THE EUROPEAN COMPUTER USERS HANDBOOK

1968/69

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SIXTH EDITION

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PERGAMON COMPUTER DATA SERIES

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INTRODUCTION

The European Computer Users Handbook, Sixth Edition, contains details of computers and peripheral equipment which one can currently consider using in Europe. It also gives details of analogue computers and calculators, together with data transmission equipment and where equipment is now considered to be a little dated, it has been shown as such. Fuller information on older computers is given in "A Record of Vintage Computers", which was published by Computer Consultants Limited two or three years ago.

One of the problems of dealing with computer equipment is the ever-increasing amount of equipment available and the fact that it is sometimes a little difficult to distinguish between genuinely new equipment and equipment which has simply been given a misleading new title in view of some minor modification which has been made to the original devices.

An attempt has been made to rationalise this state of affairs in this publication and readers are reminded that there are other publications written by Computer Consultants Limited, which go into greater detail on specific devices and where the subject is treated in a less general way than it is in 'The European Computer Users Handbook'.

G.P.O. Box 8,
Llandudno,
North Wales.
June, 1968.

R.H.Williams,
Managing Director.

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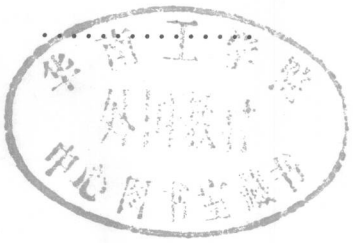
C O N T E N T S



SECTION II

DETAILS OF RECOMMENDED DIGITAL COMPUTERS WHICH COULD BE USED IN EUROPE

There follows in this Section, by name of manufacturer order, information on computers which are recommended by Computer Consultants Limited as being reasonable machines for purchase or rent at this moment in time. The list included in this Section is not necessarily final as it is, of course, possible that other computers, not listed here, might be more suitable for a certain type of prospective user.

This Section deals with each of the recommended computers by first giving details and making comments on the particular computer manufacturer concerned and then describing the particular item of equipment. The Section is not confined to British or European computers, but the facilities for marketing, maintenance and local sales effort has a direct bearing on the choice.

As will be seen, many of the companies named have other European offices and, generally, the one named is the British one. Other addresses can be supplied if desired.

MANUFACTURER: COMPAGNIE DES MACHINES BULL
94 Avenue Gambetta,
Paris XX^{e}, France.

BRITISH COMPANY: De La Rue Bull Machines Limited,
114-118 Southampton Row,
London, W.C.1.
Telephone: CHANcery Lane 5725.

The Bull Organisation with a long history of punched card equipment manufacture, developed some early electronic calculators of which several hundred were sold. They had a reciprocal patent exchange agreement with Remington Rand which expired. Their development of the Gamma 60 was sound in concept when started but eventually not a very great success.

Left without Remington support and with too little original computer development of their own to fall back on, they were in a difficult position, hence the arrangement with RCA to build in Europe the RCA 301 as the Gamma 30. They have a large well established sales force and too little equipment to sell or under development. They made arrangements with SEA of France to sell the CAB 500 as the Bull 500.

They have now formed a joint company with the General Electric Company of New York.

Bull, long established as a pioneer in punched cards and General Electric, one of the giants of the electronic industry make, on the face of it, a good team. The marriage between the two organisations enables the General Electric Company to make use of an established European marketing organisation and enables Bull to supplement its product range.

Closely associated in all this activity is the Olivetti-General Electric organisation of Italy.

BULL GAMMA 10

Availability: 12 months

Selling Price: £30,000

Rental per month: From £550

The Gamma 10 does the work of tabulators, summary punches, reproducers and electronic calculators simultaneously. It is a full-scale computer using 80-column cards, has a completely buffered system and can read 300 cards per minute, punch 300 cards per minute and print 300 lines on two independent forms while carrying out calculations simultaneously. In addition to card input the Gamma 10 C can handle input from a paper tape reader or a MICR document reader. Being a compact machine only one operator is required and no air conditioning is needed.

1024, 2048 or 4096 characters are available, with a cycle time of 7 microseconds. Only three characters are needed for each two-address instruction of the stored programme. Symbolic addressing is used for both data and programme.

Physical Characteristics:

Floor area average complete system:	140 sq. ft.
Maximum floor loading:	200 lb/sq. ft.
Power requirement:	v.2,886 kva. cycles

BULL/GE COMPATIBLES 400

Availability: 12 months

Price: From £120,000 to £365,000

The Compatibles 400 are integrated information processing systems in which the programming languages, automatic operating system and the hardware are designed, developed and delivered together.

Three models, GE 415, GE 425 and GE 435 are available and cater for a very wide range of applications.

The instruction repertoire, which includes more than 200 programmed operations, is complemented by many data manipulation features, such as :

Scatter/gather
Implode and explode
Variable length accumulator
Fixed indexing
Any-word indexing
Indirect addressing

For example, indirect addressing and scatter/gather allow record sorting without moving blocks of data in memory. Features such as these have enabled the General Electric Computer Department to produce highly efficient software for users. The Compatibles 400 have the characteristics of a variable length character machine with the speed of a word machine. The variable length accumulator allows handling of varying length fields without slowing down to one machine cycle per character.

Central Processors

GE-415: Four 6-bit characters per word (24 bits plus parity). Capacity up to 131,072 characters of core memory. Memory cycle time equivalent to 5.9 usecs. per word. Over 200 instructions, both one-address and two-address. Alphanumeric input/output and data manipulation, binary and decimal arithmetic, binary instruction format and addressing.

The accumulator, which may be located anywhere in memory is 4, 8, 12 or 16 characters in length and changeable by programme. Any word in memory may be an index word, but there are also six fixed index words for conventional indexing. Eight buffered input/output channels accommodate peripherals. Special controller for data communication lines. Processor efficiency is increased by gather-write and scatter-read. Complete error checking circuits.

GE-425: Memory cycle time is equivalent to 3.95 microseconds per word, increasing processor power and throughput over the GE-415. Word length, memory capacity and all other characteristics are the same as for the GE-415.

GE-435: Memory cycle time is equivalent to 2.8 microseconds per word, increasing processor power and throughput over the GE-425. Word length, memory capacity and all other characteristics are the same as for the GE-415/425.

Peripherals

CR-20 Card Reader: Reads standard 80-column cards, column-by-column, at 900 cards a minute in B.S.I. or binary code.

CP-10 Card Punch: Punches standard 80-column cards at 100 a minute. Read-after-punch checks verify data accuracy. A 300 cards-a-minute model is also available.

PR-20 Printer: Has 136 or 160 columns, each with 64 printable characters, 730 or 1200 lines a minute, 6 or 8 lines per inch. Vertical format control by print command, and/or tape loop. Horizontal format control by print command. Skips at 27½ inches per second.

Magnetic Tape

Date format: Binary or decimal, 7 or 9 channel compatible formats. Variable record length. Speed: Data rates if 7.5 - 10 - 15 - 20 - 28 - 30 - 40 - 42 - 56 - 80 - 83 - 111- 120 - 160 kc/s. Tape passing speeds: Forward 37.5 - 75 - 150 i.p.s. Rewind: 300 i.p.s. on all models. A dual channel controller may be specified for connection to two channels of one central processor to give alternative access to each tape unit, and simultaneous use of two tape units; or to one channel on each of two central processors for a dual system.

TR - 20 Perforated Tape Reader: Reads 5, 6, 7 or 8 channel perforated tape at 500 characters per second. Format control by plugboard.

TP - 20 Perforated Tape Punch: Punches 5, 6, 7 or 8 channel tape at 150 characters per second. TR-20 is used for off-line parity checks of TP-20 tapes. TR-20 and TP-20 can be used to duplicate tapes off-line.

Optical and Mark-sensing Reader: For documents uncoded with COC-5 optical characters and/or pencil marks. Speed: 1200 documents per minute. Data format of up to 46 characters of COC-5 printing and 42 columns of marks, 12 marking positions per column.

Optical and Magnetic Ink Reader/Sorter: Deals with documents encoded with E13B or CMC-7 magnetic ink characters or COC-5 optical characters at speeds of 1200 documents per minute.

Magnetic Ink and Mark-sensing Reader: Reads documents encoded with CMC-7 magnetic ink characters at speeds of up to 650 documents per minute.

Integrated Software

The Compatibles 400 are complemented by a complete system of integrated software and were designed by engineers, programmers and users to provide features desired by programmers and users.

Designing hardware specifically around users' needs has produced a system that requires less programming time, less debugging time and less running time.

Many hardware features of the Compatibles 400 were specifically designed to enable the Computer Department's software groups to produce more efficient software packages and operating systems.

Integrated software provides for the use of common file descriptions among several programming languages; the assembly of programs in segments; and the correction to programs at source language level.

Powerful language processors are available.

COBOL
FORTRAN
Macro Assembly Program
Basic Assembly Program
Sort Generator
Merge Generator
Report Program Generator

Powerful operating systems include:

Multiway Media Conversion
Librarian
Program Monitor
Input/Output Control System
1401 Compatibility

Debugging tools include both dynamic and post-mortem memory dumps and traces. Test data creation and subroutine collection for load-and-go are provided.

Object programs and subroutines are maintained in a relocatable format. This enables users to collect necessary library routines with a main program at object program loading time, rather than requiring the assembly of routines with each main programme.

The Program Monitor controls production runs and provides management of I/O routines, I/O program interrupts and central processor program interrupts. This system also provides the between-job function of seeking and loading the next program.

MANUFACTURER: BURROUGHS CORPORATION INC.
6071 Second Avenue,
Detroit 32,
Mich., U.S.A.

British Company Burroughs Machines Limited,
Heathrow House,
Bath Road,
Hounslow, Middlesex.
Telephone: SKYport 6522

This large American company has been a pioneer in mechanical office accounting throughout the world for a very long time. They entered the computer field in the U.S.A. at the start and enjoyed considerable success.

Up to recently they have had a token computer department in Britain, but this has been greatly expanded and is now very active.

Burroughs B 2500

Availability:	9 months
Selling Price:	£85,000
Rental per month:	£1,650 average

The Burroughs 2500 is part of the B500 system which comprises the B500, B2500, 3500, 5500, 6500, 7500 and 8500 series.

These machines have extremely fast hardware speeds, some measured in billionths of a second. They have the ability to do many unrelated jobs at once (multiprocessing) and continue to do them without interruption. There are from 4 to 20 input/output channels, plus multiplexors and exchanges that allow flexibility and simultaneity of input/output operations.

Floor area average complete system :		450 sq. ft.
Maximum floor loading:		25 lbs/sq. ft.
Power requirement:		15 kva single-phase 50 cycles
Air conditioning:	Central Processor:	No
	Peripherals:	Magnetic tape

MANUFACTURER: CONTROL DATA CORPORATION
International Operations,
8100 34th Avenue South,
Minneapolis,
Minnesota, U.S.A.

British Office: Control Data Limited,
26-32 Caxton Street,
London, S.W.1.
Telephone: SULlivan 3701

The Control Data Corporation was formed by a group, formerly employed by Remington Rand. Not surprisingly with the early experience they had obtained, their own developments were sound and they built a range of very powerful computers.

The company is now actively engaged in the European market.

CDC 6000 Series

Availability:	12 months
Selling price:	From £410,000
Rental per month:	From £10,000

The 6000 Series consists of three computers - the 6400, 6600 and 6800.

These computers provide business, industry, science and government users with the most comprehensive range of software and system compatibility in the computer industry. In addition to serving routine data processing and computational needs, the 6000 Series has been specifically designed to handle multi-processing and multi-programming, time-sharing and management information systems.

The 6000 Series represents a new concept of concurrent operation in three areas: memory input/output and functional units (of which there are ten).

The central processor for the 6400 has a unified arithmetic section, operating in a sequential manner. In the 6400 computer, the concept of "distributive computers" is readily implemented. This means that more than one central processor can be used with the same bank of memory. It is particularly useful for those who emphasize multiple access where many people want to use the system for large groups of related small problems.

The 6600 and 6800 have arithmetic sections that include ten functional units (Add, 2 Multiplies, Divide, Long Add, Shift, Boolean, 2 Increments and Branch), thus making possible the execution of instructions simultaneously within the same program.

While the 6400 has an instruction buffer register supply a continuous stream of instructions into the unified arithmetic section, the 6600 and 6800 use an instruction stack. Instructions are fed into the stack containing up to eight 60-bit words of instruction contents.

All three computers in the 6000 Series achieve processing efficiency without operator intervention by switching programs in current execution during input/output delays, whenever a higher priority requirement is encountered, or upon reaching a time limit.

A disc storage unit, a requisite to the Systems' multi-programming capabilities, provides mass random access storage increments of 500 million bits. By accumulating portions of a given program's output during generally scattered periods of execution, the disc permits program switching without loss of previous partial results whenever switching is advantageous or necessary.

The disc also is used for storage of the System Library, the source language job stack, and previously compiled programs for which execution has not been initiated. Because of a request table in one of the peripheral processors and because the position of the disc is known at all times, information is transferred in an optimum manner which greatly reduces the access time normally associated with discs.

With the same basic design concept common to all three computer systems, high speeds are achieved. These range from execution speeds of one million instructions per second on the 6400 to twelve million instructions per second on the 6800.

MANUFACTURER: DIGITAL EQUIPMENT CORPORATION
146, Main Street, Maynard,
Massachusetts, U.S.A.

724, 14th Street, N.W.
Washington D.C., U.S.A.

8939 Sepulveda Blvd.,
Los Angeles 45, U.S.A.

British Office: Digital Equipment Corporation (U.K.) Ltd.,
3, Arkwright Road,
Reading, Berkshire.
Telephone: Reading 83366

This company, which is fairly new and small, is making good progress with its range of computers.

It controls their European operation from England and manufactures some of their computers, for the European market, at Reading.

DEC PDP 8

The processor, like the PDP 7, is constructed from new integrated circuit flip chip silicon modules. PDP 8 can be used for real time applications including research and engineering.

Availability:	7 months
Selling Price:	From £6,500
Rental per month:	From £150

Physical Characteristics:

Floor area average complete system	50 sq. ft.
Maximum floor loading	150 lb/sq. ft.
Power requirement:	115v. 1 kva. 60 cycles

There is no requirement for air conditioning with the Central Processor or Peripherals.

Special Features which can be added to the Central Processing Unit are:

Extended arithmetic unit, type 182, memory extension control type 183, memory module type 184, memory parity type 188, Data channel multiplexor type DM01, Power failure option type KR01

Operation times:

	By optional extended arithmetic unit	By subroutine
Addition (fixed point)	3.0 usecs	
Multiplication (fixed point)	15 usecs	315 usecs
Division (fixed point)	30 usecs	444 usecs
Storage cycle time	1.5 usecs	

Word Length: 12 bit plus parity

Basic Storage: Magnetic core with between 4096 to 32,768 words.

Additional storage: Type 251 Magnetic Drum with up to 262 K words.

Input/Output devices:

ASR Keyboard Teleprinter	10 c.p.s.
Magnetic tape	9 - 25 Kcs, or 15, or 36 Kcs or 41 Kcs.
Type 451 Card Reader	200/800 c.p.m.
Type CROIC Card Reader	100 c.p.m.
Paper Tape Punch	50 c.p.s.
Paper Tape Reader	300 c.p.s.
Type 645 Printer	300 l.p.m.

Special Peripheral devices:

Analogue/Digital Converter 12,000/18,000 steps/minute, Incremental Plotters, CRT Display Units, Data Communications.

Software Currently available:

FORTRAN, DDT-8 (Symbolic on line Debugging program) PAL 111 (Program Assembler Language) Symbolic Tape Editor, Symbolic MACRO-8 assembler, Floating point package, mathematical routines, and utility programs.