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NEW WINDSHEAR SENSORS A GOVERNMENT-INDUSTRY SUCCESS STORY

Representatives from NASA, the Federal Aviation Administration (FAA) and industry today told how they worked together to take windshear advance-warning devices from the drawing board to the commercial aviation marketplace in just 5 years.

"A few years ago, almost nobody thought these sensors would work. Now, companies are putting ads in trade magazines saying, 'Call this 800 number for information on our product'," said Herbert Schlickenmaier, program manager at NASA Headquarters. "It's a true government-industry success story."

"The results of this cooperative effort between the FAA, NASA and industry demonstrate what can be achieved when government agencies work together and with industry to increase safety for the travelling public," said George C. "Cliff" Hay, FAA airborne windshear program manager. "At this time the Certification Office is processing several windshear detection devices for industry and approval is expected within weeks. Many firm orders for production equipment have been placed."

The windshear reports, part of a NASA/FAA conference in Hampton, Va., detailed development of microwave radar, laser radar and infrared sensors that provide up to 40 seconds warning of windshear-- sudden, violent changes in wind speed and direction that can endanger aircraft. NASA/FAA studies have shown that pilots can avoid or fly through windshear safely if they have enough warning that the hazard exists ahead of their aircraft.
Windshear was a factor in air accidents that caused at least 500 deaths from 1964 to 1985. In 1986, NASA and the FAA began a joint windshear research program that included studies of the hazard itself and flight tests of the advance-warning sensors.

In 1988, the FAA ruled that airlines had to install reactive windshear instruments, which alert pilots only after they encounter the hazard, in their planes by the end of 1993. But four airlines—Continental, Northwest, American and now-defunct Eastern—asked for and got waivers until 1995 so that they could examine NASA's work on advance-warning sensors.

"The FAA decision really transformed NASA's windshear program," said Schlickenmaier. "Now there would be real airplanes that real companies would want to plug NASA technology into." NASA's Langley Research Center in Hampton focused on detecting windshear with Doppler microwave radar, which is much like the radar that shows images of storms on TV weather reports. NASA personnel developed signal-processing mathematical formulas and built hardware used in the windshear research.

Langley worked closely with several aviation electronics firms that wanted to develop and market commercial versions of radar windshear sensors: Rockwell International's Collins Air Transport Division, Cedar Rapids, Iowa; Westinghouse Electric Corp., Baltimore; and Bendix Corp., now part of Allied-Signal Aerospace Company, Ft. Lauderdale, Fla.

NASA gave private companies information about the windshear hazard and NASA's work on forward-looking windshear radar technology. In turn, firms shared the results of their research. The arrangement greatly accelerated the transfer of technology from the NASA/FAA program to industry.

In a related effort, NASA contracted with Lockheed Missiles and Space Co., Sunnyvale, Calif., to develop a laser radar, or LIDAR. LIDAR finds windshear by reflecting laser beams off tiny particles moving in a storm. It works better in dry conditions than in heavy rain.

A third windshear sensor, a passive infrared device that picks up temperature differences inside a microburst, was produced by Turbulence Prediction Systems, Boulder, Colo. The work was part of NASA's Small Business Innovation Research (SBIR) program, which teams small companies with the government to do research.

NASA's Boeing 737 successfully tested the microwave radar and infrared sensor by flying toward -- and often into -- microbursts around the Orlando, Fla., area in 1991. The LIDAR was added for further tests in Orlando and Denver in 1992. Research aircraft from Rockwell International, Westinghouse and Allied-Signal performed similar tests to evaluate each firm's own Doppler radar systems.

Although not formally part of the NASA/FAA windshear program, Continental Airlines, Houston, has equipped three of its airliners with microwave radar, infrared and reactive windshear sensors to get engineering data under real operating conditions. The company will use the information to decide what systems to put in its aircraft.

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