NATIONAL RADIO ASTRONOMY OBSERVATORY
Green Bank, West Virginia

Memo No. 13

Pulsar Signal Processor

Project 2.625

PROGRESS REPORT

W. D. Brundage

September 20, 1982

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SEPTEMBER 20, 1982

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Progress to date is more conceptual than concrete. However, we are about to order the on-line computer system, a LSI-11 based system. Also, we may order a flash ADC and LSI multipliers for initial prototyping of the DFT processors.

At this point, the pulsar processor system is broken down into several functional blocks. Refer to Figures 1 and 2 in the September 1982 "Specifications Update", Memo No. 12.

Design work is progressing only on some blocks. Work on the remaining blocks will begin when time and man-power are available in order of relative importance (and convenience and interest). A list follows:

1. Dynamic range.

   a) Number of bits required in ADC and DFT pipeline to achieve > 30 dB specification.

   b) Cost savings for number bits < 8 in ADC.

   c) Person: R. Fisher.

2. ADC and DFT architecture.

   a) Define relationships between M bits, N filters, $f_{\text{sample rate}}$, K butterflies, etc.

   b) Select optimum M, N, f_s, K, etc., for observing objectives.

   c) Investigate hardware multiplexing for maximum efficiency and versatility.

   d) Compare the Stanford DFT system and the Japanese DFT system to the JPL pipeline DFT system.

   e) Specify DFT spectrometer system.

   f) Persons: W. Brundage, R. Fisher

3. ADC, Multipliers and Arithmetic Logic Units for DFT.

   a) Find availability vs. number of bits for sample rates $\geq$ 10 MHz.

   b) Acquire samples and prototype butterflies.

   c) Person: R. Lacasse

4. Quadrature DSB Mixer, LO, and Anti-aliasing Low Pass Filters.

   a) Specify.

   b) Design.

   c) Prototype.

   d) Person: R. Mauzy

5. RFI Excisers, Wide- and Narrow-Band.

   a) Specify architecture, algorithim(s).

   b) Person: R. Fisher

6. Dedisperser.

   a) Investigate gate array, memory, microprocessor, etc., architectures.

   b) Person: ?

7. Time/Frequency Merger.

   a) Investigate various gate array, memory, microprocessor architectures.

   b) Specify architecture.

   c) Person: ?

8. Controller.

   a) Define inputs -- Person: M. Damashek.

   b) Define outputs -- Person: ?

   c) Function Diagram -- ?

9. Display.

   a) Define outputs -- Person: M. Damashek.

   b) Define inputs -- Person: ?

   c) Function Diagram -- ?

10. On-Line Computer.

   a) Specify LSI-11 system and requisition.

   b) Define software functions.

   c) Define I/O.

10. (Continued:)

    d) Program.

    e) Person: M. Damashek

    f) Design I/O interface -- Person: R. Weimer

11. Computer Peripherals.

    a) Specify.

    b) Requisition.

    c) Persons: M. Damashek and R. Weimer