



**Federal Geographic Data Committee
FGCS Federal Geodetic Control Subcommittee**

July 14, 1999

Dr. Joseph Paiva, Vice President Land Survey
Trimble Navigation Limited
645 North Mary Avenue
Post Office Box 3642
Sunnyvale, California 94088-3642

Dear Dr. Paiva:

The Federal Geodetic Control Subcommittee (FGCS), in voluntary cooperation with Trimble, conducted a test and demonstration of the Trimble 4700 Global Positioning System (GPS) Receiver and the Trimble GPSurvey processing software from November 15-20, 1998. The results of the FGCS testing were presented in a meeting open to the general public on 20 November 1998. Information and data from this test will be available to the public through the FGCS home page (www.ngs.noaa.gov/FGCS/fgcs.html). Preliminary analysis of the positioning results indicates that the instrumentation and software, as tested, meets or exceeds the stated specifications of the manufacturer.

The test was conducted on stations of the FGCS test network located in the Washington, D.C. area, over baselines from less than 1 kilometer (km) to 108 km. The test included static, real-time kinematic and post-processed kinematic observations and processing. The following manufacturer specifications were tested:

Static Survey accuracy (1 sigma): 05 mm + 1 ppm Horizontal, 10 mm + 1 ppm Vertical¹
Kinematic Survey accuracy (1sigma) : 10 mm + 2 ppm Horizontal, 20 mm + 2 ppm Vertical¹

The Trimble system also successfully accomplished the following:

- 1) Processed data from multiple National Continuously Operating Reference Stations (CORS) National Geodetic Survey (NGS) (1 - 1200 km baselines).
- 2) Processed data from multiple receiver and antenna types.
- 3) Processed data with precise ephemerides in NGS SP3 format.
- 4) Produced output files necessary for NGS bluebooking.

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Six manufacturer-supplied Trimble 4700 GPS receivers, firmware version 1.12, were used during

¹ Assumes recommended survey procedures and conditions are met.

the test. Thirty static observations were performed on baselines approximately 0.2 km to over 100 km in length. Real-time kinematic observations were performed on six stations across a 0.5 km course. Post-processed kinematic observations were performed on five stations evenly spaced along a 25 km course.

The selection of FGCS stations for each phase of the test is made to reflect real world conditions that test the system in a variety of obstructed and multipath conditions. FGCS observers note the overall field performance of the equipment. Manufacturer personnel using GPSurvey, version 2.30a processing software performed all data processing. Data from multiple CORS stations and precise SP3 ephemerides were successfully incorporated into the static processing. Bluebook files for all observations were produced.

The FGCS agencies that were actively involved in the testing and analysis included NGS, the National Institute for Standards and Technology, the United States Geological Survey and the Department of Transportation (DOT). When the final report is prepared it will be made readily available to the public in hard copy or through the Internet. Internet access will be through the FGCS home page, maintained by NGS (<http://www.ngs.noaa.gov/FGCS/fgcs.html>). This information will also be posted on the Navigation Information Service maintained by the United States Coast Guard (USCG) of DOT (<http://www.navcen.uscg.mil>).²

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 and perform the analysis. The continued cooperation and support of these tests are greatly appreciated.

Very Respectfully,

Sally L Frodge, DOT
Chair, FGCS Instrument Working Group

cc: Mr. Charles Challstrom, FGCS Chair, and NGS
Mr. Rick Yorczyk, FGCS Secretariat, NGS
Mr. Roy Anderson, NGS, FGCS Test Coordinator
Mr. Larry Hothem, USGS
CAPT Thomas Rice, Commander USCG Navigation Center

² The USCG is the official interface for the Department of Defense (DOD) to disseminate 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.