

February 15, 2007



The Old Volks Home

Vanagon Instrument Cluster w/Tachometer Retrofit

A popular retrofit to 1980 to 1984 Vanagons is the installation of the Instrument Cluster equipped with a Tachometer utilized by later models. The obvious benefit is to monitor the RPM's of the engine and a more (usually) reliable LCD Clock. However, in some cases, it is not a direct swap and involves changes in either speedometer, speedometer cable, proper electrical connections or all of the above. The purpose of this PDF is to cover all of the bases required to do a trouble-free installation. Please note - these procedures are for USA market Vanagons.

1. First - Let's identify the various Vanagon Models

"L" Basic Vanagon Model

"GL" Deluxe Vanagon to include Campmobile (Westfalia) Models

NOTE: All different engine equipped vehicles can either be "L" or "GL" Models

2. Second - lets identify the various Instrument Clusters w/o Tachometer used on the Vanagon through 1984:

A. 80-81 L Air Cooled w/Speedometer w/o Trip Odometer & w/o Analog Clock

B. 80-81 GL Air Cooled w/Speedometer w/Trip Odometer & w/Analog Clock

NOTE: The above Speedometers use an Upper Cable that SCREWS on to the Speedometer Head.

C. 82-83.5 L Air Cooled w/Speedometer w/o Trip Odometer & w/o Analog Clock

D. 82-83.5 GL Air Cooled w/Speedometer w/Trip Odometer & w/Analog Clock

E. 82-83 L Diesel w/Speedometer w/o Trip Odometer & w/o Analog Clock &

with Coolant Temperature Gauge

F. 82-83 GL Diesel w/Speedometer w/Trip Odometer & w/Analog Clock &

with Coolant Temperature Gauge

G. 83.5-84 L Wasserboxer w/Speedometer w/o Trip Odometer & w/o Analog Clock &

with Coolant Temperature Gauge

H. 83.5-84 GL Wasserboxer w/Speedometer w/Trip Odometer & w/Analog Clock &

with Coolant Temperature Gauge.

NOTE: The 82-84 Speedometers use an Upper Cable that is PUSH/CLIP-ON to the Speedometer Head.

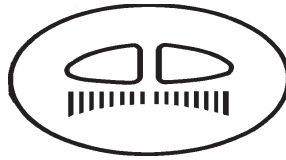
NOTE: "L" Models could be optionally upgraded to the "GL" Instrument Cluster, so this may be present on YOUR Vanagon. In fact, YOUR Cluster could have the "L" Speedometer w/Analog Clock too. It just depends on what the Original Owner got when the vehicle was originally purchased and possibly optioned for OR what subsequent owners may have replaced over the years.

NOTE: 1984 Wolfsburg Vanagon (Option S707) Wasserboxer engined models came equipped with the Tachometer and LCD Clock, which is essentially the 1985 Instrument Cluster.

NOTE: Diesel engined Vanagons never came equipped with the Tachometer and there are no provisions to use the Tachometer equipped Cluster, so these procedures are for Gasoline engined vehicles.

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3. Third - Let's identify the various Instrument Clusters w/Tachometer used on the Vanagon from 1984:

- A. 1984 Wolfsburg Model Wasserboxer w/Speedometer w/Trip Odometer
- B. 1985 L or GL Wasserboxer w/Speedometer w/Trip Odometer (including Wolfsburg Models)
- C. 86-91 Wasserboxer Models (2wd) w/Speedometer w/Trip Odometer

NOTE: 1984 & 1985 Instrument Clusters are essentially the same, even though VW had different numbers for each.

NOTE: 86-91 Instrument Clusters are equipped with the "Dynamic Oil Pressure Warning/Buzzer" System. Even though the 84-85 Instrument Cluster has the Circuit Foil present, there is no Circuit Board Assembly within the Speedometer Head Assembly as is in the 86-91 Speedometer Head Assembly.

4. Although any of the above Instrument Clusters will work in your 80-84 Vanagon, my preferred Cluster to use is the 84 Wolfsburg Model or the 85 Model as you don't have to deal with the modification to disable the Dynamic Oil Pressure Warning/Buzzer System of the 86-91 Cluster. But since 84 Wolfsburgs or 85 Model Clusters can be scarce depending on where you can source one, I will provide details towards the end of the conversion procedure on how to disable the Dynamic Oil Pressure Warning/Buzzer System when using an 86-91 Cluster.

5. CAUTION: Instrument Cluster Circuit Foils are very fragile regardless of age. Continuous bending or abuse of the connecting points will render the Circuit Foil useless and can be expensive to replace new from the Volkswagen Dealer. Exercise care if and when you have to remove and/or replace a Circuit Foil. For the purposes of this upgrade/conversion, the foil should not have to be removed or replaced, but care should be taken at the 14 Pin Flat Connector point on the Instrument Cluster as to not wear the copper tracings present on the foil and that may prevent a good, positive connection.

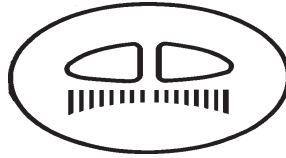
6. Let's identify the wires to the 14 Pin Flat Connector for the 80-84 Vanagon (Except Wolfsburg Model):

PIN	Wire Color	What It Does
1	Vacant	Nothing Goes Here!
2	Brown	Ground
3	White w/Blue Stripe	Instrument Lighting
4	Blue w/White Stripe	High Beam Indicator
5	Brown	Ground
6	Yellow w/Red Stripe	Coolant Temperature
NOTE: Pin 6 is Vacant on Air Cooled Models		
7	Red	Clock Power (If not installed, this is Vacant)
8	Purple w/Black Stripe	Fuel Gauge
9	Black	Main Power when Ign Switch is ON
10	Blue w/Black Stripe	Oil Pressure Indicator
11	Green w/Black Stripe	OXS/EGR Indicator
NOTE: On 1983 Diesels, this is for the Glow Plug Indicator and the wire is Blue w/Green Stripe		
12	White w/Red Stripe	Diesel (1982 Only) Glow Plug Indicator
NOTE: Pin 12 may have a wire present on Gasoline Models - it goes NOWHERE.		
13	Blue	Alternator Indicator
14	Blue w/Red Stripe	Turn Signal Indicator

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7. Let's identify the wires to the 14 Pin Flat Connector for the 1984 Wolfsburg Model, 1985 Models and 86-91 Models:

PIN	What It Does
1	Instrument Lighting
2	High Beam Indicator
3	Ground
4	Vacant
5	LCD Clock Power
6	Coolant Temperature Gauge
7	Fuel Gauge
8	Main Power When Ign Switch in ON
9	Tachometer (NOTE: Wire Color is Green on Original Installation)
10	Turn Signal Indicator
11	Alternator Indicator
12	Vacant (1984 Wolfsburg & 1985 Only)
NOTE: Pin 12 - 86-91 Models - Dynamic Oil Pressure Warning/Buzzer System Circuit Board	
13	Oil Pressure Indicator
14	OXS Indicator

Now that we've properly identified the differences between the Instrument Clusters, let's begin to begin the Upgrade/Conversion.

8. **WARNING!** Remove the Battery Ground Strap before performing this Upgrade Conversion!

9. Remove the Instrument Cluster Cover by grabbing and lifting up with your fingers at the two depressions in the front corner(s) of the Cover. Some are easy, some are a bit difficult, so exercise patience. After removal, there may be a translucent/protective cover. Remove that as well.

10. On the left side of the Cluster, remove the Seat Belt/Brake Warning Light Assembly complete. You will re-use your original one for it to work correctly. Do not use the later style or the Brake Warning Light will stay ON.

11. On the left side of the Cluster, remove the Headlight Switch complete from the Cluster by depressing the lock tabs and pulling back from the Cluster Face. Keep the switch connected to its terminal connector block.

12. On the right side of the Cluster, remove the Rear Window Defogger Rocker Switch by depressing the lock tabs and pulling back from the Cluster Face. Keep the switch connected to its terminal connector block.

13. On the right side of the Cluster, remove the Emergency/Hazard Light Rocker Switch by depressing the lock tabs and pulling back from the Cluster Face. Keep the switch connected to its terminal connector block.

14. On the right side of the Cluster, if you have an additional switch in the bottom right, remove that as well. If it just contains a blank, leave it in place for now.

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15. Locate the 4 mounting screws that hold the Cluster in place to the dashboard and remove.
16. Carefully pull the Cluster up and towards you. Remove the Speedometer Cable from the Speedometer Head.
17. Carefully remove the 14 Pin Flat Connector from the Cluster.
18. Now remove the Cluster and set it in a safe place for now.

Now it's time to switch the wires in the 14 Pin Flat Connector so that gauges and indicator lights work properly on your 80-84 Vanagon.

19. Carefully open the hinged door on the Connector. Note that the #1 Pin is VACANT, with no wire. Now follow each step EXACTLY one-by-one.

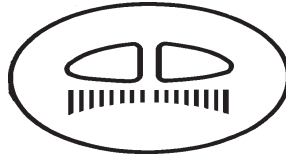
- A. Remove White w/Blue Stripe Wire from Pin 3 and re-insert into Pin1.
 - B. Remove Brown Wire from Pin 2 and re-insert into Pin 3.
 - C. Remove Blue w/White Stripe Wire from Pin 4 and re-insert into Pin 2.
- NOTE: Pin 4 remains Vacant, no wire inserted there.
- D. Remove White w/Red Stripe Wire from Pin 12. Do not re-insert it anywhere, because on Air Cooled & Gas Water Cooled it goes NOWHERE to begin with (It's a "Diesel Glow Plug thing").
 - E. Remove Brown Wire from Pin 5. Cut about 2 inches and keep the connector & wire for Step 21. Splice the remaining Brown Wire to the Brown Wire that goes to Pin 3.
 - F. Remove the Red Wire from Pin 7 and re-insert into Pin 5.
 - G. Remove the Purple w/Black Stripe Wire from Pin 8 and re-insert into Pin 7.
 - H. Remove the Black Wire from Pin 9 and re-insert into Pin 8.
 - I. Remove the Green w/Black Stripe wire from Pin 11. Leave it loose for the moment (See Step 19M).
 - J. Remove the Blue wire from Pin 13 and re-insert into Pin 11.
 - K. Remove the Blue w/Black Stripe wire from Pin 10 and re-insert into Pin 13.
 - L. Remove the Blue w/Red Stripe wire from Pin 14 and re-insert into Pin 10.
 - M. Remember that Green w/Black Stripe wire from 19I above? Re-insert that into Pin 14.
- NOTE: If you're using a Cluster from a late 89 thru 91 model, it may not have an "OXS" Indicator. If you don't have one, skip this step. Tape up the metal connector end with electrical tape and leave it loose.

OK, the only Vacant Pin holes right now are 4, 9 and 12. Pin 9 is where the Tachometer signal goes. Pins holes 4 and 12 will remain Vacant when you're done.

20. String a wire (16 or 18 gauge is fine) from the Cluster area to your Engine Compartment. Connect the Engine side of the wire with a 1/4" Female Push-on to Terminal #1 on the Ignition Coil. This is also known as the NEGATIVE side of the coil.

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Most 80-83.5 Air Cooled Vanagons I've worked on have a Plastic 2 Pole Connector that attaches to this side of the coil, with mostly wires going to the OXS Relay (Calif Models) and the Fuel Injection ECU and a Black Wire going back to the Electronic Ignition Module (ICU) (Calif Models). On Federal Air Cooled Models w/Points Ignition, there is usually only one White Wire coming off this side of the Coil to the Fuel Injection ECU. If both sides of the Plastic Connector is being used, especially on California Models, you will need to splice the Tachometer Signal Wire into one of them (I prefer the Black Wire going to the Ignition Control Unit (ICU). (WARNING: Do not confuse this Black Wire with the one(s) that is on the POSITIVE side of the Coil [Terminal 15] or you will fry the Tachometer!) If you have just a single wire going from the Plastic Connector, you can use an uninsulated 1/4" Female Push-on terminal with a "locking tab" to lock into place within the Connector, then re-connect it to the NEGATIVE side of the Coil.

On 83.5-85 Gasoline Water Cooled Models, there is usually just a Green Wire going from this side of the Coil back to the Electronic Ignition Module (ICU). If you have just a single wire going from the Plastic Connector, you can use an uninsulated 1/4" Female Push-on terminal with a "locking tab" to lock into place within the Connector, then re-connect it to the NEGATIVE side of the Coil.

21. At the Cluster side of the "Tach Wire", take the connector and wire from Step 19E and connect with a "Butt Connector" to the "Tach Wire" and seal with heated shrink-tubing for good insulation. Then re-insert the connector into Pin 9.

22. Triple check your work, make sure the proper colored wires are where they are supposed to be in the 14 Pin Flat Connector. If you're satisfied with your handiwork, close the hinged lid of the Plastic Connector to lock all of the pins into place.

Now before installing the new Cluster, we may have to make some choices, specifically regarding the speedometer and/or cable, depending on the year of your Vanagon:

23. 80-81 models: These two years used an Upper Speedo Cable that screwed onto the back of the Speedometer Head. If you wish to continue using this Speedometer, you will have to swap it to the new Cluster. If you are using 84 Wolfsburg Model and 85 Model Clusters, there's really no hassle. Simply and carefully remove the Circuit Foil from back side of the Speedometer Head and swap them. Do not cut, bend, spindle or mutilate the Foil! Just take a piece of scotch tape and attach it to the back side of the 80-81 Speedometer Head. Don't leave it loose and/or hanging. Alternatively, if you decide to use the 84-85 Speedometer in your new Cluster, you will have to change the Upper Cable to the later Slip-On/Clip-Lock Style. They are available from the VW Dealer, or at a better price probably from BusDepot.com. Remove your Upper Cable Assembly, measure it and select from the list below:

- A. 975mm - Models originally w/EGR Indicator - order 251957809A
- B. 780mm - Models originally w/OXS Indicator - order 251957809C
- C. Alternatively - Do away with the Upper & Lower Cable and install the long cable assembly used on 82-83 Diesels or the Late 89-91 models that don't use an Indicator Light - 2240mm - order 251957803E

NOTE: If you are using the 86-91 Cluster you MUST use the Speedometer Head supplied with that Cluster and modify the "Dynamic Oil Pressure/Buzzer" system so that it doesn't "screech" at you. You just can't rip off the Foil and use your original Speedometer Head like I described earlier on the 84-85 Tach Cluster.

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23. 82-84 Models: It is pretty well known in Vanagon circles that the 82-84 Speedometers (and some 80-81 models too,) originally equipped were (in a word) HORRIBLE for speed accuracy and over optimistic. My 84 Westfalia at an indicated 72MPH was actually clocked at 58MPH with stock 185Cx14 tires! Volkswagen finally corrected this when they introduced the Instrument Cluster using the Tachometer. If you look closely, the typeface (aka Font) of the numerals changed, so it's easily noticed. Alternatively - Do away with the Upper & Lower Cable and install the long cable assembly used on 82-83 Diesels or the Late 89-91 models that don't use an Indicator Light - 2240mm - order 251957803E from Volkswagen or an aftermarket vendor like Bus Depot.

NOTE: If you are using the 86-91 Cluster you MUST use the Speedometer Head supplied with that Cluster and modify the "Dynamic Oil Pressure/Buzzer" system so that it doesn't "screech" at you. You just can't rip off the Foil and use your original Speedometer Head like I described earlier on the 84-85 Tach Cluster.

Now for those using an 86-91 Instrument Cluster, here is the procedure to disable the Dynamic Oil Pressure Warning System/Buzzer in your 80-84 model (this would apply to 84 Wolfsburg models and 85 models if you're replacing your old Tachometer equipped Cluster with a newer version).

24. On the back of the Speedometer Head is a small connector that plugs into the circuit board of the Dyanmic Oil Pressure Warning System that is inside of the Speedometer Head casing. Carefully unplug it temporarily and bend the outside end pin (ground) of the group of 4 pins over to the side. Then carefully plug the connector back into place while making sure it misses the bent aside pin.

Now that we've addressed all the issues regarding the Instrument Cluster Wiring and Speedometer, let's test it with a "Pre-Installation" before doing the final installation.

25. Take the Cluster and position it in the dash opening and connect the 14 Pin Flat Connector, noting that because of the design on the Cluster and the Connector it can only connect one way. Connect this carefully to prevent damage to the Cluster Foil. Do not connect anything else at this time.

26. Reconnect the Battery Ground Strap.

27. Turn the Ignition Switch ON and start the vehicle. The Tachometer should be properly working.

28. While the engine is running, turn the Parking Lights on. There should be no change in the Tachometer reading. If the Tachometer reading does change substantially (ie: lower reading), there may be a problem with the proper grounding from Pin 3. Turn the engine off and remove the Battery Ground Strap. Disconnect the Flat Connector from the Cluster. With a VOM set at RX1K or RX2K, connect the positive to Pin 3 (Brown Wire) and connect the negative to Chassis Ground. There should be no resistance and show a direct short. If there is "infinite" ohms or very high resistance showing on the VOM, then you have a grounding problem and must be traced and corrected.

29. If while the engine is running and the Tachometer is working properly with the Parking Lights on, check to see if all Instrument Lights are working - the Speedometer Illumination, the Tachometer Illumination, the Indicator Lights Illumination and the LCD Clock Illumination. Replace if they're burnt out.

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30. After all of the checks and corrective action (if any) are done in steps 28 & 29, turn the engine off and turn the Parking Lights off. Remove the Battery Ground Strap, because we still have a couple of electrical items to re-install.

31. Reconnect the Speedometer Cable to the Speedometer Head. If you're using the Push/Clip-on style, be sure that the connector is firmly all the way on and "clicked" into place.

32. With the 4 mounting screws, remount the Instrument Cluster at the 4 mounting points. While being sure that the screws are snug, do not overtighten them or you will snap the mounting ears. Each mounting point must be screwed down or the Cluster will "bounce" as you're driving.

32. On the left side of the Cluster, re-insert the Headlight Switch, being sure that the locking tabs are positively engaged into the Cluster Housing.

33. On the left side of the Cluster, re-insert the Seat Belt/Brake Warning Light Assembly, being sure that the locking tabs are positively engaged into the Cluster Housing.

34. On the bottom right side of the Cluster, if you had a blank plate here, re-insert if there isn't one on your "new" Cluster. Take it from your old Cluster. If you had a switch in this spot on your old Cluster, re-insert, locking the tabs into place.

35. On the middle right side of the Cluster, re-insert the Hazard/Emergency Light Switch, locking the tabs into place.

36. On the top right side of the Cluster, re-insert the Rear Window Defogger Switch, locking the tabs into place.

37. Take the translucent/protective cover and re-position over the top of the Cluster.

38. Hinging the bottom portion of the Cluster Cover, reinstall the Cover, snapping the front corners into place.

39. Reconnect the Battery Ground Strap.

40. Setting the LCD Clock. At the lower left and lower right of the LCD Clock, there are 2 tiny buttons that are flush with the Clock housing. The lower left button sets the hours, the lower right button sets the minutes. With the end of a paperclip "unwound", gently press the tip of the clip to either button to properly set your time. Do this gently and carefully as if you press too hard, the contacts inside will jam and the Clock will start acting like a stopwatch. If the Clock is already acting this way, you will have to remove the Cluster and subsequently the Clock to carefully repair this.

YER DONE!

Sources for information regarding this procedure PDF (outside of my personal experience) are the contributions of the Vanagon List membership, especially those provided by Robert (Boston Bob) Donalds, Mark Drillock and Chris Turner. Additional information provided by Karl Von Salzen of the Type 2 & Vanagon Yahoo Lists. To those and others in the Vanagon Community that contributed, a heartfelt thanks.

Jim Thompson

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