NASA's Troubled Flight Plan

There's no turning back, but are we on the right path?

Until last week, whenever officials of the National Aeronautics and Space Administration studied the 1986 calendar, they felt good. Fifteen space-shuttle flights were on the boards, twice as many as in 1985. And they were high-profile projects: a probing look into Halley's comet, a plunge into Jupiter's atmosphere and the launch of a revolutionary space telescope. In July, the shuttle Discovery was to hoist a military reconnaissance satellite from a new launch pad at California'a Vandenberg Air Force Base, and in October, the Atlantis was to send a $1.2 billion Space Telescope into orbit, allowing astronomers to peer to the edges of the known universe. Those plans went on indefinite hold until the cause of Challenger's fiery death is pinpointed and corrected. No one at NASA would speculate how long that might be—but outside experts guess the program could be grounded anywhere from six months to two years.

Without doubt, the U.S. space program was the eighth victim of last week's catastrophe. Yet amid all the expressions of shock and grief, there were no suggestions that it should be turned back. Ronald Reagan and congressional leaders alike pledged undimmed faith in NASA, and most Americans apparently agree. A NEWSWEEK Poll last week found that 76 percent of respondents think spending on the space program should be held firm or even increased, up from 69 percent two years ago. But the agency will come under intense scrutiny over how that money is spent, and whether it has the right goals as well as the right stuff. Is manned space flight worth the risk, or are there some missions machines can perform just as well? Should we be exploring the edges of the galaxy, or learning the secrets of Earth's atmosphere first? How can starstruck dreams come true in a time of limited resources?

Most questions focus on the shuttle program itself: for 15 years it has been the linchpin of NASA's programs, and it remains central to its future plans. Critics have denounced the project—with a $14 billion price tag so far—as a scientifically useless, commercially inefficient stuntmobile, and shuttle supporters inside NASA and out last week braced for a new assault. "Can we afford to reconsider the scope, direction and content of the program?" asks David Lippy, president of the Center for Space Policy. "I don't think so. That might be the second national tragedy."

The Making of a Camel

Not even NASA can escape the federal budget's gravitational pull, as the history of the shuttle program shows. Searching for its next challenge in the afterglow of the 1969 moon landing, the agency contemplated a manned mission to Mars, a permanent moon base and a manned space station with a space truck ferrying men and materials to it. But with the Vietnam War raging, and some lawmakers calling to mitigate earthbound poverty first, NASA was able to win support only for the truck—and only after assuring that it would simultaneously serve military, commercial and scientific needs. It had no place to go in particular, but it was to be an orbiting lab for scientific experiments, a Cape Canaveral in the sky to launch satellites and a repair depot to fix them. Unlike past spacecraft, it would be reusable, and freight charges to commercial customers would make it pay for itself.

The design that actually emerged bore little resemblance to those initial plans, even if the mandate stayed the same. Richard Nixon's Office of Management and Budget cut the original funding in half, to $5 billion. That forced NASA to abandon designs that would have allowed the shuttle to land at commercial airports, and to scrap plans for a complementary space tug that would boost it to the 22,000-mile geosynchronous orbit where commercial satellites fly. "The design has been impaired from the start by continuous penny-pinching," says one areospace analyst. Problems with the main engines and thermal tiles caused persistent delays, and by 1978 some congressmen wanted to scrub it. It was kept alive mainly by the Pentagon's need for more reconnaissance satellites in the midst of the SALT II negotiations.

The Columbia executed a flawless landing at Edwards Air Force Base in 1981—

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1957 *The Soviet Sputnik 1 launches the Space Age*

NASA

1961 *Alan Shepard becomes the first American in space*

1962 *Crowds cheer John Glenn, the first American in orbit*

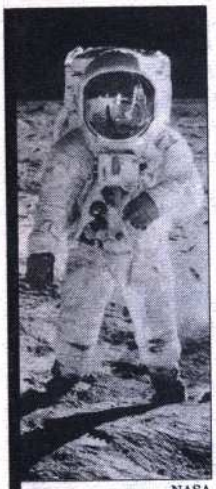
UPI-BETTMANN

NASA

1965 *An American milestone: Edward White's walk in space*

ALEX LANGLEY—DPI

1967 *Grissom, White and Chaffee would perish in a launching-pad fire*



NASA

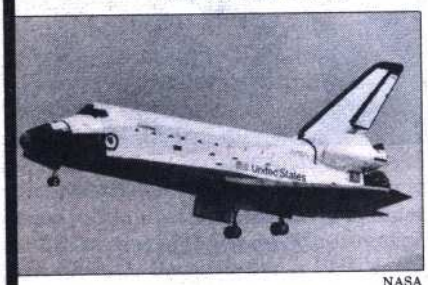
1969 *Edwin Aldrin takes a walk on the moon*

1973 *Skylab, America's manned space station*

UPI-BETTMANN NEWSPHOTOS

ROCKWELL INTERNATIONAL SPACE DIVISION

1975 *Apollo 18 and Soyuz 19 in-flight linkup promotes détente on earth*



NASA

1981 *Columbia launches the shuttle program*

1983 *Sally Ride, first U.S. woman in space*

NASA

two and one half years behind schedule and 20 percent over budget. There have been 23 successful flights since then, but experts concede that the shuttle has turned into a camel loaded down with so much baggage that it carries nothing efficiently. The decision to have it take on all launch duties for NASA and the Pentagon dictated the size and configuration of the vehicle, making it far more unwieldy than it might have been. Conventional unmanned rockets can launch satellites just as easily, into higher orbit and for less cost, as commercial customers flocking to France's rival Ariane program have discovered. In part because of competition for launch dates, "the system has not adapted itself to systematically carrying into space simple low-cost experiments," says Thomas Donahue, chairman of the National Science Foundation's space science board.

Even the Pentagon, having fought for military uses for the shuttle, has hedged its bets: concerned over secrecy and the prospect that the shuttle's frequent delays might jeopardize vital defense projects, the military converted old Titan ICBM's into expendable launch vehicles as a backup, and plans to spend $2 billion for 10 new and more powerful rockets. In the meantime, the need to devote resources to the program has forced NASA to scale back most other programs dramatically. It stopped producing its own expendable vehicles. "We practically emasculated the planetary exploration program because of the demands of the shuttle," says Rep. George Brown, a ranking member of the House Subcommittee on Space Science and Applications.

Eggs in a Broken Basket

Still, the shuttle's customers have become dependent on the program. With Challenger gone, only Atlantis, Columbia and Discovery remain; serious reconfigurations of the launch schedule are in order. The Pentagon has only one urgent mission scheduled for the shuttle this year, but if the shuttle is not flying again by January, 1987, the United States could soon find itself with diminished satellite surveillance of Soviet military operations at precisely the time Reagan comes under increasing pressure to conclude a strategic arms agreement with the Soviets. A number of experimental Star Wars projects were on the shuttle's slate for 1987.

Commercial customers have even fewer alternatives. In the short run, not even Ariane provides an outlet, since its smaller payload would require costly reconfiguration of cargo, and it is booked solid through 1986. Last on the priority list, scientific projects would be hurt most of all if the shuttle does not resume flying soon. The Galileo probe to the Jupiter, for example, has only a 10-day window, in May of this year; its next launch window isn't until June 1987. "We are back to the situation where only those vehicles we have out in space are the ones that will give us any data this year," laments Ellis Miner, deputy director for the Voyager at Jet Propulsion Labs in California. Critics argue that such is the price of NASA's concentration on the shuttle. "If you put all your eggs in one basket," says a knowledgable commentator, "and the basket develops a hole, you have to make a new basket."

Debate still rages over whether the shuttle is living up to its promises and whether it is worth continuing. "NASA has been having trouble making the shuttle what it claims to be—an economically viable undertaking," says space-policy expert John Logsden of George Washington University. The notion of having it pay for itself now seems a distant dream. To encourage customers, NASA kept the charges an artifically low $38 million per launch. That price increases this year to $71 million per flight, still substantially lower than the actual launch costs to NASA, last year estimated at $250 million to $300 million.

"It was a commercial flop—it cost too much and it performed too poorly," says Stanford University economist Roger Noll. "If NASA had been a bottom-line, rapacious capitalistic company, it would have pulled the plug. If they had been a sensible government body, they would have built one [shuttle] for experimental purposes, and reallocated the rest of the money for expendable rockets."

NASA defenders say the shuttle is more cost-effective than it seems, since launching satellites via conventional rockets also would have required a costly launch system and armies of technicians to man it. They also insist that the vehicle has proven it can fulfill multiple missions, from launching of communications satellites to in-space repair of the Solar Max satellite in 1984. The real economic dividends from scientific research may take longer. But, says Brad Meslin of the Center for Space Policy, "in the long term, the first pharmaceutical product developed on the shuttle that results in a significant advance against disease all by itself will justify forever the economic investment in the shuttle."

An Agency Under Attack

The multipronged investigation in the wake of the Challenger disaster—including a Senate probe into NASA's own investigation—will raise other questions as well. Some lawmakers wonder if pressure to meet its ambitious launch schedule may have prompted NASA to cut corners. "NASA has a superb record of not taking chances," counters former astronaut Sen. John Glenn. In fact, the recurrent delays that have marked recent shuttle launches testify to the agency's caution. "Just look

all the holds we've put in for minor and minuscule things," says one NASA veteran. "A GS-9 at the console can keep the whole program on the ground and he doesn't get overridden."

Lawmakers will also consider whether NASA should continue its civilians-in-space program, widely criticized as a public-relations ploy. Astronauts in particular have challenged the use of civilians; the shuttle missions "start being questionable when you create a reason for people to be there," said Walter Cunningham, who orbited the earth 163 times on Apollo 7 and now heads a diversified investment company in Houston. But NASA has been chided for not doing enough to keep the public interested, particularly since the shuttle's success has made space flight routine, turning the astronaut's image from Buck Rogers to Teamsters in Space. Even those conducting scientific experiments have gotten little attention. "Science doesn't sell very well," says former NASA historian Pamela Marks.

NASA has other concerns closer to home—including its top management. Administrator James Beggs is on leave pending the resolution of charges that he manipulated Pentagon contract funds while at General Dymanics. Some NASA watchers are concerned that his acting replacement, deputy adminstrator William Graham, is a veteran of military weapons programs with virtually no background in space. Such resumes are of concern at a time when the Pentagon's once tiny space budget has come to dwarf NASA's—and the long-standing rivalry between the two is heating up.

The Age of Limits

Ironically, Thomas Paine, chairman of the National Space Commission, was about to mail the first draft of the commission's report to the president on the future of the U.S. space effort last Tuesday night—the day Challenger exploded. Paine says he was about to recommend a two-pronged space program over the next 20 years. NASA would plan a new unmanned cargo launcher capable of carrying loads into space at $200 per pound (compared with $2,000 per pound on the current shuttle). It would also work on one of two other systems for carrying passengers into space—either an updated version of the shuttle, or a new-generation space transportation system like the "hypersonic transatmospheric vehicle" that the Air Force has been pushing. Paine had planned to recommend a five-year competition between those two systems, with the winner coming on line around the year 2000. Now, he says, the question will be: "Should these vehicles be speeded up and [should we] not put the money into further shuttles? . . . I don't have answers."

If Congress wants to build a new shuttle orbiter to replace the destroyed Challenger, it will have to move quickly. A replacement would probably cost about $2 billion, and take two to five years. But NASA would have to win a supplemental appropriation almost immediately, thanks to the Gramm-Rudman budget-balancing bill; after October, when its automatic axe is yielded, such additions would be virtually impossible. (Some aerospace firms are pondering whether they could finance a replacement privately. And Dartmouth physics professor Robert Jastrow says one shuttle astronaut called him with the notion of asking every American to donate $5 in memory of Christa McAuliffe, the schoolteacher who died in last week's ill-starred liftoff. Jastrow plans to propose the idea to NASA.)

Even before the Challenger disaster, there was pressure to build a fifth orbiter to meet a goal of 24 annual shuttle flights by 1990. But some experts argue that shuttle technology, once state-of-the-art, is outdated today and that NASA should devote its resources to innovation. The Air Force's proposed hypersonic superplane, for example, would fly at Mach 5 or even 25, and could make New York-Toyko in two hours, flying out of the earth's atmosphere and back in again (NEWSWEEK, Dec. 16, 1985). The basic technology already exists and the aircraft could be ready in the 1990s. Such a plane could have multiple military and commercial purposes. "It might be affordable to have a vacation in orbit," says former White House science adviser George Keyworth, who is pressing for a $500 million three-year study.

An Expedition to Mars?

For now, however, NASA is concentrating its big hopes on the space station, which it hopes to have in orbit by 1992, roughly in time to celebrate the 500th anniversary of Columbus's discovery of America. The $8 million to $12 billion project is planned to house six to eight astronauts in space for months at a time, and all along, NASA saw it as the shuttle's *raison d'etre*—a platform for planetary exploration, a staging area for all outer-space missions, and the focus of what would become industrial parks manufacturing materials in zero gravity.

Critics have questioned whether those projects, too, require a manned presence, or whether they could be conducted by robots from floating launch platforms. President Reagan remains committed to the project, however, and salvaged nearly all of NASA's $410 million funding request for 1987 from eager OMB budget-cutters, though the Gramm-Rudman threat still looms. David Lippy, for one, contends that the space station would have 20 times the capacity of the shuttle for doing original research.

Beyond the space station, NASA has hopes of sending up an advanced solar observatory sometime in the 1990s, as well as a Venus radar mapper and a Mars observer. The agency also envisions an eventual moon base and expedition to Mars. Realizing even half those dreams will require finding a balance among men, money and machinery. Many critics say that if the shuttle is any guide, NASA is sending up too many men, at too great a cost. "We have

The Public's View

Despite concerns about safety in the shuttle program, Americans clearly believe that the United States must maintain a program of manned space missions—including civilians.

The Safety Factor

Do you think that putting civilians into space is important—or is it too dangerous?

55%	Important
40%	Too dangerous
5%	Don't know

Some people think that safety margins in the shuttle program have shrunk because of time pressure from all the shuttle's commercial missions. Do you agree?

40%	Agree
48%	Disagree
12%	Don't know

Manned or Unmanned?

Some people say the United States should concentrate on unmanned missions like the Voyager probe. Others say it is important to maintain a manned space program, as well. Which comes closer to your view?

21%	Unmanned
67%	Manned as well

Time to Cut Back?

Should the amount of money being spent on the U.S. space program be increased, kept at current levels, decreased or ended altogether?

Current	Feb. '84	
26%	21%	Increased
50%	48%	Same
14%	23%	Decreased
5%	5%	Ended

For this NEWSWEEK Poll, The Gallup Organization interviewed 533 adults by telephone on Jan. 29 and 30. Some "don't know" responses omitted. The margin of error is plus or minus 5 percent. The NEWSWEEK Poll, © 1986 by NEWSWEEK, Inc.

MAURA STEPHENS FOLEY—NEWSWEEK

The Starship Free Enterprise

The space shuttle has long been a kind of Starship Free Enterprise—generating billions of dollars for aerospace contractors while also helping to open up new commercial horizons in space. Yet to many of its corporate customers, the often-delayed shuttle has been a disappointment for some time, and last week's disaster may only make things worse.

Postponements of future flights could hurt a range of companies, from those with contracts to service the shuttle to those that use it to launch satellites or mount on-board experiments. But at the same time, the Challenger's destruction could boost business for the shuttle's current and prospective competitors. The outlook for many of the affected companies depends on how long it takes NASA to determine the cause of the explosion—and on how far its findings set back the shuttle program.

Unless another shuttle goes up soon, corporations like Lockheed, which heads a consortium that performs most of the work of preparing shuttles for launching, will begin hurting. RCA Corp.'s Astro-Electronics subsidiary might lose money on contracts to provide such services as on-board television cameras and data processing for NASA in Houston and Cape Canaveral. And Astrotech Space Operations, a unit of Pittsburgh-based Astrotech International that specializes in loading satellites and other payload onto the shuttle, may see much of its business dry up.

A crisis of confidence: Corporate customers who want to launch satellites could suffer, too. The destruction of Challenger threatens to inflate the already astronomical cost of satellite insurance, even though only one uninsured NASA satellite and no commercial payloads were aboard the shuttle when it exploded. Nonetheless, because of the accident, underwriters' confidence in the shuttle "has been very severely shaken," says Robert Tirone of Alexander & Alexander, a major New York-based insurance broker.

Meanwhile, a glut of capacity on communications satellites already in orbit means that most commercial satellite users won't be harmed by a delay in shuttle launchings. Others, however, like Western Union Corp., could have trouble. The company had planned to replace an aging Westar satellite—one of its four in space—with a new one during the scheduled June flight of the shuttle Columbia; now Western Union may have to lease transmission capacity from other satellite owners, and at substantial cost.

Help from abroad: One alternative for some users may be to launch more satellites with unmanned, "expendable" rockets, such as those of the European Space Agency's Ariane rocket fleet, a NASA competitor. Locked in a price war with the American space agency for some time, Ariane may now be able to raise its charges, even though it has no vacancies in its current launch schedule until 1987. Yet some aerospace experts speculate that Ariane may try to strike a deal with NASA to put up more rockets and take on some of the U.S. agency's scheduled payload at a price.

Other aspiring shuttle competitors predict that they will ultimately benefit as well. Tiny companies like Houston-based Space Services Inc. (headed by former astronaut Donald [Deke] Slayton) and Truax Engineering and American Rocket Co. of California are trying to field simple rocket systems that could launch satellites for a fraction of the cost of the shuttle. They hope that the loss of the Challenger will focus attention on the need for more launching alternatives, helping them to raise funds from investors for further research and development.

High-risk ventures: But that may be wishful thinking. David Thompson, president of Virginia-based Orbital Sciences Corp., which makes upper-stage rockets that boost shuttle-launched satellites into higher orbits, points out that private investment in new space companies has been declining in recent years. He worries that the shuttle accident may worsen the trend. "This illustrates that traveling [and] doing business in space is not a low-risk venture," he says.

Still, there are already calls to build a fifth space shuttle to replace Challenger—a potential boon to the system's prime contractor, Rockwell International Corp. And last week Astrotech, headed by retired Rockwell chairman Willard Rockwell, said it would continue to pursue longstanding efforts to buy or lease a new shuttle from NASA in the hope of making money deploying satellites. The unexpected catastrophe of last week may have cast a pall over the shuttle program. But it hasn't clouded the vision of some starry-eyed dreamers of the commercial potential of space.

SUSAN DENTZER *with bureau reports*

to ask, 'Why are we going up for'?" says Louis Lerman of Stanford. "Manned versus unmanned—the question doesn't make sense," counters Jesco von Puttkamer, NASA's manager of long-range planning. "It's always been both. The balance is always shifting . . . Such a balance will also establish itself through Darwinian evolution in space, divided by technological can-do on one side and the desire for economy in doing it on the other side."

New Neighbors in Space

In balancing goals and resources, NASA must also consider its ever-increasing number of neighbors in space. West Germany, France, Britain and Italy have space programs, individually and through the European Space Agency, as do China, Japan and Canada. The less those programs duplicate each other, the more they can devote to seeking new frontiers. "We're really on convergent paths," says Gregg Marynaak, executive vice president of the Space Studies Institute at Princeton. The race with the Soviets created NASA in the first place, and put an American on the moon; enthusiasm for the space station has been fueled by the Soviet Salyut 7 program, which has logged twice as many man-hours in space as the entire U.S. manned space program. The Russians are believed to have a target date of 1990 for their own permanent manned space station. The Soviet version of a shuttle—a close copy of the U.S. model—seems to be a year or two away from launch. And the ESA is working on a mini-shuttle, the Hermes.

In the end NASA may well emerge stronger and more efficient in the aftermath of Challenger's death and the multiple investigations—just as it did after the 1967 launch-pad fire that killed Virgil I. (Gus) Grissom, Roger B. Chafee and Edward H. White. NASA halted the Apollo program for 18 months while experts debated its direction, progress and scope. The moon landing was delayed for nine months. "Just as then, NASA will be its own toughest, harshest critic," says Ken Pedersen, an associate NASA administrator on leave at Georgetown University.

Certainly no one was more shaken by last week's tragic loss of life than the NASA technicians who launched the seven men and women into the sky. But to them, turning back was out of the question. "In 20 years' time, this will be looked upon in the same way as the wagonload of settlers being set upon by the Indians," said Roy Gibson, director general of the British National Space Center. However heartbreaking, the truth seemed to be that death is the price of discovery.

MELINDA BECK *with* MARY HAGER, WILLIAM J. COOK *and* MARK MILLER *in Washington,* SUSAN KATZ *in New York,* DANIEL SHAPIRO *in Houston and bureau reports*