

# NEWSLETTER

## Homebrew Computer Club

Robert Reiling, Editor □ Post Office Box 626, Mountain View, CA 94042 □ Joel Miller, Staff Writer  
Typesetting, graphics and editorial services donated by Laurel Publications, 17235 Laurel Rd., Los Gatos, CA 95030 (408) 353-3609

### RANDOM DATA

By Robert Reiling

**August 4, 1976 meeting change!** An unforeseen conflict turned up at the last minute and the Stanford Linear Accelerator Center Auditorium is not available for the August 4th Homebrew Computer Club meeting. However, the **Annenberg Auditorium** in the **Cummings Art Building** on the **Stanford Campus** is available and that is this meeting's location.

This issue of the *Newsletter* is being mailed in time to reach you in advance of the August 4th meeting.

We will get together again at S.L.A.C. on August 18th, September 1st and September 15th. Following that the S.L.A.C. Auditorium is scheduled for University of California use for several weeks. Therefore, the Homebrew Computer Club will need to find an alternate meeting location or select alternate meeting dates. These alternatives are being investigated and will be reported to you at the August and September meetings.

Another survey of computer systems was conducted at the July 21st meeting. This time, with about 275 hobbyists on hand, 131 indicated they had an operational computer. The previous survey on June 9, 1976 turned up 101 operating computers.

A club is starting in Santa Cruz with the first meeting scheduled for August 10, 1976. Contact the Byte Shop in Santa Cruz for details. How about someone sending a report for the *Newsletter*?

Visitors at our July 7, 1976 meeting included Sol Libes, President of the Amateur Computer Group of New Jersey and John Craig, Editor of 73 Magazine's I/O Computer Section. It was great to visit with them and exchange views on the hobby scene.

Don't miss **Personal Computing '76** August 28th and 29th at Atlantic City, N.J. Attendance is expected to be around 5,000 people. John Dilks K2TQN phoned from New Jersey a few days ago to give me a few details and followed up by sending information about hotels, etc. Telephone me at (415) 967-6754 after 7:00PM and before 9:00PM if you need details. The value of door prizes exceeds \$5,000 now and more prizes are being added! Write for tickets — \$5.00 each in advance (\$7.50 at the door) — for the weekend including all seminars and exhibits. The address is **Personal Computing '76**, 503 West New Jersey Ave., Somers Point, New Jersey 08244. Exhibitors phone (609) 927-6950 for information on booths.

—Continued on page 4

## Notice!

The August 4, 1976 Homebrew Computer Club meeting is at the Annenberg Auditorium in the Cummings Art Building. For location, refer to the map on page 8.

### WE'RE STILL LOOKING!

By Joel Miller

If you read last month's *Newsletter*, you probably noticed a blurb asking for contributors to a new book titled *The Personal Computer* which will be published by Laurel Publications in conjunction with members of the Homebrew Computer Club. Well, we did have a good response, but we still need more contributors. All told, about seven people have responded to the notice.

So far, we seem to have a good software/hardware mix. Larry Press of the Southern California Computer Society has indicated interest both in writing a section of the book and in helping to publicize it. Warren Struven of S.L.A.C. is running S.L.A.C. equipment with a number of 6800 systems and would also like to contribute an article. Phil Wadler is thinking about writing a chapter on "structured programming" with some general notes about programming as well. Ken Jackman has contacted me about writing a chapter on game playing programs and Gary Muhonen has expressed interest also. Believe it or not, I even received a letter from Bill Fuller — an avid HBC fan in Grand Prairie, Texas — who is doing some very interesting experiments in "parapsychological biofeedback" whatever that means! I am thinking about writing an introductory chapter comparing various systems and ways to get a system up and running within specific budget limitations. Joe Alig and I will also collaborate on a chapter dealing with design concepts of video terminals.

The response we have received is very encouraging, but we could still use some help. A chapter on some really homebrew systems would be fascinating to many as would be a section on peripherals and their interfaces. If you would like to contribute, write Joel Miller at Laurel Publications, 17235 Laurel Rd., Los Gatos, CA 95030 or call (408) 353-3609.

## MONITOR MOD

By Joe Alig & Joel Miller

One of the biggest headaches for computer hobbyists is acquiring a reliable monitor at an affordable price. Unfortunately, the tremendous proliferation of TV terminals has placed a premium on monitors. While almost any TV set can be quickly converted to serve both as a TV receiver and monitor, most hobbyists shy away from modifying their TVs thinking the conversion is a difficult operation. This is not true.

If you need a monitor and do not have a TV set now, probably the cheapest way to acquire a new monitor is to buy an inexpensive Japanese B&W TV set and perform the following modifications on it. Then, you will be able to watch the boob tube, too!

Another common misconception about modifying TV sets is that they do not have adequate bandwidth for the number of characters on a line. Our experience with Japanese TV sets, TV terminals and video games reveals this is pure myth. For example, the largest number of points per raster line required for a terminal with an 80 character line is 512. We have personally displayed an interlaced video game with 908 points per line on our MGA set. The only problem which you could conceivably encounter with a 512 points/line display is that you might have to adjust the horizontal width to accommodate the display. Almost all of the small Japanese TV sets are fully isolated, have well regulated power supplies and they can usually be set up to run off a 12V car battery so you can talk to your electronic friends on vacation!

As we have already mentioned, we have had good luck with our MGA, however Sony, Panasonic, Sharp and many other brands will do just as well. These sets always come with complete schematics. Most American small B&W TV sets are also built in Japan and there are a great many competing American brands that will do just fine.

Avoid any TV which is not isolated from the line, because you may either zap yourself or fry your computer. A set which is not isolated is said to have a *hot chassis* which means that one side of the line is connected directly to the chassis. Were you to connect a hot chassis monitor to a computer with a chassis at ground level, you risk a number of things. At the very least, you will blow a fuse. More likely, you will damage the computer power supply or your own power supply!

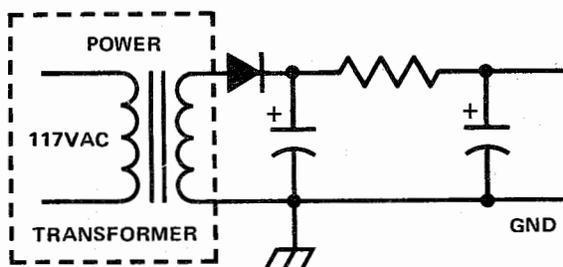


FIGURE 1. If the line input part of your schematic looks like this, you have an isolated TV and can proceed immediately with the monitor mod.

If you are planning to modify a TV set you already own, you better check to see if it is isolated before proceeding any further and here's how to do it. Get out the schematic for the set and check the area where the line voltage enters. If there is no transformer in the circuit (Figure 2), watch out because you have a hot chassis! However, if your schematic looks like Figure 1, you are in business. Always consult the schematic. Just looking in the back for a transformer is not good enough since many TVs have transformers for things other than isolation.

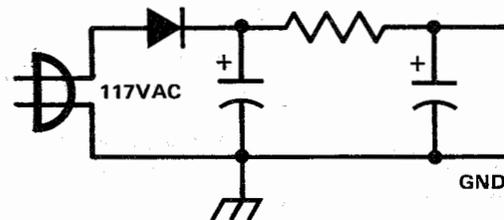


FIGURE 2. But if the schematic looks like this, you better watch out! What you need here is an isolation transformer to isolate the TV set from the line.

If you have determined that you do in fact have a hot chassis, you can still use the TV for a monitor if you provide your own isolation. Just go out and score an isolation transformer (any of the surplus stores will have them). But before you go running to the surplus store, check the back of your TV to determine the amount of power required and this is usually stamped on the back (in Watts). Get an isolation transformer which is rated 20% higher than the power requirements of the TV. Then just wire the line to either side of the transformer and wire the output of the transformer to the old line input of the TV set.

Now that you have a fully isolated TV set, you can proceed to make the monitor modification. Essentially all that is required is that the receiving circuitry (2nd or 3rd video I.F. stage) output be taken to a switch mounted on the outside of the TV so it can be turned off. Then an external connector (i.e. BNC) is connected directly to the input of the video amplifier so the signal from the computer terminal can be entered directly into the video amplifier.

First, take out the schematic and locate the picture tube. To find the video amplifier, follow the line from the first grid or the cathode. This line goes through a capacitor and to the plate of a tube or the collector of a transistor that performs the second stage of the video amplification. Then, the grid of that tube or the base of the transistor will probably go to the plate of another tube or the emitter of another transistor that is the actual video amplifier. The base of that transistor or the grid of the tube will be connected to the video detector which will either be a semiconductor or a thermionic diode. The input to this diode is inductively coupled from the second or third video I.F. stage (depending on how many stages your set has).

To make the modification, locate the power source for the inductor (B+) which will be connected to a resistor. This line will go through the inductor and enter the collector of the 2nd or 3rd video I.F. transistor or

tube. Install a switch to cut the line and remove B+ when the set is to be used as a monitor. You also have to install a switch (but use a DPDT so it's all in the same switch) in the line from the base of the video amplifier transistor or the grid of the amplifier tube (Figure 3). This switch should close to use the TV in the monitor mode. Then connect your video input to this switch and that's all there is to it. □

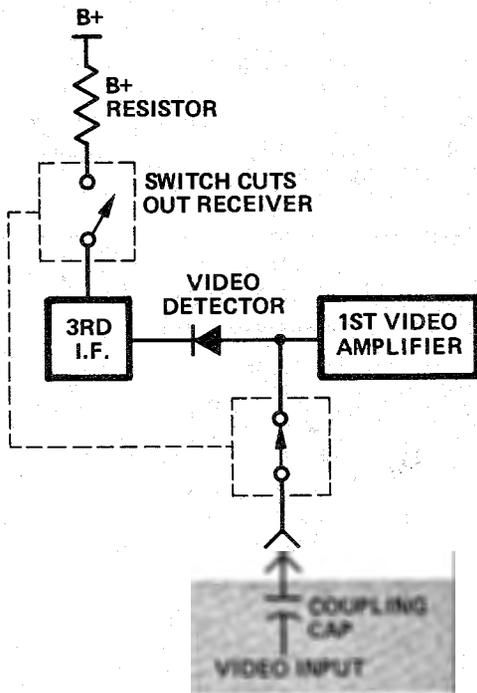


FIGURE 3. Any TV set can be converted to a monitor by performing the simple modification illustrated in this figure. A switch is installed in such a way that the receiving circuitry (2nd or 3rd I.F. stage) output is cut and the video information from the terminal entered instead when the switch is operated.

### SHOW OFF YOUR SYSTEM!

Bring it to the Community Computer Center and show us how to use it. Kids and adults come here for scheduled trips and classes and just to play. We'd like to have more things to use with them.

We'd also be happy to show you some game boxes friends have made for us and borrow any you might have already or would be willing to make.

Also, we are a tape repository. We copy tapes people send to Dr. Dobbs Journal and sell them for \$1 per ounce (plus California sales tax and handling).

We have terminals you can use with your computer or ours (a PDP 11/15) or someone else's (if you can dial it up).

We're open nights — 7 to 10 Monday to Thursday, noon to 5PM weekdays and noon to 4 Saturdays.

Call us if any of this interests you. We gladly gobble up volunteers! Community Computer Center, 1919 Menalto Ave., Menlo Park, CA 94025 (326-4444). □

## MICROCOMPUTER SYSTEM DESCRIPTION

By John Schulein

My microcomputer system is built into a surplus Cybercom tape entry system table and uses the regulated supply located in the bottom of the table. The table card file was modified (new 100-pin edge connectors instead of the original 80-pin connectors) to accept Altair sized PC cards and the power supply was modified to provide -12VDC instead of -8.5VDC. The power supply has five outputs (+24V, +12V, +5V, -5V and -12V) and each output voltage is regulated so that no PC card regulators are required. Each output voltage drives a voltage indicating LED and the 5V output is equipped with a 20A ammeter.

The microcomputer system has the following cards installed at this time.

1. CPU — Altair type with modified memory write and clock circuitry.
2. 4K RAM — 4K of 2102 RAM memory.
3. 4K RAM — 4K of 2102 RAM memory.
4. 2K PROM — 2K of 1702A PROM memory.
5. I/O — TVT and cassette interface.

The 2K PROM memory is located at 0000 hex through 07FF hex and the 8K RAM memory is at 1000 hex through 2FFF hex. The TVT is a highly modified version of the TVT-1 (*Radio Electronics*; September 1973) and includes scrolling and a UART serial interface running at 300 Baud (30 cps). The tape recording technique is the HITS (*Radio Electronics*; September 1973, p. 57) with CRC error detection implemented in software. A system monitor program is located in low memory and resides in seven 1702A's. It makes the system a pleasure to use and includes the following functions: *display memory, fill memory, move memory, memory map, edit memory, compare memory, go to location, compute 16-bit CRC word, ASCII text loader, read tape, write tape and a debug trap routine.*

To date the microcomputer system has been used to implement games and presently there are five games stored on one cassette. These games are *Numbers, Word Show, Match Game, How Many Game and Blackjack (21).*

To read in one of the game programs from cassette, the following operations are performed.

1. *Turn on system power.* The monitor will now automatically take over and after an identifying message will issue the prompting character (\*).
2. *Move the cassette tape to the start of the desired program.* Programs begin on an index mark and start with a voice message which identifies the program.
3. *Put the recorder into the play mode,* listen to the voice message describing the program and when indicated by the voice message, type "R" on the keyboard.
4. *Sit back and wait for the game to start.* The monitor program will handle all remaining tasks including the data read in, error checking and transfer to the game program.

Plans for the future include upgrading the TVT to a RAM version that will run with a 9600 Baud serial interface, adding 1702A programming capability, installing a paper tape reader and implementing some form of BASIC. □

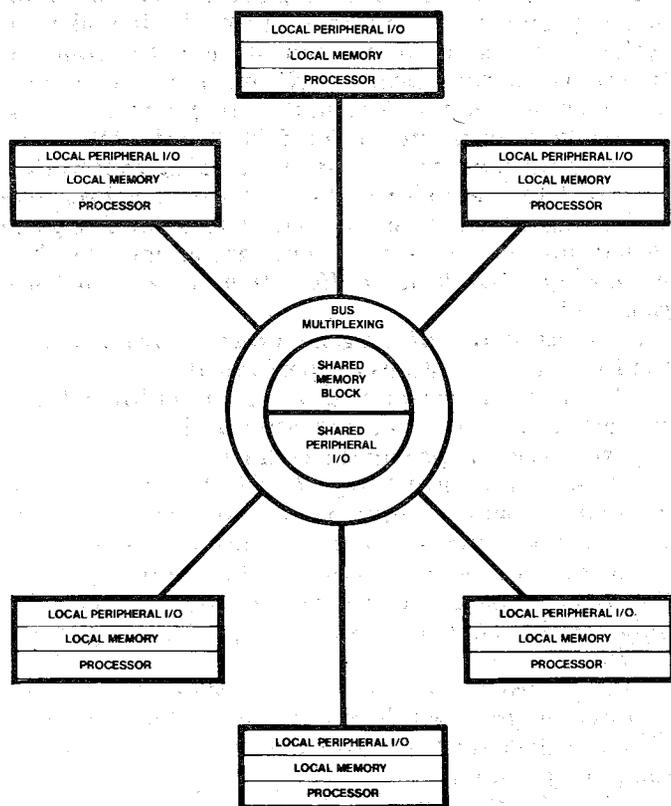
## IMSAI ANNOUNCES NEW MICROCOMPUTER MULTIPROCESSOR CAPABILITY

News Release

San Leandro, Ca.—A unique low-cost multiprocessing capability was recently introduced by IMS Associates, Inc., for use with the IMSAI 8080 microcomputer.

"Until now, multiprocessing was an expensive technique that was only possible with large computer systems," stated Ed Faber, national sales manager at IMSAI. "With an IMSAI 8080 multiprocessing system costing as little as two thousand dollars, you can handle a variety of complex applications, such as high-speed telemetry data acquisition and reformatting, and time sharing with simultaneous batch processing."

With the IMSAI multiprocessing technique, as many as six processors can be connected to a single shared memory block (or several non-contiguous memory blocks) of an IMSAI 8080 microcomputer. Each processor can operate either independently or on a shared basis with one or more I/O peripheral devices. The processors access the shared memory simultaneously on a priority basis. However, when two or more processors access the shared memory simultaneously, they are automatically sequenced according to a special pre-programmed priority status. Another unique feature of shared memory allows for semaphore resolution between processors.



IMSAI 8080 Multiprocessing System

The total memory allowed each processor is 64K bytes, less than the amount of the shared memory block. The IMSAI 8080 microcomputer chassis has room for several processors, or each processor may be installed in a separate chassis with its own control panel to facilitate monitoring and manual control.

The hardware required for the multiprocessing logic consists of a bus multiplexing board (\$399 assembled, \$325 unassembled), and—for each processor—a bus extension board (\$65). Delivery is within 30 to 60 days after receipt of order. The basic IMSAI 8080 microcomputer is \$931 assembled and \$599 unassembled.

IMS Associates, Inc. is a 4-year old company that has developed a large-scale intelligent disc system and a parallel array-based HYPERCUBE computer in addition to the IMSAI 8080. □

## RANDOM DATA

—Continued from page 1

Newsletters were received from two new areas this month. One is the New England Computer Society Newsletter, P.O. Box 198, Bedford MA 01730. Robert M. Tripp, Editor is doing a fine job with this newsletter. It's 12 pages (8" by 5½") with coverage of New England hobbyist activities. Subscription is \$6.00 per year. The other newsletter is CENOACA Newsbits, the official monthly newsletter of the Central Oklahoma Amateur Computing Association. Association dues are \$5 which includes a newsletter subscription. This newsletter runs about four pages, spirit duplicated to date, with excellent coverage of their club activities. Inquiries may be directed to Lee Lilly, Editor, P.O. Box 2213, Norman, OK. 73069. □

## ERRATUM

Volume 2, Issue 6, page 7 (List Command For The 6502). *The print subroutine location is 72C6 instead of 7216 (i.e. JSR 20 72C6 Print " ").* Five lines in the listing require correction. □

## PERSONAL COMPUTING '76

Personal Computing '76 will be a national gathering of manufacturers and users to discuss and exhibit microcomputers and it is open to the public. The weekend show is sponsored by the Southern Counties Amateur Radio Association of New Jersey, K2BR and is being held in the convention facilities of the Shelburne Hotel, Michigan Ave. on the famous Atlantic City Boardwalk. Experts in their fields will conduct many varied seminars and demonstrations on all aspects of personal computing for the beginner, the student, for the businessman and even advanced computer experts. The show will be held over the August 28th-29th weekend. Tickets are \$5.00 in advance or \$7.50 at the door and are available from Personal Computing '76, 503 W. New Jersey Ave., Somers Point NJ 08244. *Over \$5,000 in door prizes including 10 microcomputers will be given away!* □

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## AMI PROTO LOGIC DIAGRAM CORRECTIONS AND OTHER USEFUL INFORMATION

By Ray Boaz

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In my efforts with the AMI Proto Kits, several discrepancies have been found in the logic diagrams. In every case the PC board is correct; these are drawing errors only.

### Logic Diagram, Page 1

Repeated gates: IC5 has two gates with IN pin 4 and OUT pin 5 — the lower one should be IN pin 6 and OUT pin 7. IC26 has two gates with IN pin 6 and OUT pin 7 — the one on top should be IN pin 4 and OUT pin 5.

Wrong connections: See list below.

IC18-3 to IC26-10 should be IC-18-3 to IC5-2  
IC18-13 to IC26-6 should be IC-13 to IC5-10  
IC18-5 to IC26-2 should be IC18-5 to IC5-4  
IC18-11 to IC26-4 should be IC18-11 to IC5-6  
IC18-7 to IC5-6 should be IC18-7 to IC26-4  
IC18-9 to IC5-4 should be IC18-9 to IC26-2  
IC26-13 to IC5-10 should be IC26-13 to IC26-6  
IC26-11 to IC5-2 should be IC 26-11 to IC26-10

### Logic Diagram, Page 2

C5 should be .01 $\mu$ F not 6800  
C6 should be 200pF not 20pF  
C36 should be .047 $\mu$ F not .4 $\mu$ F.  
RP1 should be RP2 and 4.7K not 2.7K.  
RP2 should be RP1 and 4.7K not 2.7K.

### Logic Diagram, Page 3

S6810 RAM chip enabling E1, E2, E4 and E5 should be shown as E1, E2, E4 and E5.

### Logic Diagram, Page 4

C53 should be 4.7 $\mu$ F @ 75V not 25 $\mu$ F @ 100V. Edge connector B, pin 63 shown as pin 6. RS-232 output pins shown as RSL32.

Also along the way some useful information has been uncovered which I will pass along:

#### 1. 20mA current loop connections to TTY:

Edge Connector Pin	TTY Terminal Pin
B64	7 (Out +)
B66	6 (Out -)
B68	4 (In +)
B70	3 (In -)

2. If there is a problem with the Baud rate generator circuit, first try adding a 4.7K pull-up resistor from IC27-13 to +5V (a good place is at a feed-through hole near IC39-2).

3. AMI's 6800 chips do not have stringent restrictions on non-overlap of  $\phi 1 - \phi 2$  clocks.

4. Most surplus 555 timer chips will not operate properly in the Reset Circuit — buy a good one.

5. The "switchable" RAM on the board is not uniquely decoded when set in the low area. If you add more

memory (low address RAM), be sure to set the switch to the high area.

6. Unused gates: IC23-B (7437), IC25-C (8T97), IC55-A (74S10), IC62-B & C (74S08), IC63-A (74S00), IC64-A & B (8T97), IC66-D (7438), IC67-C & D (1488) and IC68-D (1489).

7. Modification to change from RS-232 I/O to a serial TTL I/O (such as a TVT I/O): (A) Remove the +12V (if it is being used it goes only to IC67 for RS-232 I/O). (B) Modify one 7437 as follows: bend pin 1 up and around to solder to pin 2, or cut off pin 1 where it emerges from the IC. (C) Replace IC67 with the modified 7437. Replace IC68 with a regular 7437. (D) Jumper +5V to +12V on the edge connector. A great deal of damage can result if +12V is connected to the +5V lines — be sure there is no +12V on the board.

This last modification works very well. I am using it with my TVT UART interface. However, this does result in  $\overline{\text{DATA}}$  on the interface between the CPU and TVT, so inverters must be added in the TVT UART I/O. This is good as they act as a buffer for the UART.

I have designs for the TVT UART interface and for interfacing the Bit Boffer with the AMI Proto. Anyone who has a Proto Board is welcome to them.  $\square$

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## CALL COMPUTER

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## BULLETIN BOARD

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Operating systems and general software for Intel 8080. Telephone Gerald R. Baugus anytime between 9:00PM and 6:00AM at System Services Specialists, 1350 Harrison Av., Redwood City, CA 94062. (415) 368-8169.

Project Support Engineering is making to the hobbyist an introductory offer to purchase a complete PACER KIT with all PC board assembled and tested for \$699. This is \$294 off the regular price.

The PACER is a complete desk-top microcomputer system. It utilizes the National PACE 16-bit MPU and a system monitor that gives you a complete set of control and debug functions. It is also available with National's SCAMP and — in the future — 8080 CPU.

The PACER KIT contains everything from case and unique displays to keyboard and assembled and tested PC boards. The kit can be assembled and operating within a couple of hours. Because this is an introductory offer, P.S.E. must limit the sales of kits to five to each club.

This offer is good until September 30, 1976. Interested club members should contact Daryl Becker at P.S.E. Be sure and include your club name. For more information, write Project Support Engineering, 750 N. Mary Ave., Sunnyvale, CA. 94086 or call (408) 739-8550. Out of state, call toll free at (800) 538-1798.

LO\*OP Center, Inc., Cotati, CA (707) 795-0405 is offering their course titled: *Data Processing Orientation For Office Personnel*. A fee is involved. The Center is looking for surplus equipment or parts to enhance their PDP 8 system; donations are tax deductible.

The TV Typewriter Cookbook by Don Lancaster is now available. It's full of information about TV display systems. Starting with basics and going on to cover ICs for TVTs, timing, cursor circuits, keyboards, interface circuits, hard copy and color graphics. Definitely an informative book that the computer hobbyist should have. It has 256 pages and the cost is \$9.95. The publisher is Howard W. Sams & Co., Inc. □

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## NEW PRODUCT

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Mullen Computer Boards has announced a new extender board/logic probe kit designed to fit either the Altair or IMSAI. It features logic level lights: red = 2.4 volts or greater, green = 0.8 volts or less and yellow = 0.2 second pulse HI/LO transition. A non-skid phonoprobe is provided to ensure good contact. Eyelets and jumpers in the power circuits allow convenient current measurement. The leads of the dual 50 read-out edge connector are specially formed to allow convenient access to bus signals. The PC board material is 1 oz. Cu on 0.0625" black FR4 board, which is solder plated and has 50μ" gold on the connector edge. The holes are plated through with 0.0015" Cu.

This product is available now for \$35 from Mullen Computer Boards, Blastmasters Inc., Box 31, Loma Mar, CA. 94021, or check your local computer store. □

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## THE COMPLETE & UTTER IDIOT'S GUIDE TO COMPUTER PROGRAMMING

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By Newett Awl

Anytime you set about to write assembly level code for computers, you find you have to do the same thing again and again. Suppose you want to move eight bytes of memory from one place to another. You may start by—

LXI	H, OLD ADD	Set memory access to old addr.
MOV	A, M	Get memory byte into A.
LXI	H, NEW ADD	Set memory access to new addr.
MOV	M, A	Put Memory byte in new addr.

But what now? Old address is no longer useful as a memory reference and neither is New address. Both were good for the first transfer but next time we execute the code we have, we will do exactly the same thing we did the first time — transfer the first byte from Old address to New address.

Increment. The word increment means increase by a measured amount. Now if we had made some provision for adding an increment (of one) to the memory access pointer (H&L), we could have added a nice increment (like one) to H&L and have used the result to get to the next byte.

LXI	H, OLD ADD	Set access.
MOV	A, M	Get it.
INR	H	Increment access.

Whoops, now when we set up a memory access like "LXI H, NEW ADD" we are in trouble again because H&L will then be destroyed unless we figure out a place to put them. AH HA! XCHG swaps registers D&E with registers H&L, so . . .

LXI	H, OLD ADD	Set source access.
MOV	A, M	Get it.
INR	H	Increment source access.
XCHG		Swap for destination access.
LXI	H, NEW ADD	Set destination access.
MOV	M, A	Store A at destination.
INR	H	Increment destination access.
XCHG		Swap for source access.

But now everything will be set up to the starting address if we jump back to the top of our program. We really need the LXI's only executed once. So:

	LXI	H, OLD ADD
	XCHG	
	LXI	H, NEW ADD
	XCHG	
BACK	MOV	A, M
	INR	
	XCHG	
	MOV	M, A
	INR	
	XCHG	
	JMP	BACK

—To be continued next month. □

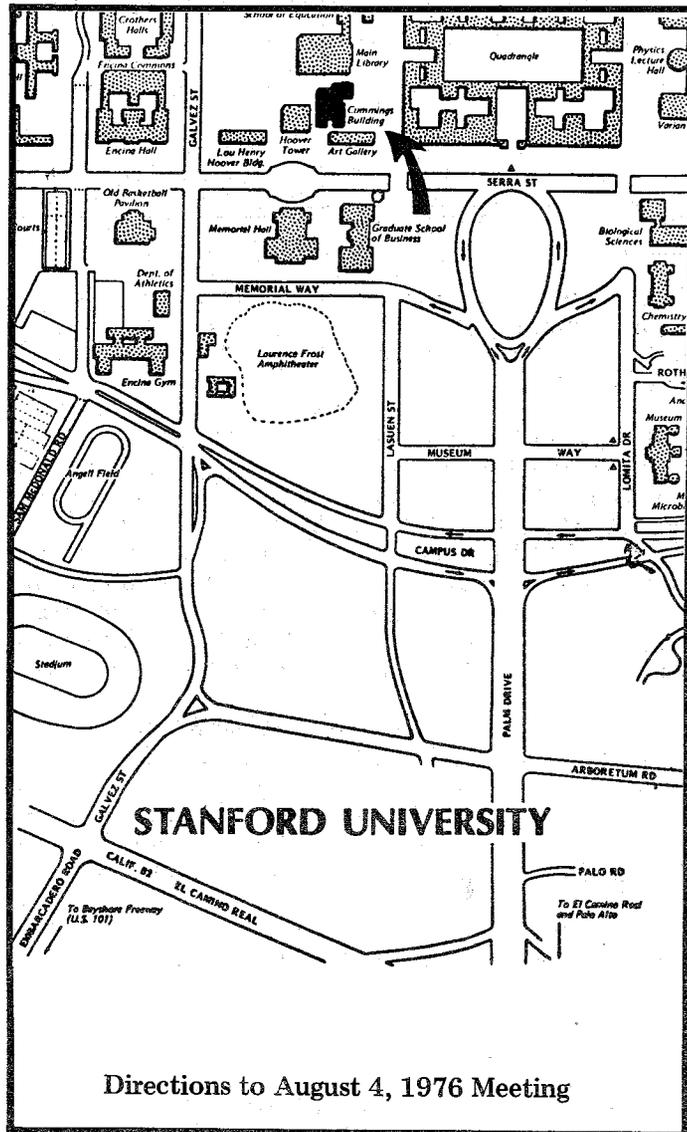
**Homebrew Computer Club  
NEWSLETTER**

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**HOME BREW COMPUTER CLUB MEETING**  
*Where & When*

The August 4, 1976 meeting is at the Annenberg Auditorium in the Cumming Art Building on the Stanford University Campus. Meeting time is 7:00PM. The map at right shows the location. Best bet for parking is behind the Main Library using Galvez Street or along Memorial Way. August 18th, September 1st and September 15th meetings are scheduled for 7:00PM at the Stanford Linear Accelerator Center Auditorium.



**HOME BREW COMPUTER CLUB  
NEWSLETTER**

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