

## Overdrive in Volvo Amazon

OVERDRIVE IS AN ELECTRICALLY CONTROLLED UNIT used for cruising at sustained speed with reduced engine revolutions per minute which leads to better fuel consumption, lower noise and lower wear. Overdrive in Volvo Amazon is similar to the fifth gear it really isn't.

When the new gearboxes M30, M31, M40 and M41 were introduced with the 1961 model year, the body had been provided with a wider tunnel to fit them. The same year, the Laycock de Normanville overdrive TYPE D was introduced together with M31 and M41. The M31 was option only on the 121 and the M41 was option only on the 122S. 1961 was the only model year with overdrive in combination with the B16 engine and this is also the only model year with the M31. When the *top of the line* model 123GT was introduced in 1967, overdrive was no longer available as option on the 122S. Overdrive is exclusively found on the 123GT during the model years 1967 – 1970. Overdrive was not available on the Estate (P 220) and neither on the cars sold in the USA.

Except for the 123GT all cars with overdrive had a badge on the left side of the trunk lid, aligned with the license plate. From model year 1965 (P 120 chassis number 166400-, P 130 chassis number 84601-) the later style overdrive badge is used.



*Early overdrive badge, 1961 – 1964*



*Late overdrive badge, 1965 – 1966*

In 1969 the B20 engine was introduced also on the Volvo Amazon and overdrive is provided as standard only on the few 123GT produced in 1969 and 1970. The Laycock de Normanville overdrive unit is now of TYPE J.



*Overdrive switch on steering wheel column and control lamp on instrument panel*

The differences between TYPE D and TYPE J are essentially that TYPE D provides a higher reduction of the RPM (0.756:1 or around 24%), but has a somewhat weaker construction and is more prone to break. The TYPE J has a more robust and reliable construction, but has a lower RPM reduction (0.797:1 or around 20%). The TYPE J also comes with an improved hydraulic system that provides smoother kick in/out and is less sensitive to pollutions thanks to an added fine particle filter in the pressure line. TYPE D is only found in combination with the B16 and B18 engines (model years 1961 – 1968) and the TYPE J only in combination with the B20 engine (model years 1969 – 1970). The TYPE J persisted into the 1980s all the way up to the Volvo 700-series. One distinction between TYPE D from TYPE J from the outside is that the solenoid is placed on the left side on the TYPE J and on the right side on the TYPE D.



Type D



Type J

The wiring is also different, where the TYPE D is wired over a relay in the engine room while the TYPE J is wired directly to +12VDC.

## Guide

START BY DISCONNECTING THE BATTERY and inspect the new gearbox. Make sure it is emptied of oil and that the inhibitor switch on the lid is in place and connected to the solenoid. The inhibitor switch prevents the overdrive from being engaged on all gears but the fourth (on the M41, second and third on the M31). Attach the new speedometer cable to the new gearbox. Also verify that the locating key on the new box fits with the shorter drive shaft. Raise the front of the car or park it above a grease pit. Disconnect the gear lever inside the car, including the rubber cover. Remove the cable to the reverse lights, the speedometer cable and disconnect the front drive shaft from the old gearbox. This is done from under the car.

The next step is to remove the old gearbox from the car. Use a floor jack to hold back the gearbox and loosen the transmission support cross member, which is secured to the underside of the floor with four bolts. Lower the gearbox somewhat so that it may be detached from the bell housing. This requires paying close attention to the throttle linkage, coolant hoses, fuel line, clutch wire, etc. Loosen the bolts that hold the gearbox and bell housing together (there is no easy way to get access to the upper bolts). Carefully slide the gearbox out of the bell housing so that the input shaft passes through the throwout bearing and remove it from the car. Detach the front part of the drive shaft and remove it.

Now it's time to mount the new gearbox in the car, which will be something of a reversed previous step. Start by attaching the shorter front drive shaft to the rear drive shaft. Then use a floor jack to raise and position the gearbox in the tunnel. This can be tricky. Don't drop the gearbox! Attach the gearbox with the rubber cushion intended for the M41, which is more robust than the corresponding one for the M40. Connect the cable to the reverse lights and pull the new speedometer cable via the engine bay to the instrument panel. Attach the speedometer cable to the speedometer. Pull the cable from the inhibitor switch on the gearbox lid. This should go from the gearbox to the engine bay in a TYPE D installation and via the engine bay to the instrument panel inside the car in a TYPE J installation. Refer to the wiring diagrams below. Well in position, the gearbox is attached to the bell house and the shorter shaft to the locating key of the gearbox.

Drill a hole in the instrument panel for the overdrive control lamp. The location of the hole is approximately 0.4" above and exactly in between the cigarette lighter and the fan knob. Insert the lamp housing into the hole and fasten it from the back of the instrument panel, using the nut. Connect the wires to the lamp according to the wiring diagram for your gearbox (TYPE D or TYPE J) below.



Connect the overdrive switch to the steering wheel column cover. To do this, there is *no* need to remove the steering wheel. Use your index finger to feel the inside of the cover's right side. On the opposite side of the turn signal switch, slightly higher up and slightly further back towards the instrument panel there is a molded section. Carefully drill a hole in the middle of that section. Connect the wires to the switch according to the wiring diagram you are using (TYPE D or TYPE J) and put the switch stick into the hole from inside the steering wheel column cover. If you have a knee protection pad ("underdash") mounted, you will need to remove this first. Attach the switch with the nuts that came with it. Attach the knob to the end of the stick and align it in the right position (compare with the turn signal switch).

There are two variants (see picture below) of the overdrive switch of which one (the lower one in the picture) appears to an aftermarket version with a looser engagement, while the other one (the upper one in the picture) is the same as fitted original with a more distinct engagement.



*Different variants of overdrive switches*

For TYPE D installations, the overdrive relay can be fixed into place in the engine bay in front of the relays for headlights and reverse lights (there is room!) or below the hood hinge (which is the factory placement). Connect the cable from the overdrive switch to connection 85 on the relay. Connect the cable from the inhibitor switch on the gearbox lid and the cable from the control lamp to connection 87. Connect a cable to 30/51 to the 25 A fuse in the fuse box. Two connections now remain – one on the control lamp and one on the overdrive switch – both of whom are connected to earth (chassis).



*Relay placement in engine bay*

For TYPE J installations, a cable is connected to the 25 A fuse in the fuse box and to the overdrive switch on the steering wheel column cover. Both the control lamp and the inhibitor switch on the gearbox lid are connected to the other connection of the overdrive switch. The other connection on the lamp is connected to earth.



Fix the overdrive badge on the trunk lid. Correct placement is on the left side, and aligned in the middle of the license plate exactly in between the license plate and the left edge of the lid. If you glue it to the lid there is no need to drill any holes. If this is done, bend or remove the pegs on the back of the badge.

Fill the gearbox with engine oil. Fill slowly as the oil room is shared between the overdrive unit and the gearbox, and the oil needs some time to level between the two spaces. Reattach the gear shift lever inside the car and don't forget the rubber cover. Reconnect the battery. Fill again with more oil after the first test run.

## Use

ENGAGEMENT OF THE OVERDRIVE IS DONE with the help of a hydraulic system which is controlled electrically by the overdrive switch that now is installed to the right on the steering wheel column. To engage the overdrive the car needs to be at constant speed on flat surface, i.e. not under acceleration, and be running on the fourth direct gear as the overdrive switch is pulled down. When the overdrive is to be disengaged the overdrive switch is pulled up, back to its original default position. The red control lamp on the instrument panel will be turned on when the overdrive switch is in its lower position.



*Engage the overdrive with the switch. The lamp is on when the switch is lowered.*

The overdrive unit will only engage on the fourth direct gear of the gearbox.

According to Volvo, there is generally no need for any additional gas or clutch pedal maneuvers when engaging or disengaging the overdrive but it is a well proven fact that the gearbox will last longer if the overdrive is treated just like a normal gear, i.e. always release the gas pedal and press the clutch whenever engaging or disengaging the overdrive. Regardless of whether or not this is done, an easy touch on the clutch pedal when disengaging from overdrive to the fourth direct gear will give a smoother transition.

Recommended speed on the fourth direct gear with the overdrive engaged is from 45 mph and up. For maintenance and repair please consult the workshop manual for respective type (D or J).

*Waiver. The text in this summary has been prepared with uttermost care but is, despite of this, strictly a guide to be used in conjunction with normal and cautious vehicle shop practice, including the safe operation of electric equipment. I do not accept liability for your actions. Work smart! Work safely!*

## Comments

- The front drive shaft from the original gearbox can be shortened and used with the new gearbox, but this must then be done very precise and the whole drive line must thereafter be balanced to avoid vibrations (which can damage gearbox, engine and rear axis). Different installations may require different lengths – measure your own gearbox and shaft before any shortening is done.
- The original speedometer cable can be used together with the new gearbox, but it then needs an alternate, shorter path to the speedometer instrument which will result in a *very* stretched cable. If possible, use the right speedometer cable, which is about one foot longer.
- It is possible to connect a TYPE J gearbox according to the TYPE D wiring diagram, and the other way around.
- It is not possible to fit only the overdrive unit on an M40 or M30 gearbox, partly because the outgoing shaft from the gearbox is too short.
- It is also not possible to fit any of the gearboxes M30, M31, M40 or M41 on any of the model years prior to 1961. They will not fit. This is because the tunnel on the earlier cars is not wide enough.
- The lids of the gearboxes are interchangeable. What differs an M40 lid from an M41 lid is the hole made for the inhibitor switch (662292) on the M41 lid, which can be drilled and threaded on a M40 lid (the right position is even marked). Lids for the short gear shift lever of a Volvo 140 will also fit, but you will then need to make a new hole in the tunnel (and to weld the old hole shut) or fit a Volvo 140 tunnel in the car.
- If you look at the wiring diagram you realize that the overdrive control lamp will only show the position of the overdrive switch – not whether or not the overdrive is engaged. For instance, driving in fourth gear with overdrive and downshifting to third will have the inhibitor switch disengage the overdrive (since the solenoid circuit is cut) and you end up driving on third gear, but the control lamp will still be on. To get the lamp to indicate “right” you need to wire the lamp to after the inhibitor switch on the gearbox lid. Many prefer this and it is a common alteration – but not original.
- If you save the M40 box and the longer front drive shaft, avoid to fix the badge on the trunk lid and avoid to drill holes for the control lamp and overdrive switch, you have avoided to make permanent changes to the car and can reassemble it to its original condition. The overdrive switch can be any one pole switch and doesn't have to be located in the steering wheel column cover. A control lamp will help but is not a must. One of the neatest “hidden” overdrive installations I've seen involved a switch for the overdrive that was positioned on the clutch pedal (much like the switch for the brake lights) that activated the overdrive only when the clutch pedal was *all* the way down, plus a resistor connected to the AMP lamp on the dash so that the lamp was lit vaguely with the overdrive engaged.
- Volvo 122S with overdrive of model year 1961 has the B16B engine in combination with M41 adjusted for 6v. The same is true of Volvo 121 with overdrive of model year 1961 which has the engine B16A in combination with M31. Volvo Amazon got 12V electrical system with model year 1962, when also the B18 engine was introduced.
- Volvo has recommended different kinds of oils in their gearboxes over the years, including ATF oil and engine oil. Today's oils are of incomparably better quality than those available in the 1960s, and today Volvo recommends the same quality and kind in both gearbox and engine: engine oil.
- A change of gearboxes affects the type designation of the car. The fifth digit in the type information is no longer correct.
- Remember to add the changes made to the wiring diagram of the car, or at least print a copy of one of the two following pages and keep it together with the instruction book.
- The overdrive switch is still being manufactured and can be found at the usual sources of classic Volvo parts. The control lamp can be difficult to find but one advice could be to

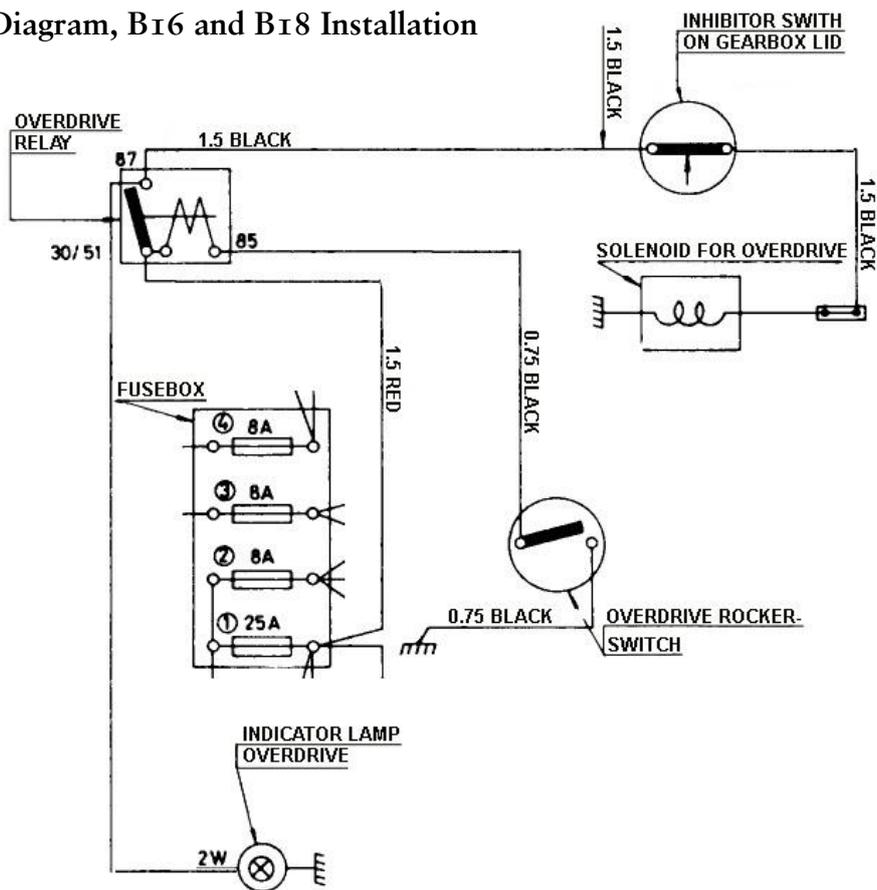
search in the boating community as the same lamp was also used by Volvo Penta in the 1960s.

- It could be tempting to skip the inhibitor switch on the gearbox lid, but do finish that thought as this switch fills a very important function. The overdrive unit cannot withstand the torque on low gears and should the overdrive be engaged together with the reverse gear the whole overdrive unit will break, something this switch is meant to prevent.

Necessary Parts, B16 and B18 Installation (Type D)

Qty.	Part number	Description	Comment
1	254382	M4I with overdrive TYPE D	B 18
1	677627	Front drive line shaft	
1	663605	Gearbox cushion	
1	669102	Relay	
2	955137	Screw for relay	
1	663047	Overdrive switch	
1	658225	Knob	
2	663048	Nut	
1	663089	Control lamp	
1	662292	Inhibitor switch	On gearbox lid
1	11996	Copper gasket	
1	670505	Speedometer cable	
1	951188	Bracket for speedometer cable	
1	663558	Badge	Model years 1961 - 1964
1	670556	Badge	Model years 1965 - 1966
0.5 gal		Engine oil	For instance SAE 10W-40

Wiring Diagram, B16 and B18 Installation



**Necessary Parts, B20 Installation (Type J)**

Qty.	Part number	Description	Comment
1	254570	M41 with overdrive TYPE J	
1	677627	Front drive line shaft	
1	663605	Gearbox cushion	
1	663047	Overdrive switch	
1	658225	Knob	
2	663048	Nut	
1	663089	Control lamp	
1	662292	Inhibitor switch	On gearbox lid
1	11996	Copper gasket	
1	670505	Speedometer cable	
1	951188	Bracket for speedometer cable	
1	670556	Badge	
0.5 gal		Engine oil	For instance SAE 10W-40

**Wiring Diagram, B20 Installation**

