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GRIDDBIT #13
USING DOS PROGRAMS TO CREATE VARIABLE INPUT MACROS FOR PCGRIDDS

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1. Background

By now, most of us have come to appreciate the tremendous operational and research benefits provided by the PCGRIDDS system. One particular advantage of this software is its ability to process sets of commands (known as macros) in order to automate complex or repetitive tasks. For all of its fine attributes, however, there are still certain operations which PCGRIDDS cannot perform effectively. Part of this limitation arises from the program's inability to incorporate variable data into its macros, much as command line parameters are utilized in DOS batch files. This sort of flexibility would be helpful in a wide variety of situations. For instance, you might want to create a derived field by solving an equation containing a constant which must be changed frequently, depending on the atmospheric regime. Or, perhaps you want to rapidly change the appearance of a graphic by adjusting certain display characteristics within its macro. We can accomplish these tasks by utilizing PCGRIDDS' gateway into DOS and running programs which will modify our macros "on the fly."

As a specific example, suppose you've created a macro to display a time-height section of relative humidity for a given point. You can define the latitude and longitude of the point, but these will have to be changed each time you move to a new area of interest. A simple solution would be to redefine the time section location each time, using the TSCT *lat lon* command. However, it could quickly become tedious to look up, then type in the lat/lons for a large number of points. A second possibility would be to create a separate macro for every possible point you might want to look at (*e.g.*, one for each of the terminal forecast locations in your area). But what if you wanted to quickly examine time-height data at any one of *five hundred* different stations? You could, of course, create 500 separate macros, though this would certainly be a time-consuming project. A better solution might be to have the computer ask you for the station's three-letter identifier, query a database of station lat/lons, then quickly re-create the macro with the new coordinates, complete with a text label identifying the location of the time-section. By doing this, we've taken advantage of the computer's innate search capabilities to do our dirty work for us.

At WSFO Birmingham, several simple PASCAL programs have been developed based on this concept. In each case, the user drops into DOS from within PCGRIDDS by typing "DOS" at the command line. One can then run the desired program by typing the name of the executable file, then entering the requested variable information. The program incorporates this user-defined data in the generation of a new macro which can be executed upon return to the

PCGRIDDS command line. The following are brief descriptions of two such programs; one generates sets of cross-sections for any two input points, while the other calculates storm-relative helicity based on a user-defined storm motion.

2. A Cross-Section Definition Program

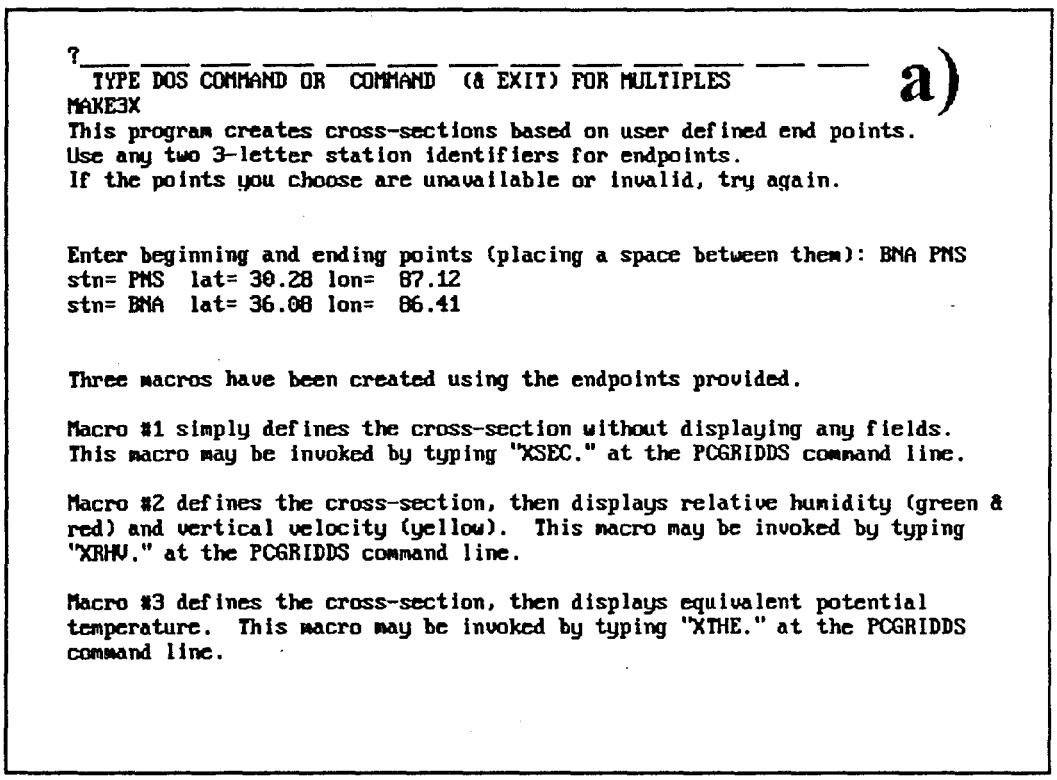
This program creates a set of cross-section macros; its advantage lies in the means by which the endpoints are defined. As seen in Fig. 1a, the user drops into DOS, types "MAKE3X," and enters the three-letter identifiers representing the endpoints of the cross-section. The program searches a station file, finds the latitude and longitude of the points, and incorporates this information into the creation of three macros. The first simply defines the cross-section, without plotting any data. The second macro ("XRHV.CMD," output shown in Fig. 1b) displays relative humidity and vertical velocity, while the third plots equivalent potential temperature. As an added touch, a text label is included in each macro to identify the location of the cross-section and provide a description of the displayed fields. A further program embellishment would allow the user to define which fields are to be plotted with the newly defined cross-section, perhaps by means of a simple menu structure.

3. A Storm-Relative Helicity Program

This second routine calculates storm-relative helicity, given a user-defined storm motion. Again, the user enters DOS, then types "MAKESRH" (as shown in Fig. 2a). The program asks for a storm direction and speed, then generates a macro, called "SRH1.CMD," which plots 1000-850 mb storm-relative helicity based on this single storm motion. Output from this macro for the March 27, 1994, "Palm Sunday Tornado Outbreak" in Alabama and Georgia is shown in Fig. 2b. This program gets around PCGRIDDS' apparent inability to subtract a constant vector from a gridded vector field by breaking up the storm motion and model wind vectors into components before performing the helicity calculations. An advantage of this macro is that it allows the user to select a variety of possible storm motions instead of having to accept a single machine-calculated default. However, one must remember when viewing this data that the storm motion vector is constant across the entire field. Therefore, the helicities are truly valid only within the immediate area of interest and probably become less accurate as one moves toward the edges of the displayed field.

4. Final Thoughts

The purpose of this paper has been to demonstrate the ability of DOS programs to perform tasks which can't be adequately handled from within the PCGRIDDS environment. The preceding examples barely scratch the surface of potential uses. In all likelihood, users in other offices could develop software solutions to tasks far more complex than those described here. Hopefully, future advancements of PCGRIDDS will obviate the need for some of these macros, although there will probably always be a use for these types of external DOS-shell programs.



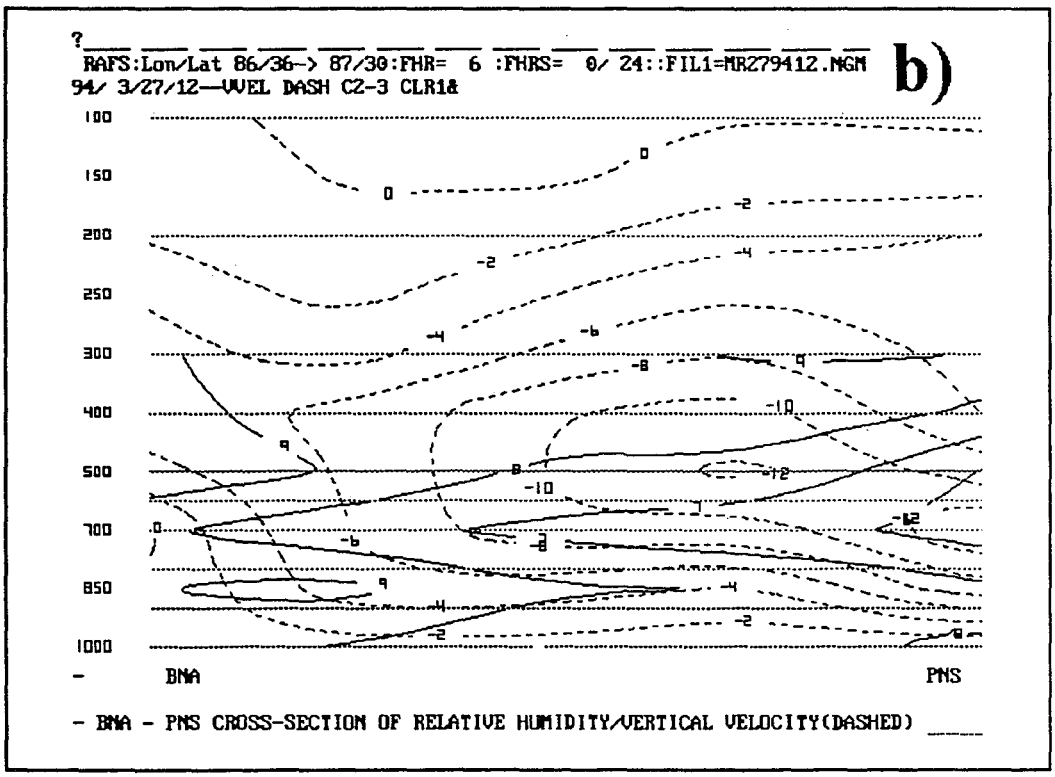
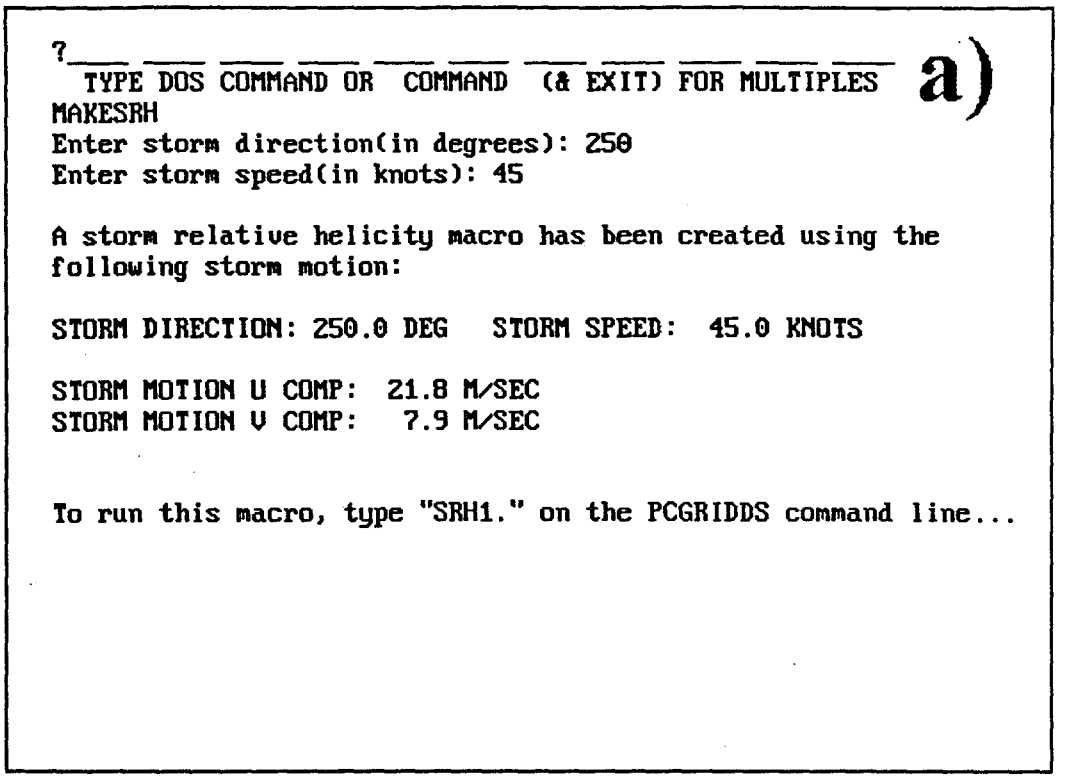


Fig. 1. Screen displays of: a) cross-section definition program in DOS; b) resulting macro output.



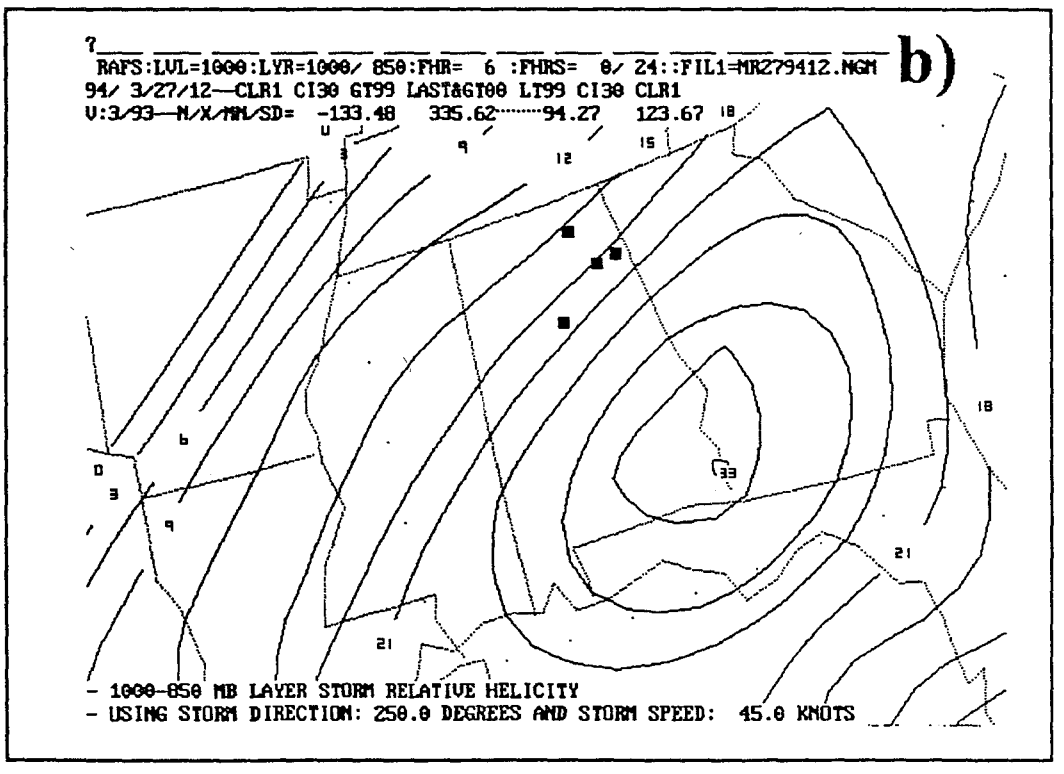


Fig. 2. Screen displays of: a) storm-relative helicity program in DOS; b) resulting macro output (six-hour NGM forecast valid 1800 UTC, 27 March 1994, contour interval 30 m^2s^{-2}. (Black squares denote locations of known tornadoes in Alabama on this day).