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Object name: BBC Micro with custom Tek4014 graphics console emulation ROM

Vintage: c.1981

Synopsis: Popular personal computer, designed for BBC Computer Literacy Project, 6502-based, customised as a display for a Siggraph Core79 compliant 3-d graphics library (also see BBC Micro Model B elsewhere in this catalog).

Description:

The BBC Micro was a popular personal computer, designed and built by Acorn Computer Ltd for BBC Computer Literacy Project. After introduction in Dec-1981 it sold reasonably well for domestic usage, but more importantly was widely sold to UK schools and universities as a result of a 50% government subsidy. Despite the lack of subsidy it sold well in Ireland too. Over 1.5 million were eventually sold.

There were two original models, A and B, where the Model A had 16kB of usable memory and the Model B had 32kB. Like the Apple II the memory was transparently shared between the memory-mapped display refresh and the CPU by clocking the memory at 2X the CPU clock rate. The CPU was a 2MHz MOS Technology 6502, but a second 6502, Z80 or NS32016 coprocessor could be added via a proprietary *Tube* interface managed by a custom chip from Ferranti.

The input/output facilities were quite good for the era. It had serial and parallel printer ports, an 8-bit general-purpose digital I/O port, an analog port for up to 4 inputs, light pen and switch inputs, and a 1MHz expansion bus. Networking was usually via an optional *Econet* network interface.

The operating system, Acorn MOS, and some language processors like BASIC were built-in in ROM. The OS was in one 16kB ROM while the language processors were selectively paged into a further 16kB ROM address space.

Dr.Brian Coghlan and Seamus Guiry of the Dept.Computer Science customised a number of BBC Micros by developing a custom Tek4014 graphics console emulation ROM to enable them to act as graphics displays for a Siggraph Core79 compliant 3-d graphics library developed by Dr.Coghlan, who also provided the algorithm for the communications buffers and queue management. Dr.Jeremy Jones contributed the algorithm to identify the memory address for the x-y coordinates. An impediment of the 6502 CPU was that the code could not jump indirectly, which was essential for the application. This was overcome by pushing the required memory address onto the stack and then executing an RTS (return from subroutine). This fooled the CPU into effectively jumping indirectly, which while unorthodox did work well and did not corrupt any code flow.

References:

1. Wikipedia, BBC Micro,
https://en.wikipedia.org/wiki/BBC_Micro