

The Haystack Observatory VLBI Correlator

Mike Titus, Brian Corey, Arthur Niell

Abstract

The Haystack Observatory VLBI Correlator supports the IVS by processing approximately 25 geodetic experiments per year. In the coming year the Mark IV correlator will become operational. This will permit increased geodetic VLBI observing time by allowing higher correlator throughput.

1. Introduction

The Haystack Observatory Mark IIIA VLBI correlator [1], located in Westford, Massachusetts, is supported by the NASA Space Geodesy Program and by the National Science Foundation. The available correlator time is divided approximately equally between processing geodetic VLBI observations for IVS and processing millimeter-wave radio astronomy observations for the Coordinated Millimeter VLBI Array. In addition to its role as an operational processor, the Haystack correlator also serves as a development system for testing new correlation modes and hardware improvements and for diagnosing correlator problems encountered either at Haystack or at one of the identical correlators at the U.S. Naval Observatory or at the Max Planck Institute for Radioastronomy. This flexibility is made possible by the presence on site of the team that designed the correlator hardware and software.

2. Correlator Operations

The Mark IIIA correlator at Haystack is designed to process simultaneously up to eight stations and 10 baselines with 14 single-sideband frequency channels each. Due to the competing hardware demands from the Mark IV correlator [2] development in the past year the available equipment of the operational correlator has had to be reduced somewhat. Currently eight baselines can be correlated from among six stations. The six tape drives are a mixture of Mark IIIA and Mark IV. The correlator configured for seven stations is shown in Figure 1.

Approximately 90% of the correlator time allocated to the IVS is used for setup and production processing of CORE experiments. The remaining 10% is used for such tasks as correlating fringe checks to test station performance after field equipment changes, testing Mark IV formatters for field certification, processing comparison tests between the Mark IIIA and Mark IV correlators, testing headstacks for viability in field use, and correlating other geodesy-related observations, such as the Mars Global Surveyor and Pathfinder astrometry experiments.

Over the past year 20 CORE B sessions and ten special experiments were processed at the Haystack Mark IIIA correlator.

3. Staff

The following Haystack personnel are involved with correlator activities.

Peter Bolis - correlator maintenance

Tom Buretta - playback drive maintenance



Figure 1. The Mark IIIA Correlator at Haystack Observatory.

Dr. Roger Cappallo - correlator models and control software
Dr. Brian Corey - experiment correlation oversight; station evaluation; technique development
David Fields - playback drive maintenance
Ellen Lautenschlager - correlator operator
Dr. Colin Lonsdale - correlator post-processing software
Glenn Millson - correlator operator
Ed Nesman - correlator maintenance
Dr. Arthur Niell - experiment correlation oversight; technique development
Don Sousa - correlator operator; experiment setup; tape library and shipping
Mike Titus - correlator operations oversight; experiment setup; computer services
Dr. Alan Whitney - correlator architect for Mark III, IIIA, and IV

4. Outlook

We expect to continue the current mode of operation for most of 1999. During the latter part of the year we will make the transition to processing on the new Mark IV correlator. This transition will be the most significant since the introduction of the Mark III system in the early 1980s. We expect a prolonged adjustment period since practically every aspect of operations will change. Although this transition will likely result in reduced efficiency initially, we expect it will provide an opportunity to re-evaluate procedures which will improve the quality and level of service provided to the community in the longer term.

References

- [1] Whitney, A. R.: Capabilities and Performance of the upgraded Mark III Correlator System, IAU, The Earth's Rotation and Reference Frames for Geodesy and Geodynamics, 429-437, 1988.
- [2] Whitney, A. R.: The Mark IV VLBI Data-Acquisition and Correlation System, In: Developments

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