ProECU Nissan GT-R

TCM Tuning Guide

V1.0

Contents

1. Introduction

The Nissan GT-R TCM is at the heart of the GT-R driving experience and delivers excellent control of the Ricardo 6 speed dual clutch transaxle. The TCM controls the pressure applied to both of the clutches in the gearbox, while accurately positioning the selector forks to select gears in two gear clusters. The TCM is tightly linked to the ECM and together they deliver much of what makes the GT-R driving experience what it is.

An in depth understanding of the GR6 transmission can be had by comprehensive reading of the Nissan technical service manual that describes the mechanical operation, and many diagnostic functions and information. For detailed service and diagnostic information please refer to section TM "Transaxle & Transmission" in the Nissan R35 GTR service manual.

Some aspects of operation are useful to know in the tuning and calibration of the TCM maps to improve the driveability and/or performance to compliment power upgrades and transmission hardware changes. Understanding the live data and how to interpret it is an important step in successfully tuning the TCM.

Live data

A full list of live data parameters can be found in the service manual, however the most important ones are listed below.

Accel Position sensor 1 (%)	Actual Accel pedal driver input
Accel Position sensor 2 (%)	Effective Accel position including adjustment by (for example) cruise control
Clutch A Pressure (Bar)	Measured pressure on Clutch A
Clutch A Slip (RPM)	Engine RPM – Clutch A output RPM
Clutch A Speed (RPM)	Clutch A shaft RPM
Clutch A Pressure Target (bar)	Target pressure on clutch A the TCM control will try to maintain
Clutch A Temperature (°C)	Estimated temperature of clutch A based on friction, load and slip
Clutch B Pressure (Bar)	Measured pressure on Clutch B
Clutch B Slip (RPM)	Engine RPM – Clutch B output RPM
Clutch B Speed (RPM)	Clutch B shaft RPM
Clutch B Pressure Target(bar)	Target pressure on clutch B the TCM control will try to maintain
Clutch B Temperature (°C)	Estimated temperature of clutch B based on friction, load and slip
Engine Speed 1 (RPM)	Engine RPM
Engine Torque Available (Nm)	Estimated engine torque potential without any reductions active
Engine Torque Demanded (Nm)	Engine torque requested by driver, sent from ECM
Engine Torque Limit Request (Nm)	Torque request sent to ECM to cut power on upshift
Engine Torque Limit Request2 (Nm)	Torque request sent to ECM to limit push after downshift blip (when req)
Fluid Temperature (°C)	Bulk temperature of transmission fluid
G Force Lateral (G)	Lateral (left/right) G-Force from the G sensor
G Force Longitudinal (G)	Fwd/Rev G-Force as calculated from rate of change of vehicle speed
Gear Current	The Gear the TCM is actually in (may be different to display)
Gear Desired	The Gear that the TCM is trying to shift to
Gear Planned	The next gear that will be shifted into if requested (preselected next gear)
Gear Indicator	Gear as shown on the dash indicator
Line Pressure (Bar)	Main hydraulic system pressure
Mode (0 to 5)	0=Auto, 2=Auto (Race), 3=Manual, 4=Manual(Race), 5=Snow/Eco
XXXX S/V Commanded (%)	Solenoid valve current commanded by TCM for various solenoids
XXXX S/V Monitored (%)	Solenoid valve current measured by TCM for various solenoids

Early Gen 1 TCM ROMs will log at approximately 10 Hz while the later ROMs such as the KJ series (both 1mb) log at 50hz. TCM logging speed is unaffected by the number of logging parameters enabled as all the data is returned no matter what the request.

EcuTek recommends the programming of all 2008-2010 TCMs with the latest KJ series ROMs as they offer a number of improvements, of which logging speed is just one, more detailed explanation of ROM choice is covered later in this manual.

Understanding the upshift sequence

The upshift sequence can be broken down into three phases:

- Take up – The incoming clutch (the clutch that will be engaged in the next gear) is preloaded with light pressure and starts to slip, taking up any slack in the transmission.
- Outgoing clutch transfer – The pressure on the outgoing clutch (the clutch that was engaged before the shift was initiated) is ramped down and finally reduced to zero.
- Incoming clutch transfer – The incoming clutch pressure is ramped up, finally to the current target clutch pressure. This can happen simultaneously with outgoing clutch transfer, or in the case of shifts at high torque it happens after to avoid significant pressure being applied to both clutches at the same time.

During the either or both of the clutch transfer phases the torque is reduced by the TCM via a torque request sent to the ECM via CANbus.

The screenshot below shows the stages on a gentle upshift from 1st to 2nd gear.
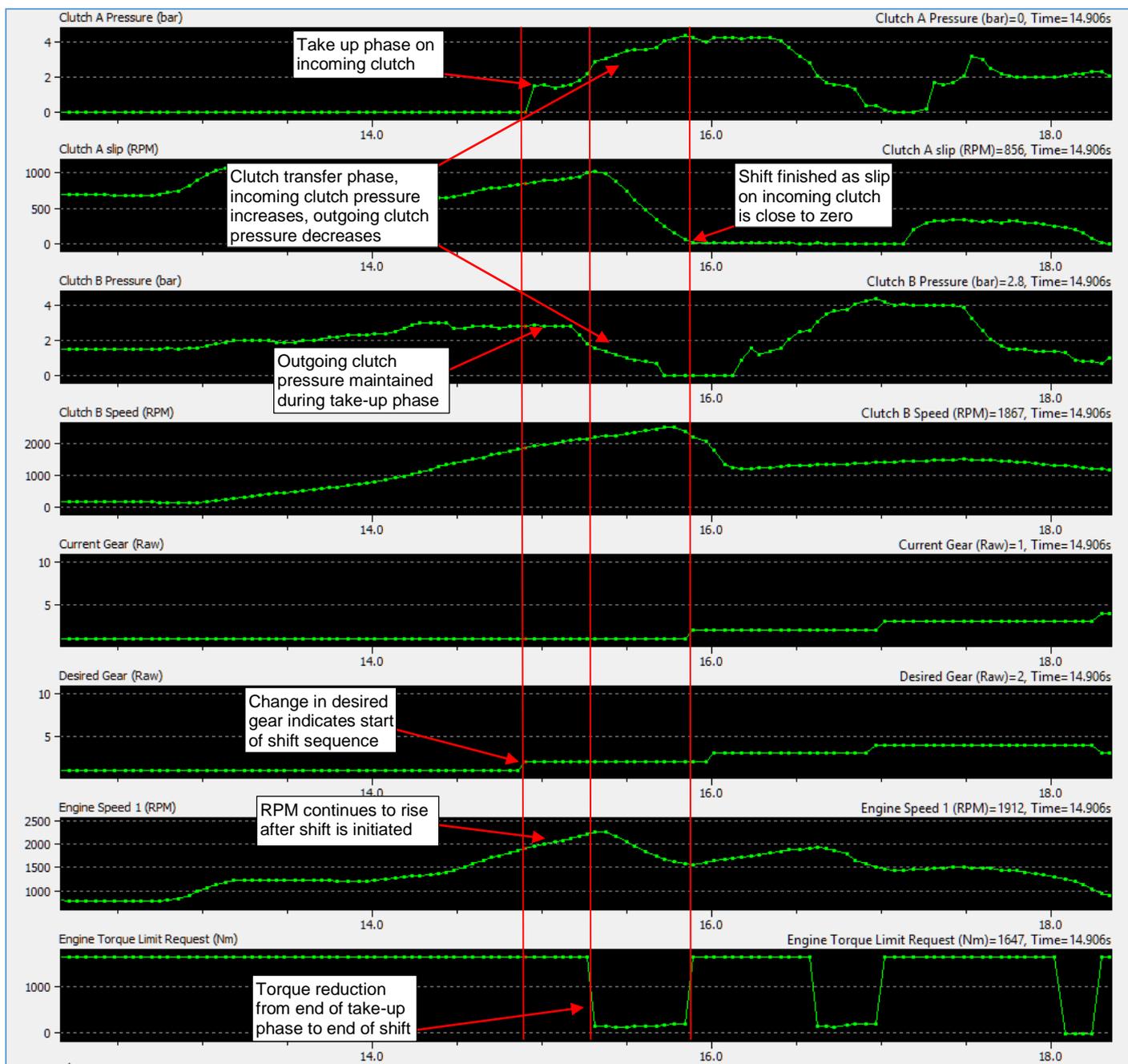
Understanding the downshift sequence

The downshift sequence is very similar to the upshift sequence, due to the low torque outputs present in overrun conditions (typically negative due to the transmission driving the engine) clutch pressures are considerably reduced and it can be difficult to see exactly what is going on. In the below example the log shows downshifting on gentle deceleration from 6th through to 3rd gear, it's worth noting that unlike upshift under even light load the clutch pressures are low and often there is no definitively engaged gear.

2. TCM Strategies and maps

Clutches

Clutch A/B Heat Loss

Clutch temperature is estimated by the TCM based on friction, RPM and clutch pressure for heat input and oil flow for cooling. The heat loss maps dictate the heat rejection from the clutch (into the oil) based on the temperature of the oil and the flowrate through the clutches. These maps are usually left standard.

Clutch Temperature Threshold 1-4

In maximum effort drag cars it may be required to raise these thresholds so they are more representative of the capabilities of an uprated clutch, or in situations where the TCM overestimates the heat input encountered with an uprated clutch. Raise all 4 thresholds together to avoid clutch temperature protection thresholds to be hit, thereby preventing limp mode situations after a number of launches, and prevent loss of clutch pressure during a drag run.

Gear Change Torque

During an upshift under load the TCM sends a request for a reduced torque level to the ECM, the ECM responds with a reduction in ignition advance to try and meet this new reduced torque level. The "Gear Change Torque" maps set what percentage of the *Engine Torque Available* should remain, the output of this map is still subject to small corrections so you may not see torque figures that exactly match the output of these maps.

The following 3 examples show the output torque requested in a few different scenarios using the stock maps.

| Example 1:	Example 2:	Example 3:
Input torque = 500Nm	Input torque = 700Nm	Input torque = 1100Nm
Map output = 70%	Map output = 60%	Map output = 60%
Requested torque = 350Nm	Requested torque = 390Nm	Requested torque = 660Nm !!!

In the case of 1100Nm input (not unknown on high power drag car) the output 660Nm, this still very high torque value can cause issues with shifting as the increased clutch slip and time to speed match results in longer overall shift times and potentially damaged clutches. Therefore on very high powered cars it's possible to rescale the input to (for example) 1000Nm and reduce map value to more like 35% giving 385Nm Shifting torque even at 1100Nm.

Gear Ratios

Gear ratio data is set individually for each gear including reverse, used for calculation purposes and is very important to be correct. Adjusting the ratio for a long 6th gear is a common procedure, however do not adjust these to compensate for changes in final drive ratio as the TCM compares output shaft A/B RPM with the engine RPM. Shifting can stop happening at all and/or become very poor when inappropriate values are used.
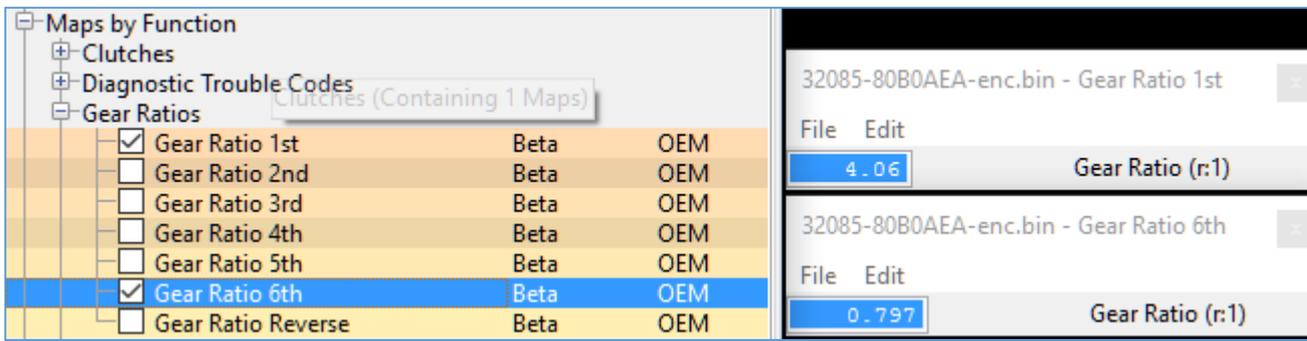
Diagnostic Trouble Codes
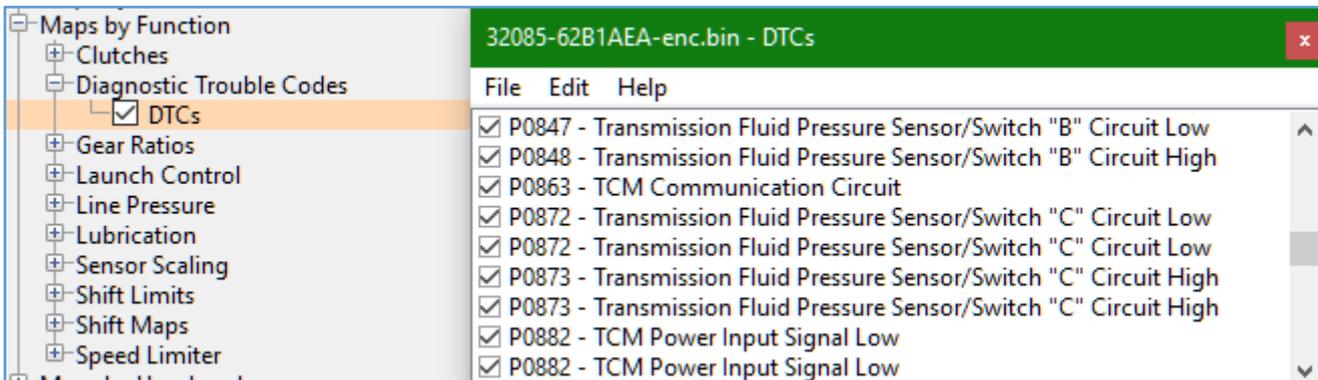
In a small number of cases it may be required to disable a DTC within the TCM. However most DTCs reported by the TCM are critical to operation and normally mean a fault is present. P2637 and P2641 are common DTCs and normally solved by making changes at the ECM, typically MAF voltage limits or bad torque estimation is the cause.

WARNING: do not assume that a DTC error code only requires something to be switched off in the TCM rom!

Line Pressure

 "Line Pressure" is the system pressure for the transmission's fluid reserve, which is then used and regulated to a lower pressure for specific sub systems within the transmission such as clutch pressure and shift solenoids. Therefore clutch pressure can never be higher than line pressure, so keep in mind that high demands on clutch pressure will require changes to the minimum target line pressure.

The **Target Line Pressure Compensation** map can be used to increase the line pressure at high temperatures and higher RPM if there are problems in maintaining the clutch pressures.

Sensor Scaling

ATF Temp Sensor

The transmission oil temperature sensor can be rescaled for non-standard temperature sensors.

Clutch A Pressure 1 and Clutch B Pressure 1

Sensor scaling for clutch and line pressures (line pressure not available on all ROMs). Two pairs of values give an overall slope for the sensor, these are the normal values used when the TCM zeros the sensor scaling. The final scaling is usually in line with the values here.

Clutch A Pressure 2 and Clutch B Pressure 2

Sensor scaling for clutch and line pressures (line pressure not available on all ROMs). Two pairs of values give an overall slope for the sensor, these are the LOWER limits used when the TCM zeros the sensor scaling and are typically 290mv lower than the Pressure 1 values.

Shift Maps (Adaptive Shift Control)

Introduction to ASC

When driven in Auto the TCM monitors how aggressively the car is being driven and selects one of 4 shift schedules depending on how demanding the driver is, Nissan calls this "Adaptive Shift Control" or ASC.

Using inputs including G forces, steering input, road speed, engine RPM, torque demand, pedal inputs and transmission mode, the TCM calculates a "demand" which goes up when driving hard and decays down when driving in a more relaxed manner. As the demand goes up so does the shift map that the TCM chooses, although Nissan simplify this to a more basic concept in the following table.
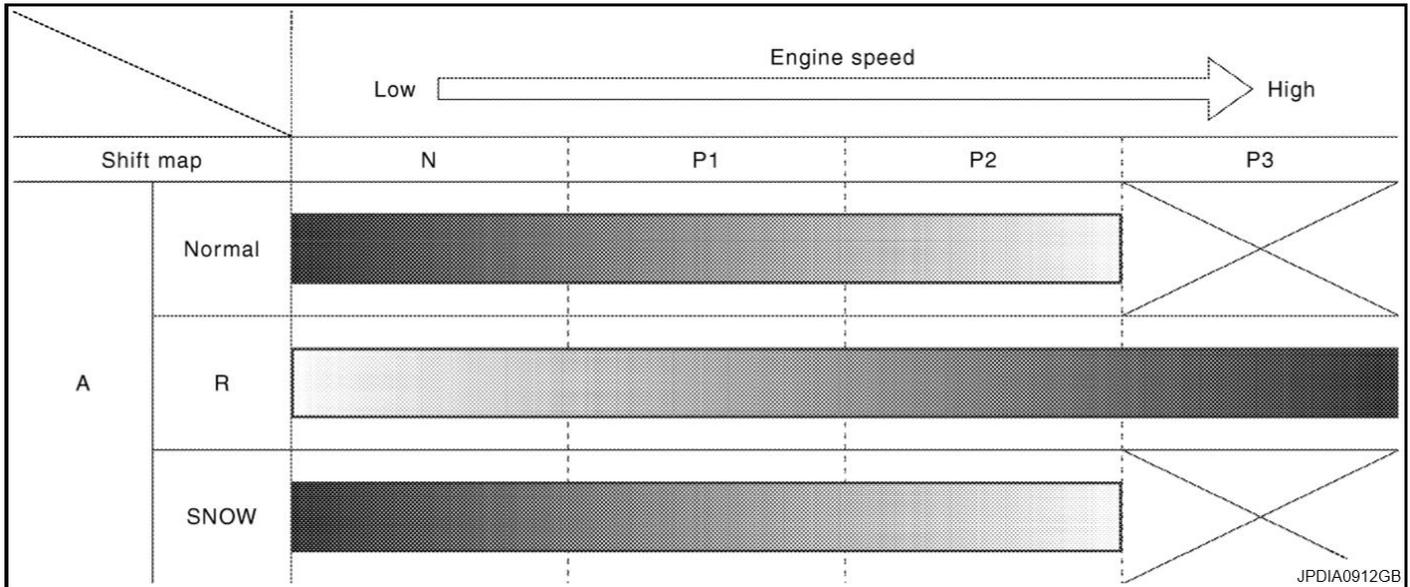
The difference between driving the car in Normal and R mode are described by Nissan in terms of resulting gear in following diagram.
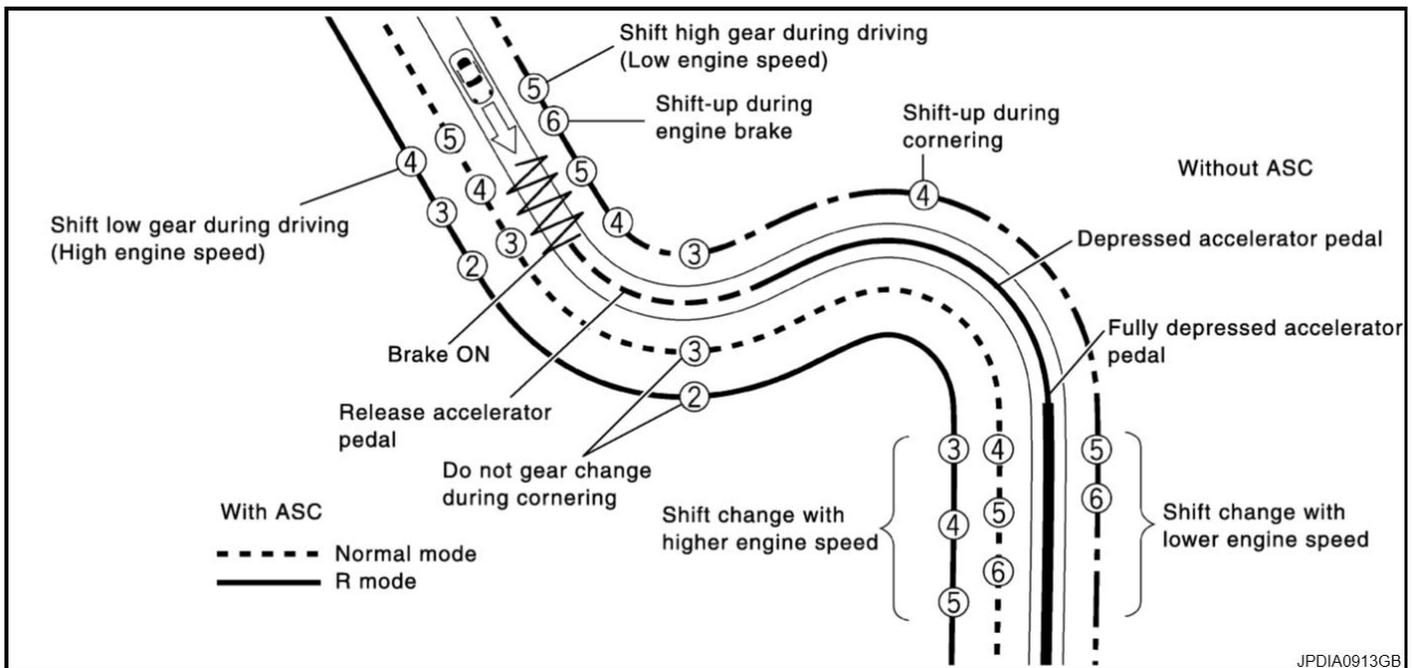
ASC Group N – P3

For normal driving in Auto mode the ASC shift maps are the ideal starting point to change the driving experience of the car, especially to prevent the TCM shifting into high gears at low speeds, a particular problem on modified cars.

In ProECU there are maps for each of the ASC schedules for up shift and downshift in each gear, for example.

- **Group N downshift 02**   = Normal Downshift from 2nd to 1st
- **Group P1 upshift 03**   = P1 Upshift from 3rd to 4th

These maps have inputs of Accel Pedal in % and outputs of road speed in Km/h, defining the speed at which the upshift or downshift is triggered depending on the accel pedal position. These can be approximated to an RPM using the following formula:

$$RPM_{shift} = VehicleSpeed * Ratio_{Gear} * Ratio_{Final} * 7.545$$

Alternatively the required speed can be calculated from the target shift RPM by rearranging the above formula:

$$VehicleSpeed = \frac{RPM_{shift}}{Ratio_{gear} * Ratio_{final} * 7.545}$$

The Stock final drive ratio is 3.7 and the stock gear ratios are listed below with values for km/h per 1000rpm. It should be noted that due to the delay in an upshift completing you should use a vehicle speed that corresponds to a lower RPM than your ultimate target, this is more important in lower gears when the RPM rate will be higher. And due to clutch slip these values are not always 100% accurate.

Gear	Stock Ratio	Km/h per 1000rpm
1	4.06	8.823
2	2.3	15.574
3	1.59	22.529
4	1.25	28.657
5	1	35.821
6	0.797	44.945

The below 2 charts show the difference between Normal and P3 ASC shift schedules across all gears (JF04)

ASC Shift Schedule - Normal

Gap always maintained

Legend:
- 1st upshift
- 2nd upshift
- 3rd upshift
- 4th upshift
- 5th upshift
- 2nd downshift
- 3rd downshift
- 4th downshift
- 5th downshift
- 6th downshift

Accel Pedal (%) vs Vehicle Speed (km/h)

ASC Shift Schedule - P3

Gap always maintained

Legend:
- 1st upshift
- 2nd upshift
- 3rd upshift
- 4th upshift
- 5th upshift
- 2nd downshift
- 3rd downshift
- 4th downshift
- 5th downshift
- 6th downshift

Accel Pedal (%) vs Vehicle Speed (km/h)

The chart below shows all the shifting options between 3rd and 4th gear in modes N through to P3.

ASC 3rd <--> 4th shifting - All modes

Lower modes equal but do not exceed higher modes

- 3rd -> 4th - P1
- 3rd -> 4th - P2
- 3rd -> 4th - P3
- 4th -> 3rd - Normal
- 4th -> 3rd - P1
- 4th -> 3rd - P2
- 4th -> 3rd - P3
- 3rd -> 4th - Normal
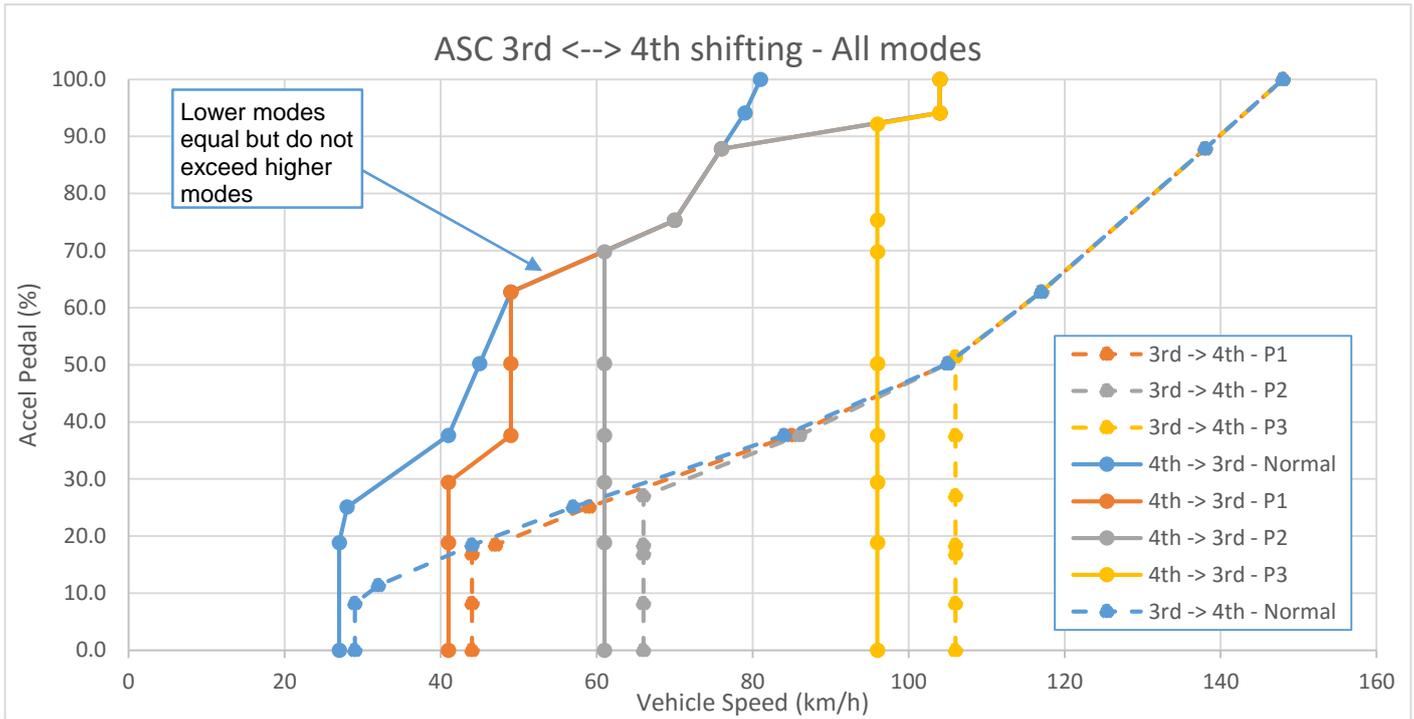
Rules for shift point values

When editing shift schedules it's important to follow some basic rules to avoid unexpected results and seemingly random shifts.

For any given group (N to P3) downshift speed (gear) =< upshift speed (gear-1)
Otherwise a downshift will immediately trigger an upshift.

For upshift and downshift, at any given Accel %, speed in N =< P1 =< P2 =< P3
Otherwise driving harder will force upshifts and downshifts at lower RPM.

Notes:

- Putting the transmission in Race mode will instantly raise the shift schedule to P1, although with gentle driving it can drop back down to Normal.
- The data values in the shift maps of 1mb TCM roms is limited to 255km/h due to being 8bit values, 1.5mb ROMs do not have this limitation (max value is 1310.7). For auto upshifting at higher speeds than 255km/h (fast standing mile cars for example) we recommend using a manual shifting mode and adjusting the shift limits as outlined in the following section.
- When accelerating hard, a high power GTR will continue to accelerate and the RPM rise as the shift is completed (please refer to "Understanding the Upshift Sequence"). As a result in low gears the shift speed is set lower than expected to ensure the RPM doesn't hit the limiter by the time the shift has completed, which can easily take 0.5s in low gears (total time from trigger to next gear clutch fully engages).

Shift Limits (Auto Upshift in Manual mode):

You can now have full control of when the TCM chooses to shift in all modes including Manual and Manual Race with the inclusion of shift limit maps.

Depending on the mode or conditions there are limits on when shifts can happen. For example to prevent 5th gear being selected in manual mode at 7000rpm in 6th gear to stop over revving, but also a minimum to prevent 3rd gear being selected at too low and RPM that would stall the engine. These maps are all in RPM, and for "Manual Mode" and "Manual Race Mode" there are separate limits for minimum and maximum upshift and downshift. There are also additional limits for when using cruise control which stops shifting at high RPM despite ASC shift schedules.

As you can see from the following screenshot the limit for auto upshifting in Manual Race mode is 10000RPM which is which to intents and purposes it is disabled. Auto mode also has the same 10000RPM limits because the ASC shift schedules should take care of the shifting decision.

While cruise control is active there are lower shift limits, these are not used if you are increasing your set speed using the cruise control switches, but are used when the ECM is maintaining a steady set cruise speed.

Check the Help text for each map individually to check the engine RPM type being use, there are 2 options:

- Current RPM = RPM at the moment you want to trigger the shift in the gear that you currently in.
- Post Shift predicted RPM = Calculated RPM in the gear that will be shifted to AFTER the shift is complete.

For Maximum Upshift and Minimum Downshift the RPM is "Current RPM".

For Minimum Upshift and Maximum Downshift the RPM is "Post Shift Predicted RPM"

For each map, the help text describes what type the RPM values are.

Example of Current RPM limit

In the 80B0A ROM the Maximum Upshift RPM in "Manual Mode" for 2nd gear is 6674rpm. This means that if the driver doesn't pull the paddle to trigger, an upshift the TCM will automatically trigger an upshift in 2nd gear at 6674rpm. Note that in low gears the limits are deliberately low to avoid hitting the limiter due to the time it take for a shift to ctually happen while the RPM is rapidly increasing.

Example of Post Shift Predicted RPM limit

In the 80B0A ROM the Maximum Downshift RPM in "Manual Normal" for 5th gear is 6965rpm. This means that when downshifting from 6th to 5th the TCM will not allow the downshift to happen until it calculates the RPM after the shift in 5th gear will be less than 6965rpm, this is why the 6th–5th downshift limit appears in the row for 5th gear.

Speed Limiter – Enable
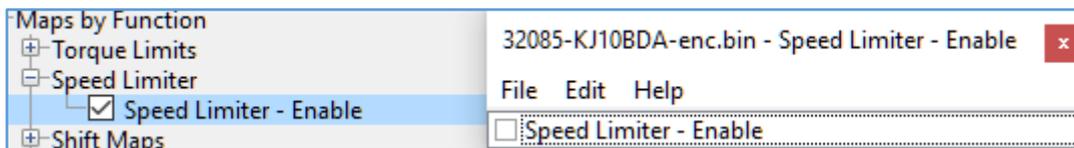
The JDM TCM ROMs all come with a speed limiter, and without this disabled a car will not be able to exceed approximately 195Km/h regardless of what the limiters are set to in the ECM. Make sure the box is unchecked to disable the limiter on JDM ROMs (this is disabled by default in the ROMs for all other regions).

Launch Control

What is the Nissan GTR Launch Control?

The Nissan GTR has a built in factory Launch Control Mode, when conditions are correct this will deliver an extremely effective launch condition. When entering the special mode the throttle butterfly will react quickly providing a burst of Engine Torque which will load the transmission and drivetrain for a blistering launch condition.

This launch condition is often mistaken and confused for the typical 'stall test' launch that can be induced by on most Auto gearboxes models at the traffic lights (left foot on the Brake, Accel pedal to the floor and wait for the lights to change). This low torque/low RPM slipping convertor/clutch launch is not the same or nearly as aggressive as the special Launch Control Mode, though this type of launch is still very effective on the GTR when used.

From 2008 to 2013 each new version of the GTR had a revised launch behaviour, and these have been broadly categorised as LC1 to LC5 by EcuTek and its competitors. The LCx nomenclature is not official Nissan terminology, although some Nissan dealers will understand the term. There appear to be five different LC strategies, however there are not 5 distinct versions of TCM rom with different LC strategies, some ROMs use the same strategy with different map an data values resulting in different behaviour for the drive, some LC versions the result of different ECM maps.

How do I make the Nissan GTR launch Control work?

When the Engine and Gearbox oils are up to temperature, the vehicle is stationary and the correct settings are applied to the 4WD and VDC switches along with Manual Gear Selection (not in Auto) then the factory Launch Control can be used (assuming the factory TCM ROM has it enabled by Nissan, see NOTE below!).

With your left foot on the brake and quickly pressing the Accel pedal to the floor, the engine RPM will rise very quickly to around 3300rpm or 4500rpm (depending on the exact LC version installed), this RPM will be held for around 5 seconds until the ECU will force release of the LC mode to prevent strain and heat on the clutches and gearbox.

If the 4WD switch is simply moved out of RACE mode and the test repeated then LC mode will not enable and the difference is clearly felt.

NOTE: LC2 and some LC3 ROMs have the factory LC mode disabled in the TCM ROM, this can be enabled using ProECU.

Launch Control versions defined

LC1 (early "JF" series TCM ROMs)

Early 2008-2009 GTR models have a built in Factory Launch Control system called LC1 which is an aggressive Launch Control Mode that put considerable strain on the drivetrain.

LC1 Launch RPM is factory set at 4500rpm and is found in the Engine ECU ROM in the 1D **Launch Control RPM** map:

LC1 Launch Control mode will only activate when:

- Oil temp is over 65 Deg C
- Transmission set in Race Mode (Red Light ON)
- VDC is OFF so traction control does not operate (Yellow Light ON)
- Gear Level selection is in MANUAL and 1st Gear is selected

LC2 ("JF" series TCM ROMs)

On later JF cars Nissan simply disabled the launch control in the TCM ROM, this was sometimes applied during servicing at Nissan dealerships and it's claimed that the launch control functionality was removed to maintain manufactures warranty.

You can see below the LC2 TCM ROM called JF09DBA has the factory Launch Control disabled by Nissan, to re-enable simply check the box, save the ROM and program into the TCM ECU. This will enable the LC1 Launch Control code again in the LC2 ROM

LC1 and LC2 can only be used with VDC OFF and in Manual – R mode and conditions must be met as described above.
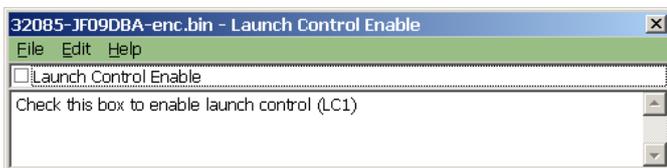
LC3 ("JW" series TCM ROMs)

2010-2011 Gen 1 GTR models have a revised Factory Launch Control system which is enabled on all JW models. LC3 is a less aggressive Launch Control strategy that is easier on the transmission and drivetrain. LC3 works with VDC ON (Traction Control working).

LC3 Launch RPM is factory set at 3300rpm and is found in the Engine ECM ROM in the 1D **Launch Control RPM** map.

LC3 Launch Control mode will only activate when:

- Oil temp is over 65 Deg C
- VDC is ON so traction control is working (RED Light ON)
- Gear Level selection is in MANUAL and 1st Gear is selected
- As seen below LC3 can be enabled in Manual with or without the Transmission in R mode (Race)

If you wish to allow LC to work in other conditions (like Auto or without VDC etc) then simply enable the condition in the TCM ROM (though the associated risks must be accepted).

NOTE: LC should be enabled in BOTH Mode A and Mode B if used with any Gen 1 GTR models.

LC4 and LC5 ("KB", "KJ", "38", "62", "80" and "89" series TCM ROMs)

2011 Gen 2 GTR models have more refined gearbox control code, along with more advanced Launch Control strategy with improved clutch control, faster gear selection and much smoother gear changes compared to earlier TCM code versions.

LC4-5 Launch RPM is factory set at 4100rpm and is found in the Engine ECM ROM in the 1D **Launch Control RPM** map.

23710-KB54B-enc.bin - Launch Control RPM	✕
File Edit	
4100	Launch RPM (RPM)

LC4-5 Launch Control mode will only activate when:

- Oil temp is over 65 Deg C
- VDC is ON so traction control is working (RED Light ON)
- Gear Level selection is in MANUAL and 1st Gear is selected
- LC4 can be enabled in Manual with or without the Transmission in R mode (Race).

If you wish to allow LC to work in other conditions (like Auto or without VDC etc) then simply enable the condition in the TCM ROM (though the associated risks must be accepted).

NOTE: LC should be enabled in BOTH Mode A and Mode B if used with any Gen 1 GTR models.

The different configuration settings that are required for Launch Control to be enabled are summarised below:

JF series TCM (LC1)

	VDC on	VDC off
Auto	NO	NO
Auto-R	NO	NO
Manu	NO	NO
Manu-R	NO	YES

JW series TCM (LC3)

	VDC on	VDC off
Auto	NO	NO
Auto-R	NO	NO
Manu	YES	NO
Manu-R	YES	NO

KB, KJ, 38 series TCM (LC4-5)

	VDC on	VDC off
Auto	NO	NO
Auto-R	YES	NO
Manu	NO	NO
Manu-R	YES	NO

EcuTek ProECU Nissan GTR TCM software allows the tuner to modify the LC setting conditions so that launch control can be activated without R-mode, or with VDC off or however you want.

NOTE: It's recommended that the latest TCM ROM is used on all Gen1 or Gen2 vehicles.

Launch Control TCM Maps
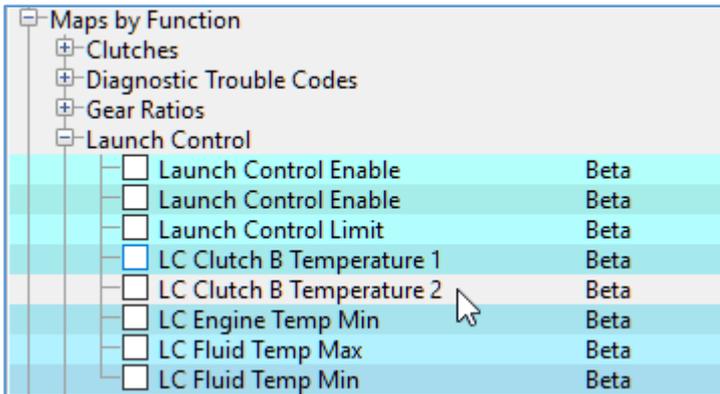
Launch Control Enable

Overall enable for the launch control strategy enabled when box is checked, enabled by default on later ROMs.

Launch Control Enable
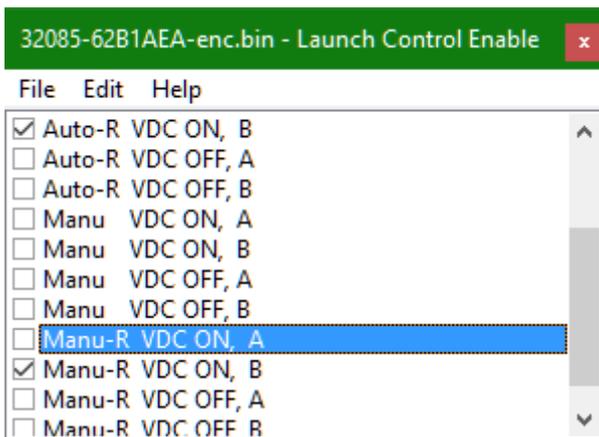
Individual enable for launch control. A checkbox exists for each possible combination of gearbox mode and VDC mode. When using the later LC4-5 ROMs in earlier TCMs make sure to enable both A and B for each mode you want to use LC.

By default launch is only enabled when VDC is enabled. For drag cars, especially those running custom TC, it's recommended to enable the LC for VDC off.

Launch Control Limit
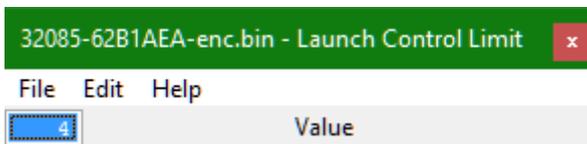
Once the limit is reached the car will need to be drive for approximately 1.5 miles before the TCM will allow another launch. Set to one more than the number of launches required. Essential for all out drag cars or for launch testing.

Launch Control Clutch B Temperature 1

Maximum clutch B temperature allow at launch. LC will not activate if the temperature already exceeds this value.

Launch Control Clutch B Temperature 2

32085-62B1AEA-enc.bin - LC Clutch B Temperature 1 [x]
File   Edit
1B0   Clutch Temperature (°C)

Maximum clutch B temperature allow during launch. If the clutch temperature exceeds this on launch the launch will be aborted.

LC Engine Temp Min

32085-62B1AEA-enc.bin - LC Clutch B Temperature 1 [x]
File   Edit
1B0   Clutch Temperature (°C)

Maximum clutch B temperature allow during launch. If the clutch temperature exceeds this on launch the launch will be aborted.

LC Fluid Temp Max

32085-62B1AEA-enc.bin - LC Clutch B Temperature 2 [x]
File   Edit
2B0   Clutch Temperature (°C)

Maximum clutch B temperature allow during launch. If the clutch temperature exceeds this on launch the launch will be aborted.

LC Fluid Temp Min

32085-62B1AEA-enc.bin - LC Clutch B Temperature 1 [x]
File   Edit
1B0   Clutch Temperature (°C)

Maximum clutch B temperature allow during launch. If the clutch temperature exceeds this on launch the launch will be aborted.

3. TCM ROM Choice

ROM Compatibility

There are 3 main groups of TCM ROM:

- Gen 1 JF and JW series ROMs – 1Mb in size
- Gen 2 KB and KJ series ROMs – 1Mb in size
- Gen 2 38, 62, 80 and 89 series ROMs – 1.5Mb in size

ROM FILE SIZE MUST MATCH THE TCM SIZE!!

- A 1.5mb ROM cannot be programmed into a 1mb TCM.
- A 1mb ROM cannot be programmed into a 1.5mb TCM.

To see the latest version ECM ROM that should be chosen for your region, go to **Feature & Licence Information** under the **Help** menu, and the select the **Supported Tuning ECUs** tab:
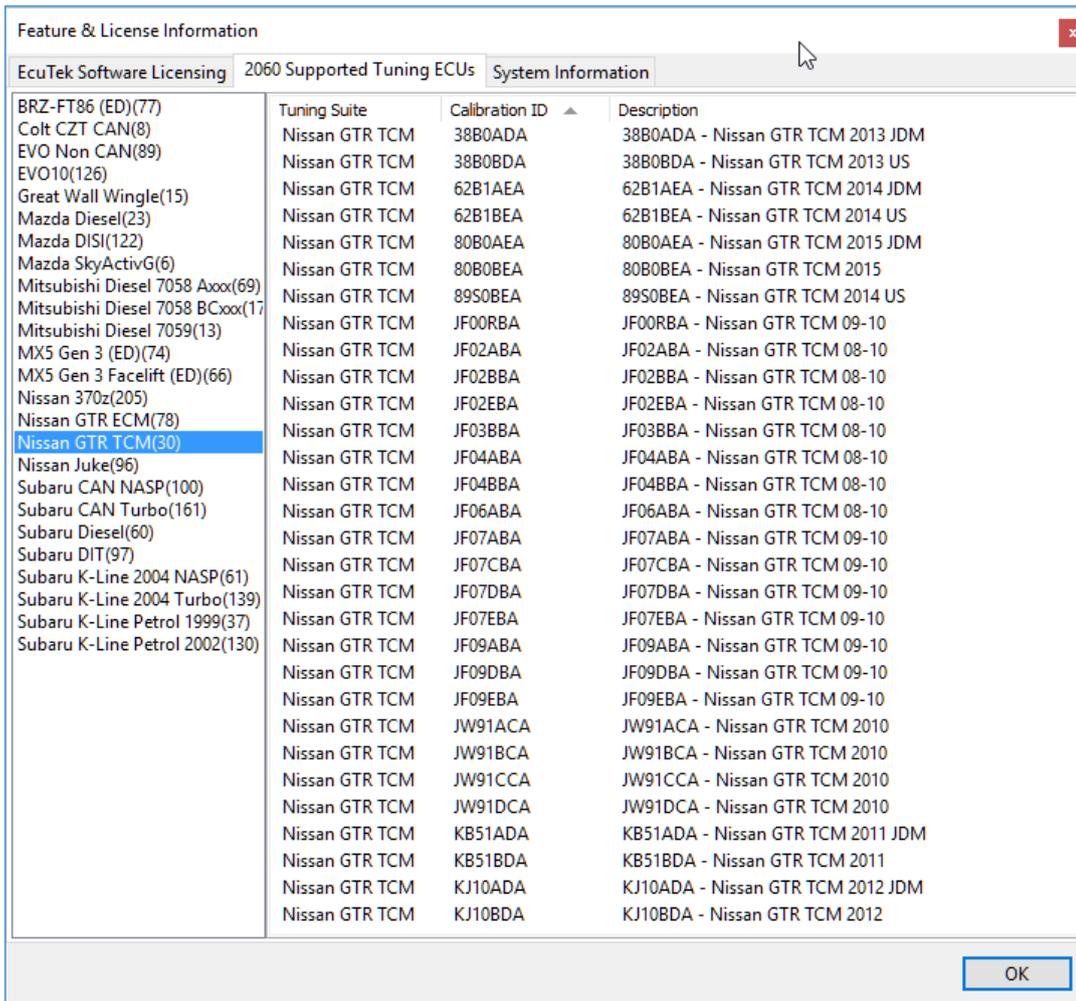
Suggested ROMs

1Mb TCM

We recommend that the LC5 TCM ROM `32085-KJ10BDA-enc.bin` is used in all 1mb TCMs (even if the ECM has not or will not been programmed with ProECU). We also recommend adding the latest version 5 RaceROM (v19472 or later) to enable the sending of extra info to the ECM and/or allowing for the Mapswitch mode to be displayed on the tacho.For

It's recommended that the latest Engine ECU ROM is also used in conjunction with the LC4-LC5 TCM code. The KJ ECM code is better suited and more compatible for the later Gen 2 TCM code versions (LC4-5).

For Gen 1 models the latest ECM code version would be the JW series ECU ROM.

Some Examples are shown below for Gen 1 GTR:

Factory ECM ROM	Suggested ECM ROM	Factory TCM ROM	Suggested TCM ROM
JF51A Euro	JW93A Euro	JF04BBA	KJ10BDA
JF04A Japan	JW90A Japan	JF02BBA	KJ10BDA
JF30A USA	JW92A USA	JF09DBA	KJ10BDA

1.5Mb TCM

The latest 2013 onwards TCMs with the 1.5mb ROMs all provide smooth shifting and launch control, and there isn't much to choose between them. Like the earlier TCMs we recommend adding the latest V5 RaceROM (v19472 or later).

The "Nismo" ROM

The ROM referred to when tuners mention the "Nismo" rom is in fact *32085-89S0BEA-enc.bin* and is automatically downloaded via EcuTek Update by ProECU. It is a 1.5Mb rom and cannot be programmed into a 1mb TCM! Some development work is in progress to identify more of the subtle changes between the 89S0BEA ROM and earlier 1.5Mb ROMs so they can be imported to the 1Mb ROMs. This may be included in a later release of ProECU but until it is announced EcuTek cannot help with more specific enquiries relating to the 89SOBEA ROM.

4. TCM RaceROM

Introduction

In order to make any changes to a TCM rom it is required to also add a RaceROM Feature File (RRFF) to ensure security for both the tuner and EcuTek. TCM RaceROM also installs FastFlash programming and adds a few custom features that compliment specific RaceROM features added to the ECM.

RaceROM Feature Files have an .ERP file extension and typically named in the following form:

       32085-62B1AEA-RaceROM-19464.ERP

Where 62B1AEA is the calibration ID and 19464 is the RaceROM version in this example.

The latest V5 TCM RaceROM Feature Files are installed in:

       C:\EcuTek\ProECURomFiles\Nissan\GTR\R35\TCM\RaceROM Feature Files\Version 5

Adding a RaceROM Feature File
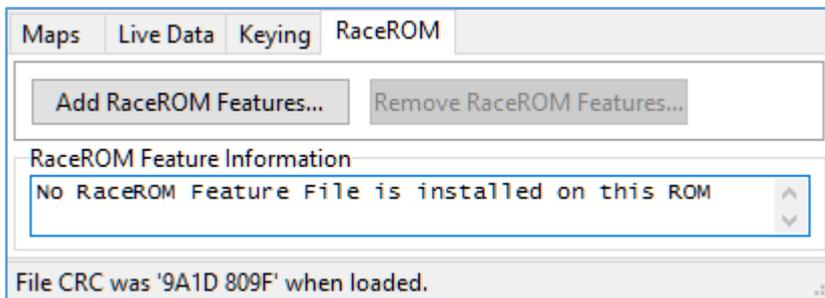
In order to add a RRFF to a ROM, first open the ROM file and the click on the **Add RaceROM Features** button found on the RaceROM tab, alternatively you can drag a RRFF directly to the ROM window using windows file manager.

Checking or removing RaceROM
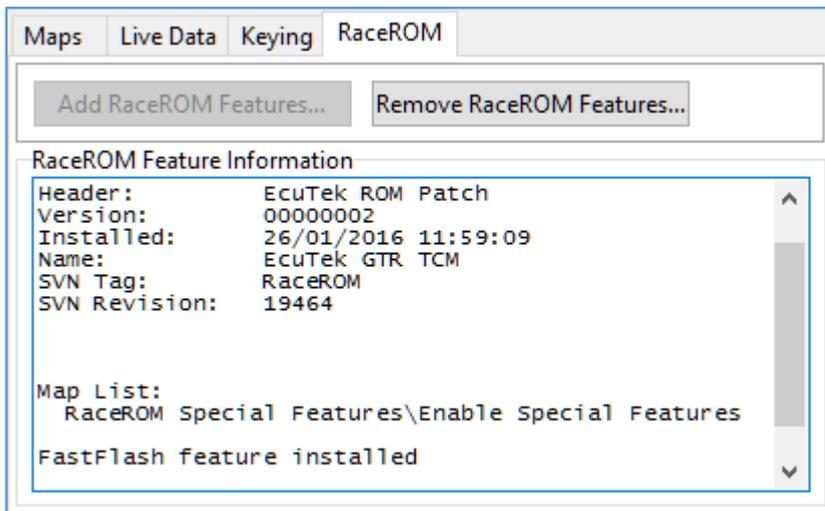
Once a RRFF has been added to a ROM its details can be checked by clicking on the RaceROM tab in the ROM editor window. Details of the RRFF and any RaceROM maps are shown.

Should you wish to remove the RaceROM Feature File, you can drag and drop the original RRFF (the .ERP file) that was used to add the features into the map editor window. Or click on the **Remove RaceROM Features...** button and manually select the RRFF that matches the one currently added to the ROM.

Enabling RaceROM Features

If the ECM is configured to show Mapswitch mode on the tacho, ensure the **Allow ECU to display Mapswitch Mode as RPM** box is checked.
Send extra data to ECU is required for the ECM to pick up additional live data such as wheel speeds and transmission temperature.
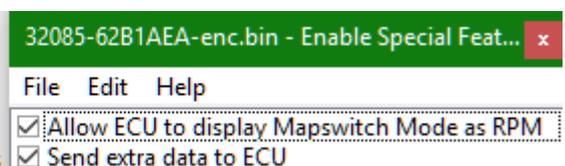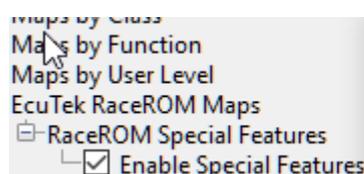
5. TCM Programming

General programming information

The GTR TCM can be reprogrammed via OBD using ProECU, the process can be carried out using the factory programming method which takes 7-8 minutes, or with EcuTek's proprietary FastFlash method when a suitable ROM is first programmed.

Programming Method

Prerequisites:

- Make sure the battery is fully charged and in good condition, standard TCM programming takes 7-8 minutes!
- Make sure all ancillaries are turned off before programming, please ensure the following :
    - o   Interior Fan Blower turned OFF (PUSH the Heater Blower knob to turn OFF)
    - o   Headlights OFF (exception of Daylight Running Lights)
    - o   Gear Lever selector in PARK position
- If the above conditions are not met then program may fail to start or possibly fail during programming.
- Ensure the correct TCM type is selected either by selecting from the ProECU pulldown menu **Tools->Detect Vehicle** or **Tools->Manually Select Vehicle** or in some cases **Tools->Manually Select Single ECU**

Programming

- Select **Program Transmission ECU** from either the Detect/Manually Select Vehicle pop-up window or from the **Tools->Nissan GTR R35 Transmission ECU 20xx** pulldown menu option.
- Ensure you have your required ROM file, it can be dragged to the programming window, or opened directly using the **Choose Rom File** button (by default ProECU automatically selects the last rom you opened/closed).
- Select the **Program ECU** button on the programming window.
- The ECU reprogramming progress can be seen in the bottom left corner of the programming window and the Coolant Temp gauge on the Driver Instrument Display.
- Once programmed, follow instructions to switch the ignition off and on in order to fully clear the DTCs.

Notes

- If the ECU cannot be programmed it may be possible it has another product already installed (married), uninstall the product before programming the ECU with EcuTek. If you cannot uninstall (un-marry) the device then contact EcuTek support for further guidance.
- We cannot guarantee compatibility with other products on other modules.
- To put a standard ROM back into the TCM then simply choose the stock ROM from the Nissan GTR folder, C:\EcuTek\ ProECURomFiles\Nissan\GTR\R35\TCM. If you wish to completely remove all licence information (which cannot be credited back to your licence key) then contact EcuTek for guidance.

Failed Flash recovery

The ECU can be recovered if part programmed, though a licence might be lost. The ECU will NOT communicate in a part programmed situation so the ECU type or vehicle type will need to be manually selected from the ProECU menu. It's **VERY IMPORTANT** to select the correct ECU or vehicle type for the recovery. Please note that the Gen 2 model ECM are 1.5MB and that Gen 2 TCM from 2014 on are 1.5MB. So it's very important!!, If you have further problems then try to disconnect the battery then retest. If you have further problems then send your log file to EcuTek for analysis (*C:\EcuTek\ ProECU-NissanECU.log*).

FastFlash Programming

FastFlash (FF) will be enabled when a FF enabled RaceROM patch is already installed on a TCM. This means the first time you program with a FF enabled ROM the programming sequence and programming time will not change. On subsequent programming operations FF will be used. The minimum programming time is approximately 20 seconds on a 1mb unit and FF will always reprogram blocks 8 and 15. More changes will require more blocks to be reprogrammed taking additional time.

The programming sequence is exactly as described above.

Unfortunately at this time the same DTC clearing and power-off sequences still need to be followed after programming.

FastFlash Failed Flash Recovery

FastFlash has been tested to ensure that it will not "brick" either the ECM or TCM if there is a programming failure, however the correct sequence must be used in order to recover from a failed programming attempt.

- Close the ProECU programming window

- Disconnect the battery for at least 15 seconds to stop the programming code continuing to run in RAM.

- Manually select the correct ECM or TCM programming window for the car. This is a critical step as ProECU will not be able to auto detect a part programmed ECM/TCM

- Select correct ROM

- Program using the normal sequence and ensuring all the normal prerequisites are met.

2008 JDM TCM issues

Some very early Gen 1 JDM region models may seem incompatible with later LC2 to LC5 TCM ROMs.
The CEL light is shown after programming but no DTCs are stored.
Programming the original LC1 TCM ROM version again will solve the DTC issue but it doesn't help us improve the TCM software.
It is possible to use the far superior LC5 ROM in these ECU by ensuring the ECM and TCM DTCs are cleared correctly and the ECM is Reset after programming the later TCM software.

The READ and CLEAR DTCs sequence will need to be repeated 2 or 3 times before the TCM DTCs are successfully cleared, so persevere and eventually the TCM CEL will clear.

You can carry out the TCM Auto Learn sequence followed by manual

6. TCM Tool

Introduction

EcuTek have reverse engineered most of the TCM related commands from the Nissan Consult III tool, and they are provided to compliment the proper tuning of the TCM and enables independent workshops to carry out most servicing related tasks. However it is not a complete replacement for a Nissan Consult III/III Plus tool.

```
Nissan GTR TCM Tools
ECU : Nissan GTR R35 Transmission ECU ->2008MY

Launch Control Counter (VDC Off) : 3

Oil Temperature Frequency 1 (-50°C/-58F to -20°C/ -4F): 0
Oil Temperature Frequency 2 (-20°C/ -4F to  80°C/176F): 185
Oil Temperature Frequency 3 ( 80°C/176F to 110°C/230F): 10
Oil Temperature Frequency 4 (110°C/230F to 140°C/284F): 0
Oil Temperature Frequency 5 (140°C/284F and over)     : 0

Clutch A Protection 1              : N
Clutch A Protection 2              : N
Clutch A Protection 3              : N
Clutch A Protection 4              : N
Clutch B Protection 1              : N
Clutch B Protection 2              : N
Clutch B Protection 3              : N
Clutch B Protection 4              : N
Clutch Overheat Protection History : N
Line Pressure Loss History         : N
High Oil Pressure History 1        : N
High Oil Pressure History 2        : N
High Oil Pressure History 3        : N

Clutch Capacity   A: 1
Clutch Capacity   B: 1
Clutch TouchPoint A: -1
Clutch TouchPoint B: -1
```

Warning History — Read | Clear
Oil Temperature History — Read
Launch Counter (VDC Off) — Read

Clutch Learning — Read | Clear | Auto Adjust

Adjust Clutch Capacities — Clutch A | Clutch B : 1 | 1

Adjust Clutch Touchpoints — Clutch A | Clutch B : -1 | -1

Clutch Gear Learning

This process will initiate the TCM ECU to self calibrate the clutch pressure, clutch touch points along with pump and solenoid duty learning.

Once the sequence starts it should be allowed to complete fully and takes around 5 minutes in total.

The vehicle should be up to temperature with coolant temp over 80 deg C and Gearbox oil temp over 65 deg C.

The vehicle should be on a level smooth surface while steering wheel is straight.

You should be in the driver seat of the vehicle whilst the learning sequence is active.

It is normal for the engine rpm to rise and fall during the test.

|

The vehicle will also shunt back and forth during the test as the gears and clutches are engaged and disengaged.

Once the learning sequence is complete the learned values can be checked under **Read Learned Data**.

Clutch Touch Points

These touch points are the actual engagement point of the clutch plates to connect the engine crankshaft drive to the input shaft of the gearbox.

It's the bite point which normally is experienced when raising the clutch pedal on a vehicle fitted with a conventional manual gearbox.

There are two gearbox shafts, Bank A (even gears 2-4-6) and Bank B (odd gears 1-3-5).

With the gearbox in Drive (manual or Auto) press the accel pedal so that the engine rpm rises, the clutch will engage and the vehicle will start to creep forward.

On a poorly calibrated touch point where the value would be below 8 (example 5) the engine rpm will rise too high (around 1200-1400rpm) and the vehicle will not really move forward, and then suddenly the clutch will engage causing an unpleasant jolt forward.

If the Touch point is too high the clutch will be engaged at idle and if the foot brake is on to prevent the vehicle from moving then the clutch will be slipping creating heat and excessive wear, when the foot brake is released (off) the vehicle will creep forward, as the accel pedal is pressed the clutch is already partially engaged and any accel movement will directly increase the vehicle speed further.

The setting required for each bank should be trial and error as each vehicles tolerance and amount of wear may be different.

The touch points should be increased until the vehicle just starts to creep and then reduced by a value of 1 so that the vehicle can almost move forward on a smooth surface.

Clutch Pressure

The Clutch pressures are applied for each clutch: Clutch A (even gears 2-4-6) and clutch B (odd gears 1-3-5).

Raising the clutch pressure values will give a more positive pull away and gear change, reducing these values will encourage clutch slip along with a smoother pull away with smooth undetectable gear changes.

On high power vehicles these pressures should be increased to minimise torque slip on gear changes. Its good practise to create a TCM log file and look closely at the Clutch slip RPM during gear shifts, especially after tuning and the power output has been increased.

Other Tools

Read Clutch Temps – This will display the maximum clutch temps that have been achieved.

Read Oil Temp History – This will show the Oil Temp history including frequency of each temperature band.

Read Warning History – This will display any protection thresholds that have been triggered.

Clear Warning History – This will clear the TCM warning history.

Reset Clutch Adjustment – These will clear and reset all current Clutch Capacity or Touchpoints.

7. TCM Questions and Answers

Which TCM ROM should I use ?

We recommend that the LC5 TCM called '32085-KJ10BDA-enc.bin ' is used in all 1mb TCMs (even if the ECM has not or will not been programmed with ProECU). For 1.5mb TCMs the latest rom for your region is usually a safe bet. If you intend to use Tacho needle display or Valet mode on the ECM then adding the latest RaceROM is essential.

The car is not smooth on gear changes.

Ensure you have the LC5 TCM ROM installed and use the latest RRFF phase 5 (19464) or newer installed, the phase 5 provides incredible smoothness and driveability. Also ensure on Gen 1 cars that you are running the JW or KB series ROM.

The clutches slip on full load

It's critical that the Fuel Trims are within +/-10% so that the Engine Torque value sent to the TCM is accurate. If it's too low the clutches will slip, watch the Clutch Slip logging parameter in the TCM ROM. Make a log of the TCM during a full load run, the maximum clutch pressure is normally 16.5 to 17.2bar, the clutch seals cannot hold more that this during our testing. See the ECM Tuning Guide for advice on adjusting the Torque Actual map to avoid the clutches slipping.

Why doesn't Race ROM Launch Control work?

Ensure coolant temp is over 70 deg C, ensure your TCM ROM has RRLC enabled in the mode you are using. Also see the Launch Control section for more help.

The car doesn't launch well

If the car bogs on launch or just after launch then make a TCM Learning sequence then adjust the clutch capacity and touch points as per the Special Tools section later in the manual. Too much clearances on the touch points can cause this.

I cannot get the Idle Learning or Gearbox Learning to work

Ensure the oil temps are hot, if bigger MAF tubes are fitted then try adding plus 5% to the MAF scale in the idle region, there is a minimum airflow g/sec required for the learning sequence to commence.

I get an error message trying to program the ECM or TCM

The engine should not be running and in PARK, also ensure headlights and interior fan blower are off, see the ECU programming section for further advise.

I get Torque error DTCs when pulling away or driving

- Ensure you are running RRFF phase 3 or newer.
- Ensure the K Factor values are stock (as K Factor will distort the engine torque values given to the TCM). See the previous idle stability questions as well.
- Some aftermarket BOV with strong springs can cause this.
- Try enabling Speed Density as a test to help you understand the problem.

8. Technical Support

What we Support

Bug Fixes

EcuTek provide technical support on ProECU Nissan GTR. This means that we will endeavour to fix any bugs that you find in the software. If a feature doesn't work as described, then please contact us so that we can make any changes required.

ECU Additions

We will also add support for newly released or reported ECU versions, as and when they are made available – the turnaround time adding new ECU support is around 7 days.

Updates must be tested prior to release, so do not call us on the day when you have a car with a brand new ECU in for tuning. Be organised – when scheduling a car for tuning, you will always take details of its specification, so find out in advance what type of ECU it contains. There will then be no mad rush when the car arrives on your premises.

What is NOT Supported

Basic Tuning Tuition

EcuTek ECU Software is provided on the understanding that you are an experienced tuner. As such, you should already be familiar with the principles of engine tuning. This means that we do not provide support on tuning questions, such as 'what boost pressure should I run with an xxx turbo?' or 'what AFR should I run at xxx RPM and yyy boost pressure?' – That is for you to decide. We are here to make your job possible, not do your job for you! If we 'costed in' this kind of support, the experienced tuner would end up subsidising the others.

Contacting EcuTek for Technical Support

Technical support via email to support@ecutek.com can often be the best way to start as emails may be routed to the individual best placed to reply to them. Most often the information required to solve a problem or give tuning help is best conveyed in document form, by initiating contact via email a chain of events can be established.

When submitting your support request, please try and include the ROM(s) file you are using and logs of the car driving, ideally logs taken while the car exhibits the problem.

Each support enquiry is handled from start to finish using Zendesk and all the available support engineers at EcuTek can see all the enquiries throughout the process. You can also register for free on our Zendesk support portal to track all of your tickets individually.

9. Glossary

AFM

Air Flow Meter

AFR

Air Fuel Ratio

Calculated Air Flow

The air flow sensor voltage is not linearly related to the amount of air flow. The ECU uses a scaling map to translate the air flow sensor voltage into an air flow rate value i.e. calculated air flow.

ECM

Engine Control Module

Engine Load

The ECU calculates engine load based on calculated air flow divided by engine RPM. It is effectively how much air enters the engine on each revolution.

FTST

Fuel Trim Short Term

FTLT

Fuel Trim Long Term

FMIC

Front Mounted Intercooler

MAF

Mass Air Flow (sensor)

MAP

Manifold Absolute Pressure (sensor)

MRP

Manifold Relative Pressure or boost pressure

MBT

Maximum Best Torque or Minimum Best Timing

O2 Sensor

Lambda Sensor (oxygen sensor)

RRLC

RaceROM Launch Control

RRBC

RaceROM Boost Control

RRFF

RaceROM Feature File (patch)

SD – Speed Density

The Mass Airflow in grams is calculated from MAP sensor not MAF sensors.

TCM

Transmission Control Unit or Gearbox ECU