System 4–70, providing up to 25 per cent more power, and two machines will be used initially. Each machine will have 393 K binary digits of store and a backing store of drums, multiple disks and phase encoded magnetic tape units.

Known as LACES (London Airport Cargo Electronic-Data-Processing-Scheme), this system will be operated by NDPS on behalf of the airlines, agents and HM Customs. It is hoped that not only will this system speed up the process, but that it will drastically reduce paperwork and provide a better measure of control over cargo imports. The system will be linked to more than 200 visual display terminals through which the agent or airline can key information into the computer system. As parcels arrive, they will be keyed into the system as a parcels entry by the airline, then as a customs entry. In this way, customs will know when a consignment is expected and the decision whether to look at the documentation only, physically to inspect the consignment, or simply to let it through, will be made by the computer according to criteria laid down by the customs. This will greatly speed up the process, and agents and airlines will know the precise position of each parcel going through customs. This visual display has been designed by Cossor Electronics and has been thoroughly tested by the GPO at Heathrow in conditions of maximum noise and vibration and in the presence of radar and other signals.

LACES will be implemented in stages, and it is likely to be extended later to include accounting for airlines and agents and export cargo. Other countries are planning similar systems and it is hoped that the Heathrow scheme will be the basis for an international airfreight data-processing network. The placing of the order with the British computer industry will put ICL in a very favourable position to tender for future contracts at overseas airports.

COMPUTERS

IBM Tries Again

IBM's recent announcement that two new computers are under development—the System/360-model-195 and the System/3—is an indication of the company's determination to capture a larger share of the extremes of the computer market. The 360-195 will be the largest and most powerful computer in their production line, while the System/3 will be one of IBM's smallest computer packages.

The system 360-195 is designed for solving computing problems for a large range of applications, but the 360-85 which is also in production at the moment is designed chiefly for the commercial market, so it seems likely that the 195 will be geared more towards the scientific and time-sharing markets. It will have an internal processing speed about twice as fast as the 360-85, with a basic machine cycle of 54 nanoseconds. The storage capacity will be up to four million bytes, organized into eight or sixteen interleaved elements, a modification which speeds up the cycle process. The 195 will be completely compatible with other models in the 360 series. It will be able to run programs from other large 360 models, and most input/output devices used with other 360 models can be attached to the new computer. Moreover, the machine is large enough to cope with several programs concurrently, using the System/360 MVT (multiprogramming with a variable number of tasks).

At the other extreme, the System/3 is designed for small firms employing between 100 and 1,000 people. In essence, it will be an accounting machine aimed at providing a company with greater automation at a price not much higher than it is currently paying. It will use punched cards about one third the size of those used in current machines, which means that present equipment in IBM's range which uses punched cards will become obsolete. It also means that the System/3 will not be compatible with other brands of computer, which suggests that this model is aimed at a new and restricted market.

Several aspects of the IBM announcement have given rise to considerable comment in the computer world. In the past, IBM has been notably unsuccessful in the large computer field. The 360-90 series did not come up to expectations, and only 20 were sold, while its predecessor, the 'Stretch', hardly reached the production stage. The 360-195 is therefore IBM's third attempt to muscle into the market for large computers. If 360–195 fails, IBM is unlikely ever to break into the large computer market. For some time, IBM's American rival, Control Data Ltd, has had the largest share of the market for giant computers with its 6600 series, which is being superseded by the 7600. IBM's announcement will probably give Control Data cause for concern because not only does it represent a major assault on the market, but also the announcement of the 195, eighteen months before its scheduled delivery date, may affect advance orders for the 7600. In the past, Control Data has complained about IBM's tactics of announcing products far in advance of the delivery date; it claimed, for example, that the announcement of the 360-90 series in 1964 was aimed at scooping the 6600 model. Many computer firms are adopting a "wait and see" attitude to the IBM announcement, and several are sceptical of IBM's ability to achieve production by the 1971 delivery date.

The 195 will be available at a rental of between $165,000 and $300,000 a month, and the purchase price will be between $7 million and $12 million. The System/3 by contrast will cost from $42,375, and can be rented at a cost of $945 a month.

FISHERIES

An Industry Floundering

THE British fishing industry is in trouble on every front. The loss of three Hull trawlers and their crews in January and February 1968 and the *Report of the Holland–Martin Committee of Inquiry into Trawler Safety* (HMSO, 14*s* 6*d*), set up after these accidents, exposed the archaic conditions of the industry, by a large margin the most hazardous occupation in Britain. The recently published *Annual Report for 1968 of the Torry Research Station* (HMSO, 6*s* 6*d*), the Government laboratory responsible for improving methods of handling fish from the time it is caught until it is in the shopping bag, adds to the gloom. Its opening sentences read: "At the time of writing the UK fishing industry is facing problems widely attributed to an over-supply of some of the major species such as cod. It is certainly true that distressingly large quantities of fish

from British landings have failed at times to find buyers and have had to go for fish meal manufacture."

The problem is, of course, accentuated by increased landings from foreign vessels and imports of processed fish. The statistics for 1967, the latest available, show this trend even if they do not reveal its magnitude in 1968. Britain imported 162,000 tons of fish in 1967 compared with 156,000 tons in 1966, 72,000 tons of canned fish in 1967 worth £35 million compared with 61,000 tons worth £28 million in 1966, 395,000 tons of fish meal (£23 million) compared with 308,000 tons (£21 million) in 1966 and 282,000 tons of fish oil (£15 million) compared with 178,000 tons (£12 million) in 1966. And while imports of almost all fish and fish products have increased, exports have declined marginally from nearly £10 million in 1966 to about £9·5 million in 1967.

In 1967 the Torry Research Station spent £377,000 on research designed to halt and reverse these trends. Its work ranges from improving methods of freezing fish at sea to trying to persuade people that canned mackerel has the taste of canned salmon even if it lacks the appearance. At the end of 1967 there were twenty freezer-trawlers and seven factory trawlers in operation in the British fishing fleet, although since then three factory trawlers have been laid up as uneconomic. The problems are simply that fish frozen at sea often looks of poor quality, with the muscle gaping and the colour unappetizing, even though the flavour may be good. Torry scientists went on seven voyages in an attempt to pinpoint the faulty steps in filleting and freezing and came up with a few seemingly elementary recommendations: the fish ought to be kept below 5° C from the time it is landed to the time it is frozen, the fish should be left to bleed, and each haul should be washed and gutted before the next is landed, for example.

At the other end of the spectrum the Torry station, which now runs the British Food Manufacturing Industries Research Association's fish canning unit, is trying to find products that can replace the £55 million worth of canned fish that Britain imported. Currently sprats and mackerel, fatty fish, are the white hopes. And for the first time Torry's programme includes the development of machines to do many of the processing operations. For example, the station is trying to extend the range of a machine designed in the first place to gut only small fish.

EXPEDITIONS

Endeavour Sails Again

THE bicentenary of Captain James Cook's first voyage of discovery has provided the impetus for a joint British and New Zealand expedition that is just about to set out for the South-west Pacific. Several parties of scientists will be engaged in biological, geological and oceanographical investigations in and around the Cook and Tonga Islands. The expedition is under the auspices of the Royal Society of New Zealand, and includes five British scientists selected by the Royal Society of London, which was invited to participate because of its close connexions with Cook's expedition.

Drs D. R. Stoddart, of the University of Cambridge, H. G. Vevers, of the Zoological Society of London, and P. E. Gibbs, of the Marine Biological Laboratory in Plymouth, will spend four weeks on the coral atoll of Aitutaki. They will concentrate on the geomorphology and ecology of the atoll and its peripheral reef and lagoon. They will be particularly interested in the bottom living fauna of the lagoon—perhaps Dr Vevers will collect some exotic specimens for the aquarium at the London Zoo, of which he is the curator.

Drs P. G. Harris, of the University of Leeds, and P. E. Baker, of the University of Oxford, will be joined by a New Zealand geologist for geological, volcanological and petrological surveys of Tofua and Kao, two small islands in the Tonga chain. There is apparently a good chance of discovering something about the origin of andesites—it has still to be resolved whether their source is the mantle or the crust of the Earth. There are also hopes of obtaining new information about the evolution of the Pacific Ocean and its margins during the expedition.

Work at sea is to be based on HMNZS Endeavour, the New Zealand Navy's Antarctic supply ship and a particularly appropriate choice for an expedition commemorating the voyage of Cook's Endeavour. At the beginning of October the various land parties will board HMNZS Endeavour, which will take them to Gisborne where Cook's first landing in New Zealand will be marked by national celebrations.

SPACE

Pioneering Solar Activity

THE latest in the series of Pioneer spacecraft, Pioneer 10, should be launched from Cape Kennedy as *Nature* goes to press. This vehicle is expected to provide valuable information on solar activity for up to two years, and will be part of a programme including four previous Pioneers, Mariners 4 and 5 and seven of the Explorer series. The chief purpose of the mission is to monitor solar disturbances and to collect data on plasma, energetic particles and magnetic and electric fields radiating outwards from the Sun towards the Earth. Data relayed simultaneously from several Pioneer spacecraft are processed by computer to produce solar weather tables, which should throw light on solar processes, the interplanetary medium and the effects of solar activity on the Earth.

Pioneer 10 is being launched by the well tried three stage Delta rocket into a unique solar orbit (see figure), which will keep it within ten million miles of the Earth during its operational lifetime. The spacecraft will pass inside and outside the Earth's orbit, alternately speeding up and slowing down relative to the Earth, and will transmit for between six months and two years.

Investigations of solar disturbances are particularly valuable because of the possible effects of solar activity on the Earth. Geomagnetic storms, which are thought to be caused by solar disturbances, can modify the orbits of spacecraft, and charged particles degrade or damage solar cells and other instruments used in space vehicles. In addition, these storms have caused trouble for years for equipment which depends on a stable magnetic field. Disruptions, sometimes lasting for a week or more, are caused in wireline communications and in systems utilizing high frequency radio signals. With luck, increased knowledge of solar disturbances will result in more effective protection against these geo-