

REFLECTIONS

manned vs. unmanned space flight

Having recently celebrated the 25th anniversary of the launch of OSCAR I, the world's first non-government orbiting satellite, Amateur Radio has a proud history to look back upon, and an exciting future to anticipate. Our nearly two dozen experimental communications satellites and three manned Ham-In-Space missions have made it possible for thousands worldwide to participate, both personally and vicariously, in space exploration and research. They have also afforded us an unprecedented opportunity to compare the relative value and merits of manned vs. unmanned space missions.

Are the complexity, expense, and risk of manned space exploration justified, and if so, on what grounds? These questions are voiced by the lay public from time to time, either in the wake of a disaster or when appropriations are under consideration. The great strides in space exploration attributable to unmanned space probes raise some valid questions. Couldn't shuttle-type missions be accomplished by unmanned, computerized, robotically controlled machinery? Wouldn't this be cheaper, safer, and easier than providing life support systems? Isn't man, in the final analysis, just so much excess baggage?

A more general question might be: Does the future of the space program lie in manned or unmanned missions? The unmanned craft now in space, and those planned for the foreseeable future, are singular enough in purpose to be controlled by telecommand. Their missions are of long duration and generally one-way; hence volunteer crew members are scarce. The rationale behind unmanned space probes is obvious; that behind manned exploration less so.

The common justifications for a human presence in space fall into three categories: philosophical, political, and technical. "Earth is the cradle of mankind," wrote early rocketry theorist Konstantin Tsiolkovsky (1857-1935), "but man cannot live in the cradle forever." We go into space for the same reason we climb mountains, explore caves, and sail the Queen's ships toward the edge of the earth and certain doom; because it is there, and we are who we are. We still rise to a challenge, just as we did in Columbus' day, and the challenges are much the same: propulsion, guidance, and environment. Within the past generation we have met these challenges, to the extent that space travel is now not only possible, but almost routine. But is it advisable?

The politician will consider the military aspects of a manned space presence, and conclude that further progress is inevitable; the only question is whether to lead or to follow. A generation ago President Kennedy said, "The exploration of space will go ahead whether we join it or not. It is one of the great adventures of our time and no nation that expects to be the leader of other nations can stay behind in the race for space."

The United States and the Soviet Union may dominate, but no longer monopolize the quest for space. Japan and the European Space Agency are making great strides not only in their well proven launch capabilities, but in space manufacturing. If the United States is to remain competitive *we must continue to send manned laboratories into space*. The financial and scientific rewards are just around the corner.

The technological imperative for manned space missions becomes obvious when we consider the experiments which have been carried aloft in the cargo bay of the space shuttle, just in the past three years. We have witnessed breakthroughs in space manufacturing and materials processing, as well as astronomy, space plasma physics, life sciences, crystal growing, antenna testing, remote sensing, radar experiments, and of course, Amateur Radio! The launching, retrieving and on-orbit repair of unmanned spacecraft require mission specialists, as well as pilot astronauts to deliver hardware and personnel to the lofty job site.

All that is present technology. In January of 1984 our President directed NASA to begin developing plans toward launching a permanent space station by the end of the decade. Current schedules suggest that fabrication can begin this year, leading to an operational space station between 1992 and 1994. Even allowing for further scheduling delays associated with returning the space shuttle to service, it is clear that the question is not one of *if*, but rather *when*. Already Europe, Canada, and Japan have indicated an intention to participate in a truly international, permanent manned space presence.

There are still those who say manned space missions are too costly, in human life as well as dollars and cents. But by the National Transportation Safety Board's uniform measure of safety — fatalities per hundred thousand miles — space travel shines as the safest transportation mode yet devised! As for financial costs, how can one put a price on progress? The medical breakthroughs alone justify the expense of the whole program. Through electrophoresis, the separating of cells by electricity in *microgravity*, pharmaceuticals have been manufactured in earth orbit at 700 times the yield and five times the purity of similar processes on earth. Dramatic advances in the treatment of anemia, cancer, diabetes, emphysema, dwarfism, thrombosis, and viral infection are but a few of the tangible results.

We who have been privileged to participate in the Amateur space program, through our OSCARs, RSs, ISKRAs, and now JAS-1 — as well as through the efforts and accomplishments of W5LFL, W0ORE, and DP0SL — are in a unique position to appreciate the roles which both manned and unmanned missions will play in a well balanced space program. To whatever extent we can influence national space policy, it behooves us to press for an aggressive space future which avails itself of the relative strengths of both men and machines. It is not only prudent to pursue both avenues of exploration, but essential to the advancement of civilization, and worthy of our financial and patriotic support.

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