Syvecs LTD

V1.1

Generic
AWD Controller

This document is intended for use by a technical audience and describes a number of procedures that are potentially hazardous. Installations should be carried out by competent persons only.

Syvecs and the author accept no liability for any damage caused by the incorrect installation or configuration of the equipment.

Please Note that due to frequent firmware changes certain windows might not be the same as the manual illustrates. If so please contact the Syvecs Tech Team for Assistance.

Support@Syvecs.com

Contents

Introduction

The Syvecs Generic AWD Controller is a compact and powerful unit for controlling 4WD/AWD systems in OEM and motorsport applications.

Designed to integrate into any vehicle via the use of a configurable CANbus communications system. Users are able to receive real-time data from the OEM/Aftermartket systems and uses this data for operational and monitoring strategies, resulting in a precise and accurate control of AWD/4WD control systems.

Additional sensors can also be connected to the controller to provide further functionality and safety such as Awd Temperature, Awd Pressure, Axle Speeds and more.

Advanced users can also setup custom can transmit option with the powerful CANbus section to allow bits or bytes to be sent on the CANbus to keep OEM systems happy or trigger warning Lights, Torque Limits and more.

The AWD controller is fitted with four Half Bridges drivers which are capable of being driven Low or High and able to handle a maximum of 15amps peak/8amp continuously per output. Pin Sharing is present on H-Bridge1/2 and 3/4 to allow up to 16 amps continuous current with paired outputs.

Each of the four H-Bridge Outputs include current monitoring and can be used as part of the protection strategy to ensure solenoids are connected and operating correctly. For example if the Awd Solenoid is driven and no current flow is detected it will immediately invoke a Limp flag or CAN message to a dash. Short circuits are also monitored, and if detected will trigger a over- current situation which will set a limp flag as well and shutdown the output for safety.

The four 0-5v analogue inputs fitted on the controller have an optional 3k 5v pull up present and can be used for an external 2WD switch, Adjustment Pot, Awd Temperature and Awd Pressure.

Four Magneto Resistive inputs are also fitted on the controller that can be used for picking up speed signals from magnetoresistive 2 wire hall speed sensors. The speeds can then be transmitted out on the CANbus also for other useful tasks.

A 6-Axis IMU sensor is also fitted on the board to allow acceleration data to be viewed in real time or linked into strategies.

Specifications

Outputs

4 X Half Bridge Outputs
15Amp Peak (100ms) 8Amp Continuous Current Monitoring on each pin
30Amp Peak (100ms) 16Amp Continuous Current if PIN Sharing

Inputs

4 x Analogue or switch inputs (0-5V)
4 x MagnetoResistive Circuits

Interfaces

USB For Updates and Config
1 x CAN 2.0B interface for communication with other controllers or logging systems 1 x Kline Interface
6 Axis IMU Chip

Power Supply

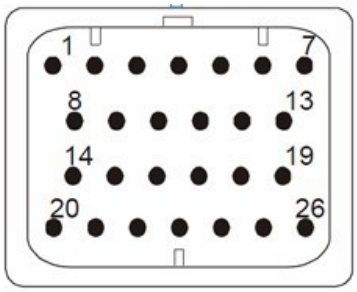
6 to 26V input voltage range
Ignition Switch Logic with high current supply

Physical

IP67 Sealed in Automotive Spec -40c to 125c
34 way Superseal 1.0
88mm x 89mm x 40mm

Mounting

Pinout



Mating connector part number: TE 3-1437290-7

Description	Pin Number	Function	Notes
PWRGND	A1	Ground	
PWRGND	A2	Ground	
H-Bridge1	A3	Output	
H-Bridge2	A4	Output	
H-Bridge3	A5	Output	
H-Bridge4	A6	Output	
12V HC	A7	12v Supply-High Current	
Kline/LinBus	A8	Kline/LinBus	
Hall 1	A9	Hall 1	MagnetoResistive1
Hall 2	A10	Hall 2	MagnetoResistive2
Hall 3	A11	Hall 3	MagnetoResistive3
Hall 4	A12	Hall 4	MagnetoResistive4
12V HC	A13	12v Supply - High Current	
NC	A14		
NC	A15		
12v IGSW	A16	12v-Ignition Switch	Wakes up Unit
Can1 H	A17	Car CANbus	
Can1 L	A18	Car CANbus	
12V HC	A19	12v Supply - High Current	
5v Out	A20	5v Output Supply	
AN1	A21	AN1	Optional Internal 3k pull up
AN2	A22	AN2	Optional Internal 3k pull up
AN3	A23	AN3	Optional Internal 3k pull up
AN4	A24	AN4	Optional Internal 3k pull up
PWRGND	A25	Ground	
PWRGND	A26	Ground	

General Connections

Connecting Power/Ground

The AWD Controller has four power connection points, three of these are high current and can be connected to a fused battery power or high current switched power source, the fourth is Ignition input and used wake up the AWD unit.

The three high current pins are linked internally, as are the power ground pins. If driving motors or solenoids which pull a lot of current then ensure the correct amount of pins are connected. Each pin on the AWD Controller is able to sink around 14 amps of current continuously, so if driving a selection of solenoids that pulls 20 amps+, ensure at least two high current 12v pins and two power ground pins are used.

Example Schematic

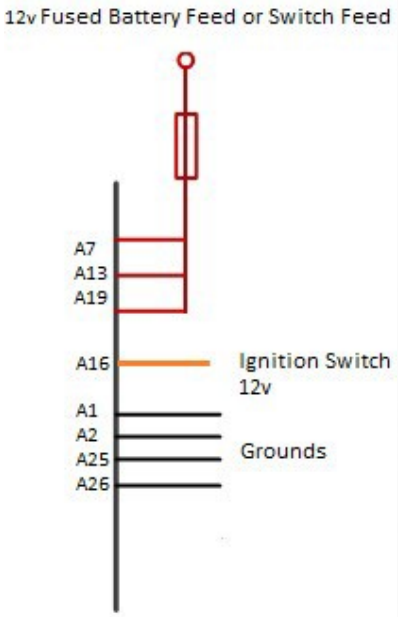


Figure 0-1 – Power and Ground Feeds

Pin Schedule

Pin Number	Function	Notes
A7	VBAT	Use a fused Switched feed.
A13	VBAT	Use a fused Switched feed.
A19	VBAT	Use a fused Switched feed.
A16	IGBAT	Ignition Switched 12v
A1	Power Ground	Ground for Power and Sensor Signal
A2	Power Ground	Ground for Power and Sensor Signal
A25	Power Ground	Ground for Power and Sensor Signal
A26	Power Ground	Ground for Power and Sensor Signal

Outputs

Half Bridge Outputs

A Half bridge driver is an electronic output that can be either switched High (Vbat) or Low (Ground). The AWD H-Bridge Outputs also have full pulse width modulation available as well as pin sharing to increase current capabilities.

Output Drive Options:

Half Bridge – The output will pull to PWRGND when off and push to VBAT when on
High Side – The output will push to VBAT when on
Low Side – The output will pull to PWRGND when on

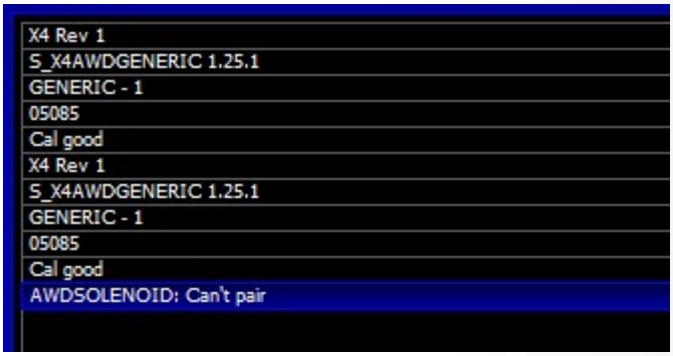
Half Bridge Pair – The paired outputs will pull to PWRGND when off and pull to VBAT when on
High Side Pair – The paired outputs will push to VBAT when on
Low Side Pair – The paired outputs will pull to PWRGND when on

These outputs can be used to drive up to 15A Peak / 8A Continuous each. H Bridge 1/2 and H Bridge 3/4 can be paired up on the AWD Controller for up to 25A Peak /16A Continuous. If you are driving the outputs for high current devices it's extremely important to ensure the 12v and Ground wire gauge is capable to handle the current demand.

Pin Schedule

Pin Number	Function	Notes
A3	H-Bridge1	Can be paired to HBridge2
A4	H-Bridge2	Can be paired to HBridge1
A5	H-Bridge3	Can be paired to HBridge4
A6	H-Bridge4	Can be paired to HBridge3

To use paired modes you must ensure in the i/o configuration pin assignments that the paired outputs are not assigned to another function as otherwise the unit will not come online and the following error will appear in mgs in the bottom right hand corner of Scal.



Inputs

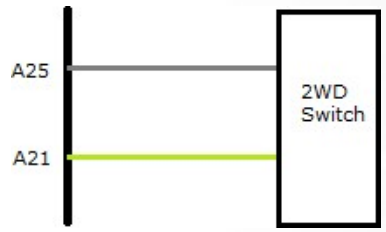
Voltage Inputs - AN Inputs

Four Analogue Inputs are available on the AWD Controller. These are just 0-5v analogue inputs and cannot support frequency waveforms. They are designed for sensors like pressure transducers or position sensors.

All of the inputs have an optional 3k Pull up which allows them to be used for thermistor sensors also.

Example wiring:

AN01 Input - 2WD Switch

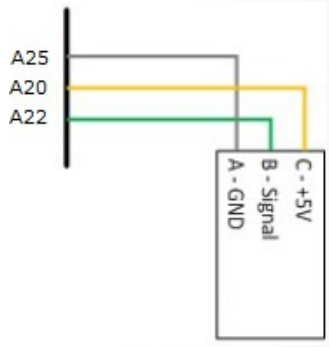


Adjustment Pot wiring

Pin Schedule

Pin Number	Function	Notes
A25	Ground	May be shared with multiple sensors
A21	An1 Input	

AN02 - Adjustment Pot



Adjustment Pot wiring

Pin Schedule

Pin Number	Function	Notes
A25	Ground	May be shared with multiple sensors
A20	5VOUT	Regulated sensor power supply
A22	An2 Input	

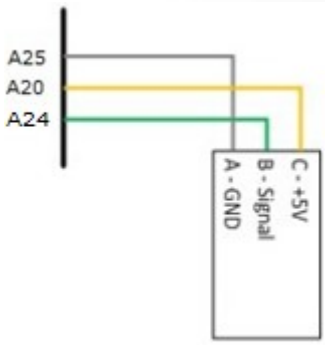
AN03 Input – AWD Pressure

Awd Pressure wiring

Pin Schedule

Pin Number	Function	Notes
A25	Ground	May be shared with multiple sensors
A23	An3 Input	

AN04 – AWD Temp

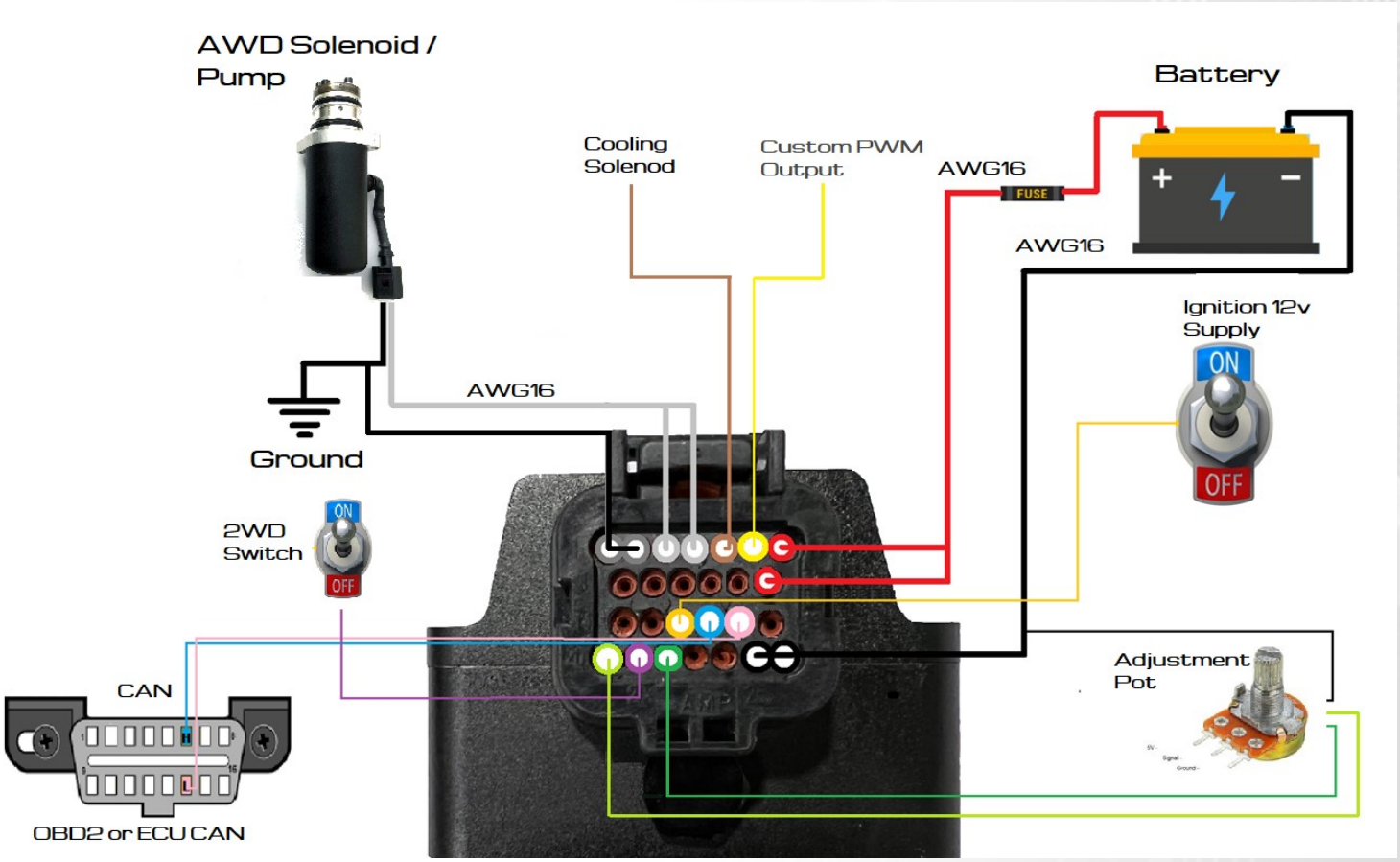


AWD Temp wiring

Pin Schedule

Pin Number	Function	Notes
A25	Ground	May be shared with multiple sensors
A20	5VOUT	Regulated sensor power supply
A24	An4 Input	

Example wiring



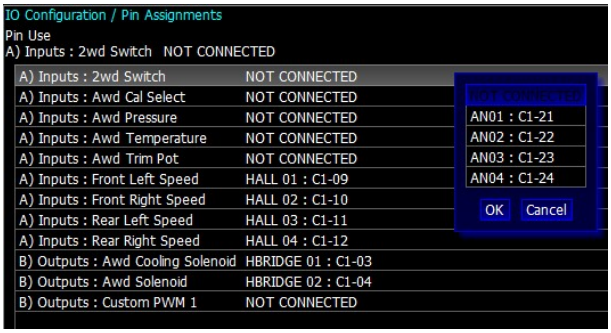
Pin1 – Ground
Pin2 – Ground
Pin3 – AWD Pump/Solenoid
Pin4 – AWD Pump/Solenoid
Pin5 – AWD Cooling Pump
Pin6 – Custom PWM
Pin7 – 12v High Current
Pin13 – 12V High Current
Pin16 – 12v Ignition Switch
Pin17 – CAN High
Pin18 – CAN Low
Pin20 – 5v Out
Pin21 – 2WD Switch
Pin22 – AWD Pot
Pin25 – Ground
Pin26 – Ground

Controls

2WD Drive Mode / BurnOut

1 .) First method is via activating one of the 2wd Mode select options and then sending in CAN data for these to be picked up via the Generic CAN Receive.

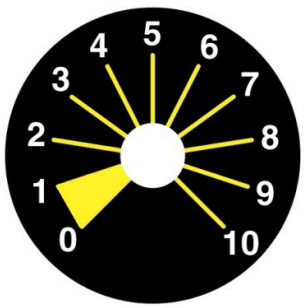
2.) Second Option is via wiring in a 2wd Switch to an AN Input on the Syvecs Awd controller. This has the option of a 3k pull up and polarity adjustment.



Live Adjustment Potentiometer

Users have the ability to adjust the AWD Duty live via a laptop or with a external potentiometer with the Syvecs AWD Unit. A 20K Rotary Potentiometer can be wired to any AN input of the Syvecs Controller and it will apply a multiplier to the Duty. Wiring for the Pot is here --- >

-1 = No Adjustment (Logic Off)
-2 = 0.6 Multiplier (Less Duty)
-3 = 0.7 Multiplier
-4 = 0.8 Multiplier
-5 = 0.9 Multiplier
-6 = 1.0 Multiplier (No Adjustment)
-7 = 1.1 Multiplier
-8 = 1.2 Multiplier
-9 = 1.3 Multiplier
9-10 = 1.4 Multiplier (More Duty)



Calibration of the AWD ECU

Users have the ability to adjust all the controls of the Syvecs AWD Unit via our Scal program that's part of SSuite. This can be downloaded from https://www.syvecs.com/software/

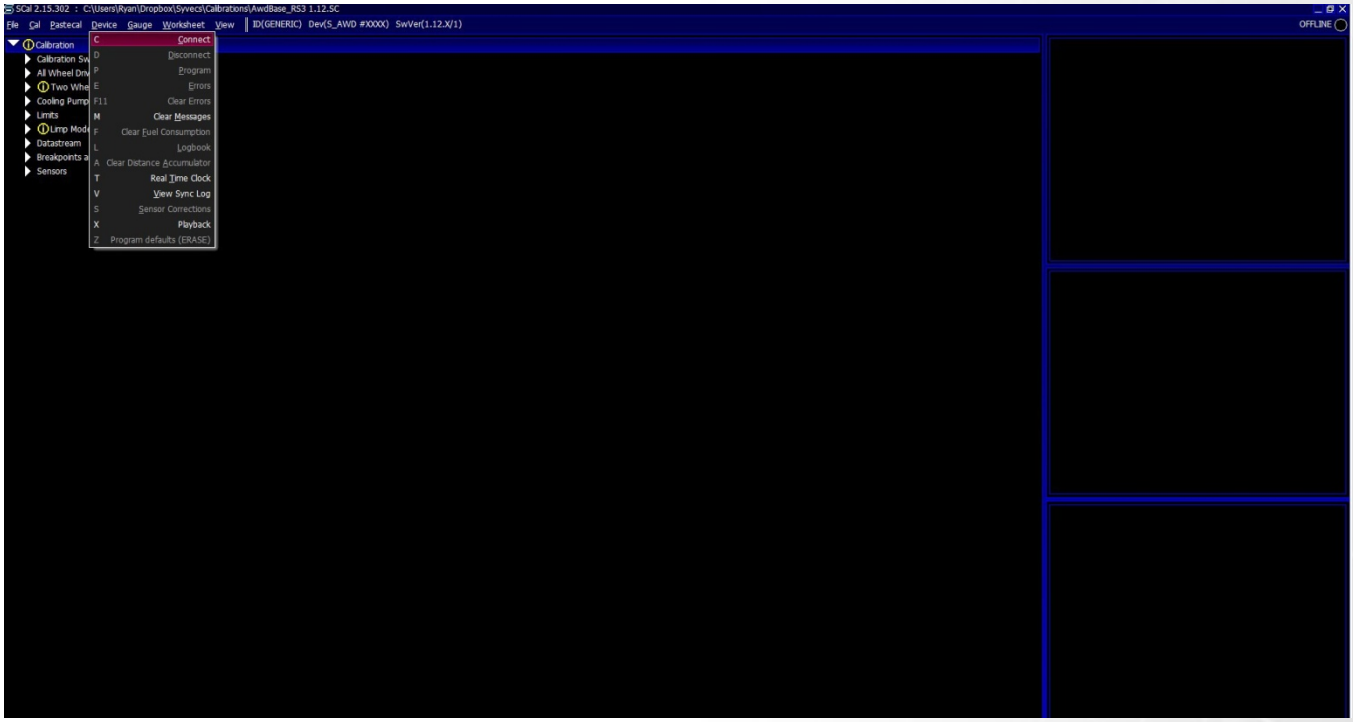
The USB port for communication is found under the main connector which is protected with a Allen key plug. Remove the plug and connect a Micro USB Cable to the AWD Unit and the other side to a Windows Laptop or PC.

Open the Scal software and select **Device - Connect** Tab at the top. This will connect to the device and grab the calibration from it. If the unit has just been updated then no Cal will be present and Users need to program defaults or load a base map.

IMPORTANT:
The AWD Ecu can be connected to and programmed outside of the car as it will power up of the USB cable alone. PLEASE NOTE: If you are connecting the Usb to an Awd Ecu before the Unit is powered up from the car power systems it will enter a bootloader state until a **Device** – **Connect** is preformed. If wanting to connect to the unit in the car then connect the USB after the Ignition is **ON** or perform a **Device** –**Connect** first to bring the unit into main code.

Green Maps can be changed live, Blue maps require a **Device** – **Program** for the calibration change to be flashed into the device.

When all calibration work is done, users must do a **Device** – **Program** so the green maps which have been changed get flashed and stored in memory.



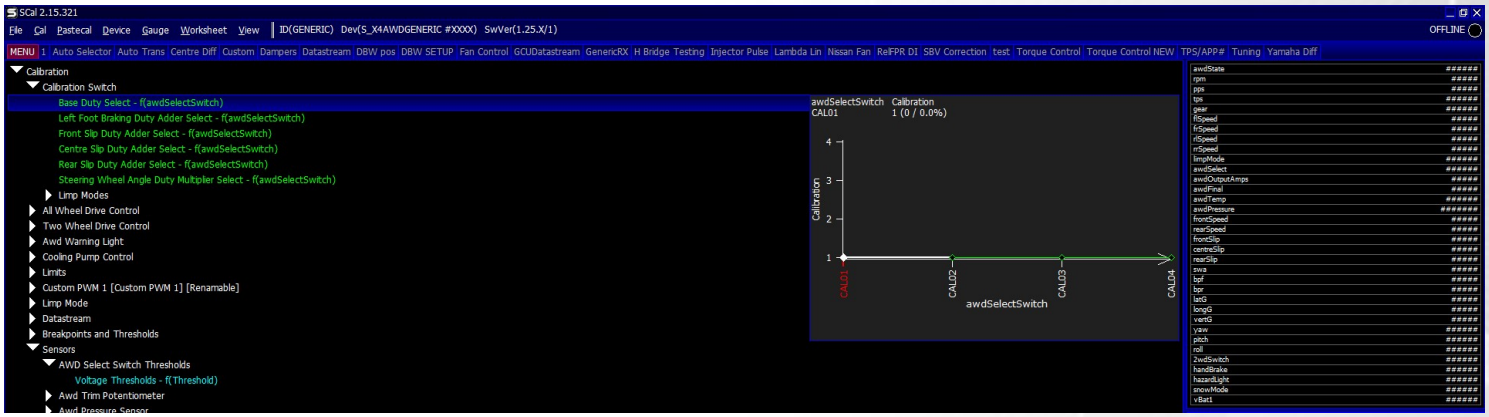
Main Code Updates

Please watch the help video here - https://youtu.be/RuXkm_9gBRU

Calibration Switching

The Syvecs AWD Unit allows for users to be able to adjust many aspects of the control strategies inside the AWD Ecu via either an external calibration switch or via CAN message controls through Generic Can Receive.

Users are able to see the active awdSelect position by viewing it via the right item list. Double clicking on the item will bring up a larger gauge.



When an external switch is wired to the Unit and assigned in I/O Configuration – Pin Assignments, users can setup the voltage threshold levels to trigger AwdSelect 1-4

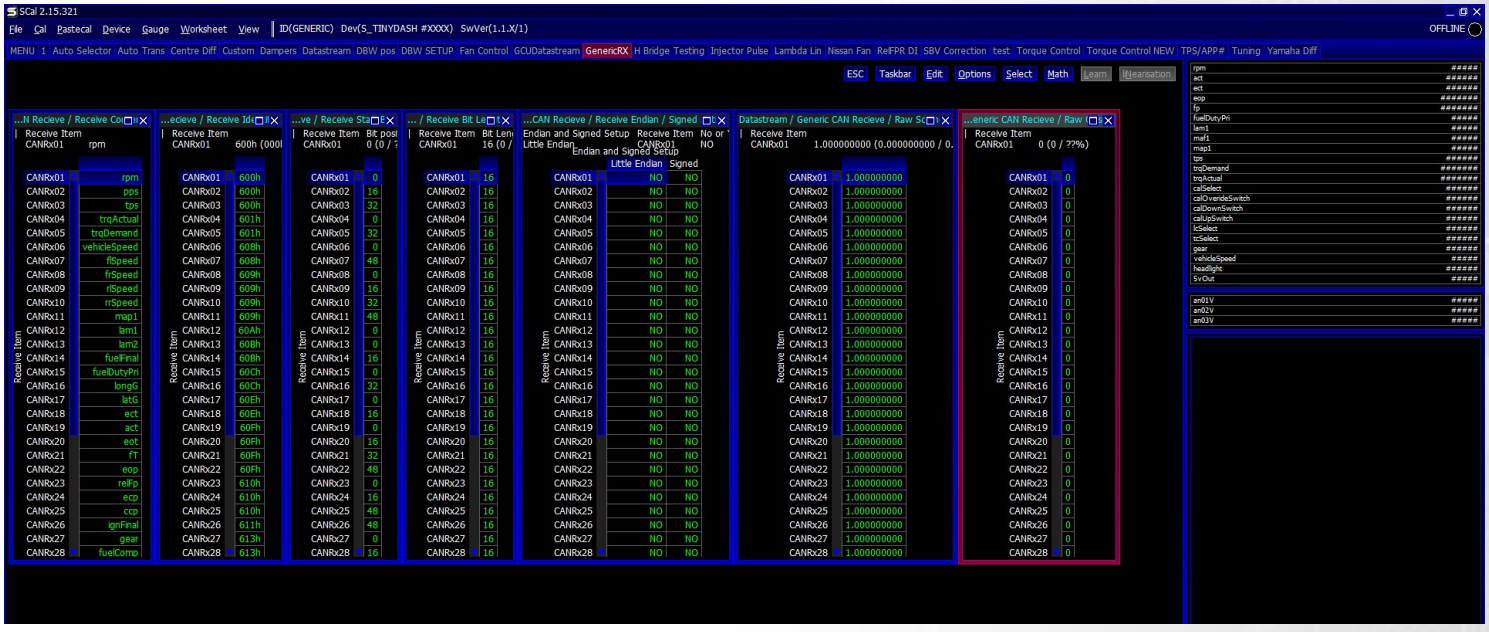
Generic CAN Receive

The generic CAN receive section allows for calibrators to setup the items needed for the Generic AWD controller to function. In order for the AWD controller to come online it needs to see an RPM, so this is the first item we suggest to get working.

Syvecs also suggests to have the following items received from CAN:

-Speeds
-Throttle Angle
-Steering Angle

The easier way to setup the Generic CAN is to create a worksheet and add in all the maps like below to make each CANRX* value line up.



Above you can see the RPM is setup to be received from CAN ID 0x600, data is not Little Endian, value is signed, scaling is 1.00 and is being picked up from start bit 0 with a length of 16 bits.

Please note: Any Item which is assigned in Pin Assignments will take its data from the Pin assignment and ignore the Generic CAN Rx data.

Help video is found here - https://youtu.be/ZC4VswRzgcA