



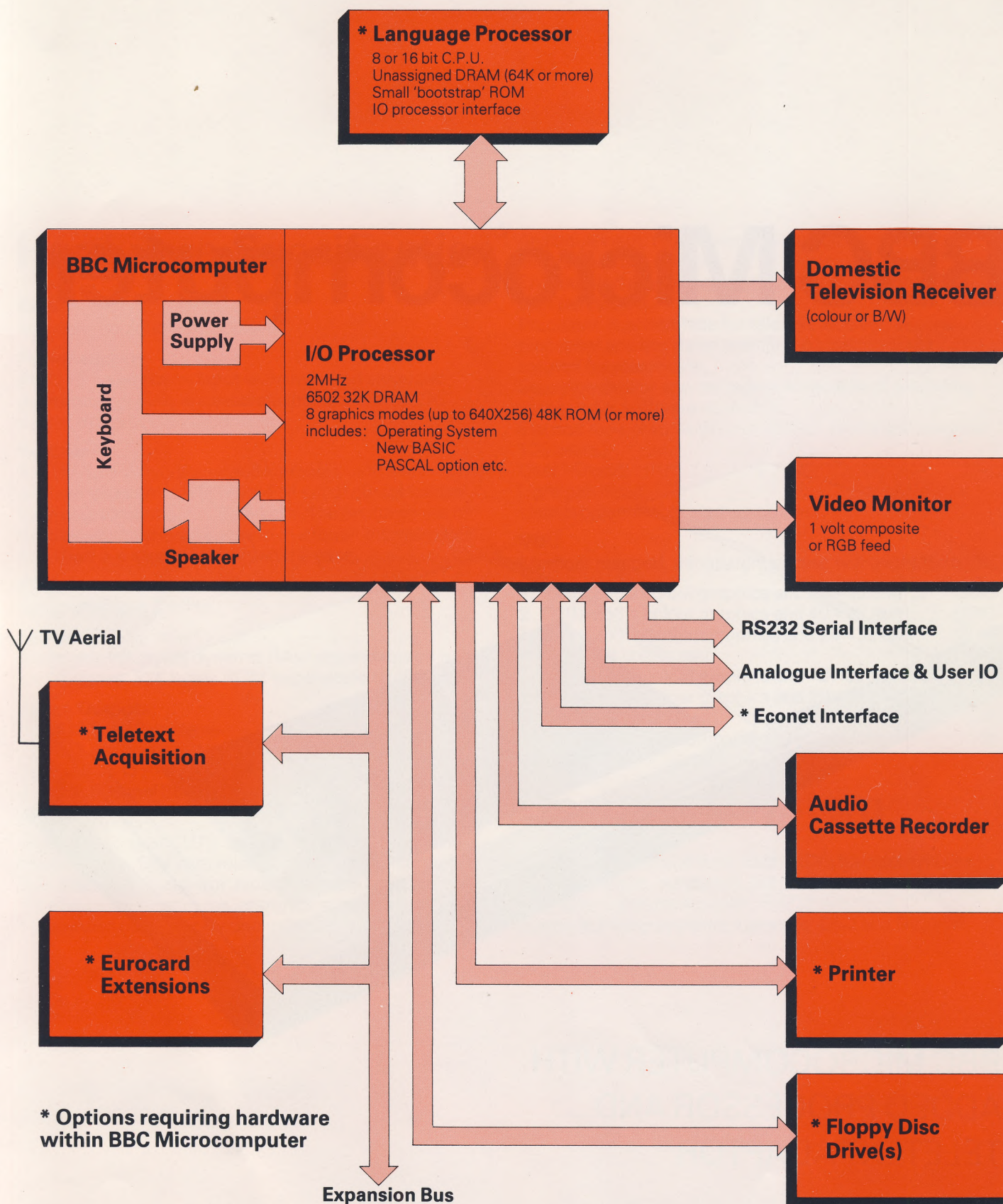
# BBC Microcomputer



BBC MICROCOMPUTER WITH  
ADDED PROCESSOR AND  
TELETEXT ADAPTOR



# BBC Microcomputer System Schematic



The BBC microcomputer system consists of the following:

Model A, the initial lowest cost option which is a complete operating unit having various optional additions within the case which when included becomes model B. Model B has all the interfaces required by a small business system.

Two separately cased options are the Teletext receiver and the second processor : The Teletext receiver permits

downloading of tele-software directly to the computer memory.

When the second processor is attached the first processor devotes itself entirely to handling I/O and permits very fast language processing to be carried out in the second processor. This option can utilise eight bit or sixteen bit processors, so that the largest option can be equivalent in power to a minicomputer and have up to 16 megabytes of RAM.

# BBC BASIC Specification

The BASIC is close to the Microsoft standard, but has several important extensions.

**BASIC Keywords:** ABS, ACS, ADC, AND, ASC, ASN, ATN, AUTO, BEEP, BGET#, BPUT#, CALL, CHAIN, CHR\$, CLEAR, CLOSE#, COLOUR, CONT, COS, COUNT, DATA, DEG, DEF, DELETE, DIM, DRAW, ELSE, END, ENDPROC, EOR, ERL, ERR, EVAL, EXP, EXT#, FALSE, FN, FN\$, FOR, GET, GRAPHICS, GOTO, GOSUB, HIMEM, HTN, IF, INKEY, INPUT, INPUT LINE, INPUT#, INSTR, INT, LEFT\$, LEN, LET, LIST, LISTO, LN, LOAD, LOCAL, LOG, LOMEM, LVAR, MID\$, MOD, MOVE, NEW, NEXT, NOT, OLD, ON, OPENIN#, OPENOUT#, OR, ORIGIN, PAGE, PI, PLOT, POINT, POS, PRINT, PRINT#, PROC, PTR, RAD, RANDOMIZE, READ, REM, RENUMBER, REPEAT, REPORT, RESTORE, RESUME, RETURN, RIGHT\$, RND, RUN, SAVE, SGN, SIN, SPC, SQR, STEP, STOP, STR\$, STRING\$, TAB, TAN, THEN, TIME, TOP, TO, TRACE, TRUE, UNTIL, USR, VAL, VPOS, WIDTH.

**Operators:** !, ?, ", #, \$, %, &, ', (, ), =, -, \*, :, ;, +, .., ..., <, >, /, <=, >=, <>, [, ], ^, ~,

## Special Features of BBC BASIC

- No restriction on variable, string, or array names; all characters are significant. Numerical and string arrays can have any number of dimensions. Any variable, or array element, can be used as the control variable in FOR ... NEXT loops.

- Features of structured BASICs, such as:  
IF ... THEN ... ELSE.  
Both FOR ... NEXT and REPEAT ... UNTIL loops.

- Multi-line procedures and functions can be declared with any number of arguments. For example:  
DEF PROCBOX (A,B)  
PLOT1,A,O : PLOT1,O,B  
PLOT1,-A,O : PLOT1,O,-B : ENDPROC

The multi-line functions form a natural extension to Microsoft's FNA, FNB... etc. For example:  
DEF FNMEAN(Q1,Q2,Q3,Q4)=(Q1+Q2+Q3+Q4)/4

PROC and FN references can be recursive, as in the following example:  
DEF FNFACTORIAL (N) IF N<2 THEN = 2 ELSE =  
FNFACTORIAL(N-1)\*N

String functions can also be created which return a string as their value, and the LOCAL statement can be used inside FN, FN\$, or PROC declarations to specify that the variables should not be altered by the call. For example:  
DEF FN\$RIGHT2(A\$)=RIGHT\$(A\$,2)  
DEF FN\$REVERSE(A\$) LOCAL B\$,Z%  
FOR Z%=1 TO LEN(A\$): B\$=MID\$(A\$,Z%,1)+B\$:NEXT:  
=B\$

- Error-handling from BASIC  
ON ... ERROR provides trapping or errors, ERL and ERR return the line and number of the error.

- Versatile set of graphics commands to give control of the graphics features from BASIC:  
GRAPHICS initialises the required graphics, with optional background colour.

COLOUR chooses which of the 16 colours for subsequent plotting.

DRAW draws a line to any coordinate.

MOVE moves graphics cursor to any coordinate.

PLOT allows plotting of lines or points, in background or foreground colour, and to absolute or relative coordinates.

ORIGIN sets the position of the graphics origin.

POINT is a function returning the colour of any point on the screen.

- Flexible control of the character-screen format, with the BASIC statements:

WIDTH selects the overall field width.

POS returns the horizontal position of the character cursor.

VPOS returns the vertical position of the character cursor.

- Many additional functions, such as:

EVAL evaluates a string. For example:

EVAL "X^Q+SIN(X)" : EVAL(FUNC\$)

Trig functions, including HTN (hyperbolic tangent), ACS (arc cos), ATN (arc tangent), LN and LOG (natural and base-10 logarithms).

- Powerful string handling. String variables and arrays with arbitrary names. Concatenation with '+' operator. String comparisons with any of the relational operators. String functions, including RIGHT\$, LEFT\$, MID\$ for substring extraction. INSTR, returns position of a sub string in a string. STRING\$ returns concatenations of a string.

- Versatile but straightforward file control from BASIC, with the statements:

OPENOUT# and OPENIN# open a specified file for output or input.

PRINT# and INPUT# write or read numbers of strings to/from the current file.

CLOSE# closes the specified file. For example:

A=OPENIN# "data"

FOR Z=1 TO 10 : INPUT#A, NUMBER(Z), NAME\$(Z) :  
NEXT Z CLOSE#A

PTR# specifies the next byte to be accessed in a file, for random-access work; for example:

PTR#A=PTR#A+10 : REM Skip Record

- Built-in assembler. Assembler statements, enclosed in square brackets '[' and ']', may be incorporated within a BASIC program, with arbitrary symbol and label names. Pseudo operations are provided to relocate code.



# Hardware Specification

## Case

Injection moulded thermoplastic.

## Power supply:

240/115 fused mains input with switched shrouded mains output. Fully encased electronics with 3A DC output made to B.S. Class 1.

## Keyboard:

Full QWERTY layout stepped keyboard with a fifth row of ten user programmable keys. Full set of cursor control keys plus all normal function keys. The switches are of the sealed wafer type encased in a tough thermoplastic mounted in a steel panel within the case.

## CPU:

6502 running at 2 MHz.

## Memory:

Basic unit 16K bytes dynamic RAM expandable on board to 32K bytes. 32K bytes ROM expandable to 48K bytes.

## Video Outputs:

3 at 625 line 50Hz frame

1. RGB and composite sync
2. 1 volt 75  $\Omega$  PAL coded composite video
3. UHF Channel 36

## Input/output:

Audio cassette at CUTS 300 baud or high speed 1200 baud via 5 pin DIN with relay switched motor control. R.S. 232 (V24) Serial with nine selectable baud rates. Parallel printer output to Centronics specification. Floppy disc controller for one or two disc drives.

Analogue input, four channel twelve bit converter for such as joystick control.

Econet Interface for local networking and sharing high cost peripherals.

Processor Bus Interface for teletext receiver, second processor and any other interface connections not catered for specifically.

Sound generator and loudspeaker capable of producing tones under software control.

Elapsed time clock with resolution of 10 ms and range of 100 years.

User I/O port.

Light pen input.

User programmable start-up option.

## VDU

Memory mapped, transparent access with eight formats:

- |  |       |
|--|-------|
| 1. 640×256 2 colour graphics and 80×30 text  | (20K) |
| 2. 320×256 4 colour graphics and 40×32 text  | (20K) |
| 3. 160×256 16 colour graphics and 20×32 text | (20K) |
| 4. 80×25 2 colour text                       | (16K) |
| 5. 320×256 2 colour graphics and 40×32 text  | (10K) |
| 6. 160×256 4 colour graphics and 20×32 text  | (10K) |
| 7. 40×25 2 colour text                       | (8K)  |
| 8. 40×25 teletext compatible                 | (1K)  |

# Operating System

Interrupt run Elapsed time clock, ADC, Vertical sync for palette changes, Keyboard, Second processor TUBE interface, Centronics printer, RS232 interface, O.S. supports 3 filing systems, Cassette, Disc and Network.

Further information may be obtained from:

**Continuing Education**  
BBC Broadcasting Centre  
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