

# After the Challenger

By HOWARD KAMAN

"They had a hunger to explore the universe and discover its truths. They, the members of the Challenger crew, were pioneers. The future doesn't belong to the faint-hearted. It belongs to the brave. The Challenger crew was pulling us into the future, and we'll continue to follow them."

U.S. President Ronald Reagan

**T**wo years ago today, the Challenger space shuttle exploded over the Atlantic Ocean, 73 seconds after takeoff. As a result of that accident, the American space program has suffered some of the greatest setbacks in its long history.

Since May 5, 1961, the Americans have had a great deal to be proud of in the field of space research. On that day, Alan B. Shepard became the first American to enter the new frontier, and since then, the Americans have become world leaders in the fields of aeronautics and space science. Through the victories of the Mercury and Apollo programs, the latter including humanity's first trip to the moon, the National Aeronautics and Space Administration (NASA) enjoyed moments of heightened glory during the '60s and early '70s.

That was then. Today, NASA has lost its boldness. Its funding has been cut drastically, receiving nowhere near the money it needs from Congress to get back on its feet. According to Ralph Nicholls, of the Institute for Space and Terrestrial Science (ISTS) at York, one of NASA's major mistakes was "putting all the eggs in one basket." That basket was the shuttle.

The space program has wild ambitions for the next 50 years, and its ability to fulfill those visions rests squarely on the shuttle. "The tragedy of the Challenger blowing up is a small thing," Nicholls explained. "There will always be disasters; you know, people die in mines. But that's not a story, it's not flashy. The real problem here is that they're committing all of their launch fleet for a period of three or four years to put (the space station) up. So, they can't do any other science from the shuttle."

It seems the major difference between the American and Soviet space programs is also the Americans' greatest difficulty. Whereas the Russians send up almost two rockets every week, the United States spends most of its time and money on research done here on earth, sending up a minuscule number of vehicles. Of 103 vehicles sent into space last year, 91 of them were from the USSR. When the construction of the space station begins, it will put research on hold another three or four years, while the shuttle spends time as a truck, simply transporting components and crew to and from the work site in orbit.

NASA, aware that its program is progressing at a much slower rate than the Russians', and pressed by the setback caused by the Challenger accident, may soon be changing its outlook. "On the NASA committees I've been on, the attitude says, 'Small

ing many researched right here at York, average about 10 to 15 years each." In Canada, the impact of this sort of 'Big Science' on our universities is twofold," Nicholls continued. "There are two things: one is in space and the other one is in high energy physics, particle physics. (Projects in these areas) take a decade to get built and running, 10 years, and how you fold that into a university system, post graduate and PhD training is very difficult."

Nicholls argues that NASA's problems could have been avoided if they had asked for more than just the space shuttle to begin with. "They said, 'We've got to have a shuttle. This is the best thing since sliced bread.' So they got the budget for it," he explained. "If they said, 'We want a shuttle and heavy launch rockets,' they probably politically couldn't have got that through. Many of the payloads that are now going in the shuttle don't really require people up there to launch them. Some of the communications satellites that they're putting up could equally well have been launched by rockets."

Indeed, as stated in the Report of the Committee on the Space Station, filed in September 1987, "The current Shuttle's ability to support the deployment, assembly and operation of the Station is marginal. Thus, an obligation to improve, maintain and operate a reliable space transportation capability for the life of the Space Station is an inherent element of the national commitment required for the program."

**P**art of the improvement of the shuttle system would include an extension of its capabilities, to make it usable for longer flights. Future shuttles will be capable of trips up to two weeks in length. "All the present shuttles, before Challenger, went up for about a week," Nicholls said. "They were really up for five days, because you lose a day and a half getting up there and setting up. Then you've got three or four days and you have to button up and come down again. If it was up for two weeks, and that calls for a lot of re-engineering, the utility of the shuttle for doing things would be greatly enhanced."

The shuttle has become the workhorse of the space program, and is one of the most crucial elements of what NASA has planned in the coming years. *Pioneering the Space Frontier*, a report prepared by the National Commission on Space, is an exciting and ambitious vision of the next 50 years in space. As outlined in the report, the gateway to the solar system is the space station, to be built by NASA. "The space station is the stepping stone for building large space structures and launching further . . . to the colonization of Mars or what have you," Nicholls explained. The station will be an international effort, involving many countries, including Canada. With regard to the Soviet craft, Mir, Nicholls argues that it's not really a

physiological data for people in space beyond about six months."

The American space station will be far more than a "manned thing." It will be an international laboratory, in which several countries, including Canada, will conduct experiments only possible in a zero-gravity environment. Because people from many cultures will be taking part in the program, Nicholls doesn't foresee domination by the military. "I know there's been this hiccup," he said. "Will Canada get aboard? Will Japan. Will ESA (The European Space Agency), if the US military puts things aboard. 'The Military' is a buzzword. Like 'radiation'; everybody thinks of nuclear radiation, while very few people understand it. The military agencies of all countries have financed a vast amount of research. Frankly, if the US Air Force hadn't taken an interest in those people in Canada in the early '50s, who were interested in physics and chemistry of the atmosphere, we wouldn't have space activity in Canada right now. Classified military projects won't work on the space station, anyway. You'll have international people on it; Europeans, Japanese and Canadians as well as Americans. So there's no way real classified work can go on in the space station, just because of how it's being organized."

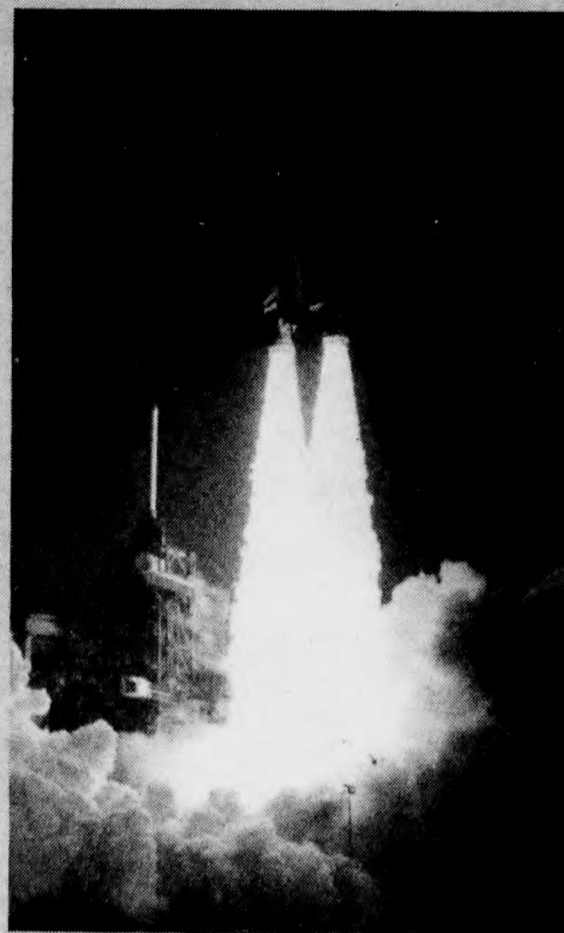
Concerning Ronald Reagan's plans for the Strategic Defense Initiative, or "Star Wars," system, Nicholls simply stated, "Whether we like it or not, there will be SDI research supported across the board. I think none of it can go on the space station, because it is not a militarily secure vehicle."

The station itself will be a long spindly structure, anchored at both ends by large solar panels, which will supply power. In the centre are the habitation modules, in which the work will be done by various countries. To date, Japan and ESA are both building modules. As far as Canada is concerned, "we have two percent of the action in the space station," Nicholls explained, in the form of a "tele-robotic servicing unit." With a Canadian space budget of \$150-million, Nicholls believes that we are getting "a tremendous bang for the buck, an awful lot for a very, very small amount of money."

Whereas Canada is economical with their money devoted to space, the Americans always seem to need more. NASA requested \$767-million for space station research in the 1988 federal budget. It received \$425-million to work with. Of the \$10.508-billion allotted to NASA in 1987, \$2.1-billion of this went towards the construction of a replacement orbiter for Challenger. As a result of a deficit reduction package (passed in US Congress last December) NASA has been given a mere total of \$8.856-billion this year.

Nicholls feels that the incredible cost of space research and work has also contributed to keeping the American space program on hold. One surprising example of such a restriction is the fact that the space station will have the capacity to hold only eight people when completed. "The benchmark is eight people, and that's hardly

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enough to keep the thing running, let alone do any serious science," Nicholls said.

**S**eeing the limitations in the number of people that can be accommodated by both the shuttle and the station, Nicholls finds it a "futile gesture" to send civilians into space, like the ill-fated teacher of the Challenger mission, Christa McAuliffe. "When you're talking projects with vast budgets, you can't get away from politics and PR," he continued. "It's magic to have people in space, so the taxpayer has got to see people in space. I'm not saying that those pressures won't occur (in the wake of the Challenger accident), but I think they'll be resisted."

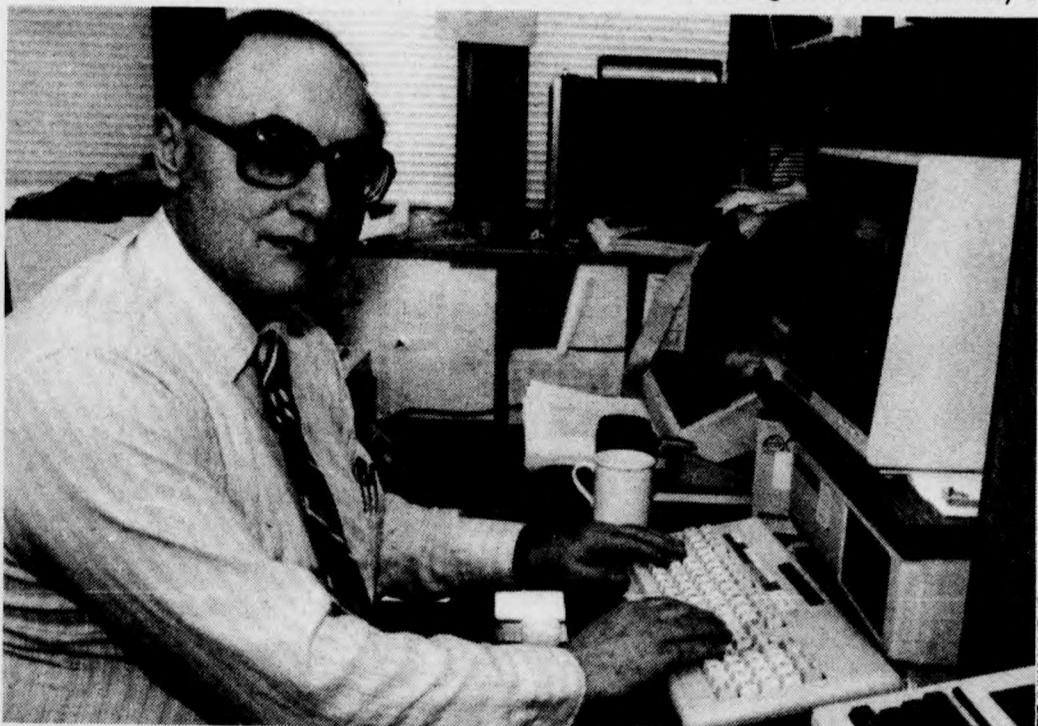
Dr. Gordon Shepherd, also of the ISTS, feels that "NASA has a history of trying to do too much for a given amount of money . . . It's a way of operating that they've gotten into. They put themselves under these enormous pressures, and in this particular case (the Challenger), it seemed the pressures got to the point that they really were beginning to sacrifice technical quality (because) the managers and the technical people wouldn't agree in every case. That's borne out by the fact that there were people who made the recommendation not to launch, and they were overruled by the managers. To get the money, they have to promise a lot, and they promise too much."

A possible solution to NASA's problems could be found in "a short term plan, that was low technology and low cost and that could be done quickly," Shepherd suggested. "That would fill the enormous gap that exists between now and the Space Station . . . That's the crux of the problem; they're so future oriented, that they're destroying their short term science and technology."

Short term science is what keeps the Soviet space program operating, according to Shepherd. This is one of the major differences between the Russian and American programs. An element that may, or may not differ between the two is the degree of influence of the government, versus the influence of the scientists themselves. "I'd be hard put to say whether the scientists have more influence in Russia or in the United States," he explained. "In principle, the scientists in the United States have more to say about the program, but then, because Congress is the all-determining factor, in the end, that's what the biggest factor is."

In his book *The Overview Effect*, which explores the possibilities of space exploration in the post-Challenger era, space scientist Frank White writes:

"Ultimately, going into space is not about a technological achievement, but about the human spirit and our contribution to universal purpose. Space exploration, in all its forms, should become humanity's modern central project, and the human space program the central project for all five billion of us. The goal should be to get us out of the cave, freeing us to see reality, rather than the illusions that persist for a species chained to a planetary surface. Humanity can no longer plead ignorance of what is truly possible."



**Charting NASA's future: Professor Ralph Nicholls of the Institute for Space and Terrestrial Science at York was a member on Canadian committees studying the future of the space programmes. He believes that NASA put all its eggs in one basket with the shuttle programme.**

and quick is beautiful.' That's the thing that's being pushed," said Nicholls. "We've got to get decent science done quickly, got to get it up there running and we've got to have projects that don't take 15 years from the germ of an idea until graduate students can work on it, because they'll be old by that time."

Projects currently under development, includ-

station at all, but a "manned thing, not at all elaborate." Yet, not to minimize the significance of Mir, Nicholls points out that the Russians are "asking questions of the most complicated thing about people in space; how long can you stay up there and get back again safely? This last Russian has been up there for a year. But until he was there, we didn't have any