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HOLDEN ALDL
PCM SIMULATOR
VT – VX – VY – VZ

This module is designed to maintain standard vehicle functionality when the factory Delco PCM has been replaced with an aftermarket ECU or is no longer used.
It simulates the PCM data transmitted on the ALDL data bus, similar to how the factory PIM (Powertrain Interface Module) used in some models works – except it provides discrete inputs and outputs, rather than data conversion from a different serial bus type (such as J1850 VPW or CAN).

Features include:

- **VATS output**, which is triggered when the BCM has successfully read the ignition key and is signalling the PCM it is OK to start. This can be used to retain the factory anti-theft system.
- **AC Request output**, which is triggered when the BCM or climate control module are requesting the PCM to engage the air conditioning compressor. This can be used to retain the factory AC control switch.
- **Oil Pressure input** – used to trigger the oil light or check oil warning on the factory instrument cluster.
- **MIL Lamp input** – used to trigger the MIL light or check engine warning on the factory instrument cluster.
- **Power / Econ input** (auto trans applications) – used to trigger the power shift pattern indicator on the factory instrument cluster.
- **Low Speed Fan request** input – used to signal the BCM that the PCM is requesting the low-speed cooling fan (which is switched by the BCM).
- **Coolant Temperature Input** – to keep the factory coolant gauge operational, using either an LS1 style coolant sensor connected directly to this module, a custom coolant sensor and pullup resistor using the configurable voltage lookup table, or back-probing off an existing sensor.
- **Gear Position input** – to keep the factory gear position indicator in the instrument cluster, using either direct connection to the PRND A/B/C/P connections on a 4L60 style range switch, discrete digital inputs for P/R/N/D, or using an analog voltage input in combination with the configurable lookup table.
- **Missing ABS/SRS module data transmission –** to prevent instrument cluster warnings if the ABS or SRS modules are not present. Data will only be transmitted if an existing ABS or SRS module is not detected.
- **Fuel Level Input –** for use with VZ clusters, using an in-tank sender unit and configurable lookup table.
- **Cruise On / Cruise Active / Alternator –** warning light inputs, for VY/VZ clusters as applicable, using spare PRND digital inputs when they are not in use.
- **ALDL to USB serial interface –** using the built in USB port that can either be used for configuration via a terminal, or as an ALDL to USB serial adaptor for direct connection to the ALDL data bus.

This module can also be used to operate a VT-VZ Instrument cluster in a stand-alone configuration, without a BCM.

REV 1.00

CONNECTORS

Back-probe view (wire side)   Connector Used: Molex Mini-Fit Jr. (4.2mm pitch) - Part #: 5557-4R / 5557-8R

Connector 1 – Power & Data

4 - PINK	**3 - ORANGE**
Ignition +12v	5v Reference
2 - BLACK	**1 - RED**
Earth	ALDL Data

PIN	COLOR	CONNECTION	DESCRIPTION
1.4	Pink	Ignition +12v	Power supply for simulator module
1.3	Orange	5v Reference	Optional 5v output for use with analog sensors
1.2	Black	Earth	Ground for simulator module
1.1	Red	ALDL Data	ALDL Data connection from simulator to other modules

Connector 2 – Input / Output

8 - WHITE	**7 - GREY**	**6 - BLUE**	**5 - BROWN**
AC Request	VATS Output	Oil Light	MIL Light
4 - ORANGE	**3 - VIOLET**	**2 - YELLOW**	**1 - GREEN**
Fuel Sender	Coolant Signal	Power/Econ	Low Speed Fan

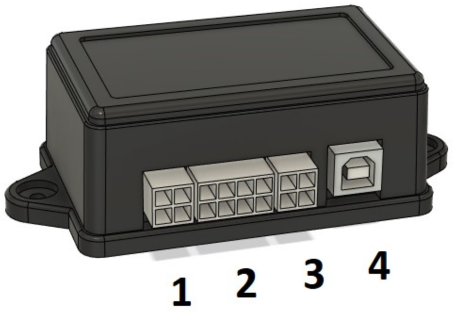
PIN	COLOR	CONNECTION	DESCRIPTION
2.8	White	AC Request	Output – switches to ground when AC clutch requested by BCM or ECC
2.7	Grey	VATS Output	Output – switches to ground when BCM has read ignition key
2.6	Blue	Oil Light	Input – Connect to ground to enable oil pressure warning light
2.5	Brown	MIL Light	Input – Connect to ground to enable engine malfunction warning light
2.4	Orange	Fuel Sender	Input – Connect to an in-tank fuel sender
2.3	Violet	Coolant Signal	Input – Connect to coolant sensor
2.2	Yellow	Power / Econ	Input – Connect to ground to enable power shift pattern light
2.1	Green	Low Speed Fan	Input – Connect to ground to request activation of BCM low-speed fan

Connector 3 – Input

4 - BLUE	**3 - YELLOW**
PRND-A Cruise On	PRND-B Cruise Active
2 - GREY	**1 - WHITE**
PRND-C Alternator Light	PRND-P PRND Analog

PIN	COLOR	CONNECTION	DESCRIPTION
3.4	Blue	PRND-A Cruise ON	Input – Connect to ground when active Digital PRND A, or Cruise Control On warning light
3.3	Yellow	PRND-B Cruise Active	Input – Connect to ground when active Digital PRND B, or Cruise Control Active warning light
3.2	Grey	PRND-C Alternator Light	Input – Connect to ground when active Digital PRND C, or Alternator warning light
3.1	White	PRND-P PRND Analog	Input – Digital PRND P (connect to ground when active) Or analog voltage input for PRND position

INSTALLATION



1	Connector 1 – Power & Data
2	Connector 2 – Input / Output
3	Connector 3 – Input
4	USB Port

Connector 1 is the main power and data connection. The pink (ignition +12v) wire should be connected to a switched ignition source, such as the one that once ran to the factory PCM. The red wire is the ALDL data connection, which should be connected to the red + black ALDL data wire that once ran to the factory PCM or PIM. Alternatively, it can be connected to the green + white ALDL data wire that runs between BCM, cluster + other modules.

Connector 2 provides the main inputs/outputs. The 2 outputs, AC Request + VATS, are low side switching outputs (switching to ground when active). Each output is rated to 0.7A, and has integrated overload, short circuit, over voltage and thermal protection. They are suited to driving an automotive relay coil, or a load up to 5w.

4 of the inputs on connector 2 (Oil light, MIL light, Power/Econ, Low Speed Fan) are digital active-low type (connect them to ground to activate). The Oil, MIL + Power/Econ inputs will signal the instrument cluster to activate the relevant warning light or message (oil pressure warning, engine malfunction warning, and power shift pattern for auto transmission applications). The low-speed fan input will signal the BCM to activate the low-speed cooling fan, which is switched by the BCM from factory (only the high-speed fan is switched by the factory PCM).

The coolant signal input is used to control the factory coolant temperature gauge. It is an analog voltage input, and can be used in a few different ways. There are 2 optional pull-up resistors that can be configured (a default 330 ohm, or a custom resistor you can solder onto the PCB yourself). There is also the choice of a standard default voltage/temperature lookup table, or a custom lookup table where you can configure the voltage/temperature relationship. Using the default 330-ohm pullup and standard lookup table, the input can be connected directly to a dedicated LS1 style coolant temperature sensor. Using the custom lookup table and a custom pullup resistor, any dedicated coolant sensor can be used. By disabling both pullup options, and using the custom lookup table, the signal wire can be spliced into an existing coolant sensor signal, no dedicated coolant sensor is required.

The fuel sender input is to operate the factory fuel gauge on VZ instrument clusters. It can be connected to any in-tank fuel sender with a range within 0 to 240 ohms. There is a lookup table that can be configured to define the resistance (ohms) to fuel level (percentage) relationship. The default values pre-programmed into the lookup table are to suit VY S2 / VZ fuel senders.

Connector 3 provides different functionality depending on the current configuration.
When the transmission type is set to automatic and PRND gear indicator type set to one of the digital modes, there are 4 additional digital active-low inputs. These provide input for the current selector/gear position on the instrument cluster. They can be spliced directly to the factory PRND A/B/C/P connections on a 4L60 style range switch, or used as separate discreet inputs for Park, Reverse, Neutral and Drive respectively.
When the transmission type is set to manual, or PRND analog mode is enabled, 3 of the inputs change function to provide a Cruise On, Cruise Active and Alternator warning light for clusters that support it (VY / VZ). The final input becomes an analog voltage input, which can signal PRND position using a voltage / gear position relationship lookup table that can be configured.

CONFIGURATION

Configuration settings and lookup tables are stored in the simulators internal EEPROM memory. These values can be changed using the terminal interface via the USB port, or by sending ALDL commands to the module. The USB port can also act as a USB to ALDL serial adaptor.

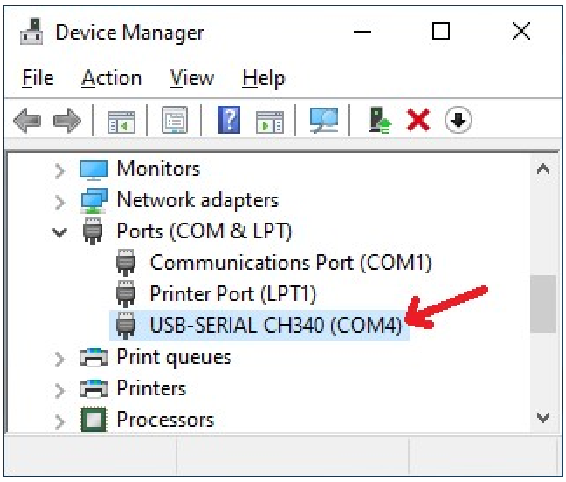
To switch between **USB Configuration Terminal** and **USB ALDL Serial** modes, a switch is located on the PCB inside the module. To access, remove the cover (4 small phillips head screws). The switch is located on the end of the circuit board near the USB port. When pushed towards the USB port side, the module is in **USB ALDL Serial** mode. When pushed the opposite way, the module is in **USB Configuration Terminal** mode.

A green power LED is provided on the PCB to indicate the simulator is powered up. When in USB configuration terminal mode and USB is connected and in use, this light will flash.
A red data LED is also provided to indicate activity on the ALDL data bus.

Configuration data is loaded from EEPROM by the module at ignition on. All settings must be saved after being changed, by commanding the module to save to EEPROM, otherwise they will be lost at the next ignition cycle.

ALDL SERIAL

In this mode the module acts as a USB to ALDL serial adaptor. A PC can receive and transmit raw data bytes to the ALDL data bus over the USB connection. ALDL operates at 8192 baud.



Check the switch on the PCB is in the ALDL USB Serial position, and connect your module to the PC using a USB cable.

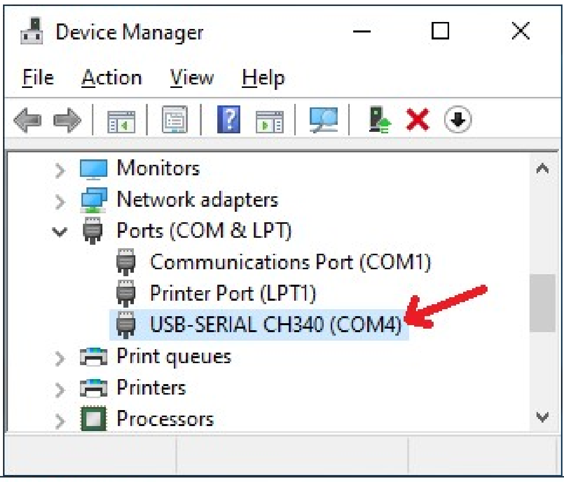
If required, device drivers should be automatically installed.

In windows, search for and open Device Manager. Under Ports, find the “USB-SERIAL CH340” device and note the COM port number. This is the ALDL USB device.

Commands can be sent to the module over ALDL for configuration, or the module can be used to send and receive data from other ALDL modules.

CONFIGURATION TERMINAL

This mode provides configuration changes using a PC terminal emulator application that supports VT100/ANSI. PuTTY is highly recommended - https://www.putty.org

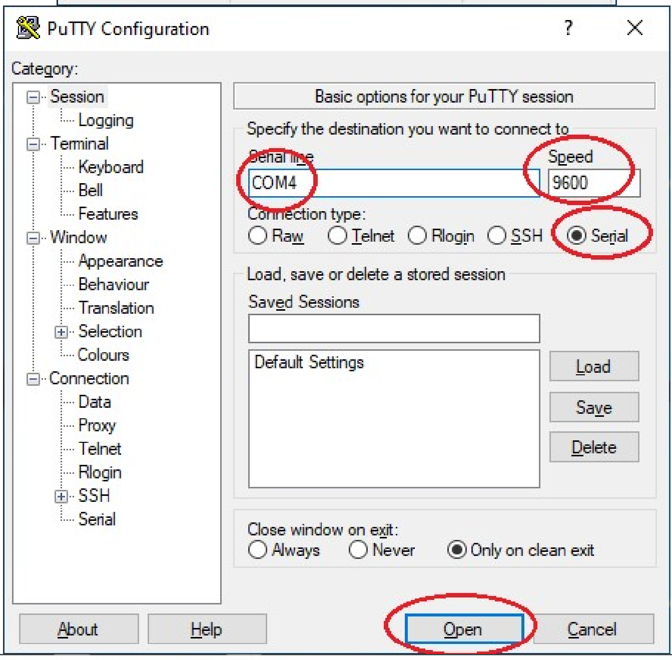


Download and install PuTTY.

Check the switch on the PCB is in the Configuration Terminal position, and connect your module to the PC using a USB cable.

If required, device drivers should be automatically installed.

In windows, search for and open Device Manager. Under Ports, find the “USB-SERIAL CH340” device and note the COM port number.



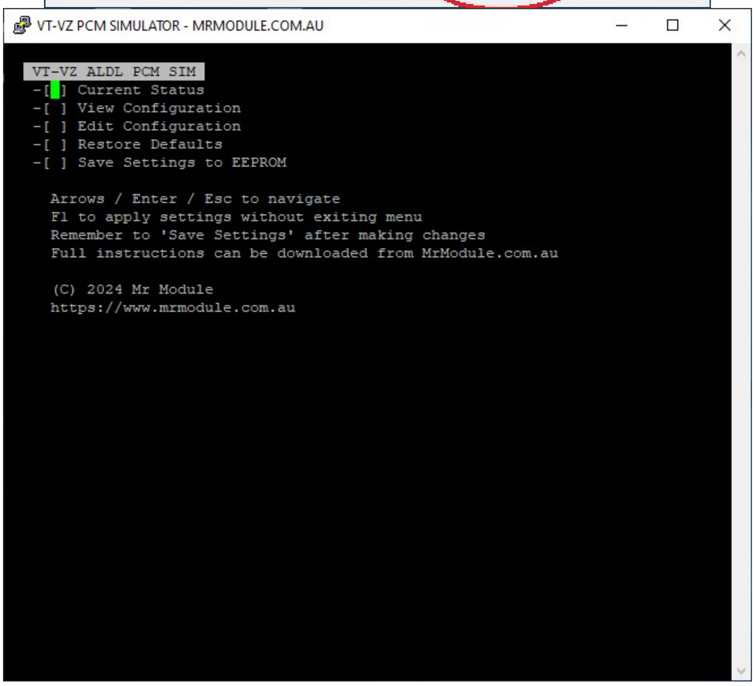
Open PuTTY.

Under Connection Type, select Serial.

Enter the COM port number identified using device manager.

Ensure Speed is set to 9600.

Click Open to launch the terminal emulator.



The configuration terminal window should open.

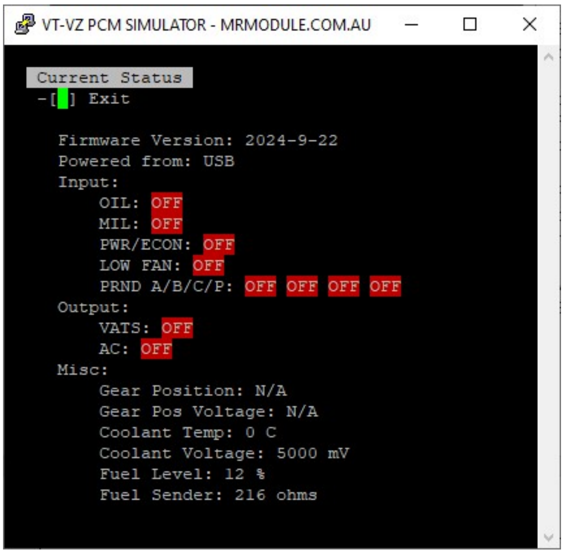
Navigate the menu options using the arrow, enter and escape keys.

Editable items will display as blue (unchanged) or purple (modified) values.
Items can be modified by scrolling to them using the arrow keys and entering a new value.
Flag options (that display clear or X) can be toggled with the enter key or space bar.

Press F1, or select the “Apply + Exit” menu option, to apply all current changes to the module.

When finished, remember to save settings to EEPROM from the main menu.

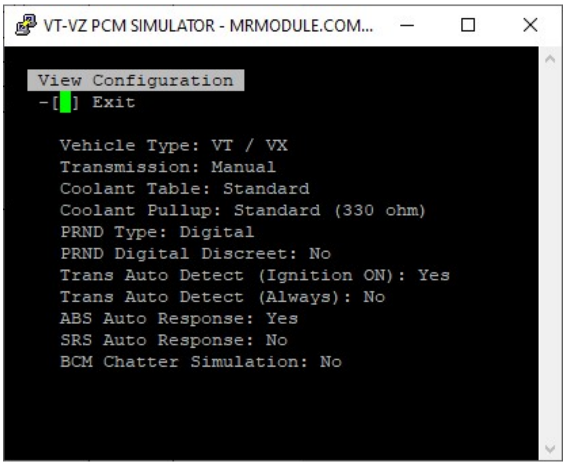
CURRENT STATUS



This menu provides information about the current input / output status of the simulator, including analog voltage readings and current fuel sender ohm value.

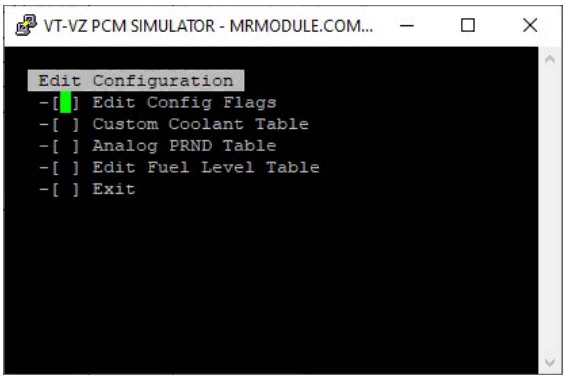
Gear position, coolant temperature and fuel level are looked up based on the current configuration of the module. Values that display N/A are currently not used, as the module is configured not to use them.

VIEW CONFIGURATION



A quick overview of how the module is currently configured to operate.

EDIT CONFIGURATION



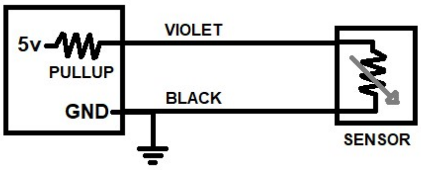
These menus allow you to edit various configuration options.

CONFIGURATION FLAGS

Name	Not Set	Set	Description
Vehicle Type	VT / VX	VY / VZ	Sets the format of ALDL data to suit different vehicle types
Transmission	Manual	Automatic	Current transmission type of vehicle. This must be set to Automatic for some clusters to display PRND position. When set to Manual, the PRND gear position inputs are disabled.
Trans Auto Detect (Ignition On)	Disabled	Enabled	Automatically detect and set the transmission type at ignition on. If any of the PRND A/B/C/P inputs are active, or the PRND type is analog, then automatic transmission will be assumed. This is intended for quick plug + play operation and should normally be disabled once you are set up, with the transmission type set and saved manually.
Trans Auto Detect (Always)	Disabled	Enabled	Automatically detect and set the transmission type. This is constantly monitored. If any of the PRND A/B/C/P inputs become active, or the PRND type is analog, then automatic transmission will be assumed. This is intended for quick plug + play operation and should normally be disabled once you are set up, with the transmission type set and saved manually.
PRND Type	Analog	Digital	Selects either analog voltage input (connection 3.1 – white wire) or digital inputs (4x connector 3 inputs) for the PRND gear position.
PRND Digital Discreet Inputs	Disabled	Enabled	By default, the connector 3 A/B/C/P inputs are designed to work with a 4L60 range switch. This enables a change to a discrete input for each position: Park (A), Reverse (B), Neutral (C) + Drive (P)
Coolant Table	Standard	Custom	Select which voltage-temperature relationship lookup table is used for coolant temperature input. The standard table is designed to work with the default 330-ohm pullup and an LS1 style sensor.
Coolant Pullup Type	Default 330 Ω	Custom	Select which pullup resistor is applied to the coolant temperature input. The default resistor value of 330 ohm is designed to compliment an LS1 style sensor. There is a provision on the PCB to solder in a custom resistor to be used with a different sensor.
Coolant Pullup Disable	Pullup Enabled	Pullup Disabled	If using a coolant input voltage signal that already has a pullup fitted (such as teeing into an existing sensor), or a signal that doesn't require a pullup, this can be used to disable both internal pullup resistors (330 ohm and custom).
ABS Auto Response	Disabled	Enabled	When enabled, the module will wait to see if factory ABS data is being transmitted. If not, it will automatically transmit ABS data. This can be useful to prevent any instrument cluster malfunction warnings.
SRS Auto Response	Disabled	Enabled	When enabled, the module will wait to see if factory SRS data is being transmitted. If not, it will automatically transmit SRS data. This can be useful to prevent any instrument cluster malfunction warnings.
BCM Chatter Simulation	Disabled	Enabled	Forces the simulator to schedule transmission of ALDL data itself. This should only be used when a factory BCM is not connected. This option allows use of an instrument cluster by itself in a stand-alone configuration. Note: Due to timing constraints, this option will be inactive whenever the configuration terminal is open (and green power LED is flashing).

COOLANT TEMPERATURE INPUT

The factory instrument cluster does not use a dedicated coolant temperature sensor, it receives coolant temperature data via ALDL (originally from the factory PCM). Simulator connection **2.3 (violet wire)** can be used to connect to a dedicated coolant sensor, tee into an existing coolant sensor, or receive coolant temperature as an analog 0-5v voltage.



A coolant temperature sensor is typically an NTC thermistor, it changes resistance based on temperature. Using a second resistor (the pullup resistor), connected in series with the sensor from a known voltage (5v), a voltage divider is created. This “signal voltage” (on the violet wire) will now change based on coolant temperature. Sensor resistance can also be calculated from signal voltage using ohms law if the pullup resistance is known, however this is not required, as the simulator just references signal voltage directly.

The simulator has 3 options for pullup resistor: A default internal 330 ohm built into the module, a custom resistor that can be soldered onto the provision provided on the PCB, or none at all.
There are 2 voltage / temperature lookup tables that can be used: A standard table designed to be used with the 330-ohm pullup and an LS1 sensor, or a custom table that can be configured with your own values.

LS1 SENSOR

Configuration flag “Coolant Table”, “Coolant Pullup Type” and “Coolant Pullup Disable” should be clear.
An LS1 type coolant sensor (eg. part # 12608814 / 15326388) should be connected to simulator connection 2.3 (violet wire). Polarity of the sensor connection is not important (it can be connected either direction).
The second wire of the sensor should be run back and earthed directly at the simulator module (joined to connection 1.2, black wire) – this prevents any voltage drop in the earth circuit effecting sensor reading.
It is important to use a dedicated sensor, do not tee into an existing sensor already connected to an ECU while using the standard lookup table.

USING A CUSTOM SENSOR

Configuration flag “Coolant Table” and “Coolant Pullup Type” should be set. “Coolant Pullup Disable” should be clear. If you wish to use a 330-ohm pullup, you can use the built in one by leaving “Coolant Pullup Type” clear. Otherwise, you must open the module up, and solder a resistor of desired value into the location labelled “COOLANT RES” on the PCB. Any through hole 1/4w resistor will fit. Select a resistor value based on the resistance curve of your desired sensor, so you will obtain good resolution in the typical range of operation (20 to 100 degrees).
Connect your thermistor/sensor to connection 2.3 (violet wire), with the opposite side of the sensor ran back and earthed directly at the module (joined to connection 1.2, black wire).
Using the configuration terminal, or by sending ALDL commands, program the signal voltage / temperature relationship into the simulator module lookup table. These values can be calculated if you know the pullup resistor value and resistance values for the sensor at different temperatures. The valid range for temperature within the lookup table is 0 to 215 degrees celsius.

TEEING INTO AN EXISTING SENSOR

This is similar to using a custom sensor, except the “Coolant Pullup Disable” configuration flag should be set. There is no need to fit a pullup resistor, having one enabled would skew the signal voltage reading for both the module and whatever else is connected to it. Have the “Coolant Table” configuration flag set, and program the voltage / temperature relationship into the lookup table (valid range 0 to 215 degrees celsius).
NOTE: Some ECU’s switch between different pullup values at different temperatures to obtain better sensor resolution. If this is the case, this will not work, as it will be impossible to know which pullup value the ECU currently has selected from signal voltage alone, and thus impossible to know the actual temperature value.

PRND GEAR POSITION INPUT

The factory instrument cluster can display selector position in auto transmission models.
For this to work, the instrument cluster must be programmed / configured for auto transmission, and the simulator module configuration flag for transmission type set to automatic.
Note: VZ clusters programmed as 5 speed auto will display “PRND43L” instead of “PRND321”

There are 3 methods for providing gear position input:

DIGITAL, WITH 4L60 RANGE SWITCH

Configuration flag “PRND Type” should be set, and “PRND Digital Discreet” should be cleared.

This allows direct connection to a 4L60 style range switch. The 4 wires on connector 3 run directly to the A/B/C/P switches, which are connected to earth in the sequence shown in the table, depending on selector position.
They can be teed in and connected in parallel with anything else connected to these switches, such as a TCM.

	A	B	C	P
PARK	Earthed	Open	Open	Earthed
REVERSE	Earthed	Earthed	Open	Open
NEUTRAL	Open	Earthed	Open	Earthed
D4	Open	Earthed	Earthed	Open
D3	Earthed	Earthed	Earthed	Earthed
D2	Earthed	Open	Earthed	Open
D1	Open	Open	Earthed	Earthed
Typical Factory Wire	Blue + White	Yellow	Grey	White
Simulator Wire	3.4 Blue	3.3 Yellow	3.2 Grey	3.1 White

DIGITAL, WITH DISCREET INPUTS

Configuration flag “PRND Type” and “PRND Digital Discreet” should be set.
This provides a single digital input for each of the 4 main gear positions. If multiple inputs are active (earthed) at once, the gear position displayed will depend on the priority. This allows use of typical reverse light and inhibitor switches, in combination with relays if required, for a very basic implementation.

	Input Wire	Priority
PARK	3.4 - Blue	2
REVERSE	3.3 - Yellow	1
NEUTRAL	3.2 - Grey	3
D4	3.1 - White	4

ANALOG

Configuration flag “PRND Type” should be cleared.
A 0v to 5v analog voltage level can be applied to 3.1 (white wire), EG. from a sensor or potentiometer mounted on the selector. This voltage is compared to the PRND lookup table, which contains min and max voltages for each gear position. If the voltage falls within range of a gear position, that position is displayed.

The lookup table can be configured using the configuration terminal or via ALDL commands. Each table position holds a millivolt value (valid range 0 to 5000).
If both min and max values are set to 0, that gear position is disabled and will not be displayed (eg. D1 in the example table). Voltages that fall outside of all gear positions will also result in no gear being displayed (eg. a voltage below 700 or above 4500 millivolts in the example table).

EXAMPLE TABLE

	MIN	MAX
D1	0	0
D2	701	1400
D3	1401	2100
D4	2101	2800
NEUTRAL	2801	3500
REVERSE	3501	4200
PARK	4201	4500

A 5v reference output is supplied on connection 1.3 (orange wire). This can be used in combination with direct connection to the simulator earth wire (connection 1.2, black wire) to provide power and earth to your potentiometer / sensor.

When in analog mode, the 3 spare digital inputs (3.2 Grey, 3.3 Yellow, 3.4 Blue) can be used for Alternator, Cruise Active and Cruise On warnings lights. These only apply to VY/VZ clusters where applicable.

FUEL LEVEL INPUT

VZ Instrument clusters receive fuel level data over ALDL, rather than having the in-tank fuel sender connected directly to them like previous models. This input is only used for VZ models.

Any fuel level sender with a range somewhere within 0 to 240 ohms can be used.

The fuel sender should be connected to connection 2.4 (orange wire), with the opposite side of the fuel sender run back and connected directly to the simulator earth (connection 1.2, black wire). This prevents any voltage drop on the earth circuit effecting fuel level reading.

An ohm to fuel level relationship lookup table is provided, which can be configured using the configuration terminal, or by sending ALDL commands.
There are 13 resistance points, from 0 to 240 ohms (20 ohms per table point), where the corresponding fuel level can be programmed.
The valid range of fuel level is 0 to 255, where 0 = 0% (empty) and 255 = 100% (full).

The default values in the table correspond to the factory VY S2 and VZ in tank fuel sender.
Note that VY S1 and previous models use a sender that operates in the reverse direction.

Fuel Level Table Values **Factory VZ in-tank sender**		
Sender Resistance (ohms)	Fuel Level (%)	Fuel Level (raw value)
0	100	**255**
20	100	**255**
40	100	**255**
60	90	**230**
80	80	**204**
100	70	**179**
120	60	**153**
140	50	**128**
160	40	**102**
180	30	**77**
200	20	**51**
220	10	**26**
240	0	**0**

Factory VZ senders use the brown + green wire for signal, and black + yellow wire for earth, however polarity of connection to the fuel sender is not important.

	VZ Fuel Pump Module Connector		
Black + Blue	**Black + Yellow**	**Brown + Green**	**Purple**
Pump Earth	Sender Earth	Sender Signal	Pump +12v (from fuel pump relay)

WARNING INPUTS

The following connections can be used to trigger warning lights or messages on the instrument cluster. Connect them to ground to trigger the warning.
Notes:

- Cruise On / Cruise Active / Alternator Light are only available when a manual transmission is selected, or an automatic is selected with an analog PRND gear position voltage input. These inputs are otherwise used to determine gear position.
- Cruise Active only applies to VY / VZ, and Alternator only applies to VZ models. Previous models used discreet wires to the instrument cluster for each function.

CONNECTION	WIRE COLOR	DESCRIPTION
2.6	Blue	Oil Light
2.5	Brown	MIL Light
2.2	Yellow	Power / Econ
3.4	Blue	Cruise ON
3.3	Yellow	Cruise Active
3.2	Grey	Alternator Light

LOW SPEED FAN INPUT

The low-speed fan input can be used to request the factory BCM turn on the low-speed cooling fan. Connect it to earth to trigger the request.

CONNECTION	WIRE COLOR	DESCRIPTION
2.1	Green	Low Speed Fan

Factory vehicles use a 2-speed cooling fan. The high-speed fan relay is controlled directly by the PCM, and the low-speed relay controlled by the BCM. The PCM sends an ALDL request to the BCM to trigger the low-speed fan. This input allows the 2-speed cooling fan system to be retained, without having to completely rewire the low-speed cooling fan.

AC REQUEST OUTPUT

The factory AC compressor is controlled by the PCM. The BCM or climate control module request the PCM to engage the compressor over ALDL when the AC is switched on. When the PCM receives this request, it uses its refrigerant pressure sensor and other variables (engine speed/load) to decides when to engage and disengage the compressor relay.

When the simulator module sees the request to the PCM to engage the AC compressor, this output will be triggered (switched to ground). This can be used to trigger a relay to power the AC compressor clutch, and retain the factory dash switch.

CONNECTION	WIRE COLOR	DESCRIPTION
2.8	White	AC Request

IMPORTANT: Wire the relay along with a refrigerant pressure switch, otherwise the compressor will run whenever the dash switch is on (even if the refrigerant pressure is excessively high or low). This could cause damage or catastrophic failure of the AC system.

VATS OUTPUT

The factory VATS anti-theft system uses a unique code that is stored in the PCM during the BCM/PCM linking procedure. When the BCM successfully reads and verifies an ignition key that has been programmed into that BCM, it will reveal the unique code to the PCM via the ALDL data bus. If the code matches the one stored in the PCM, the PCM will allow the engine to run.

When the simulator sees the BCM reveal its unique code, it means the BCM has read and verified the ignition key, and the simulator will trigger this output (switch it to ground).
This output can be used to retain the factory anti-theft system. An example would be using it as the earth side for the starter relay coil, so that the engine will not crank until the key is verified.

CONNECTION	WIRE COLOR	DESCRIPTION
2.7	Grey	VATS Output

If removing a factory LS1 PIM (powertrain interface module), this output can be connected directly to the grey or grey/blue wire that ran to the PIM from the inhibitor switch or starter relay. This will only allow the vehicle to crank when a valid ignition key is inserted.

ALDL CONFIGURATION

Configuration settings can be programmed by communicating with the simulator via ALDL.
The simulator uses device ID 0xE9.

All modes will return a response of the following format, if another is not specified:

E9	57	MD	ER	CS

MD	Mode that was requested	
ER	Error Code	
	00	No error. Task completed successfully.
	01	Unknown mode
	02	Invalid parameter count
	03	Parameter out of range
CS	Checksum	

Available modes are as follows:

0x00 REBOOT

Send:

E9	56	00	C1

Restarts PCM simulator as if ignition was switched OFF/ON.

0x01 DATA FRAME

Send:

E9	57	01	ID	CS

Receive:

E9	xx	01	ID	D1	D2	…	Dx	CS

Get a data frame from the simulator.
ID is a data frame ID, and D1,D2…Dx are data bytes:

ID	Data Bytes		
01	Firmware Version		
	D1	Build Year	
	D2	Build Month	
	D3	Build Day	
	D4	Build Hour	
	D5	Build Minute	
02	Input State		
	D1	Bitflags. 1 = Active, 0 = Inactive	
		0 (LSB)	Oil Pressure
		1	MIL Lamp
		2	Power / Econ
		3	Low Speed Fan Request
		4	PRND A
		5	PRND B
		6	PRND C
		7 (MSB)	PRND P

D2	Bitflags

0 (LSB)	Power Source (0 = USB, 1 = 12v)
1	USB Mode (0 = ALDL Passthru, 1 = Terminal)
2	USB Connected (0 = No, 1 = Yes)
3	
4	
5	
6	
7 (MSB)	

D3	PRND Gear Position

7	Park
6	Reverse
5	Neutral
4	D4
3	D3
2	D2
1	D1
0	Invalid / unknown gear

D4	Coolant Temperature (0 to 215 degrees C)
D5	Fuel Level (0 to 255 = 0 to 100%)
D6	PRND ADC value (8-bit representation)
D7	Coolant ADC value (8-bit representation)
D8	Fuel Sender Ohms

03 Output State

D1	Bitflags

0 (LSB)	VATS Output (0 = Off, 1 = On)
1	AC Request Output (0 = Off, 1 = On)
2	
3	
4	
5	
6	
7 (MSB)	

04 Configuration Flags

D1	Bitflags

0 (LSB)	Vehicle Type (0 = VT/VX, 1 = VY/VZ)
1	Transmission (0 = Manual, 1 = Auto)
2	Trans Auto Detect at Ignition On (0 = Off, 1 = On)
3	Trans Auto Detect Always (0 = Off, 1 = On)
4	ABS Auto Response (0 = Off, 1 = On)
5	SRS Auto Response (0 = Off, 1 = On)
6	Coolant Table (0 = Standard, 1 = Custom)
7 (MSB)	Coolant Pullup Type (0 = 330R Default, 1 = Custom)

D2	Bitflags

0 (LSB)	PRND Gear Position Type (0 = Analog, 1 = Digital)

1	PRND Digital Discreet Inputs (0 = Off, 1 = On)
2	BCM Chatter Simulation (0 = Off, 1 = On)
3	Coolant Pullup Disable (0 = Off, 1 = On)
4	
5	
6	
7 (MSB)	

05	Coolant Table 26 Data bytes. Table ranges 0-5v, 0.2v per cell. Each cell contains a temperature value from 0 to 215 degrees C. EG. D6: (0.2v * 6th cell) = Temperature value at 1.2v position.
06	PRND Gear Position Table 28 Data bytes. 7 x 2 Table, 16-bit/2-byte values at each location. Each location contains a millivolt value (0 – 5000). D1 – Drive 1, minimum voltage, high byte D2 – Drive 1, minimum voltage, low byte D3 – Drive 1, maximum voltage, high byte D4 – Drive 1, maximum voltage, low byte D5, D6, D7, D8 repeats for Drive 2 D9, D10, D11, D12 repeats for Drive 3 D13, D14, D15, D16 repeats for Drive 4 D17, D18, D19, D20 repeats for Neutral D21, D22, D23, D24 repeats for Reverse D25, D26, D27, D28 repeats for Park
07	Fuel Level Table 13 Data bytes. Table ranges 0-240 ohms, 20 ohms per cell. Each cell contains a fuel level value from 0 to 255 (0 to 100%). EG. D6: (20ohm * 6th cell) = Fuel level value at 120-ohm position.

0x02 OUTPUT CONTROL

Send:

E9	58	02	ID	ST	CS

Control an output. This is only temporary, and will only persist until something else triggers it to change state again (such as receiving new data from the BCM). This will not change any configuration options.
ID is the output ID, and ST is the state (0 = OFF, 1 = ON)

ID	Output
01	VATS
02	AC Request
03	Coolant Pullup (0 = Default 330R, 1 = Custom)
04	PRND P Pullup (0 = Off, 1 = On)
05	Power LED (0 = Off, 1 = On)

0x10 SAVE SETTINGS

Send:

E9	56	10	FC

Save all current configuration settings and tables to EEPROM. This must be done after anything is changed (a configuration flag, or any table values) or they will not persist after the next ignition cycle.

0x11 LOAD SETTINGS

Send:

E9	56	11	FC

Load all current configuration settings from EEPROM. This is automatically done at ignition on. If the EEPROM values are found to be invalid, default values are loaded in and the EEPROM re-written.

0x12 DEFAULT SETTINGS

Send:

E9	56	12	FC

Return all configuration flags and table values to the factory default values. This will override any configuration changes currently loaded. The restored settings will not be saved to EEPROM until a mode 0x10 "Save Settings" is sent.

0x13 READ EEPROM

Send:

E9	58	13	AH	AL	CS

Receive:

E9	68	13	AH	AL	D1	D2	…	D16	CS

Read and return 16 bytes from EEPROM memory. AH / AL are the address bytes (high and low). D1 to D16 are the returned data bytes. Valid address range is 0 to 0x3EF.

0x14 WRITE EEPROM

Send:

E9	68	14	AH	AL	D1	D2	…	D16	CS

Write 16 bytes to EEPROM memory. AH / AL are the address bytes (high and low). D1 to D16 are the data bytes. Valid address range is 0 to 0x3EF.
No verification or correction is done of the contents. The EEPROM contains a header, as well as CRC values. If at the next ignition cycle the header is missing, the entire EEPROM will be rewritten with default values. If one of the CRC values is invalid, that section will be rewritten with default values.

0x20 WRITE CONFIGURATION FLAG

Send:

E9	58	20	ID	ST	CS

Write a single configuration option flag.
ID is the configuration item, and ST is the state (0 = disabled, 1 = enabled)

ID	Configuration Item	Default Value
01	Vehicle Type (0 = VT/VX, 1 = VY/VZ)	VT/VX
02	Transmission (0 = Manual, 1 = Auto)	Manual
03	Trans Auto Detect at Ignition On (0 = Off, 1 = On)	On
04	Trans Auto Detect Always (0 = Off, 1 = On)	Off
05	ABS Auto Response (0 = Off, 1 = On)	On
06	SRS Auto Response (0 = Off, 1 = On)	Off
07	Coolant Table (0 = Default, 1 = Custom)	Default
08	Coolant Pullup (0 = 330R Default, 1 = Custom)	330R Default
09	PRND Gear Position Type (0 = Analog, 1 = Digital)	Digital
10	Digital PRND Table (0 = Default, 1 = Custom)	Default
11	BCM Chatter Simulation (0 = Off, 1 = On)	Off
12	Coolant Pullup Disable (0 = Off, 1 = On)	Off

0x21 CLEAR ALL CONFIGURATION FLAGS

Send:

E9	56	21	EB

Clear all configuration flags that can be set with mode 0x20 to their factory default state.

0x22 WRITE COOLANT TABLE

Send:

E9	70	22	D1	D2	..	D26	CS

26 Data bytes. Table ranges 0-5v, 0.2v per cell.
Each cell contains a temperature value from 0 to 215 degrees C.
EG. D6: (0.2v * 6^{th} cell) = Temperature value at 1.2v position.

0x23 WRITE GEAR POSITION TABLE

Send:

E9	72	23	D1	D2	..	D28	CS

Gear Position Table
28 Data bytes. 7 x 2 Table, 16-bit/2-byte values at each location.
See data frame for further details (Mode 0x01, frame 06)

0x24 WRITE FUEL LEVEL TABLE

Send:

E9	63	24	D1	D2	..	D13	CS

13 Data bytes. Table ranges 0-240 ohms, 20 ohms per cell.
Each cell contains a fuel level value from 0 to 255 (0 to 100%).
EG. D6: (20ohm * 6^{th} cell) = Fuel level value at 120-ohm position.

0x30	SET COOLANT TABLE LOOKUP VALUE

Send:

E9	58	30	VT	TP	CS

Write a single coolant table voltage point with the corresponding temperature value.
VT is the voltage point (0 to 25, 0.2v per point. EG. point 6 is the 1.2v location).
TP is the temperature value (valid range 0 to 215 degrees C)

0x31	SET GEAR POSITION TABLE LOOKUP VALUE

Send:

E9	5B	31	GEAR	MIN-H	MIN-L	MAX-H	MAX-L	CS

Write minimum and maximum voltages values for a single gear position.

GEAR indicates which gear to configure:

07	Park
06	Reverse
05	Neutral
04	D4
03	D3
02	D2
01	D1

MIN-H / MIN- L are the minimum voltage high and low bytes.
MAX-H / MAX-L are the maximum voltage high and low bytes.
Voltage range is 0 – 5000 millivolts.
Setting both min and max to 0 will disable that gear indication completely.

0x32	SET FUEL LEVEL TABLE LOOKUP VALUE

Send:

E9	58	32	OH	FL	CS

Write a single fuel level table ohm point with the corresponding fuel level value.
OH is the ohm point (0 to 240, 20 ohm per point. EG. point 6 is the 120-ohm location).
FL is the fuel level value (valid range 0 to 255, corresponding to 0 to 100%)

0xF0	GET AVAILABLE RAM

Send:

E9	56	F0	CS

Receive:

E9	58	F0	RH	RL	CS

Return available module RAM (RH / RL – 16-bit value). For debugging purposes.