

JAMES M. BEGGS

THE NASA SPACE STATION

The American quest for knowledge has been a major source of national strength since the earliest days of the Republic. After more than 200 years, our urge to know the unknown has tamed a continent and created a high technology base that is second to none.

Today we are looking toward another frontier that is beyond our continent and, indeed, beyond our globe—the frontier of space. We embarked on this enterprise, not to conquer new territory, but to understand better the forces that shaped us, our world, the solar system, and the universe—and, indeed, forces that have determined our evolution and will shape our ultimate destiny.

For more than 40 years, the people at APL have been part of this enterprise. Even before the Space Age began, your scientific and technological contributions helped to prepare us for it. You can be proud of your record in helping to meet national needs, both in war and in peace.

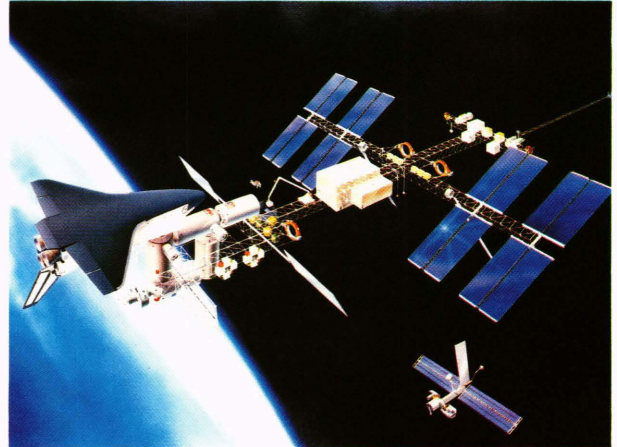
NASA is pleased that we have worked together on many important scientific programs and, in particular, that we sponsored 14 of the 50 satellites designed and made here at the Laboratory.

From the first launch of the ANNA satellites in 1962, our cooperation has extended to a variety of programs in the study of geodesy, the earth's ionosphere, X-ray and gamma-ray astronomy, oceanography, the geomagnetic field, and the earth's magnetosphere. APL has also provided dozens of instruments for NASA scientific spacecraft, including the SEASAT altimeter and the charged particle detectors on Voyagers 1 and 2.

The NASA-APL partnership has, indeed, been long and fruitful. And it will continue as we move forward with Galileo to explore Jupiter, with Ulysses to explore the heliosphere, with TOPEX to explore the oceans from space, and with other projects that we cannot yet imagine.

As we look to the future, there is a boundless universe of opportunities to explore, both in aeronautics and in space. I would like to share some brief thoughts with you about where we will be going in space over the next decade and beyond.

James M. Beggs is the Administrator of the National Aeronautics and Space Administration. This article is based on remarks made at the APL Principal Professional Staff Dinner held on December 5, 1984.



NASA's Johnson Space Center has proposed this "reference configuration" of a permanently manned Space Station. It forms the basis of preliminary design competition initiated by NASA in 1984.

After more than three and one-half years and 14 missions, we have good reason to say that the Space Shuttle has proved to be the reliable and versatile machine its designers intended it to be. It is a truly remarkable vehicle that not only gives us ready access to near-earth space, but allows us to expand our capabilities to work there.

We are planning to launch a mission a month over the next 12 months and, by 1986, will even be launching two missions in some months. If the market continues to expand as we expect it to, we will be launching 30 or 40 missions a year by the end of the century.

With the Shuttle, we not only launch satellites and spacecraft, but have proved that we can retrieve, repair, and redeploy them as well, as we did in April 1984 with the Solar Max. And we can also salvage them and bring them back to earth to be repaired and launched again, as the 2.5-million-mile service call in November 1984 demonstrated so dramatically.

The Shuttle has truly opened new doors for science, industry, and commerce in space. And now that those doors have been opened, we are preparing to take our next logical step: to build a permanently manned Space Station and to do it within a decade, as the President directed us in January 1984.

When the Space Station is operational in the early 1990s, it will be the culmination of all our efforts to expand human activities in space, beginning with Mercury and on through Gemini, Apollo, Skylab, and the Space Shuttle.

Based on studies of our user needs over the past three years, we envision many uses for the Space Station. It will function as a permanent orbital observatory, as a scientific and industrial research facility, as a repair and maintenance base for spacecraft, and as a construction base for large structures.

The Space Station will spur exploration of the solar system and the universe by both manned and unmanned vehicles. It will stimulate applications on earth and facilitate studies of the earth as a global system. In addition, it will stimulate sustained research and development on innovative systems and techniques.

With the Space Station and the family of automated and semiautomated space transportation vehicles we will develop with it, we will be able to service satellites in orbit to prolong their scientific and commercial utility. We will also be able to use the microgravity environment to develop any number of promising manufacturing enterprises, such as making pure crystals for electronic components, new alloys for industry, and new medicines to help fight such diseases as cancer, diabetes, and hemophilia.

The Station will give us a staging base for future, more ambitious missions, such as a return to the moon to establish a permanent base to mine resources, or a manned mission to Mars. It will be an essential precursor to any such missions because it will provide us with the space infrastructure we must have to accomplish our goals.

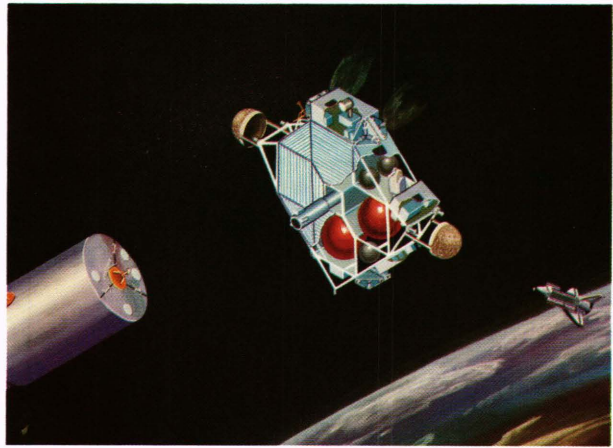
Moreover, and most important, as the cornerstone of the President's future civilian space program, the Space Station will lay the groundwork for American leadership in civilian space activity through the end of this century and beyond.

The key element of the Space Station's supporting infrastructure that will enable us to plan realistically to extend our reach in space will be the reusable space transportation vehicles I mentioned earlier. Unlike the Shuttle, which is an aerospace vehicle, these will be true spaceships, designed and built to operate only in space—in low-earth and at geostationary orbits and between them, and, eventually, at distances as far as the moon and the inner planets.

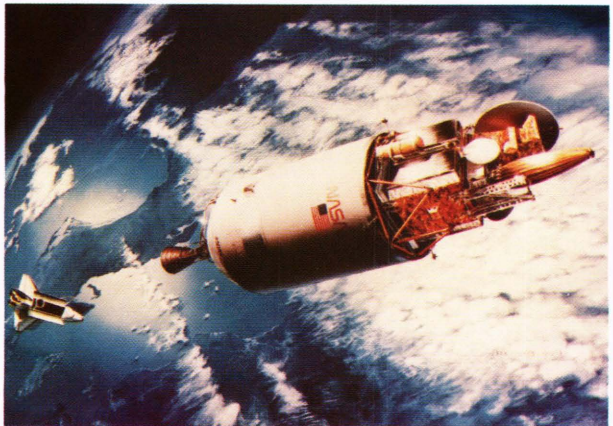
First to come on-line will be the Orbiting Maneuvering Vehicle, or OMV. It will be used to service satellites close to the Space Station and for many other tasks, such as assembling large communications antennas or an array of large telescopes.

The Orbital Transfer Vehicle, or OTV, will follow the OMV. It will be used to ferry payloads to and from near-earth and geosynchronous orbits, or to launch spacecraft to other points in the solar system.

As we move out farther from earth, to higher orbits and, perhaps, to other worlds, it is clear that this expansion will pose great challenges, both to our imaginations and our resources.



Rendezvous and docking of the Orbiting Maneuvering Vehicle (OMV), which is shown with a typical spacecraft. The OMV will return to the Orbiter for manned in-orbit repair, refurbishment of the spacecraft, or return to the earth.



Artist's concept of the Orbital Transfer Vehicle (OTV) and upper stage rocket under study at NASA's Marshall Space Flight Center. The unmanned transfer vehicle will ferry payloads in space from one orbit to another and then return on its own for reuse on a later mission.

Enterprises of the magnitude and scope of a manned lunar base or a manned mission to Mars, for example, will require not only the development of new technologies, but also of management techniques and economic analyses that will make them feasible and profitable. This implies even greater international cooperation and international sharing of both risks and benefits in the future.

We are prepared to develop and operate the Space Station alone, if necessary. But all indications are that our friends in Europe, Canada, and Japan will accept President Reagan's invitation to join with us. Their participation would increase the Station's capabilities and lay the groundwork for even more extensive joint ventures in the future.

Recently, there was a considerable flurry of press attention to a report issued by the Congressional Office of Technology Assessment. The report, *Civilian Space Stations and the U.S. Future in Space*, was wide-

ly reported to have concluded that NASA's present Space Station plans cannot be justified economically, scientifically, or militarily. Nowhere was that conclusion stated, explicitly or even implicitly. Indeed, the substance of the assessment itself, I believe, makes a very compelling case for the Space Station program. It sets out potential goals and objectives for the space program, including the need for a long-term space infrastructure and the maintenance of American leadership in space. These goals correspond in almost every respect to what we are doing and plan to do in the future.

NASA has studied Space Station concepts for more than 20 years, and we believe this step is the logical follow-on to the Space Shuttle.

We have justified the Space Station thoroughly to the President and the Congress, which has appropriated funding to begin the program. Over the past several years we have worked with the scientific, industrial, and international communities in defining potential user needs for the Station. And over the next two years, we will be working with these communities to involve them in the Station's design and eventual use.

I am heartened by public opinion polls that indicate that public support of the space program has never

been higher—it is now in the area of 70 percent. More than 50 percent of those polled believe—and rightly so—that the Space Station will improve the quality of life on earth.

I believe that the public agrees with President Reagan when he said not long ago, "Our investment in space has been one of the best investments we've ever made as a nation." That investment has averaged less than 1 percent of the federal budget over the years, and our current \$7 billion budget is only eight-tenths of 1 percent of the entire federal budget of \$845 billion.

The returns on our investment in space have been estimated at between 20 and 30 percent. And while the benefits may be difficult to quantify, they are impossible to question. They include new industries, new jobs, and greater innovation and productivity. Our space program has inspired our young people to excel. And above all, it has maintained American leadership in high technology, which is the cutting edge of progress.

Clearly, the space program has proved that our dreams of yesterday can become the realities of today. And, at the dawn of this new era in space, we have the means to make today's dreams the certainties of tomorrow.