propagated outwards from the pulsar at the speed of light, while consideration of the energy content of these disturbances, in which a beam of relativistic particles is assumed to leave the pulsar at the time of the spin-up event, leads to a total figure as high as 10^{45} ergs. Even the lower limit of 10^{41} ergs is difficult to explain by any simple change in the physical configuration of a rotating neutron star, so Scargle and Harlan suggest that the continuous energy output of the pulsar is somehow stored in the surrounding magnetic plasma and released every two years, for observations of the thin wisp over the last fifteen years suggest that there is a recurrent activity in it with this period. Even a small amount of feedback from this process would then provide the 10^{41} ergs needed to spin-up the neutron star.

TECHNOLOGY

Electrifying Success

from a Correspondent

SOME of the secrets of Japanese success in the electronics industry emerged at an international symposium on management and economics in the electronics industry, held in Edinburgh from March 17 to 20. One of the outstanding contributions came from Mr S. Shima (managing director of the Sony Corporation), who attributed the success of the Japanese electronics industry largely to the fact that 98 per cent of research investment is private, whereas 63 per cent of research in the United States is funded by the government. Success with transistor radio is being followed by marketing of the desk-top electronic calculator which, it is hoped, will sell to a value of three hundred million dollars this year. In addition to consumer-product marketing success, Sony has used basic research as a source of innovation in such devices as an electret microphone, a brushless d.c. motor capable of 20,000 r.p.m. and polycrystalline integrated circuits capable of an audio output of 20 W. The Japanese electronics industry is growing at 23 per cent per annum, and Mr C. H. Villiers (managing director of the Industrial Reorganization Corporation (IRC)) challenged the United Kingdom electronics industry to increase its sales by 25 per cent per annum.

As well as the IRC, both the National Research and Development Corporation and Technical Development Capital Ltd contributed to the symposium, with the general theme that capital is available to the entrepreneur who can make a good case for his project. One speaker suggested that with the present level of taxation in the United Kingdom a company which relied entirely on internal saving could only grow at 3-4 per cent per annum, so that borrowing was essential to any company wishing to grow fast. Villiers expounded the policy of intervention by IRC to procure mergers, on the grounds that the threshold of investment is high in a technological industry, and that the United Kingdom does not have sufficient good managers for them to be spread through many companies: there are more than 1,000 companies in the electronics industry. How therefore should large companies retain their innovators? This problem is unsolved; at present there is a large negative correlation between size of company and propensity to innovate.

Some of the contributions concerned with forecasting

and planning involved the well known technique of extrapolating past trends and others were based on "technological forecasting" and attempts to estimate the future environment. A detailed example was a computer program constructed by Mr R. A. Ireland (Brunel University) to evaluate risky enterprises. All relevant parameters, such as sales volume, labour costs, material costs, are entered as three values: "optimistic", "expected" and "pessimistic". The computer combines them all, allowing for correlations, and can print out means and standard deviations for such quantities as discounted cash flow, cumulative cash flow and probabilities of the rate of return falling below various percentages.

Two contributions dealt with the value of modern fast communications. Mr H. F. R. Perrin (divisional director of P.A. Management Consultants Ltd) pointed out that because the cost of air freight had fallen from 170 cents per ton-km in 1947 to 17 cents in 1969, it was economic to send electronic components to a low-wage country for assembly. A team of authors from Standard Telecommunications Laboratories and the University of Oxford stressed the financial penalty which would be incurred by delay in setting up a national data network. Their argument was that a high-speed data network would enable firms to reduce delays in obtaining supplies and so increase the percentage utilization of plant for a given length of queue or back-log of orders.

CONTINENTAL DRIFT

Fit of Africa and Antarctica

from our Geomagnetism Correspondent

MOST Earth scientists would agree that the continents were once joined in a single land mass; but proponents of continental drift still disagree about the precise details of continental fitting. In the matching of Antarctica and Africa, for example, it is almost impossible to decide where to put the Antarctic Peninsula. In their recent computer fit of the 500 fathom contours, Smith (A. G.) and Hallam (*Nature*, 225, 139; 1970) found that the Antarctic Peninsula

Computer fit of Antarctica and Africa along the 1,000 fathom isobath (with the exception of the Antarctic Peninsula) by Dietz and Sproll. The hatched regions represent the submerged continental shelves; and the black areas indicate the extent of mismatching.