## ChAD's **SUPERCPU Accelerators** 20 Mhz Speed for the C-64 and C-128

#### 285 IMINARY PRODUCT INFORMATION

#### <u> ីម្ខះរប</u>

SuperCPU offers unparalleled speed with 20 Mhz models for both the C-64 and C-128 (both modes). Built-in JiffyDOS Kernal helps your computer and equipped drives to keep up with its new found speed!

#### Companyint

SuperCPU promises to offer the highest level of compatibility with commercial software possible.

#### בצל תיזריו בנגב

SuperCPU requires no special knowledge or technical ability to operate. Just plug it in and watch your computer take off.

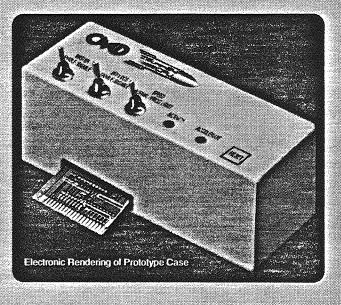
PROSEMMABILITY The SuperCPU's 20 Mhz microprocessor handles up to 16 MB of system memory, features 16 bit registers and offers full 6502, 6510 and 8502 compatibility. These features make it easy to modify and/or create software that is more sophisticated and faster than ever before!

#### What is the SuperCPU?

The Super 64 CPU is an accelerator module that speeds up the operation of your C-64/128 computer. It plugs directly into the cartridge port, and not only gives your computer added speed in calculations, but also provides the computer portion of JiffyDOS (CMD's disk speed enhancement speed) making it necessary to add only the disk drive chip(s) to your drives for a complete JiffyDOS system. At its heart is the W65C816S microprocessor running at 20 MHz and a CPLD (Complex Programmable Logic Device IC) which contains the custom logic required to mimic the characteristics of the Commodore 64. The C-64 version also contains 128K Bytes of high-speed Static RAM (the same type of high-speed cache memory found in 486/Pentium systems), and 64K Bytes of ROM. The 128 version will include additional RAM, ROM and custom logic to allow it to operate in both 64 and 128 modes. CP/M will not be supported by the SuperCPU.

#### Installation

Installing the SuperCPU 64 is simple: just plug it into the Cartridge port. No additional wiring or jumpers need to be installed inside of the computer. (The C-128 version may, however, require a jumper clip.)

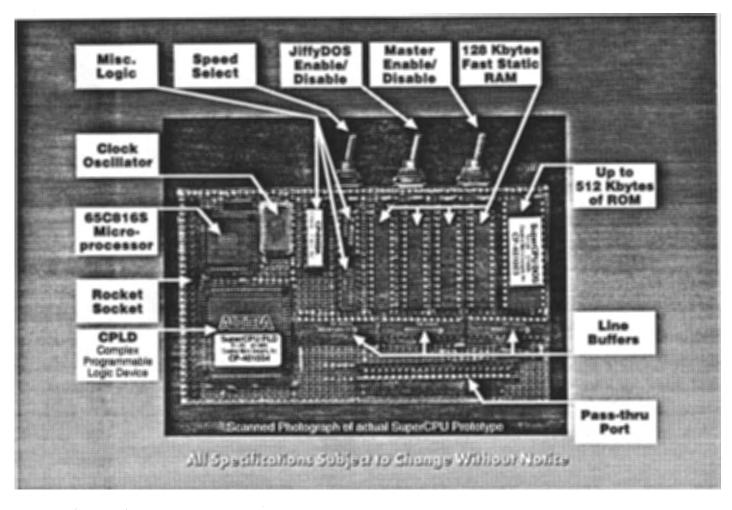


#### **Physical Characteristics**

The SuperCPU is contained within an enclosure that measures approximately 6" wide by 3" high and 2" deep. The enclosure has an opening for the Cartridge Port Pass-Thru connector at the rear, precisely in line with the computer's Cartridge Port. The unit is about the same width as a RAMLink or Commodore REU. The main circuit board inside the SuperCPU mounts vertically, keeping the depth of the unit to a minimum. This helps to prevent devices plugged into the pass-thru port from extending too far back from the computer. Three easy-to-use toggle switches line the upper front edge of the unit: a Master Enable/Disable switch, a JiffyDOS Enable/Disable switch, and a Speed selection switch. While the current prototype lacks a reset button and LED status indicators, these options are being considered for the final design.

#### Operation

Operating the SuperCPU requires no special knowledge. The user can perform all standard computer tasks in exactly the same manner as with a stock system, gaining the benefit of greatly accelerated speed. The toggle switches on the unit are clearly labeled, easily accessible, and can be used without having to refer to a manual in order to determine their function. As with CMD's RAMLink, the SuperCPU has



been designed to work out-of-the-box with any C-64 or 128 computer—no manual "tuning" adjustments will be required.

#### Compatibility

The SuperCPU 64 operates with C-64 and C-64c computers as well as the C-128/128-D in 64 mode. The W65C816S supports all legal 6502/ 6510/8502 opcodes, and will therefore provide a very high level of compatibility with existing software. The C-64 memory map is emulated exactly by the CPLD, and proprietary write-thru logic in this chip ensures full compatibility with all VIC graphic modes and memory mapping.

**REU's:** The CPLD chip in the SuperCPU includes special DMA transfer logic to provide 100% compatibility with all types of data transfers to and from Commodore REU's. The unit does not have to be slowed down to 1 MHz in order to initiate a DMA transfer to and from the REU.

**RAMLink:** The Super CPU is 100% RAMLink compatible, and contains its own version of RL-DOS, which runs from the SuperCPU's high-speed Static RAM. The faster RL-DOS, along with the efficiency of new 65C816S opcodes allows faster data transfers to and from RAMCard memory and also speeds up data transfers to/from CMD HD Series hard drives connected to RAMLink's parallel port.

*GEOS:* Version 2.0 will be 100% compatible. Special software will be provided with the SuperCPU allowing GEOS to run at full speed.

#### Performance

To help achieve its high level of performance and to accommodate the 20 MHz speed, all operating system routines are downloaded into 64K of the high-speed Static RAM during power-up. This feature eliminates the bottleneck caused by ROM-based operating system code (on PC's, this technique is called ROM-BIOS shadowing). 64K of highspeed SRAM remains free for programs. In addition, buffered write-thru circuitry (similar to PC cache controllers) eliminates the need to slow down when writing data into computer.

#### **Additional Features**

**Built-in JiffyDOS Kernal ROM:** The computer portion of JiffyDOS is built into the SuperCPU, providing DOS-Wedge commands and enabling high-speed serial transfer rates to and from JiffyDOS-equipped disk drives. The JiffyDOS Enable/Disable switch is designed to function on the fly without disabling the accelerator itself.

**Cartridge Port Pass-Thru:** Enables the full use of most plug-in hardware devices such as REU's, RAMLink, Swiftlink, SID Cartridge, GEORAM, and some software cartridges. These devices will work while the accelerator is running at 20 MHz.

**GEOS Software:** Custom software to optimize GEOS operation is provided. Additionally, an intelligent write-thru hardware circuit designed especially for GEOS effectively eliminates major performance bottlenecks associated with previous accelerator designs. Coupled with the 20 MHz clock speed, this feature will boost the performance of GEOS far beyond anything previously available.

*Speed Selection:* The speed selection switch provides three options: 1) Slow

(1 MHz) mode for compatibility with programs (such as some games) that may operate too quickly in the turbo mode; 2) a "soft" Turbo mode which operates at 20 MHz and provides programs with a software speed selection register for switching to Slow speed when necessary; and 3) a "forced" Turbo mode which keeps the CPU in 20 MHz mode regardless of the setting of the software register. This mode is useful for providing compatibility with existing programs that unintentionally alter the software register. (Note: The SuperCPU performs disk access functions properly in all modes.) Speed modes may be toggled while the SuperCPU is operating without quitting from a program.

#### **Expansion Capabilities**

The SuperCPU includes an internal connector (called the "Rocket Socket") which will enable the user to plug in a CMD-supplied RAM Expansion card. This card will have on-board SIMM sockets and can contain from 1 to 16 Megabytes of Dynamic RAM (DRAM). The RAM on this card can be used for either data or program storage. Simply put, this is like having a C-64 or C-128 with up to 16 MB's of system memory.

#### **Developer Support**

CMD will be actively working with developers willing to create new commercial software and/or modify existing software to take full advantage of the SuperCPU. A comprehensive developers package will be available, and will include an assembler which supports all 65C816S opcodes and addressing modes. In addition to the assembler, extensive documentation will provide pertinent technical specifications, guidelines, and sample code. This package will enable developers to produce programs which take advantage of the 65C816S's enhanced instruction set, 16 MB addressing capability (for users with the optional SuperRAM Expansion Card), as well as other SuperCPU capabilities.

#### **Programming Features**

The SuperCPU contains a special register which allows programmers to control the clock speed. An additional register is used to control the SuperCPU's WriteSmart<sup>™</sup> function, which determines what areas of the SuperCPU memory are mirrored in the host computer. Applications which can use reduced mirroring can significantly increase their overall operating speed.

#### **Delivery and Deposits**

Due to the recent announcement of the C-128 version of the SuperCPU, we have found it necessary to ammend our original release date for the SuperCPU-64 to mid-April 1996. The reason for this is that we will be attempting to use the same PC board for both versions and to accomplish this, we must bring the C-128 version up to the same stage of development as its C-64 counterpart. Delivery on the C-128 version of the Super CPU will be approximately 90 days after we begin shipping the C-64 version. CMD continues to accept advanced orders with a \$50.00 deposit for the SuperCPU-64. The \$50.00 deposit guarantees you a price of \$199.00 for the 20 Mhz SuperCPU-64.

SuperCPU-128 deposits will not be accepted until an accurate price projection is available. Our preliminary projections range from \$275.00 to \$375.00. We hope to begin accepting deposits on this unit by March 1, 1996.

#### In Closing

The SuperCPU is a work-in-progress, and it will take a while longer before details are set-in-stone.

What we do know is that CMD is creating a powerful new engine for our C-64's and 128's. This product without doubt is the most significant advancement in this market since the release of the Commodore itself. Clearly, the features outlined herein show that this design goes far beyond past accelerator designs.

For the most up to date information about the SuperCPU look to Commodore World Magazine and CMD's Worldwide Web page which is found at http://www.the-spa.com/cmd/

CMD is now accepting advanced orders for the Super64CPU-20. By forwarding an advanced deposit of \$50.00 or more, you will receive one of the
units from our first production run which is scheduled for mid-April'96. Additionally, your deposit guarantees your price of \$199.00 plus shipping. This
deposit shall be fully refundable prior to shipment and will be deducted from the final price of the unit. The remaining balance will be charged to your
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#### HDSeries

SCSI Hard Drive for the C-64/128 HD Series Hard Drives are available in capacities up to 1 GB, are fully partitionable, and can emulate 1541, 1571, & 1581 disks while Native partitions utilize MS-DOS-style

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