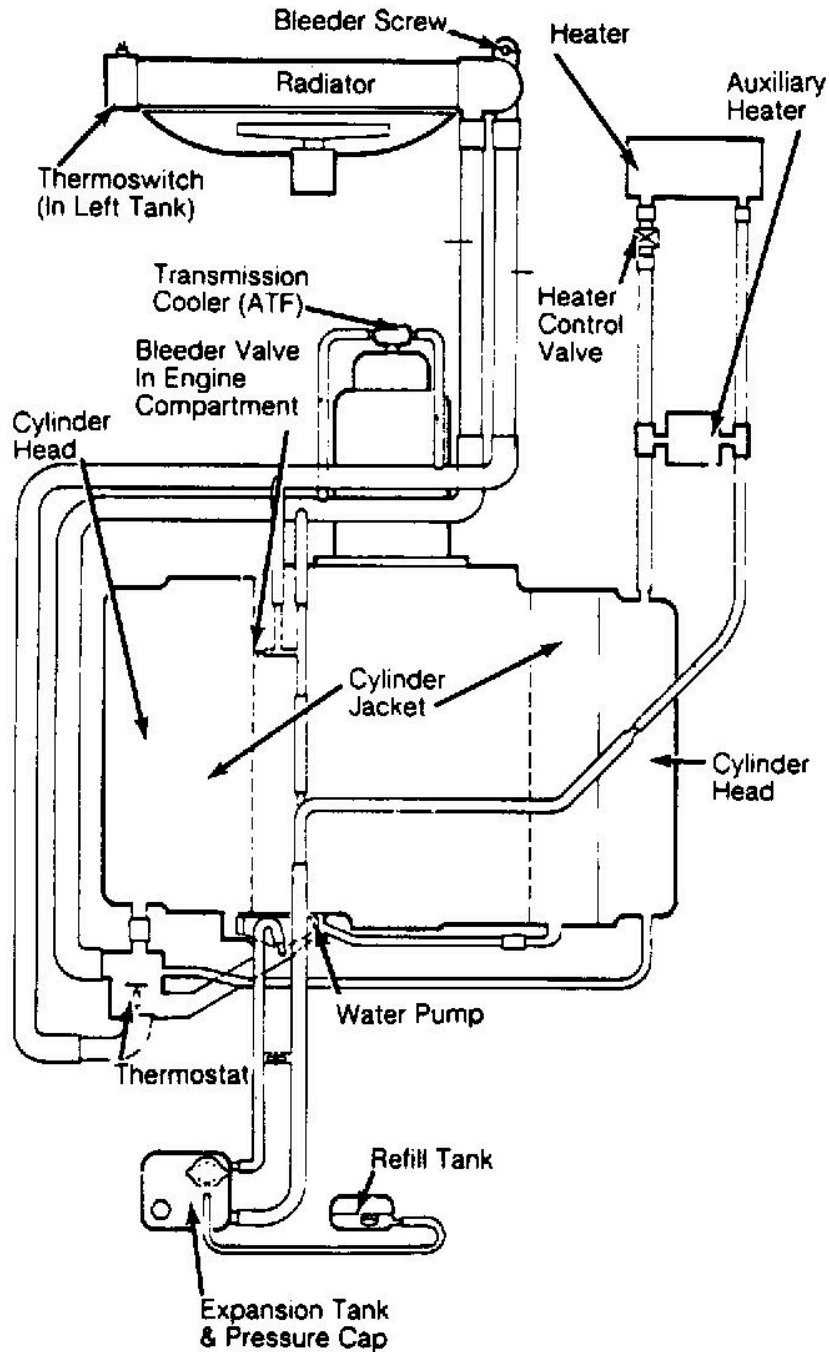


# 1991 Volkswagen Vanagon Syncro

2.1L OPPOSED 4-CYL 1991 Engines - 2.1L Opposed 4-Cylinder

corner of radiator. See **Fig. 1**.



**Fig. 1: Bleeding Cooling System**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

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2. Open bleeder valve in engine compartment (turn counterclockwise). See **Fig. 1**. Fill expansion tank until full. Start and run engine at 2000 RPM. Keep topping tank until coolant flows from bleeder screw on radiator without any air bubbles. Add coolant until tank is full, and install cap on tank.
3. Turn engine off and restart after 20 seconds. Open expansion tank cap with engine running at 2000 RPM. Close bleeder screw on radiator when coolant is flowing out. Add coolant to expansion tank until full, and close tank tightly.
4. Close bleeder valve in engine compartment. Switch engine off. Top off refill tank to maximum mark. Pressure check cooling system with engine running until cooling fan has cycled.

### ENGINE

**NOTE:** For reassembly reference, label all electrical connectors, vacuum hoses and fuel lines before removal. Place mating marks on major assemblies before removal.

#### Removal

1. Disconnect negative battery cable. Remove air cleaner with airflow sensor and air intake duct. Disconnect wires from alternator. Disconnect wiring from fuel injectors, throttle valve switch and auxiliary air regulator.
2. Disconnect 2 vacuum hoses from charcoal filter valve. Disconnect and plug fuel return line at pressure regulator and fuel line from fuel pump at "T" fitting. Remove throttle cable from throttle valve lever. On automatic transaxle models, remove snap ring and spring from throttle rod.
3. On all models, mark and disconnect coil lead and wiring plug at distributor, wiring at oxygen sensor, oil pressure switch, temperature sensor and temperature sender. Disconnect wiring to coolant level warning switch, located in expansion tank. Mark and disconnect ground leads on top left side of crankcase. See **Fig. 2**.
4. Clamp off both radiator hoses at thermostat housing. Clamp off both heater hoses at right rear side of engine compartment. Open expansion tank cap. Remove drain plugs at bottom of cylinder heads, and drain coolant. Disconnect coolant hoses from expansion tank at engine end. Remove expansion tank.
5. Disconnect brake booster vacuum line at check valve. Remove 2 upper bolts and nuts holding engine to transaxle. On models with automatic transaxle, remove 3 bolts attaching torque converter to drive plate. Access bolts through hole on top of transaxle housing. Remove rod from kickdown lever.
6. On all models, disconnect wiring at starter. On models with power steering, remove power steering pump with hoses attached. Secure pump in engine compartment. On models with A/C, remove compressor with hoses attached. Secure compressor in engine compartment.
7. Remove plates from left and right side of engine. Remove bolts from rear cover plate located at muffler, and leave plate in place. On all models, loosen transaxle mount bolts for front bracket 3 turns. Loosen lower transaxle mount bolt.
8. Attach Support Bar (VW 785/1B) so support pad is about 4.75" (120.0 mm) below transaxle housing. Support engine with Jack Adapter (US 612/5) and transmission jack. Remove 4 bolts retaining engine carrier at frame. While lowering engine, adjust angle of engine and keep wiring out of way of oil filler tube.
9. Lower engine/transaxle assembly until transaxle rests on support bar. Remove 2 lower nuts holding

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engine to transaxle. Separate engine from transaxle. On automatic transaxle models, secure torque converter in transaxle. Remove engine from vehicle.

### Installation

Check release bearing and replace if necessary. Replace all self-locking nuts. Replace coolant drain plug gaskets. To install, reverse removal procedure. Check and adjust throttle cables and linkage. Fill and bleed cooling system. See **BLEEDING COOLING SYSTEM** under REMOVAL & INSTALLATION.

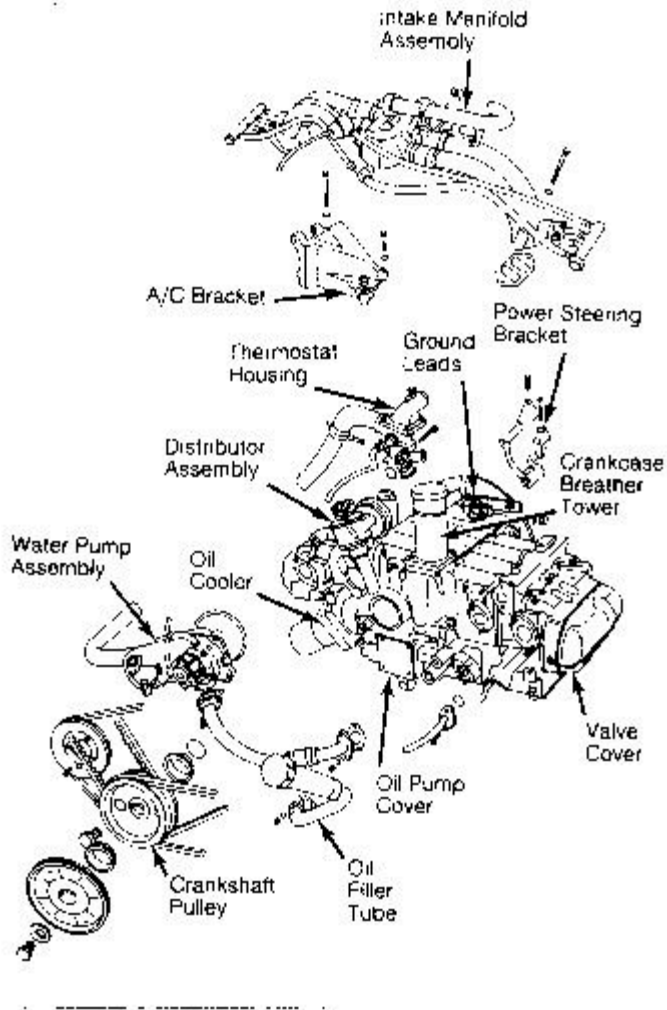
### INTAKE MANIFOLD

#### Removal & Installation

Procedures for removal and installation are not available. Remove intake manifold and throttle valve as an assembly. See **Fig. 2**. Replace all gaskets at installation.

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**Fig. 2: Identifying External Engine Components**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

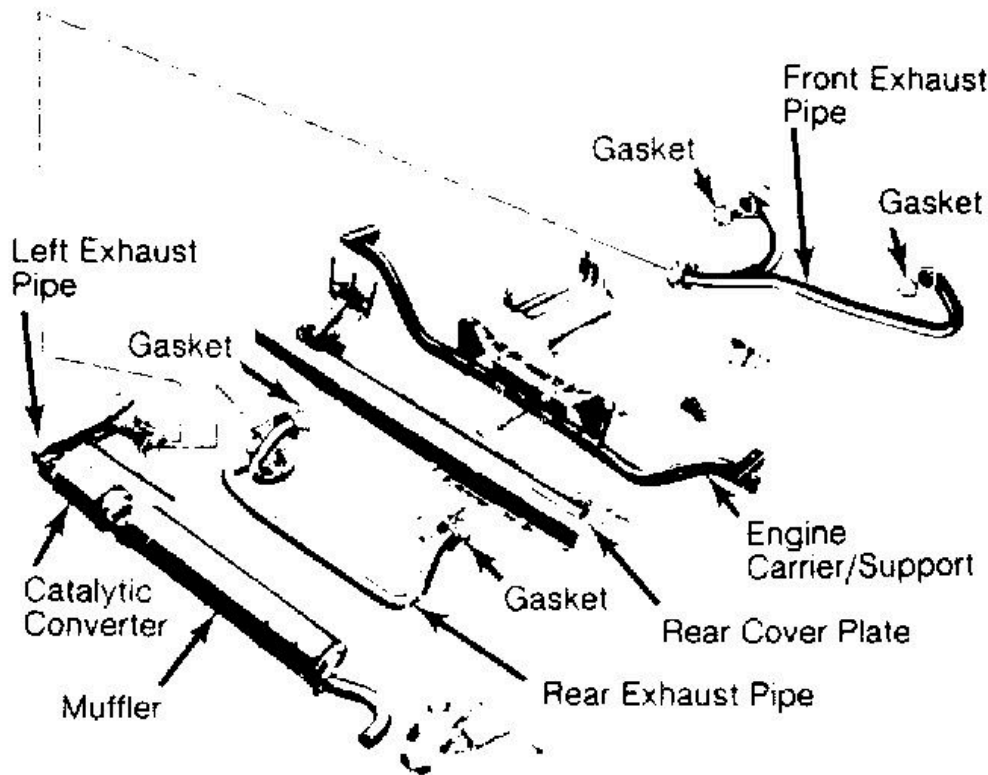
### EXHAUST MANIFOLD

#### Removal & Installation

Procedures for removal and installation are not available. See **Fig. 3**. Replace all gaskets at installation. Place metal surface of gaskets against cylinder head.

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**Fig. 3: Removing Exhaust System**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

### CYLINDER HEAD

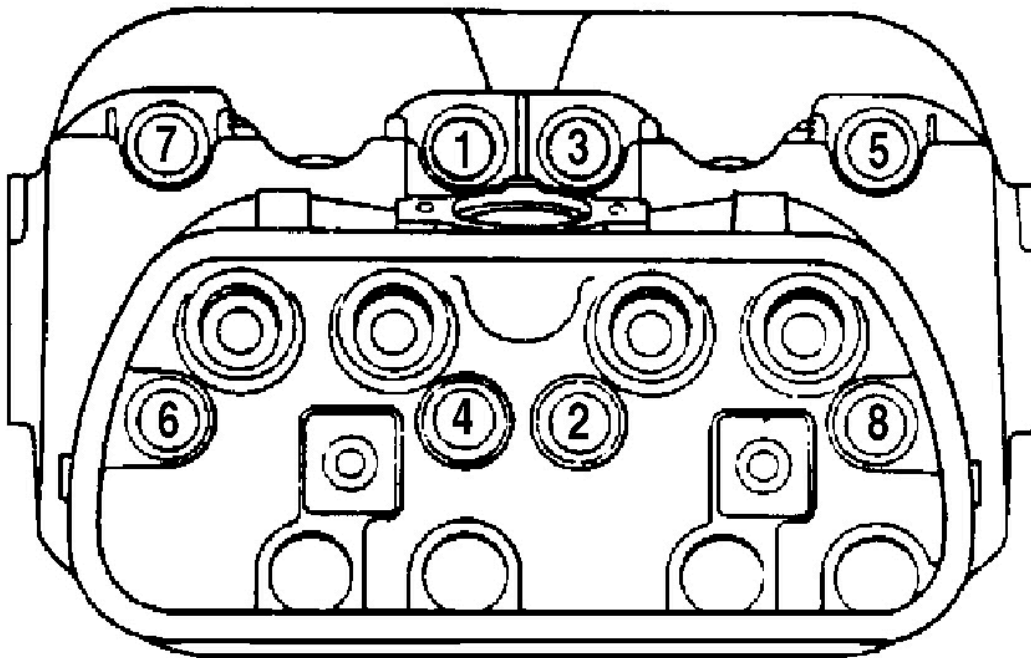
**NOTE:** Cylinder head may be removed with engine installed.

#### Removal

1. Remove rocker arm cover. Loosen rocker arm retaining nuts so tension is relieved evenly. Remove intake manifold assembly.
2. Remove expansion tank cap and drain plugs under cylinder heads. Drain cooling system. Disconnect coolant hoses at cylinder head. Remove front and rear exhaust pipes from cylinder head. Remove push rods and keep in order for reassembly.
3. Remove 8 cap nuts holding cylinder head to block. Gradually loosen nuts in reverse order of tightening sequence. See **Fig. 4**. Remove cylinder head and gasket. Remove push rod tubes. Remove metal sealing ring and thin Green "O" ring from cylinder sleeve.

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G82250

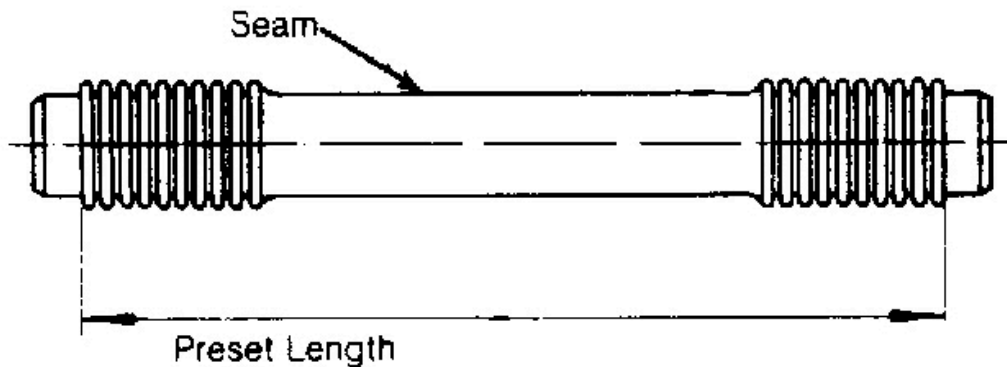
**Fig. 4: Cylinder Head Nuts Tightening Sequence**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

### Installation

1. Ensure push rod tube is about 7.64" (194.0 mm) long between inside edges of tube sealing "O" rings. See **Fig. 5**. Seam of tube faces upward and small end of tube faces cylinder head. Always use new sealing rings and thoroughly clean mating surfaces.

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**Fig. 5: Measuring Push Rod Tube Length**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

2. Clean cylinder head sealing surface. Install new thin Green "O" ring and metal gasket on cylinder sleeves. Apply a 1-2 mm bead of Sealing Compound (VW No. D 000 400) to center of new water jacket gasket.

**CAUTION: Using too much sealant may plug cylinder head cooling passages.  
Install cylinder head within 45 minutes after applying sealant.**

3. Coat sealing face of cap nuts with waterproof sealant. Install and snug cap nut at No. 1 stud to hold cylinder head in place. Install remaining cap nuts. Tighten cap nuts (in sequence) to 84 INCH lbs. (10 N.m). See **Fig. 4**. Make sure push rod tubes are correctly seated.
4. Tighten cap nuts in 2 steps (in sequence) to final torque of 37 ft. lbs. (50 N.m). Install push rods, ensuring push rods fit into cups of lifters. Install rocker assembly with slots facing upward on shaft supports. Adjust hydraulic lifters after tightening rocker arm assembly nuts. See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS. Install rocker cover with new gasket.
5. Install remaining parts in reverse order of removal. Use new exhaust flange gaskets with metal surface toward head. Always use new locking nuts. Fill and bleed cooling system. See **BLEEDING COOLING SYSTEM** under REMOVAL & INSTALLATION.

### CRANKSHAFT FRONT SEAL

#### Removal

1. Loosen A/C compressor or power steering pump (if equipped). Remove drive belts from crankshaft pulley. Loosen alternator and remove drive belt.
2. Remove coolant expansion tank and set aside. Remove screws and bolts from exhaust heat shield. Move heat shield down and away from installed position. Rotate pulley until alignment holes are horizontal.