

SPACE STRATEGY

Almost a Blank Cheque

THE long awaited statement of government policy on space, made public last weekend by President Nixon, is not so much a declaration of purpose as a framework within which the National Aeronautics and Space Administration will be able to carry out most, although not quite all, of the schemes on which hearts have been set. To some, no doubt, it will be disappointing that the journey to Mars is described merely as a "longer range goal we should keep in mind as we proceed with our exploration of the planets". On the other hand, the President has made a firm commitment to the schemes for sending an unmanned rocket on a grand tour of the outer planets, using the gravitational field of one to help pave the way to the next—a trick which will be feasible in the late seventies but not thereafter until some time in the twenty-first century. One of the potentially most interesting features of the strategy now outlined is an undertaking to "encourage greater international cooperation in space".

The President's starting point last weekend was that "having completed that long stride into the future which has been our objective for the last decade, we must now define new goals which make sense for the seventies". He was anxious that the space programme should not stagnate but, at the same time, said "that we should not try to do everything at once".

The declaration of policy is said to be based on a consideration of the report of the space task group under Vice-President Agnew (see *Nature* **223**, 1297; 1969), and in practice it consists of an endorsement of most of the options there spelled out except the mission to Mars. The guiding principle, President Nixon says, was that the space programme should satisfy the hankering after exploration, that it should help to provide scientific understanding and, in particular, "should be attentive" to what scientists might suggest; third, that the space programme should exploit practical applications.

In practice, the President said that exploration of the Moon should continue even after the Apollo programme is completed, that there should be "bold exploration of the planets and the universe" with the grand tour as a starting point, an attempt to reduce the cost of space operations, which implies approval for the scheme to develop a space shuttle, an attempt to extend peoples' capacity to live and work in space, which implies approval for the experimental space station on which NASA is working, the increased applications of space technology in fields such as air traffic control and navigation as well as in meteorology and telecommunications, and the deliberate involvement of other countries than the United States.

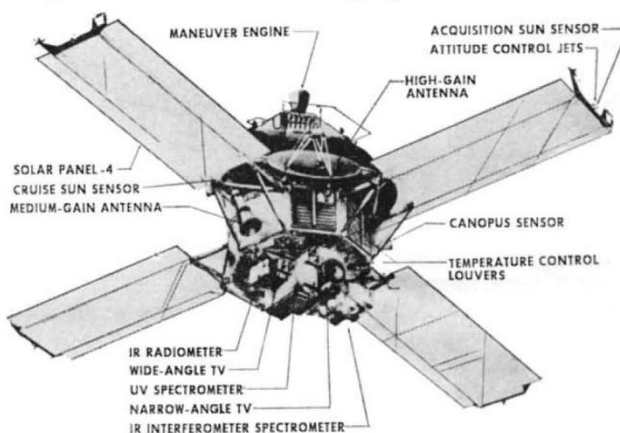
This declaration of policy will almost certainly imply that the budget of NASA will not in future shrink below \$3,000 million a year. Indeed, as the space shuttle project moves from design to construction in 1972 and 1973 it may well be necessary to spend more on implementing the package which the President has put together.

To this extent, the new policy should provide NASA with a greater sense of security in the months ahead as well as with one or two exciting schemes on which to work.

PLANETS

Mars Progress Report

ONE reason why the plan to send two unmanned spacecraft into Mars orbit next year has not suffered in the wave of budget cuts is that it is based on the well-tried Mariner design whose most recent success was the close approach to Mars last summer. On the other hand, the more ambitious Viking project to soft-land two capsules on the surface of Mars has been postponed for two years from 1973 to 1975. The delay is expected to increase the \$750 million cost of the Viking project by \$150 million. Half of the increased expenditure will cover a rise in wages, and half the extra costs incurred by the less favourable position of Mars in 1975. Experiments for the Viking capsules and for the orbiting spacecraft from which they will be ejected were chosen last year (see *Nature*, **225**, 124; 1970), and none of the British proposals was selected.



The 1971 Mariner spacecraft.

The National Aeronautics and Space Administration has now published more details of next year's missions which will pave the way for Viking by identifying particularly interesting areas on Mars. Two spacecraft will be launched to reach Mars on November 14 (Mariner 8) and on November 24 (Mariner 9). The spacecraft are basically the same as the Mariners which achieved the close approach to Mars last summer, with the addition of a small engine to power the velocity change of 3,400 miles per hour for insertion into Mars orbit. Each spacecraft will weigh about 2,200 lb, which includes 970 lb of fuel. The 125 lb of scientific instrumentation on board will be made up of a 50 mm wide-angle television camera, and a 500 mm telephoto camera for detailed work, an infrared radiometer to measure surface temperatures, an ultraviolet spectrometer to identify the composition of the atmosphere, and an infrared interferometer spectrometer to look at constituents of the atmosphere and surface. Then there will be the usual close observations of the telemetry signals to improve estimates of various astronomical constants and for further information about the atmosphere of Mars.

The chief aim of Mariner 8 is to provide the maps of the surface which planetary astronomers badly need. It is already known that the density of cratering on Mars varies widely from place to place, for example, and good maps are essential for work on crater statistics. The plan is for the wide-angle television camera to cover the band between 40° north and 60° south with