NISTUNE

REALTIME ECU TUNING

NEO ECU TUNING

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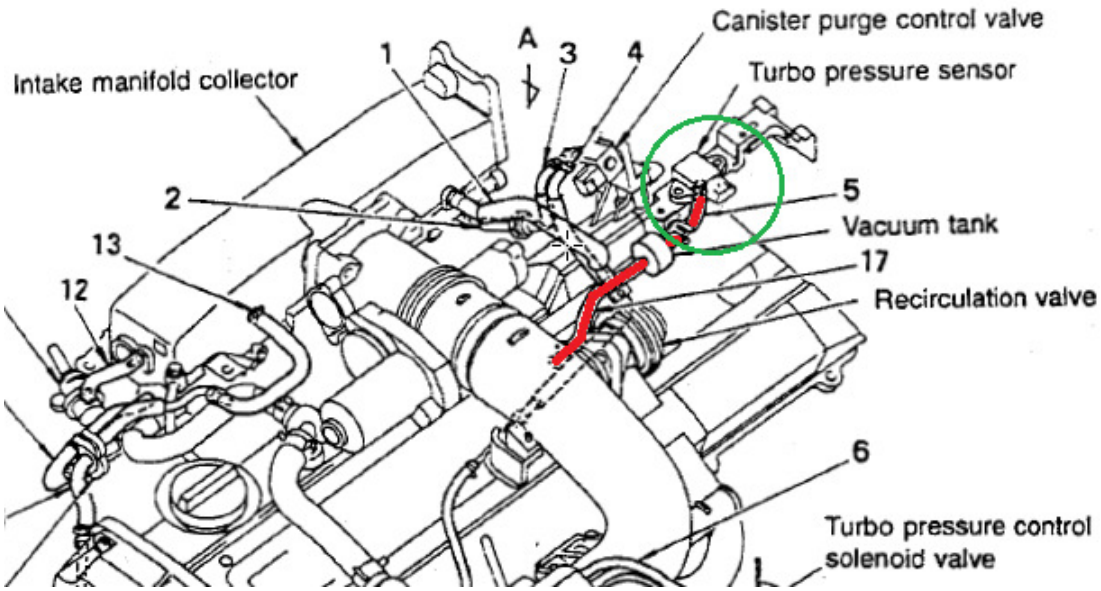
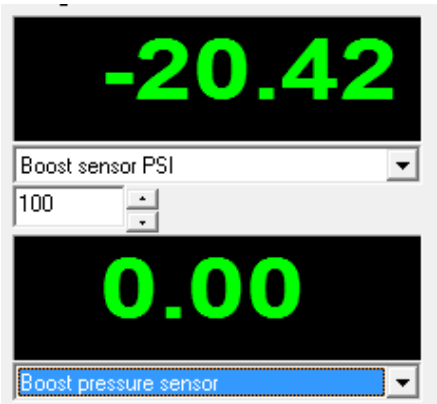
1. Factory Boost Sensor Setup and Adjustment

Nissan has added a boost sensor to the Nissan ECU for NEO engines. Ensure the boost sensor connected as per the below diagram:



If using an aftermarket plenum / throttle body without the TCS, ensure the boost sensor is still **plumbed before the throttle body**. If plumbed incorrectly you may experience ***throttle response issues***.

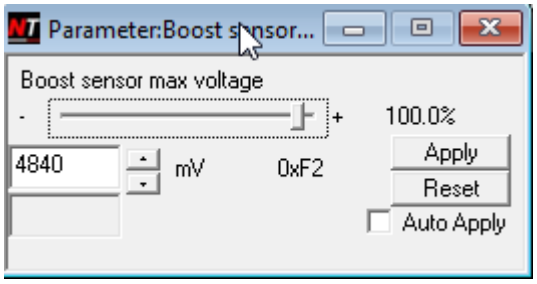
Boost pressure sensor. Uses a vaccum/boost equipped MAP sensor capable of measuring up to 5.12 volts at 18psi. To view the boost pressure enable this consult register. Nistune will display the value in volts and PSI on the gauges.



Boost Pressure Sensor Gauges

If the boost sensor voltage exceeds the specified max voltage 4.84 volts (4840mv) the Boost Sensor DTC code will be raised. [26] DTC BOOST PRESSURE SENSOR (Starts=0).

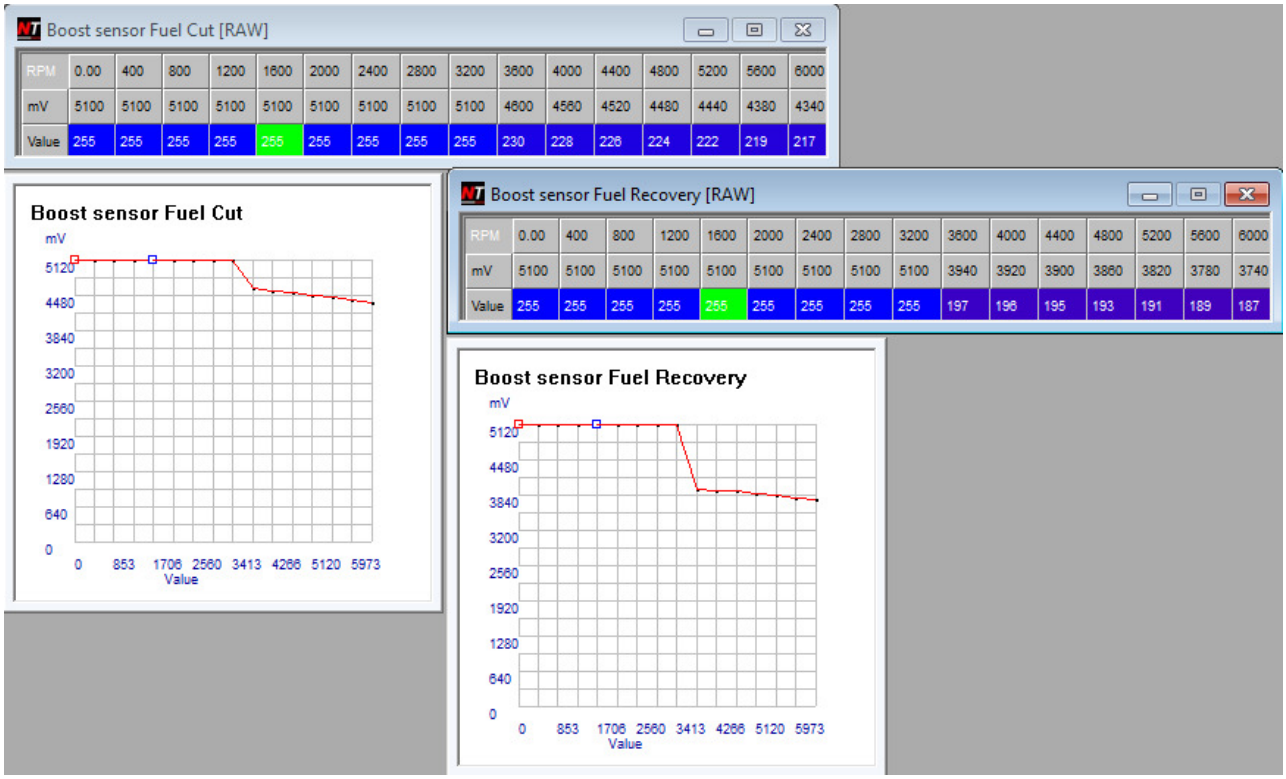
This is about 16-17psi. Adjust the max boost voltage to 5120mV to avoid this.



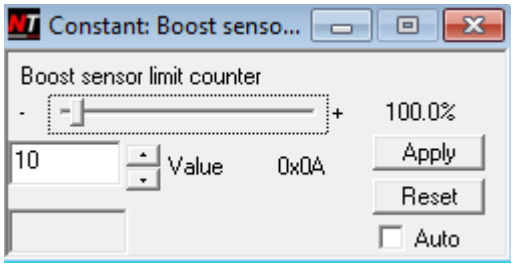
Next increase your boost sensor fuel cut table. These are used instead of TP limit tables during normal operation

- Increasing the values of these tables to a maximum of 5100 millivolts will work upto 18psi for safely limiting boost levels.

Note: 5100mV = 18 psi, 4340mV = 12 psi



- Above 18 psi to increase the **Boost sensor limit counter** adjusting the time over 18psi before the ECU performs a fuel cut



Note: Maximum of 255 will effectively disable the cut completely

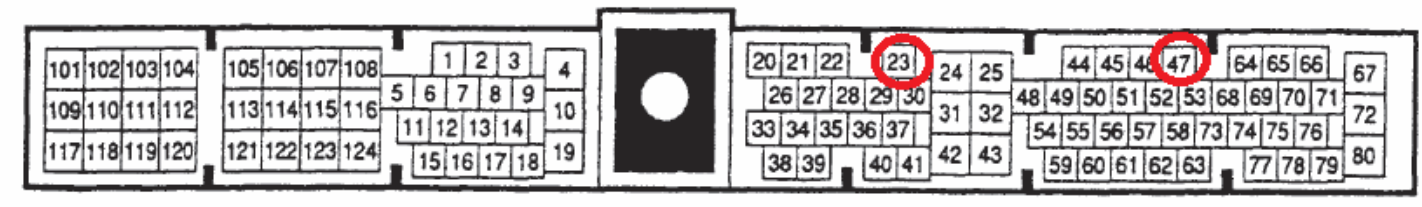
Important note: When the boost sensor is disconnected, and there is a Boost Sensor DTC fault code, the ECU will instead use the TP limit tables and counter (see further)

2. Boost Sensor (removed – Option 1)

Removing the boost sensor is not recommended as it can cause drivability and throttle response issues. The boost sensor is used in conjunction with the TPS for calculating fuel on throttle opening

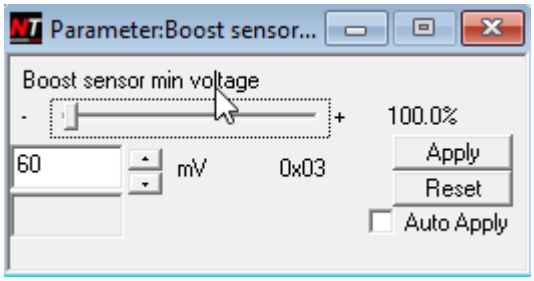
Faking boost sensor input

Where the vehicle is transplanted, and boost sensor is not available one method of avoiding the DTC fault is to connect TPS signal to the boost sensor signal to fake the input. Note that **this is only a workaround** for a **missing boost sensor** and will not result in the same throttle response



Connect TPS sensor signal (pin 23) to boost sensor input (pin 47) to prevent DTC faults, and TP corrections mentioned at part (a)

Below 60mv the DTC is raised (primarily for detecting a disconnected boost sensor). Note setting to 0 will not clear the DTC code if the boost sensor is disconnected



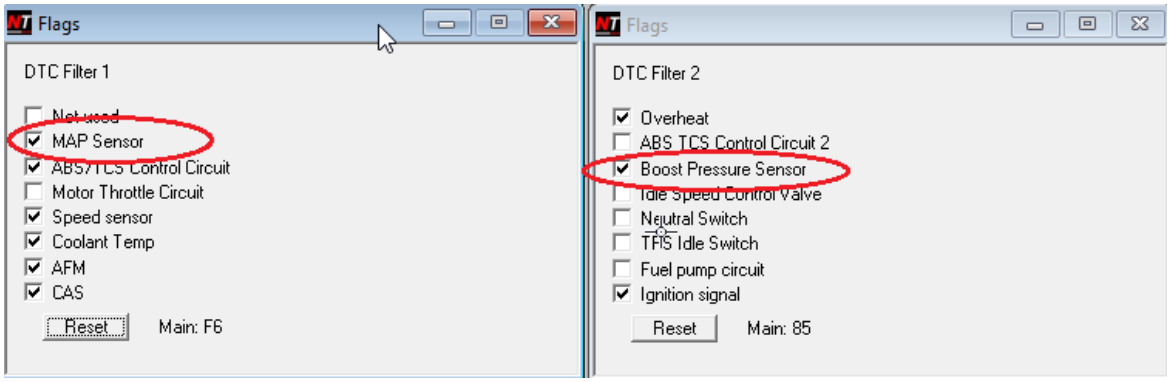
3. Boost Sensor (removed – Option 2)

1. Running without a boost sensor (not recommended) requires some changes to parameters.

   (a) Disconnecting the MAP sensor wiring will raise a boost sensor DTC fault code and **will result in problems**

[26] DTC BOOST PRESSURE SENSOR (Starts=0)

Unticking DTC fault filters for the boost sensor to remove the DTC fault and check engine light

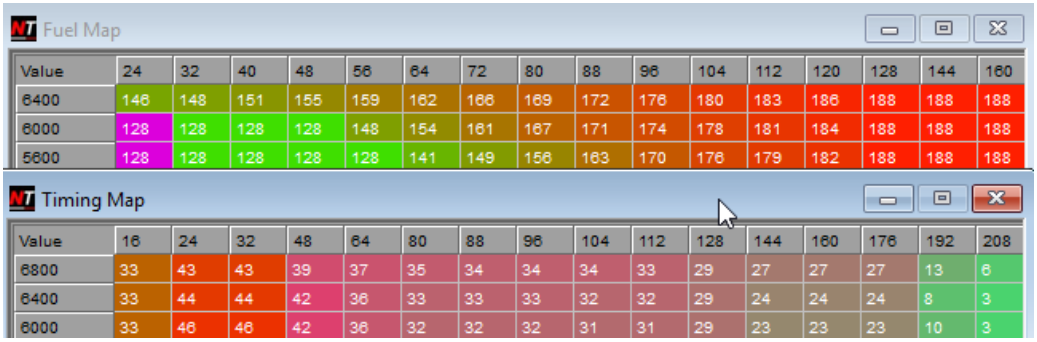


This will put the ECU in a **boost limp state** and have effects on TP

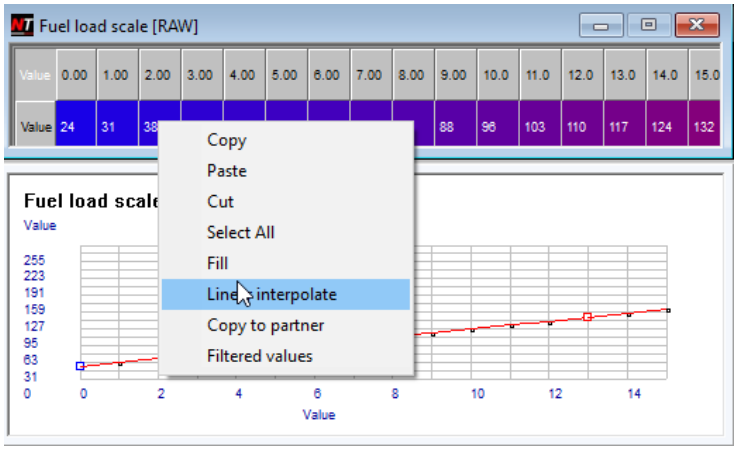
   (b) **Disconnecting the MAP sensor hose** results in using a default voltage of 2.70 volts and will **not** raise fault codes, but still **will result in problems**.

2. You must map the ECU TP load scales under 132 to ensure that a lean condition is not reached:

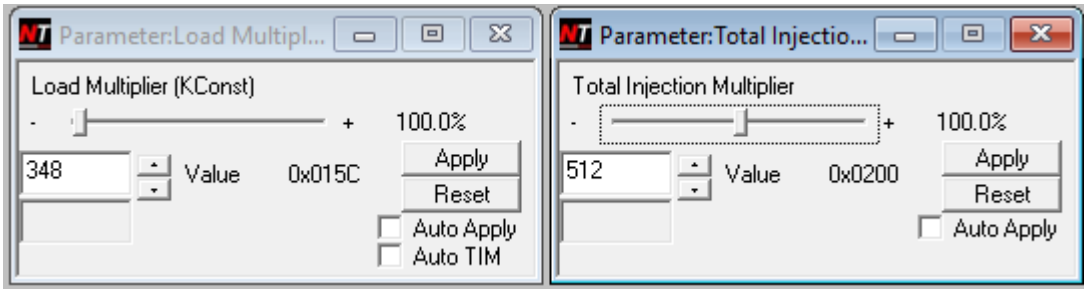
Both sets of scales must be remapped to 132 maximum:



Adjust both sets of TP scales, by setting 132 maximum and then interpolate. Do the same for timing by 'Copy to partner' from the fuel load scale.



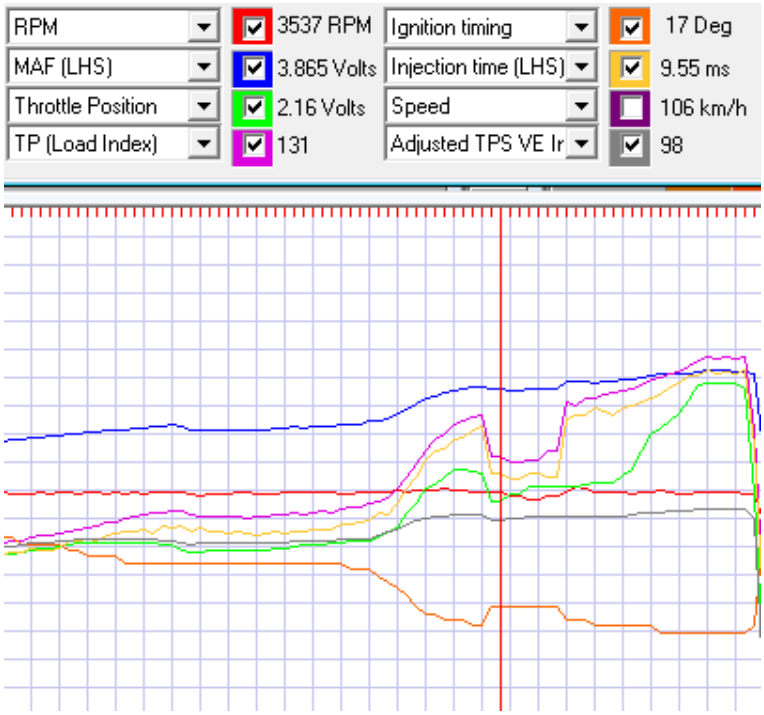
After adjusting the scales, you may need to also adjust the TP multiplier (K constant) so that your fuel maptrace runs within your new scales (upto TP=132)



If you have TP overshooting the updated scalers (say 30% over), then drop K Constant by about this percentage, and then increase your TIM by the same amount to keep the same fueling.

Base fueling should be stoich during cruise conditions (near 0% STFT and LTFT)

We do this since running without a working boost sensor will affect injection when TP is over 132 and the throttle is lifted **causing a lean condition**

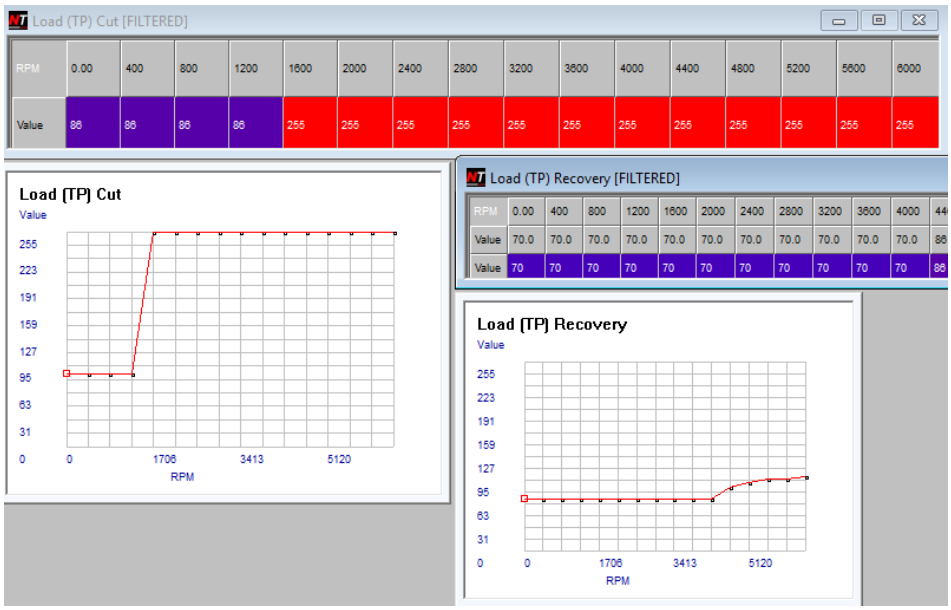


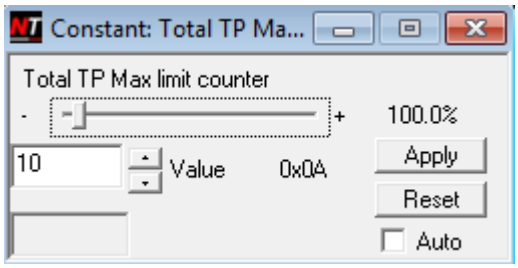
Steady RPM (red) and increasing MAF (blue) but the slight decrease in throttle position (green) the Nissan ECU has drops the TP load (purple) and resulting injeciton pulsewidth (yellow) resulting in a lean condition.

Nissan NEO ECUs will trigger a sharp drop in TP when the MAP sensor does not report valid boost readings.

Rescale upto maximum TP of 132 to aovid this issue when the boost sensor is not connected/working

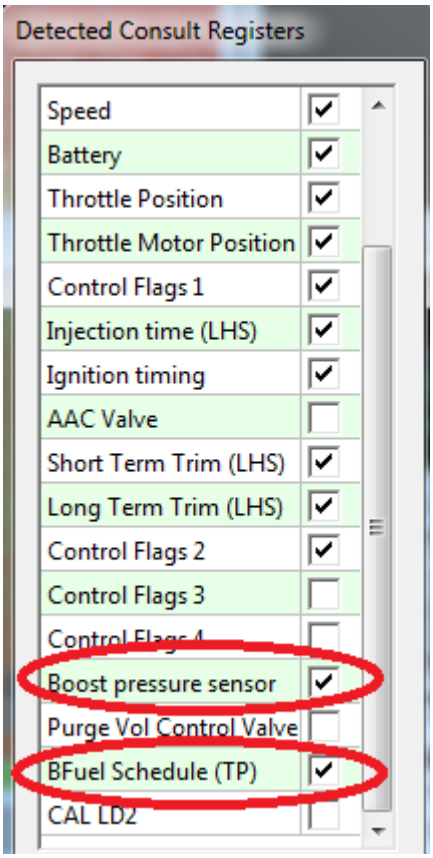
3. With the boost sensor disabled, the TP cut limit tables and counter are instead used and must be increased where required





4. TP Load Register (BFuel Schedule)

BFuel Schedule (Theoretical Pulsewidth) is the replacement TP (load) parameter used with NEO ECUs.



Consult Register Selection

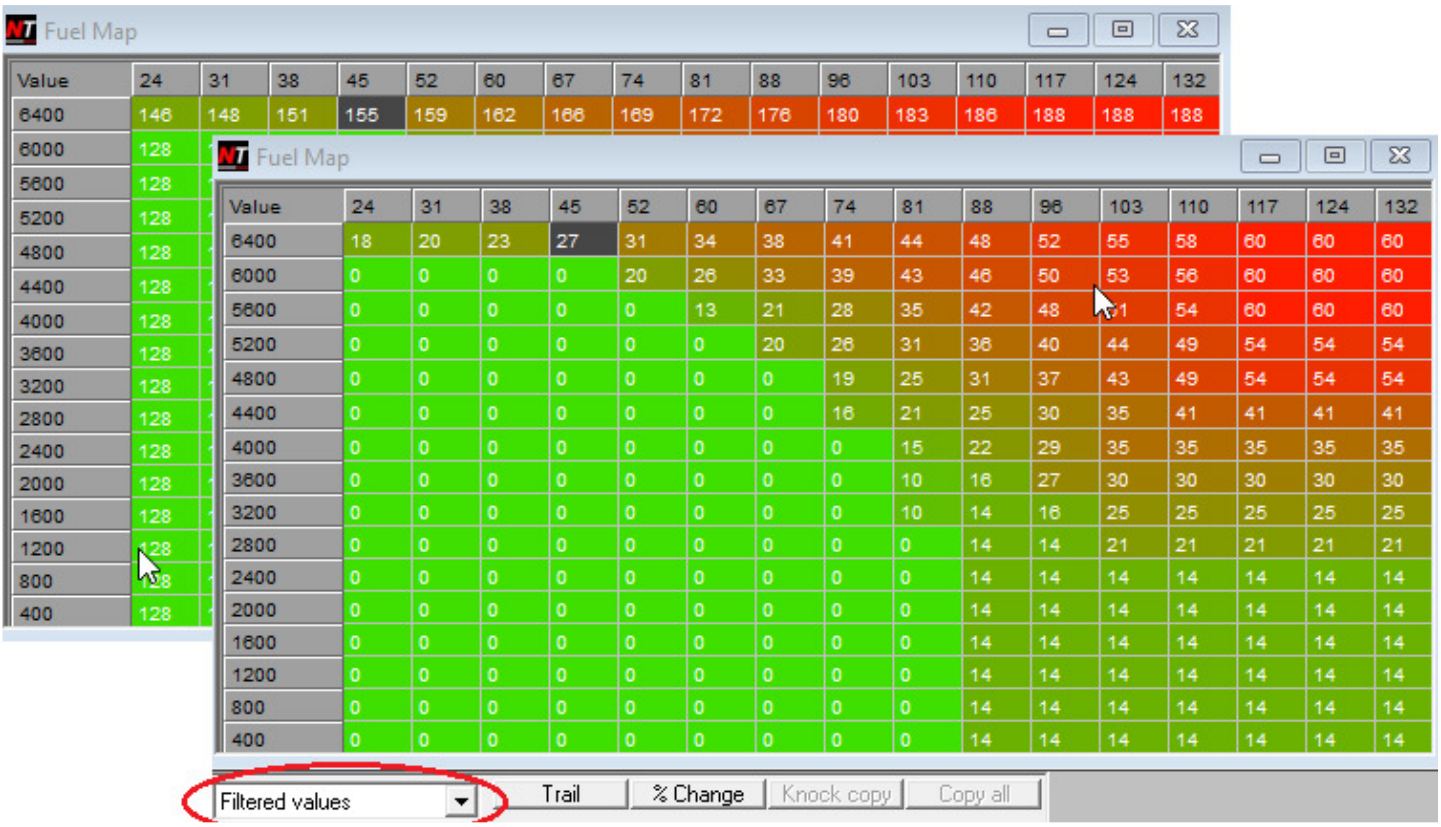
This parameter used for maptracing the columns on the fuel and timing maps and is a preliminary calculation used for final injection. Right click the background of Nistune and ‘Select Channels’ to show this screen

5. Fuel maps

NEO equipped ECUs now use two separate fuel maps. These function differently to earlier Nissan ECUs.

These maps do not command actual AFRs but **trim the calculated base fuel (TP) schedule** to add more fuel on top of what is calculated from the MAF

Tip: View the maps as 'Filtered values' so you can see the trim amounts



The primary fuel map no longer uses the 'O2' feedback flag overlay over the map like used with earlier Nissan ECU implementation

Values **equal** 0 indicate the closed loop area of the fuel map
Values **above** 0 command adjustment to the base fuel mixture. Increased values result in additional fueling

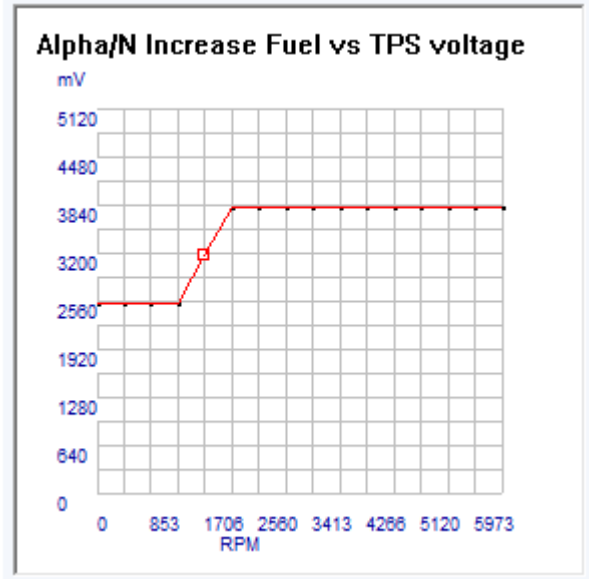
6. AlphaN/Increase Fuel (vs TPS)

The Alpha/N table functions the same as with earlier ECUs. The TPS voltage is compared against the table value for the current engine RPMs

If the throttle position exceeds the current table value then the last column of the fuel map is used instead of the map traced cursor position.

Alpha/N Increase Fuel vs TPS voltage [RAW]

RPM	0.00	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000
mV	2520	2520	2520	2520	3160	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800	3800
Value	126	126	126	126	158	190	190	190	190	190	190	190	190	190	190	190



It is normally recommended to set this table to 255 (maximum TPS value) and then tune the fuel map directly for predictable tuning of the fuel map.

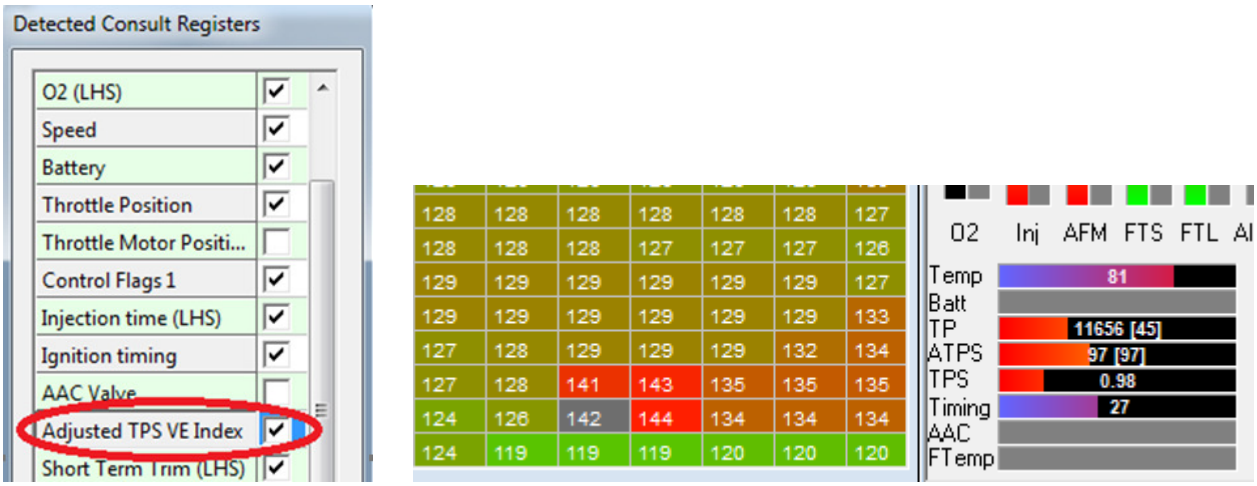
7. Throttle Enrich (VE) Map

All throttle enrichment is done through the one map in NEO ECUs the **Fuel Throttle Enrich (VE) map**

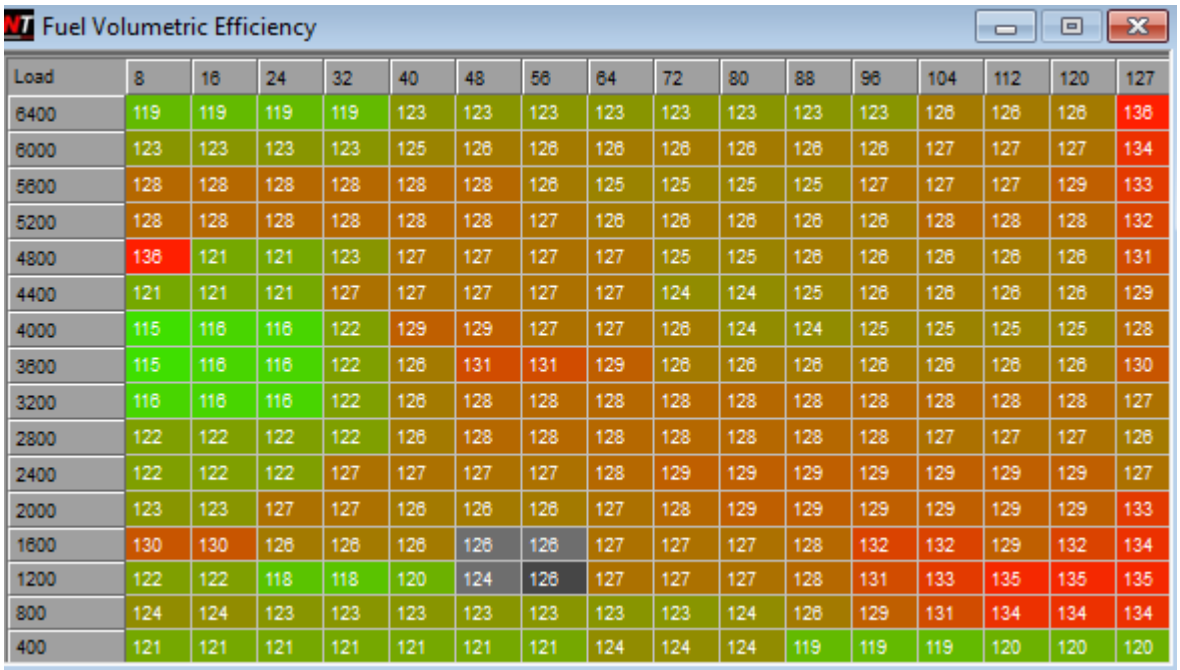
Normally there should not be a requirement to adjust this map. However it may be adjusted if there are throttle response issues.

The map is indexed by **boost sensor + TPS sensor** on horizontal axis, and **RPM** on the vertical axis.

To ensure correct tracing, add ATPS (Adjusted TPS VE index) to consult channels:



These maps are used in conjunction with the fuel (and Alpha/N tables)



Load	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	127
6400	119	119	119	119	123	123	123	123	123	123	123	123	126	126	126	136
6000	123	123	123	123	125	126	126	126	126	126	126	126	127	127	127	134
5600	128	128	128	128	128	128	126	125	125	125	125	127	127	127	129	133
5200	128	128	128	128	128	128	127	126	126	126	126	126	128	128	128	132
4800	136	121	121	123	127	127	127	127	125	125	126	126	126	126	126	131
4400	121	121	121	127	127	127	127	127	124	124	125	126	126	126	126	129
4000	115	116	116	122	129	129	127	127	126	124	124	125	125	125	125	128
3600	115	116	116	122	126	131	131	129	126	126	126	126	126	126	126	130
3200	116	116	116	122	126	128	128	128	128	128	128	128	128	128	128	127
2800	122	122	122	122	126	128	128	128	128	128	128	128	127	127	127	126
2400	122	122	122	127	127	127	127	128	129	129	129	129	129	129	129	127
2000	123	123	127	127	126	126	126	127	128	129	129	129	129	129	129	133
1600	130	130	126	126	126	126	126	127	127	127	128	132	132	129	132	134
1200	122	122	118	118	120	124	126	127	127	127	128	131	133	135	135	135
800	124	124	123	123	123	123	123	123	123	124	126	129	131	134	134	134
400	121	121	121	121	121	121	121	124	124	124	119	119	119	120	120	120

Note: Horizontal indexing takes the TPS index table value and multiplies against the boost multiplier value

8. Removing traction control

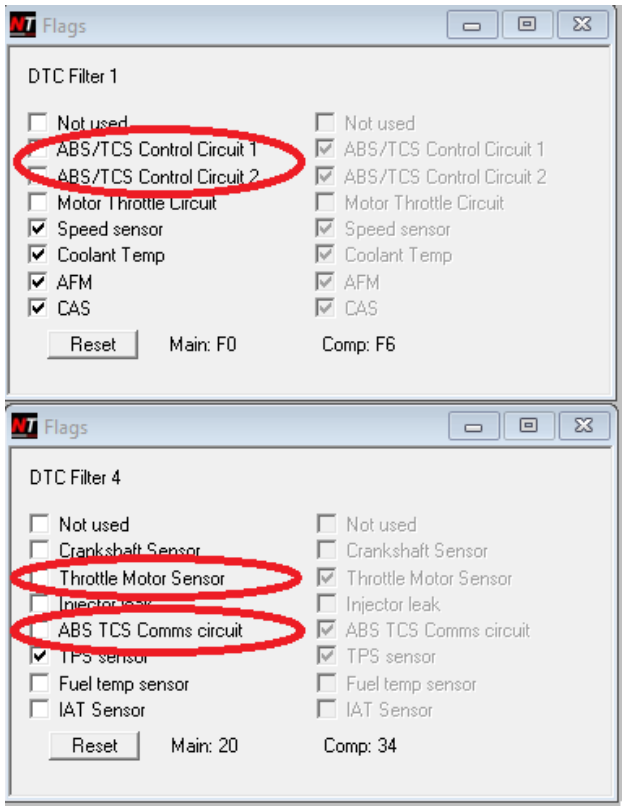
When using NEO ECUs in other vehicles without the supporting ABS and TCS equipment, or when doing a throttle body/plenum conversion, fault codes will be raised and vehicle operation may be affected:

[44] DTC ABC TCS COMMS CIRCUIT (Starts=0)
[46] DTC THROTTLE MOTOR SENSOR (Starts=0)

We normally will use the 4WD Stagea base ROM image for both situations:

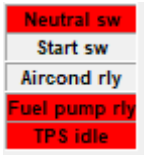
WC34_RB25DET_23710_0V80F_4WD_MT_FP.ent
WC34_RB25DET_23710_0V80G_4WD_MT_FP.ent

The other method is disabling filter flags for these features will prevent the ECU code from calling those functions:



Unticking these items will disable the Code 44 (ABS/TCS comms circuit DTC error) and motor throttle circuit will remove the Code 46 (Throttle Motor Sensor DTC error)

Do not adjust other checkboxes as it may result in undesired effects such as not return to idle. With conversions make sure TPS idle is indicated at start, and that the Neutral switch functions correctly. Otherwise TPS idle and return to idle may not function correctly.

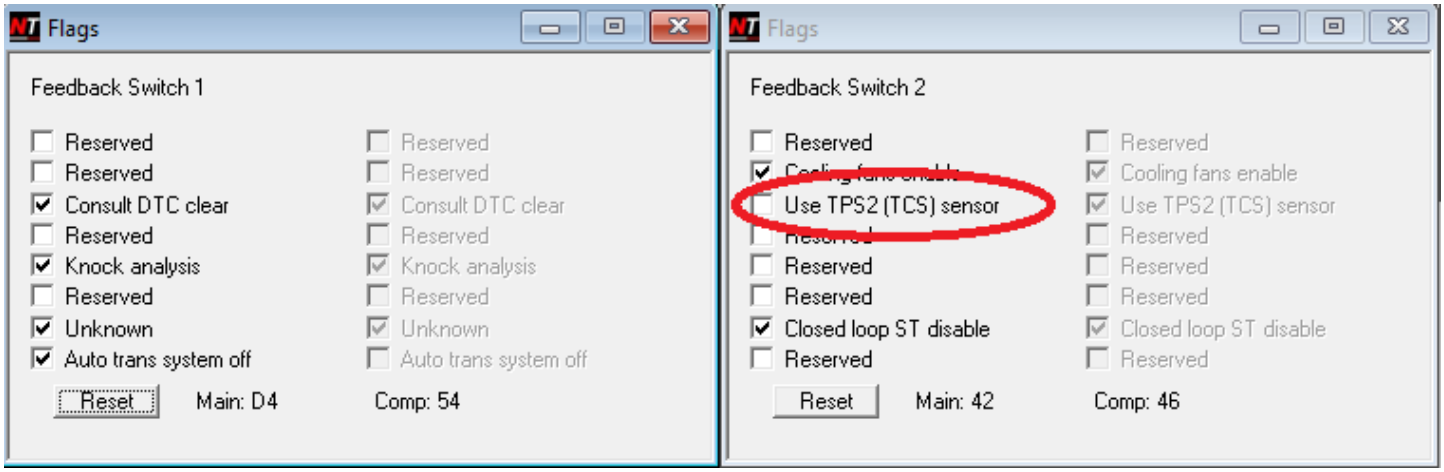


Also see the next section, and disable TPS2 (TCS) sensor in Feedback Switch 2

9. Feedback Control Flags

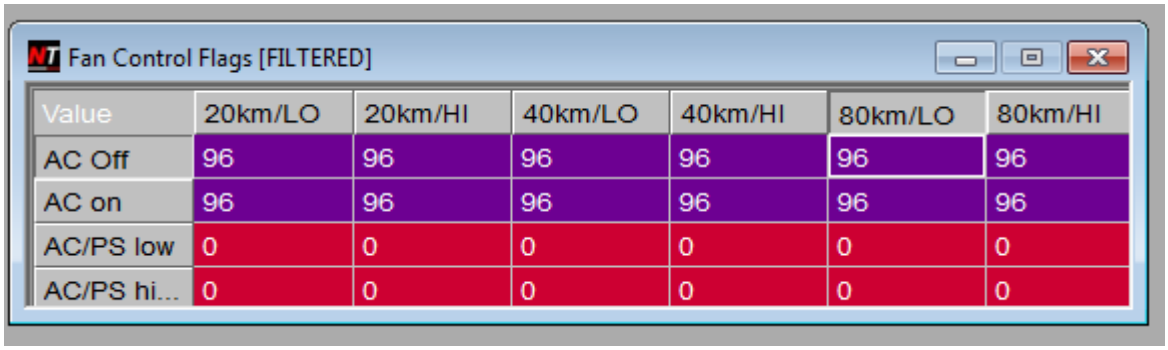
Feedback control flags have changed for this ECU.

Knock analysis can still be disabled and disabling closed loop short term uses a different register (not tested at this time). Internal Nissan diagnostics (not recommended for customer usage) have been added for completeness only



10. Fan Control Table

This table is available in the 'Misc tables' section of Nistune



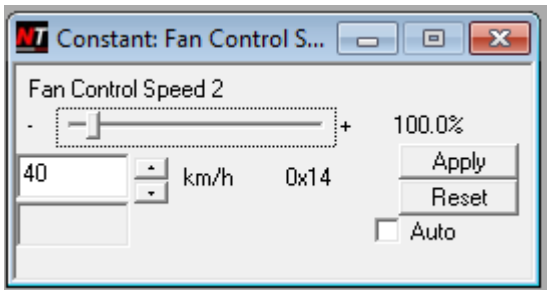
Value	20km/LO	20km/HI	40km/LO	40km/HI	80km/LO	80km/HI
AC Off	96	96	96	96	96	96
AC on	96	96	96	96	96	96
AC/PS low	0	0	0	0	0	0
AC/PS hi...	0	0	0	0	0	0

There are different settings depending if the Air Conditioner switch is on / off

Right Click the table to view as 'FILTERED' values

96 = Fans on

Adjustment of Fan Control speed 2 (middle band) can be made using this parameter:



11. Appendix: Throttle Enrich indexing

The Fuel Throttle Enrich (VE) map is used in addition to the fuel map to trim mixtures based on boost+TPS vs RPM scaling.

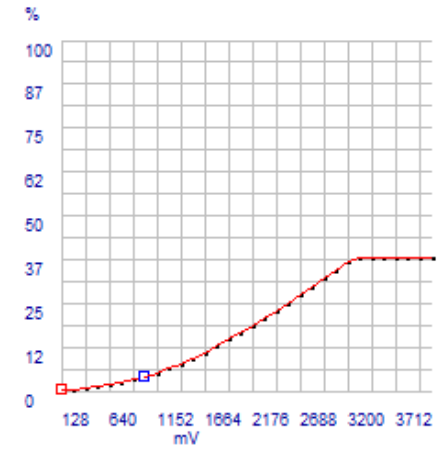
VE maps are used adjust enrichment based on TPS position for all later model Nissan ECUs. The boost+TPS lookup is peformed with the following table. There has not been any requirement to change these tables. This information is here for completeness only.

TPS Voltage Quantifier

TPS is calculated firstly by converting TPS raw voltage to a TPS reference position

TPS Index Voltage Quantifier [RAW]

mV	128	256	384	512	640	768	896	1024	1152	1280	1408	1536	1664	1792	1920	2048	2176	2304	2432	2560
%	0.04	0.26	0.62	1.07	1.64	2.34	3.17	4.13	5.23	6.45	7.78	9.30	10.9	13.0	14.8	16.7	18.6	20.7	22.8	25.0
Value	25	170	406	703	1077	1535	2080	2706	3428	4225	5099	6095	7173	8530	9701	10930	12218	13561	14963	16406



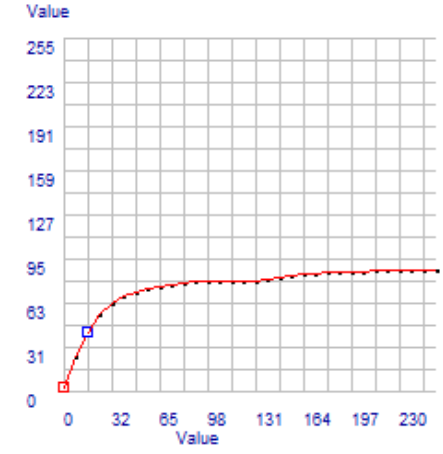
The TPS reference position is then divided by RPM and used to reference the VE map index table.

VE Map Index table

Boost sensor available: The value in this table is then multiplied against the boost sensor table
Boost sensor not available: Value is divided by two
The calculated value is used to index the VE map

VE Map index by TPS 1 [RAW]

Value	0.00	16.0	32.0	48.0	64.0	80.0	96.0	112	128	144	160	176	192	208	224	240	256
Value	1.56	24.6	42.2	55.1	62.9	68.0	71.1	73.4	75.4	77.0	77.7	78.5	78.9	79.3	79.7	79.7	79.7
Value	4	63	108	141	161	174	182	188	193	197	199	201	202	203	204	204	204



VE Map Boost Index table

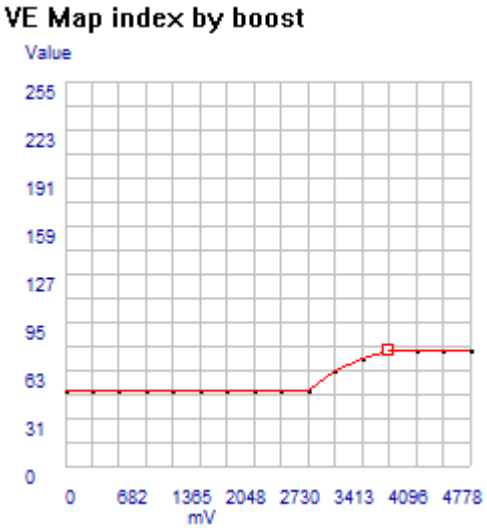
The values in this table are a percentage multiplier against the values in the VE map index table. For example this table is indexed with current boost voltage of 3840mV (3.8V)

Take 110 from the previous table x 76.5% = TPS VE index value of 83.

So as boost increases the reference to the VE table increases to the right.

VE Map index by boost [RAW]

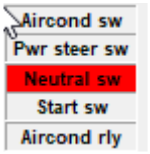
Value	0.00	320	640	960	1280	1600	1920	2240	2560	2880	3200	3520	3840	4160	4480	4800
Value	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	62.5	70.7	76.2	76.2	76.2	76.2
Value	128	128	128	128	128	128	128	128	128	128	160	181	195	195	195	195



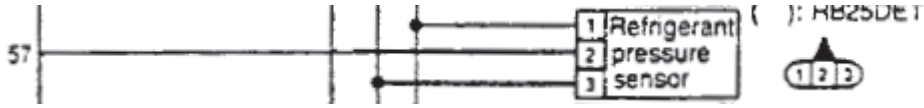
12. Appendix: Air conditioning (transplants)

ECU Pin 14 - output to the AC relay (controls AC compressor)

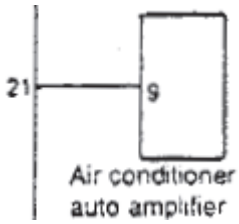
Should enable when the ‘Air cond relay’ indicator is displayed in the Nistune software



ECU Pin 57 - Refrigerant pressure sensor



Needs voltage around 3.5V input for the AC to activate. Either use an actual sensor or simulate the sensor input. One customer has used the coolant temp sensor input (pin 56) which operates on a similar voltage to simulate this sensor.



ECU Pin 21 - AC auto amplifier. Switch input to the ECU for AC, wire in to AC switch with transplants where not connected in the current loom.

When pins 57 and 51 show valid inputs the Aircond Switch indicator should illuminate in the software, and the Aircond Relay indicator should also illuminate