

Presentation to
Alignment Engineering Group
SLAC

By

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Objectives at Beginning of Winter - 2003

- Setup of the new GPS receiver (RS 500) at Base Station (M40).
- Setup RS 500 for the RTK usage inside SLAC.
- Become a part of the (NGS) CORS Network.

Setup of the Base Station

- Features of the Leica RS 500 GPS receiver:
 - Controlled completely by software (ControlStation[®])
 - 4 RS-232 Ports for simultaneous Differential data outputs (Leica Binary format, RTCM, CMR)
 - Meant for usage as a Base Station only. Cannot be used as a rover.
- RS 500 obtained on 13 Jan 2003

- Basic setup at the M40 is the same (antenna, power, network connection etc).
- The Terminals (TR 500) used with other receivers is ineffective with the RS 500. Being a Base Station, only a few features of the receiver can be controlled.
- ControlStation is needed to operate and control the receiver.
- RS-232 port is used for communication between the receiver and a PC.

- Testing of the receiver was done with a desktop in Trailer 283 and later at M40 with the Toshiba Laptop (Libretto).
- To allow remote control of the receiver a RS-232 to Ethernet converter is used (National Instruments ENet 232/2).
- UPS installed at M40 and at Logging PC to protect from power surges and temporary outages.
- Lightning protection installed.

■ Data Logging types

- External Logging: Is done on an external computer. Data is sent via the ether net from the sensor.
- Internal Logging: Is done on the memory card of the sensor (256 Mb). Once the card gets full the receiver seizes).
- Ring Buffer: Old data is overwritten. Memory does not get full.
- Simultaneous download and logging not possible.

■ Logging Specifications:

- Sampling Interval - 30 seconds
- Duration of log files - 24 hours

■ Data Formats:

- External – Automatic conversion to RINEX
- Internal and Ring – Stored as Leica Binary. Can be converted to Rinex.

AFTER INSTALLATION



Monitor Program

- M40 is for 24 hour / 7 days logging.
- Program checks if ControlStation is running.
- Checks for error logs (communication error, logging error etc)
- Sends E-Mail to operators in case of failure.
- Handles preprocessing of data and storage.

Preprocessing of Data

- Format by passing through TEQC.
- Compress the observation files.
- Store Observation and Navigation files on Network / Disc.
- Perform preliminary Quality Check using position error.

RTK Verification

- Baud rate incompatibility.
- Setup modified in ControlStation
- RTK verified with Rover for Leica and RTCM formats.

Requirements for CORS

- ☑ Dual Frequency (L1 and L2).
- ☑ Track 8 satellites above 10 degrees.
- ☑ Sampling at 30 seconds.
- ☑ Provide:
 - ☐ P-Code pseudorange.
 - ☐ L1 and L2 full length carrier phase.
- ☑ Antenna must be dual frequency.
- ☑ 1 cm stability of Antenna.
- Data Storage on network.

Future Work

- Use of low end GPS receivers for RTK in SLAC.
- New frequency for dual purpose.