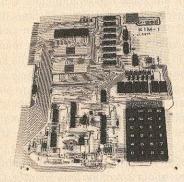


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CIRCLE NO. 38 ON FREE INFORMATION CARD



By Leslie Solomon

POTPOURRI FROM HERE AND THERE

ERE ARE a number of interesting hardware and software items to titillate the computer hobbyist. Some were brought to our attention through the mail; others were spotted at the Personal Computing show in Atlantic City.

16K for SWTP Computers. Gimix Inc. (1337 W. 37th Pl., Chicago, IL 60609: Tel: 312-376-0440) has introduced a 16k static RAM board for the SS-50 (SWTPC) bus. Using TMS4044 4k-by-1 bit fully static RAM's, each 4k block is switch addressable at any 4k boundary, while memory write protect and memory disable are controllable in 4k switch-selectable blocks. Special features include each 4k block software programmable to any address at 4k boundaries, and software control of write protect and memory disable. This allows multi-tasking with just one 16k board and a little software overhead; it also permits memory beyond 65k.

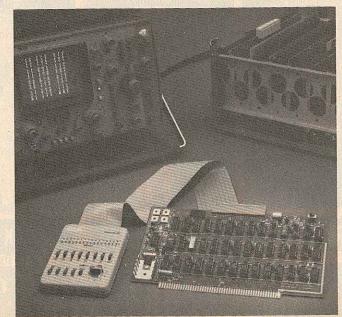
New Logic Analyzer. In February 1977, Popular Electronics intro-

duced the first logic analyzer kit for the computer hobbyist. This electronic tool has since become a very popular instrument for debugging hardware and software. However, before the instrument can be used, several independent test leads must be connected to the microprocessor system-not an unusual requirement, but a chore nonetheless. Now, the designers of the original logic analyzer have developed a refined version that eliminates these steps, at least for Altair S-100 bus mainframes. It's called the Model 150 Bus Grabber (\$359 in kit form, \$449 assembled, and available from Paratronics, Inc., 800 Charcot Ave., San Jose, CA 95131; Tel: 408-262-2252).

Paratronics has crammed a complete logic analyzer on a single multilayered pc board that can be directly plugged into this popular bus. Working in conjunction with a hand-held "pod" that contains all the switching, the Bus Grabber monitors 64 signals—56 through the board edge connector, and 8 (user defined) through an 8-lead probe assem-

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Paratronics' Bus Grabber is analyzer on a pc board.



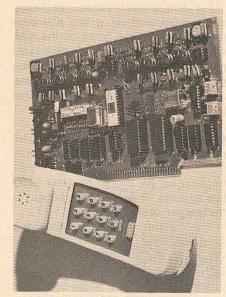
bly. Three connectors couple the board to the scope vertical, horizontal, and intensity inputs.

The display is data domain (1's and 0's truth table); size is 1 byte by 16 words deep; and display can be either octal or hex. Display modes are single or repetitive. Data collection is in either positive or negative time and memory size is 16 bits by 16 words. The trigger word can be 24 bits wide (16 bus address lines and 8 input data lines). The same flexible trigger is also featured, as is the scope trigger for "glitch" analysis. Data is collected at greater than 8 megabytes per second.

The hand-held pod makes operation very simple. Triggering, display formatting, and operational modes of the Model 150 are controlled from this pod, which is ribbon-cable connected to the main board. An 8-position switch on the pod enables looking at the external inputs, MPU control signals, MPU interrupts, MPU status, MPU data bus in, MPU data bus out, and the upper and lower address bytes. With this selection, and a simple program, it is easy to take a look at just about every important signal.

The Bus Grabber takes 700 mA from the -8-volt bus, and 50 mA from the +16-volt bus.

Telephone Interface. If you would like to interface your Altair S-100 bus computer to the Touch-Tone ® telephone system, MK Enterprises (8911)



MK Enterprises' MK-II DTMF transceiver board with phone.

Norwick Rd., Richmond, VA 23229; Tel: 804-285-2292) has just the device for the job. Its MK-II dual-tone, multi-frequency (DTMF) transceiver board con-

verts the DTMF (Bell Standard) into binary, and binary into DTMF, making this a fully operational transceiver. The board comes fully assembled and tested with application information and a manual for \$425.

On incoming calls, vectored interrupts allow for ring detection as well as detecting the presence of DTMF signals. This permits phoning into the computer and executing programs by punching the correct tone pad sequence on the remote phone. On outgoing calls, the dialed digits are loaded into a FIFO (first in

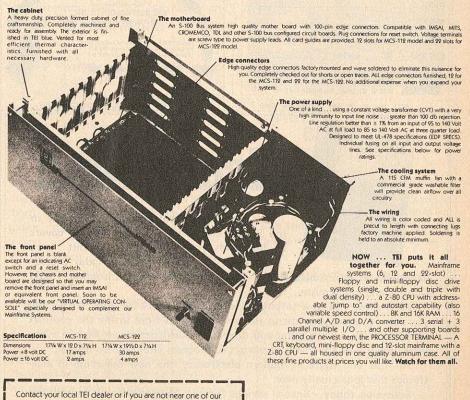
first out) buffer at processor speed, then unloading the data into a DTMF tone generator at a rate compatible with the Bell System's equipment. A 4-bit output port allows supervision of trunk interface equipment (DAA devices). Single tones can be generated instead of dual tones (under software control).

Applications of the MK-II include monitoring and tabulation of outgoing phone calls, home security "dialers," and PABX systems. Remote operation of ac applicances is also possible by 60-Hz modulation with DTMF signalling.

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KIM Doings. If you are a KIM user, or are about to get a KIM, you should also get a copy of the "First Book of KIM" (\$9 from ORB, P.O. Box 311, Argonne, IL 60439). The book is divided into six useful sections, and starts with a viewpoint of the absolute beginner, discussing KIM programming from ground zero. It covers RAM, ROM, hex numbering, program loading and running, and how the KIM works on a step-by-step basis with simple exercises as a learning aid.

The second portion covers 27 games (with full listings) that include some of the better-known BASIC games such as blackiack, lunar lander, and table tennis. A "music box" program that uses the audio output connector of KIM is also included in this portion.

The third section covers 13 utility programs that include Hypertape (allows loading a full lk in 21 seconds), a directory program, a memory test, a movedata-anywhere program, a KIM phaselocked-loop test, a bubble-sort program, and three useful tape programs: Superdupe, allowing duplication of a tape quickly; Tape Verify, for verification of a just-recorded tape; and Vutape, which lets you see the contents of a KIM format tape as it goes by.

The Expansion section discusses the number of ways that the KIM can be expanded from both hardware and software viewpoints. The Interface section illustrates some low-cost hardware addi-

The last section, called Pot-Pourri, covers guidelines for writing KIM programs, some useful notes on the KIM display, a KIM alphabet for displaying alphanumerics, a random-number program, a listing of the many KIM articles and some 6502 software sources. Altogether, a good book for KIM persons.

65K Board. Every computer hobbyist probably needs more memory. There is also no doubt that most hobbyists have been buying peripherals for Altair S100 bus systems. This, of course, brings up the problem of slot space.

The approach used by Extensys Corp. (592 Weddell Dr., S-3, Sunnyvale, CA 94086; Tel: 408-734-1525) to solve both the extra memory and slot space problem is to create a single board that can hold up to 65,536 bytes and has hardware provisions for bank switching to 1 million bytes or more.

The basic RM64-16 Dynamic Memory Board sells for \$595 and comes with 16k of RAM, but it is socketed for all 65k. Also available are the RM-32 for \$895 (32k), the RM-48 for \$1195 (48k), and

POPULAR ELECTRONICS

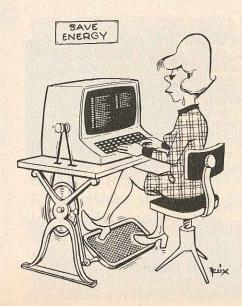
the RM-64 for \$1495 (64). If you just want to increase the basic 16k board. then a 16k upgrade kit is available for \$375. Other boards include the MM16 Memory Manager at \$295.

Power requirements are +12 volts at 300 mA, +5 volts at 750 mA, and -5 volts at 1 mA. The memory board has a cycle time of 500 ns and a 400-ns access time.

If you are wondering how you can have 64k of RAM and a few k of ROM with a single 8-bit processor, the new board uses "bank switching" and a special provision that allows for memory overlap. A "Read" may occur from both RAM and ROM, but the bus drivers are inhibited on the RAM board to prevent bus conflict. This allows ROM "Reads" to have precedence over RAM "Reads." From a hardware perspective, it means adding one small lead to the present computer bus. There is also "Write" protection in 16k blocks and board select logic that allows for more than one 64k byte board per system.

TI Programmer. Probably the most widespread digital device used today is the calculator. Available in a variety of types, from the simple "four banger" to complex programmable models, they all have one thing in common—they operate with decimal input and deliver decimal readout.

There is a new guy on the block, designed specifically for computer hardware and software types: the Texas Instruments "TI Programmer" (\$49). The main feature of this unique calculator is that it can perform arithmetic functions in either decimal, octal, or hex with the capability of converting from one base to another at the operation of a single key.



DECEMBER 1977

Other features include: signed floating point arithmetic for conventional computations (decimal), a 1's complement key for octal and hex, 15 sets of parentheses at each of the four processing levels, independent memory with summation to memory capability, and ability to perform logic operations such as OR, AND, XOR in octal and hex. A constant mode allows operations with a constant number for all arithmetic and logical operations. A battery saver and automatic turn-off are provided for longer battery life.

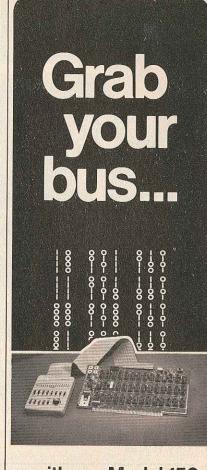
Each of the 15 keys used in entering numerical data (to FFFF in hex) is also identified by its binary code printed under each key.

If you do any programming where you have to convert from octal to hex, or vice versa, or you must know the decimal equivalent of an octal/hex number, you really have to take a look at this new low-cost pocket calculator. It is a real time saver. One of our software buddies insists that he can work out quite a bit of his programs with this calculator, enabling him to work away from his com-

SWTP Firmware. Since the introduction of the SWTPC (Southwest Technical Products Co.) 6800 Computer System, Motorola's MIKBUG has been supplied as the mini-operating system. Although this monitor has proven to be an excellent one, the staff at SWTPC has accumulated a list of additions and modifications to MIKBUG, thereby creating their version called SWTBUG (or Swatbug). Sixteen major subroutines have been positioned with the same entry points as MIKBUG so that most programs which are MIKBUG compatible will also run with the Swatbug, without modification.

The new monitor supports an ACIA MP-S Serial Interface at I/O port-1, as well as a PIA MP-C Control Interface at I/O port 0 or 1. This allows users who have a MP-C Control Interface to use Swatbug without an additional MP-S Serial Interface option. It also permits users who have an MP-S Serial Interface to operate their control terminal from 110 to 9600 baud on the MP-S; an optional MP-C handles the "Kansas City" A -30 Cassette Interface at 300 baud.

The new monitor also generates MP-C Control Interface signals for reader-on, reader-off, punch-on and punchoff. This eliminates terminal control character decoding as used with MIK-BUG. The MIKBUG INEEE and OUT-EEE subroutines reside at the same addresses in Swatbug.



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The Model 150 plugs into one slot of an S-100, computer and "grabs" fifty-six major signals. Fifty-six. That's more troubleshooting and training visibility than any other logic analyzer can of-fer you. Need to look at signals external to the bus? No problem. The Model 150 even incorporates a fully-independent 8-channel analyzer identical to the popular Model 100A. (See Popular Electronics, Feb. 1977.)

A remote-control plug-in pod provides fingertip control over all triggering, data collection and dis-play functions. So plug the Model 150 into your computer - you may never unplug it again.

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COMPUTER BITS

(continued from page 121)

Swatbug also makes it possible for the user to set single-level breakpoints within user programming for debugging purposes. Furthermore, the monitor generates a "home" and "erase" command for the SWTP CT-1024. It also erases each CT-1024 line before writing a new one and vectors all software interrupt instruction to a location pointed to by a user-defined address located in scratchpad RAM. Moreover, Swatbug boots in the new SWRPC MF-68 Minifloppy Disk by typing in a single character (D).

Other Swatbug commands include cassette or paper tape dumps and appends the now-famous "S9" to the end of the tape, and outputs all of the record/ punch (on/off control commands as

All SWTPC 6800 Computer Systems with MIKBUG can use the SWTBUG by replacing the socketed MIKBUG with the new chip and making one minor change on the board. The SWTBUG sells for

Video Monitors. If you are thinking about modifying a TV receiver for use as a monitor for your computing system, you should be aware that VAMP, Inc. (P.O. Box 29315, Hollywood, CA 90029) is making available its ADVM-1 at \$23.95. This is a universal conversion kit for either transformer-powered receivers or "hot" chassis types. According to VAMP, the kit can be used with any TV receiver. When installed, it provides the necessary isolation to ensure safety and protect the video source. It is said to produce up to 80 characters per line. The kit bypasses the tuner and i-f strip, and a bypass switch is provided for normal TV

VAMP also offers its RFVM-1 at \$8.95 for installation in the video source. It can be tuned from channel 2 to channel 6.

COSMAC Elf News. A Canadian electronics supplier, Tektron Equipment Corp. (Caistor Centre, Ontario, Canada LOR 1EO) has started a newsletter directed to some 300 1802-MPU-based computer owners in the area. They're trying to form a microprocessor club which will be heavily oriented toward the 1802 MPU's. Domestically, an Elf Users Group is being formed for all 1802 fans by Netronics Inc. (333 Litchfield Rd., New Milford, CT 06776). An exchange of hardware and software ideas is planned for the groups.

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Electronics Library

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by Marvin Tepper

Based on the FCC syllabus-type study guides, this book covers the material appearing on the Advanced and Extra Class theory exams. Within the chapters dealing with each exam, the questions are arranged in such categories as Rules and Regulations, Radio Phenomena, Operating Procedures, Emission Characteristics, Electrical Principles, Practical Circuits, Circuit Components, Antennas and Transmission Lines, and Radio Communication Practices. Other chapters deal with general information and Morse code requirements. Three appendices include practice examinations and answers, excerpts from the Communications Act of 1934 and Part 97 of the FCC Rules and Regulations, and Docket No. 20282 (Proposed Restructuring of the Amateur Radio Service). Published by the Hayden Book Co., Inc., 50 Essex Street, Rochelle Park, NJ 07662. 160 pages. \$5.95 soft cover.

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(Continued on page 153)

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