The Sky Is The Limit

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Introduction

Legal Stuff

All brands and trademarks are the property of their respective owners.

Any modifications or procedures followed are at your own risk.

Much of the contents have been compiled from many resources, conversations with people, posting made to message boards, and technical articles published on the internet.

My deepest respects and thanks to those who have posted helpful material on the SkylinesDownunder forum – it is a truly great resource!
Skyline history

The Skyline name has been around for many years -- since 1955 in fact. This timeline and history is based on material from the Skylines Downunder website, and other internet resources.

1955  The Prince Motor Company produced the Skyline ALSIS1 in either a four door sedan, or a five door wagon. It was powered by a 1484cc four cylinder engine producing 60 horsepower.

1957  The Skyline ALSI2 was released, with some cosmetic enhancements. Namely quad headlights, a new grill, and a new bonnet emblem.

1961  The Skyline Sport BLRA3 was released. It was an Italian design, and hand built, so production numbers were limited. This model was available as either a coupe or convertible. The engine was a 1862cc unit producing 83 horse power.

1961  The Skyline S50E series was released. It was powered by a 1484 cc four cylinder engine producing 70 horsepower. It was during the life of this model in 1966, that Prince Motor Company and Nissan were merged. Options included a three speed column change, or a four speed floor change with bucket seats. Again this model was available in either a four door sedan, or a five door wagon.

1965  The first sporty Skyline -- the Prince GT S54 was created to go racing. The body was based on a modified S50 with a lengthened nose section, and a 1988cc six cylinder engine with either triple 40DCOE18 Webber carburettors, or a lower compression version with a single carburettor producing 127 and 106 horsepower respectively. Features included a LSD, a five speed close ratio gearbox, front disc brakes with twin callipers, and finned drums on the rear.

1967  The Nissan Skyline 1500. Powered by a 1483cc four cylinder engine producing 94 horsepower. Available in either a four door sedan, or a five door wagon.

1969  The Nissan Skyline C10 series. Engines included a 1988cc six cylinder pushing 106 horsepower, a 1973cc L20 six cylinder engine with 109 horsepower, and the 1998cc DOHC S20 GTR engine producing 160 horsepower with triple Solex carburettors. The range was available in two and four door sedans, and five door wagons (except for the GTR which was limited to the sedan options) The GTR was nicknamed "Hakosuka"

1972  The Nissan Skyline C110 series. Again, a range of models and engine types. The interesting models included the 2000GTX powered by the 130 horsepower L20, the 2000GTR with the 160 horsepower S20. Other variants included 1600GT, 1800GT.

1977  Another new generation of Skylines. Models included 1600TI, 1800Tlex, 2000GT. In 1980 the first turbo charged Skyline was released - the2000GTex with a 140 horsepower L20 engine.
Nissan R30 Skyline. The Skyline was evolving into the shape we associate with modern Skylines with this release. Models were similar to the last generation with a few additions, 1800TI, 2000GTex, 2000GTex turbo, and 2800GT. The lightweight R30 2000 RS and R30 RS Turbo packed the new FJ20 two litre four cylinder engine in both naturally aspirated and turbo versions producing 145 and 190 horsepower respectively. 1983 saw a facelift for the RS series, now renamed the RSX and RSX Turbo. By 1984, the RSX Turbo C produced 205 horsepower, and was nicknamed "Te Ka Men" or Iron Mask. The RS Turbo formed the basis for Nissan's early Group A programme. Many of us can recall the Nissan's in Peter Jackson colours competing in the Australian Touring Car Championship, with George Fury and a young Glenn Seton.

Nissan R31 Skyline. Another step in the evolution of the Skyline. New models included the GTSX, and the GTSR. The RB20DET was introduced, as was HICAS. The RB20DET engines in the R31 range are known as "Red Tops" after the colouring of their valve cover.

Nissan R32 Skyline. Models included the GXI, GTE, GTS, GTST, GTS25, GTS4, and GTR. Engines included the CA18 for the GXI, and then the RB20E for the GTE, RB20DE for the GTS, 160kw RB20DET for the GTST and GTS4, RB25DE for the GTS25, and the 206kw RB26DETT for the top of the range GTR. The GTS4 and GT R models featured Nissan's new all wheel drive system. The valve cover colour for the RB20DET is now silver for the R32 series.

Nissan R33 Skyline. This model was heavier than the very popular R32 series, and based on the Laurel platform. The models again are very similar to the previous generation, with GTS25T, GTS25, GTS4 (naturally aspirated only), and the GTR.

The R34 Skyline series. A more aerodynamic design than the previous R33 series, and another boost in performance.

The R-34 GT-R and GT-T go on sale in New Zealand from Nissan dealers.
Specifications

Engine

What are the specifications of the RB series engine? Nissan makes engine identification easy all those letters and numbers have meanings!

RB  series of engine
20 / 25 / 26  capacity (20~1998cc / 25~2497cc / 26~2597cc)
D  Double Overhead Cam (or DOHC)
E  EFI (Electronic fuel injection)
T /TT  Turbo / twin turbo

<table>
<thead>
<tr>
<th>Engine</th>
<th>Power</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB20E</td>
<td>97kW</td>
<td>172Nm</td>
</tr>
<tr>
<td>RB20DE</td>
<td>116kW</td>
<td>184Nm</td>
</tr>
<tr>
<td>RB20DET (Red top)</td>
<td>134kW</td>
<td>225Nm</td>
</tr>
<tr>
<td>RB20DET (Silver top)</td>
<td>160kW</td>
<td>263Nm</td>
</tr>
<tr>
<td>RB25DE</td>
<td>142kW</td>
<td>231Nm</td>
</tr>
<tr>
<td>RB25DET</td>
<td>187kW</td>
<td>295Nm</td>
</tr>
<tr>
<td>RB26DET</td>
<td>208kW</td>
<td>368Nm</td>
</tr>
</tbody>
</table>

Basic R32 GT-R specifications

Gear ratios:  Wheelbase  2615mm
             Front Track  1480mm
1st  3.214:1  Rear Track  1480mm
2nd  1.925:1  Length  4545mm
3rd  1.302:1  Width  1755mm
4th  1.000:1  Height  1340mm
5th  0.752:1  Ground Clearance  135mm
Diff  4.11:1  Kerb Weight  1430kg (there are many weights published)
            Fuel Tank  72 litres

Tyres  225/50 R16 92V Bridgestone Potenza RE71
Wheels 8.0 x 16” Alloy (these have 8.0x16 cast into the rim)
## Basic R32 specifications

<table>
<thead>
<tr>
<th></th>
<th>2 Door Specification</th>
<th>4 Door Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Track</td>
<td>1460mm</td>
<td>Front Track</td>
</tr>
<tr>
<td>Rear Track</td>
<td>1460mm</td>
<td>Rear Track</td>
</tr>
<tr>
<td>Length</td>
<td>4530mm</td>
<td>Length</td>
</tr>
<tr>
<td>Width</td>
<td>1695mm</td>
<td>Width</td>
</tr>
<tr>
<td>Height</td>
<td>1325mm</td>
<td>Height</td>
</tr>
<tr>
<td>Ground Clearance</td>
<td>145mm</td>
<td>Ground Clearance</td>
</tr>
<tr>
<td>Fuel Tank</td>
<td>60 litres</td>
<td>Fuel Tank</td>
</tr>
</tbody>
</table>

## Vehicle weights

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>R32 GTS</td>
<td>1260kg</td>
</tr>
<tr>
<td>R32 GTS25</td>
<td>1380kg</td>
</tr>
<tr>
<td>R32 GTSt</td>
<td>1280kg</td>
</tr>
<tr>
<td>R32 GTS4</td>
<td>1480kg</td>
</tr>
<tr>
<td>R32 GTR</td>
<td>1480kg</td>
</tr>
</tbody>
</table>

NB: these weights are unconfirmed.

## R32 Wheels

R32's are available with the following factory wheels:

<table>
<thead>
<tr>
<th>Size</th>
<th>Offset</th>
<th>OEM tyres</th>
</tr>
</thead>
<tbody>
<tr>
<td>14x5 ½ JJ</td>
<td>40mm offset</td>
<td>165SR14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>185/70R14</td>
</tr>
<tr>
<td>15x6 JJ</td>
<td>40mm offset</td>
<td>185/70R14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>205/60R15</td>
</tr>
<tr>
<td>16x6 ½ JJ</td>
<td>40mm offset</td>
<td>205/55R16</td>
</tr>
<tr>
<td>16x8 JJ</td>
<td>30mm offset</td>
<td>225/50R16</td>
</tr>
</tbody>
</table>

The 16x8 JJ are GT-R wheels are very hard to come by. The size of the wheel is stamped into the rim for identification purposes.

Upgrades to tyre size can be done with differing results. Some members have reported good results with 225 sized tyres on the GTS-t 16x6 rim, others have had excessive tire-wall flexing.
Deciphering model serial numbers

On the R32 and R33 Skylines, there is a blue plate attached to the firewall on the driver's side. On the plate, there are a series of numbers and letters which make up the model and options of the car.

The R32 and R33 plate looks like this: (italics are my inserts)

<table>
<thead>
<tr>
<th>Nissan Motor Co LTD Japan</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E-HCR32</td>
<td></td>
</tr>
<tr>
<td>Chassis No</td>
<td>HCR32-016693</td>
</tr>
<tr>
<td>Model</td>
<td>RCR32GASM AA</td>
</tr>
<tr>
<td>Colour code</td>
<td>KG1    G    130</td>
</tr>
<tr>
<td>Engine</td>
<td>RB20DET 1998 cc</td>
</tr>
<tr>
<td>Transmission / Axle</td>
<td>RE4R01A  RC43</td>
</tr>
</tbody>
</table>

Colour codes:

<table>
<thead>
<tr>
<th>R32</th>
<th>Colour</th>
<th>R33</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>KG1</td>
<td>Light grey</td>
<td>1N4</td>
<td>Light grey/silver</td>
</tr>
<tr>
<td>TG0</td>
<td>Dark grey</td>
<td>1N3</td>
<td>Dark Blue</td>
</tr>
<tr>
<td>TH1</td>
<td>Dark blue</td>
<td>AN0</td>
<td>Burgundy</td>
</tr>
<tr>
<td>BJ0</td>
<td>Light blue</td>
<td>KH3</td>
<td>Black</td>
</tr>
<tr>
<td>AH3</td>
<td>Red</td>
<td>QM1</td>
<td>White</td>
</tr>
<tr>
<td>KH6</td>
<td>Cream</td>
<td>KH2</td>
<td>Dark Grey</td>
</tr>
<tr>
<td>326</td>
<td>White</td>
<td>DN0</td>
<td>Aqua Blue</td>
</tr>
<tr>
<td>732</td>
<td>Black</td>
<td>BN6</td>
<td>Awesome blue</td>
</tr>
</tbody>
</table>

Transmissions:

- RE4R01A
- RE4R07A
- RE5R01A
- FS5R30A
- FS5W7

4 speed auto
4 speed auto
5 speed auto
5 speed manual
5 speed manual GTS
**Fuel**

The Skyline's handbook recommends the use of premium unleaded for the RB20DET and RB26DETT. Do not use 91 octane in any Skyline. The fuel tank holds 60 litres in all models except for the GTR which has a 72 litre tank.

My own R32 GTSt is an auto, and returns the following figures:

<table>
<thead>
<tr>
<th></th>
<th>km/l</th>
<th>l/100km</th>
<th>MPG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>9.93</td>
<td>10.08</td>
<td>28.04</td>
</tr>
<tr>
<td>Best</td>
<td>11.15</td>
<td>8.97</td>
<td>31.5</td>
</tr>
<tr>
<td>Worst</td>
<td>9.24</td>
<td>10.83</td>
<td>26.1</td>
</tr>
</tbody>
</table>

Fuel consumption can be worked out by totally filling your tank, resetting the trip meter, driving, refilling the tank, taking note of the litres taken to refill and the distance on the trip meter. Don't run the fuel tank to empty, as this may suck any rubbish in the tank through the fuel system.

**Fuel consumption formula**

\[
\begin{align*}
A &= \text{kilometers from the tripmeter} \\
B &= \text{litres of petrol taken to refill the tank} \\
C &= A / B \\
D &= 100 / C \\
E &= (A / 1.609) / (B / 4.546)
\end{align*}
\]

Kilometers per litre = C  
Litres per 100 kilometres = D  
Miles per gallon (Imperial)= E

To calculate US miles per gallon, substitute 3.785 instead of 4.546 in the calculation for the variable E.
Buying a Skyline

Points to watch

We are fairly lucky that we have a wide range of Skylines available thanks to our second-hand car importing industry which has been going strong for over a decade. With so many cars on the market, there is no reason to buy a lemon.

Here are some points to watch for with Skylines.

The year of manufacture can be found by looking at the front seatbelts, near the floor mounting point. There is a fabric tag with the seatbelt specifications and the year of manufacture sewn onto the webbing.

Inspect the welded seams in the front door sills just below the plastic kick plate. This is where I have seen rust start to form on Skylines, especially the R32. The R33 has an identical seam, so these will also show in years to come.

Remove the rubber around the boot rim – this is a prime rust spot in any car. While you are in there, look in the side panels and make sure they are not full of water.

Feel inside the panels in the boot where the jack is – debris found here will tell a story. Watch for glass (broken rear window or tail lights at some point)

Inside the engine bay, look for crayon or chalk marks on components – this may indicate they have been replaced with second-hand parts.

Crawl under the car and inspect behind the front and rear bumpers for signs of collision damage.

If you are keen, use a set of vernier callipers to measure the panel gaps especially on the doors.

Diagnostics – it's something the AA doesn't do or know about. Chances are the seller doesn't know about them either. Run them!

With the front wheels off the ground, check the play in the top end – any more than 5mm and there could be expensive repairs needed.

Watch the oil pressure when the car is hot – Keep in mind the oil pressure sender is prone to failure. These are the factory specifications for oil pressure on the RB20DET:

\[
\begin{align*}
1\text{kg/cm}^2 & @ 600 \text{ rpm} \\
3\text{kg/cm}^2 & @ 2000 \text{ rpm} \\
4\text{kg/cm}^2 & @ 6000 \text{ rpm}
\end{align*}
\]
The Skyline being originally from Japan, and not marketed in this country, there is some confusion over exactly what models and options are available. This has been constructed from a Japanese Skyline sales brochure, so hopefully this can show us the low down on model availability.

<table>
<thead>
<tr>
<th>Model Type</th>
<th>Model Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Door</td>
<td>4 Door</td>
</tr>
<tr>
<td>GTS</td>
<td>GXS</td>
</tr>
<tr>
<td>GTS Type S</td>
<td>GTE</td>
</tr>
<tr>
<td>GTS-t</td>
<td>GTS</td>
</tr>
<tr>
<td>GTS-t Type M</td>
<td>GTS Type S</td>
</tr>
<tr>
<td>GTS-4</td>
<td>GTS-t</td>
</tr>
<tr>
<td>GT-R</td>
<td>GTS-t Type M</td>
</tr>
</tbody>
</table>

The "Type" rears it's head at this point. This is a hotly contested issue as to what makes a particular car special. The following is what I have read from the sales brochure, and seems like a logical rule of thumb (I count the GTS-4 as a Type M for clarity reasons)

The Type S is based on the GTS, and has alloy wheels, HICAS, and the sport type steering wheel. The Type M is based on the GTS-t, and has the 16x6.5 alloy wheels,HICAS, and the sport type steering wheel. The Type M, Type S and GTS-t have HICAS, the regular models don't.

Options: Climate air conditioning, Electric front spoiler, Sunroof, Cruise control, Premium audio (Kenwood / Alpine / AddZest), Rear spoiler, "Bug eye" headlights, Alloy wheels, Premium brake package.
After Purchase

As you may not know the history of the car, it is best to start with a full service.

Air filter – replace.

Fuel filter – replace. Run a bottle of injector cleaner through the system with the next tank of petrol.

Oil filter – replace, and change the oil. If there is a sludge problem do a hot oil change and repeat within 1,000 km. Don’t use an engine flush treatment.

Automatic transmission – have the oil changed. The transmission cooler should also be flushed.

Spark plugs – replace. Make sure they are replaced with the platinum resister type.

Timing belt – inspect and replace. Nissan specify a 100,000 km life for these. Be safe and prevent the rain of valves.

Radiator – add plenty of anti-freeze. Without the protection of anti-freeze (corrosion inhibitor) there are parts that will corrode and eventually cause you grief. Check the condition of all the hoses while you are at it.

Battery – monitor and replace if needed. Japanese car batteries are smaller than the regular sized car battery, and it may be the factory fitted battery (over five or six years old)

ECU – reset it. Make it learn our driving conditions.
Systems and Diagnostics

**HICAS**

**What is HICAS? And do I have it?**

Good question. HICAS is Nissan's version of four wheel steering. It is an acronym for High Capacity Actively Controlled Suspension. Unlike other Japanese car manufacturers 4WS (e.g. Honda's system) HICAS never exceeds +/- 1°. It is designed for high speed response rather than parking manoeuvres.

The system is electrohydraulic: the ECU in the boot directs a hydraulic actuator at the rear axle to steer the rear wheels using the rearmost suspension links. The result is usually no more than 0.4° of movement. HICAS gives a touch of counter steer before settling with the rear wheel pointing the same way as the front. (Maybe this explains why my Skyline feels so loose on high speed gravel) This results in sharp turn in, and enhanced stability at medium to high speeds.

Anyway, have a crawl under the rear of your Skyline and have a look. Watch for the hydraulic actuator mounted on the rear of the differential, with arms connected to the rearmost suspension links. The controller is mounted inside the boot, up on the underside of the parcel shelf in the boot.

R32 - Some HICAS models are powered by fluid drawn from the power steering system with a set of valves in the engine bay near to the bottom of the battery tray, while others have a separate system comprising of a pump and reservoir mostly contained behind the right hand side panel in the boot. R32 models with HICAS: GTS Type S, GTS-t, GTS-t Type M, GTS-4, GT- R.

The R32 GTST has the power steering powered system, and the R32 GTS-4 and R32 GT-R models have the self contained hydraulic systems.

The R33 model saw the introduction of electronic actuation, Nissan claimed a weight saving was behind this move.
HICAS Diagnostic Mode

There is a HICAS warning light in the instrument cluster. If it comes on, it is indicative of a problem.

R32: Check the HICAS oil level (power steering reservoir in some models, or a remote reservoir accessible from the boot)

R32 and R33: Check all HICAS electrical connections, and if the light remains on, follow the diagnostic below.

Note that having an aftermarket steering wheel fitted without the appropriate HICAS boss adaptor can also cause the HICAS system to show a fault. Advanced Imports in Auckland stock the HICAS Boss adaptor kits.

Procedure:
- Switch ignition off, transmission in neutral or auto in Park.
- Start engine
- Very quickly (with a couple of seconds), turn the steering wheel left and right about 20 degrees from centre five times, and then pump the brakes five times, then press the brake pedal once more this will enter diagnostic mode.
- Drive forwards or backwards about 5 metres at a speed less than 10km/hr, this will enter full diagnostic mode.
- The HICAS light in the instrument cluster will be flashing quickly (for normal) or will flash a code indicating any problems.
- Long flash = first digit, short flash = second digit.
- Diagnostics will return to normal after five minutes, or any speed over 10km/hr, or ignition is turned off.
HICAS Diagnostic Codes 1989-1993

1. HICAS solenoid right hand
2. HICAS solenoid left hand
3. Cut off valve
4. Power steering solenoid
5. Vehicle speed sensor
6. Steering angle sensor
7. Neutral position sensor

HICAS Diagnostic Codes 1993-1999

11. HICAS control unit
12. HICAS motor power supply not present
13. HICAS motor output not present
21. Vehicle speed sensor not present
22. Steering angle sensor not present
23. Steering angle sensor neutral or not present
24. Rear main sensor input not present
25. Rear sub sensor input not present
31. Parking brake sensor input not present
32. (Auto) Inhibitor switch input not present, (Manual) Neutral switch input not present
33. Engine speed signal not present
ECU Reset

This is a very good procedure to follow, especially after making any changes to the car, for example after fitting a new exhaust, or air filter, or just every couple of months as part of a service routine.

To reset the ECU, disconnect your car's battery for 24 hours. This will reset the ECU to the factory defaults.

I have also heard that this can be done more quickly by disconnecting the battery and pressing the brake pedal (discharging any residual power in the car's electrical system), and then reconnecting the battery.

It has been recently posted that this technique can help if done prior to a run down a drag strip, with a fuel tank of octane boosted petrol or #1 racing fuel.

Apparently when the car is started for the very first time, the factory ECU advances the timing by about two degrees, and monitors the knock sensor. If any detonation is detected, the ECU will retard the timing by three degrees. It will continue advancing and retarding by progressively smaller increments. After a time, the ECU is doing the advance / retard by only tenths of a degree, and any power gains resulting from a tank of #1 racing fuel for example will take a long time to show, and not be noticeable. Resetting the ECU will cause the ECU to very quickly re-map the ignition curves when the car is restarted. The poster advises disconnecting the battery, pressing the brake pedal, and reconnecting the battery prior to staging.

I have watched my own car have this done on a chassis dyno – it is amazing to watch the ECU relearning.

Both a friend and I have done it to our GTSt Skylines with good results. My friend reports a smoother drive, and more free revving. First impressions on my car is that it starts quicker (not that it ever cranked for more than a second or two), feels smoother in the low rev range, and seems to have a little more torque in low speed acceleration. Possibly better fuel economy also, but I also had my catalytic converter gutted about a day or so after resetting the ECU.
**ECU Diagnostics**

Usually you have to remove the computer from the mounts in the passenger foot-well, as the LED(s) you need to see is pointing away from you. Remove the plastic panel to gain access to the ECU.

<table>
<thead>
<tr>
<th>There are three different types of factory ECU available in Skylines.</th>
</tr>
</thead>
<tbody>
<tr>
<td>One type has two LEDs and five modes</td>
</tr>
<tr>
<td>The second type has one LED and two modes</td>
</tr>
<tr>
<td>The last type has no LEDs, the output is done with the engine check light in the instrument cluster. Acts as a single LED ECU.</td>
</tr>
</tbody>
</table>

- Switch on the ignition, but don't start. The LED on the ECU will be glowing.
- Turn the selector screw clockwise all the way (gently!)
- For two LED ECU's: the LED will flash once, pause, flash twice, pause... all the way up to five. This is the diagnostic mode. Mode 1 = one flash, mode 5 = five flashes. When you reach the right mode, turn the screw back counter clockwise. Mode 3 is what most people use.
- For single LED ECU's: wait a couple of seconds, and turn the screw back counter clockwise, the ECU is now in mode 2.
- The engine check light on the dash will mirror the LED on the computer.

The LED will flash out a code (or series of codes if there is more than one fault) The ECU will keep error codes in memory for 50 starts, so keep in mind if an error happened 51 starts ago, there will be no record of it in the ECU.

More recent ECU's have two LED's (red = first digit, green = second digit, for example, red 2x flash, green 1x flash = code 21)

The ECU’s on most R32’s have one LED, long flash = first digit, short flash = second digit, for example, long, long, short = code 21.

Note the ECU fitted to R31 Skylines has a smaller subset of the codes, and the code for all OK is 44 on the R31 ECU. The R30 Skyline has a totally different ECU.
**ECU Diagnostic Codes**

11  Crankshaft position sensor  
12  MAF sensor circuit (air flow meter)  
13  Coolant temperature circuit  
14  Vehicle speed sensor circuit  
21  Ignition circuit  
31  ECU (ouch!)  
34  Knock sensor  
43  Throttle position circuit  
45  Injector leak  
51  Ignition circuit  
54  Auto signal to ECU  
55  All OK

Turn the ignition off to put the ECU back to normal.

**$O^2$ sensor test procedure**

There is also a $O^2$ sensor test in real time available.

- Do the same procedure as above to get the ECU into mode 2 (single LED ECU) or mode 1 (dual LED ECU’s)
- Start the engine.
- Warm the engine, and then run under no load at 2000 rpm for the test.
- Single LEDs: on = lean, off = rich
- Dual LED’s: green LED on = lean, green LED off = rich
- Go by the trend shown, e.g. mostly on = lean, mostly off = rich. The LED should be flashing between 510 times per 10 seconds under normal conditions.
Climate Control Diagnostics R32 and R33

The climate control has a diagnostic mode.

Enter the diagnostic mode by pressing the OFF button for five seconds within ten seconds of turning the ignition on.

Sensor check

Sensor check is selected by pressing HOT switch (the red triangle) while in diagnostic mode. The microcomputer detects whether each sensor input signal is within correct parameters. The results are displayed on the screen.

If normal, a "20" is displayed.

If abnormal the failed sensor number is displayed. The sensor numbers are as follows:

20 - all is normal
21 - outside air sensor
22 - Inside air sensor
23 - Water temperature sensor
24 - Intake temperature sensor
25 - Sunload sensor (small sensor on the left hand side of the dashboard near the windscreen)
26 - PBR
27 - Refrigerant temperature sensor

This should tell you if any of your sensors are faulty.

Mode door position check

(This is probably not the cause of your problems but it is a nifty self check to play with). While in Sensor check, depress the HOT button again. This will operate the the mode door actuator, and checks the whether the position detection switch is operating. Again the results are displayed on the display.

If normal, a "30" is displayed.

If abnormal the number of the faulty mode is displayed as follows:

30: Normal
31: VENT
32: B/L (Bi level)
34: FOOT
35: DEFROST/FOOT
36: DEFROST
**Actuator operation check**

By pressing the HOT button while in Mode Door Position check, you can actually send a signal to check the operation of the actuator manually. This is a bit complex, and will be expanded upon when a manual can viewed.

**Sensor recognition check**

Press the HOT switch again and a "5" will be indicated in the display section. If you press the "AMB" button (R32) or the windscreen defroster button (R33) in this status, the display will show the temperature sensed by each sensor. This will give you an indication also of which (if any) are faulty.

Temperatures will be displayed in the following order (R32):

5 -> Outside air temp -> Inside air temp -> Suction temp -> Refrigerant temp

R33 seems to have a different selection, with three temperatures being displayed.

Obviously if any of these temps seem excessively different from actual temperatures you have a problem!

**Calibration**

If you depress the fan switch during the Sensor Recognition check, you will go to Calibration in which you can set the difference between the indicated temperature and sensed temperature.

While in Calibration press the HOT or COLD buttons to change the display by plus or minus 3 degrees in .5 degree increments (R32) or 1 degree increments (R33).
**R33 Fuse Box translation**

**Dashboard Fusebox**

<table>
<thead>
<tr>
<th>Left Column, top to bottom</th>
<th>Right Column, top to bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td>10A – Rear Wiper</td>
<td>10A – Shift lock</td>
</tr>
<tr>
<td>10A – Anti-stop</td>
<td>10A – A/T control</td>
</tr>
<tr>
<td>10A – Starter Indicator</td>
<td>10A – Air conditioner</td>
</tr>
<tr>
<td>10A – Room lamp</td>
<td>10A – Engine control</td>
</tr>
<tr>
<td>10A – Stop lamp</td>
<td>10A – Air bag</td>
</tr>
</tbody>
</table>

| 10A – Electrics              | 20A – Blower motor          |
| 10A – Engine Control         | 20A – Blower motor          |
| 10A – Hazard lamp            | 10A – Audio                 |
| 15A – Fog lamp               | 15A – Cigarette lighter     |
| 10A – Turn signal            | 20A – Front wiper           |
| 10A – Meters                 | 10A – Mirror de-fogger      |
| 10A – Electrics              | 20A – Rear de-fogger        |

Note that the engine bay fuse / relay box has a fuse key printed on the inside of the cover in English.
Auto Transmission Diagnostics

Enter the auto transmission diagnostics mode

- Have the car at normal temperature in Park with the overdrive on
- Start the engine. The power light will go out after 2 seconds
- Turn the ignition off
- Move the selector to Drive (you may have to use the push button release)
- Overdrive off
- Wait 2 seconds, and turn the ignition on
- Wait 2 seconds and move the selector to 2
- Overdrive on
- Move the selector to 1
- Overdrive Off
- Press the accelerator fully and release

Auto transmission diagnostics codes

The error codes are flashed out using the Power light on the dashboard (R32) or the Power / Snow button (R33). The sequence starts with one long flash. If everything is OK, this will be followed by ten short flashes.

Errors are indicated by a long flash in the sequence of short flashes.

<table>
<thead>
<tr>
<th>Flash Order</th>
<th>Error Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st flash longer</td>
<td>Revolution sensor shorted or disconnected</td>
</tr>
<tr>
<td>2nd flash longer</td>
<td>Speed sensor shorted or disconnected</td>
</tr>
<tr>
<td>3rd flash longer</td>
<td>Throttle sensor shorted or disconnected</td>
</tr>
<tr>
<td>4th flash longer</td>
<td>Shift solenoid A shorted or disconnected</td>
</tr>
<tr>
<td>5th flash longer</td>
<td>Shift solenoid B shorted or disconnected</td>
</tr>
<tr>
<td>6th flash longer</td>
<td>Overrun clutch solenoid shorted or disconnected</td>
</tr>
<tr>
<td>7th flash longer</td>
<td>Lockup solenoid shorted or disconnected</td>
</tr>
<tr>
<td>8th flash longer</td>
<td>Fluid temperature sensor is disconnected or the control unit power source is damaged</td>
</tr>
<tr>
<td>9th flash longer</td>
<td>Engine revolution sensor shorted or disconnected</td>
</tr>
<tr>
<td>10th flash longer</td>
<td>Line pressure solenoid shorted or disconnected</td>
</tr>
<tr>
<td>All flashes the same with no long start flash</td>
<td>Battery voltage low, has been recently disconnected or control unit has just been reconnected</td>
</tr>
</tbody>
</table>
Interior

Changing the steering wheel

If you are going to replace your steering wheel with an aftermarket wheel, you need a HICAS boss adapter. Otherwise the HICAS will show an error for the steering angle sensor not found.

Cleaning a leather steering wheel

This is something most people miss doing to their cars. Visit a saddlery (horse gear store) and buy a bottle of Saddle Soap. Dilute some into a bucket of warm water, and with a soft cloth wipe the wheel over. You will be surprised how much dirt comes off the leather wheel. Keep doing this until no more dirt come off in the cloth, you may need a couple of buckets of water. After doing this, the steering wheel will feel like new again. For some reason conventional cleaners don't do as good a job as saddle soap for leather.

Remove the rear seat

The seat bottom (the part you sit on) can be removed by putting your hands under the seat for passenger door side (if a four door) or just behind where your feet are (if sitting in back seat) and pulling it up really hard. The seat is basically held there by some bent tabs which go into the cars body.

Once this seat comes out the back part is held by two bolts, one on either end at the bottom, and the seat top slides upwards as it is held at the top by three sliders.

Be very careful if you intend to make any modifications to the parcel shelf and seat back - the LTSA consider this a structural area, and may render your car unroadworthy.

Remove the surround from the climate control / stereo - R32

Start by pulling out the ash tray. Behind the ash tray are two screws, remove these.

Reach into the space vacated by the ash tray, and press upwards on the auto shifter surround (which has the power / hold buttons) The surround should pop out.

The surround around the climate control and stereo can now be gently pried off. Gentle is the word here.
Remove the surround from the climate control / stereo – R33

Remove the ash tray. Remove the two screws visible behind. Gently pry up the auto shifter surround at the back edge (hand-brake end). The shifter surround will now come off, lift over the shifter, and place to one side. This leaves another two screws visible holding the console surround on. Remove these. The plastic surround will now come away with a little bit of gentle work.

To help with removal, drop the steering wheel, and open the driver’s side door. The auto shifter will have to be moved while you are doing this, so leave the ignition key in.

The stock stereo is mounted in a removable rack type mount together with the coin tray / oddments box.

Remove the dashboard – R33

Pull out ashtray and remove two screws from behind.

Carefully pull up gear shift surround, remove cigarette lighter and light plugs, and move as far to one side as possible.

Remove 2 screws that were hidden by the gearshift surround.

Remove 6-7 screws (can’t remember exactly how many) from underneath the steering wheel column, as you will need to remove the plastic surrounds in order to remove the dash.

Remove plastic surrounds around steering column.

CAREFULLY, and I mean carefully ie by levering up in the best places so it doesn’t cause it stress, remove the dash and centre console. Its all in one piece, and you will have to unplug the demister switch, hazard lights switch, clock, air-con sensor and pipe, and electric mirror controls.

There should now be a further 4 screws that are holding the centre stereo and air-con bracket in place. These can be removed and the entire bracket removed.
Fitting a band expander

These are dead easy to fit, the hardest part is getting into the centre console, and finding a live feed for the power supply.

Follow the instructions for removing the console, and if you can't find a live feed, piggyback the cigarette lighter feed – just add a longer wire to the usually very short band expander power wire. Before you settle on a power source, check it with the headlights on – you don't want a power source that is tied into the instrument light dimmer... unless you only want to listen to the stereo in daylight.

In an automatic, you will need to have the ignition on some of the time, as you have to move the auto shifter out of park when the console is removed. If you have an electric aerial don't have the radio on when you pull the aerial plug out the back of the stereo – the electric aerial will get a bit confused.

As a side note, don't buy the cheapest expander on the market – a low dollar version only picked up two FM stations on my R33 until I fitted one that cost $20 more. I get all the stations now, even miles from the city.
Controls and Instruments

Boost gauge -- how to read

The stock Skyline turbo boost gauge is calibrated to the weird measurement of millimetres of mercury. This form of measurement is used in some engineering circles.

760mm HG = 1 bar = 14.6 PSI

<table>
<thead>
<tr>
<th>Gauge reading</th>
<th>PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 PSI</td>
</tr>
<tr>
<td>1/4</td>
<td>3.36  PSI</td>
</tr>
<tr>
<td>1/2</td>
<td>6.72  PSI</td>
</tr>
<tr>
<td>3/4</td>
<td>9.1   PSI</td>
</tr>
<tr>
<td>Full (7)</td>
<td>13.4  PSI</td>
</tr>
</tbody>
</table>

Power and Hold buttons -- what do they do?

Hold -- this will make the transmission hang onto 3rd and 4th gears. When the car is accelerated away from a stop, the transmission starts off on 2nd gear to prevent slipping. Very useful for wet conditions. This is marked "Snow" in R33 models.

If neither of these buttons is pressed, the transmission is in Auto mode. If your acceleration becomes spirited, it will change into the power mode.

Power -- this changes the shift points further up the rev range.

Disabling the remote boot release

Open the boot, and look for the opening about 10cm below the boot lip. There is a small lever inside the opening. Press the lever down to disable the remote boot release, pull up to re-enable.

The boot can only be opened by the square-headed ignition key if the remote release is disabled. The round-headed valet key will open the car, and start it, but will not undo the boot, nor the glovebox if locked.
The climate control has a feature that isn't documented in the R32 owner's manual.

With the fan on, temperature set at 18 (the lowest it will go), press and hold the temperature down button for a couple of seconds. The climate control will show "FC", the air conditioning will come on in re-circulated mode. This must be a fast cool, as it sets the optimum setting for cooling the car quickly. The re-circulation mode can be turned off.

There is a "FH" mode also with the temperature set at 32 (the highest temperature). Press and hold the temperature up button to enter the FH (fast heat?) mode.
Simple modifications

Cold air intake R32 (no bodywork cutting involved)

The stock inlet to the air box, is located under the lefthand headlight with an opening at the radiator side of the headlight. Not the biggest inlet, or the best place for one.

Not wanting to cut a hole in the bodywork I decided to have a look at cutting another inlet into the bottom of the plastic inlet assembly. I made an interesting discovery it already had been done, but was blanked off.

Here follows the instructions:

1. Remove the left headlight, and remove the inlet assembly from underneath.

   After some feedback from a reader, here are the detailed instructions on how to remove the headlight.

   a) There are two bolts behind the indicator (remove the screw in the top of the indicator and pull gently towards the front of the car, indicator assembly should come out).

   b) There are another two nuts on the engine side of the headlight you will need a universal socket drive to get at these as they are obscured by the aircon lines and the carbon canister. There are actually four nuts in a vertical row, it is only the top and bottom ones you need to remove. I can't stress how difficult it is to remove these without a universal socket drive, it is also handy to have a long magnetic wand to pick up anything you drop.

2. You will also need to loosen the three expanding pins that hold the front spoiler in front of the radiator.

3. The headlight will come out with a bit of gentle pulling. Be careful when unplugging the connection for the driving light the connection on the bulb is easy to break, and the bulb hard to locate in a shop.

4. Remove the rivets holding the rubber and foam on the bottom of the plastic assembly.

5. Peel back the rubber and foam, under that will be a metal pressing with two openings. Remove the two rivets that hold this on. Either cut or fold the rubber and foam so it won't impede.

6. Revealed will be two 40mm diameter inlets. Who knows why they were there, only to be blanked off... Using a small saw, cut out the bottom of the inlet assembly, I made a large oval shape and smoothed the edges.

7. That's it! There is now a supply of cool air (from the same source that feeds the intercooler) for the intake. Optionally blank off the original inlet. Put everything back on the car.

As a bit of a postscript, a friend of mine started to do the same modification, but decided to bin the plastic inlet that sits underneath the headlight. No problems on either his car or mine after a year.
**Gutting the catalytic converter**

*NB: Consider any legal implications before you do this. If you carry out this modification in California, you could be stung with a US$20,000 fine. This is currently a legal modification here in New Zealand.*

I had my cat gutted for $45 down at my local muffler shop. Gutting is something that can be done at home if I knew how simple it is I would have done it myself... besides I like taking things to pieces!

I stood and watched them at work, and here is what they did.

Basically the cat has a shield on the underside (remove), and flanges at both ends with bolts. Hard part is removing the bolts, plenty of CRC/WD40 does the trick. Undo the temperature probe, and drop the cat out. Put in a vice, and use a hammer and whatever to smack the guts out (looks like a ceramic honeycomb with heaps of metallic gauze in there)

The contents of my cat filled the best part of a household bucket. Put the shell back into the exhaust system, a little bit of sealer on the flanges, maybe some antiseize on the bolts, put the temperature probe back in. Shield back in place (optional)

If the catalytic converter has been removed, the temperature probe should be grounded to the car's body or replumbed into the exhaust system to prevent the exhaust warning light showing.

The car now seems to comes onto boost quicker, this may have also helped my fuel economy improve.

**Remove the 100 km/hr overspeed warning - R32**

Sounds horrible doesn't it?

- Remove the plastic panels under the driver's side dashboard.
- Drop the steering column (using the height / reach adjustment)
- Remove the instrument cluster. The small aluminium box on a bracket behind the cluster is the noisemaker.
- Disconnect the spade terminal, and remove the dingdong box. Peace at last.

**Aftermarket Boost Gauge -- where to plumb**

Use either the brass plug near where the brake booster connects into the inlet manifold, or the small line with runs off to the MAP sensor on the right hand inner guard near the brake booster.

Do not tap into the hose which runs from the inlet manifold to the fuel pressure regulator, or the wastegate supply line. If you loose pressure in these two hoses due to crimping or the hose blowing off, you risk killing your engine.
Building an intercooler water sprayer

It is a fact of physics that with air, the greater the temperature the less dense a given volume of air is. Remember the basic school science phrase hot air expands?

Air is also heated by compressing it. This is what the turbo does. Car manufactures have included intercoolers to help cool the air once it has been through the turbocharger. The intercooler on Skylines is on the passenger side, at the front of the car, just in front of the wheel arch. It looks like a radiator.

What we can do is enhance the cooling properties of the intercooler, thus giving us greater density in the air charge once it has left the turbocharger. This is done by spraying water onto the intercooler. The evaporating water pulls heat from the surface of the intercooler, reducing the temperature of the air passing though the intercooler. It is done on some WRC type production cars namely some WRX’s, and Evolution Lancer’s. There is also a range of after-market water sprayer kits around.

This project cost me a total of $70 or so plus my own unskilled labour. Don’t hang around a performance shop, hit the garden centre!

Parts list

- A roll of 4mm irrigation hose
- A couple of spray heads 4mm
- T-branch 4mm
- A 12 volt pump (cat. P8900) $12.95
- A switch (cat. P7664) $14.95
- 6 metres of wire about $8
- A 20 litre tank $14.95
- A packet of 100 x 200mm cable ties $2.95
- 2 x one way anti-siphon valves (for aquarium air pump, Uni-pet brand) $4.00

A more durable pump is available from Dick Smith, cat. P8905, $24.95.
Assembly

I started by putting in the electrical parts first.

One of the most difficult parts is getting the power supply for the pump. I ran the wire from the boot, though behind the back seat on the passenger side, down under the carpet next to the existing rear window washer water line, up from the carpet under the dash where the ECU is, under the blower motor, and into the centre console piggybacked into the lighter power supply.

I popped out one of the two blanks next to the steering wheel (one of these is used for the spoiler switch on some cars) Later I'll go to a wrecker and get another, but for now I made a plywood blank to mount the switch onto, and put it back in – a tight fit. I made the plywood blank black so it doesn't look dumb.

The water line goes from the pump and tank in the boot, out through one of the the small rubber plugs in the spare wheel well and up to the front of the car following the HICAS lines. I used plenty of cable ties to secure the line and keep it tidy. Up into the engine bay, past the battery, under the rubber shroud on the radiator support. I ended up taking out the indicator to make everything easier to install. I used a couple of cable ties to position the spray head.

It was quite a long job to route the water line – it would have been much quicker with the car on a hoist or ramps - I have neither. Lots of dirt in my eyes...

At the tank end - the outlet hose from the tank goes to the pump, from the pump into a one way valve (prevents the pump getting un-primed), to a T-splitter. The other side of the T goes to the spray head end of the hose. The centre feed from the T goes to a one way valve mounted higher than the tank, the valve is done so water will not come out, but air can go in to break the siphon. The T also serves as a handy point to prime the pump from.

How does it go?

At this early stage, I seem to be getting higher boost. I find a ten second spray is enough to make difference. I think the project is worthwhile, as it has taught me a little more about my car, and seems to have a positive effect on performance.

Possible additional related modifications

The pipes between the intercooler and the inlet can be lagged using insulated plumbing tape.

R32 – the ambient temperature sensor can be moved to the intercooler outlet pipe. The sensor is located on the bonnet catch support, just in front of the radiator. It's slightly smaller than a box of matches. Extend the existing wires to the new location.

A throttle position trigger can be added to the intercooler sprayer, so that full throttle (or near full throttle) will trigger a spray.
Simple Tips

Cleaning tar from paintwork

Don't use thinners to get rid of tar, you can use baby oil, vegetable oil or Vaseline. Use hand soap to remove the oil afterwards. Anything with a petroleum base will break down the tar. The trick is to use something that won't harm the paint finish.

Electric aerials

Give the aerial a bit of a lubrication. Use CRC white lithium grease and shield the car's paintwork with a newspaper while you spray. The lithium grease will make the aerial much quieter when it is going up and down. Check that any water can drain away from under the electric aerial in the side panels.

Air Conditioning - looking after

Make sure you run the air-conditioning at least once a fortnight, even during winter. This helps to keep the system healthy, remember it is basically a refrigerator.

When you are running the air-conditioning, plan ahead so that a couple of minutes out from your destination you can turn the AC off, and run the fan on high until you turn the engine off. This evaporates any moisture in the system, and prevents bacteria and fungus growing (which can cause rancid smells when the AC is run)

If your AC does smell rancid, you can buy some chemical preparation to spray down the vents and try to kill off the fungus and bacteria growing in there.

My Skyline seems sluggish sometimes: Fuel filter

Interesting problem, and one I have had for a while. The car seemed to have a flat feeling to it sometimes, and drove normally the rest of the time.

What did the trick for me was changing the fuel filter. The old filter was quite heavy, and when shaken, heaps of sludge came out.

Back in my V8 days I always ran a glass fuel filter before the carburettor, and it was always interesting to see how much junk ended up in the filter.

Be prepared for a bit of labour to replace the filter, and remember to disconnect the battery when you do this, as the filter is quite near the starter in an R32. The fuel filter in the R33 is much easier to get at.
Oil pressure: Sender failure

Like all normal vehicles, good oil pressure is essential. The sender itself is located by the oil filter on the left hand side of the block.

The following figures are the workshop manual specification for oil pressure on the RB20DET...

\[
\begin{align*}
1\text{kg/cm}^2 & \text{ @ 600 rpm} \\
3\text{kg/cm}^2 & \text{ @ 2000 rpm} \\
4\text{kg/cm}^2 & \text{ @ 6000 rpm}
\end{align*}
\]

My own car has a oil pressure gauge that doesn't behave due to a fault somewhere, so I had a check done by running a remote gauge which gave the correct numbers... Whew! Update: the oil pressure switch replaced.

Oil pressure: Stuffed oil filter

When an oil filter becomes clogged, a bypass valve opens this means the filter is offering zero protection to your motor. The Skyline handbook recommends a 5000 km service interval for turbo models. I get mine serviced every 10,000 km. With oil, you should stick with a quality brand and ensure you are using a oil with a good viscosity range. Brands I have used are Pennzoil, Quaker State, and Ampol. Keep the "Lubemart" 30/40 for the tractor.

If there is a sludge problem do a hot oil change and repeat within 1,000 km. Don't use an engine flush treatment.
Coils - R32

Most of the ignition system is hidden under the cover with "Nissan Twin Cam 24 Valve" embossed on it. Each platinum spark plug has an individual coil mounted on top.

These coils are fragile (so I'm told) and it may be a good idea to leave this one to the professionals. But if you have the skills, the cause is usually one of two things: either a coil failure or an amplifier (also known as the ignitor) failure.

The amplifier is the black box at the back of the block, which controls the coils. A faulty coil can be diagnosed by swapping the coil from the misfiring cylinder with another. If it still misses on the same cylinder, the problem is with the amplifier.

Update  I now have had two coils fail. The good news is that the price of them is slowly dropping over time.

Another way of testing a coil is to measure the resistance between pins A and B on the coil pack. It should read 0.7 ohms for a healthy coil pack.

![Coil Diagram]

Air flow meter

Most people seem to recommend borrowing and swapping in a known good air flow meter before rushing out and buying a new part.

If you are replacing an air filter element, give the element a blow out first especially if it appears to have a silicon treatment. This will contaminate the air flow meter and cause poor running otherwise.

When an air flow meter fails, the ECU will go into a limp home mode, where engine revs are limited to about 2500 RPM with an unstable high idle. Check all vacuum and pressure lines around the engine first before replacing the air flow meter, as a loose hose can cause similar symptoms.

Some owners have successfully cleaned their air flow meters using CRC Contact Cleaner. The AFM has a self cleaning facility where the wire is briefly heated more then normal when the engine is turned off.