

FIELD SERVICE BULLETIN

FSB# 160126

January 26, 2016

Revised January 28, 2016

Affected Products: Sonoma, Tempus LX, Unison, Meridian, Tycho (all GPS-Synchronized)

Part Number:	Description:
3015-xxxx-xxx	Tempus LX GPS Network Time Server
3017-xxxx-xxx	Unison GPS Network Time Server
3019-xxxx-xxx	Meridian Precision GPS TimeBase
3021-xxxx-xxx	Tycho GPS Frequency Reference
3027-xxxx-xxx	Sonoma D12 Network Time Server (GPS)
3029-xxxx-xxx	Sonoma N12 Network Time Server (GPS)

Note: "x" is variable.

Problem:

Temporary GPS system anomaly may have caused a UTC time step of 13.7 microseconds resulting in a TFOM level change and a Loss-Of-Lock Indicator.

For units with a TCXO, the loss-of-lock indicator was on for minutes. For units with an OCXO or rubidium, the loss-of-lock indicator was on for one to six hours. The EndRun products listed above that were affected self-recovered and removed the time step after receipt of a correct almanac shortly after 00:00 UTC Jan 27.

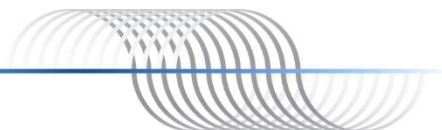
An issue with a GPS ground system software update resulted in some satellites transmitting erroneous UTC parameters in the almanac data set beginning around 23:00 UTC on January 25th for about twelve hours into January 26th. The error was related to the decommissioning of SV23 (PRN32) ([Reference NANU 2016008](#)) at 22:00 UTC on January 25th.

EndRun provided a report to the [U.S. Coast Guard Navigation Center](#) with data collected from its GPS products in operation at the time of the event. The Coast Guard advised that the [Air Force GPS Operations Center](#) acknowledged that there was a software error associated with the decommissioning that was resolved at 11:17 UTC January 26th. The Air Force subsequently issued an [official press release](#) on January 27th with details regarding the GPS ground system software anomaly and UTC time error.

The EndRun products listed above use a GPS receiver from a major GPS company that may have received the erroneous data and temporarily caused the timekeeping firmware to introduce a time step of approximately 13.7 microseconds to UTC. This is what caused the TFOM level change and the loss-of-lock indicator.

EndRun experienced the time step with systems in our Santa Rosa, California lab. Review of system logs indicates incorrect UTC parameters within the GPS receiver beginning at 23:38 UTC January 25th as follows:

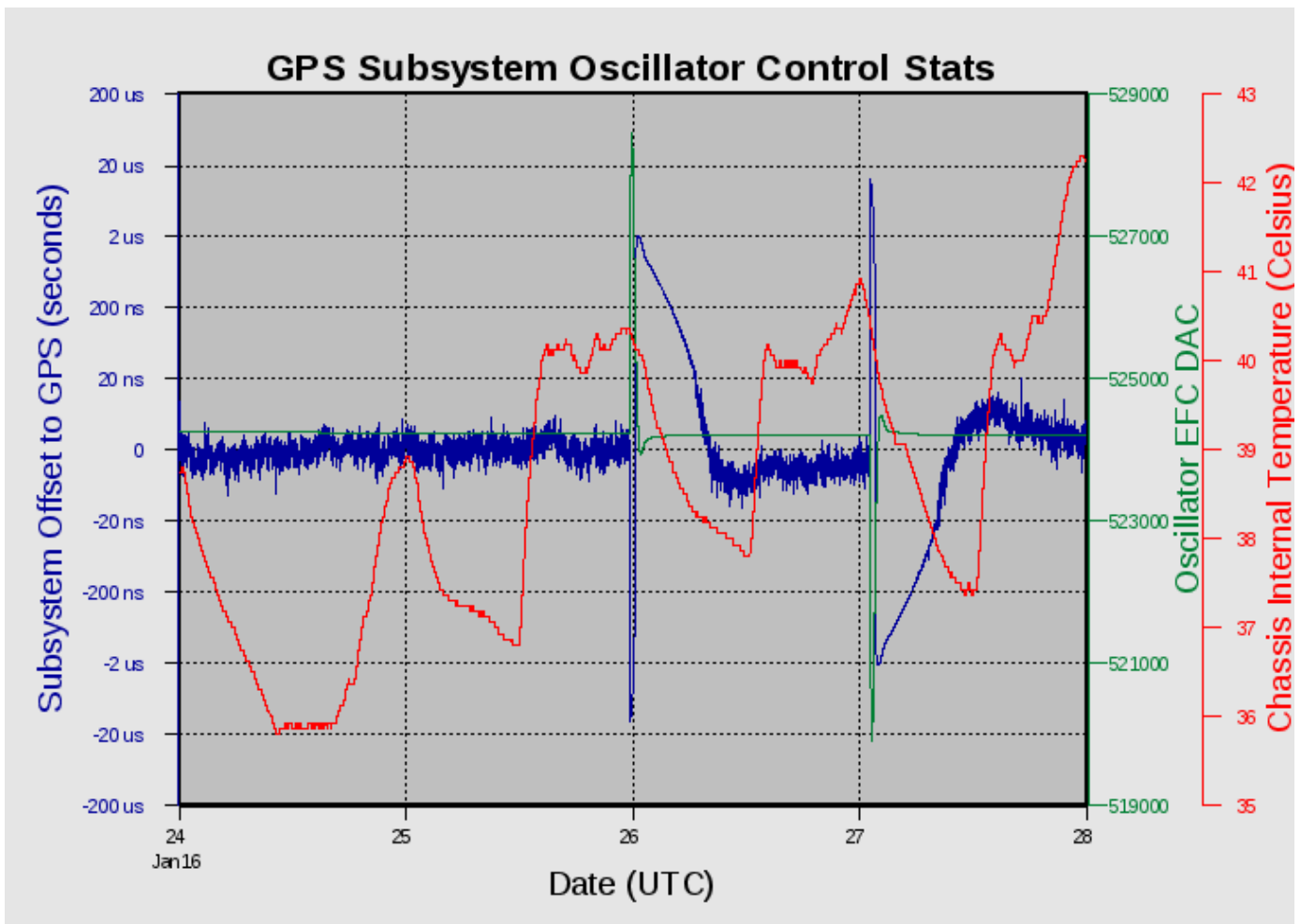
a0:	-1.369603e-05s	Bad – indicates an erroneous ~13.7 microsecond UTC correction.
a1:	+1.243450e-14 s/s	Good
WN_t	0	Bad – incorrect week number for UTC parameters. Should have been 1881.
t_ot	0s	Bad – should have been a non-zero, multiple of 2 ¹² value.



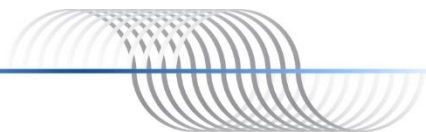
The source of these incorrect UTC parameters was the software error that manifested in the broadcast almanac data set. A correct almanac is now provided by all satellites.

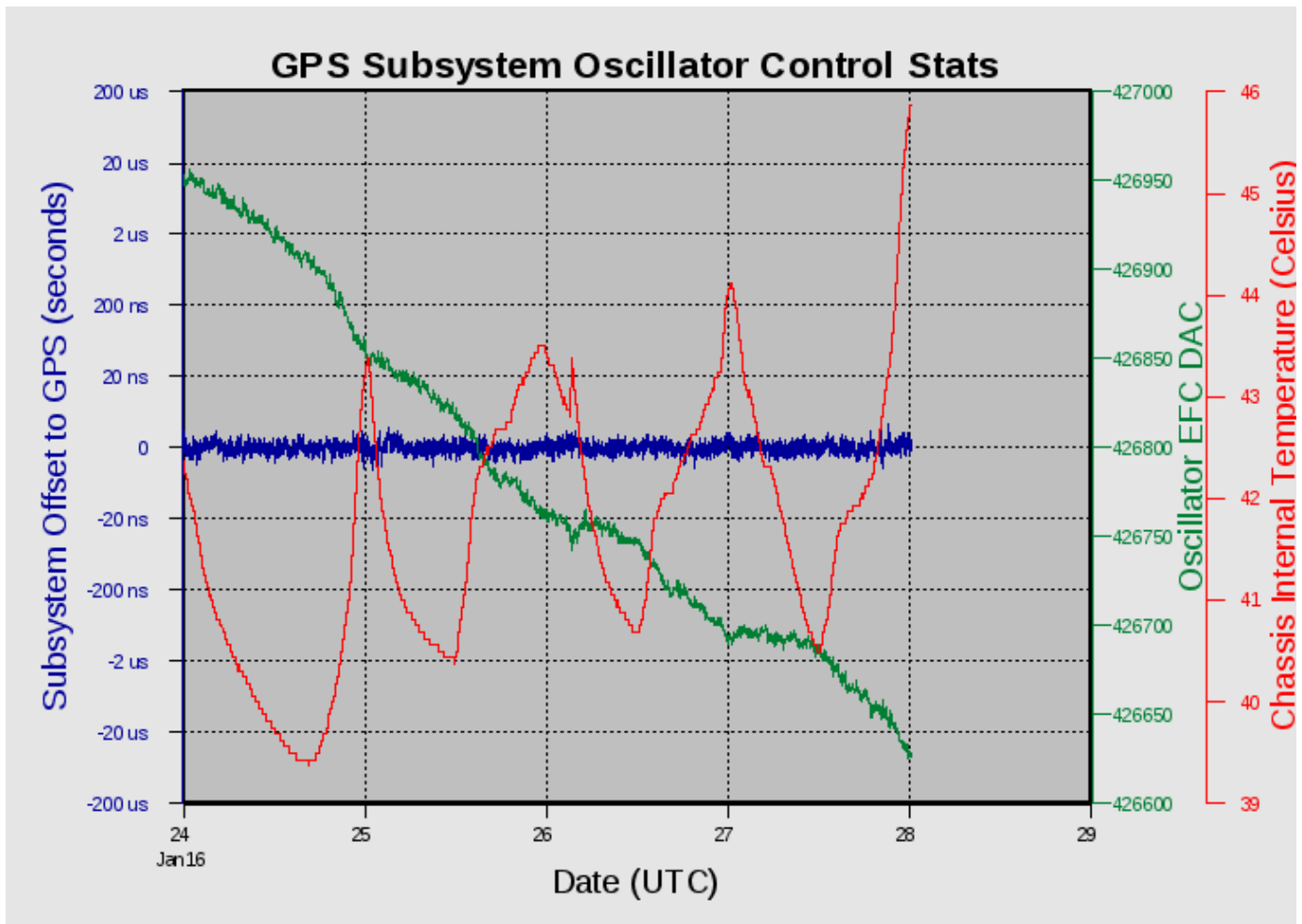
EndRun's Meridian II and Tycho II Precision TimeBase utilize EndRun's proprietary GPS receiver and were not impacted by this issue. The incorrect almanac data set was rejected as it did not pass the GPS receiver's integrity checks.

Following are plots from a Sonoma GPS Network Time Server and a Meridian II Precision TimeBase during the January 25 – 27 event period that were operating in EndRun's lab. The Sonoma plot illustrates the 13.7 microsecond time step and recovery. The Meridian II plot illustrates normal operation through the event.



Sonoma GPS Network Time Server





Meridian II Precision TimeBase

Contact Information:

Feel free to contact us if you have any questions or need help:

EndRun Technologies
2270 Northpoint Parkway, Santa Rosa, CA 95407 U.S.A.
707-573-8633 or 1-877-749-3878 (toll-free)
support@endruntechnologies.com

