

# PRODUCT INFORMATION By



From

**CALIFORNIA COMPUTER SYSTEMS**

**Manufacturers of Quality Peripherals**

for the Commodore **PET**\*

and the Radio Shack **TRS-80**#

\*PET is a trademark of Commodore Business Machines.

#TRS-80 is a trademark of the Radio Shack/Tandy Company.

309 Laurelwood Rd. #18, Santa Clara, CA 95050  
(408) 988-1620

# The **8100** by **HUH**

From CCS

## An S-100 Bus Adapter/Motherboard for the TRS-80 — plus a whole lot more !!!

The 8100 allows a Radio Shack TRS-80 computer to be interfaced to the popular S-100 Bus for memory expansion and extended I/O capabilities.

The 8100 opens up a whole new world of peripheral devices to the TRS-80 owner. For example, you can now easily add more memory, floppy disc systems, PROM boards, printer interfaces, multi-purpose I/O boards, AC device controllers, and a whole host of other varied peripherals.

The 8100 has its own built-in 6 slot motherboard which includes our unique card guide system which keeps the boards in their places.

The 8100 is designed to sit on a table top next to your TRS-80 and connects to it via a ribbon cable. A second TRS-80 connector allows other TRS-80 devices to be connected at the same time.

Not only do you get an S-100 Bus interface and motherboard, but the 8100 has more on board options -

### like **16K of RAM**

The 8100 has support circuitry and sockets for eight 16K dynamic RAM chips allowing you to expand the memory of your TRS-80 by 16K without having to buy any S-100 RAM boards. Our unique scheme allows the RAM to be split into 4K blocks which can be addressed to any 4K boundary.

If you purchased an expansion memory kit for TRS-80 you could be left with eight 4K RAM chips and nowhere to put them! Well they can go in the RAM sockets instead! That's right, you can use either 4K or 16K chips and address them anywhere you like.

You get everything you need to add your own RAM chips to the 8100 when you order the RAM Support Option - support circuitry, sockets for all IC's including the RAM chips, all by-pass capacitors, dip switches and instructions.

But wait. The 8100 still has more on board options. S-100 Bus, RAM,

### and **Serial and Parallel I/O**

The 8100 has a full RS232/20 ma serial interface who's features include: RS232 and 20 ma current loop interface, software programmable baud rate from DC to 56K baud, software programmable modem control lines, on board DB-25 connector and much more. Jumper selection allows the TRS-80 to look like a computer or a terminal. Now you can drive a standard serial printer from your TRS-80 - and we give you the patches to use the LPRINT and LLIST commands in Level II Basic.

The 8100 also has an 8 bit parallel input port and an 8 bit parallel output port. Both are latched, have both positive and negative strobe inputs and outputs and have plenty of drive capability. A standard 22 pin edge connector is used for connecting to them.

You get everything you need for the interface circuitry when you order the I/O Option - sockets, IC's, DB-25 connector, parallel connector, and software.

# Specifications The 8100

## S-100 Bus Interface

- Motherboard:** 6 slots, card guides and extension connector for adding another motherboard. Basic unit includes only one connector and card guide set. (Additional connectors extra.)
- Interface:** All the most commonly used S-100 Bus signals are implemented including PSYNC and MWRITE. All lines buffered.
- Clocks:** Ø1 and Ø2 run at 1.76 Mhz synchronous with the TRS-80 clock. Crystal controlled 2 Mhz clock provided on S-100 Bus pin 49 (CLOCK).
- Power Req.:** Requires standard S-100 power supply, user must supply.
- Limitations:** DMA not available. Wait states longer than 1 millisecond are not allowed because of the dynamic memory in the TRS-80.

## Dynamic RAM

- Chips used:** Uses either 4K or 16K 16 pin dynamic RAM's such as 4027 or 4116 or their equivalent - user must supply RAM chips. Any TRS-80 compatible RAM expansion kit will work.
- Addressing:** May be split into four 4K blocks. Each block individually addressable to any 4K boundary via dip switch.
- Refresh:** Transparent to CPU operation. Does not slow CPU.

## I/O Interfaces

### Serial

- Type:** Asynchronous, RS232 or 20 ma current loop, jumper selected.
- Baud rate:** Crystal controlled. Software programmable from DC to 56K baud. Non-standard baud rates as easily programmed as standard baud rates.
- Stop bits:** Software selectable 1, 1 1/2, or 2 stop bits.
- Parity:** Software selectable even, odd or none.
- Word length:** Software selectable 5, 6, 7, or 8 bits.

### Parallel

- General:** 8 bits per port plus strobes. Auxiliary voltages provided at connector.
- Input:** Latched data and strobe lines. Jumper selectable for either positive or negative strobe inputs. Inputs LSTTL.
- Output:** Latched data. Positive and negative strobes simultaneously available. LSTTL outputs.

## Pricing information

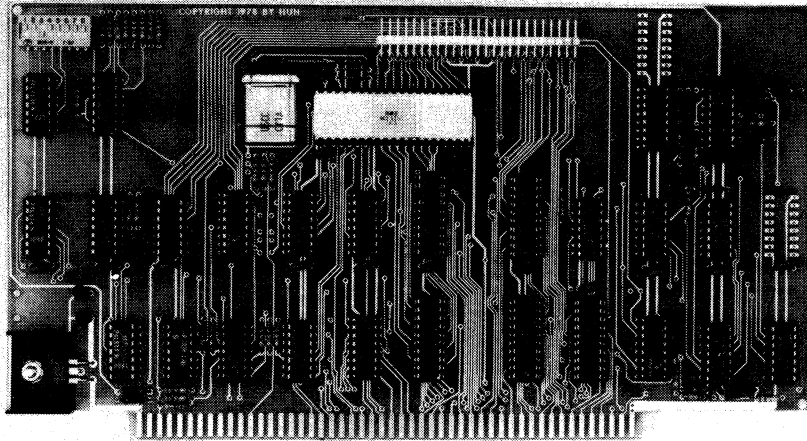
<u>ITEM</u>	<u>KIT PRICE</u>	<u>ASSM. PRICE</u>
Basic Unit (S-100 interface)	\$185.00	\$245.00*
RAM Support Option	45.00	75.00*
I/O Option	85.00	115.00*
5 Extra Connectors & Card Guides	<u>45.00</u>	<u>75.00</u>
IF PURCHASED SEPARATELY	\$360.00	\$510.00
<u>IF PURCHASED TOGETHER</u>	<u>\$295.00</u>	<u>\$375.00</u>
<u>YOU SAVE</u>	\$ 65.00!!!	\$135.00!!!

\*Applies only when installed with initial purchase.

**CALIFORNIA COMPUTER SYSTEMS (408) 988-1620**

# The S-100 MPA

by **HUH**  
From CCS



## An S-100 Bus Adapter for the Commodore PET\*

The S-100 MPA (Memory & Peripherals Adapter) allows a Commodore PET 2001\* computer to be interfaced to the popular S-100 Bus for memory expansion and extended I/O capabilities.

The S-100 MPA opens up a whole new world of peripheral products to the PET owner. For example, you can now easily add more memory, printer interfaces, PROM boards, AC device controllers, floppy disc systems, color graphics interfaces and a whole host of other varied peripherals.

The S-100 MPA is an S-100 sized board that plugs into any suitable, user supplied mainframe (motherboard, chassis and power supply) and a cable then connects to the memory expansion connector on the PET. It's that simple to install.

The S-100 MPA is not a "bare bones" emulation of the S-100 Bus. In fact, the S-100 MPA meets or exceeds most of the the proposed IEEE S-100 Bus Standard. This means you get total compatibility with almost every S-100 Bus peripheral available.

The S-100 MPA is the only one that gives you full DMA in accordance with the S-100 Bus protocol. This means you can use a Dazzler from Cromemco. Or just about anything!

## The S-100 MPA can also be a Stand-Alone CPU!

An important feature of the S-100 MPA is it's ability to become a stand-alone 6502 processor board for the S-100 Bus. This makes it the only 6502 - S-100 CPU board that truly emulates the complete S-100 Bus. Just order the Stand Alone Option and the extra parts just plug right in.

\*PET is a trademark of Commodore Business Machines

# Specifications

The S-100 MPA

**Processor:** On board 6502 or 6502 in host system.  
**Processor Clock:** 1 Mhz.  
**S-100 Ø1 & Ø2:** Non-overlapping @ 4 Mhz. See note 1.  
**ØCLOCK (Pin 49):** 2 Mhz for baud rate dependent I/O boards, etc.  
**DMA Capability:** Normal S-100 Bus protocol. See note 2.  
**Wait States:** Read wait states emulated. Write wait states not available. See note 2.  
**PSYNC:** True PSYNC signal emulated.  
**MWRITE:** Provided.  
**I/O Addressing:** Fully emulates 8080 type I/O. No need for memory-mapped I/O boards. Dip switch addressable to any 256 byte block.  
**I/O Addr. Mirror:** Provided. Can be disabled by installing jumper.  
**On Board Logic:** All clocked logic. No one-shots.  
**Power Req.:** Under 750 ma.  
**Circuit Board:** FR-4 Epoxy, solder masked both sides, silk screened component legend, gold plated edge contacts. Standard S-100 sized.  
**Sockets:** Provided for all IC's.  
**Price:** Mfg. sugg. list: Kit - \$199.95 Assm. - \$279.95  
Stand Alone Option - \$49.95

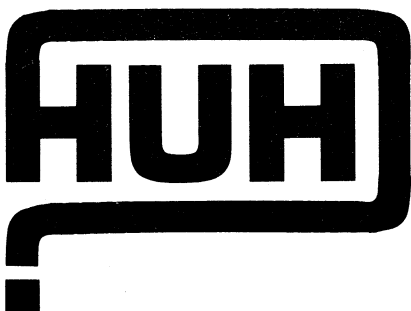
**Note 1:** In terms of it's cycle efficiency, the 6502 running at 1 Mhz is equivalent to an 8080 or Z-80 running at 4 Mhz, so in order to maintain proper bus timing Ø1 and Ø2 must run at 4 Mhz. It however does not affect memory access time which is still 500 nsec.

**Note 2:** When used with the Commodore Pet, a jumper must be installed inside the Pet to utilize the DMA and wait state capabilities of the S-100 MPA. If you don't need these functions, the jumper need not be installed.

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

## Where to get it

The S-100 MPA is available through your local computer store. If they don't have it, ask them to get it! If you have no computer store near you, the S-100 MPA is available direct from HUH Electronics at the prices shown above. Please include \$5.00 for shipping and handling. Calif. residents include 6% sales tax. We accept Visa and Mastercharge.



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# ACCESSORIES

From CCS

## For your Commodore PET\* Computer

### The VIDEO BUFFER

The Video Buffer by HUH Electronics is actually a video combiner that allows conventional TV's or monitors to be used with the Commodore PET Computer for larger screen displays or remote viewing. This is particularly useful in classroom situations. It plugs onto the User Port and provides a standard 75 ohm video output (the normal PET only provides separated sync and video).

For those that don't have monitors, the Video Buffer is designed for on-board use of the M&R Enterprises SUP'R'MOD II (the best RF modulator on the market!). It just plugs right in! Just order the SUP'R'MOD II option.

The Video Buffer comes completely assembled and tested for \$29.95. This includes a standard RCA-type video connector. This configuration is for those who have a monitor, or if you already own a modulator. For those who want to use standard TV's, you can order the SUP'R'MOD II option for \$29.95 extra (\$59.90 for the whole thing). This includes the SUP'R'MOD II, RF cable and 60db isolation antenna switch.

### The PETUNIA

If you haven't already guessed, the Petunia is a music board for use with the Commodore PET Computer. It plugs onto the User Port and is actually a high quality 8 bit digital to analog convertor. The software (supplied) is what turns it into a music generator that can play up to four notes at once. Or you can use it as a DAC for graphics, control and other varied applications.

The Petunia requires an external amplifier and speaker to operate, but it comes with a standard RCA-type jack for connection to your stereo or whatever.

The Petunia comes assembled and tested for \$29.95 which includes driving software and complete instructions.

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# The COMBO

For those who want both a Video Buffer and a Petunia you can get them both on one circuit board. That's right - both functions on one board! Not only does this offer you added convenience, but you save \$10.00!

The Combo consists of one circuit board containing a Video Buffer and a Petunia both fully assembled and tested and is only \$49.95. It's also available with SUP'R'MOD II installed for only \$79.95. Now that's a pretty powerful combination.

# The BEEPER

The Beeper is the perfect addition to your Commodore PET Computer. Ever noticed how long it takes to load and save tapes? Tired of watching the screen waiting for READY to appear?

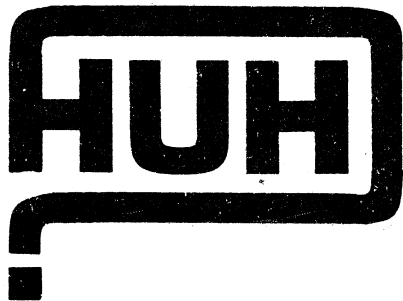
Well, the Beeper will automatically beep when a file header is found or written, and will also beep when a program is finished being loaded or saved.

The Beeper can also be beeped under program control for adding emphasis and game effects to your programs and for use in interactive audible feedback applications. We provide full documentation.

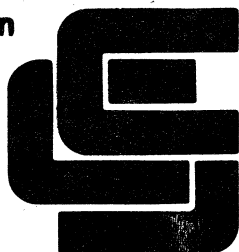
The Beeper is installed inside the PET in seconds. It just plugs right in. A volume control is provided for adjusting the level of the beep to your own ear. The Beeper is fully assembled and tested and is only \$24.95.

# Ordering Information

HUH products from CCS generally available at your local computer store. If they don't stock our products, ask them to! If you have no computer store near you, our products are available factory direct at the prices shown above. California residents please include 6½% sales tax. We accept Visa and Mastercharge.



From



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# PETUNIA PLAYER <sup>by</sup>

From CCS

## A High-level Music Playing and Composing System

### for the PETUNIA

The PETUNIA PLAYER allows you to easily use HUH Electronics' Petunia music board to play or compose music. Some of its features are:

Music can be played directly from the keyboard. The PET's keyboard can be considered as banks of keys, each row representing an octave. In this mode 4 octaves are directly accessible with half notes being played with the shift key. A 2 octave mode is also available with half notes directly accessible.

Music can be stored for playback in the same format as it is played from the keyboard. Thus, only a single musical notation has to be learned. Once the music is stored (as DATA statements in your program), it can be played back in one of three ways: (1) The music can be played back a single note at a time with the notes being displayed as they are played. This allows the music to be easily checked and corrected. (2) The music can be played back in a slower than normal speed with the notes also being displayed as they are played. And (3) The music can be converted to an internal format and played back at the proper tempo. This eliminates the delays that occur when a BASIC program is used to convert and play each note.

The PETUNIA PLAYER can play up to four notes simultaneously, unlike most music systems which play only a single note at a time. This allows chords to be played in addition to melodies.

All the standard note durations can be specified: whole, half, quarter, eighth, sixteenth, thirty-second, sixty-fourth, all the preceding dotted, and triplet half, quarter and eighth notes.

Repeats, codas and similar constructs are easily handled. This eliminates tedious coding of similar parts, as well as reducing storage requirements.

Complete listings and descriptions of both the assembly language and BASIC programs are provided allowing the PETUNIA PLAYER user to make changes to fit his or her needs. The assembly language program is relocatable allowing it to fit in any size PET.

With all these features the PETUNIA PLAYER costs only \$14.95 and includes source listings, program documentation, comprehensive user's manual and PET-loadable cassette. The PETUNIA PLAYER is available at leading computer stores or factory direct (please include \$2.00 shipping and handling, CA residents please include 6% sales tax.)

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