MicroStrain Sensing Technical Note

3DMGQ7

Current Firmware Upgrade

Date

August 4, 2021

Summary

This technical note details the most current firmware available for the MicroStrain Sensing ***3DMGQ7*** inertial sensor. The technical note additionally describes firmware changes since the initial product release and the use of SensorConnect software to perform the firmware upgrade.

Detail

As we see in the table below, the current firmware for the model 6284-4220 ***3DMGQ7*** is version 1.0.0.8. This firmware is contained in the file object entitled ***GQ7_Firmware_2021_JUL_b8.zhex***.

3DMGQ7 Firmware

Firmware Version	ChangeLog
1.0.01	Initial Firmware Release
1.0.02	1. Added odometer scale factor state to EKF to improve speed measurement and added ODOMETER_SCALE_FACTOR_ERROR (0x8247) and ODOMETER_SCALE_FACTOR_ERROR_UNCERTAINTY (0x8248) data fields. 2. Modified GNSS preprocessing to improve tight coupling / RTK performance. 3. Removed oscillations in attitude under static conditions in Vertical Gyro/AHRS mode. 4. Initial gyro bias convergence improved. 5. Now accepts GPS Time Update command (0x0172) when the PPS source is anything but one of the internal receivers. 6. USB driver modified to stop sending data when no host is detected via SET_LINE_CONTROL_STATE packet. This fixes a communications failure issue in Linux and Windows when the host reboots and the device was in streaming mode. 7. LED behavior modified to be consistent given above USB driver change.
1.0.03	1. Fixed bug with DA float solution uncertainty not updating if the number of L2 measurements are below threshold. 2. Fixed an inaccuracy in the calculation of DA float update using inertial data. 3. Improved recovery time of poor dual antenna fix. 4. Modified Kalman filter reset code to: a) prevent filter divergence for large clock jumps (occasionally seen on power up after initial PPS lock), b) ensure complete reset, both major and minor cycle. 5. Modified filter data timestamp assignment so that timestamps are monotonic, even after reset (they were resetting to zero for 1 major cycle after reset). 6. Lowered residual warning threshold for dual antenna measurement.
1.0.04	Fixed estimation filter orientation matrix and quaternion to match DCP (were the inverse transformation.)

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1.0.05	1. Fixed field index and field count values for raw GNSS data fields (0x20 and 0x22) to reflect only transmitted data (disabled constellations aren't counted now). 2. Balanced DA float solution to rely less on L2, and to reduce reliance on initial measurements and reduce chance of outliers giving a bad initial fix. 3. Modified RTK processing to improve long baseline performance. 4. Added (0x82,0x49) filter data with clearer information regarding DA fix. 5. Updated warning flag conditions for error states (high bias/scale factors/mounting errors) will trigger warning flags. 6. Made antenna offset error tracking enabled by default. 7. Fixed certain raw GNSS data quantities not being transmitted properly. 8. Fixed GNSS solution data not decimating properly when raw GNSS data was also selected for transmission.
1.0.06	Fixed a bug in the reference position configuration command (0x0D, 0x55) that caused an invalid parameter error for altitudes of 0 or less. These should be allowed.
1.0.07	1. Added complementary filter support. 2. Fixed a bug causing the compensated acceleration vector (0x82, 0x1C) to be reported incorrectly from the Kalman filter. 3. Added support for quaternion sensor-to-vehicle transform. 4. Increased serial buffer size to address issues with dropped packets when streaming large amounts of raw GNSS data over the serial port.
1.0.08	1. Added post-EKF smoothing to position, velocity, and attitude estimates to reduce sawtoothing. 2. Improved handling of GNSS data inconsistencies between receivers to reduce impact of multipath effects. etc. 3. Adjusted EKF measurement model for pressure sensor aiding to improve consistency. 4. Fixed bug which caused sensor to incorrectly report a dual antenna configuration error when antenna separation was less than 50 cm (actual lower limit is 25 cm).

Upgrading Firmware With SensorConnect

The firmware on the ***3DMGQ7*** inertial sensor may be upgraded with MicroStrain Sensing's SensorConnect software. The Windows software is available for download and installation on the MicroStrain website at: https://www.microstrain.com/software/sensorconnect. The user is required to download the ZHEX file from the ***3DMGQ7*** web page. SensorConnect performs the upgrade under user control.

Support

MicroStrain Sensing support engineers are always available by phone, email, chat, and Teams to support you in any way we can.

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