I·C·T

1301

DATA PROCESSING SYSTEM

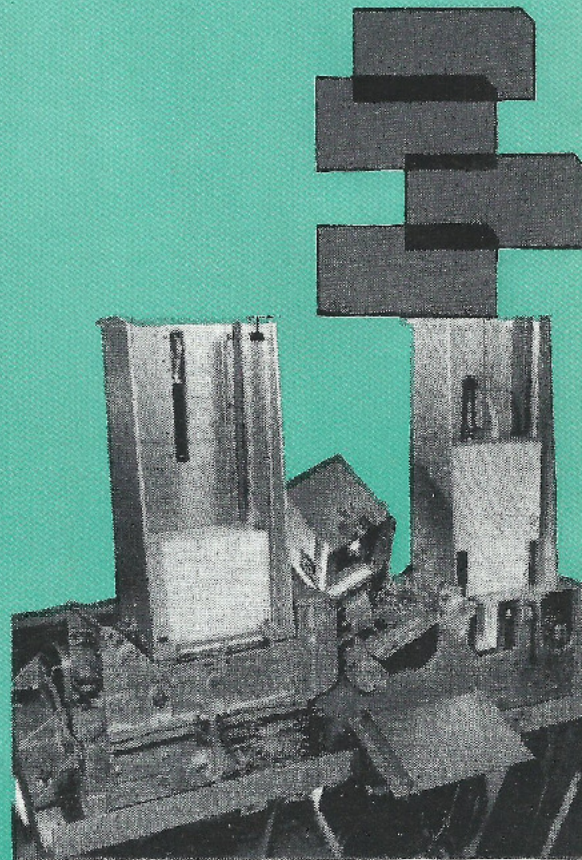INTERNATIONAL COMPUTERS AND TABULATORS LIMITED

INPUT

PUNCHED CARDS AT 600 A MINUTE

Cards: 80-column capacity.
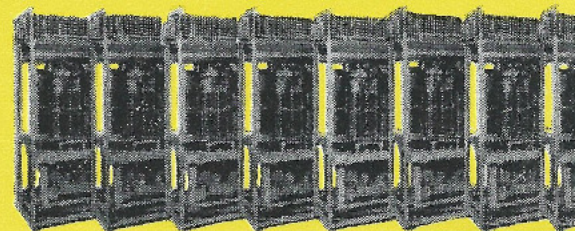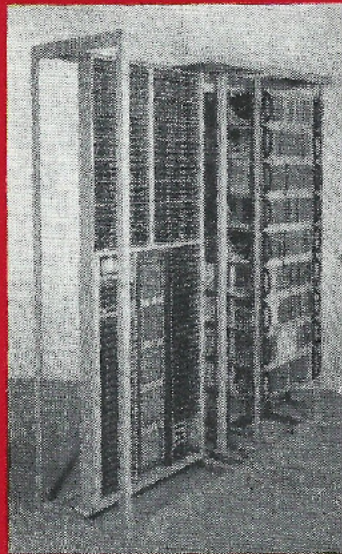
Reading: By photoelectric sensing stations

Checking: Accuracy of input is maintained by two separate readings of cards within the machine. Controlled by program.
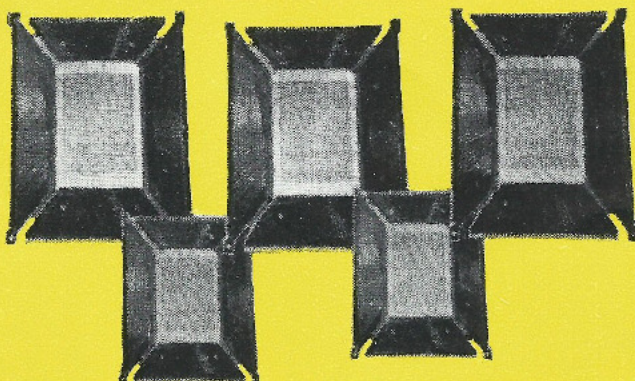
STORAGE

IMMEDIATE ACCESS CORE STORE

Basic capacity of 400 words, each of 12 digits. Scaleable up to 2,000 words in multiples of 400 words.

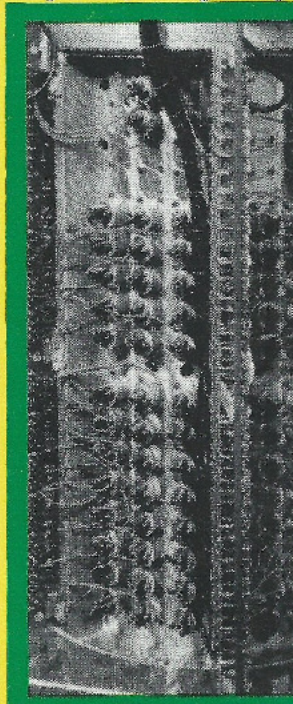Access time to any word is effectively zero.

DRUM STORE

Basic capacity of 12,000 words of 12 digits.

Scaleable up to 96,000 words in multiples of 12,000.

MAGNETIC TAPE

Input data is also presented by means of magnetic tape. The systems available are described below.

MAGNETIC TAPE

Two systems are available—Standard system: 22,500 decimal digits per second; High speed system: 90,000 decimal digits per second.

	Standard	High speed
Tape Width	$\frac{1}{2}$ inch	1 inch
Reel length	3,600 feet	3,600 feet
Tracks		
Total	10	16
for data	4	8
for checking	6	8
Digits per inch	300	600
Inches per second	75	150
Word length	12 digits including sign	12 digits including sign
Alphabetic characters (zone and numeric)	2 digits	2 digits
Digit rate per second	22,500	90,000
Block length	unlimited	unlimited
Stop/Start time	11 milli-seconds	8.7 milli-seconds
Automatic error correction	of single-bit errors in any digit	of single-bit errors in any digit pair
Error detection	yes	yes

I·C·T 1301

PROGRAMMING

SERVICES

A wide range of utility routines, including:

Assembly program to convert floating addresses to relative addresses;

An assembly program for converting relative addresses to absolute addresses;

Program to check validity of the program imput;

Time sharing control routine for peripheral units;

Distribution generators on a time sharing or non-time sharing basis for operation of peripheral equipment;

Assembly program for incorporation of library sub-routines in main program;

Trace routine for program proving;

Program diagnostic routine;

Drum and core storage dumps;

Loading routine for arrays;

Zero-izing selected storage areas;

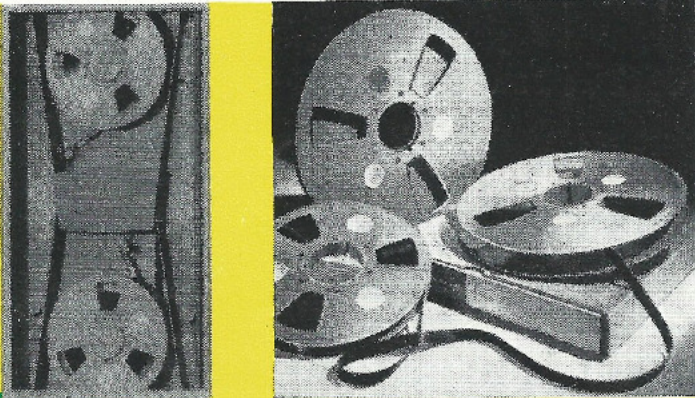Insertion of stop orders in selected storage areas;

Tape housekeeping routines;

Order blocking routines

Extensive library of mathematical and commercial programs

AUTOMATIC CODING

A significant advance made by I.C.T in the preparation by the computer of its own programs, and based on the international language COBOL (Common Business Oriented Language).

SALES OFFICES

LONDON
Victoria House, Southampton Row, London, W.C.1. (Holborn 7866)
88 High Holborn, London, W.C.1 (Chancery 3311)
City Wall House, 84/90 Chiswell Street, London, E.C.2. (Monarch 1596)
Mason House, 163/173 Praed Street, London, W.2. (Paddington 0771)
60 Kingly Street, Regent Street, London, W.1. (Regent 8621/7)

ABERDEEN
14 Bon Accord Crescent, Aberdeen. (51371/2)

BELFAST
Alanbrooke Road, Castlereagh, Belfast, 6. (51391/2/3)

BIRMINGHAM
King Edward House, New Street, Birmingham, 2. (Midland 1812)
Prudential Buildings, St. Philips Place, Colmore Row, Birmingham, 3. (Central 7621)

BRIGHTON
Norwich Union House, Church Street, Brighton, 1. (25956)

BRISTOL
84 Broadmead, Bristol, 1. (23401)

CARDIFF
40 Windsor Place, Cardiff. (28215)

COVENTRY
28/34 Whitefriars Street, Coventry. (21455/6)

DUNDEE
13 Albert Square, Dundee. (27292)

EDINBURGH
42 Frederick Street, Edinburgh, 2. (Caledonian 2011 and 2086)

GLASGOW
13/17 Renfield Street, Glasgow, C.2. (City 6626)

HITCHIN
2 Walsworth Road, Hitchin. (2241)

LEEDS
Provincial House, 26 Albion Street, Leeds, 1. (35551)

LEICESTER
2 1 Charles Street, Leicester. (29561/2/3)

LIVERPOOL
Sefton House, Exchange Street East, Liverpool. (Maritime 2345/9)

MANCHESTER
Century Insurance Building, St. Peter's Square, Manchester. (Central 9160 and 9162/9)
51 Mosley Street, Manchester, 2. (Central 8727/9)

MIDDLESBROUGH
Yorkshire Penny Bank Chambers, Wilson Street, Middlesbrough. (2814)

NEWCASTLE UPON TYNE
Neville Hall, Westgate Road, Newcastle upon Tyne, 1. (29786/7)

NORWICH
Castle House, 21 Davey Place, Norwich. (26132/3/4)

NOTTINGHAM
Norwich Union House, 10 South Parade, Nottingham. (46421/2)

OXFORD
21 Beaumont Street, Oxford. (42313)

PRESTON
163 Eldon Street, Preston. (56634)

SHEFFIELD
54/56 Fargate, Sheffield, 1. (27186/7/8/9)

SOUTHAMPTON
7 Cumberland Place, Southampton. (24659)

WOLVERHAMPTON
71 Bath Road, Wolverhampton. (23449 and 27721)

SUPPLIES BRANCH
88 High Holborn, London, W.C.1. (Chancery 3311)

SERVICE BUREAUX
Aberdeen, Birmingham, Glasgow, Leeds, Liverpool, London, Manchester, Molesey (Surrey), Newcastle upon Tyne, Nottingham, Southampton and Watford.

DIVIDEND SERVICE BUREAU
Victoria House, Southampton Row, London, W.C.1. (Holborn 7866)

EDUCATION AND TRAINING CENTRES
Bradenham Manor, near High Wycombe, Bucks. (Naphill 2191/2/3)
Moor Hall, Cookham, Berks. (Bourne End 1840)
36 Hertford Street, London, W.1. (Grosvenor 1765)
Fulwood Place, London, W.C.1. (Chancery 3311)

COMPUTER CENTRE
Putney Bridge House, Putney Bridge Approach, London, S.W.6. (Renown 3322)

PUNCHED CARD DEMONSTRATION CENTRE
Hamilton House, 138 Piccadilly, London, W.1. (Hyde Park 8080)

SPECIAL PROJECTS
Powder Mill Lane, Dartford, Kent. (20241)

LECTURES AND FILMS
149 Park Lane, London, W.1. (Hyde Park 8080)

WORKS
Letchworth Garden City, Hertfordshire; Croydon, Surrey; Castlereagh, near Belfast; Dartford, Kent; Stevenage, Hertfordshire; Alderley Edge, Cheshire; Chertsey, Surrey; Cirencester, Gloucestershire; Kirkby, Lancashire; Southport, Lancashire; Stockport, Cheshire.

RESEARCH AND DESIGN DIVISION
Letchworth Garden City, Hertfordshire; Stevenage, Hertfordshire; Whyteleafe, Surrey.

FIELD ENGINEERING
Oxen Road, Luton, Bedfordshire. (6530/1)

# INTERNATIONAL COMPUTERS AND TABULATORS LIMITED

I·C·T

HEAD OFFICE: GLOUCESTER HOUSE, 149 PARK LANE, LONDON, W.1. *TELEPHONE:* HYDE PARK 8080

I.C.T, ITS SUBSIDIARIES AND DEALERS OPERATE OVERSEA IN:

Australia; East Africa; South Africa; Rhodesia; Portuguese East Africa; Nigeria; Belgium; Burma; Canada; Ceylon; Cyprus; Denmark; Eastern Europe; Eire; Finland; France; Germany (West); Ghana; Greece; Holland; Hong Kong; India; Iran; Iraq; Italy; Japan; Jordan; Kuwait; Lebanon; Malaya; Malta; Mauritius; Mexico; New Zealand; North Borneo; Norway; Pakistan; Sarawak; Singapore; Spain; State of Brunei; Sudan; Sweden; Switzerland; United Arab Republic; United States of America; West Indies.

The central processor is made up of two of these units and comprises the program controller, pulse generator, function mesh and arithmetic unit.
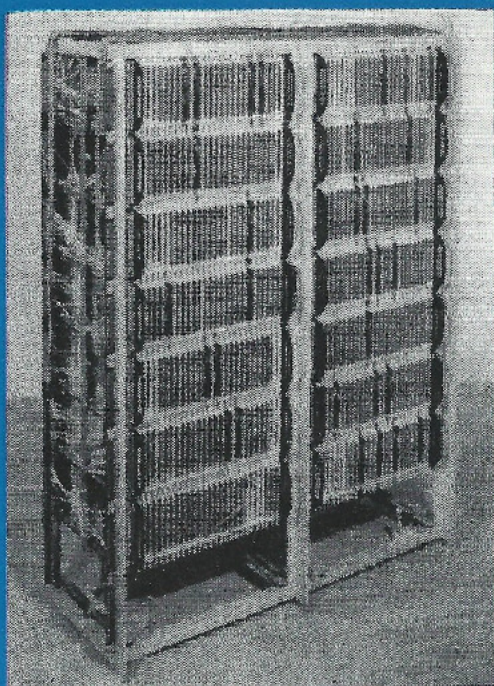
CENTRAL PROCESSOR

Fully transistorized and operating at 1,000,000 cycles per sec

ARITHMETIC UNIT — includes what is termed the 'mill', in which all numeric processes take place, and three one-word registers—A, B and C.

REGISTERS — interconnected to each other and to the mill, and transmit to and receive data from the mill, the input/output units, the core store and the drums.

WORD LENGTH — Twelve decimal or sterling digits including sign.

INPUT DATA — Both numeric (decimal or sterling) and alphabetical information can be read, processed, stored and printed out.

INSTRUCTION FORM — Single address. Each word normally containing two instructions.

CHECKING — All transfers in and out of storage are checked. An error correcting code is used for the tape units.

INTERNAL MODE — Serial/parallel.

NUMBER BASE — Binary coded (decimal or sterling).

ARITHMETIC FUNCTIONS (decimal or sterling)

ADDITION AND SUBTRACTION — 21 microseconds to obey.

MULTIPLICATION — 170 microseconds average per multiplier digit.

DIVISION — By program.

FIXED POINT OPERATION — The computer has been designed to work in fixed point, to minimise the cost and increase the speed of processing data. A full range of utility routines is provided for floating point operation and for double-length and complex number arithmetic.

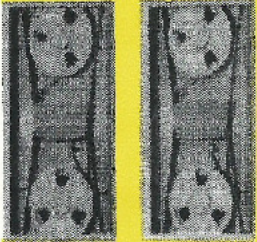The line printing f
1301 match the
output o

OUTPUT

F
C

PRINTING POS
LINE: 120, each of
and alphabetic c
symbols; at ten char
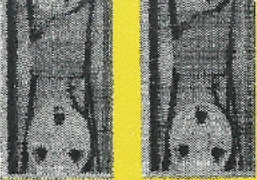
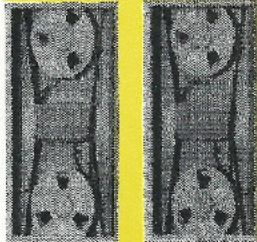**Either system extensible from one unit up to eight**

Variable Block Length
making maximum effective use of tape with fewest blank gaps.

Two-Unit Control
enabling one unit to read at same time as another writes.

Auto-Correction
checking system detects and corrects single-bit errors, and detects all double errors.
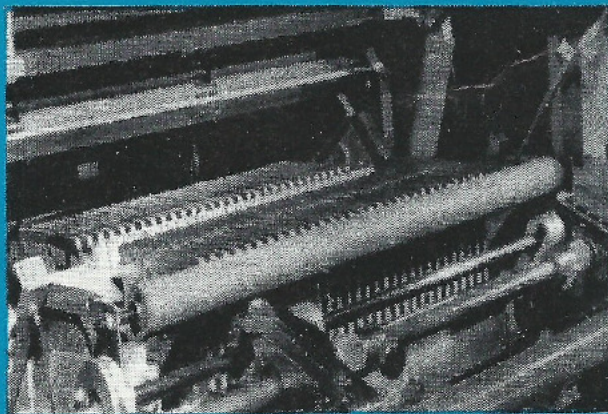
Automatic 'Break-In'
when reading and writing.

Advantages

★ Substantial reduction in the time and expenses of preparing a program;

★ Amendments to program made simply by changing the English language statements;

★ 'Debugging' of programs can be practically eliminated;

★ The procedure can be taught in a very short time—allowing the executive to communicate more directly with the computer.

A detailed descriptive brochure with specification is available on request at any of the I.C.T offices listed on the back page.


...s of the ...potential ...machine.

...TED ...PUT

A speed of up to 600 lines a minute provides a rate of printing which caters for the production of the large volumes of information necessary in many organizations.

PAPER MOVEMENT: up to 400 feet per minute. Both printing and paper movement are under direct control of the program, and a set of utility programs is available to cater automatically for various types and formats of output.
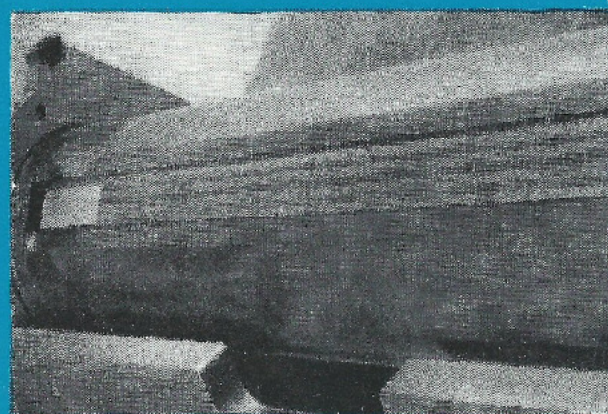
...NS PER
...numeric
...ers, with
...s to inch.

PUNCHED OUTPUT

Operates at a speed of 100 cards per minute, using 80-column cards.

Information to be punched is transmitted from the central processor; the punching being checked by being read back immediately from the card and compared with the original results held in a store.

The card punch is under control of the program, and punching can occur simultaneously with card input reading, with the production of printed output and with the reading and writing of magnetic tape.

Utility programs are available to cater automatically for all types of punched output.
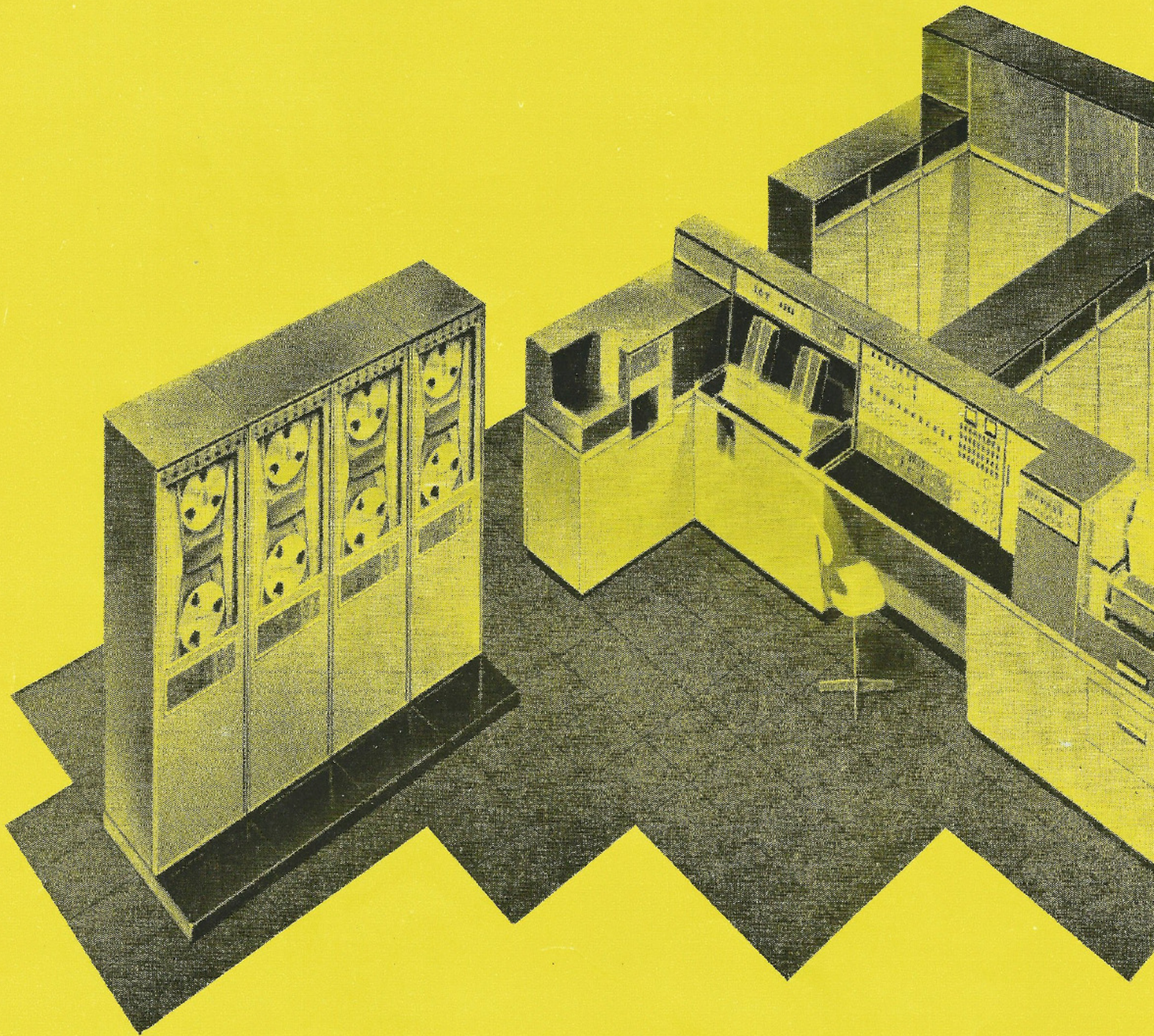
SPEED AND CAPACITY

The 1301 works at 1,000,000 cycles a second—a megacycle; it does 37,000 additions, subtractions and transfers a second; and multiplication of two 4-digit numbers (for example) at the rate of 1,450 per second. It has immediate access core store capacity of 4,800 up to 24,000 digits; internal backing drum storage of 144,000 up to 1,152,000 digits; and it uses up to eight magnetic tape decks, each having a reel with a capacity of 25,000,000 digits, read and written at a speed of up to 90,000 digits per second.

SIMPLICITY

Attention has been paid to the simplicity of loading and unloading of magnetic tape decks and other peripheral units. Automatic coding is provided, eliminating much of the drudgery of programming, reducing it to the point where system analysts and other staff can directly approach the machines. Sub-routines and utility routines provide for ease of program preparation. The design of the machine, particularly the display console, and the extensive use of indicators, is a further step in simplicity of operation.

LOW COST

The high internal pulse rate is fully utilized to enable all units to function simultaneously under the control of the program. The control of input and output by program saves the cost of buffer storage. Together with the provision of scaleable storage units, these features are the major factors enabling the basic machine to be offered at low initial cost. The construction of the machine makes for ease and consequent low cost of installation. A full library of sub-routines and utility routines is provided and reduces the cost and the time taken to get a job running. In addition, automatic programming facilities assist in curtailing 'make ready' time, and contribute to low operating costs. Full transistorization and consequent low power consumption assure minimum running costs.

FLEXIBILITY

The card reader, card punch and the printer can all operate simultaneously with magnetic tape reading and writing. The automatic break-in and automatic queueing features of the magnetic tape system provide ideal facilities for multi-reel file processing. The use of the program control, the provision of mixed radix arithmetic, variable block-length records for magnetic tape, and of large areas of storage, all contribute to the flexibility of the 1301.

EXPANSIBILITY

The modular construction employed allows for the on-site increase of immediate access core storage from 400 to 2,000 words (in steps of 400), of drum storage from 1 to 8 drums, and the fitting of from 1 to 8 magnetic tape decks. The basic system has, therefore, ample potential to meet the needs of an expanding organization. The range of possible configurations ensures that the best system can be supplied to serve the current requirements of individual organizations, the system being designed to meet changing data processing requirements arising in expanding organizations.

ACCURACY

The maximum rate of accurate data processing is achieved by the automatic checking of the punched cards at both the input and the output stages, the checking of all transfers to and from the storage units, the control exercised over the printing operation, and the use of automatic error detection and correction in the magnetic tape systems.

RELIABILITY

The highest standard of reliability and long life has been built into the 1301 by the use of advanced design techniques. It is fully transistorized, with printed wiring circuits and uses wrapped connections, which eliminate plugs and sockets. The circuit design allows the use of wide tolerances on all electronic components. The advanced design techniques are also responsible for the extremely low power consumption.

A NEW CONCEPT

These features of the I.C.T 1301 build into a system which for the first time offers really intriguing possibilities. It can satisfy the demand for the establishment of a high performance, fully integrated data processing system, as a central service in a large organization serving the many facets of management control. Equally it paves the way for the introduction of comprehensive data processing systems into far smaller organizations, or smaller units of organizations, than has hitherto been thought possible or expedient.