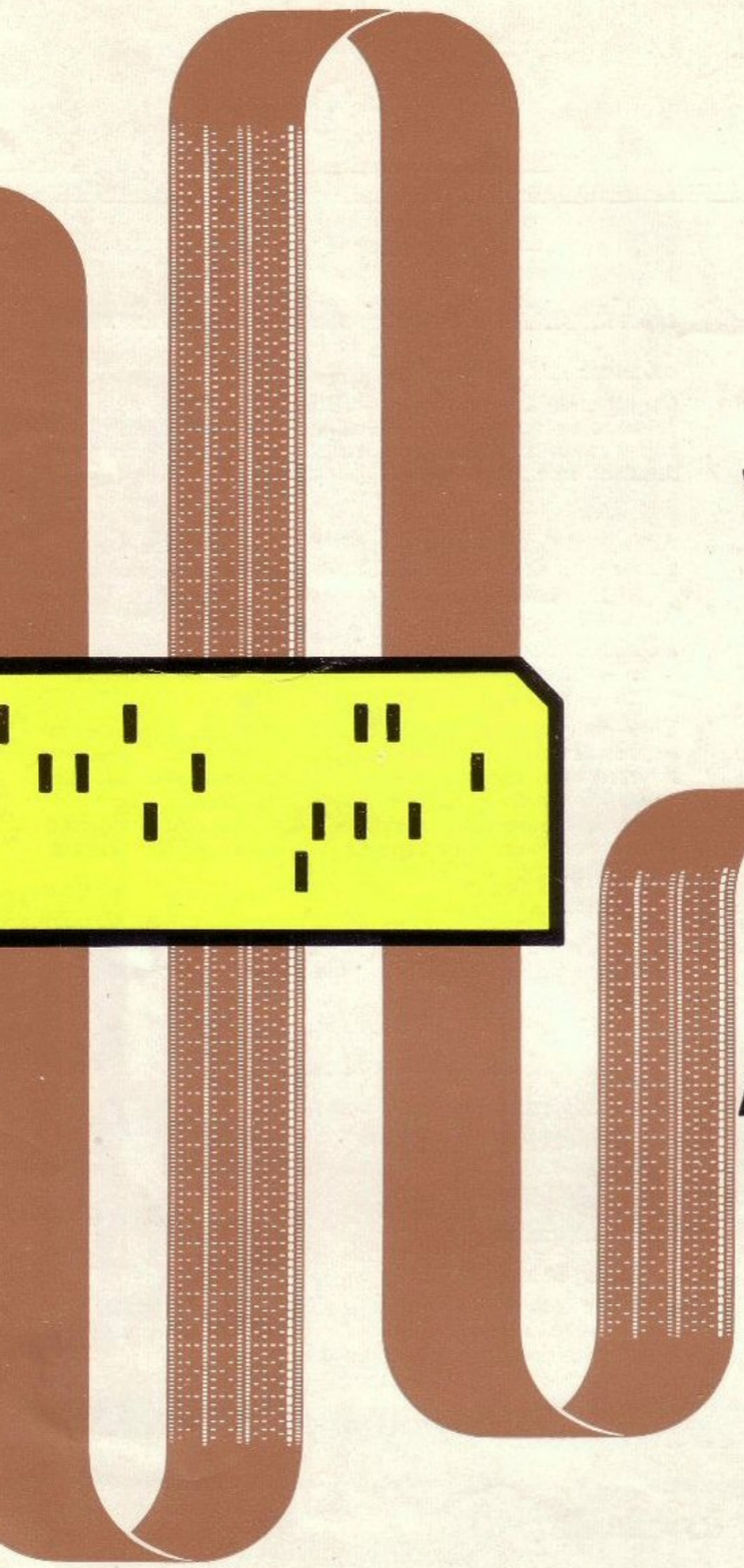
This PDF was
produced at the
ict1301 project
by Rod Brown.

From a document
kindly donated by
John Procter.

Visit ict1301.co.uk
for project news.



I·C·T

1301

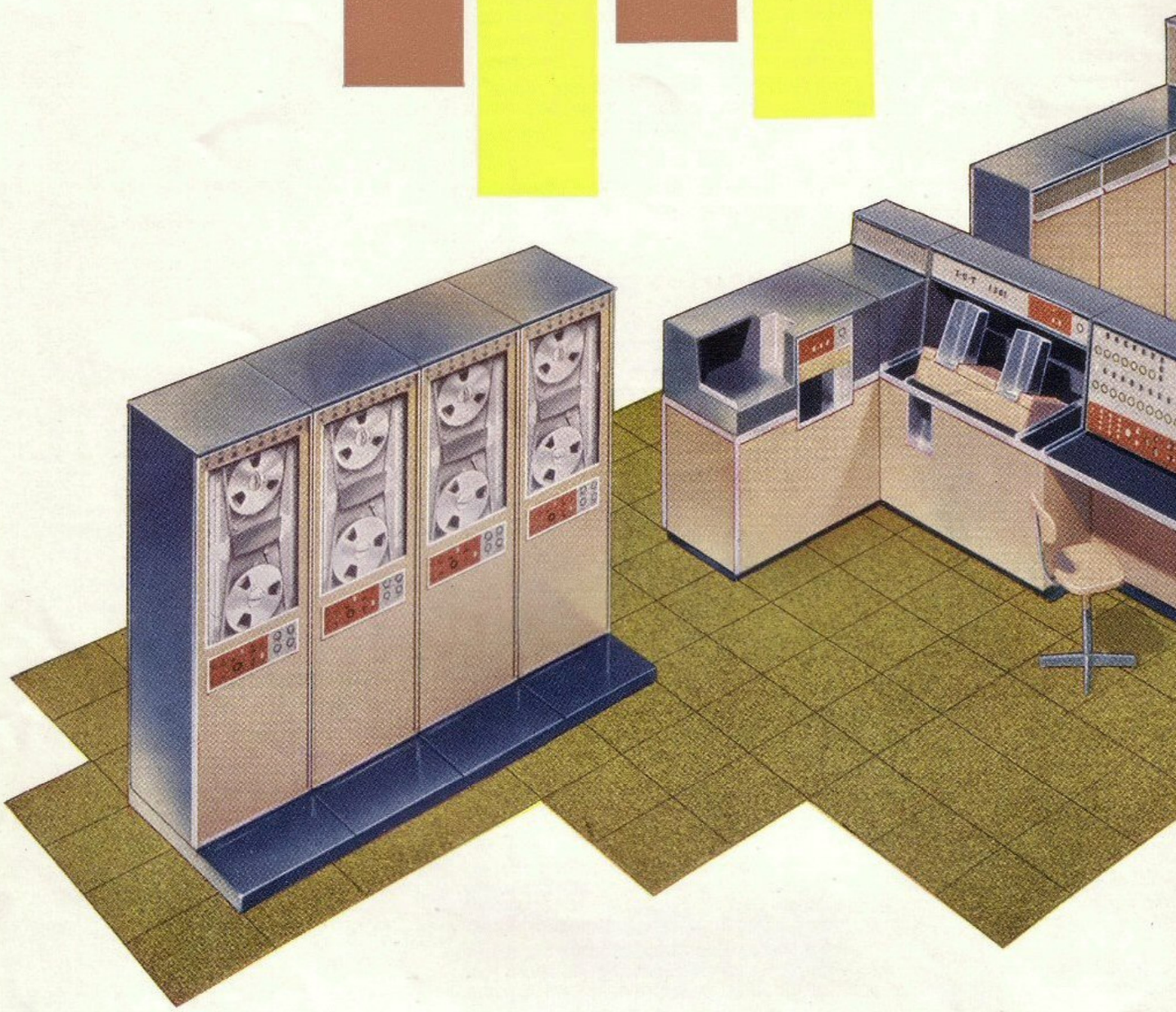
DATA PROCESSING SYSTEM

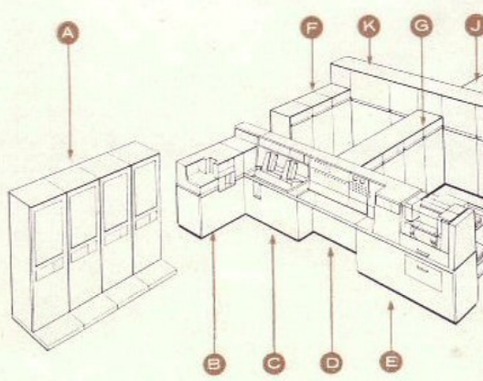
SPECIFICATION AND ORDER CODE

I·C·T

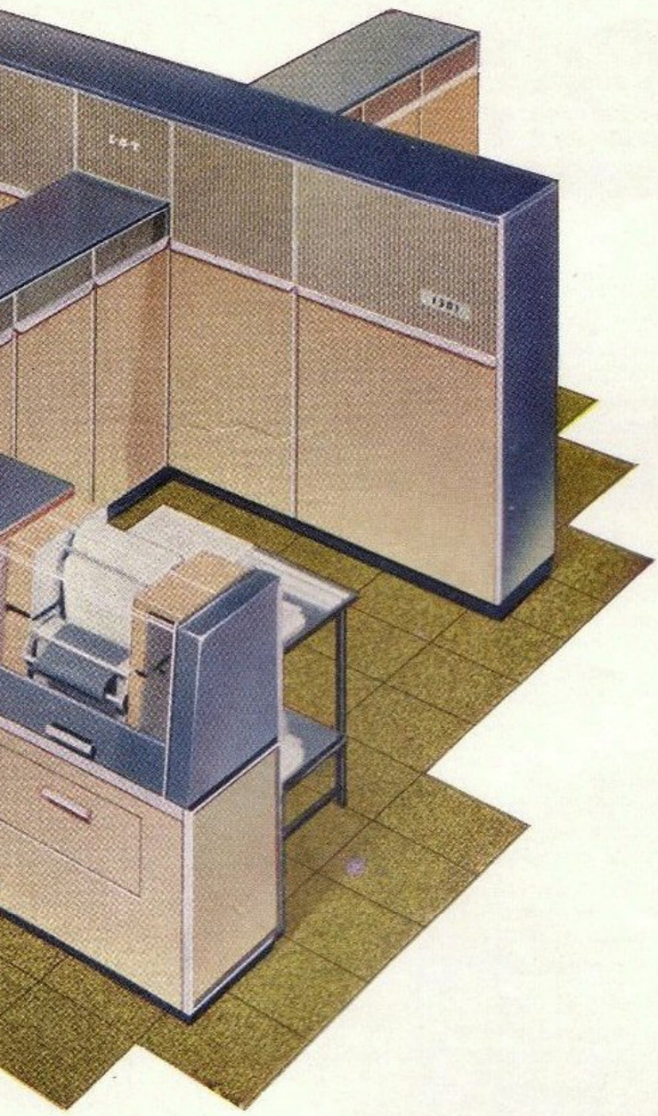
1301

DATA P





ESSING SYSTEM



IETIC TAPE SYSTEM
PUNCH
READER
ROL CONSOLE AND DISPLAY
PRINTER
TIONAL DRUM STORAGE

G CENTRAL PROCESSOR
H PAPER TROLLEY
I IMMEDIATE ACCESS CORE STORE
J MAGNETIC TAPE CONTROL
K MAGNETIC DRUM

SPEED
Megacycle processor
Fast magnetic tape systems
High speed card input
High speed line printer
Minimal latency
drum transfers

SIMPLICITY
Simple to operate
Simple to program
Automatic coding system
Extensive program library

FLEXIBILITY
Variable storage system
Time sharing
Automatic break-in facilities
Stored program control
Variable block-length records
Mixed radix arithmetic

EXPANSIBILITY
Magnetic drums
Magnetic tape systems
Multiple core storage
Modular construction

ACCURACY
Automatic checking
Automatic error correction

RELIABILITY
Fully transistorised
Toleranced circuits
Wrapped connections
Printed wiring techniques

LOW COST
Low basic cost
Ease of installation
Ease of programming
Low power consumption
Economic expansibility

SERVICE
50 years of I.C.T and
70 years of G.E.C. experience
I.C.T services

1301 O

INSTR

DESIGNATION	FUNCTION	ADDRESS	
0	00	Not used	DO NOTHING. Proceed to the next instruction.
0	11	Not used	STOP.
0	21	0–12	SET DECIMAL POINT REGISTER. The decimal point register is set with the value contained in the address. It specifies the decimal point position to be used during multiplication to obtain the correct positioning of the product.
0	22	2–12	SET STERLING POSITION REGISTER. The register is set with the value contained in the address. In all subsequent *sterling* operations this will be the 10/– position until the register is reset.
0	30	0000–1999	SET ROW BINARY REGISTER FROM IMMEDIATE ACCESS CORE. The row binary register will be set by the least significant digit *only* from the immediate access core store which is addressed (value may be 0 to 15).
0	31	0000–1999	CREATE ROW BINARY 1. Row binary is created by comparing the value of each digit of the immediate access core store addressed, in turn, with the value of the row binary register. On equality of values a "bit" is placed in the 1's stream only of register B in the appropriate digit position.
0	32	0000–1999	CREATE ROW BINARY 2. As for row binary 1 in "2's stream"
0	33	0000–1999	CREATE ROW BINARY 3. As for binary 1 in "4's stream".
0	34	0000–1999	CREATE ROW BINARY 4. As for row binary 1 in "8's stream".
0	35	0000–1999	LOGICAL AND. $0+0=0$, $0+1=0$, $1+0=0$, $1+1=1$. Applied to corresponding *bits* of register B and the addressed immediate access core store leaving result in register B.
0	36	0000–1999	LOGICAL OR. $0+0=0$, $1+0=1$, $0+1=1$, $1+1=1$. Applied to corresponding *bits* of register B and the addressed immediate access core store leaving result in registers A and B and the immediate access core store.
0	37	0000–1999	TRANSFER FROM IMMEDIATE ACCESS CORE STORE TO REGISTER B. The addressed immediate access core store is placed in register B.
0	38		INPUT/OUTPUT CONTROL (EXCLUDING MAGNETIC TAPE). This instruction will activate an input or output unit; the unit and its action being selected by the address digits as follows:—
		2 or 7	Card reader.
		13 to 16 & 20 to 26	Line printer functions including paper movement
		42 to 47	Card punch.
MAGNETIC TAPE ORDERS			
0	39	001x	WRITE. Write on to tape deck x beginning with the addressed immediate access
0	00	0001–1999 (x=1–8)	core store and continuing until the end of block (a word of all 15's) is transferred and written, and stop. This is a double length instruction and must be contained in one word. Transfer is controlled by the data transfer unit.
0	39	002x	READ. Read from tape transport x placing the words in the addressed immediate
0	00	0001–1999 (x=1–8)	access core store and following locations until the end of block is transferred, and stop. This is double length instruction. Transfer is controlled by the data transfer unit.
0	39	003x (x=1–8)	BACK SPACE. Reverse tape deck x and go to the start of the last block and then stop (ready to run forward again).
0	39	004x	CANCEL. Start tape deck x, cancel the next block and then stop. A cancelled block will automatically be ignored during any subsequent read operation.
0	39	005x (x=1–8)	REWIND. Rewind tape deck x to the beginning of tape marker (ready for re-run).
0	39	006x (x=1–8)	UNLOAD. Rewind tape deck x completely on to one reel and stop the tape deck, switching it to local control.
0	40	0000–1999	WRITE ZERO TO IMMEDIATE ACCESS CORE STORE. Zero (with correct check digits) is written into the addressed immediate access core store and into register A.
0	41	0000–1999	TRANSFER REGISTER A TO IMMEDIATE ACCESS CORE STORE. Register A is written into addressed immediate access core store. Register A remains unaltered.
0	42	0000–1999	TRANSFER REGISTER B TO IMMEDIATE ACCESS CORE STORE. Register B is written into the addressed immediate access core store, and into register A. Register B remains unaltered.
0	43	0000–1999	TRANSFER REGISTER C TO IMMEDIATE ACCESS CORE STORE. Register C is written into the addressed immediate access core store, and register A. Register C remains unaltered.
0	44	Not used	TRANSFER REGISTER C TO REGISTER B. Register C is transferred to register B. Register C remains unaltered.
0	45	0000-1999	Block transfer in immediate access core.
0	1-20	0000-1999	Store of the number of words cited (1-20) starting from the first addressed immediate access core store to the second.
0	54	0–12	CIRCULATE LEFT. Register B is circulated to the left the number of places indicated in the address position (digits from the most significant end of the register appearing in the least significant end).

ER CODE

ND THEIR EFFECT

ON	FUNCTION	ADDRESS	
0	55	0–12	LEFT SHIFT. Register B is shifted to the left the number of places indicated in the address position. Zeros are entered at the least significant end and the most significant digits will be lost. (This will also cause zero to be placed in register A).
0	56	0–12	RIGHT SHIFT PROPAGATING SIGN. Register B is shifted to the right the number of places indicated in the address position propagating the sign of the most significant digit. The least significant digits are lost. 0's will be propagated if the most significant digit is 0 to 4; 9's if it is 5 or greater.
0	57	0–12	RIGHT SHIFT ENTERING ZEROS. Register B is shifted to the right the number of places indicated in the address position entering 0's at the most significant end. The least significant digits will be lost.
0	60	0000–1999	CLEAR ADD. The addressed immediate access core store is added to 0 and placed in register B.
0	61	0000–1999	CLEAR SUBTRACT. The addressed immediate access core store is subtracted from 0 and placed in register B.
0	62	0000–1999	ADD. The addressed immediate access core store is added to register B.
0	63	0000–1999	SUBTRACT. The addressed immediate access core store is subtracted from Register B.
0	64	0000–1999	ADD TO IMMEDIATE ACCESS CORE STORE. Register B is added to the addressed immediate access core store, register B remains unaltered. The result will also be placed in register A.
0	65	0000–1999	SUBTRACT FROM IMMEDIATE ACCESS CORE STORE. Register B is subtracted from the addressed immediate access core store, register B remains unaltered. The result will also be placed in register A.
0	66	0000–1999	ADD 1 TO IMMEDIATE ACCESS CORE STORE. The contents of the addressed immediate access core store are increased by 1. The result will also be placed in register A.
0	67	0000–1999	SUBTRACT 1 FROM IMMEDIATE ACCESS CORE STORE. The contents of the addressed immediate access core store are decreased by 1. The result will also be placed in register A.
0	68	0000–1999	COMPARE. Register B is subtracted from the addressed immediate access core store, the result being placed in register A and the original factors left unaltered.
0	69	0000-1999	MULTIPLY. The addressed immediate access core store is multiplied by register B, the single length product determined by the decimal point register being placed in both registers B and C.
0	70–78	0000–1999	STERLING ADDITION AND SUBTRACTION INSTRUCTIONS. As for functions 0 60 to 0 68 but with arithmetic in sterling, the 10/– position being defined by the contents of the sterling position register (see function 0 22).
0	79	0000–1999	STERLING MULTIPLY. As for function 69 but with sterling in the addressed immediate access core store, the 10/– position being defined by that register.
0 0	80 1–20	0000–1999 0000–9599	DECADE TRANSFER TO DRUM. Up to 20 decades each of 10 words can be successively transferred to the drum, commencing with the immediate access core store address and the drum decade address specified.
0 0	81 1–20	0000–1999 0000–9599	DECADE TRANSFER FROM DRUM. This instruction is similar to function 0 80 above, except that the transfer takes place from the drum to the immediate access core store.
0 0	82 20	0000–1800 0000–9580	CHANNEL TRANSFER TO DRUM. This instruction is similar to function 0 80 above, but will cause a channel of 20 decades to be transferred to the drum with reduced access time.
0 0	83 20	0000–1800 0000–9580	CHANNEL TRANSFER FROM DRUM. This instruction is similar to function 0 82 except that it transfers data from the drum to the immediate access core store.
0 0	84–87 1–20	0000–1999 XXXX	RESERVED STORE TRANSFERS. These instructions are identical to functions 0 80 to 0 83 respectively except that each refers to a reserved store on the magnetic drum, and the appropriate reserved store addresses are used.
4	00	0000–1999	UNCONDITIONAL JUMP. Indicator 00 which is permanently set is "tested" and an unconditional jump to the instruction in the specified immediate access core store address occurs.
4	01–99	0000–1999	TEST AND JUMP. Indicators which are specified by the function number are tested. If the tested indicator is set the next instruction is taken from the addressed immediate access core store position and if it is not set the next sequential instruction is obeyed. Indicators are set by numbers passing through the mill for equal to, greater than or less than zero; may be set by program (see below under designations 8 and 9) or manually at the start of an operation. Other indicators reflect the availability of input and output units and parity check results. According to the type of indicator, it may or may not be unset as a result of the test.
8	10–19	Not used	SET INDICATOR. The indicator specified by the function number is set.
9	10–19	Not used	UNSET INDICATOR. The indicator specified by the function number is unset.

1301 TECHNIC

INPUT

1—CARD READER TYPE 590/0

Each 80-column card is read twice and checked by program.
Cards fed endwise at 600/minute, face downwards, column 80 leading.
Independent rows of 12 photocells and associated amplifiers for reading and checking of punched information.
Hopper capacity 2,000 cards.
Stacker capacity 2,000 cards.
Auxiliary stacker capacity 500 cards.

OUTPUT

1—LINE PRINTER, TYPE 660/0

120 printing positions each of 50 characters.
Lateral spacing, 10 characters per inch.
Vertical spacing, 6 characters per inch.
Single paper feed (4 parts).
Line spacing or throwing by program.
Maximum printing speed is 600 lines/minute for up to 120 characters.

1—CARD PUNCH, TYPE 600/0

100 fully punched 80-column cards a minute.
Each punched card is read and checked by program.
Hopper capacity 800 cards.
Stacker capacity 650 cards, with offset facility.

IMMEDIATE ACCESS CORE STORE

400 words of immediate access core storage.
Up to a total of 2,000 words in multiples of 400 words.

MAGNETIC DRUM

12,000 words are stored in 60 channels of 200 words/channel.
Electronic channel selection is used and the average access time is 5.7 ms.
Up to a total of eight can be fitted.

CONTROL AND VISUAL DISPLAYS (CONSOLE)

OPERATOR AND PROGRAMMER

On-off control and warning indicators associated with the principal units. Indicators which display the contents of the registers and switches which enable the programmer to set numbers into the registers.

ENGINEER

Additional indicators and switches for maintenance together with the meters and controls for marginal checking.

MAGNETIC TAPE

GENERAL

Two alternative magnetic tape systems are available as additional specification to the basic 1301 system. These are referred to as the High Speed and Standard systems. An automatic break-in facility is provided whereby the main program is interrupted whenever a tape unit requires access to the computer. One tape may be read and one written simultaneously.

NUMBER OF UNITS

From one to eight tape decks may be specified. Decks associated with a particular computer must all use the same tape system.

TAPE LENGTH

Each reel contains 3,600 feet of tape.

BLOCK LENGTH.

Variable.

CHECKING

Automatic correction of single bit errors; detection of double bit errors.

CONTROL UNIT

A magnetic tape control unit is added to the computer if a tape system is specified. It comprises the deck address selector unit and the data transfer unit.

PRINCIPAL TECHNICAL DETAILS

WORD LENGTH	12 decimal or sterling digits including sign.
P.R.F.	1 megacycle per second.
INPUT DATA	Both numeric (decimal or sterling) and alphabetical information can be read into the computer, processed, stored, printed out in all print positions.
INSTRUCTION FORM	The single address system is used. Each word normally contains two instructions, though certain instructions of double length use a whole word.
CHECKING	All transfers out of both the drum and the core store are checked. An error correcting code is used for the tape units.
INTERNAL MODE	Serial-parallel.
NUMBER BASE	Binary-coded decimal.
ELECTRONICS	Solid state components and transistors are used throughout.

ARITHMETIC FUNCTIONS

ADDITION AND SUBTRACTION	Decimal or sterling (21 microseconds to obey).
MULTIPLICATION	Decimal or sterling (170 microseconds average per multiplier digit).
DIVISION	Decimal or sterling by program.

PROGRAMMING

An automatic coding system will be available as an aid to programming the computer.

SPECIFICATION

QUEUEING FACILITY

More than one tape unit may be assigned the same reference number. Consecutive reels of the same file, loaded and ready for use, will be automatically processed in sequence and while the second reel is running through the first may be rewound.

	STANDARD SYSTEM	HIGH SPEED SYSTEM
Tape width	½ inch	1 inch
Reel length	3,600 feet	3,600 feet
Channels used		
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	variable up to limit imposed by IAS available	variable up to limit imposed by IAS available
Inter block gap	0·9 - 1·29 ins	1·12 - 1·35 ins
Inter block gap time	12·0 - 19·4 ms	7·5 - 11·2 ms
Automatic error correction	of single bit errors in any digit.	of single bit errors in any digit pair.
Error detection	Yes	Yes

OPERATION

The operator's area is laid out to give a clear view of all lights. The operator's portion of the central control panel and of the individual input/output units have a common background colour. Particular attention has been paid to the layout and design of the controls to provide maximum clarity and ease of operation. The desk portion has been treated to unify the front area and ample space is provided for two people to sit at the central controls. There is space at the card reader for card boxes adjacent to the hopper and to the stacker, and guide rails to assist in moving full boxes and to prevent accidental damage to the desk in that area. There are two lockers on the right of the control desk, which can be used by the operator and for storage of log sheets and manuals. The transparent cover for the printer reduces noise level. Except for the back row of units, the computer is below eye level.

SIZE

The front area of the computer including the main electronics unit is 4′ 8″ high, and this height has been maintained in order that it does not cut the room into walled areas when installed. The back unit is 6′ 2″ tall. It is necessary in considering installation to provide a minimum of 3′ 6″ clearance round all units, for ease of access to the equipment for maintenance. The minimum room size for a basic 1301 installation, including this clearance, is 24′ x 24′.

APPROXIMATE WEIGHTS OF UNITS

BASIC INSTALLATION	lbs.
Central processor (transported in 2 sections) 2 x 315=	630
Immediate access core store (first 400 words)	500
Magnetic drum electronics unit	160
Magnetic drum	380
Card reader	250
Line printer	750
Card punch	640
Power supply unit...	200
Control and display	300
Paper trolley	30
Approximate weight of basic installation ...	3,840

SCALEABLE ITEMS	lbs.
Immediate access core store—per additional 400 words	130
Magnetic drums—per additional drum	360
Magnetic tape control unit	1675
Magnetic tape decks—per deck	600

POWER SUPPLY

3 phase, 4 wire, 50 c/s, 346/450V. The computer will also operate on 40 c/s and 60 c/s with minor modifications. The power consumption is 7 kVA. for a basic installation, rising to 11.2 kVA. for one with 8 drums. When the machine is, in addition, fitted with magnetic tape, the consumption can rise to approximately 30.8 kVA. when 8 decks are connected. A typical one drum, four magnetic tape installation has a power consumption of 19 kVA.

The high degree of reliability and long life of solid-state devices are combined with low power dissipation. The need for forced air cooling is considerably reduced and the unit is more compact. The lower working temperature also leads to greater reliability and longer life of other circuit components. Power supply equipment is reduced and other advantages include low operating voltages, which make service testing of live circuits easier and safer, and an immunity from noise interference, which is promoted by the generally lower impedance levels.

INSTALLATION

The basic machine is transported in its constituent cabinets, the largest of which is 6′ 9″ × 6′ 5″ × 2′ 8″, and assembled on site. Levelling devices are fitted to all units, unevenness of the floor is taken up in the variation of the depth of the plinth.

The punch unit can be pulled away from the power supply unit to provide access for maintenance.

CABLING

The need for under-flooring wiring or floor cables has been reduced to a minimum. Special connections are eliminated altogether in those cases where magnetic tape is not specified.

AIR CONDITIONING

Heat generated by the basic machine amounts to 5 kW. and air conditioning is not normally required. Where magnetic tape units are included in the system, air conditioning is required for those units.

NOISE REDUCTION

Precautions have been taken to ensure that the level of noise emanating from the installation will be as low as possible.

CARD AND PAPER TROLLEY

In view of the distinctive visual treatment of the 1301, a card trolley and a paper trolley have been designed to harmonise with the overall design.

INTERNATIONAL COMPUTERS AND TABULATORS LIMITED

Head Office: **Gloucester House, 149 Old Park Lane, London, W.1.** *Telephone:* **Hyde Park 8080**

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. Phillip's Place, Colmore Row, Birmingham, 3. (Central 7621)
BRIGHTON	Norwich Union House, Church Street, Brighton, 1. (67198)
BRISTOL	Bridge House, Baldwin Street, 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)
KINGSTON-UPON-THAMES	Quebec House, Richmond Road, Kingston-upon-Thames. (1020)
LEEDS	Provincial House, 26 Albion Street, Leeds, 1. (35551)
LEICESTER	221 Charles Street, Leicester. (29561/2/3)
LIVERPOOL	Sefton House, Exchange Street East, Liverpool. (Maritime 2345/9)
MANCHESTER	17/27 John Dalton Street, Manchester 2. (Deansgate 8633)
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	13 St. Giles, Oxford. (57364/5)
PRESTON	163 Eldon Street, Preston. (56634)
SHEFFIELD	54/56 Fargate, Sheffield, 1. (27186/7/8/9)
SOUTHAMPTON	18 Cumberland Place, Southampton. (24659)
WOLVERHAMPTON	71 Bath Road, Wolverhampton. (23449 and 27721)

SUPPLIES BRANCH

88 High Holborn, London, W.C.1. (Chan 3311)

DATA PROCESSING BUREAUX

Aberdeen, Birmingham, Corby, Glas Leeds, Liverpool, London, Manche Molesey (Surrey), Newcastle-upon-T Nottingham, Southampton and Watford.

DIVIDEND SERVICE BUREAU

City Gate House, Lackington St Finsbury Square, London, E.C.2. (Mon 1596)

EDUCATION AND TRAINING

Data Processing Training Establishments

Bradenham Manor, near High Wycor Bucks. (Naphill 2191/2/3)

Moor Hall, Cookham, Berks. (Bourne 1840)

88 High Holborn, London, W.C.1. (Chan 3311)

102 Queen's Road, Brighton. (29621)

Engineering Training Establishments at:

Castlereagh (Northern Ireland), Croy Dartford, Letchworth, Stevenage Southport.

COMPUTER CENTRE

Putney Bridge House, Putney Br Approach, London, S.W.6. (Renown 3

PUNCHED CARD DEMONSTRATION CENTI

Hamilton House, 138 Piccadilly, Lon W.1. (Hyde Park 8080)

LECTURES AND FILMS

149 Old Park Lane, London, W.1. (H Park 8080)

WORKS

Letchworth Garden City, Hertfords Croydon, Surrey; Castlereagh, near Be Dartford, Kent; Stevenage, Hertfords Alderley Edge, Cheshire; Chertsey, Su Cirencester, Gloucestershire; Kirkby, La shire; Southport, Lancashire; Stock Cheshire.

FIELD ENGINEERING

Oxen Road, Luton, Bedfordshire. (6530

I.C.T SPECIAL PROJECTS

Powder Mill Lane, Dartford, Kent (21

I.C.T (ENGINEERING) LIMITED

Letchworth Garden City, Hertfords Stevenage, Hertfordshire; Whyteleafe, Surrey; Coventry.

I·C·T

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.

Printed in Great Britain

P134/12.62/2MR3/FP