Micro-8 Computer User Group
Cabrillo Computer Center
4350 Constellation Road
Lompoc, CA 93436

Hal Singer - Editor
June 20, 1976
Vol. 2, No. 6

Proposed Micro-8 Publication Schedule

Issue # 7 -- middle of Sept.
8 -- middle of Oct.
9 -- middle of Nov.

These publishing dates may be moved up if some very timely information or articles come in.

SCCS Newsletter Reprinting Service

Consideration of the SCCS newsletter reprinting service was on the agenda for the last board of directors meeting but some very important business is suppose to have tabled all scheduled agenda items so we will have to wait for word on whether they feel they can support this idea.

Experience With Suppliers

I just got thru placing several hundred dollars worth of component orders and thought I'd report my results:

1) Solid State Music, 2102A Walsh Ave., Santa Clara, CA 95050
Fantastic 5 day service. All items received except some 74LS157's which were not in the catalog but which I ordered anyway. The 5320 National TV synch generator chip only cost $4.95 and James has it listed for $18.95. Burgoon's boards and kits receive universal acclaim. This is where I intend to do my business in the future.
2) Electronic Discount Sales, 138 N. 81st St., Mesa, AZ
Fantastic 6 day service. I ordered the TCH cassette interface kit for $28.50. It came with a good quality plated-thru PC board, all IC's, resistors, and capacitors packaged and identified with the schematic part numbers and 2 unit select relays (12 volt). Certainly beats trying to round up all the parts by yourself. Their TV II kit at $115 may be a super buy.
3) S. D. Sales, PO Box 28810, Dallas, TX 75228
Excellent 7 day service. I ordered 2102-1's at 8/$12.95 and asked if there were more 1702A's available. I received Signetic 2LU2-1's and a free 1702A and data sheets on each. You can't argue with service like that!
4) Bill Godbout, Oakland Airport, CA 94614
Twelve day service and a real loser! I ordered 8 standard catalog items and they were out of 4 of them. Which ones? The ones I placed the order for in the first place, naturally. And how can you run out of 14 and 16 pin IC sockets? I have heard that there is a reliability problem with one version of his 4K Altair memory board.

Factory Prototyping Kits Are Great But Where Do You Get A Teletype?

One of the most exciting developments that will certainly benefit the computer hobbyist is the rapid proliferation of manufacturer's single board prototyping kits priced very attractively. Some Examples: 1) MOS Tech KIM ($245 assembled) 2) Fairchild F-8 ($185 assembled, $145 kit) 3) AMI 6800 ($149 partial kit, club purchase) 4) National SC/MP Kit ($99) 5) Intel SK 8080 ($399 ?), etc.

The biggest hangup the hobbyist has in utilizing these fantastic buys is that each has a monitor that requires use of a 20 ma current loop TTY and how many of use have one of those or the $1000 to get one? The monitors can be changed but that entails reprogramming and reburning PROMs. Adding a UART and current loop I/O to an existing TVT design is complicated and ends up costing close to $300 plus.

What we need is a cheap but versatile TV set video driver that will take a 20 ma current loop TTY. Rumor has it that RCA and maybe some other companies will soon announce TV video driver chips that will make the job easy but I'll believe that when Solid State Music stocks them. I would like to be the first (but a little competition would be welcomed) to announce a design for a device that meets the following specs for under $125 (hopefully under $100). Anyone willing to accept the challenge?

El Cheapo Glass Teletype Specifications

Display	- 16 lines of 32 or 40 characters with full scrolling & cursor Reset button clears screen Received character codes: Erase to beginning of screen Erase to beginning of line Backup cursor 1 character Carriage Return & Line Feed
Inputs	- Reset Pushbutton 7 ASCII lines & keyboard strobe (negative logic) 20 ma current loop receive (110 baud standard)
Outputs	- 75 ohm composite video output 20 ma current loop transmit (110 baud standard)
Power	- +5, -12, (+12 if necessary)
Other features desirable (but not necessary)	
	Upper/lower case Selectable baud rate Speaker for received bell code Selection of character line width (32/40/65 char/line) 20 or 24 lines
Price	- PC board and all components (IC's preferably socketed) Under $125 --- (Preferably under $100)

SWTPC 6800 Computer Newsletter

If you have an M6800 system you will definitely want to write Southwest Technical Products Corp., 219 W. Rhapsody, San Antonio, TX 78216 and ask them how to get a copy of their newsletter. The first is 50 pages and contains source code for an editor and micro-BASIC written by Robert Uiterwyk, 4402 Meadowwood Way, Tampa, Fl 33624 and Bill Turner as well as a bunch of other interesting programs. Their new graphics terminal looks neat but watch the fine print. It looks to me like you have to take the timing signals from the SWTPC TVT-II.

Robert Lenge's Visit To The US

Robert of Sao Paulo, Brasil stopped and visted many participants and companies on a swing around the US. He even visited us in Lompoc! (Where in the world is Lompoc?) He is heading back to Brasil with an F-8, SC/MP and hopefully a Digital Group Z-80 system. I'm sure he will be yelling for help to get all that stuff running soon. When he does, please send letters to him by airmail or they will take months to get there.

SUBSCRIPTION FORM

(copy if you don't want to mess up NL)

☐ .....Volume 1 back issues 1 thru 4 $3.50
(56 mice-type pages)
☐ .....Volume 1 back issues 5 thru 12 $6.00
(186 mice-type pages)
☐ .....Volume 1 combination 1 thru 12 $8.00
(the principal is on my back because we have too many boxes cluttering up the computer center)
☐ .....Volume 2 issues 1 thru at least 9 $6.00

Name _____

Address _____

_____

Zip _____

Telephone No. _____
(may be published -- leave blank if you prefer)

Please also include a little note describing your equipment, plans for the future, experience, etc. Thank you.

Computerising A TV Game by Gary Schober

(note: Reprinted from the Amateur Computer Group Of NJ Newsletter, UCTI, 1776 Raritan Rd., Scotch Plains, NJ 07076 - Worth joining for $2.00/yr)

The following information covers the computer games system I demonstrated at the last ACG meeting. The game is a General Instruments AY-3-8500-1, which is preprogrammed to play six games; tennis, hockey, squash and practice or rifle shooting. To the basic circuit, I added the colorizer and KIM I/O circuitry. The output of the colorizer circuit will drive the video input of a standard color monitor. Note that additional circuitry is required to interface the unit to a color TV receiver.

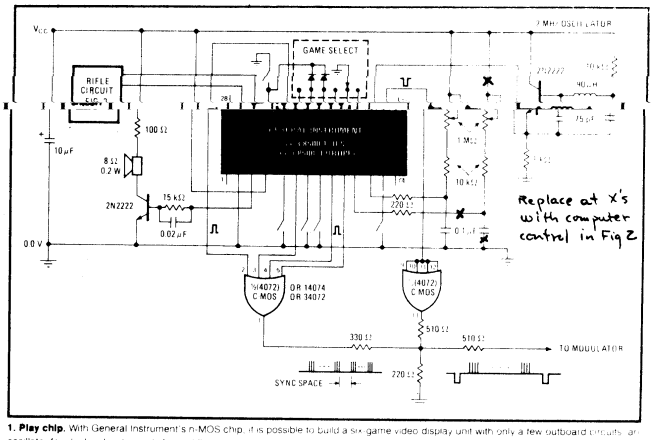
The game can be interfaced to the microcomputer so that the computer assumes the role of the opponent and you can play against the computer. Warning; it is very difficult to beat the computer! The KIM program is listed below. The program is easily loaded using the keyboard/display on the KIM computer. Have fun!

TV Game Program 6502-KIM

Label	Address	Op Code		Comments
SETPIA	0100	A9 01	LDA	LOAD 01
	0102	8D 01 17	STA	SET UP I/O: PA7=Ball (input) PA6=Bat (input) PA0=Output (error)
BALLCK	0105	2C 00 17	BIT	Test for Ball (PA7=1)
	0108	30 02	BMI	To Output ones; if N=1
	010A	70 0D	BVS	To Output zeros; if V=1
	010C	A9 FF	LDA	Load PA0 with one
	010E	8D 00 17	STA	Store in PIA @ 1700
Batchk	0111	2C 00 17	BIT	Test for bat yet?
	0114	10 03	SPL	To output zeros if N=0
	0116	4C 05 01	JMP	Jump back to BALLCK
	0119	A9 00	LDA	Load PA0 with zero
	011B	8D 00 17	STA	Store in PIA @ 1700
	011E	4C 05 01	JMP	Jump back to BALLCK

PIA = 1700 PA7 = Ball Input PA6 = Bat Input PA0 = Output

(Note: the printing in my copy was rough. What you get is what I could see when I retyped it and redrew the schematics. See ELECTRONICS, June 24, 1976 for a fascinating article on video games -- must reading!)



1. **Play chip.** With General Instrument's n-MOS chip, it is possible to build a six-game video display unit with only a few outboard circuits: an oscillator for clock pulse, two pots for paddle control, loudspeaker, and video processing circuits, plus a video modulator not shown.

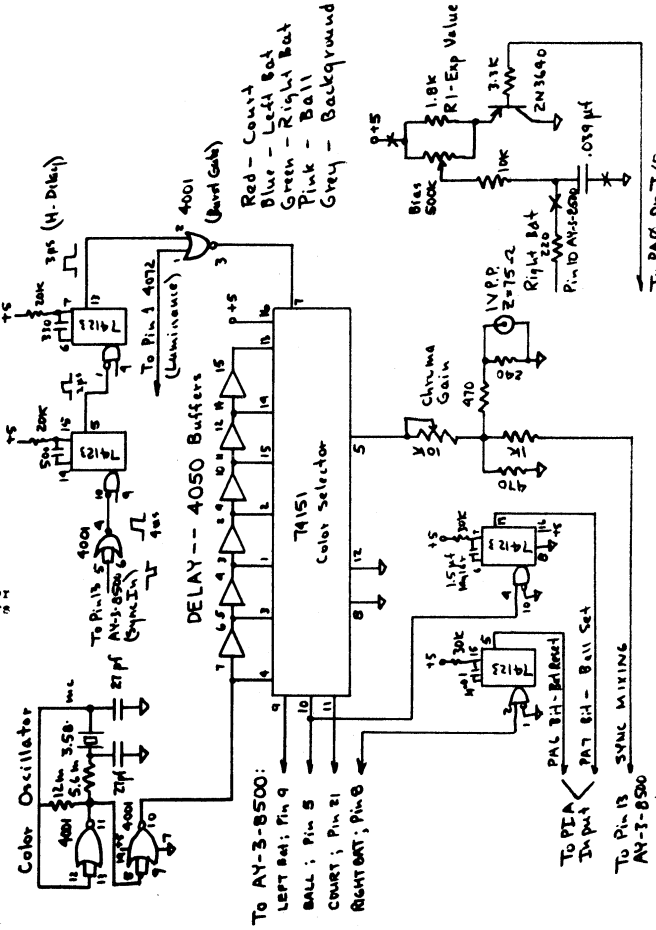


Fig 2. Colorizer & KIM I/O For AY-3-8500 Game
By G. Schober 4/76

IMPLEMENTING A SOFTWARE CURSOR FOR A SUDING/D.G. TV READOUT

Soon after the initial enthusiasm of toying with a Suding/Digital Group TV readout has worn off, the inevitable question will come to mind -- WHERE IS THE CURSOR? Am I going to have to count off the spaces? #%&*@#% ! The Suding TV readout presents to the hobbyists one, if not the most, inexpensive forms of output available today. Its only drawback being the lack of a cursor. A simple solution that has been proposed is filling the screen with periods rather than blanks on a home erase command -- so a dot marks the spot. We shall explore a more acceptable approach at obtaining a software cursor.

Recognition is in order to Phil Mork for his suggestions and modifications to the earlier Suding TV Readout (See Digital Group Clearinghouse Vol 1. No. 1). These modifications have been incorporated in the present generation of TV Readouts. The mods basically allow the moving the "invisible" cursor forward without writing or erasing. This allows the positioning of this "invisible" cursor anywhere on the screen, thus creating a so called "pseudo" cursor. Now, if we could only see it!

All we need is a little software! The procedure is as follows:
1) We define our cursor to be an ASCII underscore "_" (137_8);
2) Everytime a character is to be inputed, the cursor is written on the screen and then the "pseudo cursor routine" is called upon to advance the invisible cursor 511 positions. Thus the input will overwrite the visible cursor! Simple, right? It should be obvious that the cursor is only effective and needed when inputing from the keyboard. The program output does not need it, only the human at the keyboard. Therefore, any cursor routine such as this one should be tied to the keyboard input routine only. When the input routine is called, it will output the visible cursor and then reposition by advancing 511 spaces, then the routine should fall through to the regular input routine. Now admit it, it is simple!

Below are 8080 listings for the software solution to the problem:

```
LINE ADDRESS BY1 BY2 BY3  LABL   OPERATION      COMMENT
0010 006 000 305          CURS:  PUSH  B        Save register status
0020     001 076 337             MVI   A,"_"    Load cursor
0030     003 315 372 000         CALL  WRCHR    Write it on TV
0040     006 001 377 002         LXI   B,255,2  Load B,C w/no. of
0050                                            spaces pseudo cursor
0060                                            is to advance
0070     011 315 036 006         CALL  PSCUR    Advance pseudo cursor
0100     014 301                 POP   B        Restore register used
0110     015 333 000       IN  : IN    0
0120     017 376 200             CPI   '200'    Strobe present?
0130     021 372 015 006         JM    IN       Wait for strobe
0140     024 365                 PUSH  PSW
0150     025 333 000       NIN : IN    0

LINE ADDRESS BY1 BY2 BY3  LABL   OPERATION      COMMENT
0160 006 027 376 200              CPI   '200'    Strobe present?
0170     031 362 025 006          JP    NIN      Wait for no strobe
0200     034 361                  POP   PSW
0210     035 311                  RET
*
*
0220 006 036 376 001      PSCUR: MVI   A,1      Load cursor advance
0230     040 315 372 000         CALL  WRCHR    Output it
0240     043 015                 DCR   C
0250     044 302 036 006         JNZ   PSCUR    Advanced one page?
0260     047 005                 DCR   B
0270     050 302 036 006         JNZ   PSCUR    Advanced all?
0300     053 311                 RET
*
*
0310 000 372 323 000      WRCHR: OUT   0        Output to TV
0320     374 257                 XRA   A        Clear A
0330     375 323 000             OUT   0        Output to clear
0340     377 311                 RET
```

Some of these routines (IN, WRCHR) are very likely to reside in your present system so the routine is not as long as it first appears. Next month a 27¢ modification to the readout will be presented which will cut the software overhead required for the cursor routine by half. If in the meantime you have any questions feel free to contact me--Roberto Denis 11080 N.W. 39 ST. Coral Springs, FL 33065

Micro-8 Newsletter
Cabrillo Computer Center
Lompoc, Calif.

8 June 1976
331 Poplar St.
Winnetka, Ill. 60093

Dear Hal:
I had the pleasure of witnessing The DIGITAL GROUP's presentation in Milwaukee on 22 May and Chicago at the CACHE meeting on 23 May. I was very impressed with many aspects of their operation.

They have a very clearly defined and explicitly stated set of technical and business philosophies. Much of it is contained in their literature. They have an approach that is going to provide total performance to their customers; the whole will be greater than the sum of the parts, it seems to me.

Contrary to most designers - who start with a CPU chip and design outwards from it (good industrial practice) - Dr. Suding, based on his experience in ham radio and his appreciation for the hobbyists needs, has started with the peripherals and designed inwards towards the CPU. This has a number of very important results.

1) CPUs come and go, but your peripherals live on forever - well, almost. The outside in design approach means that a new CPU does not obsolete all your peripheral interfaces. If you decide to upgrade your CPU, you don't have the tremendous expense and trouble of changing everything else.

2) A major expense for a system is memory. If you have bought good memory chips to begin with, changing the CPU will not affect your memory boards. The bus for the memory is not dependent upon special characteristics of the CPU, so again, you can change the CPU without having to reinvest in new memory boards.

3) To change to a different or new CPU means changing only one board. Everything else works just as before. Of course, the software may be different and we are always talking about 8-bit systems.

All the CPU boards in their system come with EROM and 2K of RAM. As soon as you turn on the power it displays a message telling you to load the operating system cassette. This done, you can immediately use the keyboard to enter programs or select a demonstration program already on the cassette that comes with the system. Right away your wife and kids can use the computer themselves. That's the kind of total performance I like - it helps in buying 8K more memory soon!

During his discussion, Dr. Suding switched from one CPU to another to another and had each up and doing things in the time it took to speak only a few sentences. All it took was swaping the CPU cards and the operating system cassettes. An ordinary home cassette recorder of reasonable quality is all that is needed. Both the "3-board system" (2K of RAM) and "4-board system" (10K of RAM) come with a cassette interface (110 baud) and a TV-monitor interface. Both of these systems include a mother board and an I/O board with 4 input and 4 output ports. The user has 2 7/8 input and 2 7/8 output ports available for his use.

Two important aspects of the DIGITAL GROUP's business philosophy the hobbyist should be aware of are:

- They do NOT formally announce a product until it is ready to go into production and can be delivered as advertised. (Of course, a forthcoming shortage of common IC types that some are predicting will foul up all our suppliers.)

- They provide many options in their catalog. This can be confusing, but it does allow you to save money by using things you already have.

I built my "3½" board system over Memorial Day weekend. (I already had a bunch of 91L02s on order from another source, so I got the 3-board system plus the memory board with everything except the memory chips.) I worked slowly and carefully. It took 15 3/4 hours to assemble the boards. In all my double and triple checking, I still managed to assign the I/O ports to 60 - 63 instead of 0 - 3. As soon as I corrected that error the message "Read 8080 INITIALIZE Cassette" appeared. Very satisfying! I did find that the clock frequency was not quite right and sometimes did strange things. It appears that the crystal is marginal and at the time of writing this letter they are sending me a replacement.

So far, I am very well satisfied and it looks like I will continue to be. This is because of their total performance package. First I will spend considerable time with their "EDUCATOR" software cassette package. This shows the contents of the CPU registers in such anamner that you can readily see the effect of each mnemonic machine language command as it is entered. It should really enable me to learn the 8080 command set. Then I will begin working with their "TINY BASIC EXTENDED" cassette and have some fun with their game cassette packages. In each case, all I have to do is pop in the cassette and the monitor screen will tell me what choices I can make on the keyboard. Incidentally, the operating system cassette contains routines to test memory, test the CPU interrupt handler, and to make the system perform as a frequency counter, as well as cassette read or write, keyboard program, register, flag and stack pointer display, and storage dump.

They have other products I saw in operation - the Zilog Z80 CPU, half a megabyte of storage on two Phi-decks (built to Dgital Group specs) complete with its own operating system, and others. The Zilog looks fantastic! Dr. Suding apparently was the first peron in the country to have the Zilog going in a system - it was just 3 weeks after the factory made its first chips.

Now that the DIGITAL GROUP has started to advertise (June magazines) and their volume picks up, it will be interesting to see how they manage themselves. I expect they will encounter many of the difficulties that other new, successful companies in this hobby business encounter. They do have interesting products and appear to have a unique approach.

Yours truly,
Chuck Douds
Charles F. Douds

SPEECH TECHNOLOGY CORPORATION

Thank you for your inquiry on the Model 200 Voice Generator. A product bulletin and price list are enclosed.

You will note that the Model 200 contains a general-purpose vocabulary suited to many system and instrumentation applications. It is easily interfaced with 7 or 8--level parallel data sources, such as tape-punch interface, or (with optional RS-232 interface) to serial data sources, such as a Teletype controller.

However, the technology and functional elements of the Model 200 lead to tailored configurations of extraordinarily low-cost. For example, a multichannel voice-generator, operating from computer-stored vocabulary data, can be supplied at less than $500 in 100 quantity (with single voice channel). Additional voice channels, operating simultaneously and independently from the same vocabulary, can be supplied at about $200.

The standard Model 200 is deliverable in two weeks. Optional serial interface and memory extension can be delivered in six weeks.

Please call or write me if you would like further information.

631 Wilshire Blvd.
Santa Monica, CA 90401
(213)393-0101

Yours sincerely,

John E. Stork
President

Page 2

RICHARD GATES, PO BOX 756, KENTFIELD, CA 94904
I HAVE AN ALTAIR 8800 WITH 20K, CASSETTE INTERFACE, TTY INTERFACE, BYTESAVER, AND A DISK SYSTEM COLING UP IN THE FALL. I TEACH EDUCATIONALLY HANDICAPPED STUDENTS AT THE HIGH SCHOOL LEVEL AND USE THE ALTAIR AS A MOTIVATIONAL TOOL.-NON READERS AND POOR WRITERS AS WELL AS KIDS WITH LOW MATH SKILLS, NO LOGICAL THINKING ABILITY-REALLY DIG THE COMPUTER AND IN THE PROCESS OF PLAYING GAMES, TYPING RESPONSES, LEARNING A LITTLE BASIC , ETC.. . ARE IMPROVING ALL OF THE ABOVE SKILLS THAT EVERYONE HAD GIVEN UP ON THEIR LEARNING LONG AGO!!
MY PROBLEM IS THAT I DON'T KNOW MUCH , IF ANYTHING ABOUT COMPUTERS-EITHER HARDWARE OR SOFTWARE. AS A RESULT A LOT OF COMPUTER POTENTIAL IS BEING WASTED. I NEED ALL THE HELP I CAN GET IN OBTAINING PROGRAMS THAT WILL BE USEFUL IN THE SETTING I JUST DESCRIBED. "THE QUICK BROWN FOX" IN THE APRIL ISSUE OF INTERFACE IS A GOOD EXAMPLE OF WHAT I NEED. ALSO, I NEED TO FIND SOME PEOPLE IN MARIN COUNTY . WHO WOULD HELP ME GET THE SYSTEM UP WHEN IT BOMBS. WE LORE A LOT OF VALUABLE TIME BECAUSE OF MY LACK OF TECHNICAL KNOW HOW.
ALL SUGGESTIONS WILL BE GREATLY APPRECIATED.

Richard Anderson, 1000-B Lund St., Austin, TX 78704 (512) 441-2655 is just getting started with computers but has been working as a microwave radio repairman. He is now a geologist with the Univ. of Texas and his first system will be an AMI 6800. He is interested in seeing more about vocal output.

WILLIAM E. SEVERANCE, JR.

TELEPHONE
207 925-2271

MAIN STREET
CENTER LOVELL, MAINE 04016

May 20, 1976

Dear Hal,

Sorry not to have written in such a long time. First, I'll compliment you on the continuence of the NL and its tremendous usefulness to the hobbyist.

I've finally completed work on my Monitor and Loader Program for the 8008 along with full documentation of the source code and hardware add-ons. As indicated in the enclosed "ad" which you may wish to run in the NL, I am offering a 47 page Packet to interested readers for $7.50 postpaid. In writing the program, I've tried to make all commands as easy to use as possible and still stay under 1K memory usage. If you'd like, I'll send you a free copy in appreciation for what you've done for us hobbyists.

Although the program development itself took only a week, the write-up of the source code required nearly a month of sporadic typing. Hence, I've decided not to release my 4k text editor TEXTED to the public as hand assembly and documentation of the source code is too time consuming. I know this is exactly the type of software people are looking for, but I cannot take the time from my other work to prepare it. Any suggestions on how to distribute such programs would be appreciated.

I finally gave up on my Sudding Cassette circuit and purchased a National Multiplex Corp. CC-7 Digital Data Recorder ($149.00 -- see ads in BYTE). Delivery time by UPS was great -- only 8 days. And, the unit has performed flawlessly at 300, 600, 1200, and 2400 baud. After several long dumps and recoveries of an entire 12K at this latter rate, I feel confident to use 2400 baud for all my storage. They have also announced the CC-7A which has a variable motor speed control allowing for the matching of one recorder to another of the same or different users. ($169.00 I think).

Scelbi's Galaxy Game for the 8008/8080 is really great! Running in 4K, it embodies nearly all the commands and excitement of the BASIC and FORTRAN versions of STRTRK. Their well documented book is available for $14.95. See the ad in BYTE for details.

The best news for me is that I've finally entered into a purchase contract for DEC's new DATASYSTEM 310 W word processing system for use in our real estate business. Based around the PDP-8 processor, it features dual floppy disc drives, 24x80 character CRT, and 540 wpm letter quality printer. Delivery is to be before Aug. 17. I may also be purchasing their scientific operating system giving me FORTRAN, BASIC, and assembler. So, while I'll always retain a fondness for the 8008, it's on to better things!

Sincerely,

Bill

William E. Severance, Jr.

NOW READY

OS-8 MONITOR AND LOADER PROGRAM

FOR THE 8008

Fingers tired of flipping those sense switches? Go bananas with every crash or power failure? The answer is simple: Burn into 1K of 1702A or 5204 pROM the OS-8 Monitor and Loader Program. Featuring eleven human-engineered commands, it allows full control of the loading and examining of memory, octal or hex dump, initiation of execution at any address, and the reading, writing, and control of cassette tape mass storage.

Software/Hardware Packet Includes:

25 pages of source code which also contains many useful routines for octal input, octal or hex output, ASCII text output, cassette handling, etc.

12 pages of operating instructions including many examples.

Schematics and documentation for 256 level hardware Pushdown Stack, Serial-Parallel Interface and Controller for use with Suding or many other Cassette Modems, pROM interface.

Although I am not attempting to make a profit on the M&L Program, I must charge $7.50 postpaid for the complete package to cover my printing and mailing costs. Since I do not know what the response to this offer will be, it will be necessary to delay printing until fifteen orders are received. If this number is not reached, I shall return, uncashed, your check by July 1, 1976. Unfortunately, Xeroxing is out of the question, coming to about $12.00 for the entire package.

If you have any questions about the M&L, or would like to place your order, contact:

WILLIAM E. SEVERANCE, JR.
Center Lovell, Maine 04016
Tel. (207) 925-2271

Concordia Lutheran High School

1601 ST. JOE RIVER DRIVE • FORT WAYNE, INDIANA 46805 • 219 483-1102

GUENTHER K. HERZOG, PRINCIPAL
WILLIAM C. BECKMANN, VICE PRINCIPAL

May 13, 1976

We are about to order a microcomputer system for use in our school, being compelled by finances to implement a low cost computing system. Our principal uses will be teaching of programming in the BASIC language and running educational simulation programs.

We would appreciate it if you would share with us any information you might have about the reliability of the following systems.

1. Altair 8800
2. IMSAI 8080
3. SWTP 6800

The components we are considering are listed in the general description on the attached page.

Your comments on such things as difficulties in kit building, quality of BASIC software, ongoing maintenance, and manufacturer support would be very helpful.

Please feel free to respond with informal notes. Whatever information you can send will be very much appreciated.

Sincerely,

Donald K. Gayer

Donald K. Gayer
Coordinator Educational
Computer Concepts Curriculum
Project

P.S. We have heard rumors that there is a university writing BASIC software for the 8080, but we have not been able to find out which one. We would appreciate any information you might have about this too.

Member North Central Association of Colleges and Secondary Schools

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Editor - Micro 8 Newsletter
Cabrillo Computer Center
4350 Constellation Road
Lompoc, Ca. 93436

Dear Hal; May 6, 1976

Good news and bad news. I still don't have the CW program from the keyboard finished nor the 360 cross assembler though both are over 3/4 done. I am taking 7 credits this term through UCSB Extension and I'm swamped with work. One class is writing a compiler and the other is writing an operating system including a Virtual Machine simulator. I understand the same project was done at Vandenburg so you may be familiar with it.

On the good side, I got one of the Sargents Dist Co. keyboards and it really looks good. I haven't had time to interface mine yet but Bill Cowley has his running. I'm working on getting my Model 15 Teletype interfaced to my 2 Meter FM equipment. I hope to be on 146.58 and 146.10-146.70 late this month or early in June. (My call is WB6JKK). Dave is working on the ASCII to BAUDOT boards and we both hope to have hard copy this summer. Pete's Electronics 3007 Ventura Blvd Oxnard, Ca. 93030 (Highway 101 between Rice and Almond off ramps) is now an IMSAI dealer and has a lot of other surplus electronics including some really great Teletype test sets 37.5 to 9600 Baud, 5,6,7,and 8 level code, internal test message on a diode matrix plug in board, distortion switch selectable 0 to 49% and other features. Mine works like a champ.

73

Glen Charnock

Glen Charnock WB6JKK
560 W. Gonzales Rd.
Apt. 22
Oxnard, Ca. 93030

May 9, 1976.

ROBERT B. LEGGE
PO Box Nº 30.069 /Ave Alvaro Ramos 1142
Zip Code = 01.000 São Paulo, Brasil.

Dear Hal:

Following your recommendation, on April 7 I sent TINY BASIC $ 3,00 for the first three issues of Dr. Dobbs Journal etc. and another dollar for airmail postage, which amount proved to be grossly insufficient. Nevertheless, TINY BASIC have already Airmailed me the first three issues of their N.L. and I consider it very good indeed.

To continue, of course, they need more subscriptions and I hope you might request all readers of your m8 NL to support their enterprise, by sending $ 10 for one year's subscription (ten issues). Foreign postage or Airmail is extra, of course. I am continuing my own subscription with them, and of course sending them the extra airmail postage.

Your newsletter continues to arrive quickly, by Air. I hope you will get around to answering some of my letters & queries, soon. Please publish my revised address as above - our P.O. Box number has been altered.

Best regards and good wishes - Sincerely:

Rob Legge

Page 3

SPECIFICATIONS FOR MICRO-COMPUTER SYSTEM

Micro-computer with CPU board, cabinet, power supply and expansion capability
Bootstrap loader on ROM or PROM
16K RAM TO 32K RAM
Serial I-O interface with two RS-232 Ports
Single floppy disk drive
Extended BASIC Software (Multi-user)
Disk operating system software
Should be able to handle TTY type terminals in a Time-Share mode (program simultaneously)
Diagnostic software to help pinpoint electrical malfunctions

* * * * * *

We hope to expand at a later date to include dual floppy disk and CRT or flatbed graphics.

Contact Person
Donald K. Gayer, Coordinator
Educational Computer Concepts
Curriculum Project
Concordia Lutheran High School
1601 St. Joe River Dr.
Fort Wayne, Indiana 46805
219-483-1102

TO: Computer Clubs
Dear Members:

May 10, 1976

Enclosed you will find the installation instructions for my 32 to 64 character/line TVT-II modification board and 2K memory board. Radio Electronics has had my article on this subject since early February but will not make a decision on publishing it because they feel there is not sufficient interest in computers to warrant publication. You and I know that they are wrong and I felt that everyone would want to know about the design before RE catches on. Please bring all of your Club member's attentions to the enclosed instructions. The modifications can be made easily by wire wrapping or they can purchase a set of boards. My TVT-II has been modified since early October and I am using a very old TV with no bandpass problems.

The boards I am offering are fine quality MIL-STD with tin/lead fused plating and plated through holes. The boards are also silk screened on the component side for easy assembly. My board manufacturer is tooled up for manufacturing the boards and can guarantee shipment within 3 weeks after receiving orders. I also have layouts complete for an uppercase/lowercase auxiliary board for the TVT-II as well as the computer controlled cursor interface mentioned within. These boards will also be provided if there is enough interest.

Please provide this information to all of your members. Board prices are $5.00 for the auxiliary board, $12.00 for the 2K memory board and $16.00 for the set. Shipping is included in these prices. Texas residents add 5% tax. Please make checks payable to Digital Designs.

Digital Designs
P. O. Box 4241
Victoria, Texas 77901

Sincerely yours,
David O. Valliere

David O. Valliere

P.S. Please excuse the poor quality of these reproductions. The instructions shipped with boards will be photo offset.

DIGITAL DESIGN

TVT-II
32 TO 64 CHARACTER/LINE MODIFICATION

If you are using your TVT-II as a computer I/O you may have found the 32 character/line format somewhat limiting. By making minor modifications to the TVT-II board you can lengthen the 32 character line to 64 characters/line and thereby expand your system's capabilities.

The TVT-II memory is continuously being addressed through nine address lines to generate the vidio data used by the television display. The tenth address line (A9) is used to switch from page one to page two. By using the A9 address line for continuous addressing, the TVT-II can be modified to display 64 characters/line. Since the additional 512 characters being displayed are what used to be page two, additional memory will have to be added to provide storage of a second page.

HOW IT WORKS The basic design of the TVT-II make the modifications required to make it display 64 characters/line quite simple. IC21 and IC14 on the main TVT-II board normally count up 32 characters and upon reaching the 33rd count pin 11, IC14 and address A0 go high which disables the "dot clock" until the next line is started. Being in the 33rd character position also enables the vidio blanking circuit through IC12C and IC5B. With the "dot clock" disabled and the vidio blanking circuit enabled the line is blanked until a new line is started. By allowing the vidio generation and the "dot clock" to continue operating until the 65th character position is reached, 64 characters/line will be counted. This can be done by disconnecting pin 11, IC14 from the vidio blanking circuit and connecting it to address line A9, after having disconnected A9 from the page 1-2 flip-flop. Pin 11, IC14 is also tied to pin 14, the input of the unused counter in IC14 whose output (pin 12) is then tied to the vidio blanking circuit. Thus we have effectively added an additional 32 counts to the address lines through pin 12, IC14 and transfered the vidio blanking function to the 65th character position through pin 12. Since the RC oscillator network of the "dot clock" IC18B was originally tuned for 32 characters/line, capacitor C4 will have to be replaced with an 8 pF unit to provide the dot rate required for 64 characters/line.

Since we are now addressing the memory continuously through ten address lines/page, the cursor compare circuitry must be modified to provide comparison of the A9 address bit. This modification will require providing an additional cursor position count bit and a comparator. The designer used a 74193 BCD counter to allow preloading the additional cursor bit through a computer cursor position interface and still minimize the components required. The additional 74193 (IC1, FIGURE 1) is attached to the carry and borrow bits of the original cursor counter IC35 after disconnecting them from the 5th bit flip-flop IC27A. Carry and borrow bits are generated by the new counter through nand gates IC4A and IC4B and are sent to the original 5th bit flip-flop IC27A. The cursor count bit generated by IC1 is tied to pin 15, IC42 on the main board and compared with the A4 address bit. The output of the 5th bit flip-flop IC27A which was originally compared with the A4 address is brought on to the new circuitry and compared with address A9 by the comparator IC2. The cascaded "=" pulse from IC42 on the main board is inputed to IC2 whose output "=" pulse is sent to IC41. Thus we have provided an additional cursor count bit which is compared with address A4. Our new A9 address is compared to the old 5th bit flip-flop whose output has now become the 6th bit count. IC42 and IC41 on the main board IC2 in the new circuit provide the compare pulse required to position the cursor on the 64 character line.

Since we are now addressing the full 1024 addresses in the memory continuously, an additional six 2102's will be required to store a second page of data. By tieing the CE pins of each group of memories to pins 8 and 9 of the page flip-flop IC27B the pages will role over as originally designed.

ASSEMBLY The modifications will require cutting the foil traces at several points on the main board. This can be done quite easily with a single edge razor blade. Care should be taken to avoid getting the small pieces of foil removed in between the pins of the ICs on the board. Several jumper wires must be installed from the main board to the auxiliary cursor count board. These jumpers should be made with 26 Ga. or finer insulated wire cut as short as possible. Loops and crossovers should be avoided to minimize noise.

To provide the 64 character count the following connections should be made on the main board.

( ) Cut the trace between pin 11, IC14 and pin 9, IC12.

( ) Connect pin 11, IC14 to pin 14, IC14.

( ) Connect pin 12, IC14 to pin 9, IC12.

( ) Cut the trace between pin 9, IC27 and J7-9.

( ) Connect pin 11, IC14 to J7-9. This is the new A9 address line.

The cursor modifications can now be made. The new cicuitry is contained on the 3 in. by 2 in. single sided board shown in Figure 2. This board has been designed to be mounted directly above the +5 v. and GND buses which run across the center of the main board. Mounting of the board should not be done until all other connections are complete. The components should now be mounted on the board from the silk screened side. Refer to Figure 3 to verify component positioning.

( ) Mount IC1, 74193 BCD counter.

( ) Mount IC2, 7485 comparator

( ) Mount IC3, 7404 hex inverter

( ) Mount IC4, 7400 quad nand gate

( ) Mount C1, 0.1 mfd disc capacitor

The following cuts and connections should now be made on the main board.

( ) Cut the trace between pin 9, IC28 and pin 13, IC35.

( ) Cut the trace between pin 10, IC28 and pin 12 ,IC35.

( ) Cut the trace between pin 12, IC35 and pin 11, IC33.

( ) Cut the trace between pin 13, IC35 and pin 13, IC33.

Page 4

( ) Connect pin 9, IC28 to pin 13, IC33.

( ) Connect pin 10, IC28 to pin 11, IC33.

( ) Cut the trace between pin 6, IC42 and pin 3, IC41.

( ) Cut the trace between pin 15, IC42 and the plated through hole immediately adjacent to IC42.

We are now ready to make the following connections from the main board to the auxiliary board.

( ) Connect pin 14, IC35 to B

( ) Connect pin 11, IC34 to C

( ) Connect pin 12, IC35 to D

( ) Connect pin 13, IC35 to E

( ) Connect the plated through hole adjacent to IC42 to G

( ) Connect pin 15, IC35 to H

( ) Connect pin 11, IC33 to J

( ) Connect pin 6, IC42 to K

( ) Connect pin 3, IC41 to L

( ) Connect pin 11, IC14 to F

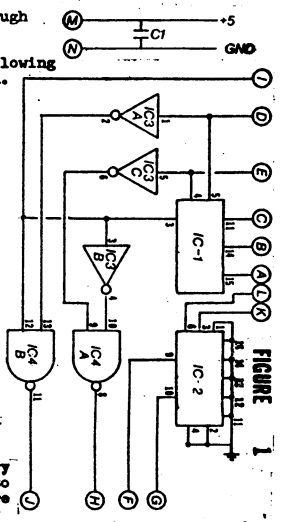


FIGURE 1

NOTE: Connection point A is for the cursor count preload a will not be made at this time.

( ) Mount the auxiliary board on the main board using heavy gauge wire. M is connected to the +5 volt bus and N to the GND bus. Note that the M & N connecting points are positioned such that the board can be mounted directly above the bus traces running across the center of the board.

( ) Replace the 38 pf capacitor C4 on the main board with an 18 pf capacitor.

MEMORY MODIFICATIONS Modification of the original memory is not required if you do not need two pages of I/O. If you would like to have two page capabilities two methods are available. You can use the 2 memory board shown in Figure 4 or you can piggyback the additional memory onto the original TVT-II memory board. If you are using the 2 K memory board the instructions are given below.

2K MEMORY INSTRUCTIONS The 2K memry board not only provides two page storage for the 64 character/line TVT-II but also provides storage of the seventh ASCII data bit. Storage of this bit is essential for complete communications to the computer when using the Screen Read option. The original TVT-II memory board does not provide this capability.

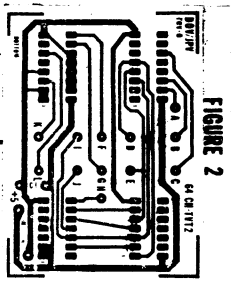


FIGURE 2

( ) Install capacitors C1-C14, 0.10 mfd. Note: These are decoupling capacitors and are not necessarily needed, however at least one should be present on each column (C8-C14).

( ) Install connectors J7 and J8.

( ) Connect pin 8, IC27 to J7 terminal 10 on the main board.

( ) Omit this step if sockets are used. Solder ICs Z1-Z6 and Z8-Z13, 2102 memories to the board using care to avoid solder bridges. Refer to Figure 4 for proper positioning. Note: These are MOS devices and care should be taken to avoid static discharge to the pins. Use only a fully grounded soldering iron.

( ) Solder in ICs Z7 and Z14 if the board is to be used with the Screen Read option.

( ) If sockets are used solder in place and carefully load ICs Z1-Z6 and Z8-Z13, 2102 memories as stated above. Load ICs Z7 and Z14 if the board is to be used with the Screen Read option.

( ) Connect a short length of wire to pin 9, IC27 on the main board. The other end of this lead is to be connected to the CE terminal on the memory board. This connection should be made with some type of slip on connector to facilitate easy removal of the memory board.

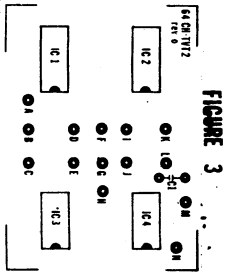


FIGURE 3

NOTE: Connections D70A, D71A, D70B and D71B are for the seventh ASCII data bit and will not be used when the Screen Read option is not being used.

The memory board is now complete and is ready for testing on the main board.

PIGGYBACKING INSTRUCTIONS If you are not using the 2K memory board but would like to have two pages of data this can be done by piggybacking six additional 2102s onto the existing six on the original TVT-II memory board. The procedure follows.

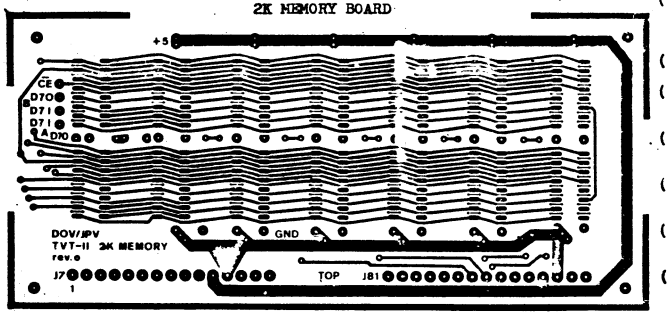
( ) Cut the trace between the $\overline{CE}$ trace and ground on the memory board. This short section is located directly above IC6 on the board. The $\overline{CE}$ trace goes to pin 13 of all the memories.

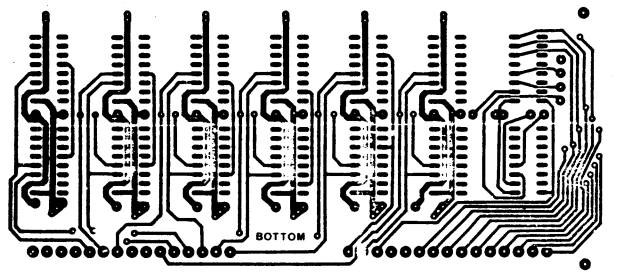
( ) Connect the $\overline{CE}$ trace to pin 8, IC27 on the main board.

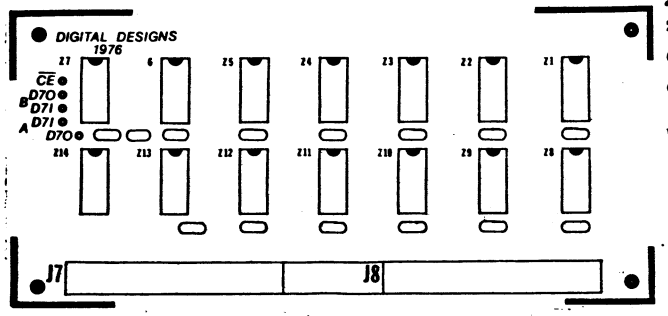
( ) Carefully bend pin 13 of six new memories out so that it is parallel to the chip.

FIGURE 4

2K MEMORY BOARD







( ) Carefully position each of these chips on top of the existing memory chips on the board. Solder each of the 15 unbent pins to the pins of the existing memories. You should now have six 2102s piggybacked on top of the existing 2102s. Note: Use grounded soldering iron.

( ) Carefully connect the $\overline{CE}$ pins of the new chips together with a length of wire. This is the page two $\overline{CE}$ line.

( ) Connect this wire to pin 9, IC27 on the main board

You now have two pages of data which are automatically rolled over by the page flip-flop IC27 which enables the $\overline{CE}$ line of either six 2102s.

EARLY TVT-II MEMORY MODIFICATION

You may have an early design TVT-II which uses the $\overline{CE}$ line on the memories. If you have one of these units terminal 10, J7 will have a trace leading to it. If you have one of these units the memory modification will require the following additional procedures.

( ) Cut the traces between pins lands 1 and 2, 4 and 5 and between these pins and the ground bus of IC4 on the auxiliary board.

( ) Connect pin 8, IC3 to pins 1 and 4, IC4.

( ) Cut the trace between pin 8, IC17 and terminal 10, J7 just before it reaches J7.

( ) Connect pin 8, IC17 to pin 9, IC3 on the auxiliary board.

( ) Connect pin 8, IC27 to pin 2, IC4 on the auxiliary board.

( ) Connect pin 9, IC27 to pin 5, IC4 on the auxiliary board.

( ) Pins 3 and 6 of IC4 should now be used in place of pins 8 and 9 of IC27 for driving the two $\overline{CE}$ lines. IC3 inverts the normal $\overline{CE}$ pulse which is then nanded with the output of IC27B, the page flip-flop. The nanded signal is then used to address either page of memory through the $\overline{CE}$ lines.

After checking all connections and foil cuts the power can be turned on with the memory board out. The screen will be filled with either ? or ● symbols. R38 should be adjusted to provide a steady display. R6 and R4 can then be used to center the display on the screen. If the characters appear smeared, your TV has a limited bandpass and cannot be used with a 64 character display without modifications. Most TV's should be able to handle the increased display density with no problems.

You are now ready to shut the power off and install the memory board. Turn the power back on and enjoy the 64 character/line display. Don't forget to revise your TVT-II schematic with the modifications that you have made.

PARTS LIST

2K MEMORY BOARD

Z1-Z6, Z8-Z13	2102 memories	
C1-C14	0.10 mfd capacitors	
Optional Z7, Z14	2102 memories	
Wire	26 Ga.	
2 15 pin Molex board connectors		

64 CHARACTER BOARD

IC1	74193	
IC2	7485	
IC3	7404	
IC4	7400	
C1	0.10 mfd disc	
C4	on main board	18 pf
Wire	26 Ga.	

The auxiliary board and 2K memory boards shown are available from DIGITAL DESIGN, BOX 4241 VICTORIA, TEXAS 77901. Both boards are Milspec with tin/lead fused plating and silk screened component placement. The auxiliary board is single-sided whereas the 2K board is double-sided with plated through holes. The auxiliary board is $5.00
The 2K board is $12.00. If ordered together they are $16.00
Shipping is included in board prices.
Shipment within 3 weeks is guaranteed.
Texas orders add 5% sales tax.

Wouldn't it have been fun to attend the COMPUTERFEST held at Shaker Heights, OH on June 11-13. How about somebody giving us a random on the presentations?

MACC

PUT IT ALL TOGETHER

LEARN HOW TO

FRIDAY

TECHNICAL SESSIONS: FRIDAY 6:00PM - 10:00PM
SATURDAY 9:00AM - 5:00PM
SUNDAY 10:00AM - 3:00PM

EXHIBIT AREA: SATURDAY 9:00AM - 10:00PM
SUNDAY 10:00AM - 5:00PM

FLEA MARKET: SATURDAY 9:00AM - 5:00PM
SUNDAY 10:00AM - 3:00PM

DOOR PRIZES: DRAWING WILL BE HELD AT 2:00PM SUNDAY. YOU NEED NOT BE PRESENT TO WIN. ADDITIONAL PRIZES OFFERED BY EXHIBITORS.

SATURDAY

6:00 "MACHINES WHO THINK AND PEOPLE WHO PREACH" by Dr. Ted Nelson, Dayton Mental Health Center. Fascinating glimpse into the philosophical aspects of computing and brain modeling.

7:00 "A FLOPPY DISK INTERFACE FOR UNDER $50" by Dr. Kent Mitchell of the TCH Group. An innovative 220 floppy disk interface is discussed by its designer.

8:00 "THE 6800 ARCHITECTURE AND NEW PRODUCTS" by Jim Frenzel of Motorola. An overview of the 6800 chip family and a discussion covering specific uses, applications, and overview of the 6800 chip family.

9:00 "MASTER CLUB SUPPORT ANNOUNCEMENT" by Paul Young, Master Section will inform on the P-8 processor, its CP/M, and access forms.

10:00 "THE LSI-11, DEC's ANSWER TO MICRO MADNESS" by Tony Ringel, Digital Equipment Corporation. The LSI-11 is compared with microcomputers.

11:00 "THE TCH FLOPPY DISK INTERFACE" by Kent Mitchell, TCH. Less than $100 will be discussed by its designer.

12:00 "THE KIM-1, A 6502-BASED SYSTEM" by Dr. Ted Nelson. The KIM-1, a 6502 system, and the KIM-1 computer system.

1:00 "LOW END MINICOMPUTER DEVELOPMENT" by Tom Roebuck, Data 16-bit, single board, MicroNova.

2:00 "DISTRIBUTED PROCESSING AND THE FUTURE" by Jim Frenzel. An overview covers the advantages in the consumer marketplace of distributed processing. The P-8 distributed its computing capabilities.

SUNDAY

10:00 "COMPARATIVE ANATOMY: Z-80, 6800 AND OTHERS" by Dr. Robert Suding, Digital Group. The Zilog Z-80 popular microprocessor chip.

11:00 "Pal-Deck" by Dr. Robert Suding, Digital Group. A computer controlled digital cassette tape drive and systems applications.

12:00 "TECHNICAL INNOVATIONS IN MICROCOMPUTER SOFTWARE" by Dr. Harold Garstad, Cromemco. Newer software techniques including a Color TV Dazzler demo.

1:00 "Computer Controlled Radio Network" by Dr. Richard Cunningham, Purdue University. Talk controlled switched message network.

EXHIBITS

AMERICAN USED MICROCOMPUTER — Hundreds, yes hundreds, of used computer equipment. Computer peripherals.

APPLIED INFORMATION DEVELOPMENT, INC. — LSI-11, 16/32-bit oriented equipment, some of KIM's own design. Announcement of special club offer.

COMPUMART — Surplus equipment for experimenters.

CROMEMCO — Dazzler, Floating Point Board, Cyclops Interface Board.

DATA DOMAIN — DMA/2 floating point processor board, Model 1 cassette interface.

DATA GENERAL — MicroNova, LSI Nova system.

DIGITAL EQUIPMENT CORPORATION — LSI-11 and related products, NOVA based elevator controller, PDP-8/A

DIGITAL GROUP — Latest products in the 6800 line. TV Typewriter, TV Cassette.

ELS SYSTEMS ENGINEERING — IMSAI microcomputer, SOFF 6800, Color TV Dazzler, TV Typewriter, PDP-8, other wares from the Taylor Kit store.

HAL COMMUNICATIONS — New 4096 processor board, intelligent terminal, bidirectional, full duplex.

HAMILTON-AVNET — Macinnes COMP kit, Solar kit, wire from Intel, Extended, MCS, Signetics.

INNOVEX — Hobbyist drives, assorted accessories.

JIM DIETRICH AND ASSOCIATES — Memex products, Half price offer on floppy drives.

McSHANE, Inc. — MCM/70 Microcomputer, Control Interface, MCM/700 computer, Control Interface.

MINIMICROMART — TV Typewriter, CRT-6000 terminal with TVI, Altair computer boards, CWC/DOS, Printer products, Shoe Program Some.

MOSTEK — 4-K eprom with human processor, 4-K static, microprocessor, and chip family.

MOTOROLA — Digital Data Modules, Hexadecimal and octal keyboards, I/O boards.

NATIONAL MULTIPLEX — Computer Devices, model 400 expander, other 6800 and 8080 boards.

OHIO SCIENTIFIC INSTRUMENTS — Boards, Microboard, kits, boards, Tick-Tac-Toe and Memo Game.

PIONEER STANDARD — Pic-disk cassette system, Alphawriter paper tape reader.

SHAMROCK ELECTRONIC SALES — Intelligent Systems Color CRT kit, microcomputer, Pencil modem.

WKM ASSOCIATES

EXHIBITS AND FLEA MARKET OPEN 9:00 SATURDAY AND 10:00 SUNDAY

Glendon C. Smith, 5822 Daffodil Cr., Dayton, OH 45449 May 20, 1976

Gentlemen:

Enclosed is a short description of a TV display circuit I use in my Altair 8800. Although I have not yet used the graphics display capability, it should be useful, as is, for games requiring a playing board. With synchronisation as discussed, fast games should be clearer.

Others may wish to make changes in the logic which sometimes was the result of space limitations. If fast data selectors are used as specified, the memory can probably run without wait states.

Sincerely, Glendon C. Smith

T. V. Display With Graphics

By Glendon C. Smith

The TV Display described in this report is intended for direct plug-in to the bus of an ALTAIR 8800 or other similar microcomputer. The circuits could be adapted to CPU's other than the 8080.

This display differs from the TV Typewriter circuit in three major areas. 1) The screen refresh memory is connected to the bus when it is being loaded or altered. 2) The display can produce 128 characters stored in a Motorola ROM (12 lines of up to 32 characters each) and/or up to 128 graphic shapes (8 x 8 picture elements) stored in RAM (24 lines of 32 shapes). 3) a crystal controlled commercial sync generator IC is used to provide vertical interlace and a jitter-free display. Other features include the ability to have the 8th bit in the byte used to specify a character or a graphic shape cause that character or shape to blink or to reverse itself, the ability to reverse the entire display by software, to display a border or not, and the capability of having software scrolls, an erasing cursor, and other custom features.

As presently implemented, switching from refresh operation to the bus is not synchronized with the blanking for borders so that insertion of a character causes the loss of about two sweep lines (a white or dark band about 1 mm wide provides notice that a letter was written). This is not annoying to those who have seen the display. For fast games, it might be advisable to switch the memories back to the bus during FIELD and delay the CPU if these memories are addressed during FIELD. This would slow the display slightly. Without synchronization, a software line feed or scroll up (moving 384 characters) takes about 10 milliseconds or about one-half of a vertical sweep of the TV screen.

The construction of the prototype of this display was eased by using two commercially available boards (and associated components) which were connected together by hinged bars the length of the connector spacing on my ALTAIR mother board. The memory board (MB-2 from Solid State Music) has its copper traces connecting all 8 of the 2102's comprising a bank (1K x 8 bits) before connecting the next bank. Before mounting the sockets, it is necessary to cut many copper traces between banks. The bank nearest the bus connector will become bank 0 (lowest address). It is not used by the TV Display.

The next higher bank (bank 1) stores the 128 graphic shapes (8 x 8 bits each). Bank 2 stores the codes for the graphic shapes (24 x 32 bytes and has some space which my be used for subroutines. If the graphic capbilities are not being used all three lower banks may be used as part of main memory. The highest, bank 3, stores up to 1024 characters which may be arranged as 32 lines (only 12 displayed) of 32 characters, or as two pages with enough space left over for routines which write on either page (page 1 has scrolling, cursor, etc.). The latter system is the one I have used thus far, but I can imagine applications such as text editing which might use several K of memory for character storage with more elaborate scrolling schemes.

The other board used is a Universal I/O Board (IO-1) from Solid State Music. It just barely has space for all the circuits for the TV Display plus one INPUT Port for a keyboard (Clare-Pendar). Eight pieces of 8 or 10 conductor ribbon cable handle the interconnections between boards and help in keeping the bits in order.

One of the changes to the memory board which is not shown in the diagrams concerns chip enable and R/W inputs to the 2102's. Pin 3 of each bank or 2102's was disconnected from pin 11 of 7400 A and now received its input from one of the address selectors as shown. Pin 12 on the 74L42A was ungrounded and connected to pin 11 of 7400 A. The outputs of the 74L42A then became R/W feeding the address selectors and the pin 13's of the 2102's formerly connected here are all connected to +5 volts so the chip outputs are enabled.

Several other points will come up in preparing the Solid State Music boards for this use. The designer of the I/O universal board ran +5 and gnd lines to many positions, expecting you to use 16 or 14 pin IC's there. However, he did not leave a space between the ends of the IC positions as their length requires, so many of these traces must be cut before sockets are installed. Because the output port (200 octal in my system) does not need an output connector, traces to this 14 pin pad are cut and an IC is installed there. On the memory board MB-2, all the data input lines are left intact as are all the address lines from the connector to the nearest 1K bank of memory (which will become bank 0). All the data outputs are isolated by cutting the traces at appropriate points, as are the address lines to banks 1, 2, and 3. The chip enable and R/W lines are discussed above.

Other arrangements of the 2K memory used in the generation of the graphics portion might be useful. For example, a 128 x 96 display of individually addressable points (each point, however, is 4 times the area of a picture element of the current display and the blinking and reversing possibilities appear to be out). One might build only the character portion or only the graphic portion (and generate the needed characters). The display described here may stimulate club members to design a special display as a group project and to produce p.c. boards to ease the labor for all concerned.

I use the Hitachi PO-3 12" B&W TV. It is easy to interface, is all solid state with instant on, and is available for about $68. Interface information is available.

Output Port - Control Byte Functions

Port (200 octal in my system) -

Bit 0 High to display page 2 characters
Bit 1 High to blink preselected characters
Bit 2 High to blink preselected graphics
Bit 3 High to Invert (reverse) preselected characters or graphics
Bit 4 High to invert (reverse) entire display
Bit 5 High to display surround (border)
Bit 6 Low to connect bank 3 (character storage to bus
Bit 7 Low to connect banks 1 and 2 to bus

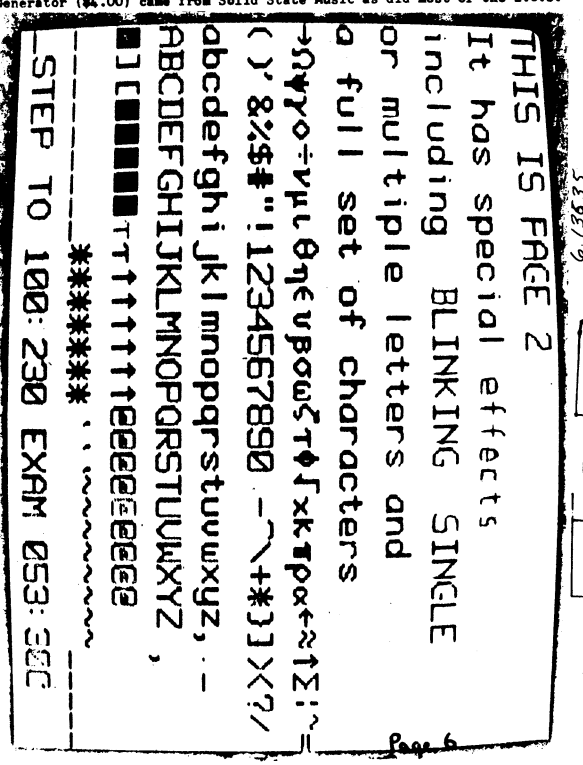
The 8212 output port is cleared by the fron panel switch so that the 3 banks of memory can be dumped (or loaded) without special instructions in existing programs.

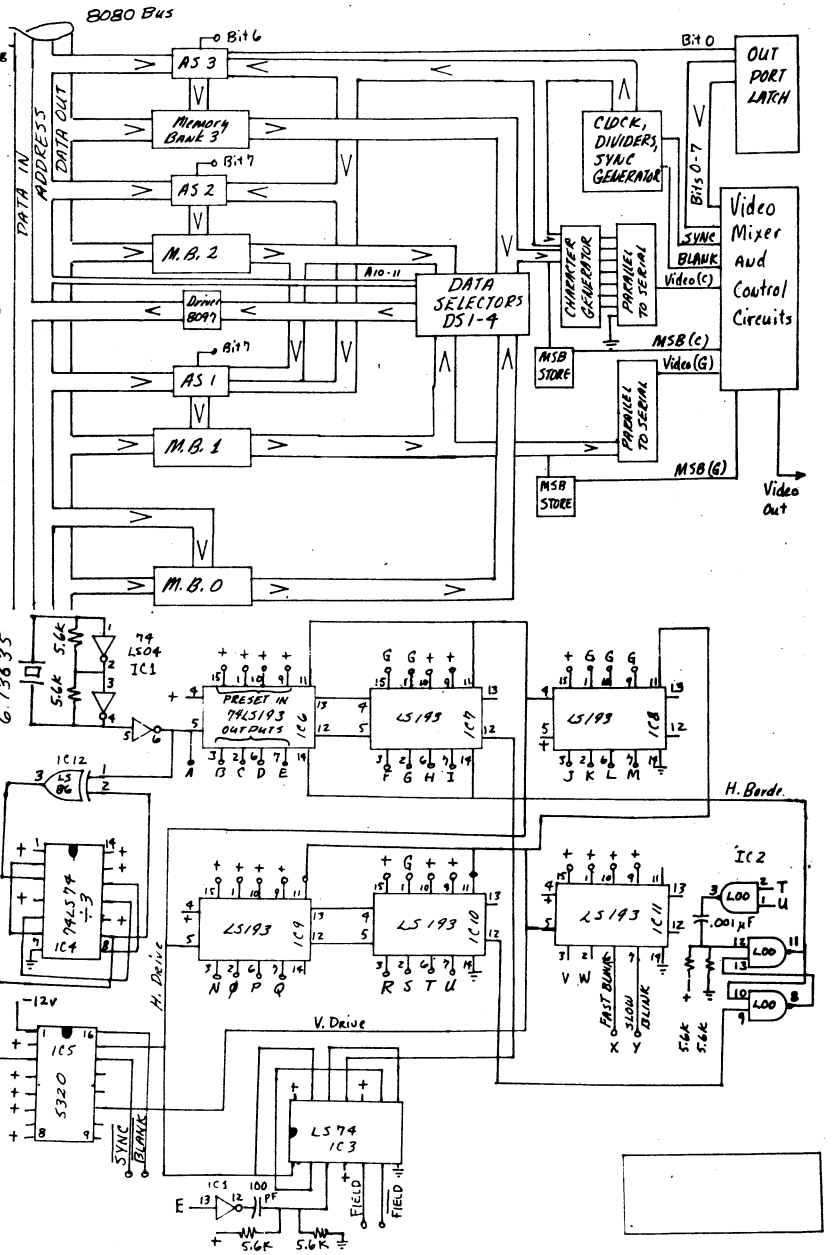
Suppliers

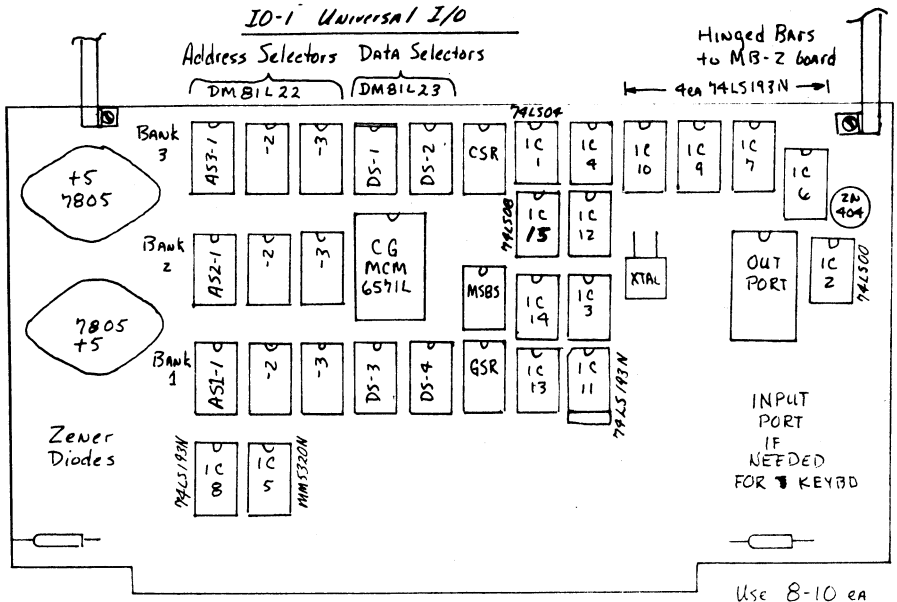
MB-2, IO-1 boards and kits from: Solid State Music, 2102A Walsh Ave. Santa Clara, CA 95050

6.13635 MHz, 26C Series Crystal @ $5.50 postpaid
International Crystal Mfg., 10 North Lee, Oklahoma City, OK 73102

The MC6571C character gen. came from the Digital Group but I understand that a new version only requires +5 volts. The 5320 (National) Sync Generator ($4.00) came from Solid State Music as did most of the I.C.s.

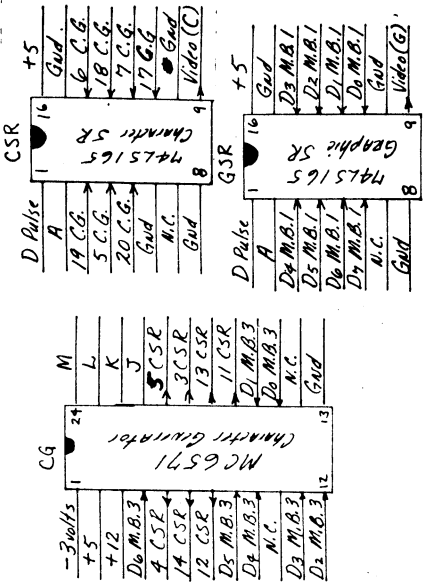




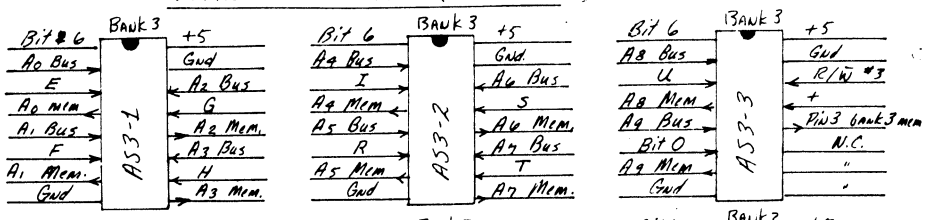


MSBS, IC4, IC3 = 74LS74N
GSR, CSR = 74L165N
IC13 = 74LS10N
IC14 = 74LS02N
IC12 = 74L86N

Use 8-10 ea 0.1 mfd disc bypass caps on +5 lines - divide IC load between Regs.



ADDRESS SELECTORS (DM81L22's)

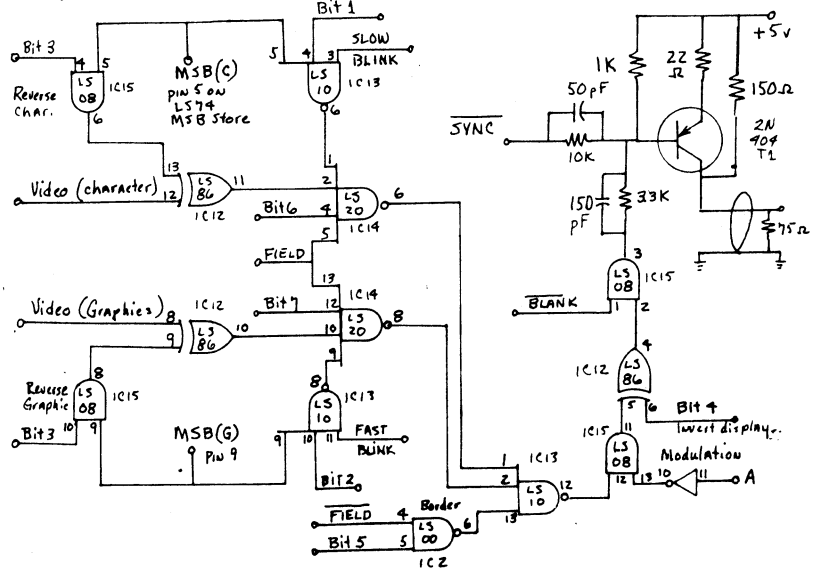


Data inputs not marked are connected to the corresponding bus address line as Bank 3 selectors. Memory address output lines go to the corresponding banks of memory.

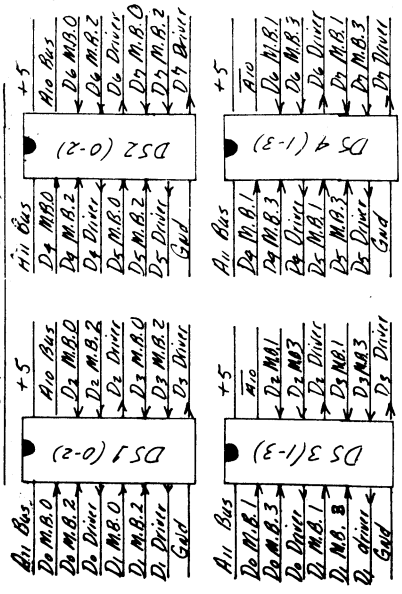
Do = Least significant Data bit from a 1K bank of memory
M.B. = memory bank
N.C. = no connection

Notes:
M.B. = memory bank - 1K x 8 bits
C.G. = Character generator
N.C. = no connection
A = highest clock frequency
D = A ÷ 8
M.B.3 is the highest 1K bank which stores ASCII codes for characters
M.B.2 stores codes for the graphics
M.B.1 stores up to 128 - 8x8 graphic shapes

Note: IC1 Ao Bus, LS04



Data Selectors (Tri-state) 81L23's



We are indebted to Terry Ritter, 2524B Glen Springs, Austin, TX 78741 for rounding up the following information. Who knows what will happen when Intel gets hundreds of requests in for kits.

UNIVERSITY KITS

The following University Kits are available to classes and individual student projects. All Kits contain functional devices which have been rejected for cosmetic defects. Documentation describing the operation of the units in each Kit is also included.

Kit A	Kit B	Kit C	
1 - 4040	1 - 8080A	1 - 3001	Microprogram control unit
1 - 4201	1 - 8224 clock gen	8 - 3002	CP ARRAY
2 - 4002-1	8 - 2102A 1024 bit static RAM	1 - 3003	Look ahead carry gen.
2 - 4002-2	4 - 1702A EPROM	2 - 3212	multiprotocol latched multifix (isolated)
1 - 4008	4 - 8212 I/O	1 - 3214	Priority int control
1 - 4009	1 - 8205 1-of-8 Decoder	4 - 3226	4-bid bidirectional bus driver
4 - 1702A		10 - 3601	Bipolar prom (256x4)

Please include a check payable to Intel Corporation in the amount of $20.00 per Kit. California shipments must include 6% sales tax.

UNIVERSITY MICROCOMPUTER KIT REQUEST

Name: _____

School: _____

Your Position: _____

School Address: _____

_____

_____

Phone: _____

Number of Kits required: Kit _____

Number _____

Please describe the nature and intent of the class or project.

_____

_____

_____

If you are an instructor, how many students are involved in this class or project? What is their level of sophistication (undergraduate, graduate, etc.)?

_____

_____

_____

-2-

If you are a student, please provide the name and school address of your faculty advisor.

_____

_____

_____

Is this an individual project or are other students also involved?

_____

_____

Intel is interested in making available general applications information to all microprocessor users. Do you anticipate producing a final paper (or perhaps a program) that we might make available to other users?

_____

_____

_____

Please return this form to:

Dr. A. J. Nichols, Manager
Microcomputer Applications
Intel Corporation
3065 Bowers Avenue
Santa Clara, CA 95051

W.A. Harnell,
165 Merkley Square,
Scarborough, Ontario,
Canada M1G 2Z1

April 11, 1976

I have just finished reading Vol 2 No.4 and feel that I must express my disappointment and difference of view relative to the announced phase-out of the N.L. I feel that you and your associates have done a great deal to assist the advancement of the hobby computer movement to date. This is not the appropriate time to bail out.

I also understand that publishing the letter must take a great amount of your time as well as the time of your students, whose presence is even noted (the hand-written addresses on the letters) and do appreciate it.

Is there no way to prolong the life of Micro-8 by increasing subscription costs etc.? I somehow don't feel that BYTE, PCC, TCH or any of the other currently available publications can replace the services which you have provided. I do hope that you will reconsider and am sure that hundreds of other computer hobbyists will write expressing their concurrence. Should you go through with your decision to phase-out, I would like to extend my thanks and gratitude for the services which you have rendered as well as my best wishes for your future activities in whatever field they may be.

I would like to say also, that I am in full agreement with you and Dr. Michael Hayes regarding MITS Basic. From some of the correspondence that I have seen, I believe that Bill Gates' greatest problem stems from the fact that he had an ineffective marketing plan for the software or is grossly naive or both.

NOTE: I am attempting to locate a copy of information or schematics on both for a Mohawk Data Sciences Paper Tape Reader, Model 3005 which I have recently procured. I would be happy to pay for any copying or other associated expenses. Thanks.

What a pity that he nor Ed Roberts could not understand that if the price for Basic was right, they probably would have sold the package to better that 50% of Altair purchasers, particularly if the package had been included with the initial purchase. They may have got less per package but they surely would have reaped greater profits. I do not have a copy of their Basic and I do not intend to either purchase or use it. I have, however, placed orders with Processor Tech. for their ALS-8, SIM-I, EPT-2 and the recently announced FOCAL. I'd much rather pay $440.00 for the firmware and feel that I had received something for my money than a "screwing" which is the feeling I get every time I consider Basic.

One other very interesting point is the announcement by IMSAI of the inclusion of 4K Basic in their initial basic kit. I believe that Ed Roberts said as late as the last newsletter the noone would ever give software away. I believe that this is true but IMSAI makes the purchase (and so does Proc. Tech.) very palatable. I may be taking a screwing anyway but the way that these people do it makes you feel that you have been loved and kissed in the process.

I have a lot of respect for some of the things that MITS have done in the past year but the Basic controversy and Bill Gates' name calling do not go down well. These people have succeeded in alienating a very great number of their past, could have been future, customers; a most unfortunate situation for them as well as the computer hobbyist. Please do publish letters re: the software flap. All of us should know just what is going on.

Mr. R.B. Legge of Sao Paulo, Brazil will find available from IBM do Brasil, In Sao Paulo, the following manuals related to his Selectric I/O problems as well as other pertinent publications:

1052/1053 Theory-Maintenance Form no. S225-3179
Selectric I/O keybd Printer Manual of Theory of operation Form n. S225-6595
72 I/O Reference & Adjustment Pocket Book Form no. 902-111-0

Regards,
Bill Harnell

X I have available 3 4K Altair RAM boards completely assembled and in excellent operating condition for $180. The memory IC's are in sockets and the board has been thoroughly tested and burned-in. Less 100-pin edge connector, but will ship postpaid. Anyone interested should contact me at the above address. I also have an Altair 1K static board in the same condition for $100.

I might point out that Mikra-D has a good deal on a video terminal. For $495 you get a complete, direct teletype replacement CRT terminal. Worth looking in to. Mikra-D Incorporated, Box 403, Holliston, MA 01746

Sincerely Yours,

John Martin

John Martin

JOHN P. MARTIN
808 DAY STREET
FAIRMONT, MINNESOTA 56031

Art Hicks, Box 642, La Jolla, CA 92038 In #2,#3 you asked about opinions of OSI superboards. I just got their CPU, 4K RAM, proto, & backplane boards. They specified 60 days but it only took 5 weeks for the CPU & Ram. I'm still waiting for the other two boards but it's still 2 weeks until promised delivery. Boards are good but not perfect quality. The documentation is not for a beginner but if you're into designing your own system as I am, its quite adequate. My system will consist of a 6800 CPU, 8K static RAM, OSI video terminal and various features such as hardware mult/div and breakpoint. When completed, I'll let you know if OSI stuff is as good as they claim.

Steve Newberry, 24225 Summerhill, Los Altos, CA 94022 says he is a novice in hardware but has some programming experience and hopes to get a M6800 based system and has a SWTP kit for the TVT-2.

Len Cupryk, 94 Maisonneuve St., Chateauguay, P. Que, Canada is presently building an ALTAIR 8800.

I finally broke down and bought myself a system. I took out a bank loan, added some cash of my own and mailed my cashier check to the Digital Group for their Three-board system.

Three days later I read in PCC that caution was needed in dealing with DG. I also read some mixed reports in Micro-8 News. I was really nervous, had bad dreams and didn't sleep for nights.

2/10/76 Order placed with DG
3-board system kit plus power supply
they promised 3 week delivery
Order placed with Herbach & Rademan
Clare/Fender Keyboard

2/21 The three boards arrived
missing 7400 and 22uF capacitor

2/25 Keyboard arrived

2/26 Power supply arrived

3/3 Mother board arrived

Total time: 3 weeks - one day
The missing parts took 4 weeks and two letters

Ed Epp

All parts are good quality
TV-Cassette and Mother boards slightly warped
5V 6A supply by Lontak Inc; looks impressive
Documentation fair; assumes a lot, several minor errors
Chassis, switches and connectors need to be ordered from other distributors at present

	There spent
2.5 hours	I/O card
4.75	CPU card
3.25	TV-Cass card
2.5	-5, +12V power supply
.5	Mother board
6.5	TV modifications
17.5	Planning, cutting, mounting, wiring chassis
1.5	Checking things out
----	
hours	Total time

I took my time and spread it over about 40 days. I must say I savored every minute of it.

I had trouble with the TV characters being out of focus. It finally dawned on me, after scratching my head for several days, that the TV interface was overdriving the TV video. I solved the problem by turning the contrast and brightness to zero. Later I plan to add a pot on the interface output.

When I had gone through their checks, I turned the system on and sure enough there was a message on the TV screen, "Read 8080 Initialize Cassette."

After dancing around the room, I proceeded to read in the cassette. Numbers flashed across the screen. First 1's then 2's and finally 7's when a bunch of dots. The dots weren't supposed to happen. More scratching of the head and several days later I decided it must be the cassette recorder.

I borrowed a recorder from the school to replace my EL Cheapo and everything happened just like it was supposed to. However, it still misses a few bits now and then. The 1100 baud rate is too fast for my EL Cheapo. It looks like it would be possible to set the cassette read and write constant at a lower baud rate, record the Operation Monitor, and then overtime the system is turned on key in the new constant from the front panel, and then read in the cassette on an EL Cheapo. However, the DG system does not come with a front panel, just plans for one.

I've been spending most of my time figuring out what makes the Monitor work. The DG documentation is not much help. I've also found out that machine language is a far cry from Fortran.

I will echo what some others have said about the DG system.

It does what they say it will do.

It worked the first time I turned it on, says a lot considering how complex it is. It's definitely not a beginners kit.

More documentation: flow charts for the Monitor (I'm working on a set), clearer instructions, spec sheets for the IC's and a better description of how it works would be nice. But that would mean more money and maybe in that case the documentation is OK.

Last week I got info about DG's Tiny Basic. I plan to order that and another 8K of RAM from them.

Materials I'm finding helpful; "The Bugbook III"

Hopefully my "Intel 8080A Users Manual" will get here soon.

Keep up the good work.

Yours,
Edward C Epp
Freeman Junior College
Freeman, South Dakota 57029
Ed C Epp

"There is a Washington, D.C. Amateur Computer Society, even though we have learned of a couple of other Computer-Oriented groups in our area: the Chesapeake Microcomputer Club, and the Amateur Radio Research and Development Corp. Both of these organizations meet in the far suburbs, so it seemed a good idea to get one going to fill the hole in the middle. Besides that, we based our society at the Catholic University of America to make use of its resources; we use their Computer Center Annex to meet and their computer to edit and produce our newsletter. We have no dues, we ask for donations from those who can, we have a constitution, but it includes a clause to keep things "as informal as possible". Anyone is welcome to join---just show up. We meet officially on the last Friday of each month, at 7:30 pm in the Computer Center Annex of the Catholic University of America. We meet informally almost every friday night, some place, talking hardware, playing games on the timesharing PDP-10 with the six Decwriters in the annex. I, as director of the society, extend a welcome and invitation to other hobbyists to stop in and visit us, if they are visiting the nation's capital during the Bicentennial year."

Robert J. Jones, ea
4201 Massachusetts Avenue, #168,
Washington, D.C., 20016
April 16, 1976.

I look forward to receiving your newsletters because, with a friend of mine (Bill Gunn) I have opted to join the "Computer for the People" movement.

Our equipment at present consists of:

1 Altair 8800 with modified (15 Amp, preregulated) power supply.
1 IMSAI 8080.
1 Teletype.
1 B & W video display system - Processor Tech. VDM & keyboard.
1 Cromemco "Dazzler" and "Bytesaver".

On order we have a Tarbell cassette interface and 16K of static memory to augument the 12K we presently have.

Evaluations:

a) Altair 8800 - took a long time to get running properly - had to replace 8212's - power supply was inadequate when more than 4 boards were used.

- CPU - card had a gold bridge between PREADY line and WAIT line.

b) Godbout 4K memory board - constant headache - after replacing almost all its chips, is still not reliable.

c) Processor Tech. memory boards - good quality, no problems.

d) Processor Tech VDM display - worked almost immediately and it was no problem to modify a B & W TV to use with it.

e) Cromemco Dazzler - was difficult and time consuming to debug.

We are also thinking very seriously of implementing a floppy disc system to go with our IMSAI 8080. To do this we will either buy the IMSAI flappy disc system or, much more cheaply, build the floppy disc system described by Hal Chamberlin in The Computer Hobbyist.

One request - I would like to acquire an advanced text editing system - that is, one that would be suitable for producing a newsletter, producing address labels, form letters, etc. If you, or your reader, know where such software might be obtained (we are willing to pay!) I would appreciate hearing from you. In the near future we intend to start a hobbyist computer club in our area.

Yours truly,

April 26, 1976

Karl H. Brackhaus
#203 - 1625 W. 13th
Vancouver, B. C.
Canada V6J 2G9
(604) 738-9341

Each time I get a new issue of the Micro-8 Newsletter, I get the same feeling as when going to the Tivoli-Gardens in Copenhagen: Americans everywhere ! For a while, I was disappointed that maybe no "foreigners" had this great hobby of Micro-8 - until now, I realize that I could contribute by writing myself.

Having gone through the big problems of getting the neccessary parts (we don't have as many possibilities to buy as you have) I have succeeded in getting my Mark-8 running perfectly with 5 K memory.

Further I have built a TVT-1 and bought a teletype with reader and puncher. For the time being I work on connecting them and making the lay-out for 4 K 1702. When this is done I plan to make new I/O boards and cassette interface.

With regard to software, my intensions are to have monitor-8 placed in the 1702, after which I shall go further into Basic.

This depends, however, on my finding of a non resident type to reach higher speeds. When this is done I plan to start working on a circuit analyzer program.

I sure am sorry to hear that you intend to lay down the newsletter by the end of this year, as I feel it has given birth to many a great idea - and why give up such an initiative ? I just hope you will change your mind about it as the World needs to get some fun on a non-profit basis.

With best regards, May 31, 1976

Mogens Pelle
Birkhøjterrasserne 416C
3520 Farum - DENMARK

Thanks for the prompt response to my request for back issues of the NL. I have been totally absorbed with them since their arrival. Wrote to the Digital Group, received a flyer which went into some detail on what they had coming up but didn't see anything about cassette interface or 8K memory board I thought they carried.

On another matter, my 8008 still isn't up and running properly yet. I have tracked it down to a TII coming out of the processor chip but don't know why. Have been doing some reading about the 6502 and that looks like it would be much simpler to get on-line. But I'll keep plugging along on it and hope to correct the problem.

Wishing you the best,

Jim DePoy
604 Royal Palm Drive
Virginia Beach, VA 23452
(804) 486-7342

Jim DePoy

I want to get:
"8008A Microcomputer System's Manual"
"Intellec 8/Mod 80 Microcomputer Development System Reference Manual"
SCELBI software manuals

Recently there has been a lot of discussion about mag tape recording standards, and out of that discussion came the new "Kansas City" standard, and the hardware featured in Byte magazine in March. Unfortunately, there hasn't been very much said about the data format to be used with the new standard. I don't think many people realize that the data format is just as important as the hardware, if we are really going to be able to freely interchange taped programs sometime in the future.
If your tape Dump routine uses a leader of Øs, and doesn't specify the area in memory the program occupies, and my cassette loader is looking for a leader of all ones, and expects to find the load limits specified on the tape, you and I are going to have a hard time exchanging programs without changing our load and dump routines to fit each other. This could get sticky, especially since my routines are in PROM, and I don't really want to reprogram them, even if you have the greatest software in the world on your tapes.
I'm sure all the Mark-8 owners remember the many discussions on standardization of I/O port assignments, etc.; let's avoid doing that now by deciding on a definite data format before everyone gets his "Kansas City" interface on-line.
I'd like to suggest the following as a place to start:

1. A leader of between 60-100 bytes of all Øs. This would last 3-5 seconds at 300 baud per second. That gives plenty of time for the AGC to lock up, and also enough time for me to start the cassette read routine in my monitor program.

2. A "377" byte would show the end of the leader and trigger the software to look for the first data bits. I chose "377" because it is a relatively unused code for addressing purposes.

3. The next four bytes on the tape would be the low and high start address and the low and high stop address, specifying where in memory the taped data is to be loaded.

4. Data bytes follow.

5. After the last data byte there would again be one "377" byte. This provides an immediate check on the program length. If the last address has been loaded and the next byte is other than a "377", an error has occured.

6. After the "377" would be the checksum byte. The cassette write routine calculates the checksum by adding each data byte in the accumulator, ignoring any overflow, and writing the checksum byte on the tape. The read routine calculates the checksum in the same way, and compares the two. This method is not as error free as the cyclic redundancy check used by the TCH routines, but it uses much less software. The low speed of the interface and its inherent reliability should eliminate most load errors.

7. After the checksum would come a trailer of 25-50 bytes of all "Ø", which only separate one program from the next. Length of the trailer is really unimportant.

This format doesn't use blocks of data, again because of the low speed of the interface. Using a block format means increasing the amount of time it takes to load a program into memory.
I believe the software for this format could be relatively short, especially if the interface uses a UART and perhaps interrupts instead of timing loops for reading the tape.
I'm sure there will be other suggestions for data format. All I want to do is start the discussion now, so we can all start exchanging taped programs sooner.

Thanks,

Samuel H. Daniel
402 Juniper
Vandenberg AFB, Ca 93437

Editor
Micro 8 computer Newsletter
Cabrillo Computer Center
4350 Constellation Rd.
Lompoc California. 93436

April 26, 1976

Dear Sir:

Western Data Systems has a new microcomputer. The 370/02A. It uses the Mos Technology 6502mp and is the most versatile of the low price/performance microcomputers that are available. The high operating speed (twice the cycle speed of the 6800, and five times that of the 8080) makes the 370/02A the ideal choice of the computer hobbyest and industrial user alike.

The single 13.75"X11.5" P.C.B. contains memory, I/O ports, a L.E.D. data and address display, and more, much more. It consists of all circuitry needed to be a stand alone microcomputer or a stand alone microcontroller for even such high devices as disc peripherals.

Designed with identical drive capabilities around the Altair 8800-100 pin tri-state bus, the 370/02A is plug in compatable with the long list of Altair peripherals. And thats not all. The 370/02A Bare Bones kit is at the lowest price ever. For an introductory offer we are selling the kit for $79.95, which includes 370/02A P.C.B., 26 switches, wooden stand, and complete documentation. Or the complete kit for just $169.95, which includes 370/02A P.C.B., 26 keyswitches, wooden stand, complete set of I.C.s, 500ns memory, resistors, capacitors, L.E.D., 1 mhz 6502mp, and complete documentaion.

We think that Micro readers would be interested in reading about this new dynamic microcomputer. We would be very interested in writing an article for Micro 8 about the 370/02A.

We would also appreciate some information such as price and availability on advertising our products in Micro 8. Your prompt attention to this letter would be greatfully appreciated.

Sincerely yours

Western Data Systems
3650 Charles St./Suite Z
Santa Clara, CA 95050

Cindy A. Indihar
(Marketing Manager)

esg

Cindy A. Indihar, Marketing Manager
Western Data Systems
3650 Charles St./Suite Z
Santa Clara, CA 95050

3 May 1976

Dear Cindy Indihar:

Thank you for the product release information on your 370/02A PCB and computer kit. From your brief description, it appears that your company has produced a product tailor made to the hobbyist's current needs. Making the unit ALTAIR bus compatible is a particularly shrewd design feature.

I would be interested in purchasing a unit for school evaluation but would appreciate slightly more detailed technical information and delivery details before writing out a check.

I would be delighted to print an informative writeup on the system. Paid advertising is not accepted for the Micro-8 Newsletter but truly informative articles are nearly always printed without cost. I hope you will be willing to submit such a technically informative article.

Thank you very much for your letter. Hope to hear from you soon.

Sincerely,

Harold L. Singer
Micro-8 Newsletter Editor

May 20, 1976

Thank you for your letter and for your interest in Western Data Systems.

Enclosed is the article which you requested.

Also I am enclosing a picture of the 370/02A to give you a better look at how dynamic this new product is. We have decided to use the name DATA HANDLER for the computer instead of the technical name 370/02A.

I will send you complete information on delivery and purchasing as soon as we get it bach from the printer. If you have any questions please feel free to call me at anytime.

Sincerely

Cindy A. Indihar
(Marketing Manager)

THE DATA HANDLER
FROM
WESTERN DATA SYSTEMS

Western Data Systems has just introduced a new microcomputer called THE DATA HANDLER. It combines the Mos Technology 6502 microprocessor with the latest state of the art technology producing a high performance microcomputer at a price anyone can afford.

The high speed operating capabilities of the Data Handler are enabled by the use of an easy to use full function hardware controlled front panel, a large ground plane area (to minimize noise at high operating speeds) on the P.C.B. and 2102 type RAMS.

Slower accessing memories (EPROMS and ROMS) may be used, although this will reduce the cycle speed to within the limits of other microcomputer kits.

The single 12.75"X10.5" P.C.B. can directly address 65K of memory and contains 1K bytes of static ram of the board with complete address decoding.

It also consists of all circuitry needed to be a stand alone microcomputer or a stand alone microcontroller for even such high speed devices as disk peripherals.

THE DATA HANDLER is designed with identical drive capabilities around the 8800 Altair, 100 pin tri-state bus. It's plug in compatable with the long list of Altair peripherals, and even the 8800 C.P.U. board will plug right in. Expandability can be achieved in a manner identical to the 8800 Altair by using the mother board.

And thats not all, there is more. The Data Handler has dual interrupt lines (one maskable), slow down circuitry for slow memories, DMA (direct memory access) circuitry, and DMA acknowledge control. It also contains one 8 bit parallel input port, one 8 bit parallel output port, seperate IO address control and memory control lines, single voltage (+5v@ 1.8A) and cycle times to 250ns.

It has front panel control with the use of keyboard switches which provide the following hardware functions:

A. Single cycle operation.
B. Single instruction operation.
C. Memory examine (left incremental)
D. Memory deposit (left incremental)
E. Initialization.
F. Halt.
G. Run.
H. Hex data and address entry.

For an introductory offer the DATA HANDLER is selling for an unbelievable price of $79.95. This is the BARE BONES kit it includes, the Data Handler P.C.B., 26 Keyboard switches, P.C.B. stand, and complete documentation.

The complete kit is also available from Western Data Systems for the low price of $169.95. The complete kit contains all I.C.'s, 500ns memory, resistors, capacitors, L.E.D.'s, 1 mhz 6502mp, everything needed to build a complete microcomputer.

For complete information on ordering,

wite to Western Data Systems
3650 Charles St./Suite Z
Santa Clara, Calif. 95050

(Introductory offer expires August 31,1976.)

Micro-8 Newsletter
Cabrillo Computer Center
Lompoc, CA 93436

8 June 1976
381 Poplar Dr.
Winnetka, Ill. 60093

Dear Hal:
We have read a number of complaints about our suppliers. I would like to provide a positive note. On 19 March 1976 I placed an order for a Poly-88 (then called "Micro-Altair") with POLYMORPHIC SYSTEMS. I later received information, witnessed a demonstration, etc., that convinced me that the "Altair Bus" was not the way to go. On 27 May, more than 60 days after Polymorphic Systems received my order, I sent a cancellation notice by Certified Mail. In the same mail with the acknowledgement of delivery card I received a check from Polymorphic Systems for the full amount of my order.

I think that speaks very well of them. While they haven't become well known in the Chicago area, I understand that their kits are good. I would urge them and all other manufacturers to acknowledge receipt of orders over $100 with a letter or post card even if it is a pre-printed form. It would make us feel better about them.

Yours truly,
Charles F. Bonds

Bruce Ehresman, 16681 Bartlett Ln., #2, Huntington Beach, CA 92647 sent a postcard saying a questionaire would arrive that would help him gauge the impact of a new, innovative product on the hobby enthusiast's market. No survey yet and no indication as to the remarkable new product.

SCCS INTERFACE
ART CHILDS — 256 N. Adams Bl., Suite 210, Glendale, Calif. 91206 — (213) 243-5179 — SHEILA CLARKE, Editorial Assistant

The National Publication of the Southern California Computer Society

To: All you contributors to INTERFACE

Please forgive this form-type letter, but there are so many of you (thank heavens), that writing each individually is impossible.

Thought I'd clue you into the latest deadlines and magazine scam.

We just got the June (Star Trek) issue off to the typesetters, and it will be back for proofing on Sunday, May 9th. I know it's short notice, but all authors will probably want to proof their own stories, so we hope to see you here Sunday around 1:30 pm.

Our July issue will be devoted to hardware. We'll be telling the hobbyist what's available, especially if he's not a hardware type, where to buy it, how to select peripherals, what we know about several manufacturers, their product and their backup service.

For the July issue, we'll probably want to have people really organize the material we're now accumulating, for information charts, product reviews, etc. If you're interested in contributing, let me know.

The copy deadline is July 17th. PLEASE DON'T WAIT UNTIL THE MAY MEETING to turn in your copy...it's much too late to get in.

We're doing everything we can to beat the post office rap...it's their fault the magazine is late. The only way we can get past that is to get the magazine printed earlier. That means getting the copy typeset earlier. So we need your help by getting your stories and articles on time.

Thanks for your past help...without it there wouldn't be an INTERFACE. Looking forward to working with you on the July issue.

Sincerely,

THE MAGAZINE NAG

FOR SALE:

1. ALTAIR 8800: new kit, original cost $439, plus $8 shippage. Opened and inspected for damage, other wise untouched. Sell for $400 with all documentation, Will ship.

2. MIL MOD - 8: debugged and running with MONITOR-8! Boards include: CPU, TTY, BUFFER, 2k - PROM without the PROM's, 2k RAM with 2k 650 ns. 2102's, INPUT, OUTPUT, 4k ROM/PROM/RAM board, containing a 2k MONITOR-8 ROM, with room for 1k each of PROM and RAM, BACKPLANE - MOTHER board, completed, able to program 1702/1702A's. Documentation includes: MIL applications manual MF 8008, R.E. Mark - 8 manual, INTEL users manual MCS - 8, MOD - 8 and MOD - 80 documentation packages from R. Schwartz, Chicago, giving details of easy conversion to 8080 cpu. Sell for $300. Will ship. All IC's socketed

3. CASSETTE INTERFACE, from Digital Group, works well with MIL MOD - 8 system. Cost $25. Will sell for $20. Includes documentation and plug for board.

4. CREED TTY: from R. Cook, Chicago. With documentation. Cost $125. Sell for $100. You ship.

5. TVT - 1 and KRD - 1: Radio Elect. TVT - 1 debugged and running with a modified UART board, such that it simulates a KSR - 33! 32 character, by 16 lines. Keyboard modified to give proper strobe delay. Works well with MIL MOD - 8 system for I/O device. With documentation. Sell for $120. Will ship.

Will sell above # 2 - 3 - 4 - 5 for $500

Money order please. SASE for further information.

Richard F. Schultz
611 N. Dexter
Lansing, Michigan 48910
517 - 393 - 9438

UNIVERSITY of PENNSYLVANIA

PHILADELPHIA 19174

DEPARTMENT OF MATHEMATICS E1

May 3, 1976

S. A. Cochran, Jr., Esq.
P.O. Box 607
Tyler, Texas 75701

Dear Mr. Cochran:

I saw your letter to the Micro-8 Newsletter concerning the Burroughs typewriter. I am unable to satisfy your desire for a manual since I do not have one, but I am quite willing to share the results of my experimentation; I have been able to get my unit to work (although I believe that I have not fully fathomed its mysteries).

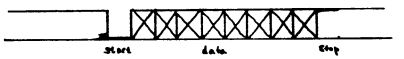
Not having any information about your equipment, I shall assume that you have both the typewriter and the box of control electronics. (I didn't get the card reader.) After coupling the two units via the cable supplied, one has access only to the 25 pin connector for input-output use.

I tracked the wires in this I/O cable; the results are shown on the attached sheet. The numbers on the extreme right are the pin numbers of the 25-pin connector. Note that #8 (connected to a white wire) goes nowhere!

#2 is serial data out
#3 is serial data in
#5 is on-line control

The unmarked leads from the transistors disappear into the jungle of IC's.

Data Format: 8 bit Ascii with MSB selected to give even parity. Transmission is serial at 150 Baud — start bit, 8 data bits, 1 stop bit. Furthermore, 1 is positive voltage and 0 is negative. (This is contrary to the RS-232 convention.)



On-line operation: The on-line switch should be on, and #5 should be positive; I permanently connected #5 to #20.

Transmit: Transmission starts by depressing the switch marked 'Transmit'. This produces the following sequence: the keyboard is unlocked, the lights marked 'Transmit' and 'Send' are lit, and the control character STX is sent out from #2. At this point the machine functions as a typewriter in the usual sense while simultaneously transmitting the Ascii codes for the keys. Transmission ends by depressing the switch ETX. This does several things, but the relevant ones are: the code for ETX is sent out from #2 and it is followed by transmission of the system parity. This byte is needed — see below.

On-line operation, receive: This description assumes that one has just completed a transmission from the typewriter. Transmission from the CPU starts with STX. This causes the 'receive' light to go on. Characters can now be sent out to the typewriter; with a system-parity byte being developed. One starts with the system-parity byte which originated from the typewriter, then each character sent from the CPU (not counting the initial STX) is exclusive-ored with the developing system-parity byte. Transmission ends with ETX, followed by the value of the system-parity. If all is well, the typewriter will emit an ACK output to the CPU, and will start to type.

- Apart from STX, ETX, ETB, ACK, the functioning control characters are CR and HT.

Buffer: The control electronics has a buffer memory of approximately 140 bytes. The message from the CPU to the typewriter is stored in this buffer until the ETX and system-parity arrive, at which time the printer will start. If the message is too long, the procedure is the following: keeping a count of characters, the CPU sends STX, text, ETX, parity not to exceed the buffer size. When ACK is received from the typewriter, one can send the next installment, following the same form STX, text, ETX, parity, but this time setting the starting value of the system-parity to zero. This process can be repeated as often as one wants.

Note that ETB may be used instead of ETX with some minor changes. Also, on my machine sending control characters DC1 or DC2 from CPU to the typewriter has some mysterious effect which I have not yet figured out.

There are some built-in protections against time-wasters! If no action occurs for more than 30 seconds, the error light comes on and everything disconnects. Pressing 'reset' reactivates the machine.

Because of the voltages involved in the Burroughs, I connected my computer (Altair 8800) to the typewriter via 2 opto-couplers.

Please let me know if this information has been of any value to you. If your letter to Hal Singer should cause a manual to appear miraculously, I would very much like to have a copy, and would certainly be willing to pay the cost of Xeroxing.

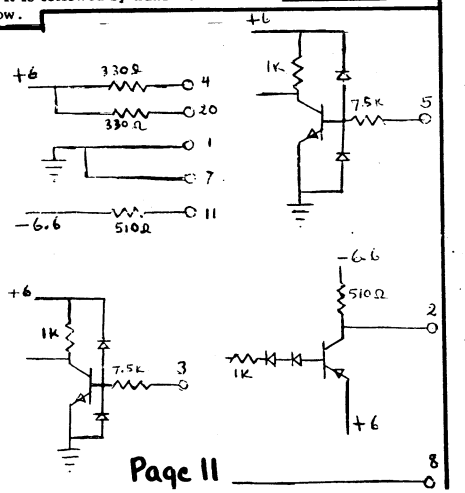
Sincerely yours,
Oscar Goldman
Oscar Goldman
Professor

Rotterdam April 10, 1976

Dear Hal

I am glad that you received my letter this time . The last time I wrote was when your group was menchend in a PE article. I reed in the back isseus that you got a lot of responce that time my letter must have got lost In the pile . Ihreceived all the back isseus in good orther and had quiet a bit of reading to catch up ,reading thru them all I was surpriced that th ir are so many Mark-8 onwers and people who are building one. If you reed thru the other mag, RE, PE, Byte you would hardly think they still exist I am also currently building one because at the moment it is the only one I can afford I have to pay about 25% extra on all part and kits for extra postage and import deu , at the moment I am still in the proces of gathering the parts. I reed that most people have changed to 2102 memories instead of 1101 that where used in the original one, could any one inform me how to this? The equipment that I have is a TVT-I with at first a SWTP keyboard but as more people found out that it is rather slow and puts out a slash when you the tvt on repeat. I have now a micro switch 55SWI-2 keyboard (hall-effect) witch I converted to ASCII code this work much better. My plan are finishing the Mark-8 and converting the TVT to 64 characters per line and using it to put RTTY on screen . I would also like to contact with fellow computer hobbist in europ or the U.S.A. Would you also please not my change of addres

Hank K Berkhoudt
Hesselkamp 4
Rotterdam 3023
Holland



Home computer terminals feasible by 1985

The computer terminal will not receive widespread acceptance in the home until its price drops to the level of a color-television set—$400 to $500—said Joel Moses of Massachusetts Institute of Technology at the recent convocation celebrating the 100th anniversary of the telephone. A terminal with 32,000 words of memory will cost about $400 by 1985, and by 1995, it will be available with 1 million words of memory for about the same price, he predicted. He based the forecasts on the assumption that semiconductor costs will drop 40% per year.

Another important cost factor will be carrier charges, assuming, of course, that sufficient capacity will be available to handle all of the additional traffic these terminals will produce. Moses says that line costs cannot exceed twice the level of today's telephone costs in order for the average family to afford these terminals. To minimize communications to meet these cost objectives, much of the storage and processing will have to be done by the terminal, especially in view of the limited bit rates of local loops, which might require lengthy transmissions for long texts and graphics.

But even if Moses' predictions come true, IBM Corp. may not sell the terminal, at least not at the outset. Said Bob O. Evans, president of IBM's System Communications division: "We've been looking for some time at these applications, and I've been perplexed in finding where the real revenue-producing potential can be found."

MULTIPURPOSE. Science writer Arthur C. Clarke says the terminal will consist of a visual display, TV camera, and a sound system—a combination he dubbed "console" for communications console. "During the course of a day, . . . you will use the home console to call your friends and deal in business, exactly as you use the telephone now—with this difference: you'll be able to exchange any amount of tabular or graphical information.

"Thus, if you are an author, you'll be able to wave that horrid page one type in front of your terminal, will supply instant news and information. John McCarthy of Stanford University urged that computer utilities serve as publishing

DATA COMMUNICATIONS
May/June 76

Ronald B. Keele, 9823 Redfern Ave., Inglewood, CA 90301 (213)672-5437 says that now that they have stopped handling the monthly SCCS meetings It finally grew too big for TRW) he now has time to work on his computer.

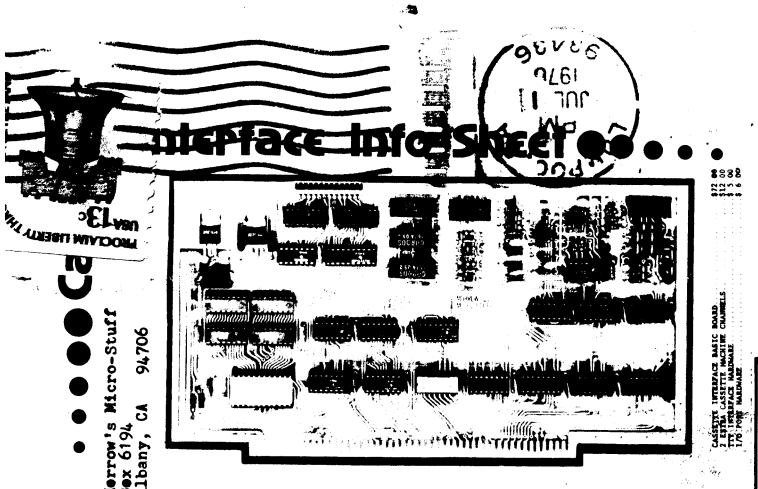
Randall Kent Munkres has a Mark-8 with a SWTP TVT-2 and says he is finding it more and more difficult to get useful 8008 information from all of the publications.

Felton Mitchell, WA4OSR, PO Box 973, Mobile, AL 36601 (205)342-7259 wants his name published and requests that anyone interested in hobby computers in the Mobile, AL area contact him.

TO:

FIRST CLASS MAIL

MICRO-8 USER GROUP
CABRILLO COMPUTER CENTER
4350 CONSTELLATION ROAD
LOMPOC, CA 93436



THE KEY TO INEXPENSIVE, MASS STORAGE IS A CASSETTE MEMORY. You can record up to 90,000 bytes of information on a single C-60 cassette, and you don't have to worry about losing information when you turn off your system: it's right there in the cassette. However, not all cassette interfaces are alike.

The Morrow's Micro-Stuff Cassette Interface is a different type of interface. It is not a "bare bones" type peripheral; it comes with RAM, EROM, and several options---such as a general purpose I/O port, extra cassette channels, or RS-232/TTY interface. It is fully compatible with the Altair 8800 and IMSAI microcomputers and will work with these machines whether they have a front panel or not. Pop it into the edge connector---then you're ready to go.

THE "CASSETTE OPERATING EXECUTIVE" EROM

Because the cassette interface does so much, there are a lot of features we need to cover. Let's start by looking at the EROM we've nicknamed COPE, for Cassette OPerating Executive. This EROM stores all the routines you need for cassette interfacing:

1. COPE contains routines which generate bi-phase (1200/2400 Hz; 300 baud) waveforms, as well as routines which detect bi-phase waveforms and convert these waveforms to binary information.
2. COPE contains routines which transfer and format data from the computer's memory to the Cassette Interface onboard RAM...and writes out this information, in blocks, on 1, 2, or 3 cassettes (it can also shuttle between these three machines).
3. COPE contains routines which read data from any of the three cassettes into the Interface's RAM, performs error checking on this data (that's a nice touch!), strips off formatting and error-checking information, and transfers this data to user memory areas in your microcomputer.
4. COPE contains routines which simulate the function of a UART along with a TTY reader control, so the interface can talk to any RS-232/TTY type device.
5. COPE contains a bootstrap routine which allows a monitor or operating system to be read from cassette #1 when the computer is first turned on.

DOCUMENTATION

One of the most important aspects of any kit is the documentation...so before we look at the other technical features of the Cassette Interface, let's elaborate on the aids you receive that allow you to get this system up and running with a minimum of confusion...

1. Logic print
2. Parts layout and assembly instructions
3. 2 separate listings: an assembly language listing of the software routines, along with a general explanation of how the routines work and how they are used
4. An applications note which guides you to maximum use of the routines in the EROM, as well as a detailed description of the bi-phase hobbyist standard adopted by most major microcomputer manufacturers at the Kansas City convention.

This documentation package is available separately for $4.95 (refundable with order).

THE HARDWARE STORY

The Cassette Interface uses the latest low power Schottky parts available, and puts them all on an industrial-quality, plated through double-sided board (epoxy glass base). There is on board regulation for +5V, +12V, and -12V. As far as power consumption is concerned, with a fully loaded board (1/O port, 3 cassette channels, RS-232/TTY interface) you will need about 650 ma typically, with 900 ma being the absolute worst case.

Both cassette and RS-232/TTY interfaces communicate with the outside world via a 16 pin DIP socket---so you can use low-cost flat cable to connect the board to your interface devices. The 8 bit I/O port uses a 26 pin flat ribbon connector, with the reliable signal/ground/signal/ground alternate lead system for high-speed communications.

OTHER FEATURES

- **Internal data paths are completely isolated from buss data paths.
- **All I/O devices are totally under software control, and may be used for applications other than cassette interfacing...for example, if you only need two of the three cassette channels you have an extra relay available that will handle up to 1A, 10W, or 200V to use as desired.
- **The parallel I/O port uses a hi-current, hi input Z transceiver, an 8 bit latch, and handshaking signals...which can be used independently or in conjunction with relays and serial interfaces on the board.

ADDRESS REQUIREMENTS

1024 memory locations are required and must start at a 1K boundary. Unless otherwise specified, the starting address is 8000 (hex); however, when ordering you may specify any start-address desired (the COPE software will be assembled to reflect this requirement).

Four I/O device addresses are required and must start at a device number divisible by 4. Unless specified otherwise the I/O addresses are devices 4, 5, 6, and 7. Again, these can be changed when you order...just let us know.

After you've built the Cassette Interface, all you need to do is load the starting data address, the word count, and title information into the format area of the RAM, then execute a CALL READ TAPE or CALL WRITE TAPE. Data blocks of up to 65K may be read or written directly using these routines and calling conventions.

SUMMARY

With the on board EROM/RAM and multiple SERIAL/PARALLEL lines available, this is the only board you'll need to add to your Altair 8800/IMSAI for process-control applications. The ability to talk to three cassettes allows for sort-and-merge type operations not possible with only one or two cassettes. The board is expandable, so you can add capabilities --- as your needs require.

FINAL COMMENT FROM GEORGE MORROW: "What can I say? This is a marvelous board. Every morning I wake up with a new way of using it."

FOR CURRENT PRICING AND AVAILABLE OPTIONS, SEE OUR FLYER.

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