

Satellite launchers

Ariane backers confident

Evry, France

In France, where they build Ariane, Europe's answer to the US space shuttle, one newspaper last week reckoned the score in own goals to be: Shuttle 3, Ariane 2. That is, the shuttle has lost one more communications satellite than Ariane, although it has regained one too. Certainly this leaves the space insurance business equally nervous of both systems.

But at Evry, south of Paris, from where the French space agency CNES and the commercial launcher company Arianespace run the Ariane programme, there is an increasing sense that Ariane may prove to be a winner in the billion-dollar market for communications satellites.

Without any sense of crowing over shuttle problems — for Ariane has had its own, and may yet have more — it is pointed out at Evry that launch from the shuttle into geostationary orbit is more complicated and more expensive than launch by Ariane. A communications customer on the shuttle must also buy a substantial rocket — the "perigee motor" — to lift the satellite from the low shuttle orbit to the elliptical geostationary transfer orbit (GTO), which reaches up to the parking height of geostationary satellites. It is these motors that failed in the recent shuttle flight. Ariane reaches GTO in one shot, using liquid fuel stages which are theoretically more accurate and reliable.

However, even if there is some delay in the shuttle's geostationary launch programme, Arianespace is not in a position to gain any immediate benefit. Its order book is almost full for two years, with room (perhaps) for only one more "good" customer in 1985.

The limiting factor is the Ariane production line, which can turn out no more than six launchers a year. From 1985, the launch site at Hourou, French Guiana, will be able to cope with 12 launches a year. So Arianespace, which is desperately undercapitalized (it could be bankrupted by a single launch failure), is seeking new capital in Europe to construct a second production line.

In the long run, however, much depends on the Ariane development programme. So far, Ariane launches have used only the first version of Ariane. A week ago, the last tests were completed on the second and third versions (Ariane-2 and Ariane-3, identical except that the latter has two extra strap-on solid boosters in the first stage). The first new version launched will be an Ariane-3, due to take the European Space Agency's ECS-1 and the French Telecom 1-A aloft this July. To maintain confidence in Ariane, of course, the new rocket should not suffer the teething troubles of Ariane-1 — which suffered high frequency vibrations in the first stage (causing failure of the second launch test) and then lubrication failure in the upper stage cryogenic fuel

pump (that knocked out the fifth). According to the man in the hot seat, the *Chef de Projet* for Ariane-3 (and a future Ariane-4), André Van Gaver, the problems that hit Ariane-1 are now solved — or as solved as anything can be in the space business.

After Ariane-3 will come Ariane-4, the first parts of the first flight model of which are to be completed this year. Ariane-4, to fly in March 1986, is designed around the next generation of communications satellites led by Intelsat VI: 4,200 kg and approaching 4 metres in diameter, comparable with the shuttle bay's 4.5 metres. The future of Arianespace depends on the company's success in gaining contracts for the Intelsat VI series, but knowing this, Intelsat can afford to wait. Around half the Intelsat business would be ample to give Arianespace a living, says Van Gaver.

The United States "made a mistake" in dropping conventional launchers in order to push business towards the shuttle, Van Gaver believes. Now the United States is trying to commercialize the old launchers

(Thor-Delta and Atlas) "but we have yet to see any contracts".

Ariane's other competitor is probably Japan — Van Gaver does not see the Soviet Union or China entering the Western telecommunications market. Japan's space programme is at present uncompetitive, but the Japanese space agency is developing a large cryogenic engine (such as Europe would only see on Ariane-5, now at the planning stage). "We must watch Japan carefully" Van Gaver says.

Robert Walgate

● Intelsat, the international communications satellite organization, has finally decided to go back to an old design for Intelsat V F8, due for launch on Ariane on 5 March. Problems with the L-band maritime communications system (see *Nature* 2 February, p.401) had pushed the launch back two months. Inmarsat, the organization which uses the L-band system, has complained that Intelsat V F7 is unworkable and has refused to accept it. Unable to solve the problem on F8, Intelsat has gone back to the F6 design, which still has problems but not so bad as those of F7. F9, which was to have been launched by Ariane this summer, has now been put back to 1985. □

US space station

Manufacturing plans launched

Washington

WITH a masterly sense of timing, the National Aeronautics and Space Administration (NASA) has announced that a major company, the Minnesota-based 3M Corporation, is planning to embark on a new programme of space research with the aim of eventually producing commercial products in orbit. The corporation's decision comes fast on the heels of President Reagan's announcement that the United States will build a manned space station within a decade, and is being portrayed by NASA as vindication of its claims that a space station could become the nucleus of a sizeable space-based manufacturing industry.

At a formal ceremony announcing 3M's plans, NASA administrator James Beggs did his utmost to link the company's decision with the President's approval of the space station. 3M, he pointed out, was the first non-aerospace corporation to sign a memorandum of understanding with NASA since the space station was approved. He said the deal would hasten the day when US industries were as comfortable with factories in space as they were with those on Earth.

NASA's enthusiasm is understandable. To persuade Congress to fall in with its plans for a space station, the agency must show that private industry (and foreign governments) are prepared to pick up a share of the tab. Propaganda value apart, the agreement with 3M looks decidedly one-sided. In return for expressing an

interest in space, 3M scientists will receive free access to NASA laboratories where materials processing research is under way. 3M also gets two free flights on the shuttle, the first as early as August.

3M's research programme will focus on processing organic materials in the low-gravity, high-vacuum environment available in space. Its vice president for technology services, Dr R. M. Adams, said the company's first experiment on board the shuttle would look at the growth of organic crystals and the development of thin films with novel physical and chemical properties.

Directed by both President Reagan and Congress to encourage commercial investment in space, NASA faces an uphill struggle in extending commercialization beyond its one great success story — the satellite communications industry which does more than \$2000 million of business a year. The most visible commercial interest in space-based manufacturing has come from Johnson & Johnson and McDonnell Douglas, which are developing a prototype instrument for the large-scale production of drugs by electrophoresis in space.

To garner more investment, NASA plans to offer an expensive array of incentives including free or subsidized flights on the shuttle and access to NASA expertise. That could queer NASA's pitch with academic scientists, many of whom have been grumbling for years about the length of the waiting list for space on the shuttle.

Peter David