NEW ALTAIR™ COMPUTER CENTERS OPENING

by Gwen Jennings

Would you like to play StarTrek on an Altair Computer or have a computer control the utility usage in your home, or do your billing and inventory, or use an Altair Computer for scientific projects? Perhaps you would just like to spend some time exploring all the possible uses of the Altair. Do you need help with a special application or programming? Do you need an Altair product fast? Where are all these things possible? THE ALTAIR COMPUTER CENTER.

Nearly a year ago the world's first computer store--The Computer Store--was opened by Dick Heiser in Los Angeles. The concept was new and daring, but it was the logical result of the Altair phenomenon. Until that time Altair microcomputers were sold largely through the mail. While MITS had tremendous success with this marketing technique, it was very difficult to provide all the necessary support for the Altair when corresponding with customers over the phone and through the mail.

The Computer Systemcenter, Atlanta, Georgia

COMPUTER STORES ACROSS THE U.S.

Besides selling Altairs, Heiser made his store available for a number of services, including kit assembly advice, software information, and a meeting place for computer hobbyists. In the August issue of "Computer Notes", Heiser reported that business was much better than he had ever imagined. "People in this business haven't been optimistic enough," reported Heiser, "I've tried to be as optimistic as possible, but that has turned out to be too conservative. You have to be wildly optimistic!"

The impact of Heiser's pioneering effort was felt throughout the electronic industry and today there are 19 Altair Computer centers all across the United States and many more in the works. Just in the past month stores have been opened in Chicago, New York, Hartford, and Albuquerque.

The concept of retailing electronic equipment was certainly not new, but the concept of a store for microcomputers providing a full spectrum of services was. At the very heart of the Altair computer center is the main ingredient which is, "the personal touch". This idea of personalizing the computer market was started by MITS when it was a small firm of 15 people on Linn Avenue in Albuquerque. Since then, MITS has moved into a much larger facility and has grown to employ about 120 people, but the initial idea has not been lost.

The people who own and run the Altair Computer Centers are very active in the computer field, both hardware and software. MITS dealers have assisted in configuring systems for schools, hobbyists, scientists, engineers, small business and industry. Many centers have extensive education programs from general computing to sophisticated usage technology. Demo units are in all stores for hands-on demonstrations.

There is no "typical" Altair Computer Center, although they all carry a full line of MITS products and provide consistently high quality service. Every location is as individualistic as its owner.

In this issue of "Computer Notes", we are reviewing each of the Altair Computer Centers. In future issues, we will carry progress reports about the existing computer stores and keep you updated on the opening of new stores.

Story starts on page 5

COMPUTER NOTES
mits
MAY 1976
Vol. 1 Issue 12

If there had only been a Southern California Auto Society

By David Bunnell

Recently, I had the opportunity to speak to nearly 1000 members of the Southern California Computer Society. The occasion was their May 22 meeting, which was held at, of all places, the Samual Goldwyn Theater at The Academy of Motion Picture Arts & Sciences in Beverly Hills.

During that speech, it occurred to me, as I looked out over the audience, that computer hobbyists as a group have to be about the most sophisticated consumers in society today. One reason is they cover a wide range of professional backgrounds, income groups, age groups, etc., but a more important reason is that they have very inquisitive minds, and as computer people, they are very much involved in the mechanisms of how things work.

I told the members of the audience that MITS was very lucky to have such a sophisticated customer base, that they had had a great influence on my company, and by in large we appreciate it. Many people, no doubt thinking about some of the criticisms we have received about delivery and other problems, chuckled rather loudly when I said this. Well, I meant it, and if I can digress a bit, I think I can explain why.

Migraine on the Freeway

The day before the SCCS meeting I was scheduled to have dinner with Yuri Spiro, publisher of Digital Design, at 6 p.m. in San Bernadino. Thinking that I had plenty of time, I left the Computer Store in Santa Monica at 4 p.m. By 6:30 p.m. I was on a jammed freeway at least 50 miles from San Bernadino, I had a massive headache, and was ready to foreswear the automobile habit for the rest of my days.

Comparing computers to automobiles is, as they say in the trade, like comparing apples to oranges, but in some ways they both symbolize the massive influence technology has had on society. The automobile has provided us with unprecedented mobility and its positive aspects are really undeniable. However, I can't help thinking how it may have turned out a lot better if there had been a Southern California Automobile Society to hound manufacturers about such things as emissions and safety and to regulate and in some ways direct the growth of the beast.

Thanks to the SCCS and other hobby clubs, computer development will probably stay on the positive track. More and more people are learning about computers, and you hear less about 1984 horror stories.

The politics of the moment

Getting back to The Computer Store in Santa Monica, Dick Heiser made some interesting observations to me that I think could very well apply to all of us in the personal computer movement.

In order to start the world's first computer store, Heiser had to make a number of risky decisions. Had the idea failed, he could very well have ended up in debt for life.

The idea didn't fail, and now Heiser is in a mode where he says he is no longer making risky decisions. Instead, he is concentrating on such conservative things as providing his customers good service and building up his good business reputation. Whereas, his first store seemed to strive for pizzazz and hard sell, the new Computer Store is remarkably low key and professional.

As I see it, the Southern California Computer Society is in the same boat. Their meeting Saturday was absolutely flawless and professional. From the presentations by filmmaker and electro-optical technique expert, John Whitney, computer graphic experts, Ivan Sutherland and Glen Fleck, to the cheese sandwiches and Mexican coffee, the whole affair was just super.

Unfortunately, there seems to be a certain amount of grumbling and politics going on in the Southern California Computer Society that could very well be destructive. A few hot headed individuals have used the society as an opportunity to seize the microphone and make their self-importance known. Sure, the issues are important, but most of them seem to boil down to momentary polemics with little impact on long range goals.

The same can be said of many of the other clubs. The giant killers who would take on the big, faceless companies are more likely to destroy their own organizations than destroy companies. Sure, its OK to keep the manufacturers in line, but the tact should be cooperation and not confrontation.

The dilemma is this: some vocal hobbyists seem to feel that manufacturers should not make profit, that all of their time and effort should be donated to the cause on a charity basis. At the same time, others seem to feel that manufacturers should provide an inordinate amount of support to the point where it becomes ludicrous. The first criterion rules out any large, professional companies entering the hobbyist field and the second criterion rules out the small guy.

What's important after all

The people at MITS would like to make it clear that we have found the vast majority of computer hobbyists to be reputable, up-front people. We have enjoyed our association with hobbyist clubs, publications, and individuals. And we recognize the importance of the computer hobbyist.

My concern is not the damage the hobbyist can do to MITS, because in the final analysis what MITS does internally will decide the success or failure of the company. My concern is that hobbyists will get so side tracked by club politics that they won't have time for what is really important. And that, my friends, is personal computing.

COMPUTER NOTES

Publisher	David Bunnell
Editor	Andrea Lewis
Production	Tom Antreasian Al McCahon Grace Brown
Contributors	Ed Roberts Gale Schonfeld Paul Allen Tom Durston Steve Pollini Pat Godding Mark Chamberlin Paul Wasmund Dave Silva

Ramblings from Ed Roberts

by Ed Roberts,
President of MITS, Inc.

THE END

After rereading my column for this month I decided that it is more of an advertisement for the 680b and 8800b than it is ramblings. I hope you will forgive me for this, but I am enthused and very pleased with the results of both programs.

680b

The Altair 680b is now in production. By the time you read this column the backlog of 680's will have been shipped and there will be 680's in stock. We will have a 680b with 33K words of memory at the NCC (National Computer Conference) to be held at the New York City Coliseum June 7-11. The 680 BASIC is essentially identical to 8K Altair 8800 BASIC. A 680b with 33K of memory running BASIC is truly impressive. In terms of both software and hardware it is significantly more powerful than any other 6800 system currently available. Just in case you haven't followed the 680 program, let me describe a few of the unique features of the 680.

1) It is the only 6800 processor available which has a full front panel. I personally consider a front panel extremely useful for system maintenance and a must for hardware development. The 680b will soon be available at lower cost without a front panel for those who prefer.

2) The minimum unit includes 1K words of static RAM and a PROM monitor which can be ordered to operate with either TTY, RS232 or 5-level Baudot Teletypes™. The I/O port will electrically interface with either an ASR-33 Teletype, standard RS232 or Baudot Teletype I/O driver (also a unique feature).

3) The basic unit has provision for 1K words of PROM memory. 256 words are included in the basic unit.

4) The I/O buffer is a full UART system, i.e., ACIA 6850, not a bit banger as on most other 6800 systems.

5) A low-power, high-speed add-on 16K static memory will be available in quantity in less than 60 days. Incidentally, if you are wondering where the 33K words of memory come from in the system I described earlier, it consists of two 16K static cards plus the 1K static mainframe memory. The price for this 16K memory card is $685. Order part number 680 BSM.

6) The Altair 680 BASIC is the only real higher language available for any 6800 system. A copy of BASIC will be free to anyone who purchases a 680b and a 16K memory card.

The wait has been a long and frustrating one for many 680 customers, but I am sure that in retrospect they will find the wait has been rewarded by owning the finest 6800 processor available anywhere.

ALTAIR 8800b

Shipments on the 8800b are now scheduled to begin in late June or early July. The Altair 8800b is the ultimate in low cost computer systems. Admittedly, I am not the most unbiased evaluator, but I don't think there will be any question in anyone's mind as to the position of the 8800b in the hierarchy of low cost systems. Your first impression of the 8800b should be extremely positive due to its all new industrial design. But if you go deeper, your positive reaction will increase enormously. The front panel electronics are a totally new design which can be reprogrammed by simply changing one PROM. For the purist, there is not one single shot in the whole system. The front panel is logically isolated from the system bus by an isolation/interface card. Front panel logic wiring is routed to the interface card via preassembled ribbon cables and connectors. The CPU design has been improved and clock signals are crystal controlled both in frequency and pulse width. The motherboard supplied with the unit has 18 slots. We rate the power supply at 18 amps DC. At 8V (actually the transformer is rated at close to 30 amps RMS), the ± 18V supply has a total of 4 amps. There are literally hundreds of design changes and improvements in the 8800b which are not available in any predecessor.

Now for the update kit. If you currently own an 8800 Altair and you wish to upgrade to an 8800b, you can. The cost for the update kit is $489. The only things you keep from your original Altair are the front panel switches, LED's, the 8080, 8212, the case and your motherboard. The rest of your original Altair system can be used for spare parts or prototyping. If you want the new flat handled switches and new LED's, add $78.

Ordering information for the basic update kit - order 8800 B-U kit at $489. For new switches and LED's kit order B-SL at $78. If you want just the "b" power supply, order 8800 B-PS at $147.

More detailed information will appear in future advertisements and brochures.

MY SYSTEM

I am frequently asked what kind of system I have. Unfortunately, my answer for the last two years has been more often "no system" rather than a description of a system. The problem has been that each time I have gotten a system together it has been "recalled" for use at a conference or demo, etc. But about a month ago I took "delivery" on a system that I intend to fight to keep. It consists of an Altair 8800 (not A or B--I intend to upgrade to a "b" when the 8800b backlog is cleared), 60K of RAM memory, 2K of PROM memory for boots, dual floppy disk, a line printer, ASR-33 and a 9600 baud 24 line, 80 character CRT terminal (Lear Sigler ADM-3).

I feel that this system very closely approaches the reasonable upper limit of a personal computer. A plotter is the only lacking element and that problem will soon be resolved for all of us.

customer service news

By Gale Schonfeld

The last month has really been a busy one for those of us in the Customer Service Department. We have added two new people, Dottie West and Becki Chrisman; Kris Ray is now helping Hugh Scupp with industrial orders, and Mollee Smith and I are working hard to help you with your orders and problems.

Software Library

We need your help to expedite the processing of Software Library entries. Please try to conform to the following guidelines:

(1) All entries should be submitted on our coding forms. These are available for $2.00 per 50. Please specify how many cover sheets you need. If this is not specified, you will be sent 20 cover sheets and 30 second sheets.

(2) All entries should be TYPED. Xerox, hand-written, and computer print-out copies are very difficult to print from, usually require re-typing, and may be reason for non-acceptance into the library.

(3) All entries should be submitted on 8 1/2 x 11 white paper. Entries of larger size normally need to be retyped or reduced in size, which reduces the readability of the program.

Please send all entries to the attention of the Software Department. If you have any problems after judging, please feel free to contact me.

Returning Merchandise

When you return an item for exchange, replacement, credit or refund, please enclose a note (and a

— continued on page 10 —

COMPUTER STORES

THE COMPUTER SYSTEMCENTER
3330 Piedmont Road
Atlanta, GA 30305

Total commitment and support for the computer user is the theme of THE COMPUTER SYSTEMCENTER, located in Atlanta, Georgia. Featuring the MITS Altair microcomputer product line, the Systemcenter stresses complete system performance from the hobbyist to the professional. Their business software packages include an Accounting system, an Inventory system, and a Word Processing system, all of which are written for the Altair 8800 CPU using the disk BASIC language software. For the user whose needs exceed the storage capacity of the floppy disk, the Systemcenter has announced hard disk units with Altair-compatible controllers. "By adding on-line storage capacity in the megabyte range to the work-horse Altair mainframe," states Richard Stafford, head of the development project, "we are able to offer to the end user a price/performance capability unmatched in the entire industry."

On the retail front, community involvement is accented. An on-site classroom facility is used for public instruction, and frequent lectures and demonstrations are held at area organizations. Jim Dunion, public spokesman for THE COMPUTER SYSTEMCENTER, will address a session at the June National Computer Conference in New York. His topic will center around the structure and responsibilities of the nationally-emerging retail computer store.

the COMPUTER STORE, INC.
120 Cambridge St.
Burlington, MA 01803

The Computer Store founders, Dick Brown and Sid Halligan, are technological entrepreneurs who declared their independence from Digital Equipment and Prime Computer, respectively, to do their own thing with the things they know best: mini- and microcomputers.

At the Computer Store you can purchase just about anything associated with small computers. The store features the MITS line of Altair 8800 and 680 kits and fully-assembled systems, but equipment from such commercial vendors as Digital Equipment and Data General is available as well. Also for sale are tools and instruments; books and manuals; logic, memory and processor chips and boards; components such as keyboards, power supplies and T.V. monitors; and software. A blueprint library and copying services are provided to stimulate what Sid Halligan calls "technology transfer at the hobbyist level." (He assures us, however, that proprietary software rights will be respected.) Experimenters with problems can receive assistance from a technical staff with access to a library of diagnostic and development software, and equipped with ROM burners and a full complement of test equipment. Regular patrons are invited to attend educational film showings and vendor presentations.

the Computer Store, Inc., Burlington

Besides the products already mentioned, Brown and Halligan also act as distributors of commercial terminals and products, and stock such general computer supplies as printer paper and ribbons, hard and floppy disks, paper tape and cards, and magnetic cartridges and cassettes. The Computer Store is already a distributor for the Information Terminals line of floppy and cassette drives, and for the 3M line of magnetic media.

This is in keeping with Halligan's observation that computers no longer present a public image of mysterious electronic brains that require the care of an elite group of specialists. Instead, Halligan sees computers as increasingly ubiquitous tools that before the end of this decade will be as accepted and almost as pervasive as office typewriters or copiers.

the COMPUTER STORE, INC.
63 South Main St.
Windsor Locks, CT 06096

The Computer Store, serving the Hartford, Conn. and Springfield, Mass. area is located at 63 South Main Street, Windsor Locks, Conn. It is at the junction of Conn. Route 159 and Interstate 91. The staff is ready to meet the computer needs of both home hobbyists and businessmen alike with a full line of computer products and services.

George and Susan Gilpatrick will assist you in designing the perfect system for your application. They bring together extensive knowledge of hardware and software design and business applications. They own one of the first Altair 8800's and have spent the past year developing operating systems for the home user. They are now looking forward to being able to serve the business community with custom tailored systems.

COMPUTER PRODUCTS UNLIMITED
4216 West 12th St.
Little Rock, AR 72204

Computer Products Unlimited (CPU), in Little Rock, Arkansas, opened January 29 of this year. Located on one of the main arteries, at 4216 West 12th Street, CPU is easily accessible to both local and out-of-town customers. The owner-manager is Harry W. Mohrmann, 31, who has an extensive background in hardware and software development and in electronics.

CPU caters to the small business, and toward this end offers designing, installation, and maintenance of complete computer systems for any application. Custom software is also available, as well as programming instruction for any businessperson who desires it.

The hobbyist has not been neglected, either. CPU carries a complete line of MITS equipment, as well as technical books and magazines, electronic tools and parts, and simulation board games. In addition, a work area is available in which hobbyists may build their kits or receive assistance in trouble-shooting and repair. Time is available, by the hour, on three in-house computers to play games or to learn programming. Customers may choose to use anything from 4K BASIC to Extended BASIC utilizing floppy disks, CRT, line printer, and a card reader.

Harry Mohrmann of CPU in Little Rock

One service that has been especially popular with customers is a 24-hour turnaround mail order service. All MITS hardware and software is available by calling (501) 666-2839.

Additional activities include assistance to computer clubs in surrounding areas by way of demonstrations and hands-on-experience for members of the clubs. Hardware classes at the local university have been enlightened in the area of minicomputers through lecture-demonstrations and question-and-answer periods. Many students and club members have found it helpful to be able to drop by CPU for further information.

The staff and management are anxious to be of assistance at any time, on any problem. Our friends

ACROSS THE U.S.

are encouraged to come in to browse, read, ask questions, exchange ideas, or simply talk. We are open Monday through Saturday from 10 to 6, and we have plenty of parking, so when you are in our neighborhood, drop by to see us.

MARSH DATA SYSTEMS
5405-B Southern Comfort Blvd.
Tampa, FL 33614

A multi-faceted staff of six people is waiting to serve you at Marsh Data Systems in Tampa, Florida. Emphasizing complete inventory and fast service, MDS is ready to talk computers with everyone from the newest Altair owner to the most sophisticated systems buyer. Here's a rundown of the personnel who make MDS the busy place it is:

Dennis May, formerly director of an IBM installation in Canada for 12 years, is on hand for any general information about microcomputers. He knows systems -- both large and small.

If you need information on the modification or operation of BASIC, Bill Turner is the man to talk to. Bill has many years experience developing operating systems for computers and has just finished developing BASIC for a major computer manufacturer.

Directing clients to the proper department is the responsibility of secretary Maria Salas, who keeps traffic running smoothly through the store.

If you have questions on applications programs, you'll see Paul Payne who has been developing and installing business systems for many years and knows the best method to accomplish your objective.

Technical advisor is Jerry Alexander, who knows the operation of Altair circuits in detail.

If it's interface information you need, you'll talk to Don Marsh.

Don Marsh of Marsh Data Systems

Many useful items of interest to Altair owners are available at Marsh Data Systems. They stock most of the integrated circuits in the Altair and have sockets kits for Altair interface and memory boards. Also available: a set of instructions for interfacing various devices to the Altair. Application programs, written in BASIC, are being placed on cassette tape for sale as a package. The first program developed is for a mailing list. It will print out lists in Zip Code order for bulk mailing, or in alphabetical order. Specific names can be searched and printed out. If you know only the person's first name, for instance "Paul", the program will print out all the information about every Paul. An individual's name can also be located in the mailing list if you know only the street number.

Many other applications programs are being developed plus utility programs such bubble sort, merge, etc.

"Whatever your computer needs, we at Marsh Data Systems welcome the change to satisfy them."

Store hours are 9 a.m. to 5 p.m Mon.-Thurs. and 10 a.m. to 8 p.m. Fri. and Sat. Phone 813-886-9890.

The Computer Store in Santa Monica

THE COMPUTER STORE
(Arrowhead Computer Co.)
820 Broadway
Santa Monica, CA 90401

"The Computer Store has gone big!" That's the story that's going around Los Angeles. After 10 months in business, Dick and Lois Heiser decided to move into larger quarters. Their first year as the world's first computer dealers saw a rapid growth of interest in personal computers. Correspondingly, business grew beyond their optimistic predictions.

The Computer Store had its beginnings in a 1200 sq. ft. storefront in a central, but slightly seedy location on the west side of Los Angeles. Dick handled the store alone for a week; thereafter, one by one, new people joined the staff to serve the increasing needs of the store. Lois was the first to join, leaving a long-time programming job at the Rand Corporation. Next to join the staff of The Computer Store was Mike Eusey, a self defined "computer freak" who was one of the first to order an Altair in January of 1975. Mike loves to talk about computers, especially the MITS products. He's easily identified by his red hair, dry wit, and ease with explaining the "black box" computer to non-computer people. One of Mike's side interests is music synthesis using computers.

Steve Zook, the next staff member, has developed a reputation for his talents in trouble-shooting hardware problems. Although Steve is modest about his talents, Dick feels that he is a "computer doctor" without equal. Besides hardware repair, Steve has written an assembler package for the 8800 in addition to demo software.

John Trotter and Gary Shannon are the latest to join The Computer Store. Both John and Gary have years of software experience. Gary has also built several of his own personal computers from scratch. John is involved in developing software for the Cromemco TV Dazzler. Gary, among several interests, has taken the 680 demo unit under his wing and developed demo software for it.

With this able crew, The Computer Store moved to 820 Broadway in Santa Monica on May 5th. The new store location is ideal for computer nuts who also love the ocean - it's eight blocks from the sea. The store showroom has three demo units: a floppy disk, printer, disk BASIC system; a TV Dazzler system; and a 680 with TV typewriter system. A wall rack of computer hardware and software literature is also provided.

The future for The Computer Store and its crew of avid computer fans looks bright. Besides being a success, The Computer Store is also a lot of fun. Dick sees the hobby market expanding as well as the small business market. He expects to support both. To fill the software gap, Dick and crew intend to develop software themselves. They have also been talking about the unique opportunity available to programmers, now that the affordable small system exists. "Systems houses are the answer to the software gap," Dick asserts.

Everyone is invited to visit The Computer Store. It can be reached by taking the Santa Monica Freeway west to the "last Santa Monica exit" at Lincoln Blvd. Turn right on Lincoln, go two blocks to Broadway, turn right on Broadway. The Computer Store is on your right. Phone: (213) 451-0713.

GATEWAY ELECTRONICS
2839 W. 44th Ave.
Denver, CO 80211

Gateway Electronics, Inc. of Colorado is a retail store oriented to the hobbyist with a complete stock of MITS products, full service and many support items. They have 6 full-time employees, including a repairman. In addition to serving the hobbyist, they have customers from schools, manufacturers, and small businesses.

There are two demonstration units in the store; an 8800 with 24K of memory, and a new Altair 680b.

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Now, you can buy an Altair 8800 or Altair 680 computer kit right off the shelf. Most all Altair options, software and manuals are also available. The MITS Dealer List below is just the beginning:

off the shelf

RETAIL COMPUTER STORE, INC.
410 N.E. 72nd
Seattle, WA 98115
(206) 524-4101

COMPUTER KITS
1044 University Ave.
Berkeley, CA 94710
(415) 845-5300

THE COMPUTER STORE
(Arrowhead Computer Co.)
820 Broadway
Santa Monica, CA 90401
(213) 451-0713

THE COMPUTER SHACK
3120 San Mateo NE
Albuquerque, NM 87110

GATEWAY ELECTRONICS
2839 W. 44th Ave.
Denver, CO 80211
(303) 458-5444

GATEWAY ELECTRONICS
8123-25 Page Blvd.
St. Louis, MO 63130
(314) 427-6116

BYTE'TRONICS
Suite 103 – 1600 Hayes St.
Nashville, TN 37919
(615) 329-1979

CHICAGO COMPUTER STORE
517 Talcott Rd.
Park Ridge, IL 60068
(312) 823-2388

MARSH DATA SYSTEMS
5405-B Southern Comfort Blvd.
Tampa, FL 33614
(813) 886-9890

MICROSYSTEMS
6605A Backlick Rd.
Springfield, VA 22150
(Washington DC area)
(703) 569-1110

THE COMPUTER SYSTEMCENTER
3330 Piedmont Road
Atlanta, GA 30305
(404) 231-1691

the COMPUTER STORE, INC.
120 Cambridge St.
Burlington, MA 01803
(617) 272-8770

THE COMPUTER STORE OF ANN ARBOR
310 East Washington St.
Ann Arbor, MI 48108

COMPUTER PRODUCTS UNLIMITED
4216 West 12th St.
Little Rock, AK 72204
(501) 666-2839

the COMPUTER STORE, INC.
63 South Main St.
Windsor Locks, CT 06096

the COMPUTER STORE of NEW YORK
55 West 39th St.
New York, NY 10018

THE COMPUTER ROOM
3938 Beau D'Rue Drive
Eagan, MN 55122
(612) 452-2567

NOTE: Altair is a trademark of MITS, Inc.

MITS, Inc. 2450 Alamo S.E. Albuquerque, N.M. 87106

Computer Stores
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COMPUTER KITS
1044 University Ave.
Berkeley, CA 94710

The MITS dealer in the San Francisco Bay area is Computer Kits, Inc., located at University Avenue and Tenth Street in Berkeley. The diverse range of services offered at Computer Kits can be attributed to the varied backgrounds of its proprietors. The president, Pete Roberts, has had an association with computers that dates back to the mid 1950's when he took first place in a school science fair with a digital logic TIC-TAC-TOE game built with discarded telephone relays. Since that time he has attended Cornell (BS, math, '63, no CS degrees then), worked as a research assistant on Project Genie, and founded his own small computer consulting firm. He retired from that firm last summer and, after visiting The Computer Store in L.A., began to lay the groundwork for his own store, Computer Kits.

Another member of the staff is Ed Quinn, a reformed sociologist (MA, '49, U. of Chicago) and one-time Asst. Professor (LeMoyne College, Memphis, Tenn.). Ed received his introduction to computers while in the Navy, on an assignment as executive secretary of the Committee for Business Applications of Electronics Computers. Nine years later he joined IBM's T. J. Watson Research Center to do studies in computer-based instruction (CBI--now called CAI). While working for IBM, Ed made a number of highly significant research findings related to CAI techniques. (When asked what some of these findings were, he responded, "I don't remember.") Since leaving IBM in 1969, he has had his own business (registered investment advisor), and held management jobs, including business manager of a research project at the Univ. of California where he met Pete.

The third member of Computer Kits' ruling troika is Mark Reiley, a December graduate of the University of California. He is chiefly responsible for assembly and repair. Mark majored in English, and his field of special interest was the novels of William Faulkner. Before last September, when he took a course in FORTRAN programming. Mark didn't even know which side of the card you punch holes in. Under the skilled tutelage of Pete and Ed, he has become an avid programmer and skilled designer. In truth, the rapidity with which Mark acquired a high level of skill in coping with digital circuitry cannot be attributed entirely to his untrained genius. He spent three years in the Army as a radar technician.

While Computer Kits is pleased to supply many of the needs of the computer hobbyist, the main thrust is to provide in-depth service to the applications-oriented customer. The staff is well equipped to bring a diverse point of view to the requirements of this customer, and to assist him in designing a system which is well adapted to these requirements. This may include designing special purpose hardware or software. It routinely includes substantial consultation, instruction, and assistance in assembly.

Computer Kits is located at 1044 University Avenue, Berkeley, CA, 94710. Telephone number: (415) 845-5300. American Express Card, BankAmericard, Master Charge, and COD orders are accepted.

The manager, George Mensik, is one of the founders of the Denver Amateur Computer Society.

MICROSYSTEMS
6605A Backlick Rd.
Springfield, VA 22150
(Washington DC area)

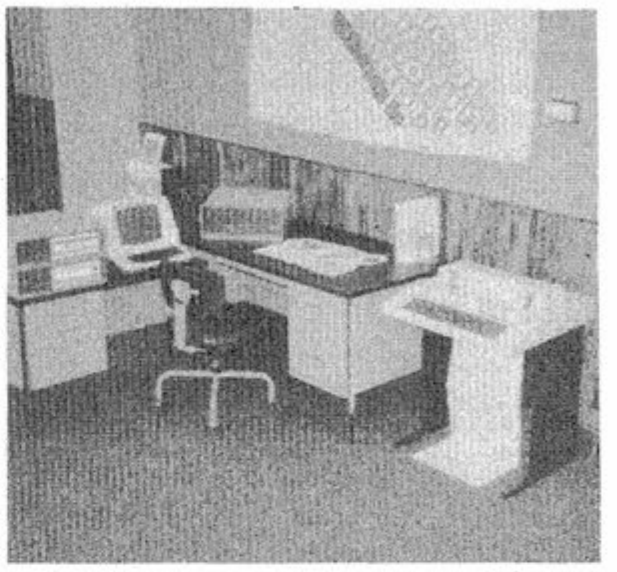
Microsystems opened as one of the early Altair Computer outlets in November, 1975. Since that time they have grown into a first class computer center supporting the hobbyist, local school systems, and commercial accounts. Under the direction of Russell Banks, Microsystems serves the Washington DC area, Maryland, Virginia, and the Middle Atlantic States. Mr. Banks and the other members of the Microsystems team are all seasoned computer professionals with many years of hardware and software experience in business, scientific and automation applications using mini and microcomputers. They service and support the complete Altair computer line and turnkey systems using Altair components in a variety of applications. Their expertise in software, as well as hardware, has allowed them to develop systems for specific applications requiring custom software design.

Microsystems has also been very active in recent computer and hamfest shows on the East Coast. Recently they represented the MITS line with one of the largest displays at the Trenton Computer Festival. Upcoming show plans include a "SCI-FI" display in conjunction with a national STARTREK Convention and a large display at the "Personal Computing '76" Consumer Trade Fair to be held in Atlantic City in August.

In addition to the Altair line, Microsystems is now stocking computer related publications and parts and accessories of interest to the Altair user. The Microsystems organization is geared to handle both the commercial professional and the hobbyist. If you are interested in starting an Altair system or adding software or hardware support to an existing system, see them at their new Springfield, Virginia showroom or call them at 703-569-1110.

THE COMPUTER ROOM
3938 Beau D'Rue Drive
Eagan, MN 55122

The Computer Room, Inc. is located at 3938 Beau D' Rue Dr. in Eagan, Minnesota, south of the Minneapolis Airport near Highway 13 and Cedar Ave. Hours are 9-9 Mon. and Wed., and 9-6 Tue., Thur., Fri., and Sat. Assistance is available from Dale Hagert and Jim Connell in hardware, and Bob Raemer in software.



The Computer Room, Eagan, Minn.

THE COMPUTER STORE OF ANN ARBOR
310 East Washington St.
Ann Arbor, MI 48108

They currently have Altair computers running with the Altair Disk, TTY, Dec-Writer II, Lear ADM-3, and SWTP CT-1024. Support items include Weller soldering equipment and Xcelite tools, TTY paper and paper tape, 7400 series IC's, and computer magazines. Customers are welcome to use the shop facilities and test gear. If users in this area would like to organize a computer club, their classroom accomodates 20-25 people.

See you soon, at The Computer Room!

Peter Blond and Don Damon opened the Computer Store of Ann Arbor on May 19 with one major objective in mind: to present Southeastern Michigan with a dramatic computing alternative . . . the Altair from MITS. They feel that the local computer store concept will fill the "service and availability gap", thus making the price/performance ratio for the Altair even more outstanding.

The people at the Computer Store of Ann Arbor currently view a primary market consisting of: educational users, industrial users, software designers, and commercial users who seek turnkey solutions to business problems. Experimenters and hobbyists are also welcome to take part in the services offered at the CS/AA. These services include hardware maintenance, systems analysis, contract programming, advice and support.

The products they offer include the entire Altair line of computers and peripherals, many Altair-compatible peripherals and various general computer supplies.

-continued on page 9-

New Products

Controllable High Speed Tape Reader

88-HSR (assembled only)

Designed around a REMEX 300 character-per-second opto-reader, the 88-HSR connects directly to one port of an 88-4PIO parallel interface card or one parallel port of an Altair 680b. Software features include start/stop on character and low power standby mode. The standby mode serves two purposes: it reduces motor voltage during periods of inactivity, and also allows tapes to be read at the reduced speed of 30 cps.

The reader is enclosed in an Optima case that is the same style and colors as the Altair 8800 and 680b cases.

Specifications:

Reading Speed	300 cps or 30 cps, software selectable stops "on character"
Tapes	
a) light transmissivity	57% or less
b) thickness	.0027 - .0045 inch
c) type	standard 8-track (1-inch) and most other standard 5, 6, or 7 track
Data Output	TTL: a) less than .4 volts @ 16 ma (No Hole) 2.4 - 5 volts @ .2 ma (Hole)
	b) Plug-in compatable with 88-4PIO or Altair 680 parallel port
Drive	DC stepping motor with sprocket drive
READ Mechanism	Filament lamp to fiber optics to photo cells
	Lamp operated below voltage rating to greatly increase life
Tape Loading	easy in-line, front load
Dimensions	6 1/2 inches high, 8 1/2 inches wide, 11 inches deep
Power	50 watts, running

680b Paper Tape Reader Control

by Steve Pollini

It has been advertised that the Altair 680b has a Paper Tape Reader Control output. This output function utilizes the Request To Send ($\overline{RTS}$) output of the Motorola 6850 (ACIA) and is fully software controllable. The desirability of having such a feature is dubious until you try to generate an object tape or assemble a program with a two-pass assembler.

During the process of assembling a program, a single line of data is read from the paper tape, assembled, and then printed. If the paper tape is not halted while the computer is assembling and printing the line that was just read in, data will be lost as soon as the next line begins to be read. Therefore, it is very useful to have a paper tape reader controller on your Teletype, such as the one that is in the MITS 88-TYA.

What this circuitry essentially consists of is a relay that makes and breaks the supply current to the reader feed magnet within the Teletype. The relay is supplied with current from the 20ma current loop interface supplied on the 680b main board. The relay is driven by the $\overline{RTS}$ output of the ACIA.

Turn to page 15 for a diagram of the circuitry necessary to implement a paper tape reader controller on an ASR-3320 Teletype.

-continued on page 15-

Product Review

MITS 4K STATIC MEMORY

By Tom Durston

Reports from our customers indicate the work we put into the design of the 88-4MCS was well worth the effort.

The features that make the 88-4MCS outstanding are:

- Solder mask on the soldered side of the PC Board. This helps prevent solder shorts during assembly.
- Dip Switch for address selection. (No address jumpers.)
- Sockets for all logic and memory I.C.s.
- A manual that includes a complete theory of operation and troubleshooting section.

The 88-4MCS has received very favorable comments on its reliability and trouble-free operation. It functions equally well with dynamic memory and our new 16K static memory (88-16MCS).

Other specifications include:

Access Time - 450 ns worst case (300 ns typical)

Power Requirement - +8V unregulated at 1.2A, max.

Memory Array - 4 each 1K x 8 bits (32 ea. 2102 A-4)

Price - $167.00 kit, $325.00 assembled.

HARDWARE

from MITS repair dept.

by Jay Miller and Dave Silva

I. TROUBLESHOOTING 4K DYNAMIC BOARDS

A. Addressing

A one-to-one relationship exists between the slope of the address straps (I2, I3, I4, I5) and the switches (A12, A13, A14, A15). With the address switch up, the strap must have positive slope from I to A to enable the board. All straps are at Vcc with the board enabled, and J8 must go low. THE BOARD IS NOW ENABLED.

Within the domain of the board, there are 4096 bytes (locations) addressed by the switches to the right of A12,13,14,15. Twelve pins about the 4060s follow these A0 through A11 switches with respect to the examine switch. The pin configuration for the 4060 is given below:

Source	Signal		Signal	Source
Zener D2	Vbb	(1	22) Gnd	Buss 50,100
Q9	A9	(2	21) A8	Q3
Q13	A10	(3	20) A7	Q5
Q11	A11	(4	19) A6	Q7
J8	$\overline{CS}$	(5	18) Vdd	7812 reg +12v
R or Z	DIN	(6	17) CD	+12v pulse via Q1, Z
To latch	$\overline{DOUT}$	(7	16) (not used)	
P7 or O9	A0	(8	15) A5	P9 or O3
P5 or O11	A1	(9	14) A4	P11 or O5
P3 or O13	A2	(10	13) A3	P13 or O7
7805	Vcc	(11	12) $\overline{WE}$	A4

(4060)

With the appropriate switch raised, the levels at the address pins (above) rise to switched Vcc. A small square imposed on this DC level on the 2, 3, 4 and 19, 20, 21 pins is due to the driver Q being tri-stated by I13-- a function of refresh. Going behind the lines from O are the counters, E and F.

IC E: pin 3 - 30 usec
pin 2 - 60 usec
pin 6 - .12 msec
pin 7 - .25 msec

IC F: pin 3 - .5 msec
pin 2 - 1 msec

Counters E and F are a function of refresh. Chip O is referred to as the artificial address driver.

B. Protect/Unprotect

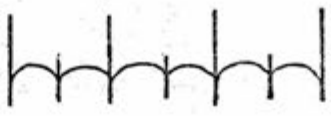
Tb is the protect flop. T_b-$\overline{Q}$ is used to control the LED on the panel for protect. Pin 9, if low, allows the $\overline{WE}$ at the 4060 to fall during a write. You may verify this by chips M and A. T is set to protect with a high from M1. A .1uF cap is placed across pin 5 to ground of Tb to prevent noise transients from clocking T. Jumpers 13 and 14 should be checked. Pin 10 should no longer be common with pin 4 (Vcc) but rather with pin 11 (gnd).

C. Deposit Switches to 4060s

In this discussion, it is assumed that refresh is working properly.
In the Dep mode we may assign a 4060 to each address switch on the right half of the front panel. Pin 6 is the data input to the chip. If a zero is deposited into the chip in question, active high pulses are observed (pulse width approximately .6 millisec wide). Depositing a 1 presents no spikes. The data lines are inverted between the buss and the RAMs since the RAMs invert the data internally.

With $\overline{WE}$ active, the following forms at pin 7 ($\overline{DOUT}$) may be seen with the scope at 20 usec/div and at TTL levels:

Bit Set 

Bit Cleared 

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Computer Stores
-continued from page 7-

RETAIL COMPUTER STORE, INC.
410 N.E. 72nd
Seattle, WA 98115
(206) 524-4101

Tim and Susanne Broom are the proprietors of the first computer store in the Pacific Northwest. Tim has been in the computer field for twelve years -- the last six of which have been dedicated to his own software and systems consulting corporation. The outlet opened on March 1 and is called The Retail Computer Store. Beginning with a large empty store and a pile of computers in the corner, they have since enlarged their inventory and continue to "work around" the carpenters, plumbers, and electricians who are sprucing up the building for their Grand Opening on July 12. None of this flurry of preparatory activity has discouraged Northwest computerniks from enjoying the benefits of having their own computer store nearby. With help from the Northwest Computer Club, the Seattle community has rapidly become aware of the store's existence, and two of the club's presidents are now store employees. Steve Herber started on May 1 as Store Manager and Bob Wallace is Publications Manager. Tim and Susanne say that the club is a "terrific group of people" whose help and interest has contributed enormously to the store's present success. The Brooms hosted a club meeting at the store and seventy-five people were in attendance.

In addition to the hobby market, the Retail Computer Store has sold systems to the University of Washington for use in such diverse applications as brain chemical analysis and environmental research.

The Retail Computer store believes in being a service to those people who want computers in their life. They offer high quality hardware, software, printware, servicing and parts. In an effort to remove cybercrud from the Seattle area, they will be holding a beginning computer class in conjunction with their Grand Opening. "We envision a future where computer stores will bring microprocessors into the home in a humanistic manner." With a positive outlook like that, let's wish the Retail Computer Store all the success in the world!

-continued on page 11-

from MITS repair dept. -continued from page 9-

A feature of the $\overline{WE}$ remains obscure in the stop state. The following program running will smoke it out:

0	333	Input sense switches
1	377	
2	062	Store at location 100
3	100	
4	000	
5	303	Loop
6	000	
7	000	

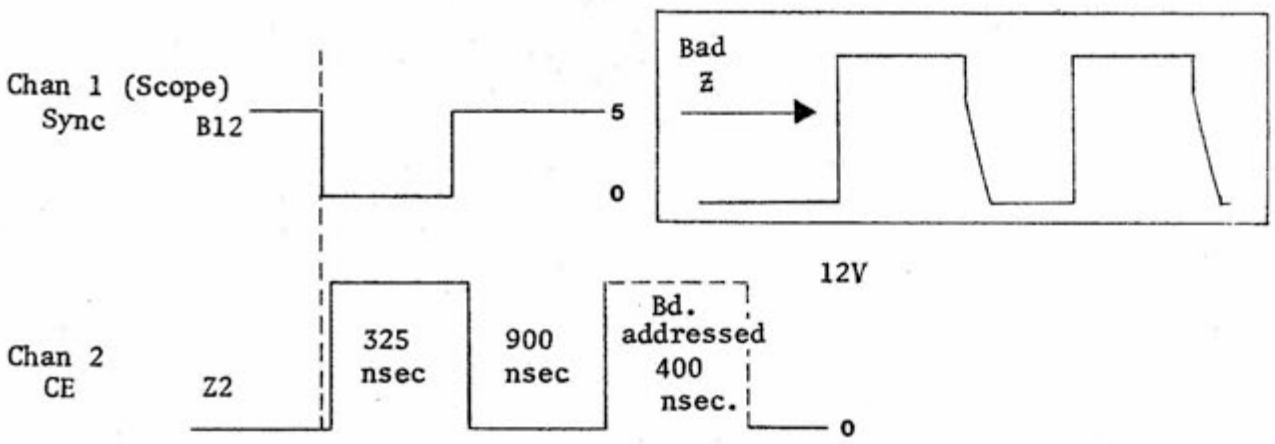
While running the unit you should see the $\overline{WE}$ line pulse low. If the line is shorted to Vcc, no pulses appear.

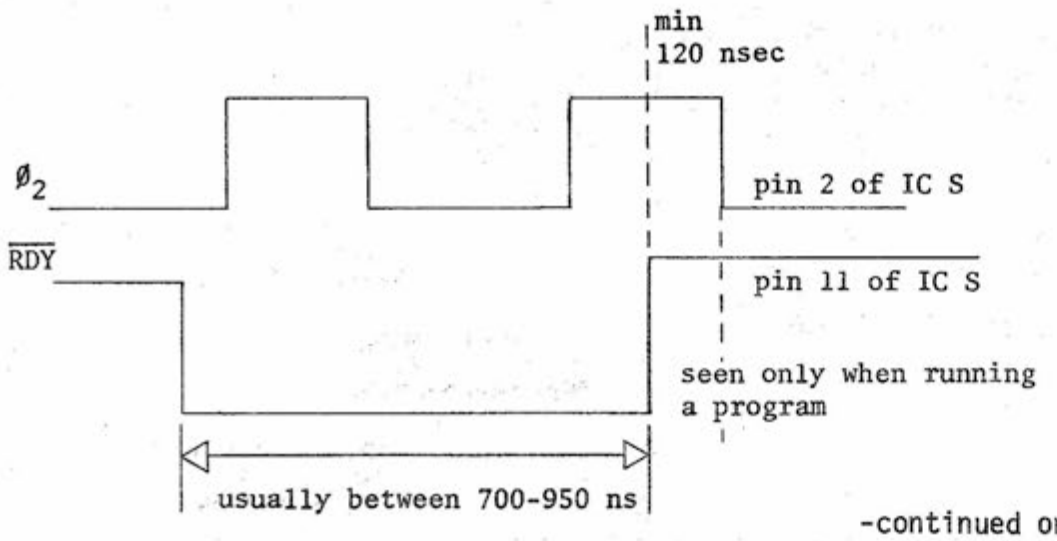
D. Refresh

Refresh requires reading the memory locations over short time intervals as well as providing an external write and read to the system. The $\overline{READY}$, SYNC, Ø1 and Ø2 serve to synchronize the refresh and read systems. The sync passes through A and should be pulsing only while the machine is running. K3 has negative-going spikes about 32 usec apart and should not have a square wave(due to a faulty G). In static reset state M11 is low and M12 is high due to the initial status of the 8080. On the other side of the Read/Write flop (Hb) check pin 11 of N for a strobe every 32 usec. This pulse is used to load the latch with the data available at pin 7 of the 4060s.

Chip Enable is provided by Q1 (12v level) and is strobed through L from H. The rise and fall time for this level must be minimal, hence the transistor is used. If not, usually Z is at fault (see drawing below). As the board is addressed two pulses appear at Z2 and the second disappears as other 4Ks are addressed. CE must be related to B12 as shown to insure that the addresses are stable before enabling the chips.

If the board is to be used with a Disk, any caps at C3, C4, C5 or the delay between Read/Write and the Latch must not have diamonds on them as the tolerance isn't tight enough. Also R5 and R6 are to be changed to 15K and 30K respectively. These changes should produce the forms below. If not, R5 may have to be reduced further to 13K. In essence, we must catch the Ø2 that has been getting away to leave the wait state and keep up with the Disk.





-continued on page 11-

quality control

MITS, Inc. is in the process of up-dating and improving their Quality Control Program.

This results in more reliability and a better appearance in our products.

All PC Boards shipped in the future will have a solder mask to help eliminate the possibility of solder bridges during assembly.

Future QC operations will include incoming inspection of PC Boards on a sample basis and random sampling of kits to insure that the correct parts are being shipped at all times.

Kits returned for repair will receive a visual inspection, which will usually save time for the test technician.

In the near future, the QC Department will be responsible for electrical testing, and all boards and assemblies will have a visual and electrical inspection stamp to insure you that the product received has been through a complete Quality Control check.

Robert Scott,
QC Supervisor

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Customer Service News

copy of your invoice, if possible) specifically stating the reason for return such as duplicate shipment, damaged in shipment, etc., and how you wish us to proceed--such as replacement of the item, credit your account, or issue refund.

If you do not enclose a letter, processing of your return may be delayed until we have contacted you.

Repair Department

When returning an item for repair, please address the package to the attention of the Repair Department. Be sure that items are properly packed to avoid damage in shipment. Always enclose a letter stating what the problems are with your unit. Our Repair Department will acknowledge receipt of your package, including your work order number, in the event that you need to contact them.

If you feel there are problems with certain IC chips, such as CPU or memory chips, please return the entire board so that the Repair Department may test and check-out the item for all possible problems.

continued on page 12

from MITS repair dept. -continued from page 10-

II. DISK PRECAUTIONS—Protecting Floppies
Protecting the Disk Drive

The following "Disk Precautions" will help prevent unnecessary abuse of the floppies or the disk system itself.

The floppies are very susceptable to magnetic fields. Keep them away from flourescent lamps, transformers and soldering irons. Store the floppies free from dust to protect the surface and save on head wear. Marking the floppies should be mandatory.

The drive should be shipped only with the safety board or strap provided. While the board or strap is installed, the door should be fixed shut. Attempting to open the door with the board in the drive will damage it.

Consider the following program:

```
0     333     Input sense switches
1     377
2     323     Out to Disk enable channel
3     010
4     303     Loop
5     000
6     000
```

By raising A8 to A11 we should be addressing another Disk on the Daisy and as a result Disk 0 should be disabled. We may also simulate an open door by raising A15, which will also disable Disk 0.

Suppose that Disk 0 is enabled and we wish to mechanically operate the head and track movement (a scratch floppy is advised until the operator is familiar with the Disk). Change byte 3 of the program from 10 to 11. We will now output to the control channel. Toggling A8 will move the head in toward the center (to track 77). Likewise toggling A9 will move it out. A10 up will load the head and A11 up will unload it.

To protect the floppy, the head should be unloaded and the Disk disabled before opening the door. This is done in BASIC by an OUT 8,255. Now the Disk may be changed quite safely. Remember that BASIC deals in decimal, unless the Q option (octal notation) is used. Using the WAIT command to read status from the Disk is straightforward. Reading and Writing data with the Disk in machine code is more complex due to the sector bookkeeping.

A reminder: the Disk is composed of 77 tracks of 4K per track and rotates at 360 rpm. There are 32 sectors per track and 128 free bytes per sector.

III. DISK ERRATUM

On Disk board #1 there is a track missing that allows unused inputs of the logic to float instead of being tied to V_{HB}. It could possibly affect the sector circuit if noise were picked up by this line. To remedy the problem, connect the top end of R16 (V_{HB}) to pin 7 of IC F2. This is easily done on the bottom (solder side) of the PC board, since a track from F2-7 passes right next to the pad for R16.

CLASSIFIED ADS

For Sale: Two "INKTRONIC" Printers. Able to print and receive up to 120 characters per second or 1200 words per minute. Price: $500 each or $800 for both. Also used Model 15 and Model 20 Teletypes (Baudot 5-level). Can be hooked up to an Altair Computer. Price $100 for Model 15, $150 for Model 20. For details on these items contact:

Ralph Hayford
1010 Elmwood Ave.
Evanston, IL 60202

For Sale: Keyboard ASCII. Magnetic reed switches, interface with SWTP keyboard PC board. Format includes: typewriter keys, 8 function keys, 6 clear keys, cursor control keys, and 0-9 calculator key-type format. Contact:

Larry Belmontes, Jr.
1762 Yale St.
Corpus Christi, TX 78416

Computer Stores
-continued from page 9-

CHICAGO COMPUTER STORE
517 Talcott Rd.
Park Ridge, IL 60068
(312) 823-2388

On May 15th the Chicago Computer Store opened its doors for business to serve the Chicago area; the hobbyist as well as the business and industrial community.

Some of the objectives of the Chicago Computer Store are to provide computer products "off the shelf", a repair facility, an exclusive Altair users group and clinic, a library of all computer related books, magazines, newspapers, catalogues, etc., and a gathering place for anyone interested in microcomputers. The Chicago Computer Store heartily endorses Mr. Roberts' comments ("Ramblings from Ed Roberts", April, 1976, Computer Notes) offering service and support to any Altair owner, even if the unit was not purchased through their store.

The Chicago Computer Store will supply many books, magazines, etc. that will aid those interested in microcomputers. They will also stock any products and peripherals that are of good quality and compatible with the Altair computers, such as Cromemco, Processor Technology, and Southwest Technical Products.

The "exclusive" Altair users group is not intended to close doors to outsiders (those with intentions to purchase Altairs are welcome), nor is it intended in any way to compete with an already existing Chicago computer club, CACHE. Rather, its primary purpose will be a learning and service clinic for Altair owners. No frills, no dues, just a simple clinic to resolve any mutual problems and pass on ideas of common interest.

The store will be happy to work with anyone in the sale of any viable products that they may have developed (hardware and/or software). The Chicago Computer Store also welcomes any suggestions and/or criticism that will make it the type of store that will best serve the "Computer" public.

Four additional Altair computer stores that have recently opened are:

BYTE'TRONICS
Suite 103 – 1600 Hayes St.
Nashville, TN 37919
(615) 329-1979

the COMPUTER STORE of NEW YORK
55 West 39th St.
New York, NY 10018

THE COMPUTER SHACK
3120 San Mateo NE
Albuquerque, NM 87110

GATEWAY ELECTRONICS
8123-25 Page Blvd.
St. Louis, MO 63130

Jim Gerow, James Erlach

TOP SOFTWARE CONTEST

By Paul Allen

This month 21 programs were accepted into the Altair Software Library. The percentage of BASIC programs seems to be increasing, with more than 50% of the programs submitted being written in Altair BASIC or another BASIC variant.

This month's winner is (again) Jim Gerow, with his FORTRAN cross assembler (#5-24-763) for the 680b. See Mark Chamberlin's article for more details.

Second place program is James Erlach's REACTION tester program (#5-3-761). This well-written Altair BASIC program makes good use of the INP function to detect when a terminal key is struck.

Third place program is David Dodge's BASIC program (#4-27-767) which drills a student on the addition of fractions with different denominators.

First place subroutine is Walter King's extensive ACR test program (#4-27-764). Second place subroutine is George Rompot's breakpoint routine for use with JAMON.

FIRST PLACE MAJOR PROGRAM

#5-24-763
Author: Jim Gerow
Length: 1800 lines
Title: 6800 Cross Assembler
Written in FORTRAN.

SECOND PLACE MAJOR PROGRAM

#5-3-761
Author: James Erlach
Length: 36 lines (Altair BASIC)
Title: REACTION
Tests your reaction time by timing how long it takes you to hit a terminal key after the computer rings a bell.

THIRD PLACE MAJOR PROGRAM

#4-27-767
Author: David W. Dodge
Length: About 300 lines (BASIC)
Title: LCM
Computer Assisted Instruction (CAI) program teaches how to add fractions with different denominators.

FIRST PLACE SUBROUTINE

#4-27-764
Author: Walter King
Length: 75 bytes
Title: ACR Diagnostic
Thorough routines for checkout and alignment of ACR board with extensive error reporting.

SECOND PLACE SUBROUTINE

#4-27-766
Author: George Rompot
Length: 64 bytes
Title: INTD
Breakpoint routine to use in conjunction with JAMON to display registers and stack pointer. RST 0 is used to set breakpoints.

#4-27-764
Author: Erik Mueller
Length: 256 bytes
Title: Horse Race
Five horses race across screen of TVT.

#4-27-763
Author: Gerald Hansel
Length: 60 lines (BASIC)
Title: Roulette
Plays roulette against house by using doubling strategy.

#5-14-763
Author: George Rompot
Length: 335 bytes
Title: Shooting Stars
Plays "Shooting Stars" game found in May 1976 issue of Byte magazine. VDM-1 required for display.

#5-14-762
Author: George Rompot
Length: 23 bytes
Title: SCREEN FILL
Moves strings of text to VDM-1 display buffer.

#4-27-762
Author: Ron Santore
Length: Slightly greater than 1K bytes
Title: Button
Plays "guess who has the button" game on an ASCII terminal.

#4-27-761
Author: Gerald Hansel
Length: 66 bytes
Title: Trig Table (BASIC)
Prints a trig table of sine, cosine and tangent functions for selected angles.

#5-3-763
Author: Mitchell Wolrich
Length: 140 lines (BASIC)
Title: YUM
Plays Yahtze game. All instructions and prompts are in French.

#5-4-761
Author: Bill Thompson
Length: 304 lines (HP BASIC)
Title: Least Squares
Performs least squares of six different curves to a set of data points.

-continued on page 13-

680-b SOFTWARE

by Mark Chamberlin

Now that hundreds of 680b's are out in computerland, I'm expecting the Software Library to be rapidly filled with high quality 680b programs.

Jim Gerow, author of the 8800 cross assembler, has submitted a 680b cross assembler written in FORTRAN IV. The program has been assigned #5-29-763 and will be available for $15 for a listing and $30 for a listing and paper tape.

The 680b PROM Monitor's LOAD command loads paper tapes punched using the Motorola hexadecimal punch format. (See the 680b System Monitor Manual for information regarding this format.) A program to punch hexadecimal formatted tapes can be found in the 680b Programming Manual under Sample Programs.

The punch program can be entered into memory using the Monitor's M&N commands. It can then be used to punch a paper tape of itself for future use.

William Kennedy of New Jersey was kind enough to respond to my urgent request for a name for the PROM Monitor. Shame on the rest of you laggards! It was decided, however, that Mr. Kennedy's suggestion of MONiSTER does not project the type of image that MITS would like to promote for the Monitor. Therefore, the Monitor has been duly dubbed the 680b PROM Monitor.

I'll be waiting to hear from anyone who has questions, comments, or suggestions concerning 680b software and/or 680b software documentation.

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Customer Service News

Remember that the warranty on kits is 90 days for parts only, and labor for computer repairs is $22.00 per hour. The warranty on assembled items is 90 days for parts and labor. Postage and handling is paid by the customer.

When requesting technical assistance by phone, please advise the MITS operator if you are calling about an item already in for repair or an item possibly needing repair. This will help you get to the right department much faster.

Until next month - Gale

Disk Extended BASIC by Paul Allen

There were a few features in Disk Extended BASIC version 3.3 that were left out of the preliminary documentation. These are the INSTR string search function and the NAME statement used to change the name of disk files. Documentation which appears in the revised Disk Extended BASIC manual is reprinted below.

INSTR Function

The INSTR function is used to find the position of the first occurrence of a string within another string:

```
X=INSTR(<string formula of string being searched>,<search string>)

or

X=INSTR(<numeric offset>,<string being searched>,<search string>)
```

Examples:

```
PRINT INSTR("MITS ALTAIR 8800","8800")
13

OK
PRINT INSTR(7,"MITS ALTAIR 8800","A")
9

OK
```

The first position of the string is always one. If the <numeric offset> is greater than the length of the string being searched or if the <string being searched> is null, INSTR returns zero. If the second string argument is the null (length zero) string, INSTR will return <numeric offset> (the default is one if <numeric offset> is omitted. If the <search string> cannot be found in the <string being searched>, INSTR returns zero.

Otherwise INSTR returns the character position of the first occurance of <search string> in the <string being searched>.

An FUNCTION CALL error will occur if the <numeric formula> is less than or equal to zero or greater than 255 decimal.

Renaming Files - the NAME Statement

The NAME statement is used to change the name of a file:

```
NAME <old file name> AS <new file name>[,<disk number>]
```

Example:

```
NAME "OLDFILE" AS "NEWFILE"
```

The <old file name> must exist or A FILE NOT FOUND error will occur. A file with the same name as <new file name> must not exist or a FILE ALREADY EXISTS error will occur. After the NAME statement has been executed the file will exist on the same disk in the same area of disk space. Only the name has been changed.

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SOFTWARE

Software Contest
-continued from page 12-

#5-3-764
Author: George Rompot
Length: 197 bytes
Title: TARGET
Plays a game where missles are shot at a moving target. Score is kept on the screen of VDM-1.

#5-4-762
Author: Bill Thompson
Length: 141 lines (HP BASIC)
Title: Polar Plotting
Calculates and plots a function on a polar graph.

#5-4-763
Author: Bill Thompson
Length: 375 lines (HP BASIC)
Title: Multiple Linear Regression
Program performs multiple linear regression analysis for one independent variable and up to six independent transforms.

#5-6-761
Author: Craig Pearce
Length: 43 lines (Altair BASIC)
Title: BAGELS
Plays familiar 3-digit number guessing game.

#5-6-762
Author: Craig Pearce
Length: 19 lines (Altair BASIC)
Title: Number Predictor
Number guessing game. Exceptionally well documented.

#5-6-763
Author: Craig Pearce
Length: 24 lines (Altair BASIC)
Title: Day of the Week
Calculates day of the week for any date later than September 14, 1752.

680 Software Policy

By Paul Allen

Pricing for 680 software has been determined. The assembler, editor and 8K BASIC will be available at no charge with the 680 16K memory board. If you do not own a MITS 6800 machine and wish to run 680 BASIC, the cost is $200 for a hex paper tape with I/O patch points and manual provided. This does not include a source listing. We can relocate BASIC in memory or configure it for special I/O devices for an extra charge. OEM licenses for 6800 BASIC are also available. Write or call me if you are interested.

The Assembler/Editor package is also available (without purchase of a machine) with patch points and manual for $75. Also the Altair software library and software contest are now open to 680 programs as well as 8800 programs.

Disk Extended BASIC -continued from page 13-

A few bugs have been uncovered in the PIP utility program. Change the lines below (changes underlined):

```
   19    CLOSE1:PRINT"+";`
 5100    GOSUB6000:GOSUB4000
 9011    IF EOF(1) THEN 19
12022    INPUT . . . . . THEN 19
12010    C$ . . . . . THEN 19
 2020    A$=DSKI$((S*17)AND31)
```

The change to line 19 allows LIST to be performed more than once. The changes in 9011, 12022 and 12010 change references from a non-existant line 18 to line 19. The changes to 2020 fix a bug in the DIRectory command that limited the number of files printed to 8.

Here is a program (SUBS) I wrote which demonstrates the use of INSTR and LINE INPUT to perform a string substitute on a program file saved in ASCII code on the disk. First an example run of the program is given (all double quotes in a saved copy of the program are changed to percent signs):

```
OK
RUN
WHAT IS THE FILE NAME ON DISK Ø? SUBSA
WHAT IS THE SEARCH STRING? "
WHAT IS THE SUBSTITUTE STRING? %
WHAT IS THE OUTPUT FILE NAME DISK Ø ? SUBSA2
10 PRINT %WHAT IS THE FILE NAME ON DISK Ø? %;:LINE INPUT P$
15 PRINT %WHAT IS THE SEARCH STRING? %;:LINE INPUT S$
17 PRINT %WHAT IS THE SUBSTITUTE STRING? %;:LINE INPUT N$
20 PRINT %WHAT IS THE OUTPUT FILE NAME DISK Ø ? %;:LINE INPUT O$
25 OPEN %I%,1,P$
26 OPEN %O%,2,O$
75 L$=%%:IF X=Ø THEN 90 ELSE L$=LEFT$(T$,X-1)
1000 PRINT %*DONE*%:END
*DONE*

OK
REM ABOVE IS OUTPUT PRODUCED BY "SUBS" PROGRAM

OK
REM PROGRAM LISTED BELOW:

OK
LIST

5 CLEAR 1000
10 PRINT "WHAT IS THE FILE NAME ON DISK Ø? ";:LINE INPUT P$
15 PRINT "WHAT IS THE SEARCH STRING? ";:LINE INPUT S$
17 PRINT "WHAT IS THE SUBSTITUTE STRING? ";:LINE INPUT N$
20 PRINT "WHAT IS THE OUTPUT FILE NAME DISK Ø ? ";:LINE INPUT O$
25 OPEN "I",1,P$
26 OPEN "O",2,O$
30 IF EOF(1) THEN 1000
40 LINE INPUT #1,T$
50 S=1:F=Ø
55 X=INSTR(S,T$,S$)
60 IF X<>Ø THEN 75
65 IF F THEN PRINT T$
66 PRINT #2,T$:GOTO 30
75 L$="":IF X=Ø THEN 90 ELSE L$=LEFT$(T$,X-1)
80 R$=MID$(T$,X+LEN(S$))
90 T$=L$+N$+R$
100 S=LEN(L$)+LEN(N$)+1:F=1:GOTO 55
1000 PRINT "*DONE*":END

OK
```

Afterword: The variable F is used as a flag to remember whether any substitutions have been made in a particular line.

DOS is near

By Paul Wasmund

The long-awaited Disk Operating System is on the way. At this time the DEBUG program is finished, the System Monitor and Text Editor are nearing completion, and the Assembler is about two weeks from completion. Documentation for this powerful new system has been started, and we hope to release the package in July.

The Assembler is the biggest news in the DOS. It is a full two-pass assembler with features that: 1) generate relocatable code, 2) produce a full assembler listing, and 3) allow operand expressions. Since the output of the Assembler is relocatable, a Linking Loader is included to link routines assembled separately into a complete object program.

The System Monitor (about 7K bytes) is the core of the Disk Operating System. It contains all disk management code, drivers for all peripherals including the line printer, and the command decoding routines.

The following is a list of some of the DOS commands:

```
RUN    -Runs a file created by the
        SAVE command
SAVE   -Saves absolute programs cre-
        ated by the Linking Loader
COPY   -Copies files and merges files
        (replaces the Print, Merge,
        and Dump commands of other
        disk operating systems)
RENAME-Renames a disk file
KILL   -Deletes files from the disk
MOUNT  -Reads information from disk
        to determine how much is in
        use
UNLOAD-Closes all disk files and
        flags that the disk needs to
        be mounted
```

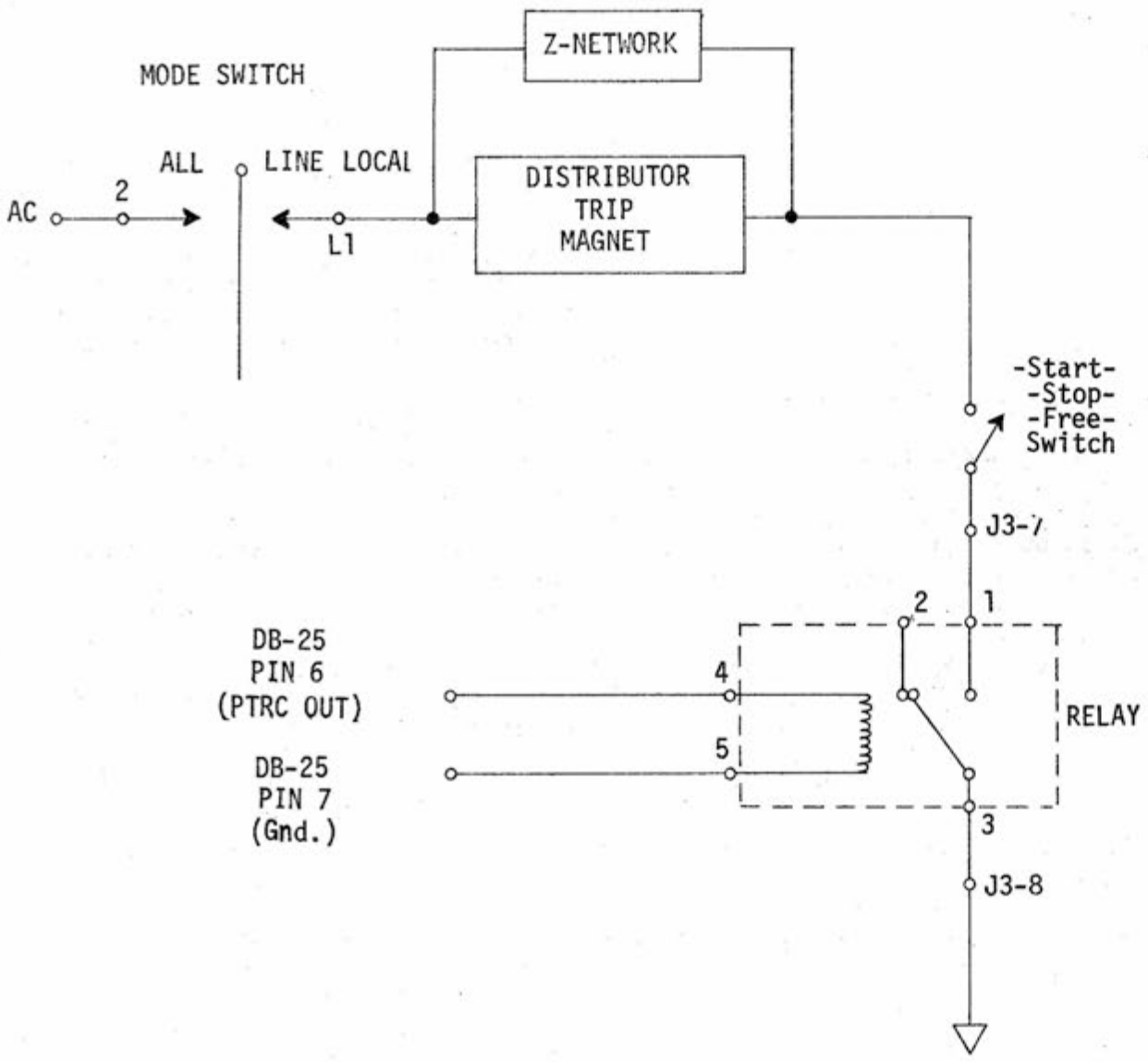
Programs are also included for copying one disk to another, initiating disks, etc.

the mysterious issue 8

Many C/N subscribers have written to our Customer Service Department saying that they have received Computer Notes Issue 7 and Issue 9, but no Issue 8. So I guess it's finally out in the open--there is no Issue 8! The January '76 issue was #7, and the next issue, February '76, was mistakenly assigned #9.

-Andrea

680b PTRC -continued from page 8-



The relay used in the MITS 88-TYA is a Guardian 10 amp 1345 DC relay (form C). The coil draws approximately 5 milliamps and is therefore easily driven by the 20ma interface labelled "PTRC" (Paper Tape Reader Controller) on the 680b main board. To connect the relay to an ASR-3320, remove the jumper between pins 7 and 8 on J3 of the Teletype. Connect pin 7 of J3 to pin 1 of the relay and pin 8 of J3 to pin 3 of the Teletype.

All of the software necessary to control this output while assembling a program is contained within the Assembler. However, if you want to control this output to read in a data file from paper tape while not assembling a program, the following information will be useful.

When the $\overline{\text{RTS}}$ output goes high, the reader is turned on. When it is low, the reader is turned off.

To turn the reader on:

```
LDA  A    #$    D1
STA  A     $    F000
```

This stores D1 in the Control Register of the ACIA. Bits five and six function together such that when six is a one and five is a zero, the $\overline{\text{RTS}}$ line is high with Transmitting Interrupt Disabled. The Control Register is also set for a ÷ 16 clock, two stop bits, eight bits, and no parity.

To turn the reader off:

```
LDA  A    #$    B1
STA  A     $    F000
```

This stores B1 in the ACIA Control Register. Bits five and six function together such that when they are both zeros the $\overline{\text{RTS}}$ line is low with Transmitting Interrupt Disabled. The Control Register is also set for a ÷ 16 clock, two stop bits, eight bits, and no parity. To turn the reader off with Transmitting Interrupt Enabled, do a LDA A #$ 91 instead of a LDA A #$ B1.

For further information on the ACIA Control Register, see the 680b Programming Manual, Appendix C.

Computer Clubs

New Address for:
El Paso Computer Group - EPCG
9716 Saigon Drive
El Paso, TX 79925

River City Computer Hobbyists
2642 Lamar Ave.
Memphis, TN 38114
901-743-6155

Ventura County Computer Society
PO Box 525
Port Hueneme, CA 93041
Contact: John A. Borders
805-985-1631

Oregonians:
A computer group is forming in Oregon--membership is presently at 49. Meetings are the last Saturday of each month. The club is currently nameless, but is running a contest to select a name. Contact one of their officers for more information:
Bill Marsh/Portland, OR/288-9692
Mike Boyd/Milwaukie, OR/659-7214
Joseph Bartel/Portland, OR/233-8283
John Lynch/Lake Oswego, OR/636-8598

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If you would like your name published in C/N so that other Altair users may contact you, send name and address to Gale Schonfeld, Customer Service Dept. at MITS.

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