Overview

I am trying to use my AIM Solo DL as a digital Dash in my 84 ½ Formula Ford.

I am using a MicroSquirt as the sensor interface converting all the sensor inputs and reading the values from CAN. No output features other than CAN bus data are being used. Where the sensors match the intended function of the Microsquirt, Great Success. Where the sensors do not match, well, this is where the challenge lies.

AIM Solo DL will not display the actual oil pressure on the display, just ADC Counts. This might not sound so bad, other than the ADC counts are inversely proportional to the actual pressure. Low counts = high pressure, High counts=low pressure. This makes it confusing to see high numbers when the engine is off and lower numbers when it is running. BTH, the sensor is connected to ADC6. I had similar plans to add a Hall effect sensor to VR2, but let's tackle this one first.

I have upgraded to registered version of TunerStudio. This allows me to create custom variables and custom gauges. This works great on the PC, unfortunately, it didn't work on my Solo DL because:

1. The new variables seem to remain local to the PC

2. Even with the new variables, they are not part of the memory stack being queried by Solo DL.

I have tried to create an expression similar to ADC6={0.0 + (100.0 - 0.0) * ((adc6 - 813.0)/(175.0 - 813.0)) But unfortunately this did not seem to work. I believe that because ADC6 is not part of the *.MSQ file, it does not become part of the tune burned to the MS.

Is there a way that I can mathematically change one of the variables already in the MSQ file so that it reads 0-100. In perhaps clearer terms, a function similar to what is done with TPS. The calibration of this sensor worked great!

Oil Pressure Reading On AIM Solo DL

Background

I am trying to use my AIM Solo DL as a digital Dash in my 84 ½ Reynard FF1600. I had my AIM Solo DL as a data acquisition device for several years and do not see the need to update or change to Solo DL 2 or MyChron5 or MXL or other digital dash. The car is used for Autocross only and does not need the sophistication of these advanced units.

Sensor:
Autometer

2252

ADC6

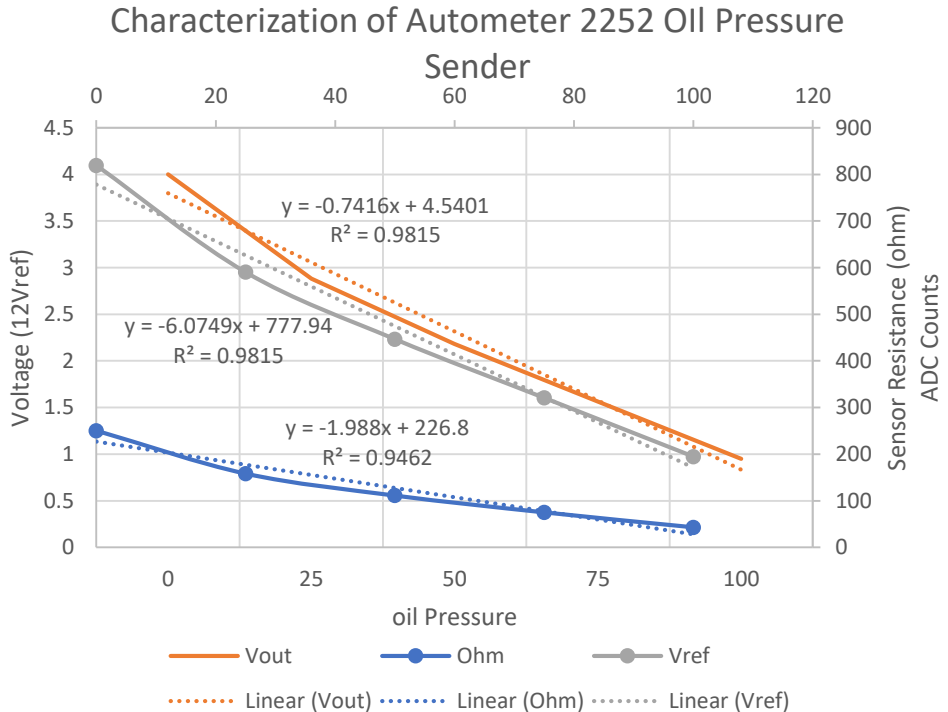Microsquirt: Running MS2 Extra 3.4.2 Release 20160421

CAN Bus

Aim Solo DL: Firmware 46.03.24

For the most part, this system works well. Collection of throttle position, RPM, Coolant Temp and the addition of warning lights, makes this a very elegant setup for my purposes.

Problem Statement:

AIM Solo DL will not display the actual oil pressure on the display, just ADC Counts. The ADC counts are inversely proportional to the actual pressure. Low counts = high pressure, High counts=low pressure.

Characterization of Autometer 2252 OIl Pressure Sender

$y = -0.7416x + 4.5401$
$R^2 = 0.9815$

$y = -6.0749x + 777.94$
$R^2 = 0.9815$

$y = -1.988x + 226.8$
$R^2 = 0.9462$

Voltage (12Vref)

oil Pressure

Sensor Resistance (ohm)

ADC Counts

Vout ●—— Ohm ●—— Vref

·········· Linear (Vout) ·········· Linear (Ohm) ·········· Linear (Vref)

I would like the numeric value on the display match the actual Oil Pressure

3 ways to correct the issue

Sensor:

Autometer 2252

ADC6

CAN Bus

Aim Solo DL:
Firmware 46.03.24

Fix it in Hardware

(Under investigation)
The configuration of the hardware is such that it produces decreasing electrical resistance (ohms) with increasing pressure. The unit cannot be wired differently and an op-amp or electrically isolated sensor would be needed.

Fix it in the MS

(Current Disussion)
This is the focus of the rest of this paper.

Fix it in the Data Logger

(Eliminated as a possibility)
I have discussed with the technical team at AIM Sports. They are unable to provide support due to the limited impact it would have on their product.

Fix it in MegaSquirt

Some Background

- The AIM Solo DL is a Datalogger, Collecting data from parameters on CAN bus or RS232, it contains a 3-axis accelerometer, and measures velocity with GPS. It uses a sophisticated data analysis software package (Race Studio) for data analysis and management.

- It is configured to accept data from CAN bus from 100s of different ECUs from different OEMs alternate ECUs including MegaSquirt.

- It is configured to request data from the ECU (pull) as opposed to the ECU broadcasting(push). It reads ~50 different variables from MSII without CAN being enabled in Tuner Studio.

- This is part of the problem. Since Solo DL is only configured for the 50 channels,Oil Pressure not being one of them, I believe my only recourse is to perform a math transformation of the signal. This would be very similar to what is done with EGT6 as it is converted from ADC counts to temperature.

Trials done to date

- I have upgraded to registered version of TunerStudio. This allows me to create custom variables and custom gauges. This works great, unfortunately, it didn't work because:
    - The new variables seem to remain local to the PC
    - Even with the new variables, they are not part of the memory stack being queried by Solo DL.
- I have tried to create an expression similar to ADC6={0.0 + (100.0 - 0.0) * ((adc6 - 813.0)/(175.0 - 813.0)) But unfortunately this did not seem to work. I believe that because ADC6 is not part of the *.MSQ file, it does not become part of the tune burned to the MS.

Fix it in Hardware

Under Development

Fix it in the Data Logger

AIM RaceStudio V 2.56.44 Settings for AIM Solo DL

Specific AIM Solo DL Channel Configuration for ADC6

Comments:
- These can be edited and imported back into the Solo DL
- Uncertain of what the functionality each line provides.

```
[CONF_CANALELOGGER 47]
ID_CANALELOGGER=3022
ID_LOGGER=54
NUM_CANALE=553
NOME_CANALE=MS2_ADC6
UNI_MIS=_&08000
ENABLED=1
ACQUISITO=1
TIPO_FREQ=2
CODICE_SENS=155
ST_SENS=2
CAT_SENS=8
PARAM_1=0.0000000000000000000E+000
PARAM_2=0.0000000000000000000E+000
PARAM_3=0.0000000000000000000E+000
PARAM_4=0.0000000000000000000E+000
PARAM_5=0.0000000000000000000E+000
INIZ_SCALA=0.0000000000000000000E+000
FINE_SCALA=1.0230000000000000000E+003
PASS_FILTRO=0
CAN_VALIDO=1
NOME_SENSORE_CUST=
CODE_GAIN_SENS=0
ORDINAMENTO_CANALE=1042
CODE_CATEGORIA_LOGGER_CANALE=2
ID_ECU_OR_SLAVE=14338
SHORT_NAME_CANALE=ADC6
CAN_CONFIGURABILE=1
```

Changes the Channel Name in the System Manager ← NOME_CANALE=MS2_ADC6

Changes the Sensor Type and Measure units System Manager ← CODICE_SENS=155

Changes the resolution of the units(but perhaps more) ← CAT_SENS=8

120- RPM
121 Vehicle Speed
123 Temp
127 Angle 0.1 resolution
150 Percentage %
155 Raw Value
212 Pressure
222 Raw Value
341 Voltage

Changes the signal name on the Solo DL display ← SHORT_NAME_CANALE=ADC6

Specific AIM Solo DL Channel Configuration for ADC6

```
[CONF_CANALELOGGER 47]
ID_CANALELOGGER=3022
ID_LOGGER=54
NUM_CANALE=553
NOME_CANALE=MS2_ADC6
UNI_MIS=_&08000
ENABLED=1
ACQUISITO=1
TIPO_FREQ=2
CODICE_SENS=155
ST_SENS=2
CAT_SENS=8
PARAM_1=0.0000000000000000000E+000
PARAM_2=0.0000000000000000000E+000
PARAM_3=0.0000000000000000000E+000
PARAM_4=0.0000000000000000000E+000
PARAM_5=0.0000000000000000000E+000
INIZ_SCALA=0.0000000000000000000E+000
FINE_SCALA=1.0230000000000000000E+003
PASS_FILTRO=0
CAN_VALIDO=1
NOME_SENSORE_CUST=
CODE_GAIN_SENS=0
ORDINAMENTO_CANALE=1042
CODE_CATEGORIA_LOGGER_CANALE=2
ID_ECU_OR_SLAVE=14338
SHORT_NAME_CANALE=ADC6
CAN_CONFIGURABILE=1
```

Help Needed

- I would like to know if I can use these parameters to invert and scale the values being collected so the display on the Solo DL shows Oil Pressure properly on the display?

These look similar to the curve fit parameters used in custom sensor calibrations.

Range and scale of the numbers being transmitted. Here it is 0-1023

Specific AIM Solo DL Channel Configuration Custom Sensor

[SENSORI_PERSONALIZZATI 1]
ID_CUSTOM_SENSOR=1
NOME_CUST_SENS=OIl PressureADC
UNI_MIS_CUST_SENS=_&03040043
NUM_PUNTI_CUST_SENS=5
PARAM_0_CUST_SENS=1.34036483764648440000E+002
PARAM_1_CUST_SENS=-1.49251461029052730000E-001
PARAM_2_CUST_SENS=-1.70726532815024260000E-004
PARAM_3_CUST_SENS=1.86989893791178470000E-007
PARAM_4_CUST_SENS=0.00000000000000000000E+000
TIPO_CURVA_CUST_SENS=0
INIZIO_SCALA_CUST_SENS=0.00000000000000000000E+000
FONDO_SCALA_CUST_SENS=5.00000000000000000000E+003
CODE_FREQ_MIN_CUST_SENS=0
CODE_FREQ_MAX_CUST_SENS=8
NUM_DECIMALI_CUST_SENS=3
CODE_GAIN_CUST_SENS=0
PREDEF_CUST_SENS=0
CODE_CATEGORIA_SENS=6
CODE_ALIMENTAZIONE=0

I have tried to cut and paste this into the channel configuration for ADC6. I did have some minor success as it trimmed the output from 3 digits to 2 digits (833 ADC counts now display as 83).

Discussion with MegaSquirt

- My other approach is to discuss with the team from MegaSquirt (MS)to see if I can modifiy the software and perform the transformation in the Megasquirt prior to transmitting to the Solo DL.
- They have code which calibrates throttle position and provides information as a percentage.
- I have been able to create a variable in MS called Oil_Pressure, but it is not being transmitted to the Solo DL.
  - I think that this is due to the fact that the Solo DL is requesting the data from the MS and Solo DL knows the memory address from which to pull the data. (Solo DL pulls the data as opposed to MS pushing the data to Solo DL.)
- Another challenge with MegaSquirt is that the transformed value is not being added to the memory on the module, it is only being used to provide a gauge and datalog for the interface software (Tuner Studio MS).

Contact Info

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