THIS IS IT FOLKS OUR TENTH !!!

This issue marks our TENTH year as Sacramento Microcomputer Users Group for all types and brands of computers. Our meetings are open to all users !!!

**********************
SMUG MEETING

SEE PACK COVER AND GO TO THE SMUD TRAINING ROOM

NEXT MONTH OUR MEETING DAY IS TUESDAY MAY 28, @ 7:30 PM

**********************

TENTH CELEBRATION ON MAY 4th

AT Raff Hall, American River College. See map on page 3
SPEAKERS STARTS AT 10:00AM

**********************

NEXT MONTH.............
TURBO TUTOR STARTED
The first of many tutors

FEATURES..........

SMUG ISSUE #1........ 7 MAY 1975
20/20 HINDSIGHT........ 9
J.J. Warkentin reviews 1975
JAN 1975 EDITORIAL..... 9
F/E Look at ALTAIR 8800
CHRONOLOGY........... 12
Event in computer history
THF KIT FRA............ 14
A look at impotent kits
BUILD THE ALTAIR 8800...17
A look at what started it all
SMUG SPEAKERS.......... 20
Some words about our speakers
COMPUTER FITS.......... 22
The first computer column
BUY A MITS............ 25
That first MITS ad
THE EDITOR LOOKS BACK...27
Bill Kibler looks at 1975

DEPARTMENTS...........

PRESIDENT'S MESSAGE.... 5
TREASURER'S REPORT.... 2
SECRETARY'S LINE.... 7
VP SPEAKERS............. 18
EDITOR'S TIME......... 21
SIG/M Vols. 206 & 207.. 30
SMUG's RCMP NEWS...... 28
MEMBERSHIP APPLICATION 15
ADVERTISER INDEX...... 2
CONF ON VACATION -- PACK NEXT MONTH

*******************************
* *
* INDEX TO ADVERTISERS *
* *
* ADVANCED COMP PROD.......19 *
* *
* BUSINESS CARDS...........31 *
* *
* BYTE BROKERS.............27 *
* *
* CITRUS SOFTWARE..........24 *
* *
* COMPUTER BOOKS..........10 *
* *
* COMPUTERTIME...........5 *
* *
* DCC..................16 *
* *
* DIGITAL INDUSTRIES......24 *
* *
* EMPIRICAL TECH..........13 *
* *
* HALTED SPECIALTIES CO...8 *
* *
* JVE ELECTRONICS.........26 *
* *
* M.P.S..................23 *
* *
* MICRO CORNICOPIA.......4 *
* *
* PCE SYSTEMS.............21 *
* *
* QUEST MEDIA.............23 *
* *
* RENTECH COMPUTER RENTAL.30 *
* *
* SOFTWARE PLUS...........29 *
* *
* ZACK ELECTRONICS.......6 *
* *
* *
* *******************************

PUSH & POP

THE MONTHLY PUBLICATION OF THE SACRAMENTO MICROCOMPUTER USER'S GROUP

Editor..................Bill Kilner (989-3886)
Mailing List............Al Duran (723-9822)
Advertiser Billing......Roy Korb (481-2744)
Graphic Assistance......Judy Putler

OFFICERS
President..............Ken Benedict (988-9832)
Vice President.........Bob Schlegel (485-0773)
Secretary...............Dave McAfee (487-1103)
Treasurer...............Jud Sway (362-8062)
Board Member...........John Vankenten (722-5436)
Board Member...........Al Duran (723-9822)
Board Member...........Cameron Clarke (969-1388)
Board Member...........Jim Mazzarelli (723-3538)
Board Member...........Ken Montgomery (364-5283)
Board Member...........Dick Towle (635-1413)
Dick Librarian..........Bob Pess (362-5712)

PUSH & POP is published monthly at Sacramento, CA. Subscription rates are $12 per year. Membership in SMUC includes a free subscription to the PUSH & POP. Address all correspondence to: SMUC PO Box 161513, Sacramento, CA 95816, Attn: Push & Pop.

DISPLAY ADVERTISING RATES

<table>
<thead>
<tr>
<th>Ad Size</th>
<th>One Insertion Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Cards</td>
<td>$ 4.00</td>
</tr>
<tr>
<td>one year paid in advance</td>
<td>$ 40.00</td>
</tr>
<tr>
<td>Quarter Page</td>
<td>$ 12.00</td>
</tr>
<tr>
<td>Half Page</td>
<td>$ 20.00</td>
</tr>
<tr>
<td>Full Page</td>
<td>$ 34.00</td>
</tr>
</tbody>
</table>

TERMS: All advertising copy must be camera ready. Ad deadline is the first Tuesday of each month for publication of that month. Free ad pickup at your place of business in the greater Sacramento area.

Non-profit organizations, such as computer clubs are free to reprint material from the PUSH & POP provided appropriate credit is given. Organizations for profit must contact the editor for reprint permission.

********************************************************************
SMUG 10th Anniversary
Saturday May 4th  9am to 6pm
American River College
Raef Hall  Room 160

SETUP 9:00 AM
SPEAKERS 10:00 AM
ENDS AT 5:00 PM
NO FOOD ALLOWED
INSIDE HALL!!
TABLE OF CONTENTS

Automatic Disk Re-logging With CP/M 2.2 ........................................... 4
Interrupt Driven Serial Print Driver .................................................. 18
Review: Microshell RAM Disk .......................................................... 41
Do It Yourself Smart Video Controller .............................................. 43
In-line Object Code In Turbo Pascal .................................................. 51
An Inspired Turbo Tweak ............................................................... 56
New Software for KSTROKES ............................................................ 63
A Low Cost EPROM Eraser .............................................................. 63
Forsell and C-Composites Benchmark .............................................. 65
Running CP/M on TPA ................................................................. 67
Reads To Use Files ........................................................................... 81

Regular Features
The S-100 Bus ................................. 9 On Your Own .......................... 72
In The Public Domain ......................... 13 Technical Tips ..................... 74
The News Letter ............................. 21 Culture Corner ...................... 82
Cry Clearly ..................................... 26
The Silver Column .......................... 32 Future Topics ...................... 83
The Keypress Column ...................... 35 Tricks ................................ 84
Pascal Procedures ......................... 52 Review: Z80 PIC 8 .................... 84
FORTHWorld ................................. 56 The Last Page ...................... 88

---

RISK FREE
You get your 7th issue free when you order a year subscription (6 issues) for $16. Plus, if you're not delighted with Micro C after receiving your first issue, just drop a note and we'll refund your entire $16, no questions asked.
Order # (503) 382-5060
SPECIAL OFFER!

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
<th>Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year Subscription</td>
<td>$16.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(plus 7th issue free)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Canada &amp; Mexico</td>
<td>$22.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other Foreign</td>
<td>$30.00</td>
<td></td>
</tr>
</tbody>
</table>

Only $16.00
Make check or money order payable to:
Micro Cornucopia

P.O. Box 223  Bend, OR 97709
□ VISA  □ MasterCard
Card No.  
Exp  Signature   

PAGE 4
FROM THE SMUG
PRESIDENT'S SYSTEM

As May approaches, so does our Club's 10th Anniversary. Way back in 1975, a small group of hobbyists got together in Sacramento because of a common interest in the new field of Microcomputing. Before then, only large and medium sized computers existed, but nothing for the small, personal computers. A few tiny businesses were created to sell kits to the experimenter so they could build their very own microcomputer. Many companies came and went since that time and there was an explosive demand by the public for small inexpensive computers. Stories abound of successes and failures of these small computer companies where fortunes could be made overnight and failures were equally as swift. Books and articles have been published about the history of the microcomputer and I couldn’t do it justice to cover it in a few paragraphs in our newsletter.

As remote as 10 years seems, many of our Club members have been around since the early days of microcomputing and are eager to share the details and “war stories” of being pioneers. In celebration of these last 10 years, we have decided to hold a 10th Anniversary Celebration on Saturday, May 4th at American River College in Sacramento. An all day affair will include exhibits of early computers and related devices and speakers from both our own club membership and other notable pioneers from the microcomputer world.

Hardware exhibits will include the Altair, IMSAI, SOL and North Star computers as well as other computers and I/O devices. These will be on display with a brief history of each device. How many of you remember the ASR-33, a paper tape terminal that was “hi-tech” just a few short years ago? Come take a nostalgic view of the past and talk to the owners of these marvellous devices.

Speakers will be sharing their personal glimpses of how they started and what they have seen in this fast paced world of microcomputing. Tentatively, speakers include George Morrow, Bill Godbout, Mark Garetz (he and George Morrow were the primary forces behind the S-100 Bus Standard), John Draper (Cap'n Crunch), Dave Thompson (Editor and Publisher of Micro Cornucopia magazine), Dallas Parcher (who has owned just about one of everything), and Charley Foster (with his many personal contacts in the micro world). There are other speakers that may be scheduled at the last minute and having Comdex the following week may affect George Morrow and Bill Godbout, but we have their tentative agreement to speak to us about their colorful past. An agenda will be available soon with details of exact speaker times. As always, there may be last minute changes.

Also invited to attend will be some of the local computer clubs and most of the local media, both TV and Radio. The hours will be from 9:00 a.m. to 6:00 p.m. at Raef Hall (Room 160) on the American River College Campus in Sacramento. Maps will be available at the next meeting as well as the agenda. We hope to see you there for an enjoyable day of reminiscing.  

Ken Benedict

SOFTWARE
PRINTERS
MODEMS
BOOKS
DESKS
DISKS

commodore
QUALIFIED SERVICE CENTER
Warranty & Non Warranty Repair

COMPUTERTIME
8040 D Greenback Lane
Citrus Heights, CA 95610
(916) 723-4000
(916) 969-4111
(3 Blocks East of Sunrise)

PAGE 5
Smug members gather close to get the first glimpse of the new computer-based phone and pen! Note the excitement.

Happy Anniversary and many more from Jack Electronics!
It was a cold, windy, rainy night and it was SMUG general meeting night, so away I went to the SMUD Board Room. When I walked into the room, the other twelve or fourteen people that were there looked around. Yep, folks there was not much of a turn out that night. The meeting was very short (ended so early my wife was suspicious). The discussion that occurred was about the upcoming May anniversary event. Some of the guest speakers were named (see the President's Message for more about the speakers and the function), the event was described, and help was solicited to make the thirtieth anniversary a time to remember. First time attendees were asked to introduce them selves, and sequential access was followed by random access. We were on our way home by 9:00 pm, no fight to get us out by 10. Oh, by the way, yours truly made a half fast thought out proposal about a Programmer Workbench (see the Soap Fox). So here I am at 10 pm on the following Thursday, sitting in my shorts and socks trying to get the Board Meeting minutes typed and transmitted to the Editor. My Weinhein's Ale and my daughter's rat (read hamster) are my only companions. The Board Meeting was held at Roy Korb's home, and it started on time. The Board members present were Benedict, Schlegel (late again), McAfee, Warkentin, Mazzarrelli, and Montgomery. Bill Kibler (Editor) and Roy Korb were also present.

It was discussed why some of the long term members were not renewing their membership, concern was expressed that perhaps their money had been received, and the fact not recorded. The Board will investigate, it was stated that some of our long term members were constantly on the road and perhaps had chosen not to renew. The newsletter was the next topic. It was decided that all active members from this and last year would receive a copy of the special May issue of the newsletter. Again, the Editor requested articles for the publication by asking each of those present if he had his article ready. Yes Bill, here it is. Bill Kibler presented a proposed new masthead that is simpler and cleaner. A discussion was held regarding a logo for the club. Didn't we go through this last year?

The Public Domain was the next topic of discussion. Don Bozarth and Bob Hess will be assembling another of those neat collections of Public Domain. According to my past conversations with Don, he is going to have two disks of utility programs ready for the May anniversary. I gave Benedict a disk of MBASIC skill development programs (read GAMES) to be included, also pledging to have a sampler disk of programming languages including BASIC, COBOL, FORTH, and PASCAL (may take two disks). There was a discussion if the club should use flippies (both sides of a single sized disk) or use two disks. If we used two disks the cost to the club would be slightly more, but the purchaser would have the option of reading one of the disks he wanted if he didn't buy both. A short discussion about including some of the smaller clubs under our masthead. Many other groups appear to be doing that very successfully.

Volunteers are still needed to help with the special event, no skills are needed for many of the areas where we need help. Ken is also looking for hosts for our guest speakers. He intends on popping for dinners for a couple of them, this is a good opportunity to get to know some of the old tigers in the field (oh my gawd they are younger than I am).

Don't miss our next general meeting April 23, 1985, and please feel free to attend the next Board Meeting at Bill Kibler's house on Wednesday May 1, 1985. Don't forget the May 4, 1985 anniversary special at American River College (Raef Hall).

SECRETARY'S SOAPBOX

During the last general meeting I proposed the development of a PROGRAMMER WORKBENCH. Just what is a programmer workbench?

Primarily the workbench is a group of individual tools working together within a shell. The tools range from an editor to a compiler. Most of us use these tools individually to program any size system. If you think about it, you probably utilize this concept quite often. For example, most of the experienced programmers I know have a development disk available that contains most of the day to day programs they use to develop, debug and document a program.

Some of the tools might be:

Editor - most desirable would be a full screen editor. The editor would probably have user exits that could allow for automatic numbering, inclusion of source files, hierarchy capability and other tailored routines.

Macro Processor - The macro processor would have conditional branching, word replacement, and a library facility.

Library Facility - The library facility would store source and object modules in a compressed format. The source modules would also include macros as well as full programs. Compression would reduce the overall space requirements for the data on the library.

Pre-processor - The pre-processor would include the ability to expand shortened data names, pull source code from the library, convert pascal code to comments, utilize the standard structured code constructs-interpreting them to a target language, and have the ability to line number a program down dependent on the language used.

Cross-reference - Pass a data file, extract the special symbols, extract each data name exclude any reserved words and create a cross reference list.

Some of the tools could be combined into one logical tool, for instance the macro processor, pre-processor, and cross-reference modules could be a single program.

If you would be interested in discussing the concept, please feel free to call me or talk to me at one of the meetings. Would this make a good club, or special interest group project?

Second item, what happened at the West Coast Computer Faire?

I was disappointed that there were very few major manufacturers there. I really wanted to get my hands on a Pivot from Morrow, I would have liked to see the HP Unix box. Who ever makes the box that looks like the IBM PC must have made a mint! There were "PC look alikes" that were so poorly put together that the labels were crooked. Very little 80 or CP/M equipment and less software. Noted that Carousel Microtools were holding a clearance sale, they are out of business. I liked the user groups being in the middle of things instead of on the corners. It looked like a class swap meet with all the discounters.

Shugart Quad Density 5 1/4 for $89. Good deals.

Dave McAfee
********** DISK DRIVES **********

TEAC FD-557-03 HALF HIGH, DOUBLE SIDED, QUAD DEN. 5 1/4.......NEW JUST IN................. $139.00

TEC FB-503 HALF HIGH, DOUBLE SIDED, DOUBLE DEN. 5 1/4.......NEW JUST IN ................. $99.00

MPI 501-C HALF HIGH, DOUBLE SIDED DOUBLE DEN. USED / TESTED JUST IN ................. $49.00

SHUGART SA-455, HALF HIGH, DOUBLE SIDED, DOUBLE DEN. NEW CLOSE OUT STOCK ONLY.. $125.00

TANDON TM-100-4 DOUBLE SIDES, QUAD DEN. ....USED .... $99.00

********** DISKETTES **********

5 1/4 SS DD,......NEW...$ 1.75 EA
WITH COVERS 10 $ 15.00
100 $125.00

Let's have TEN more years together!!! H.S.C.

PAGE 8
THIS IS THE FIRST EDITION OF THE SACRAMENTO MINICOMPUTER USERS GROUP NEWSLETTER, WHICH IS INTENDED AS A FORUM FOR INFORMATION EXCHANGE AMONG MINICOMPUTER USERS IN THE SACRAMENTO AREA. THIS NEWSLETTER IS INTENDED TO SUPPLEMENT RATHER THAN SUPPLANT ANY OTHER SIMILAR PUBLICATIONS SUCH AS THE MITS, SCELBAY, MARK-8, INTEL OR OTHERS. ITS PRIME FUNCTION IS TO SPEED INFORMATION EXCHANGE AMONG ITS CONTRIBUTORS.

PRESENT INTENTIONS ARE TO PUBLISH MONTHLY, BUT IF MORE FREQUENT PUBLICATION PROVES ADVANTAGEOUS, THIS CAN BE CHANGED.

CONTENTS OF THE NEWSLETTER WILL BE DETERMINED PRIMARILY BY WHAT MINI USERS SUBMIT. WE WILL PUBLISH PROGRAM DESCRIPTIONS OF ALL SOFTWARE SUBMITTED (AN ACTUAL LISTING IF SHORT); FUNCTIONAL DESCRIPTIONS OF ALL HARDWARE SUBMITTED; AND INFORMATION OF GENERAL INTEREST IN THE FIELD OF MINIS. COMPLETE DOCUMENTATION OF ALL SOFTWARE AND HARDWARE SUBMITTED WILL BE RETAINED ON FILE AND WILL BE PROVIDED ON REQUEST FOR THE COST OF COPYING (WILL BE SPECIFIED IN DESCRIPTION) PLUS A LARGE SASE.

IF YOU DESIRE TO RECEIVE THIS NEWSLETTER PLEASE SEND A QUANTITY OF LARGE SELF-ADDRESSED STAMPED ENVELOPES (SAE) TO THE FOLLOWING ADDRESS:

S.M.U.G., P.O. BOX 741, CITRUS HEIGHTS CA 95610

YOU WILL THEN RECEIVE THE NEWSLETTER TILL WE RUN OUT OF SASES. WE WILL NOTE ON YOUR SECOND TO LAST ENVELOPE THAT WE ONLY HAVE ONE MORE, SO YOU CAN SEND MORE.

MITS-NOTE: AS OF 22 APRIL 75 MITS HAS BEGUN SHIPPING THREE SERIAL-I/O UNITS, SIO-A, SIO-P, AND SIO-C.

SOFTWARE: +TWO VERSIONS OF BASIC AS WELL AS AN ASSEMBLER AND TEXT EDITOR ARE NOW LISTED BY MITS -- SHIPMENT DATES UNKNOWN.
+SMUG MEMBERS ARE PRESENTLY DEVELOPING BOTH FORTRAN AND ALGOL COMPILERS.

HARDWARE: +A SMUG MEMBER IS PRESENTLY DEVELOPING A CRT-DISPLAY SPECIFICALLY FOR THE ALT AIR 8800. THIS IS A DISPLAY ONLY (MUST BE USED WITH AND PLUGS INTO THE 8800). NOT A TERMINAL. VIDEO TO BE FED TO A STANDARD TV SET
+A LOW-COST VECTORED INTERRUPT CARD IS IN THE WORKS, PRESENTLY DELAYED DUE TO MANUFACTURER OF PRIME CHIP NOT ABLE TO SUPPLY.
+LOW COST MEMORY BOARDS IN DEVELOPMENT. WILL USE SUCH CHIPS AS 2102, POSSIBLY 1101, IN STATIC BOARDS. DYNAMIC BOARDS ALSO IN DEVELOPMENT FOR 1103, 2107, 5262. ANYONE WITH TWO, THREE, OR FOUR PHASE CLOCK EXPERIENCE PLEASE CONTACT SMUG.
+ROM BOARDS ALSO, PROBABLY 82S129 OR SIMILAR STATIC ROM. IF ANYONE IS ABLE TO PROCE LOW COST DYNAMIC ROMS, COULD DESIGN FOR THEM ALSO.

A SMUG MEETING IS SCHEDULED FOR ALL INTERESTED ON 4 MAY 75 AT 3620 PARK DRIVE IN CITRUS HEIGHTS. MAP ENCLOSED. IF YOU GET LOST, CALL 726-2371 (ROSEVILLE EXCHANGE) FOR ASSISTANCE. CHIPS AND DIPS WILL BE PROVIDED -- BRING YOUR OWN BEVERAGE.
IN FOUR LOCATIONS

TO SERVE YOU BETTER

GOLDEN STATE BUSINESS SYSTEMS
1009 - 12th STREET
SACRAMENTO, CA 95841
PHONE 441-2917

COMPUTERIZED
2666 MARCONI AVENUE
SACRAMENTO, CA 95821
PHONE 973-8714

BYTE BROKERS
5111 'D' COLLEGE OAK DRIVE
SACRAMENTO, CA 95841
PHONE 334-2983

COMPUTERS, ETC.
9500-16 GREENBACK LANE
FOLSOM, CA 95630
PHONE 989-1516

Come in and see the BEST in computer books from dBase to UNIX

PAGE 10
History is strange stuff; what we remember is so often ignored by the historians, and what is historic is often ignored by us at the time.

In 1973 I left a job in Portland, Oregon in order to return to a more reasonable climate within the boundaries of California. I nevertheless intermittently returned to Portland to visit my old friends at the workplace. On one such visit, one of them brought to work the January 1975 issue of Popular Electronics magazine (now called Computers and Electronics). Featured on the cover was a computer and a banner "BUILD YOUR OWN COMPUTER!" As we perused the article I doubt that any of the others felt any more historic than I did.

As time passed, the impact of that article was noticed more and more in electronic hobbyist circles. The nature of the articles in electronics magazines changed toward digital electronics and peripheral devices for the Altair (the subject in the cover of the January 1975 Popular Electronics), and the ads in such magazines developed a definite leaning in the direction of microcomputer stuff.

The concept of a personal computer for me grew only gradually, until I started slowly collecting items needed for putting together a system. Finally in May of 1977 I began to purchase the major parts needed to build a microcomputer. In the mean time I had heard of a computing conference that started attending the meetings. This provided the opportunity to meet like-minded enthusiasts, and develop friendships that later proved resources for suggestions and help as my system took shape.

As the opportunities presented themselves, I worked with and on other peoples' microcomputers. This led to the situation that those other systems were operational, but my own was not. Finally toward the end of 1980, the decision was made-- time for mine. In those few years the hobby had spawned an industry, and the products I had purchased were now quite obsolete. Nevertheless, I went ahead with using them to construct a system. One of the things I learned is that if it is available, it is already obsolete. If you decide to wait for the newest item, you will never have a computer system.

Since the time that my system became operational, it has continued to evolve, with newer products with more capability replacing some of the older items. But I can still say, "It's mine", and mean more than merely "It's paid for".

In the years since 1975 the nature of the microcomputer business has changed tremendously. The little black chips are now being incorporated into almost everything except teapots (at least I have not seen any, yet), and a huge industry has developed around it. Funny, 10 years ago, it didn't seem THAT big of a deal...

THE HOME COMPUTER IS HERE!

For many years, we've been reading and hearing about how computers will one day be a household item. Therefore, we're especially proud to present in this issue the first commercial type of minicomputer project ever published that's priced within reach of many households—the Altair 8800, with an under-$400 complete kit cost, including cabinet.

To give you some insight to our editorial goal for this momentous project, we were determined not to present a digital computer demonstrator with blinking LED's that would simply be fun to build and watch, but suffer from limited usefulness. High chip costs would have made this a most expensive toy. What we wanted for our readers was a state-of-the-art minicomputer whose capabilities would match those of currently available units at a mere fraction of the cost.

After turning down three computer project proposals that did not meet these requirements, the breakthrough was made possible with the availability of the Intel 8080 n-channel CPU (central processor unit)—the highest-performance, single-chip processor available at this time. As a result, Altair 8800 offers up to 65,000 words of memory, 256 inputs and outputs simultaneously, buss line expansion, subroutines that are enormously deep, and fast cycle time, among other desirable characteristics. Peripheral equipment such as a "smart" CRT terminal is expected to be available, too, to make up a within-pocket-book-reach sophisticated minicomputer system.

Unlike a calculator—and we're presenting an under-$90 scientific calculator in this issue, too—computers can make logical decisions for an accounting system, navigation computer, time-shared computer, sophisticated intrusion system, and thousands of other applications. The "power" of Altair 8800 is such that it can handle many programs simultaneously.

What we're presenting to you, the POPULAR ELECTRONICS reader, therefore, is a minicomputer that will grow with your needs, rather than one that will be obsolete as you move more deeply into computerized applications. With minicomputers exhibiting an annual growth rate of some 50%, according to the E.I.A., and with predictions that six out of ten computers sold by 1975 will be mini's, you can be sure that there will be manifold uses we cannot even think of at this time.

There'll be more coverage on the subject in future issues. Meanwhile, the home computer age is here—finally.
1976

Intel announces the 8080 microprocessor
Motorola announces the 6800 microprocessor
Nat Wadsworth markets Scellbi-81t computer kit
David Ahl publishes first issue of Creative Computing
Ted Nelson publishes Computer Library/Dream Machines
Radio Electronics publishes plans for Mark-8 computer

Ed Roberts' Altair 8800 kit is featured in Popular Electronics cover story
Cromemco founded; introduces PROM programming board
Processor Technology founded; introduces video display board
Polyomorphics founded; introduces A/D board
Wavemate founded; introduces Jupiter II kit
IMS/L founded; introduces 8080 computer
Sphere founded; introduces line of 6800-based computers
Southwest Technical Products introduces 6800 computer
Bill Gates and Paul Allen write Basic for the Altair
First computer clubs founded (Homebrew in San Francisco, SCCS in Los Angeles, AC/GNJ in New Jersey)
Dick Heiser opens first retail computer store in Santa Monica
Paul Terrell opens first Byte Shop in Mountain View
Wayne Green publishes first issue of Byte
Adam Osborne publishes An Introduction to Microcomputers

1977

Commodore announces PET designed by Chuck Peddle
Apple II announced
Radio Shack TRS-80 announced
Heathkit announces H8 and H11 computer kits
North Star Horizon announced
Vector Graphic announces S-100 system
Technical Design Labs announces Xitan

1978

Ohio Scientific announces line of Challenger computers
Ed Roberts sells MITS to Pertec
Structured Systems announces CBasic
Scientific Research sells first applications software disks
Software Records announces 12" LP of programs
First Microsoft ads for Basic and Fortran
Scott Adams founds Adventure International
Jim Warren organizes First West Coast Computer Fair
First Computerland franchise store opened in Morristown, NJ; 24 stores open by year end
First issues of Kilobaud, Personal Computing, ROM, Microtek
Over 200 active manufacturers by year end

Texas Instruments introduces 99/4
Radio Shack announces Model II business computer
APF introduces the Imagination Machine
MicroPro announces WordStar
Sesame Place Theme Park includes a computer center
Hayes announces Micromodem 100
Novation introduces the Cat acoustic modem
Automated Simulations (now Epyx) offers first package, Starfleet Orion
MicroNet announces CompuServe service
The Source founded
Microcomputer Industry Trade Association formed

MicroPro International founded; announces Word-Master and Super-Sort
Dan Bricklin and Bob Frankston write VisiCalc
Micro Systems Services announces Dial-A-Program (software by phone)
NCC holds first Personal Computing Festival
Osborne introduces the first transportable computer
Commodore announces the Vic-20
IBM announces the PC
Microsoft produces MS-DOS (PC-DOS)
Bally computer acquired by Astrovision; re-introduced with Z-Grass
Okidata introduces Microline 82 printer
First color printers announced
Sirius Software founded
Big Five Software founded
Zork relinquished to game writers at Infocom;
Zork II introduced

1982

Commodore 64 announced
Epson announces HX-20, first notebook computer
Grid announces Grid/Compoas

Wang announces Professional Computer
DEC announces Rainbow
100, Professional 325 and 350 computers
Kaypro announced
Apple announces Lisa
Franklin introduces Apple compatible Ace 100
NEC announces 16-bit Advanced Personal Computer
Toshiba announces T-100 computer
Seven IBM "compatible" computers announced
More than 20 companies announce expansion boards and hard disks for IBM PC
Teleram announces first S-100 bubble memory systems

Sony announces 3½" microfloppy drive
Japanese Fifth Generation Project launched
Three colleges require students to have personal computers

1983

IBM announces PCjr and PC XT
Radio Shack announces Model 100, NEC announces 8201
Sharp announces PC-5000
Epson announces QX-10 computer with Valdacs
ACT announces Apricot
Atari announces 800XL, 1200XL, 1450XL computers
Colecotype announces Adam
SpectraVideo announces 318, 328 computers
Mattel announces Aquarius computer
Timex announces Timex/Sinclair 2000; withdraws from market eight months later
Androbot announces four home robots
TI announces Professional Computer, CC-40 Portable
TI withdraws 99/4A Osborne Computer files for Chapter 11

1984

Apple announces Macintosh, Apple IIc
Hewlett Packard introduces Model 110 Portable
Commodore announces 264 (now the Plus 4)
ACT introduces first upward compatible line of seven computers
Amiga announces Lorraine
Mattel, Timex, SpectraVideo, Victor, Actrix, Computer Devices leave market or sell out
Warner sells Atari to Jack Tramiel
Peak year for educational software
Number of software manufacturers tops 500

Number of personal computing magazines tops 150; starts to decline
PC publishes largest monthly magazine in history with 774 pages

EMPIRICAL TECHNOLOGY

Dysan Diskettes

at AFFORDABLE PRICES

5½” SSSD 104/1D...........$20
5½” SSSD 3740/1...........$27.50
5½” DSSD 104/2D...........$27.50
5½” DSSD 3740/2D...........$36.50

$30.25

Plastic library cases $1.50 extra

LOWEST PRICES IN TOWN!

EMPIRICAL TECHNOLOGY

— Phone Orders Only —

ASK FOR JIM
AM: Tues. & Thurs.
PM: Mon. Wed. Fri.

(916) 967-0821
As people started adding peripherals to their Altairs, the limited capacity of the power supply reared its ugly head. Hence, Howard Fulmer brought out a beefy power supply to replace the original Altair unit. Ed Roberts had been attacking the board compatible companies, calling them parasites, so in a burst of uncharacteristic modem engineering, he launched his company Parasitic Engineering.

The Scelbi-8B was designed by Nat Wadsworth prior to the Altair. It was built around the 8008 chip, a less powerful processor than the 8080. A 1K machine in kit form was priced at $499. Unfortunately, Nat suffered several heart attacks in this period, dropped the computer project, and went into publishing software and books.

Mike Wise's Sphere 1 was an all-in-one computer built around the Motorola 6800 mpu. With 4K of memory, it sold for $860 in kit form, and $1400 assembled. Sphere was one of the few companies to offer floppy disk drives (8′). However, at a kit price of $6100 and assembled price of $7995, the company didn't sell many dual floppy disk Sphere 4 systems.

Another system built around the 6800 was the Southwest Technical Products 6800. This machine used an S-50 bus and was one of the first systems to incorporate a loader and minioperating system (Mikbug) in ROM. With 2K of memory and a terminal interface, the kit sold for $450. SWTPC also made a terminal kit for use with any TV set priced at only $175. Dan Meyer's SWTPC is one of the few survivors from the early days. The company is still making 6800 and 68000-based systems, the majority of which are sold on an OEM basis to Fisher Scientific.

Bare bones computer kits on a single board were quite popular in 1975, primarily because of their low price. In general, these units consisted of an mpu, less than 1K of memory, a numeric keypad with a few extra keys, say 20 total, and little else. Some of those available were the Martin Research Mike family, Microcomputer Associates John Jass, (Computer in a Book), Hal MCEM-8080, National Semiconductor SC/MP, and MOS Technology KIM-1.

Going into 1975, there were just two companies active in the microcomputer field: Scelbi and IMSAI. By the end of the year, the dream had spread like wildfire and there were 27 manufacturers, two magazines (Creative Computing and Byte), and ten user groups and clubs. Also, in 1975, Dick Heiser opened the first retail computer store in Los Angeles, and Paul Terrell opened the first Byte Shop in Mountain View. Bill Gates and Paul Allen wrote a Basic interpreter for the Altair, and Adam Osborne self-published An Introduction to Microcomputers. But the fun was just beginning!
REASONS FOR NOT LIKING EASY-TO-USE SOFTWARE
Ted Nelson

I. THE OLD WAS GOOD ENOUGH
I learned it, why can’t you?
What’s complicated about it?
I had no problem learning.
All you have to do is just look in the manual.
That easy stuff is for kids.
This sort of thing is all right in its place, but not for computer professionals.

II. THE OLD WAS BETTER
It’s discipline that’s good for you.
It’s really elegant/logical, if you just take the time to study it.
They’ve taken away the logical beauty and covered it with mud.
Computers were not meant to be used so fast.
Such things were not meant to be.
What’s the matter with these people?
The next generation won’t know what it means to type a command line.
If someone wants to sit here acting like a damn fool, that’s all right,
but count me out.
I say it’s stupid.
It’s all sizzle. Where’s the beef?
Six months from now it’ll be some otherfad.

III. THE NEW IS BAD
We’re losing sight of basics.
This is just a symptom of what’s wrong with the world today.
They keep wanting “more features,” never less.
Kids shouldn’t see this stuff—maybe they’ll get a false sense of reasonableness.
Where will it end?

IV. WHAT’S TO NOT LIKE
I don’t like the mice.
Look at all you have to go through to do a simple [ ... ]
I want to be able to do it with one keystroke.
Yeah, this sort of thing is fine, but look who has to maintain it.
If people are too stupid to use computers right, they don’t deserve to.
I have better things to do than coddle morons.

V. TO HELL IN A HANDBASKET
Maybe some people just shouldn’t use a computer.
Things shouldn’t be made easy—it destroys character.
If it becomes this easy, use of computers will pass out of the hands of those who really understand them.
It will cause unemployment.
It will cause widespread social disruption.
If you make things too easy, they’ll be overused.
It will strain the people.
Everybody will want one.
Mice will give people misshapen arms.
Our fingers will atrophy from not using the keyboard.
They want to reduce people to a lump of jelly.
If God had intended computers to be used that way,
He would’ve given us light pens instead of fingers.
A man is a man and a computer is a computer,
and if we let them get this close together,
the next thing you know...

McCpypright © 1984 Theodor H. Nelson

In addition to newsletters and meetings, clubs started holding conferences and shows, although honors for the first big microcomputer conference go to David Bunnell who organized the World Altair Computer Conference in March 1976. It was followed two months later by the first Trenton (NJ) Computer Festival organized by Sol Libes and the first Midwest Area Computer Club Conference which drew a staggering 4000 people.
DCC DELIVERS

1 EPSON
RX Series
- 100 cps
- Quad Density
- Multiple Fonts
- More

FX Series
- 150 cps
- Quad Density
- Multiple Fonts
- Buffer

JX80
- New
- 7 colors
- Excellent Graphics
- Number One
- And Built Like It.

RX80 $229
RX80ft $279
FX80+ LOW!! JX80
FX100+ LOW!! LQ 1500

**MANAGING YOUR MONEY alone is enough reason**
**for many, many people**
**to buy a computer.**

- Seven financial programs in one
- Balances your checkbook, prepares your budget
- Calculates your taxes and analysis loops
- Life insurance, stock portfolios, and more

On Sale $349

**MECA**
Software that makes you personally more productive

**SERVICES**
- Factory authorized service
- Custom service

**SUPPORT**
24/7 support

**SELECTION**
- Easy to remember commands
- On-screen help
- Windows

Easy word processing, including

- Wordstar 2000
- All the features of 2000, plus
- Telecommunications
- Mail List data base
- Indexing and more

Only $275

Wordstar 2000

**NOW THERE ARE NO LIMITS**

Lotus 1-2-3
SYMPHONY
paradise color
zenith 123 gr/222 am
zenith 135 rgb/comp

- 1068
- 259
- 280
- 254
- 995
- 465

- 199
- 355/589
- 1315
- 129

1341
FULTON AVE
(916) 971-3503

DCC OFFERS LEASING, FINANCING & PURCHASE ORDER ITEMS.

SACRAMENTO'S #1 VALUE LEADER

COMPUTER CENTER
M-F 10:00-7:00 SAT 10:00-5:00

CLOSED SUNDAY

The professional low cost computer store

Also Located
SAN JOSE/CAMPBELL
MT. VIEW/SUNNYVALE
EXCLUSIVE!

ALTAIR 8800
The most powerful minicomputer project ever presented—can be built for under $400

BY H. EDWARD ROBERTS AND WILLIAM YATES

THE era of the computer in every home—a favorite topic among science-fiction writers—has arrived! It's made possible by the POPULAR ELECTRONICS/MITS Altair 8800, a full-blown computer that can hold its own against sophisticated minicomputers now on the market. And it doesn't cost several thousand dollars. In fact, it's in a color TV-receiver's price class—under $400 for a complete kit.

The Altair 8800 is not a "demonstrator" or souped-up calculator. It is the most powerful computer ever presented as a construction project in any electronics magazine. In many ways, it represents a revolutionary development in electronic design and thinking.

The Altair 8800 is a parallel 8-bit word/16-bit address computer with an instruction cycle time of 2 µs. Its central processing unit is a new LSI chip that is many times more powerful than previous IC processors. It can accommodate 256 inputs and 256 outputs, all directly addressable, and has 78 basic machine instructions (as compared with 40 in the usual minicomputer). This means that you can write an extensive and detailed program. The basic computer has 256 words of memory, but it can be economically expanded for 65,000 words. Thus, with full expansion, up to 65,000 subroutines can all be going at the same time.

The basic computer is a complete system. The program can be entered via switches located on the front panel, providing a LED readout in binary format. The very-low-cost terminal presented in POPULAR ELECTRONICS last month can also be used.

PROCESSOR DESCRIPTION
Processor: 8 bit parallel
Max. memory: 65,000 words (all directly addressable)
Instruction cycle time: 2 µs (min.)
Inputs and outputs: 256 (all directly addressable)
Number of basic machine instructions: 78 (181 with variants)
Add/subtract time: 2 µs
Number of subroutine levels: 65,000
Interrupt structure: 8 hardwire vectored levels plus software levels
Number of auxiliary registers: 8 plus stack pointer, program counter and accumulator
Memory type: semiconductor (dynamic or static RAM, ROM, PROM)
Memory access time: 850 ns static RAM; 420 or 150 ns dynamic Ram
INAPPROPRIATE, INEXACT AND OUTRAGEOUS

Does that have a familiar ring? The calls from the faithful are beckoning oh! APRIORI, EXEGESIS & RETORIC, a la 'Bozarth, past Vice Prex. Since Don didn't hear the call in time, I decided that I had some obligation to fill in temporarily.

by Bob Schlegel

In this our TENTH year, I felt obliged to recall some of your old nostalgia for the post-Lerseth pre-Duran era of Quinn & Schlegel. In fact, its been so long since I cut and pasted a Push'n Pop I have to strain to remember those all-night sessions typing and editing articles. It always seemed worth it, tho, because of all the warm feedback and reactions to the Zingers I tried to hide in the Letter portion. In reality, that feedback may have only come from a small handful of you, but to me, it seemed to come from a large and diverse spectrum of SMUGGERS. Ever since Al Duran brought us into the new era of a pertinent and proud newsletter, I've meant to say that THANKS to all of you, both for your support and your understanding of Push'n Pop, the way it was.

This issue of Push'n Pop is going out to a lot of old freinds whose names have since dropped from the SMUG rolls; and to all of you, I say 'Hello' and y'all c'mon back. No matter how you may be engrossed in your slick tightly-wrapped factory-built PC, surely you recall the life and times of SMUG, the challenge of finding the right computer that would finally do what you always knew one could do, and the racey baudacious Random Access.

Part of our program May 4, at RAEF Hall, AR College, will feature some of those old freinds and personages from the SMUG scrapbook. Surely a moment or two of debate will occur to establish finally which Club really organized first... Homebrew (Mountain View), New Jersey SIGM, or SMUG! The organized and random periods of Saturdays celebration will shine with both our very own celebrities as well as the distinguished personages mentioned throughout this magazine. Finally, I thought I'd bring up some old memorabilia that might jar old memories... In going through old Push'n Pop's, I encountered many fond memories from my Murphy's Law calendar, those ingenious ads from Ron at Zackit's (now Zack's), and some of those outrageous articles I stuck in the letters when nothing else came in. Lotsa good stuff in them, tho. Like the dBASE II undocumented flaws, how to recover a crashed Wordstar file, how to use DU-77, and many great CP/M mods from John Moorhead. ...The story of my freind who I discovered with a prosthesis... Traditions we can never displace, like the now-traditional Tektronics Tanker Anchor Lee Whitehead would bring home from the Santa Clara County Swap meets, John Quinn's 45 degree twist to the IC pins to keep them from vibrating out of the sockets! And so many timely product reviews from Dallas Parcher... complete with demonstrations. Such a rich heritage! Occasionally unintentional discovery and blown covers surfaced... like an evening after a board meeting when Al Duran and I worshiped for an hour at the church of the bent elbow. When the P&P hit the mailbox Kathy knew for sure the board meeting didn't last til 1 A.M.

Just 'cause you're coming Tuesday, we've added a special speaker event, a bit 'o the Blarney from Martin Maxwell, not-so-recently-returned from a teaching sabatical in Ireland, where the inconsistencies between Leprechauns and Micros so frustrated him that he rushed back and immediately stumbled into an IBM-PC. Martin has an extensive Micro-computer back-ground stretching from the XEROX 820, Osboren and ZORBA, clear out to the PC-XT and Networks and the ITT PC's. He was featured at the 10th West Coast Computer Faire speaking on Humor in Micro-Computing. So, with Martin as an incentive, we hope to see you Tuesday night. And again, no misunderstanding, we want to see you at the 10 year anniversary at RAEF hall, as well. You'll be richly rewarded and thoroughly entertained. Don't be missin' any of it!
ADVANCED COMPUTER PRODUCTS
10TH ANNIVERSARY
SPECIALS

-----------------------------
RAM UPGRADES / $100 CLOSEOUTS

64K 9 / $19.50
256K 9 / $ 69.95
TUART $95.00
MORROW 8" DISK JOCKEY $149.00
IMSAI FRONT PANEL $69.95
8080 CPU $29.95
64K STATIC $99.95

STANDARD BUS CONNECTORS

Z-80 CARD $55.00
8085 CPU CARD $55.00
16K RAM $55.00
Z-80 PIO $60.00
FLOPPY CONTROLLER $60.00
SASI INTERFACE $70.00
RELAY (SPST) $35.00
RELAY (DPDT) $45.00
ARITHMETIC $125.00
EPROM CARD $70.00
SYNC / ASYNC $65.00
UNIVERSAL ASYNC $65.00
REMDACS $80.00
12 BIT A / D $250.00

SOFTWARE SPECIALS

WORDSTAR (APPLE) $99.00
SUPERCALC (IBM PC) $25.00
DATASTAR (APPLE) $69.00

HARDWARE SPECIALS

IBM MONOCHROME CARD $199.00
COLOR CARD W / PARALLEL I / F $179.00
GRAPHICS MASTER BY TECMAR $399.00
GRAPHIX PLUS 2 BY STB $299.00
INTELLIMODEM (IBM PC INTERNAL) $299.00
COMPUTER TABLE (OAK OR WALNUT) $69.00
SHUGART 604 (5 MEG) $99.00
SEAGATE 506 (5 MEG) $199.00

COEX PRODUCTS

RS232 INLINE TESTER: $14.95
CONFIGURATION BLOCK $14.95
GENDER CHANGER $9.95
NULL MODEM ADAPTER $9.95
APPLE PARALLEL CARD $29.95
16K RAM CARD $25.00
IBM COMPATIBLE MULTIFUNCTION (S,P,C,&"O") $149.95 EXPAND TO 384K

CALL OR MAIL ORDER ADVANCED COMPUTER PRODUCTS
1310 E. EDINGER SANTA ANA CA, 92705
(714) 558-8813

PS: DON'T FORGET SO. CAL'S NOCCC "LARGEST" COMPUTER SWAP MEET APRIL 28 8PM TO 2PM IN ACP PARKING LOT.
SPECIAL EVENTS

WILLIAM GODBOUT

William J. Godbout has been involved in the computer industry since 1959; while at IBM his experience spanned the transition from vacuum tubes to transistors. After completing military service in 1967, he founded Godbout Electronics. Having worked with microprocessor technology since its advent, in 1973, he established CompuPro of Hayward, CA as a manufacturer and supplier of microcomputer components and systems.

Godbout, a nationally recognized authority on the IEEE 696/S-100 bus standard, has designed several microcomputer components and systems.

The use of microcomputers in daily business operations gives managers direct, local control over information resources that is impossible when dealing with a mainframe maintained by “high priests” in a data processing department.

The real value of microcomputers in the workplace is in the amplification of individual human effort and human skills, raising the individual’s productivity by improving his creativity. Increased productivity is vital to bringing about the reindustrialization of the U.S. and its conversion from a “smokestack society” to an “information society.”

One of the ways to speed this conversion to an information society is by developing a matrix of management skills within which to employ microcomputers, workstations, mainframes, communications, networks, and all the other rapidly developing electronic tools available.

GEORGE MORROW

Before 1976, Morrow lectured in calculus at the University of California at Berkeley (where he began designing and programming computers), worked as a technician at Shockley Transistor, and held more than 100 other positions, most of them as a short-order cook. He served as first chairman of the IEEE 696 S-100 bus standard subcommittee. He holds a B.S. in physics from Stanford University, an M.S. in mathematics from the University of Oklahoma and has completed the doctoral program in mathematics at UC Berkeley.

Draper was the world’s premier "phone phreak", that is, someone who uses electronic or other devices to outwit telephone central circuitry and make free calls or otherwise exploit the system. Draper virtually invented phone phreaking and was for many years its leading practitioner, the legendary "phirst phreaker." In the fall of 1977 Draper was visiting Woz at Apple and expressed interest in (and designed) a digital telephone card for Apple. An early applications program for the Apple (by him) was a simple word processor, EasyWriter (like Electric Pencil).

Mark Garetz

Mark is one of the driving forces behind the new designs from Godbout and was instrumental in the S-100 Standard, of which he will have much to talk about.

David Thompson

David is the editor of MICRO CORNUCOPIA which started out as a newsletter for BUG BOARDS. His magazine now covers all single boards like Kaypro and Xerox’s, and now the S-100 with Dave Hardy and Sol Libes. He will speak on "The Big Board, Xerox, and Kaypro: Early Single Board Clones."

OTHER SMUG GUEST SPEAKERS

John Draper (Captain Crunch)

George C. Morrow is founder and chairman of the board of Morrow, Inc., maker of desktop personal computers and add-on boards and disk subsystems for S-100 bus systems. Morrow founded the company in his garage in 1976 as Thinker Toys. A self-trained logic designer, he created products including I/O, memory, and other S-100 boards. Morrow, Inc. entered the personal computer market in 1982 with the Micro Decision line of low cost computers.
This was the great issue which I have now finished and it is back to a more normal size and style next month. I still will run some old stuff, but mostly as fillers (like our issue #2). I hope you enjoyed this look back, it sure was hard work and in no way did it really cover all of the past 10 years. The 10th year issue of CREATIVE COMPUTING has the largest review of those ten years and was the source of much in this issue.

I will be starting to call people again, looking for those promised articles and features. I haven’t got much response from members, but then I’ve been busy elsewhere which is going to change. So if you have promised me an article, lookout, I will be after you at the next meeting, for sure!!

I didn’t get much chance to cover the upcoming event, but next issue should have a review of what went on. I know it will not be needed as everyone will be there, but some of the P&P’s go outside of California. We need to remind you that some of our locals will also be speaking, and unfortunately they were not covered in this issue. I promise to make up for it next month, by reviewing their talks.

Some last minute news is about the meeting where we will have a speaker. It will be a very entertaining time this month so don’t miss it (it also should be a dry night). We got lots of new things planned for you, and will be glad to add anything you think will make it better, so stop by and be active. Remember we deal with all kinds of systems and can help just about anybody out of a problem.

Bill Kibler

(916) 485-0773

Consumer-Compatible Liveware
Microcomputer Applications Analysis and Design
Software Development
Systems Integration

BOB SCHLEGEL
Systems Analyst
5713 Jeff Way
Carmichael, CA 95608
A NEW BREED OF HOBBYISTS

FOR many years, the thought of having one's own digital computer was only a dream because they could cost anywhere from $10,000 to several million.

But in the late 1960's, Digital Equipment Corp. announced its $24,000 PDP-8, raising hopes of forward thinkers for that elusive home computer. With the 1970 introduction of the microprocessor IC (CPU-on-a-chip), representing the "heart" of a full-blown digital computer in a single IC package, they knew it was just a matter of time before prices dropped.

Not content to wait, amateur computer users banded together during the early '70s to share ideas and equipment. In fact, many of the successful applications of microprocessors on the market today owe their origination to these hardy souls, who experimented with building personal computers.

The breakthrough in low-cost microprocessors occurred just before Christmas 1974, when the January 1975 issue of POPULAR ELECTRONICS reached readers with the first relatively inexpensive unit—about $400 in kit form—that competed in performance with much costlier commercial units. The aftermath is heartwarming to electronics hobbyists—CPU prices are plummeting, and at least one major manufacturer drastically cut the price of its microprocessor.

People interested in computers fall into three major groups: (1) Strong background in "hardware," the physical electronics equipment; weak in "software," the instruction programs needed to make the computer perform some useful task. (2) Strong background in "software," weak in "hardware." (3) Interested amateurs who have no experience in either sector, but find the world of computers an exciting challenge they'd like to tackle.

So it's not surprising to learn that small hobbyist groups are springing up all over the country, where competent and enthusiastic programmers who cannot read a wiring or logic diagram share ideas with electronic engineers and technicians who work with computers daily, but still find the mysteries of software virtually a black art. For example, a recent letter addressed to POPULAR ELECTRONICS from Hai Singer (hardware editor) and Steve Diamond (software editor), Cabrillo Computer Center, 4350 Constellation Road, Lompoc, CA 93436, stated that they represent a user group of 300 hobbyists actively constructing microcomputers, and would like to encourage participation in their group by persons planning to build the Altair 8800 computer that debuted in POPULAR ELECTRONICS' January 1975 issue. The group published four newsletters, which can be received by sending a self-addressed, manila envelope with 50c stamp to the address above.

What's a Computer? A computer is a deceptively simple kind of device if you look at it from a "black box" viewpoint, not trying to understand all the electronic "innards."

All computers are fundamentally alike from the largest to the smallest. And the humblest of computers can perform the same work as a huge computer can, except that it takes more time to do it! With a suitable program (software) in its memory, a computer can be a game player, a home accounting machine, or an environmental controller; and in many cases, it can be all of these things at the same time.

No matter how large or small, a computer must have five basic elements, as illustrated.

1. The Arithmetic Logic Unit (ALU) performs additions, subtractions, and all the other arithmetic and logical operations on the input data (something on the order of a super calculator). It is the features of the ALU that determine the ultimate potential power of the computer.

2. The Control portion orchestrates the movement of data and instructions from one part of the computer to another by taking the operational instructions that were inserted (programmed) into the memory and using these to perform some function to change the input data to output data.

3. The Memory (more properly called Storage, but the two words are used interchangeably) is used to hold operational instructions for the computer, and store intermediate results, commonly used tables, and other pertinent data.

4. The Input Circuit allows the computer to accept data from the outside world. The actual input can come from a single sensor, a two-wire system, or a complex network of things to be monitored. Anything that can be converted into computer-acceptable data can be used as the input.

5. The Output Circuit delivers the data generated by the computer to some form of device that does the appropriate work. Without output capabilities, the computer serves no useful purpose.

The ALU and Control circuits are often combined and called a Central Processing Unit (CPU). Years ago, the CPU was awesome—a few feet high, a couple of feet deep, and several feet long. With the advent of large-scale integration (LSI), a complex CPU can now be contained within a single integrated circuit having 40 or less pins. Interestingly, there are now over 25 microprocessors to choose from, if you elect to build your own computer.
Our congratulations to SMUG on its many contributions over the past ten years to the growth in understanding and use of computers within the community. May there be many more such milestones.

We have always enjoyed supporting “true believers,” and have always appreciated the many kind words we have in return received.

Serving a variety of your peripheral repair needs.

MPS
213 Kenroy Lane, #9
Roseville, CA 95678
(916) 786-6550

(916) 488-3310 or 920-3300
(800) 882-6600 (In CA) • (800) 542-4073

Now You Can Order All Your Peripherals, Supplies and Accessories from Quest!!

<table>
<thead>
<tr>
<th>Printers</th>
<th>Disk Packs</th>
<th>Diskettes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epson</td>
<td>Control Data</td>
<td>3M</td>
</tr>
<tr>
<td>Qume</td>
<td>Dyan</td>
<td>Memorex</td>
</tr>
<tr>
<td>Diablo</td>
<td>Nashua</td>
<td>Mag Media</td>
</tr>
<tr>
<td>Data Products</td>
<td>DEC</td>
<td>IBM</td>
</tr>
<tr>
<td>NEC</td>
<td>Computer Tape</td>
<td>CDC</td>
</tr>
<tr>
<td>Okidata</td>
<td>Memorex</td>
<td>Dyan</td>
</tr>
<tr>
<td>DEC</td>
<td>3M</td>
<td>Maxell</td>
</tr>
<tr>
<td>Mannesmann Talley</td>
<td>CDC</td>
<td>Verbatim</td>
</tr>
<tr>
<td><strong>Terminals</strong></td>
<td><strong>Ribbons</strong></td>
<td><strong>Accessories</strong></td>
</tr>
<tr>
<td>Wyse</td>
<td>Data Products</td>
<td>Computer Paper</td>
</tr>
<tr>
<td>Qume</td>
<td>General Ribbon</td>
<td>Computer Labels</td>
</tr>
<tr>
<td>Altos</td>
<td>NEC</td>
<td>Data Binders</td>
</tr>
<tr>
<td>Lear-Siegler</td>
<td>Diablo</td>
<td>Surge Protectors</td>
</tr>
<tr>
<td>ADDS</td>
<td>Qume</td>
<td>Diskette Storage</td>
</tr>
<tr>
<td>DEC</td>
<td>Wang</td>
<td>Computer Furniture</td>
</tr>
<tr>
<td></td>
<td>IBM</td>
<td></td>
</tr>
</tbody>
</table>

Yes, We Have Great Prices On Peripherals, Too!

PC MONITORS
Amdek 300 G .......................... $ 135.00
NEC Color (TC 1215) ............... $ 240.00

All Printer
Sound Enclosures
20% OFF
Prices subject to change
Interfaces and cables not included

PRINTERS
Epson RX 80 FT (Matrix) ........... $ 326.00
Epson FX 100 (Matrix) ............ $ 655.00
NEC 2000 Spinwriter (LQ) .......... $ 665.00
NEC 3510 (LQ) ...................... $1328.00
Okidata 93IBM (Matrix) ............ $ 655.00
Qume Sprint 1140+ (LQ) .......... $1322.00

MODEMS
Hayes 1200 Baud (External) ........ $ 513.00
Hayes 1200 Baud (Internal) ........ $ 434.00
Ventel 1200 Baud (External) ....... $ 370.00
Ventel 1200 Baud (Internal) ....... $ 370.00

Prices subject to change without notice.
Citrus Software Systems

For More Information, Please Call:

James M. Mazzarelli
Citrus Software Systems
P.O. Box 939
Citrus Heights, CA 95611-0939
(916) 723-3538

---

MORROW

You have IBM® PC's in your office. What you're looking for is a lightweight computer that you can take with you when you leave your office - one that uses the same 5 1/4" disks and software you use on your desktop PC.

We have what you're looking for. The new Morrow Pivot: the only battery operated 8SDOS™ computer with 5 1/4" drives. It runs most PC software you already own, like Lotus 1-2-3®.

Pivot comes with 256K of RAM, two IBM® format 5 1/4" disk drives, a built-in Modem, and special executive features like a clock/calendar, phone directory, appointment scheduler, calculator - all in an 11.5 pound package that costs just $1,995

SEE IT AT YOUR LOCAL AUTHORIZED MORROW DEALER:

Pivot

First Choice
For A
Second
Computer

11265 SUNRISE GOLD CIRCLE SUITE 'N'
RANCHO CORDOVA, CA 95670
PHONE 635-1294

COME SEE US IN OUR NEW LOCATION
BUILDING
YOUR OWN COMPUTER
WON'T BE A PIECE OF CAKE.
(But, we'll make it a rewarding experience.)

Chances are you won't be able to assemble the Altair 8800 Computer in an hour or two. But, that's only because the Altair is a real, full-blown computer. It's not a demonstration kit.

The Altair Computer is fast, powerful, and flexible. Its basic instruction cycle time is 2 microseconds. It can directly address 256 input and 256 output devices and up to 65,000 words of memory.

Thanks to bus orientation and wide selection of interface cards the Altair 8800 requires almost no design changes to connect with most external devices. Up to 15 additional cards can be added inside the main case.

The Altair Computer kit is about as difficult to assemble as a desktop calculator. If you can handle a soldering iron and follow simple instructions, you can build a computer.

You see, at MITS, we want your experience with our kits to be rewarding. That's why we take such pains to write an accurate, straightforward assembly manual. One that you follow step-by-step. (We leave nothing to the imagination.)

Some electronic kit companies are experts at cutting the corners. They promise you the sky and deliver a box full of surplus parts and a few pages of faded instructions run off on their copying machine.

We're experts at not cutting the corners. Our Altair Computer has been designed for both the hobby and the industrial market. It has to be constructed of the finest, quality parts. And it is.

That's why we give you double-sided boards, gold-plated connectors, a 10 Amp power supply (enough to power 15 additional cards), toggle switches and an all aluminum case complete with sub-panel and detachable dress panel.

That's why we give you three manuals (Assembly, Operator's and Trouble-shooting) in a hard-cover, 3 ring binder plus an Assembly Hints manual.

Buy our computer and we'll automatically make you a member of the Altair User's Group. You'll have access to a whole range of custom software designed exclusively for the Altair 8800.

We're quite serious about making computer power available to you at a price you can afford.

BASIC ALTAIR AND OPTIONS

The basic Altair 8800 Computer includes the CPU, front panel control board, front panel lights and switches, power supply and expander board (with room for 3 extra cards) all enclosed in a handsome, aluminum case.

Options now available include 4K dynamic memory cards, 1K static memory cards, parallel I/O cards, three serial I/O cards (TTL, RS232, and TTY), octal to binary computer terminal, 32 character alpha-numeric display terminal, ASCII keyboard, audio interface, floppy disc system, and expander cards.

Software now available includes an assembler, text editor and system monitor.

PRICE
Altair 8800 Computer: $439.00 kit
$621.00 assembled

SAVE $45.00!
For P.E. readers only! The Basic Altair 8800 Computer plus 256 words of static memory. $542.00 value. Now, only $497.00. Check the appropriate box in the coupon below.*

Warranty: 90 days on parts and labor for assembled units.
90 days on parts for kits.
prices and specifications subject to change without notice
MITS/6328 Linn N.E., Albuquerque, N.M., 87108, 505/265-7553

MAIL THIS COUPON TODAY!

☐ Enclosed is a Check for $__________
☐ or Bank Americard #__________
☐ or Master Charge #__________

Credit Card Expiration Date _________
☐ ALTAIR 8800 Kit ☐ Assembled ☐ P.E. Kit
Include $8.00 for Postage and Handling
☐ Please send free Altair System Catalogue

NAME_________________________
ADDRESS______________________

* Special

MITS/6328 Linn, N.E., Albuquerque, New Mexico 87108, 505/265-7553
NEW! 256K CHARACTER PRINTER BUFFER

SPOOL-Z-Q 100 PRINTER BUFFER

TECHNICAL DETAILS


PARALLEL OUTPUT — Standard Centronics interface signals, 8 Data, Busy & Strobe.

MEMORY TYPE AND EXPANSION — Spool-Z-Q 100 uses industry standard 4164 type 64K RAM chips. Sizes available are 32, 64, 128, 192, and 256K characters. Every Spool-Z-Q 100 is fully socketed for 256K and may be expanded by just plugging in chips.

AUTOMATIC SPACE CHARACTER COMPRESSION — Although the maximum size is 256K (56,120 pages of print) the space compression feature allows Spool-Z-Q to effectively hold much more printing which contains many spaces (listings, etc.).

OTHER CAPABILITIES — Spool-Z-Q 100 has the same Pause-on-Formfeed, Clear Buffer, Copy, and Self Test abilities as our stand-alone Spool-Z-Q. Signals are available on an 8 pin DIP socket to allow control of these functions via a simple external switch panel which will be available as an option.

PRICES: (Including shipping)

1601 Fulton Ave., Suite 10A
Sacramento, CA 95825
(916) 483-0709

PRICE SHEET

- DOCUMENTATION ALONE — (No C.O.D.)
- KIT 1.
- KIT 2.
- KIT 3.
- KIT 4.
- 32K PARALLEL ONLY KIT
- 32K SERIAL/PARALLEL KIT
- 128K - $409
- 192K - $469
- 256K - $529

- $319
- $349

- $209
- $239

- $40

- $65

- $60

- $119

OTHER PRODUCTS — In addition to Spool-Z-Q 100, we also manufacture Spool-Z-Q stand alone parallel printer buffers and the FDCX4 Double Density Upgrade Board for the Cromemco 4FDC, single density disk controller board.
THE EDITOR LOOKS BACK THROUGH THE PAST

When the club decided on celebrating it's 10th year, we talked about what you were doing then. Several other features in this issue also deal with 10 years past, but for me a look back a little farther was also in order.

I joined the navy in 1964 and got trained on a computer like system. This unit worked using all the normal logic but used very small tubes in most circuits. Like transistors these tubes were either on or off, making possible flip-flops and the like. Each card would contain four flip-flops, which now would be in one IC, at one hundredth the size.

After my stretch in the service I went to work in radio and TV where little of the new technology was appearing. True, there were more transistors, but little of the IC's and no processors. There were some regular computers around then, but mostly the big mainframes. My first experience in broadcasting with the new chips, came about 1973 when KFHK was putting together a new remote control for their Sutro tower installation. I was the only tech on staff with maintenance experience on logic systems, so the task of installation and removing the bugs was mine. And bugs there were a plenty. It was a form of hardwire microcomputer but not as smart, and with a few wiring errors. Once the unit was cleaned of the problems it worked fine and set the stage for my later intro into computers.

About this time I got the traveling blues, and went to work for a geophysical outfit, where we used a portable calculator. This was a Friden unit and was about the size of a Kaypro, but with only 256 program steps possible. It was used for difference for us, as we became the first and for a while only group who was able to do our calculations in the field. This decreased the amount of labor and time for letting the client know where to drill (which saved them lots of money!). I have only to consider what we would have been able to do had we systems like what is available now. I sure would have got more sleep as we spent every night calculating and plotting our data (usually till midnight or later).

When my traveling stopped, I decided to go to college on the GI bill, but decided some extra money would help. One day in early 1976, I answered an ad in the chronicle for people to solder boards at home, from some company called IMSAI. When I called them a voice from the past step out and said hello. I went to high school in Novato and last I knew of Joe Killian my buddy of many years, was his plans to go to college in L.A._ Well, here he was in Oakland as a partner and working manager of IMSAI. I didn't get the job (lived too far away), but I did start keeping track of both Joe and IMSAI.

I plugged away at college and got my degree, learned some programing, bought a TRS-80, and in simple got started. For me it was like finding a second home, where anything was possible and I was in control of it. The TRS-80 didn't last long as it was far too limiting, in came an IMSAI. Used but who cares, beside I knew one of it's designers, and could always call for help. I spent some time trying to get it running, but only discovered I had some bad chips, a few burned chips here and there. I was able to fix some of it but finally decided it was time to sell Joe. Of course by now IMSAI was gone (replaced by Fisher-Freeitas who I also got to know well before they too closed down, much later) and Joe was now at Micropro.

This was now about 1979, and things were starting to move, and so was Micropro. When I called Joe, I wasn't sure who was asking the questions. As it turned out he needed a good technician and quick. I guessed I passed the test as next week I started helping the design engineer Glen Ewing work on a single board system. Wordstar was selling well, but a really good syste, designed just for it was missing. Well at least that was the idea, and to help it along had just come a company called Seagate, under the leadership of Bubart (the disk drive maker) and had produced a mini Winchester. At this time there were not any hard disk controllers so this was a rather risky business venture, both for the design and that Micropro was mostly known for it's software and not it's hardware (they had already made a few accessory boards with little sales results).

Well I really learned alot there but, could see troubles down the line. The products release time fell behind and production was slow getting started, and before long everybody had beat them to the market. Some European interest liked the design, and bought it, after that I lost track of it and Micropro. Which moved me to great Sacramento and more micro.

For me this trip back in time was fun, and until I recently read the parts in "FIRE IN THE VALLEY" on the IMSAI people, I had no real idea why some of the people I worked with acted the way they did. These early est'er had been a part of something big, but lost it all and were trying now to get it back. I had drive to get ahead, but also some common sense, which the est'er lost somewhere along the way. I didn't get rich then, but I had fun, both then and now in reviewing the past, and I hope you had fun too.

Bill Kibler

MAY IS BIRTHDAY MONTH
SMUG IS 10 YEARS OLD!!!
THE BYTE BROKERS IS ALSO
CELEBRATING IT'S BIRTHDAY!!!
STOP BY AND LET'S CELEBRATE
TOGETHER!!!

THE BYTE BROKERS, INC
344-BYTE HOTLINE
Computer Store
5111 D College Oak Dr.
Sacramento, CA 95841

HOURS M-F 10-9/TH 10-6/SAT 10-6 SUN CLOSED
The month of March was significantly different from the previous two months, with many more callers and much more file transfer activity. This is good...we want to see as many using the system as possible.

Five hundred sixty-three calls were logged by the system, up considerably from 266 the month before. File transfers also showed a dramatic increase: 491 versus 156 the previous month. I am particularly happy to see the number of uploads increase, as there is usually a dearth of such activity. Last month the ratio of ups to downs was 1:25. In March it was about 1:15.3. Even so, there is room for improvement in this area.

| Number of files received | 30 |
| Number of files sent     | 461|
| Total files transferred  | 491|

| Number of files sent at 300 baud | 226 |
| Number of files sent at 1200 baud | 235 |
| Total number of minutes of transfer time | 5078 |
| Percentage of files sent at 300 baud | 49% |
| Percentage of files sent at 1200 baud | 51% |
| Percentage of send time at 300 baud | 31% |
| Percentage of send time at 1200 baud | 69% |

Report all files that were sent 6 or more times:

<table>
<thead>
<tr>
<th>Count</th>
<th>Filename</th>
<th>Library</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>EFS</td>
<td>DOC</td>
</tr>
<tr>
<td>24</td>
<td>DISKMEMDIR</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>CLUES</td>
<td>DOC</td>
</tr>
<tr>
<td>6</td>
<td>NEWBASESAGM</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>NULU11</td>
<td>LIB</td>
</tr>
</tbody>
</table>

 Normally I report on files that were sent 3 or more times, but in March there were a total of 39 files that met that criteria, too many to list in this report.

March saw a number of changes to the system. The most user-oriented one was a coordinated modification to EYE and RPES that permits the caller to re-enter RPES from CP/M without having to log on again. Since a significant number of files pertaining to dBase and WordStar are now on the system, I have set up separate areas for them. Use the SYSMAP command to locate the new areas.

A commonly asked question is, "When is the best time to call the system?" It is easier to answer the inverse of the question—the WORST time to call is when it is most convenient for you. That will be the time that everyone else is calling. The most activity seems to be in the evenings after 9PM. During March approximately 1/9 of the available time was utilized to transfer files. If we assume that an equal amount of additional time was spent in RPES, then the system was in use only 1/4 of the total available time. You should have no problem getting onto the system, if you call at the right time!

I plan to start a series of tutorials in this space covering the operation of the the RCP/M from the caller’s viewpoint, with the idea of providing some information that can help the caller to utilize the system more effectively.

TUTORIAL part I

Initial logon sequence: The system depends on the caller for establishing the baud rate. After calling the system, the SMUG RCP/M waits for a carriage return or a Control-C to be transmitted by the caller. The testing sequence is 300 baud, then 1200 baud. The low-speed caller will get in with one key-entry, while the high-speed caller will have to hit a key twice.

The next thing the system asks for is the number of nulls you need. It is amazing how many callers don’t understand what a null is. Look on it as basically a unit of delay that the system should wait after it sends a carriage-return/linefeed to the caller. In the good old days this was to allow time for the print-head to return to the left side of the paper. In this age of CRTs you may not require any, or maybe 1 or 2, depending on your software/hardware. I occasionally call the system using a printing terminal at 300 baud, and 4 nulls suits quite nicely. From home at 1200 baud I ask for 2 nulls. This prevents dropping the first 1 or 2 characters from the beginning of the line.

At this point RPES will print a bulletin, which may be bypassed or cut short with a control-X. Read it at least once a month in case an important announcement is posted.

You will then be prompted for the date. The format of your reply is checked...don’t forget the slashes and the correct number of digits. If your response is judged incorrect, the prompt will be repeated.

Next, you are asked for your name. It is important to use the same spelling each time you log on, else the system thinks you are a different person. If you use the message portion of the system this is particularly important, as the system will let you see your mail only if the name for which there is mail matches your name. Richard Lastname is definitely not the same person as Rich Lastame. By the way, capitalization is not of importance at this point.

The last item I will discuss this month is the password. The purpose of the password is to protect you. It is used to make sure you are you. The main purpose is to allow only you to read and kill your private messages. The case of the characters in the password IS important..."n" is NOT the same as "N" in the password. Secondly, REMEMBER your password. If you don’t, you can still log on to the system if you use a DIFFERENT name, but then you will not receive any mail addressed to your previous name.

Next month I will discuss some of the internals of RPES.
Introducing Volksmodem

VOLKSMODEM 12™
A very smart 300/1200 baud auto-dial/auto-answer modem that makes computer-to-computer communications smarter, faster and easier.

Compatible with virtually every personal computer on the market today, the Volksmodem 12 is loaded with today's most desired features. By using the Volksmodem 12, one adapter cable and software, you are instantly in touch with the world of data communications.

The Volksmodem 12 is capable of full unattended operation in conjunction with stand-alone terminals and computers which have an RS232-C interface. With the Volksmodem 12's ability to access data sources as well as transmit data information, it's truly the affordable way to maximize your personal computer's productivity.

SPECIFICATIONS
Data Interface Outputs
RS-232C compatible
MARK (OFF) – 4.0V min (typical)
SPACE (ON) +4.0V min (typical)

Inputs
MARK (OFF) 0 to –25V
SPACE (ON) +2.5 to +25V

Data Format
Serial, binary, asynchronous

Operate Mode
Manual dial, manual answer, automatic answer/originator mode select

Data Rate
0 to 300 bps, full duplex or half duplex

Modulation
Phase coherent, frequency shift-keyed (FSK)

Volksmodem 12 Features
- Direct connection for RS-232C type interface
- Bell 103, 212A compatible
- Full Duplex, Half Duplex (at 300 bps)
- Voice/Data Switch
- Five Software Programmable Set Registers
- 0-300-1200 Baud
- Auto-Dial/Auto-Answer

copy holder

For all typing and reading matter... Hold copy at your eye level...

Copy Holder accommodates letter or legal size paper. Features a non-glare reflective surface and a stable (movable) line finder. Mount easily on horizontal surface and offers a spring balanced flexible arm which adjusts copy holder for your needs. Shipping Weight, 4 lbs.

Prices good through 5/31/85

SOFTWARE PLUS
6201 C Greenback Lane
(916) 726-8793
Citrus Heights, CA 95610

ORDERING INFORMATION
ADD $2.00 PER ORDER FOR SHIPPING.
WE ACCEPT VISA, MASTERCARD,
CHECKS, M.O.
C.O.D. ADD $3.00 EXTRA.
California Residents, Add 6% Sales Tax to Orders
SMUG offers the most recent volumes of SIG/M and the CP/M User's Group public domain software that have significance to CP/M users running 8080 or Z-80 processors. At our next general club meeting, we will sell SIG/M Volumes 182 and 183. Each volume offered will be provided on a new 8" SSD disk and will cost $4.50.

Those who need software on 5-1/4" disks can make arrangements with Dave McAfee at the meeting or by calling him at 487-1103. The formats available, (all soft-sectorized, single-sided), for $5 each, are:

MORROW MICRO DECISION- DEC VT-180 - NEC PC-8001A
TRS-80 Mod-I (Omicron) - TRS-80 Mod-III (MM CP/M)
ZENITH Z-1000 - KAYPRO II/4/10 - TI PROFESSIONAL
HEATH w/MAGNOLIA - IBM PC w/CP/M-86 - SUPERBRAIN
OSBORNE I (S&D-DD) - XEROX 820 (S&D-DD) - ACCESS

You can review a printed copy of the latest CPMUG & SIG/M Library Indexes at our club meeting. Custom copying of CPMUG or SIG/M volumes other than those offered this month can be done for the same price as the regularly offered volumes by Bob Rees. You must, however, make special arrangements with Bob at the meeting. Copying onto member provided 8" disks can also be arranged with Bob for $2.50 per volume.

SIG/M Volume 207 CP/M 86 Library Utilities, Vfile and Dump for NEC APC

207.01 APC-DUMP.LBR 16K NEC APC dump program
207.02 APCVFILE.LBR 74K VFILER for NEC APC
207.03 VFILERCP.M.CMD 9K /
207.03 WIDUMP86.LBR 11K CP/M 86 bidirect. dump
207.04 BISHOW86.CMD 2K Improved CP/M 86 SHOW
207.05 BISHOW86.LBR 12K /
207.06 LTYP686.LBR 10K LTYP6 for CP/M 86
207.07 LUB6 .CMD 19K CP/M 86 library util.
207.08 LUB6-2 .LBR 39K /
207.09 PRINT86 .LBR 15K CP/M 86 PRINT utility
207.10 TYPESQ86.LBR 7K CP/M 86 Typesqueeze
207.11 USQ .CMD 18K Unsqueeze for CP/M 86

SIG/M Volume 206 Library, Printing and Sorting Routines in CP/M 80 and 86

206.01 ENCOL .LBR 79K multiple column listing
206.02 HJELP .LBR 59K HELP files, even squeezed
206.03 QSORT .LBR 20K Quicksort to order the
206.04 TY .LBR 63K type, whether binary,
squeezed or library


RENT A COMPUTER FOR A MONTH

COMPUTERS • PRINTERS • TERMINALS • MONITORS • MODEMS
OTHER EQUIPMENT AND SUPPLIES

RENTALS ALSO AVAILABLE BY THE HOUR, DAY, OR WEEK

CALL 927-5255

RentTech COMPUTER RENTAL

Formerly Computer Rental in Fair Oaks • Now at 1537 Howe Avenue, Sacramento
<table>
<thead>
<tr>
<th>MONTH</th>
<th>BOARD</th>
<th>COPY</th>
<th>ADVERTISERS</th>
<th>PRINTER</th>
<th>MAILING</th>
<th>MEETING</th>
<th>1985</th>
<th>MEETING</th>
<th>DEADLINE</th>
<th>DEADLINE</th>
<th>DELIVERY</th>
<th>DATE</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAY</td>
<td>2 THUR</td>
<td>10 FRI</td>
<td>13 MONDAY</td>
<td>17 FRI</td>
<td>20 MON</td>
<td>28 TUES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JUN</td>
<td>6 THUR</td>
<td>7 FRI</td>
<td>10 MONDAY</td>
<td>14 FRI</td>
<td>17 MON</td>
<td>25 TUES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JUL</td>
<td>4 THUR</td>
<td>5 FRI</td>
<td>8 MONDAY</td>
<td>12 FRI</td>
<td>15 MON</td>
<td>23 TUES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUG</td>
<td>1 THUR</td>
<td>9 FRI</td>
<td>12 MONDAY</td>
<td>16 FRI</td>
<td>16 MON</td>
<td>27 TUES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To join SMUG or to renew your SMUG membership, use this form or a copy of the information and bring to the next meeting or mail to SMUG, P.O. Box 116513, Sacramento, CA 95816. Dues: $12 yearly -- make checks to 'SMUG'.

NAME: ___________________________ HOME PHONE: _____________

ADDRESS: ___________________________

CITY: ___________________________ STATE: ___________ ZIP: ___________

You may release my name and home phone number to other SMUG members YES..... NO.....

I will consider conducting a seminar for other SMUG members YES..... NO.....

I will consider writing an article for the SMUG PUSH & POP YES..... NO.....

I will consider helping with some of the work required to keep SMUG strong YES..... NO.....
NOTICE OF MEETING:
TUESDAY APRIL 23, 1985 AT 7:30 PM

SMUG MEETING LOCATION
SMUD AUDITORIUM (behind Carti Bros.)
59th St. - 1/2 block south of Folsom Blvd

DON'T MISS OUR GUEST SPEAKER IT WILL BE A VERY ENTERTAINING NIGHT!!!

SACRAMENTO MICROCOMPUTER USER'S GROUP
P.O. BOX 161513 SACRAMENTO, CA 95816

ADDRESS CORRECTION REQUESTED
FORWARDING AND RETURN POSTAGE GUARANTEED

To:

PUSH & POP
909-620-1970
PUSH & POP
909-620-1489

PUSH & POP
909-620-1970
PUSH & POP
909-620-1489