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## Syncro Decoupler Installation Guide

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Read entire guide before beginning installation. Use common sense! Don't do something if it doesn't seem safe or doesn't make sense to you. If in doubt, stop and seek advice from a qualified mechanic.

*WARNING! Do not disassemble decoupler! This decoupler has been carefully assembled and calibrated.*

### **Clean Transmission**

Now is the time to check under the van to see how dirty, oily, or muddy things are. A do-it-yourself carwash or power washer can really help here!

### **Positioning the Van for the Installation**

- With the van on a level surface, place wheel chocks under rear tires and firmly set emergency brake.
  - Undo the two bolts from the rear of the engine skid frame.
  - With jack under the front cross member (just aft of the spare tire pan), jack up the front of the van as high as your jack stands will reach.
  - A good place to set the jack stands is on the round subframe cross member just aft of the front wheels.
- Think safety!** Make sure van is well positioned and stable.

### **Pull Skid Bars and Shift Rod**

- Undo the skid bar bolts (17mm) and drop the engine skid frame and the long skid bars—on later models, also remove the small bolt. Pull the skid assembly out to the rear.
- With the transmission in neutral (this is a safety measure), undo the two 13mm shift rod bracket bolts on the transmission and tie the shift rod off to the passenger side.

### **Drain the Oil**

- **But first**, loosen the filler plug before you drain the oil—this really helps in the refilling process!
- You can either drain the transmission oil completely or just be prepared to lose about a quart of oil (depending on how high the nose of the van is raised) when you pull the output housing off the transmission. Have a pan ready, as you will have some oil leak out no matter what you do.

### **Lower, But Don't Remove, Front Transmission Mounts**

- Using a 17mm wrench on top and a 17mm socket on bottom, feel for the bolt shaft protruding above the nut and unscrew bolt until bolt is level with the top edge of the nut.
- Some have found that removing brackets from the frame and supporting the transmission with a jack to be easier on later models.

### **Detach Drive Shaft from Transmission**

- Remove the four (4) bolts and nuts securing the drive shaft to the output flange of the transmission (13mm open-end wrenches). Separate the flanges with a knife-edged tool if needed.
- According to the Bentley Manual, you have to loosen the front differential mounting bolts. This is not required when you lower the transmission mounts first.
- Tie up the driveshaft toward the passenger side of the van.



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### Clean Area Around Output Housing

- Use solvent or spray cleaner to remove any dirt or grease from joint area.

### Remove Existing Output Housing

- Using a 13mm socket and ratchet undo the seven bolts from the output housing, including the ground strap bolt. Do not remove the ground strap from the body of the van.
- Tap the housing and drive flange with a soft hammer to loosen from transmission. Position drain pan to catch oil. Remove housing and coupling sleeve by pulling toward front. Clean and send both the housing and the coupling sleeve back for the core deposit. **NOTE: Both pieces must be cleaned and returned to receive deposit credit refund.**

### Prepare Decoupler for Installation

- **Important:** Check existing housing for the **two locating sleeves**, one on each side (sometimes they are stuck on the transmission), and transfer to decoupler housing or leave in transmission. Make sure that there are **two** of them, and that they are on either side.
- Apply flange sealer to mating flange surface. Note: More is not always better; a thin, continuous film is best—as in, paper-thin. Apply only to the perimeter of the housing. Don't cover the entire wide area, as this is in contact with the large bearing. Look at the transmission to see.
- Clean up exposed flange of transmission with solvent or contact cleaner.
- Verify that there is oil in the recess of the decoupler shaft where it mates with the pinion shaft.

### Install Decoupler

- Install in reverse order of removal.
  - Don't be too concerned about oil leaking across sealing face of transmission. They are almost always wet with oil and the sealer generally seals every time.
  - Verify that the new housing is lining up and seating on the **locating sleeves** before tightening bolts.
- Note: The two slightly longer bolts go into the locating sleeve holes.**
- Torque the seven (7) bolts—remember to reinstall the ground wire—to 15 ft. pounds, as per Bentley Manual 35.103.
  - Test decoupling action by hooking a vacuum line to the black nipple on the vacuum solenoid and sucking strongly. Now, by hand, turn the drive flange. It should turn freely.
  - Now, hook vacuum line to the blue nipple and suck again while turning the drive flange. The decoupler should engage and the flange should not turn anymore.

### Reinstall Driveshaft

Torque the four (4) bolts to 26 ft. pounds as per Bentley Manual. Use blue threadlock on these.

### Tighten Transmission Mount Bolts

No torque specs given in Bentley Manual. Just good and tight!

### Refill Transmission

Measure amount of oil drained, plus what leaked out, and add same amount of fresh oil to transmission. Complete refill is 5 quarts. It's easier to fill with the skid bar off.



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### Hook Up Switch

- The pigtail with the plug for the indicator light switch can be found in the large harness bundle along the frame behind the charcoal canister in the driver's side wheel well. Remove the hose clamp holding the canister to view the area better. Pry out the large red tie wrap holding the harness bundle at the very front of the wheel well.
- Find the plug to the fuel tank sender (plugged into the side of the fuel tank behind the spring tower), and follow the wire forward about a foot. Separate the individual harnesses until you find the one with two wires coming out of the 1/8-inch sheath: one brown and one brown with a black trace.
- This one has a rubber hood for the plug on the end. You will have to clean it up and probably dig out the dirt with a wire and compressed air/water. Using a stiff wire and taping the harness plug to it, thread the wire through the frame opening, following the path taken by the fuel line going from the fuel pump to the fuel filter. Plug the harness into the electrical switch on the decoupler. Slide the rubber hood over the contacts.

### Install Vacuum Switch and Lines

- Lower spare tire pan and remove spare tire.
- **Note: Non-difflock equipped Syncros see addendum (near end of instructions) and skip ahead to next bolded section.**
- Inside van, on center console, remove the knob on the existing difflock switch by holding the shaft with smooth pliers and unscrewing the knob.
- Remove the four (4) screws securing the Syncro difflock panel on to the center console.
- Now, undo the gold metal bracket and pull out a little bit to give some working room.
- Remove lower plastic shroud by spreading sideways at top back side edges and pulling straight back. Check for clearance on top of shroud and metal dash lower edge.
- Warm the plastic indicator panel and drill a hole for the new switch shaft in the center position. **Be careful!** This is a brittle piece of plastic.
- Install light bulb into center position of PC board with a quarter-twist.

### **NON-DIFFLOCK EQUIPPED SYNCROS CONTINUE FROM HERE.**

- Thread two (or three from non-difflock) vacuum lines along harness bundle on driver's side from the front of the van. Start in the cab under the dash, cut a slot into the rubber seal, and push the taped-together lines down and through. A little soapy water helps.
- Identify both ends of one line with a marker or tape. Follow the same path as the lines to the difflock from the difflock switch. Zip tie lines to bundle where needed.
- On existing difflock vacuum switch, locate the middle vacuum line, cut a 2-inch piece out, and install the triangular tee. Cut as close to the switch as practical to leave enough length on the harness end to hook up the tee. - Install the new vacuum switch onto the gold bracket in the center position with the provided nut.
- Connect the two lines to the outer nipples on the new switch using rubber elbows. Connect identified line to front nipple.
- Connect the two lines to the vacuum solenoid on the decoupler. Connect identified line to the blue nipple.



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- Connect a short line to the center nipple on new switch and suck while activating the switch. With the ignition on, the center position light should come on when the decoupler is engaged with the switch shaft pulled out. If not, have someone turn the driveshaft back and forth to facilitate engagement. If the light doesn't come on, reverse the two outer lines on the switch and try again. The light should be out when the driveshaft turns freely and should come on when the shaft won't turn.
- When proper operation is verified, connect a short line from the new tee on existing switch to the center nipple on the new switch.
- Replace bracket and panel, being careful not to kink vacuum lines!
- Replace spare tire and secure pan, making sure vacuum lines are not pinched.

### Replace Shift Rod and Skid Bar Assembly

Reverse of removal, lube shift ball on transmission with grease. **CAUTION:** Do not break off decoupler vacuum solenoid hose nipple when installing the upper middle skid bar bolt and nut. The blue nipple is in direct line with the bolt and nut, and it is **very fragile**.

### Remove Jack Stands

Lower van with floor jack. Check and fill oil level in transmission. Level should be at bottom of filler opening. Remove wheel chocks.

### Test Drive

With decoupler switch in decouple mode (knob pushed in all the way), listen for any unusual noise while driving in a straight line. Now make some slow sharp turns, listening again for unusual sounds. With wheels straight ahead, stop and pull out on decoupler switch and gently start to engage clutch. The indicator light should light up—indicating that the van is in Syncro mode (all-wheel drive). Next, while driving in a straight line, push the decoupler switch in and lightly let up on the gas two times. This removes torque from the coupler and allows it to shift. The indicator light should go out, and the van is now in rear-wheel drive mode. If any unusual noise or operation is observed, call or email for tech support.

### Troubleshooting

Decoupler won't shift or shifts slowly: This condition is usually caused by lack of sufficient vacuum, due to a leak or clogged filter/lines. The system has a check valve with a very fine filter in it. The valve is located by the vacuum reservoir in the middle under the van on the driver's side. Over years, the filter can clog up, causing slow engagement of both the difflock and the decoupler. Remove and try to suck through the valve. It should allow air to flow in one direction. If there is a restriction, try bypassing the valve. If the decoupler now operates properly, replace the valve. Another reason for low vacuum is a split rubber connector in the system, usually on the transmission vacuum solenoid. Check these for softness, splits, or rot. Look for kinks or pinched lines. Test by first blowing through the line with the other end open; it should flow freely. Close the far end and suck on it to test for sealing. If these are okay, check the switch on the dash; these often leak air, reducing vacuum. Test by sucking through the middle nipple with the front nipple blocked and the shaft pulled out. Now try the rear nipple with the shaft pushed in. No air should leak past the silver shaft. Replace switch if it leaks. Check the difflock vacuum actuator. Test by sucking on each side with a tube for vacuum tightness—but **do not blow**. Replace if it leaks. The



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tee on the large vacuum line from where the difflock system gets its vacuum has a restriction in it that has been known to clog up if the line ever gets disconnected and sucks dust. Poke a fine wire through the tee to clear it out.

### Cautions

- **Do not dyno-test** with the decoupler disengaged and the front wheels immobilized. The decoupler was designed for normal driving modes—pull driveshaft for dyno-testing or other extreme conditions. Avoid high speed rear wheel spinning while front wheels are stopped.
- **Do not** engage or disengage the decoupler while making a turn or while spinning a wheel. Doing so may damage the pinion shaft and is not covered under warranty.
- **Only** engage or disengage the decoupler while stopped or while all wheels are turning at the same speed (i.e. traveling in a straight line). This can be done at any speed. To engage or disengage at speed, lightly let up on gas pedal two times after activating the switch to ensure full coupling.
- **Do not** tow the van on a wheel dolly where one set of wheels is immobilized and the other set is turning. Decoupler was not designed for this and damage may occur to the transmission. If you need to tow your van this way, remove the driveshaft. It is okay to flat tow the van with all wheels turning on the pavement and decoupler disengaged.

### Driving

When the decoupler is disengaged, the van essentially drives and behaves as a rear-wheel drive van, so drive accordingly. In a safe area, test the braking, turning, and acceleration both in 2WD and Syncro (all-wheel drive) mode. Become familiar with the different dynamics of the van in the two different modes. If you have a grassy area to test on, this will accentuate the differences between the two modes. Keep safety in mind and learn how your van handles. When conditions warrant, operate your van in Syncro mode!

### Addendum for Non-Difflock Equipped Syncros

To install the decoupler and make it operational, you will have to add the vacuum reservoir kit. Please follow the guide below.

1. Install check valve (with blue side toward reservoir) onto the tee-fitting on one end of the reservoir using the short tubing already fitted to the tee. Wetting the nipple of the check valve helps start the tube onto nipple.
2. Mount the reservoir (with fitting facing to the rear) under van in the central area on the driver's side. There is a small frame running lengthwise close to the long skid bar. Zip tie the reservoir to this rib with four zipties.
3. Connected from the check valve, run a length of vacuum tubing to the intake plenum close to the ignition distributor.
4. Remove the vacuum line for the fuel pressure regulator from the plenum (this is directly under the larger vacuum line on the left rear of the plenum supplying the brake vacuum booster).
5. Attach the rubber tee to the small nipple on the plenum and—using a short piece of white vacuum line—connect the fuel pressure regulator vacuum line to one leg of the tee. Connect the other leg of the tee to the vacuum line you just ran from the check valve.



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6. From the tee on the reservoir, snake a vacuum line to the front of the van along the driver's side harness bundle and up into the center of the dash. Remove center lower console shroud as described in main guide.
7. Mount switch and indicator light in metal part of dash, centered and directly under radio. Drill appropriate sized holes for switch and indicator light.
8. Using rubber connector, hook up vacuum line from reservoir to middle nipple on switch.
9. Hook up electrical leads to indicator light:
  - a. Bring hot lead from back of fuse box. On page 97.102 of Bentley Manual, note the ten vertical dark contacts labeled "G." Use the 2<sup>nd</sup> or 3<sup>rd</sup> contact down from the top on the outer side of the box. Test electrically for +12v with ignition on, 0v ignition off.
  - b. Route the hot lead from step A through the indicator light. Find and terminate to a loose three point connector under the instrument panel behind fuse box. This connector has three wires: white/black, blue/brown, and brown/black. About four inches back from the unused connector, there is also a violet/black wire coming out of the harness sheath. This wire terminates in connector plug B3 (we only note the violet/black wire to help locate the correct connector). Now, cut the brown/black wire loose from the connector and—using a butt connector—splice the indicator light wire to this wire. This wire grounds (after going through the decoupler switch) to the body in the engine compartment under the ignition coil. Make sure it is grounded there.

### Warranty

This product is proudly manufactured in the USA and features a 24 month, unlimited mileage non-transferable warranty. Warranty covers defects in parts or workmanship—but does not cover abuse. **This warranty is limited to our repair of the decoupler, not for work done elsewhere.** Warranty does not cover removal and installation of unit. Any decoupler returned for possible warranty repair must be accompanied by a copy of the purchase invoice.

### Core Return

The housing assembly with shaft and drive shaft flange (\$750) AND internal-spline coupling sleeve (\$250) must be returned. Core **MUST** be cleaned and degreased. All or some of this deposit may be forfeited depending upon the condition of the core.

Please call our sales staff at 888-469-3789 (option 2), or email [sales@gowesty.com](mailto:sales@gowesty.com) to obtain an RMA number prior to shipping your core back



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## GW-V-857-711-981

Decoupler or Locker Replacement Valve  
1986-1991 Vanagon Syncro (4WD)

The original locker/decoupler valves are expensive and hard to find! Update your system with these new, high quality, AND lower cost manually-controlled pneumatic valves.

### Tools Needed

- 15mm Wrench
- Step Drill (Up to 9/16")
- Rotary Tool with Cutoff Wheel
- Phillips Head Screwdriver



### Parts List

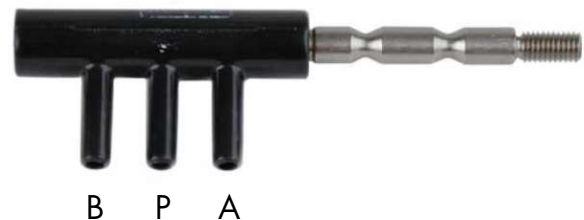
- Manual Pneumatic Control Valve (1)
- M12 Washer (1)
- Barbed Tee (1)
- Silicone Black Tubing (1 Foot)
- 1/8" NPT Barbed Elbow Fittings (3)
- Knob Adapter (1)



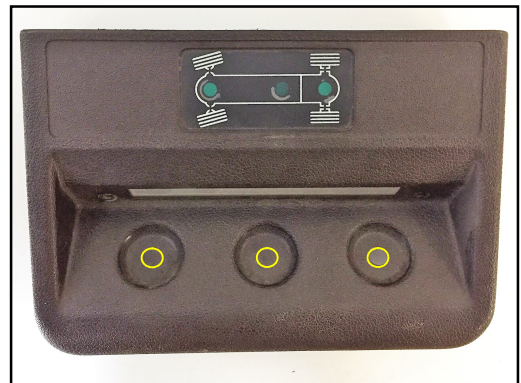
**! NOTE: See Syncro decoupler installation guide for complete decoupler installation.**

### Installation Instructions

- 1) Begin by installing the elbow fittings into the valve body. The barbed fitting can be bent upward to allow the fitting to spin around and into place. The labels on the new valve correspond with the labels below on the original valve.



- 2) Next, remove the locker console and ventilation panel from your Syncro. If your console currently has or previously had an OE valve, you will need to drill out the hole 9/16" for the valve stem to accommodate the new, larger valve. If you plan to use three aftermarket valves, you will need to trim the ventilation panel along the dotted line as shown below using a rotary tool or cutoff wheel. Otherwise, the valves can be positioned to fit without modification. A small rotary tool is recommended for a precise, clean cut.



*Note: It is extremely easy to break the console. It is recommended that you use a step drill bit to avoid fracturing the console.*



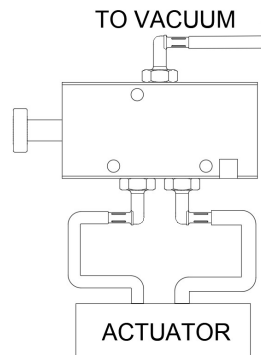
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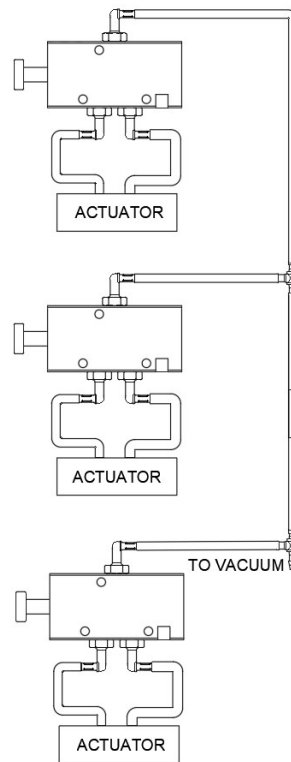
Decoupler or Locker Replacement Valve  
1986-1991 Vanagon Syncro (4WD)

- 3) Next, install the valves into the retaining bracket with the included washers and nuts. Loosely thread the nut by hand, as you will need to fine tune the valve position when reinstalling the console. Cut the black tubing into sections to allow you to connect the valve fittings to the semi-clear vacuum tubing routed to the vacuum reservoir and actuators. The goal is to connect the fitting installed at the port labeled "P" to vacuum, and the "A" and "B" ports to the actuator. It is recommended that you verify you have connected the tubing properly by testing the valve before moving forward. The decoupler or locker should be **disengaged** when the light is off and **engaged** when the light is on.

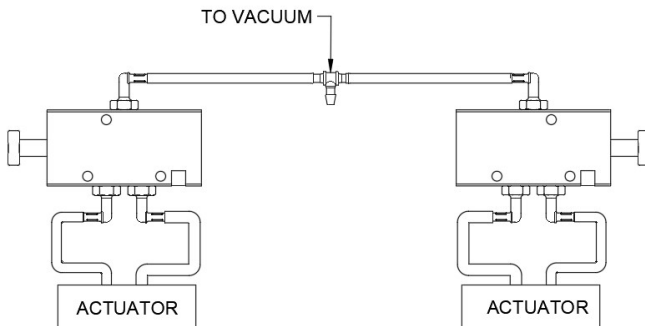
### SINGLE VALVE SCHEMATIC



### 3 VALVE SCHEMATIC



### 2 VALVE SCHEMATIC



*Note: When installing three valves, you will need to install the valves at an angle, as shown below.*





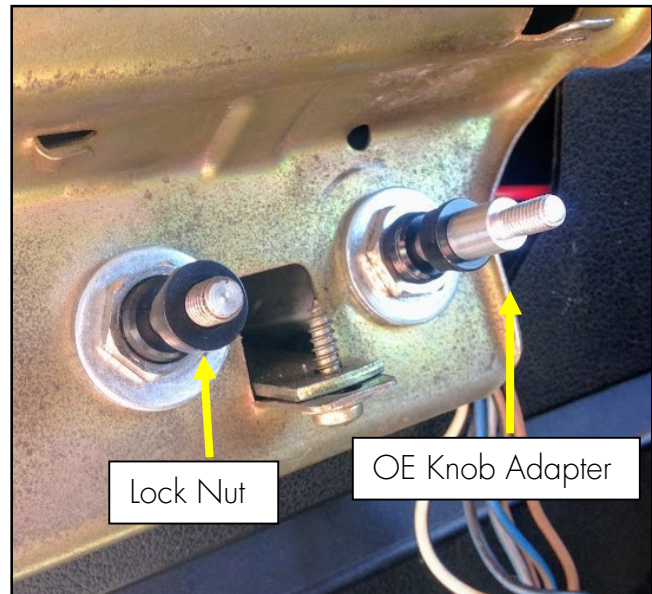


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Decoupler or Locker Replacement Valve  
1986-1991 Vanagon Syncro (4WD)

- 4) Reinstall the retaining bracket and push the ventilation panel back into place. It is recommended that you leave the bottom screw out until you have pushed the ventilation panel back into place. Once the bracket and ventilation panel are installed, adjust and check the location of each valve with the locker panel installed. This will involve tightening and loosening the nut securing each valve between checks. It may be helpful to apply pressure on the valve stem in the required direction while tightening the nut. Once the valve stems are centered, install the lock nuts and ventilation panel. Screw the knobs on. If you wish to use your original knob, you will need to screw the included knob adaptor onto the aftermarket valve stem. With this adapter threaded onto the stem, the aftermarket valve can now accept your original knob. If you need a new knob, it can be purchased on our website separately.



**Time to go rock crawling!**