A MULTIPROCESSOR AIRBORNE LIDAR DATA SYSTEM

by

C.W. Wright, S.A. Bailey, G.E. Heath (672),and C.R. Piazza (CSC)

A new multiprocessor data acquisition system has been developed for the existing Airborne Oceanographic Lidar (AOL). This implementation simultaneously utilizes five single board 68010 microcomputers, the UNIX system V operating system, and the real-time executive VRTX. Remote sensing data are collected via CAMAC, GPIB, RS-232, and specialized data sources.

The original data acquisition system was implemented on a Hewlett Packard HP 21-MX 16 bit minicomputer using a multi-tasking real-time operating system and a mixture of assembly and Fortran languages. The constant evolutionary state of the AOL places substantial demands on the real-time data acquisition hardware and software, as well as the post flight data analysis software. As new data sources were added, the original data acquisition software eventually required rewriting in assembly language.

The present collection of data sources produce data at widely varied rates and require varied amounts of burdensome real-time processing and formatting. It was decided in 1985 to replace the aging HP 21-MX minicomputer with a multiprocessor system. Each data source or group of related and compatible data sources would be connected to a single dedicated microcomputer. To simplify the programming task, the "C" programming language was chosen to replace assembler completely.

A new and flexible recording format was devised and implemented to accommodate the constantly changing sensor configuration. The new format allows for the addition, modification, or deletion, of data sources with little or no impact on existing acquisition and analysis software.

A central feature of this data system is the minimization of non-remote sensing bus traffic. Therefore, it is highly desirable that each micro be capable of functioning as much as possible on-card or via private peripherals. The bus is used primarily for the transfer of remote sensing data to or from the buffer queue.

At present, the AOL data system (AOLDS) is working as planned and has been successfully flown on several missions. A paper titled "A Multiprocessor Airborne Lidar Data System" was presented in February of this year at BUSCON-88. The attached drawing is a block diagram of the current AOLDS.

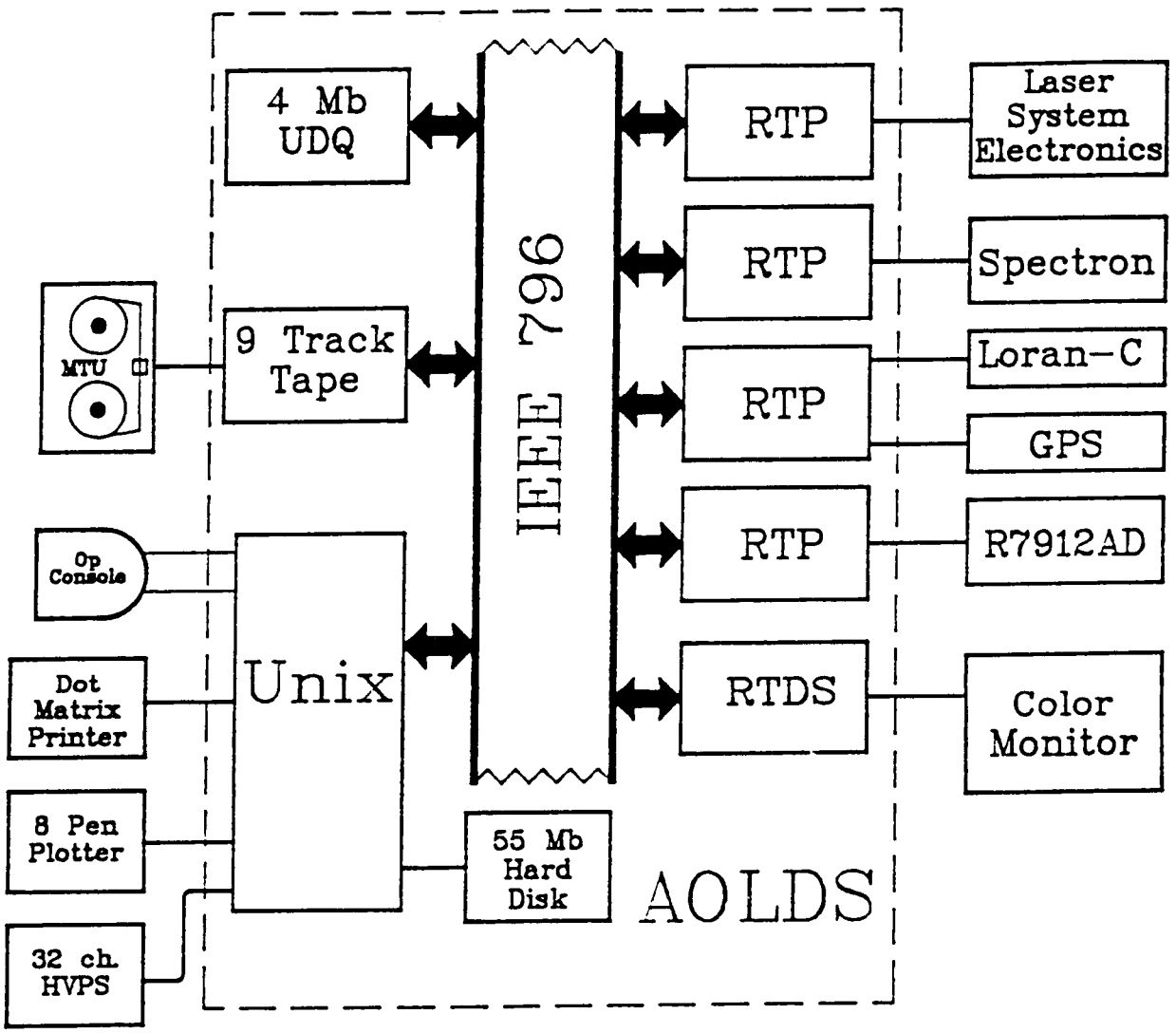

Figure 1. Data Collection System