BUDGETS

The blunt broadax

As the House of Representatives came to grips with Federal expenditures last week, the budget-cutters were zeroing in on science and technology. But they were zeroing in with a broadax, rather than a scalpel. And particularly in the fields of science and its applications, an ax is not only inappropriate; it also promises to be ineffective.

"You know the game they're playing," says an official in the Bureau of the Budget who works closely with Federal science programs. "They're talking, trying to force the Administration to tighten up. But they can't cut research without cutting the programs to which they're attached." And that includes agriculture, weather services and the supersonic transport, as well as space, defense and education.

The issue was triggered weeks ago when President Johnson requested a 10 percent income tax surcharge to hold down a skyrocketing Federal deficit. The House, sparked by Republican economizers, threatened to hold interim Federal appropriations hostage until President Johnson offered a spending cut as the price of enactment of his tax hike.

House Democrats, behind Appropriations Committee Chairman George Mahon (D-Tex.), unblocked the appropriations process—at least temporarily—and tossed the ball back to Congress, suggesting that still-pending or recallable appropriations ought to be cut by Congress, if it was serious about economy. And along with Representative Wilbur Mills (D-Ark.), chairman of the tax-writing Ways and Means Committee, Mahon identified the Government's $16.3 billion proposed research and development budget as a likely place for Congress to start cutting.

Then, last week, Mahon and his Committee formally proposed to the House a $2 billion to $3 billion overall reduction in expenditures, of which almost half was to come from R&D.

But there's a hooker. The Committee specifically excluded weapons-related research and other emergency situations. And political and administrative realities will exclude still others.

The fact is that there is not a single agency of the Federal Government—with the exception of the $500 million-a-year National Science Foundation whose mission is the support of science per se—empowered to spend a dime on research unless it advances the mission of the agency, be it defense, health, space, agriculture or whatnot. Some money leaks through, but it is generally considered to be infinitesimal, at least in the scale now under consideration. Cutting the R&D means cutting the programs.

Of the $16.3 billion total, more than $7.5 billion is in the defense appropriation, and is largely inviolable. The National Aeronautics and Space Administration's appropriation is already in process of being reduced from a proposed $5.1 billion to below $4.7 billion, at the expense of post-Apollo missions and planning; such already-made reductions will be considered part of the overall cut.

That leaves roughly $1 billion to come out of other research programs.

The National Institutes of Health, which requested $1.187 billion for this year, is currently the subject of heated and lengthy debate between the House, which is offering $1.174 billion and the Senate, which proposes adding programs rather than cutting, for a total of $1.252 billion. The House has already rejected a $1.207 billion compromise, but is unlikely to be able to force the totals down much below the original request.

The remainder of the R&D money is buried in the programs of other agencies and, if Congress can force the Administration to sift and cut, some reductions may be made.

The Science Foundation, for instance, is a likely candidate for a 10 percent cut, according to present anticipations. That would be $50 million, and could hurt individual researchers in such fields as chemistry, astronomy, meteorology and basic ocean sciences.

The whole Department of Commerce, housing the National Bureau of Standards and the Environmental Science Services Administration, has asked for no more than $79 million for research and development; the Department of Transportation asked $273 million, the bulk of which is to develop the supersonic transport plane, a program already approved in both Houses and unlikely to be recalled and slashed. The totals in Agriculture, Interior, the Veterans Administration and other agencies are likewise small, and so intimately tied to programs to which Congress is committed, that broadax slashes are unlikely.

That leaves the Atomic Energy Commission, with a proposed $1.369 billion proposed for R&D, of which a third is weapons development and another third reactor development, with a healthy commitment to Naval ship reactors.

The research component of AEC's budget has been singled out as a possible place to cut. But even an across-the-board slash in the $272 million physical, $90 million biological and $29 million miscellaneous research projects would account for little, even if the prestigious Joint Congressional Committee on Atomic Energy would sit still for it.

"The places that are likely to hurt," says the Budget Bureau official, "are the relatively new research areas, where the science is not so deeply entrenched." Among these he lists educational research, urban and social sciences, poverty and related programs.

Even if Congress wields its broadax, by available estimates less than $150 million could be reasonably saved. And this would be at the expense of programs Congress is not likely to want to hurt.

So this year, at least, despite the oratory, Congress is likely to settle for little more than it has already gotten out of the space program.

But next year, the budgets for which are already being developed by planners with a pencil in one hand and a scalpel in the other, scientists and engineers who think the last two years have been tough may really have to pull in their belts—or travel plans. ◈

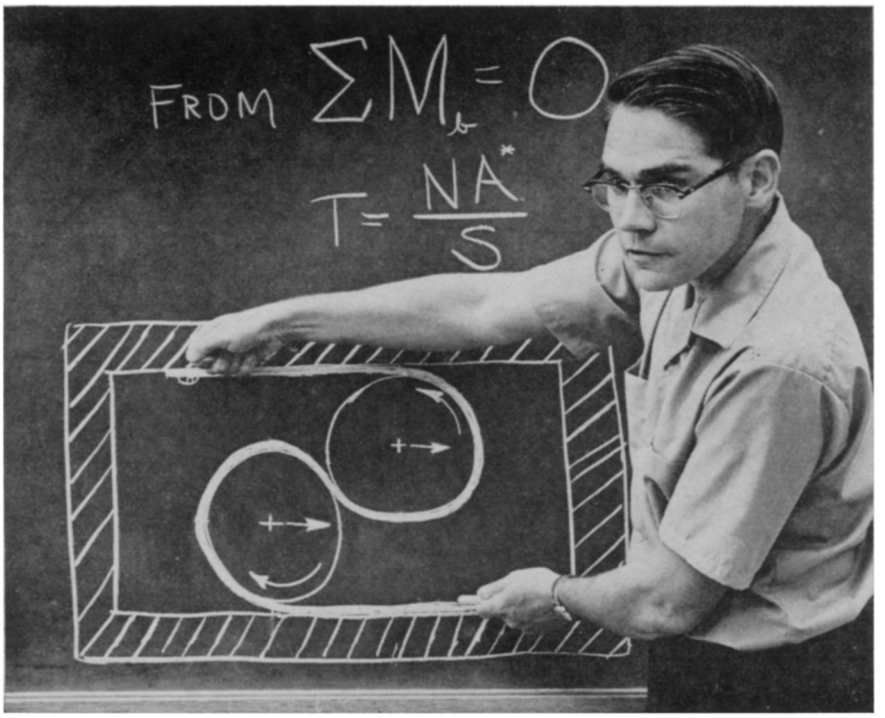
THE ROLAMITE

A new mechanism

Mechanical engineers have a general way of classifying their creations according to their complexity: machines, the most complicated, are made up of devices, which in turn use a number of elementary mechanisms such as gears, valves and springs.

Invention of a new elementary mechanism is a rare event. But last week engineers at the Sandia Corp. were claiming that distinction for their newly developed concept, the rolamite, which combines the functions of a spring, switch, valve, pump and gauge all in one small low-friction package.

The rolamite, according to its inventor, Donald F. Wilkes, consists essentially of two rollers inside parallel guides and separated by a thin band of flexible



Sandia Corp.

Rolamite inventor Donald F. Wilkes describes how rollers and band move.

metal or plastic, bent in the form of an S. The rollers, as they move between the guides, touch only the flexible band. In operation, one or the other of the rollers is pushed or pulled externally, and the whole configuration moves along the parallel guides.

Since the band itself moves over the rollers at the same speed at which the rollers spin, there is no slipping or sliding of the rollers within the band. And that's important, because rolling friction is much smaller than sliding friction.

Ball bearings use the same principle of rolling friction. But Sandia claims experiments have shown the rolamite to have a tenth the friction of the best ball or roller bearings—so low, in fact, that no lubrication is needed in many applications.

Inventor Wilkes first came up with the rolamite concept while looking for a device that would measure acceleration, and turn on an electric circuit when the acceleration reached a certain point.

He was working with a suspension mechanism employing an S-shaped spring band as a component of the accelerometer.

It worked vertically, but was unstable and hard to attach to other devices.

Puzzling over it, Wilkes realized that, by trapping rollers in the bends of the S, he could make the device work horizontally, and the rolamite was born.

The rolamite serves the accelerometer with reliability and precision in a very small package. When the force of acceleration is great enough to overcome the tension of the flexible band, the rollers move along the guides to a point where electric contact can be made.

Another application which Sandia engineers like very much is a highly sensitive thermostat, to switch on a circuit at a particular temperature. If one end of the band is made of a metal that expands faster than the rest of the band as temperature increases, then the rollers will be moved by changing temperatures. Because of the low friction, a rolamite thermostat is claimed to be four or five times as sensitive as a conventional thermostat using the differential-expansion principle.

How fast the rollers move, and how much force is needed to move them, depend among other factors on the size and weight of the rollers, the distance between guides, and the thickness of the band and its flexibility. Changing these factors can change the operation of the rolamite.

One of the most useful ways of changing roller speed and force is by cutting holes in the band. When the roller reaches a cutout it moves faster. Designing the shape and location of the cutout automatically regulates the operation of the rolamite.

One kind of cutout can be used to create what's called a negative spring action, a very elusive mechanical function. An ordinary spring creates a positive force: the farther it is pulled from its normal, unflexed position, the more force is required. But a triangular cutout on a rolamite band can be located so that the farther the roller moves from the initial position, the less resistance it encounters.

The negative spring principle means that once the critical force is applied the rollers move faster and faster toward the end of their run, and the switching takes place more quickly.

Sandia Corp., which develops nuclear weapons for the Atomic Energy Commission, says the rolamite business is in its infancy, but there are at least 54 functions for the device so far discovered, including relays, bearings, pumps, pistons, brakes, cutting tools and shock absorbers.

Patent rights are being applied for by the AEC, which means that they will be available on no-charge licenses to any number of qualified producers.

Despite his lack of exclusive patent rights, inventor Wilkes is leaving the corporation, according to Sandia spokesmen, to start his own company. ◈

REPORT ON ALCOHOL

Neither wet nor dry

Alcohol is so misused by the American public that to provide every problem drinker with treatment would require the energies of most of the physicians, psychiatrists, social workers, nurses and psychologists in the country.

California drinkers alone could take up the full time work of every psychiatrist and social worker, and even at that, each problem drinker would get no more than weekly contact with a psychiatrist and monthly contact with a social worker.

This is the state of the nation, as reported by a scientific commission on alcoholism this month. Nothing will suffice, says the commission, but prevention—American drinking patterns and attitudes have to change.

In its first report after six years of investigation, the Cooperative Commission on the Study of Alcoholism concludes that alcohol is here to stay and that Americans had better integrate it more deeply into family life if they are going to learn how to control it; the solutions to alcoholism are apt to be wet, not dry. The Commission went on to recommend that alcohol be used in a family setting and that the legal drinking age be lowered to 18.

Such action, according to the Commission, would help rob alcohol of its special place in American life. The likely result would be more tolerance and less emotion about alcohol plus better drinking habits.

The 21-member Commission, composed of leading authorities on alcoholism, did its work with a $1 million grant from the National Institute of