

measurements and calculations have shown that when foil thicknesses or particle sizes are reduced to $<25\ \mu\text{m}$, eddy currents become unimportant.

We have performed low-temperature test (see figure) of a cobalt-based magnetic material made by Honeywell called Meglas 2714A, which has very

high permeability at room temperature and is available in form of tape-wound cores of various sizes. These cores are wound from $18\text{-}\mu\text{m}$ thick ribbons to reduce eddy current for high-frequency operations. The relative permeability is higher than 10,000 at frequencies up to 100 kHz, the limit of capability of our

measurement. EMI filters made from this material should work at low temperature.

This work was done by Talso Chui and Hung Quach of Caltech for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1). NPO-30901

Lightweight Electronic Camera for Research on Clouds

This camera would rapidly acquire image data on aerosol particles.

Goddard Space Flight Center, Greenbelt, Maryland

“Micro-CPI” (wherein “CPI” signifies “cloud-particle imager”) is the name of a small, lightweight electronic camera that has been proposed for use in research on clouds. The Micro-CPI would be incorporated into a small autonomous or remotely piloted airplane of a type that is now used in meteorological research and that is capable of remaining aloft for times long enough (typically about 30 hours) to collect statistically significant sets of data.

According to a preliminary design, the Micro-CPI would have a mass $<1.5\ \text{kg}$ and would consume less than 7 W of electric power. It would acquire and digitize high-resolution ($3\text{-}\mu\text{m}$ -pixel) images of

ice particles and water drops at a rate up to 1,000 particles (and/or drops) per second. The Micro-CPI incorporates a particle detection laser that triggers the camera imaging laser, and also counts and sizes very small ($<1\text{-}\mu\text{m}$) aerosol particles and cloud drops up to about $100\ \mu\text{m}$ in diameter. The Micro-CPI could record data for an observation time of more than 30 hours and could operate autonomously.

Although a quantitative estimate of the cost of the Micro-CPI is not yet available, it has been projected that the cost would be low, relative to the costs of cameras of conventional design that could offer the same imaging capabili-

ties. This is fortunate because there could be a potential need in the coming years to launch hundreds or even thousands of small uninhabited aircraft carrying cameras of Micro-CPI design as part of an effort to measure properties of clouds on a global scale. There are also potential applications in the measurement of drop-size distributions in sprays, especially in the agricultural and painting industries.

This work was done by Paul Lawson of SPEC Inc. for Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-14950-1

Pilot Weather Advisor System

Cockpit displays of weather affecting flight are updated every five minutes.

John H. Glenn Research Center, Cleveland, Ohio

The Pilot Weather Advisor (PWA) system is an automated satellite radio-broadcasting system that provides nearly real-time weather data to pilots of aircraft in flight anywhere in the continental United States. The system was designed to enhance safety in two distinct ways: First, the automated receipt of information would relieve the pilot of the time-consuming and distracting task of obtaining weather information via voice communication with ground stations. Second, the presentation of the information would be centered around a map format, thereby making the spatial and temporal relationships in the surrounding weather situation much easier to understand. Starting in the early 1990s, the PWA system was developed by ViGYAN, Inc., under the NASA SBIR program. The system recently became

commercially viable and was sold to WSI, a leading provider of weather services in aviation. The system is now marketed under the brand name “WSI InFlight.”

The PWA system includes a ground processor (see figure), wherein a computer running special-purpose software converts, compresses, and schedules the weather data. The compressed data are then transmitted through a ground station to a geosynchronous satellite, from whence they are broadcast to cover the continental United States. The signal is acquired by a light, low-drag antenna mounted on a subscriber's aircraft, and is then interpreted by an equally lightweight receiver. In the cockpit of each InFlight equipped aircraft, the data are processed, by use of other special-purpose software and hardware, into an

easy-to-interpret graphical display. The display is presented on a portable or panel-mounted unit. The data, which include graphical meteorological aviation reports (METARs), terminal aerodrome forecasts (TAFs), and Next Generation Weather Radar (NEXRAD) images, as well as other weather products, are updated every five minutes.

Accessibility of the system to light general aviation was a design goal because such airplanes are more susceptible to changes in weather than are larger, higher-flying airplanes. The lightweight, low-drag nature of the PWA airborne components and the relatively low cost of acquiring and using the equipment make the PWA system affordable for incorporation into lower-cost single-engine airplanes, which constitute the largest segment of the aviation market. Hence,