

against this year's \$1.196 billion for the conduct of research. And the National Institutes of Health, holding to modest requests, are maintaining research at the expense of training.

And in the Federal support of research on college and university campuses, which under the Johnson Administration has come to be the support of higher education, rather than of science, a spending level \$104 million over this year's \$1.414 billion is being sought. But for the longer haul, signaled by the request for new spending authority, the jump is only \$63 million over this year's stringent \$1.5 billion.

President Johnson has tried to take some of the curse off the holdback in support of science education. Where possible, this year, he is proposing extension of a practice he initiated in earlier tight years: substituting loan guarantees or interest subsidies on loans for direct grants wherever possible.

Grants for academic facilities, for instance, were \$307 million in fiscal 1968, \$242 million this year and are scheduled at \$150 million for next. But Federal subsidies for interest on private loans, which didn't exist for this purpose in 1968, jump in the next budget from \$145 million to \$250 million.

And while National Defense Education Act loans to students will drop this year from \$442 million to \$398 million, available Federal interest subsidies to students, making private bank loans more feasible, will jump from \$750 million to \$924 million.

The continued plateau in spending for the development of expensive new systems is chiefly the result of the cutbacks in the space program.

But that cutback did not become an overall reduction because of the start the Department of Defense is making on the kind of expenditures that promise, ultimately, to eat up the savings that develop with the reduction of U.S. commitments in Southeast Asia. Defense is going ahead with deployment of the Sentinel antiballistic missile; Defense is proceeding with, and AEC is developing the powerplants for, Vice Adm. Hyman Rickover's new classes of deep, swift and quiet submarines; and the Manned Orbiting Laboratory, a resurrection of the Rover nuclear-propelled rocket and new aircraft are all beginning to move.

In addition, the \$36 million growth in Defense spending on oceanography makes up the bulk of the Government-wide growth from \$472 million to \$528 million, and the Defense Department's jump in space spending authority, from \$2.08 billion to \$2.22 billion, is approaching the heady regions once exclusively the province of the National Aeronautics and Space Administration's \$3.599 billion now allocated to space.

SCIENCE FOUNDATION

One to talk about

"We are glad to have a budget we can talk about," says Dr. Louis Levin, executive associate director of the National Science Foundation. The budget that makes him glad would allow the NSF to spend about \$85 million more than the \$435 million it disbursed in fiscal year 1969, an increase that would bring spending only slightly above the level of previous years.

The National Science Foundation was one of the most severely hit agencies in last year's budget cutting. The \$520 million in obligational authority requested for 1970 thus represents only a slight increase over the \$505 million spent in fiscal 1968, and is in fact slightly less than the \$527 million originally requested for fiscal 1969. The 1970 request would represent new appropriation of \$500 million since the NSF has some unobligated funds left over.

Though if approved it will in fact be the largest NSF budget ever, this year's request does not represent manna for the foundation's hungry clients. Inflation makes it probable, officials admit, that no more and possibly less research can be bought with the 1970 kitty than the foundation bought in 1968.

The foundation is supposed to be a significant channel of Federal support to research in colleges and universities. Dr. Levin says the foundation would like to provide about a third of the money for this purpose, but the 1970 budget does not increase the proportion beyond the current 15 percent.

The foundation's share of the 1970 academic research budget is \$255 million, up from \$210 million last year. Total Federal support of academic research will be about \$1.5 billion.

DEFENSE

Funding the new craft

The Department of Defense budget for fiscal year 1970 is \$83 billion, up from \$81.3 billion in fiscal year 1969 but about \$20 billion to \$30 billion less than the Joint Chiefs of Staff wanted. About \$500 million of the \$1.7 billion increase is for research, development, testing and evaluation, the biggest single R&D increase in the 1970 pot. Most of this increase, \$400 million, is in advanced manned strategic aircraft, improvements in missile technology, a variety of new fighter and attack planes, antisubmarine warfare development and ship missile systems.

The main projects slated for increases are the vsx antisubmarine warfare aircraft; two Navy supersonic

fighters, the F-14A and F-14B; the early warning aircraft, virtually a flying radar station; the F-15 fighter, and the Advanced Manned Strategic Aircraft, a bomber.

Most of the increase in the Science Foundation's academic research support is ticketed for support of institutions, rather than for grants to individual researchers. The institutional support total goes from \$41 million in fiscal 1969 to a total of \$74 million in 1970.

The foundation's University Science Development program, the so-called centers of excellence, is up to \$30 million from \$20 million in 1969. This will allow adding two or three new institutions to those carried over from previous years.

Another NSF program, Departmental Science Development, which makes grants to whole academic departments, is up by \$2 million, from \$8 million to \$10 million. This will allow addition of three or four new departments.

Meanwhile funds for grants to individuals remain virtually at the same levels as in fiscal 1969 except for a new item of \$10 million for interdisciplinary studies of social problems.

The NSF budget also asks \$5 million for the International Biological Program (up from \$500,000), a project for large-scale ecological studies.

In addition, there is \$6.5 million for the Ocean Sediment Coring Project (up from \$2.5 million); \$3 million for resurfacing the Arecibo radio telescope to give it better resolving power; \$2 million for a new oceanographic vessel with laboratory modules for different sorts of research that can be lifted on and off like container freight according to the purpose of a given voyage; \$10 million for the National Sea Grant Program (up from \$6 million), which gives grants for oceanographic studies in colleges.

A new item in the budget is a missile carrying frigate, for which \$196 million in procurement funds have been slated in 1970. The Manned Orbiting Laboratory is up from \$515 million to \$576 million in 1970.

For research and development, the total funding required to complete programs approved or proposed in the year is \$5.6 billion, an increase of \$850 million over 1969.

Chief programs initiated in previous years and considered vital enough to be continued include conversion of more ballistic missile submarines from Polaris to Poseidon missile systems and replacement of Minuteman I with Minuteman III missiles. The Poseidon and Minuteman missiles will be equipped with multiple warheads and penetration aids to overcome enemy defenses. The RDT&E and procurement funds for conversion from Polaris to Poseidon missile systems is \$492 million in this year's budget, \$356 million in last year's. Other carry-overs are the F-111 planes, deployment of the Sentinel missile defense system and modernization of U.S. air defenses.

A portion of the \$500 million increase in the defense research and development budget is due to financial adjustments which include greater funding of university projects and to funding for new centers-of-excellence Project Themis contracts. Expenditures for support of research in colleges and universities will increase in 1970 from \$252 million to \$275 million, but Defense Department spending in higher education will still be below its 1966 level.

Military sciences programs, which support most basic research, show an increase from \$561 million to \$617 million. Included under military sciences are programs such as the effects of boundary layer turbulence on aircraft, propulsion and explosive chemistry, superconductivity, electro-optics, information processing, acoustics and oceanography. More research will also be pursued in marine technology, missile guidance, propulsion and electronics.

ATOMIC

Over the 50 percent line

The Atomic Energy Commission, spending more but requesting less, finds itself over a line it did not want to cross. For years the AEC has boasted that it spent more on civilian uses than on weapons. In fiscal 1970 51.8 percent of its money will go toward weapon building and development.

The commission expects to spend \$2.571 billion, if Congress approves. It is asking for appropriations of \$2.438

billion; the rest would be money already on hand. Last year it spent \$2.451 billion.

Over all, research and development programs will take some 67 percent of the total outlay. This is an increase of \$16 million, about four percent. The commission admits that the cost of such activities is rising faster than the four percent rate, but that is true of research in most areas of the budget.

A major effort will be the 200-400 billion-electron-volt accelerator being built in Batavia, Ill. The AEC would like Congress to authorize the full remaining cost, \$217 million (of a \$250 million total), and actually appropriate \$102 million. Congress in the past has been hesitant to put up more than one year's worth of money at a time.

Although most of the budget will go to weapons-related projects, the commission will be building fewer nuclear bombs. This gives it a major saving in the procurement of raw material, particularly uranium concentrates, which will run to \$66 million, instead of the current year's \$103 million.

The cost of testing weapons, including site preparation, should drop from \$311 million to \$275 million. This will include a one kiloton calibration shot this spring at Amchitka, Alaska.

In the reactor program, the money will continue to flow toward breeders, with \$92 million scheduled. Total civilian reactor funds: \$137 million.

A next generation of ship-driving reactors, including submarine and surface models, will be up \$14 million from last year's \$125 million.

While spending \$286 on physics (up \$11 million), the commission will invest \$92 million in biology and medicine, an increase of \$3.5 million.

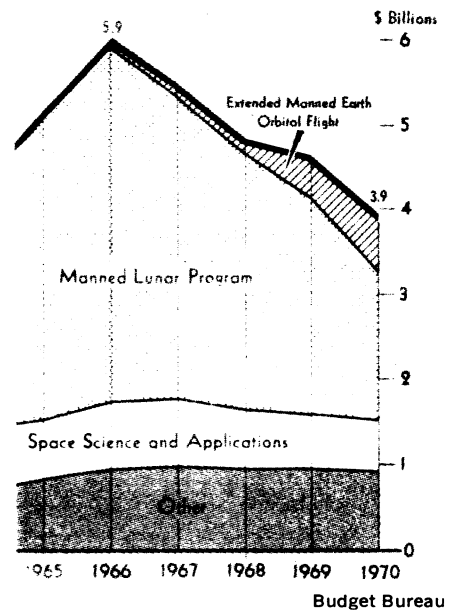
The Plowshare program, designed to develop civilian uses of nuclear explosives, will stay close to its 1969 funding rate of \$14 million. This will include one scientific shot, and two or three carried on in partnership with interested industries.

NASA

Post-Apollo question mark

The manned lunar landing, as the National Aeronautics and Space Administration's proposed fiscal 1970 budget clearly reflects, is almost at hand.

As the fantastically complex, \$24 billion Apollo program builds up to its climax, most of its bills have already been paid. For the budget year 1970, the space agency plans to spend only about \$1.65 billion to cover as many as five landings on the lunar surface. In the present fiscal year, Apollo is costing more than \$2 billion, and in fiscal 1968, it took a \$2.56 billion bite out of



Apollo shrinks, post-Apollo grows.

the plunging space budget.

With the leveling off of the Apollo program itself, and with preparations underway for post-Apollo activity such as orbiting workshops, the space agency's pocketbook may finally stop its drastic shrinkage, which has cut the NASA budget from \$5.25 billion in fiscal 1965 down to \$3.88 billion four years later.

Congress's approval, in fact, says acting agency Administrator Thomas Paine, "would halt a four-year downward trend in the NASA budget." Taking into account funds that were trimmed off in the Government-wide fiscal 1969 budget-cutting, but which will again be available next year, the Administration's budget request calls for a spending level of \$3.878 billion, almost exactly the same as the present year.

After Apollo, which could last into calendar 1971, with team after team of astronauts setting up packages of scientific experiments at different locations on the moon, the manned space flight emphasis for the time being will be on using leftover Apollo hardware for research in earth orbit. The Apollo Applications Program's two major projects will be a huge workshop in orbit, made of an empty S-4B rocket stage, and a large telescope, mounted on the workshop, for detailed studies of the sun and stars. The budget request more than doubles 1969's, bringing the amount to almost \$309 million.

While manned space flights may be keeping fairly close to earth in the early part of the coming decade, NASA has plans for unmanned probes to visit all but two of the eight other known planets in the Solar System.

Mars is the chief target, with a pair of Mariner spacecraft already set for this year, and another in 1971. A small