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# Kim-1/6502 POWER!

If you think that KIM-1 with 1K RAM is a limited power machine -- hold on to your hat! Peter Jennings has written a chess-playing program that runs in 1K using just the keyboard and display. I've played against his current version, which plays at the 'competent beginner' level. Even this is quite impressive, but Peter tells me that he'll be beefing up the strategy over the next few months and expects to play a fairly competent chess game. All this in 1K! Never underestimate your KIM.

Peter plans to market his chess program commercially after he polishes it up in the next few months ... I'm looking forward to seeing the final version.
--Jim Butterfield

Kim-1 USER NOTES
c/o Eric C. Rehnke
425 Meadow Lane
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FIRST CLASS

Tiny Basic pg 12

As of now we have 470 members...and plenty of new ideas to develop. But first, we have some corrections for volume 1 issue 1.

**ALREADY CORRECTED IN #1**

Page 4 - the second instruction in the random number generator should be SEC not (SED)

Page 13 - bottom portion of listing should read:

```
027A C8
027B C0 06
027D 90 F3
027F 20 30 1F
0282 60
```

Page 16 - top address should read 005B (not 005E), address 0091 should contain
C9 15 (not 09 15)

Page 18 - address 0238 should be D0 (not DC)
address 0242 should be D8 (not DB)

. . . . . . . . . . .

To alleviate possible typographical errors in future issues, please try to submit articles single spaced on white bond so that we may cut and paste instead of re-typing. Also, if you expect a personal response to correspondence, please include a self addressed stamped envelope, to help defray expenses.

. . . . . . . . . . .

## MOS KIMATH PACKAGE PRELIMINARY

Let's hold off from interfacing calculator chips to our 6502's - at least for a while. I just received preliminary documentation from MOS Technology for a floating-point package (up to 17 digits and exponents from +99 to -99) that may be what we need for adding higher math functions to our machines. It's a 2K x 8 ROM with routines for ADD, SUBTRACT, MULTIPLY, DIVIDE, SQUARE ROOT, LOG, ANTILOG, TANGENT, and ARCTANGENT, in 4 different formats. KIMATH also has several subroutines for evaluating polynomial expressions which can be used to approximate most other mathematical functions.

The price and availability are not known at this time and will be passed along when released from MOS.

. . . . . . . . . . .

Have you seen the October issue of BYTE?

**HANS!!!**

The theme of the issue was morse code interpretation and several different methods were presented. This application is a natural for the KIM! (with suitable I/O). The article on page 36 showed, perhaps, the most logical and easiest to implement form of morse code handling ( I will be using this algorithm). There were also several audio

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to digital conversion circuits using the 567 tone decoder that looked promising.

I am quite excited over the possibility of combining two of my hobbies in this summer and will be spending alot of energy in this area. I know that some of you are also working on this application, so let's hear from you.

If we can get a workable program together - we may be able to interest MOS Technology into masking off a ROM (2K x 8). There might be room for a BAUDOT RTTY program also (ON ONE CHIP!).

**············**

### MORE USER GROUPS GETTING STARTED

STANTON, CALIFORNIA - Daniel Gardner, 11825 Beach Blvd., Stanton, Cal. 90680
Phone - 714-898-7264

TORONTO, CANADA - Peter R. Jennings, 1612-43 Thorncliff Pk. Dr., Toronto, Ontario, Canada M4H 1J4 Phone 416-423-8263 or 678-1365

HOUSTON, TEXAS - Jeff Campbell Phone 464-6571

**············**

### THE OTHER TIMER
by Richard W. Lutz

Need a second interval timer? Your KIM system has one in the 6530-002 that is used only when loading or dumping to audio cassette. In applications where possibly you have dedicated your "application" Timer (address 170A-170F) to a real time clock and you may still need to time intervals or incorporate delays, the other timer is available instead of using software timing loops. However, the timer has to be polled (BIT Test) rather than run on an interrupt basis as 6530-002 is used for the audio cassette interface.

Addresses of The "Other Timer":

```
1744 = Divide by 1 Time
1745 = Divide by 8 Time
1746 = Divide by 64 Time
1747 = Divide by 1024 Time
1747 = Read Time Out Bit (Bit Test)
1746 = Read Time
```

Want your program in firmware? Richard is offering to program EPROMS with your program. He also has a circuit board available (with buffered address lines) that will accept the PROM and a 6530. For details, drop him a post card.

122 Carol Street
Carrboro, North Carolina 27510

**············**

Here's a tip that may help other beginners with the KIM-1. In order for the single step SST switch to work, it is necessary to load the interrupt vector 1000 into location 17FA & 17FB 17FA (00) 17FB (1C)
I didn't know this—the manual isn't clear—and I sent my computer back to MOS Tech. for repairs.

RELATIVE BRANCH TABLE
6502 and 6800

by Fred Crawford Jr.
2132 Carolina Dr. NE
Cedar Rapids, Iowa
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### BACKWARD RELATIVE

|    | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 8 - | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 |
| 9 - | 112 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 |
| A - | 96 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 |
| B - | 80 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 |
| C - | 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 |
| D - | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 |
| E - | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 |
| F - | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

...........

### FORWARD RELATIVE

|    | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 0 - | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1 - | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| 2 - | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 |
| 3 - | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 |
| 4 - | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 |
| 5 - | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 |
| 6 - | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 |
| 7 - | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 |

MODIFYING THE S.D. SALES 4K LOW-POWER RAM BOARD
FOR USE WITH KIM

from Robert E. Haas
2288 Blackburn St.
Eugene, Or. 97405

My KIM-1 system currently has an additional 8K of RAM and a 16-line by 64-character video display of my own design plus an ASCII keyboard. One of the two 4K memory boards in my system is a modified S.D. Sales Altair-compatible board. My first contribution to the newsletter is the enclosed article detailing the modifications I made to the S.D. Sales board. The neophyte KIM owner should probably not attempt to perform such a modification, but a more knowledgeable user who is looking for a low-cost memory, but up to now has not had the confidence to purchase an Altair-compatible board, will be interested.

I am writing an assembler for the 6502 which will use a modified version of the KIM cassette I/O protocol for source input and object output. I have added start-stop control via peripheral pins and can read and write individual records on cassette tape. The process is slow but cheap and reliable. I would like to distribute the assembler through the User's Group when it is finished. I will make it easy for a user to integrate his own video or hard-copy output into it.

I am happy that a KIM/6502 User's Group has been started. I would like to see an end to the dominance of the hobby computer field by Altair and friends.

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---

The modifications described here do not require any damage or physical changes to the board (trace cut) so the board can be restored to, and retain resale value as, an Altair-compatible board. The modification proceeds as follows:

1. Solder all components on the board per the instructions. Do not insert any IC's into sockets yet. (Do solder the regulators on the board.)

2. Install jumpers in the memory-address-selection area between a-a, b-b, c-c, and d-d.

3. Using a short piece of small-diameter bare wire (such as #30 wirewrap wire, stripped) tack a jumper between IC-34 pins 6, 9, and 10. Tack a similar jumper between IC-39 pins 2 and 5.

4. Using insulated wire tack a jumper between IC-34 pins 12 and 13 and IC-39 pin 6. Tack a jumper between IC-34 pin 8 and IC-39 pin 6.

5. Tack four insulated-wire jumpers between the following pins of IC's 37 and 33: IC-37 pins 13, 11, 9, and 5 to IC-33 pins 3, 8, 11, and 6, respectively.

6. Tack-solder four 560-ohm, ¼w resistors between +5 volts (found at IC-34 and IC-37 pin 14) and IC-34 pins 1, 2, 4, and 5.

7. Insert the 21L02's and IC-34, a 74S20, and IC's 38, 40, 41, 42, and 43 (8797's). IC's 33, 35, 36, 37, and 39 are not used, and must be omitted.

Modification is complete and connection between KIM and the memory board should be made via an Altair-style 100-pin connector. The connections are as follows:

Expansion connector

| | | Memory board conn. |
|---|---|---|
| pin A | (A30) | pin 79 |
| pin B | (Ab1) | pin E0 |
| pin C | (A31) | pin E1 |
| pin D | (AB3) | pin 31 |
| pin E | (AB4) | pin 30 |
| pin F | (AB5) | pin 29 |
| pin H | (AB6) | pin E2 |
| pin J | (AB7) | pin E3 |
| pin K | (AB8) | pin E4 |
| pin L | (AB9) | pin 34 |
| | | |
| pin Z | (RAM-R/W) | pin 68 |
| pin Y | (R/x) | pin 47 |

Application connector

| | | |
|---|---|---|
| pin P | (DB7) | pins 43 and 90 |
| pin 9 | (DB6) | pins 40 and 93 |
| pin 10 | (DB5) | pins 39 and 92 |
| pin 11 | (DB4) | pins 38 and 91 |
| pin 12 | (DB3) | pins 42 and 89 |
| pin 13 | (DB2) | pins 41 and 88 |
| pin 14 | (DB1) | pins 35 and 94 |
| pin 15 | (DB0) | pins 36 and 95 |

KIM Application connector

| | | |
|---|---|---|
| pin C | (L1) | pin 33 |
| pin D | (K2) | pin 85 |
| pin E | (K3) | pin 66 |
| pin F | (K4) | pin 32 |

Con't.

System ground must be connected to memory board pins 50 and 100 and a source of +8 volts unregulated to memory board pins 1 and 51. The board draws about 1 ampere.

The 8T97 buffers used on the memory present a fraction of a TTL load to the KIM, therefore no other buffers are required. Of course, if additional devices are connected to the KIM, buffers will be required.

..........

## TIMER

by Joel Swank #186
4655 S. W. 142nd
Beaverton, Ore. 97005

TIMER turns KIM into a digital stopwatch showing up to 99 minutes and 59.99 seconds. It is designed to be accurate to 50 microseconds per second. The interval time is used to count 9984 cycles and the instructions between the time out and the reset of the timer make up the other 16 cycles in .01 seconds. The keyboard is used to control the routine as follows:

| KEY | FUNCTION |
|-----|----------|
| 0 | stop |
| 1 | #0 |
| 2 | reset |
| 3 | print time on terminal |
| 4 | return to KIM |

```
0320                    *=$0320
0320 A9 00    TIMER     LDA #0
0322 85 F9    RESET     STA INH
0324 85 FA              STA POINTL
0326 85 FB              STA POINTH
0328 20 1F 1F           JTA POINTH
032B 20 6A 1F           JSR SCANDS      light display
032E C9 04    HOLD      CMF #4          read keyboard
0330 D0 03              BNE GETKEY      key 4
0332 4C 64 1C           JMP CLEAR       return to kim
0335 C9 03              CMF #3          key 3
0337 D0 1F              BNE NOFRT
0339 A5 FB    NOQUIT    LDA POINTH      print value
033B 20 3B 1E           JSR PRTBYT      on terminal
033E A9 3A              LDA #':
0340 20 A0 1E           JSR OUTCH
0343 A5 FA              LDA POINTL
0345 20 3B 1E           JSR PRTBYT
0348 A9 2E              LDA #'.
034A 20 A0 1E           JSR OUTCH
034D A5 F9              LDA INH
034F 20 3B 1E           JSR PRTBYT
0352 20 2F 1E           JSR CRLF
0355 38                 SEC
0356 B0 D0              BCS HOLD
0358 C9 02    NOFRT     CMP #2          key 2
035A 70 C4              BCS RESET       back to zero
035C C9 01              CMP #1          key 1
```

Con't.

---

```
017D 29 0F    HEXOUT    AND #$0F        remove unwanted bits
017F C9 0A              CMP #$0A        change to ASCII by..
0181 18                 CLC             adding..
0182 30 02              BMI HEX1
0184 69 07              ADC #$07        if A to F
0186 69 30    HEX1      ADC #$30        if numeric
0188 A0 08    OUTCHT    LDY #$03        for the eight bits..
018A 84 02              STY COUNT
018C A0 02    TRY       LDY #$02        send 3 units
018E 94 02              STY TRIB        starting at 3600 hertz
0190 BE 02    ZON       LDX NFUL,Y      number of half cycles
0193 48                 PHA             keep the character
0194 2C 47 17           BIT CLKRDI      wait for the previous..
0197 10 FB              BPL ZON1        cycle to complete
0199 B9 BF 01           LDA TIMG,Y      Get the time to the..
019C 9D 44 17           STA CLK1T       ..next pulse ($7E or C3)
019F A5 E1              LDA GANG
01A1 49 40              EOR #$40        Flip between 1 and 0
01A3 8D 42 17           STA SBD
01A6 95 E1              STA GANG
01A8 CA                 DEX
01A9 D0 E9              BNE ZON1        have we sent all the cycles?
01AB 68       FLA                       nope, send another one
01AC C6 E3              DEC TRIB        get back the character
01AE F0 05              BEQ SET2        one less unit to send
01B0 30 07              BMI ROUT        and the last one's here
01B2 4A                 LSR A           none left? quit
01B3 90 DB              BCC ZON         Take next bit
01B5 A0 00    SET2      LDY #$00        ..and if it's a one..
01B7 F0 D7              BEQ ZON         switch to 2400 cycles/sec
01B9 C6 E2    ROUT      DEC COUNT       unconditional return
01BB D0 CF              BNE TRY         one less bit
01BD 60                 RTS             any more? go back
01BE 02       NFUL      .BYTE $02       ; frequency/density controls
                                        two pulses; one cycle!
01BF C3 03 7E TIMG      .BYTE $C3,$03,$7E
                        end
```

..........

## SUBSCRIPTION INFORMATION

A Microcomputer Data Processing course, utilizing the KIM-1, will be held at Thames Valley State Technical College in Norwich, Connecticut. The course will consist of 22 evening sessions and will run from Dec. 6, 1976 thru Feb. 28, 1977. Contact Frank Bytichi (203) 886-0177 for more information.

..........

# SUPERTAPE!

October, 1976          Jim Butterfield
                       Toronto

```
0100 A9 AD    DUMFT   LDA #$AD      op code LDA
0102 8D EC 17         STA VEB       set up subrtn
0105 20 32 19         JSR INTVEB
0108 A9 27            LDA #$27      flag to go to SBD
010A 85 E1            STA GANG
010C A9 BF            LDA #$BF      open the channels
010E 8D DD 17         STA FBDD      send 100...
0111 A2 64            LDX #$64      ..SYNC chars
0113 A9 16            LDA #$16
0115 A9 2A    HIC     LDA #$2A      send asterisk
0117 20               JSR OUTCHT    then the ID
011A 20               LDA ID
011D 20        ...    JSR OUTCHT    followed by
0120 AD               LDA SAL       the start address
0123 20               JSR OUTCHT    (low and high)
0126 AD               LDA SAH
0129 20               JSR OUTCHT
012C AD       DUMFT4  LDA VEB       get memory word
012F 20               JSR OUTCHT    and send it
0132 20               JSR INXVEB    on to next address
0135 AD               LDA VEB+1     is the address..
0137 18               CMP EAL       ..at the end?
013B AD               LDA VEB+2
013D E9               SBC EAH
0140 20               BCC DUMFT4    no, go back!
0143 AD               LDA #$2F      yes, send end-data
0146 20               JSR OUTBTC    ..and checksum
0148 AD               LDA CHKL      ..hi and low..
014B 20               JSR OUTBT
014E 90               LDA CHKH
0151 AD               JSR OUTBT
0154 20               LDA #$04      send two..
0157 A2               LDX #$02      EOT characters
0159 A9               LDA HIC
015B A9               JSR OUTCHT
015E 4C               JMP DISI2     and we're finished
```

*subroutines follow here*

```
0161 96 E0    HIC1    STX TIC       count
0164 93 01            PHA
0167 20               JSR OUTCHT    send character
016A C6 E0            PLA           ..and bring it back
016C E0               DEC TIC
016D F7               BNE HIC1      do it again
0170            OUTBTC RTS
0171 49       OUTBT   PHA
0172 4A               JSR OUTCHT
0173 4A               PLA
0174 4A       CHKT    LSR A         compute checksum
0175 4A               save the character
0176 20               JSR HEXOUT    ..and take its
0179 20 2D 01         PLA           four left bits..
017C 60               JSR HEXOUT    write 'em ...
                      RTS           now the 4 right bits..
```

---

```
035B D0 C8            BNE HCLD
035D A9 9C            LDA #$9C      set timer
0360 8D 06 17         STA TIMSET
0362 20 1F 1F         JSR SCANDS    display value
0365 20 1F 1F         LDA TIMGET    check timer
0368 AD 07 17  EKFCK  BEQ EKFCK     wait loop
036B F0               LDA KIM       delay 4 usec
036D AD 00 1C         STA TIMSET    set timer
0370 A9 9C            STA TIMSET
0372 8D 06 17  DISPL  CLC
0375 18               SED           set flags
0376 F8        CKRY   LDA INH
0377 A5 F9            ADC #1        increment hundredths
0379 69 01            STA POINTL
037B 85 F9            LDA INTL
037D A5 FA            ADC #0        increment seconds
037F 69 00            STA POINTL
0381 85 FA            LDA #$60      stop at 60
0383 C9 60            CMP POINTL
0385 D0 0B            BNE CKRY
0387 A9 00            LDA #0
0389 85 FA            STA POINTL
038B 18               CLC           increment minutes
038D A5 FB            LDA POINTH
038F 69 01            ADC #1        zero seconds
0391 85 FB            STA POINTH
0393 20 6A 1F         JSR GETKEY    read keyboard
0396 C9 00            CMP #0        key 0
0398 D0 CB            BNE DISPL
039A F0 8C            BEQ HCLD      stop
```

---

KIM-1 SOFTWARE—

Robert Tripp, editor of THE COMPUTERIST has put together a package of games, demo-programs and a real-time monitor to control the whole works on a cassette. It's available as a package (cassette, source listings & instructions) for $10.00. It's called PLEASE. runs on the basic KIM with no additional memory or I/O and sounds very interesting. It is available from Micro-Cosmos, 210 Daniel Webster Hwy. So., So. Nashua, N.H. 03060

MORE SOFTWARE:

6502 Program Exchange, 2920 Moana Ln., Reno Nevada, 89509 ($.25 for program list.) Most programs were written for TIM & JOLT monitors, but easily converted to KIM by chang-ing I/O subroutine calls. You need a TTY or TVT. For .25 extra, order TIM (DEMON) subroutine list and their effects to make conversion to KIM alot easier. (and it's cheaper than buying a TIM manual).

TINY BASIC NOW AVAILABLE ON KIM CASSETTE          from Bob Grater

(BASIC STARTS AT $0200) (NOT $2000)

Bob Grater has informed me that the Byte Shop #2 will be making Tiny Basic available on KIM compatible cassettes for $9.50 + $1.00 shipping. User manual is included in the deal.

Also from Bob...The SAB-1 (serial adapter board) will be available for $24.95 + $1.00 shipping from: Byte Shop #2, 3400 W. El Camino Real, Santa Clara, Cal. 95051.

We will have it set up at the Byte Shop #2, so that KIM users in the Bay Area can bring their KIM-1 in and play it thru our TVT to see how the system works. Also included a simple circuit that I use to clock the UART off of #1 on KIM instead of the on-board clock--this makes a super stable clock. All the CD-4020 outputs can be buf-fered and can be used to drive a number of other accessory circuits.

Programs for the 6502 can often be found in Dr. Dobb's Journal of Computer Calisthenics & Orthodontia (a year's subscription is $10 to Box 310, Menlo Park C.4, 94025). The August 1976 issue contains a full set of floating point routines (including logarithms but not trig functions) September 1976 has a 'disassembler'. You'll need to do a little modifying since programs are often written for other monitors (like APPLE or JOLT).



FREQ. AVAILABLE

Clock freq / BaudRate = 16

*Some members have reported that they are having difficulties getting the following Kluge Harp to run correctly. ~the editor~*

## KIM-1 KLUGE HARP

from Robert G. Lloyd
7554 Southgate Rd.
Fayetteville, N.C.
28304
(919) 867-5822

I am sending a program for A KLUGE HARP (OCT 75, BYTE, PAGE 14)

| ADDRESS | MACHINE CODE | LABELS | MNEMONICS | COMMENTS |
|---|---|---|---|---|
| 0300 | A0 FF | MUSIC | LDY #$FF | |
| 02 | A9 00 | LOOP2 | LDA #$00 | |
| 04 | 8D 03 17 | | STA PBDD | |
| 07 | EE 03 17 | | INC PBDD | |
| 0A | A9 80 | | LDA #$80 | |
| 0C | 8D 0B 03 | | STA PADD | |
| 0F | EE 0B 03 | | INC | |
| 12 | A2 02 | | LDX #$02 | |
| 15 | A2 02 | NOTER | INC | |
| 17 | CA | LOOP1 | DEX | |
| 18 | D0 FD | | BNE LOOP1 | |
| 1A | D0 | | DEY | |
| 1D | B8 | | BNE LOOP2 | |
| 1E | E5 | | | |
| 1F | A5 00 | SCORE | LDA #$00 | IN 0 PAGE |
| 22 | 8D 16 03 | | STA NOTER | |
| 25 | A2 FF | | LDY #$FF | SET LOOP COUNTER FOR SPEED OF MUSIC |
| 27 | A0 FF | LOOP4 | LDY #$FF | |
| 29 | 88 | LOOP3 | DEY | |
| 2A | D0 FD | | BNE LOOP3 | |
| 2C | CA | | DEX | |
| 2D | D0 F8 | | BNE LOOP4 | |
| 2F | C5 30 | | CMP #$30 | SET FOR END OF SONG |
| 31 | D0 CF | | BNE LOOP2 | |
| 33 | A9 00 | | LDA #$00 | SET SCORE START |
| 35 | 8D 1E 03 | | STA #$00 | RESET LOC 031E TO 00 |
| 38 | A9 02 | | LDA #$02 | RESET LOC |
| 3A | 8D 16 03 | | STA #$02 | 0316 TO 02 |
| 3D | 4C DC 1C | | JMP PCCMD | EXIT DISPLAY PC |

THE SCORE START IS SET AT ADDRESS 031E

THE SCORE END IS SET AT ADDRESS 0330

THE SCORE IS LOCATED IN "0" PAGE

**TWINKLE, TWINKLE, LITTLE STAR**    SET LOC 031E TO 00,    SET LOC 0330 TO 30
```
0000 02 02 55 55 39 39 33 33 39
     40 40 45 45 4C 4C 55 39 39 40
     1C 1C 22 22 2B 2B 33
0028 55 55 55 33 33 39 40 40 45
     45 4C 4C 55 02 02 02
```

**DAISY**    SET LOC 031E to 00,    SET LOC 0330 to 63
```
0000 02 02 02 1C 1C 22 22 22 2B
     2B 39 39 39 1C 1C 22 22 22 2B
     1C 1C 22 22 22 2B 33 33
     22 20 22 22 2B 1C 22 26 26
     2B 2B 26 22 22 2B 33 33
     39 39 39 2B 22 2B 1C 22 26
005A 26 26 39 2B 22 2B 22 20 1C 22 2B
     39 39 39 2B 2B 2B 02 02 02
```

---

*SUPERTAPE WORKS GREAT!! HIGHLY RECOMMENDED ~the editor~*

**KIM-1 / TTY FIXIT MOD** - from Ronald Kushnier, 310 Addison Ct., Cornwell Hts., Pa. 19020
The keyboard return from the TTY normally goes through a 150 ohm resistor (R4) to +5 volts. Disconnect the keyboard return lead from pin "U" on the applications connector and connect it through a 470 ohm ½ watt resistor to pin "W" (+12 vdc). Pin "W" is now used for both audio cassette interface and TTY when hooked to +12 vdc. This turned hopeless chatter into perfect copy. Now if I can only figure a way to get the teletype home from work....

## SUPERTAPE!

Jim Butterfield
Toronto

How long does it take you to load a full 1K of KIM-1 memory? Over two minutes? And if you're going for memory expansion, how long will it take you to load your 8K? Twenty minutes?

Hold onto your hats. Program SUPERTAPE! will write fully compatible tapes in a fraction of the time. You can load a full 1K in 21 seconds.

Fully compatible means this: once you've written a tape using SUPERTAPE! you can read it back in using the normal KIM-1 program (starting at 1873 as usual). And the utilities and diagnostic programs work on this super-compressed data (e.g., DIRECTORY and VUTAPE).

You'll need some memory space for the program, of course. If you have memory expansion, there'll be no problem finding space, of course. But if you're on the basic KIM-1, so I am, you'll have to "squeeze in" SUPERTAPE! along with the program you're dumping to tape. I try to leave page 1 alone usually (the stack can overwrite your program due to bugs); so I stage SUPERTAPE! in that area. For the convenience of relocation, the listing underlines those addresses that will need changing. There are also four values needed in page zero which you may change to any convenient location.

For those interested in the theory of the thing, I should mention: SUPERTAPE! is not the limit. If you wished to abandon KIM-1 monitor compatibility, you could continue to speed up tape by a factor of 4 or 5 times more. (Can you imagine reading 1K in four seconds?). For the moment, however, SUPERTAPE! is plenty fast for me.

Thanks go to Julien Dube for his help in staging early versions of SUPERTAPE!

### PRELIMINARY RESULTS OF SUPERTAPE TRIALS

So far, Supertape has been tried on a half-dozen or so cassette recorders, with mixed results. Three of them give solid input: never-fail loading. The other three work poorly or not at all.

The only common factor I can spot (don't have elaborate test facilities here) is cassette player output level - the good ones invariably blast out a fairly strong signal. In principle, level shouldn't matter; the first thing the signal hits on the KIM-1 board is a limiter which cuts all signals down to the same size.

For those who would like to improve their tape speed but can't get full speed Supertape to work on their cassettes, a change of two locations will give intermediate packing densities:

| Name | Speed improvement | 031E | 01C0 |
|---|---|---|---|
| STANDARD | x 1 | 0C | 12 |
| FASTTAPE | x 2 | 06 | 09 |
| SPEEDTAPE | x 3 | 04 | 06 |
| SUPERTAPE | x 6 | 02 | 03 |

Maybe we should start a catalogue of cassette recorder models and what speeds each will support.

contd.....

Program VUTAPE lets you actually see the contents of a KIM format tape as it's going by. It shows the data going by very quickly, because of the tape speed ... but you can at least 'sense' the kind of material on the tape.

In case of tape troubles, this should give you a hint as to the area of your problem: nothing? noise? dropouts? And you can prepare a test tape (see below) to check out the tape quality and your recorder. The test tape will also help you establish the best settings for your volume and tone controls.

Perhaps VU-TAPE's most useful function, though, is to give you a 'feeling' for how data is stored on tape. You can actually watch the processor trying to synchronise into the bit stream. Once it's synched, you'll see the characters rolling off the tape ... until an END or illegal character drops you back into the sync mode again. It's educational to watch. And since the program is fairly short, you should be able to trace out just how the processor tracks the input tape.

VUTAPE starts at location 0000 and is fully relocatable (so you can load it anyplace it fits).

```
KIM UTILITY: VU-TAPE                                    02

0000 D8        START  CLD
0001 A9 7F            LDA #$7F
0003 9D 41 17         STA PADD
0006 A9 13     SYN    LDA #$13      ..set display dir reg
0008 85 E0            STA POINT     ..window 6 and tape in
000A 8D 42 17         STA SBD       and keep pointer
000D 46 F9            LSR INH       ..get a bit and
000F 20 41 1A         JSR RDBIT     ..slip it into
0012 05 F9            ORA INH       ..the right-hand
0014 85 F9            STA INH       ..side:
0016 AD 40 17         STA SAD       show bit flow on display
0019 C9 16     TST    CMP #$16      ..is it a SYNC?
001B D0 E9            BNE SYN       nope, keep 'em rolling
001D 20 24 1A         JSR RDCHT     yup, start grabbing...
0020 C9 2A            CMP #$2A      .9 bits at a time and..
0022 D0 F5            BNE TST       .if it's not an '*'..
0024 A9 00     STREAM LDA #$00      ..then start showing
0026 8D E9 17         STA SAVX      ..characters 1 at a time
0029 20 24 1A         JSR RDCHT     ..converting to hexadec..
002C 20 00 1A         JSR PACKT     ..if legal
002F A6 E0            LDX SYN
0031 A6 E0            LDX POINT
0033 E0               INX
0034 E8               INX           Move along to next..
0035 E0 15            CPX #$15      ..display position
0037 D0 02            BNE OVER      (if last digit..
0039 A2 09            LDX #$09      ..reset to first)
003B 86 E0     OVER   STX POINT
003D 9E 42 17         STX SBD
0040 AA               TAX           change character read
0041 BD E7 1F         LDA TABLE,X   ..to segments and..
0044 9D 40 17         STA SAD       send to the display
0047 D0 DB            BNE STREAM    unconditional jump
```
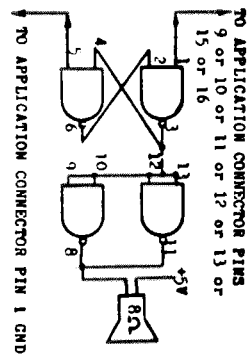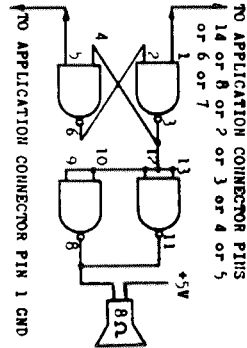
**Checking Out Tape/Recorders**

Make a test tape containing an endless stream of SYNC characters with the following program:

```
0000 A0 2B     LDY #$2B    ..directional..
0002 8C 47 17  STY PADD    ..registers
0005 A9 16  LP LDA #$16    SYNC
0007 20 7A DUTCH JSR OUTCH ..'out to tape
000A D0 F9     BNE LP
```

Now use program VUTAPE. The display should show a steady synchronisation pattern. Try playing with your controls and see over what range the pattern stays locked in. The wider the range, the better your cassette/recorder.

---

Here is the circuit for the music:



TO APPLICATION CONNECTOR PINS
14 or 8 or 2 or 3 or 4 or 5,
or 6 or 7

TO APPLICATION CONNECTOR PIN 1 GND

ANOTHER APPLICATION CONNECTOR PINS
9 or 10 or 11 or 12 or 13 or
15 or 16

TO APPLICATION CONNECTOR PIN 1 GND

The program by STAN OCKERS (ALPHANUMERICS ON THE KIM DISPLAY) is very good. I tryed it and it works great. Is the'r some way to hook up a set of RAM 2 X 7 DOT MATRIX LEDS for the display?

I am trying to get a club started in the FAYETTEVILLE area. We only have 5 members right now.

Yours truly,
ROBERT G. LLOYD

KEEP UP THE GOOD WORK

**HEX CODES FOR NOTES**

| LOW OCTAVE | | MIDDLE OCTAVE | | HIGH OCTAVE | |
|---|---|---|---|---|---|
| C | AA | C | 55 | C | 2B |
| C# | A0 | C# | 50 | C# | 28 |
| D | 98 | D | 4C | D | 26 |
| D# | 90 | D# | 48 | D# | 24 |
| E | 89 | E | 45 | E | 22 |
| F | 80 | F | 40 | F | 20 |
| F# | 7A | F# | 3D | F# | 1E |
| G | 72 | G | 39 | G | 1C |
| G# | 6C | G# | 36 | G# | 1B |
| A | 66 | A | 33 | A | 19 |
| A# | 60 | A# | 30 | A# | 18 |
| B | 5A | B | 2D | B | 15 |

**ANOTHER KIM-1 APPLICATION IDEA**
AN AUTOMATED PROM PROGRAMMER--can be set up to program fusible-link type (82S123, 82S129 etc.) or the erase-able variety (1702A, 520A etc.) will save many hours of time doing a job that your computer does alot better. Who'll be the first to get this to-gether?

**A NOTE FROM WILLIAM H. DEAZLEY, 1320 Blood Road, Cowlesville, NY 14037**
The KIM-1 USER'S MANUAL, page 36, last line, states that RAM locations 17C0 to 17EB are available for application programs; however 17E7, 17E8, 17E9, 17EA and 17EB are used for CIRKL, CHKH, SAVX, SAVX and SAVX respectively (see page 5 of 6530-003 software list). Therefore application programs should not use those locations and the last line on page 36 of the KIM-1 USER'S MANUAL should be changed to: "......RAM from 1700 to 17E6."
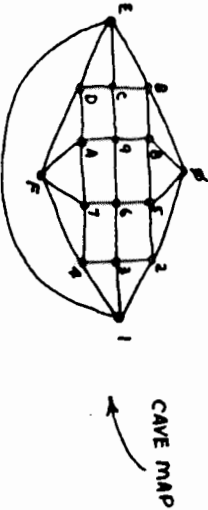
# HUNT THE WUMPUS

Stan Ockers
R.R. #4 Box 209
Lockport, Ill. 60441

GAME BY GREGORY YOB
ADAPTED FOR THE KIM-1 BY STAN OCKERS

I first run across the WUMPUS in THE BEST OF CREATIVE COMPUTING where it is programmed in basic. The following is based on this program with modifications so I could fit the program and messages in the KIM-1 memory. The messages appear on the display in scanning form with "sort-of" alphanumeric letters.

The WUMPUS lives in a cave of 16 rooms (labeled 0-F). Each room has four tunnels leading to other rooms (see the figure). When the program is started, you and the WUMPUS are placed at random. Also placed at random are two bottomless pits (they don't bother the WUMPUS, he's too heavy). If you enter a room with a pit, you fall in and lose. You will be able to move to the WUMPUS, he has sucker-type feet) and two rooms with SUPERBATS, (also no trouble to the WUMPUS, he's too heavy). If you enter a room with a pit, you fall in and lose. You will be warned when Bats, Pits or the WUMPUS are nearby. If you enter the room with the WUMPUS, he wakes and either moves to an adjacent room or just eats you (you lose). In order to capture the WUMPUS you have three cans of "MOOD CHANGE" Gas. When thrown into a room containing the WUMPUS the gas causes him to turn from a vicious snarling beast into a meek and loveable creature. He will even come out and give you a hug. Beware though, once you toss a can of gas in the room it is contaminated and you cannot enter or the gas will turn you into a beast (you lose).

The program starts at 0000. If you lose and want everything to remain the same, (except the room you are in), restart at 0316. Use the reset key to stop the program because about half of page one is used and if you just use the stop button the stack will eventually work its way down into the program. The byte at 0029 controls the speed of the display. Once you get use to the characters you can speed things up by putting in a lower number. The message normally given tells you what room you are in and what the choices are for the next room. In order to fire the mood gas press PC (Pitch Can?) when the rooms to be selected are displayed. Then indicate the room into which you want to pitch the can. It takes a fresh can to get the WUMPUS (he may move into a room already gassed). GOOD HUNTING!

CAVE MAP

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0000  80 EE DC BE 80 F7 D0 F9 80 84 D4 80 30 80
0010  F8 BE D4 80 F9 B8 ED 80 80 80 F8 DC 80
0020  xx xx xx 80 DE 80 DC DC DC F3 ED 80 FC BE
0030  B7 F3 F9 80 00 9C BE B7 F3 BE ED 80 00
0040  80 90 F3 20 30 0F F3 ED 80 00 00 80
0050  02 02 01 01 00 03 06 07 09 0A 01 04
0060  -- -- -- 01 02 05 06 07 08 09 0A 07
0070  02 00 80 04 03 09 0F 08 0C 0C 0C 0A
0080  80 B8 DC ED F9 80 00 80 DC DC 80 xx
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(con't.)

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0100  80 9C BE B7 F3 BE ED 80 B9 B8 DC FD F9 00 F3
0110  84 F8 80 B9 B8 3C 3D F9 00 80 FC F7 80 ED 80
0120  B4 DC ED F9 80 80 F6 F7 80 F8 80 DC BE BE
0130  BE BE 80 80 DC 80 EE BE DC 80 80 80 ED BE
0140  F3 BE D0 FC F7 80 ED 80 80 F6 F8 80 DC 80
0150  EE EE 84 84 F9 F9 80 F7 80 B8 84 D4 80
0160  F3 84 F8 80 00 80 84 D4 80 DC 80
0170  B7 80 80 DC BE 80 F1 80 BD F7 ED 00

0200  84 DE 85 BD A9 07 85 DF A0 05 A2 05 B1 DD DC
0210  D0 01 60 95 E8 8B CA 10 F3 B8 18 93 65 DF 85 DC
0220  20 28 02 A4 0C 4C 0A 02 CA A5 6 DA A9 DF 85
0230  17 20 3E 02 2C 07 17 10 F8 56 80 A9 52 85 07
0240  80 41 17 A0 00 A2 09 B9 E8 00 84 F: 20 4E 1F C8
0250  00 06 90 F3 20 3D 1F F7 80 60 20 8C 16 20 F0 F8
0260  20 3E 02 F0 FB 80 69 6A 1F C9 15 10
0270  E7 60 A5 00 04 66 00 20 6E 29 85 F0 05 0A 90
0280  FD 70 05 06 00 A5 C0 06 00 20 F0 05 0A 90
0290  04 D5 CB F0 0A A5 17 29 0F 60 20 29 0F C9 04
02A0  30 0D 82 07 AD 06 17 29 03 A3 B5 C6 85 A5
02B0  CB 60 A6 CA B5 50 95 8C C8 85 C8
02C0  B5 80 85 C9 A0 A2 03 56 F0 02 CA 10 F9 60 A0
02D0  01 A0 F7 F8 20 80 EE 1C 2C 80 A9 BD BD A0
02E0  F3 F7 80 00 9C BE B7 F3 BE ED 80
02F0  BE BD 80 F1 30 DC M7 80 9C PE B7 F3 BE ED 80
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0300  AD 06 17 85 30 A9 FF A2 0E 95 C1 FB A9 05
0310  85 20 A0 05 01 02 A0 00 A2 05 20 72 02 29 0F D5
0320  CA F0 F5 CA 10 F9 CA 00 3B 10 EC 20 02 02 A0
0330  01 84 E1 B9 C6 00 20 9F 02 9A 30 17 A0 05 04
0340  A9 19 10 0A ED 01 30 0A A9 0E 10 02 A9 00 01
0350  20 00 02 C6 E1 A4 E1 10 DA A4 B9 E7 1F 95 0C
0360  A2 03 B4 C6 B9 E7 1F 95 20 CA 10 F6 A0 00 98
0370  00 A2 20 58 02 39 14 FD 48 20 05 02 8F 02 8A
0380  A5 CA A2 04 D5 C1 F0 33 CA 10 F9 20 8F 02 8A
0390  30 9A BD 03 10 17 80 01 1D A0 26 20 A0 01 xx
03A0  3D 00 00 02 4C 16 03 49 4F 20 A9 65 20 CF
03B0  02 A0 00 A9 R7 20 00 02 58 02 85 D1
03C0  8A 30 EE A5 31 A6 80 95 C0 C5 C8 F0 F0
03D0  03 ED B9 E7 1F 85 9F A0 A9 90 20 4C
03E0  1A A4 ED 02 A9 DE 20 00 02 A9 20 CF 02
03F0  6C 03 A9 02 00 F7 A9 73 20 CF 02
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