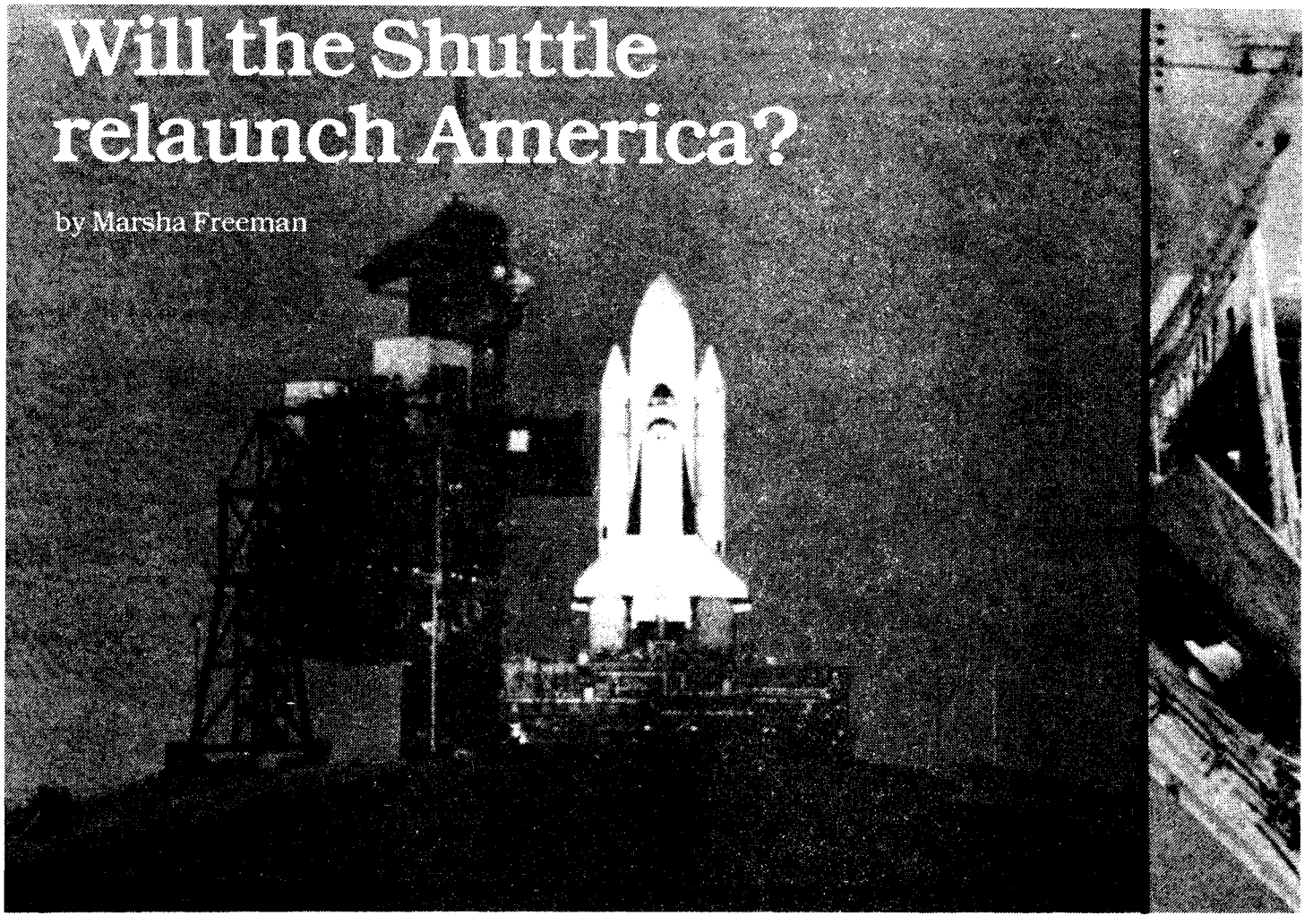
Will the Shuttle relaunch America?

by Marsha Freeman



The magnificent performance of the Space Shuttle Columbia was a vivid reminder of the promise of the U.S. space program and what it did for America in the 1960s and early 1970s.

In the economy, the space program returned $14 dollars for every $1 invested in it, creating new jobs, new factories, and new products. In education, the space program infused an entire nation with a new understanding of science and trained hundreds of thousands of scientists, engineers, and technicians. In science, the space program not only put man in space, but opened far more detailed knowledge of the universe. The space program has suffered the same fate as other U.S. high-technology programs, such as fusion and magneto-hydrodynamics, under the knife of Budget Director David Stockman. And its true contribution is not really understood by many of its military supporters. The Shuttle *can* relaunch America if the policies of the zero-growth military faction and the civilian Malthusians are defeated. The Shuttle is the keystone of the family of technological innovations that can transport the world economy to the fusion age.

That near-perfect success of NASA's Space Shuttle Orbiter Columbia is not merely a technological and engineering marvel. It is an even greater testimony to the ability of U.S. science, engineering, and industry, considering the fact that the program was never funded at a level adequate to keep it on schedule or to do all of the testing and check-out work that industry and NASA would have liked to do.

Given these restrictions, the capability demonstrated by the Shuttle test flight is a spectacular but greatly reduced example of the capabilities the United States could have in space science, exploration, manufacturing, and eventually colonization if NASA were adequately funded.

Since 1965, at the peak of the Apollo project to land a man on the Moon and return him safely to Earth, NASA's capabilities have been eroded. To carry out Apollo planetary probes, a series of communications, military, and weather satellites, and myriad scientific experiments, NASA built an institution of national laboratories, university education programs, cooperative agreements with other nations, and a working relation-

ship with American industry that produced a nearly unbroken chain of successes throughout the 1960s and 1970s.

But although NASA's programs have been a success, its plans for necessary and exciting experiments in space were constantly being trimmed down. When Apollo ended its most active phase in 1969, for example, tens of thousands of engineers were laid off. The Space Transportation System, or Shuttle program, is the only U.S. manned space effort that remains.

If the U.S. space program were to have the same number of scientists and engineers, laboratory facilities, and array of programs that it had 15 years ago, the NASA budget today would have to be about *$14 billion*. This means that with the $6 billion level of funding proposed by the administration, nearly two-thirds of NASA's capabilities have been eliminated or put into cold storage since the mid-1960s.

NASA's program

Before leaving the government as the administrator for NASA early this year, Dr. Robert Frosch submitted

a NASA budget request for FY82 that included a 20 percent increase in funding over FY81. This $6.7 billion budget level would have given NASA a 9 percent increase after inflation, to begin some of the programs deferred during the Carter administration and earlier.

The budget "gives us some leeway for some expansion, but not for as much as I would like to have seen, given NASA's extremely tight budget over the past decade," Frosch said in a budget briefing Jan. 15.

The scientific research programs included in NASA's FY82 request give some sense of the exciting scope of the space science frontier. The FY82 budget request included:

- A start for the Venus Orbiting Imaging Radar (VOIR) spacecraft, to be launched by the Space Shuttle in 1986. VOIR was designed to probe Venus's dense cloud cover while in orbit and map its surface, investigate its geophysical and atmospheric makeup, and continue the process of penetrating the shrouded planet with the most sophisticated nonphotographic technology to get beneath its clouds.
- A Geological Applications Program (GAP) to study the utility of remote sensing of the Earth's geological resources on a continental scale. Ultimately, this data would contribute to the discovery of vital resources such as minerals, oil, and gas. GAP is part of the technology applications from the Landsat series of satellites, which has opened up Earth exploration and monitoring from space.
- Instrument development and continued research activity for the National Oceanic Satellite System (NOSS), a joint program of three government agencies. Its mission is to demonstrate global observation of the world's oceans from space through the use of satellites.

Within the decade, the NOSS system could help predict optimum maritime routes, forecast regional fish catches, help avert coastal disasters, and provide other useful information on the world's oceanic and atmospheric processes that help determine both weather and climate.

- An upper Atmospheric Research Satellite and a Numerical Aerodynamic Simulator to improve large-scale computer technology, which measures and records airflow over three-dimensional aerodynamic surfaces as part of NASA's aeronautics research program.

International missions

In the area of planetary exploration, NASA had planned to continue the Galileo mission to Jupiter on course, with a proposed budget increase to $108 million from the FY81 allocation of $63.1 million. The International Solar Polar Mission, a joint program with the European Space Agency (ESA), was to be kept on target with a budget of $58 million, from the reduced FY81 level of $39.6 million (see below).

The Gamma Ray Observatory, begun in 1981 at a funding level of $17.6 million, was to be geared up to a level of $52 million; and the Spacelab testing was to be kept on schedule with adequate financial support.

Spacelab, also being built by ESA, is a laboratory that will fly in the Shuttle orbiter and allow nonastronaut scientists access to the unique environment of space. The highly flexible laboratory will permit experiments in space physics, life sciences, materials processing and many other project areas, and will in many areas shorten R&D time by 10 or more years.

In the area of technology development and applications, Frosch outlined missions to demonstate and transfer space-related technology for benefits on Earth. For example, the Landsat data, in addition to the geological applications mentioned above, are very important for worldwide agricultural monitoring, planning, and development. The FY82 budget presented by NASA included $33.1 million for the Agristars program. Under this program, worldwide data on crop and water inventory, disease and damage monitoring, and soil condition, all available from Landsat, would be used for better management and planning around the globe.

In sum, as Frosch put it, the FY82 budget request "produced in a highly constrained fiscal environment, is good, but not as good as it should be if we are to revitalize NASA as the cutting edge of our scientific and technological progress. We need a long-term investment philosophy for NASA," he continued, "which recognizes that the payoffs will include not only improved knowledge of the Earth and the universe but improved economic performance and more jobs here at home."

Stockman sabotage

It has been well documented that the economic payback from government investment in NASA's research, development, and technology programs and related scientific missions has the greatest return to the civilian economy of any investment the government can make.

Chase Econometrics, for example, has estimated that for each dollar spent by NASA, 14 dollars are returned to the economy in new jobs, new plant and equipment, and entirely new technologies for industry, transportation, and agriculture. In this light, none of the rationalizations for cutting the NASA budget for FY82 in order to "save money" or "balance the budget" to restore the economic health of the nation makes any sense.

Yet the Office of Management and Budget proposals released March 10 cut the funding for NASA by $605 million, about 10 percent. (This was actually less than what OMB Director David Stockman had pro-

posed early in the budget process, when he said he thought NASA's budget could be cut by one-third, because all its projects were long-term and could be deferred.) Now, since there is no "fat" in the NASA budget—all of it is spent on science and scientific and engineering manpower—many of the programs Dr. Frosch hoped to see kept on schedule or initiated are to be dropped.

In a press conference Feb. 23, before the Reagan budget was released, Sen. Harrison Schmitt (R-N.M.), a former astronaut and the most ardent, articulate congressional supporter of the space program, agreed with this reporter that many of the NASA programs could indeed be economically justified because of their civilian payback; but the senator held fast to the argument that *some* cuts would have to be sustained by the space agency in line with the President's overall budget effort.

The present task

On April 2, nearly two weeks before the flight of the Columbia, the Space Science and Applications subcommittee of the House Committee on Science and Technology, chaired by Rep. Ronnie Flippo (D-Ala.) reprogrammed the proposed NASA budget for FY82 to add $60 million to NASA's programs that were in jeopardy.

Although the subcommittee worked within the ceiling set by the administration budget, restoring only 10 percent of the projected cut of $604 million, the subcommittee decided that no promising future space missions would be *cancelled,* although some were reduced and many deferred.

For example, the subcommittee held open the option that the United States could participate in a mission to study Haley's Comet when it veers near the Earth in 1986. And the International Solar Polar Mission—whose cancellation created a diplomatic storm in Washington by the Europeans who would have wasted the $50 million they have already spent on the joint mission—was restored.

Spacelab cuts, of great concern to the Europeans who are building the facility, were lessened. The full House committee, which passed the revised Flippo NASA budget out of committee, also restored the life sciences program, the technology transfer program, and support for the science missions at a reduced level.

Ignoring the facts of the matter, a good part of the nation's media and some short-sighted congressional spokesmen squawked that the Space Shuttle is "a waste of money." (The same kind of press coverage, of course, played a large role in the erosion of NASA after Apollo.)

Almost as if anticipating this media reaction, Sen. Howell Heflin (D-Ala.) submitted a statement to the *Congressional Record* a week before the Shuttle launch, summarizing the studies on NASA's economic impact and chiding the administration for its short-sighted view of the NASA programs:

> The contribution of the National Aeronautics and Space Administration productivity in aeronautics and space activities is worthy of praise and study as an example of how government and industry can work together to make conditions better for all of us. Yet for the past 10 years America's productivity has steadily declined. . . .
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> I have no doubt that a major factor is the decline in support of research and development, the base on which productivity ultimately rests. It is my conviction that America's R&D effort has long been underfunded and its relation and importance to productivity and employment and confidence greatly underestimated.
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> Thus, it might be instructive to examine an institution which exemplifies what a government-industry-academic partnership can mean to this country in terms of productivity, economic growth, technological superiority, jobs, new industries, better methods and goods, and, perhaps, even more important, national pride and prestige. It would, in my judgment, be difficult to find an R&D team which has made more significant contributions to our country's well-being than NASA. NASA's budget represents less than 1 percent per year of federal spending, yet its impact on our economy and on our national life is substantial.

In 1965, at the height of NASA's funding, the space program budget was 3.79 percent of the total federal budget, Heflin showed in a chart. This percentage has declined steadily downwards, falling to a level of 0.82 for 1981.

After reviewing many of NASA's programs that have directly affected growth potential on Earth, such as the communications satellites and Landsat earth resources satellites, Heflin concluded:

> In my judgment, we must unleash the creativity, the imagination, and the technology innovation of these superb teams of scientists and our space program and provide them with the funds necessary to move these daring programs forward. We must, for our own sake, provide new challenges to aim toward, not watch as they surpass the old ones. I am convinced that NASA is the best hope for retaining aerospace leadership and markets. I am convinced that far greater support is needed. In a larger sense, I am convinced that research and development is essential to our growth and productivity and to our spirit—the spirit that is recognized everywhere as "American."