

RTK Correction Data Formats

In the world of RTK, there are a handful of correction data formats. Most receivers will accept one or more of these formats, so when building a system, you need to be aware of which formats each of your systems supports and try to standardize.

NCT - John Deere's proprietary correction data format. In 1999, as precision agriculture was really starting to get going, John Deere acquired GNSS manufacturer NavCom. Today the company makes receivers for both agriculture and other industries. While their non-agricultural receivers are capable of a wide variety of standard formats, the ag receivers are limited to only this proprietary format. Generally speaking, if you want to use a JD rover on RTK, you'll need to use a JD base station. The format supports GPS and GLONASS, but if you want to use the GLONASS satellites in the RTK solution, you will need a GLONASS capable receiver at both the base and rover.

CMR - Trimble's original format. Initially this was a proprietary format, but other receiver manufacturers figured out how to parse it, and Trimble eventually published their specs so everyone could use it. Today it is rarely used unless you have legacy equipment that doesn't support anything newer. The messages can be viewed as the Trimble_TSIP part; the following messages (packets) numbers were open: 0, 1, 2, 3.

CMR+ - The second generation of Trimble's CMR. It features a more compact message structure than CMR had. The GPS portion of this protocol was originally Trimble proprietary, but was later released and has become a widely used standard. No GLONASS specifications were released by Trimble, but other manufacturers have extended the format to include GLONASS information as well. Unfortunately the GLONASS portion isn't as standardized as the GPS portion is. Compatibility between receiver manufacturers when using GLONASS is a crapshoot.

CMRX - This is the latest correction data format from Trimble, offering even more data compression than CMR+ did. As of today, it remains proprietary to Trimble receivers.

RTX - This is a Trimble specific system that uses satellites to transport RTK correction data to the rover rather than terrestrial radios or cellular networks. The data stream is actually CMRX correction data. The improved data compression of CMRX is extremely valuable to a satellite based system as bandwidth on a satellite is rather expensive. As with CMRX, this is only available on Trimble receivers.

TSIP - This is a communications protocol designed by Trimble for communication between devices and GPS receivers. It allows bi-directional configuration and position data. The Trimble NAV-2 steering controller connects to a GPS receiver via TSIP, so it requires a receiver that can communicate in TSIP, which essentially means a receiver made by Trimble for that purpose. As of this writing, I am not aware of any non-Trimble receivers that use TSIP.

RTCM v2 - The Radio Technical Commission for Maritime Services is an independent international non-profit organization that produces standards for radio communications. Version 1 had problems

and was replaced by version 2.0. Version 2.1 added RTK support, version 2.2 added GLONASS support, and version 2.3 added some messages to improve the accuracy of RTK. This is an open standard used by many manufactures, but as it is old, it is only used on legacy equipment that cannot use version 3.

RTCM v3 - The newest data format from RTCM, which has better data compression and message integrity than version 2.x had. Version 3.1 added support for Network RTK via the Master Auxiliary concept. Still an open standard, this format is used by most modern receivers.

NMEA 0183 - This is the international standard for GPS position data. Various message types within this data format can contain info about position, accuracy, speed, time, and satellites tracked. This message type is supported by nearly every GNSS receiver on the market. This is a one-way data stream from the GNSS receiver to the device using the data. Configuration of the receiver has to be done via some other data format.

Last updated: March 3, 2013; [Link](#)

The following rules apply:

When output is RTCM 2.1, position accuracy is 1 cm.

When output is RTCM 2.3 and messages #22 and #24 are disabled, position accuracy is 1 cm;

When output is RTCM 2.3, message #22 is enabled and message #24 is disabled, position accuracy is 1/256 cm.

When output is RTCM 2.3 and message #24 is enabled, position accuracy is 0.1 mm.

When output is RTCM 3.1, position accuracy is 0.1 mm.

When output is CMR, CMR+, or CMRx, position accuracy is 1 mm.

The above is a copy/paste from: www.cors.us (WV RTN) // @Plumb Bill, August 28, 2014