November 17, 1998

Ms. Wendy Watson, Director of Custom Products
NovAtel, Inc.
1120 68th Avenue NE
Calgary, Alberta
CANADA T2E8SF

Dear Ms. Watson:

The Federal Geodetic Control Subcommittee (FGCS) conducted a complete test of the system capabilities of the dual-frequency (L1 and L2) NovAtel Outrider™ Global Positioning System (GPS) Receiver and the SoftSurv™ post-processing software from 15 June to 20 June, 1997. The FGCS has concluded that the preliminary analysis of the positioning results indicate that the NovAtel Outrider™ GPS receiver and the associated SoftSurv™ software, as tested, will meet or exceed the manufacturer's stated specifications.

The test was conducted on stations of the FGCS test network, located in the general Washington, D.C. area. Currently, the test network extends approximately 55 kilometers (km) in the east-west direction and 108 km in the north-south direction. The test included the demonstration of the system, as well as collection and processing of the data using the manufacturer's instrumentation and software. A primary purpose of FGCS testing is to verify that for new technology, the manufacturer's equipment and associated software meet or exceed the manufacturer's stated specifications.

The complete FGCS test for GPS equipment includes several phases of observations: static, rapid-static, stop-and-go kinematic and real-time kinematic. Static observations are made on short, medium, and long baselines. Rapid-static and real-time kinematic are tested using the kinematic test course on the National Institute of Standards and Technology (NIST) grounds in Gaithersburg, Maryland. To provide further assessment data, stop-and-go is performed, using on-the-fly techniques for integer initialization. This latter phase of testing is performed under conditions that any GPS user might encounter in the field; the current highway route extends for 25 km in Maryland. All phases of the test were successfully completed.

FGCS observations are made regarding overall field performance of the equipment. All data is recorded in the field, or it is noted that equipment cannot perform this function. For GPS surveying systems, the test examines the capability of the software to:
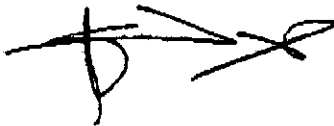1] reduce the data in the manufacturer's own format;
2] process the data from another manufacturer in Receiver Independent Exchange (RINEX) format, version 2.0;
3] process data downloaded from the Continuously Operating Reference Stations (CORS) systems being established by the National Geodetic Survey (NGS); and,
4] post-process data using both the predicted (broadcast) ephemerides and the precise ephemerides produced by NGS (SP3 format).

Six of the NovAtel Outrider™ GPS receivers, firmware version 4.437, were supplied by NovAtel, and used during the test. Short, medium, and long baselines were observed over four days of the field-testing using the established FGCS test course. Static baseline observations varied in length from approximately 0.184 km to 108 km. The Ultra High Frequency (UHF) radios were used to support the stop-and-go and real-time kinematic tests. The surveying system was evaluated using both field observations made by FGCS observers and later analysis of the post-processed results based on the recorded data. On-site daily processing was done using the manufacturer's post-processing software, SoftSurv™, version 1.11. The daily data sets and subsets were processed and analyzed. The SoftSurv™ software successfully processed RINEX data, downloaded from two CORS stations: station Gaithersburg located within 1 km of the NIST portion of the FGCS test course, and station Sandy Hook, which is located over 300 km away in New Jersey. NovAtel also submitted the data in the NGS data formats (B and G files). Additionally, the software post-processed data using the NGS precise ephemeris data, thereby successfully completing all the current software evaluation phases of FGCS testing.

The results of the FGCS testing were presented in a meeting open to the general public on 20 June 1997. The FGCS members actively involved in the testing and analysis included NGS, NIST, the United States Geological Survey and the Department of Transportation (DOT). The data from this test and any reports will be made available to the public through the FGCS home page (http://www.ngs.noaa.gov/FGCS/fgcs). The FGCS website is maintained by NGS. Pertinent information is hyper-linked to the website of the Navigation Information Service (NIS) (http://www.navcen.uscg.mil), maintained by the United States Coast Guard of DOT. The USCG is the designated interface for the Department of Defense (DOD) for dissemination of GPS information to the civil community. The GPS was developed and is operated by the DOD. GPS is officially a dual-use system, and in this capacity is jointly managed by DOD and DOT.

Sincere thanks is given to those who have devoted their professional time and talents to performing this testing, the data reduction, report writing and dissemination of this information. It takes great effort on the part of the manufacturer, as well as the Federal representatives, to conduct these tests. The continued cooperation and support of these tests are greatly appreciated.

Sincerely,

Sally L. Frodge
Chair, FGCS Instrument Working Group
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cc:
Mr. Charles Challstrom, FGCS Chair
Mr. Rick Yorczyk, FGCS Secretariat
Mr. Roy Anderson, NGS, FGCS Test Coordinator
Mr. Larry Hothem, USGS
CAPT. James Doherty, Commander USCG Navigation Center