

# MicroStrain Sensing Technical Note

## All 3DM-GX5/CX5/CV5 Models Current Firmware Upgrade

### Date

February 15, 2021

### Summary

This technical note details the most current firmware available for all models of MicroStrain Sensing **3DM-GX5**, **3DM-CX5** and **3DM-CV5** inertial sensors. The technical note additionally describes firmware changes since the last major firmware release and the use of SensorConnect software to perform the firmware upgrade.

### Detail

Every 3DM-GX5, 3DM-CX5 and 3DM-CV5 inertial sensor has two microprocessors. We refer to one microprocessor as the **NAV** processor and the other as the **IMU** processor. Each of these processors has a separate and distinct firmware. As we see in the table below, and as an example, the current firmware for the model 6253-4220 3DM-GX5-25 are NAV firmware **1.1.76** and IMU firmware **1.1.03**. These firmwares are contained in the file object entitled *philo\_firmware\_r48802\_b49.zhex*.

### Current firmware by model

Base Model Number	Model Name	NAV Firmware Version	IMU Firmware Version	ZHEX File
6255-4250	3DM-GX5-10	1.1.76	1.1.03	philo_firmware_r48802_b49.zhex
6254-4220	3DM-GX5-15	1.1.76	1.1.03	philo_firmware_r48802_b49.zhex
6253-4220	3DM-GX5-25	1.1.76	1.1.03	philo_firmware_r48802_b49.zhex
6252-4220	3DM-GX5-35	1.1.76	1.1.03	philo_firmware_r48802_b49.zhex
6251-4220	3DM-GX5-45	1.1.76	1.1.03	philo_firmware_r48802_b49.zhex
6275-4210	3DM-CX5-10	1.1.76	1.1.03	philo_firmware_r48802_b49.zhex
6274-4260	3DM-CX5-15	1.1.76	1.1.03	philo_firmware_r48802_b49.zhex
6273-4260	3DM-CX5-25	1.1.76	1.1.03	philo_firmware_r48802_b49.zhex
6271-4260	3DM-CX5-45	1.1.76	1.1.03	philo_firmware_r48802_b49.zhex
6259-4210	3DM-CV5-10	1.1.76	1.1.03	philo_firmware_r48802_b49.zhex
6258-4260	3DM-CV5-15	1.1.76	1.1.03	philo_firmware_r48802_b49.zhex
6257-4260	3DM-CV5-25	1.1.76	1.1.03	philo_firmware_r48802_b49.zhex

### NAV Firmware for GX5/CX5 Models -45 and -35

Firmware Version	ChangeLog
1.1.68	Internal change for manufacturing; no impact on operation.
1.1.69	Fix bug where internal PPS would stay on when external GNSS was selected.
1.1.71	<ol style="list-style-type: none"><li>Fix bug where baud would not be correctly loaded/saved on 'all settings' command for -10 devices (doesn't impact -45 but shared code).</li><li>Updates to external attitude inputs to handle sensor2vehicle transform correctly.</li></ol>
1.1.72	Internal change for manufacturing; no impact on operation.

# All 3DM-GX5/CX5/CV5 Models

## Current Firmware Upgrade

### NAV Firmware for GX5/CX5 Models -45 and -35 (continued)

1.1.73	<ol style="list-style-type: none"><li>1. Added sensor2vehicle rotation commands that use quaternions (MIP_CMD_DESC_FILTER_SENSOR2VEHICLE_ROTATION_QUATERNION) and matrices (MIP_CMD_DESC_FILTER_SENSOR2VEHICLE_ROTATION_DCM).</li><li>2. Renamed the original sensor2vehicle transformation command from "MIP_CMD_DESC_FILTER_SENSOR2VEHICLE_TRANSFORMATION" to "MIP_CMD_DESC_FILTER_SENSOR2VEHICLE_ROTATION_EULER" to be more explicit about what is actually happening.</li><li>3. Sensor2Vehicle rotations now affect external heading inputs.</li><li>4. New commands to supported descriptors.</li><li>5. The total time for the filter to initialize from start-up has been extended from ~5 seconds to ~7 seconds to fix a bug when using external GNSS updates. Previously, external updates sent within the first 5 seconds of power on could result in filter instability. This was due to how the attitude was being initialized.</li><li>6. Fixed bug in Matrix to Quaternion conversion: For certain DCMs, the matrix to quat calculation would not properly calculate the quaternion, instead returning the default quaternion (example problem matrix = [1 0 0; 0 0 -1; 0 1 0]).</li><li>7. The filter initial position did not take into account the antenna offset vector; this has been fixed.</li><li>8. Fixed a bug introduced in 1.1.69, where the PPS selection hardware was not being updated correctly. When the user selects external GNSS updates at the GNSS source, it now switches the PPS to an input. When internal GNSS updates are the source, it is an output.</li><li>9. The bootloader has been updated to streamline updates when using USB.</li><li>10. LED indication logic has been changed - previously, when the device was in idle and the LED was pulsing, a command response would cause the LED to change to fast-blink (streaming) mode for 2 seconds. With the updated logic, the LED only enters fast-blink (streaming) mode if data is being streamed out of the device.</li><li>11. Added limited support for the MIP_CMD_DESC_FILTER_ADAPTIVE_FILTER_OPTIONS command. This command only affects adaptive filtering of GNSS position and velocity measurements, it does not control other measurements, as these are controlled via other commands. The only supported level parameter values are: 0 - OFF, 2 - MODERATE. The time_limit parameter has no effect on the 5-series devices.</li></ol>
1.1.74	Internal change for manufacturing; no impact on operation.
1.1.75	Internal change for manufacturing; no impact on operation.
1.1.76	Internal change for manufacturing; no impact on operation.

# All 3DM-GX5/CX5/CV5 Models

## Current Firmware Upgrade

### NAV Firmware for GX5/CX5/CV5 Models -25, -15 and -10

Firmware Version	ChangeLog
1.1.68	Internal change for manufacturing; no impact on operation.
1.1.69	Internal change for manufacturing; no impact on operation.
1.1.70	Fixed bug which would leave internally generated PPS on if External PPS was selected (doesn't impact this product, but shared code).
1.1.72	<ol style="list-style-type: none"><li>1. Added additional check for false PPS beacon_status to zero gps_latency.</li><li>2. Incorporated changes relevant to external inputs in the sensor2vehicle transformed frame.</li><li>3. Updated baud handling to operate correctly on the -10 series.</li></ol>
1.1.74 and above	Please see <b>NAV Firmware for Models -45 and -35</b> as the firmware version numbers have been aligned and the project used to build the 2 images is largely the same.

### IMU Firmware for All GX5/CX5/CV5 Models

Firmware Version	ChangeLog
1.1.00	Use differential magnetometer measurements (one with SET, one with RESET) to improve rejection of magnetic disturbances.
1.1.03	Internal change for manufacturing; no impact on operation.

### Upgrading Firmware With SensorConnect

The firmware on all **3DM-GX5**, **3DM-CX5** and **3DM-CV5** inertial sensor models 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 appropriate ZHEX file from the web page for the particular inertial sensor model. 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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