checking of flight data but would not independently check on a plane's location at sea.

Navstar, an Air Force satellite project, might be able to provide an independent check anywhere on the earth's surface. It is supposed to enable a ship or plane, or even a soldier fitted with a special backpack, to use its precise atomic-clock signal to fix the receiver's location by triangulation to within 100 meters—or with better equipment, within tens of meters. As happens with military gadgets, this one has proved more expensive than originally planned. For this reason and because Navstar could be used or attacked by enemies, the Defense Department briefly lost interest in it. Navstar was put far down on the Pentagon's wish list. In 1981 the House Armed Services Committee zeroed it out of the budget. Then Navstar was rescued in 1982, partly because congressmen like Glickman were interested in its civil uses.

In saving it, the military authorization bill of 1982 imposed some new requirements. It asked the Pentagon to open Navstar to civilians and redesign the system to include a user's tax. One goal was to shift some of the costs out of the Defense budget. If allowed to stand, this decision would make Navstar the only U.S. navigation system for which there is a fee. In addition to spending $10,000 to $20,000 per vehicle for receiving equipment, airlines and others would pay several thousand dollars per year per receiver. This prospect and the fact that the signal was going to be "fuzzed up" to discourage unauthorized use seemed likely to kill commercial interest.

In the aftermath of the Korean disaster, however, Congress seems ready to give the concept a new push. If Percy's resolution is approved, all taxpayers will foot the Navstar bill. It will not be small.

Seven experimental satellites are now aloft. The full system will require about 18 operational spacecraft, three orbiting spares, and seven spares on the ground. The primary contractor, Rockwell International, 2 months ago won approval from the Air Force to begin producing the satellites, for a price of $2.5 billion. Launching and operating them will cost extra. Six years ago, the U.S. airlines shot down a civilian proposal known as Aerosat, which would have aided navigation and communication at sea, because it seemed too expensive at less than one-tenth this price.

In the meantime, a private company in Princeton, New Jersey, is trying to establish itself in the very same marketplace. This is Geostar, headed by Gerard O'Neill, a particle physicist, advocate of space industrialization, author of the book *2081*, and president of the Space Studies Institute in Princeton. With self-assurance, he says that Geostar—still a concept more than a tangible thing—will not compete with Navstar because it will be so much better and cheaper.

O'Neill is reluctant to discuss his project just now, for he has applied to the Federal Communications Commission (FCC) for a special allocation of radio frequencies, and the period of public comment is still running. When the docket closes later this fall, he plans to hold a press conference and announce the (presumably favorable) results of a test in California intended to simulate the Geostar system.

As disclosed in the FCC docket, Geostar would consist of three satellites in geostationary orbit, a ground station with massive computing facilities, and thousands of small transponders operating at microwave frequency. The latter would be used not just by airplanes (O'Neill thinks this will be less than 10 percent of the market) but by rail cars, trucks, and ordinary autos. The fundamental difference between this system and Navstar is that Navstar requires very sophisticated, nontransmitting analytical equipment in each receiver, while Geostar puts all the sophistication into the ground station. Users would communicate with the station through "stupid" but noisy transponders, each costing in the range of $200 to $400, according to O'Neill. Another important distinction is that Navstar would tell the receiver its own location, while Geostar would give this information to the receiver and a central tracking office.

As valuable as these satellite systems could become, right now they face major obstacles, some of which are nontechnical. For example, the FAA in December 1981 adopted a sweeping air traffic control scheme, the "National Airspace System Plan," and in 1982 won authorization to begin buying equipment to carry it through the end of the century. The plan does not include Navstar or any space-based scheme for guiding aircraft.

The reason for the omission, says an FAA official, is that no such system is available now. It would be irresponsible for the government to count on something that has not been tested. The logic is sound, but there may be another bureaucratic rationale at work here as well, the logic of inertia. If so, it has been reinforced by the airlines' reluctance to get involved with what they apparently view as a 21st-century luxury.

—**ELIOT MARSHALL**

New CDC Director Is Named

James O. Mason, executive director of the Utah Department of Health, has been named the new director of the Centers for Disease Control (CDC) in Atlanta, Secretary of Health and Human Services Margaret Heckler announced last week. Mason will replace current director William Foege, who last spring announced his intention to resign after 6 years as agency chief. Foege plans to spend more time on research and international programs at CDC.

Mason, 55, received his medical degree from the University of Utah and a doctorate in public health from Harvard. He is quite familiar with the workings of CDC. Mason served 11 years at CDC from 1959 to 1970, working in epidemiology and the bureau of laboratories. He was CDC deputy director from 1969 to 1970 under David Sencer's directorship. Mason has directed the Utah Department of Health for 4 years.

Mason's appointment is being well received by J. Donald Millar, head of the National Institute of Occupational Safety and Health, a branch of CDC. Millar, who was himself a front runner for the job, said that Mason is "an excellent choice." According to Millar, Mason was one of the first scientists in the United States to link contaminated shellfish with development of hepatitis in humans.—**MARJORIE SUN**

A PAC for Star Wars

The innumerable political action committees already gearing up for Campaign 84 were joined last week by a new one: the American Space Frontiers Committee (PAC), dedicated to making a program of space-based missile defense known as the High Frontier strategy "the prime defense issue in the 1984 elections."

The new PAC intends to help finance the campaigns of people who support its goals. The High Frontier strategy, which was conceived well before President Reagan's "Star Wars" speech of 23 March, is the brainchild of retired Army Lieutenant General Daniel O. Graham, former