

all-metal mirror, but should be built at an arid, high-level site because water vapor in the atmosphere absorbs infrared radiation.

No price tag for any of these recommendations was set by the panel.

The present state of funds for basic science facilities in the budget is poor. The National Science Foundation is cutting this year's spending by 10 per cent and will shrink next year by even more. And the Navy, another traditional supporter of astronomy, last week announced a cutback of 2,400 jobs at 15 research laboratories. Given the dollar drought, astronomers privately declare that although they would like to see all recommended facilities placed in operation, the most feasible—and the most urgent as far as time is concerned—is a 60-inch instrument in the Southern Hemisphere. ◇

TOIL AND TROUBLE

Cracks in the ivory tower

As America's college and university administrators open their campuses this fall, they are finding themselves caught between the hot fire of student anarchists and the cold wind of the draft. And over it all stands a Congress, bearing down on student protests, and a Department of Defense, growing skeptical about faculty members who accept Federal research money while publicly denouncing Federal policy.

Student demonstrations or disturbances have already occurred this fall on a number of campuses—most notably Columbia University's which was closed by a student insurrection last spring (SN: 5/25, p. 493).

While the more radical students have no less a purpose than total social revolution—at least according to Mark Rudd, leader of the Columbia disturbances—the moderates have various programs for here-and-now reform of their universities. Some administrators, like Columbia's new president Andrew W. Cordier, who set up committees of faculty members, administration officials and students to consider a thorough reshaping of the university's organization, are moving in with reform programs in an attempt to split the moderates away from the radicals. How much success they will have remains to be seen.

Some observers see the demonstrations as the Spock-raised, permissive generation's attempt to turn the whole world into its playpen.

Other observers take a grimmer view. FBI Director J. Edgar Hoover warns the country's law enforcement agencies that "these militant extremists are not simply faddists or college kids at play. . . . It would be foolhardy for educators, public officials, and law en-

forcement officers to ignore or dismiss lightly the revolutionary terrorism. . . ."

Congress seems to agree with Hoover. Recently a House-Senate conference committee voted to permit—but not require—university administrators to deny Federal funds to students supported by the Higher Education Act if they are convicted of a crime involving use of force, disruption of campus activities or seizure of college property, or who willfully refuse to obey lawful orders of college authorities.

The Senate tacked a similar amendment onto the appropriations bill for the Departments of Labor and Health, Education and Welfare.

Meanwhile the same beleaguered administrators are trying to prepare their graduate schools for the still-pending threat of Selective Service. New regulations last spring (SN: 3/23, p. 281) changed graduate students from a safely deferred class to the most eligible for induction. Deans predicted that graduate schools would be emptied.

So far there has been no such depopulation, but deans attribute the maintenance of graduate enrollment to the unusually low draft calls of the last few months and to willingness of students to take a chance. They are now worried about what will happen when the second semester starts in February.

INEVITABLE SWINGER

SST: fixed wing for now

The variable-sweep wing has almost certainly been designed out of the U.S. supersonic transport. It has recently been the cause of troubles with the F-111 fighter as well. Nevertheless it may still have a bright future.

The wing system has promise at least as great as the problems it currently faces. It offers plenty of wing area for control and lift at low speeds, then allows the pilot to sweep most of the surface out of the way during supersonic flight, when it would only cause unwanted drag.

The Boeing Co., contract winner in the United States' supersonic sweepstakes, has conceded that the swing-wing will not be a part of its SST design—although the concept was a key factor in getting Boeing its contract. Boeing has shifted gears and is now devoting most of its design energies to a fixed wing rather like the one Lockheed Aircraft Co. had submitted in the contract competition.

The swing-wing is in more trouble with the SST than with the F-111. A swing-wing big enough for a commercial airliner poses problems that a small, fighter-sized wing does not.

Because a swing-wing must withstand the stress of being moved dur-

Betty M. Vetter, executive director of the Scientific Manpower Commission, estimates: "In engineering, mathematics and the physical sciences we can expect the loss of about three half-classes of entering graduate students . . . and three half-classes of Ph.D.'s a few years later."

Even faculty dissenters, who are presumably older and wiser than the students, are coming in for governmental slaps. Some months ago a group of mathematicians, many of whom are supported by the Defense Department, signed an advertisement against the war in Vietnam. They have now received letters from the Army Research Office and the Air Force Office of Scientific Research asking them to consider whether in light of their views they felt they could continue to accept the department's money.

A few days later, Dr. John S. Foster Jr., director of defense research and engineering, issued a memo which at once supported the policy of his departmental subordinates in asking such reviews and, at the same time, suggested that they not lean on the dissenters too hard. They are to review questionable contracts, he said, but should not "emphasize nontechnical issues in your evaluation of the desirability of terminating or renewing research contracts."

ing flight, it must be made much more rigid than a fixed wing, at the cost of additional weight. Fighter planes, particularly supersonic ones, are designed in the first place to withstand extreme stresses such as those caused by high-speed turns, so that most of the extra rigidity is already present.

Airliners, however, are not designed for such loads. Building the extra stiffness into the wing exacts a punishing weight penalty—one of the major reasons that Boeing has switched the bulk of its SST design effort back to a fixed wing (SN: 3/16, p. 254).

Beyond the SST lies the hypersonic transport (SN: 6/3/67 p. 528), predicted to fly in the 1990's at speeds from six to as much as 15 or 20 times the speed of sound. At such speeds, every square foot of wing that can be shaved off will be worth miles per hour, gallons of fuel and perhaps hundreds of dollars in operating costs.

New lightweight but strong materials and alloys now being created and studied may turn the trick for hypersonic (and perhaps even second-generation supersonic) airliners to come. Another help will be development of more powerful engines to fly the heavy structures needed by swing-wings.