# Manned space flight at 30: What does the future hold?

*April 12 marks the thirtieth anniversary of the first manned space flight and the tenth anniversary of the first Space Shuttle mission. A perspective by Marsha Freeman.*

On April 12, 1961, Soviet Major Yuri Gagarin blasted off atop an intercontinental ballistic missle, strapped into his Vostok spacecraft, to become the first human being to venture into space.

Three weeks later, on May 5, 1961, U.S. Navy Cmdr. Alan Shepard spent approximately 15 minutes in his Freedom 7 Mercury capsule on a suborbital flight, which took the first American into space. Twenty days later, President John F. Kennedy announced that, before the end of the 1960s, the United States would land a man on the Moon, and return him safely to the Earth.

Exactly 20 years after Yuri Gagarin's first flight, U.S. astronauts John Young and Robert Crippen made a 54-hour trip in the Space Shuttle orbiter Columbia, ushering in the era of reusable spacecraft capabilities. The maiden flight of the Space Transportation System was the first new launch system whose first flight-test was manned.

The 30 years from 1961-91 of the manned space age have seen over 100 people spend days, months, and even a year, in space. People have learned how to live, explore, experiment, and occasionally relax in this strange environment. We have retrieved pieces of our nearest neighbor, the Moon; observed the universe, from spacecraft circling the Earth, with a view unattainable from the surface; and begun to learn how our bodies, which have always lived in the one-gravity environment of Earth, change in space.

The first 30 years of man in space have been a prelude to the real purpose of the venture—to move human civilization to other worlds. These will be worlds which man must create, as there is nowhere in the Solar System which can accommodate human life without the most advanced technology and thoughtful planning.

In 1958, the House Select Committee on Astronautics and Space Exploration directed its staff to ask some of the nation's leaders in science, engineering, industry, government, and the military what they thought was possible in the following decade. The result of this effort was a volume titled, *The Next Ten Years in Space, 1959-1969,* which we excerpt below. The report was in such great demand, that 10,000 copies were authorized to be printed.

In its report to the Select Committee, headed by Speaker of the House Sam Rayburn, the staff stated, "This report is one of the most fascinating studies ever prepared for the Congress. It is not the fanciful creation of this staff, but rather a summary of the thinking of the leading scientists, engineers, industrialists, military officials, and government administrators concerned with our national space program. These are men whose training and responsibility have made them careful, sober, and accurate in what they say. The sum total of their assessment of the next 10 years adds up to an astonishing technological preview of the world of tomorrow.

"One word of caution is required," the staff report continued. "All the plans, programs, and projections these qualified men present will count for little unless the United States decides to meet this challenge with the mobilization of its private industry as well as public facilities, its resources, manpower, matériel, and money, which the national space effort requires."

## The results of the first decade

What had the manned space programs actually accomplished, by 1969?

The United States had spent the decade of the 1960s mobilizing its scientific, engineering, productive, and imaginative resources and had landed two men on the Moon. The Russians had tried, but failed to develop and successfully test a booster rocket capable of taking cosmonauts to the Moon. Though they denied that they had ever been in the race, as the U.S. got closer and closer to the lunar landing, American experts on the Soviet space program always maintained the Russians *had* indeed tried, but had not been able to accomplish the task.

More recently, over the first few years of glasnost, there has been the most extraordinary opening up of significant aspects of the Soviet space program to the Western press. Reporters have taken tours of the launch facilities, the cosmonaut training center; they have even been shown the lunar landing module which the Russians had denied existed, designed and built for the race to the Moon. American astronauts have been invited to and attended Soviet space launches.

## Program for a permanent space presence

In 1969, the United States stood poised on the edge of the next major milestones in the manned space program. Technology to transport astronauts to the Moon and keep them alive, and productively working while there, had been designed, built, and tested, and for the most part, had worked. Men had also worked in orbit, from where they were able to perform biological and materials experiments, remotely sense and photograph the Earth, and observe the heavens. It was clear that, although there were physiological effects from prolonged weightlessness, man could more than likely adapt to this new environment and move his science, culture, and civilization into space.

Even before the first lunar landing, President Nixon had appointed a space task force to come up with suggestions for the next decades of the space program. Headed by Vice President Spiro Agnew (who reportedly said as the Apollo astronuats blasted off for the Moon, "Now, on to Mars!"), and including NASA Administrator Tom Paine, the group proposed a multilayered effort to build the infrastructure for a permanent presence in space. This was designed to consolidate the gains made in the Apollo crash program, and included long-term facilities to stay in space, such as an Earth-orbital space station, and a reusable shuttle to regularly take men and material to and from orbit.

But there was no thought of shrinking back from the next frontier. According to the task force, and supporting thinkers such as Wernher von Braun, the next step was a manned landing on Mars, and their estimate was that this could be achieved in 1980. This would require a major breakthrough in propulsion technology, since a trip to Mars using that day's chemical rockets would take close to a year, which was unnecessary, and also unacceptable due to the dangers of radiation.

Work on nuclear fission propulsion, as "predicted" in the above quotes, was well under way by 1969. All of the second-generation nuclear technologies which should have been applied for commercial application in the electric utility industry back home had already been designed, such as liquid metal reactors, and high-temperature gas-cooled reactors.

The Nixon economic and budget crises sliced the NASA programs to the bone. The manned Mars mission was canceled, along with the nuclear propulsion program. The space station was put on hold, and the President gave the go-ahead only for the Space Shuttle. That program suffered through continuous underfunding, and compromises in engineering and other areas were made to finally complete it.

## Today's narrowed perspective

The U.S. space program has been marking time since the first Shuttle flight.

Space Station Freedom, which was supposed to be operational by 1994, is now planned to be continuously manned near the year 2000. Instead of a crew of eight, only four astronauts will be on board. The electric power, for the station itself and its scientific experiments, has been cut from 75 kilowatts to 56. The rate that scientific data can be transmitted to Earth has been cut from 300 million bits per second to 50 million. The size of the U.S. habitation and laboratory modules has been cut. The Space Station is needed for solving the physiological and medical problems people develop living in less than Earth gravity. The Space Station could act as a platform for scientific observation, toward the Earth and away from it, as well as a service station for free-flying space observatories, like the Hubble Space Telescope. Ultimately it would serve as the transportation hub on the way to the Moon, and to Mars.

President Bush's Space Exploration Initiative—to return to the Moon and then finally accomplish the manned mission to Mars—is proving to be unserious window dressing.

For the past 30 years, each time there has been a study of the long-range goals of the space program, the recommendations have always been the same: develop the infrastructure in transportation systems and waystations for the permanent development of scientific and economic activity; establish colonies on our frontiers—i.e., the Moon, and then go on to make Mars habitable for human life. Scientists such as Krafft Ehricke and Wernher von Braun occasionally became impatient with the seeming inability of men and their elected governments to carry out these long-range goals. Were they here today, they would certainly agree: The task now is to get on with it.

Documentation

# 'The next ten years in space: 1959-1969'

*What follows are excerpts from the contributions to the 1958 House Select Committee on Astronautics report.*

## Krafft A. Ehricke

*Assistant to the Chief Engineer, Convair, San Diego, California.*

During the year 1958, the government has become increasingly aware of the necessity to actively and consistently sponsor a national space-development program. The prime motivation for authorizing the considerable financial effort involved, derives from the concern for Congress for the economic welfare and military strength of the nation. Leadership in science and technology and in the exploration of our micro and macrocosmic environment is one of the prerequisites for assuring this condition and therewith also for gaining the right and the ability to shape a better world for all mankind. . . .

. . . The plateaus of achievement which can realistically be expected must be consistent with the vehicular capabilities estimated to be available during the next 10 years. These are, briefly: ICBM booster rockets; upper stages with advanced chemical propulsion systems; large boosters with 1.5 to 3 million pounds of thrust; upper stages with nuclear heat exchanger power plants.

On the basis of this vehicular capability, space technology may be expected to reach the following plateaus of achievement during the coming decade. . . .

**Lunar space.** . . .

(3c) First manned lunar landings.

This may be a marginal goal for the period 1959-69.

**Interplanetary and planetary space.** . . .

(4b) Planetary probes . . . during the next 10 years there exist only a maximum of five opportunities to launch a Mars probe and seven occasions for a Venus probe. . . .

With the advent of a 1.5 million pound booster vehicle it will become possible to transmit a probe to the planet Jupiter. The opportunity for this arises once almost every year. The transfer time would be in excess of one year. A Jupiter probe would be of considerable scientific interest, but is a difficult project which may not be practical until the end of the sixties. . . .

Advanced astronautic concepts, such as the manned lunar base and manned flights to other planets must await the harnessing of nuclear power for spacecraft propulsion. The two most attractive and realistic concepts using nuclear energy are at present the nuclear heat exchanger rocket and the nuclear energized ion rocket. Of these two, the former is more universally usable, since it is capable of a sufficiently strong acceleration (0.2-0.02 g) to establish fast cislunar transfer and lunar landing as well as takeoff. . . .

Propulsion research and development will concentrate on nuclear drives, ion drive, and other potentially promising methods of propulsion. It appears reasonable to assume that a nuclear heat exchanger drive will have been perfected and flight tested in cislunar space by the end of the next 10 years. Ion-propulsion research can be expected to be in an advanced state.

By the end of the next 10 years we can thus expect the following state of development in astronautics. . . .

1. Communication and television relay satellites at very great altitudes, probably as high as 22,000 miles (24-hour orbit) in equatorial and inclined orbits.

2. Global weather monitoring on a routine basis from optical satellites circling the globe in polar or highly inclined

# 'A prize beyond price'

*In 1986, Lyndon LaRouche was the only presidential candidate to elaborate a program for the next half-century of space exploration, aiming toward a fully manned colony on Mars. We excerpt here a small portion of his program, which appeared in the November-December 1986 issue of* Fusion *magazine, entitled, "The Science and Technology Needed to Colonize Mars."*

At present, broadly speaking, Americans lack those psychological potentials for space exploration which existed during the 1960s and earlier. Through the influence of those irrationalists, such as the "ecologists" and the counterculture generally, many of our citizens have lost connection with the principles of moral character and science-like intellectual development traditional to the Augustinian heritage. We, as a nation, are presently in the process of being self-destroyed by the growing influence of the "ecologists" and the radical counterculture. Over the reorbits some 4,000 to 8,000 miles high.

3. Radio-navigation satellites some 1,000 miles high, serving the ships on seas in equatorial and inclined orbits.

4. One or more relatively small manned space stations some 300 miles high in the equator plane for orbital flight training, life support systems development and man-conducted research in space.

5. All or many of these satellites and space stations will be equipped with nuclear auxiliary power supply systems.

6. Satellites of the Moon will have been established and landings with instrumented probes on the Moon will have been accomplished. Probably, the first landings by man will have been achieved.

7. Man will have circumnavigated the Moon using vehicles launched directly from the Earth's surface without orbital assembly or fueling.

8. Interplanetary probes will have covered the entire inner solar system from inside the orbit of Mercury to the asteroid belt beyond Mars. Encounter probes will have been sent to Venus and Mars and instrumented satellites of these planets will have been established. Probes may have been sent out as far as to the planet Jupiter.

9. All of these projects will have been carried out essentially on the basis of chemical rockets, such as the ICBM boosters with advanced chemical upper stages and the 1.5 million pound thrust booster with chemical upper stages. However, at the end of this decade nuclear powered upper stages, boosted beyond the atmosphere by chemical first stages, will be available.

10. Research in auxiliary power systems, energy conversion, materials, and electrical propulsion systems will have made great strides.

11. Close international cooperation in the scientific and practical usage of satellites, as well as in monitoring and tracking of space vehicles and in control of transmission frequencies, will have been established. At least one new launching complex for space vehicles will have been built, located in the mid-Pacific on or near the Equator.

12. Man will have sufficient information to decide for or against a permanent lunar base and will begin to look to the planets.

## Maj. Gen. J.B. Medaris

*Commanding General, U.S. Army Ordnance Missile Command, Redstone Arsenal, Huntsville, Alabama.*

The coming decade will undoubtedly be chronicled by history as the birth of the Age of Space, for the decade is certain to be marked by phenomenal technological achievements; however, any attempt to second guess the extent of these achievements must be tempered by the realization that

cent 20 years, we have undergone a "cultural paradigm shift," away from Augustinian tradition, toward a philosophical outlook akin to that of the Russians.

This recent difficulty is not, however, an argument against space exploration. Precisely the opposite; the psychological demands placed upon our society by bold ventures into space, are precisely the stimulant best recommended to bring us back to ourselves, our moral heritage.

There are many practical things which must be done, urgently, to save our nation. These are the indispensable, which we shall lack the resolution to accomplish, unless our desision-making once again embraces the essential.

Space is there. It is a challenge within man's grasp. It is a challenge which bears upon the improvement of life on Earth. We must respond to that challenge with goodness.

What is the desire of the good person? What else but to discover the laws of creation less imperfectly, to the end that our knowledge, as guide to our practice, deviates less from the will of the Creator expressed in the lawful ordering of this universe. Who can be good, who does not yearn for agreement with the Creator, and, on that account, to lessen the imperfection of one's own understanding of the lawful ordering of creation?

What could be a more beautiful event in the existence of mortal mankind than to step up from the mud of our planet, into space, to accept whatever challenge we discover to be awaiting us there? To think of such a task as imminently before us, is to experience an awesome sense of beauty within us.

On this planet, especially during the recent 20 years, increasing portions of the populations of even Western Europe and the Americas are afflicted with cultural dispair.

"There is no future," say the doomsaying "ecologists." Believing the "ecologist" propaganda, the young person seeks momentary escape in the here and now: Drug usage proliferates, destroying growing ratios of our youth, on this account. That same stink of irrationalism and cultural pessimism, which spawned the Nazi upsurge in Weimar Germany, spreads among our nations, spoiling the very will of our nations to survive.

We must turn the mind's eye of the young upward, to the heavens, while we point: "There lies the future of mankind."

In that respect, the conquest of space is a prize beyond price.

there is almost always an unfortunate gap between that which is possible and that which is probable. . . .

The House Select Committee on Astronautics and Space Exploration recently invited the comments of various members of the Army Ordnance Missile Command on the . . . space program. . . .

There was not a dissenting comment on the possibility of accomplishing this program within this time frame. In fact, AOMC presented its recommendations to the committee on how this program could be most efficiently realized. In each comment, however, there was a warning note: having decided what is possible we must take a look at those conditions in our national space effort which breach the possible and the probable.

I would list the following:

1. We must establish a long-range, national program which takes advantage of all available resources, military and civilian.

2. We must then fund that program on a long-range sustained basis so that our technology does not suffer a hand-to-mouth, fits-and-starts existence from one fiscal year to the next.

3. We must empower our program managers with the legal capability of making decisions when they are needed.

4. We must spend more money for applied research. . .

How close we come to the mark which history has set for us—how closely the probable approaches the possible—depends primarily on the quality and quantity of money, men, and material which we are willing to expend toward this end. Given the resources, we know how to accomplish the necessary economy of action, and here I would defer to Plutarch's definition of economy, which, he said, is but money-making in things inanimate—but when exercised over men becomes policy.

## Dr. Wernher von Braun

*Director, Development Operations Division, Army Ballistic Missile Agency, Redstone Arsenal, Huntsville, Alabama.*

(a) Will man reach the Moon? the planets?

(b) Will weather forecasting become an exact science?

(c) What types of propulsion will be developed?

In the following I have endeavored to come up with a comprehensive answer which should cover the above subjects.

It is my opinion that manned flight around the Moon is possible within the next 8 to 10 years, and a 2-way flight to the Moon, including landing, a few years thereafter. The launching of manned, Earth-orbital vehicles will have to precede such efforts and can be expected within the next 3 to 4 years. It seems unlikely that either Soviet or United States technology will be far enough advanced in the next 10 years to permit man's reaching the planets, although instrumented probes to the nearer planets (Mars or Venus) are a certainty.

At an altitude of some 22,000 miles, 3 communications satellites spaced 120 degrees apart in the same equatorial 24-hour orbit, will provide a global telephone, telegraph, television, radio and facsimile transmission system of sufficient traffic handling capacity to serve the entire earth. Revenues from this worldwide service should be used for the financial support of future deep-space exploration projects.

Meteorological satellites, equipped with television cameras and circling at altitudes of only several hundred miles through near-polar orbits, will provide uninterrupted information on the cloud coverage on every point on Earth. Such information will not only enhance our understanding of the total solar energy absorbed by the Earth (and not reflected by the clouds), but it will also furnish immediate information on impending weather changes, hurricane dangers, and the like. It can be expected that the yearly savings incurred to agriculture and the tourist industry by improved weather forecasting will run into the hundreds of millions.

Rocket vehicles, of course, will be the key to accomplishment in the space age. If we are to expand our capability in space exploration, we must initiate a national integrated missile and space vehicle program which utilizes all existing development teams and facilities. Such a program would permit the development of five generations of space vehicle families within the next 10 years. The first generation, which is now in existence, utilizes short-range ballistic missiles such as Redstone for the boosters and has demonstrated an orbital payload capability of up to 33 pounds. The second and third generations would utilize IRBM and ICBM missiles as boosters, with payload capabilities increasing to 3,000 and 10,000 pounds, respectively. Fourth and fifth generation space vehicles require the development of boosters between 1 and several million pounds of thrust, and will have payload capabilities on the order of 25,000 to 100,000 pounds.

Other requirements for an integrated national space program would be the development of space navigation and guidance systems, crew engineering equipment and techniques, new and improved test and launching facilities, and new and improved satellite and space-vehicle payload compartments to accomplish astronomical research missions based on the idea of look-see.

The extent of United States achievements in the space age's next decade will depend on such a well laid-out national program. The Soviet Union with its traditional 5-year-plans obviously has such a long-range space program in operation. It is utterly essential that we now commit resources likewise to a long-range, integrated national program and sustain that program even if public interest in it temporarily abates. For if public opinion again becomes lethargic, it will, of course, be reawakened by Soviet accomplishments. But the resultant stop-and-go method would be neither economical nor successful.

I hope you will not think I am begging the question of *where* we are going by answering with another question: *How much* are we willing to pay?