

lines at wavelengths greater than 0.8 mm. It will also provide Britain's radioastronomers — whose long lead in radiointerferometry has been broken by the construction of the US Very Large Array — with access to at least one world class instrument.

Robert Walgate

Ariane

Half way to the Devil

EUROPEAN hopes of commercial competition with the delayed American space shuttle have been called into question by the failure on 23 May of the second launch test of Ariane, the European three-stage 1,750 kg payload launcher. The European Space Agency, responsible for Ariane, has always held that two successful flights in the four-flight test series (the next tests are due in November this year and February 1981) would be counted a success; but what matters is whether potential clients will take the same view. They will no doubt now be on their guard.

The rocket fell into the sea less than 10 km from its launch site in Kourou, French Guyana. It now lies in muddy waters some 7 to 10 metres deep between Kourou and the former French penal colony, Devil's Island. Two ships are searching for it, one with sonar and the other with drag-nets. If the rocket is found, it should be recoverable.

The fuel tanks were destroyed by an automatic device, but the propulsion bay — the collection of four combustion chambers where the critical fault occurred — is expected to be intact. It may prove crucial in determining the cause of the accident.

Preliminary analysis of telemetric data has revealed that one of the four first stage engines began to 'flicker' 4.4 sec after ignition, 1.1 sec after lift-off. The pressure in its combustion chamber oscillated at 1,000 Hz with an amplitude of 4 bars about its design pressure of 54 bars, and the exhaust gases turned yellow, indicating inefficient oxidation of the fuel. By 6 seconds the fault appeared to have corrected itself.

At 28 seconds the fault recurred for an instant, and then the temperature began to rise steadily in the propulsion bay from 24°C to 56°C. At 64 seconds the temperature jumped to 100°C and the combustion chamber pressure dropped to 10 bar. Ariane started to roll. By 104 sec the roll had reached 10 rpm, and two other engines lost pressure; the third followed at 108 sec. The self-destruct systems then decided that Ariane had had enough, and blew out the fuel tanks.

A similar loss of pressure was detected just after ignition of the Ariane engines on the first launch test in November 1979; but

this loss was detected soon enough to abort the launch. At a subsequent attempt, lift-off and launch were successful, and the earlier fault was put down to instrument error. There may now be doubts about whether this was the case.

The Ariane first stage engines are derived from those of an earlier French rocket, 'Diamant' — and this rocket also experienced catastrophic losses of power during its development. However, 44 ground tests of the Ariane four-engine assembly showed power loss only once.

The fault probably traces back to a fluid or chemical instability in the injector, the 'carburettor' that injects fuel and oxidant into the combustion chamber; and the question arises whether the instability is triggered by a mechanical fault in the injector, or is simply an inherent instability due to a design error. If the latter, a further series of ground tests will be necessary before Ariane's third test flight, and the money available for those tests is limited.

Another possibility being considered by Ariane engineers is that the geometry of the exhaust deflectors at the launch pad led to

an acoustic effect which in turn induced the instability. The deflector geometry is completely different at Kourou from the geometry adopted in the ground-based tests.

Robert Walgate

Pesticides

EEC directive disputed

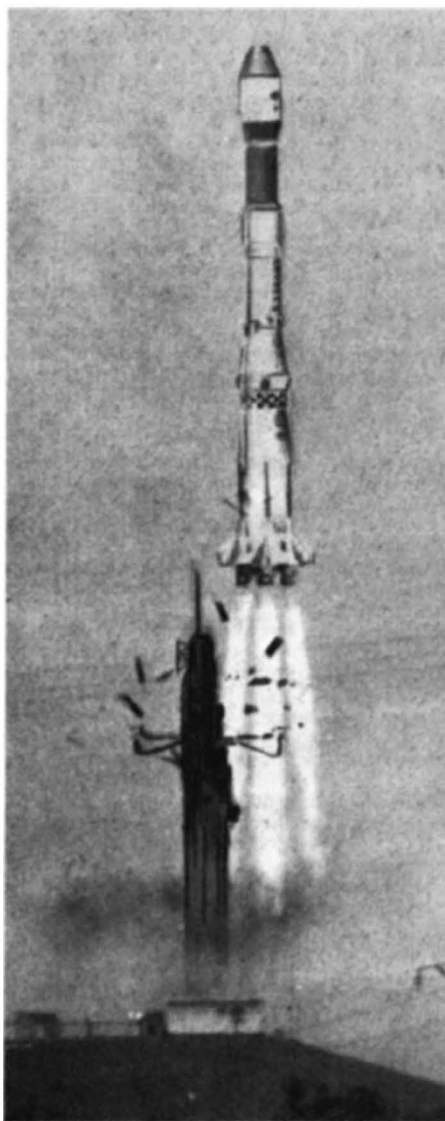
THE long-standing argument over the basis for environmental standards between some European governments and the European Commission now appears to have spread to the consumers' associations. Thus last week (27 May) the Consumers' Association, the London-based consumer group, published a criticism of the draft directive on the regulation of pesticides in foodstuffs originally promulgated in 1976.

The CA's argument is based on a comparative study carried out in the past three years in West Germany and the UK. The nub of the issue, according to the report 'Pesticide Residues and Food' (Consumers' Association, 14 Buckingham Street, London WC2) is whether the regulation of pesticides in the human diet is best accomplished by fixing maximum concentrations of permissible pesticide residues in foodstuffs appearing on the domestic market.

The EEC directive proposes that there should be maximum permitted levels of certain pesticides (particularly the organochlorines) in foodstuffs, and that it should be the responsibility of national governments to sample foodstuffs regularly, analysing them for their pesticide content. This is for practical purposes the system now in operation in West Germany.

By contrast, the British system is based on a voluntary scheme for the approval (by the Ministry of Agriculture, Fisheries and Food on the recommendation of an expert Advisory Committee) of pesticides offered for sale in the United Kingdom and on estimates of what foods people eat. The CA joins with other critics of the system in urging that the approval scheme should be made statutory, but otherwise comes to the conclusion that this scheme has adequately served its purpose of keeping pesticide concentrations in human blood and tissues within acceptable limits.

One of the CA's chief arguments in favour of the British system of control is that the German system is much more expensive. But the report, while recognising that harmonisation of environmental standards is necessary in the interests of European free trade, argues that it would be inequitable that all members of the EEC should have to adopt the most stringent (and cumbersome) of the control procedures now in force.



The Ariane launch, just as the first of the four engines began to flicker.