

## ONCORE TECHNICAL APPLICATION NOTE

### *UT Plus 2.2 Production Firmware Notes*

The UT Plus Oncore 2.2 firmware has been released for production. Several changes to the firmware have been made since the released 2.0 version based on customer inputs. This note documents the differences between the 2.0 production release and the 2.2 production release.

1. **Wideband Acquisition Jamming Immunity Improvement** - The satellite signal acquisition algorithm in the VP Oncore has been implemented in the UT Plus Oncore in order to improve the acquisition performance of the UT Plus in a jamming environment. The trade-off to achieve this improvement is a longer typical time to first fix (TTFF) in all startup conditions. The preliminary typical startup times are 20 seconds hot, 50 seconds warm, and 4 minutes cold.
2. **Code Phase Fix**- An infrequent error during the acquisition of a satellite that caused an incorrect determination of the code phase has been fixed. The effect of the measurement error was a position error of less than 200 m and a timing error of less than 125 ns in position-hold mode.
3. **Bit Synchronization Fix** - An infrequent error in the tracking of a satellite in the narrow band mode has been fixed. This type of error caused a large position and time error which was immediately detected by internal integrity monitors that reset the tracking channel, eliminating the error completely.
4. **Time Residual Output Fix** - The time residuals reported in the Time RAIM Setup and Status Message (@@En) are now compensated for the Earth's rotation.
5. **Satellite Selection Fix** - An error in the satellite selection list generation algorithm has been fixed. This error would occasionally cause a healthy satellite above the horizon to not be included in the tracking list.
6. **Sky Search Fix** - When the receiver has an almanac, position, date, and time, a satellite selection list is generated, and satellites on the list are assigned to channels for acquisition. If a fix isn't acquired after a few minutes, the lower four channels start to search for satellites not on the visibility list. In version 2.0 firmware, the satellites did not search all satellites in the sky properly.
7. **1PPS Estimation Before First Fix** - Before the receiver computes a fix, the oscillator offset is estimated based on the crystal characteristics stored in memory. As a result, the 1PPS solution is closer to UTC from the time the first satellite is acquired until the first fix is computed and the true oscillator offset is determined.
8. **Position-Hold Reset** - The channel assignments are reset when the Position-Hold Mode is disabled. This prevents possible anomalies when transitioning back into the position fix mode.



9. Position/Status/Data Message Fix - The channel dependent information is now set to zero if the SVID is zero.
10. Default Date Changed - The default date is now 1/1/98.
11. The reacquisition search strategy has been modified to allow for large temperature swings. The modified strategy adjusts the estimated oscillator offset based on temperature sensor measurements, crystal characteristics, and frequency uncertainty growth as a function of the outage time.
12. A soft reset has been implemented when a long outage occurs. When the receiver is in Position-Hold Mode, a reset is done after two hours of not tracking any satellites. The reset restarts the satellite search and acquisition process without clearing any of the information stored in RAM (position, time, almanac, ephemeris, settings, etc.). When not in Position-Hold Mode, a reset is done after 45 minutes.

