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Automatic Lightning Location System

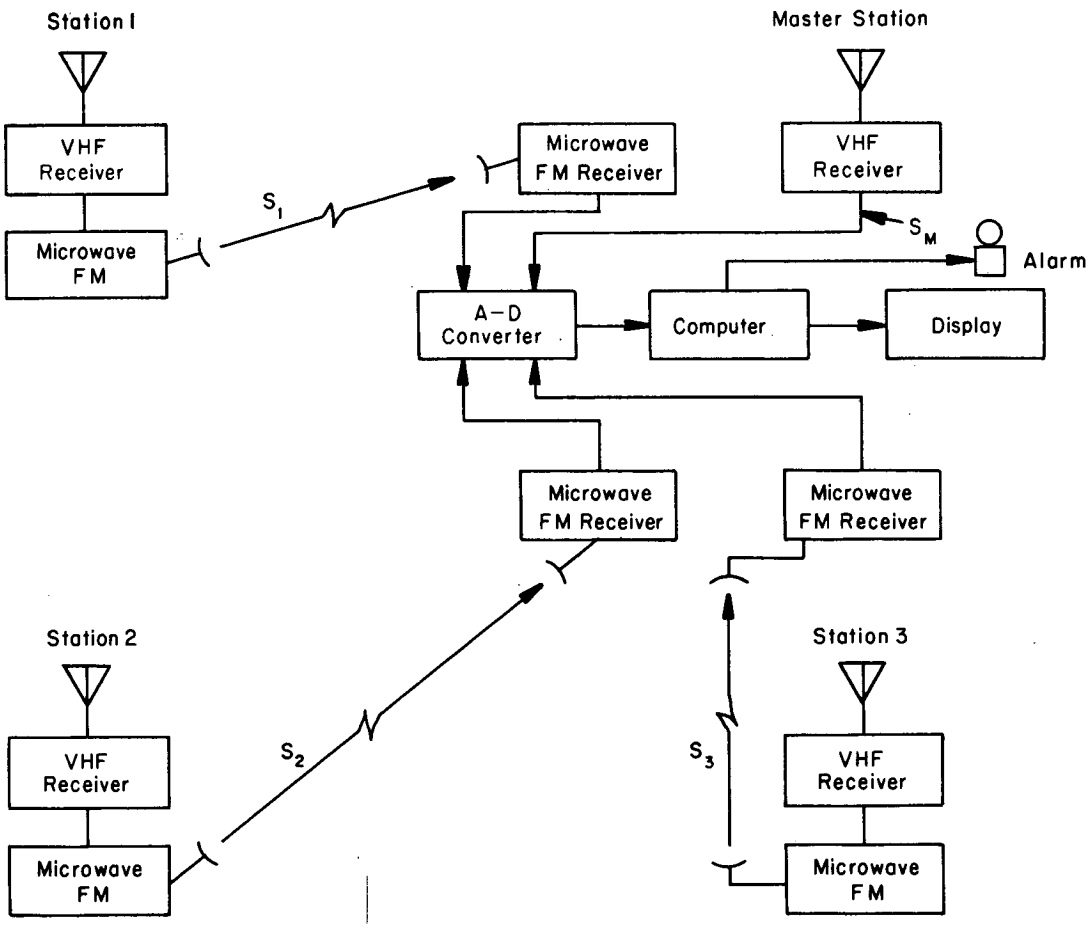

Figure 1. Block Diagram of ALLS

Hyperbolic triangulation of the vhf radiation emitted by a lightning discharge indicates the position and path of lightning storms. Three remote stations and one master station detect the signal to unambiguously locate the point of discharge. Figure 1 is a block diagram of the system.

The three remote stations transmit their received signals to the master station by FM microwave link. The

(continued overleaf)

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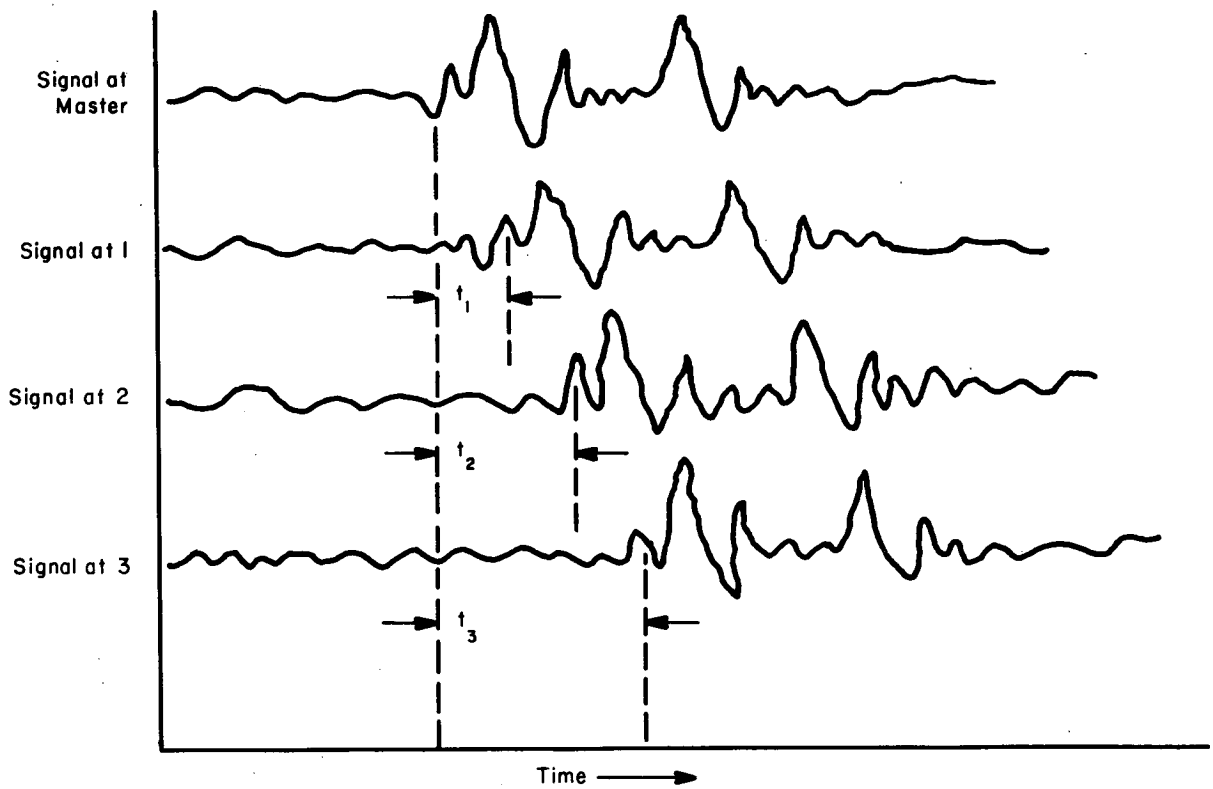

Figure 2. Waveform Matching for Time Difference Measurement

signals are digitized in an analog-to-digital converter, fed into a computer and cross-correlated with the signal received at the master station. Waveforms are matched by positioning the signals along the time axis until they are most nearly superimposed with that received at the master (Figure 2). All signal arrival times are related to the arrival time at the master station, eliminating precise clock synchronization at each station. The computer processing compensates for the data transmittal times between the remote stations and the master so the time delays in the signals are due only to the difference in distance from the lightning discharge.

Since a hyperbola is the locus of all points whose difference in distance from two fixed points is constant, three hyperbolas can be drawn using the master station and each of the remote stations as foci. The difference in arrival times between the master and individual stations is the constant. The point of discharge must lie on each of the hyperbolas simultaneously; i.e., at the intersection.

This innovation may be of interest to large electric power companies, pipeline companies, forest fire lookout centers, and airports.

Note:

Requests for further information may be directed to:

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Patent status:

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