

total eclipse visible from the British Isles. This will pass over Cornwall on August 11, 1999.

European Space Marks Time

THE much heralded European Space Conference (ESC) of Ministers in Bonn in July has now been postponed to an indefinite date in the autumn. Originally it was to have taken place "as early as possible in 1968", because much hangs on the policy decisions it is intended to take. These include the future activities of ESRO (the European Space Research Organization) and ELDO (European Launcher Development Organization) and whether these can be co-ordinated along the lines of the Causse Report (see *Nature*, 217, 1089; 1968). The European position on next year's renegotiation of the Intelsat agreement for a world network of space telecommunications and the level of European participation in various other types of application satellite were also to be discussed. It now seems probable that the European Space Conference will not only be late but limited. The British Government's decision to withdraw from ELDO at the earliest moment that is legally possible, and to have nothing to do with the Eurovision TV satellite, is likely to require so much reassessment and re-allocation of responsibilities in the short term that there will be little time left for long-term planning. This would be a mistake and an expensive one. The main trouble with joint European space projects is that ill-defined projects have been adopted too hastily and that long-term aims have been insufficiently assessed.

The decision to postpone the July meeting of the ESC in Bonn was taken at a meeting of the ESC Alternates (government officials) in Paris on May 10. From this meeting it also became clear that the British Government's analysis of the value of ELDO and the Causse Report was not shared by Britain's continental partners. The five other European members of ELDO are the ones that count. They are also members of ESRO and the effective members of CETS (Conférence Européenne pour les Télécommunications par Satellite). All favoured the continuation of ELDO and the TV satellite as recommended by the Causse Report, and effectively rejected the British view. None of them adopted the British view of "cost effectiveness" in assessing the value of the Causse proposals. Thus they are prepared to support ELDO capital investment as an act of faith towards as yet uncertain dividends in the future. This apparently includes shouldering Britain's 27 per cent share of ELDO's costs from 1970 or so.

Meanwhile, ESRO, which in its present form Britain alone supports wholeheartedly, needs a satellite success to justify its continued existence. Its credibility has been severely dented by the recent cancellation of its major projects, the TD 1 and 2 satellites. Experimenters are well aware that simple space scientific experiments can be launched for less money and with half the trouble and delay by national programmes than by ESRO. They look therefore to ESRO only for the complex spacecraft which require a large launcher as yet beyond European scope. ESRO therefore needs a satellite success to demonstrate its ability. ESRO's first satellite was due last spring, but due to a complication of troubles a second attempt was scheduled for last Friday. Now launch of this

satellite is postponed indefinitely for "technical reasons". ESRO says the delay is caused by difficulties in the third stage of the American Scout launcher. There is evidence, however, that the British-built satellite and its tape-recorder have not been working faultlessly. If the ESRO satellite misses its launch window and has to join the queue behind various American operational launches for the second time, ESRO will again have lost face.

Safety in the Air

THE standards of safety reached by British airlines are significantly worse than those of airlines in the United States, or in Australia. This disquieting conclusion, already known in qualitative terms, has been put on a quantitative basis this week by a joint review by the Director of Aviation Safety and the Air Registration Board, assisted by two independent advisers (*The Safety Performance of United Kingdom Airlines*, HMSO, 8s. 6d.). There are a number of ways of measuring airline safety, none of them entirely satisfactory; but on the basis of the number of notifiable accidents per 100,000 stage flights, the United Kingdom scores 2.62, against 2.03 for France, 0.96 for Australia and 1.41 for the United States. The fatal accident record, a less reliable record because fatal accidents occur too rarely to be statistically significant, shows a similar trend. France and the United Kingdom show 0.47 and 0.43 respectively, while the United States at 0.18 and Australia at 0.09 are significantly better. Australia's performance, in particular, is startlingly good, and the report draws some lessons from it.

The review was begun after two fatal accidents involving DC 4 aircraft operated by British firms; one took place in Perpignan, the other in Stockport. But the conclusions reached by the report on the question of older aircraft are reassuring; safety records do not seem to show a decline as the aircraft ages. Such declines as there are are almost certainly caused by changes in the type of use—non-scheduled operation and smaller airlines, who use older aircraft, show worse accident records. Some aircraft seem to improve with age—the Comet 4 and the Viscount, for example, show records which have improved during the years in service. The Boeing 707, on the other hand, after six years in service is beginning to show a worsening accident rate. One surprising conclusion is that new aircraft take a very long time to settle down to a steady accident rate. As many as two million hours of experience can elapse before the full safety potential of a new aircraft is realized—this means that if 100 aircraft are built, and each flies 3,000 hours a year, it takes six years for the "learning" period to be completed.

The report makes a number of recommendations. The most important is that the staff responsible for inspection should be brought up to full strength. Sir Frederick Brundrett, one of the independent advisers, puts it most strongly in a note in the report—"If the approved system of supervision is agreed to depend on a programme of inspections, it is quite absurd to think that this can be properly carried out without adequate staff of the right calibre". The Flight Operators Inspectorate, for example, has never been at more than half strength, and the Civil Aviation Flying Unit is

no better off. Apart from this, the report suggests that some Australian practices might be adopted, in particular the one which requires all "incidents" which might have led to accidents to be reported. More than 5,000 such incidents are reported each year, and the information derived from them is undoubtedly very useful. But pilot error is still the most substantial cause of accidents; better training and better flight deck management are suggested as ways of reducing this.

Television from the East

LATER this year, work is to start on re-equipping the telecommunications station at Goonhilly so that it can handle telephone and television traffic between Britain and Australia, India, Pakistan, Japan and other countries in the Far East. The aerial at Goonhilly is at present dealing with communications across the Atlantic with the Early Bird satellite, but a second aerial is under construction and will take over the Atlantic route, relaying signals via the first Intelsat III satellite, later this year. The first aerial will then be free for improvements to be carried out, so that it can match the sophistication of the new generation of communications satellites and the increased number of communications channels they can carry.

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New aerial under construction at Goonhilly. (Crown copyright, courtesy of HM Postmaster General.)

The Post Office expects the modifications to be completed in the first half of 1969, when Goonhilly will have facilities for 264 two-way telephone channels between Britain and 12 different stations in the Far East, relayed through another Intelsat III satellite over the Indian Ocean. The system will also be able to carry 625 line colour television programmes. GEC-AEI (Electronics) Ltd have been awarded a £400,000 contract by the Post Office to carry out the work.

More Nuclear Power

THE Central Electricity Generating Board has asked the Ministry of Power for permission to build another nuclear power station at Sizewell in Suffolk. This

means that there are now five stations awaiting decisions from the Ministry—Seaton Carew in County Durham, Heysham in the North West, Sizewell B (all nuclear stations); the Isle of Grain oil fired station, and a coal fired station at West Burton. The ministry is continuing to drag its heels over the Seaton Carew decision, and the CEGB will doubtless be hoping that a decision can be reached on Sizewell very much more quickly than this. The station, powered by four advanced gas cooled reactors, would be a very big one, generating 2,500 MW of electricity, and would be on the same site as the existing Sizewell A station, a nuclear station of the Magnox type, which generates 580 MW. For this reason, it should be possible to estimate the cost of the new station with considerable accuracy; the geology of the site is known, access roads are built, and the conditions of water supply are known. The policy of building new stations on the same site as the old ones also means that amenity interests are less of a problem—once the first station is built, local residents are less likely to complain about the building of a new one.

This time the CEGB is looking for a quick decision—it wants the new station to come into operation by 1974. Nuclear stations in Britain take a long time to build, so that construction should begin by the end of 1969. Requests for tenders should go out at the end of this year, which gives the ministry six months to make up its mind—about the time it usually takes. This leisurely rate of progress has its critics, although delays in the initial planning stage are much less costly than those occurring during the building of the station. (The worst thing of all is when the station keeps breaking down after commissioning; this is rare in Britain, but did happen at Trawsfynydd in Wales with a Magnox station.) For a station of this size, the CEGB will have to pay some £170–180 million, but it is still not at all clear who will be building the station. Discussions about the reorganization of the nuclear power industry are still in progress, with the Industrial Reorganization Corporation called in as court wizards to try to sort out the mess created by the joint efforts of the CEGB, the Atomic Energy Authority, the Ministries of Power and Technology, and the House of Commons Select Committee on Science and Technology.

Maps, Missals and Watermarks

A TECHNIQUE for dating documents by beta-radiography of their watermarks has been developed by Dr Allan Stevenson of the British Museum. The technique has already been used on the Vinland map, the Constance Missal and undated Caxton manuscripts.

Early papermakers used watermarks both as trademarks and to signify different grades of paper. The wire moulds that formed the watermark lasted for not more than two years and tended to deteriorate in a recognizable manner. Documents can thus be dated with some precision by comparing their watermarks with those in documents of known date.

Watermarks in the pages of old books and documents, however, tend to be faint or invisible, and with the naked eye their details cannot be discriminated exactly enough for dating purposes. Dr Stevenson has found that very precise impressions can be gained by beta-radiography. He places a 'Perspex' sheet embedded