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## The Nucleus' PCA board - a review

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The advent of the PC class of computers has led to the introduction of numerous plug-in boards for various purposes. As a result, it is now cheaper to buy a PC-XT and multichannel scaling board than to buy a stand-alone multichannel analyzer. One of the first boards manufactured that does multichannel scaling is the PCA board sold by The Nucleus (761 Emory Valley Rd., Oak Ridge, TN 37831-2561, USA). We have been using two for two years and the following review may be of interest to those doing photon counting.

The board plugs into a PC-XT or PC-AT and requires a CGA or EGA board driving the monitor. The price depends on the amount of on-board memory you choose, varying from US\$1850 for 1024 channels of memory to US\$2950 for 8096 channels of memory. Memory can be accessed in groups of 256, 512, 1K, 2K, 4K or 8K channels, thus with 8K channels of memory one can store 32 glow curves of 256 channels each. Each channel may contain up to 16 million counts. The board allows one to do multichannel scaling (10 MHz) or pulse-height analysis. This review will not cover the latter except to note that a colleague found that the dc supply on his PC-XT introduced a spurious broadening of the spectral peaks. For multi-channel scaling the input pulses counted must be TTL positive, >50ns duration.

The board can be operated in one of two modes. Firstly it can be operated directly from the keyboard. Here it is easy and convenient to operate, one selects from a screen menu using the ten F keys and the cursor keys; for some things one will have to refer to the manual. While the board is collecting data one can use the computer for other tasks if one wishes. Having collected a set of data one can then write it to a file, the data is written in binary format and is preceded by a 512 byte header containing information regarding the data collection, time etc. If one wishes to do anything further with the data, one will probably wish to convert the data to ASCII format; a short BASIC program is provided that will do this.

For routine work one will want to operate the board from BASIC (or some other language). This can be done using PEEKs and POKEs and CALLing machine language subroutines that are provided. This is quite straightforward once one gets the hang of it, although one will probably run into problems. It did, in fact, take me some months to get our system working and here I must fault the manufacturer for inadequate help

and insufficient guidance in the manual. For example, if the program crashes or if you break it with the PCA display on the screen, you will have to reboot the computer if you are using BASICA. One, must, therefore, in the software, change the screen mode before trying to execute any further instructions. This is the sort of thing that took me months to find out. One thing that really annoyed me is that there was a defect in the software supplied - it wouldn't write the data collected to a file! The company knew I had this problem and found the solution, but didn't take the initiative to tell me.

If one wishes to be a little more independent one can access the data, do calculations, and plot it as one chooses during collection. I have not done much of this but note that a fair amount of technical information is provided. The company is not willing to provide source code information for their own software, however. When operated from the keyboard the PCA works like an ordinary MCS and one can see the data being acquired, a point at a time. When used with the routines provided it does nothing that it is not told to do. This is fine except that if you wish to see the data accumulating, you must repeatedly tell it to update the screen display, the consequence is that the whole data display flashes continuously. This is not particularly pleasant, but there appears to be no alternative without building one's own screen display.

We have used two of these boards for over two years and they have given no trouble. I can recommend them providing you are able to live with a minimum of help from the company. We have found more software problems than those mentioned, and I dare say there are others we have not found. The company has announced a new version, the PCAII, which should be available later this year (1988). It has improved hardware and Pop-up/ Pop-down menus. A faster (100 MHz) board which only does the multichannel scaling, and is therefore cheaper, is available from Ortec; I am trying one out and hope to report on it in due course. I am told that CMTE in Germany sells a PC based system which may be worth looking into. If anyone knows of any other alternatives, it would be appreciated if they sent a note to Ancient TL.

PR Reviewed by Ed Haskell