COMPATIBILITY PRODUCTS

COMPATIBILITY products are interface connection modules designed to allow all computers to gain the benefit of using a standard range of extensions and accessories. This concept is based on the generally used arrangement of 16 address lines and 8 data lines being valid for the majority of 8 bit microprocessors. By this means those CUBE and Acorn extensions which are memory mapped can be used with almost any computer.

Each COMPATIBILITY product connects in some way to the host computer's data bus, and presents a DIN 41612 two row plug to the CUBE/Acorn extension. A 64 way ribbon cable (see page 13.1) is the used to connect from the COMPATIBILITY unit to the extension, which can then be mechanically mounted in a way suitable to the particular situation

1440	COMPATIBILITY unit for Rockwell AIM 65	20.00
1441	COMPATIBILITY unit for Apple	20.00
1442	COMPATIBILITY unit for PET 40 column	20.00
1443	COMPATIBILITY unit for PET 80 column	20.00
1444	COMPATIBILITY unit for Sinclair ZX81	40.00
1445	COMPATIBILITY unit for Acorn Atom	20.00
1446	COMPATIBILITY unit for BBC Computer (1MHx connection)	20.00
1445	COMPATIBILITY unit for Acorn Atom	20.00

THE BBC COMPUTER

The BBC Computer was developed by Acorn Computers to a BBC specification, and is a remarkable machine, both in performance and in value for money.
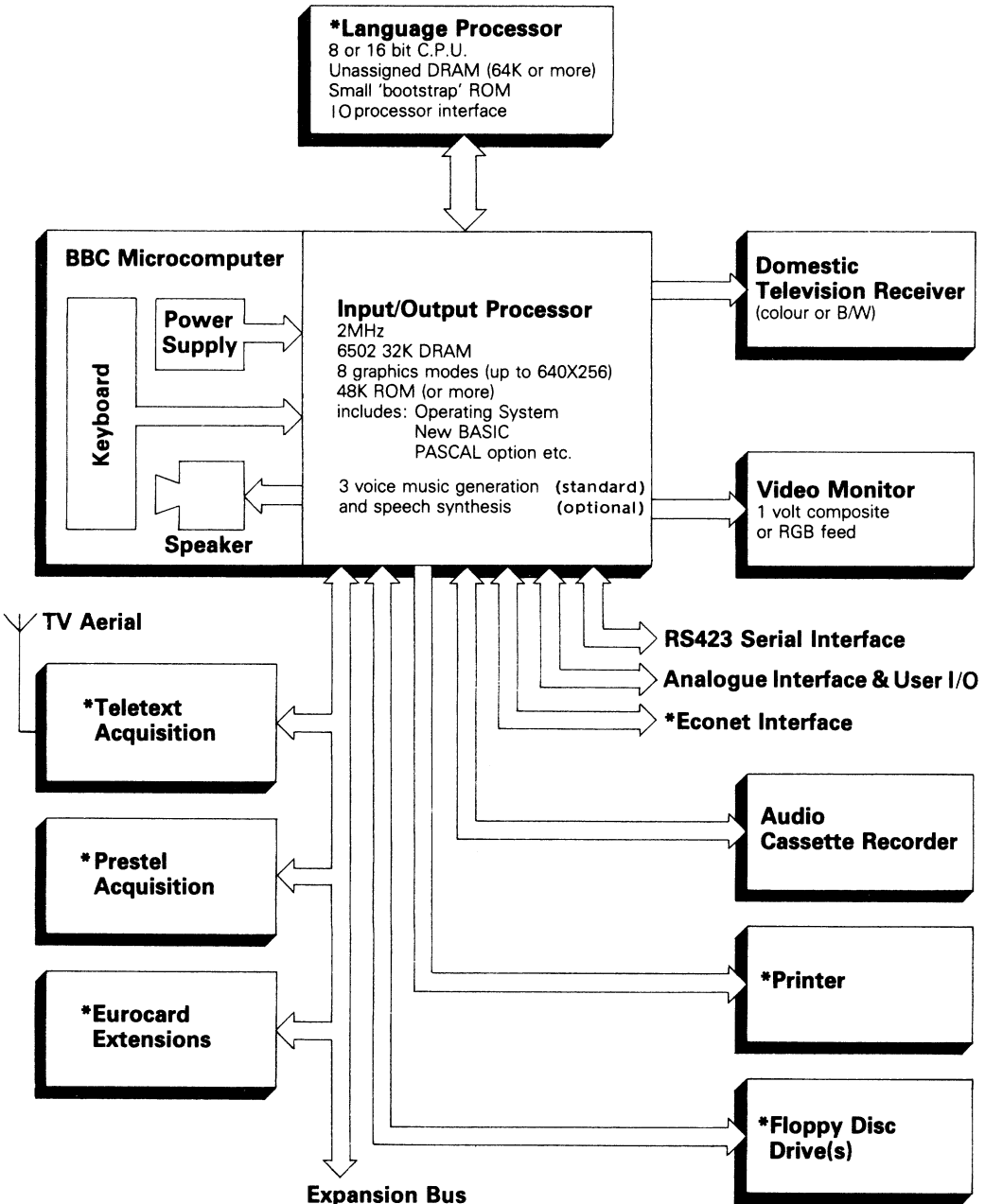
It is interesting to note that the Sinclair Spectrum is being promoted as a "direct rival to the BBC Computer, but at half the price." Our view at Control Universal is that the Spectrum certainly does represent very high performance for the money, and we would be pleased to sell it, should we be invited to do so. However, the BBC Computer is clearly superior, and well worth the higher price. The following short comparison indicates this.

	Spectrum	BBC
UHF output to standard tv	yes	yes
Output to standard tv monitor	no	yes
keyboard	40 key miniature	73 key full size
bus expansion connector	yes (1)	yes (2MHz + 1MHz)
printer interface	extra	built-in
cassette interface	1500 baud	300 baud + 1200 baud
graphics memory	6.5k	20k
text display	32 ch x 24 lines	80 ch x 32 lines

There are many more points of difference, and our comparison is based only on literature checks, but we summarise both computers as excellent value for money, and the Sinclair as a first class introductory machine for the hobbyist, and the BBC Computer as a first class serious computer capable of almost limitless expansion.

BBC Microcomputer System Plan

***Options requiring additional
hardware within BBC Microcomputer**

*Language Processor
8 or 16 bit C.P.U.
Unassigned DRAM (64K or more)
Small 'bootstrap' ROM
I O processor interface

BBC Microcomputer

Power Supply

Keyboard

Input/Output Processor
2MHz
6502 32K DRAM
8 graphics modes (up to 640X256)
48K ROM (or more)
includes : Operating System
New BASIC
PASCAL option etc.

3 voice music generation (standard)
and speech synthesis (optional)

Speaker

**Domestic
Television Receiver**
(colour or B/W)

Video Monitor
1 volt composite
or RGB feed

TV Aerial

***Teletext
Acquisition**

***Prestel
Acquisition**

***Eurocard
Extensions**

RS423 Serial Interface

Analogue Interface & User I/O

*Econet Interface

**Audio
Cassette Recorder**

*Printer

***Floppy Disc
Drive(s)**

Expansion Bus

P 21.2

MAIN FEATURES

■ **Processor**	2 MHz 6502A
■ **Memory**	16K ROM BASIC 16K ROM Machine Operating System 32K RAM (16K on Model A)
■ **Keyboard**	73 key full QWERTY layout, including 10 user definable function keys, 4 cursor control keys, two key rollover and auto repeat.
■ **Display**	Mixed high resolution graphics and upper and lower case text. Full colour on all 8 display modes :

0 640×256 2 colour graphics and 80×32 text ⎫
1 320×256 4 colour graphics and 40×32 text ⎬ Model B Only
2 160×256 16 colour graphics and 20×32 text ⎭
3 80×25   2 colour text
4 320×256 2 colour graphics and 40×32 text
5 160×256 4 colour graphics and 20×32 text
6 40×25   2 colour text
7 40×25   Teletext display

UHF, composite video and separate RGB and Sync outputs.

■ **External Storage**	300 baud and 1200 baud interface (with motor control) for standard cassette recorders.
■ **Tone Generation**	Three-voice music synthesis with full envelope control feeding internal loudspeaker.
■ **Printer Interfaces** (Model B Only)	1 8 bit plus full two-line handshake "Centronics" port. 2 75 baud to 9600 baud software selectable serial port to drive RS232 devices with full two-line handshake.
■ **User Input/Output** (Model B Only)	8 bit parallel input/output port.
■ **Analogue Inputs** (Model B Only)	Four analogue inputs for games, paddles or control applications.
■ **Expansion Capabilities**	Within the computer (at extra cost) Floppy Disk Interface Econet Interface Speech Synthesis Cartridge ROM Pack Interface "Tube" connector for second processor option.
■ **Second Processor Option**	The Computer is designed so that it can be expanded to run with a second processor and considerably expanded memory. Planned expansion units which are connected via the "tube" include: 3 MHz 6502 with 60K RAM Z80 with 60K RAM running CP/M 16 bit processor with 128K RAM.

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Model A BBC Microcomputer System

A fast, powerful self-contained computer system generating high resolution colour graphics and capable of synthesising 3 part music. The computer is contained in a rigid injection moulded thermoplastic case. The following are contained within the computer thus ensuring the minimum of connecting wires.

■ 73 key full travel QWERTY keyboard with 10 user definable function keys. The keyboard has two key rollover and auto repeat.

■ Internal 240/115V power supply is fully encased and made to BS Class 1.

■ The internal loudspeaker is driven from a 3-voice music synthesis circuit with full ADSR envelope control.

■ A fully modulated PAL colour television signal, for connection to a normal domestic television aerial socket, is available through a phono connector.

■ A BNC connector supplies a composite video output to drive a black and white or PAL colour monitor.

■ A standard audio cassette recorder can be used to record computer programs at 300 or 1200 baud using the CUTS standard tones. The cassette recorder is under full automatic motor control and is connected to the computer via a 7 pin DIN connector.

■ An interrupt driven elapsed time clock enables real time control and timing of user responses.

■ The unit uses a 2 MHz 6502 and includes 16K of Random Access Memory.

■ A 16K Read Only Memory (ROM) integrated circuit contains an extensive and powerful Machine Operating System designed to interface easily to high level languages.

■ A further 16K "Language ROM" contains an extremely powerful and fast BASIC interpreter. The interpreter includes a 6502 assembler which enables BASIC statements to be freely mixed with 6502 assembly language.

■ Up to four 16K Language ROMs may be plugged into the machine at any time. These four ROMs are "paged" and may include Pascal, Word Processing, computer aided design software, Disk and Econet routines or Teletext acquisition software.

■ The standard television output is 625 line 50 Hz, interlaced, fully encoded PAL, modulated on UHF channel 36. Other standards are available.

■ The full-colour Teletext display of 40 characters by 25 lines has full character rounding with double height, flashing, coloured background and text – all to the Teletext standard.

■ The non Teletext display modes provide user definable characters in addition to the standard upper and lower case alpha-numeric font. In these modes, graphics may be freely mixed with text. Text characters can be positioned not only on, for example, a 40×32 grid, but at any intermediate position.

■ Separate or overlapping text and graphic windows can be easily user-defined over any area of the display. Each of these windows may be filled and scrolled separately.

■ The Model A is able to support the following modes:
    4 320×256 2 colour graphics and 40×32 text
    5 160×256 4 colour graphics and 20×32 text
    6 40× 25 2 colour text
    7 40× 25 Teletext display

- All graphics access is "transparent" resulting in a fast snow-free display.
- Extensive support is provided in the Machine Operating System for the graphics facilities, and this is fully reflected in the BASIC interpreter. These facilities include the ability to rapidly draw lines and to fill large areas of colour. In addition, very rapid changes of areas of colour can be effected.
- The Model A BBC Microcomputer System can be expanded at any time to the Model B System. In addition, or as an alternative, other facilities such as the Econet, may be fitted within the computer systems.

Model B BBC Microcomputer System

The Model B BBC Microcomputer System is an enhanced version of the Model A Microcomputer but with the following differences:

- 32K Random Access Memory (RAM). This enables all the graphics modes to be used

0	640×256 2 colour graphics and 80×32 text	(20K)
1	320×256 4 colour graphics and 40×32 text	(20K)
2	160×256 16 colour graphics and 20×32 text	(20K)
3	80× 25 2 colour text	(16K)
4	320×256 2 colour graphics and 40×32 text	(10K)
5	160×256 4 colour graphics and 20×32 text	(10K)
6	40× 25 2 colour text	(8K)
7	40× 25 Teletext display	(1K)

- The installed RAM is divided between the high resolution graphics display, the user's program and Machine Operating System variables. The Machine Operating System requires about 3¼K of RAM in the Model A. If higher resolutions are required with large programmes then the second processor option may be fitted.
- Serial interface to RS423 standard. The new standard has been designed to be inter-operable with RS232C equipment but offers a considerably enhanced specification – for example in maximum length of cable and maximum data transfer rates. Baud rates are software selectable between 75 baud and 9600 baud. The interface provides not only two-way data transfer, but also two way hand-shaking using RTS and CTS lines. Connection to the machine is made via a 5 way "diamond" DIN connector and various interconnecting plugs are available for the various standard 25 way D type circuits.
- An 8 bit "Centronics type" parallel printer port is provided with "Strobe" and "Acknowledge" lines.
- An 8 bit input/output port is also provided.
- 4 12 bit analogue input channels are provided. Each channel has an input voltage range of 0-2.5V and the internal converter provides a number in the range 0 to 4095. The conversion time for each channel is 10 milliseconds and when the conversion is complete, the processor is interrupted and the value stored in a memory location for later access. These analogue inputs can be used not only in laboratory control situations, but also as inputs for games–paddles or joysticks.
- A 1 MHz buffered extension bus is provided for connection to PRESTEL, Teletext or various other expansion units.
- All interface sockets to external peripherals, are fitted to the Model B. These include R/G/B/Sync for colour monitors, Econet, serial interface, parallel printer, disk and tube. Having the interface sockets fitted enables the internal expansions mentioned above to be fitted without further soldering.

EXPANSION

Both Model A and Model B may have the following expansion options fitted internally at purchase, or by Dealers at a later date.

- Floppy disk interface
- Econet network interface (separate leaflet available)
- Voice synthesis circuits
- Cartridge ROM pack interface
- Various alternative high-level languages in ROM

External options which plug directly into the machine include:

- Paddles
- Cassette Recorder
- Black and White and colour monitors and televisions
- 5¼" single-sided disk drive (100K)
- 5¼" dual double-sided double track density disk drives (800K)
- 80 column dot-matrix printer
- Daisy Wheel Printer
- Teletext acquisition unit ⎰   both of these enable Telesoftware to be
- Prestel acquisition unit ⎱   downloaded into the BBC Computer as well as providing access to the normal Teletext/Prestel services. Pages may be "grabbed" and stored for later use
- 3MHz 6502 second processor with 60K of RAM
- Z80 second processor with 60K of RAM and a fully CP/M-compatible operating system

SOFTWARE

Considerable attention has been paid to the overall design of the system and application software. A modular approach has been adopted specifically to ease the interfacing of various high-level languages (such as BASIC and Pascal) to the operating system.

■ Machine Operating System (MOS)

A 16K ROM is used for the MOS. This software controls all input/output devices using a well defined interface. The MOS supports the following interrupts:

- ☐ Event-Timer (used as elapsed time clock)
- ☐ 4 channel analogue to digital converter
- ☐ Vertical sync
- ☐ Keyboard and keyboard buffer
- ☐ Tube byte transfer
- ☐ Music tone generation and buffer
- ☐ Serial interface, input and output, and buffers
- ☐ Parallel input/output port

and "hooks" are provided to support other devices such as:

- ☐ Teletext
- ☐ Prestel
- ☐ Econet file system
- ☐ Disk file system

Many of the operating system calls are vectored to enable the user to change them if required at a future date.

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BBC VERSION OF BASIC

The BASIC interpreter is an exremely fast implementation, very close
to the Mirosoft standard, but with numerous powerful extensions.

* Long Variables
* Integer, floating point and string variables
* Multi-dimension integer, floating point and string arrays
* Extensive support for string handling
* IF ... THEN .... ELSE
* REPEAT ... UNTIL
* Multi-line integer, floating point and string functions
* Procedures
* Local variables
* Full recursion on all functions and procedures
* Effective error trapping and and handling
* Cassette loading and saving of programs and data
* Full support for for the extensive colour graphics
* Easy control of the built-in music generation circuits
* Built-in 6502 mnemonic assembler enabling BASIC and assembler to
be mixed, or pure assembly language programs to be produced.
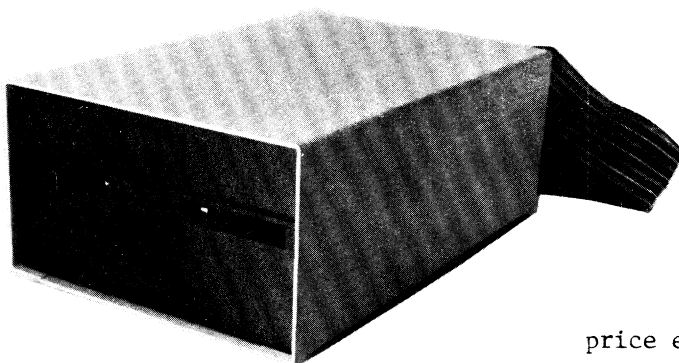
AND 01
Single Disk
Extension

price excl VAT

ANA 01	BBC Computer Model A	309.00
ANA 02	Model A + Econet interface	369.00
ANB 01	BBC Computer Model B	348.00
ANB 02	BBC Computer Model B + Econet interface	389.00
ANB 03	Model B + disk interface	409.00
ANB 04	Model B + Disk + Econet interfaces	450.00
	(all the above include a User's Manual)	
AND 01	Single disk drive extension 100k bytes capacity	230.00
ANE 01	Teletext receiver	144.00
ANE 02	Prestel receiver	90.00
	TV monitors – see page 10.1	
ANF 03	Cassette recorder	26.00
ANG 01	5 way DIN to 25 way D type serial cable	8.50
489	Printer interface cable, Centronics type, 1m long	15.00
ANH 01	Games paddles, per pair	11.50
ANJ 01	Extra copies of user's guide	10.00

SOFTWARE FOR BBC COMPUTERS

DESK DIARY

This package consists of two programs for the Model B.

ADDRESS BOOK allows you to build up a file of several hundred names, addresses and telephone numbers which can be retrieved by name, or by matching with other information specified in the entry. Applications include mailing lists and customer records

PLANNER works just like a written diary, but with a real-time alarm and many automatic features. There is space for 3000 entries, which may be one of three kinds: appointments at a specified time of day; regular events, such as birthdays and bill payments which automatically get carried forward; and exclusive entries for trips and holidays, which prevent appointments being made over a specified period

1366 BBC Desk Diary   9.00

ALGEBRAIC MANIPULATION PACKAGE

This suite of four programs for the BBC Computer Model A or B will perform a wide range of algebraic manipulations, and expressions can be symbolically differentiated or integrated. The package is intended for use in Mathematics teaching or research.

POLYNOM can expand and simplify a polynomial expression into the equivalent polynomial.

RATIONAL can expand and simplify an expression of rational terms into the equivalent ratio of two polynomials, reduced to lowest terms.

TRIGONOM can expand, simplify, differentiate or integrate a trigonometric expression, including ratios of trigonometric terms, into the equivalent standard form.

FOURIER can perform trigonometric transformations into a linear combination of sines and cosines of integer multiples of x.

1367 BBC Computer Algebraic Manipulation Package   9.00

BBC PEEKO COMPUTER

The Peeko-Computer simulates the operation of a simplified microcomputer in order to teach the fundamentals of machine code programming; it is suitable for either the Model A or the Model B. The Peeko-Computer has ten easily learned instructions, and the display gives a visual analogy of the operation of a real microcomputer. Programs can be entered, single-stepped or run with the memory and register contents being displayed at every step. To aid comprehension each instruction mnemonic is displayed as it is encountered.

The Peeko-Computer comes complete with a 16 page instruction manual including exercises and examples, and the cassette includes five demonstration Peeko-Computer programs.

1367 BBC Computer Peeko-Computer   9.00

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ALTERNATIVE LANGUAGES FOR THE BBC COMPUTER

FORTH

Acornsoft FORTH is a complete implementation of the FORTH language, to the 1979 standard specification, for the BBC Computer Model B. FORTH is a compiled language so programs run very fast (typically 5 times faster than BASIC).

The cassette includes:
>The FORTH dictionary and compiler
>The tape interface and screen editor
>The graphics package
>A high resolution graphics demonstration

In addition to a comprehensive set of arithmetic and and stack operators, control transfer words and defining words, Acornsoft FORTH includes more advanced features for defining the actions of defining words themselves. This opens the door to "metaFORTH" and user defined FORTH-based languages.

1369 BBC Computer FORTH language cassette   14.50
1370 "FORTH on the BBC Computer" book by R de Grandis Harrison 7.50

LISP

Acornsoft LISP for the BBC Computer Model A or B consists of 5.5k of machine code interpreter, plus 3k of initiallised LISP workspace containing utilities and constants, which can be deleted to make extra space if not required. It is intended for students, researchers and hobbyists who want to find out about the fundamental language of artificial intelligence research, and system designers who require more flexibility in data and control structures than is provided by traditional programming languages.

The system contains a number of extensions to basic LISP, including PEEK, POKE, CALL and VDU to provide easy interface with the BBC Computer MOS (machine operating system), improved interactive control structures using LOOP, WHILE and UNTIL funtions and disk input/output control functions.

1371 BBC LISP language cassette   14.50
1372 BBC LISP book "LISP on the BBC Microcomputer"   7.50

WORD PROCESSING

This package is supplied in ROMs to fit inside the BBC Computer. It therefore uses none of the user RAM leaving about 27k bytes free for text - about 4000 words.

It uses text mode 3 during text entry, with the top line continuously displaying the exact number of words in the document, and the number of bytes left free. When printing out, if there is more than 16k bytes of free RAM, then the screen can show the exact format of the printed output without actually printing it.

There are an impressive array of formatting commands, which appear in a different colour (darker shade in monochrome) to avoid confusion, including justification, lines per page, line spacing, centring, etc., and the usual set of text manipulation commands.

1373 BBC Computer Word Processing Package   65.00

BOOKS AND GAMES FOR THE BBC COMPUTER
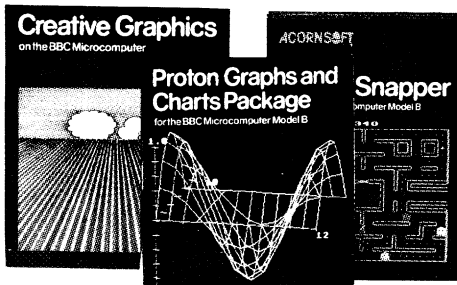
1374   PHILOSOPHERS QUEST   model B only   8.50

An advanced Adventure in which you tell the computer what you want
to do, and it describes in plain English your progress through a
fascinating world full of fiendish puzzles to be solved. To complete
your quest you have to think hard about everything you do!

1375 DEFENDER   model B only   8.50

No compromises have been made in this amazing fast action graphics
game. Save the humanoids from the landers, using the ship's laser
missiles, smart bombs and hyperspace jump. Complete with mutants,
bombers, pods, swarmers and baiters to attack you.

1376 MONSTERS   model B only   8.50

You control an animated figure pursued by monsters who chase him up
ladders and along walls; the only hope of survival is to dig holes
in the walls and trap the monsters by filling them in. Score more by
dropping the monsters through several levels, but watch your oxygen.
With sound effects and high score.

1377 SNAPPER   model B only   8.50

A superbly authentic version of the currently most popular arcade
game. Guide the Snapper through the maze eating dots and avoiding
the creatures that chase you. Complete with full sound effects,
score, and a ladder of high scores.

1378   "CREATIVE GRAPHICS ON THE BBC MICROCOMPUTER" book   7.50
1380   "CREATIVE GRAPHICS ON THE BBC MICROCOMPUTER" cassette 8.50

This book describes how to exploit the excellent graphics facilities
provided by the BBC Computer. It includes 40 programs which will run
on either the model A or the model B to produce a spectacular range
of pictures and patterns in full colour, including animated
pictures, recusively defined curves, and rotating three dimensionl
shapes.

1379 "GRAPHS AND CHARTS ON THE BBC MICROCOMPUTER" book   7.50
1381 "GRAPHS AND CHARTS ON THE BBC MICROCOMPUTER" cassette   8.50

The book describes a set oof graphics routines which can be
incorporated into programs to presnet data graphically in a wide
range of applications. The graphs include automatic scaling,
labelling of axes and use of colours.

Routines are included to draw two and three dimensional graphs,
stereo pairs, two and three dimensional contour maps, bar charts and
pie charts.

WAS THIS CATALOGUE ADDRESSED TO YOU?

If not, we would be glad to add your name to our mailing list.
Please fill in the details on this card and send it to us.

Your name ....

Your position ....

Name of Organisation ....

Address ....

....

....

Phone no ....

CONTROL UNIVERSAL LTD
Unit 2 Andersons Court
Newnham Road
CAMBRIDGE
CB3 9EZ

ORDER FORM

We suggest that you use this order form, or a photocopy of it, as it will assist both you and us in avoiding any confusion about what you require.

Date of order...............

INVOICE ADDRESS   DELIVERY ADDRESS IF DIFFERENT

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....

....

....

....

NAME OF PERSON PLACING ORDER   TELEPHONE NO OF THIS PERSON

....
ORDER NO (ESSENTIAL   HAVE YOU ALREADY GOT A
FOR CREDIT ORDERS)..............   CREDIT ACCOUNT WITH US?.........
IF NO A/C,
METHOD OF PAYMENT...........VISA/ACCESS NO.........................

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CONTINUE OVERLEAF IF NECESSARY   Signature.........................

IF YOU ARE ORDERING SOFTWARE PLEASE CAREFULLY CHECK THE APPROPIATE
PAGE FOR ALL THE OPTIONS

ANY SPECIAL INSTRUCTIONS?...

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ORDER FORM CONTINUATION

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