Conversion equation polynomials for voltage and resistance sensors

Polynomial equation: ax^2 + bx + c

Field Name	Equation	Units	Coefficients		
			a	b	c
fringe_analog_x	Polynomial	Volts	0	7.63E-05	-2.50E+00
tach_analog_x	Polynomial	Volts	0	7.63E-05	-2.50E+00
cal_res_1_analog_x	Polynomial	Ohm	0	7.63E-02	-2.50E+03
cal_res_2_analog_x	Polynomial	Ohm	0	7.63E-02	-2.50E+03
agnd_status_analog_x	Polynomial	Volts	0	7.63E-05	-2.50E+00
pos15v_status_analog_x	Polynomial	Volts	0	5.71E-04	-1.87E+01
pos12v_status_analog_x	Polynomial	Volts	0	4.57E-04	-1.50E+01
pos10v_status_analog_x	Polynomial	Volts	0	3.83E-04	-1.26E+01
pos5v_status_analog_x	Polynomial	Volts	0	2.00E-04	-6.55E+00
pos3_3v_status_analog_x	Polynomial	Volts	0	1.14E-04	-3.75E+00
pos2_5v_status_analog_x	Polynomial	Volts	0	1.53E-04	-5.00E+00
pos1_5v_status_analog_x	Polynomial	Volts	0	7.63E-05	-2.50E+00
neg15v_status_analog_x	Polynomial	Volts	0	5.71E-04	-1.87E+01
neg12v_status_analog_x	Polynomial	Volts	0	4.57E-04	-1.50E+01
neg5v_status_analog_x	Polynomial	Volts	0	2.00E-04	-6.55E+00

Calibrated Thermistor Parameters use in the Steinhart-Hart equation to convert thermistor resistance into temperature.

The following describes how telemetry counts can be converted to thermistor resistance and thereon to temperature. For readability the formula is broken down into a series of equations.
The first equation converts telemetry counts into a voltage. This is the voltage seen at the input of the ADC.

V = [(5 x Counts / 65536) – 2.5]

The same equation is used to convert ADC counts for “cal_res_1_analog_x (V16)” (which is a 0.01% 2.32 kΩ calibration resistor) into volts.

V16 = [(5 x Temp 16 Counts / 65536) – 2.5]

The next equation uses V16 to determine the current source value with the precise value of Calibration Resistor

Ics = V16 / 2320

This should be close to 0.001 amps. In case the current source calibration is not used, a nominal value of 0.0010041 amps should be used for Ics.
The next equation converts the voltage into the parallel resistance of the thermistor resistance and a 2490 Ω resistor in parallel to the thermistor.

R parallel = V / Ics

The next equation converts the parallel resistance to the thermistor resistance in kΩ called Rt.

Rt = 2490 x R parallel / (2490 – R parallel)

Temp C = (1/(A+B*ln(Rt)+C*ln(Rt)^3))-273.15

Where, “ln(x)” is the Natural Log of “x”, and A,B,C are thermistor parameters determined from thermistor calibration data (below).

Sensor	Equation	Unit	A	B	C
ir_detector_temp_1_analog_x	Steinhart-Hart	Deg C	0.001404955	0.000237	1.02741E-07
ir_detector_temp_2_analog_x	Steinhart-Hart	Deg C	0.001405657	0.000237	1.03498E-07
black_body_temp_1_analog_x	Steinhart-Hart	Deg C	0.001404039	0.000237	1.02236E-07
black_body_temp_2_analog_x	Steinhart-Hart	Deg C	0.001406122	0.000237	1.03935E-07
primary_mirror_temp_1_analog_x	Steinhart-Hart	Deg C	0.001405434	0.000237	1.0397E-07
primary_mirror_temp_2_analog_x	Steinhart-Hart	Deg C	0.001406404	0.000237	1.04798E-07
secondary_mirror_tmp_1_anlog_x	Steinhart-Hart	Deg C	0.001406226	0.000237	1.05335E-07

secondary_mirror_tmp_2_anlog_x	Steinhart-Hart	Deg C	0.001406932	0.000236	1.05134E-07
cal_ref_temp_analog_x	Steinhart-Hart	Deg C	0.001405769	0.000237	1.04017E-07
cal_actuator_temp_analog_x	Steinhart-Hart	Deg C	0.001406353	0.000237	1.03949E-07
beam_splitter_temp_analog_x	Steinhart-Hart	Deg C	0.001406182	0.000237	1.03627E-07
laser_temp_analog_x	Steinhart-Hart	Deg C	0.001405324	0.000237	1.03356E-07
motor_temp_analog_x	Steinhart-Hart	Deg C	0.001405443	0.000237	1.0372E-07
cntrl_brd_temp_analog_x	Steinhart-Hart	Deg C	0.001405421	0.000237	1.03766E-07

ifgm DN to Volts converstion

(x * scale) + offset. Where x is a single 2-byte value. Scale and offset are specified in the GS:
"scale": 0.0000762939, "offset": -2.5,