

# Engine Idle And Ignition Timing

## Factory idle

Engine	Transmission	RPM
RB20E	Manual	600
RB20E	Auto	650
RB25DE	Manual	650
RB25DE	Auto	650
RB25DET	Manual	650
RB25DET	Auto	650
RB26DETT	Manual	900

All should be +/- 50rpm of the above.

## To set Idle

- Start car and warm up with steering wheel in centre, all lights and air con OFF, turn ecu diagnostic screw (on the ecu) anti-clockwise until it bottoms out (rpm will drop if it wasn't bottomed out already).
- While car is running disconnect the idle feedback plug (its the short wire coming out the BOTTOM of the TPS, unplug it).
- Go to the back of the inlet manifold and find the idle/aux air control solenoids, find the solenoid with the BROWN plug, on the opposite side of that solenoid there is a large phillips head screw. Turn it anti-clockwise to raise RPM, clockwise to lower it.
- After rpm is set, plug idle feedback plug back in. If rpm need to be increased in the future, turn the diagnostic screw clockwise. Maximum adjustment with the ecu screw is approx 250rpm because if its turned any further it puts the ecu into diagnostic mode.

## R33 engine ignition timing

Engine	Transmission	Timing Degree @ RPM
RB20E	Manual	20 @ 600
RB20E	Auto	20 @ 650
RB25DE	Manual	15 @ 650
RB25DE	Auto	15 @ 650
RB25DET	Manual	15 @ 650
RB25DET	Auto	15 @ 650
RB26DETT	Manual	20 @ 900

## To set engine ignition timing

- warm the car up, best to go for a drive to make real sure its well warmed up.
- Check rpm and make sure they are correct for the motor, if not adjust it as above. DO NOT rely on the tacho, its not accurate. There is an RPM meter signal wire on a 2 contact plug which is by the battery/battery box behind the drivers side headlight or on the left strut tower, its a grey plug. Make sure steering is centered, lights and air con ALL OFF.
- Unplug idle feedback control plug (see setting idle if you dont know what it is). I have been told that this step ISNT needed but according to Nissan workshop tech I have it says to do it so im sure there is a reason for it.

## For a non-powered timing light...

- **Rb20e** - remove number 1 spark plug lead (very front one), plug one of the timing light leads into the spark plug lead and the other on to the top of the spark plug.
- **Rb2xde/det** - remove number 1 coil, plug one of the timing light leads into the spark coil and the other onto the top of the spark plug.

## For a powered timing light

- Connect the (+) and (-) leads of the light to the correct battery terminals.
- **Rb20e** - hook the signal clamp into number 1 lead
- **Rb2xde/det** - look at number 1 coil and the 3 wires going to it, 2 of the wires are power and ALL the other coils will have these 2 wires of the same colour, the other wire is the signal wire, that's the one you want. On or around the coil ignitor (series 1 r33) there will be a loop of wire the same colour as the signal wire to number 1 coil. Find this wire and hook the signal clamp over this wire. On R33 series 2, the loop of wire is near the back firewall (no ignitor on series 2). If you can't find it on either series 1 or 2, cut back the tube that covers the 3 wires going to coil 1. Clamp the signal wire here.
- Restart car before it gets cold again.
- At this point the timing light should be flashing. Aim it at the crankshaft. Looking just above the crankshaft, at about 2 o'clock on the timing belt cover, there is a fixed mark. The marks that will be seen with the timing light on the crankshaft have to be lined up with the fixed mark on the belt cover. On the crankshaft there are 7 marks, 0 to 30 deg so each mark after 0 deg represents 5 deg, 0 deg is coloured orange and all the rest are white.
- **Rb20e** - undo the bolts around the dizzy and rotate to get desired ignition timing. Move clockwise to advance, opposite to retard.
- **Rb2xde/det** - undo the 3 bolts holding the cam angle sensor (end of exhaust cam) and rotate to get desired ignition timing. Move anti clockwise to advance, opposite to retard.
- Do bolts back up, remove light etc.....

## The following is intended for hcr32 and hnr32 rb20det.

Vehicle model: hcr32 and hnr32

Engine type: rb20det

Displacement (cc): 1998

Combustion chamber: pent-roof type

Valve arrangement : DOHC belt drive

Bore x stroke mm: 78.0 x 69.7

Compression ratio : 8.5

Compression pressure: (kg / cm<sup>2</sup>) / (rpm) 12.0 / 300

Maximum output (net) (ps / rpm): 215 / 6400

Maximum torque (net) (kg-m / rpm): 27.0 / 3200

Fuel consumption ratio (g / GS.h) / (rpm): 215 / 2400

Dimensions m/t (l / w / h) (mm): 845x660x685

Dimensions a/t (l / w / h) (mm): 830x660x685

Idle speed (rpm): 800

Ignition timing a/t (BTDCdegrees / rpm): 15 / 650

Ignition timing m/t (BTDCdegrees / rpm): 20 / 650

Firing order: 1-5-3-6-2-4

Valve clearance cold (mm) intake: 0.45 +/- 0.003

Valve clearance cold (mm) exhaust: 0.38 +/- 0.003

Throttle chamber bolts torque setting (kg-m) first stage: 0.9 - 1.1

Throttle chamber bolts torque setting (kg-m) second stage: 1.8 - 2.2

Flywheel run-out limit (mm): 0.10

Con rod nut tightening stage 1 (kg-m): 2.3 - 2.9

Con rod nut tightening stage 2(kg-m): 3.9 - 4.5

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### **rb20det Engine variations:**

The rb20det came in two different forms, the earlier red top with the NICS system and the newer silver top version with the ECCS system. The red top is the earlier version of the rb20det and came as standard with the r31 skyline, z32 fairlady and the nissan laurel, whilst the r32 skylines and nissan cefiro came with the silver top version.

Just to confuse you more there were a few red top rb20dets with the eccs system, heres some engine power outputs.

RB20DET red top  
1986-1987: 178bhp (NICS version)  
1988-1989: 190bhp (ECCS version)  
RB20DET silver top  
1989 onwards: 215bhp

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### **Resetting the rb20det ECU:**

You can reset the ecu by disconnecting the battery and then pressing the brake pedal in for a minute or so, doing this tries to light up the brake lights and removes all of the voltage from the ecu, then connect it back up and go for a drive. Make sure the front wheels are straight when you do this or else the hicass can get a bit screwed up because it thinks the wheels are turning slightly.

The ECU has the mapping for the fuelling this wont change but the timing and airflow is monitored all of the time and adjusted according to conditions if you have been using low octane fuel or carried out recent mods then you'll benefit from the ECU reset as it relearns the optimum settings and changes the timing in very large increments initially then as it gets closer to being right it narrows the adjustments down.

The ignition timing is advanced until knock is detected and then pulled back in narrowing swings above and below ideal until it has narrowed it down to being ok. Once settled it almost stops learning and will use tiny adjustments each time you go out and take a lot longer to get to its ideal each time.

### **Part numbers for of r32 gts-t:**

\*Warning, this part list is in nowhere complete\*

Water Pump: 21010-21U25  
Thermostat: 21200-42L05  
coil Packs: 22433 60u02 mcp-300124  
Oil Filter Genuine Nissan: 15208-H8911  
Oil Filter Ryco: Z145A  
Oil Filter Valvoline: R9  
Oil Capacity: 4.6L with filter (7.5w 30 is recommended)  
Coolant Capacity: 9L  
Manual Gearbox: 2L (80w 90)  
P/s Fluid capacity, non-hicas: 1.8L  
Sump washer 11026-01M02  
Fuel filter 16400-53J10

Rear diff oil 1.5L  
Alternator belt 11720-24U00  
Cam belt 13028-20P10  
PAS belt 11950-04U00  
NGK standard plugs PFR5A-11 1.1mm gapped  
NGK Iridium plugs T7341T-8 0.8mm gapped  
Trust-Greddy Iridium plugs IT08 0.8mm gapped  
Brake pads and discs for r32 gtst are the same as s13 200sx (silvia s13)  
Speedo drive gearbox end 32702-58S21  
Air Flow Meter 22680-02U00

### **Diagnostic for the rb20det ECU**

The ECU is in the passenger footwell, behind the plastic kickplate to the left of your feet. You'll have to remove the computer from the mounts in the footwell, as the led/leds you'll need to see are pointing towards the front of the car. Switch on the ignition but don't start engine, the led on the ECU will begin glowing turn the selector screw clockwise all the way.

There's three types of factory ecu in Skylines, One type has two LEDs and five modes, the other type has one LED and two modes and the last type has no LEDs, the output is done with the engine check light in the instrument cluster.

For two led ecus 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 one led ecus 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 More recent ECU's have two LED's red is first digit, green is second digit, eg red 2x flash, green 1x flash = code 21. The ecus on most R32's have one LED, long flash = first digit, short flash = second digit, eg long, long, short = code 21.

Codes:

- 11 Crankshaft position sensor
- 12 MAF sensor circuit
- 13 Coolant temperature circuit
- 14 Vehicle speed sensor circuit
- 21 Ignition circuit
- 31 ECU
- 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.

There is also a O2 sensor test in real time available - do the above to get the ECU into mode 2 (single LED ECU) or mode 1 (2 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

## **rb20det eccs control unit pin layout.**

- 1 Ign signal (power transistor) Cyl #1
- 2 Ign signal (power transistor) Cyl #5
- 3 Ign signal (power transistor) Cyl #3
- 5 engine. A/T control input signal (bt1)
- 6 Sub electrical fan relay (engine temp switch)
- 7 Tacometeter speed signal
- 9 AC relay (AC cut signal)
- 10 Ground (ign signal system)
- 11 Ign signal (power transistor) Cyl #6
- 12 Ign signal (power transistor) Cyl #2
- 13 Ign signal (power transistor) Cyl #4
- 14 engine. a/t control input sigal (bt2)
- 15 engine. a/t control input sigal (bt3)
- 16 ECCS relay
- 18 fuel pump relay
- 19 Power steering switch
- 20 Ground (ignition signal system)
- 21(RX) Receive (control unit data reception)
- 22 (TX) Transmit (data sent from control unit)
- 23 Detonation sensor 1 (cyl 1-3)
- 24 Detonation sensor 2 (cyl 4-6)
- 26 Air flow meter ground
- 27 Air flow meter intake air quantity signal
- 28 Engine temp sensor
- 29 Exhaust gas sensor
- 30 Sensor ground (throttle sen, ENG temp)
- 31 clock (synchronization signal)
- 32 Monitor and check lamp (red)
- 38 Throttle opening output
- 41 Crank angle sensor (120degree signal)
- 42 Crank angle sensor (1 degree signal)
- 43 Ignition switch START signal
- 44 Neutral switch
- 45 Ignition switch (IGN)
- 46 AC switch
- 47 (CHK) Check (diagnosis activation)
- 48 Throttle sensor power supply
- 49 Control unit power supply
- 50 Ground (control unit)
- 51 Crank angle sensor (120 degree signal)
- 52 Crank angle sensor (1 degree signal)
- 53 Vehicle speed sensor
- 54 Throttle valve switch (idle connection pt)
- 56 Throttle sensor output signal
- 57 Throttle valve switch power supply
- 58 Battery power supply
- 59 Control unit power supply
- 60 Ground (control unit)
- 101 Injector #1
- 103 Injector #3
- 104 Fuel pump terminal voltage control output
- 105 Injector #2 107 Injector ground
- 108 Injector ground
- 109 Injector power supply
- 110 Injector #5
- 112 Injector #4
- 114 Injector #6
- 115 exhaust gas sensor heater ground
- 116 injector ground

## **Z32 afm: Wiring and info to fit to rb20det.**

<http://www.rb20det.com/z32afm.jpg>

Z32 connections are marked A to F but only four connections are used when fitting to the rb20det. This wiring diagram is based on fitting a z32 afm to a r32 gts-t.

A: Blank off

B: connect to Black wire

C: connect to black/silver

D: connect to white

E: connect to black with white trace

F: Blank off

A Z32 AFM will support up to 450 BHP with the correct supporting mods, it has a 80mm diameter and you'll need the eprom remapped to suit.

## **ECCS Component parts**

Component part | Type | Installation position  
injector | elevation resistor type | intake manifold  
fuel pump | electronic. turbine type | fuel tank  
aac valve | solenoid type | collector  
ignition coil | small mould type | cylinder head  
power transistor unit | 6 channel electronic distribution | rocker cover  
crank angle sensor | photocell type (auto camshaft) | cylinder head left bank front  
air flow meter | hot wire type | front left  
throttle sensor | variable resistor type | throttle chamber  
throttle valve switch | switch | throttle chamber  
engine temperature sensor | thermistor type | water outlet  
exhaust gas sensor | zirconium type (no heater) | exhaust outlet  
detonation sensor | pressure-electrical type | cylinder block right side

## **Coil pack maintenance:**

Over time the coil pack contact points (where they connect to the spark plugs) will get fouled causing numerous rough running problems from high rpm misfire to rough idle, so bearing this in mind it's a good idea to check and clean them. First off be very careful with the coils pack when removing and cleaning, it took me 2 hours to do this job spending about 20 minutes on each coil pack.

- 1: carefully remove coil pack 1 at a time.
- 2: carefully remove the rubber boot from the coil pack.
- 3: inspect boot and clean, replace if needed.
- 4: use 600 grit (very fine) sand paper to gently clean contact point.
- 5: refit rubber boot making sure it's firmly attached.
- 6 refit coil pack.

## **Brake upgrade for the r32 gtst:**

This is a conversion I've just finished on my own car, to do the conversion you'll need the following:

1. Two front calipers from an r33 gtst
2. Two front discs (296mm X 30mm) also from an r33 gtst
3. Brake pads to suit
4. Slightly longer brake lines for both sides...(I forgot to measure but you'll see when you do the

conversion)

Then all you do is literally bolt the new discs and calipers on and hey presto big brakes on a budget, its also been said that the r32 gtr discs and calipers will bolt straight onto an r32 gtst giving you 330mm X 32mm discs but since i've not tried this myself i'm not 100% sure.