8.3D REAL-TIME MST RADAR SIGNAL PROCESSING USING A MICROCOMPUTER RUNNING UNDER FORTH

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Since January 1983, data on power, correlation time, and velocity have been obtained at the Urbana radar using an Apple II microcomputer and a single floppy disk drive. This system includes the following features:

(1) Measurement of the real and imaginary components of the received signal at 20 altitudes spaced by 1.5 km;
(2) Coherent integration of these components over a 1/8-s time period;
(3) Continuous real-time display of the height profiles of the two coherently integrated components;
(4) Real-time calculation of the one-minute averages of the power and autocovariance function up to 6 lags (namely, 0.75 s);
(5) Output of these data to floppy disk once every 2 minutes;
(6) Display of the 1-minute power profiles while the data are being stored to the disk;
(7) Visual prompting for the operator to change disks when required at the end of each hour of data; and
(8) Continuous audible indication of the status of the interrupt service routine.

Accomplishment of this goal was made possible by two developments: first, the use of a new correlation algorithm (see paper 8.4-A); and second, the use of the FORTH language to manage the various low-level and high-level procedures involved.

Sixty minutes of binary data can be stored on each side of an Apple floppy disk, so the storage requirements are not excessive. Subsequent analysis programs, written in BASIC and compiled, permit the velocity, correlation and power values to be stored on a single disk for a typical 6-hour sequence of data.

Advantages of this approach over our previous use of a minicomputer include:

(1) Greater convenience of using a small, easily handled microcomputer.
(2) Compactness and ease of access of floppy disks compared to magnetic tape.
(3) Ease of maintenance since the system involves only 1% of the complexity of the minicomputer.
(4) Availability of directly addressable screen memory, enabling updating eight times per second.
(5) Compatibility of the output format with numerous data analysis programs written for the Apple.

The details of this program will be described in a forthcoming University of Illinois Aeronomy Report. The software is available on floppy disk from the author.