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

head of the Defense Intelligence Agency, director of High Frontier, Inc., in Washington, and chairman of the new PAC. Graham's program would start with a ground-based missile defense system around MX silos (thereby contravening the 1972 treaty restricting antiballistic missiles), and then over the next 10 to 15 years evolve toward a global system of 432 killer satellites that would destroy hostile ICBM's with infrared-homing missiles, or perhaps with laser or particle-beam weapons. In addition, Graham's $35-billion plan calls for solar power satellites, a high-capacity space shuttle, and a military space station with provisions for "fly-along" of civilian experiments.

Graham, like Reagan, sees this kind of orbital defense system as an alternative to the current defense strategy of Mutual Assured Destruction. His theme—"A strategy of Hope for Americans and Free People Everywhere"—seems to have struck a chord. President of the new PAC is Robert Dornan, formerly a Republican congressman from California and before that a talk-show host in Los Angeles. The host committee for the PAC's inaugural breakfast meeting on 29 September included such luminaries as former astronaut Buzz Aldrin, science fiction author Robert A. Heinlein, Senator Jesse Helms (R–N.C.), the Reverend Jerry Falwell, Admiral Thomas Moorer, Claire Booth Luce, and Phyllis Schlafly. Already, the new PAC has raised some $100,000 toward its goal of $1 million.

—M. MITCHELL WALDROP

Reagan Gives Blessing to Federal Labs' Reforms

President Reagan has endorsed the recommendations for reform of the federal laboratories made by a White House Science Council panel (*Science*, 29 July, p. 438) and told Executive Office officials that he wants a progress report on the response of the agencies involved by mid-1984.

In a 5 August memorandum to the heads of departments and agencies that operate the federal labs Reagan said that he was directing the Office of Science and Technology Policy (OSTP) and the Office of Management and Budget (OMB) to lead an effort to implement the review panel's recommendations. He said he wanted OSTP and OMB to report back on progress no later than 1 July 1984.

A few days before the memo was issued, review panel chairman David Packard and OSTP director George A. Keyworth, II, discussed the panel's findings with Reagan and members of his Cabinet in a session that lasted about an hour. Such attention to R & D issues from the President and Cabinet members has been rare since the days of the Eisenhower, Kennedy, and early Johnson Administrations when, by comparison with later periods, the President's science adviser and President's Science Advisory Committee were on a hobnobbing basis with the President and Cabinet members.—JOHN WALSH

Airliner Incident Affects Soviet–U.S. Exchanges

Soviet–U.S. bilateral cooperation in science and technology was further jolted as a result of the Soviet attack on the Korean airliner, but the exchanges are still operating at a reduced level.

U.S. actions in response to the incident produced some ironies. The single intergovernmental exchange program in science and technology canceled as a result of the attack was one on transportation research that concentrated on work on air safety. The Administration also announced it would indefinitely suspend negotiations which had recently been resumed with the Soviets on a general agreement on academic, scientific, and cultural exchanges. The official U.S. position prior to the incident was that no such agreement to resume talks had been reached.

The fate of the transportation program appears to have been in part due to timing. The program's 5-year term had officially expired on 19 June, but the two countries had agreed informally to continue to discuss a renewal. After the attack on the airliner, President Reagan ordered the negotiations ended, effectively killing the program. An atomic energy research program had also officially expired in June, but was renegotiated and signed in July, well before the downing incident.

The transportation exchange program which included projects on microwave landing systems, navigation aids, and collision avoidance, was regarded as important to international air safety by U.S. officials and an attempt will apparently be made to continue at least parts of it under trilateral arrangements, including the British as well as the Soviets.

The major disruption to the exchanges caused by the incident occurred in mid-September when the Soviet government ordered 20 Soviet scholars who had just arrived in the United States to begin exchanges at U.S. universities to return to the Soviet Union. A Soviet embassy spokesman in Washington said that the action was prompted by concern that because of the atmosphere of recrimination in this country, the scholars might be subjected to harassment or physical abuse. A State Department official said that the possibility that the Soviet scholars will come here for the spring semester is being left open. A small number of U.S. scientists involved in the exchanges have either remained in the Soviet Union or entered the country since the airliner incident occurred.

The private science and technology exchange program administered by the U.S. National Academy of Sciences is operating under the conditions that prevailed before the attack on the airliner (*Science*, 22 July, p. 346). Activities under both the intergovernmental and private exchange agreements were reduced on U.S. initiative as a result of the Soviet occupation of Afghanistan and imposition of martial law in Poland.

In the absence of a general agreement on both cultural and scientific exchanges, the two countries will apparently continue making ad hoc decisions as individual exchange programs come up for renewal. U.S. decisions have been based primarily on assessments of the usefulness of particular programs to this country and on the then current state of Soviet–U.S. relations. The next program up for renewal among the seven surviving science and technology programs, dating from the early 1970's, is one in housing technology which will require a decision in December.

—JOHN WALSH