

confined almost exclusively to revenue expenditure". The objective has been to work out a kind of yardstick for relating the annual expenditure of technical colleges to the amount of teaching which they undertake. Much of the report is devoted to a somewhat puzzled inquiry into the reasons why expenditure at many technical colleges differs by as much as thirty per cent from what would be calculated from the formula. What the committee has to say about the procedures which should be used for handling the finances of technical colleges will probably be valuable for the more enlightened local authorities. For many, however, the new yardsticks will quickly become a straitjacket. There is a real danger that the development of the technical colleges will be unreasonably restrained precisely when there is a need for them to be able to try out new ideas.

This part of the educational system is, in other words, in danger of becoming a second-class system. One obvious difficulty is that when this truth is widely appreciated, the difficulties of recruiting people to the technical colleges, already considerable, will be increased enormously. The result will be the further neglect of close on 1.5 million students. Another is that the division between the technical colleges and the universities will be sharpened, and already there is too much snobbery in the universities and inverted snobbery in the colleges. In the long run, these problems are every bit as important for higher education in Britain as the issues which seem to university academics to be the most pressing—the public insults of the Prices and Incomes Board, for example. In the circumstances, it is not unreasonable to ask that the universities should divert some of the energy they have recently been spending on public debate towards the problems of relationships with the technical colleges. The present separation of the two types of institution is unstable as well as inequitable, and the ideal is that there should be some means by which a technical college can hope to promote itself to a higher status by diligence and flair. This implies a spectrum of institutions, not a binary separation.

#### NUCLEAR POWER

### Keeping it Natural

AUSTRALIA is continuing to devote the greater part of its nuclear development expenditure to one system—natural uranium reactors fuelled and moderated by heavy water. This, the Australian Atomic Energy Commission believes, is the system most likely to be applicable to Australian conditions. The latest annual report of the AEC appears to narrow the choice even further, by suggesting that one "particularly attractive" system is the type moderated by heavy water and cooled by ordinary water. Essentially, there are two such systems. The best developed is the Canadian CANDU boiling light water system being installed as a 250 MW prototype at Gentilly. This seems to command a great deal of confidence. The alternative is the British steam generating heavy water reactor, modified for use with natural uranium. A third possibility, the Italian CIRENE system, is less fully developed.

At the moment, AEC personnel are participating in both the British and Canadian development programmes in order to get experience of both systems at first hand. The AEC disavows any intention of developing a system of its own, which it says would be far too expensive. It also points out that modifying the SGHWR to run on natural uranium is far from easy. To achieve a reasonable burn-up with natural uranium, it is necessary to remove all neutron absorbing material from the core. This means thinner pressure tubes, thinner fuel cladding and more closely spaced fuel pins, and problems of safety and control become harder. Solutions to these problems, though they exist, all militate against the economics of the system. Softening this pill, the report suggests that the UKAEA has been unable to do as much work on the system as it intended, because of other more urgent commitments.

During the year, the AEC also continued basic work on reactor physics and isotope and radiation programmes. But the second largest sum of money—about one-eighth of the research budget—was spent on a programme rather confusingly described in the annual report as *Aborigine Primus*. In fact this represents the amount of work which is still directed towards high-temperature gas-cooled reactors. Until the recent preoccupation with natural uranium reactors took over, the AEC was interested in a gas-cooled reactor using pebble-bed technology and enriched fuel; *Aborigine Primus* ("somewhat fancifully named", as an AEC man in London admitted) represents an attempt to apply this technology to a very small reactor suitable for remote country regions. But while Australia, a producer of uranium, remains doubtful about the prospects of enriching it cheaply, natural uranium reactors are certain to dominate. Aborigines will have to remain content with traditional methods.

#### SUPERSONIC FLIGHT

### Hazards of Flying High

WITH the advent of supersonic aircraft such as Concorde and the Russian Tupolev 144, which can fly at altitudes of 20 km, increasing attention is being given to the danger to passengers of high doses of radiation (see *Nature*, 217, 5; 1968). Last week<sup>1</sup> Dr J. F. Loutit, director of the Radiobiological Research Unit at Harwell, drew attention to the danger when he quoted the suggestion of the Space Radiation Space Panel and the Task Group of Committee 1 of the International Commission on Radiological Protection that "the vast majority of visible solar disturbances do not result in significant radiation near the Earth; those that do, and notably those that result in potentially dangerous



The TU 144 on its first flight.