A life-saving satellite beacon heads a list of technology transfers for improving safety and the environment

Tracking the Double Eagle

Last summer a trio of aeronauts made aviation history. Ben Abruzzo, Maxie Anderson and Larry Newman, all of Albuquerque, New Mexico, piloted their balloon *Double Eagle II* from Presque Isle, Maine to Miserey, France, some 50 miles from Paris. They were the first to negotiate a successful Atlantic crossing in a freeflying balloon after a score of attempts over a span of more than a century.

A year earlier, Abruzzo and Anderson had made an unsuccessful try in their predecessor balloon *Double Eagle.* On that occasion, a NASA-developed satellite beacon helped save their lives.

Carried aboard the balloon, the simple, seven-pound beacon continuously transmitted signals to NASA's Nimbus-6 satellite. Nimbus relayed the signals to monitors at Goddard Space Flight Center, enabling Goddard to compute the balloon's position. Position reports were then telephoned regularly to *Double Eagle's* control center at Bedford, Massachusetts. This monitoring system proved invaluable when the balloon encountered trouble several days after liftoff.

Caught in a massive, swirling storm, *Double Eagle* was forced down off Iceland. Heavy rain made voice communication impossible. But thanks to the beacon, Nimbus-6 and Goddard's tracking, the downed balloon's position was known. A Navy rescue plane promptly arrived on the scene.

Needless to say, the beacons—two of them this time—were aboard *Double Eagle II* on last year's successful crossing. Afterward, Abruzzo and Anderson visited Goddard Space Flight Center to express their thanks for NASA's tracking assistance on both flights and for saving their lives on the first attempt. The beacons, said Abruzzo, were "the most important pieces of equipment aboard."

The beacon figured in other headline-making events last year; it was carried by Japanese explorer Naomi Uemura on two Arctic expeditions. The first was a 54-day solo dog-sled trek from Ellesmere Island in Canada's Northwest Territories across 600 miles of Arctic wasteland to the North Pole. Later, Uemura dog-sledded the length of Greenland, some 2,170 miles.

On both trips, Goddard tracked Uemura's progress by means of Nimbus-relayed signals. Both journeys were successful and no rescue was needed, but Uemura's beacon had a special switch to indicate emergency as a backup to his voice communications. The beacon served another purpose: the Smithsonian Institution, which requested NASA participation, wanted an accurate record of Uemura's daily positions for correlation with snow, ice and air samples he was taking. Beacon cost was defrayed by Uemura's Japanese sponsors, Mainichi Newspapers and Bungei Shunju Publishing Company. The National Geographic Magazine also supported the project.

Still another Goddard effort last year involved tracking a Smithsonian scientific expedition across the desolate Western Desert of Egypt. In other applications, the beacons are extensively used on buoys to track currents for oceanographic and environmental studies. The U.S. Coast Guard puts beacons on icebergs, to help predict their drift routes in the waters off Greenland and Labrador as an aid to the International Ice Patrol. And in ecology studies conducted by the Department of the Interior, a mini-version of the beacon has been used to track polar bears in their Arctic wanderings.

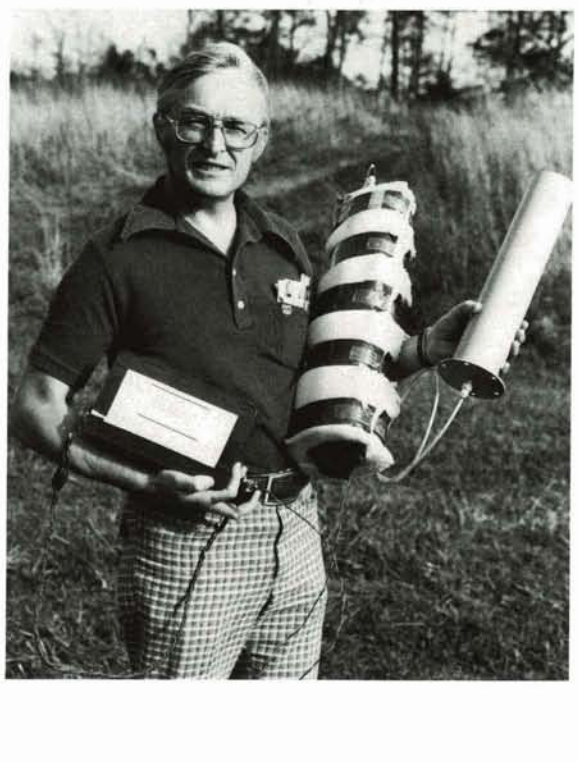
The relatively low-cost beacon—officially the Random Access Measurement System (RAMS)—was originally developed by Goddard for a major meteorological experiment in which Nimbus-6 gathered data from some 450 balloons free-floating in tropical areas. Such location and interrogation of weather platforms was not new, but beacons used in earlier work were expensive and they also used large amounts of transmitting power. Innovations in Nimbus-6 permitted development of the simple, economical, low-power RAMS.

The beacons are manufactured by Handar, Inc., Santa Clara, California. In a new development, Handar has repackaged the satellite beacon technology in a hand-held, battery-powered Emergency Location Transmitter which allows the receiving satellite to pinpoint the source of the signals. The principal application is for rescue utility aboard private aircraft flying over sparsely-populated areas.

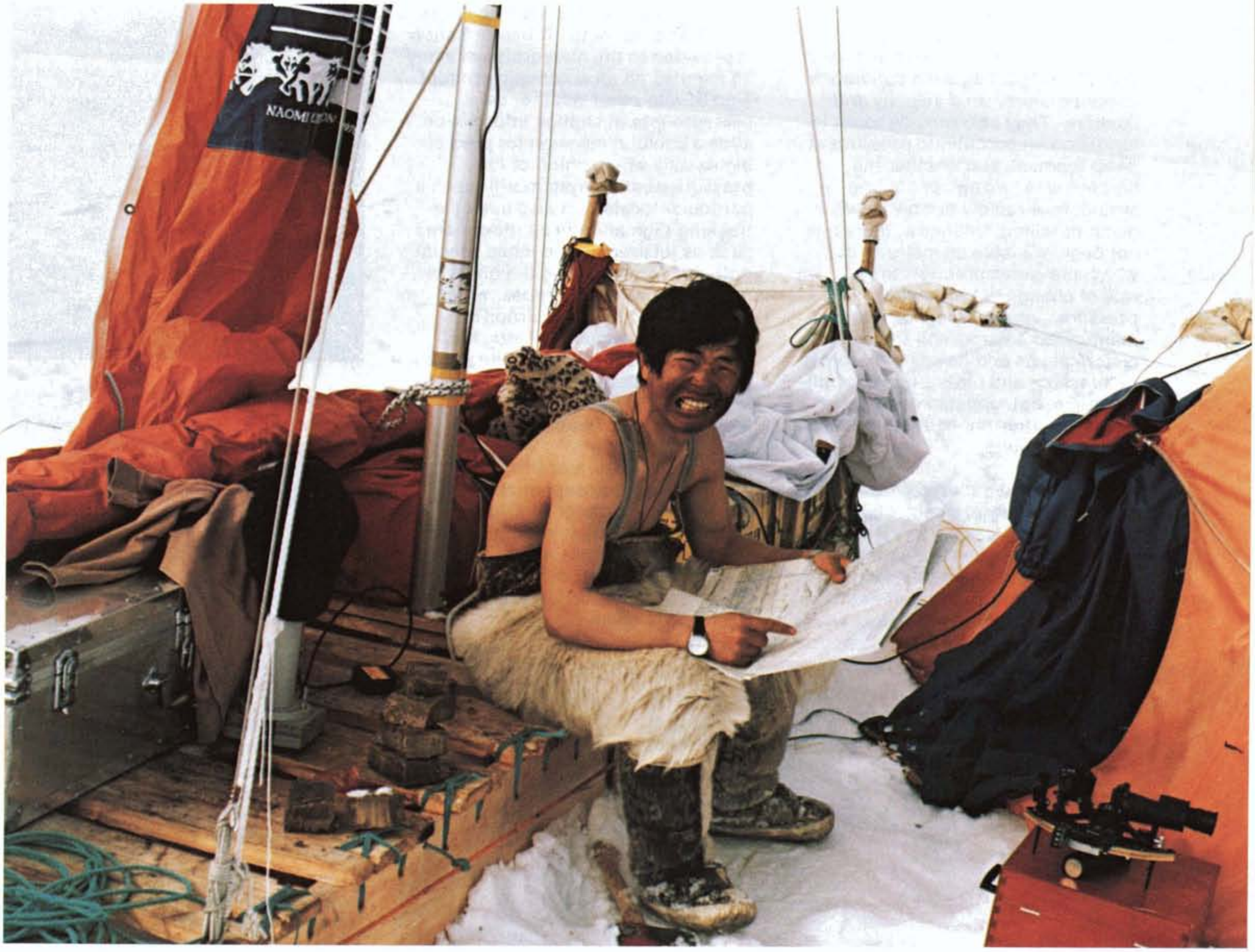
Double Eagle II *is shown over Brittany, France as it neared the end of a momentous journey last year, the first successful transatlantic balloon flight. The balloon carried a NASA satellite beacon which had helped save the lives of two crewmen on an earlier attempt to cross the Atlantic.*

Bungei Shunju
Magazine, Tokyo

Arctic explorer Naomi Uemura is pictured at the North Pole after a 600-mile dog sled trek from northwestern Canada. The equipment on his sled included the NASA beacon, whose satellite-relayed signals enabled Goddard Space Flight Center to track Uemura's progress.



A NASA engineer displays the three components of Goddard Space Flight Center's satellite beacon: at right, the antenna; in the center, the signal transmitter; and at left the battery pack.



Naomi Uemura pauses to consult his map during a second 1978 Arctic exploration on which he dog-sledded the length of Greenland. The hooded instrument at Uemura's right is the NASA beacon which provided a record of his daily positions. The information was used to determine locations of snow, ice and air samples he collected.

Bungei Shunju Magazine, Tokyo