

# RB30 DOHC

R32 & R33 Skyline Specific  
Last Update – 8<sup>th</sup> November 2007

This guide has originated from the following HUGE thread on SAU.

[Skylines Australia RB30 DOHC Guide](#)

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Thanks to all of those who have made pictures available for use within this document which includes Cobra30

<http://users.tpg.com.au/cobra30/twincam.htm>



## Compatible DOHC Heads

Three heads can be used for the twin cam conversion.

- RB26DETT Head
- RB25DE (R32) Head
- RB25DE/T (R33) VCT Head

All three heads cc up around the 62-64cc mark.

However, please be sure to double check, there have been cases where people have bought heads that for some reason are way off. Possibly fiddled with.



As a reference point the RB30's SOHC head cc's up around the 55 to 58cc mark.

The **RB26DETT** head from the R32/33 GTR bolts only requires a modification to the head stud holes. The RB26DETT runs larger studs. All water/oil galleys line up.

The **R32 RB25DE** head bolts straight up to the RB30E bottom end. All water/oil galleys line up. N/A valve springs have less tension which may cause issues when running big boost. Cams and springs are interchangeable with RB20DET items. Valve springs identical, cams are slightly different.

The **R33 RB25DE/T** has variable cam timing (VCT/NVCS); this requires welding of the heads VCT oil feed. The head still requires oil to its VCT, you will have to tap in to the oil galley and run an oil feed to it. The most common used feed is T'ing into the oil pressure sender feed.

Compare the pictures below to gain an understanding of how the head needs to be modified.



RB25DET VCT Bottom End



RB30E Bottom End No-VCT oil galley

The R33 RB25 also requires you to plumb in an external head oil return, you can T in to the turbo drain.

The RB20DE/T has smaller ports and much smaller valves to the RB25 & 26 heads.

R32 RB20DET Inlet – 30mm

R32 RB20DET Exhaust – 27mm

R32 RB25 Inlet – ~34mm

R32 RB25 Exhaust – 29mm

**R32 RB25** head uses the RB20DET style ports but larger.

The ports are still not 'as' large as the R33 RB25 or RB26 heads.

Slightly smaller ports - I haven't been able to pick any performance downsides apart from the lack of VCT.

The 'slightly' smaller ports should not put you off this head.

This head is recommended for use in an R32 for ease of installation and compatibility with existing sensors & plugs.

This head uses hydraulic lifters.

**R33 RB25 & RB26 heads** use the same style inlet ports with the same or very similar measurements.

Use one of these two heads if you are putting the rb30det in to a R33 for ease of installation.

This head uses hydraulic lifters.

**R34 RB25 heads** bolt up fine; The R34 head cc's up at 50-51cc's

They utilize solid cams so use a bucket on shim setup. No hydraulic lifters.

The hydraulic heads can only support cams with approximately ~9mm lift before they require machining of the buckets for clearance.

## Head Gasket

Personal preference.

Tried and proven is to O-ring the block and use a standard Nissan RB26 or 30 OEM head gasket.

I personally used and re-used (with a spray of Hylomar) a COMETIC multilayer head gasket.

Trust Head gaskets are excellent.

The RB30 uses the same head gasket as the RB26, an RB25 gasket can also be used.

## Inlet Manifold and Plenum

R32/R33 RB25 plenums and inlet manifolds are not interchangeable. The R32 RB20DET plenum bolts on to the R32 RB25 Inlet manifold.

R32 RB25 & RB26 heads run top feed injectors.  
R33 heads run side feed injectors.  
The R33 RB25 & GTR ports are slightly larger than the R32 RB25's.

For comparisons sake, a picture of an RB20DET Inlet manifold with a R32 RB25DE gasket over the top. Note the port size difference.



## Exhaust Manifold

R32 RB20/25, R33 RB25 have the same exhaust manifold bolt up. They are interchangeable.  
RB26 exhaust manifolds utilize a different bolt up pattern.

In order to bolt up the exhaust manifold of your choice you must grind down the water galleys protruding lumps that run from the front to the rear of the block.  
They must be removed as they foul the exhaust manifold.



## Short Motor

Be sure to select a short motor that has provision for the turbos oil feed/return, water return and has both lower tensioner locations machined flat, some do not have the machined area to mount the tensioner.  
Yellow highlights vertical to one another are the oil feed and return.  
The Yellow highlight towards the rear of the block is the water return.  
Water feed is provided from a hose/steel pipe assembly that feeds from the opposite side of the block.  
Should the block lack water/oil provision it is possible to drill and tap.

For a street driven motor with a twin cam oil pump use the follow head oil restrictors.

RB25 Head – Blocked rear , 1.5mm front.

RB26 Heads – Blocked rear, 1.25 to 1.5mm front.

Consider slightly restricting both RB25 and RB26 down to 1.1-1.2 should the car see a LOT of track work with an N1 oil pump.



Use the RB20/25/26's oil dip stick & holder as the RB30's is not long enough to clear the DOHC inlet manifold.

You will have to use the RB20/RB25 block heater hose attachments accordingly. They are situated on the inlet side of the motor at the front where the thermostat resides and towards the back of the motor roughly where cylinders 5 & 6 reside.

## Sumps

Grind off the RB20/25/26 fins towards the back of the sump, the rb30 crank and rods have a longer throw and will foul.  
The RB30 sump has no clearance issues in the R32/R33 Skylines.

## Pistons

RB30ET Pistons

~7:1 CR. Too low, you will loose response and fuel economy.

RB30E Pistons

~8.2:1 CR. Nice, 8.5:1 to 9:1 is preferred depending on fuel quality.



The RB25/26 spec pistons have a smaller deck height vs. RB30 pistons.

The piston will sit lower in the bore when at TDC. Deck the block to compensate. Always measure first!

CP make a nice RB30 Flat top piston suitable, it runs a 1.280" compression height, deck the block 0.020" to achieve a zero deck clearance, run a 0.040" head gasket all to achieve a nice 8.2-8.3:1 comp ratio with a nice tight quench that aids low/mid range power and improves fuel economy. They have recently released a piston to achieve a 9:1 ratio.

## Rods

Stock rods have proved to be reliable up close to 500rkw providing the motor is spun to no more than 7000rpm.

Spoolup on SAU offers a great deal on forged rods. ~\$800-\$900 for a set  
RB30's run a 152.7mm Rod. This gives us a nice 1.8:1 rod ratio.



## Crank

The crank is nitrated from factory, providing it is in good condition, a linish is only required.

On some high km RB30 cranks the front and rear seals eat away at the crank a little, if bad enough this has to be re-leaved.

The R32 RB20/25/26 and series 1 R33 RB25DET crank to oil pump engagement does not engage with the full length of the oil pumps internal gear. Think of it as placing pressure on your rib cage with a single finger then doing the same with your palm. With a greater surface area wear on the surface where the two gears engage is reduced.

It's a well known issue, It is a very wise move to have a full length crank collar installed, the item costs approximately \$100 or \$350 installed

A JUN crank collar can also be purchased for a greater cost..

Both crank collars are universal and suit ALL oil pumps.

ALL RB twin cam oil pumps will benefit with the use of a full length oil pump drive collar.

## Engine Bearings

The Genuine Nissan Bearings are good but there is better available.

King Performance bearings, Clevite and ACL are all excellent.

Ensure you have plenty of oil flow, pressure, suitable clearances and you will have a strong reliable motor.

## Oil Pump

Many have had success using the RB30ET oil pump.

It is best to use an oil pump from a twin cam motor as these provide more flow and pressure.

All RB oil pumps are interchangeable.

I'll stress again. The RB pumps do have a reliability issue and crack if used at 7000rpm+ and high km's without a crank collar.



Ensure you use **lock tight** on the bolts when assembling the oil pump as they are known to rattle loose causing a gradual loss of oil pressure.

## Piston Oil Squirters

Oil squirters are used in the imported turbo Skylines to help remove heat from the piston crown which improves reliability.

Ceramic coating the tops of the pistons works well but can create hotspots elsewhere. If ceramic coating, ceramic coat the whole combustion chamber.

Adapting the oil squirters to the RB30 block is possible; however the main bearing oil gallery is in a slightly different position to those in an RB20/25/26. Machining is required to make them fit.



## Water pump & Thermostat

All GTR, R32 RB20/25 & VL/R31 RB30 water pumps and thermostats are interchangeable.

R33 RB25 water pump have a slightly different bolt up pattern.

The RB30E aftermarket water pump will set you back \$70 to \$90.

The RB26 N1 water pump is anti-cavitation and flows more.

Genuine thermostats feel and look much better quality than aftermarket items. You will be required to use the RB20/25 thermostat housing to allow for stock hose positioning.



## Flywheel

All of the RB20, 25 & 26 Flywheels are interchangeable.

## Ancillaries

The only modification to bolt up ancillaries is the Power steering bracket.

The RB20/25/26 the top power steer bracket mount bolts up to the head.

Due to the extra deck height the rb30 has the top power steer bracket mount bolt up to the block.

You will be required to grind the lug flat so the bracket is able to sit flat on the block.

The R31 Skyline power steer bracket looks identical to the modified R32 power steering bracket. Look in to it.



## Knock Sensors

The GTST knock sensors are the same knock sensor type as the RB30's run. The RB26 knock sensors are a different type that utilizes a different bolt size; sleaving of the original block boss's are required OR you can drill/tap the 2 blank boss's above the std boss's.

## ECU

Use the corresponding ECU to the head you are using. It simplifies wiring, injector and sensor compatibility.

The R32 ECU's can be re-mapped; AP Engineering PowerFC's are also available.

Ensure the ECU you select supports the following features:

- Closed Loop – Fuel economy & Emissions
- Knock Sensor – Safety
- Sequential Injection – Fuel economy & higher average power
- 6 ignition drivers – Doesn't overwork your coils

The R33 & R32 ECU's will run the RB30DET with no problems for the run-in period.

However, do be sure to have it checked on a dyno just to make sure there are no issues elsewhere.

## AFM

The standard RB20/RB25DET AFM's are 80mm

The Z32 AFM (80mm) or the VH41/Q45 AFM (90mm).

The Z32 AFM supports a little over 300rkw with the Q45 AFM supporting up to 350rkw.

## Injectors

The R32 RB20/25 (260cc) and RB26 (440cc) injectors are top feed. The RB26's run low imp. injectors the rb20/25 high imp. Injectors.

The R33 RB25DE/T run side feed injectors. The Turbo injectors are 370cc items.

## Turbo

A minimum of a GT30R or equivalent is required for the motor to rev nicely to 6500-7000rpm on the standard cams.

When using the stock turbo you will be required to use a longer piece of oil resistant hose for the oil drain pipe, you will also be required to bend and stretch the oil and water lines to meet with the turbo. It's not a problem.

## Gearbox/Clutch

All of the RB gearboxes have the same bolt up pattern.

The R33 Series 1 and Series 2 gearbox's all use a push type clutch.

The R32 RB20DET gearbox doesn't like the 3ltr torque, I stripped third gear with only ~180rkw.

To put things in to perspective, the rb30det making ~180rkw was making the same amount of torque as an rb25det making 300rkw.

The RB25DET gearbox is known to hold up to 450-500rkw and is fine for the RB30DET

## Engine Mounts

The RB30DET block is approximately 38mm taller than any of the other RB blocks. This causes a few fouling issues with the bonnet when used with the high RB25 stock inlet manifold/plenum.

The RB26 inlet manifold/plenum doesn't have these issues as it sits much lower.

If you want to run the stock RB25 inlet manifold/plenum you will have to lower the engine by 15mm on the driver's side and 12mm on the passenger's side.

You will then be required to remove the lower lip of the radiators shroud otherwise the fan will munch it up.

I also found it worthwhile to relieve the gearbox and centre bearing mount slightly. In an attempt to reduce driveline angles to an absolute minimum.

One good reason to use the RB26 head.

## Factory Cam Specs

Model	Engine code	Type	Cam Duration (IN)	Cam Duration (EX)	Cam lift IN(mm)	Cam lift EX(mm)	Lobe centre angle (IN)	Lobe centre angle (EX)	NVCS range (rpm)
BNR32	RB26 DETT	Solid	240°	236°	8.58	8.28	113°	125°	
BCNR33								120°	
BCNR33 N1							117°	121°	
BNR34									
BNR34 N1									
R31	RB20DET	Lash	248°	240°	7.80	7.80	108°	118°	
HCR32	RB20DE	Lash	232°	240°	7.30	7.80	111°	117°	
	RB20DET		240°		7.80		115°	120°	
	RB25DE		232°	7.30	111°	118°			
ECR33	RB25DE	Lash	240°	240°	7.80	7.80	120°	117°	1050
	RB25DET								5700
ER34	RB25DE	Solid	236°	232°	8.40	6.90	119°	115°	below
	RB25DET					8.70			5700
									below
									5400

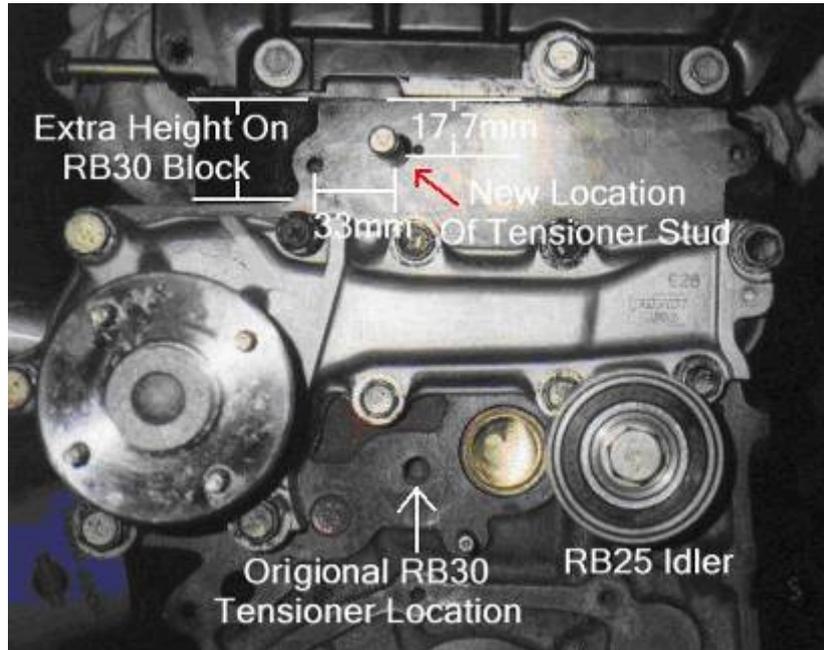
This information is courtesy of [Tomei's web site](#). It may not be 100% correct.

VCT/NVCS, experimentation has indicated the more power you make, the lower the VCT/NVCS engagement rpm will be. This is reflected when comparing the rpm of NVCS engagement for the turbo and non-turbo engines.

The only way to find is by experimentation or through the use of a computer simulated engine dyno package such as [Dyno2003](#) or even better and much more accurate do two dyno runs, one with the vct engaged and the other with it disengaged, where the two graphs overlap this is the perfect rpm to have the vct engaging.

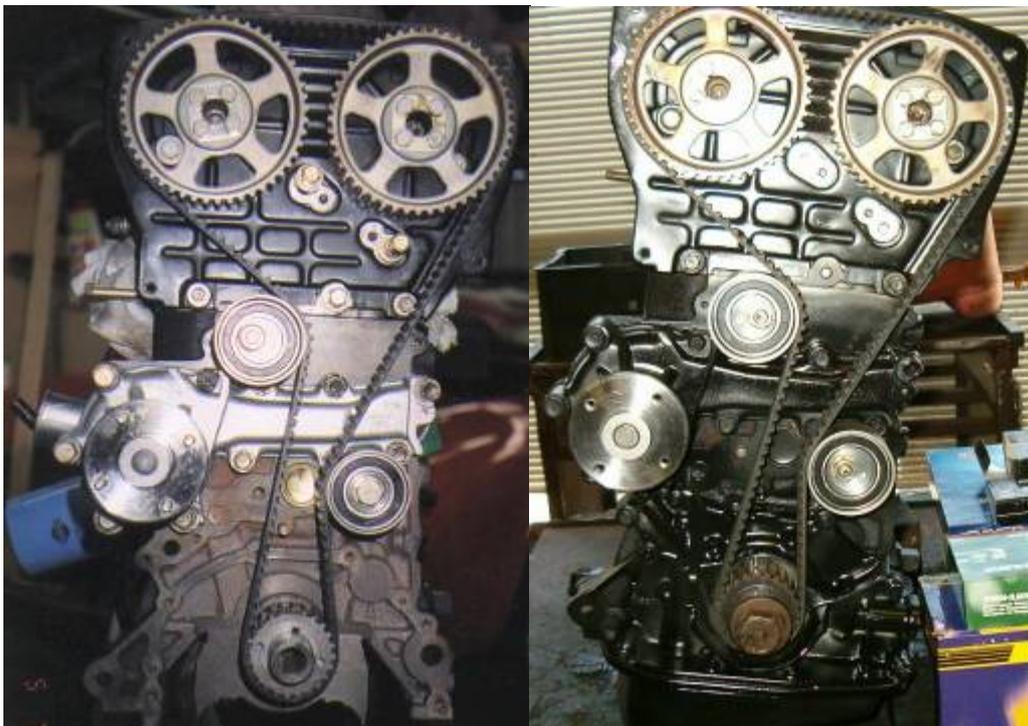
## Cam Belt

I positioned a tensioner above the water pump as per the pic below. Don't worry about drilling in to the water galley located approximately 9mm deep as you can tape up the studs thread and it won't leak. Ensure the studs hole is drilled and tapped square!



*Courtesy of Cobra30*

Due to the extra deck height of the RB30 Block you require a belt that is approximately 11 teeth longer. A total of around 152 teeth will be needed the Dayco part number for this setup is 94407.



*Courtesy of Cobra30*

Using a tensioner and idler we found the timing belt tension to be greater than the factory recommended spec of 20kg's.

We used a second tensioner in place of the idler bearing (lower bearing) in order to bring the belt tension down to the factory recommended spec of 20kg's.

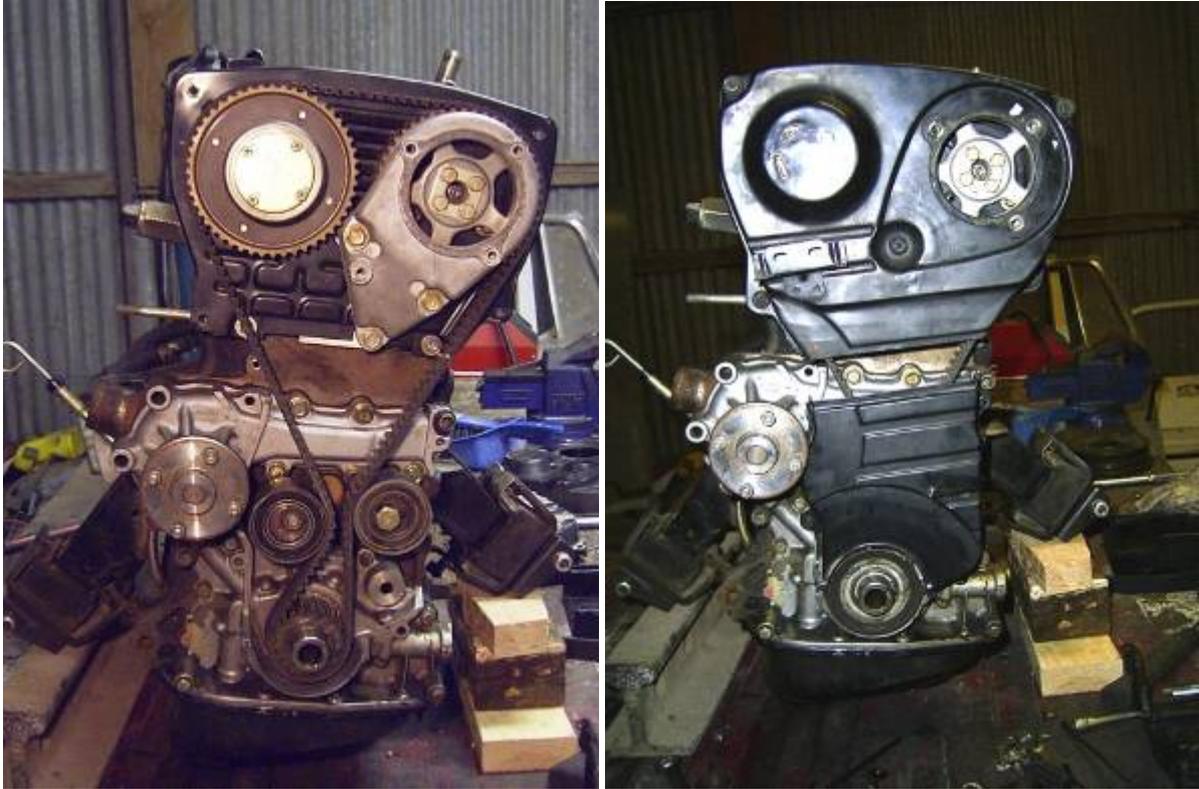
This gives us much more adjustment not to mention how much cheaper a new tensioner is compared to an idler. Use the RB20/25 lower cam belt cover as the RB30 cam belt cover is slightly taller and fouls with the top tensioner.

It is possible to use the factory tensioner and idler locations however once again you will be required to use two tensioners to get the correct belt tension.

I personally do not recommend this method as the belt comes too close together.

It uses a Gates POWERGRIP GT2 p/n 1200 8MGT 30

It measures 1200mm long, 8mm pitch on teeth, 150 teeth, and 25mm wide, it was cut down from 30mm in the factory.



There is also a Bosch belt that can apparently be used - VB-T866, I have no further information on it.

There has been some reports of a harmonic effect when using the POWERGRIP belt as the tooth profile is apparently slightly different to the cam and crank gears.

When marking out the position to drill and tap the upper tensioner do be sure to dummy it up to ensure the belt and tensioners clear both the lower and upper cam belt covers.

### **GTR/GTS4 Special Notes**

The RB30 shoehorn in to the GTR and GTS4 engine bays is a huge squeeze. Due to the 4wd the ability to lower the engine has been removed. Engine and bonnet fouling issues occur. It is imperative a GTR style low mount position inlet manifold/plenum is used. The Bonnet support structures must be slightly trimmed to clear the cam belt cover. The GTR's standard turbo pipe that has twinturbo written on it also fouls the bonnet, the bonnet support structure in that position must also be trimmed.

## FAQ

### *How hard can I rev the RB30 safely?*

As with the R32 GTR, R32 RB20DET and R33 RB25DET S1 motors they all have a small oil pump crank drive. Excessive rev's 7500rpm on all of these motors will eventually see a failed oil pump.

That being said the RB30 'harmonics' are overrated. They rev no problems to 7500rpm, however at this rpm you most definitely should be running a full oil pump crank drive from Jun or ProEngines and ensure the motor is well balanced. For the ultimate reliability anything past this and you would seriously want to look at forged rods, pistons and an aftermarket (ATI) harmonic balancer.

Do all these things and providing you have big enough cams to support the airflow and the motor will rev and be reliable.

One last thing... Back in the Bathurst days the Gibson motorsport team restricted the RB26's to 7000rpm. Much over this and the motor saw a much shorter life. So as with all RB's keep rev's to a bare minimum if you want it to last.

# THE END.

Thanks to Skylines Australia for making my RB30DET and this guide a reality.

A **really big thanks** to all those over at [SAU](#), especially [Christian \(Prank\)](#) for spending his hard earned \$\$ on SAU and [Skylines Downunder](#) who have also shared their knowledge.

Head over to the current [RB30 Thread at Skylines Australia](#).

I am sure you will be thankful for this guide when you check out how large the thread is.

A big thaks to all those that have done the rb30det combination In the past and taken pictures, some of those I have included in this guide.