INTRODUCTION

I started playing with the Internal ROM socket in the C128 back in the late 1980's. At first I used 32K (27256) EPROMs, but ran out of room quickly. I decided to try to find something that had more room for programs.

Intel was making an EPROM (27513) that they called a Paged EPROM. It had 4 – 16K pages of ROM, equivalent to a 64K (27512) EPROM. I used the I/O at the Expansion Port to select a page on the EPROM (1,2,3 or 4). Put the page number on the Data Bus and write to the I/O address ($DE00). Whatever page you select, 16K of ROM will show up at $8000 – $9FFF and again at $A000 – $BFFF. It was OK for awhile, but I still did not have enough room for the programs I used most of the time.

Then Intel came out with an 8 paged EPROM (27011) 8 – 16K pages (1 MEG) of ROM. I was able to put most of my programs and a couple of large programs that I use, Merlin 128 and Word Writer, in the ROM. Intel talked about making a 2 MEG Paged EPROM, but it never showed up. Their next 2 MEG EPROM was the 27020, 32-pin package. In order to use the 32-pin package, I would have to make an adapter with controlling circuitry. I didn't want to fool with it at the time, I thought 1 MEG of ROM would be enough.

The 27513 and the 27011 EPROMs are 28-pin packages and were easy to install. The page select pin is pin 27. After the ROM was programmed, bend pin 27 up enough so the pin would not go into the socket when installed in the C128, tack solder a lead to pin 27 with a clip on the other end and clip it to the I/O on the Expansion Port. That's it, no adapter and easy to install. Later, I started using a socket with pin 27 removed. It was easier to erase and reprogram the EPROM.

I programmed several 27010 EPROMs for friends in our computer club and I gave a demonstration at the Kansas City, MO computer club. After awhile I moved away from Commodore and concentrated on my job and preparing for retirement. I retired 5 years ago and started playing with the C128 again.

I decided to play around with the large capacity EPROMs, 27010 (1 MEG), 27020 (2 MEG), 27040 (4 MEG) and 27080 (8 MEG).

First I made a cartridge board for the C64 that would accommodate any one of the four high capacity EPROMs.

The C64 will only see 8k or 16k of ROM, so I set it up to use 16k, from $8000 to $BFFF. So with the 1 meg EPROM you will have 8 – 16k sections of PROM available. From this point forward the word section(s) will be referred to Page(s). With a 2 MEG EPROM there will be 16 – 16k Pages of PROM, with a 4 MEG EPROM there will be 32 – 16k Pages and with an 8 MEG EPROM there will be 64 pages of PROM. With an 8 meg EPROM you could put 63 – 16k cartridge games in one cartridge (the first page, Page 0, is where you would put the menu).

I did not want to restrict the cartridge to just 16k cartridge games, so I modified the board so that it would be able to shut itself off and go to C64 basic, or load a bigger game, and even multipart games. But we can get into that later when I cover the C64 section.

I needed more than 1 meg of ROM space for the C128, so I made an adapter for the Internal ROM socket. With the adapter it will allow the use of a 32-pin EPROM in a 28-pin socket. Like the C64 Cartridge, it will accommodate any one of the high capacity EPROMs.

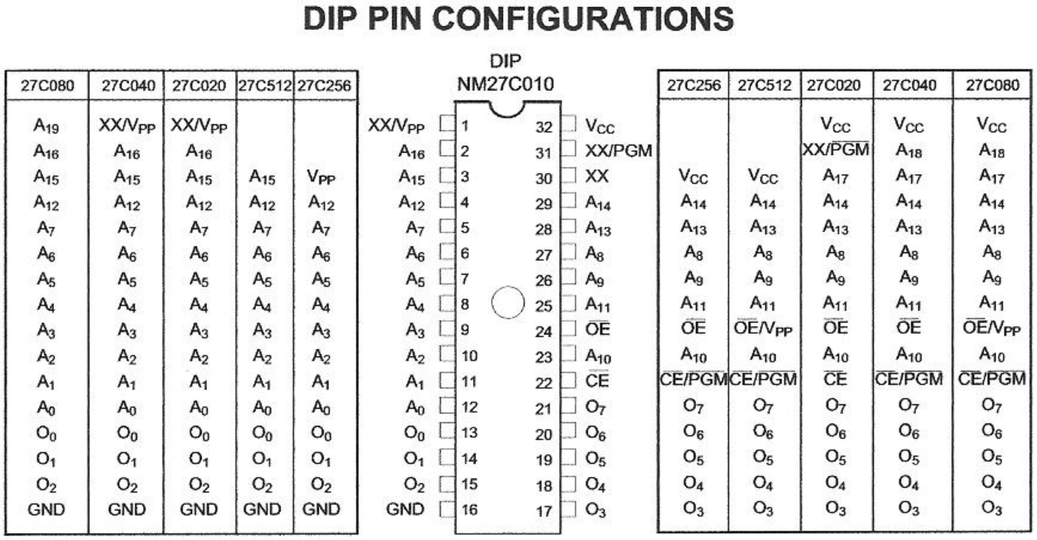
I stopped using the I/O at the Expansion Port because it interfered with some cartridge programs. The C128 has two unused I/Os, pin 12 and pin 14 of U3 (74LS138). I chose pin 12 that is available at $D700 in the I/O section. With the I/O in C128 memory active you can READ or WRITE to address $D700 and the voltage at pin 12 of U3 will transition from high to low. This I/O is used to select one of the possible pages of the EPROM (0-32). All you have to do is put the page number (in HEX format) on the data buss and write to $D700 and the EPROM will switch to the page you selected. For example:

```
LDA #$1B        ; PAGE 27
NOP
NOP
STA $D700       ; TRANSITION PIN 12
```

The NOPs are to allow enough time for the page number to appear on the data buss before you transition pin 12. Another example (this is the way I do it):

```
LDA #$1B        ; PAGE 27
STA $D700
STA $D700
```

HOW IT WORKS



DIP PIN CONFIGURATIONS

27C080	27C040	27C020	27C512	27C256	DIP NM27C010				27C256	27C512	27C020	27C040	27C080
A_{19}	XX/V_{PP}	XX/V_{PP}			XX/V_{PP}	1	32	V_{CC}			V_{CC}	V_{CC}	V_{CC}
A_{16}	A_{16}	A_{16}			A_{16}	2	31	XX/PGM			XX/$\overline{PGM}$	A_{18}	A_{18}
A_{15}	A_{15}	A_{15}	A_{15}	V_{PP}	A_{15}	3	30	XX	V_{CC}	V_{CC}	A_{17}	A_{17}	A_{17}
A_{12}	A_{12}	A_{12}	A_{12}	A_{12}	A_{12}	4	29	A_{14}	A_{14}	A_{14}	A_{14}	A_{14}	A_{14}
A_7	A_7	A_7	A_7	A_7	A_7	5	28	A_{13}	A_{13}	A_{13}	A_{13}	A_{13}	A_{13}
A_6	A_6	A_6	A_6	A_6	A_6	6	27	A_8	A_8	A_8	A_8	A_8	A_8
A_5	A_5	A_5	A_5	A_5	A_5	7	26	A_9	A_9	A_9	A_9	A_9	A_9
A_4	A_4	A_4	A_4	A_4	A_4	8	25	A_{11}	A_{11}	A_{11}	A_{11}	A_{11}	A_{11}
A_3	A_3	A_3	A_3	A_3	A_3	9	24	$\overline{OE}$	$\overline{OE}$	$\overline{OE}$/V_{PP}	$\overline{OE}$	$\overline{OE}$	$\overline{OE}$/V_{PP}
A_2	A_2	A_2	A_2	A_2	A_2	10	23	A_{10}	A_{10}	A_{10}	A_{10}	A_{10}	A_{10}
A_1	A_1	A_1	A_1	A_1	A_1	11	22	$\overline{CE}$	$\overline{CE/PGM}$	$\overline{CE/PGM}$	$\overline{CE}$	$\overline{CE/PGM}$	$\overline{CE/PGM}$
A_0	A_0	A_0	A_0	A_0	A_0	12	21	O_7	O_7	O_7	O_7	O_7	O_7
O_0	O_0	O_0	O_0	O_0	O_0	13	20	O_6	O_6	O_6	O_6	O_6	O_6
O_1	O_1	O_1	O_1	O_1	O_1	14	19	O_5	O_5	O_5	O_5	O_5	O_5
O_2	O_2	O_2	O_2	O_2	O_2	15	18	O_4	O_4	O_4	O_4	O_4	O_4
GND	GND	GND	GND	GND	GND	16	17	O_3	O_3	O_3	O_3	O_3	O_3

Figure 1

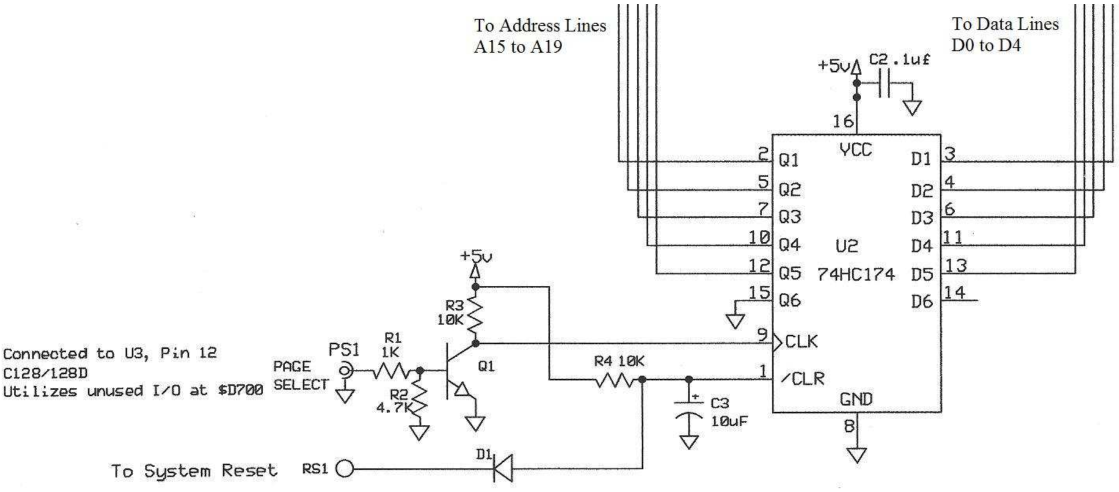


Figure 2

The Internal ROM area will use only 32k of memory space ($8000 - $FFFF). If you look at a schematic of the C128, the Internal ROM area (U36) has only 15 address lines (A0-A14). That is the same as a 32k EPROM (27256). Below is the total number of address lines for the high capacity EPROMs. Refer to Figure 1.

27010	17 adrs lines	A0-A16	1 meg
27020	18 adrs lines	A0-A17	2 meg
27040	19 adrs lines	A0-A18	4 meg
27080	20 adrs lines	A0-A19	8 meg

To use the other areas of the larger EPROMs, we have to control the remaining address lines. I have done that by using a D-type Flip-Flop for each extra address line. Refer to Figure 2. The page number is placed on the data buss and the binary value will appear at the D inputs of the HEX D Flip-Flop (27HC174). When the clock input is transitioned from a low to a high the data at the D inputs will be transferred to the Q outputs and the address lines of the EPROM.

The transistor in figure 2 is used as an inverter because the signal from U3 pin-12 transitions from high to low, the clock input on the HEX D flip-flop requires a low to high transition.

Resistor R4 and C3 are used to hold the Flip-Flops in reset mode during power up. That way the ROM will always come up on Page 0 at power up. (Optional) If you connect RS1 to system reset, the ROM will be reset to Page 0 every time you push the reset button.

Here is how it looks with a 27010 (1 MEG EPROM):

Pg HEX	A16	A15	
Page 00	0	0	32K x 8
Page 01	0	1	32K x 8
Page 02	1	0	32K x 8
Page 03	1	1	32K x 8
Total			128K x 8

Here is how it looks with a 27020 (2 MEG EPROM):

Pg HEX	A17	A16	A15	
Page 00	0	0	0	32K x 8
Page 01	0	0	1	32K x 8
Page 02	0	1	0	32K x 8
Page 03	0	1	1	32K x 8
Page 04	1	0	0	32K x 8
Page 05	1	0	1	32K x 8
Page 06	1	1	0	32K x 8
Page 07	1	1	1	32K x 8
Total				256K x 8

Here is how it looks with a 27040 (4 MEG EPROM):

Pg HEX	A18	A17	A16	A15	
Page 00	0	0	0	0	32K x 8
Page 01	0	0	0	1	32K x 8
Page 02	0	0	1	0	32K x 8
Page 03	0	0	1	1	32K x 8
Page 04	0	1	0	0	32K x 8
Page 05	0	1	0	1	32K x 8
Page 06	0	1	1	0	32K x 8
Page 07	0	1	1	1	32K x 8
Page 08	1	0	0	0	32K x 8
Page 09	1	0	0	1	32K x 8
Page 0A	1	0	1	0	32K x 8
Page 0B	1	0	1	1	32K x 8
Page 0C	1	1	0	0	32K x 8
Page 0D	1	1	0	1	32K x 8
Page 0E	1	1	1	0	32K x 8
Page 0F	1	1	1	1	32K x 8
Total					512K x 8

Here is how it looks with a 27080 (8 MEG EPROM):

Pg HEX	A19	A18	A17	A16	A15	
Page 00	0	0	0	0	0	32K x 8
Page 01	0	0	0	0	1	32K x 8
Page 02	0	0	0	1	0	32K x 8
Page 03	0	0	0	1	1	32K x 8
Page 04	0	0	1	0	0	32K x 8
Page 05	0	0	1	0	1	32K x 8
Page 06	0	0	1	1	0	32K x 8
Page 07	0	0	1	1	1	32K x 8
Page 08	0	1	0	0	0	32K x 8
Page 09	0	1	0	0	1	32K x 8
Page 0A	0	1	0	1	0	32K x 8
Page 0B	0	1	0	1	1	32K x 8
Page 0C	0	1	1	0	0	32K x 8
Page 0D	0	1	1	0	1	32K x 8
Page 0E	0	1	1	1	0	32K x 8
Page 0F	0	1	1	1	1	32K x 8
Page 10	1	0	0	0	0	32K x 8
Page 11	1	0	0	0	1	32K x 8
Page 12	1	0	0	1	0	32K x 8
Page 13	1	0	0	1	1	32K x 8
Page 14	1	0	1	0	0	32K x 8
Page 15	1	0	1	0	1	32K x 8
Page 16	1	0	1	1	0	32K x 8
Page 17	1	0	1	1	1	32K x 8
Page 18	1	1	0	0	0	32K x 8
Page 19	1	1	0	0	1	32K x 8
Page 1A	1	1	0	1	0	32K x 8
Page 1B	1	1	0	1	1	32K x 8
Page 1C	1	1	1	0	0	32K x 8
Page 1D	1	1	1	0	1	32K x 8
Page 1E	1	1	1	1	0	32K x 8
Page 1F	1	1	1	1	1	32K x 8
Total						1024K x 8

AUTO START AND PROGRAM FUNCTION KEYS

The first thing you have to do is make the programs easy to access. The C128 has an auto boot routine during power up and reset for cartridge, Internal ROM and disk (device 8). We will just cover the Internal ROM.

During the power up or reset routine your computer will look for CBM at the beginning of Internal ROM $8000 or $C000. Here is what it will look like:

Bytes	Description
x000-02	Cold start entry
x003-05	Warm start entry
x006	ID byte, $00 for due nothing, anything else for auto-start
x007-09	“CBM” string

Note: x = $8 (middle) or $C (high)

```
$8000   EA EA EA 4C 0A 80 FF 43 42 4D

$8000  NOP                    ;COLD START
$8001  NOP
$8002  NOP
$8003  JMP $800A              ;WARM START
$8006  FF                     ;ID, $00 OR $01
$8007  ‘CBM’                  ;CBM STRING
$800A                         ;START OF PGM
```

It will make note in lower RAM that there is an auto-start in Internal ROM and return to the ROM during the PHENIOX routine and run the program at $800A.

The program at $800A will reprogram one of the Function Keys that will jump to the MENU of all the programs in your Internal ROM. Here is the Merlin listing for the program, you can find the source code on disk:

```
                ***********************************************
                * re-program a function key                   *
                * x reg = f-key no.                           *
                * y reg = length of string                    *
                * acu = pointer to location of string $24/$25 *
                * store bank no. of string loc in $26         *
                ***********************************************

                STLOC     =     $24         ;string location
                BANK      =     $26         ;bank loc. of string
                PGSW      =     $D700       ;switch page of int. ROM
                PFKEY     =     $FF65       ;routine to reprogram
                                            ; f-keys
                CONFIG    =     $FF00       ;change memory
                                            ; configuration

                          ORG   $8000

8000: EA                  NOP
8001: EA                  NOP
8002: EA                  NOP
8003: 4C 0A 80            JMP   PGKEY
8006: FF                  HEX   FF
8007: 43 42 4D            TXT   'cbm'

800A: AD 00 FF  PGKEY     LDA   CONFIG      ;get configuration
800D: 48                  PHA               ;put on stack
800E: A9 06               LDA   #$06        ;int ROM & KERNAL
8010: 8D 00 FF            STA   CONFIG      ;set config
8013: 85 26               STA   BANK        ;store bank no. in $26
8015: A9 36               LDA   #<STR       ;get lo byte of string loc
8017: 85 24               STA   STLOC       ;store in $24
8019: A9 80               LDA   #>STR       ;get hi byte of string loc
801B: 85 25               STA   STLOC+1     ;store in $25
801D: A2 0A               LDX   #$0A        ;Fkey number to prg
                                            ; #$0A is help key
801F: A0 08               LDY   #$08        ;no. of bytes for string
8021: A9 24               LDA   #STLOC      ;loc. of string
8023: 20 65 FF            JSR   PFKEY       ;program f-key
8026: A2 0F               LDX   #$0F        ;no. of bytes to relocate
8028: BD 3E 80  LOOP      LDA   JPMENU,X    ;get byte
802B: 9D A0 10            STA   $10A0,X     ;store byte
802E: CA                  DEX               ;decrease X by 1
802F: 10 F7               BPL   LOOP        ;loop until finished
8031: 68                  PLA               ;get org. config
8032: 8D 00 FF            STA   CONFIG      ;set config
8035: 60                  RTS               ;return
```

```
                *********************************
                * new f-key definition, 8 bytes *
                *********************************

8036: 53 59 53  STR      TXT   'sys4256',0d  ;this will system to
8039: 34 32 35 36 0D
                                          ; jpmenu at loc. $10A0

                ************************************
                * ml routine that will jmp to menu *
                ************************************

803E: A9 06     JPMENU   LDA   #$06       ;internal ROM & kernal
8040: 8D 00 FF           STA   CONFIG     ;set configuration
8043: A9 00              LDA   #$00       ;page 0
8045: 8D 00 D7           STA   PGSW       ;switch page
8048: 8D 00 D7           STA   PGSW
804B: 4C 4E 80           JMP   MENU       ;jmp to internal ROM menu

804E: EA        MENU     NOP              ;append menu here

```

Place the object code for the above routine at the beginning of a 27256 EPROM, plug it into the Internal ROM socket and turn the computer on. It will reprogram the HELP key, when you push the HELP key, the computer will attempt to run the menu if you have one in ROM. The line marked in red is what determines which function key is programmed. Hex numbers $01 - $08 cover the function keys, $09 will reprogram SHIFT RUN/STOP and $0A will reprogram the HELP key

Below is what the MENU in the Megabit C128 Internal ROM looks like. You can find the Merlin source listing on the disk.

```

                JMPLDR   =     $10E0      ;jump to loader
                PRESET   =     $10F0      ;program reset
                WRMSTRT  =     $4003      ;warm basic start
                PRINT    =     $C00C      ;print to screen
                PGSW     =     $D700      ;switch page of Int ROM
                CONFIG   =     $FF00      ;set memory configuration
                STOP     =     $FFE1      ;check stop key
                GETIN    =     $FFE4      ;get a char in acu
                RESET    =     $FFFC      ;hard reset

                         ORG   $1300

1300: A2 FF              LDX   #$FF
1302: 9A                 TXS
1303: A2 16              LDX   #$16       ;internal rom with i/o
1305: 8E 01 D5           STX   $D501      ; at $ff01
1308: E8                 INX              ;internal ROM w/o i/o
1309: 8E 02 D5           STX   $D502      ; at $ff02
```

```
130C: 58                  CLI
130D: D8                  CLD
130E: A5 D7               LDA   $D7           ;ck for 40 or 80 col scrn
1310: F0 0D               BEQ   SCN40         ;40 col scrn
1312: AD 11 D0            LDA   $D011         ;80 col scrn
1315: 29 6F               AND   #$6F          ;switch to fast mode
1317: 8D 11 D0            STA   $D011         ; and blank 40-col
131A: A9 01               LDA   #$01
131C: 8D 30 D0            STA   $D030
131F: A9 00     SCN40     LDA   #$00
1321: 85 C6               STA   $C6
1323: 85 C7               STA   $C7
1325: 85 FD               STA   $FD           ;clr menu counter
1327: A2 0A               LDX   #$0A
1329: BD 29 15  LOOP1     LDA   LDRSTG,X
132C: 9D E0 10            STA   JMPLDR,X
132F: CA                  DEX
1330: 10 F7               BPL   LOOP1
1332: 20 C3 14  NEWSC     JSR   PRTSCN
1335: 20 E1 FF  GETK      JSR   STOP
1338: F0 2D               BEQ   QUIT
133A: 20 E4 FF            JSR   GETIN
133D: F0 F6               BEQ   GETK
133F: C9 20               CMP   #$20
1341: F0 16               BEQ   NXMN          ;next menu
1343: C9 41               CMP   #$41          ;is it below #$41?
1345: 90 EE               BCC   GETK          ;yes, then go back
1347: C9 60               CMP   #$60          ;is it above #$60?
1349: B0 EA               BCS   GETK          ;yes, then go back
134B: 38                  SEC
134C: E9 41               SBC   #$41          ; subtract #$41
134E: 0A                  ASL                 ;multi by 2
134F: AA                  TAX                 ;trans acu to X
1350: BD 83 13            LDA   CMD+1,X       ;get adrs loc hi
1353: 48                  PHA                 ;put on stack
1354: BD 82 13            LDA   CMD,X         ;get adrs loc lo
1357: 48                  PHA                 ;put on stack
1358: 60                  RTS                 ;CMD entry

1359: E6 FD     NXMN      INC   $FD           ;incr menu ctr
135B: A5 FD               LDA   $FD
135D: C9 03               CMP   #$03          ;is it #$03?
135F: D0 D1               BNE   NEWSC         ;no, then prt nxt menu
1361: A9 00     CLR       LDA   #$00
1363: 85 FD               STA   $FD           ;clr menu ctr
1365: F0 CB               BEQ   NEWSC         ;print menu 1

1367: A9 93     QUIT      LDA   #$93          ;clr screen
1369: 20 0C C0            JSR   PRINT
136C: A2 07               LDX   #$07          ;trans basic jump
136E: BD 7A 13  LOOP2     LDA   TOBAS,X       ;to program reset
1371: 9D F0 10            STA   PRESET,X
1374: CA                  DEX
1375: 10 F7               BPL   LOOP2
1377: 4C F0 10            JMP   PRESET

137A: A9 00     TOBAS     LDA   #$00
```

```
137C: 8D 00 FF  77            STA   CONFIG
137F: 4C 03 40  78            JMP   WRMSTRT
                79
1382: F6 13     80   CMD      DA    MER-1      ;merlin 128
1384: FF 13     81            DA    PRO-1      ;promos 2.0
1386: 08 14     82            DA    DE-1       ;my disk editor
1388: 0B 14     83            DA    FK-1       ;function key display
138A: 0E 14     84            DA    VW-1       ;vizawrite 128
138C: 17 14     85            DA    VS-1       ;vizastar 128
138E: 20 14     86            DA    SQR-1      ;seq file reader
1390: 23 14     87            DA    BGEN-1     ;begin & end adrs
1392: 26 14     88            DA    FTFC-1     ;fastrac file copier
1394: 2F 14     89            DA    DIRE-1     ;directory editor
1396: 38 14     90            DA    CO80-1     ;color 80col
1398: 3B 14     91            DA    DM-1       ;basic data maker
139A: 3E 14     92            DA    MON64-1    ;monitor 64
139C: 47 14     93            DA    ZED-1      ;zed 128
139E: 50 14     94            DA    MERGP-1    ;basic merge +
13A0: 53 14     95            DA    MAVFC-1    ;maverick file copy
13A2: 5C 14     96            DA    MAVTE-1    ;maverick track editor
13A4: 65 14     97            DA    SGL41-1    ;single 41 data copy
13A6: 6E 14     98            DA    DUL41-1    ;dual 41 data copy
13A8: 77 14     99            DA    SGLNY-1    ;single nybbler
13AA: 80 14     100           DA    DULNY-1    ;dual nybbler
13AC: 89 14     101           DA    SGL81-1    ;single 81 data copy
13AE: 92 14     102           DA    MAVFT-1    ;maverick file tracer
13B0: 9B 14     103           DA    MAVTS-1    ;maverick track & sector ed
13B2: A4 14     104           DA    VDC-1      ;64k vdc ram test
13B4: AD 14     105           DA    REU-1      ;reu test
13B6: 34 13     106           DA    GETK-1     ;fill
13B8: BF 13     107           DA    BAS8-1     ;basic 8, \ key
13BA: 34 13     108           DA    GETK-1     ;fill
13BC: C7 13     109           DA    SERV-1     ;servant, ^ key
13BE: CF 13     110           DA    KEYD-1     ;keydos, _ key
                111
                112  ***** loaders for 32k programs *****
                113
13C0: 20 D8 13  114  BAS8     JSR   TROM
13C3: A9 0D     115           LDA   #$0D       ;ld page no
13C5: 4C F0 10  116           JMP   PRESET
                117
13C8: 20 D8 13  118  SERV     JSR   TROM
13CB: A9 0E     119           LDA   #$0E       ;ld page no
13CD: 4C F0 10  120           JMP   PRESET
                121
13D0: 20 D8 13  122  KEYD     JSR   TROM
13D3: A9 0F     123           LDA   #$0F       ;ld page no
13D5: 4C F0 10  124           JMP   PRESET
                125
13D8: A9 93     126  TROM     LDA   #$93       ;clr the scrn
13DA: 20 0C C0  127           JSR   PRINT
13DD: A2 0D     128           LDX   #$0D
13DF: BD E9 13  129  LOOP3    LDA   TOROM,X
13E2: 9D F0 10  130           STA   PRESET,X
13E5: CA        131           DEX
13E6: 10 F7     132           BPL   LOOP3
13E8: 60        133           RTS
```

```

13E9: 8D 00 D7  TOROM    STA   PGSW
13EC: 8D 00 D7           STA   PGSW
13EF: A9 00              LDA   #$00
13F1: 8D 00 FF           STA   CONFIG
13F4: 6C FC FF           JMP   (RESET)

                ***** to loaders of smaller programs *****

13F7: A9 01     MER      LDA   #$01       ;ld page no
13F9: A2 00              LDX   #$00       ;ld low byte
13FB: A0 80              LDY   #$80       ;ld high byte
13FD: 4C B7 14           JMP   GO         ;jmp to merlin

1400: A9 03     PRO      LDA   #$03       ;ld page no
1402: A2 00              LDX   #$00       ;ld low byte
1404: A0 90              LDY   #$90       ;ld high byte
1406: 4C B7 14           JMP   GO         ;jmp to promos

1409: 4C 00 B0  DE       JMP   $B000      ;jmp to disk edit

140C: 4C 00 97  FK       JMP   $9700      ;jmp to fkeys

140F: A9 0A     VW       LDA   #$0A       ;ld page no
1411: A2 00              LDX   #$00       ;ld low byte
1413: A0 85              LDY   #$85       ;ld high byte
1415: 4C B7 14           JMP   GO         ;jmp to vizawrite

1418: A9 0C     VS       LDA   #$0C       ;ld page no
141A: A2 00              LDX   #$00       ;ld low byte
141C: A0 90              LDY   #$90       ;ld high byte
141E: 4C B7 14           JMP   GO         ;jmp to vizastar

1421: 4C 00 9D  SQR      JMP   $9D00      ;jmp to seq reader

1424: 4C 00 A4  BGEN     JMP   $A400      ;jmp to begin & end

1427: A9 03     FTFC     LDA   #$03       ;ld page no
1429: A2 00              LDX   #$00       ;ld low byte
142B: A0 91              LDY   #$91       ;ld high byte
142D: 4C B7 14           JMP   GO         ;jmp to ft file copy

1430: A9 02     DIRE     LDA   #$02       ;ld page no
1432: A2 00              LDX   #$00       ;ld low byte
1434: A0 81              LDY   #$81       ;ld high byte
1436: 4C B7 14           JMP   GO         ;jmp to dir edit

1439: 4C 00 9A  CO80     JMP   $9A00      ;jmp to color80

143C: 4C 90 A4  DM       JMP   $A490      ;jmp to data maker

143F: A9 02     MON64    LDA   #$02       ;ld page no
1441: A2 00              LDX   #$00       ;ld low byte
1443: A0 80              LDY   #$80       ;ld high byte
1445: 4C B7 14           JMP   GO         ;jmp to monitor64

1448: A9 02     ZED      LDA   #$02       ;ld page no
```

```
144A: A2 00     191           LDX   #$00       ;ld low byte
144C: A0 82     192           LDY   #$82       ;ld high byte
144E: 4C B7 14  193           JMP   GO         ;jmp to zed 128
                194
1451: 4C 0E 93  195  MERGP    JMP   $930E      ;jmp to merge +
                196
1454: A9 08     197  MAVFC    LDA   #$08       ;ld page no
1456: A2 00     198           LDX   #$00       ;ld low byte
1458: A0 80     199           LDY   #$80       ;ld high byte
145A: 4C B7 14  200           JMP   GO         ;jmp to mav file copy
                201
145D: A9 04     202  MAVTE    LDA   #$04       ;ld page no
145F: A2 00     203           LDX   #$00       ;ld low byte
1461: A0 80     204           LDY   #$80       ;ld high byte
1463: 4C B7 14  205           JMP   GO         ;jmp to mav trk edit
                206
1466: A9 07     207  SGL41    LDA   #$07       ;ld page no
1468: A2 00     208           LDX   #$00       ;ld low byte
146A: A0 90     209           LDY   #$90       ;ld high byte
146C: 4C B7 14  210           JMP   GO         ;jmp to 41 data copy
                211
146F: A9 06     212  DUL41    LDA   #$06       ;ld page no
1471: A2 00     213           LDX   #$00       ;ld low byte
1473: A0 90     214           LDY   #$90       ;ld high byte
1475: 4C B7 14  215           JMP   GO         ;jmp to dual data copy
                216
1478: A9 05     217  SGLNY    LDA   #$05       ;ld page no
147A: A2 00     218           LDX   #$00       ;ld low byte
147C: A0 90     219           LDY   #$90       ;ld high byte
147E: 4C B7 14  220           JMP   GO         ;jmp to sgl nybbler
                221
1481: A9 05     222  DULNY    LDA   #$05       ;ld page no
1483: A2 00     223           LDX   #$00       ;ld low byte
1485: A0 91     224           LDY   #$91       ;ld high byte
1487: 4C B7 14  225           JMP   GO         ;jmp to dual nybbler
                226
148A: A9 04     227  SGL81    LDA   #$04       ;ld page no
148C: A2 00     228           LDX   #$00       ;ld low byte
148E: A0 81     229           LDY   #$81       ;ld high byte
1490: 4C B7 14  230           JMP   GO         ;jmp to 81 data copy
                231
1493: A9 06     232  MAVFT    LDA   #$06       ;ld page no
1495: A2 00     233           LDX   #$00       ;ld low byte
1497: A0 91     234           LDY   #$91       ;ld high byte
1499: 4C B7 14  235           JMP   GO         ;jmp to file tracer
                236
149C: A9 07     237  MAVTS    LDA   #$07       ;ld page no
149E: A2 00     238           LDX   #$00       ;ld low byte
14A0: A0 91     239           LDY   #$91       ;ld high byte
14A2: 4C B7 14  240           JMP   GO         ;jmp to trk & sec edit
                241
14A5: A9 08     242  VDC      LDA   #$08       ;ld page no
14A7: A2 00     243           LDX   #$00       ;ld low byte
14A9: A0 81     244           LDY   #$81       ;ld high byte
14AB: 4C B7 14  245           JMP   GO         ;jmp to vdc ram test
                246
14AE: A9 08     247  REU      LDA   #$08       ;ld page no
```

```
14B0: A2 00     248          LDX   #$00        ;ld low byte
14B2: A0 82     249          LDY   #$82        ;ld high byte
14B4: 4C B7 14  250          JMP   GO          ;jmp to reu test
                251
14B7: 8D E1 10  252  GO      STA   $10E1
14BA: 8E E9 10  253          STX   $10E9
14BD: 8C EA 10  254          STY   $10EA
14C0: 4C E0 10  255          JMP   $10E0       ;jmp to loader
                256
14C3: A5 FD     257  PRTSCN  LDA   $FD
14C5: C9 00     258          CMP   #$00
14C7: F0 0B     259          BEQ   MU1         ;menu 1
14C9: C9 01     260          CMP   #$01
14CB: F0 12     261          BEQ   MU2         ;menu 2
14CD: C9 02     262          CMP   #$02
14CF: F0 19     263          BEQ   MU3         ;menu 3
14D1: 4C 61 13  264          JMP   CLR
                265
14D4: A9 34     266  MU1     LDA   #<MENU1     ;get lo byte of menu1
14D6: 85 FA     267          STA   $FA         ;store in $fa
14D8: A9 15     268          LDA   #>MENU1     ;get hi byte of menu1
14DA: 85 FB     269          STA   $FB         ;store in $fb
14DC: 4C F2 14  270          JMP   PRT         ;prt menu1
                271
14DF: A9 CC     272  MU2     LDA   #<MENU2
14E1: 85 FA     273          STA   $FA
14E3: A9 16     274          LDA   #>MENU2
14E5: 85 FB     275          STA   $FB
14E7: 4C F2 14  276          JMP   PRT
                277
14EA: A9 64     278  MU3     LDA   #<MENU3
14EC: 85 FA     279          STA   $FA
14EE: A9 18     280          LDA   #>MENU3
14F0: 85 FB     281          STA   $FB
14F2: A0 00     282  PRT     LDY   #$00
14F4: B1 FA     283  LOOP4   LDA   ($FA),Y
14F6: F0 10     284          BEQ   SKIP2
14F8: C8        285          INY
14F9: C0 00     286          CPY   #$00
14FB: D0 02     287          BNE   SKIP
14FD: E6 FB     288          INC   $FB
14FF: C9 FF     289  SKIP    CMP   #$FF
1501: F0 06     290          BEQ   SKIP1
1503: 20 0C C0  291          JSR   PRINT
1506: D0 EC     292          BNE   LOOP4
1508: 60        293  SKIP2   RTS
                294
1509: 84 FC     295  SKIP1   STY   $FC
150B: A5 D7     296          LDA   $D7
150D: D0 01     297          BNE   SKIP5
150F: C8        298          INY
1510: B1 FA     299  SKIP5   LDA   ($FA),Y
1512: AA        300          TAX
1513: E0 00     301          CPX   #$00
1515: F0 08     302          BEQ   NOSPC
1517: A9 20     303          LDA   #$20
1519: 20 0C C0  304  NXSP    JSR   PRINT
```

```
151C: CA        305          DEX
151D: 10 FA     306          BPL   NXSP
151F: E6 FC     307  NOSPC    INC   $FC
1521: E6 FC     308          INC   $FC
1523: A4 FC     309          LDY   $FC
1525: D0 CD     310          BNE   LOOP4
1527: F0 CB     311          BEQ   LOOP4
                312
                313  ***** routine to loaders *****
                314
1529: A9 00     315  LDRSTG   LDA   #$00
152B: 8D 00 D7  316          STA   PGSW
152E: 8D 00 D7  317          STA   PGSW
1531: 4C 00 00  318          JMP   $0000
                319
                320  ************************************************
                321  * ff = end of sentence, next is 80-col spaces, *
                322  * next is 40-col spaces, 12 = reverse print    *
                323  * 00 before ff = end of menu                   *
                324  ************************************************
                325
1534: 93 8E 0D  326  MENU1    HEX   93,8E,0D,0D,FF,1E,0A,12
153C: 20 49 4E  327          TXT   ' internal rom menu '0d,0d,ff,20,0c
1554: 42 59 20  328          TXT   'by d.c. newbury'0d,0d,ff,22,0e
1568: 4D 45 4E  329          TXT   'menu 1 of 3'0d,0d,ff,14,00
                330
1578: 41 29 20  331          TXT   'a) merlin c128      '
158C: 42 29 20  332          TXT   'b) promos 2.0       '0d,ff,14,00
                333
15A4: 43 29 20  334          TXT   'c) my disk editor   '
15B8: 44 29 20  335          TXT   'd) function keys    '0d,ff,14,00
                336
15D0: 45 29 20  337          TXT   'e) viza write 128   '
15E4: 46 29 20  338          TXT   'f) viza star 128    '0d,ff,14,00
                339
15FC: 47 29 20  340          TXT   'g) seq reader 128   '
1610: 48 29 20  341          TXT   'h) begin & end adrs '0d,ff,14,00
                342
1628: 49 29 20  343          TXT   'i) fastrac filecopy '
163C: 4A 29 20  344          TXT   'j) directory editor '0d,ff,14,00
                345
1654: 4B 29 20  346          TXT   'k) color 80 col     '
1668: 4C 29 20  347          TXT   'l) basic data maker '0d,ff,14,00
                348
1680: 4D 29 20  349          TXT   'm) monitor 64       '0d,0d,ff,1e,0a,12
                350
169A: 20 50 52  351          TXT   ' press stop to exit '0d,ff,1c,08,12
16B3: 20 50 52  352          TXT   ' press space next menu '0d,00
                353
                354
16CC: 93 8E 0D  355  MENU2    HEX   93,8E,0D,0D,FF,1E,0A,12
16D4: 20 49 4E  356          TXT   ' internal rom menu '0d,0d,ff,20,0c
16EC: 42 59 20  357          TXT   'by d.c. newbury'0d,0d,ff,22,0e
1700: 4D 45 4E  358          TXT   'menu 2 of 3'0d,0d,ff,14,00
                359
1710: 4E 29 20  360          TXT   'n) zed 128          '
1724: 4F 29 20  361          TXT   'o) basic merge +    '0d,ff,14,00
```

```
                362
173C: 50 29 20  363           TXT   'p) mav file copy    '
1750: 51 29 20  364           TXT   'q) mav track editor '0d,ff,14,00
                365
1768: 52 29 20  366           TXT   'r) sgl 41 data copy '
177C: 53 29 20  367           TXT   's) dul 41 data copy '0d,ff,14,00
                368
1794: 54 29 20  369           TXT   't) single nybbler   '
17A8: 55 29 20  370           TXT   'u) dual nybbler     '0d,ff,14,00
                371
17C0: 56 29 20  372           TXT   'v) sgl 81 data copy '
17D4: 57 29 20  373           TXT   'w) mav file tracer  '0d,ff,14,00
                374
17EC: 58 29 20  375           TXT   'x) mav trk&sec edit '
1800: 59 29 20  376           TXT   'y) 64k vdc ram test '0d,ff,14,00
                377
1818: 5A 29 20  378           TXT   'z) reu test         '0d,0d,ff,1e,0a,12
                379
1832: 20 50 52  380           TXT   ' press stop to exit '0d,ff,1c,08,12
184B: 20 50 52  381           TXT   ' press space next menu '0d,00
                382
                383
1864: 93 8E 0D  384  MENU3    HEX   93,8E,0D,0D,FF,1E,0A,12
186C: 20 49 4E  385           TXT   ' internal rom menu '0d,0d,ff,20,0c
1884: 42 59 20  386           TXT   'by d.c. newbury'0d,0d,ff,22,0e
1898: 4D 45 4E  387           TXT   'menu 3 of 3'0d,0d,ff,14,00
                388
18A8: 5C 29 20  389           TXT   '£) basic 8          '
18BC: 5E 29 20  390           TXT   '↑) servant          '0d,ff,14,00
                391
18D4: 5F 29 20  392           TXT   '←) key dos          '
18E8: 20 20 20  393           TXT   '                    '0d,ff,14,00
                394
1900: 20 20 20  395           TXT   '                    '
1914: 20 20 20  396           TXT   '                    '0d,ff,14,00
                397
192C: 20 20 20  398           TXT   '                    '
1940: 20 20 20  399           TXT   '                    '0d,ff,14,00
                400
1958: 20 20 20  401           TXT   '                    '
196C: 20 20 20  402           TXT   '                    '0d,ff,14,00
                403
1984: 20 20 20  404           TXT   '                    '
1998: 20 20 20  405           TXT   '                    '0d,ff,14,00
                406
19B0: 20 20 20  407           TXT   '                    '0d,0d,ff,1e,0a,12
                408
19CA: 20 50 52  409           TXT   ' press stop to exit '0d,ff,1c,08,12
19E3: 20 50 52  410           TXT   ' press space next menu '0d,00
                411
```

You can load and run C128 programs or C64 programs from the Internal ROM area. But when you quit the C64 programs you will have to reset the computer to get back into C128 mode.

You can run BASIC or ML programs from Internal ROM, C128 or C64. We will look at loaders for the different types of programs. The C64 programs will have to be transferred to RAM first, then switched to C64 mode. You cannot get access to Internal ROM from C64 mode.

There is something else that I need to mention about using programs in C64 mode. If the program is a large program that extends past the start of BASIC ($A000) or loads into the beginning of that area, your program will be corrupted when you switch to C64 mode.

When the C64 is initializing it will check RAM to find the end of basic RAM. When it bumps into ROM at $A000, $9FFF is the end of BASIC RAM. It checks RAM by saving a byte at each location, stores a byte $55 and then checks to see if it is $55 and then puts the original byte back into the RAM location. When it gets to the edge of ROM ($A000), it tries to store byte $55 at that location and it will, only in RAM. When it reads that location it will read byte $94 instead of byte $55. It will stop checking RAM and move on without restoring the original byte at RAM location $A000. If there is important data at that location, your program will crash when it gets there. So keep that in mind when loading and starting C64 programs.

The next program is a loader used to transfer ZED 128 to RAM from Internal ROM and start the program with a basic one liner. The program is in two parts. The first part will transfer the loader to RAM at $0C00, jump to the RAM loader and continue on.

At the end of the listing (line 92) is where the data is that tells the loader where the program is in ROM ($85BF - $C814) and where in RAM ($1C01) it's to be loaded.

When finished transferring the program (line 74), it will set the computer up to run the program. Starting at line 75 it will switch memory to RAM 0 and switch in all system ROMs. Then switch Internal ROM to page 0, if you don't have the reset option of the adapter hooked up then you will have to switch in page 0 at the end of each loader before you start the program. That way when you push the reset button the Internal ROM will re-program the function key.

Next ZED 128 requires that the pre-configuration registers be restored to default values, then sets device 8 as the default disk drive. At line 90 you will see the basic one liner (sys7200 and return). To run it you will have to put the low byte of the address location – 1 in the X register and the high byte of the address location in the Y register and jump to $AFA5 (execute a line in basic). See the source listing at line 86, X = $7D and Y = $0C that would mean that the one liner is at $0C7E.

```

                ********************************
                *  LOADER FOR ZED 128          *
                ********************************
                *
                         ORG   $8200
                *
                FROM     =     $60        ;loc at start of ROM
                TO       =     $62        ;load to start of RAM
                END      =     $64        ;loc at end of ROM
                DRV      =     $BA        ;disk drive number
                STBAS    =     $AFA5      ;execute a line
                PRTSCN   =     $C00C      ;print char to screen
                PCRA     =     $D501      ;mem pre-config A reg
                PCRB     =     $D502      ;mem pre-config B reg
                PGSW     =     $D700      ;int ROM page switch
                CONFIG   =     $FF00      ;mem configuration reg
                LCRA     =     $FF01      ;mem load-config A reg
                LCRB     =     $FF02      ;mem load-config B reg

8200: A9 92              LDA   #RAMLD+LAST;trans loader routine
8202: 85 FA              STA   $FA        ; to RAM at $0C00
8204: A2 00              LDX   #$00
8206: BD 14 82  NXTRAN   LDA   BEGIN+3,X
8209: 9D 00 0C           STA   RAMLD,X
820C: E8                 INX
820D: E4 FA              CPX   $FA
820F: D0 F5              BNE   NXTRAN
8211: 4C 00 0C  BEGIN    JMP   RAMLD      ;jump to loader routine

                         ORG   $0C00

0C00: A9 93     RAMLD    LDA   #$93       ;clear screen
0C02: 20 0C C0           JSR   PRTSCN
0C05: 78                 SEI              ;set the interupt
0C06: A2 00              LDX   #0         ;clear information indexer
0C08: 8D 01 FF  NXPG     STA   LCRA       ;RAM 0, Int ROM, I/O
0C0B: BD 90 0C           LDA   PGNO,X     ;get first rom page no.
0C0E: 8D 00 D7           STA   PGSW       ;select page at $d700
0C11: 8D 00 D7           STA   PGSW
0C14: BD 8A 0C           LDA   FROMLO,X   ;from rom low byte
0C17: 85 60              STA   FROM
0C19: BD 8B 0C           LDA   FROMHI,X   ;from rom high byte
0C1C: 85 61              STA   FROM+1
0C1E: BD 8C 0C           LDA   TOLO,X     ;to ram low byte
0C21: 85 62              STA   TO
0C23: BD 8D 0C           LDA   TOHI,X     ;to ram high byte
0C26: 85 63              STA   TO+1
0C28: BD 8E 0C           LDA   ENDLO,X    ;end adrs rom low byte
0C2B: 85 64              STA   END
0C2D: BD 8F 0C           LDA   ENDHI,X    ;end adrs rom high byte
0C30: 85 65              STA   END+1
0C32: A0 00              LDY   #$00
0C34: 8D 02 FF           STA   LCRB       ;RAM 0, Int ROM
0C37: B1 60     LOOP1    LDA   (FROM),Y   ;get byte from rom
0C39: 91 62              STA   (TO),Y     ;store byte in ram
0C3B: A5 61              LDA   FROM+1     ;ck for end lo byte
```

```
0C3D: C5 65     59             CMP   END+1
0C3F: D0 06     60             BNE   SKIP1       ;not end, then cont.
0C41: A5 60     61             LDA   FROM        ;ck for end hi byte
0C43: C5 64     62             CMP   END
0C45: F0 0E     63             BEQ   SKIP3       ;if end, ck for nx page
0C47: E6 60     64   SKIP1     INC   FROM        ;inc from lo
0C49: D0 02     65             BNE   SKIP2
0C4B: E6 61     66             INC   FROM+1      ;inc from hi
0C4D: E6 62     67   SKIP2     INC   TO          ;inc to lo
0C4F: D0 E6     68             BNE   LOOP1
0C51: E6 63     69             INC   TO+1        ;inc to hi
0C53: D0 E2     70             BNE   LOOP1       ;get and store nx byte
0C55: E8        71   SKIP3     INX
0C56: BD 90 0C  72             LDA   PGNO,X      ;get next page
0C59: C9 FF     73             CMP   #$FF        ;ck for end of transfer
0C5B: D0 AB     74             BNE   NXPG        ;if not $ff, jmp to nx page
0C5D: A9 00     75             LDA   #0          ;switch to
0C5F: 8D 00 FF  76             STA   CONFIG      ; RAM with all sys ROMs
0C62: 8D 00 D7  77             STA   PGSW        ; page 0 Int ROM
0C65: 8D 00 D7  78             STA   PGSW
0C68: A9 3F     79             LDA   #$3F        ;restore pre-conf regs
0C6A: 8D 01 D5  80             STA   PCRA
0C6D: A9 7F     81             LDA   #$7F
0C6F: 8D 02 D5  82             STA   PCRB
0C72: A9 08     83             LDA   #$08        ;set device 8 as
0C74: 85 BA     84             STA   DRV         ; default drive
0C76: 58        85             CLI               ;clr the interrupt
0C77: A2 7D     86             LDX   #<BST-1     ;lo adrs -1 of start of bas
0C79: A0 0C     87             LDY   #>BST       ;hi adrs of start of bas
0C7B: 4C A5 AF  88             JMP   STBAS       ;jump execute a line ($AFA5)
                89
0C7E: 53 59 53  90   BST       TXT   'sys7200',00,0d,00,00,00
0C81: 37 32 30 30 00 0D 00 00
0C89: 00
                91
                92   *** TRANSFER INFORMATION FOR ZED ***
                93   *** $FF INDICATES END OF TRANSFER ***
                94
0C8A: BF        95   FROMLO    HEX   BF
0C8B: 85        96   FROMHI    HEX   85
0C8C: 01        97   TOLO      HEX   01
0C8D: 1C        98   TOHI      HEX   1C
0C8E: 14        99   ENDLO     HEX   14
0C8F: C8        100  ENDHI     HEX   C8
0C90: 02 FF     101  PGNO      HEX   02,FF
                102  LAST
```

The next loader is basically the same as the previous loader, except it does not use BASIC start. Beginning at line 70 the program will switch in all system ROMs and switch to Page 0 of the Internal ROM. Then clear the interrupt and jump to the beginning of the program at $2000.

```
                2
                3    ********************************
                4    *  LOADER FOR MERLIN 128       *
                5    ********************************
                6    *
                7             ORG   $8000
                8    *
                9    FROM     =     $60
                10   TO       =     $62
                11   END      =     $64
                12   PRTSCN   =     $C00C
                13   PGSW     =     $D700
                14   CONFIG   =     $FF00
                15   LCRA     =     $FF01
                16   LCRB     =     $FF02
                17
8000: A9 6E     18            LDA   #RAMLD+LAST
8002: 85 FA     19            STA   $FA
8004: A2 00     20            LDX   #$00
8006: BD 14 80  21   NXTRAN   LDA   BEGIN+3,X
8009: 9D 00 0C  22            STA   RAMLD,X
800C: E8        23            INX
800D: E4 FA     24            CPX   $FA
800F: D0 F5     25            BNE   NXTRAN
8011: 4C 00 0C  26   BEGIN    JMP   RAMLD
                27
                28            ORG   $0C00
                29
0C00: A9 93     30   RAMLD    LDA   #$93       ;clear screen
0C02: 20 0C C0  31            JSR   PRTSCN
0C05: 78        32            SEI
0C06: A2 00     33            LDX   #0         ;clear information indexer
0C08: BD 6C 0C  34            LDA   PGNO,X     ;get first rom page no.
0C0B: 8D 01 FF  35   NXPG     STA   LCRA       ;internal rom w/ io
0C0E: 8D 00 D7  36            STA   PGSW       ;select page at $d700
0C11: BD 66 0C  37            LDA   FROMLO,X   ;from rom low byte
0C14: 85 60     38            STA   FROM
0C16: BD 67 0C  39            LDA   FROMHI,X   ;from rom high byte
0C19: 85 61     40            STA   FROM+1
0C1B: BD 68 0C  41            LDA   TOLO,X     ;to ram low byte
0C1E: 85 62     42            STA   TO
0C20: BD 69 0C  43            LDA   TOHI,X     ;to ram high byte
0C23: 85 63     44            STA   TO+1
0C25: BD 6A 0C  45            LDA   ENDLO,X    ;end adrs rom low byte
0C28: 85 64     46            STA   END
0C2A: BD 6B 0C  47            LDA   ENDHI,X    ;end adrs rom high byte
0C2D: 85 65     48            STA   END+1
0C2F: A0 00     49            LDY   #$00
0C31: 8D 02 FF  50            STA   LCRB       ;all int rom/ram 0
0C34: B1 60     51   LOOP1    LDA   (FROM),Y   ;get byte from rom
0C36: 91 62     52            STA   (TO),Y     ;store byte in ram
0C38: A5 61     53            LDA   FROM+1     ;ck for end lo byte
```

```
0C3A: C5 65     54          CMP   END+1
0C3C: D0 06     55          BNE   SKIP1      ;not end, then cont.
0C3E: A5 60     56          LDA   FROM       ;ck for end hi byte
0C40: C5 64     57          CMP   END
0C42: F0 0E     58          BEQ   SKIP3      ;if end, then ck for nx page
0C44: E6 60     59   SKIP1  INC   FROM       ;inc from lo
0C46: D0 02     60          BNE   SKIP2
0C48: E6 61     61          INC   FROM+1     ;inc from hi
0C4A: E6 62     62   SKIP2  INC   TO         ;inc to lo
0C4C: D0 E6     63          BNE   LOOP1
0C4E: E6 63     64          INC   TO+1       ;inc to hi
0C50: D0 E2     65          BNE   LOOP1      ;get and store nx byte
0C52: E8        66   SKIP3  INX
0C53: BD 6C 0C  67          LDA   PGNO,X     ;get next page
0C56: C9 FF     68          CMP   #$FF       ;ck for end of transfer
0C58: D0 B1     69          BNE   NXPG       ;if not $ff, jmp to nx page
0C5A: A9 00     70          LDA   #0         ;switch to sys ROMs
0C5C: 8D 00 FF  71          STA   CONFIG
0C5F: 8D 00 D7  72          STA   PGSW       ;internal ROM pg to 0
0C62: 58        73          CLI
0C63: 4C 00 1C  74          JMP   $2000      ;start Merlin 128
                75
                76   *** TRANSFER INFORMATION FOR MERLIN ***
                77   *** $FF INDICATES END OF TRANSFER ***
                78
0C66: 00        79   FROMLO HEX   00
0C67: 81        80   FROMHI HEX   81
0C68: 40        81   TOLO   HEX   40
0C69: 1A        82   TOHI   HEX   1A
0C6A: 49        83   ENDLO  HEX   49
0C6B: F0        84   ENDHI  HEX   F0
0C6C: 01 FF     85   PGNO   HEX   01,FF
                86   LAST
```

The next loader is for VizaWrite Word Processor, you’ll notice it has two loaders. The first one is for the main program which is quite large. It loads from $0B00 to $FEDF and it takes two 32K ROM pages to hold it all. The next loader will load a small amount of code that goes from $0400 to $089A.

VizaWrite and VizaStar both have a small amount of ROM code that is plugged into the cartridge port. It works like a dongle, if it’s not there, then the program will crash. I looked through the code of the main program and found where the program checks for the cartridge ROM, changed it to look at Internal ROM instead. So, the last thing the second loader will do before starting the program ($0B1A) is to switch in the page (line 59) that has the ROM code at $8000 (Page 3).

```

                ************************************
                *  VizaWrite LOADER FOR PAGED EPROM  *
                ************************************
                *
                         ORG   $8500
                *
                FROM     =     $60
                TO       =     $62
                END      =     $64
                PGSW     =     $D700      ;page select
                CONFIG   =     $FF00
                LCRA     =     $FF01
                LCRB     =     $FF02
                SWAPPER  =     $FF5F      ;40,80-col screen swapper
                PRIMM    =     $FF7D      ;print text to screen routine
                SECLDR   =     $8700      ;adrs for $0400 ldr

8500: A9 06              LDA   #$06       ;RAM 0 & Int ROM,I/O,kernal
8502: 8D 00 FF           STA   CONFIG
8505: A5 D7              LDA   $D7        ;ck for 80-col
8507: D0 03              BNE   NO40
8509: 20 5F FF           JSR   SWAPPER    ;swap from 40 to 80-col
850C: 20 7D FF  NO40     JSR   PRIMM      ;print copyright notice
850F: 93 0D 0D           HEX   93,0D,0D,0D,0D,0D
8512: 0D 0D 0D
8515: 09 09 09           HEX   09,09,09,09
8518: 09
8519: 20 20 56           TXT   '  viza'0d,0d,09,09,09,09
851C: 49 5A 41 0D 0D 09 09 09
8524: 09
8525: 53 4F 46           TXT   'software'0d,0d,09,09,09,09
8528: 54 57 41 52 45 0D 0D 09
8530: 09 09 09
8533: 20 20 31           TXT   '  128'0d,0d,0d,09,09,09,09
8536: 32 38 0D 0D 0D 09 09 09
853E: 09
853F: 56 49 5A           TXT   'vizawrite'0d,0d,09,09,09
8542: 41 57 52 49 54 45 0D 0D
854A: 09 09 09
854D: 20 20 20           TXT   '     by kelvin lacy'0d,0d,0d,09,09
8550: 20 20 42 59 20 4B 45 4C
8558: 56 49 4E 20 4C 41 43 59
8560: 0D 0D 0D 09 09
8565: 20 20 20           TXT   '    copyright 1985 viza software
ltd.'0d,00
8568: 20 43 4F 50 59 52 49 47
8570: 48 54 20 31 39 38 35 20
8578: 56 49 5A 41 20 53 4F 46
8580: 54 57 41 52 45 20 4C 54
8588: 44 2E 0D 00
```

```
858C: A2 00      35             LDX    #$00         ;transfer loader to $0400
858E: BD 9A 85   36   NXTRAN    LDA    BEGIN+3,X
8591: 9D 00 04   37             STA    $0400,X
8594: E8         38             INX
8595: D0 F7      39             BNE    NXTRAN
8597: 4C 00 04   40   BEGIN     JMP    RAMLD        ;jmp to loader
                 41
                 42             ORG    $0400
                 43
0400: 78         44   RAMLD     SEI                 ;set the interrupt
0401: A2 00      45             LDX    #$00         ;clear information indexer
0403: BD 6F 04   46             LDA    PGNO,X       ;get first rom page no.
0406: 8D 01 FF   47   NXPG      STA    LCRA
0409: 8D 00 D7   48             STA    PGSW         ;select page at $D700
040C: BD 63 04   49             LDA    FROMLO,X     ;from rom low byte
040F: 85 60      50             STA    FROM
0411: BD 65 04   51             LDA    FROMHI,X     ;from rom high byte
0414: 85 61      52             STA    FROM+1
0416: BD 67 04   53             LDA    TOLO,X       ;to ram low byte
0419: 85 62      54             STA    TO
041B: BD 69 04   55             LDA    TOHI,X       ;to ram high byte
041E: 85 63      56             STA    TO+1
0420: BD 6B 04   57             LDA    ENDLO,X      ;end adrs rom low byte
0423: 85 64      58             STA    END
0425: BD 6D 04   59             LDA    ENDHI,X      ;end adrs rom high byte
0428: 85 65      60             STA    END+1
042A: 8D 02 FF   61             STA    LCRB
042D: A0 00      62             LDY    #$00
042F: B1 60      63   LOOP1     LDA    (FROM),Y     ;get byte from rom
0431: 91 62      64             STA    (TO),Y       ;store byte in ram
0433: A5 61      65             LDA    FROM+1       ;ck for end lo byte
0435: C5 65      66             CMP    END+1
0437: D0 06      67             BNE    SKIP1        ;not end, then cont.
0439: A5 60      68             LDA    FROM         ;ck for end hi byte
043B: C5 64      69             CMP    END
043D: F0 0E      70             BEQ    SKIP3        ;if end, then ck for nx page
043F: E6 60      71   SKIP1     INC    FROM         ;inc from lo
0441: D0 02      72             BNE    SKIP2
0443: E6 61      73             INC    FROM+1       ;inc from hi
0445: E6 62      74   SKIP2     INC    TO           ;inc to lo
0447: D0 E6      75             BNE    LOOP1
0449: E6 63      76             INC    TO+1         ;inc to hi
044B: D0 E2      77             BNE    LOOP1        ;get and store nx byte
044D: E8         78   SKIP3     INX
044E: BD 6F 04   79             LDA    PGNO,X       ;get next page
0451: C9 FF      80             CMP    #$FF         ;ck for end of transfer
0453: D0 B1      81             BNE    NXPG         ;if not $ff, then jmp to nx
page
0455: A9 06      82             LDA    #$06         ;switch cr to RAM 0 & Int ROM
0457: 8D 00 FF   83             STA    CONFIG
045A: 58         84             CLI
045B: A9 0A      85             LDA    #$0A         ;switch to page for $0400 ldr
045D: 8D 00 D7   86             STA    PGSW
0460: 4C 00 87   87             JMP    SECLDR       ;jmp to $0400 loader
                 88
```

```
                *** TRANSFER INFORMATION FOR VizaWrite ***
                *** $FF INDICATES END OF TRANSFER ***

0463: 00 1B     FROMLO   HEX   00,1B
0465: 80 8A     FROMHI   HEX   80,8A
0467: 00 FE     TOLO     HEX   00,FE
0469: 0B 89     TOHI     HEX   0B,89
046B: FD FD     ENDLO    HEX   FD,FD
046D: FE FE     ENDHI    HEX   FE,FE
046F: 09 0A FF  PGNO     HEX   09,0A,FF

```

```

                ***************************************
                *  VizaWrite LOADER FOR PAGED EPROM  *
                ***************************************
                *
                         ORG   $8700
                *
                FROM     =     $60
                TO       =     $62
                END      =     $64
                PGSW     =     $D700

8700: A2 00              LDX   #$00
8702: BD 0E 87  NXTRAN   LDA   BEGIN+3,X
8705: 9D 00 09           STA   $0900,X
8708: E8                 INX
8709: D0 F7              BNE   NXTRAN
870B: 4C 00 09  BEGIN    JMP   RAMLD

                         ORG   $0900

0900: A2 00     RAMLD    LDX   #$00       ;clear information indexer
0902: BD 63 09           LDA   PGNO,X     ;get first rom page no.
0905: 8D 00 D7  NXPG     STA   PGSW       ;select page at $d700
0908: 8D 00 D7           STA   PGSW
090B: BD 5D 09           LDA   FROMLO,X   ;from rom low byte
090E: 85 60              STA   FROM
0910: BD 5E 09           LDA   FROMHI,X   ;from rom high byte
0913: 85 61              STA   FROM+1
0915: BD 5F 09           LDA   TOLO,X     ;to ram low byte
0918: 85 62              STA   TO
091A: BD 60 09           LDA   TOHI,X     ;to ram high byte
091D: 85 63              STA   TO+1
091F: BD 61 09           LDA   ENDLO,X    ;end adrs rom low byte
0922: 85 64              STA   END
0924: BD 62 09           LDA   ENDHI,X    ;end adrs rom high byte
0927: 85 65              STA   END+1
0929: A0 00              LDY   #$00
092B: B1 60     LOOP1    LDA   (FROM),Y   ;get byte from rom
092D: 91 62              STA   (TO),Y     ;store byte in ram
092F: A5 61              LDA   FROM+1     ;ck for end lo byte
0931: C5 65              CMP   END+1
0933: D0 06              BNE   SKIP1      ;not end, then cont.
```

```
0935: A5 60               LDA   FROM        ;ck for end hi byte
0937: C5 64               CMP   END
0939: F0 0E               BEQ   SKIP3       ;if end, then ck for nx page
093B: E6 60     SKIP1     INC   FROM        ;inc from lo
093D: D0 02               BNE   SKIP2
093F: E6 61               INC   FROM+1      ;inc from hi
0941: E6 62     SKIP2     INC   TO          ;inc to lo
0943: D0 E6               BNE   LOOP1
0945: E6 63               INC   TO+1        ;inc to hi
0947: D0 E2               BNE   LOOP1       ;get and store nx byte
0949: E8        SKIP3     INX
094A: BD 63 09            LDA   PGNO,X      ;get next page
094D: C9 FF               CMP   #$FF        ;ck for end of transfer
094F: D0 B4               BNE   NXPG        ;if not $ff, jmp to nx page
0951: A9 03               LDA   #$03        ;switch to page for int-cart
0953: 8D 00 D7            STA   PGSW
0956: 8D 00 D7            STA   PGSW
0959: 78                  SEI
095A: 4C 1A 0B            JMP   $0B1A       ;jmp to start pgm

                *** TRANSFER INFORMATION FOR VizaWrite ***
                *** $FF INDICATES END OF TRANSFER ***

095D: 00        FROMLO    HEX   00
095E: 80        FROMHI    HEX   80
095F: 00        TOLO      HEX   00
0960: 04        TOHI      HEX   04
0961: 9A        ENDLO     HEX   9A
0962: 84        ENDHI     HEX   84
0963: 0A FF     PGNO      HEX   0A,FF
```

The next loader is for a program that runs in C64 mode, Monitor 64. In the first part of the loader, the code for the monitor is transferred to RAM at $C000. Then the auto-run routine is transferred to $8000. When both programs are in place, a small routine will be placed at $10F0 and then the loader will jump to the routine. All system ROMs are set, page 0 of the Internal ROM is switched in and then the program jumps to Kernal routine GO64.

When the C128 goes to C64 mode it will start at the reset vector ($FCE2). The first thing it will do is Set the Interrupt, clear the Stack, Clear the Decimal and then check for “CBM80” at $8004 - $8008. If it finds CBM80, then it will jump to the vector at $8000. At $8009 the code will setup C64 mode and stop short of printing the opening screen and printing the READY prompt. At the very end it will jump to the start of Monitor 64 ($C000).

```



                MON64    =     $C000       ;monitor entry
                PRINT    =     $C00C       ;print a char to scrn
                PGSW     =     $D700       ;switch page in Int ROM
                CONFIG   =     $FF00       ;configuration register
                GO64     =     $FF4D       ;128 jmp to 64 mode
                INIT     =     $E3BF       ;initialize basic
                BASVEC   =     $E453       ;copies bas vectors
                RESTOR   =     $FD15       ;restores I/O vectors
                RAMTAS   =     $FD50       ;RAM test
                IOINIT   =     $FDA3       ;initialize CIA
                CINT     =     $FF5B       ;initialize scrn editor

                         ORG   $8000

8000: A9 93              LDA   #$93
8002: 20 0C C0           JSR   PRINT       ;clr the screen
8005: A2 05              LDX   #$05
8007: BD 57 80  LOOP     LDA   TRAN,X      ;transfer to & from
800A: 95 60              STA   $60,X       ; info to variables
800C: CA                 DEX
800D: 10 F8              BPL   LOOP
800F: 78                 SEI
8010: A0 00              LDY   #$00
8012: B1 60     LOOP1    LDA   ($60),Y
8014: 91 62              STA   ($62),Y
8016: A5 61              LDA   $61
8018: C5 65              CMP   $65
801A: D0 06              BNE   SKIP1
801C: A5 60              LDA   $60
801E: C5 64              CMP   $64
8020: F0 0E              BEQ   SKIP3
8022: E6 60     SKIP1    INC   $60
8024: D0 02              BNE   SKIP2
8026: E6 61              INC   $61
8028: E6 62     SKIP2    INC   $62
802A: D0 E6              BNE   LOOP1
802C: E6 63              INC   $63
802E: D0 E2              BNE   LOOP1
8030: A2 27     SKIP3    LDX   #AUST+END
8032: BD 5D 80  LOOP2    LDA   TRAN+6,X
8035: 9D 00 80           STA   $8000,X
8038: CA                 DEX
8039: 10 F7              BPL   LOOP2
803B: A2 0D              LDX   #$0D
803D: BD 49 80  LOOP3    LDA   RAMST,X
8040: 9D F0 10           STA   $10F0,X
8043: CA                 DEX
8044: 10 F7              BPL   LOOP3
8046: 4C F0 10           JMP   $10F0

```

```
8049: A9 00     54   RAMST    LDA   #0
804B: 8D 00 FF  55            STA   CONFIG
804E: 8D 00 D7  56            STA   PGSW
8051: 8D 00 D7  57            STA   PGSW
8054: 4C 4D FF  58            JMP   GO64
                59
8057: 3E F0     60   TRAN     DA    $F03E      ;from in ROM
8059: 00 C0     61            DA    MON64      ;to in RAM
805B: FD FE     62            DA    $FEFD      ;end in ROM
                63
                64   **********************************
                65   * this is the auto-start routine *
                66   * that will start C64 monitor    *
                67   **********************************
                68
                69            ORG   $8000
                70
8000: 09 80     71   AUST     DA    $8009
8002: 09 80     72            DA    $8009
                73
8004: C3 C2 CD  74            TXT   "cbm"       ;bit 7 is set on cbm
8007: 38 30     75            TXT   '80'
                76
8009: A2 05     77            LDX   #$05
800B: 8E 08 80  78            STX   $8008      ;disable auto-start
800E: 8E 16 D0  79            STX   $D016
8011: 20 A3 FD  80            JSR   IOINIT
8014: 20 50 FD  81            JSR   RAMTAS
8017: 20 15 FD  82            JSR   RESTOR
801A: 20 5B FF  83            JSR   CINT
801D: 58        84            CLI
801E: 20 53 E4  85            JSR   BASVEC
8021: 20 BF E3  86            JSR   INIT
8024: 4C 00 C0  87            JMP   MON64
                88   END
```

The next loader program is used for all the Maverick programs. The C64 auto-start routine for the C64 is at the end of the program code.

```
                2
                3    ********************************
                4    *  LOADER FOR MAVERICK PGMS    *
                5    ********************************
                6    *
                7             ORG   $9100
                8    *
                9    FROM     =     $60
                10   TO       =     $62
                END       =     $64
                PRTSCN    =     $C00C
                PGSW      =     $D700
                CONFIG    =     $FF00
                GO64      =     $FF4D

9100: A9 71               LDA   #RAMLD+LAST
9102: 85 FA               STA   $FA
9104: A2 00               LDX   #$00
9106: BD 14 91  NXTRAN    LDA   BEGIN+3,X
9109: 9D 00 0C            STA   RAMLD,X
910C: E8                  INX
910D: E4 FA               CPX   $FA
910F: D0 F5               BNE   NXTRAN
9111: 4C 00 0C  BEGIN     JMP   RAMLD

                          ORG   $0C00

0C00: A9 93     RAMLD     LDA   #$93         ;clear screen
0C02: 20 0C C0            JSR   PRTSCN
0C05: 78                  SEI
0C06: A2 00               LDX   #0           ;clear information indexer
0C08: BD 6F 0C            LDA   PGNO,X       ;get first rom page no.
0C0B: 8D 00 D7  NXPG      STA   PGSW         ;select page at $d700
0C0E: 8D 00 D7            STA   PGSW
0C11: BD 69 0C            LDA   FROMLO,X     ;from rom low byte
0C14: 85 60               STA   FROM
0C16: BD 6A 0C            LDA   FROMHI,X     ;from rom high byte
0C19: 85 61               STA   FROM+1
0C1B: BD 6B 0C            LDA   TOLO,X       ;to ram low byte
0C1E: 85 62               STA   TO
0C20: BD 6C 0C            LDA   TOHI,X       ;to ram high byte
0C23: 85 63               STA   TO+1
0C25: BD 6D 0C            LDA   ENDLO,X      ;end adrs rom low byte
0C28: 85 64               STA   END
0C2A: BD 6E 0C            LDA   ENDHI,X      ;end adrs rom high byte
0C2D: 85 65               STA   END+1
0C2F: 8D 02 FF            STA   $FF02
0C32: A0 00               LDY   #$00
0C34: B1 60     H0C24     LDA   (FROM),Y     ;get byte from rom
0C36: 91 62               STA   (TO),Y       ;store byte in ram
0C38: A5 61               LDA   FROM+1       ;ck for end lo byte
0C3A: C5 65               CMP   END+1
0C3C: D0 06               BNE   H0C3B        ;not end, then cont.
0C3E: A5 60               LDA   FROM         ;ck for end hi byte
0C40: C5 64               CMP   END
0C42: F0 0E               BEQ   H0C49        ;if end, then ck for nx page
0C44: E6 60     H0C3B     INC   FROM         ;inc from lo
0C46: D0 02               BNE   H0C41
0C48: E6 61               INC   FROM+1       ;inc from hi
0C4A: E6 62     H0C41     INC   TO           ;inc to lo
0C4C: D0 E6               BNE   H0C24
0C4E: E6 63               INC   TO+1         ;inc to hi
0C50: D0 E2               BNE   H0C24        ;get and store nx byte
```

```
0C52: E8        65   H0C49    INX
0C53: BD 6F 0C  66            LDA   PGNO,X     ;get next page
0C56: C9 FF     67            CMP   #$FF       ;ck for end of transfer
0C58: D0 B1     68            BNE   NXPG       ;if not $ff, jmp to nx page
0C5A: A9 00     69            LDA   #0         ;switch to page 0
0C5C: 8D 00 FF  70            STA   CONFIG
0C5F: 8D 00 D7  71            STA   PGSW
0C62: 8D 00 D7  72            STA   PGSW
0C65: 58        73            CLI
0C66: 4C 4D FF  74            JMP   GO64
                75
                76   *** TRANSFER INFORMATION FOR MAVERICK ***
                77   *** $FF INDICATES END OF TRANSFER ***
                78
0C69: EC        79   FROMLO   HEX   EC
0C6A: 9C        80   FROMHI   HEX   9C
0C6B: 00        81   TOLO     HEX   00
0C6C: 4F        82   TOHI     HEX   4F
0C6D: F4        83   ENDLO    HEX   F4
0C6E: CD        84   ENDHI    HEX   CD
0C6F: 05 FF     85   PGNO     HEX   05,FF
                86   LAST
                87
```

The Maverick program is transferred to memory at $4F00 (see line 81 and 82 above), the end of the program is at $7EFF. The following program will setup C64 mode and transfer the program to its proper location and start it.

The end of all the Maverick programs in Internal ROM is at $8008. The following at $8000 will auto-start the C64:
$8000 00 7F 00 7F C3 C2 CD 38 30

$7F00
$7F00
CBM80

When the beginning of C64 code sees the CBM80 it will jump to $7F00 and run the following code. It will move the program from $4F00-$7EFF to $0800-$37FF and start the program at $0800.

```

*****************************
* maverick loader and start *
*****************************

MAVST    =     $0800      ;maverick entry
INIT     =     $E3BF      ;initialize basic
```

```
                BASVEC   =     $E453      ;copies basic vectors
                RESTOR   =     $FD15      ;restores I/O vectors
                RAMTAS   =     $FD50      ;RAM test
                IOINIT   =     $FDA3      ;initialize CIA
                CINT     =     $FF5B      ;initialize scrn editor

                         ORG   $7F00

                ******************
                * setup C64 mode *
                ******************

7F00: A2 05              LDX   #$05
7F02: 8E 08 80           STX   $8008      ;disable auto-start
7F05: 8E 16 D0           STX   $D016
7F08: 20 A3 FD           JSR   IOINIT
7F0B: 20 50 FD           JSR   RAMTAS
7F0E: 20 15 FD           JSR   RESTOR
7F11: 20 5B FF           JSR   CINT
7F14: 58                 CLI
7F15: 20 53 E4           JSR   BASVEC
7F18: 20 BF E3           JSR   INIT

                *****************************
                * transfer maverick pgm to  *
                * proper location & start   *
                * from $4F00-$7EFF to $0800 *
                *****************************

7F1B: A9 00              LDA   #$00
7F1D: 85 FB              STA   $FB
7F1F: 85 FD              STA   $FD
7F21: AA                 TAX
7F22: A9 54              LDA   #$4F
7F24: 85 FC              STA   $FC
7F26: A9 08              LDA   #$08
7F28: 85 FE              STA   $FE
7F2A: A0 00              LDY   #$00
7F2C: B1 FB     LOOP     LDA   ($FB),Y
7F2E: 91 FD              STA   ($FD),Y
7F30: 8A                 TXA              ;clean up as you go
7F31: 91 FB              STA   ($FB),Y
7F33: C8                 INY
7F34: D0 F6              BNE   LOOP
7F36: E6 FC              INC   $FC
7F38: E6 FE              INC   $FE
7F3A: A5 FC              LDA   $FC
7F3C: C9 7F              CMP   #$7F
7F3E: D0 EC              BNE   LOOP
7F40: A9 08              LDA   #$08       ;set drv 8 as default
7F42: 85 BA              STA   $BA
7F44: 4C 00 08           JMP   MAVST      ;jmp to pgm start

```

THE C64 CARTRIDGE

The C64 Cartridge will have the same memory space available as the C128 Internal ROM Adapter, but you can only access 16K bytes at a time ($8000 to $BFFF). Then you will have to switch to another page for more data or you can start your program.

The cartridge can be used in several different ways, 8K ROM cartridge programs, 16K ROM cartridge programs, any size programs that run in RAM. Also you can switch the cartridge off and go to Basic, all under software control.

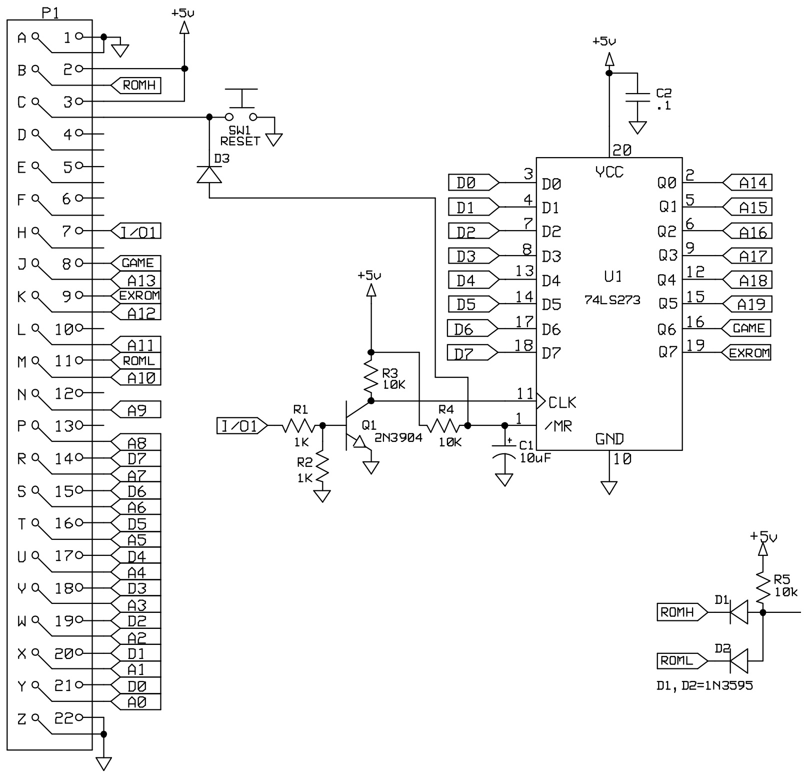


Figure 3

In Figure 3 above you'll notice a 74LS273 (Octal D Flip-Flop) is used to control the extra address lines of the high capacity EPROMs. The 74LS273 is a high-speed 8-Bit Register. The register consists of eight D-Type Flip-Flops with a Common Clock and an asynchronous active LOW Master Reset. It works the same as the C128 Internal ROM Adapter, except it has two extra control lines that are used to control the GAME and EXROM lines on the C64. Bit 6 will control GAME and Bit 7 will control EXROM.

Here is how it looks with a 27010 (2 MEG EPROM):

Pg HEX	A16	A15	A14	
Page 00	0	0	0	16K x 8
Page 01	0	0	1	16K x 8
Page 02	0	1	0	16K x 8
Page 03	0	1	1	16K x 8
Page 04	1	0	0	16K x 8
Page 05	1	0	1	16K x 8
Page 06	1	1	0	16K x 8
Page 07	1	1	1	16K x 8
Total				128K x 8

Here is how it looks with a 27020 (4 MEG EPROM):

Pg HEX	A17	A16	A15	A14	
Page 00	0	0	0	0	16K x 8
Page 01	0	0	0	1	16K x 8
Page 02	0	0	1	0	16K x 8
Page 03	0	0	1	1	16K x 8
Page 04	0	1	0	0	16K x 8
Page 05	0	1	0	1	16K x 8
Page 06	0	1	1	0	16K x 8
Page 07	0	1	1	1	16K x 8
Page 08	1	0	0	0	16K x 8
Page 09	1	0	0	1	16K x 8
Page 0A	1	0	1	0	16K x 8
Page 0B	1	0	1	1	16K x 8
Page 0C	1	1	0	0	16K x 8
Page 0D	1	1	0	1	16K x 8
Page 0E	1	1	1	0	16K x 8
Page 0F	1	1	1	1	16K x 8
Total					256K x 8

Here is how it looks with a 27040 (8 MEG EPROM):

Pg HEX	A18	A17	A16	A15	A14	
Page 00	0	0	0	0	0	16K x 8
Page 01	0	0	0	0	1	16K x 8
Page 02	0	0	0	1	0	16K x 8
Page 03	0	0	0	1	1	16K x 8
Page 04	0	0	1	0	0	16K x 8
Page 05	0	0	1	0	1	16K x 8
Page 06	0	0	1	1	0	16K x 8
Page 07	0	0	1	1	1	16K x 8
Page 08	0	1	0	0	0	16K x 8
Page 09	0	1	0	0	1	16K x 8
Page 0A	0	1	0	1	0	16K x 8
Page 0B	0	1	0	1	1	16K x 8
Page 0C	0	1	1	0	0	16K x 8
Page 0D	0	1	1	0	1	16K x 8
Page 0E	0	1	1	1	0	16K x 8
Page 0F	0	1	1	1	1	16K x 8
Page 10	1	0	0	0	0	16K x 8
Page 11	1	0	0	0	1	16K x 8
Page 12	1	0	0	1	0	16K x 8
Page 13	1	0	0	1	1	16K x 8
Page 14	1	0	1	0	0	16K x 8
Page 15	1	0	1	0	1	16K x 8
Page 16	1	0	1	1	0	16K x 8
Page 17	1	0	1	1	1	16K x 8
Page 18	1	1	0	0	0	16K x 8
Page 19	1	1	0	0	1	16K x 8
Page 1A	1	1	0	1	0	16K x 8
Page 1B	1	1	0	1	1	16K x 8
Page 1C	1	1	1	0	0	16K x 8
Page 1D	1	1	1	0	1	16K x 8
Page 1E	1	1	1	1	0	16K x 8
Page 1F	1	1	1	1	1	16K x 8
Total						512K x 8

Here is how it looks with a 27080 (8 MEG EPROM):

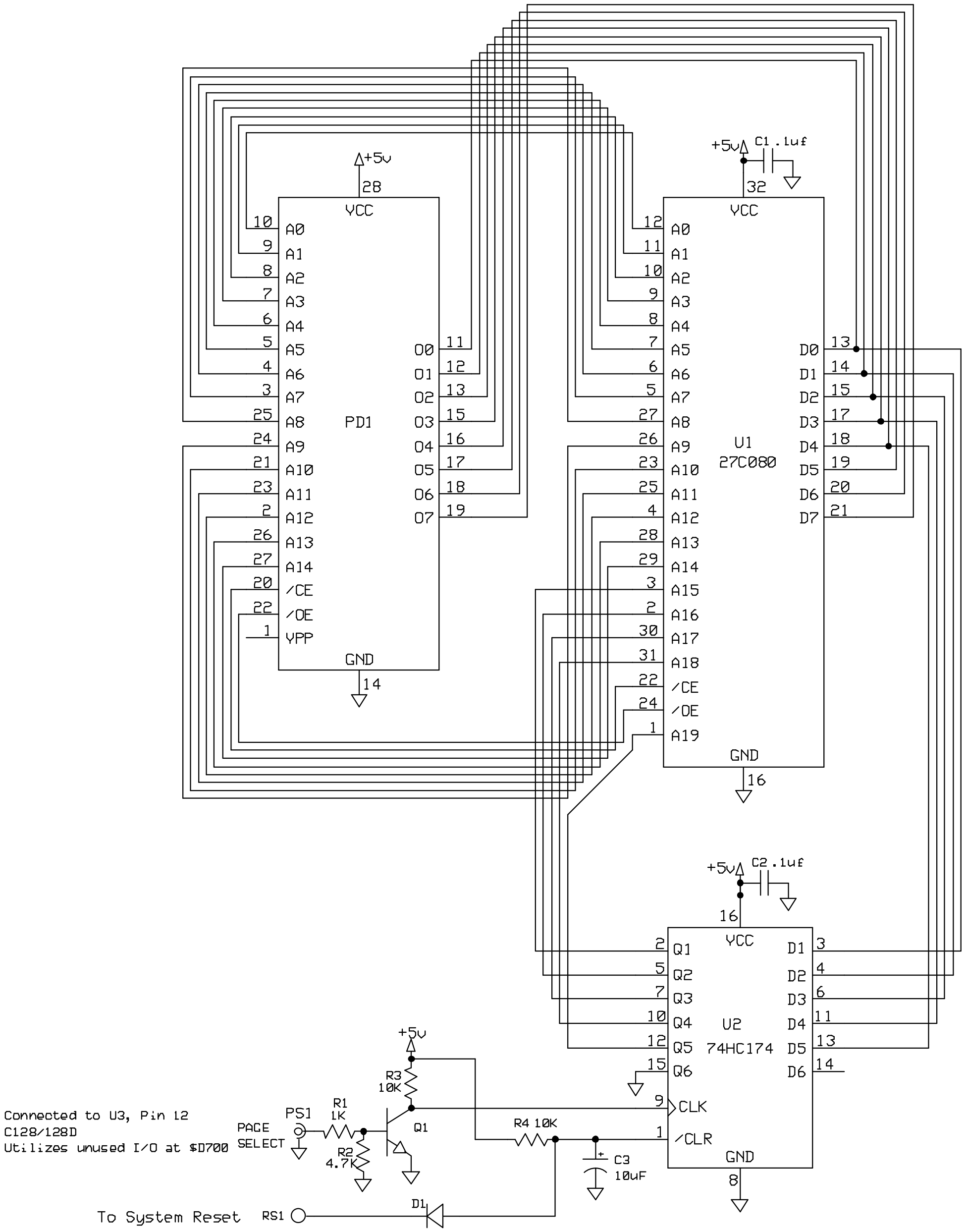
Pg HEX	A19	A18	A17	A16	A15	A14	
Page 00	0	0	0	0	0	0	16K x 8
Page 01	0	0	0	0	0	1	16K x 8
Page 02	0	0	0	0	1	0	16K x 8
Page 03	0	0	0	0	1	1	16K x 8
Page 04	0	0	0	1	0	0	16K x 8
Page 05	0	0	0	1	0	1	16K x 8
Page 06	0	0	0	1	1	0	16K x 8
Page 07	0	0	0	1	1	1	16K x 8
Page 08	0	0	1	0	0	0	16K x 8
Page 09	0	0	1	0	0	1	16K x 8
Page 0A	0	0	1	0	1	0	16K x 8
Page 0B	0	0	1	0	1	1	16K x 8
Page 0C	0	0	1	1	0	0	16K x 8
Page 0D	0	0	1	1	0	1	16K x 8
Page 0E	0	0	1	1	1	0	16K x 8
Page 0F	0	0	1	1	1	1	16K x 8
Page 10	0	1	0	0	0	0	16K x 8
Page 11	0	1	0	0	0	1	16K x 8
Page 12	0	1	0	0	1	0	16K x 8
Page 13	0	1	0	0	1	1	16K x 8
Page 14	0	1	0	1	0	0	16K x 8
Page 15	0	1	0	1	0	1	16K x 8
Page 16	0	1	0	1	1	0	16K x 8
Page 17	0	1	0	1	1	1	16K x 8
Page 18	0	1	1	0	0	0	16K x 8
Page 19	0	1	1	0	0	1	16K x 8
Page 1A	0	1	1	0	1	0	16K x 8
Page 1B	0	1	1	0	1	1	16K x 8
Page 1C	0	1	1	1	0	0	16K x 8
Page 1D	0	1	1	1	0	1	16K x 8
Page 1E	0	1	1	1	1	0	16K x 8
Page 1F	0	1	1	1	1	1	16K x 8
Page 20	1	0	0	0	0	0	16K x 8
Page 21	1	0	0	0	0	1	16K x 8
Page 22	1	0	0	0	1	0	16K x 8
Page 23	1	0	0	0	1	1	16K x 8
Page 24	1	0	0	1	0	0	16K x 8
Page 25	1	0	0	1	0	1	16K x 8
Page 26	1	0	0	1	1	0	16K x 8
Page 27	1	0	0	1	1	1	16K x 8

Pg HEX	A19	A18	A17	A16	A15	A14	
Page 28	1	0	1	0	0	0	16K x 8
Page 29	1	0	1	0	0	1	16K x 8
Page 2A	1	0	1	0	1	0	16K x 8
Page 2B	1	0	1	0	1	1	16K x 8
Page 2C	1	0	1	1	0	0	16K x 8
Page 2D	1	0	1	1	0	1	16K x 8
Page 2E	1	0	1	1	1	0	16K x 8
Page 2F	1	0	1	1	1	1	16K x 8
Page 30	1	1	0	0	0	0	16K x 8
Page 31	1	1	0	0	0	1	16K x 8
Page 32	1	1	0	0	1	0	16K x 8
Page 33	1	1	0	0	1	1	16K x 8
Page 34	1	1	0	1	0	0	16K x 8
Page 35	1	1	0	1	0	1	16K x 8
Page 36	1	1	0	1	1	0	16K x 8
Page 37	1	1	0	1	1	1	16K x 8
Page 38	1	1	1	0	0	0	16K x 8
Page 39	1	1	1	0	0	1	16K x 8
Page 3A	1	1	1	0	1	0	16K x 8
Page 3B	1	1	1	0	1	1	16K x 8
Page 3C	1	1	1	1	0	0	16K x 8
Page 3D	1	1	1	1	0	1	16K x 8
Page 3E	1	1	1	1	1	0	16K x 8
Page 3F	1	1	1	1	1	1	16K x 8
Total							1024K x 8

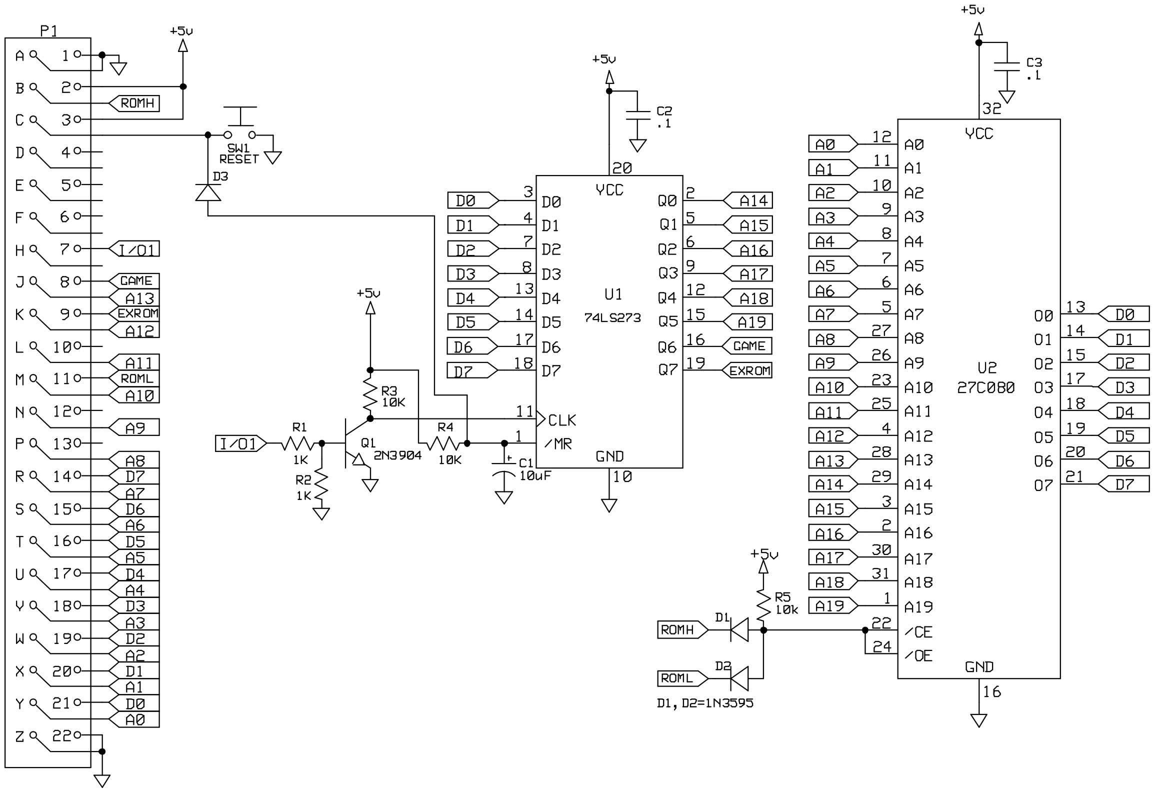
Page	Bit 6	Bit 7	
00	0	0	GAME & EXROM pulled low (access pg #0 to pg #63)
40	0	1	GAME is high & EXROM is low
80	1	0	GAME is low & EXROM is high
C0	1	1	GAME is high & EXROM is high (turn off cartridge)

When Bits 6 and 7 are high, then the cartridge is turned off. Selecting page number $C0 will turn off the cartridge. In the Menu the STOP key will turn off the cartridge and send you to BASIC. Also when you load and run a program that runs in RAM, you will have to turn the cartridge off before the program is started.

The following menu program will work on a C64 or C128 in the C64 mode. The first menu will access 26 programs, the second menu will access 26 programs and the third menu will access 26 programs. You probably will not need the third menu. The stop key will turn off the cartridge and exit to BASIC.



MEGABIT 128 INTERNAL ADAPTER



MEGABIT C64 CARTRIDGE