

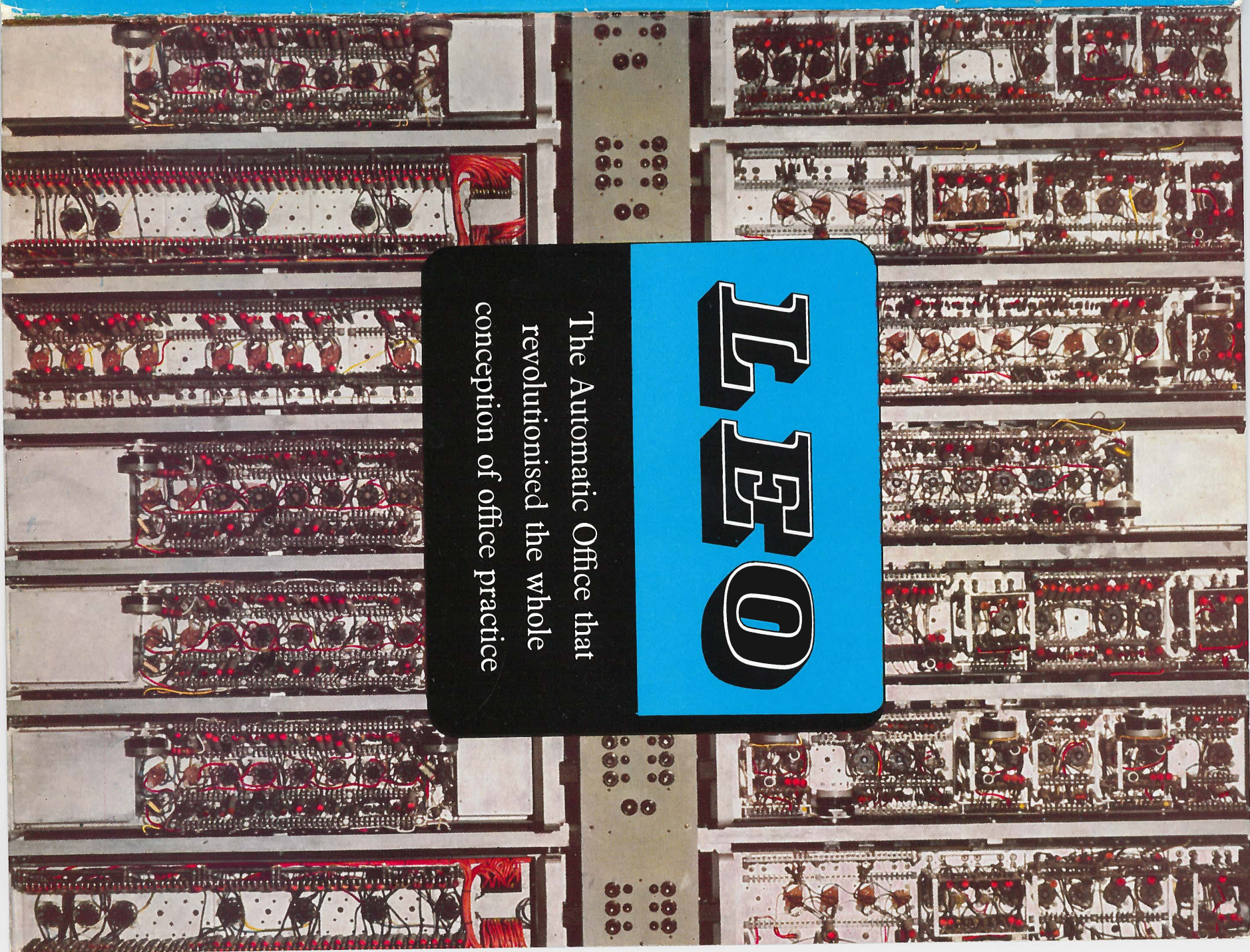


LERO



LERO

The Automatic Office that
revolutionised the whole
conception of office practice





LEEO

The Automatic Office that revolutionised
the whole conception of office practice

Routine repetitive clerical work can now be done from start to finish in one continuous operation.

Considerable savings are made in clerical costs. Manpower is available for more productive work. Management receives an up-to-the-minute service of vital statistics that could not be made available by any other means.

LEEO

The first Automatic Office anywhere in the
world to undertake routine clerical work

LEEO operates as a service department and deals with the routine work of the other departments of the enterprise to a strict time-table. The data for each job is supplied by the department concerned and transferred to punched cards or tape by the LEEO staff.

In less than a minute the operating instructions are fed to LEEO, which then automatically takes in all the data, carries out the calculations from start to finish in one run, rejects or prints out on an exception slip any inconsistencies and produces the results in the required form ready for those who need to act on the information.

LEEO

The first Automatic Office to contain a
computer especially designed for clerical work

LEEO was specially developed for clerical work and is therefore capable of performing practically every routine accounting and statistical job in the office or in the factory.

LEEO

The Automatic Office with a long record of
regular service and proven achievement



The first installation, which started regular work in 1953, has ever since been accepting an increasing amount of clerical work for automatic processing.

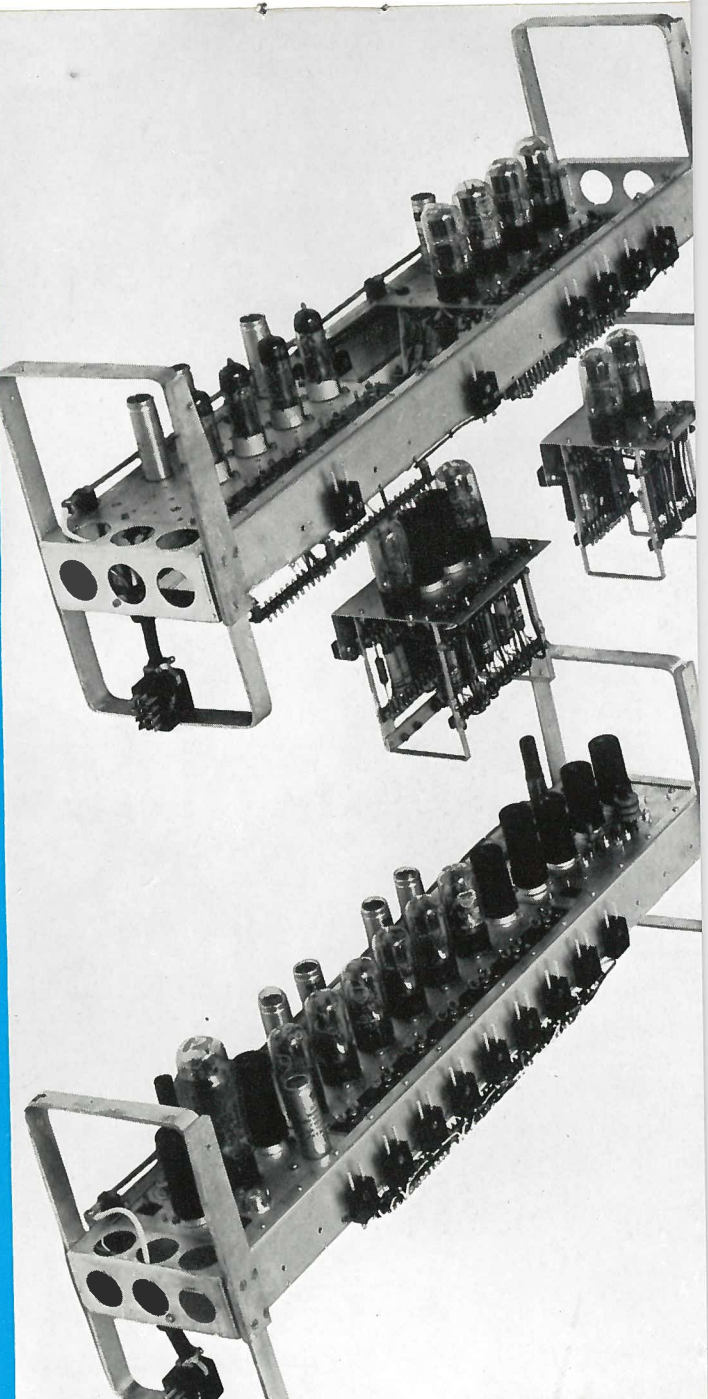
The following are brief descriptions of the first large scale clerical jobs ever carried out in an automatic office.

PAY-ROLL

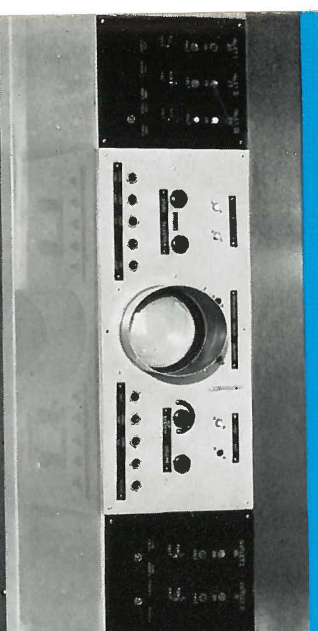
Since 9th February 1954, LEO has been solely relied upon to produce each week the pay-roll for an ever increasing number of staff which by July 1955 had reached a figure of 10,000. The entire calculations with all deductions and adjustments including P.A.Y.E., are carried out automatically in one operation through to the printing of the pay slips. A detailed analysis for accounting and cost accounting purposes is produced simultaneously as a by-product.

BRANCH ORDERING AND DELIVERY

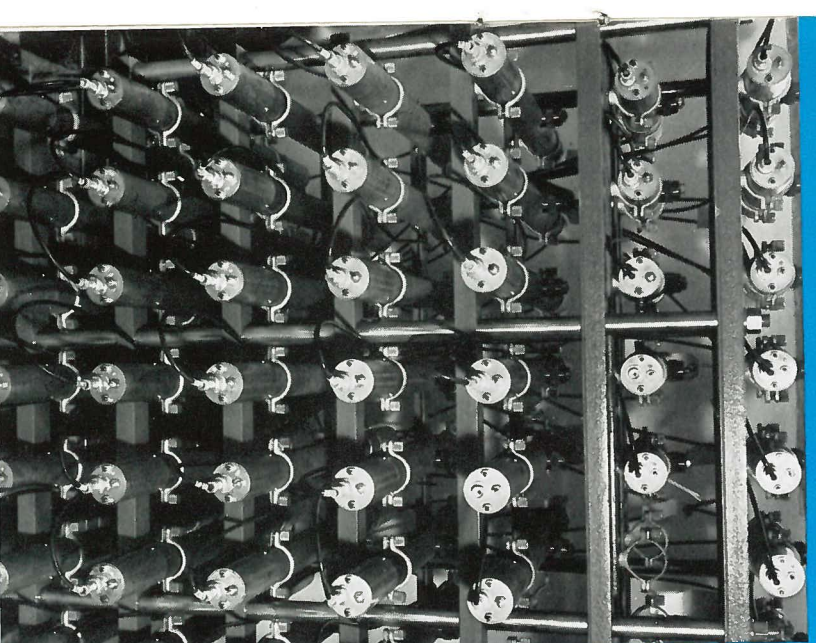
Since 20th November 1954, LEO has provided a clerical service for the supply of 250 items of goods to each of 150 branches. Every day approximately 8,000 revisions of standing orders are telephoned and, within an hour of receiving the last, standing orders and revisions are collated by LEO to produce the total production orders, the sub-totals required for the movement of goods in bulk ready for despatch, and the documents for packing the requirements for each branch. In addition the deliveries to each branch are valued and cash totals accumulated, stock control figures are provided and statistics are produced for management showing those branches where the deliveries for particular kinds of goods have risen or fallen significantly.



TOP. Two typical units from the electronic circuits and two small package units.



CENTRE LEFT. Operating part of the control desk.
BOTTOM LEFT. A general view of the delay tubes of the fast access store.



BOTTOM RIGHT. A long delay tube for the fast access store and two views of a short tube for the access registers in the arithmetic unit.



The following are some examples of the type of work for which LEO has been developed

SALES ACCOUNTING

Orders on factories and stores.
Invoicing, including public utility billing.
Credit status, frequency of ordering, turnover statistics etc.
Sales analysis by commodities, travellers, areas, etc.
Customer account records, monthly statements, ageing of overdue accounts, control of credit etc.

PURCHASES ACCOUNTING

Supplier account records, remittance advices etc.
Expenditure analyses and budget control records.

STORES ACCOUNTING

Stores records, including the signalling of maximum and minimum stock levels, appropriations, requisitions on buyers etc.
Stock valuation, at standard, actual and average prices, price difference accounts etc.
Analyses of stock issues for cost accounting purposes.

COST ACCOUNTING

Records for job costing, process costing and standard costing.

PRODUCTION CONTROL

Production planning and progress chasing, including machine utilization and labour statistics.

Descriptions of some representative jobs are enclosed in the pocket at the back of this brochure.

Although the important savings and real advantages of LEO lie in its statistics to a strict time-table, LEO has proved its versatility and following are

capacity to perform routine clerical work and to produce management reliability by completing many other types of jobs of which the examples:-

MARKET SURVEY

Analysis of the answers to large questionnaires from a wide range of people.
150 cross tabulations of the answers to 16 basic questions and 100 possible supplementary questions from each of 1,400 people were produced in one night.

STATISTICAL TABLES

Computations of statistics for various commercial, governmental, and United Nations organisations.

ACTUARIAL TABLES

Joint life and last survivor annuity tables for the Institute of Actuaries.

BROKERAGE TABLES

Preparation of tables showing the prices of international shares related to rates of exchange, stamp duties, commission, etc.

PRICE TARIFFS

Computations to show the effect of possible tariff changes for an Electricity Supply Board and production of actual tariffs at short notice for other organisations.

P. A. V. E.

The calculation and printing in page form of the entire range of tax tables for the Inland Revenue for 1955/56.

HEALTH STATISTICS

Classification of miners in relation to their successive occupations.

Range tables for the Ordnance Board.

Calculation of behaviour for armament manufacturers.

Evaluation of flutter and stress coefficients for aircraft manufacturing companies.

Computations for the European Council for Nuclear Research.

Determination of the behaviour of various network designs.

The computation of pressure and flow characteristics in fuel injection systems.

Computations to improve weather forecasting.

Determination of electron density contours of a molecule and of precise position of individual atoms.

BALLISTICS

GUIDED MISSILES

AIRCRAFT DESIGN

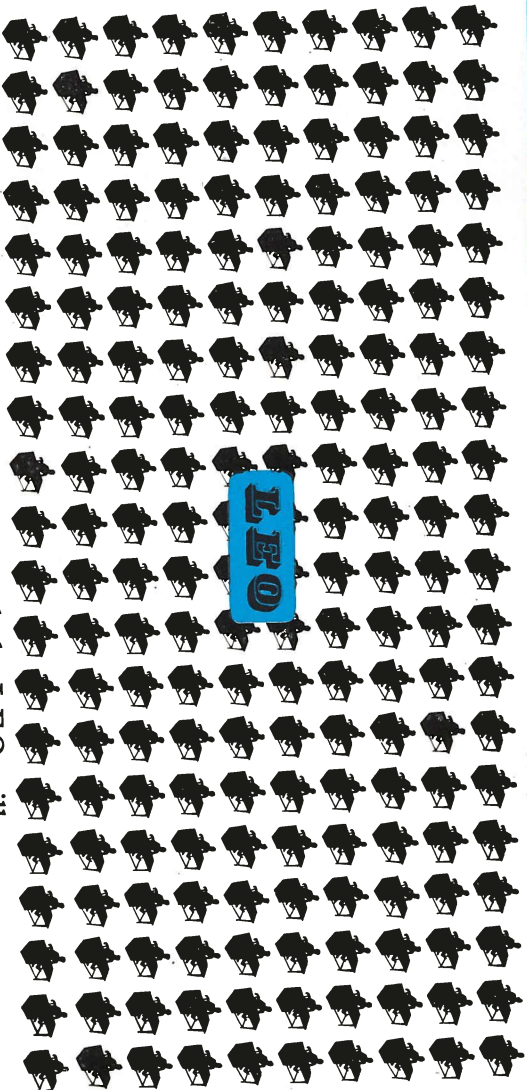
NUCLEAR RESEARCH

ELECTRICAL FILTER NETWORKS

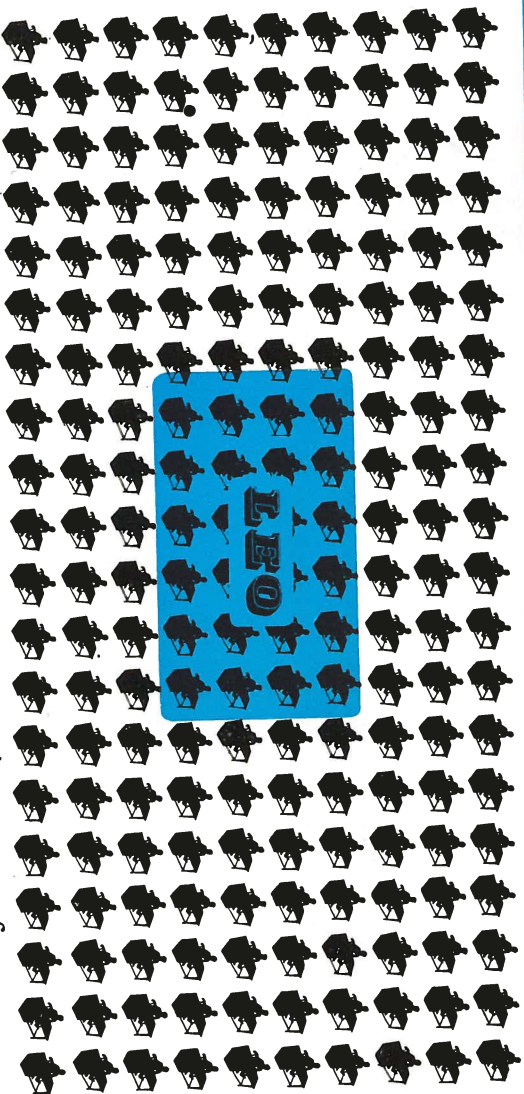
HYDRAULICS

METEOROLOGY

CRYSTALLOGRAPHY

LEO**SAVES MONEY**

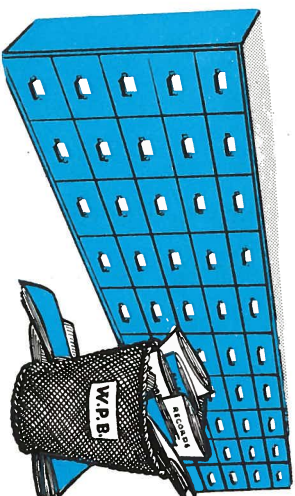
By doing the work of 200 clerks LEO will pay for itself in less than one year of full operation.

LEO**SAVES SPACE**

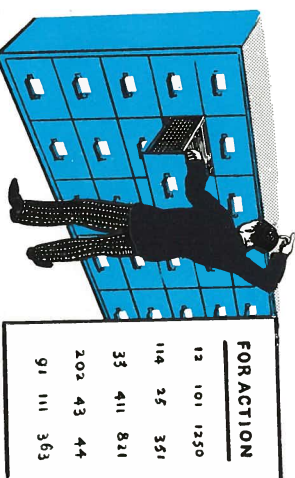
200 clerks occupy 9,000 sq.ft. LEO occupies 1,150 sq.ft.

LEO**SAVES RECORDS**

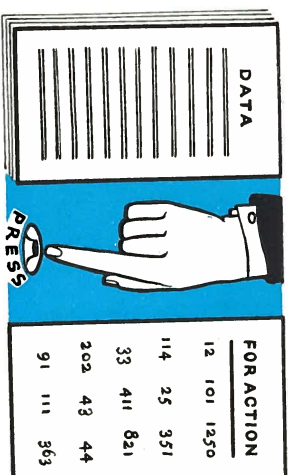
All the working out is done in LEO, and the only records produced are those actually needed for action. There is less paper, and the time of the managers and others who read the records is saved.

**LEO****SAVES GUESSWORK**

At virtually no extra cost LEO can provide as a by-product vital statistics that could not otherwise be made available economically, enabling management to base decisions on up-to-date facts.

**LEO****SAVES DELAY**

LEO works so quickly that each job is finished within a very short time. Thus the business operations and the management decisions that depend on the job can both take place with a minimum of delay.



The Practical Approach

LEO Computers Ltd, who designed and developed the Automatic Office and have a unique operating experience, offer a comprehensive consultancy service for the benefit of any organisation wishing to consider the value of an electronic computer in relation to its own business.

The practical approach to this problem is to carry out a complete investigation into the cost and time taken to complete an actual job by existing methods, and compare this with the cost and time taken to do the same job on LEO. These investigations and studies are made by LEO staff who have had unrivalled practical experience in analysing, designing, and programming clerical systems for an Automatic Office and who well understand business requirements.

The investigation falls naturally into four stages and at the end of each intermediate stage it can be seen whether there is an advantage in proceeding to the next.

STAGE 1 Job Appraisal

LEO Computers Ltd. will examine the organisation's clerical work and will recommend a job which is suitable for study. An estimate will be given of the cost of preparing a detailed statement of the requirements of the job in a form which will enable the job to be programmed for an Automatic Office.

STAGE 2 Job Requirements

LEO Computers Ltd. will co-operate in preparing the statement of the Job Requirements. This necessitates a thorough understanding of all the results and statistics that are likely to be required and the form in which they are to be prepared, and the sources from which the necessary data can be made available.

When the Job Requirements statement has been finalised an estimate will be given of:

- (a) The time taken by LEO to perform the job, from which a first estimate can be made of the potential saving on the job.
- (b) The cost of programming and mounting a full scale demonstration.

STAGE 3 Programme and Demonstration

LEO Computers Ltd. will programme the selected job as set out in the Job Requirements statement and will then carry out a full scale demonstration run to show exactly how the job is done, the time it takes and the incidental additional advantages that can be gained.

STAGE 4 The LEO Automatic Office

LEO Computers Ltd. will, if desired, continue to carry out the job and any other job regularly on a service basis, in collaboration with the customer's own office organisation.

OR

LEO Computers Ltd. will quote for, build and supply the equipment required and if desired will in the meantime train programmers, operators and maintenance staff so that the Automatic Office can be put into service as soon as it is installed.

Further information will gladly be made available to those who seek more detailed particulars. Those who have not seen LEO at work and would like to do so should ask for an invitation to a demonstration of one of the regular jobs being done by the computer.

Specification

The Standard LEO II comprises a number of basic units all coupled together to work automatically. The basic units are:

1. Fast Access Store
2. Arithmetical Unit
3. Coordinator
4. Input Channels
5. Output Channels
6. Reading and Recording Devices

1. Fast Access Store

The fast access store has 2,048 compartments. A single compartment may hold either an order of the programme or a number up to 250,000. Two compartments may be used together for the purpose of holding a 'long' number up to 250,000,000,000. The average access time to each compartment of the store is 1/6000th of a second.

in 1/1000th of a second. Division takes 1/300th of a second.

2. Arithmetical Unit

These are electronic circuits which provide for automatic addition, subtraction, multiplication and division. There is also provision for automatically augmenting running totals and calculating control totals.

There are 13 immediate access registers in the arithmetical unit and an order to carry out addition or subtraction of numbers already held in these registers takes 1/3000th of a second. The time for multiplication varies according to the number of digits involved, but most clerical multiplications can be completed

3. Coordinator

This controls the sequence and timing of operations. It enables the next order to be commenced automatically immediately the previous order has been completed irrespective of the varying times taken to complete different orders.

4. Input Channels

There are three independent input channels, each capable of being connected to any one of a number of appropriate electro-mechanical reading devices and each able to take in data simultaneously and independently of the other input channels and of the calculations being carried out in the computer itself.

Data may be fed in binary, decimal or sterling notation. There is automatic conversion of input data from decimal or sterling notation to binary notation.

A buffer store assembles blocks of data until the fast access store is ready to accept it.

5. Output Channels

There are two output channels each connected to its own electro-mechanical recording device which can record simultaneously and independently of each other, of the calculations in the computer and of the input channels.

One channel feeds a printer for producing printed results and the other channel feeds a punch for punching carry-forward information. Alternatively two printers or two punches may be used.

A buffer store receives blocks of results from the fast access store and holds them until the recording devices are ready for them.

Result numbers may be automatically converted from binary to decimal or sterling as required for printing or punching.

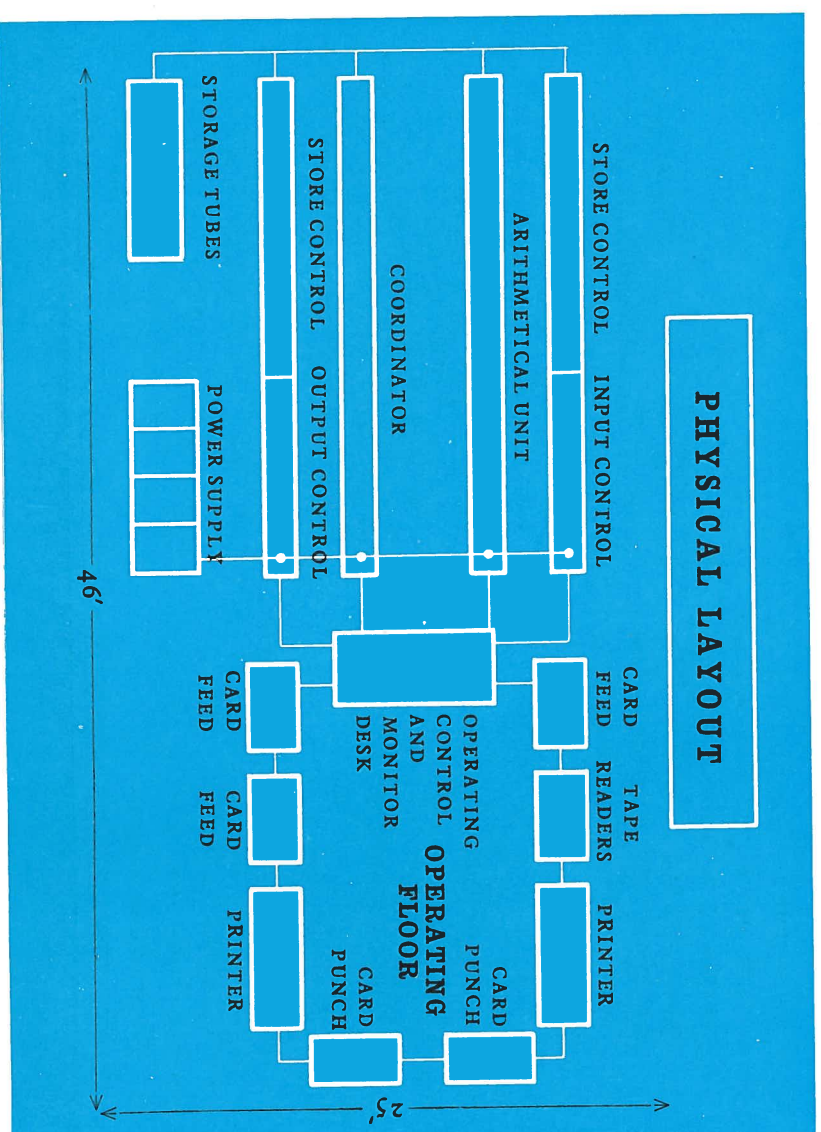
6. Reading and Recording Devices

The reading and recording devices can be varied to suit user's requirements. Descriptions of those currently recommended are enclosed in the pocket at the back of this brochure.

Additional Facilities

LEO II is designed so that additional facilities can be provided to meet particular needs as for instance:

- (a) Extra input and output channels.
- (b) An auxiliary store up to 32 times the capacity of the fast access store.
- (c) Special arithmetical facilities.

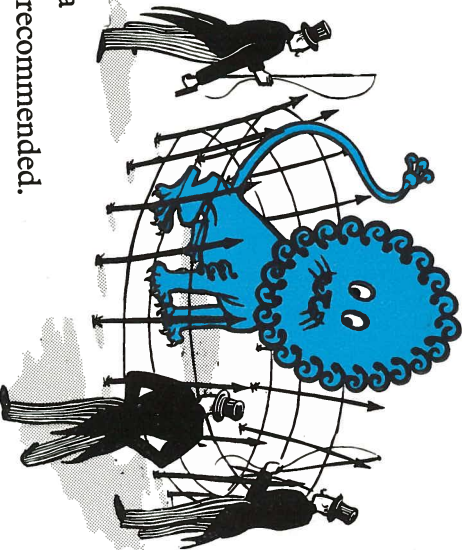


What staff are required for operating and maintaining LEO?

1 Senior operator
1 Senior engineer
1 Query clerk

} per shift.

An assistant operator for assembling data and an assistant maintenance engineer are recommended.



How many programmers are necessary?

The minimum requirement is one senior and one assistant but the number is dependent upon the variety of jobs.

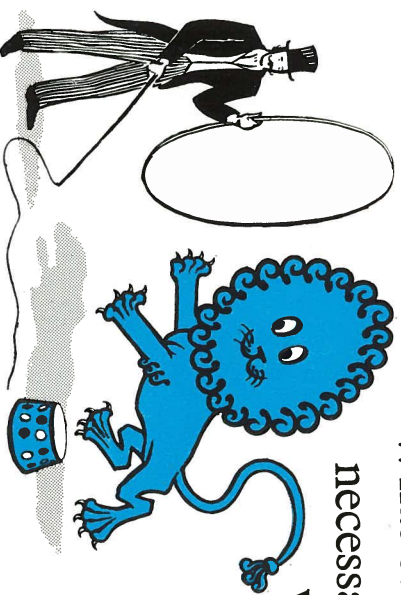
Programmers require a wide experience of clerical work and a thorough training in the technique of programming, they should have reached a good standard in mathematics in the G.C.E. Examination (ordinary level). Suitable candidates for training can probably be found in every large office.

How long does it take to prepare a programme?

This depends on the job but, after the job requirements have been defined, it is likely to take two to four months.

What staff arrangements are necessary prior to installation?

Whilst awaiting delivery, operators, programmers and engineers undergo training courses. As part of their training, programmers prepare and test clients' own programmes under the guidance of LEO experts, in readiness for installation.



How soon can LEO start working after the commencement of the installation?

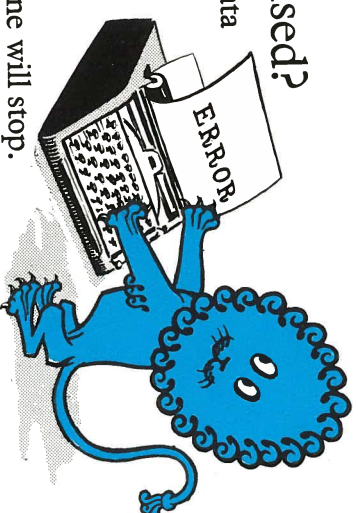
A period of three to four weeks should be allowed to include the assembly and thorough testing of all equipment to ensure the high standard of reliability required for clerical work.

How long does it take to change jobs?

Within two minutes of the finish of one job, the programme for the next, the brought forward data, the current data and amendments and the necessary stationery can all be made ready. At the pressing of the starter button LEO takes in all the data, processes it in accordance with the programme instructions and prints out the results. It goes on doing this automatically until all the results have been produced.

What checks on accuracy are used?

As it will always be impossible to produce data 100 per cent free of human error, checks on consistency and accuracy of data are built into the programme. LEO will indicate the nature of any error by printing an exception slip. If the error is sufficiently serious the machine will stop.



What is the maximum loading?

There is no reason why LEO should not work continuously round the clock apart from short periods for daily tests and maintenance. Not only does this reduce the running costs but some components, such as valves, seem to improve in performance when run continuously.

Is a temperature cooled and soundproof room necessary?

A temperature cooled room is not required since LEO has its own cooling system. Apart from the reading and recording equipment, the Automatic Office is silent and does not need to be housed in a soundproof room.

What power supply is required?

LEO uses normal mains supply of electricity and has its own auxiliary equipment for ensuring the stability of the current. The power consumption is about 35kVA.

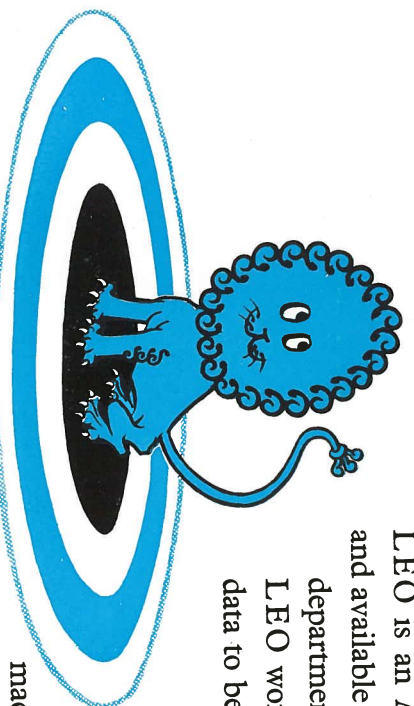
What reorganisation is necessary?

This depends on particular circumstances. Generally speaking some reorganisation will be desirable to make the best use of this powerful new tool of management and to take full advantage of the opportunity to integrate many hitherto separate jobs.

Is a high degree of centralisation necessary?

LEO is an Automatic Office installed at the centre and available to give a clerical service to any factory or department.

LEO works so fast that usually it is possible for data to be sent in from the operating department, processed and returned in good time for the local management to take action on the results. In this way decentralised clerical services can be made more effective.



What does it cost to maintain LEO?

Operating experience suggests that an allowance of £1 an hour will more than cover all component costs.

What other replacements are necessary?

Apart from its reading and recording equipment, LEO has no moving parts. It does not become worn in the way that mechanical devices with moving parts deteriorate with age. Provided proper maintenance is carried out a LEO Automatic Office has an indefinite life.

How is LEO's reliability achieved?

- (a) by using circuits with adequate margins of operation.
- (b) by providing a thorough routine of preventive maintenance.
- (c) by testing each day and replacing any component found to have deteriorated.

What will be the effect of future developments?

LEO has been specifically designed so that any individual part can be taken out and replaced with an improved part as and when it becomes available.



This pocket contains details of some representative jobs that have been performed by LEO and other items of information such as particulars of input and output equipment.

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