THE KIM FORUM

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Here's the beginning of a monthly feature for all you folks with KIM-1s . . . and for those of you thinking of getting one. As a matter of fact, there is a great deal of information here which will be of interest to owners of any 6502-based system. (We may just change the name to the 6502 FORUM sometime in the future.)

I would be more than happy to set aside more pages in Kilobaud *for similar monthly features on other systems. – John.*

As Manager of Product Support for MOS Technology's KIM Products for the last year, I obviously have an emotional attachment to KIM, but why should *Kilobaud* devote a forum to the products of one manufacturer? I think there are several good reasons. First, with over six thousand units sold, it is one of the most popular microcomputer systems introduced so far in this infant industry. Second, although the owner of an 8080-based system can find a constant stream of articles which relate to his system, relatively little has been offered for the many owners of 6502-based hardware. Third, during my time with MOS Technology I had the pleasure of talking with hundreds of KIM owners around the country, and this forum is an ideal way for us to stay in contact and continue the exchange of information and ideas which is at the heart of our hobby.

Where is KIM Going?

One of the questions most frequently asked me was "what are the future plans for KIM?" Most KIM owners are aware that MOS offers a KIM-2 4K RAM expansion board and a KIM-3 8K RAM expansion board. Either of these can be attached directly to a KIM-1. To expand further, a motherboard (KIM-4) must be added and MOS has planned a KIM-5 ROM expansion board, which will hold up to eight MCS6504 (2K by 8) mask-programmed ROMs (the ROMs are not provided with the KIM-5 but must be purchased separately). At present, there are two sets of software which are planned for release in ROMs – KIMath and a resident assembler/editor.

KIMath

KIMath will occupy a single ROM and consists of a set of subroutines for doing floating-point arithmetic. All calculations are done in BCD to avoid the round-off errors which are inherent in binary floating-point routines. The subroutine user can specify the precision (in decimal digits) of any calculation. The more precision specified, of course, the longer the computation time. The package will handle a maximum of sixteen decimal digits of precision plus a two digit exponent so numbers in the range of ±1 times 10E±98 can be handled. The subroutines occupy memory locations F800-FFF8 and were written so they could be used with any 650X-based system – not just KIM. The subroutines include code for addition, subtraction, multiplication, division, square roots, logs, exponents, tangents and arctangents. All the other trig functions can be generated through the use of trigonometric identities. A subroutine is also provided for evaluating user-specified polynomials, so any continuous function can be approximated.

The KIMath ROM should be available by the time you read this. If you don't want to pay $50 for the ROM, the Programming Manual for KIMath is available for $15 and it includes a complete listing of both source and object code. The manual also contains thirty-seven pages of information on using the subroutines, including a worked-out sample application. If you want to use the ROM but balk at paying $80 for the KIM-5 board to hold it, you'll be happy to know that the 6540 ROM can be attached directly to the KIM address and data busses, although you'll need a couple of extra ICs to send the right signal to the KIM-1 Decode Enable line. I'll provide an interface schematic for this in a future issue of the KIM forum.

The Resident Assembler/Editor

To create any large-scale software on a microcomputer, an assembler is a necessity. Industrial microcomputer users can use the cross-assemblers available on several commercial time-sharing systems, but the expense of going this route is too much for any but the most affluent hobbyist. Thus, the introduction of the KIM resident assembler should facilitate user software generation and make a lot more software available. The assembler and text editor are available as a set of three MCS6540 ROMs – a total of 6K of code. The $150 which MOS charges for the set may seem exorbitant until you realize that you don't have to buy 6K of RAM to store it in (which would cost as much or more) and you'll never have to load it or have it clobbered by errant statements in the program you are developing. Like KIMath, the Assembler/Editor will work on any 650X-based system. Since the program has to do terminal I/O, locations are reserved in memory page zero to contain the address of the terminal input and output routines. These locations are automatically initialized for KIM owners; users of other 6500 systems (JOLT, TIM, Apple, Baby!, OSI, etc.) can preset those locations with the addresses for the device service routines of their own system. The Editor/Assembler occupies the memory space from E000 to F7FF; thus the editor, assembler, and KIMath fit together in the top 8K of memory.

The text editor is a standard line-numbered text editor; it provides much the same editing capability you would find in a BASIC system. You can enter or insert new lines, replace old lines, resequence the line numbers, dump the text file to audio cassette or paper tape, list out lines in the file, and locate lines in the file which contain any specified text string. There is also a special command (actually, any command which begins with an X) to allow you to jump to a user-written subroutine so that you can extend the editor's capabilities to meet your own needs. Naturally, both the editor and assembler require that you have a terminal connected to the serial port on the KIM-1.

The assembler is a single-pass assembler; if your source text is on paper tape or audio cassette, you only have to feed it through once. Normally your source text will be in memory and the assembled code is always written to memory. The source code, symbol table, and object code can

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or the I/O routines already available in a user's system. The Tychon Editor/Assembler accepts both octal and hexadecimal values throughout the program and the program listings may be in either octal or hexadecimal form. The switch between octal and hex is made at any time using keyboard commands. The TEA package is the only editor/assembler available which allows the user to easily change the numbering system used. The editor/assembler is relocatable using a special relocator within the program which will place TEA anywhere in the 8080's memory space. The program is available in 1702A or 2708 PROMs and on paper tape. Listings are also available. Delivery is immediate. Prices start at $35 for a paper tape version plus the User's Manual. For further information contact Tychon, Inc., Blacksburg VA 24060.

Low-Cost Microcomputer Software

Digital Research now offers CP/M, a low-cost advanced disk operating system designed for use with IBM-compatible diskette-based computer systems which employ the Intel 8080 microcomputer. Previously available only to OEMs, CP/M has been in existence for over three years in various manufacturers' products and has undergone extensive field testing. The functions of this software package include named dynamic files, program editing, assembly, debugging, batch processing, and instantaneous program loading, resulting in facilities similar to popular timesharing services. CP/M is an "unbundled" software package which can be easily adapted to any 8080 or Z-80 computer system with at least 16K of main memory and one or two IBM-compatible disk drives. Although the standard CP/M system operates on an Intel MDS, the field-modification manual provided with CP/M tells how to alter CP/M for other hardware configurations. Price for a complete CP/M system in object form with documentation is $70, documentation (set of 6 manuals) alone is $25. For further information, contact Digital Research, PO Box 579, Pacific Grove CA 93950.

6502 Resident Assembler, Tiny BASIC Interpretive Programs on ROM

Microcomputer Associates Inc. announce their 6502 Resident Assembler Program (RAP) and Tiny BASIC interpretive program on ROM chips. Two 2K x 8 ROMs comprise the software ROM package housing the 1.75K Resident Assembler and the 2.2K Tiny BASIC program.

Formerly contained in seven 1702A PROMs, RAP is the only single pass Resident 6502 assembler available today. Statements are entered either from paper tape or directly from a terminal keyboard. RAP generates a listing and places object code into RAM for immediate execution. A minimum of 4K x 8 RAM memory is needed with the users' 6502 microcomputer. RAP allows a 6502 microcomputer to function economically as a microcomputer development system. Following assembly the programs can be debugged using the debugging facilities of DEMON, Microcomputer Associates' DE-bug MONitor program housed in the 1K ROM section of a 6530 ROM/RAM-I/O-Interval timer circuit. A text editor is included.

The ROMs are totally pin-compatible with 2708-type PROMs.

The RAP/Tiny BASIC ROM package (SW101) is priced at $200 and includes full documentation with deliveries from stock to 30 days ARO.

RAP is also available on a set of seven 1702A PROMs (SW200) for $295. Tiny BASIC is available either in paper tape format (SW300) for $25 or on a set of nine 1702A PROMs (SW201) for $275. All software is fully documented with deliveries from stock to 30 days ARO.

For further information contact Darrell Crow, Microcomputer Associates, 2589 Scott Blvd., Santa Clara CA 95050.

PUBLISHER'S REMARKS

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fantastic act at Seattle. There will be a whole series of microprocessor talks . . . introduction to digital logic . . . introduction to computers . . . to programming . . . how to get started . . . and a forum on the future of the computer hobby. Will you have time to see the exhibits? There are even rumors that I may be talking too . . . in case any of you are interested in how to make money in this new field. Big money. Other than by publishing magazines . . . that is . . . that's already taken.

This will be the first opportunity for the microcomputer industry to show in the Northwest, so they will probably be there in force. It isn't all that far from Silicon Gulch for most of them.

The computerfest will be held at the Seattle Center, with some of the other formalities taking place at the Washington Plaza Hotel.

EDITOR'S REMARKS

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meeting over the phone!

If you ever get a chance to talk to 250 people from inside a phone booth . . , be sure and try it.

Miscellaneous

Jim Brown needs help! His article in the March issue of KB ("Using the '$50' Terminal") has generated an unprecedented response from readers. He can't supply 8080 or 6800 listings for his software because it was written for his home brew 16-bit machine. If anyone who has taken his flowcharts and generated the 8080 or 6800 code would please sit down and write it up as an article for *Kilobaud* he would be very grateful. Sounds like a good idea.

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be located anywhere in memory you wish. You may have several different source files in memory simultaneously. If you have insufficient memory space to store a large source program, you can break it into several segments, store each segment on audio tape, then bring back one segment at a time for assembly. The assembler will assemble the successive segments until it encounters an "END" statement. It will then put out the symbol table and terminate assembly.

Although the editor is fairly limited (it has no capability to edit within a given line, for instance) it is quite sufficient for editing assembly language programs. The assembler is very fast and with good error diagnostics. Perhaps its only serious fault is that the printed symbol table is not sorted alphabetically and no cross-references are given.

Other Hardware is Available

When I left MOS Technology they had just produced the first samples of a new 4K static RAM. It would be reasonable to guess that they will incorporate it into the KIM line later this year, perhaps as a 16K (byte) RAM board.

I have heard rumors that other companies are planning to offer EROM boards, A/D converters, and video display modules compatible with the KIM motherboard bus structure. I saw a flyer the other day for a motherboard for KIM which would accept Altair bus boards. STM Systems is developing a floppy disk package for their BABY! which should be transferrable to KIM. If you hear of KIM-compatible units, drop me a line and I'll mention them in future editions of the forum. In the next issue I'll cover some of the software available for KIM.

The User Group

As a final note, every KIM owner should subscribe to the KIM User Group Newletter. This publication (which is not connected with MOS Technology) is issued every 4-6 weeks and is filled with programs and useful information. A recent issue contained a program to allow KIM to read and write cassettes at six times the standard speed with no hardware modifications. Send five dollars for six issues (and ask that your subscription start with the back issues) to: Eric Rehnke, 425 Meadow Lane, Seven Hills, OH 44131.

I would enjoy hearing from you too.

BOOKS

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in that Scelbi's mnemonics are different from those used by Intel. This is due to a desire to make the 8080 mnemonics upward compatible with those for the 8008; not a bad idea but rather confusing to those of us who learned the 8080 first. Fortunately there is a conversion table in the back, so you can look up any confusing symbols which occur in the text (suggestion – the cross reference table is ordered by function; an additional alphabetical table would help in future editions). After introducing the instruction set, the book discusses the stack, and then the cookbook section.

The chapters, in order, are General Purpose Routines, Conversion Routines, Decimal Arithmetic Routines, Floating Point Routines, I/O Processing, and Search and Sort Routines. Each chapter addresses a number of common problems, presenting flowcharts and well annotated assembler listings to illustrate possible solutions. The routines are written so that they can be combined easily, and are explained well enough in the text that even a beginning programmer should be able to see how they work without difficulty. Some high points are the monitor routines in the first chapter, the ASCII/BAUDOT conversion routines, and the floating point routines. The latter are integrated, and an octal memory dump is given in the appendix. One of the things I appreciated most is the extensive set of appendices; too many books fail to provide the tables needed to make conversions. The book is well worth its price.

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Scientific and Engineering Problem-Solving With the Computer

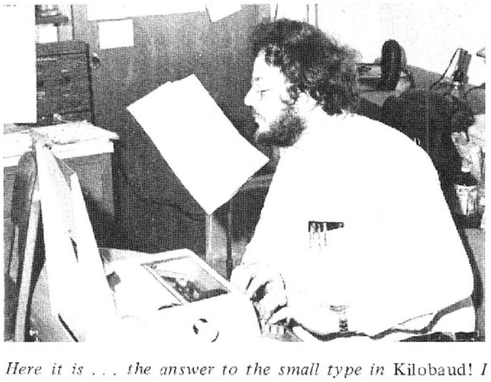
William Ralph Bennett Jr.
Prentice-Hall Inc 1976
457 pages, $17.95

If this ponderously titled book were called something like *Not-So-Basic BASIC* and was on the shelves of your local hobby computer pusher, it would be a best seller. But it's not and it isn't, so you'll have to look in your local college bookstore or order it specifically.

Two chapters alone are worth the price of this book: chapter 3 "Plotting and Graphic Display" and chapter 4, "Language." Chapter 3 discusses the routines needed for getting different plots out of printers and CRTs but the main emphasis is on the lowly Teletype. Subroutine or program segments are included for plotting two or more simultaneous functions, contour plots, plots with hidden lines, and stereoscopic projections. For the non-scientific oriented computer hacker the 96 page chapter on language is the high point of the book. Bennett begins an excellent discussion of the structure of language by means of the "monkey-typewriter" notion: If enough monkeys were allowed to pound away at typewriters long enough, all the collected literature of mankind, past, present, and future would result. By using letter frequencies and letter-pair frequencies of different language samples from different authors and a randomizing BASIC "monkey program," Bennett produces gibberish which can be easily identified as coming from German, French, Italian, Hemingway-English, or Poe-English monkeys. The main thrust of this chapter is the analysis and solution of simple cryptograms and ancient writings.

The book is actually a text for Bennett's course at Yale: "The Computer as a Research Tool" which has made the Yale students' top-ten list several times. As such, this book assumes no prior knowledge of computers but it doesn't talk down to the reader. Make no mistake, the author makes some demands on your intellect but his style is easy to understand and he has a sense of humor which shows. Some of the mathematics may be too much for some readers but these sections can be easily skipped. The introduction gives a complete background for BASIC. Where dialects of BASIC differ the author will warn you. All the programs in this book were run on a Hewlett-Packard minicomputer and used no more than 16K of memory. Chapter 2, "More Advanced Programming," contains concepts from introductory calculus (derivitives, Taylor series, definite integrals and matrix algebra). Applications programmed in this chapter range from economic input-output analysis, pattern recognition, to solution of simultaneous equations.

Chapters 5, Dynamics, chapter 7, Wave Motion and Fourier Series, and chapter 8, Electronics and communications are for the



Here it is . . . the answer to the small type in Kilobaud! *I expect that music stands will become the next really hot item to be carried in computer stores across the country! We gave you the problem and now we've given you the solution. No more complaints, okay? – John.*