MASSACHUSETTS INSTITUTE OF TECHNOLOGY
HAYSTACK OBSERVATORY

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TO : Mark IV Development Group

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SUBJECT : Upgrade to Mark IV Data-Acquisition Capability

This memo describes in detail the requirements for upgrading existing Mark IIIA systems to Mark IV capability, and outlines what is needed to upgrade a VLBA system. The key to the Mark IV upgrade lies in the capabilities of the formatters, and these capabilities are compared in table I.

FORMATTER CAPABILITY COMPARISON						
	Mark III Mark IIIA	Mark IV	*Mark IVA*	**Mark IVB**	Standard VLBA	Augmented VLBA
1-bit Samplers	28					12
2-bit Samplers		32	32	32	16	16
Sample Rate, MHz	8	16	*32*	*32*	32	32
Output Channels	28	64	64	**128**	64	28 or 32
Data Rate/Track Msamples/sec	9	18	18	18	9	9

The Augmented VLBA System is fully compatible with either Standard VLBA or Mark IIIA depending on which set of sampler output connectors are used as described in VLBA Acquisition Memos #89, #167, and #182. This chart shows the Mark IV upgrade path, first to 32 Msamples/sec, and then to 128 output channels for a total output data rate of 2,048 Mb/s.

The data acquisition capabilities of the various systems are shown in Table II, where a Mark IIIA System with a Mark IVA Formatter has been called Mark IIIB.

The upgrade of a Mark IIIA system to a basic Mark IV capability requires the following items:

- Mark IV Field System Computer
- Mark IV Formatter
- Mark IV I/O Board
- Mark IV Power Distributor
- 2 VLBA Write Modules (PC version, or modified wire-wrap)
- VLBA Read Module
- VLBA Read/Write Head Interface, modified
- VLBA Read preamplifiers
- 28 8-MHz filters installed in the Video Converters

In addition, for full 32-channel operation, two more video converters are required, with additional wiring in the rack to accommodate them.

The upgrade of a Standard VLBA system to basic Mark IV operation requires:

- Mark IV Field System Computer
- 6 additional Base-Band Converters
- 2 additional 2-bit sampler boards
- A formatter upgraded for 18-MHz output data rate per track
- A Write Module with transformerless monitor circuits
- A second, upgraded, Write Module
- A Read/Write Interface, modified for 18 Mb/s operation
- A second head stack with a Mark IIIA Write-only Interface

For full 32-channel operation, two more Base-Band Converters are required, if space can be found for them in the Data Acquisition Rack.