

Technical Note

V-Link[®] and 3DM-GX1[®]



Using the 3DM-GX1[®] with the V-Link[®]

Overview

MicroStrain's [V-Link[®]](#) wireless voltage node has 3 single ended analog input channels designed to acquire and digitize any 0-3 VDC sensor at 12 bits and transmit the data wirelessly to a host computer. MicroStrain's [3DM-GX1[®]](#) orientation sensor is available with an analog output option which provides four channels of reconstructed analog output at 12 bit resolution. The 3DM-GX1[®] can be connected to the V-Link[®]'s single ended analog channels and its analog orientation data can be digitized and transmitted to a host computer. This technical note discusses how to do this integration and assumes the user has some familiarity with both devices.

Wiring

The 3DM-GX1[®] presents a 4 wire pigtail from its analog port. The wires are color-coded and output 3 data quantities and a mid-scale reference. The table below shows Gyro-stabilized Euler angles as an example:

Channel 1	Green	Gyro-stabilized Roll
Channel 2	White	Gyro-stabilized Pitch
Channel 3	Black	Gyro-stabilized Yaw
Channel 4	Red	Mid-scale reference (2.5 volts)

The V-Link[®] presents 3 single ended analog input channels on its two green Phoenix connectors. These inputs are designated **Ain5**, **Ain6** and **Ain7** and are used in conjunction with any of the 3 **GND** (ground) inputs.



Using the 3DM-GX1[®] with the V-Link[®]

To connect the 3DM-GX1[®] pigtail to the V-Link[®], make these connections:

- Connect the green (roll) lead of the 3DM-GX1[®] pigtail to Ain5 on the V-Link[®]
- Connect the white (pitch) lead to Ain6
- Connect the black (yaw) lead to Ain7
- Connect the silver ground shield of the 3DM-GX1[®] pigtail to one of the 3 GNDs on the V-Link[®]

Sensor Voltage

As stated, the V-Link[®] will accept any 0-3 VDC sensor. By default, the 3DM-GX1[®] is a 0-5 VDC sensor. However, it can be manipulated to output 0-3 VDC by writing certain values to its non-volatile memory (EEPROM). The table below shows both the default 0-5 VDC output settings and the special 0-3 VDC output settings. Using the utility software provided with the 3DM-GX1[®], initiate communication with the 3DM-GX1[®] and go to the EEPROM Map screen in the software. After READING the EEPROM, you will observe the default settings shown in the table. Change each of these settings to reflect the special settings and WRITE these new settings to EEPROM using the software.

EEPROM	Default value (0-5 VDC output)	Special value (0-3 VDC output)***
204	0	0
206	1024	614
208	2048	1228
210	4095	2457
212	1024	614
214	1024	614
216	340	204
218	4096	2457
220	2048	1228
222	2048	1228

*****Note:** The interaction of the EEPROM settings and the power regulator on the 3DM-GX1[®] is not perfect. In actuality the 0-3 volt output settings result in a 0-2.92 volts range and we use that range below to perform our further processing.

Reconstructing Engineering Units in Agile-Link software

The digitized analog output of the 3DM-GX1[®] arrives in Agile-Link software as 'bits'. These 'bits' can be reconstructed into the 3DM-GX1[®]'s analog output by using the following formula:

$$\text{Volts} = \text{Output Bits} \times (2.92 \text{ Volts} / 4096 \text{ Bits})$$

For example, if the output of Ain5 (channel 5 on the V-Link[®]) is 2048 bits, the analog output of the 3DM-GX1[®]'s roll channel is 1.42 volts.

For example, if the output of Ain7 (channel 7 of the V-Link[®]) is 1024 bits, the analog output of the 3DM-GX1[®]'s yaw channel is 0.73 volts.

To carry this further, we can now scale the volts into degrees by using the following formula:

Roll Degrees \
Pitch Degrees | = (Output Volts x 2) x (180 Degrees / 2.92 Volts) – 180 Degrees
Yaw Degrees /

The table below shows the relationship of 3DM-GX1[®] degrees and volts with Agile-Link bits:

Degrees	Volts	Bits
-180	0	0
-90	0.73	1024
0	1.46	2048
90	2.19	3072
180	2.92	4096

Note

A detailed discussion of the 3DM-GX1[®]'s analog output option can be found at: [Analog Output Option](#).



MicroStrain, Inc.
459 Hurricane Lane, Unit 102 ph: 800-449-3878
Williston, VT 05495 USA fax: 802-863-4093
www.microstrain.com support@microstrain.com