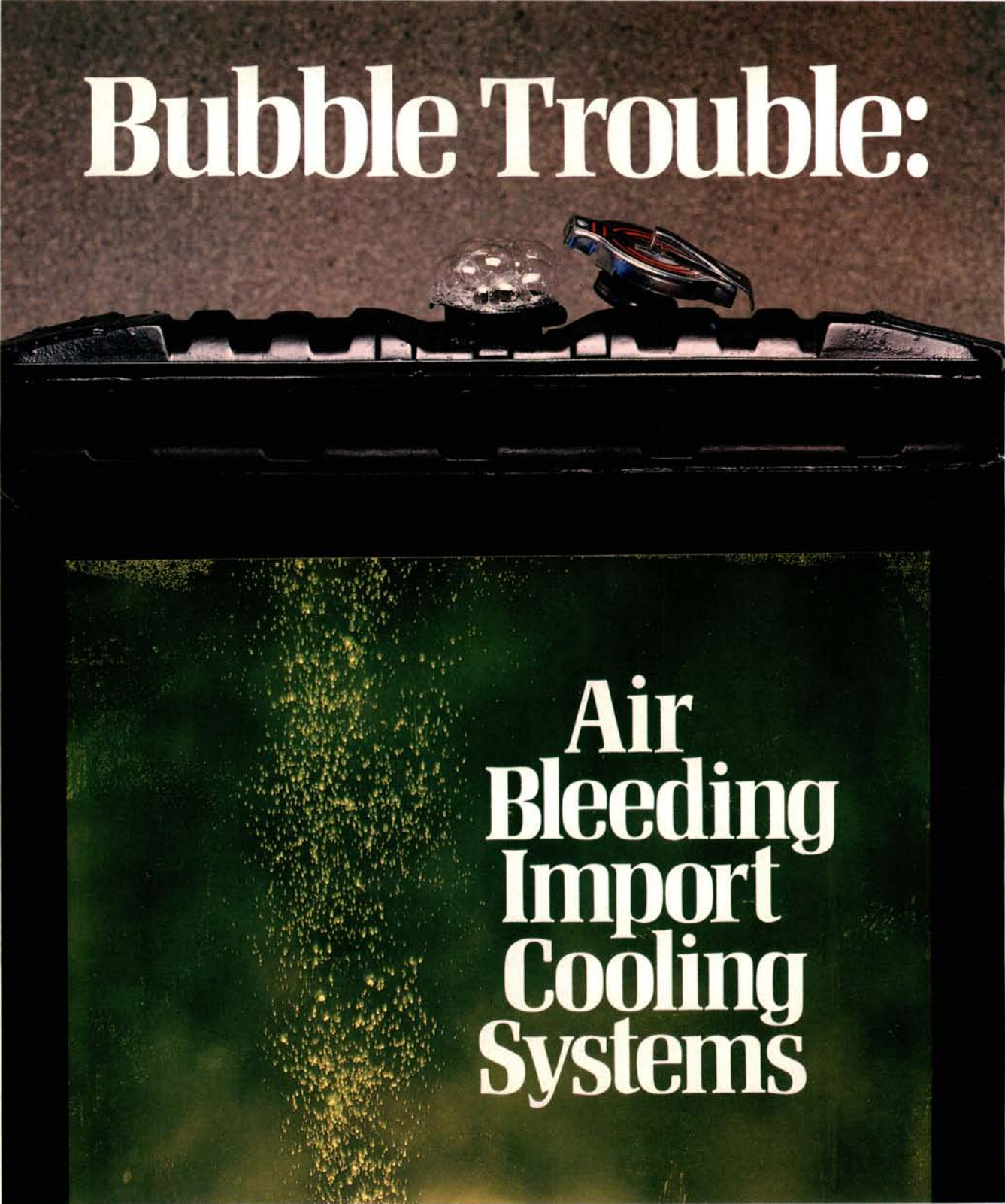


Bubble Trouble:



Air Bleeding Import Cooling Systems

I hate to admit how long it's been since I threw one of my baby daughters over my shoulder and burped her after her bottle. Let's just say it's been a while. Some cooling systems are a little like that. You fill

them, but there's some air trapped inside. Air doesn't remove heat nearly as well as coolant does, so occasionally, you have to "burp the baby" and get rid of that trapped air.

Specific air-bleeding procedures have been fairly common on imports. Some systems are very simple. Some are more complicated and require bleeding at several places due to the extensive plumbing involved. Some have electrically operated cooling fans that just won't come on unless the system is properly bled. This can cause overheating and possible engine damage.

General Considerations

Before starting with specific bleeding sequences, let's stop and look at some basic considerations dealing with cooling systems in general. If these basics aren't observed, or if the engine and cooling system have leaks, either internal leaks between cooling jackets and combustion chambers, or the more common external leaks caused by bad hoses and loose clamps, you'll never get the cooling system to work properly.

- Check for the proper concentration of anti-freeze/coolant. Too much anti-freeze is just as bad as too little. The coolant will have poor heat transfer characteristics, and may actually solidify, clogging and damaging the system. Too much anti-freeze can also damage plastic components over a period of time.

- Check all hoses and the water pump drive belt before you start. Pressure test the system and check for leaks. Check the coolant pressure cap and the condition of the coolant recovery jug. Make sure the correct pressure cap has been installed. Make sure the water pump is in good shape.

- If you've replaced the thermostat before bleeding the system, make sure you used the correct thermostat and installed it properly. Some systems require a thermostat with a small check ball or poppet vent. This vent has to be properly positioned in most vehicles, or bleeding will be difficult at best.

- On cars with low, sloping hoods, the heater core may be higher than the radiator fill neck. If the cooling system is not equipped with a bleeder valve, raising the front (or maybe the rear in some cases) of the vehicle until the radiator or fill neck is above the heater core will help to vent any trapped air.

- If a customer complains that the system has been bled repeatedly because of low coolant and borderline overheating conditions, there has to be a reason. Perhaps the thermo-sensor for the electric cooling fan is bad. Maybe the fan clutch on a pump-driven fan is slipping. Maybe the head gasket is blown. Urge the customer to get to the root of his problem, or you'll see him again—and again—and again.

- If you can't get the heater to work after repeated bleeding of the system, one way to check for a blocked heater core is to pull inlet and outlet hoses and run hot water from a garden hose through the core. Turn on the blower fan. If you have good heat, then your problem isn't a bad core, but an air pocket preventing proper coolant circulation.

- After bleeding one of these systems, make sure everything is working properly. The heater should blow hot air on request, and the electric cooling fan should cycle. On those cars equipped with air conditioning, don't forget the additional loads placed on the cooling system by the heat from the condenser. Coolant temperature has to stay within acceptable limits even with the air conditioning on.

- When you bleed a system after a head gasket replacement, carefully inspect plastic components in the system for corrosion damage. Anti-freeze/coolant can combine with exhaust gases to form a corrosive compound that can damage plastic. This compound may appear as a grayish residue in the cooling system. Replace any damaged parts and flush the system if necessary before refilling and bleeding.

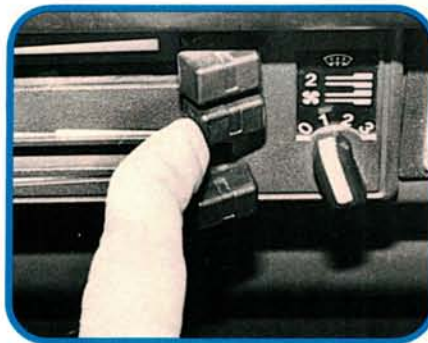
—By Ralph Birnbaum

Volkswagen Water-Boxer

Tracking the flow of coolant in the Vanagon water-boxer is a bit like tracking the Amazon river. The engine is in the back and the radiator is up front—miles away. There are a number of steps involved in properly bleeding this system.

There are two coolant jugs. One uses a vented pressure cap with an overflow hose running to a non-pressurized overflow recovery jug. The recovery jug fill cap is found to the left of the oil filler neck, behind the rear license plate.

Volkswagen recommends that you use only their approved, phosphate-free anti-freeze/coolant in this system, P/N ZVW 237 102. Use of the wrong coolant may lead to harmful deposits and overheating leading to engine damage.



1

Turn the dashboard heater control to full hot to open the heater core. The lever for heat intensity is the second one down from the top. Slide it to the far right to allow coolant to circulate through the heater core.



6

Once you've filled the radiator and replaced the cap, keep filling the system through the remote filler neck. Detach the hose from the tee as shown. Fill slowly as you squeeze and release the radiator hose. When the coolant comes to the top of the tee as shown, reinstall the hose from the filler neck.



7

Start the engine. Double check to be sure the heater valve is open. Keep the system topped-off at the remote filler neck as any trapped air escapes. Gently squeeze and release the top radiator hose to help purge any remaining bubbles. The top hose should warm as the thermostat opens.



8

The coolant will swirl and bubble as the engine warms, but you should be able to run the engine until the cooling fan comes on without having to install the pressure cap. If it does boil over before the fan comes on, there's trapped air somewhere in the system. Wear eye protection.



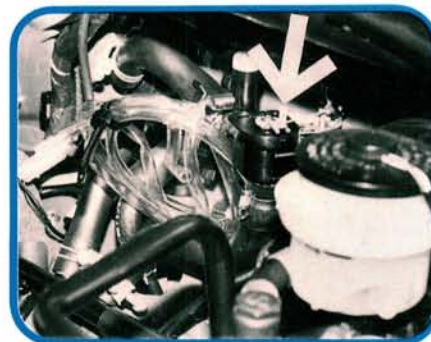
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Make sure you test the pressure cap for correct opening pressure and its ability to hold that pressure. On earlier models, this recovery jug is below the water pump, so cap operation is critical. Correct the coolant level in the jug. Test drive the car and double check for leaks.

Toyota MR2

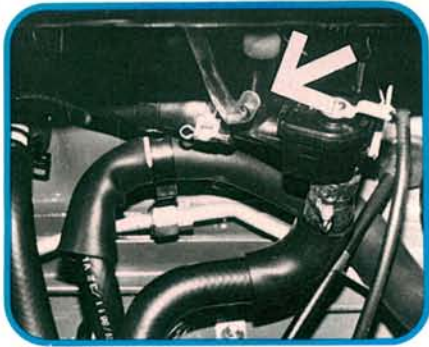
The Toyota MR2 also uses a rear engine configuration with the radiator and cooling fans up front. A combination of stainless steel tubing and rubber hoses carry the coolant over hill and dale to complete the cooling system. All the nooks and crannies are perfect places for air to get trapped. The principles involved are similar to those in the Vanagon, but there's one additional valve to contend with. The job isn't a tough one, however. The folks at the factory even provide you with some clear tubing (special tooling of sorts) to make things a little cleaner and easier for you.

Also be aware that this is a pretty good sized system for a small car. Complete refill of the system calls for 12.4 liters (13.1 quarts) of coolant mix. Keep this in mind when making estimates.



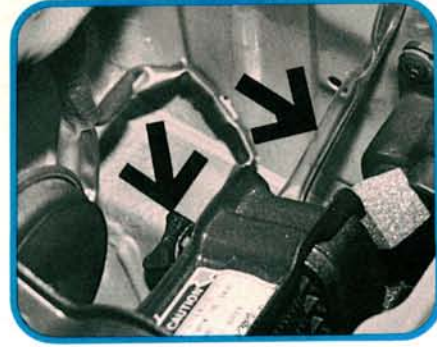
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The mid-engine Toyota MR2 has three bleeding valves, two of them in the front of the car in the luggage compartment, and one on the engine. Before you start filling an empty system, start by opening the hood. Then remove the spare tire and the trim panel behind it to expose the heater valve.



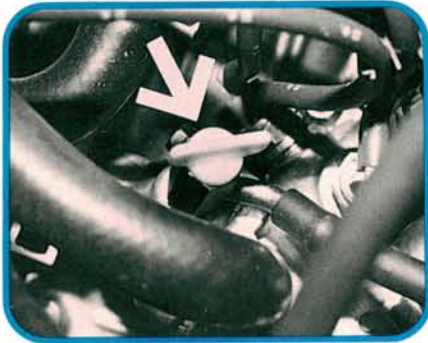
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Fully open the heater valve. Remove the two lengths of coiled service hose provided. Attach one to the bleeder on the heater valve and tape it in the air above the valve to the underside of the hood. The hoses need to be free of kinks and bends or they'll trap any air trying to escape.



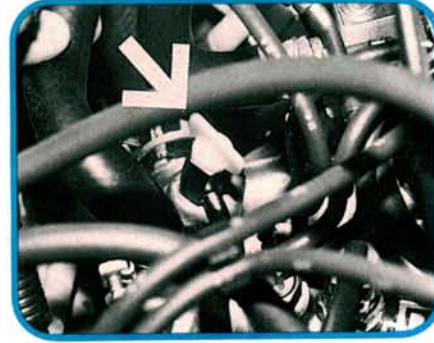
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Attach the other hose to the bleeder valve on the left top of the radiator. Tape it to the hood support rod above the valve. Be sure you don't kink the hose. These hoses were very cold from being outside. Placing them in a little warm water first made them a lot more flexible and easy to handle.



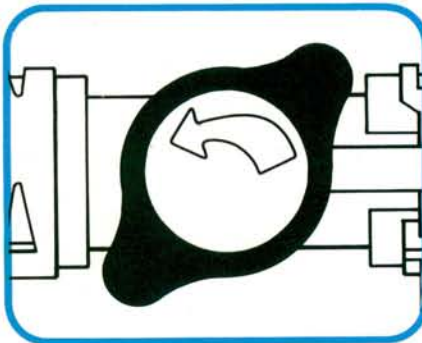
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Open the bleeder valves in the luggage compartment about three turns. Now travel back to the engine compartment and open this bleeder valve about three turns. Remove the pressure cap at the fill neck in the engine compartment and begin slowly adding coolant mixture.



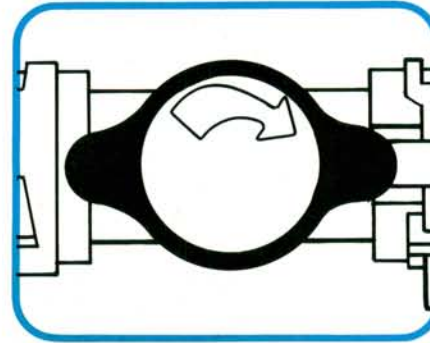
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When coolant begins flowing from the engine compartment bleeder, close it. Continue adding coolant slowly until the coolant level in the service hoses is as high as the coolant in the fill neck in the engine compartment.



6

Close the heater valve bleeder and radiator bleeder. Remove the service hoses. Be careful to catch any remaining coolant in the service hoses in a rag. Install the pressure cap to its first stop and run the engine at fast idle for about three minutes.



7

If the coolant level goes down a bit at the fill neck after running the engine, top it off. Reinstall and fully tighten the pressure cap. Correct the coolant reservoir fluid level and you're done. Toyota suggests you have the customer return in a week or 300 miles to recheck the coolant.