A Proposed Green Bank Interferometer Control System

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The GB Interferometer

Existing control system
Existing Telescope Hardware

- Polar mounted 85 ft. antennas
- Dual polarization S/X band Receivers
- Digital delay rack and multipliers
- DDP-116 Control Computer
New System Block Diagram

- **85-1**
- **85-2**
- **LO**
- **Sampler, 70 MHz**
- **Delay line, 0.9ns/step, 8us**
- **Delay line, 0.9ns/step, 8us**
- **D/A Converter**
- **Gain/Zero**
- **VME Chassis**
- **Supervisory/data Acquisition Computer**
- **Ethernet link**
- **New Jansky Lab control rooms**

- **Delay values**
- **125Khz serial bit stream**
- **B=35MHz**
- **Individual fiber MCB links to each telescope for front-end control and telescope control**
- **8 channels total power**
- **8 channels multiplier outputs**
- **50 or 100 Hz sampling rate**

- **Ethernet link**
New Control System Hardware

- Control Computer
- Telescope Interfaces
- Digital Delay Interface
- A-D converter
Control Computer

12 slot VME chassis

BC-635 VME IRIG-B Decoder
VIP-616 IP Carrier
MVME-167 SBC
Telescope Interfaces

- Standard MCB interface
- Relay controls
- Fiber-optic emergency stop system
Digital delay line interface

- Off the Shelf IP modules
- Delays
- Gain control and zero
BSDO datasheet
IP480 datasheet
A/D Converter

- Off the Shelf IP module
- 16 differential channels at 16 bits
- Samples at intervals determined by on-board timer
IP330 datasheet
IP Carrier Board

- Carries 4 IP modules

- A32 or A16 Addressing

- Front panel or P2 I/O connections
VIP616 datasheet
Control Software General Principles

- Reconfigurable

- Resilient
Control Software modules

- Observing control
- Procedure control
- Time daemon
- Positions daemon
- Data acquisition and fringe Fitting
- Loggers
- Alarms
Ymir slide
Control Software

- Interferometer Coordinator
  - Archivist
  - Backend Manager
  - Antenna Coordinator
    - Antenna Manager
    - Receiver Manager

- Antenna Loggers
- Receiver Loggers
- Fringe Data Loggers

Replicated for each antenna
Device Managers

- Antenna Manager
- Receiver Manager
- Backend Manager
Coordinators

- Interferometer Coordinator

- Antenna Coordinator

- Archivist
Reused GBT software

- mcTime
- Message system
- Watchdog system
- TaskMaster system
- Monitor system
- Data logger system
- User interfaces
- Support libraries
Reused GBT software libraries, Part 1

**ConfigIO** handles reading and writing configuration files in a standard manner.

**Control** is the mother of all libraries. It contains the manager classes.

**Coords** handles coordinate transformations.

**DataDesc** is a library for accessing internal manager information.

**DeviceAccess** works with the above DataDesc library.
Reused GBT software libraries, Part 2

DynamicLoader is a library for loading shared objects at run-time.

FSM is a finite state machine library.

FitsIO encapsulates Pence’s CFITSIO library to handle telescope data.

GServer is a Glish RPC server

IF provides support for calculating the frequency characteristics of an IF channel.
Reused GBT software libraries, Part 3

**MCBInterface** provides packaged classes for accessing words or parts of words on the MCB.

**Matrix** is a matrix math package.

**MesgMuxIF** is the interface to the system message multiplexer.

**MesgProc** contains all of the container classes for Messages.

**Message** implements the application or event-generating side of the Message system.
**Reused GBT software libraries, Part 4**

**PVA** is a base class to encapsulate Position / Velocity / Acceleration and duration.

**RPC++** is a C++ Interface for remote procedure calls, including a system interface for the select system call.

**Scan** provides a framework for specification of arbitrarily complex movements of a mirror.

**ScanSpec** is used to sequence through XXXSegment lists, in real-time.

**Sequencer** flushes system defined vxWorks semaphores at their defined interval.
Reused GBT software libraries, Part 5

**TaskLib** implements vxWorks task management calls on Solaris

**TimeKeeper** is used by the coordinate transformation libraries to keep track of local time.

**TimeStamp** is a class for producing and manipulating Time reference tags or TimeStamps.

**TimeStampUtil** contains a routine to set the clock on a Unix machine.

**util** is a module with utility functions and classes for getting the environment, parsing text, etc.
Conclusion