record sales for the last quarter of 1968 have proved too tough a yardstick for the first few months of the year, which are usually lean, the overall trend must be considered quite promising. The increase in exports of computers from Britain is particularly encouraging, with an increase of 29 per cent compared with the first quarter of 1968 to give total sales of £10·6 million.

TABLE OF COMPUTER SALES FROM BRITAIN

	Total	Exports	Running totals	Running exports
1966 Q4	29,405	7,622	114,938	33,580
1967 Q1	25,907	8,481	114,184	33,993
Q2	29,702	9,443	114,613	34,391
Q3	35,186	9,473	120,200	35,019
Q4	36,438	9,905	127,233	37,302
1968 Q1	33,819	8,244	135,145	37,065
Q2	36,785	10,246	142,228	37,868
Q3	44,147	10,147	151,189	38,542
Q4	50,596	12,203	165,347	40,840
1969 Q1	43,037	10,641	174,565	43,237

The table, which shows how the sales of computers from Britain have fluctuated during the past two and a half years, is based on figures issued by the Ministry of Technology. The first two columns show the actual quarterly figures, and the others contain running totals for the four quarters up to and including that in question. The latter columns give a more accurate guide to the overall trends in sales. Turnover relating to the repair and maintenance of existing computers has been excluded, but both British manufactured and "factored" computers are included. The irregularly high figure for sales in the last quarter of 1968 is attributable almost entirely to a boom in factored hardware.

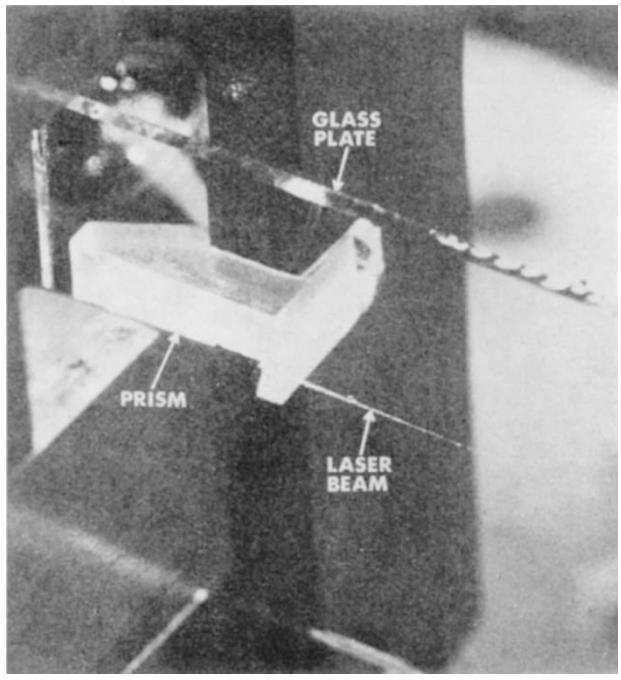
The pattern of export sales will be a source of satisfaction to those who have put their faith in the healing powers of devaluation. Apart from the predictable plateau immediately after devaluation in November 1967, the figures have risen at a rate which can certainly be called promising, and which may within the next two quarters turn out to be quite remarkable. Total orders at March 31 were at the record level of £258 million, according to the Ministry of Technology.

LASERS

Thin Film Modes

AN unexpectedly obvious method of guiding laser beams into thin crystal films by means of a simple prism looks like being the solution to a problem that has been plaguing Bell Telephone Laboratories for some while now. By allowing laser light to tunnel across the junction between a prism and a thin semiconducting film, P. K. Tien, R. Ulrichand and R. J. Martin of the Bell Laboratories have managed to transfer more than 50 per cent of the energy of the laser beam to the film. The efficient introduction of laser energy into thin crystal films is crucial to the development of laser amplifiers, light modulators and other components of a potential laser communication system.

Earlier attempts to direct a laser beam through the edge of a semiconducting film have been flawed by scattering from ragged edges of the film. In addition,



The bright streak of light is a laser beam travelling in an invisibly thin crystal film deposited on the back of the glass plate.

the films are usually much thinner than the width of the laser beam and, even if the problem of focusing the beam had been overcome, there would be immense difficulties in aligning the beam with the film.

In the experiments at the Bell Laboratories, the base of the prism was placed parallel to the film and at a precise distance from it. A proportion of the laser light then passed through the prism, tunnelled through the gap and set up electromagnetic oscillations in the film. This prism-coupling technique has the advantage, it seems, that a single mode of oscillation can be excited in the film by the appropriate orientation of the laser beam. The photograph shows the laser beam travelling in a thin film. One of the chief problems of thin film laser beam circuitry is the loss of light by scattering at microscopic imperfections in the films. A good deal of research is being carried out both at Bell and elsewhere to improve the production of these very thin crystal films.

A possible use for the prism film coupler is to split light beams into groups of different wavelength to form the separate channels of a laser communication system. Within the film, the beams could be modulated or amplified. They could then be taken out of the film, travel to some destination by a "pipeline", and then be coupled into a new film for signal processing.

TELECOMMUNICATIONS

Stored Programs for Sale

COMPUTERIZED telephone systems are finding new applications in Australia. L. M. Ericsson, the Swedish telephone equipment manufacturer, has just received a contract of undisclosed value from the Overseas Telecommunications Commission for a computer controlled exchange which is to deal with calls between

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international lines and the Australian national network. The system is of a type already installed at Tumba, near Stockholm, and should go into trial operation in Sydney in 1970. Trials will last until 1972, after which the exchange may be expanded for regular commercial use.

The Australian Post Office is currently considering tenders for a large capacity trunk exchange in Sydney, possibly operating on a basis of stored program control. It may be next year before a contract is awarded, but a number of companies from Britain, Europe and Japan have submitted designs, and in view of the particular requirements of the Australian network it seems that stored program control may eventually be used. How this technique works can most easily be described by a comparison with critical path analysis. Because a trunk call is typically routed in a complex way through a number of exchanges, the most economical path available may be difficult to find quickly, as is well known to all who have been frustrated in their attempts to make long-distance calls through the operator. With the coming of trunk dialling, it is clearly helpful to accelerate the process, and the value of stored program control is that it can bring this about by making it a matter of going through computer routines. An Ericsson system for this is now in operation at the Tumba exchange in Sweden. In Britain, the Post Office is conducting trials with a model of a large exchange system which uses a measure of stored program control for switching operations. According to the Post Office, decisions on suitability for general use on the public telephone network must await assessment of these London trials, but industrial opinion is that it may be ten or fifteen years before the system will come into widespread operation.

Whether stored program control is suitable for a particular telephone system is very much a function of the nature of the network and the size of the exchanges involved. Smaller exchanges may continue to function quite happily with mechanical switching, and the GPO is developing improved electromechanical devices for operating switches. If stored program control is going to be used, however, it is better that the exchange should be entirely electronic, because the time saved might be reduced considerably by the slower action of mechanical switches. It seems to be the development of a complete electronic exchange that needs most work.

One pointer to the future may be provided by information released from the Plessey Co., Ltd, last April, which forecasts that the market for stored program control systems will be expanding greatly by the mid-1970s. The company expects to have 4,000 people engaged by then in working on a version which, it claims, has clear advantages through using several smaller processors instead of one centralized processor. If one computer fails, it can be substituted automatically from another part of the system, so that total breakdown is avoided.

HIGH ENERGY PHYSICS

Labour Troubles at Frascati

It is tragic that ever since the successful operation of the Italian electron–positron storage ring ADONE (*Nature*, **222**, 927; 1969), the laboratory at Frascati has been on a go-slow strike which has involved a complete cessation of research. The Centro Nazionali di Energia Nucleare runs three laboratories in Italy, including a large part of the National Laboratory in Frascati (including ADONE). It is in an unusual position; the president of CNEN is not a civil servant but one of the ministers of the government (Tassari). This led to problems some years ago when the secretary-general of CNEN—Ippolito—was jailed for exceeding his authority (the only personal gain there seems to have been the personal use of a CNEN car while at Cortina d'Ampezzo).

For the past year, the Government of Italy has had more important preoccupations than CNEN; the socialist party has split, and there is the unusual experience of a political crisis during the summer holiday. The effect on CNEN has been disastrous. There have been no proper salary increases for some time; and there is no proper organization with which the union (SANN) can negotiate. Among other details, which it is hard to discuss from a distance, the union wants an immediate salary increase; the lowest scale now is L.75,000 (£80) a month (paid for 14 months) which is inadequate with Italy's high cost of living. An immediate increase of L.30,000 is requested.

It is to be hoped that these issues can soon be resolved even in the absence of the president of CNEN and that ADONE can commence the exciting experiments that are prepared.

PHYSICS

Anglo-Italian Microscope

The agreement reached in 1968 between the Royal Society and the Accademia Nazionale dei Lincei for promoting Anglo-Italian collaboration in science has now led to a joint programme of research to be carried out at the Cavendish Laboratory, Cambridge, and the University of Bologna to study the development of new electron microscope instruments and techniques. The Science Research Council is making a grant of £23,000 towards the cost of the project and the Consiglio Nationale della Richerche of Italy is providing £6,000.

The research will be carried out by Dr H. Valdre at the University of Bologna and Drs V. E. Cosslett, A. Howie and L. M. Brown at Cambridge. The grants will cover a period of three years, and will provide a welcome extension of the collaboration between the two university groups established some years ago.

The project will be in two parts. The first will be to examine the production of an electron optical analogue of the familiar light optical phase contrast microscope. The experiments to be carried out include the interpretation of electron diffraction data by determining the relative phases in a diffraction pattern and the structure determination of viruses and macromolecules. There may also be a study to determine unambiguously the nature of imperfections in crystalline materials and to investigate the possibility of resolving individual atoms in the electron microscope.

The second part of the project will involve the design and development of a straining stage, with specimen tilting, to work reliably under conditions of constant load. Among the proposed experiments is the observa-

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