

# EduCALC TECHNICAL NOTES

27953 CABOT ROAD LAGUNA NIGUEL, CA 92677

## HP-41CV OR HP-41CX? Cost Is Not The Most Important Consideration

The price difference between the HP-41CV and HP-41CX is often enough that the prospective HP-41 owner is tempted to settle for the HP-41CV. While this makes good economic sense if the intended application and use is properly matched to the HP-41CV, it is generally a poor choice. A little background will explain why.

The HP-41CV and HP-41CX are advanced programmable scientific calculators following in the tradition of the original HP-41C introduced in July, 1979—over eight years ago. The original 41C had 117 functions and 64 memory registers. At seven bytes/register, 64 registers is 455 bytes of user memory. A plug-in memory module which added 64 registers of user memory was available. Up to four of these modules could be plugged into the 41C and many users wanted 'full memory' 41Cs. HP responded to this need with the Quad memory module. This product gave 41C users full memory and left three ports free for applications modules or peripherals. The demand for HP-41Cs with Quad memory modules prompted HP to produce a model that had the Quad module 'built in'. This was called the HP-41CV. The 'V' added to the model number may be thought of as a roman numeral '5', indicating five times more memory than the original 41C. The 41CV was a major improvement because it maximized both mainframe memory and ports. The mainframe memory of an HP-41CV is 320 registers or 2240 bytes. The permanent .END. instruction takes three bytes, so the actual user available memory is 2,237 bytes.

By 1983, HP noticed that there was a high percentage of users buying the HP-41CV and Time module and/or Extended Functions module. The Time module adds extremely powerful time, alarm, stopwatch and date functions. The extended functions module was introduced to meet the continued demands for more memory. The HP-41 can address a total of 1024 registers and the 41CV used most of the address space from 0 to 511 registers. Two extended memory modules increase memory from 512 registers to 1023. Not all registers can be addressed due to HP's programming, so the extended memory modules allow the use of only 238 of the maximum 256 registers. This memory is treated as off-line memory and is used by down-loading and up-loading files from extended memory to mainframe memory. The programs required to do this are included in the Extended Functions module. This is a special module that contains RAM as well as ROM for the programs. The RAM portion adds 127 registers to the mainframe memory (below register 511) which are treated as extended memory.

The Time ROM and Extended Functions ROM (4K each) were so popular that HP decided to add a third HP-41. They added these two modules so that they wouldn't take two ports. Since these were program modules, or eXternal ROMs added internally, they called it an HP-41CX. In addition to these two modules being built in, a third 'module' was also added. This software consists primarily of a text editor for operating on extended memory files. These programs are not available in module form and are unique to the HP-41CX.

The HP-41CX is the better buy, not so much for the economics—it is much lower in cost in the long run—but for the saving of ports for applications ROMs and peripherals. The HP-41CV user needs to add the Extended Functions module before the Extended Memory modules can be added. A full memory HP-41CV would require three ports to do this. When this is realized, the CV user will be attracted to the tripple module conversion. This is an additional \$55 in cost. The informed customer will realize that the most important reason to buy the HP-41CX is port congestion. The HP-41 is such an incredible product that there are dozens of software and hardware products competing for port space. Buying an HP-41CV is indicated in those applications where future expansion is not a consideration. The HP-41CX offers such a tremendous value that the additional cost is easily justified, as discussed above. The table below summarizes the features of these two machines.

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TABLE 1: HP-41CV and HP-41CX Feature Comparison

	<u>HP-41CV</u>	<u>HP-41CX</u>	Inc. Cost [36]**
Mainframe Memory	2,237 bytes*	2,237 bytes*	N/A
Extended Memory	none	882 bytes	
Mainframe ROM	12K	24K	
Extended Functions	none	built-in*	\$63.75
Timer Module	none	built-in*	\$63.75
Text Editor	none	built-in*	Not Available
Manuals	one	two	<u>\$15.00</u>
			\$142.50

\*See note below.

\*\*These may be added to the HP-41CV but they take up two ports.

Conclusion: Investing over \$100 for a programmable calculator seems like a major investment for many prospective calculator buyers. When the HP-41 is considered because it is 'the best there is,' the cost of the HP-41CV may seem high, but to invest even more in the HP-41CX may seem unnecessary. The tremendous value received from the small price difference makes the HP-41CX attractive economically—from the knowledgeable user's point of view. The most important consideration, however, is not cost, but the need for as many ports as possible for future expansion. Many users who have bought an HP-41CV end up selling it because they find that they need the power of the CX after learning what the machine can do. The HP-41CV is suitable for those users who do not plan on expanding memory, and for those who have a specific use that is entirely met by the limited features of the HP-41CV. At first reflection, the HP-41CV may appear attractive, but ask any active HP-41CX user if he would be willing to settle for the limited features of the HP-41CV after he has used an HP-41CX.

Note: Memory capacity is confusing because different numbers are given in print. The mainframe memory is 2,237 bytes as described above. Extended memory is 127 registers or 889 bytes. EMROOM or CAT 4, however, will only show 124 registers. The reason for the three register difference is one register is used as a partition register, and two registers are required for the file header. The machine subtracts these registers to show the space available for file contents. The two registers allocated for the header could be used, even if EMROOM or Cat 4 shows 0, by resizing using the HP-41CX function RESZFL to increase a file size by two registers—another reason to buy a CX. Extended Memory Modules are 238 registers each. The total HP-41 memory is: Mainframe, 2,237 bytes; Extended Functions, 882 bytes; and Extended Memory 3,332 bytes for a useable total of 6,451 bytes; 2,237 are on-line, and 4,214 bytes are off-line storage.

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