

US space plans

Economy flights in prospect

Pasadena, California

CUT-rate planetary missions have been included in the 1985 budget request of the National Aeronautics and Space Administration (NASA). The series of probes, known as "Observer", will use modified Earth-orbital satellites to explore the nearby planets. The first flight could take place in 1982, with subsequent missions at one to two year intervals.

The new probes would add significantly to the modest resurgence in planetary exploration of the past year. Congress this fall approved funds for the Venus Radar Mapper mission, the first new planetary mission since Galileo. Galileo, which was to have been launched on its journey to Jupiter in 1982, was repeatedly delayed by setbacks in the shuttle programme, and is now scheduled for 1986.

Costs for the Observer probes will be kept down by designing instruments to fit available vehicles, rather than the other way around as in past practice. The Jet Propulsion Laboratory (JPL) here, which has primary responsibility for planetary missions, is ready to issue a request for proposals from satellite manufacturers for supplying the vehicles. Possible candidates include the RCA weather and communications satellites, TRW's satcoms, and Hughes communication satellites. By limiting the Observer missions to the nearby planets, Mars and Venus, requirements for power, temperature control and communications systems will be modest and can easily be adapted to fit the adapted Earth-orbit satellites. One of the first Observers is expected to be a Mars orbiter that will probe the geochemistry and climate of that planet.

The renewed hopes for planetary science come just two years after JPL, finding it hard to keep its staff employed, sought and received unprecedented permission from California Institute of Technology (which operates JPL for NASA) to take on defence contract work in an amount up to one-third of the laboratory's total operating budget. But with things looking up (besides the Venus Radar Mapper and the hoped-for Observers, JPL is busy with Galileo and the forthcoming rendezvous of Voyager with Uranus and Neptune), the laboratory expects to hold the defence work to its present level of 20 per cent.

JPL also has plans for more ambitious planetary missions. So-called Mariner Mark II probes, which similarly would draw on existing hardware designs, are being planned for exploration of more distant planets and perhaps comets; one much discussed idea would be a Saturn orbiter that would carry an entry probe to be dropped into Titan, Saturn's volcanic moon. Both the Observer and Mariner Mark II flights could be carried out under a \$300 million annual budget, according to

JPL officials. The Mariner Mark II probes would be launched every two to three years.

Much less is being heard about grand, novel missions, such as a sample-return mission to Mars. JPL officials see those as "augmentation" missions that will only be contemplated if extra money becomes available.

Stephen Budiansky

Soviet space programme

Not without hitches

AFTER more than three months of Western speculation, Soviet cosmonauts Vladimir Lyakhov and Aleksandr Aleksandrov have at last admitted that during their 150-day mission aboard the Salyut-7/Soyuz-T9 complex, there had indeed been a "slight" leak of propellant, although, they said, this "had not affected either the flight or the research programme".

Ironically, on the same day that the cosmonauts talked about their flight at a press conference in Moscow, *Aviation Week and Space Technology* published further claims about the Lyakhov-Aleksandrov mission. During their final weeks aboard the station, it was claimed, the cosmonauts had had to endure "cold, damp and uncomfortable conditions" due to a "solar array problem", that had "reduced electrical power and seriously affected" the environmental control system. The crew's two space walks on 1 and 3 November, *Aviation Week* said, had been necessary to install additional solar panels, in order to save the station from becoming uninhabitable in the near future. When the loss of environmental control became serious, *Aviation Week* claims, the Soviet planners decided to "train and launch" a repair crew — cosmonauts Vladimir Titov and Gennadii Strekalov. When the launch had to be aborted because of a fire in the booster-rocket, however, Lyakhov and Aleksandrov had to carry out emergency repairs themselves.

According to the Soviet flight controllers and the cosmonauts themselves, however, the work on the solar panels had always been "one of the most responsible parts" of the original flight programme. The new panels were needed, they explained, to increase the power supply of Salyut-7 so that more experiments could be performed simultaneously. Deployment of the panels, moreover, had confirmed that the techniques and procedures proposed for large-scale assembly work in space, are, indeed, practicable. It also provided data for evaluating and improving the ground-level training programme for such assembly work in space as well as useful feedback for the designers of space-suits.

French get hooked

JUST before Christmas the French post office, PTT, inaugurated "Minitel", an electronic telephone directory designed to lead the French market into the Elysian Fields of the "hooked-up home".

Minitel has been on trial in Brittany and Versailles, but now the experiment has been extended into part of Paris. By March, there should be 50,000 sets operational in the centre of France, and 3 million should be in action by 1986.

Basically, Minitel is designed to replace paper directories: a user dials 11 to link up to a local computer, and then — using a keyboard — answers a few questions to tell the computer the name (and/or address) whose number is sought. The answer is displayed on a small television screen. But of course, with such technology in place many other uses spring to mind — one option is screen-to-screen communication between two Minitels, so the deaf can use the telephone.

In Velizy-Versailles PTT has offered other services: banking, cinema booking, rail timetables, stock exchange prices, even a newspaper; and the take-up has been moderate. One-third of the Minitel owners (who like the others in the experiments have been given them free, though those outside experimental areas can rent them at £6 a month) do not use the machines at all; but the other two thirds use them an average of 40 minutes a week. The biggest users are those with children between 12 and 15; the smallest, retired people.

Where people have been offered the choice of a Minitel or a conventional directory, 46 per cent have chosen Minitel. It is nearly the figure forecast by PTT (50 per cent), but not enough yet to encourage PTT to abandon its printing machines.

Robert Walgate

The Soviet claim that the deployment of the panels was from the beginning an integral part of the flight programme accords with recent hints that the construction of a permanently-staffed orbital station (always a long-term aim of the Soviet space programme) is now a definite project. Moreover, if it were simply an emergency repair job, carried out in the absence of the trained "repair team", it is remarkable that Lyakhov and Aleksandrov could carry it out without, apparently, undue difficulty. According to their own account, however, the cosmonauts had carefully practised the whole procedure (in the simulation tank) and the flight-plan had been worked out so that the main operations were carried out within the radio-visibility zone and in the illuminated part of the orbit. The special equipment, moreover, used in deploying the panels included not only tools and manipulators, but also non-slip safety handrails — once again, substantiating the Soviet claim that this was a pre-planned "experiment", not an emergency repair job.

Vera Rich