUSTMENT

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). Tighten screws 2 additional turns and tighten locknuts. 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 and remove cylinder head. NOTE – *Mark cylinders to insure they are reinstalled in original position.* Remove deflector plates from bottom of cylinders and pull 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 oil ring gap faces upward when cylinder is installed.

2) Apply oil to cylinder, piston, rings and piston pin. Compress rings with suitable ring compressor (VW123). Install new sealing gasket on crankcase side and slide cylinder over piston.

VANAGON 4 CYLINDER (Cont.)

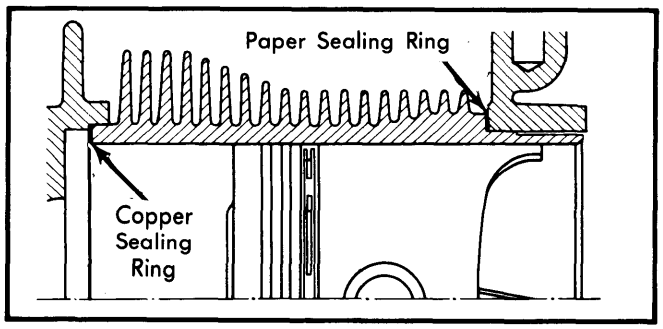

Fig. 4 Location and Seating of Cylinder Seal

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.

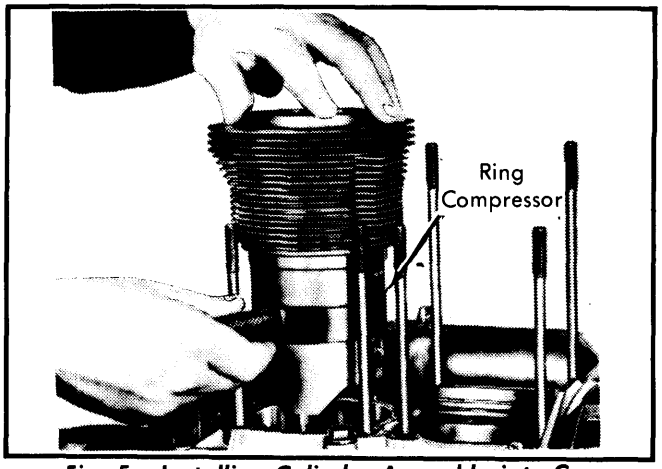

Fig. 5 Installing Cylinder Assembly into Case

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 same weight grade as original or within 10 g of original piston weight. Piston size, weight and installation position are marked on top of piston

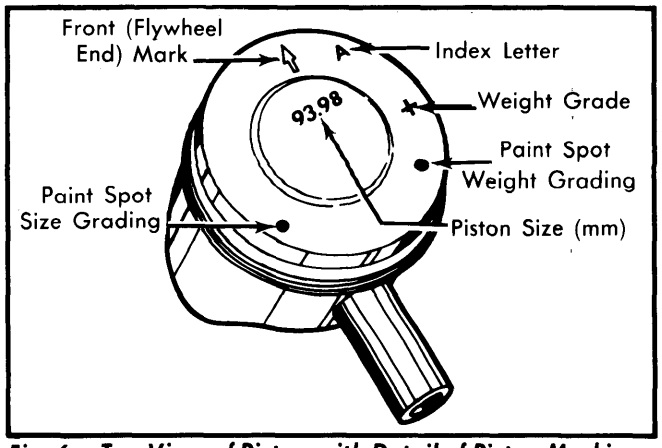

Fig. 6 Top View of Piston with Detail of Piston Markings

See *Fig. 6*. Pistons and cylinders are available in 2 oversizes: .020" (.508 mm) and .040" (1.016 mm).

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.*

3) 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.

4) 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.

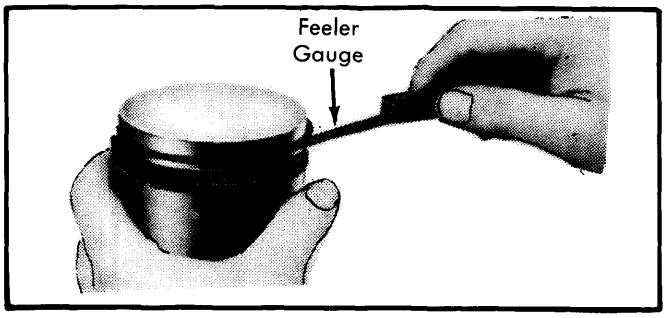

Fig. 7 Measuring Piston Ring Side Clearance with Feeler Gauge

PISTON PINS

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

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.

VANAGON 4 CYLINDER (Cont.)

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.

CAUTION — *Never insert tools between crankcase flanges to separate halves. If stuck together, use rubber hammer to loosen right hand half from left.*

Reassembly — 1) Thoroughly clean and inspect both crankcase halves. Remove old 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 lett 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 hand 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 and install nuts with sealing rings outward. Tighten main bearing nuts and bolts and hand turn crankshaft to check for free movement. Coat bolt heads and nuts of 8 mm bolts with sealer, then install and tighten.

5) Check crankshaft end play. *See Thrust Bearing Alignment.* 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 suitable 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. Main and connecting rod bearings are available in .010", .020" and .030" undersize.

4) Lubricate and install number 3 bearing. Heat crankshaft gear to approximately 176° F 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 method, check main and connecting rod bearings. If main bearing clearance on Nos. 1 and 3 exceeds .007" (.18 mm), .0067" (.17 mm) on No. 2, or .0075" (.19 mm) on No. 3; 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. 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.

7) 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 Thrust Bearing Alignment.*

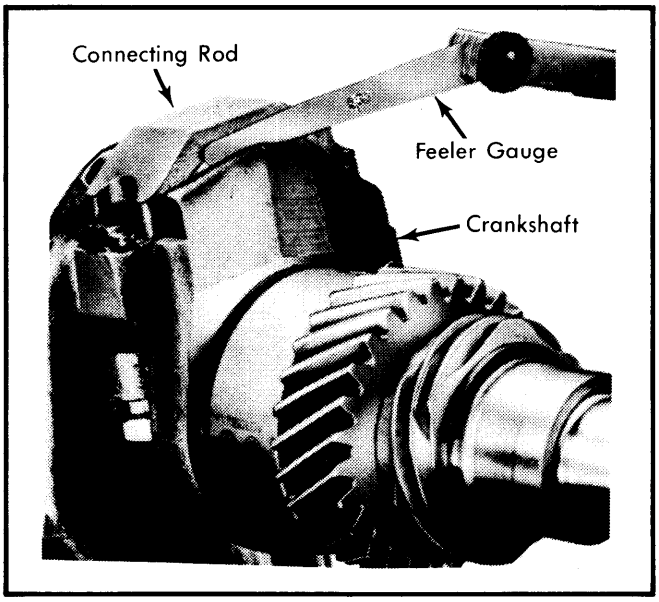

Fig. 8 Using a Feeler Gauge to Check Connecting Rod Side Clearance

CRANKSHAFT END PLAY

NOTE — *Crankshaft end play is checked with engine assembled.*

1) 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.

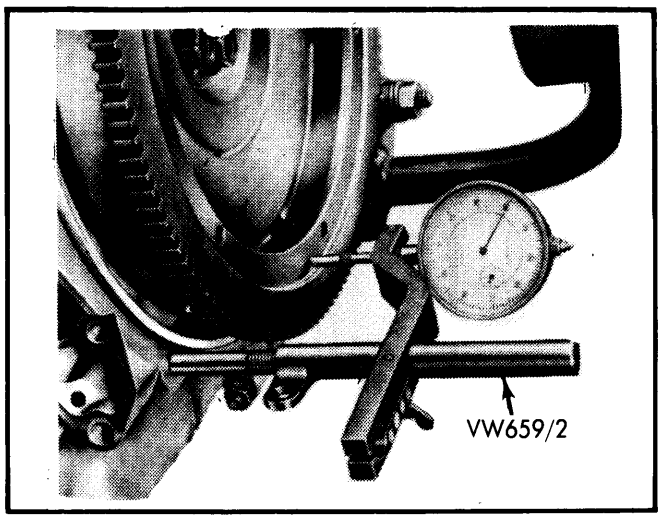

Fig. 9 Using a Dial Indicator to Check Crankshaft End Play

VANAGON 4 CYLINDER (Cont.)

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 three shims to obtain correct end play.

Thrust Bearing Shims

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

3) With correct shim thickness determined, install crankshaft oil seal. See *Front Crankshaft Oil Seal*. Install flywheel, tighten bolts as required, and recheck crankshaft end play.

CRANKSHAFT REAR OIL SEAL

Removal & Installation – Remove blower impeller and pull impeller hub off crankshaft with suitable tool (VW185). Pry old seal out, using caution to avoid scratching shaft or crankcase. Clean recess and chamfer edges of seal seat, if necessary. Coat outside of seal lightly with sealer and start into position by hand. Press into final position with tool (VW190) and lightly lubricate fan hub before completing installation.

CRANKSHAFT FRONT OIL SEAL

Removal & Installation – 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. Seal lip must point toward crankcase. Complete installation with tool (VW191). Lubricate contact surface on flywheel and install flywheel.

DISTRIBUTOR DRIVE INSTALLATION

When crankcase has been assembled, and remaining components installed, distributor drive must be installed. Rotate crankshaft until No. 1 piston is at TDC, compression stroke. 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 must face toward outside of vehicle *(See Fig. 10)*.

Fig. 10 Engine Distributor Drive Installation Position

CAMSHAFT

CAMSHAFT INSTALLATION

1) With camshaft removed, check riveting of camshaft gear to camshaft. Check camshaft for maximum runout of .0016" (.041 mm). If beyond limit, replace 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.

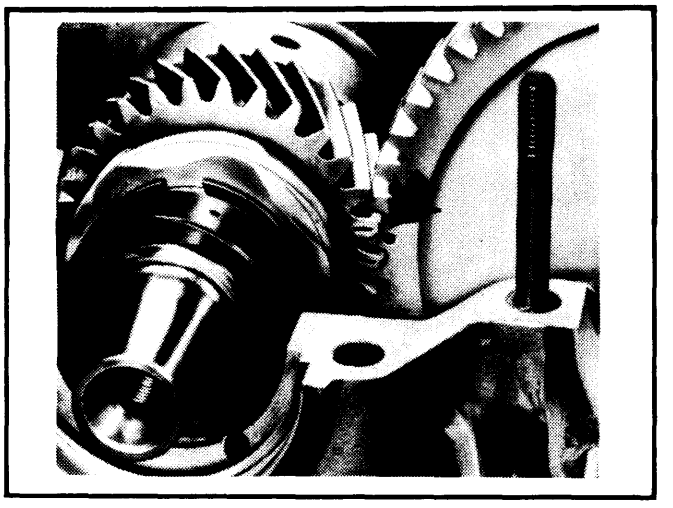

Fig. 11 Position of Camshaft Timing Gear

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 back of gear facing number three bearing journal of camshaft.

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 camshaft with a dial indicator. If end play exceeds .006" (.16 mm), replace camshaft and/or bearings.

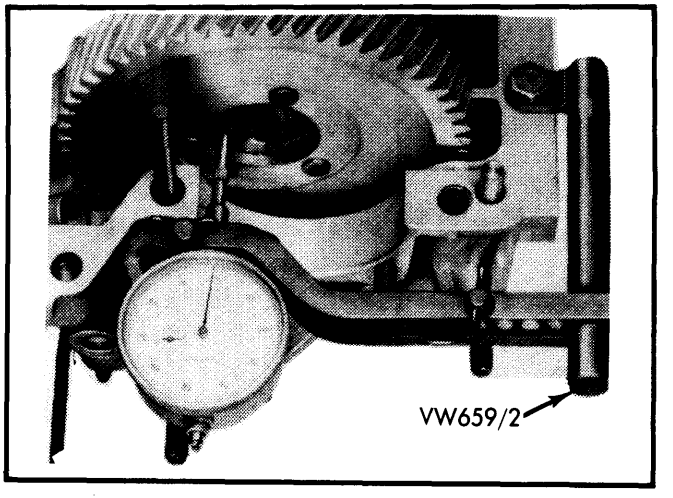

Fig. 12 Measuring Camshaft End Play with a Dial Indicator

VANAGON 4 CYLINDER (Cont.)

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 – 3.2 qts. Add .5 qt. with filter change.

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

Oil Filter – Full-flow, throw-away type oil filter.

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 crankcase below 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 3¾-4⅜ lbs. (1.7-2.0 kg) load.

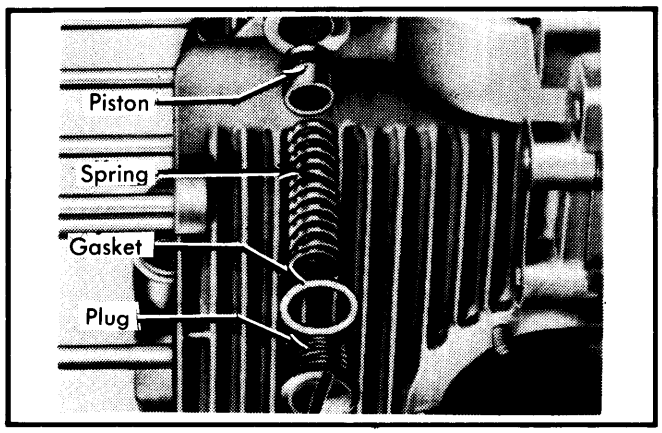

Fig. 13 Expanded View of Relief Valve Components

ENGINE OILING SYSTEM

Full pressure lubrication system utilizing a gear-type oil pump and 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.

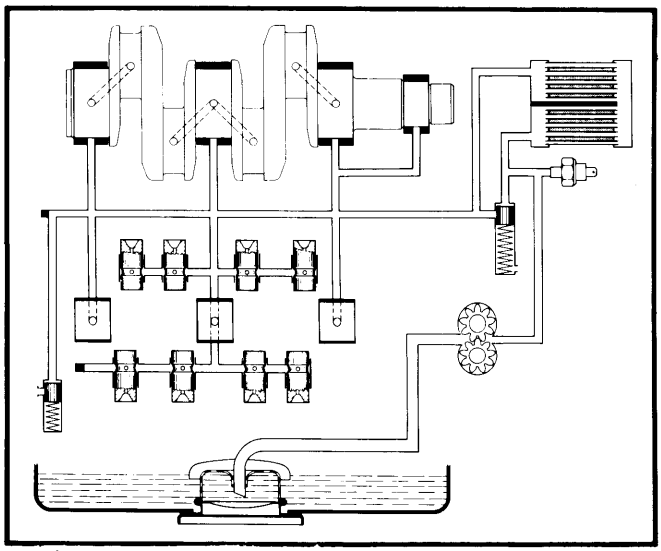

Fig. 14 Distribution of Oil for Engine Lubrication

OIL COOLER

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 support strap and oil cooler as unit. Always use new rubber seals when installing oil cooler.

OIL PUMP

Removal – Remove engine. Remove 4 nuts holding oil pump. Using 2 levers, pry oil pump out of crankcase. See *Fig. 15*.

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 two revolutions. Pump plate should now be aligned with camshaft. Refit new gasket and reverse removal procedure for remaining components.

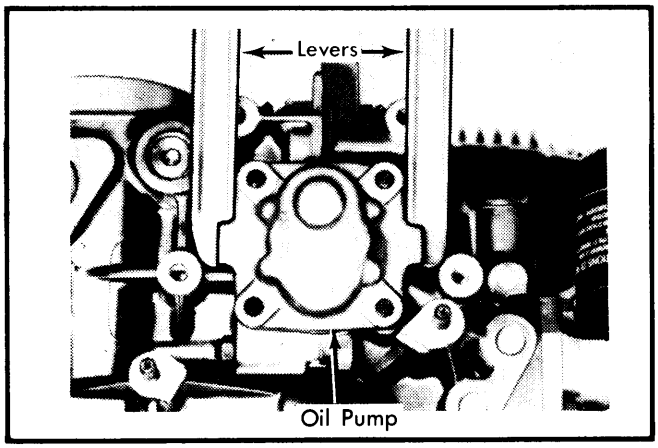

Fig. 15 Using Levers to Remove Oil Pump

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 two-piece unit, mounted around blower and attached to 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.

VANAGON 4 CYLINDER (Cont.)

BLOWER SHROUD REMOVAL

1) Remove engine as previously outlined. Remove ignition timing scale, fan with crankshaft pulley and alternator belt.

2) Disconnect cooling air control cable from control flap shaft. Remove four nuts attaching blower shroud to crankcase and pull assembly to rear and off engine. To install, reverse removal procedure. Adjust air flap control cable by pushing flaps into closed position and tighten cable.

3) Disconnect flap actuating cable from control shaft. Remove nuts securing shroud to crankcase and remove both halves of blower shroud.

4) To install, reverse removal procedure. Adjust air flap control by pushing flaps into closed position and tighten cable control.

5) Install drive belt and tighten alternator into proper belt tensioning position. Belt should have a maximum 0.6" (15.2 mm) deflection. Install cover plates and engine.

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Year	Displ.		Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke	
	cu. ins.	cc					in.	mm	in.	mm
1980	120	1970	Fuel Injection	67@4200	101@3000	7.3:1	3.70	94	2.795	71

VALVES

Engine & 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							
Int.	1.547 (39.3)	29.5	30°	.071-.087 (1.80-2.21)	.3125-.3129 (7.936-7.948)	.018 (.46)	.....
Exh.	1.299 (33.0)	45°	45°	.079-.098 (2.01-2.49)	.3508-.3512 (8.910-8.920)	.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 (76.20-84.37@28.96)	.....

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)	.....

PISTONS, PINS, RINGS

Engine	PISTONS	PINS		RINGS		
	Clearance In. (mm)	Piston Fit In. (mm)	Rod Fit In. (mm)	Rings	End Gap In. (mm)	Side Clearance In. (mm)
1970 cc	.001-.002 (.02-.05)	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.

VANAGON 4 CYLINDER (Cont.)

ENGINE SPECIFICATIONS (Cont.)

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 (.069-.127)	1.9677-1.9685 (49.98-50.00)	.0008-.0027 (.020-.069)	.004-.016 (.10-.41)
2	2.3609-2.3617 (59.967-59.987)	.0012-.0035 (.030-.089)					
3	2.3609-2.3617 (59.967-59.987)	.0016-.0039 (.041-.099)					
4	1.5739-1.5748 (39.977-40.025)	.0020-.0039 (.051-.099)					

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Connecting Rod Nut	25 (3.45)
Crankcase Half Nuts (8 mm)	14 (1.94)
Crankcase Half Sealing Nuts (10 mm)	25 (3.46)
Cylinder Head Nuts	22 (3.04)
Rocker Shaft-to-Cylinder Head Nuts	11 (1.52)
Heat Exchanger-to-Cylinder Head	16 (2.21)
Oil Pan-to-Crankcase Nuts	9 (1.24)
Drive Plate-to-Crankshaft	65 (8.99)
Hub-to-Crankshaft Bolt	23 (3.18)
Fan-to-Hub	14 (1.94)
Engine-to-Transmission	22 (3.04)
Oil Pump-to-Crankcase	18 (2.48)
Oil Cooler-to-Crankcase	14 (1.94)
Flywheel-to-Crankshaft	80 (11.06)
Clutch-to-Flywheel	18 (2.5)
Torque Converter-to-Drive Plate	18 (2.48)