

7: *RamWorks Auxiliary Memory*

For Programmers Only...

Because RamWorks is completely compatible with the Apple Extended 80 Column card, the purpose of this chapter is to describe only the feature which is unique to RamWorks, extended auxiliary memory. This material is definitely intended for assembly language programmers. Information concerning the access and control of the 80 column firmware, screen features, and auxiliary memory can be found in the Apple //e Reference Manual.

Warning: Don't attempt to use the auxiliary memory directly from an interpreter such as BASIC or Pascal. These interpreters use certain portions of main memory that, when switched to auxiliary memory can cause your program and the interpreter to "bomb".

Bank Switching

The 6502 microprocessor has the address capability of only 64 kilobytes. In order to address more memory, use "bank switching," a feature built in to the Apple //e's firmware. Soft switches control whether the 6502 addresses the 64K bank of main memory or the single 64K bank of auxiliary memory available with the Extended 80 Column card. In order to use more than just 64K of auxiliary memory, RamWorks combines this bank switching technique with its own firmware feature called, "the bank select register." The bank select register determines which of 48 possible 64K banks of auxiliary memory the 6502 addresses.

The bank select register is mapped into the //e's memory space at location \$C073 (49267). The programmer can select one of 48 valid banks by writing the bank number into this location. (Chapter 6 provides the bank numbers for various memory configurations.) Once you make the bank selection, soft switches built into the //e firmware function as they normally would. This allows data transfer from main memory to auxiliary memory and vice versa.

Data transfers between banks of auxiliary memory must be done in two stages. The data transfers to main memory first and then from main memory to the desired bank(s). You can also transfer, one byte at a time, using the Accumulator.

Bank 0 in RamWorks always contains the text information for the 80 column display and the graphics information for the double high resolution display. This bank must be active whenever the program updates the display screen. Only Bank 0 contains the video information. This feature, unique to RamWorks, eliminates a screen flicker problem inherent with some other brands of memory cards when they access other banks.

The bank select register is initialized to zero on a power-up, but not after a reset. Please refer to the programming suggestion in "Reset Vector".

The location of the bank select register is also shared with the system. Writing to the bank select register will also trigger the paddle strobe, used to read the paddle inputs. To