SHARC II/IRC Interface

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ABSTRACT

This document briefly describes the SHARC II instrument, its interface with other hardware at the Caltech Submillimeter Observatory, and how the Goddard Instrument Remote Control software could be used for its data acquisition.

1. SHARC II Hardware

The SHARC II hardware is sketched in Figure 1. SHARC II will have a 6-12×32 bolometer array. The acquisition computer is running Solaris 7, and the primary component of the IRC software is located on that machine. However, the user does not sit in the same room as the acquisition computer. Instead, the user runs the instrument and telescope from a SUN console in the control room. Remote logins and XWindows are used to access IRC for command entry and graphical feedback.

Caltech will be responsible for the lower level software interface to the DSP's, digital I/O, and serial devices. We intend to get the computer hardware and software ready for a test on the observatory site in August 2000.

2. Antenna Computer Interface

The acquisition computer and antenna computer are connected via ethernet. Commands to the antenna computer are sent using the OBS language, which has been used for ASTRO at the South Pole. Responses are to be displayed in the window with the command line. Antenna positional data is requested from the antenna computer after each integration.

3. User interface

The user interface displays on a separate computer from the one on which the data acquisition takes place. The interface consists of a command line, a menu bar, command palettes, and whatever

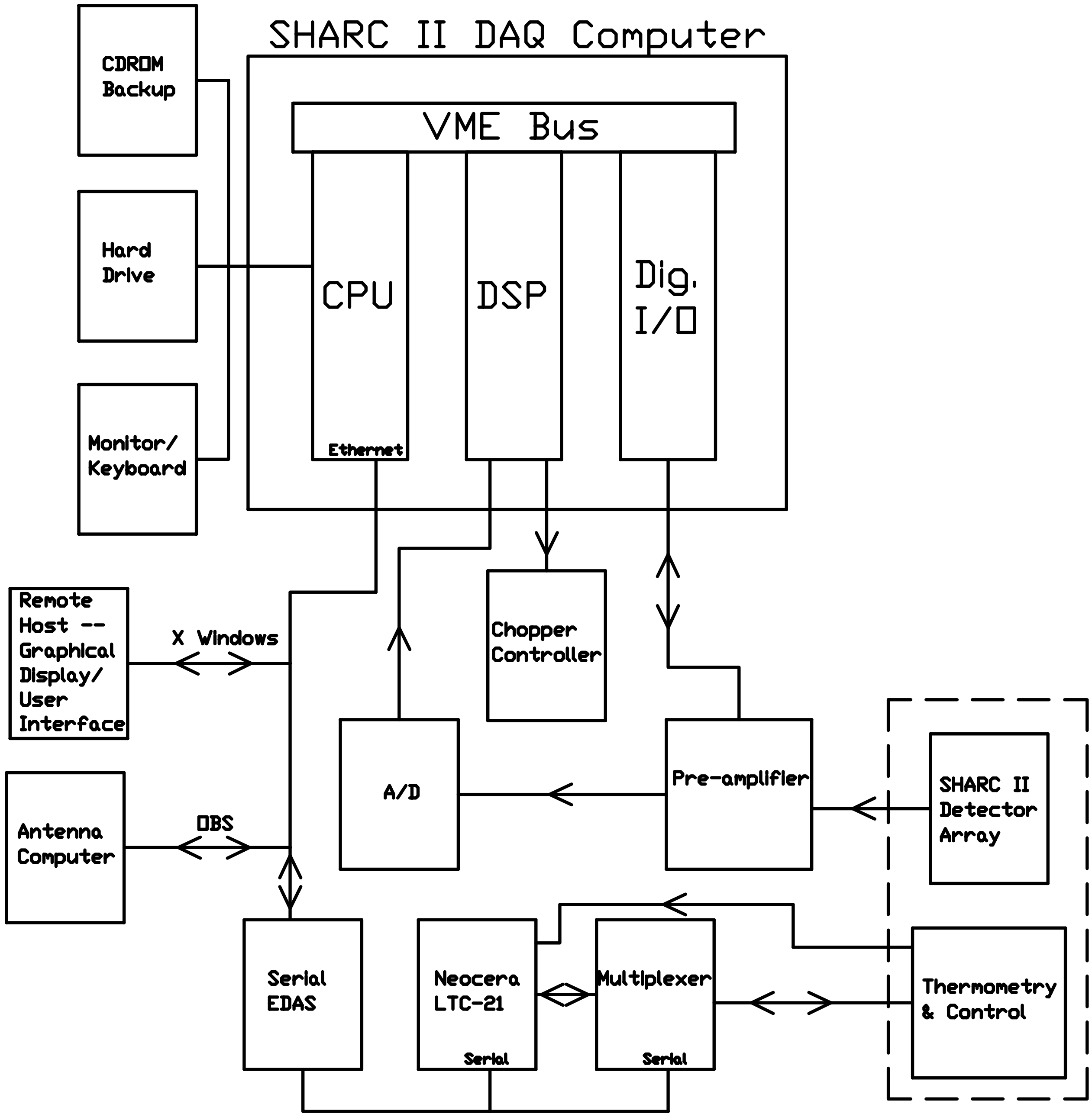

Fig. 1.— SHARC II hardware. The instrument (dotted rectangle), preamplifiers, A/D system, and serial devices are affixed to the telescope. The acquisition computer and antenna computer are located in a receiver backend rack. The remote user interface is located in the control room.

visualization windows are open at the time. The command line also has a list containing the history of commands issued and logs all commands to a file. The command palettes are sets of icons/buttons of the common commands that will open windows in which the user can enter the parameters for that command. Windows will contain appropriate defaults or the last entered parameters, if that command has been used before during the current session. There are two command palettes, one of basic commands and one of advanced commands.

3.1. Visualization Windows

1. Twinkle box for the entire array
2. Strip charts for individual pixels
3. Single pixel noise chart
4. Total array noise read-out
5. Line plots
6. Status information

Individual pixel strip charts and single pixel noise charts are obtained by clicking on the desired pixel on the twinkle box. The twinkle box, status information window, and total array noise read-out are all obtained from the pull-down menus. Line plots are graphs of a selected area of the array. If a 1-D region is being viewed, the plot shows signal vs. pixel as a single line. If a 2-D region is selected, the plot is a 3-D bar graph.

4. Data

Data originates in two places, the DSPs and the antenna computer. (See Figure 2.) The data stream from the DSPs can be regarded as continuous, with the data from the antenna computer being infrequently collected, correlated with the DSP data, and saved to file. The two streams are correlated using time stamps. The merged data are saved to the hard drive and automatically sent to analysis software. Results from the analysis software are saved to hard disk and fed to the visualization windows.

Much of the submillimeter astronomy community is familiar with the SCUBA User Reduction Facility (SURF), so we may use that for data analysis. Alternatively, analysis can be carried out by IRC software.

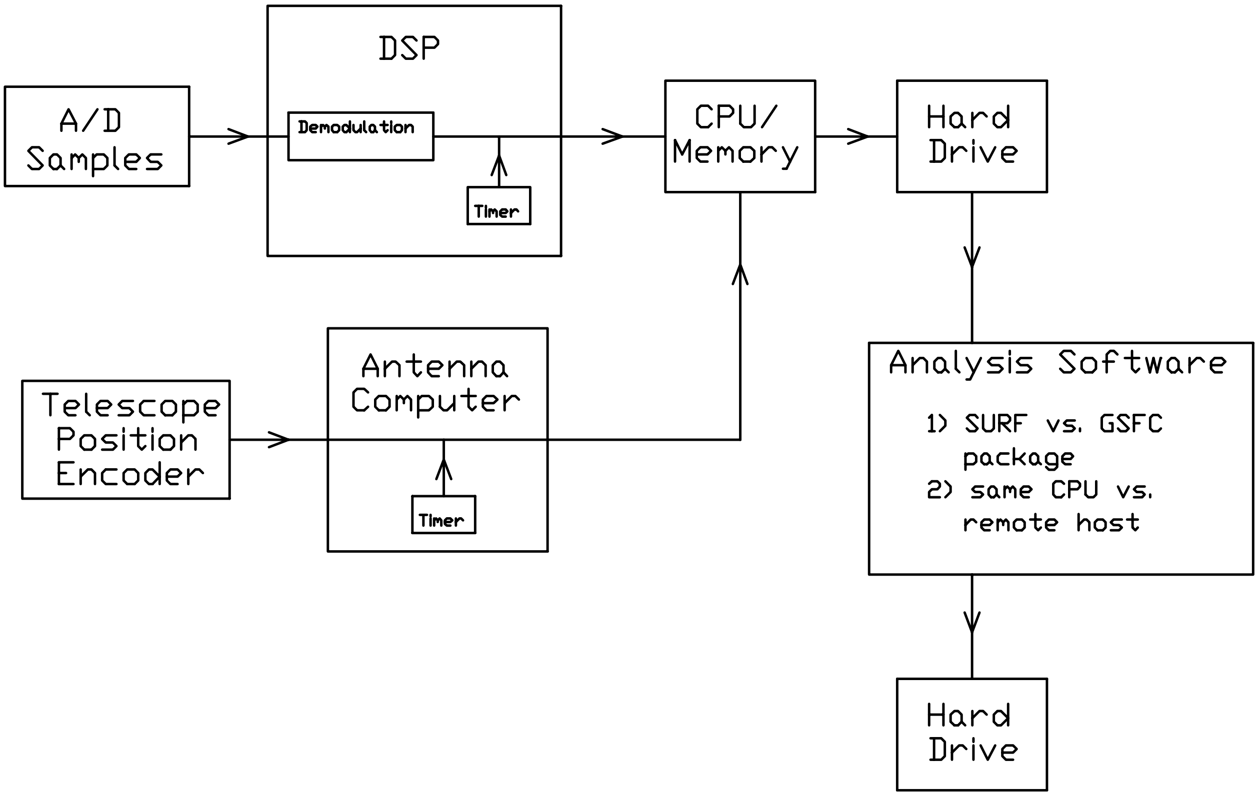

Fig. 2.— SHARC II data path.