

# NASA TECH BRIEF



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## Crossed-Beam Technique for Measuring Horizontal Winds

### The problem:

To investigate the theory of wind velocity measurement by crossed-beam detectors, and to develop a design technique using three single-beam detectors to measure horizontal wind velocity components accurately.

### The solution:

With properly oriented detectors, winds approximately constant near a selected height, blowing into or out of a 90-degree arc can be calculated with reasonably small error. The accuracy, which depends on both wind velocity and direction, is at least as good as 13% of the velocity and within 16 degrees of the direction, if the uncertainty in observation time measurement is at most  $\pm 0.1$  sec.

### How it's done:

In general, three ground-based single-beam detectors are sufficient to determine wind vectors present within a given volume. However, the analysis of the general, three-dimensional case, involves rather complex mathematics. If the wind to be measured is horizontal, an assumption that is often justified in

practice, the analysis may be accomplished using a much simpler geometry.

The many arbitrary parameters which enter the design problem are finally reduced to only two by consideration of efficiency, size limitation, and error reduction.

This design technique should interest meteorologists, physicists and personnel involved in weather detection research.

### Note:

1. Documentation is available from:  
Clearinghouse for Federal Scientific  
and Technical Information  
Springfield, Virginia 22151  
Price \$3.00  
Reference: TSP69-10447

### Patent status:

No patent action is contemplated by NASA.

Source: W. H. Heybey of  
Aero-Astrodynamics Laboratory  
under contract to  
Marshall Space Flight Center  
(MFS-20160)

Category 02