Micro-8 Computer User Group Newsletter
Hal Singer - Editor
Cabrillo Computer Center
4350 Constellation Road — March 10, 1976
Lompoc, CA 93436 — Vol. 2, No. 3

I tried to get NL No. 3 out in 3 weeks but missed it by a little. You wouldn't believe the number of things that have been going on around here. One of my students has our Centronics line printer running at full speed on a 120 cps serial interface and learned a lot about adding handlers to an operating system in the process. We have three more projects to finish on the PDP-8s and then I can get back to serious micro work: 1) modify the time share BASIC (Edu 25) to handle floppy disks 2) add a magtape system (Dectape emulator) 3) interface a Dura Mach 10 selectric typewriter.

Bob Albrecht, Keith Britton, and myself presented a session at IEEE COMPCON on Feb. 26 entitled the Personal Computer. My presentation was "The Hobby Computer Explosion", a slide show on what's happending. Keith's presentation was on the home computer. He broke everyone up by mentioning the IBM 5100, a fantastic machine with state of the art electronics and something only IBM could do--miniaturize a dinosaur. His presentation was extremely thought-provoking and he stunned us all by asking us to name the cheapest output device for a home computer in a couple of years. Everyone automatically says a TV set. He proved that VOCAL OUTPUT will be cheapest. The circuitry will involve a processor controlled ROM and about 4 to 5 chips--about $25 worth of electronics. Think about that one!

SASE's

The SASE idea was a great idea but didn't work too well. At least we didn't have to send the checks back (subscriptions are up to about 425 now). Those that did send an SASE will be rewarded with some kind of worthwhile goody in it eventually.

Consumer Legislation

I think we should get mean and nasty (at least by letter) with any supplier that violates the new consumer legislation. If you don't receive something you ordered within a month, please write a letter demanding delivery or your money back and report to the FTC if you don't get satisfaction.

Ad Policy

As always, no paid advertising is accepted. However, I always mention to inquirers that informative literature that in my opinion will be of interest to the hobbyist may be printed. I try to select stuff that has not been published as ads or articles elsewhere but there is bound to be some duplication. The M6800 board that will plug into an ALTAIR on page 11 is my idea of a fantastic item that guys need to know about.

Duplicate Newsletters

I'm having trouble getting the mailing list for Volume 2 straightened out. You may have gotten 2 copies of No. 2 but better two than none. Thanks to those that let me know. If you ever get cheated out of one, please let us know.

Tiny BASIC Newsletter

Bob Albrecht of PCC sent out the first issue of Tiny BASIC. It's fantastic if you have any desire to know what's in a high level language interpreter and will worth $3 for 3 issues. You also have to have the PCC newspaper. Bob will send you a sample issue (the last) for $1.00. You won't be disappointed. Write PCC, PO Box 310, Menlo Park, CA 94025.

Byte Boffer PC Board

Owen Phairis, 1908 12th Street, Santa Monica, CA 90405 will provide PC boards for the Lancaster unit for $3.00.

Ohio Scientific Instruments Logic Trainer

I ordered a $99 OSI 300 computer trainer. The order was recorded Feb 3 and the unit arrive at the school Mar. 3. I was almost disappointed--I was ready to write a nasty letter demanding delivery. They do deliver!

What they deliver is a different story. For $99, you can't expect much and I didn't get much. The PC board quality makes the MARK-8 boards look good. Assembly quality was terrible, complete with cold soldered joints. The switches are barely useable. The experiment manual is poor and difficult to follow. Design does show how little hardware is necessary to make a 6502 work. Has anyone had any experience with their super boards?

Digital Group System

The DG sent the Cabrillo Comp. Center a DG8080 three board system on a temporary loan. Some initial impressions: Nice quality boards, does exactly what the ads say, software performs exactly as described--press the button, load a cassette, and you're read to do things, documentation excellent but more than a project for a beginner. You are asked to evaluate your resources and abilities in the beginning pages of the manual and decide whether youre up to it and if not, to send the unit back for assembly or a refund. The Suding cassette circuit seems to work flawlessly on the $120 Sony cassette unit provided. The Sanyo video monitor produces the sharpest picture you could ask for. Very impressive. On the negative side, it's not ALTAIR bus compatible and the PROM bootstrap resides in page zero making it a hassle to use programs that use page zero (but then you shouldn't use page zero).

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SUBSCRIPTION FORM

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

☐ .... Volume 1 back issues 1 thru 4 $3.50
☐ .... Volume 1 back issues 5 thru 12 $6.00
☐ .... Volume 2 1 thru 6 $6.00

NAME ______________________________

ADDRESS ______________________________

____

ZIP ______________

TELEPHONE # ______________________________

(May be published -- leave blank if you prefer)

Also include (if you desire) a little note or letter describing your equipment, plans for the future, experience, etc. Thank you.

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IMSAI

Reports from people viewing and purchasing IMSAI machines are fantastic. Apparently super quality but then a few reports are coming thru about price increases and parts dribbling in by mail. You should also check out how really ALTAIR program compatible it really is. I heard one report that there are differences that have to be compensated for in software.

PCM-12 -- PCM's PDP-8 Compatible Machine

Do you suppose that PCM has won the award for the biggest credibility gap in initial advertising literature? They led us to believe a 4K machine with I/O would be about $600. If I read the price list correctly, the true price is closer to $1200. A Fabritech 4K core memory PDP-8 compatible machine is not much over that.

Sincerely,
Hal Singer - Editor

March 10, 1976

Dear Hal,

My Digital Group 8080 System was up and running only 14 hours after the parts were taken out of the envelopes! It consists of the Suding TV and cassette interface, four parallel input and four parallel output ports, an 8080A microprocessor, and 2K of 500ns 2102s. The system also includes a 256 byte PROM, which contains a cassette loader and several other useful subroutines, all of which are user-callable for programming.

Assembly directions were clear, but not Heathkit type, and some knowledge of electronics is assumed. However, I believe that anyone who knows resistor codes and can find pin 1 on an IC can assemble the kit successfully. Soldering requires a low-power iron with a fine tip. An O'scope and a frequency counter were the only test instruments used for final checkout. I assembled the input-output board, and it worked perfectly the first time it was plugged in. It is the first kit I have ever built. The uP board and the TV-cassette interface board were assembled by Robert White, a close friend and experienced kit-builder. The uP board worked perfectly the first time. The TV-cassette board had the only assembly error, we misread the color codes for two resistors. After we located the error, it only took ten minutes to replace them with the correct values. No other problems. All ICs were good, which is remarkable. Two capacitors were not supplied, but were easily scrounged in Robert White's junkbox.

Software supplied by the Digital Group consisted of a game program like Tic-Tac-Toe, a memory check routine, a Bicentennial music routine, and a System Monitor program allowing for keyboard programming in octal from an ASCII keyboard, Cassette read and write routines, and a storage dump routine useful for debugging programs. After working with the supplied software for several days, I rewrote it to include many of the features of Monitor-8. When I am satisfied with it, I will make listings available to other Digital Group System owners, if they want it. The software supplied is good, but should be regarded as just the beginning, not as the final word.

I'm using my system with a surplus Clare-Pendar keyboard purchased from the Digital Group (it works perfectly, but I'm not too happy with the feel of the keyboard.), and a power supply borrowed from Robert White. My own power supply from the Digital Group has not been received yet. Everything else ordered from the Digital Group was received within 5 weeks of the time I ordered.

Future plans include 8K of memory (already ordered), another cassette interface allowing for motor control, and a scientific calculator interface. Programming is my main interest, and now that my system is running, I can get to work.

Yours,
Sam

Samuel H. Daniel
402 Juniper
Vandenberg AFB, Ca 93437

Hal:

Enclosed is a check for $9.50 for NL issues 1-11 of volume 1. (I've got #12, so don't need another.) To me, the NL provides an invaluable source of gossip, trivia and useful information, and I'd hate to see it leave the scene. Keep up the good work!

As far as the letter from Bill Gates in the 10 Feb issue, I've got the following comments:

(1) Pirated software, as far as I'm concerned, is not the way to do things. I will not argue the point that MITS has some (to me) unsatisfactory requirements for the legal acquisition of MITS BASIC... that doesn't ok piracy.

(2) I do not possess a copy of MITS BASIC, nor do I plan to buy one. Starting from PCC's "Tiny BASIC", I feel that I can write a quite satisfactory BASIC compiler/interpretor of my own. The reason why I will not get MITS BASIC is quite simple: I don't like "black box" software, and MITS wants $3000 for source listings for 4K and 8K BASIC (see Computer Notes, July 75, page 6). In other words, MITS is not interested in letting out the source listings.

(3) As far as Bill Gates' comment that $40,000 of computer time went into the development of the various BASIC versions, I find that unbelievable. Where I work, the accounting charge for IBM 370/168 time, which includes overhead, staff salary, etc., is somewhere around $2000 per CPU hour. If we had three programmers on a project who used 20 CPU hrs in a year for program testing and development, they'd be out in the streets looking for employment suited to their abilities. (When I was in school, I wrote a compiler for something on the order of Tiny BASIC for a term project -- 2 months of evenings and 1/2 hour of IBM 7074 time, the standard student account allotment.)

(4) In Computer News of October 75 (page 3), H. Edward Roberts, MITS president, states "We made a $180,000 royalty committment to Micro Soft in order to have BASIC available to our customers." I certainly wish I could have put in a bid on that project! A price tag like that to me indicates someone trying to get rich in a hurry... a top systems programmer in this neighborhood might make $18-20K a year, if he's really good

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February 23, 1976

This letter confirms our phone conversation this evening. Since my brief note to you, I have acquired an IMSAI 8080 system. Module I of this system has already been delivered and assembled. This included IMSAI's very business-like cabinet, MPU board, front panel, power supply (rated at ± 16 v at 3 amps, +8v. at 24 amps.) and 1K of RAM. In the bargain, IMSAI delivered, wihtout any special request, paper tape and code listings for its loader, editor and assembler, all of which require approximately the lower 6K of RAM. IMSAI uses select Intel 8111's, which are capable of times of 500 ns and better, rather than 2101's or any equivalent thereof. As received, the power supply consisted of a (sizeable) transformer, two .015 Farad 20v condensers (for the +16 and -16v supplies) and an 0.1 Farad 10v condenser for the +8v supply. In this respect, they have gone in for, not overkill, but *sufficiency*. The rating for this supply, as delivered, was de-rated a little by the insertion of voltage dropping diodes in series with the transformer. It was suggested that if the power supply began to load up, the diodes be replaced by low resistance jumpers, and if additional +8v were ever required, the power supply could be upgraded to 30Amps of +8v dc by adding another 0.1 Farad condenser in parallel with the one issued. I haven't gotten the system up yet; am waiting for IMSAI's 22-position Big Mama mother board, replacing the 6 board position mother board originally issued me.

Module I was delivered in Tyler within 14 days of the date I mailed in my order. Module II has not yet arrived. It will include an additional 7K of RAM, 2 serial I/O ports, IMSAI's Vector Interrupt and Real Time Clock Board, and IMSAI's Cassette Interface Board, which is switch selectable between the Popular Electronics standard, published in P-E for September, 1975, and the Kansas City standard, announced in BYTE for January, 1976. For hard I/O, I have acquired a FridenModel 9350-2 automatic typewriter, with controller, which is already encoded in full 7-bit ASCII. Thus far, we've been able to make it talk to itself through its buffer, and have gotten it to talk to the computer. [We--includes John Arnold and Dick Whipple, the writers of Tiny Basic, and their Altair, in which they have 9K of Altari memory, plus my 1K board on loan.] Our trouble is, that we haven't been able to get it to listen to the computer.

[At this point, you gave me the name of Nelson Henderson, of Santa Maria, CA, who has the same equipment and scads of Friden manuals, but still the same problem: lovely equipment, but how to make it run? You also gave me the name of Ken McGinnis, who was concentrating on getting up a system to do accounts for a doctor's office under $2500.]

The purpose of my call was to find out the address of the party who was adveer tising the OP-80A Low Cost Optical Paper Tape Reader. You didn't have his name handy, but promised to write me tomorrow from school and give me not only his name and address, but also the name of a fellow who was selling optical sensor diodes (?) for $5.00, where the OP80-A was buying them for $28.00 for use in his rig. Please send both these names, and their addresses, if you haven't done so already.

John and Dick will sell cassettes containing their Tiny Basic for the 8080 microprocessor, recorded according to the Suding system, for $5.00 each. Octal listings of Tiny Basic are also available in Peoples Computer Company's Tiny Basic Newsletter--a side newsletter, which they are selling for $3.00 for three issues, and supposed to fold after the three issues are sold out. If interested in the tape version, write John Arnold, Rt. 4, Box 52-A, Tyler, Texas 75701. Terms: cash or check with order.

As soon as I have digested the large amounts of hardware already acquired, and done a little with it, I will expect to start acquiring Phi-Decks and set up a more complete operating system that can work for a lawyer's office and both do simple accounting and form typing.

I enclose check for $6.00, which should cover the transmission to me of Vol. I, issues 5-12 of your Newsletter. With thanks for all your assistance, I am

Yours very truly,

S. A. Cochran, Jr.

...a great deal of the information in the Micro 8 NL and thank you very much for your efforts for all of us. Because of the interest you have sparked in me I plan to go into business administration in the area of data processing management. I think the microcomputer will be used more in the future in the area of small businesses, so I hope to work in that area.

Sincerely,

Randall A. Walker

Harold Cronin, 55B Rowe Street, China Lake, CA 93555 says a computer club is starting at the Naval Weapons Center with fellows working on Altairs, TVT's, and some interested in intersil 6100 PDP-8/E based systems.

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SOME COMMENTS ON THE "AMATEUR" ASPECTS OF THE SMALL SYSTEMS FIELD

FEBRUARY 25, 1976

IT'S BEEN ONLY 2 1/2 YEARS SINCE DON LANCASTER'S TVT ARTICLE OPENED THE FLOOD GATES OF WHAT WAS TO BECOME KNOWN LOOSELY AS THE COMPUTER HOBBYIST OR AMATEUR COMPUTER ENTHUSIAST FIELD. IT HAS BEEN ONE OF THE HIGHLIGHTS OF THE ALREADY FUTURE-SHOCKED ELECTRONICS INDUSTRY OF THE MID-'70S.

ALL OF US INVOLVED IN THIS MAELSTROM HAVE BEEN MOST THANKFUL FOR HAL SINGER AND HIS GROUP(ALONG WITH LOCAL SIMILARLY-STYLED NLs), AND MANY OF US REALIZED THAT THE LIGHTNING CHANGES IN THE FIELD ARE DIRECTLY RELATED TO THE TIMELY COMMUNICATION CHANNEL, THE INTERCHANGE UPDATED EVERY FEW MONTHS--MADE POSSIBLE BY THE MICRO-8 NL. TO SAY THAT WE WITNESSED ONE OF THOSE PERIODS IN MODERN TECHNOLOGICAL HISTORY THAT WAS GERMINAL IS PROBABLY NO EXAGGERATION.

NOW THAT OUR FIELD HAS GROWN ENOUGH TO HAVE IT'S OWN COMMERCIAL PUBLICATION (BYTE) I THINK IT APPROPRIATE TO EXAMINE CERTAIN ASPECTS OF OUR ACTIVITIES THAT ARE CROPPING UP OFTEN ENOUGH TO LABEL AS TRENDS.

FOR ONE THING THERE ARE A LOT OF PEOPLE IN THE FIELD WHO ARE FRANKLY SOFTWARE-ORIENTED WITH A PARTICULAR TWIST. THEY'RE INTERESTED IN COMPUTER "GAMES". THEY ARE ALMOST ALWAYS VERY BRIGHT, NUMERICALLY/MATHEMATICALLY/RATIONALLY ORIENTED, USUALLY INTELLECTUAL, USUALLY YOUNG, USUALLY WITHOUT THE FINANCIAL RESOURCES AND HARDWARE KNOWHOW TO HAVE HAD THEIR OWN COMPUTER AT HOME HERETOFORE, AND USUALLY IN NO WAY INTERESTED IN USING COMPUTERS FOR "SERIOUS" PURPOSES. (HERE'S THE CRUCIAL LINES IN THIS ARTICLE. I DEFINE AS "SERIOUS": WANTINNG TO MAKE SOME SYSTEM IN SOCIETY WORK BETTER, SMOOTHER, MORE SAFELY, WITH LESS WASTE, LOSS , PAIN, FRUSTRATION, ENERGY EXPENDITURE, OR DELAY--THAN WITHOUT COMPUTER IMPLEMENTATION.)

NOW EVEN THO (OR BECAUSE) THESE SOFTWARE PHREAKS ARE NOT "SERIOUS" PROVISO, THEY WILL MAKE MOST EXCITING AND WORTHWHILE CONTRIBUTIONS TO SOFTWARE DEVELOPMENT, EXTENDING WAY BEYOND "GAMES" INTO SYSTEMS ARCHITECTURE WITH COMMERCIAL RAMIFICATIONS. THE PROVISO IS THAT ANOTHER CATEGORY OF PARTICIPANT IN OUR FIELD MUST MAKE HIS PRESENCE KNOWN IN AN ACTIVE FASHION, AND MUST GET SUFFICIENT SUPPORT FROM CIRCUIT DESIGNERS AND VENDORS. THIS TYPE IS HE (FROM HERE ON READ HE OR SHE) WHO FEELS RESPONSIBLE FOR A SPECIFIC ECONOMIC, SOCIOLOGIC, OR POLITICAL PROBLEM IN A PERSONAL KIND OF WAY (EITHER BECAUSE HIS INCOME DEPENDS ON IT, OR BECAUSE HIS NEEDS ARE THERE) THAT HE THINKS MAY BE RESOLVED BY COMPUTER TECHNOLOGY.

I PREDICT WITH ONE

HOW IS THIS GUY DIFFERENT THAN THE TYPICAL DP MAN MAKING HIS LIVING IN THE INDUSTRY NOW? THE MAJOR DIFFERENCE IS THAT HE'S A GUY WHO DID NOT GET THE BOSS TO BANKROLL HIS FAVORITE COMPUTER PROJECT OR IS NOT WORKING FOR INTERNATIONAL BOMBASTIC MACHINE'S LATEST 64-TRILLION DOLLAR RESEARCH PROJECT. IN OTHER WAYS HE IS LIKE HIS FORTUNATE COUNTERPART. THAT IS TO SAY, WHAT HIS BIG-BANKROLLED BRETHREN FIND INDISPENSABLE TO A RELIABLE ELECTRONIC DATA SYSTEM, HE TOO FINDS ABSOLUTELY ESSENTIAL. FOR EXAMPLE, HE INSISTS ON AN UNINTERRUPTABLE POWER SUPPLY, REDUNDANT HARDWARE, LOW MTBF AND DOWNTIME, LOW ERROR RATES, HIGH DATA TRANSFER RATES, GOOD DATA SECURITY FACTORS, INTERSYSTEM COMPATABILITY (HARDWARE AND SOFTWARE), AND HIGH QUALITY HUMAN/MACHINE INTERFACING.

SO WHAT I SEE COMING IS THIS. BRIGHT PEOPLE WILL "PLAY", AND CREATE LOVELY, ELEGANT, AND EXQUISITE IMPRACTICALITIES.....THEN THE SLOTHS AMONG US WHO ARE IN TOUCH WITH EVERY DAY PRESSURES AND CONTINGENCIES WILL FASHION FROM THEM NEW WAYS OF DOING THINGS AND FOR CHEAP.

I'VE DEALT ONLY IN GENERALITIES SO FAR. IN CLOSING LET ME DESCRIBE A SPECIFIC AND HOW I THINK THIS DISCUSSION MAY IMPINGE ON THE FUTURE.

A STANDARD HAS BEEN DEVELOPED RECENTLY FOR CASSETTE MEMORY HARDWARE AND SOFTWARE. WHAT I NOTICE HAPPENING IS THE SACRIFICE OF THE SINGLE MOST IMPORTANT QUALITY IN SUCH A SYSTEM: THE HIGHEST RELIABLE DATA RATE FOR THE LOWEST DOLLAR. SYSTEMS ARE BEING TURNED ASIDE WHICH HAVE DOUBLE THE DATA RATE FOR THE SAME DEGREE OF RELIABILITY FOR ONLY A MODERATE INCREASE IN COST..... IN ORDER THAT THE SYSTEM MAY USE THE LOWEST-PRICED HOME CASSETTE RECORDERS AVAILABLE. THIS OFTEN MEANS A SAVINGS OF ONLY $20-50 BETWEEN THE "EL CHEAPOS" AND A RELIABLE DECK. ALSO PART OF THE DESIGN PHILOSOPHY APPEARS TO BE PROTECTION OF THE ANL FEATURE OF THE HOME RECORDER--DESIGNING AROUND THIS FEATURE (WITH ITS ATTENDANT INCREASE IN COST, COMPLEXITY, AND UNRELIABILITY) IN ORDER NOT TO HAVE TO TAMPER WITH ITS INSIDES. THIS PRESUMABLY SO THE MACHINE CAN STILL SERVE THE FAMILY TO RECORD AUDIO PROJECTS WHEN NOT STORING DATA. PUTTING THESE VARIOUS DESIGN CONSIDERATIONS TOGETHER YOU GET A CASSETTE INTERFACE THAT VERY SUCCESSFULLY MEETS ITS DESIGN GOAL: A DEVICE MUCH APPRECIATED BY A HIGH SCHOOL STUDENT WITH NO VISIBLE MEANS OF SUPPORT, WHO CAN THEREFORE AFFORD TO COMPROMISE RELIABLE DATA RATES.

AND NOW THAT I'VE BROUGHT DOWN ON MY HEAD THE RIGHTEOUS WRATH OF ALL THE HIGH SCHOOL COMPUTER PHREAKS THROUGHOUT THE LAND LET ME SAY TWO THINGS: 1) I AM ACTIVE IN PROVIDING LOCAL HIGH SCHOOL AND COLLEGE STUDENTS WITH WHATEVER HARDWARE KNOW HOW I HAVE TO HELP THEM IN LOW COST MODS TO SURPLUS DATA EQUIPMENT (SEE MY LETTER TO MICRO-8 NL ON "PROJECT SCM-TTL UPDATE"); 2) I THINK THE COMPUTER FIELD SHOULD SPLIT INTO TWO LEVELS, ONE PROVIDING SUPER LOW COST NON-SOPHISTICATED GEAR TO YOUNG PEOPLE, AND ONE OFFERING INDUSTRY QUALITY GEAR AT 1/5TH INDUSTRY PRICES.* THIS WILL BE A X2 MARKUP INSTEAD OF THE USUAL X10.

*-THIS WOULD BE A KIT PRICE.

William J. Schenker, MD, 2086 Essensy, Walnut Creek, CA 94596 "SCM Equipment -- SASE puts you on roster for buy/sell/swap. This will be a clearinghouse service, gratis--all I will do is make up a roster from your responses and distribute it on a once only basis."

Bruce Brown, WB4YTU/WA9GVK, 4801 Kenmore Ave., #1022, Alexandria, VA 22304 has a friend that just received a Digital Group 8080 machine after a six week wait and he is having problems with bad IC's in the TV display board. In the DC area, they use a homebrew 8008 system using 2K of PROM, 2K of RAM tied to the WR4AAG TV repeater to provide a "time share" remote terminal access computer system.

Thanks go to Samuel H. Daniel, 402 Juniper St., Vandenberg AFB, CA 93437 for typing up the information in a bunch of hand written letters. Sam has a Digital Group (DG) system that he is very nervously assembling. He has already completely rewritten most of the DG system programs and is now testing the new versions out on the DG 808C system loaned to the Cabrillo Computer Center. His own system should be up and running within a week or so.

Benton H Schaub, Jr., PO Box 28, Gambrills, Md 21054 is currently building a Digital Group 8080 system which he chose because it offered a complete system concept: TVT, expandable memory, Bootstrap EPROM, cassette interface, multiple I/O ports, keyboard, and power supply. Also included is a software operating system on cassette. In general, he has nothing but praise for the Digital Group. They have had delivery problems, but have shipped various parts of the kit as they became available in an attempt to meet their 3-week delivery schedule. He said the workmanship looks great and all components have been first-rate. The instructions assume a certain level of competance so a moderate amount of circuit theory and kitbuilding experience is best.

Randall K Webb, 123 Stratford Ave, Ventura, Ca 93003 has a bare bones Altair and has bought but not received a 3P+S I/O board from Processor Technology. He has a keyboard and plans to add 8K of memory and a TVT. He is an EE & CS major at UCSB and hopes some of his work will earn credit towards graduation.

Teunis Slagboom, 1694 Donnelly Ave, Victoria BC, Canada V8P 1X9, owns an Altair 8800 and subscribed to Vol. 2 of the NL. He says he hopes to contribute to the NL in the future.

Lum Loo, 709 Quintard, Anniston, Ala., 36201 says he has a 64 x 64 x 13 memory stack, and would like some info or ideas on adapting it to the Altair 8800.

Bruce Brown (#B4YTU/WA9GVK), 4801 Kenmore Ave. #1022, Alexandria, Va 22304 said the newsletter is doing an outstanding job providing invaluable info not obtainable through commercial publications, and could save someone lots of money by pointing out reputable dealers. He says James Electronics is the best from his experience. He uses a homebrew 8008 system with 2K RAM, and 2K PROM tied to the WR4AAG TV repeater to provide a "timeshare" remote access terminal computer system.

Bob and Barb Juanillo, 35360 Fircrest, Newark, Ca. 94560 recommends a textbook for the newcomer to computers and digital devices in general. It is the "Practical Digital Electronics - An Introduction" with accompanying workbook ($8.00 each from Hewlett-Packard, 1501 Page Mill Rd, Palo Alto, Ca) The book is item #05035-90002.

D. Mark Allen, 2467 Hemlock Ave, Morro Bay, Ca 93442 has a working TV Typewriter he is trying to interface with his Altair 8800. He is interested in an 8 or 9 bit parallel modem which he is trying to get to work and should give a Baud rate around 2400 if it works.

Vernon T. Kempf, Kempf Associated Enterprises, Inc., 194 Edgemond Lane, Barrington, Ill. 60010 is a new subscriber to the NL.

David Gillespie, 1331 N. Lotta Dr., Los Angeles, Ca. 90063 only recently saw a copy of the Micro-8 NL for the first time. He has a Mil Mod/8 running and requested a copy of the Mil cassette interface.

Peter Wolfe, 42409 Highland Dr., Box 139 Yarrow, BC, Canada VØX 2AØ says he is one of the approximately 8000 Altair owners, but he bought his as a partial kit he is still trying to put together. He said the NL has come a long way from #1 when we said "It is quite possible that we may have Hundreds of participants.

Jack Klincher, 15448 Meyers Rd, Detroit, Mich. 48227 sent in $6.00 for the next volume of the newsletter. He has a Mark 8 and is interested in expanding the memory.

Lee C. Hanson, 2914 Snyder Ave, Cheyenne, Wyo 82001 is currently building a MOD 80. He sold his Mark 8 so he is temporarily without a computer. He plans to get at least 8K of 91L02 (500ns) RAM for the MOD 80 and also the MITS BASIC. He also wants to interface the Suding TVT. He has in his possession the C-MOD-8-9 ROM board and the Monitor 8 ROM from Mini Micro Mart. He would like to sell them both for $75.00

Bart M Berger, 1380 Howard St, San Francisco, Ca 94103 (415)861-4089 - a new phone number- is in the very first stages of building a new TVT that is very fast (more than 15,700 chars/sec parallel, 9600 baud max. rate for serial input) with a 32 x 64 display using interlacing memory. The only problem may be readability. He promises more details if it is ever finished.

Ronald K Angstadt, Rd. 3, Box 281, Kutztown, Pa 19530, hasn't worked on his Mark-8 for a long time, but just received a TVT-III from Micro Mini Mart, after waiting 3½ months. He also has the Suding Calculator interface, and a MOD-8 cassette interface. He wants to get a Monitor for the Mark-8, but doesn't want to wait another 3½ months to get one from MMM.

Robert K Burandt 3429 E 71st St, Inver Grove Hts, Mn 55075, has a Scelbi 8H with 8K RAM and a Digital Group TV-Cassette interface. He has also ordered a Digital Group 8080 10K system, and is considering building the 64 x 64 graphics interface from Byte #2.

Jeb Boswell, MD, 28 Kenilworth St, Newton, Mass 02158 credits the NL for his success in buikding an 8008 type system.

Duane L Gustavus, 2001 Golf Ct, Denton, Tx 76201, says from past experience that the NL is still the best buy in the field for the computer hobbyist. He has the 8K BASIC tape from MITS, but zapped his CPU and had to send it back to MITS for repair. Its enough to turn your hair white, he says.

Larry R Shultis, Box 218, Fontana, Wis 53125 says he received the NL and Byte the same day, and found he couldn't put down the NL until he had read all the fine print, which isn't the case with Byte. He wants to know if anyone has ideas on interfacing a HP-45 to an Altair; also if anyone has had experience with saturation recording or with National Multiplex's Computer Aid digital data recorder.

Martin Haase, Jr, Box 1549, Boulder, Co 80302, expects to have his MOS Technology 6502 system running with 2K of 350ns low-power 2102s, a Digital Group TV and Cassette interface which worked flawlessly the first time it was turned on, and a keyboard hooked to a UART to interface to the 6502. Future plans include A-D and D-A converters, floppy disk, modem, a line printer, X-Y plotter and CRT graphics. His next CPU will probably be an 8080 because of all the great amount of software available for it. He's also looking at the TI-9900 and the PDP LSI-11. He would like opinions on the IMSAI 8080.

The Litton Calculator/Computer Club has just formed at Litton Guidance and Control Systems, Mail Station 78/31, 5500 Canoga Ave, Woodland Hills, Ca 91364, and meets during lunch hours to promote common interests. W V Bennet, is President, and S Lieberman is Secretary.

Timothy H Jackins, 585 Ashton, Palo Alto, Ca 94306 is just now nearing completion of a Mark-8 and needs help in debugging and going even further.

Robert J Jones, MA, 4201 Massachusetts Ave, Washington, DC 20016, reports he has formed the Amateur Computer Society at Catholic University of America.

Gary T. Post, VA 174, Cecil Field, Fl 32215, is in the Navy and says that since he started building a Mark-8 he has been to 6 foreign countries. He has finished construction, but hasn't had time to debug it. Now he will be at the same address for three years and will have more time. He says he'll probably have an 8080 system running before the Mark-8 is working.

John Griffin, 34008 22nd Pl SW, Federal Way, Wa 98003, has a Mark-8 with 10K of RAM, TVT, keyboard, and FSK tape, but just found out about the NL from a friend. He is looking for a good text editor program.

Don Birzei, 1512 E North St, Waukesha, Wi 53186, is building an Altair 8800. Future plans include BASIC, from MITS or someone else. He is looking for a cheap, used ASR 33. He has the Suding calculator interface from Micro Mini Mart, and says the board is inaccurately drilled and the assembly drawings and schematic are unreadable.

Mike Talbutt, 3229 Parkview Ct. S., Columbus, In 47201 (812)376-7738 (a new address) is getting ready to start construction of a system based on the 6800, or more likely the MOS Technology 6502, which he'll probably get from Ohio Scientific Instruments, Box 374, Hudson, Oh 44236.

John James, 1597 Monument St, Concord, Mass 01742, has a Mike-2 with 2K RAM, TVT-II, and Suding cassette interface. He reported some problems with the 50 pin connectors, but replaced them with the SkotchFlex versions and has had no more trouble. He modified the Suding Operating System to work on the Mike. He wants to build an assembler and a CW (Morse Code) learning program, which would randomly send letters, check on correct reception through the keyboard, and modify letter probability according to mistakes made by the user.

Baron B Barker, 9748 Pinewood Ave, Tujunga, Ca 91042, has worked out an ASCII to Octal loading program which he uses with his Mark-8 and a TVT-II. His new project is building a MC6800 setup.

February 10, 1976

Hal Singer
Micro-8 Newsletter
4350 Constellation Road
Lompoc, CA 93436

MiniMicroMart
1618 James Street, Syracuse, N.Y. 13203; Phone: (315) 422-4467

Dear Hal:

Keep up the good work! Enclosed is $10.00 for my subscription to the next series of newsletters.

My ears are still slightly burning from some of the material that appeared in your last newsletter. In spite of some of the unfavorable comments, I hope you will be able to keep up the good work.

I am not sure, however, that you are doing all the Micro-8 newsletter readers a service by printing letters from customers about suppliers without giving the supplier the opportunity to reply. Some of the things we have seen published have been true; some are inaccurate. In almost all cases, the complaintant had been satisfied by the time the letter had been printed.

I would still like to get a copy of the paper tape for the two mailing lists and any software you might have for handling mailing lists for the PDP-8.

Sincerely,

Maury Goldberg
Maury Goldberg

Box 574
THE MEDICAL SCHOOL
Ward Memorial Building
303 E. Chicago Ave.

MAPLE
Microcomputer APL Enthusiasts
is here!

NORTHWESTERN UNIVERSITY
CHICAGO, ILLINOIS 60611

I'd like to know if anyone is interested in furthering the following projects (well, projects-to-be):

APL for uP users: promote APL as a compact, universal code for program notation which can be easily read by any user, and then translated to his uP's code through a APL/uP dictionary. First for the 8080, then....

Software: initially, without vectors (PCC may begin work on this soon)
next, vectors
then, arrays: 2D and color, then 3D?

Hardware: firmware to automatically implement the APL character set on TVT's, and then for those dictionaries!
a matrix printer which will be able to cover the whole page with dots (filling in even the spaces between lines and letters) (and someday even between the dots!) to print the programs in APL text

Essentially, I'd like MAPLE to serve as a focus for the information required to implement the aforesaid projects. If you know of anything that has to do with the above, please tell me about it!

John Sikorski
John Sikorski

Mark Spohr, M.D.
1372 Marion St.
Denver, Colorado 80218

Micro 8 Newsletter

At long last I am getting around to writing you! I have learned much from the newsletter and it is time that I contributed. My background is B.S.E.E. and M.D. I hope to get something together in the medical engineering field when I finish my internship but plans are nebulous now.

My system is 8008 based, mostly wirewrap, with Dr. Suding's modifications and VLCCT (handwired). A Digital Group cassette interface is working well with the loader program in two 8223 PROMs in high memory (I built an 8223 programmer which is controlled by the Mark-8 - programs an 8223 in about three minutes - I'll send a schematic and software when I get it in readable form). My system has 6K of 2102 memory, Digital Group TVT and an ASCII keyboard. It has been running well since late Oct.75 (how time flies). The Suding mods make the thing easy to use. Actually, No front panel and a decent monitor program would be better (My next computer .....). Power supply is a homebrew Kludge which is ugly but conservatively designed (10 amp @ 5v.). TV monitor is a 12" Motorola AC/DC with isolation transformer which works well.

After writing several game programs, I decided that hand assembly was not the wave of the future(even with an electric eraser - modified wire wrap gun). On investigating monitors and assemblers, I decided the MIL Monitor 8 was the best way to go (even though it is only a "one pass" assembler). The Monitor 8 was modified so that it could be used with the Digital Group TVT and cassette interface. I also couldn't resist adding a few goodies: such as software scrolling for the TVT, new commands to insert and delete instructions (with automatic adjustment of program JMP and CAL addresses to maintain registration of loops), zero buffer area, and load ASCII text into memory. These new instructions coupled with the original functions of the Monitor 8 (symbolic and octal load and dump, copy and translate functions, breakpoint insertion, program execution, and editing capabilities) make a very handy monitor in 3K of memory. The modified Monitor 8 will be available through the Digital Group.

I would like to put in my vote in favor of the computer conference as suggested in NL #12 by David Christianson. This would be an ideal format for the NL to evolve into now that schematics and kits are available for 103 Modems. This would save a lot of paper, postage and delay . It seems like the logical next step.

Please keep up your effort. We need your open forum, informal format free of advertising bias. Sincerely,

Mark Spohr MD

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2 March 1976

CACHE P.O. BOX 36 VERNON HILLS, ILL. 60061

Last November, a company called Great Northern Computers Ltd. had published in the Micro-8 Newsletter a letter, requesting people to help debug their computer kits' documentation. Individuals selected by GNC would be allowed to purchase a GNC kit at a reduced price, and would receive two copies of the construction manuals, one of which was to be returned to GNC when the kit was completed. This second set of instructions was to be modified, corrected, and otherwise annotated, as required. I wrote to them shortly after their letter appeared, and received a letter in reply early in February announcing that I was one they had selected for debugging. Since I had thought of some questions concerning their systems, I attempted to call them by using their return address and going through directory assistance. There was no listing for GNC, nor for two other companies who were listed on the return address of the envelope. It was at that time that I noticed the postmark - Tampa, Florida. I have written them again, with a number of questions about their kits(one 8008-based system for $295, and one 8080-based for $345), a few more questions concerning the mailing discrepencies, and a suggestion that they call me to facilitate my response to their selection. I'll let you know what develops as soon as I know.

The Chicago Area Computer Hobbyist Exchange, CACHE, held its February meeting on the 29th, at Northwestern University. Ed Curry, vice-president of MITS, along with one each of their software and hardware people. The general atmosphere generated by the MITS people appeared to be one of candor and honesty; however, when their responses to people's questions were viewed with more examination, it appears that not a great deal of information was presented. Invariably, the MITS peoples' responses to specific questions were "We've been swamped with work, so bear with our problems," or "We ship all orders within 60 days." This last comment brought a few chuckles, and snickers, from a number of people in the audience. They showed some new hardware, such as a 4K static RAM board, a 16K static RAM board, a vectored interrupt board, and so on, although none of the items seemed to have either a specific cost, or a delivery date. The software presentation, consisting of a presentation of MITS' extended BASIC disk system commands, was a farce. Not only is MITS' DOS nowhere near ready, the presenter was inaudible, and appeared to have taken over software duties at MITS the day before the meeting.

The high point of the meeting came after the MITS presentation, when we had three microcomputers shown. We had an IMSAI 8080, and a PACER working; and a KIM-1, which had been installed in a briefcase. The IMSAI is exquisite; commercial quality throughout, a 30-amp power supply, and lots of room for expansion. The PACER, using the PACE mpu, is a hex-format, self-contained system. I didn't get a close look at the PACER, so I can't go into further details.

Our next meeting will be on March 28; no site has yet been selected. We have tentatively scheduled a demonstration of the IBM 5100 portable computer(too expensive for most of us, but we want to see it anyhow), and a presentation by a Motorola applications engineer.

As editor of the CACHE Newsletter, I can easily sympathize with the problems which you and John Craig have had to face with the Micro-8 Newsletter. The first two CACHE Newsletters were two-men projects, as far as assembly was concerned. The quality, however, seems to have made a quantum leap from the first to the second; hopefully, it will continue to do so.

These comments seem to bring me up to date, except to note that I have a set of MIL Mod-80 boards waiting to populated. Maybe next month. . .

Geoffrey D. Lowe
4439 N. California
Chicago, IL 60625

312/588-7586

Cordially,

Geoff Lowe

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20 February 1976

I would hate to do an audit trail on how I happened to run across your address. To make a long story short, I have been trying for the last six months to piece together enough information on the 8008 to assembly the start of a small system. Although I have most of the hardware, including the 8008, I can obtain no specifics on the CPU (clock cycles?/machine state outputs 50, 51, 52, etc.?) My requests for information have been turned down by "Radio Electronics," and ignored by Intel. Last week, I obtained a back copy of "The Computer Hobbyist" which mentioned your group.

Could you please provide me with a copy of the MARK-8 plans (logic/schematic), if possible, plus an 8008 user's guide. If not, could you lead me in some direction in which I may obtain these items? Please notify me of any costs which may be involved.

I would be forever in your debt,

LANNY L. LARSEN
650 Village Green Parkway
Newport News, Virginia 23602

Page 4

Trivia: In the issue I just received, I noticed that people are now telling what other newsletters and things they subscribe to. I currently subscribe to: Byte, Pop. Electronics, Radio Electronics, Scientific American, TCH, PCC, Electronic Engineering Times, a pair of Audio oriented mags, The Digital Group Clearinghouse, as well as the NL's.

Our SWTPC TVT is still awaiting the loving hand of a Maintainance Person to marry it to our PDP 8e. (When I tried, they just ignored each other.) With all the pain it has been,it IS nearly compattible with a Selectype.

Maybe I should not talk about this, but I am finally ready to send off the first of a series of homebrew computer design articles to Carl Helmers of Byte. I do not know what he will say about it yet. If it were to be printed in the NL it would gobble up dozens of issues. I am currently titling it, aptly enough,"Designing a Homebrew Computer".

The following is a list of why, for my first system, I have decided on using the MOS Technology 6502:

1) It is the first and thus prone to errors.

2) I have no experience in devising the necessary clock circuits necessary for nearly every other MPU in existance. It's built into the 6502.

3) MOS Tech. has come out with hardware and software manuals that make most of the work easy.

4) The 6502 treats I/O devs. as memory, an imperitive need with my up and comming modifications.

5) Due to some of the innovative things I plan to add, I WANT to start nearly from scratch.

6) In order to keep costs as low as possible, a prime consideration has been that the 6502 is an 8-bit processer. 16 bits is double the hardware in most cases, and 12-bits is an outright pain in view of all these new 8-bit oriented support chips that are comming out.

7) I do not plan on just designing one system. My NEXT one will almost deffinitely be based on the Intersil 6100 chip. I am a devout PDP 8 freak!!!

8) I have all the 6502 hardware documentation on hand. I don't know how long it my take to get comparable info from Intersil. I do know that it will cost a pile from anybody else.

Together, these reasons spell MOS Tech. 6502. After I have gained experience, and time, I will jump right into an Intersil system. The prime advantage of an 8 bit system,though,lies in the relative inexpensiveness of memory. According to the data I have at this time, I can get 16 K of 91L02 memory for aproximately 240.00. Now,you ask?

$30.00 for the digital group's 8K memory PC board,
$10.24 for IC socket; (OPTIONAL)
$192.00 for 128 91L02's (Provided Steve Edelman's deal works out)

Using Jim Brick's pig y backing technique, it is possible to make the 8K board accept up to 16 K

Now I have a problem. Currently, I plan my 6502 card cage as ten slots with a 72 line super bus. Maybe it's a simple problem, but I have no current data on bus drivers. (My most recent semiconductor data library is National's 1974!) How do you get around bus expansion if you have EVERYTHING reading off of the address lines. I know that there is no problem up to ten slots, but what happens after that. Do I have to pipe all my lines through another set of bus drivers for every ten slots. Also, what is the best way to terminate the data and control bus so as to limit ringing???? If these problems are easily soluable, I will seriously consider going to 20 slot cage. I am hopping that the resulting cage will come off as something like DEC's OMNIBUS. Please, somebody help me with this.

Finally, I am still interested in getting a VERY cheap model 32 printer for my MMM terminal. Also, can someone recommend either a good process (I have access to a high school Chemistry Lab) for the making of two sided PC boards. Or is it cheaper to send my schematics to someone else. If so, WHO???

Yours in Hobbyist Computing,

William Cattey

William Cattey
39 Pequot Road
Wallingford, Ct. 06492

This is a pretty old letter so if you are interested in anything here, write Jim and see what the present status is.

Jim Garrett
522 Rollingridge Ln.
Garland, Tx. 75041

Dear Friends,

In contacting MITS about the avalabil. of there Altair 8800 * (trademark?) P/C boards I have found that they are no longer going to supply the boards to the hobbiest. After checking around here in Dallas I have come to the conclusion that if there is enough interest I will make an equivalent improved set of boards for us at cost. The purpose of this letter is to guage that interest.

I am asking everyone that is interested in Altair 8800(*) -LIKE boards to drop me a postcard (or letter) stating their needs and demand. These are improved boards (A DISCLAIMER: I do not offer Altair(*) products or kits, I sell parts and accessories which can be used in the Altair 8800(*)).

The display board will contain the neccesary mods to provide an octal display (for approximatly $15 in components you can read octal insteed of binary), AC switch improvements will be instituted, grounding on all boards will be improved, mods to the CPU board will include reduced switch noise and better and more conventional connecting between display board, the memory boards will have provisions for a DIP switch for address selection (no more jumpers) and the power supply board will have no or few jumpers (this will improve reliability).

The tenitive prices are as follows:

Description of Board	Cost (Estimated)	
CPU	$18.50	ALL BOARDS ARE MADE TO MIL SPECS WITH GOLD PLATED EDGE CONNECTORS OF 1/16 INCH MATERIAL.
4K Memory (Static or Dynamic)	18.00	
Power supply	13.50	
Display and Control	33.00	
SET I (1 each CPU,P/S,andD/C)	$58.50	
SET II (4 each of either static or dynamic)	65.00	
SET III ***** SETS I + II *****	$115.00	

(This includes postage, insurance and full documentation of all mods.)

I am willing to produce any other boards if there is enough demand. Along the same lines I may be able to supply the dip switches, connectors (both 100 pin and IC) and miniture switches if there is enough interest at OEM prices.

Let me repeat that I'm not in this to make a killing, I am interested in producing a high quality product and making enough to build my system.

If the demand is enough I will send out an order form by the middle of January to everyone that sends a postcard or letter with delivery to begin the latter part of Febuary or first of March.

10/21/75

Thanks,

Jim Garrett

December 15, 1975

Roland V. Lupient
Route 3, Box 303
Mosinee, WI 54455

Dear Hal,

The time between the date a letter is written to you and the date that the information gets published can make the information a bit misleading. For example, the November 1, 1975 newsletter stated that I sent my Altair 8800 back to MITS on May 22, 1975, and that I did not get it back yet. Actually I got it back on June 11, 1975. I had SC10 on the CPU board connected between PSYNC and ground, the directions and drawings in the construction manual are not the clearest. They relocated it, checked the voltages, installed a deposit modification on the display/control board, charged me $11.00 for ½ hour work and $8.00 shipping.

On June 18, 1975 I ordered the IC's to expand the 1K board from the 256 words supplied with the original kit to 1K, changed my order of February 25, 1975 from the Comter 256 to the Comter II, ordered the Line Printer and Controller, and four 4K Dynamic RAM boards.

Everything, except the Comter II, arrived on October 14, 1975. Two of the 4K Ram boards were returned to MITS on December 10, 1975 because they failed to function properly. A wrong resistor was supplied for the Serial I/O board for the Comter II (the board was shipped, but the terminal was not).

On October 20, 1975 my order for Extended Basic software and the assembler package was acknowledged, but backordered, and scheduled to be shipped 12/27/75 and 11/19/75 respectively. The latest promise on shipment of the Comter II is January 16, 1976.

Now that I have learned a little more about the Altair 8800 it seems that expanding the 1K board was a mistake--it would have been more economical to scrap the 256 wordsof static memory, but I was under the mistaken impression that some static memory was necessary for the successful operation of the computer.

Some other hobbyists I met convinced me that I am not going to be completely satisfied with the Comter II, because of the limited display capability that it has, and that the Typewriter II from SWTP might serve me better. I would like to hear from anyone who might be able to offer any other solution for this terminal, keyboard/display problem.

Please enter my order for Volume 2, 1 thru 6 of the "Micro-8 Newsletter", $6.00 check enclosed. My office phone is 715-457-2139, home 715-457-2502. I hope you can keep us to NL, since there are not enough hobbyists here to form a club and the NL is a good substitute.

Enclosed is a bulletin from Processor Technology describing a memory stand-by operation. I have made the modification on my 4kRA board and presently use a 2V stand-by power supply. The only problem I've encountered is that all AC power to the peripheral equipment must be turned off before the computer is shut down. Turning off everything with a master switch caused garbage to be loaded in memory.

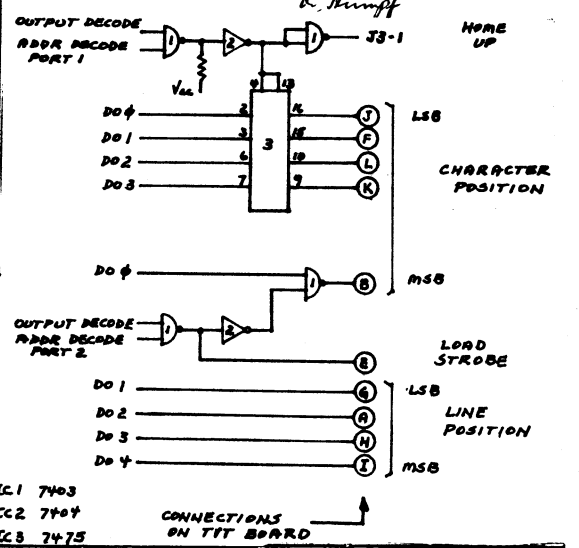
The SWTP TVT-2 has provisions to load the cursor position register directly and thereby moving the cursor anywhere on the screen. This will greatly increase the update rate of the display when only a small number of characters have to be displayed (I came up with this circuit to speed up the LIFE game). The character position is determined by 1C35 and 1C27A; the line position by 1C34. A total of 9 bits are needed for cursor positioning requiring 2 output ports. This also makes the software somewhat messy. In my interface the first output instruction latches the first 4 bits in a 7475 and the cursor is set to the home position (resets 1C27A). Next the remaining 5 bits are sent out along with a strobe pulse to load the register.

Some comments on suppliers. I have received excellent service from James and Solid State Music. I'm sending a letter to the FTC regarding an order I placed with MiniMicroMart in June 75. Two requests for a refund have been ignored.

Adolph F Stumpf
5639-A Ute
Glendale, AZ 85307

Sincerely ypurs,

A. Stumpf



Yes, of course I'll send you six bucks for Volume 2 - 1 thru 6 (Enclosed is my check for same). I've never enjoyed a publication so much. Usually only one or two articles in a magazine interest me and one reading usually does it. I'm interested in every article-letter Micro-8 prints and I read 'em again and again. I'm going to be very sad if and when you close up.

The computer bug hit me in a big way back in Oct 75. Since then I've been devouring everything about it I can get ahold of. I'm in a rural area and if there are any other computer enthusists near I'm not aware of them. I live in the eastern panhandle of West Virginia about eighty miles away from Washington. If there is a club in Hagerstown, Md or Frederick, Md I'd like to know about it. Your newsletter is my sole present contact with others.

I have subscribed to the Computer Hobbiest (six weeks ago - no response) and Byte (four weeks ago - no response). I want to get the back issues of ECS and wrote to Carl Helmers as suggested in u-8. Carl said no sale, no loan of remaining copies. Will you lend me yours? I will photo copy & return immediately and am willing to send you a security deposite sizeable enough to insure return. Same dismal respose to efforts to get Mark-8 plans. Tracked down the back issue of Radio Electronics thru interlibrary loan, found only the description and sent off for plans to RE, Naturally I found that offer closed out. I still want the plans; the modifications written up in u-8 don't do me much good without the schematics. Will you lend me yours with the understanding I'll return immediately? If nothing else, could someone in your group xerox the schematics? Thats all I really have to have. With that in mind I'm enclosing an SAE and an extra two buck check to cover the xerox cost. I'm especially interested in the Mark-8 control panel.

Thru your newsletter I learned of Robert Swartz, sent for and promptly received Mod 8 and Mod 80 documentation. He provides a good service. For those who are interested: Space Circuits' number is 519-742-5896 but phone orders with charge card numbers are not accepted. They promise two day shipment out of stock for all Mod8/80 boards. The basic set of 7 boards for either Mod8 or 80 is currently (Jan 30) $86.70. Extra boards are still $13.00 except for prom programmer backplane at $24.75. The $10 postage & handling and 8 % duty still hold. I intend to install this unit in a Mini Micro Mart RM terminal and have been promised by Maury over the phone to get shipment immediately after receipt of order. After the warnings in your newsletter I am very fearful, but he is the only one I know with a Rix for sale. I'll let you know how it all turns out.

I'm an ex-heavy ground radar tec, now highschool chemistry and physics teacher who does a little land surveying on the side. I have a HP 9100a, circa 1969, with no peripherals. I would like to interface it with an intellegent typewriter so that I didn't have to hand copy everything the Hp9100 does. Thus the interest in the RM terminal. I expect it will take at least a year to get my system up. I certainly hope you're still publishing at that time.

31 Jan 76

Sincerely

Teriff C. Young, Box 826
Shepherdstown, WV 25443

Dear People,

First please enter a change of address from PO Box 5104 to the above box number, everything else the same.

Second, Could you please ask in the newsletter if anyone else received the Sanders 720 terminal that was offered for a while earlier and whether there is any information (schematics and such) available. I and a friend of mine in South Carolina have one each and need the info.

I have sold him a set of MOD-8 boards and ROM that I haven't had time to get into (moving etc) and am helping a friend here with a 6800 system for stock market stuff. I am also working on a alpha-numeric CRT terminal usong a smoke-damaged Ball monitor that used to be available around here, a Herbach& Rademan keyboard, based on the Ann Arbor terminals circuits, and using the Univac printer mechanism I got from Mini-Micro-Mart for hard copy. I want to do a graphics terminal with a 6800 for intelligence next, but that is some in the future. I am also looking forward to seeing what Godbout turns up with on his 16-bit sytem.

FYI and probably worth following up. Steve Wozniak who is in the Home-Brew Computer Club here has designed a 40x24 TV terminal that probably can be built for less than 70$ and has included a serial EIA interface and rolls. It is called the Call-computer terminal and the info may be available from them. It uses 32 chips and is pretty simple. It would make a great console for people with bright ?ds. Thats all the info I have on it.

Thanx
Doug

Douglas Faunt
PO Box 60116
Sunnyvale CA 94086

Enclosed you will find a paper entitled "One Evaluation of a SPHERE System" for publication in Micro-8 NL. I have also sent a copy to Peoples Computer Co. to get as much hobbiest coverage as possible (I realize some duplication will occur).

I have a request to make. I would like to know of any inexpensive 1702A PROM programming circuits that I can buy or build that will be compatible with my Sphere system (as is or by modification). I have a copy of the Intel circuit and it is quite complicated and heavily discrete. There has to be a better way. I could design my own but why re-invent the wheel.

Speaking of re-inventing the wheel, I grew tired of waiting for Sphere to deliver my cassette interface so I designed my own. It uses Manchester (Aiken F/2F) coding, has no one-shots, will tolerate +25% to -31.25% speed and/or frequency variations, records at 1500 bps and 800 bpi, and uses 16 IC's. Why go against the KC Std. you asked. Well for trading software I will have a KC Std. via Sphere, but my own design is more efficient at packing data and record and playback times. However, if you wish to use the KC Std., changing one timing circuit will get you there. If you are interested let me know and I will do a short article on it.

I guess that is it for now.

Yours truly,

Chuck

2309 Hazel Ave.
Dayton, OH 45420

March 5, 1976

Charles E. Burton, Ph.D.

One Evaluation of a SPHERE System

Which Processor?

In the early 1970's Intel developed some microelectronic circuits that would revolutionize the electronics industry and would intrigue hobbiests. Although the Intel 4004 was developed first, the Intel 8008 has probably been used by more hobbyists than the 4004 because of the design of the Mark 8 and of the Microsystems International MOD-8. The major drawbacks of the 8008 are the large quantity of overhead circuitry required and the slower speed, when compared with the second generation devices; however, the price made it attractive. Then MITS introduced the Altair 8800, using the Intel 8080, and the hobbyist market exploded. Now kits are available which use the National IMP-16 and PACE, the Motorola 6800, the Fairchild F-8, the MOS Technology 6502, the Intersil IM6100, and others. After surveying all of the available microprocessor data, I decided to go with an M6800 system; although for software support the IM6100 might have been a better choice since it emulates the PDP-8/E, thus opening up a vast library of DEC software. The M6800 has an architecture similar to the PDP-11, treating I/O and memory addressing the same. The chip family approach and a single power supply are also desirable features of the Motorola device.

Placing the Order

Sphere was probably the first company to introduce a system using the Motorola microprocessor. They started their design in early 1975 and I believe their first advertisement appeared in Radio-Electronics in July, 1975. Their introductory offer was very enticing and subsequent telephone conversations convinced me to take a chance on this new system. I ordered the System 2 kit containing a CPU board with 4K bytes of dynamic RAM, a CRT board (similar to the TVT video generator), a keyboard, a Communication/Cassette board, a power supply, and a terminal. Their introductory offer included a 180 day guarantee and a 5% rebate for late delivery (in excess of 60 days).

Delivery

The kit was not delivered within the 60 day period and Sphere lived up to their rebate offer. The kit did arrive about a month later and it came in five or so installments. However, as of the first of the year, the Communication/Cassette board has not been delivered. This late delivery is due in part to a redesign required to make the cassette interface compatible with the BYTE conference standard. The delivery has been promised for March, 1976. The Operator and Reference Manual and the System Software were not delivered until about 1½ months after the parts were received.

Assembly

1. The CPU Board

The instructions consisted of 1½ pages of assembly procedure, a parts list, a part layout sheet, and schematics. I spent about five hours assembling this board. The 1702A's containing the monitor were not included with the parts and were not received until November. One resistor was mislabelled and on the layout sheet; there were no instructions on using the real time clock; a few of the parts were crowded making part insertion difficult at times; and there were a few errors on the schematics.

2. The Keyboard

The instructions consisted of 3½ pages of assembly procedure, a parts list, a part layout sheet, and schematics. I spent about five hours assembling this board. The assembly procedure for the space bar was absent from the instructions, causing some head scratching. The key-switches are similar to those used in the SWTP TVT and their reliability is questionable. At the outset, four checked out bad, i.e. open or short After assembly, three turned out to have extremely bouncy characteristics and two went bad (shorted) during a three week period of no use. Sphere indicated that the manufacturer has tightened their QA and if the owner wants to return the old switches for exchange, along with $5 for handling, Sphere will replace the keys. The major problem is that after the keys are soldered in place, unsoldering may destroy the etch (because the lines are very thin) and the plated-through holes.

There were a few PC board layout errors which had been corrected by Sphere by cutting the etch and running wire. One of the original bad keyswitches was one that Sphere had soldered into the board as a PC board correction.

3. The CRT Board

The instructions consisted of 2 pages of assembly procedure, a parts list, a part layout sheet, and schematics. I spent about four hours assembling this board. Numerous resistor positions on the layout sheet were absent or wrong; part count and components delivered were wrong in a couple instances; instructions to complete the RF section were not included and one PC board layout error which Sphere had corrected was evident.

An RF transmitter can be added to this board since the PC board has the etched area available. The circuit for the transmitter is identical to the TVT circuit published by Radio-Electronics. There are also pads available for affixing a Gaussian shield. I made my shield from copper screen, cut to form a five sided box. All edges were soldered and silicon rubber glue was applied to the base of the shield to insulate the shield, thus preventing component shorting. Wires were soldered to the screen, then soldered to the shield grounding pads.

4. The Power Supply Module

The instructions consisted of no assembly procedure, a parts list, a part layout sheet, and schematics. I spent about four hours assembling this module. The major problems came from missing hardware (nuts and bolts) and a couple of misdrilled holes. The lack of enclosed assembly procedure caused some frustration.

5. The Terminal Module

The assembly instructions consisted of no assembly procedure, a parts list, and no part layout sheet. I spent about one hour assembling this module. Again, missing hardware and some tolerance errors caused problems. Also, the lack of assembly procedure and a part layout caused frustration.

6. General

The boards are good quality and the plated-through holes saved untold problems. The only thing that I am apprehensive about is the narrow etch widths. Because they are narrow, soldering and unsoldering components can cause the etch to lift away from the boards; also, ohmic drops and noise problems can occur. There are more than enough decoupling capacitors on all of the boards.

Any missing parts and hardware were promply sent. The new assembly procedures (included in the Operator and Reference Manual) have been updated to include some of the procedures that were missing from the original instructions. However, I must say that a major deficiency of this kit is the documentation. I believe that the assembly procedures are not nearly sufficient for the general hobbiest. Sphere would do well to survey Heathkit, SWTP, and MITS kit assembly instructions for use as guidelines to improvement. After reading the Operator and Reference Manual,it was found that the manual could also stand a vast amount of improvement. I estimate that there are at least two typographical, grammatical, and/or technical errors per page.

Debugging

After the components were soldered to the boards, the flux was removed by using a toothbrush and alcohol. I found that backlighting the boards with a high intensity light allowed me to easily find most solder bridges. However, because some of the component solder pads were so close to etch lines, a couple of bridges appeared as though they were proper solder connections. In particular, one of the clock circuits had such a solder bridge and it took me about two hours to find it.

Much has been written about "the front panel vs. the software monitor." During the debugging of the system, a front panel can be invaluable. If clock circuits, memory address or data busses, etc. are defective, a system monitor is of no use! I started degugging the system with a VOM and a logic probe, progessed to an oscilloscope, and ended with a logic state analyzer. In all I spent about seven hours running down the various "bugs."

I had and still have some powef supply problems. The zener diodes and the series resistors of the -5 volt and -12 volt supplies run extremely hot. Increasing the series resistor to reduce the zener current would probably alleviate the problem. The +5 volt and +12 volt supplies are low, but within the regulator specifications. However, ohmic drops in the cable from the power supply to the terminal (about ten feet of 22 AWG wire) and in the interconnecting and distribution ribbon cable (about four feet of 30AWG wire) drop these voltages to near or below the lower limit of the IC supply voltage specifications. I believe that it would have been much better to distribute the unregulated voltages to the boards and to put regulator circuits on each board. The system cost would have increased somewhat, but the problems with ohmic drops would have been overcome.

The power-on-restart circuit only works occasionally. However, a "fix" has been suggested in Sphere's Global News.

Another documentation deficiency that is also evident is the lack of information on debugging any hardware problems. If the kit builder does not have a good understanding of digital circuits and the other circuits which make up the kit, he will have a rough time during this phase of the kit construction. Also schematic errors can make things even worse!

Hardware

The CPU board contains the M6800 CPU, four 1702A PROM'S (1K bytes) containing the Sphere Program Development System(PDS) software, eight 2107 dynamic RAM'S (4K bytes), an optional PIA, a two phase system clock, a refresh clock, a real time clock, and control logic. The system clock phases (ϕ1 and ϕ2) are derived from two monostable multivibrators configured into an astable arrangement. The ϕ1 time is about 500nsec. in duration. The ϕ2 is about 820 nsec. for all cases except during a write RAM cycle where it is 1000 nsec. This cycle time is 32% to 50% longer than the fastest CPU clock rate. The dynamic RAM refresh is not done on a cycle steal basis but shuts down the CPU by pulling the HALT line low for 64 system clock cycles out of about every 2 msec. The refresh clock is also derived using two monostables. The real time clock is derived from the refresh clock using a binary counter to produce 512, 256, 128, or 64 interrupts per second (tied to IRQ). The action of pulling the HALT line low during refresh causes two major problems. First, software timing loops, a major programming tool, are impossible to use reliably. Second, the real time clock suffers from a similar problem since all interrups are ignored while the CPU is halted. There is another problem with the real time clock. It has the lowest priority in the interrupt structure since there is no way to directly detect that the real time clock was the interrupting device. All other I/O devices whose interrupts are enabled must be polled before the real time clock can be assumed to have caused the interrupt, i.e. assumed by default.

The keyboard module has and is still giving me 90% of my headaches. The major cause seems to be the keyswitches. The keypress codes are derived using the system clocks, two binary counters and a one of sixteen decoder, i.e. a multiplexing scheme. The keyboard I/O is done through ½ of a PIA, leaving the other ½ of the PIA for a user defined function.

The CRT board contains a video generator (similar to the SWTP TVT), etched area for an RF oscillator/twin lead antenna hook-up (parts and connection instructions not supplied), 512 bytes of static RAM, and a video clocking circuit. The video clock is also derived from two monostables. This clocking method does produce some waviness in the display. The RAM not only provides storage for the CRT characters (32 characters per line by 16 lines) but is also memory for the CPU, i.e. directly addressable. The nifty part of this circuitry is that it has a DMA controller, whereby the video circuit can access the memory as long as the CPU is not addressing this memory segment, i.e. the CPU takes precedence.

All connections between boards (address buss, data buss, control buss, and power supply voltages) are made by ribbon cable and DIP connectors. I have experienced a couple of problems with the DIP connectors. First,the connector/socket interconnection is not real tight so that the connectors tend to work themselves loose. Second, the pins on the connectors are somewhat frail and I have had two pins break off during insertion. Third, care must be taken when inserting the connectors in the sockets. I missed proper insertion of the power supply buss cable by one "shift left." Luckily the boards are protected against connecting positive voltages to the negative supply lines and vice versa and I only burned out one diode.

Software

It is evident that Sphere has some good software writers. Within the 1K bytes of the PDS PROM'S is an Editor, a Mini-Assembler, a Debugging Aid, and some Utility Programs. The Editor has full cursor control and scrolling capabilities. The scrolling can store and retrieve text throughout the entire extent of the memory. The Assembler allows for 63 one character labels and origin and equate pseudo-operations. The opcodes are presented as two hex digit codes. The operands are defined as data (one byte), extended (two byte), or relative and take the form of two or four hex digits or a label. The Debug routine allows for addressing any memory location, viewing the contents, and changing the contents; the stack can be retrieved and modified; breakpoints (using Software Interrupt) can be set and reset; the Assembler symbol table can be accessed; and a program can be executed, all under keyboard control. The Utility routines include multiply, divide, ASCII-to-Base and Base-to-ASCII conversions, CRT I/O, and more.

Comments

Sphere has what I consider some major hardware deficiencies (especially the keyboard) and some very good software. Be that as it may, Sphere is one of the few companies that sells a complete system for a reasonable price. However, in its kit form, the present state of the documentation probably makes construction extremely difficult for the inexperienced hobbiest. To date, Sphere has lived up to most of their promises, has paid their rebate for late delivery, has promptly responded to supply missing parts, has freely answered question, and has been appreciative of feedback. On the other hand, the delivery times are not as good as had been first anticipated and promised.

In general, depending on the intent of the user, the Sphere system is a pretty good system for the money. After all is said and done, you have a system for the $860, or so, that you have spent and not just a box with front panel switches. Each individual will have to weigh the benefits against the deficiencies and make his own decision as to whether the system will meet his needs. My intnet has been to indicate problem areas and good points, so that the potential buyer can go into his purchase with his eyes wide open. I should note here that my system was one of the first delivered and problems can be expected under such circumstances. I do not intend to scrap the system; on the contrary, I intend to use the system to the full extent of its capabilities to solve the problems that interest me.

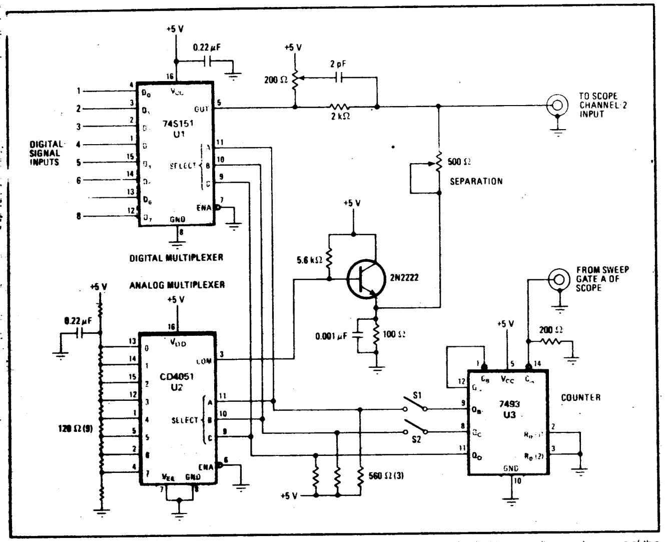
Scope display of eight signals helps debug sequential logic

by Matthew L. Fichtenbaum
General Radio Co. Concord, Mass

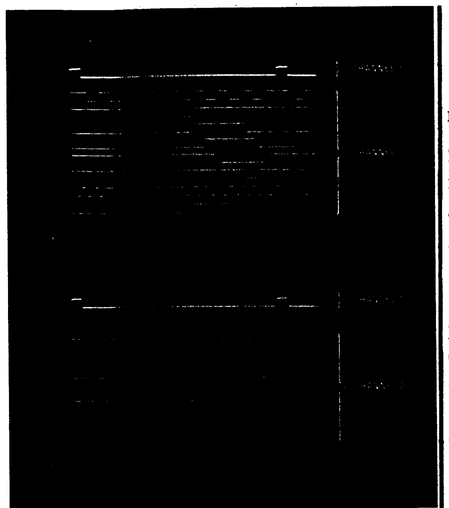
When debugging sequential logic, an engineer may have to observe several signals simultaneously. Logical states and the times that they change are of primary importance in the visual display; the exact values of voltage levels and the duration of rise times and fall times are of lesser importance.

Two, four, or eight digital signals can be displayed on one of the two channels of a Tektronix 454 or similar dual-trace oscilloscope, as demonstrated in the photographs on the next page. The other channel may then be used for triggering or for observation of a ninth signal. The eight signals are treated as logic levels and are gated by a digital multiplexer. Although this procedure does not preserve voltage levels and wave shapes, it does achieve maximum speed with simple circuitry.

The circuit for displaying the signals on the scope is illustrated in Fig. 1. The 7493 divide-by-16 counter (U3) is incremented after each scope sweep. The counter steps through the eight inputs sequentially, and the extra stage compensates for the use of every other sweep in the "alternate" display mode. The counter's highest three bits select an input signal via digital multiplexer U1, which is a 74S151 TTL Schottky type. At the same time, the CD4051 C-MOS analog multiplexer U2 picks a dc voltage off a resistor chain. This voltage is summed



1. **Multi-trace adapter.** Two, four, or eight digital input signals time-share the channel-2 trace of a dual-trace oscilloscope by means of this circuit. The digital multiplexer selects individual digital inputs in cyclic succession, and the analog multiplexer separates their wave forms vertically; sweep counter drives multiplexers. Switches S_1 and S_2 permit display of only two or four digital wave forms, instead of eight.



2. **Signal tracing.** Channel 2 of dual-trace scope is multiplexed to display eight different logic wave forms in (a) and four wave forms in (b). The channel-1 trace, used for triggering, appears at top in both photos; it is brighter than the channel-2 traces because of its higher duty ratio. This simultaneous display of several signals is convenient for logic-circuit debugging. High and low states, and the timing of their changes, are indicated accurately even though the multiplexing does not preserve voltage levels and wave shapes. The multi-trace adapter circuit is shown in Fig. 1 on the preceding page.

with the digital signal, providing a different reference level for each trace and thus separating the traces vertically from each other on the screen, as shown in Fig. 1.

The 500-ohm variable resistor adjusts the magnitude of the dc offset, varying the trace separation. The scope's variable vertical-sensitivity control may be used to adjust the over-all display amplitude. The 200-ohm potentiometer is adjusted for best transient response. Both the 500-ohm and 200-ohm pots should be cermet or other noninductive types. The three 560-ohm resistors pull up the levels of the inputs to the multiplexers.

The resistor chain could be replaced by eight potentiometers in parallel, with their wipers connected to the input terminals of the CD4051, for separate adjustments of the vertical positions of the individual traces.

If switch S_1 is open, the scope displays only four traces (digital inputs 1, 3, 5, 7). If both S_1 and S_2 are open, only two inputs (3 and 7) are displayed.

This time-division-multiplexing of channel 2 on the dual-trace scope of course makes the signal wave forms less bright than the channel-1 trace. In Fig. 2(a), the top trace is scanned eight times as often as each of the lower eight traces, and in Fig. 2(b), channel 1 is scanned four times as often as any one of the four offset wave forms that share channel 2.

The circuit may be built in a small box, with appropriate connectors to the scope and inputs. It should be used near the logic circuit under test to minimize signal-lead length and circuit-loading. Only 5 volts of dc power are required. □

WILLIAM T. PRECHT & ASSOCIATES
Data Processing Consultants
1102 S. EDSON
LOMBARD, IL. 60148
620-1671

Dec. 4, 1975

Dear Hal,

I just received the Nov. issue of your newsletter, and am enclosing a check for $6 to receive the next 6 issues. Although I am sure that it represents considerable personal sacrifice to you to put out the newsletter, I certainly hope that you will continue to do so. For most of us in the heartland, yours is the only up-to-date and unbaised source to represent users from coast to coast, and provide comprehensive news from suppliers on the west coast.

My personal Altair "toy" continues to grow, mostly with enhancements from Processor Technology, whose attitude and product quality is unexcelled. I have their 2K ROM board, 4K RAM, 3P+S I/O board, Mother Board, and the Video Display module on order. My only previous q uibble had been about price, but now with group purchases, that is being erased, too. If their ROM-based Operating System with dual cassettes (think of them as slow floppy disks) is as good as their Software Package #1, I am sure I will go that route with them as well. (No, I don't own any of their stock)!

Our Chicago users group is growing rapidly. We now have almost 200 on our mailing list, and meeting attendance has gone from 30 to 70 in 3 months. Our new name, by the way, is CACHE, (Chicago Area Computer Hobbyists' Exchange), and we are now setting up memberships, regular meeting sites, and breaking into committees. Full information can be obtained by writing to:

CACHE
P.O. Box 36
Vernon Hills, IL 60061

We would like to form an association of user groups, both for information exchange and to increase our group purchasing power. Maybe someday we can build it up to a national conference (everyone needs a few of these to attend).

Supplier notes: When the new FTC rule goes into effect, Maury Goldberg of MiniMicroMart may as well throw in the towel and keep the loot he has acquired for his junk by misleading advertising and Big Talk on the telephone. As PCC said recently, "in view of his apparent reputation, we will not waste space printing his address."

The MITS mobile was here last week, and put on a pretty good show. Mike Hunter ("the van man") does a good job, and the 8800 does its thing with a very nifty BASIC. I don't know why anyone would pay $12 a month ahead of time to see it, though.

Keep up the good work (please).

Sincerely,

Bill Precht

Dear Gentle People,

Please send Vol. 2 NL's 1 thru 6 if it has gone. I realize that I'm a little late with this but being the eternal optimist I thought I would try anyway.

I have been living in London for the last 4 years but am now going home. Home is 1202 West Koch, Bozeman MT 59715. Please consider that as an official change of address notice.

I have an Altair 8800 with 1K memory, TVT 11. cassette interface from IMS Associates (if it ever reaches me) and an ASR-33 with a 115v 50 Hz motor in it. Would sincerely appreciate any information as to where I could beg, borrow, trade, etc a 115v 60 Hz motor for the ASR.

Now for the software. I don't have any. Am interested in MITS Extended Basic but I am not very impressed with dynamic memory and I can't afford static memory. One note of interest is that Mini Software, P.O. Box 7438, Alexandria, VA 22307 is offering FORTRAN AND BASIC software packages for the 8080.

Here's hoping that you are alive, well and still publishing.

5 January, 1976
Navcommunit, Box 44
FPO NY, NY 09510

Terry [illegible]
Terry

I have recently gone to my first meeting of the South Fla. Computer Users Group. I wish that everyone in the Miami - Ft. Lauderdale area knew about it. The group is just in it's early stages, but it seems to be a GREAT idea.

I have available from me for sale :

1) The total package of TTL ics and the 8008 for the Mark-8. All of the pieces are unused and are on sale for $ 53.00 + post. For an additional $3.50 I will supply all of the resistors except those for the memory board. Or 8008 alone for $24.95.

2) I also have the hand-made positive foil- pattern artwork for the Mark-8. ALL SIX BOARDS All of the boards arecomplete except for the memory which has been adapted to 2102 chips which is probably 95% done. The $30.00 bus system has been adapted to .156 plug-in fingers (double 60) 114 conn. 6 conn. - NC The approx. size of the finished boards would be about 7 X 10.

3) For the above, I have obtained 28- 15 cond. double sided PC board connectors. They are .156, have soldertail term. and are extreemly easy to splice together to obtain the necessary double 60 conn. each .30¢ + post.

Thank You,

Ken Albin
Kenneth Albin

December 15, 1975
1820 SW 85th Court
Miami, FL

Dear Sir:

Please send me information on starting a subscription to Micro 8 News.

I have a MOS 6502 system in operation and would like to possibly submit a construction hints article to your paper.

Very truly yours,

Gerald D. Severson
Gerald D. Severson
30 Irving Terrace
Depew, New York 14043

I would like to know if anyone has tried to interface a high speed commercial computer tape transport to an Altair 8800 for mass storage. If so, I would very much like to hear from them.

305 Jackson Avenue
Crookston
Minnesota 56716

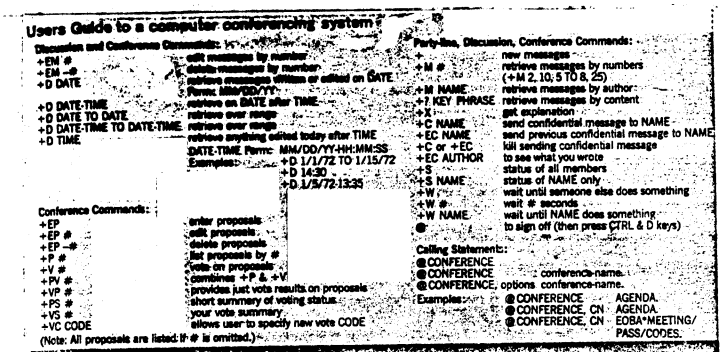
Dear Hal, 26 February 1976

Enclosed is a photocopy of an article that you might find interesting. For those poeple who are interested in computer conferencing I would like to mention a few things. 1) Computer conferencing is in use in industry and government. If you have access to a timeshare network see if it has a conferencing ability and if it does set up a conference for minicomputer hobbyists. If it doesn't have a conferencing ability write to United States Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia, 22161; and request the EM1SAR1 program which has the accession number AD767069/CPG (specify the track, density, and parity you require). The cost is $480.00. 2) If you want more information on conferencing read the article by Murray Turoff titled Human Communication via Data Networks which was published in the January 1973 issue of Computer Decisions. Also good is publication R-32 (titled Group Communication Through Computers) which is available from the Institute for the Future, 2740 Sand Hill Road, Menlo Park, California 94025 for $10.00. This publication gives examples, explanations, and sign on proceedures for the FORUM conferencing system. 3) The first step towards use by hobbyist of computer conferencing is to get some experience with computer communication via telephone. I would suggest that those poeple who feel they have the ability write into the Micro-8 NL giving their name, address, telephone number and time available. This would allow poeple to set up sechedules for simple computer communication experiments. These experiments would would provide information, build interest, and establish a core of poeple that could set up a computer conference. Maybe we can come up with a second generation Micro-8 Newsletter.

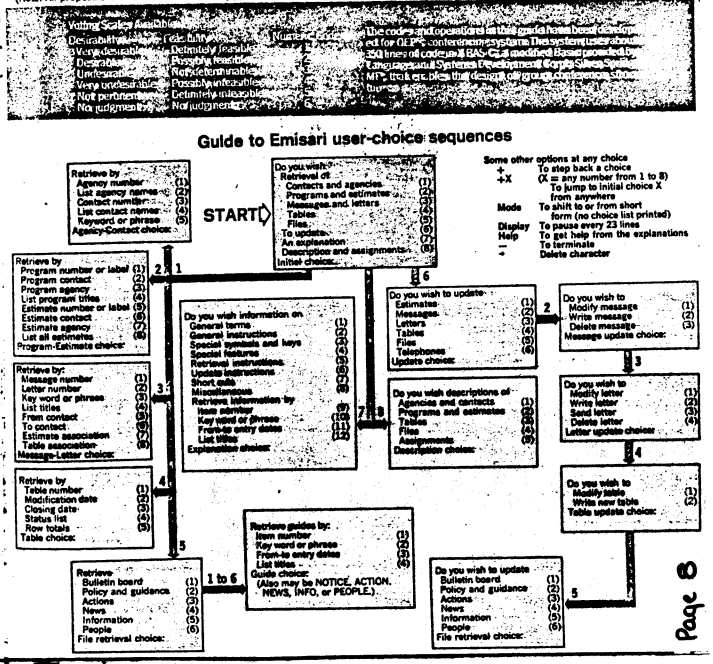
Sincerely yours;

David Christianson

David Christianson



See also next page



John Ford
5561 Esplanada
Santa Maria, Calif, 93454

Feb. 28, 1976

As I promised in my last correspondence, this letter concerns the building and performance of the Computer Hobbyist's (TCH) tape cassette interface board.

First of all, the price is right. The board can be bought and stuffed for less than $50.00, depending on the size of your junk box. After overcoming some confusion as to the polarity of several of the jumpers and tracing one bad 3900, the unit came up like a champ! The LED on the board provides the user with a straightforward means of checking operation. I was a little confused as to which motor was actually zero and which was one, but otherwise... no problems.

From a performance standpoint, it is beautiful. I've been using it for several months now and can find no fault in its operation. I suspect that most of us will be gradually moving toward the Kansas City Standard for tape recorder I/O but as a backup or in-house recorder interface, the TCH is very hard to beat. It is easy to hook up, flexible in operation, and superb in performance.

I was a little surprised to discover that I could only read in 376 words instead of 377 (a full page), but this limitation can easily be overcome by block oriented software.

I strongly recommend this unit. As a rank amateur electronics builder, I can say it was easy to put together. As an experienced software builder, I can say that it fills my requirements very well.

Hal Singer also has a TCH interface and we have experienced a difference of recording times which renders our tapes incompatable with one another. Perhaps he will find time in later correspondence to comment on the reasons for this strange anomaly. Perhaps one of the IC's controlling the timing is not performing properly on one of our boards. In any event, this problem does not affect the individual performance of the boards in any way.

John Ford

ALGONQUIN COLLEGE OF APPLIED ARTS AND TECHNOLOGY
COLLÈGE DES ARTS APPLIQUÉS ET DE TECHNOLOGIE

SCHOOL OF TECHNOLOGY
FACULTÉ DE TECHNOLOGIE

200 LEES AVENUE, OTTAWA 1, ONTARIO
200, AVENUE LEES, OTTAWA 1, ONTARIO

Dear Hal:

It was good to see you again in L.A. Thanks for the gems of information. They are worth much more than you may realize.

I talked with John Kiss re his PDP - 8 Assembler Language Programming. He has added a section on OS - 8, but he personally still works mainly with the Algonquin Assembler. He has a lot of ideas, but is not interested in publishing beyond what he has already done. The cost of the book is $3.48 + $1.50 handling from the Algonquin College Bookstore, 1385 Woodroffe Ave., Ottawa.

Re our conversation about your newsletter, I enclose $9.50. I tried to get an address/phone number for John Burgoyn, but no luck. Can you help? In particular, we need 400 2102 RAM's, soon! The price you mentioned is 1/2 of that which we can get here.

Sincerely,

H.K. Menna

P.O. Box 1664
Boulder, Colorado 80302
February 23, 1976

Pardon this rather belated reply. Enclosed is my check for Volume Two of the news letter. I feel that it serves a very worthwhile purpose, and would like to see it continued, but think that there must be a better way than having it all fall on the backs of just two people.

I have not written sooner as I have been rather busy getting the hardware going. My Martin MIKE is working well, and I certainly recommend the product. Enclosed is a short memory test program for the MIKE, which I wrote just before receiving the Martin instruction book. This program is somewhat different from most in the literature in that it only tests one page at a time, but takes each location on the page, writes a zero and reads it back, checks, then writes a one, checks, and keeps doing this for all numbers through 377 (octal) at the one address. When that address is fully checked, it moves to the next, and cycles through the same procedure. This seemed to me to be a little better test than simply writing one number, or of galloping a pattern through the memory.

The other hardware going, I think, is my MOD-8. It seemed to run MONITOR 8, properly, but teletype bugs at test time leave me some doubt. Both systems, Martin and MOD, are intended as development tools for two dedicated applications: a data logger, and a minimally smart teletype terminal for autostart operation.

Again, I appreciate the news letter greatly, and wish it (and you two) the best.

Sincerely,

Don Lund

```
ASSEMBLY LANGUAGE PROGRAM:  MIKE MEMORY TEST

LABEL   MNEMONIC    OPERAND     COMMENTS

        XRA
        JDA
        LLI         377         /start from page top, work down
        PPP         PPP         /sets page address
LOOP
        LMA
        LBM
        CMP B
        LCL
        LDI         FAIL
        JPZ         001
        ACI         NEW         /next address
        JTC         LOOP        /still checking address
NEW     DCL         PASS        /all addresses on page OK
        JTN
        XRA
        JMP         LOOP
FAIL    LLC
        LHD         DISPLAY     /7SEG display of fail address
        CAL
        HLT
PASS    LLI         321
        LHI         123
        CAL         DISPLAY     /7SEG display of pass message
        HLT

MACHINE LANGUAGE PROGRAM

000     250 310 066 377 056 PPP 370 317
010     271 326 335 110 036 010 014 001
020     140 026 010 104 006 010 061 160
030     044 010 250 104 006 010 362 353
040     106 322 000 000 066 321 056 123
050     106 322 000 000

NOTES
        This program checks one page (256 bytes) of memory at a pass.
The page being checked is specified as PPP in the program. Each
byte is written, then read, with each octal number from 0 to 377.
If the number read is not the same as the number written, the program
halts with the address displayed on the MIKE seven segment display
register. If all addresses on the page pass the test, the program
halts with "123321" latched in the display register.

1975XI21
D. Lund
```

Human communication via data networks

Computer conferencing adds new properties to organizational communication and already is cost effective for even fairly small groups

by Murray Turoff
Office of Emergency Preparedness*
Executive Office of the President

There are two major reasons why you should learn something about computer conferencing, Delphi[1] techniques, and other data network communication modes.

One is that the capacity for group interaction, and one's own efficiency in communicating with others, can be significantly enhanced with a well-conceived conferencing system. We have learned this through direct experience in communication regarding the wage and price freeze[1,2] and in system design work.

The second reason, to be developed later in some detail, regards cost. Economics already favors computerized conferencing, even for fairly small groups, within organizations that have computers and terminals. As mini-system and terminal costs decline, and digital data networks come into wide use, we should by the late seventies find this communication mode to be quite commonplace.

Verbal versus computer communication

Some people communicate best in the face-to-face verbal mode. But difficulties can arise in group communication, particularly where participants are at different levels in the corporate hierarchy. There is no opportunity for sub-group discussion, or perhaps negotiation, away from the main streams of the discussion. One generally doesn't whisper or pass notes to a neighbor. If a vote is taken, political reasons may lead one to vote as a superior votes. Serious doubts or possible difficulties with a plan under discussion may not be mentioned, or alternatively may be presented so forcefully as to kill an otherwise good idea.

The verbal mode of communication has certain rules and procedures that also inhibit free discussion. Only one person may speak at a time if the conversation is not to become confusing to the group as a whole. If you have something to say pertaining to the current speaker's remarks, you must normally wait until he is finished, and even then you may not have the opportunity to interject your comments if someone else gains the floor ahead of you. In fact, the psychology of verbal communication is such that when you have obtained the opportunity to speak, the topic may have shifted to the extent that your planned remarks are out of place or too late.

Verbal exchange, therefore, represents a synchronous form of communication. Individual participation is sequential and under the control of the group along with any explicit or implicit rules of order that apply. In this atmosphere, one may either listen or talk when allowed to.

Computer-based group communication, by contrast, allows participants to be "talking" (by typing remarks) or "listening" (by reading the remarks of others) as they choose. Since the computer stores remarks until each individual indicates he is ready to receive more of the conversation, he can now control the rate of participation. If he chooses to listen, he can vary the rate of the presentation on a crt screen for the purpose of skimming, pondering, reflecting, or even ignoring what is being said. If he talks, his remarks will be added at the end of the conversation list, and will be received by others when they have reached that point.

This is "asynchronous" communication. The group could be all talking or all listening at the same time, and all could be at different points in the conversation. This is "self-activating communication," because the individual controls the communication rate and time.

In practice in computer-based discussion, a number of separate conversation threads becoming interleaved. There is not the same pressure to restrict the discussion to a sequential flow with respect to the specific topic of the moment. Therefore, individuals who wish to think about what they say on a particular matter may wait for a time before making their remarks. The fact that some of the others in the conversation may have moved on to another topic does not detract from the ultimate impact of the comments. Furthermore, since the computer assigns a unique sequence number to each message (in the order of occurrence) and labels it with author, date and time, a later message referring to an earlier one need only begin with *"Ref. mes. #101."*

This is in sharp contrast to a verbal discussion where a typical comment referring back usually begins: *"In regard to what John was saying awhile back about such and such . . . . . ."*

While there is a learning curve for effective use of this communication mode, a group communicating in this manner becomes accustomed to this oscillating form of communication after a few hours of practice.

Furthermore, the sorting capability of the computer can be used to regroup the discussion into its separate

(Views expressed in this article are those of the author and do not necessarily reflect official policy of OEP. This material is digested from a forthcoming book entitled "Delphi and its Application," edited by H. Linstone and M. Turoff, to be published by American Elsevier, New York.)
Delphi refers to a number of approaches to obtaining and combining informed judgments in a systematic way.

Human communication . . .
(continued)

threads by utilizing unique identifiers, such as the sequence numbers or key words used in the discussion itself, to define a particular topic.

One observes that the individuals communicating through such a system tend to develop a feeling of equality with the other group members. The resulting group atmosphere is very different from a committee meeting where some one individual usually takes control (even if only tacitly) for the purpose of sequencing the discussion. The group itself does, however, wield impact on the individual. If someone is not making sensible or pertinent comments, or if his remarks are verbose and drawn out, he quickly discovers no one is commenting back on what he has said. In fact, he quickly begins to wonder if anyone is bothering to read his contributions.

In computerized conferencing, any individual may write a private message to any other individual unbeknownst to the rest of the conference members. These messages may be "carboned" to any subgroup. Therefore, two individuals may arrive privately at a joint view on some issue, or on the remarks of another individual. This universal whispering capability is available for any use an individual in the conference desires to make of it. This ability to carry out timely subgroup negotiations could lead to more rapid resolution of some particular issue. Private messages are eliminated from the conference file after delivery.

Computerized conferencing can involve 30 or more people, geographically dispersed, and participating whenever they get a chance rather than according to a forced time schedule. A conference telephone call, by contrast, begins to get difficult if more than five are involved, and all must be on the line at once. Following is a brief description of the mechanics of using our present system.

How to get your two cents in

When a participant calls up for a particular session, he will usually request first a list of the current status of the members to determine when each of them was last on and how many messages each received out of the message list. If anyone else is currently interacting when he gets on, or should someone get on while he is on, he will automatically be informed of who it is. He will then respond to computer requests for his name and security code, which logs him in, after which the computer will begin to list for him all the messages that came into the conference since he was last on. At the completion of that list he will be asked for any message he wishes to add.

When he finishes typing a message he uses a special symbol (in our case the "+" sign) to have the message added on to the conference file. Before doing so, however, he has available a number of editing capabilities which allow him to skip around the text of his message to correct errors or make changes. After he sends his message the computer will list any messages which came in while he was writing his own, and it then returns him to the writing mode for the entry of a new public message. This mode provides commands for special situations: writing a private message; editing an earlier message; retrieving messages edited in a certain time frame; and so on. All these options are described in the User's Guide (page 27).

When the user finishes, he signs off. The computer will keep a record of his location in the discussion.

The casual user or the new user need only learn how to get on and off, write a message, and send it into the central file. Retrieving comes automatically. The average user learns how to do this in about ten minutes on a good interactive terminal. Computer neophytes usually achieve quite adequate facility in a half-hour to an hour. For a group to get used to communicating proficiently about an involved issue via this method requires a few additional hours of practice.

Various degrees of anonymity may be exercised in a computerized conferencing system. Normally, when starting a new conference everyone supplies his name, which the computer then uses to "sign" each message automatically. However, everyone could use a fake or code name. In fact, if each participant selected his own code name, then no one individual including the monitor would know from whom a particular message came. This free form discussion minimizes the fear of losing one's anonymity because it is known to some monitor. Even the usual mode of operation, without any anonymity on what is said or proposed for voting, still has the feature that votes (on such things as a proposal or plan) are presented as distributions, so no one knows who voted which way except by implication from the discussion. In addition, a member of the conference may change his vote at any time.

These group discussion involving voting methods are forms of Delphi procedures. An additional aspect of Delphi-like modes are small group interaction concepts from such fields as gaming, psychodrama, organizational development, and sensitivity or role-playing techniques. Almost any of the "organizational development" techniques now used to sensitize small groups to the problems of communication and cooperation within an organization[3,4] can readily be adapted for computerized conferencing.

Why will computer conferencing take off?

There are several very concrete reasons to expect a rapid growth in the use of computer-based Delphi-like conferencing systems by medium to large organizations in the next five years:

- Most now have computers or computer services available.
- Interactive terminals are being made available in sufficient numbers to allow convenient access for most management and professional people.
- Costs for postage and correspondence preparation are rising, while digital data network development should bring data communication costs down.
- There is increasing awareness that complex problems require more communications among larger professional and management groups.

In addition, by the mid-to-late seventies interactive computer terminals may be expected to retail at costs about like that of a color TV set today, thus leading to a substantial home market for these systems.

An idea of what this may mean to society is suggested by a list of specific applications that would be possible. In several the logic and calculational abilities

Human communication . . .
(continued)

of the computer are utilized also. For example, the computer may aid people in finding discussion groups that would interest them. Or it may provide models, games, simulations and other calculational aids or structures to aid the group in focusing on their central concerns or interests.

Here are a few examples:

- A group of salesmen involved in marketing a line of computer peripherals maintains a continuous conference for the purpose of comparing responses to customer questions and analyzing competitive products.
- Division heads in a company which is spread out geographically discuss and agree on their respective responsibilities for a company proposal involving their separate operations.
- Technical librarians in a group of non-competitive companies set up a document exchange program and jointly plan complementary acquisitions.
- A committee that meets only once a month uses computerized conferencing to maintain continuous contact and to arrive at the agenda for its face-to-face sessions.
- Members of legislatures caucus at will with a computerized conference.
- A housewife joins a local conference discussing current affairs.
- Students conduct an anonymous conference with their teachers to discuss problems and subjects in a course.

Conferencing effectiveness vs other modes

How can the cost effectiveness and efficiency of computer-based conferencing be measured against other modes of communication? A simple model we have used is based on three parameters: average typing speed of the individuals in a conference; average reading rate or print speed of the terminal (whichever is lower); and the average talking rate of the same group if it were engaged in verbal exchange.

Using this information, and the number of people in the group, one may calculate how much information a group of proficient conferees at terminals could exchange in a given time period and compare it to a verbal conference. Some of these figures have been plotted for various typing and talking speeds. Relative effectiveness may be interpreted as the ratio of the number of words a group can exchange via the computer mode versus the verbal mode, given a fixed time period for discussion. Another way of viewing it, given a fixed number of words to exchange among a group, is as the ratio of the time needed to do it verbally versus the computer approach.

This analysis can be extended to costs by considering average hourly salary. Given a specific computer system and its cost for conferencing, that added cost can be traded off against the time the people in the meeting save by using the computer, where a dollar value can be assigned to their time. It is quite straightforward to calculate how many people of what average value in dollars per hour are needed to make computerized conferencing cheaper than other modes of communication. The results for a Univac 1108, which costs out at about $7/hour per user for conferencing, are shown in the following table:

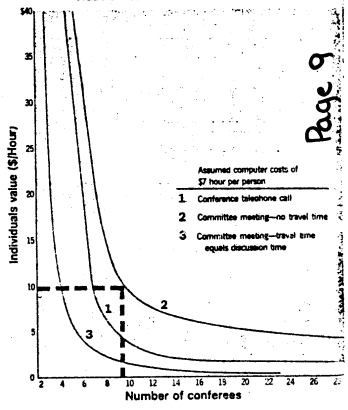
Alternative communication mode	Person's value ($/hour) $10	$20
Committee meeting where travel time equals discussion time—no travel costs	4	3
Telephone conference call	7	5
Committee meeting, no travel time—all in the same building	9	7

Measurement of communications effectiveness is more difficult. Some psychologists hope that the computer can become a useful tool in expanding the experimental basis in the area of human communications.[5] Certainly the concept of computerized conferencing lends itself to the introduction of measuring systems directly in the communication process, potentially alleviating greatly the time and effort now needed to evaluate in any experimental sense the process of human communication.

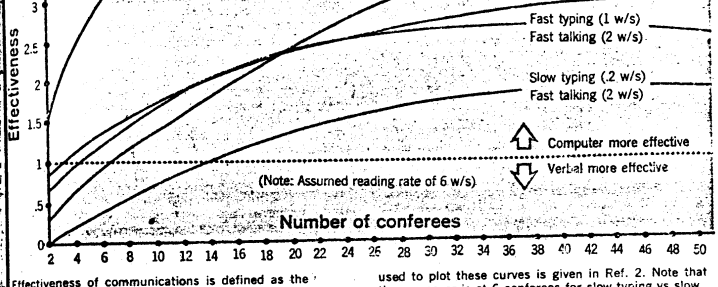
A sophisticated approach has been taken by Gordon B. Thompson of Bell-Northern Research.[6] He proposes three dimensions for the relative evaluation of any communication process.

First is degree of *"ease of access to stored human experience."* Along this dimension books or printed

Trade-off curves for conference mode



These curves enable cost trade-offs when costs have been established for the computer system and for participant salaries. Note that points in the region above curve 2 favor the computer over a committee meeting with no travel time. For points below this the meeting is more cost-effective. Derivations and plots for other computer costs, are presented in Ref. 2. The curves move out from the axes as computer costs increase. Here, at $10/hour, the computer is favored for 10 or more conferees (dashed lines).



Effectiveness of communications is defined as the ratio of times necessary to transfer a certain number of words by alternate modes. Derivation of equations used to plot these curves is given in Ref. 2. Note that the crossover is at 6 conferees for slow typing vs slow talking, and at other points for other ratios.

text rate high, the telephone intermediate, and television low. The telephone, in particular, allows a human to call on an informed person rather than search a library.

Text-searching capabilities inherent in the electronic form of the printed word provide a new alternative which can ultimately rate higher in this dimension than books, or perhaps even than the combined use of books and telephones. Computerized conferencing improves the way people index information, because the user is essentially free to tailor his own index using such things as keyword, author, and/or time-of-occurrence searches.

Thompson's second dimension concerns the *"amount of shared information the communicating group possesses and the interaction they experience."* When talking a group shares the acoustic space, since they may listen simultaneously. It has been suggested that the Picturephone is a failure in part because it adds no additional shared information space in comparison with the telephone. One party cannot view what another party is pointing to on his screen. In this dimension the telephone rates much higher than TV, which is slightly higher than books. Computerized conferencing creates something which would rate higher than the telephone because it allows full simultaneous asynchronous operation by all participants with respect to a common writing space.

The third measure of Thompson is the *"ease with which new ideas can be propagated through the group,"* or the degree to which *"shared feelings could be discovered and developed in the host society."* Here television rates high on a society-wide basis, but for small groups the various opportunities for anonymous participation and the resulting free flow of ideas provided by computerized conferencing potentially offers a greater degree of impact than the telephone or the face-to-face verbal exchange.

It is the ability of these systems to handle large groups, provide hard copy, preserve anonymity, and allow participants to control their time and rate of interaction which makes the concept attractive for many applications which would be difficult, ineffective, or inefficient with conventional alternatives. □

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1. Kupperman and Wilcox, *Emisari—An On-Line Management System in a Dynamic Environment*, May, 1972, OEP Report 1SP-108, AD No. 744-348, $3.
2. Turoff, *'Party-Line' and 'Discussion' — Computerized Conference Systems* April, 1972, OEP Report 1SP-109, AD No. 744-349, $3.
[Both preceding reports are available at $3 each from the National Technical Information Service in Springfield, VA.]
3. Pfeiffer and Jones, *A Handbook of Structured Experiences for Human Relations Training*, Iowa City, Iowa, University Associates Press, 1969.
4. Nylen, Mitchell, and Stout, *Handbook of Staff Development and Human Relations Training*, National Education Association, Washington, D. C. 1967.
5. Chapanis, *Prelude to 2001: Exploration in Human Communication*, American Psychologist, Vol. 26, No. 11, November 1971.
6. Thompson, *Three Characteristics of the Communications Revolutions*, Proceedings of the International Conference on Computer Communications, October 1972. Also *Maloch or Aquarius*, "The," Issue 4 (Feb. 1970), published by Bell-Northern Research, Ottawa.
[The Proceedings of ICCC can be obtained from IEEE, 345 East 47th Street, New York, N.Y. 10017, for $12.50 (IEEE members) or $15.00 (non-members). Refs. 1 and 2 are also included in this Proceedings.]

Dr. Murray Turoff is a senior operations research analyst in the Office of Emergency Preparedness. He has worked for the Institute of Defense Analyses and IBM. He is most interested in Delphi design, modeling, simulation, gaming, technological forecasting and information systems. He teaches technological forecasting at American University.

Here's my six bucks for volume 2. Of all the com ut r hobbist publications I have encountered, the Micro-8 newsletter is unique, and would be greatly missed if if were di:continued. Keep up the good work.

For those of you who may have wondered what has become of Phil Mork, I'm alive and well and living in Cleveland, Ohio finishing up my education in engineering at Case Western Reserve University. My Mark-8 now has two whole K of 1101, the Digital Group TVT & cassette, a two channel analog output, and a SWTP keyboard & TVT I(retired). I've got the MIL MONITOR-8 modified for the Digital Group TVT up and running and on cassette (Digital Group, 375 baud). If anyone out there is interested, I'd be glad to send a copy to anyone who sends me a blank cassette and a SASE for return of same.(Better yet, how about putting some 8008 software on the cassette!) If you use the 8008, you need Monitor-8. My version omits load and dump BNPF format and adds cassette load, dump, and verify routines, as well as load and dump ASCII. It fits in 2K of RAM with about 300$_8$ bytes left over.

I'm toying with the PCC's TINY BASIC, and maybe will have that running on my 8008 soon (if I only had more time...).

Got myself a PAIA Gnome micro (music) synthesizer. It's not very playable using the supplied ribbon controller, but it works well connected to my Mark-8 via my analog output. So far I've written a program that lets me define keys on my ASCII keyboard as notes, allowing me to play tunes by "typing". Later, I'll write programs to store tunes for later playback, and maybe control multiple synthesizers.

Managed to get a hold of an X-Y plotter, but havn't done much with it yet. I'm interested in computer graphics and games, and am kind of thinking about a video graphics display.

Guess I'll get myself a fancier computer some day,but I think I'll satisfy myself with the Mark-8 for a while. It seems that about every month a new micro comes out that's better and cheaper than the others. I'm keeping an eye on Ohio Scientific Instruments' MOS Technology 6502 system. They say they'll have a BASIC ROM board, and a PDP-8E simulator board.

If anyone wants further information or has any suggestions on what I'm doing, feel free to contact me at my Cleveland address.

Best of luck on volume 2!

Phil Mork

Phil Mork
610 Michelson
11896 Carlton Rd.
Cleveland, OH 44106
(216) 795-0850

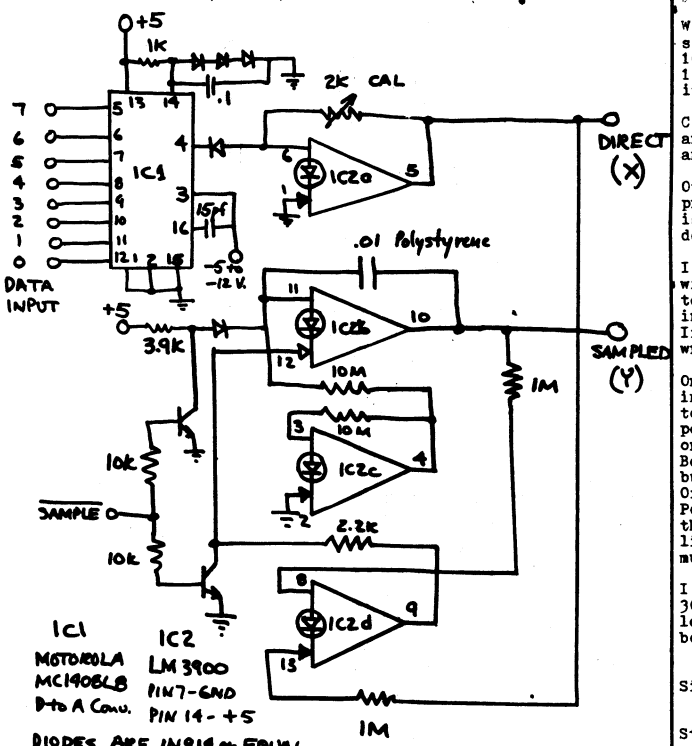
Feb. 18,1976

ps. Some of the guys in the Cleveland group are planning a "computerfest" for June

DIGITAL to ANALOG CONVERTER with SAMPLE and HOLD

Output is approximately 1-3 volts. "Sampled" output tracks "direct" output while $\overline{\text{sample}}$ is low.

By outputting a value (call it Y) and momentarily bringing $\overline{\text{sample}}$ low, then outputting a second value (X), and keeping the relative time short during which the first value (Y) is present on the data inputs, two "simultaneous" outputs are available for driving a plotter or 'scope.



1/76 PAUL MORK

Suprise, suprise! It seems I managed to list my phone number incorrectly in my last correspondence. The correct listing is 272-2339. Sorry.

Update on the RAM purchase. Worst case price is $2.00 for the 91L02A (500 ns.). The more we buy, the bigger the discount, and if we top 5k, everybody will get a refund of up to .25 per chip.

Please, if you order send a self addressed stamped postcard so I can confirm receipt of your order and notify you when to expect delivery.

We are also buying 5000 16 pin solder tail lo-profile sockets for the memory, and other uses. The cost is 16¢ each which is a real deal. The firm is giving us the 100,000 unit price since this is educational work. Delivery is from their stock and should be pretty fast.

Cornell is buying a couple of the Fly paper tape readers and I would really like to see us order 5 or so at once and get a discount. Anybody game?

Other projects nearing completion are my 8080 run ROM programmer, and a unique TV typewriter another Senior is working on. More on the former when its all up and debugged.

I must note in closing that the hobby is truly world-wide. I have received letters from Europe, Asia, and a telephone call from New Zealand. Inquires are coming in daily, most people interesting in a 100 or more chips. If I can be of any help to people, feel free to call write etc.

One additional note. Mini-Micro-Mart is really almost in my back yard and I'm wondering if I can be of help to those stranded minus $ and merchandise. Perhaps if people send in all relevant info., ie. copies of checks, orders and letters, I can talk to the States Attorney. Being in the area if half the battle. The only way I buy from them is to pick it up in person. The Post Office can be very helpful with dealing of this sort. A Postmaster can simple refuse to deliver mail to a business that doesn't live up to its promises. I would really like to see them forced to clean up their act, its so much better for business. Ah well.....

I have a note from someone who wants to sell a surplus 300 LPM line printer for $700. As soon as I find the letter again I'll send along the name + address to anybody interested.

Sincerely, Steven Edelman

Steven Edelman 204 Dryden Rd. Ithaca, N.Y. 14850

S. Trim
2991 E. 43rd. Ave.
Vancouver 16, B.C.
V5R 2Z4

Secondaly I think that your proposal summarise articles from other newsletters is important. There is no one clearing house for information in existance with the result that it is difficult to know where to look for any one piece of information. A person is almost certain to miss something of intrest to him unless he subscribes to all newsletters, a condition which is both difficult and expensive. deally there should be an index of all past and present articles which could be consulted for information on a perticular subject. Although this is not vital it might tend to increase the enjoyment of this hobby by cotting down on time wasted looking and if your not in a hobby for enjoyment what are you after. also it might slightly decrease the cost since you need only buy the perticular issue you want, a goal most hobbiests share. Thank You. Sincerly Yours

S. Trim

WILCOX ENTERPRISES
25 W 178 - 39TH ST.
NAPERVILLE, ILL. 60540

Enclosed are some copies of my updated price list, both greeen and white. It is very possible that I may have to move in June, and so I have reduced the prices on the Creeds until then, in hopes of selling as many as possible before then. I now have the 11 new type characters in stock. Who is selling the optical tape reader? I wonder if my tape winders could be used to run the tape through them. I would be happy to send a sample or two to someone who would try and report to the newsletter on it. Hope all is well with you. Life continues to be a disaster here, but I think I am getting used to it!

Sincerely,
Robert W. Cook

Page 10

WILCOX ENTERPRISES - 25W178-39th Street; Naperville, Il 60540 312-420-8601 (NEW)

CREED Model 75 teletype with interface parts kit and manual (74 lb) FOB Naperville - Wood crate included - Shipped Greyhound freight charges collect - please include phone number. The hardware interface included with the Creed interfaces to TTL level signals. Three bits of an output port and six bits of an input port are required. Information on connection to RGS, ALTAIR 8800 and MIKE2 systems is available.		150.00	20% DISCOUNT UNTIL MAY 31, 1976
Unrepairable Mod 75's available for parts - prices depend on condition			
Creed type characters . , @ : ? = & % ( ) ;	each	1.00	PP
Creed Manual - 30 pages of info. on Creed, interface circuit, programs for 8008 and 8080, etc. - Credit given if Creed purchased later		1.00	PP
Original Creed maintenance manuals on 4" x 6" microfiche		5.00	
Lamp and photocell for counting punch operations (mounted)		1.00	
Paper - Pin feed on roll - $55.00 per case of 12 (44 lb)	each	5.50	
Friction feed - $20.00 per case of 12 (44 lb)	each	2.00	
Ribbons	each	1.50	

PLATE SOLID STATE ELECTRONICS

Balboa Building, Suite 301 ☐ 735 State Street ☐ Santa Barbara, CA 93101
(805) 962-1990

Laurence L. Plate, Jr.

Business Hours:
MW 9-12, 1-4:30   TThS 9-12,
F 9-12, 1-3:30   by appointment   18 February 1976

I am now open for mini/microcomputer systems consulting and design business.

My digital electronics service business will open sometime in early March when all my servicing equipment is delivered and set-up.

The sales aspect of my business is being held in abeyance, pending to market surveys under progress. Since the market is being flooded with relatively untested and untried microcomputer systems, it will be very difficult to carry them for a given time period as well as to service them this year. However, I will try my best to select worthwhile computers for my business to offer to the public.

I am stressing on consulting and servicing aspects of my business with emphasis to give you the best system tailored to your actual needs with mind in your future growth. It is well known that the computer is an universal tool which is highly flexible to meet any given need, but it reguires the know-how to be ulitized properly. Thus, I am offering my 16 years of experience to give this know-how to the client in need.

Laurence L Plate, Jr.

NATIONAL TELETYPEWRITER CORP.

207 NEWTOWN RD. PLAINVIEW, N. Y. 11803
516-293-0444

Received your note this morning ... and thank you for responding.

Regarding your offer for mention of us in the M-8 Newsletter let me cite our activity here. We are in the Teletype business ... buying, rebuilding and selling. With the advent of do-it-yourself and assembled micros we've been selling a lot of rebuilt Teletype Model 33ASR's and KSR's to the users. Of course, our goal is to let all the fellows like yourself know of our existence and the equipment available.

The following is what we have to offer:

- Teletype 3320/3JA (ASR)
  - New $1,336
  - Rebuilt 875
- Teletype 3310/3EA (KSR)
  - New $994
  - Rebuilt 650

Availability is immediate and are FOB, New York. Guarantee on any of the above is 60 days ... exclusive of carrier damage.

Thank you for your consideration ... and best regards.

Very truly yours,

NATIONAL TELETYPEWRITER CORP.

February 20, 1976

J. F. GIBBONS, PRESIDENT

JFG/mp

P.S. We contacted you at the suggestion of Dean Lampman, Piqua, Ohio.

M R S

2-21-76

P.O. BOX 1220
HAWTHORNE, CA. 90250

We have developed a high quality product which allows owners of an Altair 8800 to develop systems with Motorola's MC6800 MPU.

This product is a must for anyone who wants:

1. To compare the Intel 8080 with the Motorola MC6800.
2. Has an Altair 8800 and plans to use the MC6800 MPU for a new design.
3. Wants to have the fexeblity of both.

The AM6800 card in an Altair 8800 also allows one to take advantage of all the best features of each processor in software through alternating processors in the same program.

It is a one board pin compatible card for an Altair 8800. No modifications are required and it will not interfere with normal execution of 8080 programs. The MC6800 gains control via software command, one instruction. You can return control by either the front panel stop switch or through software, one instruction. It will operate with either fast or slow, static or dynamic memories. MC6800 MPU status signals are brought out on unused bus lines (jumper option), ie Ø1 & Ø2 clocks, VMA, R/W lines for system development. The 8080 processor cared remains in the computer to handle all front panel controls.

The MC6800 MPU has the following software advantages: Increased interrupt structure, Two accumulators, More addressing modes, better memory instructions, and a 16 bit index register.

AM6800 Pricing AM6800 Complete Kit $148.75 Plus Tax
AM6800 Complete Kit Except MC6800 $97.75 Plus Tax
Checks received by the first of the month will receive their kit at the next meeting
Make checks payable to M.N.Kalashian

ELBA TOOL COMPANY, INC.

2-17-76

601 ESTES AVENUE — SCHAUMBURG, ILLINOIS 60172
Tel. (312) 894-4100

Here are my 48 bits for continuation of your newsletter. I thought I sent for it but it must have slipped my mind. So at our last Chicago Area Club meeting Dr. Douds comes up with a easy way to read the fine print of your newsletter and holds up a ancient gadget. You know what it was? A Sherlock Holmes spyglass. A really great invention to counter all the dissidents of you fine print.
Hope to receive the next newsletter soon

sincerely yours

Otto Barth

Computer Speaks Up At Wright-Pat Lab

AFIT, WRIGHT-PATTERSON AFB, Ohio — GGUDD MMOURRNNIING. WWEELLK-KUHMM TTOO THUH BBAIOUD-DAINAMMIKS AANNDD BBAIAANIIKS DDIIVYII-SHUHNN...

If you had a hard time getting through all that, the message was: "Good morning. Welcome to the Biodynamics and Bionics division . . ."

The rest of the message at the Aerospace Medical Research Laboratory goes on to say that you are listening to a voice generated by a mini-computer, and that computers are ready to speak.

The PDP 11 digital computer, known to its friends as Fred, is programmed to speak by Capt. Dan Warmuth, adjutant at the Air Force Institute of Technology School of Engineering. He's working with Dr. J. [illegible] Mundie, chief of the neurophysiology branch of the Biodynamics and Bionics division.

"Computers have talked before," says Warmuth, "but those that have been given words to store in their banks and draw on those words when programmed to do so. Instead of talking, they are stringing words together."

With the International Phonetic Alphabet, Fred has been programmed as a part of the lab's speech recognition project. "The input we give the computer is typed on a teletype, using a phonetic alphabet," says Warmuth. The beginning of this story is one such message.

"By using the phonetic system, the computer actually has to formulate its speech, much the same as a human brain would do," he says.

According to Warmuth, one of the practical uses of a talking computer would be to tell students inflight simulators what they are doing wrong while they are doing it.

Lest computers start monopolizing conversations, Warmuth and his colleagues also are working on a system to teach them to listen too.

PRICE SCHEDULE

AS OF 10/1/75

SRI-F8	Microprocessor Board	$ 325
SRI-RAM-2	2K (Words) Static Memory Board	$ 100
SRI-PR	PROM Board	$ 50
SRI-SER-C	Serial Interface - Control Board	$ 45
SRI-PWR	Power Supply	$ 55
SRI-MB	Main Board	$ 45
SRI-ENC	Enclosure Assembly — Complete	$ 100
SRI-DR	Digital Data Recorder	$ 150
SRI-VI-A	Video Interface	$ 150
SRI-VI-B	Video Interface	$ 275
SRI-KBD	Keyboard Assembly	$ 100
SRI-12V	Monitor	$ 125
SRI-TR	Tape Reader	$ 375
SRI-FD	Floppy Disc. System	$ 1250
	Extra Diskettes for above	$ 10
SRI-LP	Line Printer	$ 1575

NOTES: Specify Paper Tape or Cassette Programs.
$5 per 1K words duplicating charge (no charge for the Assembler or Editor software).
An additional SRI-ENC may be used for expansion.
All prices subject to change without notice.
Allow 30 days minimum shipping time from date of order.
All items shipped prepaid in continental U. S.

Systems Research, Inc.

P.O. Box 151280 · Salt Lake City, Utah 84115 · (801) 942-1093

NOTE: Our Basic Program should be done soon!!! (About March). It requires 8K of memory.

The Native Assembler also requires 8K of memory. The Native Editor requires somewhat less.

We now offer the following .....

SRI-RAM-4 4K (Words) Static Memory Board (Assembled) $ 200

SRI-VT Video Terminal RS-232 In-Out $ 375

If you want the Instruction Set for the F-8, drop us a line, and we will send it to you at no charge.

By the way, we will also offer about 25 Basic Routines along with the Main Basic. These will include Accounting, Educational, Business, Hobbyist, and many more.

Ladies and Gentlemen:

INFINITE INCORPORATED ®

Yes, there actually is a microcomputer coming on the market that uses a processor other than the 8080 or 6800.

The UT1800 general purpose microcomputer will use the RCA Cosmac single chip CPU, a very powerful little package indeed.

We can't officially release any details on price until the end of March but we thought you would like to know now that your choices are widening. The hardware will be ready in June.

The UT1800 design concept will allow you to start with the simplest low cost hardware and proceed to the very sophisticated without the usual cost duplications.

Whats more, you'll have a standard bus to work with so you can plan and build for a long time to come.

There'll be no objection to mixing and matching with the other guy's hardware. We have a long range plan.

If our stuff sounds interesting to you, drop us a post card and we'll put you on our mailing list.

INFINITE INCORPORATED
POB 906
151 Center Street
Cape Canaveral, Florida 32920

Yours truly,

W. J. Haberhern
President

PCM

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Complete PCM-12 kit: $799.00

1ea - 12010 CPU module, with IM6100C microprocessor device and 3.33 MHz crystal. Built-in crystal-controlled Baud-rate generator.
1ea - 12020 4K-word (x12-bit) static memory board, with 1K words of memory semiconductors.
1ea - 12030 Front-panel board and electronics, complete with control PROM's, and bootstrap loader.
1ea - 12050 Back-plane bus structure. Accomodates up to 15 plug-in printed-circuit modules.
1ea - 12900 Heavy-duty OEM power supply. Adequate for considerable system expansion. Voltage-regulated, fold-back current-limited, over-voltage protected. 5 volts @ 12 amps, + 12 volts @ 1.7 amps. (Assembled, just connect to system backplane.)
1ea - 12800 Attractive aluminum cabinet with card-cage built-in. Accomodates up to 15 plug-in printed-circuit modules - plenty of room for system expansion.
1ea - Set of assembly, operating and trouble-shooting manuals.

For assembled and tested PCM-12, add 425.00

Accessories:

12010-EX	Kit of required parts to convert CPU to 4.00 MHz operation. With IM6100I device. ($118.00 if ordered separately.)	32.00
12020-EX	Kit of required parts to expand original 12020 memory module to full 4K words.	139.00
12020	Additional 4K-word static memory module for expanding memory beyond original 4K words. (kit)	245.00
12040	Memory extender module. Necessary to expand memory beyond 4K words, up to 32K words. (kit)	135.00
12060	DEC-software-compatible TTY/CRT interface module. 20 ma or RS-232 I/O levels, selectable. 110-9600 Baud operation. Uses DEC device numbers 03 and 04. (kit)	97.00
12070	High-speed paper-tape reader/punch interface. Fully DEC-software-compatible. Uses DEC device numbers 01 and 02. (kit)	97.00
12080	Audio cassette interface. Inexpensive replacement for high-speed paper-tape reader/punch. Uses BYTE-standard modulation format at 300 Baud and same format at 1200 Baud, selectable. (kit)	117.00
12090	Prototyping card. For user-designed expansion logic and peripheral interfaces. Holds up to 55 DIP wire-wrap or solder-type IC sockets. (With edge-card connector, w/o IC sockets).	53.00

Available very soon - 8K dynamic memory module; DECtape interface; LINCtape system/interface; floppy disk system/interface; PROM programmer; EPROM modules and more DEC-compatible interface modules - please inquire about your needs.

END YOUR MONITORING PROBLEMS WITH A "PIXE-VERTER"

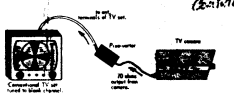
A transistorized modulated oscillator which instantly converts a TV receiver into a top notch video monitor.

ABSOLUTELY NO WIRING MODIFICATIONS REQUIRED ON THE TV RECEIVER!!

#PXV-2A
$8.50 kit form

Ideally suited for "video only" type TV cameras and video tape recorders.

- Operates on any blank channel from 2 to 6.
- Works on all cameras (vidicons, I.O.'s, iconoscopes, flying spots, etc.) as well as VTR's having a video output between .25 and 5 V.



- No direct camera-to-receiver connection required on AC/DC sets thus reducing possibility of shock hazard.
- Miniature size (approx. 1.25" x 2.1") allows it to be mounted inside most cameras and VTR's or on back of TV receiver near antenna terminals.
- Requires less than 3 ma at 6 volts.
- Printed circuit construction (including oscillator coil) permits quick and easy assembly. Total time averages about 30 minutes.

NOTE: This unit is not required when using cameras with RF output capabilities such as the ATV Research Model XT-1A.

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First Class Mail

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