6502 USER NOTES

no.13 $2.50

KEYBOARD DEBOUNCE ROUTINE

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The following code performs seeming miracles on noisy keyboards. The standard implementation of the KIM-1 monitor code wrongly assumes that inexpensive keyboards are not inherently noisy.

The code was inspired by Allen Anway's Program Branch from "Notes" 9 & 10.

CTR is any convenient page zero address.

```
A0 05        SCN0   LDY  #05   Set up safety net
84 EE               STY  CTR
20 19 1F     SCN1   JSR  SCAND
D0 F7               BNE  SCN0   Wait for key release
C6 EE               DEC  CTR    Make sure it
D0 F7               BNE  SCN1   Wasn't noise
20 19 1F     SCN2   JSR  SCAND  New key pressed?
F0 FB               BEQ  SCN2   No
20 19 1F            JSR  SCAND  Yes - check again
F0 F6               BEQ  SCN2   No
20 6A 1F            JSR  GETKEY Yes-get key immage
```

STAR WARS BATTLE

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Want some wild sound effects for your KIM? I have combined Ron Kushniers space wars phaser sound program with Jim Butterfield's random number generation to create sound effects from an entire battle scene out of Star Wars!! Interesting variations can be obtained by changing the mask byte for the random number. Location 0247 controls the number of repeats and 0254 controls the time of the phaser pulse. The program starts at 0241 and the sound output is at PA-0.

```
0200  A0 03 A9 00 85 EE A9 11 8D 06 17
020B  A9 01 8D 01 17 EE 00 17 A6 EE CA
0216  D0 FD 2C 07 17 10 F3 E6 EE A5 EE
0221  C9 FF F0 02 D0 DF 88 F0 02 D0 DA
022C  60 D8 38 A5 13 65 16 65 17 85 12
0237  A2 04 B5 12 95 13 CA 10 F9 60 20
0242  2D 02 A5 12 29 03 8D 01 02 EE 01
024D  02 20 2D 02 A5 12 29 13 8D 07 02
0258  EE 07 02 20 00 02 4C 41 02
```

SOUND EFFECTS PROGRAM

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I have been using KIM'S cassette audio output port (SBD at $1742) for outputting music and modern programs. No external hardware aside from a cassette player and an earphone or speaker are required. Simply plug the earphone or speaker into the monitor jack and push down the record button and high fidelity output will result. On my cassette player the tape doesn't even have to be moving. I think this is the simplest interface for audio experimenting yet.

I came up with the following program which makes quite an interesting noise - similar to a police siren or an alarm, using the above mentioned output method.

```
0100 A2 FF     START LDX #$FF Send 1's to
0102 8E 42 17        STX SBD  Output Port
0105 A6 00           LDX #$00 Load Freq Parameter
0107 CA        LOOP1 DEX      Wait Loop For
0108 D0 FD           BNE LOOP1 Waveform High Time
010A A2 00           LDX #$00 Send 0's To
010C 8E 42 17        STX SBD  Output Port
010F A6 00           LDX #$00 Load Freq Parameter
0111 CA        LOOP2 DEX      Wait Loop For
0112 D0 FD           BNE      Waveform Low Time
0114 C6 00           DEC      DEC Freq Once Each
                                      Loop
0116 4C 00 01        JMP      Start
```

MELODIES FOR THE MUSIC BOX

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Everyone who owns a KIM should also own The First Book of KIM. If they don't, they should get one, it's worth it. On page 88 of the book you will find Jim Butterfield's Music Box program. Load it. Mr. Butterfield wrote this program real well but he didn't include enough music for us music buffs! So load the following into KIM and you should get 1. Pop Goes the Weasel 2. Happy Birthday 3. London Bridges Falling Down 4. Ten Little Indians and 5. a short version of the Marine Hymn. The second hex dump is a more jazzed up version of the Marine's Battle Hymn I'm sure you'll enjoy it.

```
0000 FB 30 FE 00 FD 01 FC 02 C0 40 B9 39 32 32 32 C0
0010 C0 40 B9 2F A9 C0 40 B9 39 32 29 32 C0 AF 80 B9
0020 2F A9 C0 80 80 80 FB 22 FC 02 FD 01 FE 56 56 CD
0030 D6 C0 C8 56 56 CD D6 D9 C0 56 56 A9 B2 C0 E8 CD
0040 2F 2F B2 C0 B9 80 80 80 80 FB 50 FC 02 FD 02 FE
0050 FF 5D 32 AF 39 32 AF 39 32 2F 29 AF B9 2F 29 2F
0060 32 39 32 AF 40 39 B2 39 32 AF 2F 29 2F 32 39 32
0070 AF C0 AF 39 C8 00 80 80 80 80 80 80 80 80 FB 20
0080 FC 02 FD 01 FE FF C8 48 48 C8 48 48 B9 2F 2F 39
0090 40 C8 C0 40 40 C0 40 40 CD 40 40 40 4D 56 E2 C8 48
00A0 48 C8 48 48 B9 2F 39 4D C8 AF 32 32 39 39 C0 C8
00B0 80 80 80 80 FB 30 FC 02 FD 03 FE FF 62 48 C0 C0
00C0 C0 C0 C0 2F C0 4D 48 C0 C0 48 D6 E2 E2 62 48 C0
00D0 C0 C0 C0 C0 2F C0 4D 48 C0 C0 48 D6 E2 E2 FF 00
```

Jazzed Up Marine's Hymn

```
0000 FB 30 FC 02 FD 03 FE FE 62 48 C0 C0 C0 C0 C0 2F
0010 C0 4D 48 C0 C0 48 D6 E2 E2 62 48 C0 C0 C0 C0 C0
0020 2F C0 4D D6 C0 C0 48 D6 62 62 AF 32 B9 C8 B9 AF
0030 C0 4D C0 DF 32 B9 C8 39 AF C0 62 4D C0 C0 C0 C0
0040 C0 2F C0 4D 98 C0 C0 40 AB AF 80 80 80 80 80 FF
0050 00.
```

"DO LOOPS" FOR KIM

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There is often a need to repeat a section of code a given number of times. The following instructions show one way to perform the "do loop" function by executing a block of code N times.

```
      LDA  #00     load zero
      STA  I       ready do loop variable
LOOP  INC  I       increment loop variable
      LDA  N       get loop iteration limit
      CMP  I       compare to present value
      BCC  OUT     branch away if I is greater
                                  than N

      Block of instructions
      to be executed N times

      JMP  LOOP    loop back until done
OUT   BRK          stop if job is done
```

In complex programming situations it is often clarifying to code in a high level language first, and to translate that to assembly code as a second step.

MORE ENVELOPE ART

from T. Mc Fadden