
Limited Slip Differential Options for your 240SX...

I took most of this beginning text from the 240SX.org Install page, under the heading "Paul's LSD swapping" - I cleaned it up, shortened it, and corrected the errors concerning which diffs you can use, and then added most the info further down, some of which was sourced from Freshalloy.com. Thanks to the contributors noted below...

If you just want to know what fits...skip all the text below - There is a summary table at the bottom...

What is an LSD???

It stands for **Limited Slip Differential**. The differential is the thing in the rear of the car that splits the power coming from the driveshaft to the 2 rear tires (a.k.a 'pumpkin' or 'carrier'...). The 240SX (with a few exceptions - see below) uses what's called an open diff. In this setup both tires are basically free to spin at whatever speed they want to, which leads to the power being delivered through the path of least resistance - The tire that has less grip (the one spinning) will get more power transferred to it which will cause it to spin more, which will cause it to loose more grip and spin more which...

The LSD comes into play here - It comes to the rescue by stopping the loss in grip by recognizing that one tire is spinning and then transferring some of the power to the other wheel that still has grip. The type of rear Nissan uses in their OEM applications is called a Viscous LSD, which means it uses silicone and 2 plates to operate. The simplified explanation of how this works is that there is a plate stuck on the end of each shaft - These plates spin at the same speed as the wheel they are attached to. When one wheel looses grip and starts to spin faster it creates friction between the two plates due to the difference in speed. This friction heats up the silicone floating around causing it to expand. When the silicone expands it pushes on the other plate 'locking' it to the one that's spinning. This locking is what causes the other wheel to push. The fact that both wheels are now pushing is very apparent while driving.

This isn't just useful to drag racers, the difference while autocrossing is even more pronounced. The car can start accelerating earlier and harder out of corners than you could ever hope to do with an open differential. Lastly, the car is much smoother (and easier) to drift...

Now that you know what an LSD is I'm sure you want to know where to get one. The easiest way is to find a wrecked 240sx with one on it already and buy it...

There is a lot of talk about what year and options a 240SX has to have to be equipped with an LSD. From what I've heard, S13 with HICAS should have the LSD. S14 SE's with ABS (a rare find) and all Canadian 240's also have a VLSD (all of them AFAIK).

You must be careful when attempting to buy one from a junkyard, though. In my experience, they all assume that the wrecked cars they have had ABS as an option, which often turns out to be incorrect. I've heard of more than one person

who bought an "LSD" from a 240SX and found out later it was just another open diff...

The easiest way to check is to look and see if it has an orange sticker above the fill hole that identifies it as an LSD (These fall off over time, though). Also if you turn one side, the other should turn the same direction as long as you're not holding the input shaft.

Most of the time you won't be able to find an LSD from a wrecked 240SX, but you can use one from a variety of other Nissan cars - Some with no mods, other with simple modifications needed, some with a small change in gear ratio - See the summary at the bottom of this page.

The R200V (VLSD) differential is also used in the Infiniti J30 and the N/A Z32 300ZX... (EDIT: And apparently the '97-01 Q45...!!!)

If you can't find a wrecked 240SX with an LSD, for cost reasons I would recommend getting an LSD from an Infiniti J30:

The one you want is '95 or '96 - Easiest install, requires no modifications...

Pre '95 has the wrong output flanges (see the solution below), and I'm unsure about the fitment of the '97 diff (see the exceptions below).

ALL J30's had an LSD...that's why they're easy to find and you can't go wrong (i.e. get an open one by mistake as you can with a wrecked 240) The flanges for the halfshafts (the shafts that go to the wheels) are the same pattern as the S13 and S14 for the '95 and '96 J30's.

The '92-'94 J30s used a different bolt pattern on the hlaf-shafts but can be used if you also use the J30 axles...

There are more exceptions as found by **Asad**, which are also listed below.

As for gear ratio, I was under the impression when I bought mine that the J30 diffs had the same ratio as a 240SX open diff, but all the info I find now seems to contradict this.

As far as I can tell, ALL J30 diffs have a 3.916 ratio, which is 4% taller than the stock open differential.
Although it isn't very noticeable when driving, it is something to consider. It's actually nice for TURBO cars...

One way to check is to count the teeth on the ring gear, or look for a stamp that indicates the ratio:

Asad says: The ring gear actually has the ring and pinion tooth #'s stamped into it - For example:
49/12 = 4.083636 (stock ratio)
47/12 = 3.91666 (J30 ration)
48/11 ('JDM' 180SX diff, 4.36:1 ratio, 5-bolt output flanges)

One member on Freshalloy opened his J30 diff before installing it and counted 47 on the ring gear, which supports the claim that the ratio is taller...

The **'90-'96 300ZX N/A** diff also fits but takes more work...
First thing: DO NOT get the twin turbo diff, as it uses an R230V which is physically too big to work, and it's got a much different gear ratio (3.6X:1). The non-turbo has the same ratio as the 240 (4.083:1). The biggest problem with the 300ZX diff is that the output flanges are different (but the same as the early J30 differentials). They look like a '5 star' flange where the 240sx uses 3 sets of 2 holes. The parts to convert a 300ZX diff to work in a 240SX can be had for around $200-300 new...
You have 2 options: Different output shafts, or different axles (i.e. early ['92-94] J30 axles)

You'll need the output shafts from either the ABS equipped 240SX w/LSD, or the ones from a '95-96 J30 LSD (same part).

Or you can use the axles from the '92-94 J30 with the diff, as they have the same '5 star' bolt pattern but the correct length, splines count, and axle nut.

The 300ZX diff is the same size as your stock open diff b/c the Z uses 4-channel ABS, meaning the sensor is on the sides as opposed to the J30 with the sensor on the snout - so if you are really worried about the negligible extra length (see below), find the Z32 diff and convert it.

The M30 diff WILL NOT WORK because of the location of the diff mounting points...

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The Q45 differential works...but is NOT a bolt-in affair. Recently, a few different people have confirmed that the Q45 diff is a R200V...but it's NOT exactly a bolt in deal. Looks like it *might* work if you use the parts listed in the summary, below.

See here for more: **fgy33.tripod.com/id28.html** - This is a N/A 300ZX diff swap into a Q45 ...but the reverse will hold true for a Q45 diff into your 240SX...since the 300ZX dif bolts into it, when using 5-bolt axles.

And thanks to to the work of **Steve Kovacs from S&M Racing**, we know what's needed to use an earlier Q45 diff with a lower ratio (3.54) and larger axles...to hold BIG power.

--- See below for the details (summary table) ---

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A problem you may run in to when using either the J30 or 240SX (with ABS) diff is the extra length at the snout of the diff, which houses the ABS sensor. This adds about 3/4 of an inch of length to the diff, but is usually not a problem, as your driveshaft and tranny mounts should have enough play to negate this extra length.

NOTE:
The driveshaft in the ABS equipped 240's is 3/4 of an inch shorter to account for this - You may be able to find and use one of those if you have fitment issues. Many people run J30 diffs with no problems, though...Try it before you buy the ABS driveshaft or have yours shortened - You most likely don't need to spend the money.

ALSO: While you have the diff out, I would change the fluid since it's a major pain in the ass to do it while it's in the car...

You DO NOT have to use a fluid designed for an LSD as the R200V uses a sealed unit.
Nissan recommends 80W-90 oil, 1.5 liters (3 1/8 pints).

Possible exceptions for the J30 LSD fitment (cut-and-pasted, from Asad):

From a search on http://www.ka24development.com/www.car-part.com for a 1995 J30 VLSD...the years that come up in the interchange are:

1994-1997, with production dates "from 1/94" often given for the '94s (meaning it changed during the '94 model year)... and "Thru 6/96" given for '97 diffs (likewise, meaning it changed sometime in the '97 model year)... In addition, some of these diffs have in the comments "3.92 ratio" or something to that effect. If you search for a '97 J30 differential, you get 3 options: "Thru 6/96", "From 7/96 thru 11/96", and "From 12/96"... meaning there were actually TWO changes during the '97 model year. What those changes were...who knows???

I think we can draw a few conclusions:

Unless you get a great deal, avoid the '93 and early '94 diffs because you'll need the J30 axles (= more cost).

The '97 J30 diff was changed, but I don't know how (or if it fits...).

It seems the later '94 diffs (after production date 1/94) are the same as the '95-96, so you could get lucky there.
Just count the bolt holes in the oputput shafts: 5 = Early '94, and you need the axles. 6 = bolt-on diff, same as '95-96.

I'm comfortable in saying that you absolutely can be sure to get an LSD that will fit and work in an S13/14 (with a 4% reduction), from a 1995 or 1996 J30...

Summary:

Nissan VLSDs that work and the modifications needed to bolt it in:

VLSD sourced from:	Modifications needed:	Notes:
240SX with ABS	None	Differential housing is ~.75" longer 4.083 Ratio
'95-96 Infiniti J30	None	Differential housing is ~.75" longer 3.916 Ratio
'90-96 300ZX N/A	Need different output shafts or axles	Can use '92-94 J30 axles -OR- S13/S14 (or '95-96 J30) VLSD output shafts 4.083 Ratio
'92-94 Infinity J30	Need different output shafts or axles	Can use '92-94 J30 axles -OR- S13/S14 (or '95-96 J30) VLSD output shafts Differential housing is ~.75" longer 3.916 Ratio

The differentials listed above are the easy, bolt-in options for 95% of 240SX owners. The Q45 diff, below...is much more application specific.

Basically, if you want to use a Q45 diff with the lower ratio...have a good reason other than "I can find it locally".
+450rwhp, road racing for BIG courses, higher trap speed for drag racing (i.e. +140mph) etc...

VLSD sourced from:	Modifications needed:	Notes:
'97-01 Q45	Need different axles...	Should be able to use '92-94 J30 axles. NOTE: Different VLSD output shafts are NOT an option... ...the spline count inside the diff is different. 3.54:1 or 3.69:1 ratio...
'90-94 Q45	Need different axles **AND** hubs -	You'll need: *(per Steve of S&M Racing)* '90-94 Q45 (or Z32 turbo) rear hubs (5-lug) 2 new axles: One from a turbo Z32, one from a Q45 PASS. side of your S13/S14 uses a DRIVERS side Q45 axle DRIVERS side of your S13/S14 uses a DRIVERS side Z32 TT axle Input/pinion flange is LARGER - Need a different driveshaft or flange.

Here's a comparison pic from "Killjoy" of the stock open diff and a Q45 VLSD:

Miscellaneous Notes:

If you own an S13 (89-94) you will need to swap the rear cover off your stock open diff onto the VLSD:

The S13 uses a different bolt pattern (4 bolts) than the S14 (2 bolts) on the rear cover...

You will also need 2 longer mounting bolts for the S13 chassis, and 2 large washers for the front mounts...to be used with the large bushings on the front mounts.

They are M12 X 1.25 thread/pitch, 85mm long.

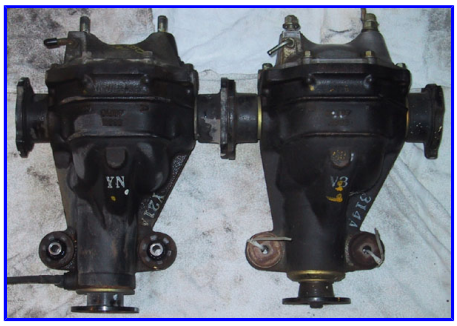
The stock S13 front mounting bolts are not long enough for the J30 and S14 diff mounts.

And I've seen more than few diffs drop out from the front mounts by not using washers - They need to be ~1.5" diameter or so, and 1/8" thick.

To overcome the .75" extra length at the nose of the diff you can:

1) Install it and see if your driveshaft and tranny mounts have enough play to soak up the extra length.

2) Get a driveshaft from an ABS equipped 240SX...it's .75" inch shorter.



You can also swap the VLSD "guts" into your stock open diff housing:

If you buy a J30 diff but would like to keep the stock 4.083:1 ratio...open it up, remove the VLSD center section, and swap it onto your open diff ring gear.

Sounds easy, but it's a time consuming process, and if you mess it up (have too much or too little clearance or backlash) - You'll ruin the gearset.

I've done it twice succesfully, so it's not that hard or scary...but you need to take your time and put EVERYTHING back EXACTLY where it came from (shims, bearings, etc...).

And to make it VERY clear...you use the VLSD center section AND output shafts...with your stock open diff ring and pinion / case / bearings.

Gear lube:

You don't have to use a fluid designed for an LSD as the R200V uses a sealed unit.

Nissan recommends 80W-90 oil, 1.5 liters (3 1/8 pints)...

E-mail me with questions, or if you find any inaccuracies - orion@gru.net.

Back to: Tech Info / Installs / KA Performance Page