

SR 6-Speed Conversion

Swapping to the 6-speed SR transmission is a bolt-on affair.

by Brad Pearson

The Nissan S15 6-speed transmission is made by Aisin as the “AZ6.” The same gearbox is used in the Maxda RX8 and MX5, Lexus IS, and Honda S2000 with slightly different cases. The early rumors of gearbox weakness have largely been dispelled over the years, with plenty of usage in high-power applications. Understanding that it is torque and shock that break things, the low vehicle weight and modest tire size of a 510 greatly reduce the potential torque loads, further increasing the safety factor.

One reason many will be interested in this transmission is the numerically lower sixth gear, giving lower engine revs on the highway. Additionally, the numerically higher low gears allow better acceleration, especially when used with the more conservative final drive gear ratios found in the later Subaru R180 differentials (e.g. 3.54:1 and

3.70:1). See Table 1 for a ratio comparison.

FITMENT

The bellhousing bolt pattern and dowel pin pattern are the same between S13, S14, and S15, so the 6-speed is a direct bolt-on to any S13-15 SR block. However, the bellhousing bolts need to be longer for the 6-speed’s bellhousing.

HARDWARE

Only three bolts can be re-used from the S13/S14 bellhousing. You will need to source:

- 4 x M10 1.5, 90mm long
- 2 x M10 1.5, 106mm long
- 1 x M12 1.75, 81mm long
- 1 x M12 1.75, 93mm long
- 2 x M12 1.75, 109mm long

These lengths will give you 1-1/2 diameters of thread engagement. You won’t find these exact lengths so you’ll need to buy longer and cut to length.

TRANSMISSION MOUNTING

The transmission mount is located further rearward so the earlier transmission mount will have to be modified, or a custom transmission mount will need to be made.

TRANSMISSION TUNNEL MODIFICATIONS

The shifter area of the S15 transmission case is a little bit wider than the earlier transmission, mainly because of two large bolt heads (for the shifter centering springs), one on each side. In my case, post installation I used these bolt heads as a fulcrum point for a long pry bar and gently massaged the transmission tunnel sheet metal for more clearance.

The shifter is in the same fore/aft position as the S13/S14. The shifter pivot housing is higher, which may require a larger clearance hole in the transmission tunnel.

REVERSE SWITCH

The connector for the reverse switch is further back, so you may need to lengthen these wires.

CLUTCH

The S15 pilot bearing is located in the flywheel, not in the crank as on the S13/S14. As a result, the transmission input shaft is shorter, and the S15 flywheel is thicker. Therefore you will have to use

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Transmission	PL510 4-speed	S13/S14 5-speed	S15 6-speed
First Gear	3.382	3.321	3.626
Second Gear	2.013	1.902	2.200
Third Gear	1.312	1.308	1.541
Fourth Gear	1.000	1.000	1.213
Fifth Gear		0.838	1.000
Sixth Gear			0.767

Table 1 —Gear ratios for the stock 510 4-speed, the S13/S14 SR 5-speed, and the S15 6-speed.

the S15 flywheel and corresponding longer flywheel bolts. The flywheel bolts are M10x1.0, and will need to be 50mm long.

An S13/S14 clutch disc, pressure plate, and pressure plate bolts can be used on the S15 flywheel, and can be matched with the S13/S14 throw-out bearing, pilot bearing, and slave cylinder can be used.

DRIVESHAFT

The S15 6-speed is the same length as the S13/S14 5-speed, so the driveshaft length is the same. However, the output shaft is larger on the S15 so the slip yoke is not compatible. Spicer makes a slip yoke that is the correct size. Any driveline shop will be able to make a driveshaft with this yoke on the forward end and a flange yoke for whatever differential you are using on the rear end.

VEHICLE SPEED SENSOR (VSS)

There are two different tailshaft housing designs for the S15 6-speed. One design has a provision for the VSS (though it is not equipped with a VSS), while the other does not. The VSS in the S15 was located in the differential.

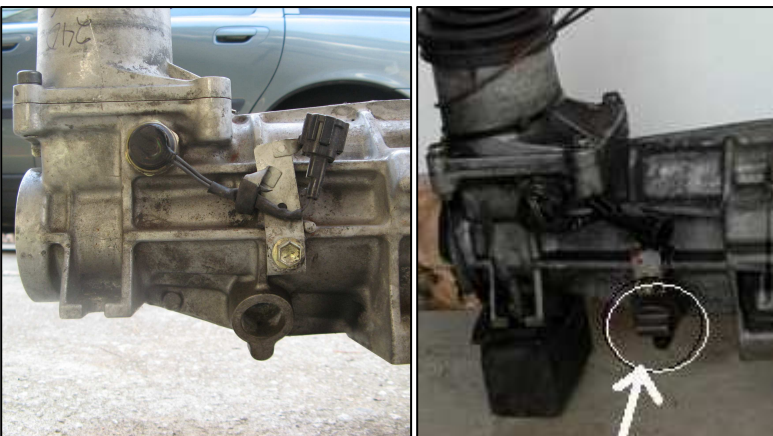


Photo 1 and 2—6-speed tailshaft shown at left with the mounting provision for a standard VSS. 6-speed tailshaft shown at right without the mounting boss for the VSS. If you have the latter transmission, you'll have to mount up an alternate VSS.

TRANSMISSIONS WITH VSS PROVISION

The location for the VSS is on the right side (passenger side for LHD), under the shifter, near the bottom of the tailshaft housing. The housings with the provision for the VSS will have an aluminum plug with an O-ring filling the hole. The plug is secured with a single M6 screw. Remove the screw and with some twisting the plug will pull straight out. The S13/S14 VSS will fit into this hole and can use the same screw for attachment.

There is no drive gear on the S15 output shaft, so you'll have to install one. Remove the tailshaft housing – this can be done with the transmission in the car, but is much easier done outside the car. The output shaft is already prepared for the gear with two c-clip grooves and a hole for a locating ball. An S13/S14 gear can be used for this, but the ID of the gear will have to be enlarged to exactly 1-1/16". I have seen metal and plastic gears, and either can be enlarged on a lathe. The plastic gear has holes that will need to be epoxy filled before machining to give the gear more strength. Slide on the first 1" c-clip, then place a standard 0.177mm ball bearing into the hole with some grease,

then slide the gear over the shaft and align the slot in the ID of the gear over the ball. Install the second c-clip. Reinstall the tailshaft housing and the VSS will perfectly mesh with the gear on the shaft.

TRANSMISSIONS WITHOUT VSS PROVISION

If you do not have the version with the plug for the VSS, then you'll have to use another sensor to signal a speedometer. I had this version and used a standard 8mm diameter cylindrical inductive proximity sensor to look at the head of a front brake rotor attachment bolt. I made a simple bracket for the sensor that attached to the bottom of the strut, and ran the cable along with the brake hydraulic line. This will require a programmable speedometer, but I have had no issues with my setup once calibrated.

DRIVING IMPRESSIONS

With the 0.767 top gear and my 3.54 diff, I now have a great highway car, turning fewer than 3000 rpm at 75mph. The first few gears have restored the torque I lost when I switched from the 3.90 diff. It's a win-win in that regard.

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Photo 3—6-speed flywheel shown on the left, compared to an S13 flywheel shown on the right. Mounting pattern for the pressure plate is the same, but pilot bushing is housed in the 6-speed flywheel.