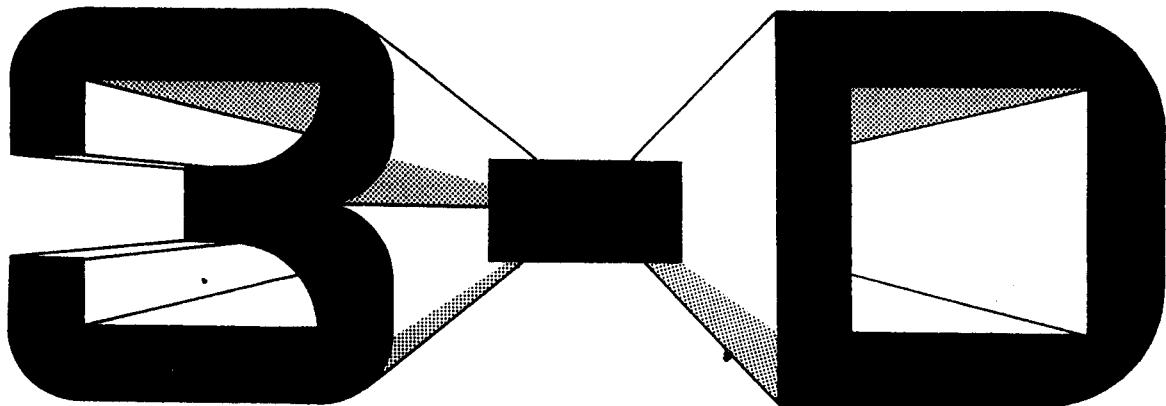


STARS



16K Disk

by Donald E. Glover

I was looking for something to do with my shiny new Action! cartridge when I ran across the article **Stars 3-D** by Craig Patchett in ANALOG No. 16. To become familiar with the new language, I decided to translate this demonstration program into Action!, a job I thought would take one or two hours. The task eventually took much longer, due to a number of strange quirks associated with the Action! language. I hope this discussion of my problems will save other Action! programmers some hair pulling and nail chewing.

My first task was to find a place for the display list (DLIST) and screen memory (STRLIN). I wanted to put them in a safe location, while allowing easy access from Action!-generated code and in-line machine code. I finally decided to put them in Action! arrays whose starting addresses were defined such that the display list and screen memory started on 1K boundaries in high memory. (The Atari cannot easily deal with a display list which crosses a 1K boundary or screen memory which crosses a 4K boundary.)

Calculations to generate the display list required that the address of screen memory be divided by 256 to obtain the high byte of the address. Performing this division on addresses greater than 32767, unfortunately, gives the wrong answer, since Action! multiplications and divisions always assume they are acting on signed numbers. Try typing:

X PRINTCE(32768/256)

in the Action! monitor and see what you get. After

figuring out the problem, I replaced the division by 256 with "RSH 8" (shift cardinal number right 8 bits). The use of this technique can be seen by examining the procedures STRINI() and DLSINI().

The next problem was to insert the addresses of the arrays STRTPH, STRTPL, and STRPOS into the machine language procedure SCROLL(). My initial attempt to do this involved inserting the address during the compilation phase. Using this method, the first instruction in the procedure SCROLL() would be:

\$BO STRTPL ;LDA STRTPL, X

To my horror, the addresses of arrays compiled into the code by this technique frequently (but not always) differed from those observed after compilation. Apparently, the addresses of arrays change during the compile phase, and the compiler cannot modify addresses inserted into machine code. The solution was to "POKEC" the addresses into the machine language routines during run time [see the procedure MAIN()].

I believe everything else in the listing is understandable, because I kept the names of all routines and most of the comments the same as those in the original assembly language listing. A word of warning: this program is designed to work with a machine having 48K of memory. If your machine has less memory, you will have to change the starting address of the arrays DLIST and STRLIN. The place to do this is clearly marked in the listing.

Before finishing, I should mention another couple of Action! peculiarities.

Action! Listing

```

***** STARS 3D DEMO ***
BY CRAIG PARCHETT
ACTION! VERSION
BY DON BLDOVR
***** BY CARD *****

***** SYSTEM Squares *****
CARD sdactn=922E,
random=9D26h,
wsync=049Ah,
sdstat=3B23h,
vdelay=3B26h,
colpf=9D96h,
color=492C0h,
kitvb=9E462h
BYTE index ; used to index into strcol
BYTE index2 ; index for indirect addressing
BYTE array ; line 0 to 32767
BYTE array2 ; line 32768 to 65535
BYTE array3 ; line 65536 to 98305
BYTE array4 ; line 98306 to 131071
BYTE array5 ; line 131072 to 163839
BYTE array6 ; line 163840 to 205616
BYTE array7 ; line 205617 to 247383
BYTE array8 ; line 247384 to 289151
BYTE array9 ; line 289152 to 330919
BYTE array10 ; line 330920 to 372686
BYTE array11 ; line 372687 to 414453
BYTE array12 ; line 414454 to 456220
BYTE array13 ; line 456221 to 497987
BYTE array14 ; line 497988 to 539754
BYTE array15 ; line 539755 to 581521
BYTE array16 ; line 581522 to 623287
BYTE array17 ; line 623288 to 665054
BYTE array18 ; line 665055 to 706821
BYTE array19 ; line 706822 to 748588
BYTE array20 ; line 748589 to 790355
BYTE array21 ; line 790356 to 832122
BYTE array22 ; line 832123 to 873889
BYTE array23 ; line 873890 to 915656
BYTE array24 ; line 915657 to 957423
BYTE array25 ; line 957424 to 999190
BYTE array26 ; line 999191 to 1040957
BYTE array27 ; line 1040958 to 1082724
BYTE array28 ; line 1082725 to 1124491
BYTE array29 ; line 1124492 to 1166258
BYTE array30 ; line 1166259 to 1208025
BYTE array31 ; line 1208026 to 1249792
BYTE array32 ; line 1249793 to 1291559
BYTE array33 ; line 1291560 to 1333335
BYTE array34 ; line 1333336 to 1375102
BYTE array35 ; line 1375103 to 1416869
BYTE array36 ; line 1416870 to 1458636
BYTE array37 ; line 1458637 to 1490403
BYTE array38 ; line 1490404 to 1532169
BYTE array39 ; line 1532170 to 1573936
BYTE array40 ; line 1573937 to 1615603
BYTE array41 ; line 1615604 to 1657370
BYTE array42 ; line 1657371 to 1699136
BYTE array43 ; line 1699137 to 1740903
BYTE array44 ; line 1740904 to 1782669
BYTE array45 ; line 1782670 to 1824436
BYTE array46 ; line 1824437 to 1866203
BYTE array47 ; line 1866204 to 1907969
BYTE array48 ; line 1908000 to 1949766
BYTE array49 ; line 1950000 to 1991766
BYTE array50 ; line 1991767 to 2033533
BYTE array51 ; line 2033534 to 2075300
BYTE array52 ; line 2075301 to 2117067
BYTE array53 ; line 2117068 to 2158834
BYTE array54 ; line 2158835 to 2190601
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BYTE array56 ; line 2232369 to 2274135
BYTE array57 ; line 2274136 to 2315902
BYTE array58 ; line 2315903 to 2357669
BYTE array59 ; line 2357670 to 2399436
BYTE array60 ; line 2399437 to 2441203
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BYTE array62 ; line 2483000 to 2524766
BYTE array63 ; line 2524767 to 2566533
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BYTE array65 ; line 2608300 to 2650066
BYTE array66 ; line 2650067 to 2691833
BYTE array67 ; line 2691834 to 2733599
BYTE array68 ; line 2733600 to 2775366
BYTE array69 ; line 2775367 to 2817133
BYTE array70 ; line 2817134 to 2858899
BYTE array71 ; line 2858900 to 2890666
BYTE array72 ; line 2890667 to 2932433
BYTE array73 ; line 2932434 to 2974199
BYTE array74 ; line 2974200 to 3015966
BYTE array75 ; line 3015967 to 3057733
BYTE array76 ; line 3057734 to 3099499
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BYTE array84 ; line 3391867 to 3433633
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BYTE array90 ; line 3632467 to 3674233
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BYTE array92 ; line 3716000 to 3758766
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