

3DM-GX1®

Orientation Sensor



Bluetooth and 3DM-GX1®

General

Bluetooth wireless technology is a short-range communications technology intended to replace the cables connecting portable and/or fixed devices while maintaining high levels of security. The key features of Bluetooth technology are robustness, low power, and low cost. The Bluetooth specification defines a uniform structure for a wide range of devices to connect and communicate with each other. Please reference the Bluetooth Special Interest Group web site at: <http://www.bluetooth.com/Bluetooth/SIG/>

MicroStrain's 3DM-GX1®, although it has no inherent Bluetooth functionality, has been shown to work in the Bluetooth environment, thereby allowing wireless orientation sensors to be deployed.

- This technical note assumes that:
 - the user has a working knowledge of the 3DM-GX1®;
 - the user is using MicroStrain's 3DM-GX1® Data Acquisition and Display software;
 - the user has a working knowledge of the 3DM-GX1® Data Communications Protocol;
 - the user has the same or similar Bluetooth hardware as will be described.

Method

A Google™ search turns up many, many Bluetooth adapters which provide transparent RS232 serial cable replacement. Grid Connect, IOGEAR, B&B Electronics and many others have these devices. We selected at random the Sena ParaniSD-100 Bluetooth serial adapter and acquired 2 units.

http://www.sena.com/products/industrial_bluetooth/bluetooth_serial_adapter/



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The Bluetooth serial adapters came with a configuration software which was used to initialize, 'pair' and establish communications between the adapters. The 'master' Bluetooth serial adapter was connected to our host PC via short serial cable and powered up by its included external power supply. The 'slave' Bluetooth serial adapter was connected to the 3DM-GX1[®] RS-232 communication cable with a 9-pin **null modem** adapter between the Bluetooth serial adapter and the 3DM-GX1[®] RS-232 communication cable. Power was applied to the Bluetooth serial adapter by its included external power supply and power was applied to the 3DM-GX1[®] communication cable.

The Baud Rate of both Bluetooth serial adapters was initially set at 38,400 with the hardware flow control set to OFF. The 3DM-GX1[®] was also set at 38,400.

A simple POLLING program was written that would open communications between the host and the 3DM-GX1[®], issue repeated poll commands, display the response and record the data to a file with a time stamp. Gyro-stabilized Euler Angles (0x0E) were used at the default timer tick interval of 6.5536 milliseconds.

Sampling was successful and robust although it was noted visually from the display that the apparent data throughput rate was less than is normally observed at 38,400 using wire cables.

The 3DM-GX1[®] can operate at 115,200, 38,400 and 19,200 baud rates. Tests were run to determine actual throughput rates using wire cables versus wireless. The results are show in the table.

Baud Rate	Wired Throughput per second	Wireless Throughput per second
115,200	~76 packets	~11 packets
38,400	~76 packets	~11 packets
19,200	~38 packets	~10 packets

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A more sophisticated CONTINUOUS testing program was written that would open communications between the host and the 3DM-GX1[®], issue a single continuous command and count good, bad and missed packets. Gyro-stabilized Euler Angles (0x0E) were used at the default timer tick interval of 6.5536 milliseconds.

Sampling was successful and robust and an apparent fast data throughput rate was visually observed. The test program calculated the results are shown in the table.

Baud Rate	Wireless Throughput per second
115,200	~74 packets; no bad or dropped packets observed
38,400	~75 packets; no bad or dropped packets observed
19,200	~75 packets; no bad or dropped packets observed

Note: MicroStrain makes no claim or warranty as to the suitability, interoperability or otherwise of its 3DM-GX1[®] and Bluetooth technology.