PIKSI® MULTI FIRMWARE 1.1 RELEASE

May 17, 2017

Updates to Swift Navigation's Multi-Band, Multi-Constellation Centimeter-Accurate RTK GNSS Receiver

Overview

Swift Navigation announces the first major firmware upgrade to Piksi® Multi. This release expands on dynamic RTK application support and provides users with increased functionality, defined below.

Version 1.1

Firmware Version 1.1 (Build 1.1.27) of the Piksi Multi GNSS Receiver is the latest update to the previous release, Firmware Version 1.0. Refer to Section 7 of the Getting Started Guide entitled "Piksi Multi - Upgrading Firmware" for detailed instructions on how to upgrade your device. For firmware release binaries and product support documentation visit support.swiftnav.com.

Firmware Update Contents

Increased Data Output Rates to Support Dynamic Use Cases

GNSS Measurements (Raw Data).....**Up to 20 Hz**
RTK Output Support
— Low Latency Mode.....**Up to 20 Hz**
— Time-Matched / Heading Mode.....**Up to 5 Hz**
IMU (Raw Data).....**Up to 200 Hz**

Additional Features Provide New Capabilities Enabling New Use Cases and Applications

Moving Baseline RTK Feature - The capability to do real-time precise relative positioning between two receivers where both receivers can now be in motion.

Piksi Multi's Moving Baseline RTK provides up to 5 Hz output of RTK support when a differential receiver pair is in motion. In this configuration, the reference receiver and relative positioning receiver are installed on separate vehicles to support
applications where precise relative positioning is important such as in agricultural and marine towing, UAV heavy lift payloads, formation or swarm-focused navigation and docking or shipboard landing.

For more information refer to the "Piksi Multi - Moving Baseline" article on the Swift Navigation support portal.

RTK-Based Heading Feature - The capability to do real-time RTK-based heading for direction finding—even when stationary—without the need for expensive navigational equipment such as gyrocompasses.

Piksi Multi's RTK-Based Heading provides up to 5 Hz GNSS compass output when two GNSS receivers, a reference and an attitude, each connected to its own respective antenna, are installed on a single rigid body. This configuration can be used to support applications such as automotive and marine heading—as well as communication infrastructure orientation applications—and can provide heading accuracies below 1 degree

For more information refer to the "Piksi - Multi Heading" article on the Swift Navigation support portal.

Improved 1 PPS Support Features - The Piksi Multi Pulse Per Second (PPS) feature has been upgraded to support more customization, including:

- Synchronization with GPS time on either the rising edge or falling edge
- Pulse Offset - Ability to set an offset in milliseconds from GPS time
- Pulse Length - Ability to change and set the length of the pulse
- Polarity - Ability to change the pulse polarity
- Pulse Time Period - Ability to output PPS at different epochs, such as once per second or slower

Standalone Logging Feature - The capability to complete autonomous data collection using a USB flash drive without the need for an attached computing resource (such as the Swift Console GUI) to start and stop data logging.

Piksi Multi's Standalone Logging enables teams to quickly initiate data logging in an untethered scenario. When enabled the module checks every 30 seconds for a FAT formatted USB drive, and on detection of a drive will start logging binary Swift Binary Protocol (SBP), rolling logs every 10 minutes and ends logging when the drive is 95% full.

For more information refer to the "Piksi Multi - Standalone Logging" article on the Swift Navigation support portal.

Data Format and Interface Support Allow Users to Better Leverage Existing Base Station Infrastructure and Facilitate Post-Processing

Standalone RINEX Conversion Utility Tool Available - The tool allows users of RTKLIB, such as those with UAV surveying applications, additional tools to support their post-process kinematic (PPK) needs.

Receiver Independent Exchange (RINEX) format is a data interchange format for raw satellite navigation system data. Swift Navigation's Standalone RINEX Conversion Utility Tool provides users the ability to save a SBP file through the Swift Console (.json) or the standalone Logging tool onboard Piksi (.sbp) and then use this tool to convert that saved file to the RINEX format for post processing.

For more information refer to the "SBP to RINEX Converter and Data Post-Processing" article on the Swift Navigation support portal.

Improved Compatibility with Existing Infrastructure (RTCM 3.1 Input) - This added support enables users to better leverage existing base station infrastructure to receive RTK corrections (observations, station coordinates, etc.) from already deployed public Continuously Operating Reference Stations (CORS).

Piksi Multi is now capable of receiving RTCM Version 3.1 messages (Msg IDs: 1002, 1004, 1005 and 1006) and can function as a standard RTK rover (RTCM input only). This communication protocol allows Piksi Multi interoperability with existing infrastructure using this protocol, such as CORS stations or other pre-existing deployed base stations.

For more information refer to the "Piksi Multi RTCM Input and NTRIP Client" article on the Swift Navigation support portal.

Additional Improvements Over Firmware 1.0

Piksi Multi's new firmware supports additional enhancements and corrections summarized below. More details can be found on the Swift Navigation support portal.

- **Improved General Performance and System Stability**
- **New SBP and NMEA Heading Messages**
- **UART Flow Control**
- **Accelerometer Default Range Setting Changed to 8g**
- **Piksi Console Simulator - GPS Time and Velocity Output**
- **NMEA Message Improvements:**
  - NMEA time stamps now provided only when position fix is valid
  - NMEA GGA message rate is now configurable
  - NMEA GSV message now reports used satellites
  - NMEA GSV message message now reports all visible satellites
- **New SBP Messages:**
  - MSG_UTC_TIME
  - MSG_DGPS_STATUS
  - MSG_AGE_CORRECTIONS

New Third-Party Drivers Available for Piksi Multi

The PolySync Core Piksi Multi Software Driver supports a more seamless integration of Piksi Multi within the autonomous vehicle sensor suite. For more information on PolySync's Core middleware and the associated Piksi Multi software driver, refer to the PolySync website.

The ArduPilot Piksi Multi Software Driver supports Piksi Multi as the primary or secondary GNSS sensor on UAVs with ArduPilot-based autopilot software. With this release, Piksi Multi supports the Pixhawk flight controller in addition to other ArduPilot compatible hardware. This driver is available in, ArduPlane 3.8.0 (and higher), ArduCopter 3.5 (and higher), and Rover 3.1 (and higher).