

## **Installation of the Vanistan Fan-equipped Oil Cooler Kit**

### ***Parts included in the kit:***

- (1) Mocal thermostatic sandwich adapter with BSP-8/JIC-8 male/male adapter fittings installed
- (1) 3/4"-16 female/male nipple extension fitting to secure sandwich adapter
- (1) oil cooler/fan assembly with main cooler support plate, temp probe and wiring attached
- (1) rear cooler support plate
- (2) rear cooler support plate securing tabs
- (2) oil hoses with straight AN-8 spin-on female fittings. The two hoses are the same length
- (1) 2.5" flexible duct hose
- (1) 2" ABS pipe, 3" long
- (2) hose clamps for flex hose
- (4) #10x1/2" hex-head sheet metal screws
- (2) M4 hexbolts
- (2) M4 plain nuts
- (2) M4 flat washers
- (2) M4 nylock nuts
- (1) Thermostatic relay controller

### ***Tools needed:***

- 1" thin-wall deep socket wrench for sandwich adapter retainer/nipple extension.
- Two 22mm or 7/8" open-end wrenches
- 27mm or 1 1/16" open-end wrench or large crescent wrench
- #2 Phillips screwdriver
- 7mm combination wrench
- 7mm socket
- 5/16" socket
- 5/16" combination wrench
- Electric drill.
- 1/8" drill bit
- center punch
- bent scribe
- Voltmeter or 12V testlight

**Note:** All directions are from the driver's point of view; front is always toward the front of the vehicle, left is always toward the driver's left, etc.

**Note:** All Syncros and some 2WD Vanagons have a plastic intake air duct snorkel within the D-pillar. This kit provides a means of attaching the 2.5" flexible duct hose to the existing snorkel. The main reason to keep the snorkel is in case of wading in deep water, but for that to protect the engine from intaking water (which can destroy it in short order) the snorkel needs to be sealed tightly enough to exclude water. The Syncro fuel filler box and snorkel tube together reduce the area for airflow, so if desired the snorkel tube can also be removed so the maximum airflow will be available to the cooler, making oil cooling less dependent on the fan-assist. With the oil cooler installation the engine will still draw all its intake air from the D-pillar duct, so this is no detriment to the engine. To detach the snorkel from its hangers you must remove the plastic grille on the outside of the rear pillar.

First remove the right rear taillight assembly's 4 Phillips-head screws. Disconnect the electrical plug and set the taillight aside. Parts of the installation will be performed by working thru the taillight opening.

Remove the Syncro dust separator cyclone box and the rubber coupling that attaches it to the air filter box.

Remove the plastic or fiberboard blockoff plate that covers the cavity at the base of the right rear D-pillar by prying off the small retainer clips. Remove the short air inlet flex hose.

### Relocate the Idle Speed Control Unit:



On '86 and later vans, the Idle Speed Control Unit (ISCU) is mounted to the front wall of the pillar cavity (it looks like a double-width relay box). Remove the controller still attached to its base connector by sliding the connector up and out of the plastic mounting bracket. Swing the controller out of the way, then remove the two screws that hold the plastic mounting bracket to the front wall of the cavity.

The plastic mounting bracket can be remounted on the rear surface of the engine bay, above and to the right of the power steering fluid reservoir. To prevent the base from turning, drill an extra hole in the backplate of the base, like the second one from the left in the picture upper-left.



Then drill two holes and use the bracket's two screws to attach the base to the rear of the engine bay like in the picture far left. Swing the controller on the end of its wiring harness out across and pop it back into place in the mounting

### Install the Cooler/Fan Assembly:



The cooler/fan assembly will be mounted within the D-pillar cavity, with both its hose fittings facing to the rear.

Take the cooler/fan assembly and insert it temporarily into the cavity space. You have to tilt the bottom edge into cavity first to clear the little stud that formerly held one of the clips for the blockoff plate that you have already removed. The stud can be broken or cut off if desired or if it interferes with the installation.

Push the assembly flat against the front wall of the cavity, and slide it into the cavity so the the left edge of the front cooler support plate aligns with the edge of the cavity wall where it meets the main engine bay. The assembly should be resting flat on the floor of the cavity. The photo middle left shows the assembly in position.



While holding the assembly in this position, mark where the two screw holes are in the forward cooler support plate. Use a marker or bent scribe to make center marks for the two holes that are against the cavity forward wall.

Then remove the cooler/fan assembly from the cavity. Center punch the two hole marks, then drill the two holes with a 1/8" bit. To make it easier to install the two sheet metal screws straight in the drilled holes when the cooler is final installed, you may pre-thread them partway into the holes now with the assembly removed.



If you plan to remove the snorkel tube or your van doesn't have it, then the duct hose can be installed later as described on p. 6.

If you wish to keep the stock snorkel tube, now you must attach the intake air flex hose to the end of the intake snorkel inside the cavity. Use the 3" piece of ABS pipe as a coupling, and slip the flex hose onto it, using the hose clamps provided. Lay the flex hose across the floor of the cavity at the rear as shown left.



Install the two M4 hexbolts thru the two small holes in the rear cooler support plate and run the two M4 plain nuts all the way down the bolts as shown far left. Tighten the bolts and nuts firmly so the bolts act as studs and won't turn when you run the last two M4 nylock nuts down them in the next step.

while guiding the oval hole over the duct hose. In final position it should be vertical and backed up against the body gusset visible thru the taillight opening as shown above right (the duct hose is not being used in this photo; later photos show how the duct hose fits thru knocked-out oval in the support plate). Put the two rear support plate retaining tabs over the bolts in the plate, and put an M4 washer and M4 nylock nut on each bolt. Position the tabs over the body gusset as shown, and tighten the nuts just enough to hold the support plate loosely in place.

If using the snorkel, take the rear cooler support plate, and slip it into the cavity



Slip the cooler/fan assembly back in place. It may help to use your bent scribe to pull the rear cooler support plate back to allow enough clearance to move the cooler/fan assembly into place, as shown at left.



When it is slid all the way in, attach the front plate to the front wall of the cavity with two of the #10 hexhead sheet metal screws, as shown at left.



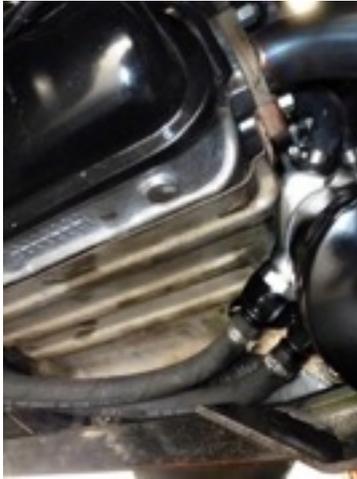
Align the holes in the edge of the rear cooler support plate with the clipnuts in the bent flange at the rear edge of the cooler/fan assembly. Attach the relay controller base and rear cooler support plate to the cooler/fan assembly with two of the #10 hexhead sheet metal screws provided, as shown at left. The controller base's wiring connector socket should be on top.

Final check the overall position of the cooler/fan assembly, that the cooler face is parallel to the lower edge of the cavity opening, etc. Gently tighten all the sheetmetal screws and the two M4 nylock nuts to secure the assembly in place.

Insert the wiring harness connector into the controller base socket, latch tab upwards, and push it in until the latch tab clicks.

### Install the Thermostatic Sandwich Plate Adapter and Oil Hoses:

**Note:** the sheetmetal cover under the left head pushrod tubes can be deleted, or if you wish to use it with this kit, you will need to remove it and notch the rear edge to allow clearance for the hoses and fittings where they leave the sandwich plate. Be careful that no cut edges can contact the hoses in that area. A completed installation using the cover is shown below (I also offer stainless steel pushrod cover shields that attach to the tubes rather than to exhaust studs so they're easy to service, these shields already have a clearance cutout for the sandwich plate and hoses. Contact me at [info@vanistan.com](mailto:info@vanistan.com) for details.)



Remove the oil filter and wipe the filter mounting flange clean.

**Tip:** while the filter is off, check the nut tension holding the oil/water heat exchanger (OWHX) in place to ensure the OWHX doesn't move when the sandwich adapter is final-tightened. Book torque spec is only 18ft.lb., but this nut should really be at least 30ft.lb.

Coat the rubber gasket on the top of the thermostatic sandwich adapter lightly with clean oil, and hold it up in place on the filter flange with the two fittings pointing forward and at a downward angle, while you thread up the nipple extension fitting to center up the adapter. At this time screw the nipple extension on only until snug.

Examine the two oil cooler hoses. They are the same length. Make sure the fittings are clean, and never use sealant or tape on them; they thread up dry and seal with direct metal-to-metal contact with fairly little torque. Do not tighten the fittings until both hoses are routed and all fittings are loosely threaded.



Loosely thread one hose to the top fitting on the oil cooler. This is the return hose, so to keep track of it you should put a wrap of tape on its opposite end. This hose must attach at the lower fitting on the sandwich adapter, which is the return port. That way the fan control thermocouple probe near the upper fitting of the cooler will be measuring the return flow temperature, and will only run the fan for additional cooling if the oil cooler is unable to lower the oil return temp to the set temperature with the available airflow. Reversing the hoses from this method will result in overcooling the oil, which is undesirable.

Loosely thread the second hose on the lower oil cooler fitting. Now run the other ends of both hoses diagonally across the top of the engine as shown upper left, and down thru the opening between the left side of the bellhousing and the thermostat housing. The hoses will run thru this area, down the front side of the left cylinder bank (shown center left), and curve underneath the engine to attach to the sandwich adapter.



**Tip:** to avoid getting dirt in the fittings put the hose ends in a plastic bag with a twist-tie to keep it in place before pushing the hoses down thru the gap.



Now bring the hoses to the sandwich adapter fittings and thread them up, being sure that the hose from the upper cooler fitting is going to the lower sandwich adapter fitting. The final fitment will look like at left.

Once the hoses are laid out where you want them and loosely threaded up at all four fittings, tighten them with the two 22mm(7/8") open-end wrenches at the cooler, and the 27mm (1 1/16") open-end or crescent wrench and one 22mm wrench on the sandwich adapter fittings. Always hold another wrench on the stationary fitting in order not to stress it, especially on the oil cooler itself as the cooler's fitting bosses can be broken off easily. The spin-on hose fittings don't need to be very tight; this type of fitting makes a good seal dry with only moderate torque, about 15-20 ft.lb., and should never be torqued more than about 25 ft.lb. or the swivel fitting can be cracked.



Before final-tightening the nipple extension, turn the sandwich adapter so that there will be room around both fittings to get an open-end wrench on them for service. Holding the sandwich adapter in that position, tighten the spigot extension with a 1" thin-wall deep socket to about 30 ft.lb. You may find that the adapter wants to turn clockwise as the nipple extension gets tightened; if so, loosen it a bit and compensate for the movement by turning the adapter a little counterclockwise first, so that it ends up at the intended angle when the nipple extension is fully tightened. Be very careful that the oil/water heat exchanger does not turn, it's seal could be disrupted.

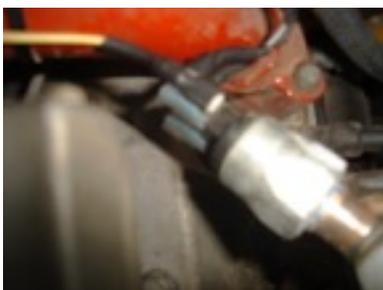
### **Install Wiring:**

The bundle of four wires should extend alongside the oil hoses toward the alternator.

The red wire with large ring terminal should be attached to the main positive post on the alternator, the stud with two thick red wires already bolted to it. Be careful when working on this connection because it is direct to the battery with no fusing; as a precaution you should disconnect the ground cable from the vehicle battery first. You can use an extra M8 x 1.25 hex nut to secure the ring terminal to the alternator post if there are enough threads exposed, otherwise remove the nut that is there and add the ring terminal to the others on the post and secure with the nut.

The black wire with small ring terminal is grounded; it can attach to any of the alternator chassis thru-bolts, there are several around the perimeter of the chassis. Slip the ring terminal over the bolt end and secure with the M5 washer and nut provided.

Lastly, the yellow wire has to be connected to a switched 12V power supply, so that the fan will only run when the ignition is on. There are two locations close to the oil cooler where this can be attached:



Most late Vanagons are equipped with power steering. Find the P/S pressure switch mounted to the P/S pump, just to the right and below the alternator. Disconnect the two wires from the pressure switch, connect your testlight or voltmeter to ground (the alternator chassis or engine block are grounded), switch on the ignition, and probe both wires; one should go hot, the other does not. Mark the hot wire with tape or marker, turn the ignition back off, and push the hot wire's connector onto the yellow wire's piggyback connector. Now the ganged wires and the other wire can be reattached to the pressure switch. It doesn't matter which spades on the switch they go to, it has no polarity.

Alternately, if the vehicle does not have power steering, in the wire bundle going to the Idle Speed Control Unit is a switched power supply that can also be used for this.

On '86 and '87 Syncros, it should be the only black wire in the bundle. On 88-90 Syncros it should be the red/white wire. Since there are many variations in wiring, though, verify that the wire you plan to connect to does go hot when the ignition is on, test this by removing the ISCU from its connector and probing the wire. Then you will need to cut off the yellow wire's piggyback connector, pull the yellow wire out of the fan controller wire bundle, and use a Skotchlok connector to patch the relay wire to the ISCU's ignition-on hot wire.

The green wire is unused in this application. It is a positive trigger wire; applying positive power to it would make the fan run regardless of temp. The oil hoses can be bundled together with wire ties at intervals, and the controller wire bundle tied along the hoses between the cooler and alternator.

### Install flexible duct hose:

On Syncros, if you earlier joined the duct hose to the snorkel tube, slip the new flex hose over the cyclone dust separator box inlet. The fit can be quite tight, so try "screwing" the cyclone box's inlet spigot into the duct hose, then reconnect the dust separator box to the air filter housing.



On non-Syncros without a cyclone box, the duct hose will connect directly to the inlet spigot of the air filter box as at left. If you didn't earlier join the duct hose to a snorkel tube, you should be able to "screw" the duct hose onto the air filter box inlet, secure it with a clamp, and then bring the free end of the duct hose to the oval hole in the rear cooler support plate and slide it thru, as shown lower left



There is some variance in the sizing of the air filter inlet spigots, so if the duct hose won't "screw" on over the spigot, and you haven't used the 3" piece of 2" ABS pipe to connect to the snorkel tube, push the ABS pipe into the inlet spigot of the air filter housing, until it will stay in place by friction-fit. Then attach the duct hose to the ABS pipe and clamp in place.

Just like the stock arrangement, whether there is a snorkel tube or not, this duct lets the engine draw cooler and cleaner air from the D-pillar vent behind the cooler, instead of hot dusty air from the engine compartment.

#### Priming, Starting, Leak-Checking:

Prefill your oil filter with clean oil and reinstall hand tight. The filter seals swell in use so the filter will become tighter, so it's important not to overtighten when installing. Overtightening the filter may result in the sandwich adapter moving or the spigot extension fitting loosening when you try to remove the filter. If this ever occurs, recheck the sandwich adapter position and tightness of the spigot extension fitting

before installing the filter again, and use less torque on the filter next time.

Start the engine and shut down after the oil pressure warning light goes out. The oil cooler will self-prime in a few seconds when the engine runs, and doesn't need any air bleeding, nor does it need to be specially drained during a routine oil change. It adds about 1 pint (~500ml) to the engine oil capacity. After getting oil pressure, let the oil settle for several minutes and check the level, you will probably need to add about a pint of oil to bring the level back up after the cooler circuit is filled.

As always with waterboxer engines, the oil level should not be filled to the top notch on the dipstick, but instead kept between the notches, closer to the lower notch is generally a better level to keep the oil. The cooler will not effect where you keep the oil level once it has been primed.

I like to leave the taillight assembly out until the engine has been run warm, so I can more easily check that all the oil cooler fittings are leak-free. Once you have verified that, reconnect and remount the taillight assembly.

The cooler takes advantage of ram-air flow down the D-pillar when the van is moving, which at speeds above 25-30mph is quite adequate to keep the oil at less than 225F in most conditions. At lower speeds on normal roads or in stop and go traffic, rpms are generally lower on average and the oil doesn't heat up much under those operating conditions. Hard climbing in low gears but with sustained higher rpms, such as when offroading in your Syncro, can heat the oil, so in that case the fan can kick in to provide airflow.



The temperature at which the fan controller will trigger the fan relay is adjustable. It is shipped with a setting that will trigger the fan at around 200-210F (93-99C). If you want to adjust the temp setting, there is an adjustment screw under the small rubber plug below the relay on the controller plate. Remove the rubber plug, and use a jeweler's screwdriver to adjust the small pot: clockwise raises the temperature trigger point. The pot will only move  $\frac{3}{4}$  of one full turn, so turn it gently. Make very small adjustments and test drive awhile to see the results, you of course will need an oil temperature gauge to do this. The settings full range is ~150-240F (65-115C). When the screw slot is vertical, the setting is about 200°F.

The thermostatic valve in the sandwich adapter allows for quick warmup and prevents overcooling because it allows oil to bypass the cooler until the oil temp has reached 180F (82C), but even while the bypass is open it creates a slow flow of oil thru the cooler circuit so the cooler is not holding a slug of cold oil when full flow is diverted to it.

**Notes on oil hoses:** Handle the oil hoses gently, avoid kinking or sharp bends. Take care when using any sharp tool near hoses. When installing, avoid forcing hoses to bend within 2" of the end fitting.

Hoses should be inspected regularly for physical damage, loose fittings, or developing leaks. Hoses can be kept clean by wiping down with a clean rag sprayed with WD40.

The two oil hoses can be bundled together at intervals with plastic zip-ties if desired. Additional protection such as sleeve wraps can be applied as you see fit. One place that I think it is wise to cover them with something fairly tough is where they cross the plane of the engine drive belts above the alternator, so they aren't lacerated if a belt gets thrown. Some heavy polyethylene plastic cut from a container, or some aluminum flashing sheet can be used to make a sleeve around both hoses there, held in place by zip-ties. Be careful that anything used to cover hoses does not have sharp edges that could lacerate them.

All hoses have a limited service life, these can be expected to provide good service for about 6-8 years, regardless of mileage. I can supply replacements on request for a reasonable cost.

Enjoy your Vanistan engine oil cooler!

Chris Corkins  
Vanistan  
**Abiquiu, NM, USA**  
[www.vanistan.com](http://www.vanistan.com)  
[info@vanistan.com](mailto:info@vanistan.com)