

What to Learn about the MCA Program Used in Gamma Spectra and Compton Scattering

I. Getting Started

- A. To start the program at: `c:\> type mca`
- B. Use the key associated with highlighted letter to select a menu item.
- C. Use the ESCAPE key to move up a menu tree.
- D. On the plot, the horizontal scale is channels. Each channel is associated with a small range of heights of the incoming pulse and for an NaI detector this pulse height is proportional to the energy deposited in the NaI crystal by the incident gamma. The vertical scale is number of event in a given channel.
- E. Move markers with left and right arrow keys, Faster movement with CTRL and arrows, and read marker position in upper right. Counts at marker position see Status Page 3
(Change status page using page up/down)
- F. Use the function key overlay chart to learn what shortcuts are available from the function keys.
 - F1 to toggle Start and Stop of acquiring data
 - Shift F2 to erase current data
 - F4 to cycle through vertical scaling method.
- G. To quit program from menu select **EXIT**.
- H. The input range is 0 to +8 volts.
- I. To change the directory into which data is saved use:
Util Command `cd "directory path"`
Please make your own directory under `c:\mca\students` using **md** "*me*"

II. Important parts of the manual to read.

- A. Chapter 3 Introduction ALL OF IT
- B. Chapter 4 Getting Acquainted
 - 4-4 Display spectrum from file
 - 4-5 Status pages
 - 4-6 Regions of Interest
 - 4-13 Displaying overlapping spectra (for Compton background)
 - 4-16 Controlling the Display
 - 4-17 Changing the vertical scale
- C. Chapter 7 is a break down of the functions available from the menu tree.
 - 7-1 Acquire On-OFF
 - 7-2,3 Presets Live, Real Total, Markers
 - 7-10 Calibrate\Manual\Energy
 - 7-15 to 26 Display
 - 7-17 overlap
 - 7-17 vscale
 - 7-20 expand
 - 7-24 cursor, Markers
 - 7-25 ROI
 - 7-27 Move\Data **VERY IMPORTANT for saving data**
 - 7-54 to 58 Util\ Dir, Print,
 - 7-58 MENU **VERY IMPORTANT** because this is the access key to the data manipulation and analysis programs described in Chapters 10 to 19

- D. Chapters 10 to 19 Basic Spectroscopy Programs
 - 10-1 to 5 Introduction
 - 14-1 to 3 MANIP (Data adding, subtracting)
VERY IMPORTANT for subtracting background
 - 15-1 to 5 DMAN (Smoothing, totalizing)
 - 19-1 to 13 LOTCNV (convert data files from binary to text form)
VERY IMPORTANT for converting saved data files into spreadsheet readable form.

III Need to be able to:

- A. Manual calibration of energy scale. From menu **Calibrate \ Manual \ Energy** See Manual page 7-10.
- B. Set Preset to stop data collection for a set Real Time, Live Time or Number of Counts. From menu **Acquire \ Preset** Set possible presets that are not used ones to zero. See Manual pages 7-2,3.
- C. Set Regions of Interest (ROI). Extract number of counts in ROI or between Markers that is in region associated with a peak, with simple background subtraction. From menu **Display \ ROI \ Create** BUT first you need to set the Right and Left Markers using **Display \ Markers \ Right** or **\ Left** and then type channel number. See Manual page 4-6, 7-24,25.
- D.. Save and retrieve data. From Menu: **Move \ Data **. Use From **RRH** which is the display **To filename.dat** use defaults for header and eff files. See Manual page 7-27.
- E. Convert saved (binary) datafiles to something a spreadsheet can read From Menu **UTIL \ Menu** then **Reports** from groups (left column, use page up/down to select) then **Convert Data to Lotus Format** (center column, use arrows). Use **F2** to execute the program, then give name of binary and name of new file to create. To return to MCA screen use **F10**. See Manual pages 19-1 to 13.
- F. Subtract file with background from main data file by saving both data sets as binary files, then from menu **UTIL \ Menu** then **Analysis** from groups (left column, use page up/down to select) then to **Manip** Use **F2** to execute the program.
 Enter **Filename.dat**, 1,4096 (first_channel_number, last_channel_number) for the results of the manipulation. (may need to create Filename.dat first!)
 Enter **Filename.dat**, 1,4096 for main data file.
 Enter -
 Enter **Filename.dat**, 1,4096 for background data file.
 If the difference between the maindata set and the background data set is small, some of the results may be negative. In this case, you may wish to add a constant to each channel using **Manip**.
 To return to MCA screen use **F10**. View newly created file using **Move\Data\ From To RRH..** See Manual pages 14- 1 to 3.
- G. To get DOS Prompt from menu **Util \ System** Then can issue DOS commands like: dir to see list of files
 cd to change directories
 del filename.ext to delete file
 copy old_name.ext new_name.ext to copy files
 Note data acquisition continues while you are at the DOS prompt.
 Type **EXIT** to return to MCA program.
- H. To adjust the Lower Level Discriminator from the menu use **Setup \ ADC \ Coarse LLD** or **Fine LLD** . Also of use **Setup \ ADC \ Zero** and **Setup \ ADC \ ULD**