Satellite launchers

Europe sees business ahead

EUROPE, and in particular France, is pinning great hopes on Ariane, the space launcher developed by the European Space Agency and now in the process of transfer to a private operator, Arianespace. French companies hold 59 per cent of Arianespace shares, followed a long way behind by Germany with 20 per cent. Britain holds 2.4 per cent, less than Italy (3.6 per cent) and Belgium (4.4 per cent).

The company says it "will pave the way into the twenty-first century". Many doubt that Ariane can succeed in a battle for the business of launching commercial satellites, but in France especially there are those who point to the success of the French military aircraft industry in recent decades as a sign of what may be possible.

Out of five test launches, two have failed (the second and the fifth), but the causes are understood and have been rectified. After the second failure, the most disturbing, Arianespace was very frank with its potential customers about exactly what had gone wrong. Essentially, it was a matter of quality control in the manufacture of a fuel pump. With control now tightened up, Arianespace claims it lost no customers through loss of confidence: Western Union withdrew from one launch, but that was because the Ariane launch calendar was set back, and Western Union had its own telecommunications customers to satisfy.

The key to Ariane's success now seems to lie in a continued series of successful launches (the next is due on 15 September), price relative to its competitors and accuracy. Accuracy is critical to a client because it means satellite lifetime. Ariane's last launch injected the European Communications Satellite ECS-1 into geostationary orbit so accurately that it needed only 2 litres of fuel to manoeuvre into its precision orbit instead of the expected 20 litres. The result is a fuel surplus that will give ECS-1 another year of life in orbit (on a planned seven years).

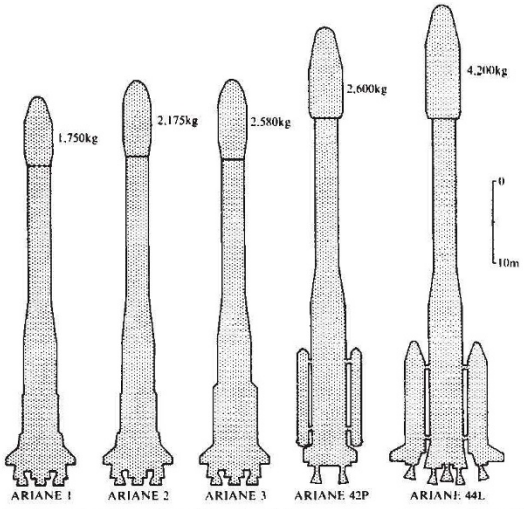
By contrast, the space shuttle's launch into geostationary orbit requires an inertial upper stage (IUS) which is both relatively inaccurate, claims Arianespace, and presently in trouble. IUS failed dramatically on 5 April this year, when the shuttle crew attempted to place a tracking and data relay satellite (TDRS-A) into geostationary orbit. An oil seal failed on IUS, throwing TDRS-A into a highly elliptical orbit. The long manoeuvre to get the satellite into the right position, using pitch control thrusters with only one pound of thrust each, was ultimately successful, but very costly in fuel. The IUS system is now under investigation, and the next shuttle/IUS launch has been put back to March 1984; it may be delayed further if a design problem is discovered. Since the main pay-off in the space business is thought to be in launching communications satellites, this current problem for the shuttle is a boon for Ariane.

However, potential clients are more interested in having two alternative launch vehicles, both successful, one on either side of the Atlantic, than in backing "the winner", Arianespace believes. Even so, costs matter, and Arianespace looks askance at federal subsidies for the shuttle. Arianespace has none, the company claims.

According to Arianespace calculations, half an Ariane-3 (up to 1,195 kg payload) will cost $25–30 million; and a shuttle flight costs $250 million (excluding research and development), but could launch four satellites of the half-an-Ariane-3 size. This suggests that the true costs of the shuttle are twice those of Ariane. But the shuttle is asking only $8–18 million during a "promotional phase", Arianespace claims. After 1986, the shuttle loses its subsidy, but launch costs should also be falling to around $180 million. This should be the future purely commercial cost of shuttle launches, according to Arianespace. Ariane 4 costs are "unknown" at present. But clients are choosing both systems, Arianespace claims.

The only flies in this transatlantic balm are the American commercial company Marion Marietta, which hopes to undercut both the shuttle and Ariane using NASA Titan rockets, the Soviet offer to launch at '$1 under" any Western price and Japan's efforts to miniaturize satellite technology so that smaller launchers (like Japan's N2) can be used. None, however, appears for the moment to be serious competition.

Robert Walgate



The Ariane series

ARIANE is actually a family of vehicles, based around the idea that communications and observation satellites (where all the business is) are likely to get bigger. Ariane 1 can carry 1,750 kg into geostationary transfer orbit. Ariane 2 and 3, for use from 1984 onwards, have a slightly bigger third stage and payload fairing, and two to four strap-on first stage solid boosters, raising the geostationary payload to 2,175 kg (Ariane 2) or 2,580 kg (Ariane 3). Ariane 4 is still under development at the French national space research centre, CNES, and will mark "a major step in the evolution of Ariane". Ariane 4 requires development of new liquid fuel boosters, but these are being based around Ariane 1, 2 and 3 Viking engines. Ariane 4 payload mass to geostationary orbit should range from 2,600 kg (in version 42P, where the '2P' refers to two solid fuel boosters) to 4,200 kg for version 44L (four liquid fuel boosters).

For international comparison, apart from the shuttle the US Titan III-C can place 4,500 kg in geostationary orbit; the Soviet AZ Soyuz, 2,500 kg; the US Atlas Centaur D1 A, 2,225 kg; Delta 3920-PAM, 1,250 kg; and Japan's N2, 850 kg. Ariane 4 is sheduled for its first test launch in December 1985. □

Engineering change

THE UK Science and Engineering Council (SERC) is worried that British industry is not taking enough notice of its engineering research — despite the fact that the council, under successive chairmen, has been edging more and more towards engineering. So it has commissioned the London-based Technical Change Centre (TCC) to investigate why industry ignores it, or as TCC puts it more sedately, "to study the way in which information is transferred between academic research institutions and industry".

TCC has begun work in disciplines in which SERC has already tried to improve industrial contact, by producing booklets which tell industrial scientists and engineers what SERC is doing. The areas are: noise and vibration, tribology and bearings, corrosion, grinding and dies and moulds. Has industry seen these booklets? Did they end up in the bin? TCC would like to know, Call Gil Collins or Carolyn Angell on 01-370 5770. Robert Walgate

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