

Washington Correlator

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Abstract

The report summarizes the work of the Washington Correlator for the year ending March, 1999. The Washington Correlator is dedicated to processing geodetic VLBI for the purpose of providing data for Earth orientation parameters, the radio reference frame, the terrestrial reference frame and related information.

1. Introduction

The Washington Correlator (WACO) is located at the U.S. Naval Observatory (USNO) in Washington, DC, USA. The correlator is sponsored and funded by the National Earth Orientation Service (NEOS) which is a joint effort of the USNO and NASA. The Washington Correlator is dedicated to processing geodetic VLBI, spending at least 90 percent of its time in that role. All of the weekly NEOS-A sessions and daily intensives are processed at WACO, as are most of the bi-weekly CORE-A sessions. The remaining time is spent on reference frame sessions and a few astrometry experiments. WACO currently utilizes a Mark IIIA correlator designed and built by Haystack Observatory that has been operating continuously at USNO since 1986. We anticipate replacement of the existing correlator with the Mark IV correlator in the coming year with concomitant increase in throughput.

2. Correlator Operations

The Washington Correlator, in its present configuration, is shown in Figure 1. With six playback units and 10 crates (14 modules each), it can process up to six stations and 10 (Mark III mode C) baselines at one time. Larger sessions can be accommodated by processing in several passes. WACO also has the capability of splitting the correlator into two systems that can process two sessions at one time, although that capability has not been used during the last year. During the reporting period, four of the playback units at WACO were Mark IV upgrades and two were older style Mark IIIA units. Five playbacks can process thin tape, but only the four Mark IV drives can accommodate high density (56 kbit/inch) recordings.

NEOS-A processing is given priority at WACO. The weekly sessions and intensives are processed as soon as the tapes arrive with all of the participating stations shipping their tapes via express delivery services. The weekly sessions (5–6 stations) are exported 7–8 days after the observation ends and the intensives (two stations) in 2–5 days. The CORE-A sessions, which are processed in the remaining time and use conventional shipping, are prepassed as soon as all tapes have arrived, but are exported with a lag of at least a month. Reference frame sessions are processed on overtime and weekend shifts. The operational budget provides for a basic 80 hours of processing per week with provision for additional 56 hours of overtime if required. During the reported period the Washington Correlator operated to capacity and now carries a backlog of at least one month.



Figure 1. The Washington Mark IIIA Correlator

3. Washington Correlator Staff

The Washington Correlator is under the management and scientific direction of the Earth Orientation Department of the U.S. Naval Observatory. USNO personnel are responsible for oversight of scheduling and processing at WACO including: set-ups, data evaluation, exporting, archiving, correlator testing, software and hardware maintenance, and development efforts as well as contacts with the VLBI community.

The daily operation of the correlator is carried out by a private contractor, AMSC, which supplies a contract manager and correlator operators.

Dr. Kerry Kingham (USNO) - VLBI Correlator Project Scientist, responsible for scientific integrity of correlated data, hardware and software maintenance and upgrades.

James O. Martin (USNO) - VLBI Correlator Project Manager, responsible for process scheduling and evaluation of data. Oversees session set-ups, and prepasses. Evaluates station performance.

Bruce Thornton (AMSC) - Operations Manager, responsible for correlator operator scheduling, daily operations, tape shipping.

Harvis Macon (AMSC) - Correlator operator, NEOS-A set-ups.

Valerie Bockarie (AMSC) - Correlator Operator

Michelle Diaz (AMSC) - Correlator Operator

Steven Springer (AMSC) - Correlator operator

Bosun Balogun (AMSC) - Tape librarian

4. Status of the Washington Correlator

The Washington Correlator was fully loaded and operated at capacity up to 136 hours per week, during the reporting period. Currently, four drives are thin tape/high density; four drives have mode A capability, two have only mode C. The four Mark IV drives have excellent playback characteristics, the two Mark IIIA drives are less sensitive and are subject to higher error rates. All ten correlator crates are fully operational. The correlator is controlled by the original (now 15 year old) HP1000 computer but all correlator output is handled by a UNIX workstation (CygX3) utilizing the Haystack Operational Postprocessing Software System (HOPS). This permits efficient data evaluation, exporting and archiving on a system that will easily integrate into the new Mark IV correlator system.

The replacement Mark IV correlator was expected at the end of 1998 but delivery was delayed because of development problems with the station units. As a result, sessions that would have been correlated at WACO, using the higher capacity of the Mark IV correlator, had to be canceled. The delayed delivery of the Mark IV correlator has also postponed plans to reduce the backlog of sessions waiting correlation.

5. Outlook

Plans for the coming year at the Washington Correlator are highly dependent on the final development and delivery of the Mark IV correlator. The correlator crates and boards are now in place at WACO but no further progress can be made until the problems with the station units can be resolved. When the Mark IV correlator is fully operational at WACO, hopefully before the end of 1999, we will use the increased capacity to reduce the backlog and process an expanded IVS observing program. The new correlator is expected to operate at double speed and will be able to process all 15 baselines on a six-station session. Within two years we anticipate adding two more playback units at which time we will be able to process all 28 baselines at once or divide the correlator to process as many as four difference sessions at once. Until then, the Mark IIIA correlator will continue to operate. In any event, before the fall of 1999, WACO should have all six drives upgraded to Mark IV, with mode A, thin tape, high density capability.