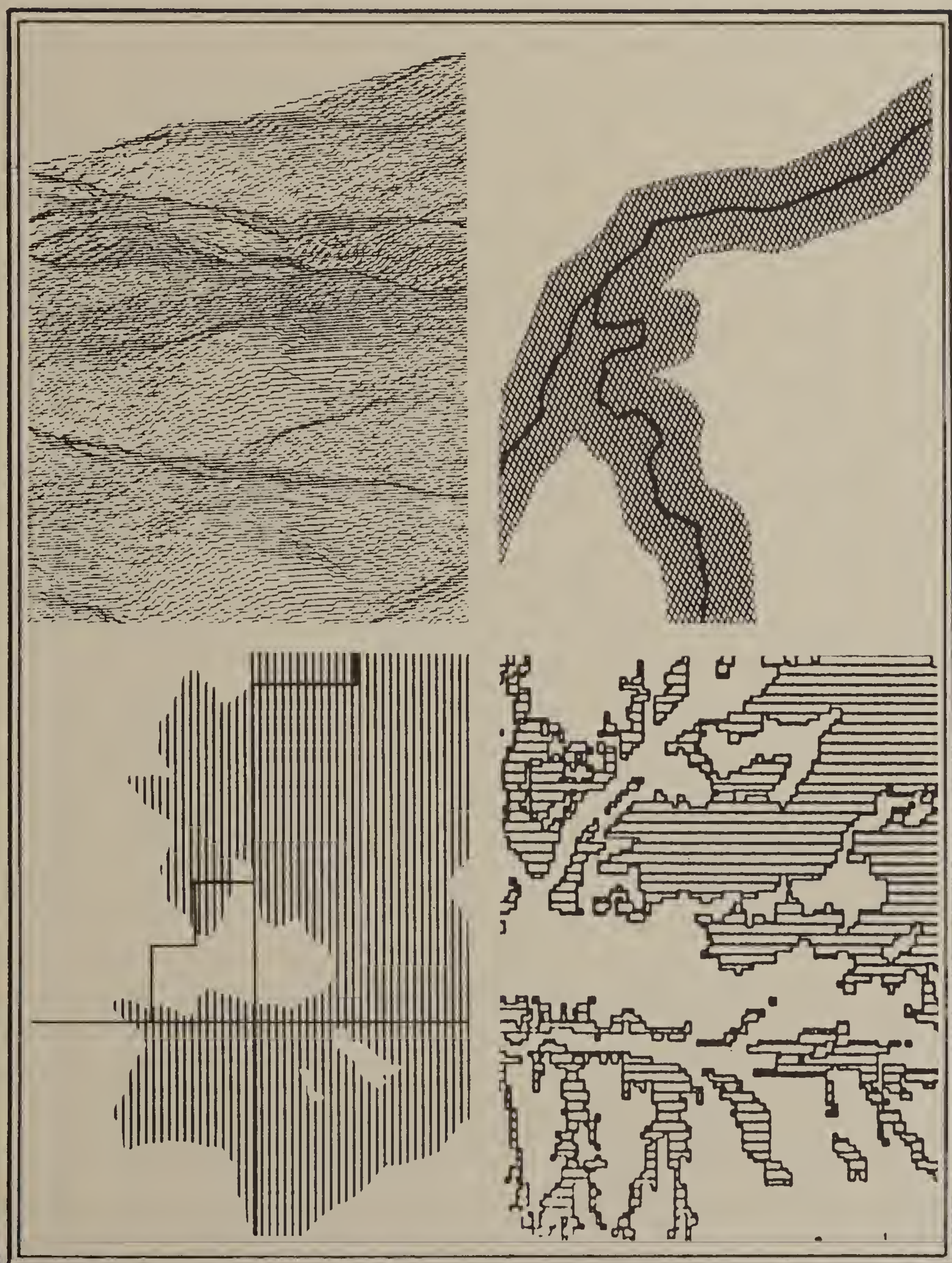
# MOSS

## USER'S MANUAL



U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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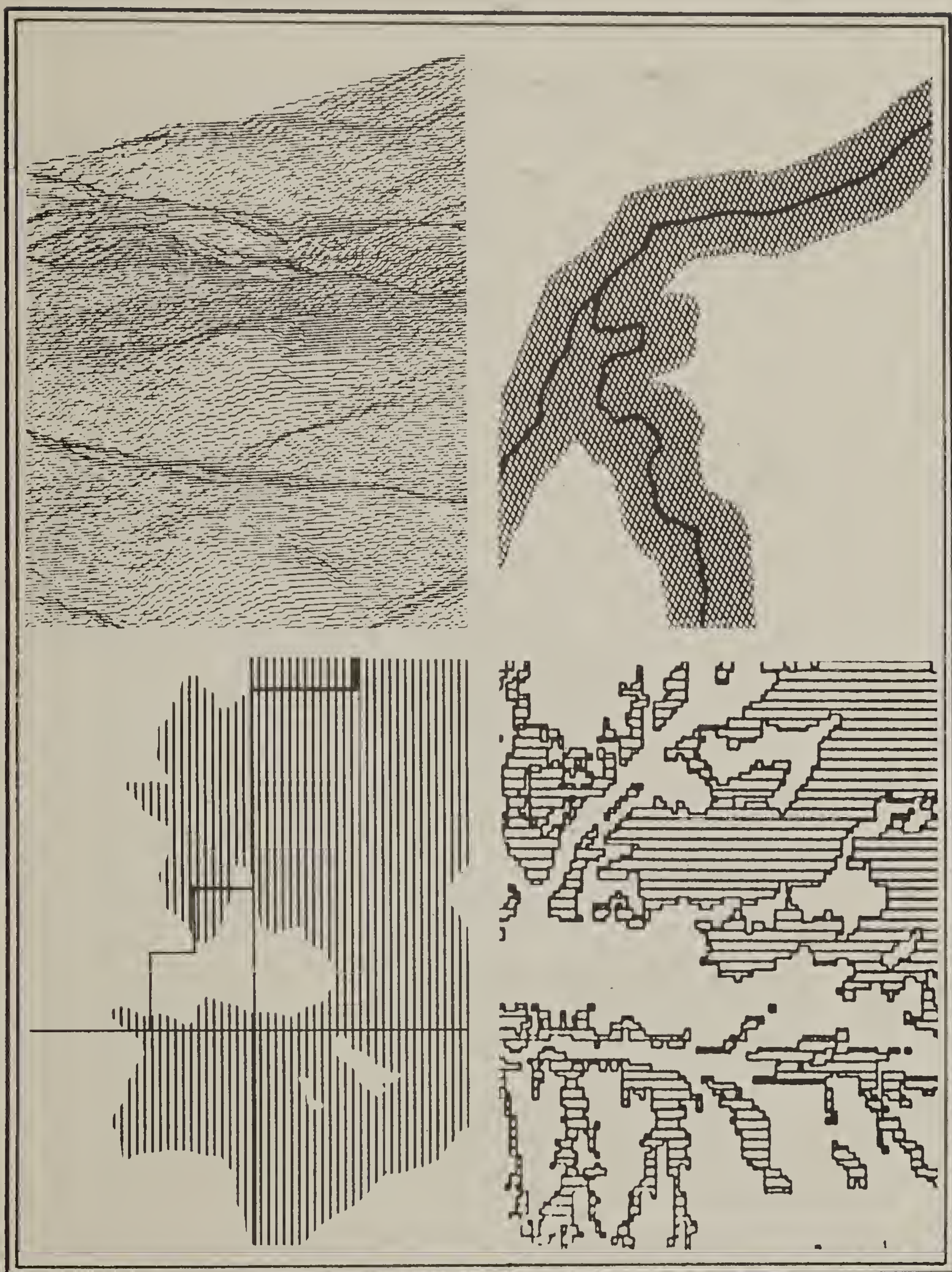

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# MOSS

# USER'S MANUAL

(VERSION.8509)

by

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# PREFACE

The MOSS User's Manual has been designed as a reference document for trained users of the Map Overlay and Statistical System (MOSS) interactive graphics software. MOSS is the data analysis component of a Geographic Information System (GIS) originally developed by the Western Energy and Land Use Team (WELUT). Currently, MOSS is being developed under the direction of the U.S. Bureau of Land Management with cooperation from the U.S. Fish and Wildlife Service, the U.S. Bureau of Indian Affairs, the U.S. Geological Survey, the U.S. Forest Service, the Soil Conservation Service, the Minerals Management Service and the U.S. Army Corps of Engineers. This document contains information necessary for a user to access and use the MOSS software. MOSS can address digital map data in two formats, vector and raster, or cell. For convenience, raster processing capabilities are specifically called MAPS (Map Analysis and Processing System), due to differences in the software. It is assumed that the reader of this document is familiar with the GIS and its applications. Specifically, it is assumed that the reader has digital data available and has access to the MOSS software and accessory hardware. This manual is not a detailed systems reference document. Those totally unfamiliar with MOSS and the GIS should contact the:

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## ACRONYMS

ADS - Automated Digitizing System

AMS - Analytical Mapping System

AOS - Advanced Operating System

BIA - U.S. Bureau of Indian Affairs

BLM - U.S. Bureau of Land Management

CDOW - Colorado Division of Wildlife

CLI - command line interpreter

COS - Cartographic Output System

CPU - central processing unit

<CR> - carriage return

CRT - cathode ray tube

DBMS - Data Base Management System

DEM - digital elevation map

DLG - digital line graph

GIS - Geographic Information System

HEP - Habitat Evaluation Procedures

MAPS - Map Analysis and Processing System

MOSS - Map Overlay and Statistical System

USFWS - U.S. Fish and Wildlife Service

USGS - U.S. Geological Survey

UTM - Universal Transverse Mercator

WELUT - Western Energy and Land Use Team

## MANUAL CONVENTIONS

The MOSS User's Manual incorporates a number of style conventions designed to promote communication and to simplify manual revision. These include:

COMMAND DESCRIPTION: Command descriptions are in 5 parts; summary, specification, explanation, example, and limitations. The command summary describes the major function(s) of the command and its use. The command specification lists the format for use of the command. The command name is given followed by the parameters or phrases which accompany the command. Some parameters may not be entered in an un-prompted mode and are indicated with an asterix (*). The command explanation is a description of the individual parameters or phrases accompanying a command. Functions of parameters or phrases are given and responses are indicated. Some parameters require specific entries and these are indicated. The command example shows an elementary use of the command. All prompts and responses are shown for MOSS commands. For MAPS commands, command variations and abbreviations are shown. If applicable, use and results of use of the command are displayed in accompanying graphics. Command limitations are listed at the end of each command description.

PAGINATION: Pages within the command description chapters (5 and 7) and Appendix C are arranged alphabetically and are paginated by command name. For reference, the command name is listed at the top of each page and a complete list of current commands immediately precedes each command section.

FIGURES: Figures in the major introductory chapter are numbered sequentially and are referenced in the list of figures. Figures/graphics in the command description chapters (5 and 7) and in Appendix C accompany commands they illustrate. These figures are not referenced, but are labeled with the command name at the top of the page.

ACRONYMS: A variety of acronyms are used throughout the text. Acronyms and their definitions are listed on page viii.

ERRORS/INCONSISTENCIES: Users finding errors or inconsistencies in the text should report these to the address given in the Preface to this manual.

UPDATES: Manual revision will be accomplished by issuing new pages indicating revision date. User's desiring to be on a mailing list for manual revisions should ensure that their names and addresses are recorded at the address given in the Preface to this manual.

ACKNOWLEDGEMENTS

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# 1. INTRODUCTION

The Geographic Information System (GIS) is a set of software for encoding, transformating, analyzing, and displaying map and other geo-based information. The GIS has been adopted by a number of federal and state agencies. This system is composed of three components: Analytical Mapping System (AMS) for digital data-entry; Map Overlay and Statistical System (MOSS) and Map Analysis and Processing System (MAPS) for data processing, analysis, and display; and Cartographic Output System (COS) plotting.

MOSS has been designed to allow users to retrieve, analyze, and display maps and other spatial data stored in the system. Map data may be stored in two formats: vector and cell or raster (Fig. 1). Vector data consist of series of (x,y) coordinates forming points, lines or polygons. Each feature in a vector map may be assigned an identifying attribute based on its characteristics. Cell data consist of a regular grid pattern in which each cell in the grid is assigned an identifying value based on its characteristics. Cell data may be created from vector data, a process called rasterizing. Because information from vector maps is generalized into cells by this conversion, vector maps may not be created from cell maps. Accuracy, resolution, storage, and processing of cell maps is directly related to grid-cell size. Some data, e.g., Landsat satellite imagery, originate in raster format.

In MOSS, cell maps are most specifically handled by software referred to as the MAPS sub-system. Command syntax and data retrieval characteristics are different. Therefore, vector processing capabilities will be referred to as MOSS whereas raster capabilities will be referred to as MAPS. Although MOSS and MAPS may be accessed together, they may also act as stand-alone systems. Limited raster processing capabilities exist within MOSS (Appendix C), but the data processing format is the same as in MAPS. Therefore, cell maps created in MOSS can be used in MAPS. Conversely, cell maps created in MAPS can be used in MOSS, with a few limitations as noted by individual commands. Choice of format will largely depend on the final intended use of data. In general, vector maps are preferred for high precision cartographic analysis and aesthetically pleasing cartographic output. Cell maps are preferred for complex cartographic modeling procedures.

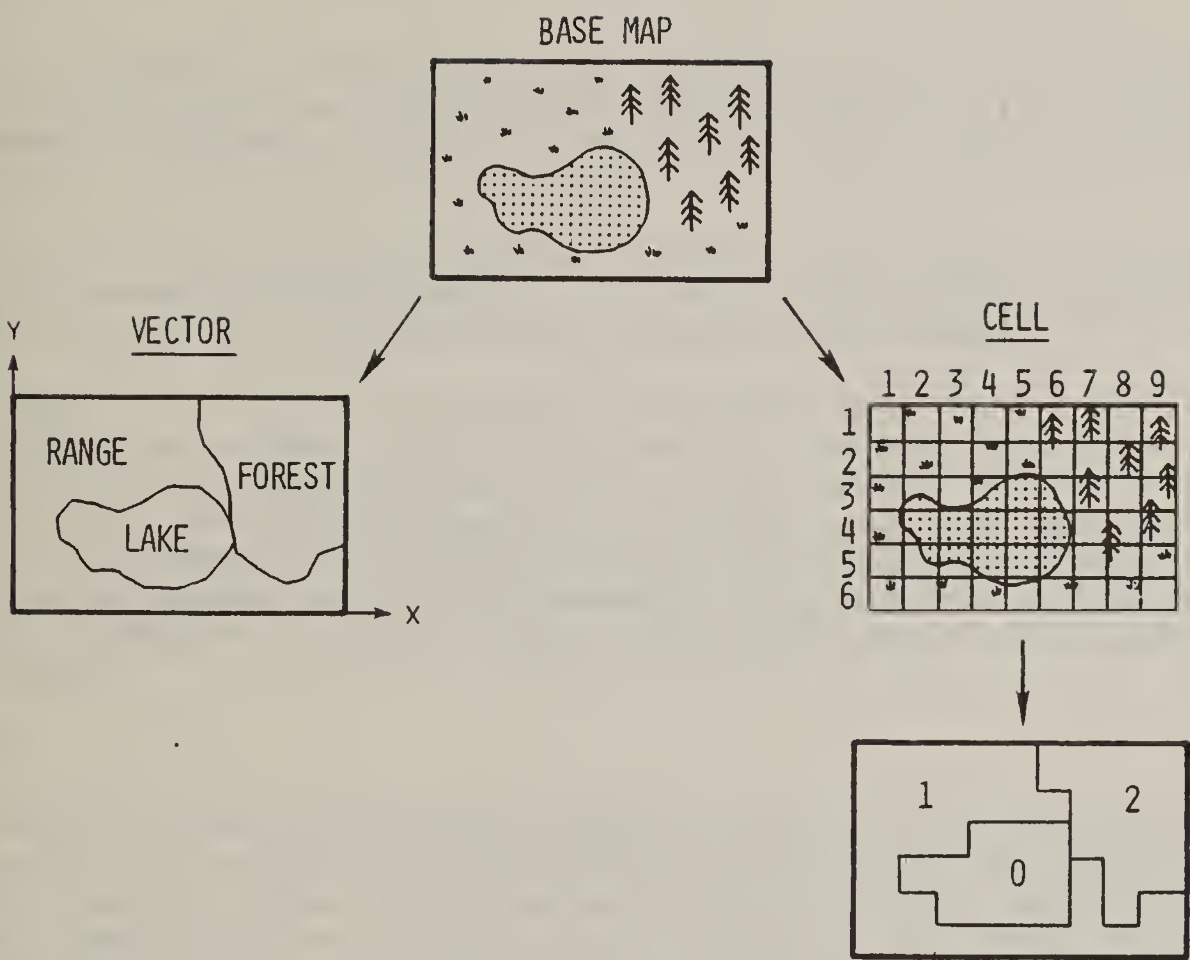



Figure 1. Data characterization in vector and cell format.

## 2. ORGANIZATION OF DATA

### PROJECTS

All information stored for processing by the system is organized on the basis of individual maps. Each of these maps indicates spatial variation of a geographic theme such as soil type, vegetation type, topographic slope or elevation, or wildlife habitat.

Collectively, maps are organized into projects. Generally, a project consists of several maps which relate to a specific geographic region or study area. A maximum of 30,000 maps can be stored in each project.

There are two types of projects, master and work. Master projects contain all original source maps for a study area that have been imported into the system. These maps cannot be amended, deleted, or renamed, but can only be accessed and read. Work projects contain all derived maps; i.e. maps that are made by the user through use of system commmands. Work projects eliminate much of the time and expense required to regenerate data sets that will be used repetitively. Unlike master project maps, work project maps may be amended, deleted, and renamed.

### FILES

Master and work projects are stored as disk files in the operating system. When accessing the MOSS and MAPS software (Appendix A), the user must supply names of the disk files containing the desired projects. Master files are usually named after the study area they encompass. An example is WOLF which represents the USGS 7.5 min quadrangle, Wolf Ridge, Colorado. Maps in a master project can be accessed simultaneously by multiple users. However, each user has his/her own work file which is called POLYGON. At any one time in a session a user may access one master file and his/her work file.

### MAPS

Each map in a project includes several associated pieces of information; a name, a status indicator, a header, a type, subjects, and items. Each of these is described in the following paragraphs:

Names

A map name is a user-defined sequence of alphabetic, numeric, or symbolic characters unbroken by blank spaces. However, a map name must begin with at least one alphabetic character. Map names in MOSS may not exceed ten characters but may be up to sixteen characters in MAPS. Each map name is used to identify particular files and thereby serves to locate all information associated with the named map. Map names are added to the project as each new map is created and stored. Names cannot be assigned, modified, or deleted outside of the system. Each map name in a project must be unique and is usually an acronym which can be used to quickly identify it. An example is MDRWOLFRG which represents mule deer ranges on the Wolf Ridge, Colorado quadrangle.

Status Indicators

A map status indicator is a letter which defines a map's status within MOSS or MAPS. Maps may be either protected (P), exposed (E), or archived (A). A protected map is one that can be accessed for processing only if that processing will leave the contents of the map unchanged. Master project maps are essentially "protected" although they have a status of E. Exposed maps may be updated, revised, overwritten, or erased at will. Work project maps are usually exposed although they may be protected or archived by the user at any time. An archived map is one which has been removed from disk (i.e. inaccessible by the system) and placed on an archival storage medium (e.g., a tape). When a new map is created, its status is automatically set to E.

Headers

Information on the source, vintage, map projection, description, and characteristics of a map are kept in a map header. This information may be modified by the user and is useful when browsing the database to determine the suitability of a map for a particular analysis.

Types

Each map in a project has a number associated with it to indicate what type of map it is. Map types fall into four general groups; vector maps, cell maps, three-dimensional maps, and input/output files.

Vector maps and their type numbers are:

1 - point
2 - line
3 - polygon

Point maps consist of single (x,y) coordinate pairs, for example, raptor nest sites. Line maps consist of series of coordinates, for example, rivers. Polygon maps consist of closed series of coordinates, for example, mule deer ranges.

Cell maps and their type numbers are:

6 - dichotomous
7 - discrete
8 - continuous
9 - multi-value

A dichotomous map is a map having cells depicting presence/absence, yes/no, +/-, etc... A discrete cell map is a map having a finite number of subjects which may be assigned to cells. A continuous cell map is a map having an infinite number of possible subjects, for example, an elevation map with elevations of 6402, 6402.1, 6402.11,... Note that various reclassification commands may be used to convert cell maps from one data type to another (see Chapter 3). A multi-value map is a cell map with multiple attributes or values for each cell.

Three-dimensional maps and their type numbers are:

5 - elevation
11 - 3D point
12 - 3D line
13 - 3D polygon

Elevation maps consist of a sparse matrix of (x,y,z) coordinates used for grid interpolation, for example, rainfall gauging stations. Three-dimensional (3D) maps are similar to their vector counterparts except that they have a third (z) coordinate.

Input/output files and their type numbers are:

10 - text
16 - write
17 - read
18 - display

Input/output "maps" consist of utilitarian work area files. Text files are true maps of prepared graphic text, for example, a word slide. Write files are files to which alphanumeric/text output may be written. Read files are files from which alphanumeric/text input may be read. Display files are files to which graphics output may be sent.

Subjects

Based on its characteristics, each feature or cell in a map is assigned an identifier called a subject. For example, a map of vegetation types might consist of three subjects; forest, shrubs, and meadows. Subjects are associated with specific geographic locations, similar to the items in a conventional map legend.

For vector maps, subjects are 30 characters (or less) alphabetic or numeric strings. Subjects are assigned to features when the map is digitized. Usually, subject names are chosen which describe the feature in a self explanatory manner (e.g., WINTER RANGE for polygons of mule deer winter range). However, they may be from a classification scheme (e.g., 411AS for closed-canopy deciduous aspen forest).

For cell maps, each cell in the map is assigned a subject, also called a value. Values are assigned when the map is initially encoded or rasterized, and are stored as real numbers between -10,000,000 and 10,000,000. It is only this numerical value which is actually processed by most of the system's operations. As numbers, they may represent actual values or serve simply as non-quantitative identifiers or codes. For example, a value of 10.0 might be used to represent areas at ten feet above sea level or it might simply represent the tenth vegetation type recorded (e.g., pinyon forest). When used as identifiers for discrete maps, it is suggested that values be assigned as a consecutive sequence of positive integers beginning with 1, and that 0 be reserved to represent a null subject (e.g., dry land on a map of water bodies). Discrete map cells which do not have a subject are treated mathematically as zero but are assigned a value of "background". Note that a discrete map cannot contain more than 32,000 unique subjects or values. A map of only one subject, and therefore only one value, is referred to as a constant cell map. A dichotomous map has two subjects, presence and absence, which are always assigned values of 1 and 0, respectively. Discrete cell values may be assigned an identifying label. This label is generated by several processing operations and is typically a descriptor of the cell value's subject. Labels may be up to 64 characters long and need not be unique. Cell values do not have to be labeled, and labels may be assigned or redefined at any time.

Some data structures (e.g., forest inventories) have multiple descriptors for each feature. The Multiple Attributes Database allows the user to assign several discrete attributes or subjects for any point, line, or polygon. For example, a stand of pinyon pine forest represented on a polygon map of forest types might have several important measurements or characteristics associated with it; percent canopy cover, downed fuel load, understory diversity, snags per acre, age of stand, seed production, etc... Accessory information such as these are called multiple attributes. Cell maps may also have multiple attributes or values. Currently, multi-value cell maps are only handled by the raster processing capabilities of MOSS.

Items

A map item or feature is the smallest unit comprising the map. For a point map this is a single (x,y) coordinate; for a line map this is a discrete line segment; for a polygon map this is a closed array of line segments; and for a cell map this is an individual cell. Each item in a vector map is assigned a unique identifying number. Each item in a cell map is represented by a pair of integer coordinates which uniquely identify a row-column position on the cell grid. Coordinates are defined with respect to an origin in the upper left corner of each map. Cell dimensions, and therefore number of rows and columns, are specified when a map is rasterized. A cell map cannot contain more than 32,000 rows or columns nor more than 10,000,000 total items. Cell maps used in MOSS may not have more than 1,024 rows or columns. Note that all maps to be used together must have the same cell size, the same number of rows and columns, the same projection and have intersecting minimum bounding rectangles.

Cell size defines geographic distance in units of cartographic distance of one grid space. A grid space is the distance between the centers of any two horizontally or vertically (as opposed to diagonally) adjacent grid-cells. Cell size is expressed in units of distance (meters or feet) or in units of area (hectares or acres).

## DATA MANIPULATION

Once the database is accessed, MOSS and MAPS provide the capability to browse the database and to retrieve all or parts of it. Browsing the database is used to determine the suitability of a map for a particular analysis. The hierarchical nature of data organization described above facilitates its retrieval from the database. Data browsing and retrieval are discussed in more detail in the following paragraphs.

### Browsing

The primary piece of information by which a map is identified is its name. All cartographic processing is done on a map-by-map basis and the map name serves to identify all data associated with that map. Once a map has been identified by its name, auxiliary information concerning the map's content may be accessed. This includes map status, header information, map type number, subject list, and number of items. The hierarchy associated with a map is a function of inherent complexity of the map and specifications provided at the time data were digitized or rasterized.

### Retrieving

The hierarchical nature of data organization allows all, or a specific portion, of a map to be retrieved (Fig. 2). Usually, only a portion of data in a map file is needed for any given analysis. At the map level, one specific subject or item may be retrieved and all others avoided. This increases the effectiveness of data analysis by allowing the user to avoid unwanted detail or extraneous data. It also increases the efficiency of data processing because less data is handled. When an existing map is specified for processing, it is convenient to think of the information associated with the map as being copied from the map file on disk to the user's access or work area (Fig. 3). New data generated as a result of processing is then written back to, and stored in, the user's work project. In as much as existing information is "copied" before reading for processing, it can be used repeatedly without being modified or destroyed. Maps which are retrieved are called "active" maps and are catalogued in an active map table. Each entry in the table is assigned a unique identifying number called the map ID, active ID, or data set ID. Some commands which create new maps automatically activate the maps. However, this data will not be automatically stored in the work project and must be specifically saved.

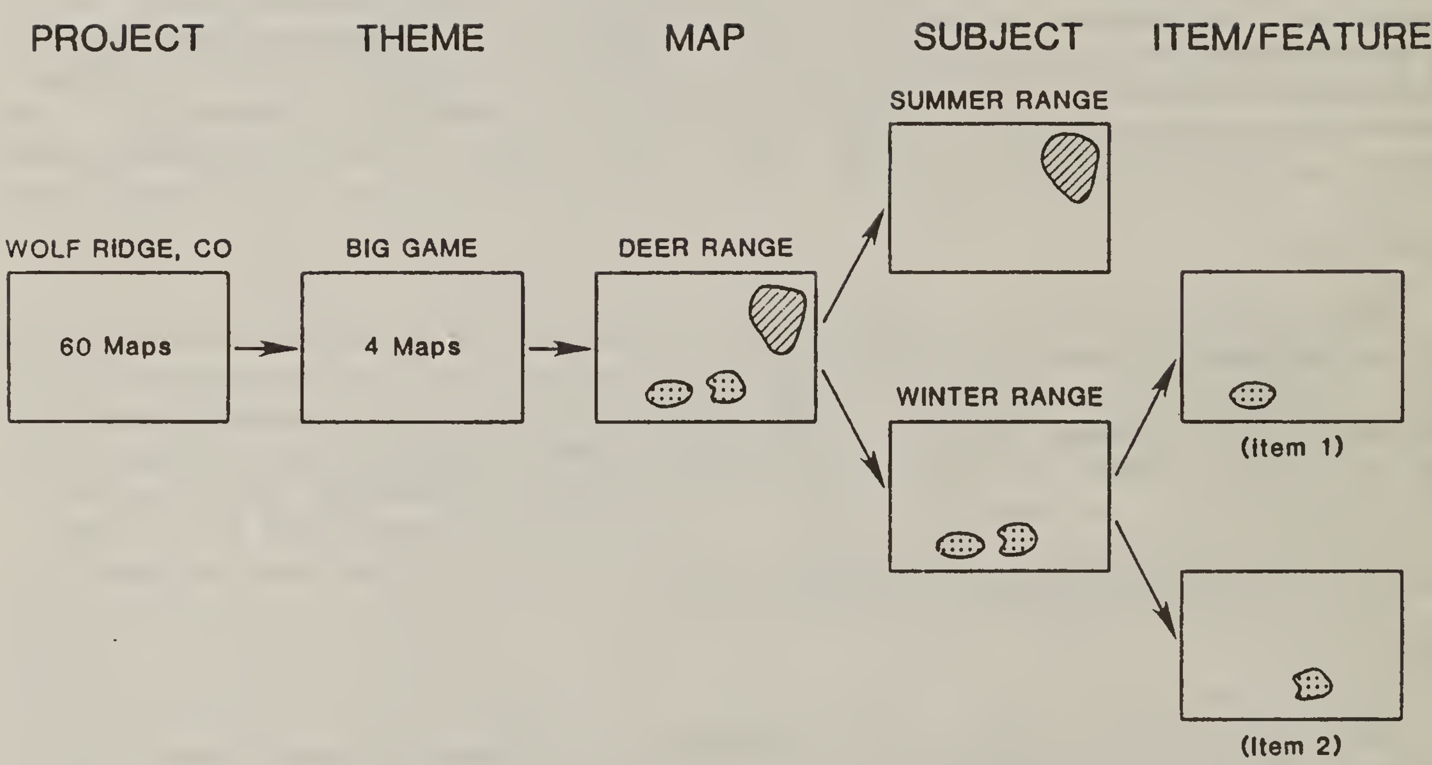



Figure 2. Hierarchy and retrieval of a polygon map.

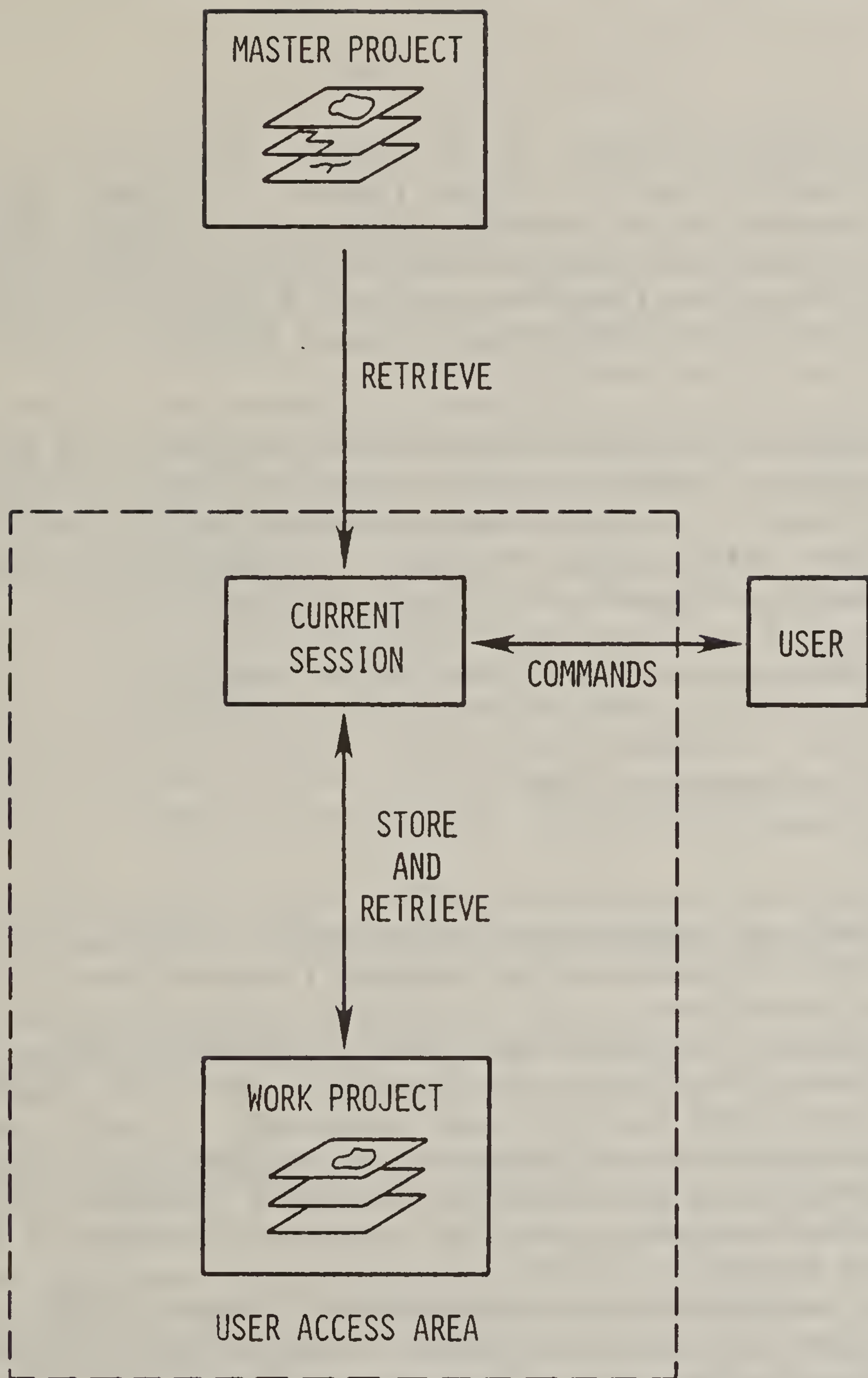



Figure 3. Data storage and retrieval.

Maps with a multiple attributes database are accompanied by three pieces of information used as the basis for database browsing and retrieval. These are: a unique numerical I.D. for each attribute, a ten character or less keyword for each attribute, and a 60 character or less description of each attribute. The keyword is typically an acronym which can be used to quickly identify a particular attribute when its I.D. number is unknown. For example, a bird species diversity index might be called BIRDINDEX.

## USER INPUT

The MOSS and MAPS software may be used in interactive or batch mode with little or no change in input or output format. In either case, all user-specified input is entered in the form of commands. A command is a string of alphabetic, numeric, symbolic, or blank characters which can be read by the system from a terminal or a disk file. Regardless of the input medium, all commands are made up of one or more 80 character input lines.

Each of the available operations and functions of the system is invoked by its own particular command and associated parameters or phrases. All operations are performed in the order they are specified. After the system is accessed, the user will be given a prompt, indicating that the system is ready to read and process a command or sequence of commands.

For MOSS, the command prompt is: ENTER COMMAND<br>?

For MAPS, the command prompt is: ?

## SYSTEM OUTPUT

Several forms of output may be generated in response to commands. Most importantly, these include maps and tabular listings associated with display and description operations. Also included are auxiliary messages in the form of; prompts which call for user-specified input, confirmations which indicate that specified operations have been performed, and error messages which tell why specified operations have not been performed. In MOSS, successful completion of a command operation is indicated by reappearance of the command prompt. In MAPS, confirmation is issued in the form of a statement beginning with "OK" followed by a brief description of the operation performed. If an error occurs, an error message is issued describing the error and giving an error number. Errors generally cause cancellation of the command but rarely cause termination of the session. User-oriented output may be directed to the log-on console, to a write or display disk file in the user's work area, or to a second auxilary terminal (also known as two terminal mode).

# 3. PROCESSING CAPABILITIES

Data processing capabilities of the software are organized as a series of individual operations which are functionally independent but which may be applied together. By controlling the order in which these operations are executed, and by using the database to store results of each operation for subsequent processing, a variety of more complex analyses can be constructed. Operations which make up the system are identified by name in the form of commands. These names are sometimes contrived but attempt to suggest the nature of each operation. Note that some command names are duplicated by MOSS and MAPS and that they may perform different operations.

Commands can be classified into five functional groups. These are: program control, data manipulation, data display, data description, and data analysis. The latter may be further subdivided into four functional classes: reclassify, overlay, distance, and neighborhood. Although other classification schemes are possible, this scheme serves the purpose of orienting the user to the underlying logic and functions of individual commands. Table 1 lists MOSS commands grouped by function. Table 2 lists MAPS commands grouped similarly. Each of these groups is described briefly in the following paragraphs:

Program Control: These commands provide an interface between MOSS and MAPS and the computer operating system and/or provide information about MOSS or MAPS itself.

Data Manipulation: These commands provide the capability to add to, access, and manipulate the map database.

Data Display: These commands provide the capability to produce user-oriented output in the form of data set displays. Display may be on a graphics CRT, an alphanumeric CRT, a line printer, or on a plotting device such as a Calcomp.

Data Description: These commands produce user-oriented output in the form of data set parameter reports and tables. These commands can calculate area, distance, perimeter, length, frequency, descriptive statistics such as mean and range, and location coordinates. They can also describe feature information and produce a listing of active data sets.

Data Analysis: These commands provide for descriptive analysis of map data sets and for the generation of new map data sets by transformation of existing maps. Each of these commands may be characterized as belonging to one of four classes according to the way in which it addresses the thematic and/or spatial content of a map. These classes function to:

- -- reclassify maps,
- -- overlay maps,
- -- measure cartographic distance, and
- -- characterize cartographic neighborhoods.

-- Reclassify: Data reclassification commands involve the creation of new maps by reassigning values of existing maps. These commands can select data sets based on attribute information, feature size or length, or a random selection of features. A typical vector example of this class of operations is illustrated in Figure 4. A typical cell example is illustrated in Figure 5.

Table 1. Functional groups of MOSS commands.

| | |
|---|---|
| Program Control: | BAUD, BUTTON, BYE, CLI, COMMANDS, COST, DEVICE, HELP, MAPS, NEWS, OPEN, PAGE, STATUS, TERMINAL, UTILITY |
| Data Manipulation: | ADD, ARCHIVE, *CONTOUR, DEARCHIVE, DELETE, DIGITIZE, DIVIDE, EDITATT, EXPORT, FREE, GENERATE, MERGE, MOVELABEL, *MULTIVAL, *POLYCELL, *POLYMVG, PROJECTION, *SAVE, SNGVAL, *SPSS, TEXT, TRANSLATE, WEED |
| Data Display: | ANNOTATE, ASSIGN, CALCOMP, ERASE, FLOOD, GCALCOMP, *GCONTOUR, HEWLETT, LEGEND, LINE, NUMBER, PLOT, *PROFILE, RESET, SHADE, SHOW, SYMBOL, TESTGRID, *THREED, VERSATEC, WINDOW, ZETA, ZOOM |
| Data Description: | ACTIVE, AREA, AUDIT, DESCRIBE, DISTANCE, FREQUENCY, LENGTH, LIST, LOCATE, PERIMETER, QUERY, REPORT, STATISTICS |
| Data Analysis: (Reclassify) | BSEARCH, COMPUTE, SAMPLE, SELECT, SIZE |
| (Overlay) | *COMPOSITE, GOVERLAY, LPOVER, *MODELG, OVERLAY |
| (Distance) | BUFFER, CONTIGUITY, EDGE, PROXIMITY |

* denotes raster capabilities (see Appendix F)

Table 2. Functional groups of MAPS commands.

| | |
|---|---|
| Program Control: | BAUD, BYE, CLOSE, COST, DISPLAY, EXPLAIN, INFORM, NEWS, OPEN, PAGE, READ, WRITE |
| Data Manipulation: | ARCHIVE, CONSTANT, COPY, DEARCHIVE, DELETE, EXPOSE, IMPORT, LABEL, PROTECT, RASTERIZE, RENAME |
| Data Display: | 3D, CONTOUR, ERASE, NOTE, PLOT, PRINT, RESET, SHADE, VIEW, WINDOW, ZOOM |
| Data Description: | AREA, DESCRIBE, LIST, QUERY, TOTAL |
| Data Analysis: (Reclassify) | AGGREGATE, CATEGORIZE, CUT, EXTRACT, FUNCTION, ISOLATE, MERGE, RENUMBER, SIZE, SLICE |
| (Overlay) | ADD, AVERAGE, BOOLEAN, COVER, CROSS, DIVIDE, EXPONENTIATE, INTERSECT, MATH, MAXIMIZE, MINIMIZE, MULTIPLY, SCORE, SUBTRACT |
| (Distance) | PROXIMITY, ZONE |
| (Neighbor) | ASPECT, SCAN, SLOPE, VISTA |

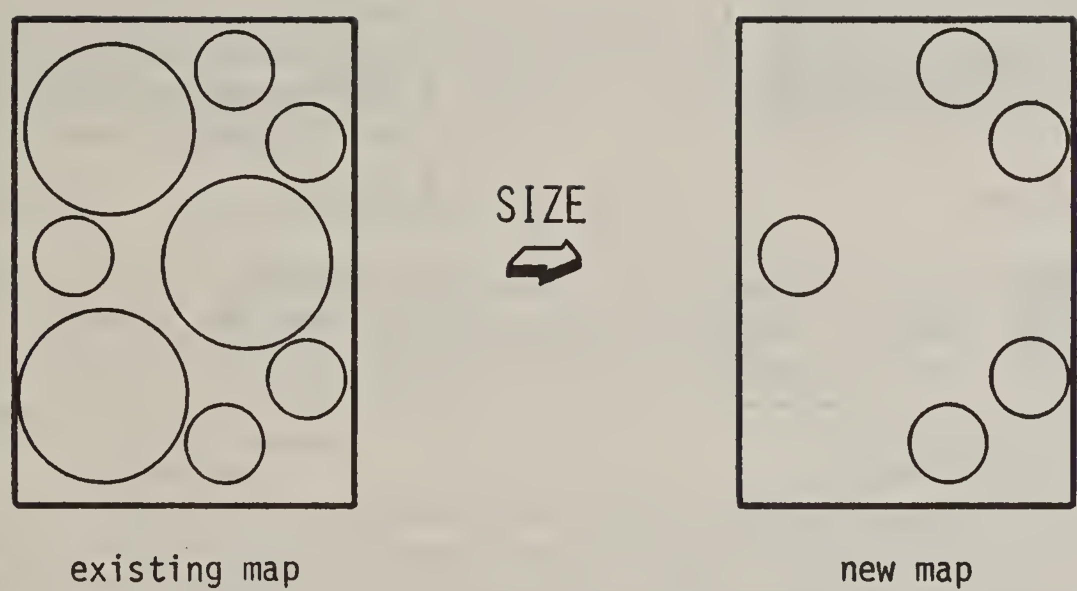



Figure 4. Example of reclassifying vector map subjects.

RENUMBER LANDSCAPE FOR WATER ASSIGNING 2 TO 0 ASSIGNING 2 TO 1 ,
ASSIGNING 1 TO 5

```
00000000055555555555
00000000555555555555
00000005555555555555
00000055555555555555
00000555555555555555
11111155555555555555
11111115555555555555
11111111555555555555

LANDSCAPE

0 FOREST
1 FIELD
5 LAKE
```

existing map

```
22222222211111111111
22222222111111111111
22222221111111111111
22222211111111111111
22222111111111111111
22222211111111111111
22222221111111111111
22222222111111111111

WATER

1 WATER
2 DRY LAND
```

new map

Figure 5. Example of reclassifying cell map values.

-- Overlay: Overlay analysis commands involve the creation of new maps computed as a function of location on two or more existing maps. These commands can perform mathematical combinations or the Boolean operations of intersection, non-intersection, and union. A typical vector example of this class of operations is illustrated in Figure 6. A typical cell example is illustrated in Figure 7.

-- Distance: Distance analysis commands relate primarily to spatial characteristics of map data. These commands can create new maps based on distance, proximity, and contiguity. A typical vector example of this class of operation is illustrated in Figure 8. A typical cell example is illustrated in Figure 9.

-- Neighborhood: Neighborhood analysis commands involve the creation of new maps computed as a function of surrounding locations. These commands can create maps of topographic slope and aspect, and compute a variety of "roving window" statistics. All operations of this class are performed on raster data. A typical example of this class of operations is illustrated in Figure 10.

## A TYPICAL SESSION

The following sequence of steps provide the user with an overview of the general procedures common to most MOSS and MAPS sessions. Figure 11 illustrates this general approach and sequence. For more detail the user may refer to specific descriptions of commands.

### Step 1: Connect to MOSS or MAPS and the data

Once the user logs on to the operating system MOSS and/or MAPS may be accessed (Appendix A). When a new session is begun, the user must open a master project database. In MOSS, the previous session may be restarted.

### Step 2: Browse the database

The next step is to determine the type and characteristics of the maps stored in the data files. Browsing the database is important for two reasons, to determine the suitability of maps for analysis and to provide a precise description of maps.

### Step 3: Retrieve the desired data

Before the user can display or analyze any data set, it must be selected. This is analogous to creating a local copy of the map. In MOSS, data which has been selected is referred to as active data.

### Step 4: Define the viewing window

Before any map can be analyzed or displayed the user must set the display window. This indicates the area of interest or viewing window on the earth's surface.

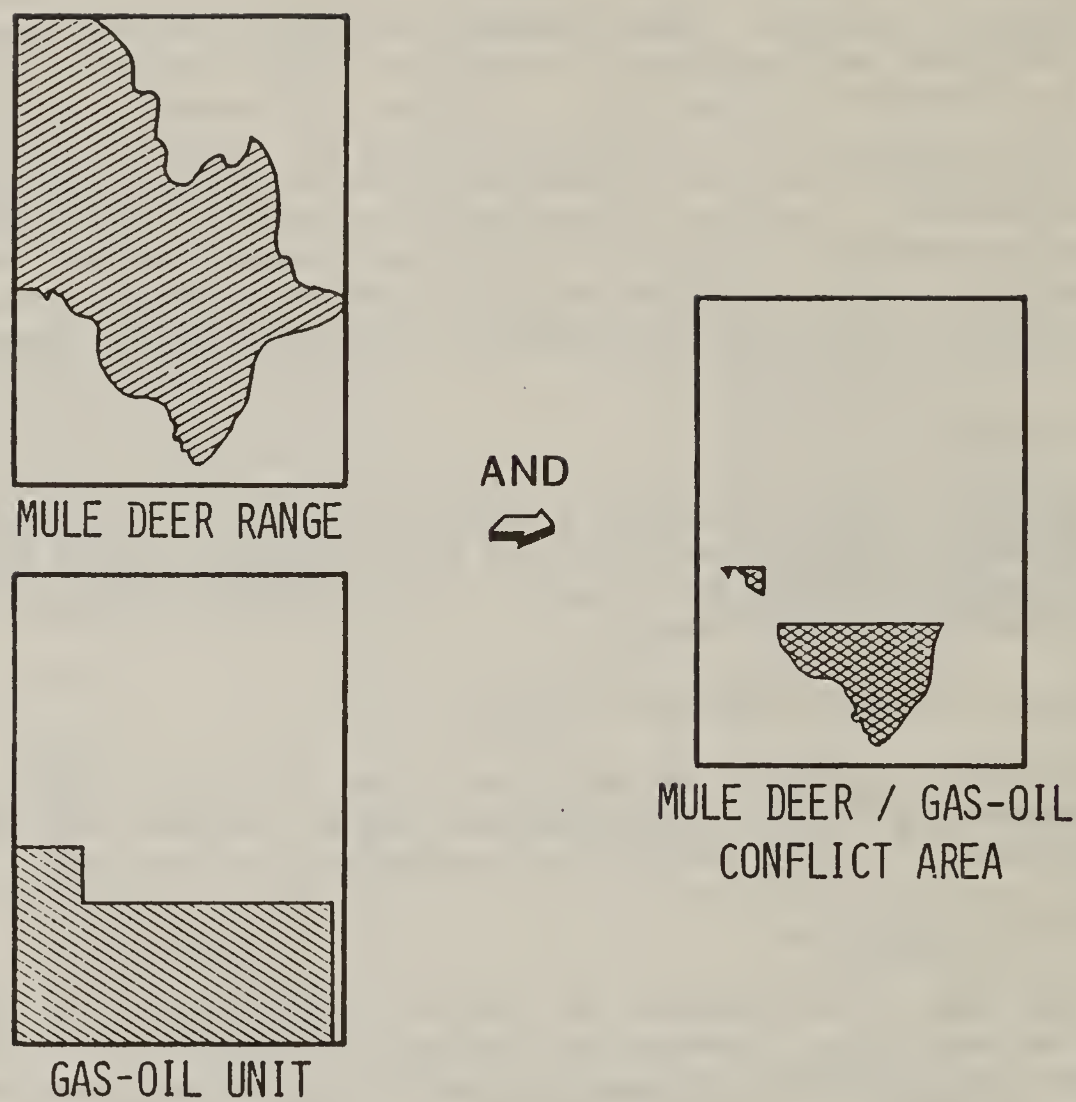



Figure 6. Example of overlaying vector maps.

MULTIPLY LANDSCAPE BY REGIONS FOR SOUTH_LAND

```
00000000055555555555
00000000555555555555
00000005555555555555
00000055555555555555
00000555555555555555
11111155555555555555
11111115555555555555

LANDSCAPE

0 FOREST
1 FIELD
5 LAKE
```

existing map

```
00000000000000000111
00000000000000011111
00000000000001111111
00000000000111111111
00000000011111111111
00000011111111111111
00011111111111111111

REGIONS

0 NORTH
1 SOUTH
```

existing map

```
00000000000000000555
00000000000000055555
00000000000005555555
00000000000555555555
00000000055555555555
00000115555555555555
00011115555555555555

SOUTH_LAND

0 NORTH REGION
1 SOUTH FIELD
5 SOUTH LAKE
```

new map

Figure 7. Example of overlaying cell maps.


Figure 8. Example of measuring cartographic distance on vector maps.

ZONE RIVER INTO 1 TO 1000 FOR WIDE_RIVER

```
00000001000000000000
00000001000000000000
00000001111000000000
00000000001000000000
00000000001000000000
00000000001000000000
00000111111000000000
00000100000000000000

RIVER

0 LAND
1 RIVER
```

existing map

```
00000021200000000000
00000021222200000000
00000021111200000000
00000022221200000000
00000000021200000000
00002222221200000000
00002111111200000000
00002122222200000000

WIDE_RIVER

0 LAND
1 RIVER
2 WITHIN 1000
```

new map

Figure 9.  Example of measuring cartographic distance on cell maps.

SCAN LANDSCAPE DIVERSITY FOR LAND_MIX

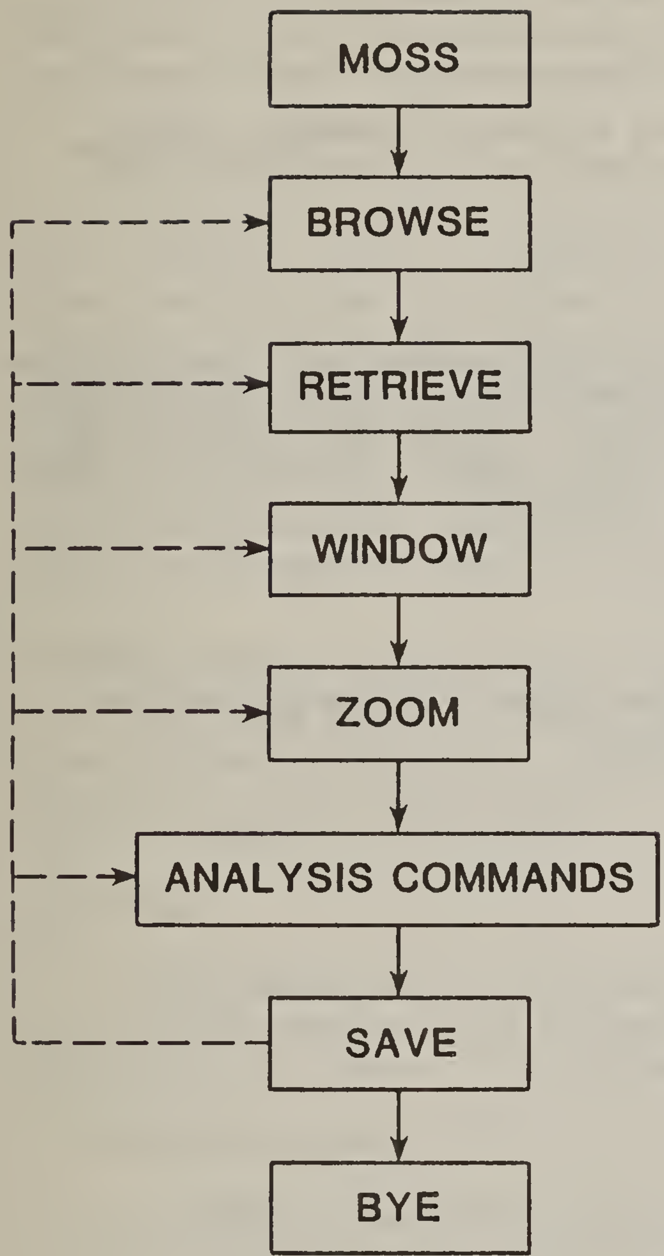
```
00000000055555555555
00000000555555555555
00000005555555555555
00000055555555555555
00000555555555555555
11111155555555555555
11111115555555555555

LANDSCAPE

0 FOREST
1 FIELD
5 LAKE
```

existing map

```
11111111221111111111
11111112211111111111
11111122111111111111
11111221111111111111
22223311111111111111
11111122111111111111
11111112211111111111

LAND_MIX

1 ONE TYPE NEARBY
2 TWO TYPES NEARBY
3 THREE TYPES NEARBY
```

new map

Figure 10. Example of characterizing cartographic neighborhoods on cell maps.




1. Connect to MOSS/MAPS and the data
2. Browse the database
3. Retrieve the desired data
4. Define the viewing window
5. Redefine the viewing window, if necessary
6. Analyse the data
7. Save the results, if necessary
8. Terminate the session

Figure 11. Eight steps in a typical session.

Step 5: Redefine the display window, if necessary

Frequently, only a certain portion of a study area is relevant to the user's analysis. The display window may be redefined to enclose the specific area of interest. There are several advantages to this; the display is magnified for greater detail and resolution, less data will be plotted thus reducing plot time, and cost of execution is reduced because less data is processed. Note that in MAPS, definition of the viewing window has no effect on data analysis i.e., the entire map is processed.

Step 6: Display and analyze the data

Maps can be displayed and analyzed using a variety of commands. These commands perform various specialized functions and their use depends on the specific analysis being addressed.

Step 7: Save the results, if necessary

Data and maps produced as a result of command processing are normally saved for future use. This reduces time and cost of having to recreate maps at the start of each session, and allows the direct application of the previously mentioned steps. However, some commands in MOSS which create new data do not automatically save them and a separate command is required.

Step 8: Terminate the session

At this point the user can either terminate the session or continue using the software by returning to any of the previous steps. Termination of the session returns the user to the operating system.

## GENERAL SYNTAX RULES

To perform a particular operation or function MOSS requires commands and parameters. A few general syntax rules regulate use of MOSS and these are described in the following paragraphs. Specific rules and limitations for individual commands are documented in the command descriptions.

### Command Format

The user executes a command by typing the name of the command followed by any parameters that are associated with the command. A parameter is a particular value, name, or response that the user must provide along with the command. MOSS has been designed to prompt the user for all parameters associated with a command. The user simply enters the command name and MOSS will query for parameter entries. Most commands provide the capability to override some or all of the prompts. Parameter entries may be typed in on the same line as the command name thus suppressing the prompts. Some parameters require a prompt and these are designated with an asterix (*). A few commands require that the parameter be entered with the command and these are noted.

### Spacing

All input parameters which are entered on one line must be separated by one and only one blank space. Words or numbers must be made up entirely of non-blank characters since blanks are assumed to mark the end of a word or number and the beginning of another.

### Spelling

All commands and entries must be spelled exactly. Misspelling will result in an error message. All commands can be abbreviated to the first four letters where this is unique. Some commands may be further abbreviated.

### Continuation Lines

All MOSS commands and parameters are short enough to be entered on one line. Thus, input may not be extended onto additional lines.

### Command Concatenation

Several commands can be specified on a single input line by using a symbol between commands. Typical symbols used are a colon (:), a period (.), or a dash (-). However, please note that a semi-colon (;) will not work. The symbol must be preceded and followed by one blank space. For example: ERASE : PLOT 1

## SUMMARY DESCRIPTION OF COMMANDS

The following is a list of MOSS commands in alphabetical order and a brief summary description of their function. Complete descriptions of commands follow in the next chapter.

| Command Name | Summary Description |
|---|---|
| ACTIVE | Produces a table identifying and describing activated maps. |
| ADD | Adds import/export format vector maps into the master database. |
| ANNOTATE | Prepares a file which contains text that may be overlaid on a plot via the GCALCOMP command. |
| ARCHIVE | Prepares maps for removal from the database onto tape. |
| AREA | Determines area, frequency, and percentage of each subject in a polygon map. |
| ASSIGN | Pre-sets graphic assignments for maps. |
| AUDIT | Prints out a detailed summary of all features in a vector map. |
| BAUD | Changes the length of time delayed after a screen erase. |
| BSEARCH | Performs complex Boolean retrievals from multiple attribute files. |
| BUFFER | Creates a buffer zone of user-specified size around any feature in a vector map. |
| BUTTON | Allows definition of function keys for commands. |
| BYE | Terminates the session. |
| CALCOMP | Produces a file for output to a plotter. |
| CLI | Temporarily allows the user to exit MOSS and access the operating system. |
| COMMANDS | Lists all commands and their abbreviations. |
| COMPUTE | Creates a new attribute field by combining interger or real attributes, numeric values, and area perimeter and length, using mathematical operations and functions. |
| CONTIGUITY | Activates all polygons of subject A and B when A and B are spatially adjacent to each other. |
| COST | Summarizes cost, elapsed time, and computer resources used during the session. |
| DEARCHIVE | Prepares maps for entry into the database from tape. |

| | |
|---|---|
| DELETE | Deletes maps from the database. |
| DESCRIBE | Allows the user to browse the contents of a map file. |
| DEVICE | Allows graphics output to be routed to different devices. |
| DIGITIZE | Creates a new vector map using a table digitizer. |
| DISTANCE | Measures distance between any two points along a path or along a straight line. |
| DIVIDE | Allows large polygons to be split. |
| EDGE | Creates a new line map based on common boundaries or edges between two or more polygon maps. |
| EDITATT | Allows for modifications of a multiple attributes file. |
| ERASE | Erases the CRT display screen. |
| EXPORT | Creates an import/export format map from an active vector map. |
| FLOOD | Displays polygon maps with color. |
| FREE | Removes active maps from the active map table. |
| FREQUENCY | Determines frequency and percentage of each subject in a vector map. |
| GCALCOMP | Creates a file of active vector maps for output to a ZETA plotter. |
| GENERATE | Creates a new vector map at a graphics terminal using cursor or keyboard input. |
| GOVERLAY | Creates a new polygon map based on the logical intersection of two polygon maps. |
| HELP | Produces a list of commands within functional groups or a detailed description of a particular command. |
| HEWLETT | Produces a file of active maps for output to a HEWLETT-PACKARD plotter. |
| LEGEND | Displays a map legend with title and scale, and labels attribute information for vector maps. |
| LENGTH | Determines length of all lines of each subject in a line map. |
| LINE | Displays line maps using a variety of possible fonts. |
| LIST | Prints out name, header, or subjects of maps stored in the master database or workfiles. |

| | |
|---|---|
| LOCATE | Determines coordinates of any point in the viewing window. |
| LPOVER | Creates a new point or line map from the logical intersection of a polygon map and a line or point map. |
| MAPS | Accesses the MAPS subsystem. |
| MERGE | Combines two or more vector maps into one map. |
| MOVELABEL | Re-positions the centroid of vector map features. |
| NEWS | Produces a narrative description of recent changes and other information. |
| NUMBER | Displays feature number, active map number, or area/length of vector maps. |
| OPEN | Allows access to different master files. |
| OVERLAY | Creates a new polygon map based on the logical intersection, union, or non-intersection between two polygon maps. |
| PAGE | Allows the default lines per page to be changed. |
| PERIMETER | Determines total distance around each subject in a polygon map. |
| PLOT | Displays maps on a graphics device. |
| PROJECTION | Changes the map projection of vector maps. |
| PROXIMITY | Activates data from a vector map based on its spatial distance to some point or other map feature. |
| QUERY | Identifies subject, area/length, feature number, and map name of any position displayed on a vector map. |
| REPORT | Generates reports from the multiple attributes database. |
| RESET | Sets the viewing window to the original coordinates specified by the WINDOW command (i.e., counteracts ZOOM). |
| SAMPLE | Performs random sampling of features in a vector map. |
| SAVE | Saves an active vector map as part of the workfile. |
| SELECT | Activates all, or a specific portion, of any master map or workfile map. |
| SHADE | Shades polygon maps with cross-hatching on the CRT. |
| SHOW | Performs a number of commands sequentially including SELECT, WINDOW, PLOT, SHADE, and AREA. |
| SIZE | Activates polygons or lines from a map based on area or length, respectively, of the features. |

| | |
|---|---|
| STATISTICS (DESCRIBE) | Produces descriptive statistics (e.g., mean,variance) on the subjects in a map. |
| STATISTICS (HISTOGRAM) | Produces a histogram (bar chart) of subjects in a map with a legend. |
| STATUS | Prints out information on volume and type of data associated with a particular mapfile, map, or session. |
| SYMBOL | Displays point or polygon maps using a variety of possible fonts. |
| TERMINAL | Specifies terminal type for Tektronix emulation. |
| TESTGRID | Plots a grid of a specified cell size. |
| TEXT | Creates and positions text in a text file. |
| TRANSLATE | Translates a vector map in x and/or y, rotates a map, or rubber sheets a map. |
| UTILITY | Allows access to ancillary database management routines. |
| VERSATEC | Produces a file of active maps for output to a VERSATEC plotter. |
| WEED | Thins points in a line or polygon map. |
| WINDOW | Sets the viewing window to a particular area of the earth's surface and defines the initial study area boundary. |
| ZETA | Produces a file of active maps for output to a ZETA plotter. |
| ZOOM | Magnifies a user-specified portion of the viewing window. |

ACTIVE
ADD
ANNOTATE
ARCHIVE
AREA
ASSIGN
AUDIT
BAUD
BSEARCH
BUFFER
BUTTON
BYE
CALCOMP
CLI
COMMANDS
COMPUTE
CONTIGUITY
COST
DEARCHIVE
DELETE
DESCRIBE
DEVICE
DIGITIZE
DISTANCE
DIVIDE
EDGE
EDITATT
ERASE
EXPORT
FLOOD
FREE
FREQUENCY
GENERATE
GOVERLAY
HELP
HEWLETT
LEGEND
LENGTH
LINE
LIST
LOCATE
LPOVER
MAPS
MERGE
MOVELABEL
NEWS
NUMBER
OPEN
OVERLAY
PAGE
PERIMETER
PLOT
PROJECTION
PROXIMITY
QUERY
REPORT
RESET
SAMPLE
SAVE
SELECT
SHADE
SHOW
SIZE
STATISTICS
  (DESCRIBE)
  (HISTOGRAM)
STATUS
SYMBOL
TERMINAL
TESTGRID
TEXT
TRANSLATE
UTILITY
VERSATEC
WEED
WINDOW
ZETA
ZOOM

The ACTIVE command is summarized as follows:

ACTIVE is a data description command that produces a table referencing map data which have been "activated". The command may be used frequently throughout a session to monitor maps that have been activated from master or workfiles. Only maps referenced in the active table can be analyzed or displayed. Commands which activate data are: SELECT, BSEARCH, CONTIGUITY, LPOVER, SAMPLE, and SIZE.

The table produced by ACTIVE references each map with an I.D. number in the left-hand column. This number is a parameter that is used to identify particular maps for analysis and display. Number of entries (i.e., features), selection criteria, map name, and data type are displayed for each active map.

The ACTIVE command is specified as follows:

ACTIVE

There are no parameters associated with the ACTIVE command.

The following is an example of use of the ACTIVE command:

```
ENTER COMMAND
? ACTIVE
```

The limitations of the ACTIVE command are as follows:

-- Cannot have more than 40 maps active at one time.

-- Cannot have more than 32,000 features active at one time.

-- Erases the screen before displaying the table.

Example of result of use of the ACTIVE command:

THE FOLLOWING MAPS ARE CURRENTLY ACTIVE

| I.D. | ITEMS | SEARCH | | | FILE NAME/TYPE | |
|---|---|---|---|---|---|---|
| 1 | 5 | ALL | | | MDRWOLFRG | 3 |
| 2 | 3 | SUBJECTS | 422PJ | | SCTWOLFRG | 3 |
| 3 | 2 | ITEMS | 1 | 3 | MDMWOLFRG | 2 |
| 4 | 17 | ALL | | | GOSWOLFRG | 1 |

TOTAL ITEMS 27

The active map table produced by the ACTIVE command. This example shows four maps currently active. ID 1 is a polygon map of mule deer ranges on Wolf Ridge, CO with 5 items. ID 2 is a polygon map of surface cover types on Wolf Ridge, CO. Three items were selected by subject "422PJ", open canopy pinyon-juniper stands. ID 3 is a line map of mule deer migration routes on Wolf Ridge, CO. Two features were selected by item number, 1 and 3. ID 4 is a point map of gas and oil sites on Wolf Ridge, CO with 17 entries. Note that the words "items", "features", and "entries" are synonomous.

The ADD command is summarized as follows:

ADD is a data manipulation command which provides for entry of import/export format maps into a master database. If multiple attributes data is to be added a system manager should be consulted.

The ADD command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

ADD (input file)* (new map name)* (template name)* (header)* (data type)*

The individual parameters of the ADD command are described below:

(input file) is the name of the import/export format map file which is the source of the map to be entered into the database.

(new map name) is the name for the map which is to be added to the database. If the map is to be created in the master data base, the full pathname must be entered along with the filename. If the master file is open when the ADD is executed and the pathname is not specified, the filename will be added to the .DT file but the file will reside in the user's working directory. The file can be added to the user's work files by opening POLYGON before performing the ADD.

(template name) is the name of the map to use as a template for the header of the new map. If you want to start a new map header from scratch, enter a carriage return and the new map header will be initalized to blanks. You will then be given the opportunity to edit the map header by responding to the (header) prompts described below.

(header) are the prompts for the new map header. For each prompt, enter a carriage return to have the new map contain the information shown in the prompt (if using a template) or enter new information. All information entered into the header, except the number of map subjects and the scale factor, are literal data. In other words, they are for the information of the user and their values do not have no effect on the handling of the data. This editing feature is important in changing the number of map subjects or the scale factor.

A scale factor of 0.1 is appropriate for map scales from 1:2000 through 1:12000, 1.0 (default) is appropriate for map scales from 1:12000 through 1:24000, 10.0 for map scales from 1:24000 through 1:100000, 100.0 for a 1:125,000 map, and 0.001 for latitude/longitude data. In general, the scale factor is computed by taking the differences of the East to West and North to South minimum bounding rectangle (MBR) from the header information and dividing the larger of the two by 32,000 and rounding to the nearest tenth. The scale factor specifies the precision of data. When entering the number of map subjects, enter the correct number. If the map has more subjects than entered, the command will not terminate sucessfully. If a number greater than the correct number is entered, the file will be generated to accomodate that many and excessive disk space will be tied up.

(data type) is the type of data contained in the map, either point, line, polygon, elevation, or 3D (x,y,z). Be sure to enter the correct data type. Entering the wrong type may cause a file to be generated which cannot be used.

The following is an example of use of the ADD command:

```
 ENTER COMMAND
? OPEN POLYGON
 ENTER COMMAND
? ADD
 ENTER INPUT FILE NAME EXPORT
 WHAT DO YOU WISH TO CALL THE NEW MAP
 __________
? PLSCOPY
 ENTER NAME OF MAP TO USE AS A TEMPLATE FOR THE NEW MAP HEADER
 OR     ENTER CARRIAGE RETURN TO START MAP HEADER FROM SCRATCH
? PLSWOLFRG

 ENTER DIGITIZER NAME  [WAMS                 ]  ? <CR>
 ENTER  CREATION DATE  [81/12/11]  ? <CR>
 ENTER  STUDYAREA NAME [RETA    ]  ? <CR>
 ENTER  DESCRIPTION
 [ PLS                 WOLF RIDGE        COLORADO 1:24000    ]
 ____________________________________________________________
? <CR>
 ENTER  MAP VINTAGE  [1981]  ? <CR>
 ENTER MAP PROJECTION DESCRIPTION [LAMBERT  ]  ? <CR>
 ENTER NUMBER OF SUBJECTS [   71]  ? <CR>
 ARE COORDINATES IN FEET OR METERS [M]  ? <CR>
 ENTER COORDINATE SCALE FACTOR [ 1.0000]? <CR>
```

```
 # 4 LAMBERT CONFORMAL CONIC
     COORDINATE UNITS ARE: METERS
 VALUES OF ENTERED PARAMETERS
 ----------------------------
SELECTED ELLIPSOID IS TYPE                                   0
SEMI-MAJOR AXIS OF ELLIPSOID                      6378206.4000
ECCENTRICITY SQUARED OF ELLIPSOID                        .0068
LATITUDE OF 1ST STANDARD PARALLEL                      37.0000
LATITUDE OF 2ND STANDARD PARALLEL                      42.0000
LONGITUDE OF CENTRAL MERIDIAN                        -109.0000
LATITUDE ORGIN OF PROJECTION                           36.0000
FALSE EASTING                                     5000000.0000
FALSE NORTHING                                           .0000

 DO YOU WISH TO CHANGE THE PROJECTION PARAMETERS [Y] ? <CR>


 IS THIS HEADER INFORMATION CORRECT [Y] ? Y
   ENTER DATATYPE

   1 = POINT
   2 = LINE
   3 = POLYGON
   5 = SAMPLE ELEVATION POINT
  11 = (X,Y,Z) POINT
  12 = (X,Y,Z) LINE
  13 = (X,Y,Z) POLYGON


? 3

 EXECUTING...PLEASE WAIT

 ADD COMPLETE FOR THE NEW MAP: PLSCOPY
    72 ITEMS AND   71 SUBJECTS IN THE NEW MAP

 THE INPUT FILE IS EXPORT
 DO YOU WISH TO DELETE THE INPUT FILE(Y) ? N
```

The limitations of the ADD command are as follows:

-- Cell data cannot be added.

-- Maps with more than 2750 unique subjects cannot be added.

-- No more than 32,000 maps can be in the master database.

-- No more than 1280 islands are allowed per polygon.

-- Input file must be in MOSS import/export format.

-- Subjects in the new map will not be in alphabetical order.

-- No check is made for correct data type.

-- If the user enters a value that is less than the actual number of subjects in the input file, a fatal error will occur.

-- If the user over-estimates the number of subjects, space will be reserved for the estimated number.

-- If the data type is entered incorrectly (i.e.,type 3 is specified but the data is actually point data), the resulting map will be virtually useless in MOSS.

The ARCHIVE command is specified as follows:

ARCHIVE is a data manipulation command that provides the user with the capability of changing the status of maps from exposed to archived. The map can then be moved to a tape for actual archiving which reduces the amount of disk storage space that is being used.

The ARCHIVE command is specified as follows:

ARCHIVE (map name)

The individual parameters of the ARCHIVE command are described below:

(map name) is the name of the map to be archived.

The following is an example of use of the ARCHIVE command:

```
 ENTER COMMAND
? ARCHIVE
 ENTER NAME OF MAP TO ARCHIVE/DEARCHIVE
? MDRWOLFRG
```

The limitations of the ARCHIVE command are as follows:

-- A map file can be on disk and still have a status of archived.

The AREA command is summarized as follows:

AREA is a data description command that produces a table of area, frequency, and percentage of each subject associated with any polygon or discrete cell map referenced in the active map table. If the file was selected by attribute, then the table is given in terms of that attribute. More than one vector map may be described at the same time. However, only one cell may be entered at a time. Area is calculated in acres.

The AREA command is specified as follows:

AREA (active ID's) (HARDCOPY) (non-sort option)

The individual parameters of the AREA command are described below:

(active ID's) are the ID numbers of polygon or discrete cell maps referenced in the active map table which are to be described. If more than one map ID is entered, all the maps specfied must be vector maps. The table will describe all the maps indicated and the totals will be summed.

(HARDCOPY) is an option to obtain a hardcopy listing of the AREA table on a line printer. If HARDCOPY is specified output is written to a disk file called LINE.PRINTER. This file can be printed by exiting MOSS and issuing the operating system print command. If anything other than the characters HARDCOPY are specified in this option, the characters are used to specify a file name and the output is written to the file. If the file exists, the output is appended to the existing file. The name the operating system uses for the line printer can also be specified. This parameter can only be entered in un-prompted mode (see example below).

(non-sort option) is an option that allows the user to display an area table for one or more active maps with subjects listed in the order digitized. If the area for more than one map is requested the subjects are grouped in the order that the ID's are typed. This option is activated by typing an "N" after HARDCOPY, a filename, or @CONSOLE (to obtain listing at console). A default would sort the subjects alphanumerically.

The following are examples of use of the AREA command:

```
 ENTER COMMAND
? AREA
 ENTER ACTIVE MAP I.D.(S)
? 1
```

To obtain a hardcopy listing:

```
 ENTER COMMAND
? AREA 1 HARDCOPY
```

To obtain a non-sorted hardcopy:

```
 ENTER COMMAND
? AREA 1 2 3 HARDCOPY N
```

The limitations of the AREA command are as follows:

-- Input map must be an active polygon or discrete cell map.

-- Cannot have more than 2500 total unique subjects in the area table.

-- If area is greater than 9999999.99 or frequency is greater than 99999, asterisks will be printed out.

-- No more than 40 maps may be described at one time.

-- If the LINE.PRINTER file created by the HARDCOPY option is to be saved it should be renamed since use of the HARDCOPY option deletes existing LINE.PRINTER files.

-- Only one cell map can be specified at a time.

-- For the N option to work, the HARDCOPY option must be used.

Examples of output from use of the AREA command:

AREA SUMMARY FOR MAP MDRWOLFRG ACTIVE MAP NO. 1

| SUBJECT | AREA | FREQUENCY | PERCENT |
|---|---|---|---|
| MULE DEER SUMMER RANGE | 122.46 | 1 | .33 |
| MULE DEER WINT CONC/WINT RANGE | 6398.34 | 3 | 17.49 |
| MULE DEER WINTER RANGE | 30053.34 | 1 | 82.17 |
| TOTAL (IN ACRES) | 36574.1 | 5 | 100.00 |

ENTER COMMAND
? AREA 3 1

AREA SUMMARY FOR MAP MLRWOLFRG ACTIVE MAP NO. 3
AREA SUMMARY FOR MAP MDRWOLFRG ACTIVE MAP NO. 1

| SUBJECT | AREA | FREQUENCY | PERCENT |
|---|---|---|---|
| MOUNTAIN LION SUMMER RANGE | 124.25 | 1 | .17 |
| MOUNTAIN LION WINTER RANGE | 36450.64 | 1 | 49.83 |
| MULE DEER SUMMER RANGE | 122.46 | 1 | .17 |
| MULE DEER WINT CONC/WINT RANGE | 6398.34 | 3 | 8.75 |
| MULE DEER WINTER RANGE | 30053.34 | 1 | 41.09 |
| TOTAL (IN ACRES) | 73149.0 | 7 | 100.00 |

Active map ID 1 is a map of mule deer ranges on Wolf Ridge, CO. Active map ID 3 is a map of mountain lion ranges on Wolf Ridge, CO. Note that the second table is a composite table and that areas from both maps have been summed to calculate total area and percent.

The ASSIGN command is summarized as follows:

ASSIGN is a data display command that allows the user to preset cartographic assignments for point, line, and polygon data. For point data, the user may assign point symbols. For line data, the user may assign line fonts as well as line thickness and color. For polygon the user may assign cross-hatch parameters as well as color. Once the user has made these assignments to the map data, all defaults in the PLOT and SHADE commands are over-ridden and the map data is presented as assigned by the user. ASSIGN also allows the user to change any of these cartographic assignments or to return to the system defaults.

The ASSIGN command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

ASSIGN (map name)* (assignment option)*

The individual parameters of the ASSIGN command are described below:

(map name) is the name of the map to be font-assigned.

(assignment option) is an option the user specifies from the main assignment menu as shown in the example below. Option 1 must be used the first time a map is going to be cartographically assigned. The user will be prompted for a font number. This is the number of the font table the user desires (see Appendix E in: Frosh, R. and J.M. Walsh. 1983. COS User's Manual. USFWS Western Energy and Land Use Team Doc.). After this, the assignment menu allows the user to assign by subject and feature, edit previous assignments, or return to the MOSS command prompt. After an option is chosen, additional prompts will be presented depending upon the option and the type of map being assigned. For example, when assigning line or point data the user will be prompted for a symbol number, line thickness, width, height, and color code. Symbol number is a line font number or a symbol font number from the font table originally specified. Line thickness is expressed in inches. A value of zero indicates normal display thickness. For assigning polygon data by subject, the user will be prompted for shade type, meters between shade lines, shade rotation, and color code for each subject. Shade type may be chosen as solid lines, or no shading. Future enhancements will include dashed lines and pattern fills. Meters between lines is the number of meters on the ground between shade lines. For a 7.5 minute quadrangle, a value of 7 will shade the polygon solid. For a 1:100000 map, a value of 100 will produce solid shading. Shade rotation is a value between -90 and +90 degrees and is the angle of rotation of the shade lines.

Color code is currently not functional except for display on a color softcopy device. Editing an assignment is similiar, after the subject to be edited is identified.

The following is an example of use of the ASSIGN command:

```
 ENTER COMMAND
? ASSIGN
 ENTER NAME OF MAP TO PERFORM FONT ASSIGNMENT ON
? STREAMS

  ENTER CARTOGRAPHIC ASSIGNMENT OPTION:
      1  = ASSIGN ENTIRE MAP (REQUIRED FIRST PASS)
      2  = CARTOGRAPHICALLY ASSIGN BY SUBJECT
      3  = CARTOGRAPHICALLY ASSIGN BY FEATURE
      4  = CARTOGRAPHICALLY ASSIGN ALL SUBJECTS
      5  = EDIT CARTOGRAPHIC ASSIGNMENT BY SUBJECT
      6  = EDIT CARTOGRAPHIC ASSIGNMENT BY FEATURE
      7  = EDIT CARTOGRAPHIC ASSIGNMENT OF ALL SUBJECTS
      8  = TERMINATE ASSIGNMENT SESSION
? 1

 ENTER FONT NUMBER FOR MAP STREAMS

? 2

  ENTER CARTOGRAPHIC ASSIGNMENT OPTION:
      1  = ASSIGN ENTIRE MAP (REQUIRED FIRST PASS)
      2  = CARTOGRAPHICALLY ASSIGN BY SUBJECT
      3  = CARTOGRAPHICALLY ASSIGN BY FEATURE
      4  = CARTOGRAPHICALLY ASSIGN ALL SUBJECTS
      5  = EDIT CARTOGRAPHIC ASSIGNMENT BY SUBJECT
      6  = EDIT CARTOGRAPHIC ASSIGNMENT BY FEATURE
      7  = EDIT CARTOGRAPHIC ASSIGNMENT OF ALL SUBJECTS
      8  = TERMINATE ASSIGNMENT SESSION
? 2

 ENTER SYMBOL NUMBER FOR SUBJECT EPHEMERAL STREAMS

? 7
 ENTER LINE THICKNESS
? 0
 ENTER GRAPHICS X SIZE
? 0
```

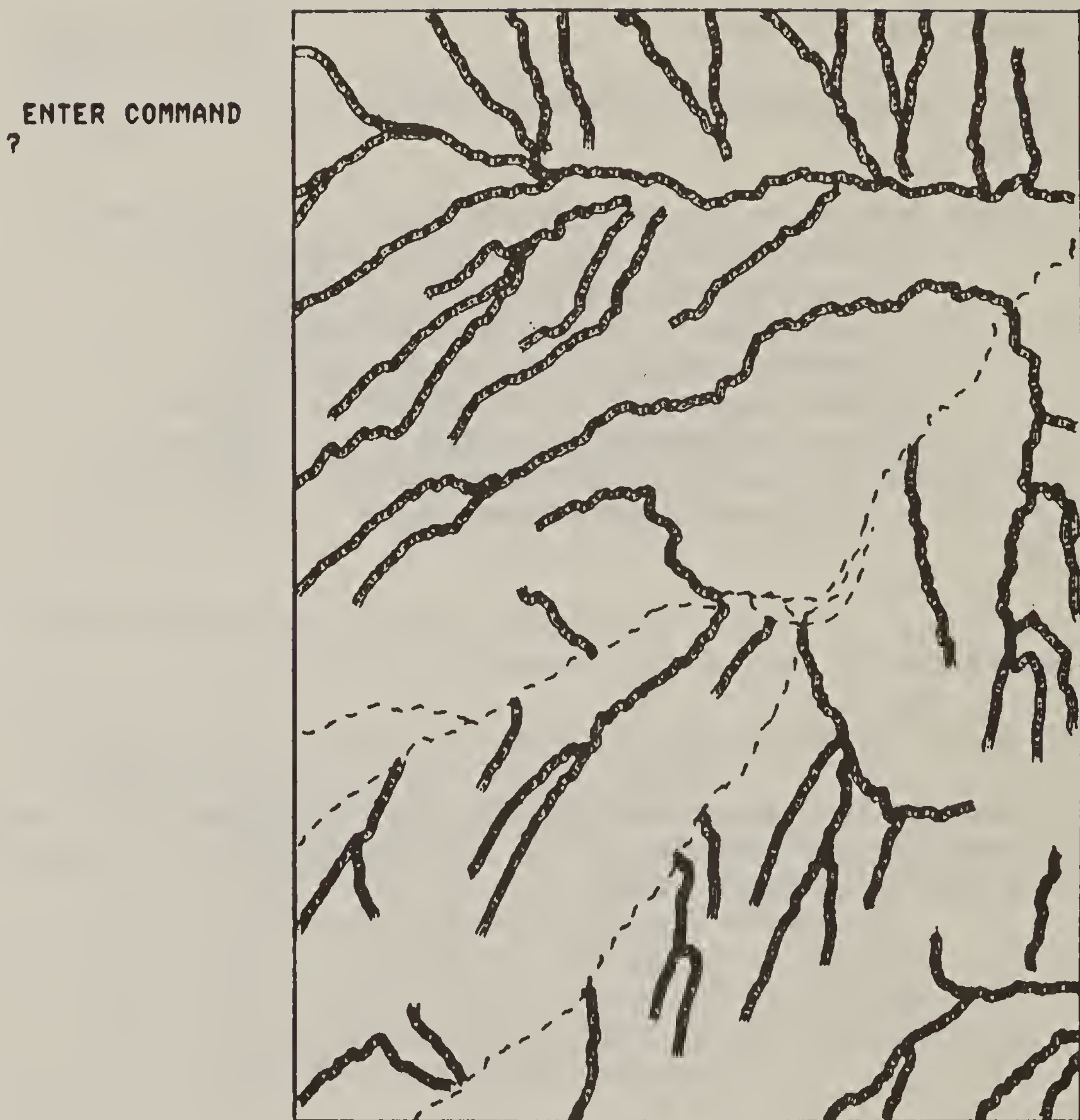
```
 ENTER GRAPHICS Y SIZE
? 0
 ENTER COLOR CODE (RETURN FOR NO COLOR)
? <CR>
 ENTER SYMBOL NUMBER FOR SUBJECT PERENNIAL STREAMS
? 4
 ENTER LINE THICKNESS
? 0
 ENTER COLOR CODE (RETURN FOR NO COLOR)
? <CR>

  ENTER CARTOGRAPHIC ASSIGNMENT OPTION:
      1  = ASSIGN ENTIRE MAP (REQUIRED FIRST PASS)
      2  = CARTOGRAPHICALLY ASSIGN BY SUBJECT
      3  = CARTOGRAPHICALLY ASSIGN BY FEATURE
      4  = CARTOGRAPHICALLY ASSIGN ALL SUBJECTS
      5  = EDIT CARTOGRAPHIC ASSIGNMENT BY SUBJECT
      6  = EDIT CARTOGRAPHIC ASSIGNMENT BY FEATURE
      7  = EDIT CARTOGRAPHIC ASSIGNMENT OF ALL SUBJECTS
      8  = TERMINATE ASSIGNMENT SESSION
? 6
```

The limitations of the ASSIGN command are as follows:

-- Cannot assign polygon maps by feature at this time.

-- Feature assignment overrides subject assignment. To change from feature assignment to subject assignment you must assign a symbol number of zero.

Example of result of use of the ASSIGN command:



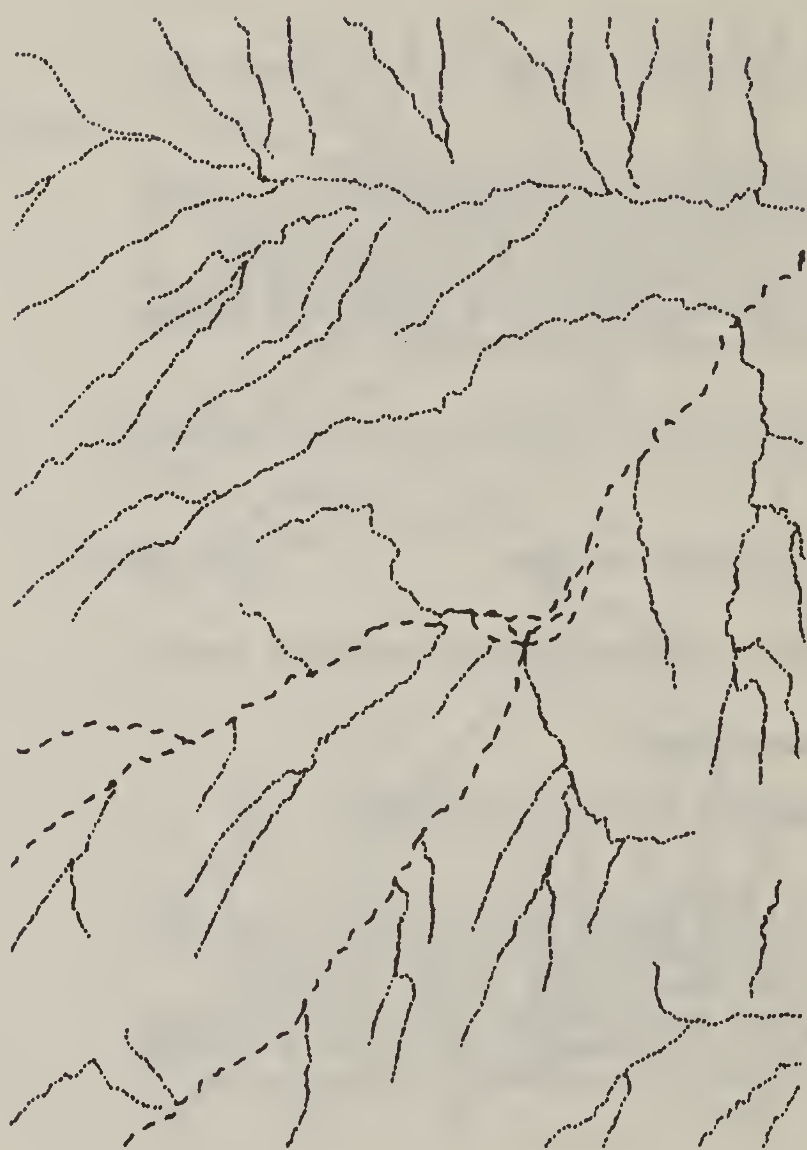

A map of surface water streams on Wolf Ridge, CO which has been line font assigned by subject. Perennial streams appear as dashed lines (font 4) and ephemeral streams are represented by a highway font (7).

Example of use of the ASSIGN command:

```
 ENTER NAME OF MAP TO PERFORM FONT ASSIGNMENT ON
? STREAMS

  ENTER CARTOGRAPHIC ASSIGNMENT OPTION:
       1  = ASSIGN ENTIRE MAP (REQUIRED FIRST PASS)
       2  = CARTOGRAPHICALLY ASSIGN BY SUBJECT
       3  = CARTOGRAPHICALLY ASSIGN BY FEATURE
       4  = EDIT CARTOGRAPHIC ASSIGNMENT BY SUBJECT
       5  = EDIT CARTOGRAPHIC ASSIGNMENT BY FEATURE
       6  = TERMINATE ASSIGNMENT SESSION
? 4

 ENTER RECORD NUMBER OF SUBJECT TO EDIT FONT NUMBER

? 1

 SUBJECT = EPHEMERAL STREAMS             FONT NUMBER =     7

 ENTER SYMBOL NUMBER FOR SUBJECT EPHEMERAL STREAMS

? 1
 ENTER LINE THICKNESS
? 0
 ENTER COLOR CODE (RETURN FOR NO COLOR)
?

  ENTER CARTOGRAPHIC ASSIGNMENT OPTION:
       1  = ASSIGN ENTIRE MAP (REQUIRED FIRST PASS)
       2  = CARTOGRAPHICALLY ASSIGN BY SUBJECT
       3  = CARTOGRAPHICALLY ASSIGN BY FEATURE
       4  = EDIT CARTOGRAPHIC ASSIGNMENT BY SUBJECT
       5  = EDIT CARTOGRAPHIC ASSIGNMENT BY FEATURE
       6  = TERMINATE ASSIGNMENT SESSION
? 6
```

The user has decided that a highway font is inappropriate to represent ephemeral streams. Font assignment for this subject is edited and ephemeral streams are assigned a dotted line type (font 1).

Example of result of use of the ASSIGN command:



A map of surface water streams on Wolf Ridge, CO which has been re-assigned by subject. Ephemeral streams now appear as a dotted line (font 1).

The AUDIT command is summarized as follows:

AUDIT is a data description command that displays a table showing for each feature in a map the subject, item number, perimeter in miles, area in acres, number of islands, and number of coordinate pairs.

The AUDIT command is specified as follows:

AUDIT (map name) (HARDCOPY)

The individual parameters of the AUDIT command are described below:

(map name) is the name of the map that the user wishes to examine.

(HARDCOPY) is an option to obtain a hardcopy listing of the AUDIT table on a line printer. Output is written to a disk file called LINE.PRINTER. This file can be printed by exiting MOSS and issuing the operating system print command. This parameter can only be entered in an unprompted mode (see example below).

The following are examples of use of the AUDIT command:

```
 ENTER COMMAND
? AUDIT
 ENTER THE NAME OF THE MAP YOU WISH TO EXAMINE
? MDRWOLFRG
```

To obtain a hardcopy listing:

```
 ENTER COMMAND
? AUDIT MDRWOLFRG HARDCOPY
```

The limitations of the AUDIT command are as follows:

-- Can only use vector maps.

-- If area or perimeter are greater than 9999999.99 then asterisks will be printed.

-- If the LINE.PRINTER file created by the HARDCOPY option is to be saved it should be renamed since use of the HARDCOPY option deletes existing LINE.PRINTER files.

Examples of output from use of the AUDIT command:

FOR THE MAP MDRWOLFRG , THERE ARE 5 POLYGONS

| SUBJECT | ITEM | PERIM (MILES) | AREA (ACRES) | ISLANDS | POINTS |
|---|---|---|---|---|---|
| MULE DEER WINT CONC/WINT RANGE | 1 | 2.74 | 272.73 | 0 | 43 |
| MULE DEER WINTER RANGE | 2 | 47.82 | 30053.34 | 1 | 370 |
| MULE DEER WINT CONC/WINT RANGE | 3 | 10.49 | 3008.53 | 0 | 166 |
| MULE DEER WINT CONC/WINT RANGE | 4 | 10.72 | 3117.07 | 0 | 118 |
| MULE DEER SUMMER RANGE | 5 | 1.74 | 122.46 | 0 | 43 |
| | | 73.50 | 36574.14 | 1 | 740 |

FOR THE MAP MDMWOLFRG , THERE ARE 3 LINES

| SUBJECT | ITEM | LENGTH (MILES) | CENTER (MILES) | POINTS |
|---|---|---|---|---|
| MULE DEER MIGRATION ROUTE | 1 | 9.41 | .00 | 6 |
| MULE DEER MIGRATION ROUTE | 2 | 3.60 | .00 | 2 |
| MULE DEER MIGRATION ROUTE | 3 | 7.28 | .00 | 12 |
| | | 20.30 | | 20 |

FOR THE MAP SCPWOLFRG , THERE ARE 16 POINTS

| SUBJECT | ITEM |
|---|---|
| PEMH | 1 |
| PEM | 2 |
| PEMX | 3 |
| PUSX | 4 |
| PUSX | 5 |
| PUB | 6 |
| PUSH | 7 |
| PUBX | 8 |
| PUBX | 9 |
| PEM | 10 |
| PUS | 11 |
| PEMX | 12 |
| PUBH | 13 |
| PUB | 14 |
| PUBH | 15 |
| PUBH | 16 |

Map MDRWOLFRG is a polygon map of mule deer ranges on Wolf Ridge, CO. Map MDMWOLFRG is a line map of mule deer migration routes on Wolf Ridge, CO. Map SCPWOLFRG is a point map of surface cover types on Wolf Ridge, CO.

The BAUD command is summarized as follows:

BAUD is a program control command which allows the user to change the time delay following a screen erase. The higher the setting, the longer the pause is after the erase. This command is necessary to support some of the older model graphics terminals.

The BAUD command is specified as follows:

BAUD (baud rate)

The individual parameters of the BAUD command are described below:

(baud rate) is the baud rate of the terminal where the user is working.

The following is an example of use of the BAUD command:

```
 ENTER COMMAND
? BAUD
 ENTER BAUD RATE
? 1200
```

The limitations of the BAUD command are as follows:

-- Only settings of 300, 1200, 2400, 4800, or 9600 may be specified.

The BSEARCH command is summarized as follows:

BSEARCH is a data reclassification command which allows the user to perform complex Boolean retrievals from a MOSS vector map multiple attributes file. Given that the proper information is in the database, the user could ask a question such as:

GIVE ME ALL THE FEATURES IN THISMAP THAT HAVE BEEN SAMPLED SINCE 1975 AND HAVE GOLD CONCENTRATIONS GREATER THAN 5 PPM OR SILVER CONCENTRATIONS GREATER THAN 15 PPM.

The multiple attributes file will be scanned and features which meet the search criteria will be activated as a new map.

The BSEARCH command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

BSEARCH (map name) (search string)*

The individual parameters of the BSEARCH command are described below:

(map name) is the name of the input map to be searched.

(search string) is a logical expression which specifies the search criteria. The generic form of the command is KEYNAME RELATION VALUE OPERATOR. KEYNAME is the 1 to 10 character field keyname to be searched. Keynames may be determined using the LIST attributes option of the LIST command. Relation is a relational indicator. Only LE, LT, EQ, NE, GT, or GE may be used. VALUE is an actual value (integer, real, or alphanumeric) that will be used for comparison during the search. OPERATOR is a logical connector. Only AND or OR may be used. Search strings may be continued on a new line using an ampersand (&). Parenthesis may be embedded in the search string and all expressions in the search string, including parenthesis, must be separated by one and only one space.

The following is an example of use of the BSEARCH command:

```
 ENTER COMMAND
? BSEARCH
 PLEASE ENTER NAME OF MAP TO SEARCH
? SGWWOLFRG
 PLEASE ENTER SEARCH STRING
? CANOPCOVER LE 40 AND HOMERANGE GT 7.0
 POLY         2 MEETS THE CRITERIA
     1 HITS FOR ACTIVE ID  2
```

The limitations of the BSEARCH command are as follows:

- -- Expressions within the search string must be separated by one and only one space.
- -- Map must have a multiple attributes file.
- -- Can only specify up to 20 keynames.
- -- Will not work right if the subject field is blank.
- -- A maximum of 8192 features can be activated.
- -- If the subject field is greater than 10 characters, it can not be besearched.

Example of result of use of the BSEARCH command:

```
 ENTER COMMAND
? ACT


 THE FOLLOWING MAPS ARE CURRENTLY ACTIVE
  I.D.    ITEMS  SEARCH                                  FILE NAME/TYPE
 ------------------------------------------------------------------------
     1        3  ALL                                     SGWWOLFRG      3
     2        1  ATTRIBUTE CANOPCOVER LE 40 AND HOMERANGESGWWOLFRG      3
 ------------------------------------------------------------------------
 TOTAL ITEMS     4
```

Result of the command is a data set referenced in the active map table as shown.

The BUFFER command is summarized as follows:

BUFFER is a distance analysis command that generates a buffer (i.e., a zone of influence) of user-specified distance around any map data referenced in the active map table. BUFFER will draw zones of influence around points (e.g., a ferret sighting), lines (e.g.,a road), or polygons (e.g., a city). Result of the command is a polygon map that is saved as part of the workfile. Since the buffer generation process may create overlapping polygons, the user is also given the option of resolving these overlaps. If the resolve overlap option is chosen, clusters of overlapping features are identified and a polygon overlay OR (union) process is initiated. Choosing the resolve overlap option will cause BUFFER to execute for a minimum of twice as long.

The BUFFER command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

BUFFER (active ID) (new map name) (radius) (resolve overlaps)*

The individual parameters of the BUFFER command are described below:

(active ID) is the ID number of a point, line, or polygon map referenced in the active map table.

(new map name) is the name for the map resulting from BUFFER.

(radius) is the desired width or radius of the buffer zone in miles.

(resolve overlaps) is an option for the user to specify whether or not polygon overlaps should be resolved. The user must answer YES or NO.

The following is an example of use of the BUFFER command:

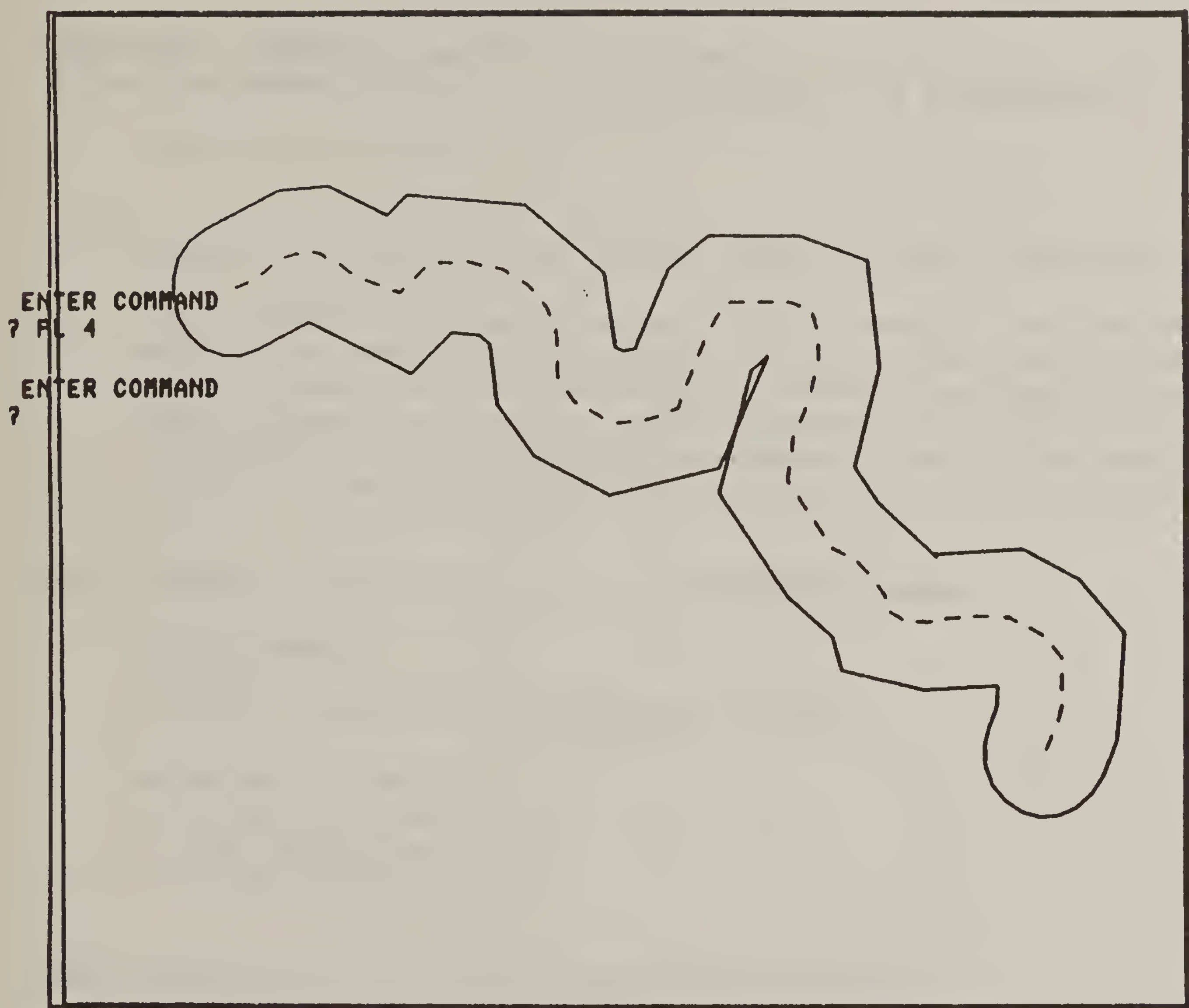
```
 ENTER COMMAND
? BUFFER
 PLEASE ENTER ACTIVE MAP ID.S TO BUFFER
? 1
WHAT DO YOU WISH TO CALL THE NEW MAP

? SWSBUFFER
```

```
 PLEASE ENTER BUFFER ZONE IN MILES
? .025
 DO YOU WISH OVERLAPS RESOLVED (YES OR NO) ? NO

 ... Building BUFFER zones ....
PROCESSING FEATURE     1
BUILD MOSS MAP        DATA TYPE =   3

RESOLVING OVERLAPS
PROCESSING FEATURE     1
BUILD MOSS MAP        DATA TYPE =   3

TOTAL TIME      =       1.86
TOTAL RECORDS   =     144.00
TOTAL JOB COST =$        .02

 ENTER COMMAND
```

The limitations of the BUFFER command are as follows:

- -- Buffer may produce erroneous results on "dirty" data; i.e.; lines with duplicate points or selfcrossing loops.
- -- Resolving overlaps option does not always work correctly.
- -- Input map must be an active vector map with window set.
- -- Input map must have less than 750 points per feature or less than 250 points per feature when resolving overlaps.
- -- May not function well with a large radius (e.g., > 1 mile).
- -- Cannot resolve overlaps on data with different subjects.

Example of result of use of the BUFFER command:




The map is a buffered ephemeral stream on Wolf Ridge, CO. The stream is plotted with a dotted line. Map ID 4 is the polygon map of the buffered area.

The BUTTON command is summarized as follows:

BUTTON is a program control command which allows the user to assign command strings to the function keys of a terminal (e.g., a DASHER). Function keys F1 - F12 may be used in combination with the <ctrl> and <shift> keys giving 47 possible combinations.

The BUTTON command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

BUTTON (menu option)*

The individual parameters of the BUTTON command are described below:

(menu option) is a menu of options for the command. The user may 1) enter button mode, 2) exit button mode, or 3) assign function keys. Option 1 causes MOSS to respond only to commands entered via function keys. Option 2 sets MOSS to regular command mode. Option 3 allows for assignment of function keys to commands. This option prompts the user for further self-explanatory input and is not described here.

The following is an example of use of the BUTTON command

```
 ENTER COMMAND
? BUTTON
********  MOSS FUNCTION KEY OPTIONS  ********

ENTER DESIRED OPTION:
1. ENTER BUTTON MODE
2. EXIT BUTTON MODE
3. ASSIGN FUNCTION KEYS
```

The limitations of the BUTTON command are as follows:

-- The <ctrl><shift>F12 key combination may not be assigned. This is reserved for the BUTTON command while in button mode which enables the user to get out of button mode.

-- When in button mode, MOSS will only respond to function buttons, i.e., command modes can not be mixed.

-- Only 47 command strings may be defined.

-- Must have a terminal with function keys.

-- The command assignments to the function keys remain regardless of how MOSS is started. However, if they are keyed to the active table, MOSS should be entered by using a RESTART command.

The following are examples of uses of the BUTTON command:

```
 ENTER COMMAND
? BUTTON
********  MOSS FUNCTION KEY OPTIONS ********

ENTER DESIRED OPTION:
1. ENTER BUTTON MODE
2. EXIT BUTTON MODE
3. ASSIGN FUNCTION KEYS

3
PRESS THE FUNCTION KEY YOU WISH TO ASSIGN, THEN HIT RETURN
(hit the key labeled F1)
CURRENT ASSIGNMENT FOR THIS KEY IS:



WHAT IS THE NEW COMMAND FOR THIS KEY ? (80 CHAR MAX)

ERASE - PLOT 1 - PLOT 4 - SHAD 3 (return)
ENTER NEXT FUNCTION KEY, OR JUST HIT RETURN TO EXIT
(return)
 ENTER COMMAND
? BUTTON
********  MOSS FUNCTION KEY OPTIONS ********

ENTER DESIRED OPTION:
1. ENTER BUTTON MODE
2. EXIT BUTTON MODE
3. ASSIGN FUNCTION KEYS

1
 ENTER FN KEY
(press the key labeled f1)ERASE - PLOT 1 - PLOT 4 - SHAD 3
ERASE - PLOT 1 - PLOT 4 - SHAD 3
(these commands are actually executed. To return to the menu,
 press CTRL SHIFT F12.)
```

To delete "program" from the button:

```
 ENTER COMMAND
? BUTTON
 ********  MOSS FUNCTION KEY OPTIONS ********

ENTER DESIRED OPTION:
1. ENTER BUTTON MODE
2. EXIT BUTTON MODE
3. ASSIGN FUNCTION KEYS

3
PRESS THE FUNCTION KEY YOU WISH TO ASSIGN, THEN HIT RETURN
(Press the key labeled F1)
CURRENT ASSIGNMENT FOR THIS KEY IS:
ERASE - PLOT 1 - PLOT 4 - SHAD 3


WHAT IS THE NEW COMMAND FOR THIS KEY ? (80 CHAR MAX)
(return)

ENTER NEXT FUNCTION KEY, OR JUST HIT RETURN TO EXIT
(return)

 ENTER COMMAND
?
```

The BYE command is summarized as follows:

BYE is a program control command which will terminate the session. After the command is issued the user is returned to the computer operating system. The user can then initiate other processes.

The BYE command is specified as follows:

```
BYE
```

There are no individual parameters associated with the BYE command.

The following is an example of use of the BYE command:

```
 ENTER COMMAND
? BYE

 USER  JOHN          LOGGED OFF FROM MOSS

  THANKYOU FOR USING MOSS

STOP

)
```

The limitations of the BYE command are as follows:

-- The active list, current master file name, baud rate, and window will be lost unless RESTART is given as the user name at the beginning of the next session (see also Appendix A).

The CALCOMP command is summarized as follows:

CALCOMP is a data display command which allows the user to produce a file of an active map or maps for output to a CALCOMP plotter.

The CALCOMP command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

CALCOMP (output file name)* (active ID's)* (output scale)*
(border option)* (corner tic option)* (map title)*
(bar scale option)* (pen color)* (attribute option)*
(shade option)* (logo option)* (ancillary annotation option)*
(legend option)*

The individual parameters of the CALCOMP command are described below:

(output file name) is the name of a disk file to which the graphics are being routed. The contents of this file can later be plotted using the SPOOL.CLI program. For assistance see the system manager.

(active ID's) are the ID numbers of maps referenced in the active map table which are to be plotted.

(output scale) is the scale for the plot. After entering a scale, MOSS will respond with the plot size in inches and query for acceptability.

(border option) is an opportunity for the user to specify a border around the plot. If a border is desired, the user will be prompted for corner tic, title, and bar scale options as below.

(corner tic option) is an opportunity for the user to have corner tics plotted if a border was requested as above.

(map title) is a title for the plot. This option is available if a border was requested as above.

(bar scale option) is an opportunity for the user to have a bar scale plotted if a border was requested as above. If a bar scale is desired the user will be prompted for units of measure (feet, miles, nautical), increment length, and bar divisions.

(pen color) is the desired pen color to be used on the plot. Available colors are 1-Black, 2-Blue, 3-Red, and 4-Green. If more than one active ID is to be plotted the user may specify different pen colors for each ID. For plotters equipped with more than four pens the user must define the colors beginning with pen five.

(attribute option) is an opportunity for the user to have attribute information or item numbers plotted. If attributes or item numbers are to be plotted, the user will be prompted for a pen color as above.

(shade option) is an opportunity for the user to have the plot shaded. If shading is desired the user will be prompted for shade density parameters and angle of rotation. If more than one active ID is to be plotted the user may specify various shade combinations for each ID.

(logo option) is an opportunity for the user to have a logo plotted. If desired, the user will be prompted for the name of a previously created file. This file must be in unit-square import/export format and may be created using a utility routine (see Appendix F).

(ancillary annotation option) is an opportunity for the user to have one or more lines of text plotted. This feature allows explanatory text to be added to enhance understandability of the plot.

(legend option) is an opportunity for the user to have a map legend plotted. If desired the user will be prompted for the name of a file containing the legend information. This file may be created prior to use of the command using a utility routine (see Appendix F).

The following is an example of use of the CALCOMP command:

```
 ENTER COMMAND
? CALCOMP
 CALCOMP OUTPUT FILE NAME?
MDRPLOT
 ENTER ACTIVE MAP I.D.(S) TO CALCOMP
? 1
OUTPUT MAP SCALE ?
? 24000
 PLOT WILL BE  12.49 BY   5.31 INCHES
******   SCALE ACCEPTABLE(Y OR N)?
? Y
```

```
 PLEASE ENTER PLOT BORDER OPTION
    0 = NO PLOT BORDER
    1 = NORMAL PLOT BORDER (DEFAULT)
    2 = THICK PLOT BORDER
? 1
 PLEASE ENTER CORNER TIC OPTION
    0 =   NO CORNER TICS, NO COLLAR
    1 =   CORNER TICS, NO COLLAR
    2 =   MAP COLLAR, NO TICS
    3 =   MAP COLLAR, TICS
? 1
 ENTER 60 CHARACTER OR LESS TITLE
? MULE DEER WINTER CONCENTRATION RANGE ON WOLF RIDGE
 PLEASE ENTER BAR SCALE OPTION
    0 =  NO BAR SCALE
    1 =  BAR SCALE
? 1
 PLEASE ENTER UNITS OF MEASURE ( FEET, MILES, NAUTICAL )
? MILES
 PLEASE ENTER INCREMENT LENGTH (DEFAULT= 1.0) ? 1.0
 PLEASE ENTER 3 BAR SCALE DIVISION VALUES ? .25 .5 .75
 ACCEPTING INPUT FOR MDRWOLFRG ACTIVE MAP   1 DATA TYPE   3

 ENTER PEN COLOR FOR ACTIVE MAP   3
 BLACK = 1, BLUE = 2, RED = 3, GREEN = 4
? 1
 ENTER ATTRIBUTE PLACEMENT OPTION
    0 =   NO ATTRIBUTE PLACEMENT
    1 =   FEATURE ATTRIBUTE AT CENTROID
    2 =   FEATURE ATTRIBUTE USING AUTOMATED PROCEDURE
    3 =   FEATURE ITEM NUMBER AT CENTROID
    4 =   FEATURE ITEM NUMBER USING AUTOMATED PROCEDURE
? 1
 PLEASE ENTER PEN COLOR FOR ATTRIBUTES ? 3
DO YOU WISH TO SHADE MAP MDRWOLFRG
? Y
 PLEASE ENTER 1 FOR SINGLE OR 2 FOR DOUBLE HATCH ? 1
DO YOU WISH THE SHADING DASHED ? ? N
 ENTER PERCENT SLOPE FOR HATCH ANGLE ? 45
 ENTER HATCH SPACING IN INCHES ? .1
 DO YOU WISH A LOGO TO BE PLOTTED ? Y
 PLEASE ENTER NAME OF LOGO FILE ? EXPORT
 DO YOU DESIRE ANCILLARY ANNOTATION (Y OR N) ? Y
```

>

```
 DO YOU WISH ANCILLARY TEXT OUTPUT ? ? Y
 BEGIN ENTERING TEXT. TERMINATE WITH A ZZ
? THIS IS AN EXAMPLE OF ANCILLARY ANNOTATION
? ZZ
 DO YOU DESIRE A MAP LEGEND (Y OR N) ? Y
 PLEASE ENTER NAME OF LEGEND FILE ? PLOT.LEGEND
```

The limitations of the CALCOMP command are as follows:

-- Input maps must be active.

-- Works very slowly on cell data. If a cell map is to be plotted, the user will be prompted for the lower and upper bounds. All cells having a value which is either equal to or between these bounds will be lumped together as if they had a single value and a line will be plotted around them.

-- Can not plot multivalue cell maps.

-- Window must be set.

-- Polygon outlines are not plotted if pen zero is selected.

The CLI command is summarized as follows:

CLI is a program control command which allows the user to temporarily leave MOSS and enter the operating system. To re-enter MOSS the user types BYE. Operating system commands are described in Appendix B.

The CLI command is specified as follows:

CLI

There are no parameters associated with the CLI command.

The following is an example of use of the CLI command:

```
 ENTER COMMAND
? CLI

AOS CLI   REV 04.23      5-AUG-83      11:42:21
) BYE
AOS CLI   TERMINATING    5-AUG-83      11:42:28
 ENTER COMMAND
?
```

The limitations of the CLI command are as follows:

-- The user must re-enter MOSS by typing BYE. If the user tries to re-enter MOSS by logging on, an error message is printed.

The COMMANDS command is summarized as follows:

COMMANDS is a program control command which displays a list of legal commands in alphabetical order and the minimum number of characters required to specify each command.

The COMMANDS command is specified as follows:

```
COMMANDS
```

There are no individual parameters associated with the COMMANDS command.

The following is an example of use of the COMMANDS command:

```
 ENTER COMMAND
? COMMANDS
```

The limitations of the COMMANDS command are as follows:

-- None found to date.

The COMPUTE command is summarized as follows:

COMPUTE is a reclassification command which creates a new real attribute by performing mathematical operations and functions on integer and real attributes. The mathematical expression may contain multiple attribute names, feature attribute names (area, perimeter,length), numerical values, mathematical operations, mathematical functions, and parentheses. The available math operations are addition, subtraction, multiplication, division, exponentiation, maximization, minimization, covering, and averaging. The available math functions are square root, logarithm, natural logarithm, truncated integer, rounded integer, absolute value, tangent, cosine, sine, arctangent, arccosine, and arcsine. The resulting new attribute is of type real and is placed in the multiple attribute file. The new attribute field, like all multiple attribute fields, can then be used through other commands, e.g., SELECT ATTRIBUTE, BSEARCH, STATISTICS DESCRIBE, EDITATT, and REPORT.

The COMPUTE command is specified as follows:

```
COMPUTE (active ID)  (attribute or value)  (operation)  ,
(attribute or value)  (operation)  (function)  ,
(  (attribute or value)  )  FOR (newattribute)
```

The individual phrases of the COMPUTE command are described below.

(active ID) is the ID number of a vector map referenced in the active map table which contains the multiple attributes to be computed.

FOR (newatribute) is an optional modifying phrase which specifies (newattribute) as the name to be assigned to the new real computed attribute. This name may not be one which is already being used for an attribute. If omitted, the name "THATATTR" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The remaining phrases may be used repeatedly in various combinations to form mathematical expressions. These expressions may include up to 128 phrases, or up to 64 names or numerical values, whichever comes first. To comply with legal syntax, each phrase specifies the legal choice of phrases which may follow it, and whether or not that phrase may legally begin or end a mathematical expression. Only those phrases which may end an expression may be followed by the FOR phrase. It is legal to follow any of these with the "," phrase to indicate continuation.

(attribute or value) is an optional modifying phrase which specifies either an attribute name, feature attribute name (AREA, PERIMETER, LENGTH), or a numerical value to be used as an operand in a mathematical operation or function. If an attribute name is specified, it must be an existing attribute name and the number of characters entered must uniquely specify the attribute. Attributes can not begin with the characters AREA, PERI, or LENG or they will be considered feature attributes. This phrase is valid to either begin or end an expression. The legal phrases which may follow (attribute or value) are: ) (operation).

(function) is an optional modifying phrase which specifies the mathematical function to be performed. A function is performed upon one oprand. This phrase may be used to begin an expression. The available functions are listed below and must be typed exactly as specified to distinguish them from attribute names and other phrases. The only legal phrase which may follow (function) is (. The following are legal functions and their actions:

```
SQRT  - computes square root
LOG   - computes logarithm
NLOG  - computes natural logarithm
INT   - computes truncated integer
ANINT - computes rounded integer
ABS   - computes absolute value
TAN   - computes tangent
COS   - computes cosine
SIN   - computes sine
ATAN  - computes arctangent
ACOS  - computes arccosine
ASIN  - computes arcsine
```

(operation) is an optional modifying phrase which specifies the mathematical operation to be performed. An operation requires two operands. The available operations are listed below and must be typed exactly as specified to distinguish them from attributes and other phrases. These operations are evaluated in order of precedence, with operators of equal precedence being evaluated from left to right. Use of parentheses may override this order. The legal phrases which may follow (operation) are: ) (map or value) (function). The following are legal operations and their actions:

```
+    - performs addition
-    - performs subtraction
*    - performs multiplication
/    - performs division
**   - performs exponentiation
MAXI - performs maximization (returns attribute of larger value)
MINI - performs minimization (returns attribute of smaller value)
COVE - performs covering (reproduces the values of the first
       attribute, then replaces or covers them with the values
       of the second attribute where that attribute is non-zero)
AVER - performs averaging (returns the average of the two
       attributes)
```

( is an optional modifying phrase which acts as a delimiter within a complex expression. This phrase is valid to begin an expression. Each ( phrase used must be matched with a corresponding ) phrase. The legal phrases which may follow ( are: ( (attribute or value) (function).

) is an optional modifying phrase which acts as a delimiter within a complex expression. This phrase is valid to end an expression. Each ) phrase must be preceded by a corresponding ( phrase. The legal phrases which may follow ) are: ) (operation).

The following are typical examples of valid COMPUTE commands:

```
COMPUTE 7 AREA + ATT2 + 98.25 + SQRT ( ATT1 ) ,
FOR NEWATT

COMPUTE 3 SQRT ( LENGTH + ATT1 + ABS ( ATT2 ) ) * ,
AVER ( ATT4 * ATT5 ) - ATT6 FOR NEWATT
```

The limitations of the COMPUTE command are as follows:

-- Phrases must be separated by one and only one blank.

-- No more than 64 attributes may be input per use of the command.

-- No more than 128 phrases may be contained in the mathematical expression.

-- Attributes may not be named SQRT, LOG, NLOG, INT, ANINT, ABS, TAN, COS, SIN, ATAN, ACOS, ASIN, +, -, *, /, **, MAXI, MINI, COVE, or AVER. Attributes may not begin with the characters AREA, PERI, or LENG.

-- Must have write access to the multiple attribute file.

The CONTIGUITY command is summarized as follows:

CONTIGUITY is a distance analysis command that allows the user to answer the question: "What is next to what?" For example, the user may have a vegetation map and wants to know how many stands of pinyon pine are adjacent to stands of douglas fir. Result of using CONTIGUITY would be a new map of all pinyon pine stands adjacent to stands of douglas fir. The resultant new map is an active data set which can be saved as part of the workfile.

The CONTIGUITY command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

CONTIGUITY (active ID's)* (tolerance)*

The individual parameters of the CONTIGUITY command are described below:

(active ID's) are the ID numbers of two polygon maps referenced in the active map table which are to be compared. Note that result of the command is a set of polygons from the map which is specified second.

(tolerance) is the contiguity tolerance range in miles used as the basis for determining contiguity. Refer to Appendix E for appropriate tolerance ranges.

The following is an example of use of the CONTIGUITY command:

```
 ENTER COMMAND
? CONTIGUITY
 ENTER TWO ACTIVE DATA SET ID'S
? 1 2
ENTER CONTIGUITY TOLERANCE (MILES)
? .0125
    31 HITS FOR ACTIVE ID  3
```

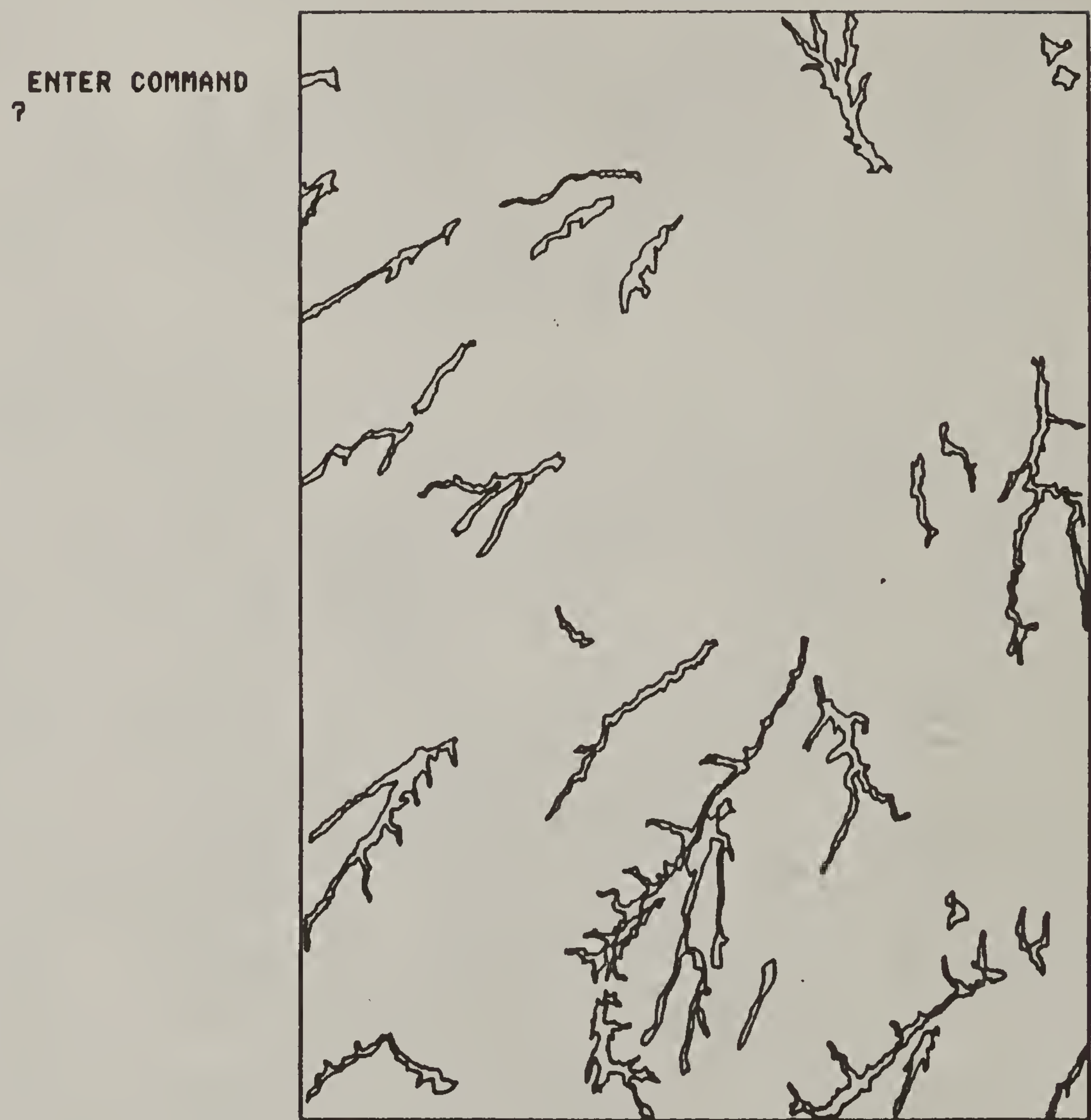
The limitations of the CONTIGUITY command are as follows:

- -- Works only with active polygon maps.
- -- Window must be set.
- -- Polygons are considered contiguous if one digitized point from active ID 2 is within the contiguity tolerance of a polygon in active ID 1. In some cases, when few points are digitized for rectilinear polygons, no contiguity is found.
- -- Use of an inappropriate tolerance parameter (see Appendix E) can cause erroneous results.

Example of use of the CONTIGUITY command:

Two maps are displayed: a map of pinyon-juniper forests (ID1; shaded) and a map of valley sagebrush (ID2; clear) on Wolf Ridge, CO. The command is used to find all stands of sagebrush which are contiguous to stands of pinyon-juniper as shown on the following page.

Example of result of use of the CONTIGUITY command:




A map of all stands of valley sagebrush which are contiguous to stands of pinyon-juniper forest on Wolf Ridge, CO.

The COST command is summarized as follows:

COST is a program control command that provides a breakdown of use of resources during a session. This breakdown provides the following information up to the point when the COST command is issued: total actual computer time used (CPU time) in seconds; number of words transferred for mass storage; and total cost of the run.

The COST command is specified as follows:

```
COST
```

There are no parameters associated with the COST command.

The following is an example of use of the COST command:

```
 ENTER COMMAND
? COST
 TOTAL TIME     =        2.86
 TOTAL RECORDS  =      348.00
 TOTAL JOB COST =$        .03
```

The limitations of the COST command are as follows:

-- The COST command must be changed whenever the host computer's system charging algorithm changes and a system manager should be consulted.

-- COST does not reflect total cost of a session if certain commands which are "swapped", such as OVERLAY, are used.

The DEARCHIVE command is summarized as follows:

DEARCHIVE is a data manipulation command that provides the user with the capability of changing the status of maps from archived to exposed. The map can then be moved to disk from tape via operating system programs. The command works in conjunction with the ARCHIVE command.

The DEARCHIVE command is specified as follows:

DEARCHIVE (map name)

The individual parameters of the DEARCHIVE command are described below:

(map name) is the name of the map to be dearchived.

The following is an example of use of the DEARCHIVE command:

```
 ENTER COMMAND
? DEARCHIVE
 ENTER NAME OF MAP TO ARCHIVE/DEARCHIVE
? MDRWOLFRG
```

The limitations of the DEARCHIVE command are as follows:

-- A map file can have a status of exposed or archived and still be on disk.

-- A map file can have a status of dearchived and not be on disk.

The DELETE command is summarized as follows:

DELETE is a data manipulation command that allows the user to delete maps from the work or master database. The name of the map is removed from the map file list and all associated files are removed from the directory. The user is permitted to delete maps out of the master database only by knowing the correct password and having write access to the database. This command should be used with extreme caution since deletion permanently removes maps.

The DELETE command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

DELETE (map name) (password)*

The individual parameters of the DELETE command are described below:

(map name) is the name of the map that is to be deleted.

(password) is the password which must be used if the map to be deleted is a master database map.

The following is an example of use of the DELETE command:

```
 ENTER COMMAND
? DELETE
 ENTER NAME OF MAP TO DELETE
? MDWOLFRG
 DATA TYPE =     3 NUMBER OF ITEMS =     8
 DO YOU WISH TO DELETE THIS FILE (Y OR N)
? Y
```

The limitations of the DELETE command are as follows:

- -- Sometimes an error message will be received stating that a file could not be deleted. This may mean that one of the files which normally would be associated with this map name could not be deleted for a variety of reasons. For example, it did not exist or it was protected from deletion.
- -- Master maps can not be deleted from disk since pathname is not resolved.
- -- A file will be deleted from the directory even if it is not in the .DT file.
- -- If only the map name is to be deleted from the map name list, the utility, DATABTEST, should be used.

The DESCRIBE command is summarized as follows:

DESCRIBE is a data description command that allows the user to browse the contents of map files. The general information about a map can be listed, the subject information can be listed for vector and discrete cell maps, the map coordinate projection can be listed, the multiple attributes of a vector map can be listed, and if the vector map has been cartographically assigned (see ASSIGN), the assignments can be listed. Judicious use of the DESCRIBE command can give valuable information that can be used to speed analysis, minimize volume of data to be analyzed, and minimize potential error and wasted effort.

The DESCRIBE command is specified as follows:

DESCRIBE (map name) (option)

The individual parameters of the DESCRIBE command are described below:

(map name) is the name of the map to be DESCRIBED.

(option) is the nature of the information to be DESCRIBED. The user may enter HEADER, PROJECTION, SUBJECTS, ATTRIBUTES, or ASSIGN.

HEADER will print the general information about a map.
PROJECTION will print the map coordinate projection.
SUBJECTS will print the subjects of vector and discrete cell maps.
ATTRIBUTE will allow browsing the multiple attributes of vector maps.
ASSIGN will print the cartographic assignment of a vector map after it has been cartographically assigned using the ASSIGN command.

The following is an example of use of the DESCRIBE command:

```
 ENTER COMMAND
? DESCRIBE
 ENTER MAPNAME TO DESCRIBE
? MDRWOLFRG
 ENTER ACTION: HEADER, PROJECTION, SUBJECTS, ATTRIBUTES, OR ASSIGN
? HEADER
```

The limitations of the DESCRIBE command are as follows:

-- None found to date.

Example of result of use of the DESCRIBE command:

```
ENTER COMMAND
? DESCRIBE MDRWOLFRG SUBJECTS

FOR MAP MDRWOLFRG THERE ARE     3 SUBJECTS
SUBJECT                          NUMBER

MULE DEER WINT CONC/WINT RANGE        3
MULE DEER WINTER RANGE                1
MULE DEER SUMMER RANGE                1
```

```
ENTER COMMAND
? DESCRIBE MDRWOLFRG HEADER

MAP MDRWOLFRG
DESCRIPTION   MULE DEER RANGE      WOLF RIDGE         COLORADO  1:24000
STUDY AREA    WHITER   PROJECTION LAMBERT
DATE          82/07/16  SOURCE WELUT/WAMS          VINTAGE 1982
TYPE    3 POLYGON       SUBJECTS       3
ITEMS     5
MBR: SOUTH  430049.7000 NORTH  443982.2000 EAST 5053420.0000 WEST 5042659.0000
```

Information on subjects in the map MDRWOLFRG is requested.
Next, header information on the same map is requested.

The DEVICE command is summarized as follows:

DEVICE is a program control command which changes where graphics output is sent. This can be a disk file or another console. The default device for graphics output is the log-on CRT. In many cases, this presents no problem. However, there are three cases in which graphics output should not go to the log-on CRT. The first is when the user wishes to save a softcopy plot (e.g., a shaded map) for later replay at much higher speeds. The second case is when the user wishes to run MOSS in two terminal mode. Two terminal mode allows the user to have all text printed at the log-on terminal and all graphics routed to another terminal. Consequently, text output will not clutter graphics output. The third case is when MOSS is to be run in batch mode. The user must use the DEVICE command and specify output to a disk file.

The DEVICE command allows the user to specify an alternate graphics output device. If a disk file is specified, all graphics will be written to this disk file. The disk file can be played back at a later date by using the CLI TYPE function (i.e., type the file at a graphics terminal). In order to operate in two terminal mode, the user must enter a console name, such as @CON24. Whatever console graphics are being routed to must be disabled!!!

The DEVICE command is specified as follows:

DEVICE (new device name)

The individual parameters of the DEVICE command are described below:

(new device name) is the name of the disk file or console to which the graphics are being routed. The user may also enter <CR> to resume graphic output to the log-on CRT.

The following is an example of use of the DEVICE command:

```
 ENTER COMMAND
? DEVICE
 OLD DEVICE FILE WAS @CONSOLE

 ENTER NAME OF NEW DEVICE FILE FOR GRAPHICS OUTPUT
  ----------
? NEWFILE
```

The limitations of the DEVICE command are as follows:

-- If graphics output is to a graphics console, the console must be disabled.

-- If output is to a disk file, do not try to use any of the commands that require cursor input, such as ZOOM, TEXT, GENERATE, LOCATE, or DISTANCE.

-- Use of the same device name as previously specified will delete the previous file contents.

-- Serious problems will result if the device is specified as a name of an existing map, a master or workfile, or any reserved MOSS names such as MOSS temporary files.

The DIGITIZE command is summarized as follows:

DIGITIZE is a data manipulation command which allows the user to digitize map data from a digitizing table. This capability is not meant to replace digitizing software systems (e.g., AMS). The following steps should be observed:

-- Place map on digitizing surface so that entire map is on surface and north is at the top of the table.

-- Tape map on so that it will not move while digitizing.

-- Find a mininum of three control points. These control points will be used to transform the digitized coordinate data from the table coordinate system (usually inches) into the coordinate system or map projection of the database. The control points should be evenly distributed over the map area. It is suggested that at least twelve points be used to insure proper transformation.

-- Number the control points from 1 to n and record the target coordinate values of these points (i.e., what they should be). Target values should be in the same coordinate system as the map database.

-- Log on to MOSS and select a reference map from the database. This is a map that covers the area in which digitizing will occur.

-- Set the display window to the reference map. This reference window will be used to display the data on the graphics CRT while digitizing. If there is no reference map, it will not affect the actual digitizing process; however, there will not be any graphics display.

The DIGITIZE command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

DIGITIZE (console number)* (format)* (number of control points)*
(crosshair input)* (target values)* (new map name)*
(new map description)* (feature type)* (feature subject)*
(crosshair input)* (9)*

The individual parameters of the DIGITIZE command are described below:

(console number) is the console identification number for the digitizing table. This number may be obtained from the system manager. (WARNING-do not type in the full name, only the integer number, e.g., if the console name is @CON9 type in 9).

(format) is used to determine what format the digitized information will be in. This feature allows MOSS to support several types of digitizing equipment. For assistance in determining the proper format for the system in use, contact the system manager.

(number of control points) is the number of control points to be used to "set up" the map. This number must be between 3 and 15.

(crosshair input) is where the user points to the control points with the digitizing table cursor.

(target values) are the actual X,Y values of the control points in the map database. These values must be entered in the same order as the control points were digitized and as real numbers with a space separating the X and the Y values.

(new map description) is a description of the map to be created. This information will be stored in the map header.

(new map name) is the name for the map to be created.

(feature type) is the type of feature to be created. The user may enter POINT, LINE, or POLYGON and only the first four characters are required/read. This parameter must be entered each time a new feature is to be created. If the user enters QUIT, he/she will be returned to the command prompt.

(feature subject) is the subject to be assigned to the new feature.

(crosshair input) is where the user digitizes the new features with the digitizing table cursor. Note that polygons must be digitized in a clockwise direction. Cursor button 0 through 3 should be used to enter a coordinate.

(9) is an opportunity to designate the end of feature input, e.g., the last point in a polygon.

The following is an example of use of the DIGITIZE command:

```
 ENTER COMMAND
? DIGITIZE
 PLEASE ENTER STATION CONSOLE NUMBER ? 2
 SELECT APPROPRIATE DIGITIZER INPUT FORMAT
     1 for (1X,R1,1X,F5.3,F5.3)
     2 for (1X,R1,F6.3,F6.3)
     3 for (I2,1X,F5.3,F5.3)
     4 for (F8.3,1X,F8.3,1X,I2)
 Your Choice ? 3
 HOW MANY CONTROL POINTS WILL BE ENTERED ? 4
 DIGITIZE CONTROL POINT 1
 DIGITIZE CONTROL POINT 2
 DIGITIZE CONTROL POINT 3
 ENTER X,Y TARGET VALUE FOR CONTROL POINT 1
?
 ENTER X,Y TARGET VALUE FOR CONTROL POINT 2
?
 ENTER X,Y TARGET VALUE FOR CONTROL POINT 3
?
  WHAT DO YOU WISH TO CALL THE NEW MAP
  __________
 ? MDMIGRAT
  USE ANOTHER MAP'S HEADER AS A TEMPLATE [Y]?
  ENTER MAPNAME FOR HEADER TEMPLATE:  ? MDRWOLFRG
 MULE DEER RANGE      WOLF RIDGE       COLORADO  1:24000
 ------------------------------------------------------------
  ENTER NEW DESCRIPTION OR RETURN TO RETAIN TEMPLATES DESCRIPTION
 REVISED MULE DEER MIGRATION ROUTES
  ENTER DATA TYPE THIS MAP IS TO BE:
       1 - POINT
       2 - LINE
       3 - POLYGON
         ? 2
 ENTER SUBJECT FOR THIS FEATURE
? LINES
 PLEASE ENTER POINTS. HIT PAD KEY 9 TO TERMINATE
```

The limitations of the DIGITIZE command are as follows:

-- Polygons must be entered with the coordinates in clockwise order.

-- Requires a digitizing table.

-- Maximum of 15 control points may be used.

-- Maximum of 100 features may be entered.

-- No more than 100 subjects may be in the new map.

-- Subjects in the new map will not be in alphabetical order.

The DISTANCE command is summarized as follows:

DISTANCE is a data description command that measures distance in kilometers, miles, and feet between any two points on the CRT. Distance may be along a straight line or along a path, such as a road or a stream. The beginning and end points of the DISTANCE measurement are identified using the crosshairs (cursor) on the graphics display terminal.

The DISTANCE command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

DISTANCE (type) (crosshair input)* (crosshair input)*

The individual parameters of the DISTANCE command are described below:

(type) is an option to specify the type of distance measurement. The user must enter either [A]irline or [P]ath. AIRLINE measures tance "as the crow flies" between two or more points identified on the CRT. PATH measures distance between two points along a discrete line segment or path. Distance is calculated in miles, kilometers, feet, and nautical miles.

(crosshair input) is where the user points with the cursor to the beginning and end points of the measurement. Use of any key other than the space bar will terminate the command.

The following is an example of use of the DISTANCE command:

```
 ENTER COMMAND
? DISTANCE
 Enter: [A]irline or [P]ath
? PATH
 Point to locations (hit anything except space to terminate)

 DISTANCE =      .1698 MILES
                 .2732 KILOMETERS
                 896.4 FEET
                .15 NAUTICAL MILES
```

The limitations of the DISTANCE command are as follows:

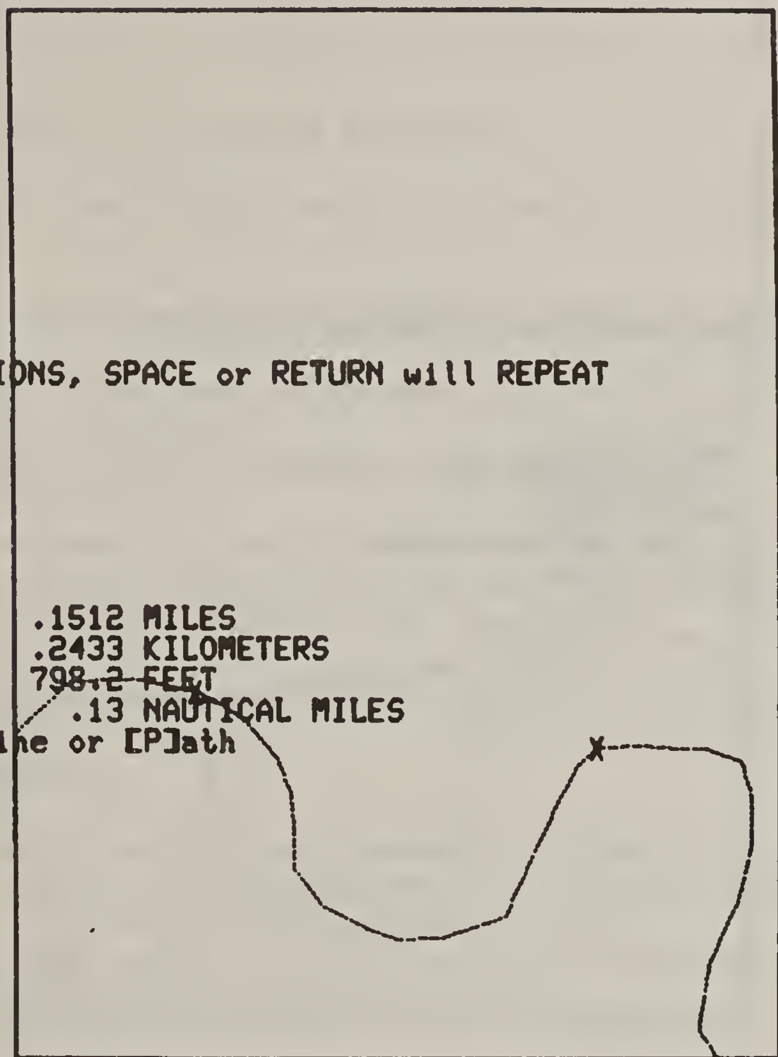
-- Window must be set.

-- If the PATH option is used, the shortest distance will be found.

-- If the PATH option is used, only distance along discrete lines is found, i.e., you cannot cross segments.

-- If the PATH option is used, it may be to the user's advantage to blowup the study area (see ZOOM). This increases the tolerance range for finding and selecting points within a line segment.

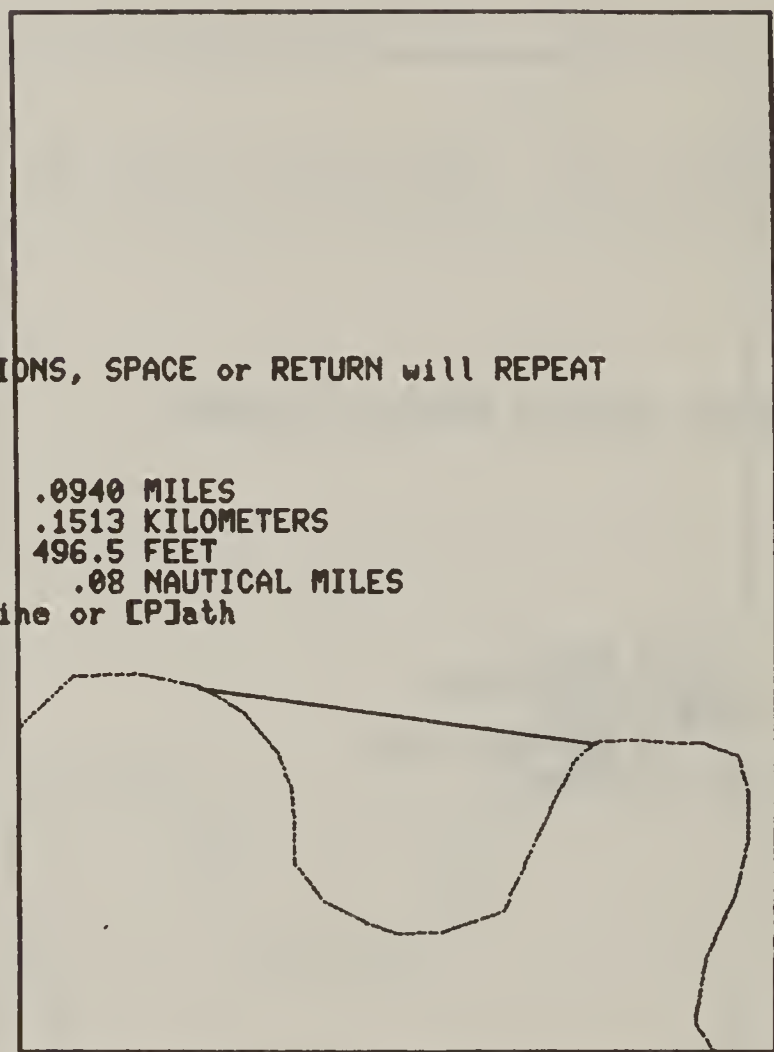
Example of use of the PATH option of the DISTANCE command:



```
 ENTER COMMAND
? DIST PATH
 POINT TO LOCATIONS, SPACE or RETURN will REPEAT



 DISTANCE =      .1512 MILES
                 .2433 KILOMETERS
                 798.2 FEET
                   .13 NAUTICAL MILES
 Enter:  [A]irline or [P]ath
?
```

The map is an enlarged portion of a map of surface water streams on Wolf Ridge, CO. Note that distance is calculated as the shortest distance along a discrete line between two points. In this case, the discrete line is a portion of a stream segment.

Example of use of the AIRLINE option of the DISTANCE command:



```
ENTER COMMAND
? DIST AIRLINE
POINT TO LOCATIONS, SPACE or RETURN will REPEAT


DISTANCE =      .0940 MILES
                .1513 KILOMETERS
                496.5 FEET
                  .08 NAUTICAL MILES
Enter:  [A]irline or [P]ath
?
```

The map is an enlarged portion of a map of surface water streams on Wolf Ridge, CO. Note that distance is calculated as a straight line between two points along this particular section of stream and that more than two points may be specified. Also note the decrease in distance from the previous plot between the same two points.

The DIVIDE command is summarized as follows:

DIVIDE is a data manipulation command which allows the user to split polygons in maps referenced in the workfile. This command is used in cases where polygons are too big or there appears to be bad data. Polygons to be divided may contain islands but the line used to split the polygon may not split any islands. Note that the viewing window will be set to the polygon to be divided.

The DIVIDE command is specified as follows:

DIVIDE (map name) (item number)* (crosshair input)*

The individual parameters of the DIVIDE command are described below:

(map name) is the name of the map on which polygons are to be divided.

(item number) is the item number of the polygon to be divided.

(crosshair input) is where the user points with the CRT cursor to two points where the polygon is to be divided. These points should be at X,Y locations which define the polygon.

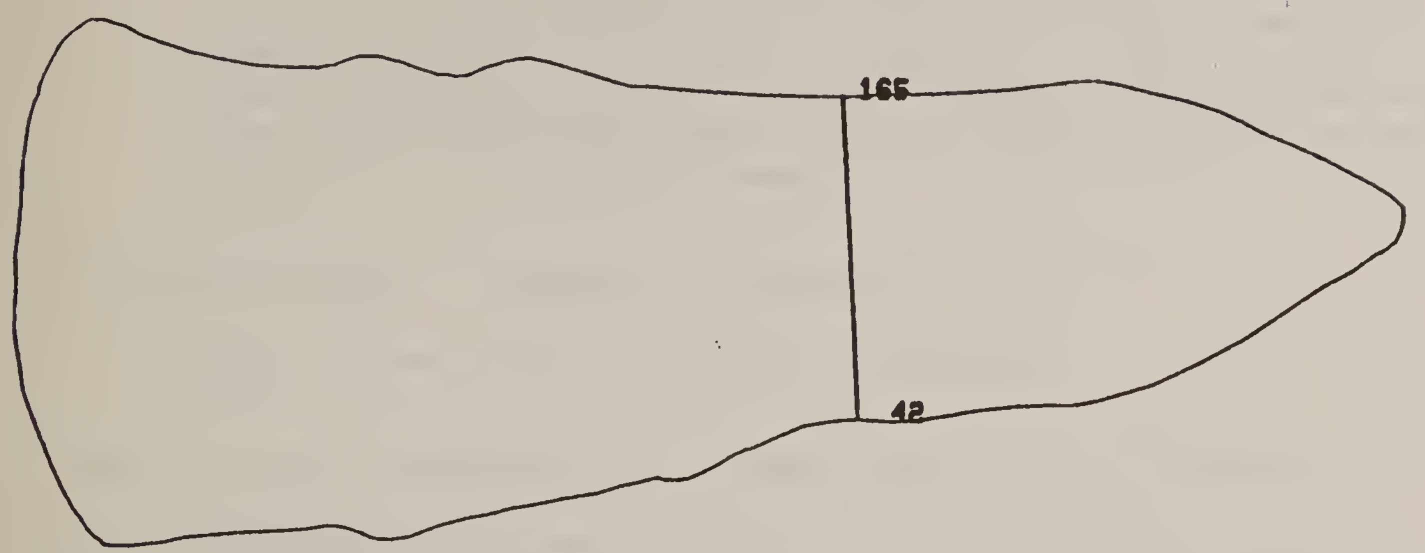
The following is an example of use of the DIVIDE command:

```
 ENTER COMMAND
? DIVIDE
 Please enter name of map [CR=NONE] ? MDRWOLFRG
 Please enter I.D. number of feature to divide [0=NONE] ? 3
 Feature    3  has =  166 coordinate pairs
 SELECT 2 data points to divide polygon [T=TERMINATE]
 Is this division OK [CR=YES] ? Y
```

The limitations of the DIVIDE command are as follows:

- -- Cannot divide islands.
- -- Cannot divide master maps without write access.
- -- Map must be displayed prior to using the command.
- -- There is no opportunity to assign new subjects to the divided polygon and thus, the new map will be topologically incorrect.
- -- Does not create a new map and the old map must be re-selected in order to reflect the effect of the command.
- -- Window is set to the polygon to be divided, therefore cannot zoom in on a portion of the polygon.
- -- Can only divide at points which exist in the database. If the crosshairs are placed on a line between points, the polygon is divided at the next point in the CW direction.

Example of result of use of the DIVIDE command:




Feature 3 is a polygon of mule deer winter concentration range on Wolf Ridge, CO. The polygon has been split at data points 42 and 165. Note that the new map is stored in the polygon workfile with one more item than before polygon division.

The EDGE command is summarized as follows:

EDGE is a distance analysis command that creates a new map of edges or common boundaries shared by subjects associated with two or more maps referenced in the active map table. A typical use of EDGE is to activate common boundaries between different surface cover types. For example, EDGE could be used to activate all common boundaries or edges between a riparian vegetation type and irrigated cropland. The result of the EDGE command is a line map that contains common boundaries shared by the input maps. Length of lines in the new map can be calculated with the LENGTH command.

The EDGE command is specified as follows:

EDGE (active ID's) (tolerance) (new map name)

The individual parameters of the EDGE command are described below:

(active ID's) are the ID numbers of two or more polygon maps referenced in the active table.

(tolerance) is the maximum distance in miles that two edges or boundaries can be separated and still be considered as a common boundary. The tolerance factor increases as minimum polygon size and accuracy of the data increases. Unless the user wishes to adopt another standard, the table and equation in Appendix E should be used to compute the tolerance factor.

(new map name) is the name for the line map which results from EDGE.

The following is an example of use of the EDGE command:

```
 ENTER COMMAND
? EDGE
 ENTER TWO OR MORE ACTIVE DATA SET I.D.'S
? 1 2
 ENTER EDGE TOLERANCE IN MILES  (NON-ZERO)
? .001
 WHAT DO YOU WISH TO CALL THE NEW MAP
  __________
? PJSGEDGE
    58 EDGES FOUND BETWEEN 423PJHR        AND 522SG
 BUILD MOSS MAP       DATA TYPE =    2
```

The limitations of the EDGE command are as follows:

-- Input must be active polygon maps.

-- Only one subject per active map.

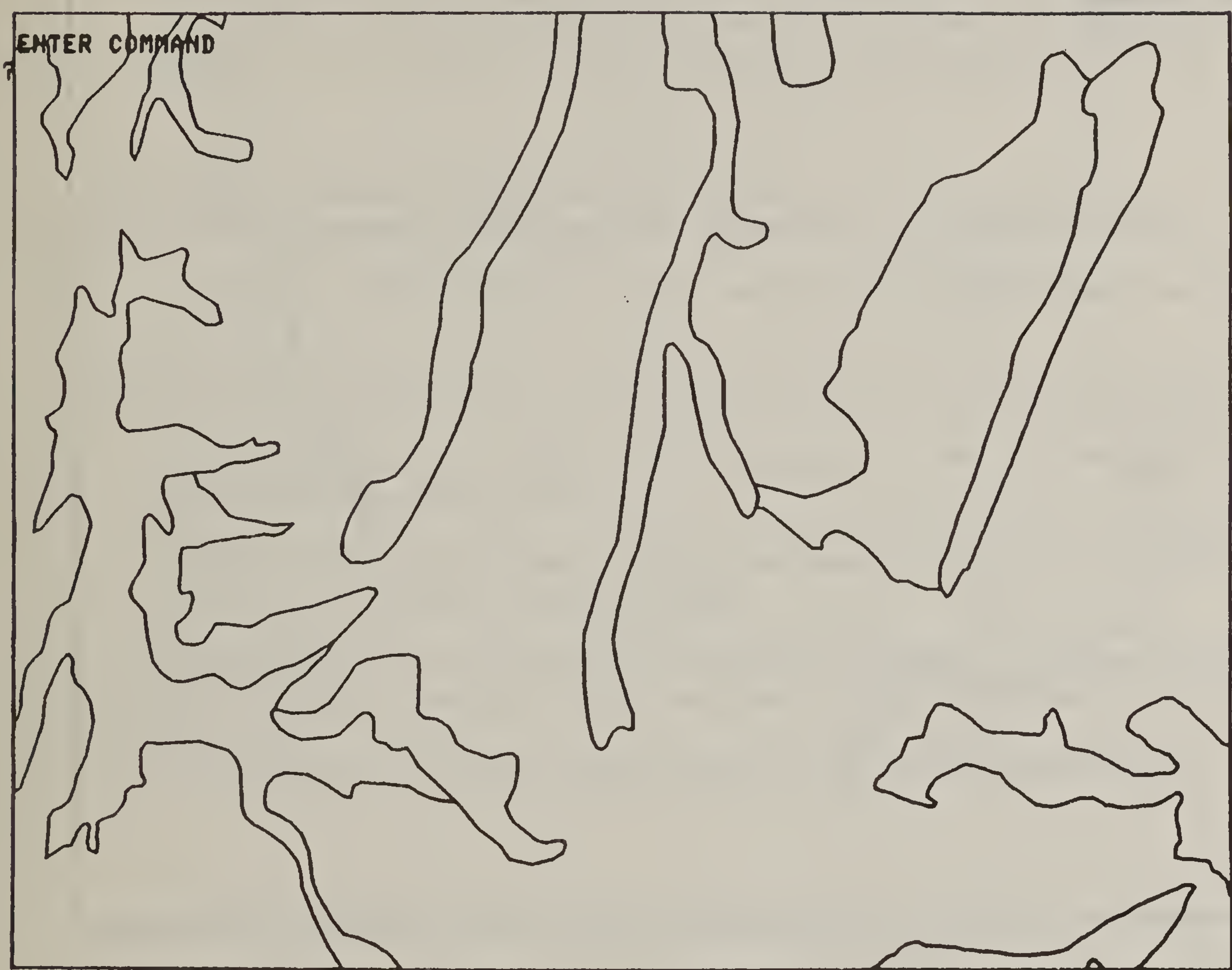
-- Window must be set.

-- A maximum of 20 input maps can be compared for EDGE.

-- Edges are determined if a minimum of two points from ID 1 are within a tolerance of ID 2.

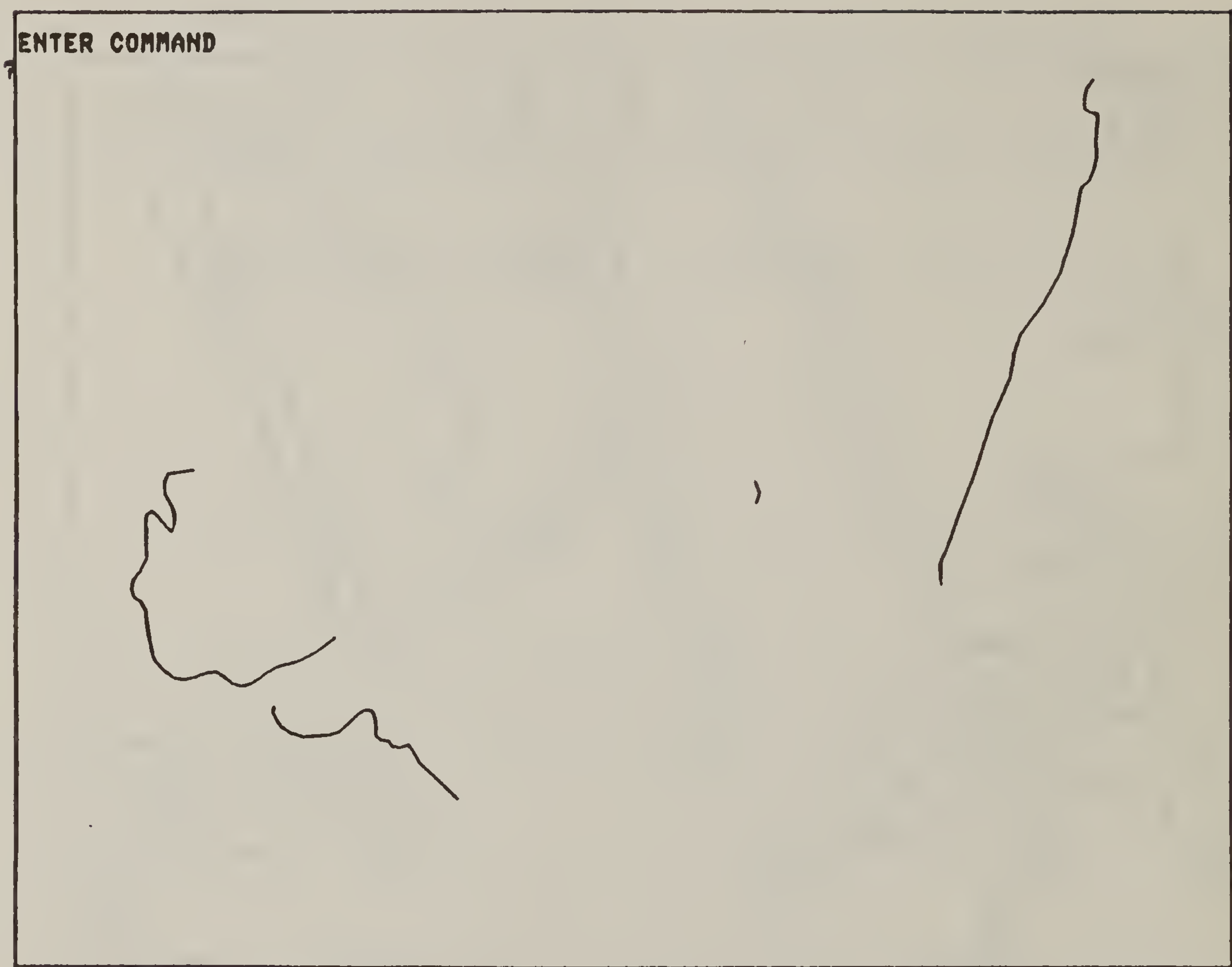
-- The tolerance factor must be appropriate or poor results may occur (.001 is usually good).

Example of use of the EDGE command:




Two maps are plotted: active ID 1 is a map of pinyon-juniper forest (423PJHR) on a portion of Wolf Ridge, CO and active ID 2 is a map of sagebrush shrubland (522SG) on the same area. Edges between these habitat types are shown on the following page.

Example of result of use of the EDGE command:




The plot is a map of edge between pinyon-juniper forest (423PJHR) and sagebrush shrubland (522SG) on a portion of Wolf Ridge, CO.

The EDITATT command is summarized as follows:

> EDITATT is a data manipulation command that allows the user to interactively edit the contents of a map's multiple attributes file. The command works similiarly to QUERY. The map to be edited must be referenced in the active map table (see ACTIVE) and the features to be edited must be displayed on the CRT (see PLOT). Once the map is displayed, multiple feature edits may be performed in one pass for all the attributes or for a single user specified attribute ID.

The EDITATT command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

> EDITATT (crosshair input)* (edit mode)* (edit field)* (new value)*

The individual parameters of the EDITATT command are described below:

> (crosshair input) is where the user points to the desired feature to edit with the CRT cursor.
>
> (edit mode) is an option to allow the user to edit all attribute fields or a single attribute field.
>
> (edit field) is an option for the user to change the field value for the designated feature. The user must enter Y (YES) or N (NO).
>
> (new value) is the new field value for the designated feature.

The following is an example of use of the EDITATT command:

```
 ENTER COMMAND
? EDITATT
 POINT TO FEATURE. SPACE or RETURN will REPEAT.

  ITEM HAS FOLLOWING CHARACTERISTICS

 SUBJECT   = MULE DEER WINT CONC/WINT RANGE
 MAP NAME  = MDRWOLFRG ITEM NUMBER =     3
 AREA      =      3008.53 ACRES

 ENTER  0-FOR ALL  #-FOR SPECIFIC  ATTRIBUTE ID:  ? 0
  KEY ACREAGE 1  VALUE    157.3
  EDIT FIELD ? Y
  NEW VALUE ? 175.3
  KEY ACREAGE 2  VALUE   193.0
  .
  .
  .
```

Since "0" was chosen, the command would loop through all attribute fields for this feature.

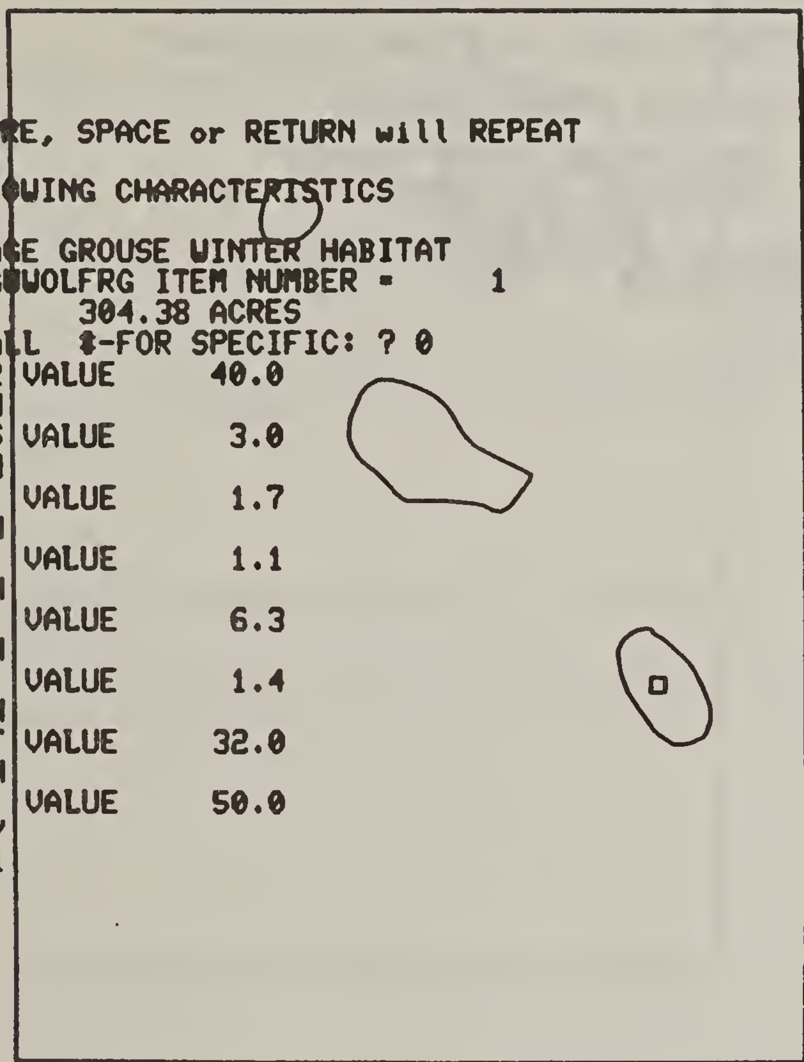
The limitations of the EDITATT command are as follows:

-- Map must be active and displayed.

-- Works best in two terminal mode.

-- Cursor must be positioned within current window.

Example of use of the EDITATT command:

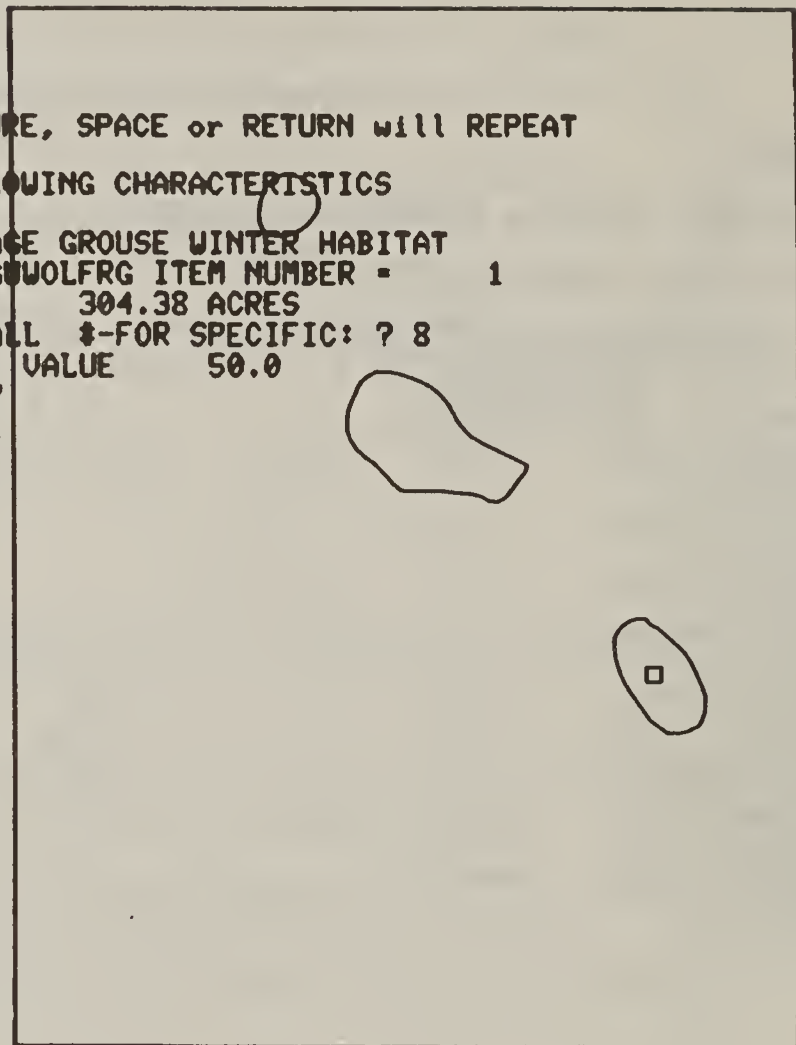


```
 ENTER COMMAND
? EDITATT
 POINT TO FEATURE, SPACE or RETURN will REPEAT

  ITEM HAS FOLLOWING CHARACTERISTICS

 SUBJECT    = SAGE GROUSE WINTER HABITAT
 MAP NAME   = SGWOLFRG ITEM NUMBER =      1
 AREA       =        304.38 ACRES
 ENTER  0-FOR ALL  #-FOR SPECIFIC: ? 0
 KEY CANOPCOVER VALUE      40.0
 EDIT FIELD ? N
 KEY SUBSPECIES VALUE       3.0
 EDIT FIELD ? N
 KEY ADULTSEXR  VALUE       1.7
 EDIT FIELD ? N
 KEY JUVSEXR    VALUE       1.1
 EDIT FIELD ? N
 KEY HOMERANGE  VALUE       6.3
 EDIT FIELD ? N
 KEY MOVEMENTS  VALUE       1.4
 EDIT FIELD ? N
 KEY SAGEHEIGHT VALUE      32.0
 EDIT FIELD ? N
 KEY SAGEWIDTH  VALUE      50.0
 EDIT FIELD ? Y
 NEW VALUE ? 51
```

A map of sage grouse wintering areas is displayed and the feature to be edited is indicated by crosshair input and marked with a small square. The value for the variable SAGEWIDTH is changed from 50.0 to 51.0 and all others are left the same.

Example of use of the EDITATT command:

```
 ENTER COMMAND
? EDITATT
 POINT TO FEATURE, SPACE or RETURN will REPEAT

  ITEM HAS FOLLOWING CHARACTERISTICS

 SUBJECT    = SAGE GROUSE WINTER HABITAT
 MAP NAME   = SGWWOLFRG ITEM NUMBER =      1
 AREA       =       304.38 ACRES
 ENTER  0-FOR ALL  #-FOR SPECIFIC: ? 8
 KEY SAGEWIDTH  VALUE     50.0
 EDIT FIELD ? Y
 NEW VALUE ? 51
```



A map of sage grouse wintering areas is displayed and the feature to be edited is indicated by crosshair input and marked with a small square. The value for the variable SAGEWIDTH is changed from 50.0 to 51.0 and all others are left the same.

The ERASE command is summarized as follows:

ERASE is a data display command that clears the display screen and sets the cursor in the upper left-hand corner of the screen. This command should be used liberally if the user wishes to keep the display screen readable.

The ERASE command is specified as follows:

ERASE

There are no individual parameters associated with the ERASE command.

The following is an example of use of the ERASE command:

```
 ENTER COMMAND
? ERASE
```

The limitations of the ERASE command are as follows:

-- If a baud rate other than 300 is being used, execution of this command will be slow.

The EXPORT command is summarized as follows:

EXPORT is a data manipulation command which allows the user to create a text file in import/export format using an active map ID as input. This command would typically be used to export data into a different geoprocessing system or to pass data to another computer.

The file generated by EXPORT is called "Export" and can be found in the user's work area. These files can become rather large so the user should ensure there is sufficient space and should delete the file when it is no longer needed. If it is desired to retain the file, it should be renamed as use of the command deletes any existing "Export" file.

The EXPORT command is specified as follows:

EXPORT (active ID)

The individual parameters of the EXPORT command are described below:

(active ID) is the ID number of a map referenced in the active map table which is to be exported.

The following is an example of use of the EXPORT command:

```
 ENTER COMMAND
? EXPORT
 ENTER ACTIVE DATA SET I.D. TO EXPORT
? 1
 NUMBER OF DATA ITEMS TO BE EXPORTED =     5
 EXECUTING.  PLEASE WAIT . . .
```

The limitations of the EXPORT command are as follows:

-- Map must be active vector data.

-- Any existing "Export" file is deleted.

The FLOOD command is summarized as follows:

FLOOD is a data display command that allows the user to display active polygon maps on a color CRT screen by shading the maps with different colors. If more than one active map ID number is specified following the command (see command format, below) each map will be plotted with different colors. This allows the user to differentiate between map data sets.

The ASSIGN command can be used to set the color for each feature or subject in a map. If assignment has been performed the FLOOD command will ignore the default colors and use the assignments.

The FLOOD command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

FLOOD (active ID's) (cancel)*

The individual parameters of the FLOOD command are described below:

(active ID's) is the ID number(s) of one or more maps referenced in the active map table which are to be colored.

(cancel) is an option that allows the user to stop a plot of maps without stopping MOSS. Entering CAN or ABO while plotting causes the main prompt to again appear. This option is unprompted.

The following is an example of use of the FLOOD command:

```
 ENTER COMMAND
? FLOOD
 ENTER ACTIVE MAP I.D.'S TO PLOT
? 1
```

The limitations of the FLOOD command are as follows:

-- Map must be active vector data with window set.

-- A color display terminal is required.

-- Polygon centroid must be inside the polygon. Use the MOVELABEL command on those polygons with the centroid outside the polygon.

The FREE command is summarized as follows:

FREE is a data manipulation command that deactivates any ID referenced in the active map table.

The FREE command is specified as follows:

FREE (active ID's)

The individual parameters of the FREE command are described below:

(active ID'S) are the ID numbers of the maps to be deactivated, i.e., deleted from the active map table. If the entire active map table is to be deactivated, the user may enter ALL instead of the active ID numbers. Active ID's can be entered in any order and the remaining active maps will be renumbered accordingly.

The following is an example of use of the FREE command:

```
 ENTER COMMAND
? FREE
 ENTER ALL OR ACTIVE MAP ID'S
? 4 2
```

The limitations of the FREE command are as follows:

-- Cannot free inclusive strings of ID's, for example "2 6" will only free ID 2 and ID 6, not ID 2 through ID 6.

Example of result of use of the FREE command:

```
THE FOLLOWING MAPS ARE CURRENTLY ACTIVE

 I.D.    ITEMS  SEARCH                                   FILE NAME/TYPE
--------------------------------------------------------------------------
    1      128  ALL                                      SUSWOLFRG     2
    2        3  ALL                                      SGWWOLFRG     3
    3       18  ALL                                      LSTWOLFRG     3
    4        5  ALL                                      MDRWOLFRG     3
    5        6  ALL                                      ALBWOLFRG     3
--------------------------------------------------------------------------
TOTAL ITEMS  160



 ENTER COMMAND
? FREE 4 2


THE FOLLOWING MAPS ARE CURRENTLY ACTIVE

 I.D.    ITEMS  SEARCH                                   FILE NAME/TYPE
--------------------------------------------------------------------------
    1      128  ALL                                      SUSWOLFRG     2
    2       18  ALL                                      LSTWOLFRG     3
    3        6  ALL                                      ALBWOLFRG     3
--------------------------------------------------------------------------
TOTAL ITEMS  152
```

The first table is the active map table before using the command. The second table is the active map table after using the command. Note that the active ID's to be freed may be specified in any order and that the remaining active ID's are renumbered accordingly.

The FREQUENCY command is summarized as follows:

FREQUENCY is a data description command that produces a table showing frequency and percent occurrence of each subject contained on any vector map referenced in the active map table. Specifically, FREQUENCY shows the number and frequency of the points, lines, or polygons associated with a particular subject on a map. More than one map may be described at the same time. If the active ID was selected using the ATTR option, the frequency will be given in terms of the selected attribute.

The FREQUENCY command is specified as follows:

FREQUENCY (active ID's) (HARDCOPY) (non-sorted)

The individual parameters of the FREQUENCY command are described below:

(active ID's) are the ID numbers of maps referenced in the active map table which are to be described. If more than one map ID is entered the command will produce a table describing all of the maps combined as one.

(HARDCOPY) is an option to obtain a hardcopy listing of the FREQUENCY table on a line printer. If HARDCOPY is specified output is written to a disk file called LINE.PRINTER. This file can be printed by exiting MOSS and issuing the operating system print command. If anything other than the characters HARDCOPY are specified in this option, the characters are used to specify a file name and the output is written to the file. If the file exists, the output is appended to the existing file. The name the operating system uses for the line printer can also be specified. This parameter can only be entered in un-prompted mode (see example below).

(non-sort option) is an option that allows the user to display a frequency table for one or more active maps with subjects listed in the order digitized. If the frequency for more than one map is requested subjects are grouped in the order that the ID's are typed. This option is activated by typing an "N" after HARDCOPY, a filename or @CONSOLE (to obtain the listing on the screen). A default would sort the subjects alphanumerically.

The following is an example of use of the FREQUENCY command:

```
 ENTER COMMAND
? FREQUENCY
 ENTER ACTIVE MAP I.D.(S)
? 1
```

To obtain a hardcopy listing:

```
 ENTER COMMAND
? FREQUENCY 1 HARDCOPY
```

To obtain a non-sorted hardcopy:

```
 ENTER COMMAND
? FREQUENCY 1 2 HARDCOPY N
```

The limitations of the FREQUENCY command are as follows:

-- No more than 40 active maps may be described at one time.

-- Input map must be active point, line, or polygon map.

-- Cannot have more than 2500 total unique subjects in the frequency table.

-- If the LINE.PRINTER file created by the HARDCOPY option is to be saved it should be renamed since use of the HARDCOPY option deletes existing LINE.PRINTER files.

Examples of output from use of the FREQUENCY command:

```
FREQUENCY SUMMARY FOR MAP MDRWOLFRQ  ACTIVE MAP NO.     1

           SUBJECT                FREQUENCY      PERCENT
--------------------------------------------------------------------
 MULE DEER SUMMER RANGE                   1         20.0
 MULE DEER WINT CONC/WINT RANGE           3         60.0
 MULE DEER WINTER RANGE                   1         20.0
--------------------------------------------------------------------
  TOTAL                                   5     100.0


 ENTER COMMAND
? FREQ 3 1


FREQUENCY SUMMARY FOR MAP MLRWOLFRQ  ACTIVE MAP NO.     3
FREQUENCY SUMMARY FOR MAP MDRWOLFRQ  ACTIVE MAP NO.     1

           SUBJECT                FREQUENCY      PERCENT
--------------------------------------------------------------------
 MOUNTAIN LION SUMMER RANGE               1         14.3
 MOUNTAIN LION WINTER RANGE               1         14.3
 MULE DEER SUMMER RANGE                   1         14.3
 MULE DEER WINT CONC/WINT RANGE           3         42.9
 MULE DEER WINTER RANGE                   1         14.3
--------------------------------------------------------------------
  TOTAL                                   7     100.0
```

Active map ID 1 is a map of mule deer ranges on Wolf Ridge, CO. Active map ID 3 is a map of mountain lion ranges on Wolf Ridge, CO. Note that the second table is a composite table and that frequency is summed to give totals and percent.

The GENERATE command is summarized as follows:

GENERATE is a data manipulation command that allows the user to create new MOSS maps interactively at a graphics terminal. Point, line, polygon, circle, and rectangular features may be created using the graphics cursor. In addition, point, line, and polygon features may be created by entering actual (x,y) coordinate data via the keyboard. The user is given the option of using another map's header as a template for generating a header for the new map. This feature also carries the projection with it.

GENERATE is best used in two terminal mode due to the amount of user interaction requiring textual input and graphics output.

The GENERATE command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

GENERATE (new map name)* (template option)* (new map description)* (map data type)* (input mode)* (feature subject)*

The individual parameters of the GENERATE command are described below:

(new map name) is the name for the map to be created using GENERATE.

(template option) is a means for the user to copy header and projection information from an existing file to the new file. If Yes is given in response to the prompt, the user is queried for a file name.

(new map description) is a description of the map to be created. This information will be stored in the map header.

(map data type) is the type of feature to be created. The user may enter POINT, LINE, POLYGON. Only the first character is required. If the map data type selected is polygon, the user is prompted to select one of the following feature types, POLYGON, CIRCLE, or RECTANGLE, or given the option, QUIT to exit. If the data type is point or line, the user may QUIT to exit. A <return> will cause the next prompt for point or line data to be displayed.

(input mode) is an option for the user to specify how the new data will be entered. If the user enters [C]ursor, input will be via the CRT graphics cursor. If the user enters [K]eyboard, input will be via typed-in (x,y) coordinate pairs. In cursor mode, the command operates within the current window setting. Note that polygon coordinates must be entered in clockwise order and need not be closed.

(feature subject) is the subject to be assigned to the new feature.

The following is an example of use of the GENERATE command:

```
 ENTER COMMAND
? GENERATE
 WHAT DO YOU WISH TO CALL THE NEW MAP
  __________
? MDMIGRAT
 USE ANOTHER MAP'S HEADER AS A TEMPLATE [Y]?
 ENTER MAPNAME FOR HEADER TEMPLATE:  ? MDRWOLFRG
MULE DEER RANGE      WOLF RIDGE         COLORADO  1:24000
------------------------------------------------------------
 ENTER NEW DESCRIPTION OR RETURN TO RETAIN TEMPLATES DESCRIPTION
REVISED MULE DEER MIGRATION ROUTES
 ENTER DATA TYPE THIS MAP IS TO BE:
      1 - POINT
      2 - LINE
      3 - POLYGON
        ? 2
 KEYBOARD OR CURSOR INPUT (K/C) ? C
 QUIT (Q) TO EXIT:  ?           (enter <RETURN> to continue)
 ENTER SUBJECT FOR THIS FEATURE
? MIGRATION ROUTE 1
 ENTER POINTS FOR FEATURE. TERMINATE WITH T KEY
 QUIT (Q) TO EXIT:  ? Q
```

The limitations of the GENERATE command are as follows:

-- No more than 100 new features per GENERATE process.

-- Cannot create islands within polygons.

-- Window must be set for cursor input mode.

-- No more than 100 subjects in the new map.

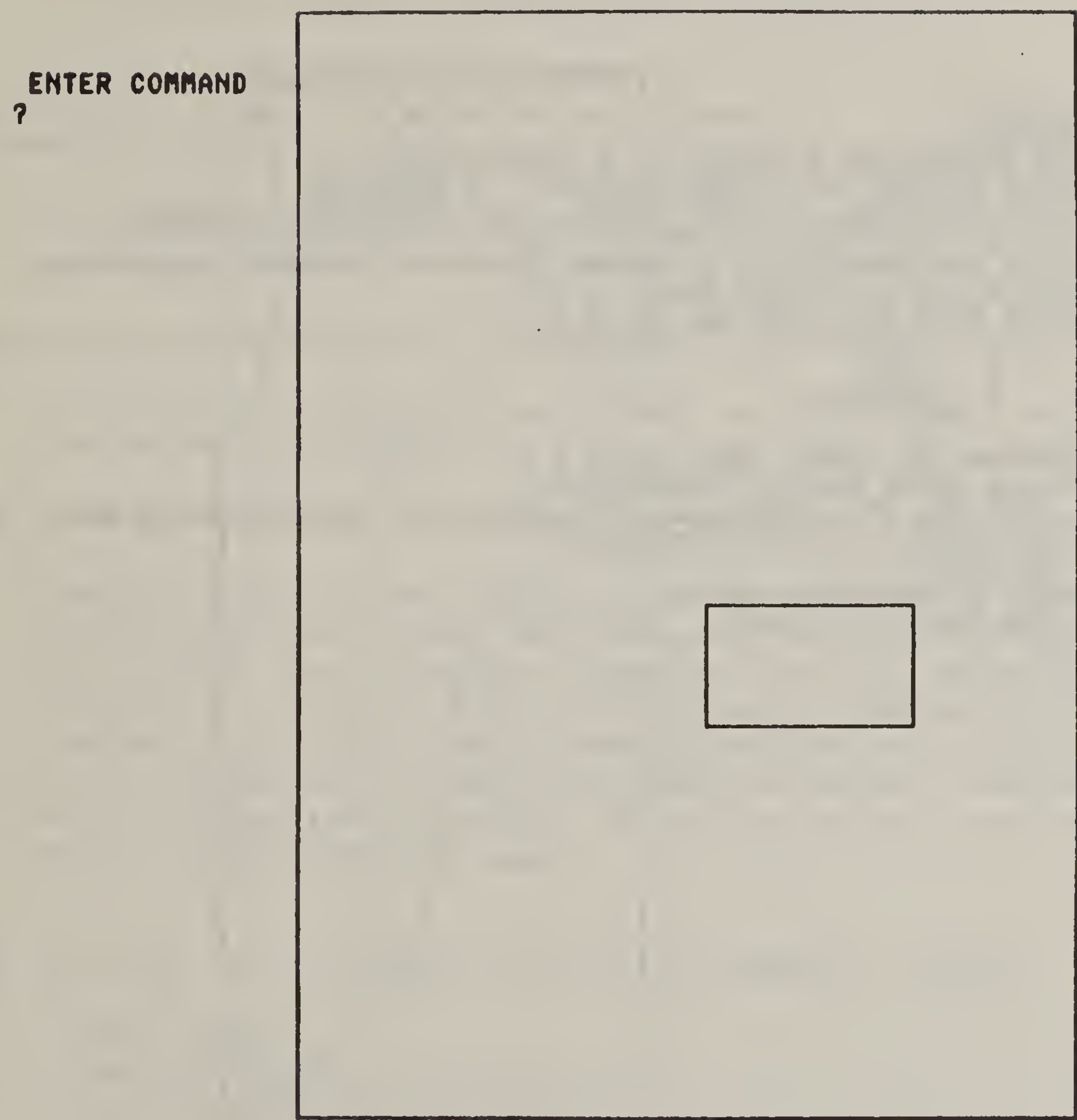
-- Polygons must be entered with the coordinates in clockwise order.

-- Subjects in the new map will not be in alphabetical order.

-- Unless the template option is selected, no projection type is assigned to the new map.

-- Can only enter POINT, LINE, or POLYGON with keyboard input.

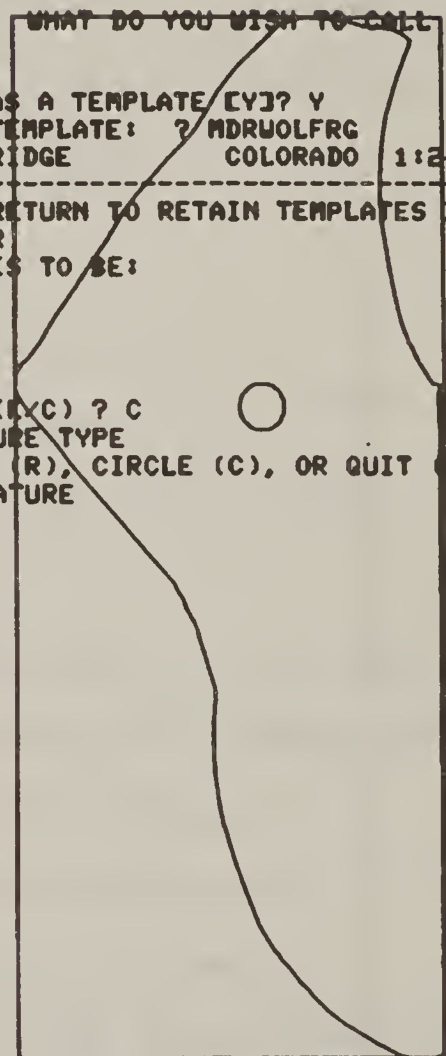
Example of result of use of the GENERATE command:




A plot of the map containing the rectangle feature created by the GENERATE command.

Example of result of use of the GENERATE command:

```
                                  WHAT DO YOU WISH TO CALL THE NEW MAP
 ----------
? FEEDLOT
 USE ANOTHER MAP'S HEADER AS A TEMPLATE [Y]? Y
 ENTER MAPNAME FOR HEADER TEMPLATE:  ? MDRWOLFRG
MULE DEER RANGE      WOLF RIDGE         COLORADO  1:24000
-----------------------------------------------------------------
 ENTER NEW DESCRIPTION OR RETURN TO RETAIN TEMPLATES DESCRIPTION
TEST FEED LOT FOR MULE DEER
 ENTER DATA TYPE THIS MAP IS TO BE:
       1 - POINT
       2 - LINE
       3 - POLYGON
          ? 3
 KEYBOARD OR CURSOR INPUT (K/C) ? C
 PLEASE ENTER POLYGON FEATURE TYPE
    POLYGON (P), RECTANGLE (R), CIRCLE (C), OR QUIT (Q) TO EXIT:  ? C
 ENTER SUBJECT FOR THIS FEATURE
? DEERFOOD
 POINT TO CENTER OF CIRCLE
 ENTER RADIUS IN MILES
? .1
```



The command is used to create a polygon map containing one feature, a circle. In this example, the feature is representative of a circular artificial feed plot for mule deer located in an area of winter concentration range. The new map is plotted along with the map of mule deer winter concentration range on Wolf Ridge, CO.

The GOVERLAY command is summarized as follows:

GOVERLAY is an overlay analysis command which is a modification of the OVERLAY command. This command finds the intersection between two active polygon maps. The resulting map is stored in the workfile. Since the GOVERLAY command may be time consuming for complicated maps, progress printouts occur occasionally.

The GOVERLAY command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

GOVERLAY (active ID's) (new map name)* (subject merge)*

The individual parameters of the GOVERLAY command are described below:

(active ID's) are the ID numbers of two polygon maps referenced in the active map table.

(new map name) is the name for the map which results from GOVERLAY.

(subject merge) is an option for the user to specify how subjects should be merged between the two maps. The user must respond YES, NO, or REV. The YES option allows the user to specify the number of characters from each map to be contained in the new subject up to a maximum of 30 total. The NO option defaults to 14 characters from the first map and 16 characters from the second. This option may also be specified with <CR>. The REV option will reverse the order of the default subject merge.

The following is an example of use of the GOVERLAY command:

```
 ENTER COMMAND
? GOVERLAY
 Enter active data set IDS
? 1 2
 WHAT DO YOU WISH TO CALL THE NEW MAP

? DEERSAGE
 Do you want to specify SUBJECT MERGE parameters [CR=NO]
    [NO = 14 chars from 1st and 16 chars from 2nd]
    [YES= input # chars from each subject]
    [REV= reverse order of subjects      ]        ? NO
```

The limitations of the GOVERLAY command are as follows:

-- Maps must be active polygon maps and window must be set.

-- Maximum of 1000 data points per polygon not including islands (use the DIVIDE command to break up large polygons).

-- Islands of polygons may not intersect to form islands.

-- Maximum of 30 characters for subjects.

MOSS commands, grouped by function, are as follows:

| | |
|---|---|
| Program Control: | BAUD, BUTTON, BYE, CLI, COMMANDS, COST, DEVICE, HELP, MAPS, NEWS, OPEN, PAGE, STATUS, TERMINAL, UTILITY |
| Data Manipulation: | ADD, ARCHIVE, *CONTOUR, DEARCHIVE, DELETE, DIGITIZE, DIVIDE, EDITATT, EXPORT, FREE, GENERATE, MERGE, MOVELABEL, *MULTIVAL, *POLYCELL, *POLYMVG, PROJECTION, *SAVE, SNGVAL, *SPSS, TEXT, TRANSLATE, WEED |
| Data Display: | ANNOTATE, ASSIGN, CALCOMP, ERASE, FLOOD, GCALCOMP, *GCONTOUR, HEWLETT, LEGEND, LINE, NUMBER, PLOT, *PROFILE, RESET, SHADE, SHOW, SYMBOL, TESTGRID, *THREED, VERSATEC, WINDOW, ZETA, ZOOM |
| Data Description: | ACTIVE, AREA, AUDIT, DESCRIBE, DISTANCE, FREQUENCY, LENGTH, LIST, LOCATE, PERIMETER, QUERY, REPORT, STATISTICS |
| Data Analysis: | |
| (Reclassify) | BSEARCH, COMPUTE, SAMPLE, SELECT, SIZE |
| (Overlay) | *COMPOSITE, GOVERLAY, LPOVER, *MODELG, OVERLAY |
| (Distance) | BUFFER, CONTIGUITY, EDGE, PROXIMITY |
| (Neighbor) | *ASPECT, *GRID, *SLOPE |

* denotes raster capabilities (see Appendix F)

The HELP command is summarized as follows:

HELP is a program control command which provides either a listing of commands or a description of function of a specific command.

The HELP command is specified as follows:

HELP

or,

HELP (command name)

The individual parameters of the HELP command are described below:

(command name) is the name of the command about which the user wants more information. Abbreviations are not allowed. If no name is specified a listing of all commands is given. This parameter must be entered in an un-prompted mode.

The following is an example of use of the HELP command:

```
 ENTER COMMAND
? HELP COST
```

The limitations of the HELP command are as follows:

-- Command names may not be abbreviated.

The HEWLETT command is summarized as follows:

HEWLETT is a data display command which allows the user to produce a file of an active map or maps for output to a HEWLETT-PACKARD plotter.

The HEWLETT command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

HEWLETT (output file name)* (active ID's)* (output scale)*
(border option)* (corner tic option)* (map title)*
(bar scale option)* (pen color)* (attribute option)*
(shade option)* (logo option)* (ancillary annotation option)*
(legend option)*

The individual parameters of the HEWLETT command are described below:

(output file name) is the name of a disk file to which the graphics are being routed. The contents of this file can later be plotted. For assistance, see the system manager.

(active ID's) are the ID numbers of maps referenced in the active map table which are to be plotted.

(output scale) is the scale for the plot. After entering a scale, MOSS will respond with the plot size in inches and query for acceptability.

(border option) is an opportunity for the user to specify a border around the plot. If a border is desired, the user will be prompted for corner tic, title, and bar scale options as below.

(corner tic option) is an opportunity for the user to have corner tics plotted if a border was requested as above.

(map title) is a title for the plot. This option is available if a border was requested as above.

(bar scale option) is an opportunity for the user to have a bar scale plotted if a border was requested as above. If a bar scale is desired the user will be prompted for units of measure (feet, miles, nautical), increment length, and bar divisions.

(pen color) is the desired pen color to be used on the plot. Available colors are 1-Black, 2-Blue, 3-Red, and 4-Green. If more than one active ID is to be plotted the user may specify different pen colors for each ID. For plotters equipped with more than four pens the user must define the colors beginning with pen five.

(attribute option) is an opportunity for the user to have attribute information or item numbers plotted. If attributes or item numbers are to be plotted, the user will be prompted for a pen color as above.

(shade option) is an opportunity for the user to have the plot shaded. If shading is desired the user will be prompted for shade density parameters and angle of rotation. If more than one active ID is to be plotted the user may specify various shade combinations for each ID.

(logo option) is an opportunity for the user to have a logo plotted. If desired, the user will be prompted for the name of a previously created file. This file must be in unit-square import/export format and may be created using a utility routine (see Appendix F).

(ancillary annotation option) is an opportunity for the user to have one or more lines of text plotted. This feature allows explanatory text to be added to enhance understandability of the plot.

(legend option) is an opportunity for the user to have a map legend plotted. If desired the user will be prompted for the name of a file containing the legend information. This file may be created prior to use of the command using a utility routine (see Appendix F).

The following is an example of use of the HEWLETT command:

```
 ENTER COMMAND
? HEWLETT
 HEWLETT PACKARD OUTPUT FILE NAME ?
MDRPLOT
 ENTER SIZE OF PAPER IN INCHES FROM LEFT TO RIGHT
 ( DISTANCE BETWEEN PINCH WHEELS ) 42
 ENTER SIZE OF PAPER IN INCHES FROM BACK TO FRONT : 60
 ENTER ACTIVE MAP I.D.(S) TO HEWLETT
? 1
OUTPUT MAP SCALE ?
? 24000
 PLOT WILL BE  12.49 BY   5.31 INCHES
******   SCALE ACCEPTABLE(Y OR N)?
? Y
```

```
 PLEASE ENTER PLOT BORDER OPTION
    0 = NO PLOT BORDER
    1 = NORMAL PLOT BORDER (DEFAULT)
    2 = THICK PLOT BORDER
? 1
 PLEASE ENTER CORNER TIC OPTION
    0 =   NO CORNER TICS, NO COLLAR
    1 =   CORNER TICS, NO COLLAR
    2 =   MAP COLLAR, NO TICS
    3 =   MAP COLLAR, TICS
? 1
 ENTER 60 CHARACTER OR LESS TITLE
? MULE DEER WINTER CONCENTRATION RANGE ON WOLF RIDGE
 PLEASE ENTER BAR SCALE OPTION
    0 =  NO BAR SCALE
    1 =  BAR SCALE
? 1
 PLEASE ENTER UNITS OF MEASURE ( FEET, MILES, NAUTICAL )
? MILES
 PLEASE ENTER INCREMENT LENGTH (DEFAULT= 1.0) ? 1.0
 PLEASE ENTER 3 BAR SCALE DIVISION VALUES ? .25 .5 .75
 ACCEPTING INPUT FOR MDRWOLFRG ACTIVE MAP    1 DATA TYPE    3

 ENTER PEN COLOR FOR ACTIVE MAP    3
 BLACK = 1, BLUE = 2, RED = 3, GREEN = 4
? 1
 ENTER ATTRIBUTE PLACEMENT OPTION
    0 =   NO ATTRIBUTE PLACEMENT
    1 =   FEATURE ATTRIBUTE AT CENTROID
    2 =   FEATURE ATTRIBUTE USING AUTOMATED PROCEDURE
    3 =   FEATURE ITEM NUMBER AT CENTROID
    4 =   FEATURE ITEM NUMBER USING AUTOMATED PROCEDURE
? 1
 PLEASE ENTER PEN COLOR FOR ATTRIBUTES ? 3
DO YOU WISH TO SHADE MAP MDRWOLFRG
? Y
 PLEASE ENTER 1 FOR SINGLE OR 2 FOR DOUBLE HATCH ? 1
DO YOU WISH THE SHADING DASHED ? ? N
 ENTER PERCENT SLOPE FOR HATCH ANGLE ? 45
 ENTER HATCH SPACING IN INCHES ? .1
 DO YOU WISH A LOGO TO BE PLOTTED ? Y
 PLEASE ENTER NAME OF LOGO FILE ? EXPORT
 DO YOU DESIRE ANCILLARY ANNOTATION (Y OR N) ? Y

>
```

```
 DO YOU WISH ANCILLARY TEXT OUTPUT ? ? Y
 BEGIN ENTERING TEXT. TERMINATE WITH A ZZ

? THIS IS AN EXAMPLE OF ANCILLARY ANNOTATION

? ZZ
 DO YOU DESIRE A MAP LEGEND (Y OR N) ? Y
 PLEASE ENTER NAME OF LEGEND FILE ? PLOT.LEGEND
```

The limitations of the HEWLETT command are as follows:

-- Input maps must be active.

-- Can not plot multivalue cell maps.

-- Window must be set.

-- Polygon outlines are not plotted if pen zero is selected.

The LEGEND command is summarized as follows:

LEGEND is a data display command that allows the user to either display attribute information at the centroid of a feature or display the map name and the display scale. Attribute information may be either the primary attribute or from the multiple attributes file.

The LEGEND command is specified as follows:

LEGEND (active ID) (display type) (number of characters)

The individual parameters of the LEGEND command are described below:

(active ID) is the ID number of a map referenced in the active table.

(display type) is an option to specify the type of display desired. The user may enter DESCRIBE, LABEL, or ELEVATION. DESCRIBE produces a map legend with the map scale and map name. The user will also be asked for crosshair input from the CRT cursor to position the legend. LABEL displays the subject (or multiple attribute information) for each item on the CRT beginning at the centroid of the line or polygon and moving horizontally. ELEVATION works only with 3-D vector data sets and will display elevation of each point in a feature.

(number of characters) is the number of characters the user wishes to display from the feature subject. This parameter can only be entered in an un-prompted mode and must be less than thirty and greater than zero.

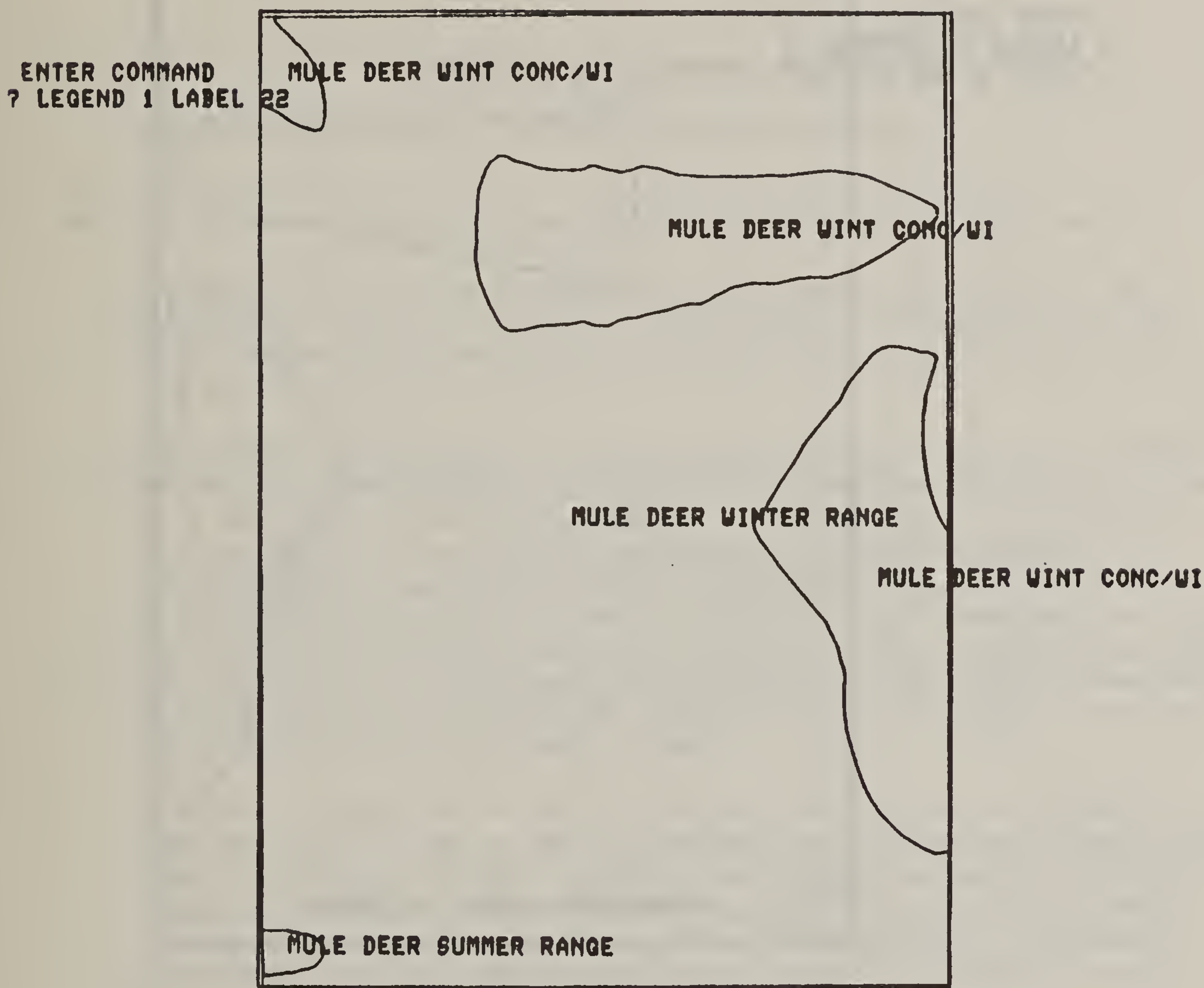
The following is an example of use of the LEGEND command:

```
 ENTER COMMAND
? LEGEND
 ENTER ACTIVE MAP I.D. TO LEGEND
? 1
 LABEL, ELEVATION, OR DESCRIBE ?
? DESCRIBE
```

The limitations of the LEGEND command are as follows:

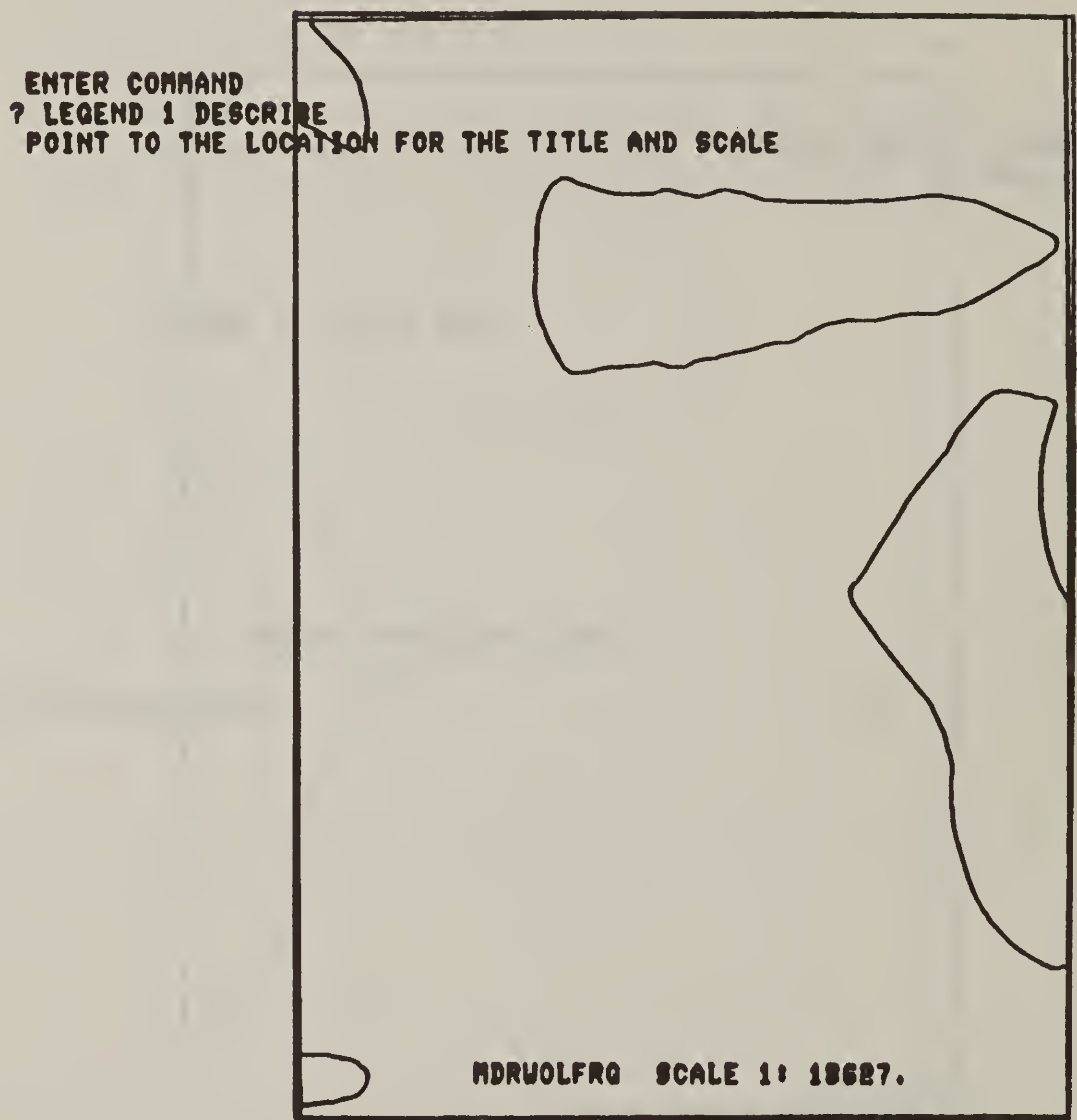
- -- Map must be active and window must be set.
- -- Does not work with cell data.
- -- Does not write to the device file if one is in use.
- -- If the item to be labeled is near the right margin, the label may wrap around. If it is too near the top, it will be clipped. This can be avoided by making the window larger.

Example of use of the LABEL option of the LEGEND command:




Active map ID 1 is a map of mule deer ranges on Wolf Ridge, CO. Note that a maximum of 22 characters has been specified for feature subject labeling and that the label begins at the centroid of each feature.

Example of use of the DESCRIBE option of the LEGEND command:




Active map ID 1 is a map of mule deer range on Wolf Ridge, CO. The map is titles MDRWOLFRG and is displayed at a scale of 1:18627. The title and scale were positioned with cross-hair (cursor) input.

The LENGTH command is summarized as follows:

LENGTH is a data description command that produces a table showing length, frequency, and percent of each subject associated with any line map referenced in the active map table. More than one map may be described at the same time. Length is summarized in miles.

The LENGTH command is specified as follows:

LENGTH (active ID's) (HARDCOPY) (non-sort option)

The individual parameters of the LENGTH command are described below:

(active ID's) are the ID numbers of line maps referenced in the active map table which are to be described. If more than one map ID is entered the command will produce a table describing all of the maps specified.

(HARDCOPY) is an option to obtain a hardcopy listing of the LENGTH table on a line printer. If HARDCOPY is specified output is written to a disk file called LINE.PRINTER. This file can be printed by exiting MOSS and issuing the operating system print command. If anything other than the characters HARDCOPY are specified in this option, the characters are used to specify a file name and the output is written to the file. If the file exists, the output is appended to the existing file. The name the operating system uses for the line printer can also be specified. This parameter can only be entered in un-prompted mode (see example below).

(non-sort option) is an option that allows the user to display a length table for one or more active maps with subjects listed in the order digitized. If the length for more than one map is requested the subjects are grouped in the order that the ID's are typed. This option is activated by typing an "N" after HARDCOPY, a filename, or @CONSOLE (to get the listing on the screen). A default would sort the subjects alphanumerically.

The following is an example of use of the LENGTH command:

```
 ENTER COMMAND
? LENGTH
 ENTER ACTIVE MAP I.D.(S)
? 5
```

To obtain a hardcopy listing:

```
 ENTER COMMAND
? LENGTH 5 HARDCOPY
```

To obtain a non-sorted hardcopy:

```
 ENTER COMMAND
? LENGTH 2 3 HARDCOPY N
```

The limitations of the LENGTH command are as follows:

-- The LENGTH command may provide erroneous results when it is used after a ZOOM command has been issued. ZOOM does not "clip" polygons that fall on the border of the display window.

-- Input map must be an active line map.

-- If length is greater then 9999999.99 miles, only asterisks will print out.

-- Cannot have more than 2500 total unique subjects in the length table.

-- No more than 40 maps may be described at one time.

-- If the LINE.PRINTER file created by the HARDCOPY option is to be saved it should be renamed since use of the HARDCOPY option deletes existing LINE.PRINTER files.

Examples of output from use of the LENGTH command:

```
LENGTH SUMMARY FOR MAP SWSWOLFRG  ACTIVE MAP NO.     5

            SUBJECT                  LENGTH     FREQUENCY    PERCENT
--------------------------------------------------------------------
 EPHEMERAL STREAMS                    94.70        94          82.57
 PERENNIAL STREAMS                    20.00        34          17.43
--------------------------------------------------------------------
  TOTAL (IN MILES)                    114.7        128     100.00


ENTER COMMAND
? LENG 5 2


LENGTH SUMMARY FOR MAP SWSWOLFRG  ACTIVE MAP NO.     5
LENGTH SUMMARY FOR MAP MDMWOLFRG  ACTIVE MAP NO.     2

            SUBJECT                  LENGTH     FREQUENCY    PERCENT
--------------------------------------------------------------------
 EPHEMERAL STREAMS                    94.70        94          70.15
 MULE DEER MIGRATION ROUTE            20.30         3          15.03
 PERENNIAL STREAMS                    20.00        34          14.81
--------------------------------------------------------------------
  TOTAL (IN MILES)                    135.0        131     100.00
```

. Active map ID 5 is a map of surface water streams on Wolf Ridge, CO. Active map ID 2 is a map of mule deer migration routes on Wolf Ridge, CO. Note that the second table is a composite table and that length and frequency are summed to give totals and percent.

The LINE command is summarized as follows:

LINE is a data display command that plots one or more active line maps (e.g., a road map) on the CRT using one of 33 possible symbols. The line symbol can either be specified by the user or assigned automatically. If user-assigned, a table of line symbols available may be displayed (see accompanying graphic).

The LINE command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

LINE (active ID's) (assign mode) (table option)* (symbol ID's)*

The individual parameters of the LINE command are described below:

(active ID's) are one or more ID numbers of line maps referenced in the active map table which are to be plotted.

(assign mode) is an option to specify line symbols. The user may enter YES, to assign symbols, or NO to have MOSS automatically assign line symbols.

(table option) is a chance for the user to view a table of line symbology in order to assign line symbols to maps. The user should enter YES, if a table is desired, or NO.

(symbol ID's) are the symbol ID numbers corresponding to the line fonts desired for maps.

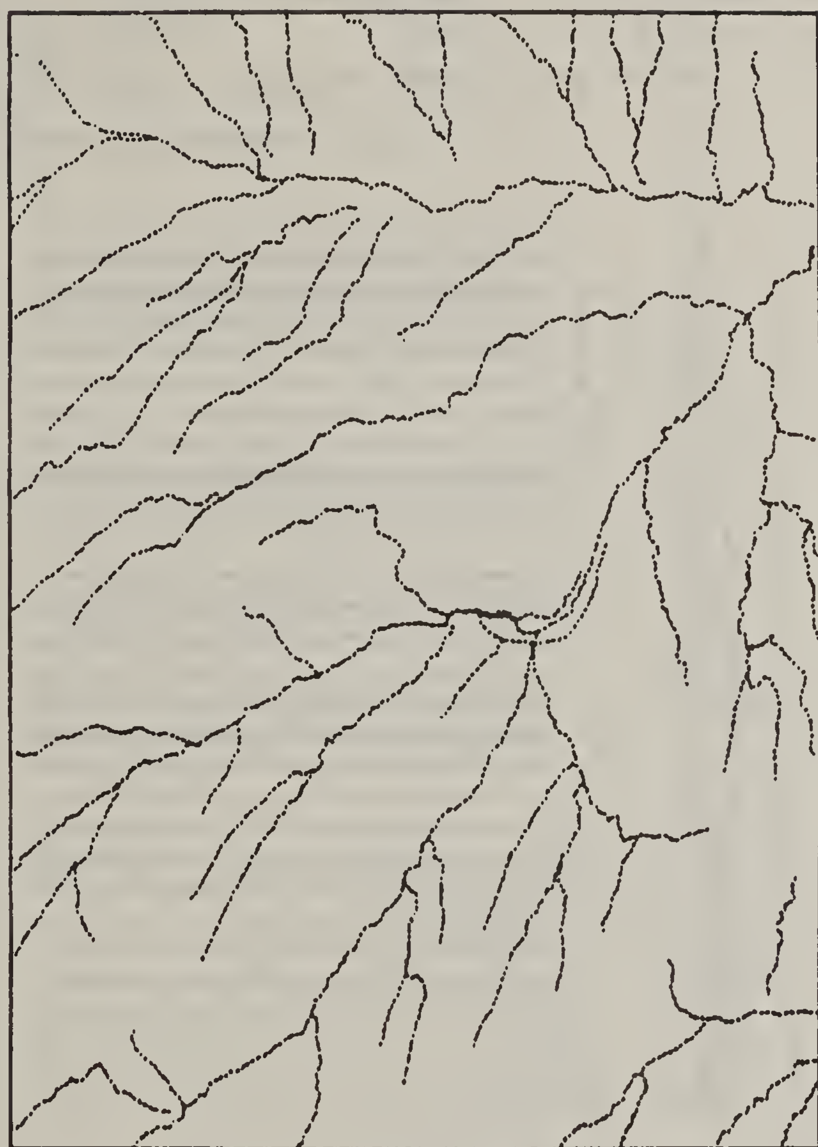
The following is an example of use of the LINE command:

```
 ENTER COMMAND
? LINE
 ENTER ACTIVE MAP I.D.'S
? 1
 DO YOU WISH TO ASSIGN LINE SYMBOLS (YES OR NO)?
? YES
 DO YOU WISH TO SEE LINE SYMBOLS (YES OR NO)?
? NO
 ENTER LINE SYMBOLOGY I.D.'S
? 1
```

The limitations of the LINE command are as follows:

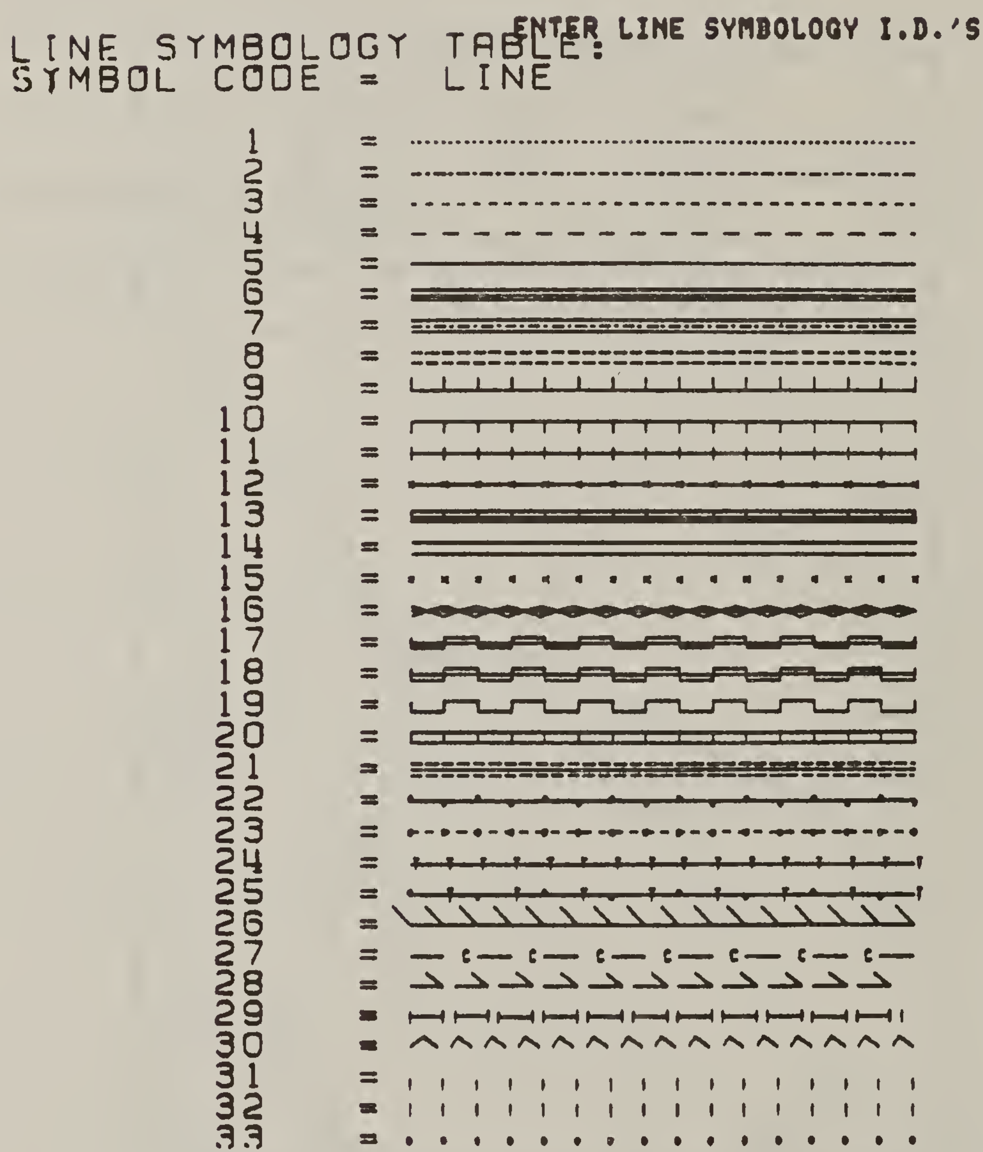
- -- This command does not function well, particularly with dashed line types. An alternate method is to use the ASSIGN command.
- -- Map must be active and window must be set.
- -- Only 33 line fonts are available.
- -- Only one map may be assigned at a time.
- -- No legend is produced.
- -- Lines on the same border are often confusing.

Example of result of use of the LINE command:



Active map ID 1 is a line map of surface water streams on Wolf Ridge, CO. Line font 1 was used.

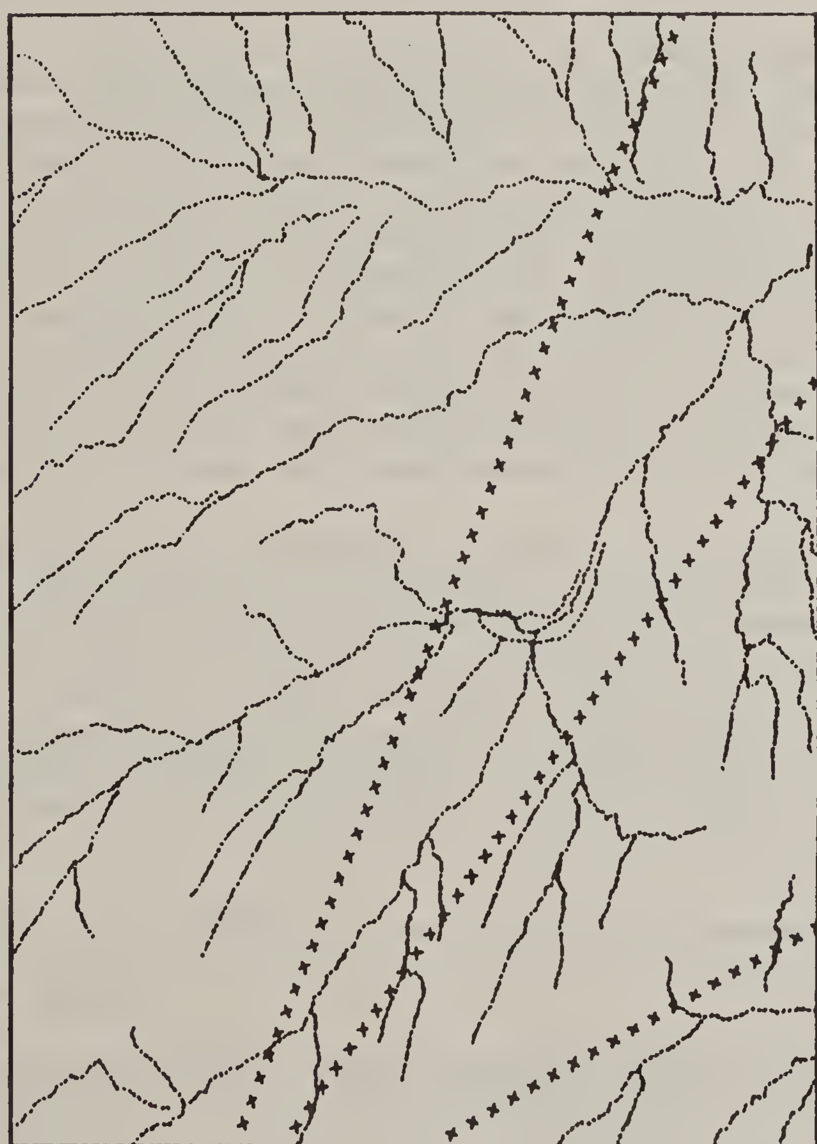
Example of the line symbology table for use with the LINE command:




This table may be viewed prior to choosing a line font if the user responds YES to the table option prompt.

Example of result of use of the LINE command:

```
 ENTER COMMAND
? LINE 1 2
 DO YOU WISH TO SEE LINE SYMBOLS (YES OR NO)?
? NO
 ENTER LINE SYMBOLOGY I.D.'S
? 1 15
```



Two maps were line font assigned simultaneously. Active map ID 1 is a line map of surface water streams and active map ID 2 is a line map of mule deer migration routes, both on Wolf Ridge, CO. Line fonts 1 and 15 were used, respectively.

The LIST command is summarized as follows:

LIST is a data manipulation command that allows the user to browse the list of map names in the database and if working with color, list the contents of the pseudo device table and/or the contents of the color lookup definition table.

The LIST command is specified as follows:

LIST (option) (template)

The individual parameters of the LIST command are described below:

(option) is the source of the data the user wishes information about. The user must respond with MAPS, MASTER, WORK, DEVICES ,COLORS, or a map name. The MAP option will produce an alphabetized listing of all maps in both the master and workfile. The MASTER option will list only the map names in the master database while the WORK option will list only the map names in the work database. The DEVICES option will list all available color raster devices along with their characteristics. The COLORS option will list all color lookup definition names on the color LUT database or will list all the colors and their intensities for a given color LUT definition. If the user responds with a map name the DESCRIBE command is executed to retain compatiblity with previous revisions.

(template) is an opportunity for the user to inquire more specifically about the list of map names. If the user responds MAPS, MASTER, or WORK to the (option) prompt, this parameter must be entered on the same line, i.e., can only be entered in an un-prompted mode. (template) allows the user to list only those maps whose names contain a specific string of characters. Allowed (templates) are +STRING, STRING+, +STRING+, or STRING+STRING where STRING is a ten character or less search string and the + must be entered.

The following is an example of use of the LIST command:

```
 ENTER COMMAND
? LIST
 ENTER: MAPS, MASTER, WORK, DEVICES, COLORS, OR <MAPNAME>
? MASTER M+
```

The limitations of the LIST command are as follows:

-- None found to date.

Examples of result of use of the LIST command:

```
 ENTER COMMAND
? LIST MAPS

  50 MAPS IN MASTER PROJECT WOLF

ALBWOLFRG  3   APCWOLFRG  3   BAMWOLFRG  3   BGHWOLFRG  3
CADWOLFRG  3   CLFWOLFRG  2   CNTWOLFRG  3   DZNWOLFRG  3
GOSWOLFRG  1   GOWWOLFRG  3   KGSWOLFRG  3   LSTWOLFRG  3
MDMWOLFRG  2   MDRWOLFRG  3   MOTWOLFRG  3   MLRWOLFRG  3
NALWOLFRG  3   NHRWOLFRG  3   OPMWOLFRG  3   OSLWOLFRG  3
OSWWOLFRG  3   PLFWOLFRG  2   PLNWOLFRG  2   PLSWOLFRG  3
POSWOLFRG  3   PPWWOLFRG  3   PURWOLFRG  3   RABWOLFRG  3
RASWOLFRG  1   RDSWOLFRG  2   SACWOLFRG  3   SCEWOLFRG  3
SCLWOLFRG  2   SCPWOLFRG  1   SCTWOLFRG  3   SGNWOLFRG  3
SGWWOLFRG  3   SGZWOLFRG  3   SLSWOLFRG  3   SQRWOLFRG  3
STYWOLFRG  3   SWSWOLFRG  2   TEPWOLFRG  3   TIGWOLFRG  3
TRNWOLFRG  2   VISWOLFRG  3   WHBWOLFRG  3   WHWWOLFRG  2
UTFWOLFRG  3   UTRWOLFRG  1

  24 MAPS IN WORK PROJECT POLYGON
```

```
 ENTER COMMAND
? LIST COLORS
 ENTER:  ALL OR A LUT DEFINITION NAME ? ALL


 THERE ARE    1 COLOR LUT DEFINTIONS ON FILE

 NO. COLORS.  LUT. DEFINITION NAME

      3              LUT2
```

Information on maps in workfile is requested. Next, information on color LUT definitions available is requested.

The LOCATE command is summarized as follows:

LOCATE is a data description command which determines the coordinates of any point(s) on a map being displayed on the CRT. Coordinates are given in units defined by the map projection (see PROJECTION). Unless the map projection type is Geographic, State Plane, or UTM, coordinate values will be in units of false easting and northing. If GEOG is specified with the command, geographic coordinates of latitude and longitude will also be displayed. In addition to displaying coordinates for specified locations, the command writes these values to a disk file called LINE.PRINTER. All coordinate pairs determined by the execution of LOCATE during a MOSS session will be written to this file. Note that if a REPORT, WRITE, or HARDCOPY command is issued during the session, the coordinate values in LINE.PRINTER will be lost.

The LOCATE command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

LOCATE (GEOG) (crosshair input)*

The individual parameters of the LOCATE command are described below:

(GEOG) is an option to have latitude and longitude values displayed also. This parameter can only be entered in an un-prompted mode along with the command itself.

(crosshair input) is where the user points with the graphics cursor to the location for which coordinates are desired. Enter SPACE or RETURN to obtain the coordinates. Use of any other key will terminate the command.

The following is an example of use of the LOCATE command:

```
 ENTER COMMAND
? LOCATE GEOG
 Point to location ( SPACE or RETURN will REPEAT.)

 LAT = 39 58 16.2 LON = -108 25 6.5
 EAST=  5049635.0 NORTH=   440759.4

 LAT = 39 58 16.5 LON = -108 25 56.9
 EAST=  5048440.0 NORTH=   440759.4
```

The limitations of the LOCATE command are as follows:

-- Window must be set or erroneous results occur.

-- Coordinate values depend upon the units defined by the map projection type.

-- If the LINE.PRINTER file created by the command is to be saved it should be renamed since use of some other commands will delete existing LINE.PRINTER files.

-- If TERMINAL is set to VISUAL only one point can be located.

-- If the map projection has not been defined, the following message will occur:

*WARNING* A projection has not been assigned to <filename>.

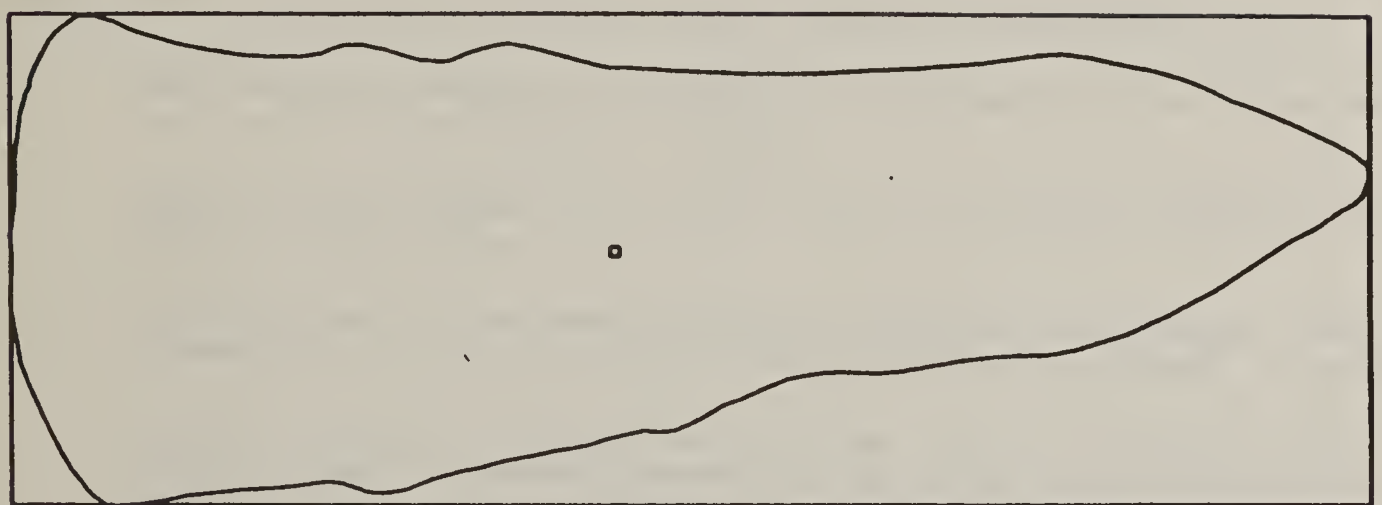
-- If multiple executions of the LOCATE GEOG command are performed too quickly, the following messages will occur:

```
*GTRIF ERROR from QPROC  ERROR 63
*LOCATR ERROR starting projection processor  ERROR 63
```

Allow more time between multiple exections of the commmand.

Example of use of the LOCATE command:

```
 ENTER COMMAND
? LOCATE GEOG
 Point to location, SPACE or RETURN will REPEAT
 LAT =  39 58 15.6 LON = -108 25 24.1
 EAST=  5049217.0 NORTH=   440738.9
```



The map is an enlarged portion of a map of mule deer ranges on Wolf Ridge, CO. Note that the coordinates of two points have been determined sequentially in both latitude and longitude and false easting and northing.

The LPOVER command is summarized as follows:

LPOVER is an overlay analysis command that creates a new map by determining the logical intersection between an active polygon map and an active point or line map. If the point or line map has multiple attributes, an entry will be made in the active map table. Otherwise, a new map will be created in the work file.

The LPOVER command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

LPOVER (ID1) (ID2) (new map name)* (subject merge)*

The individual parameters of the LPOVER command are described below:

(ID1) is the ID number of a polygon map referenced in the active map table which is the object of LPOVER.

(ID2) is the ID number of an active line or point map referenced in the active map table.

(new map name) is the name for the map resulting from LPOVER. This parameter is not prompted for if the active ID2 has mutiple attributes.

(subject merge) is an option which allows the user to specify how subjects should be merged between the two maps. The user must respond YES, NO, or REV. The YES option allows the user to specify the number of characters from each map to be contained in the new subject up to a maximum of 30 total. The NO option defaults to 14 characters from the first map and 16 characters from the second. This option may also be specified with <CR>. The REV option will reverse the order of the default subject merge. This parameter is not prompted for if active ID2 has multiple attributes.

The following is an example of use of the LPOVER command:

```
 ENTER COMMAND
? LPOVER
 ENTER ACTIVE MAP I.D.'S TO LPOVER
? 1 2
 WHAT DO YOU WISH TO CALL THE NEW MAP

? MIGCONC
```

```
Do you want to specify SUBJECT MERGE parameters [CR=NO]
   [NO = 14 chars from 1st and 16 chars from 2nd]
   [YES= input # chars from each subject]
   [REV= reverse order of subjects      ]       ? NO
BUILD MOSS MAP DATA TYPE    2
INTERSECTED FEATURES =     1
```

The limitations of the LPOVER command are as follows:

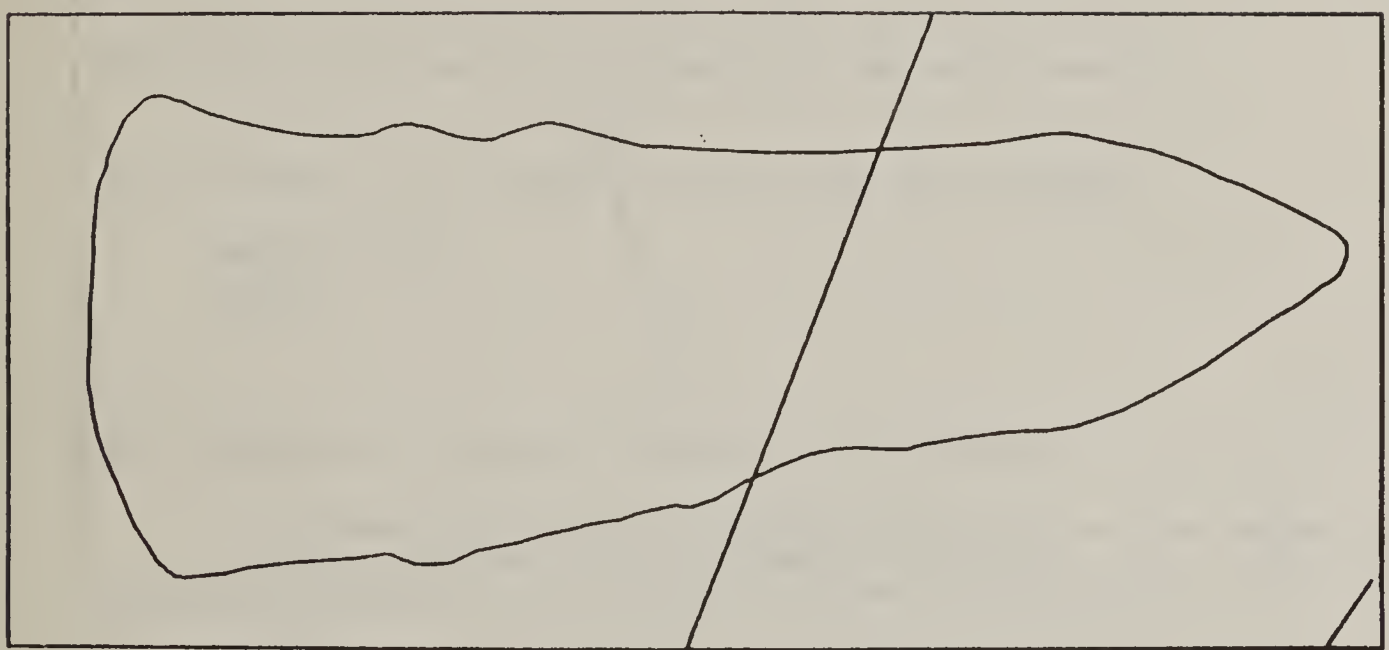
-- Both maps must be active and window must be set.

-- Line or point maps must be the second ID specified in the command.

-- Maximum of 30 characters for subject names.

Example of use of the LPOVER command:

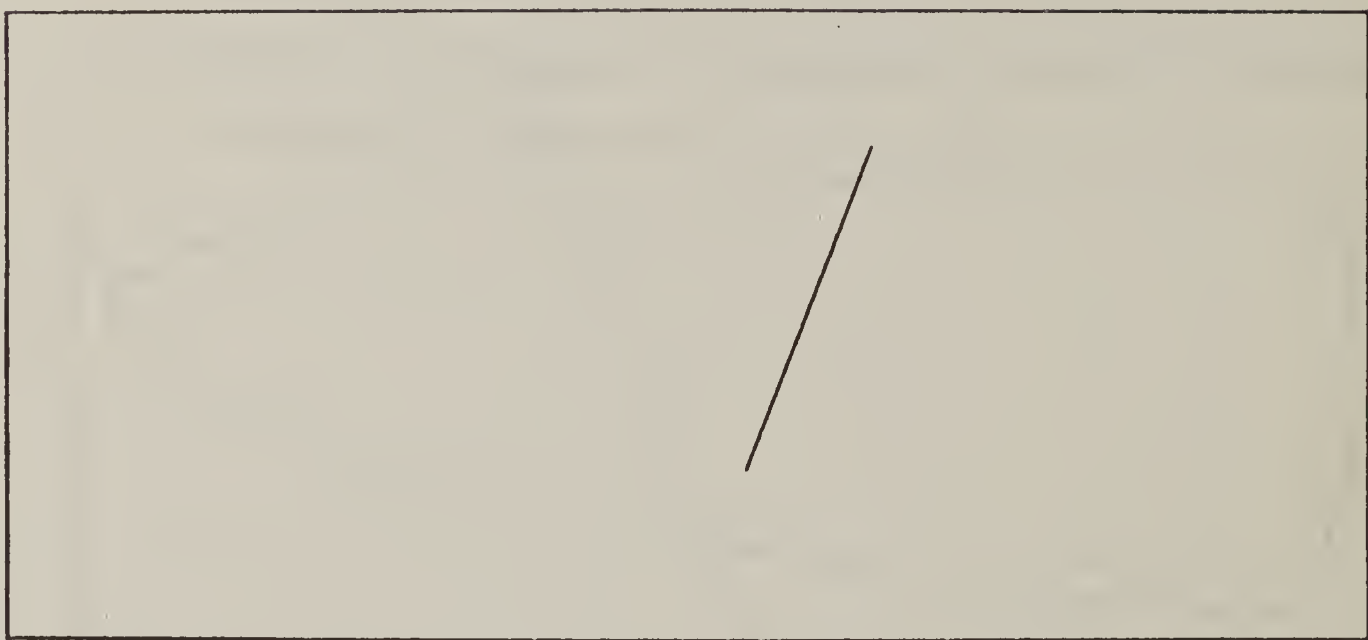
ENTER COMMAND
?



Two maps are plotted: a polygon map of mule deer winter concentration range on Wolf Ridge, CO and a line map of portions of two mule deer migration routes on Wolf Ridge, CO. The LPOVER command is used to find the intersection of these maps as shown on the following page.

Example of result of use of the LPOVER command:

```
 ENTER COMMAND
?
```



```
            SUBJECT                NUMBER

 MULE DEER WINTMULE DEER MIGRAT         1

FOR MAP MIGCONC THERE ARE      1 SUBJECTS
```

The plot is a map of that portion of mule deer migration route which passes through an area of mule deer winter concentration range. There is one subject on this line map combined as shown.

The MAPS command is summarized as follows:

MAPS is a program control command which allows the user to access the MAPS raster processing commands. The current window and open master project are provided to MAPS. To get back into the ENTER COMMAND ? prompt the user simply types BYE (see also Appendices A and C).

The MAPS command is specified as follows:

```
MAPS
```

There are no parameters associated with the MAPS command.

The following is an example of use of the MAPS command:

```
 ENTER COMMAND
? MAPS
 ?
```

The limitations of the MAPS command are as follows:

-- Only maps listed in the polygon workfile or an open master file can be accessed after the command is issued.

The MERGE command is summarized as follows:

MERGE is a data manipulation command that allows the user to splice or combine several active vector maps. For example, several big game range maps digitized as individual maps may be combined into one map by using the command. In addition, vector maps which are spatially adjacent may be merged into one map. MERGE creates a new map which is stored in the workfile. Note that a merge of different map types (e.g., line and polygon) will only be useful for display purposes.

The MERGE command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

MERGE (active ID's) (new map name) (new map description)*

The individual parameters of the MERGE command are described below:

(active ID's) are the ID numbers of two or more vector maps referenced in the active map table.

(new map name) is the name for the map resulting from use of MERGE.

(new map description) is a description of the resultant map.

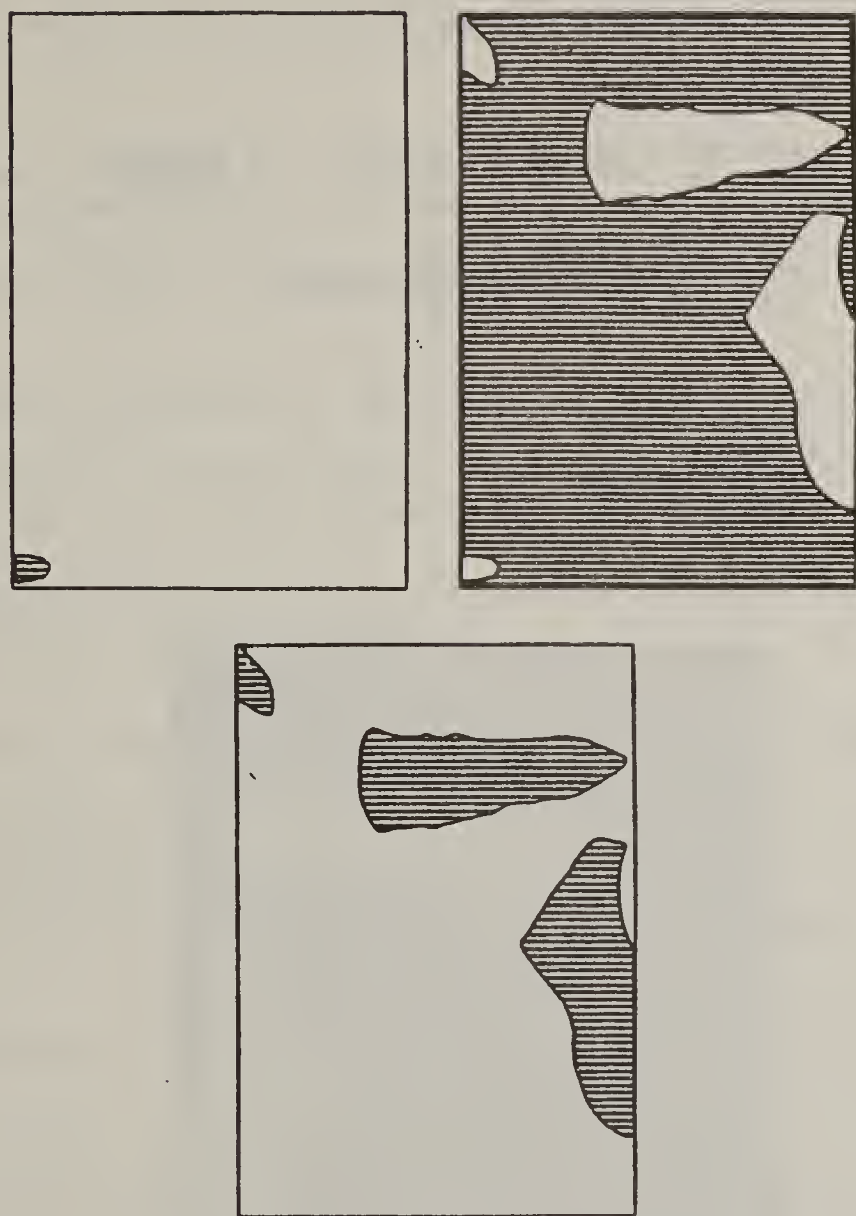
The following is an example of use of the MERGE command:

```
 ENTER COMMAND
? MERGE
 ENTER ACTIVE MAP I.D.'S TO MERGE
? 1 2 3
 WHAT DO YOU WISH TO CALL THE NEW MAP
 __________
? MDRANGES
 PLEASE ENTER 60 CHARACTER OR LESS MAP DESCRIPTION
MULE DEER RANGES ON WOLF RIDGE, CO
 NUMBER OF DATA ITEMS TO BE SAVED =    3
 NUMBER OF DATA ITEMS TO BE SAVED =    1
 NUMBER OF DATA ITEMS TO BE SAVED =    1
 MERGE COMPLETE     5 ITEMS IN NEW MAP MDRANGES
```

The limitations of the MERGE command are as follows:

- -- Maps of different subjects should be merged with caution. For example, merging a soil map with a vegetation map of the same geographic area will result in areas that overlap, thereby not making any sense.
- -- This command requires that at least two, and not more than twenty, active map ID's be entered.
- -- No edge matching is provided as a result of the MERGE command.
- -- Cannot merge cell maps.
- -- Map date does not change to reflect the date the maps are merged. The map header can be edited to show the new date, if necessary, by using the LABEL command in MAPS.

Example of use of the MERGE command:



THE FOLLOWING MAPS ARE CURRENTLY ACTIVE

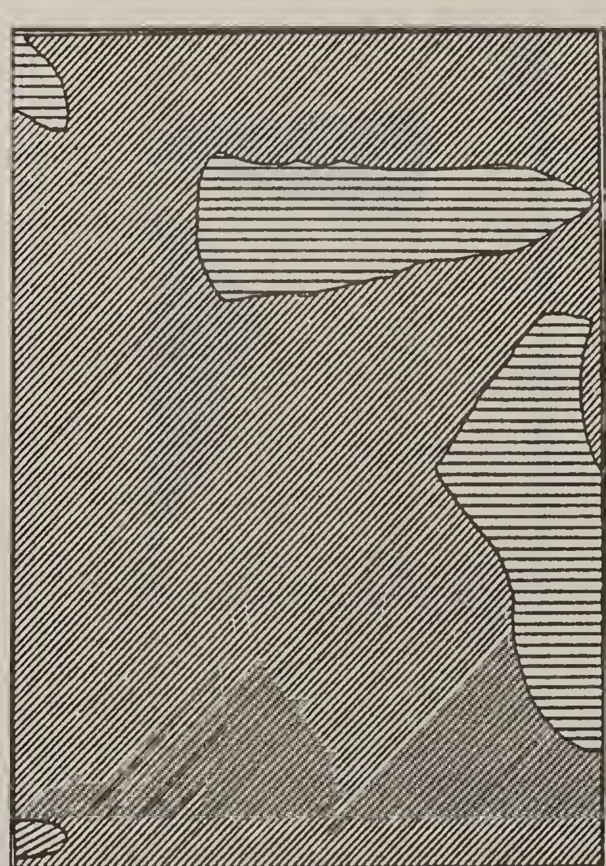
| I.D. | ITEMS | SEARCH | FILE NAME/TYPE | |
|---|---|---|---|---|
| 1 | 1 | ALL | MDSUMMER | 3 |
| 2 | 1 | ALL | MDWINTER | 3 |
| 3 | 3 | ALL | MDWINTCONC | 3 |

TOTAL ITEMS 5

Three separate maps of mule deer range on Wolf Ridge, CO are to be merged; summer range, winter range, and winter concentration range.

Example of result of use of the MERGE command:

```
 ENTER COMMAND
? SEL MDRANGES ALL
    5 HITS FOR ACTIVE ID  4
 ENTER COMMAND
? LIST MDRANGES SUBJ

 FOR MAP MDRANGES THERE ARE     3 SUBJECTS
 SUBJECT                          NUMBER

 MULE DEER SUMMER RANGE                 1
 MULE DEER WINT CONC/WINT RANGE         3
 MULE DEER WINTER RANGE                 1


 ENTER COMMAND
? PLOT 4
 ENTER COMMAND
? SHADE 4
```



A shaded plot of the map resulting from merging three mule deer range maps as in the previous graphic. This map is named MDRANGES and is stored in the polygon workfile.

The MOVELABEL command is summarized as follows:

MOVELABEL is a data manipulation command which allows the user to re-position labels previously generated by MOSS. MOSS labels are usually positioned at the centroid of polygons. The MOVELABEL command will change the (x,y) coordinate location of the labels to a new, user-specified location.

The MOVELABEL command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

MOVELABEL (active ID) (crosshair input)*

The individual parameters of the MOVELABEL command are described below:

(active ID) is the ID number of a map referenced in the active map table for which label re-positioning is desired.

(crosshair input) is where the user points with the cursor to the desired new label location.

The following is an example of use of the MOVELABEL command:

```
 ENTER COMMAND
? MOVELABEL
 Please enter active MAPID for label move ? 2
 HIT <C> KEY TO CONTINUE OR <M> KEY TO MOVE LABEL
```

The limitations of the MOVELABEL command are as follows:

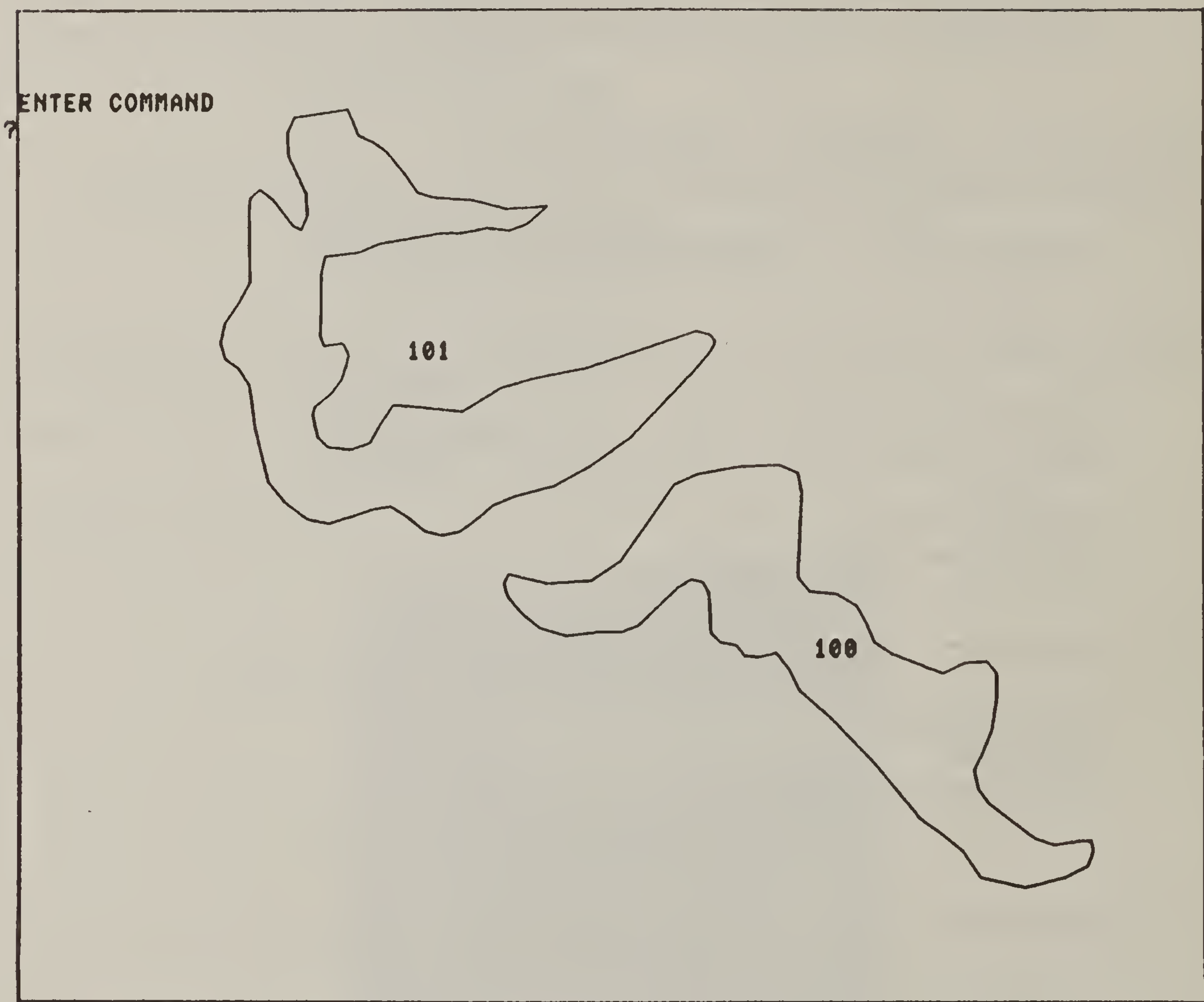
-- Map must be active and window must be set.

-- Cannot specify a single feature to modify without consideration of all features and their label positions.

-- Cannot move labels (i.e., change centroids) on master file maps without write access.

-- Currently can not be used with point or line maps.

Example of use of the MOVELABEL command:




Two polygon features and their centroids are displayed. For clarity it would be desirable to move the label of feature 101 inside the polygon.

The NEWS command is summarized as follows:

NEWS is a program control command that provides the user with news on the latest changes and additions to MOSS.

The NEWS command is specified as follows:

```
NEWS
```

There are no individual parameters associated with the NEWS command.

The following is an example of use of the NEWS command:

```
 ENTER COMMAND
? NEWS
```

The limitations of the NEWS command are as follows:

-- None found to date.

The NUMBER command is summarized as follows:

Number is a data display command that allows the user to either plot active ID number at the centroid of features in a map, plot feature ID number at the centroid, or plot feature areas at the centroid. Area is expressed in acres. A typical use might be to assign number 1 to polygons of mule deer winter concentration range and number 2 to polygons of deer summer range.

The NUMBER command is specified as follows:

NUMBER (active ID's) (type of numbering)

The individual parameters of the NUMBER command are described below:

(active ID's) is the ID number(s) of an active map(s) referenced in the active map table which is to be numbered.

(type of numbering) is an option for the user to specify what will be assigned. The user must enter M(map ID), F(feature ID), or A(area). Map ID will assign active ID numbers to polygons of different maps. Feature will plot the ID number of all features of a given map at the centroid of the feature. Area will plot area in acres at the centroid of all polygons in a given map. If a line map is used, the area option will plot the length in miles at the median coordinate pair of each feature.

The following is an example of use of the NUMBER command:

```
 ENTER COMMAND
? NUMBER
 ENTER ACTIVE MAP I.D.'S TO NUMBER
? 1
 Enter: [M]apid, [F]eature, or [A]reas ? F
```

The limitations of the NUMBER command are as follows:

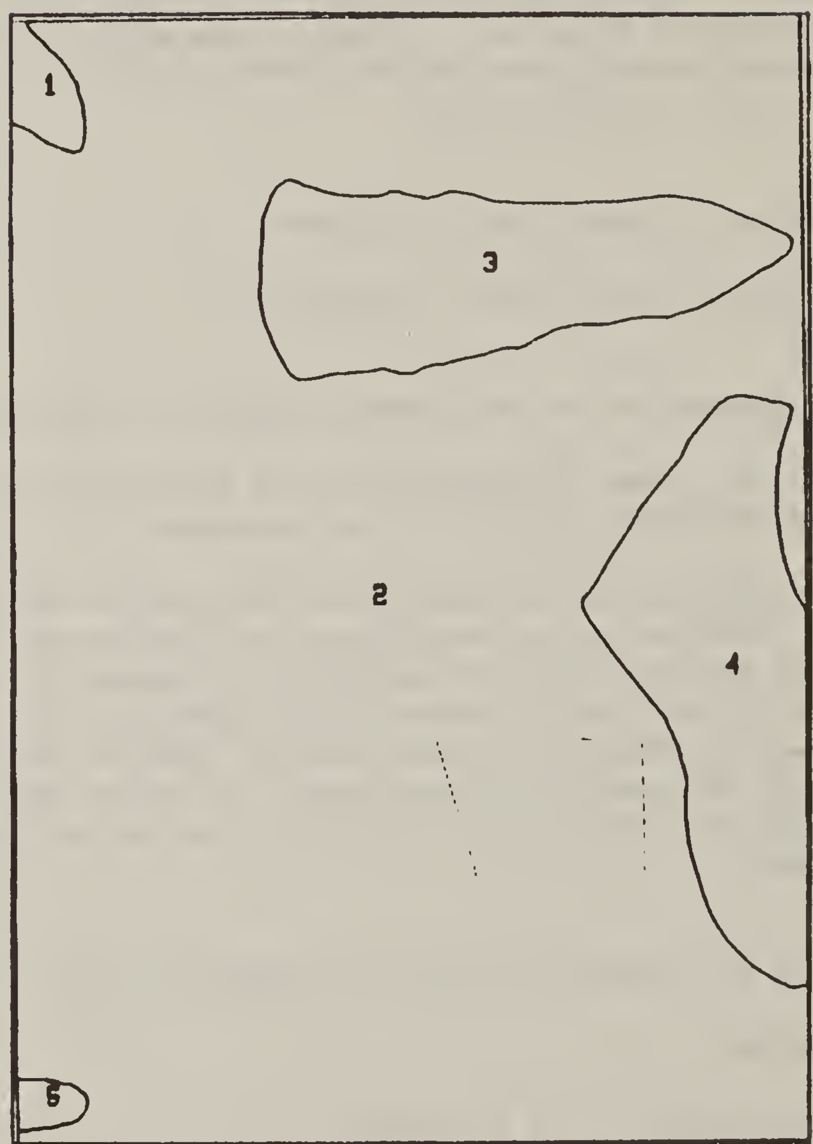
-- Map must be active and window must be set.

-- Does not work with cell data.

-- Area is only given in acres.

-- Only 40 maps may be numbered at a time.

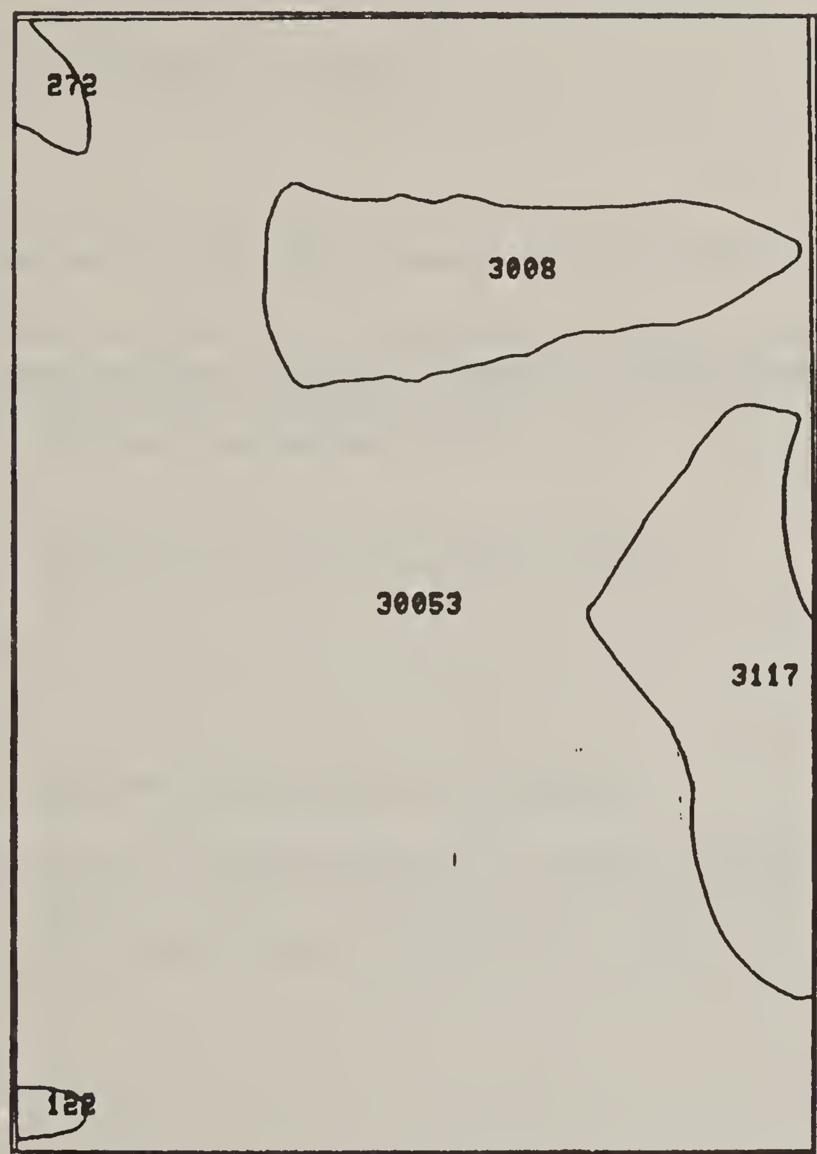
Example of result of use of the NUMBER command:




Active map ID 1 is a map of mule deer ranges on Wolf Ridge, CO. The feature ID option has been used to number each feature at the centroid.

Example of result of use of the NUMBER command:

```
 ENTER COMMAND
? NUMBER 1 A

 ENTER COMMAND
?
```




Active map ID 1 is a map of mule deer ranges on Wolf Ridge, CO. The area option has been used to display area in acres of each feature at the centroid.

The OPEN command is summarized as follows:

OPEN is a program control command that permits the user to access master projects. If a master project is not opened, unpredictable results can occur.

The OPEN command is specified as follows:

OPEN (name)

The individual parameters of the OPEN command are described below:

(name) is the name of the file containing the master project map names. This name provides access to the disk file containing the master project maps whose directory location was specified at the time MOSS was accessed (see Appendix A).

The following is an example of use of the OPEN command

```
 ENTER COMMAND
? OPEN WOLF
```

The limitations of the OPEN command are as follows:

-- Name of the master database must be less than 10 characters.

-- Only one master project may be accessed at a time.

The OVERLAY command is summarized as follows:

OVERLAY is an overlay analysis command that creates a new map by determining the logical intersection, union, or non-intersection between two polygon maps refernced in the active map table. The new map is saved in the user's workfile.

The OVERLAY command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

OVERLAY (active ID's) (new map name)* (subject merge)* (logic)* (attributes)*

The individual parameters of the OVERLAY command are described below:

(active ID's) are the ID numbers of two polygon maps referenced in the active map table which are to be overlayed.

(new map name) is the name for the new map resulting from OVERLAY.

(subject merge) is an option for the user to specify how subjects should be merged between the two maps. The user must respond YES, NO, or REV. The YES option allows the user to specify the number of characters from each map to be contained in the new subject up to a maximum of 30 total. The NO option defaults to 14 characters from the first map and 16 characters from the second. This option may also be specified with <CR>. The REV option will reverse the order of the default subject merge. This parameter is not used if either of the active ID's has been created from a multiple attributes selection (see SELECT).

(logic) is an option for the user to specify the nature of the overlay process. Intersection, union, and non-intersection may be calculated by specifying 1, 2, or 3, respectively. Note that the results of intersection and non-intersection are dependant upon the order of active ID specification.

(attributes) is an option for the user when one or both of the maps have multiple attributes. A selection, all, or none of the multiple attributes can be saved from a map having multiple attributes. If multiple attributes are saved they are used to build a multiple attribute file for the new map. The user can enter attribute ID numbers to save, enter -1 to save all attributes, or enter a zero to not save any attributes. If neither of the maps have multiple attributes this option does not appear.

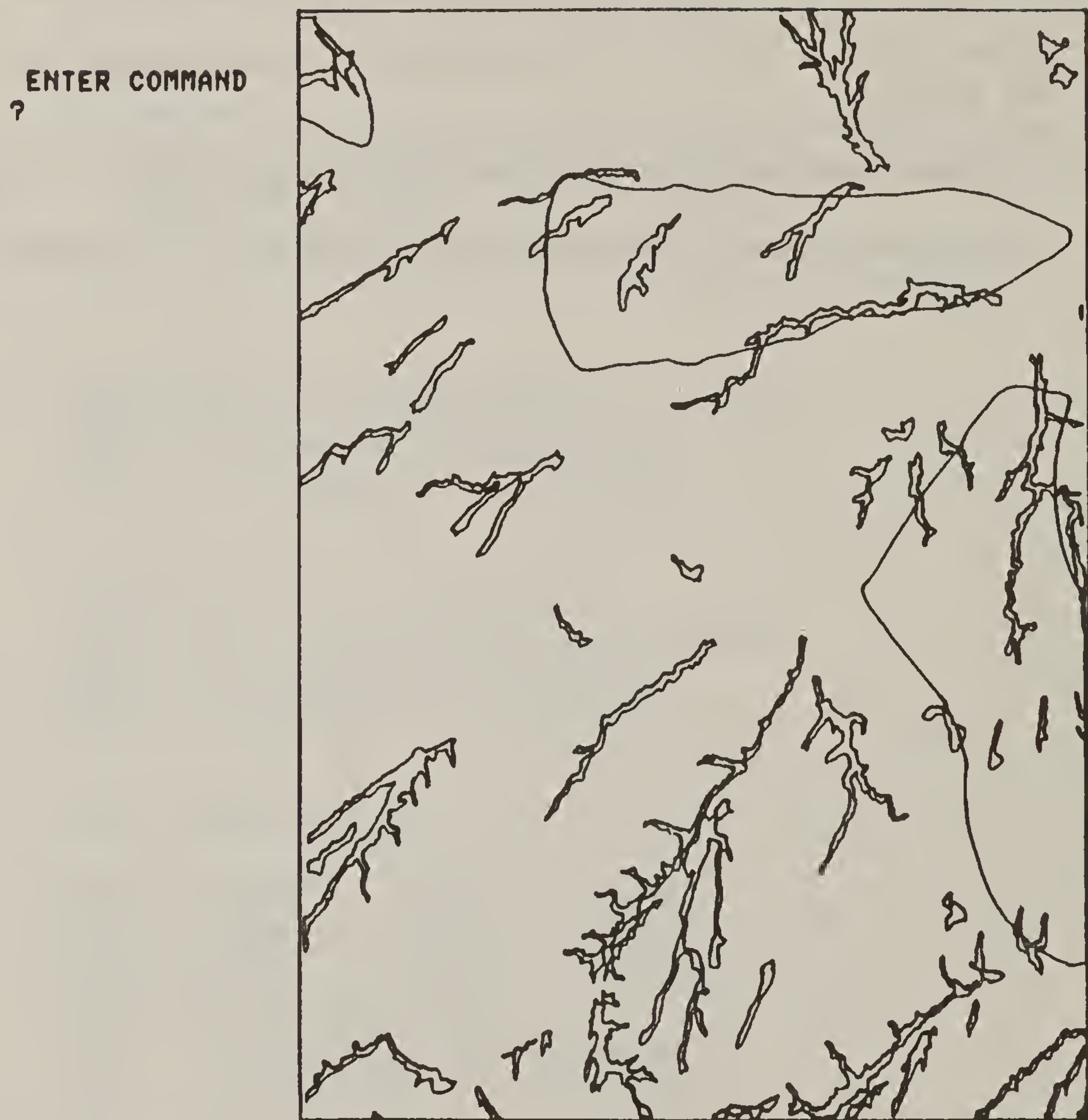
The following is an example of use of the OVERLAY command:

```
 ENTER COMMAND
? OVERLAY
 Enter active data set I.D.s to OVERLAY
? 1 2
 WHAT DO YOU WISH TO CALL THE NEW MAP
  __________
? DEERSAGE
 Do you want to specify SUBJECT MERGE parameters [CR=NO]
    [NO = 14 chars from 1st and 16 chars from 2nd]
    [YES= input # chars from each subject]
    [REV= reverse order of subjects      ]         ? NO
 Enter: 1 for Intersection, 2 for Union, 3 for Not
? 1

 MDRWOLFRG HAS    5 ATTRIBUTES
 ENTER UPTO  5 ATTRIBUTE ID(S) TO RETAIN
 ENTER -1 TO RETAIN ALL ATTRIBUTES
 ENTER  0 TO RETAIN NO  ATTRIBUTES
? 5 2 3

 SGWWOLFRG HAS    5 ATTRIBUTES
 ENTER UPTO  5 ATTRIBUTE ID(S) TO RETAIN
 ENTER -1 TO RETAIN ALL ATTRIBUTES
 ENTER  0 TO RETAIN NO  ATTRIBUTES
? -1

 TOTAL MAJOR POLYGONS     3

 MAJOR POLYGON    1 ITEM    1 SUBJECT    1
 MAJOR POLYGON    2 ITEM    3 SUBJECT    1
 MAJOR POLYGON    3 ITEM    4 SUBJECT    1
 BUILD MOSS MAP DATA TYPE     3
 SAVE    3 ATTRIBUTES FROM MDRWOLFRG
  AND   -1 ATTRIBUTES FROM SGWWOLFRG

 INTERSECTED POLYGONS =      20
 TOTAL TIME     =     124.45
 TOTAL RECORDS  =    1466.00
 TOTAL JOB COST =$      1.12
```

The limitations of the OVERLAY command are as follows:

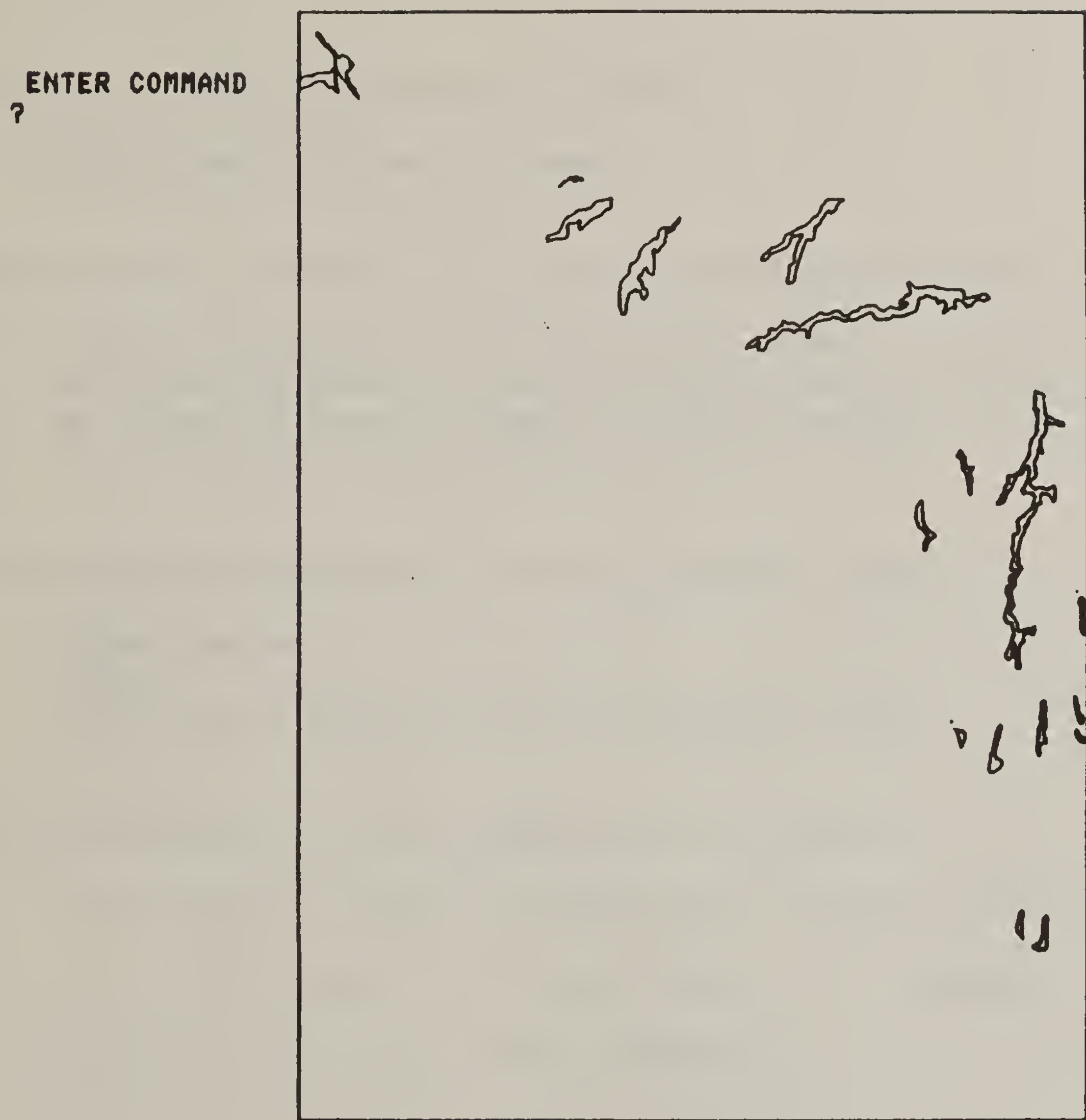
- -- Both maps must be active polygon maps and window must be set.
- -- A maximum of 30 characters may be specified for subjects.
- -- UNION requires that the first active map have no more than one feature.
- -- NOT cannot be used with features that contain interior polygons.
- -- Only two maps can be overlayed per issuance of the command.

Example of use of the OVERLAY command:




Two maps are displayed: a map of mule deer winter concentration range (ID1) and a map of valley sagebrush (ID2) on Wolf Ridge, CO. The command is used to find all stands of sagebrush which intersect areas of mule deer winter concentration range.

Example of result of use of the OVERLAY command:




A map of all stands of valley sagebrush which occur in areas of mule deer winter concentration range on Wolf Ridge, CO.

The PAGE command is summarized as follows:

PAGE is a program control command which allows the user to set the number of lines per page for tabular output to the CRT. The default is 24 lines per page. This value may be set to any number between 1 and 120.

The PAGE command is specified as follows:

PAGE (number of lines per page)

The individual parameters of the PAGE command are described below:

(number of lines per page) is a number between 1 and 120 that specifies the number of output lines per page. A value of 60 is the number of lines per page on a Tektronix 4014 at the smallest character size. This parameter defaults to 24.

The following is an example of use of the PAGE command:

```
 ENTER COMMAND
? PAGE
 Please enter the number of lines per page ? 60
```

The limitations of the PAGE command are as follows:

-- The number of lines per page must be between 1 and 120.

-- The PAGE command is not operational an all commands.

-- Applies only to the working session.

The PERIMETER command is summarized as follows:

PERIMETER is a data description command that produces a summary table of length, frequency, and percent of the perimeter for each subject associated with any polygon map referenced in the active map table. More than one map may be described at one time. Length is summarized in miles.

The PERIMETER command is specified as follows:

PERIMETER (active ID's) (HARDCOPY) (non-sort option)

The individual parameters of the PERIMETER command are described below:

(active ID's) are the ID numbers of polygon maps referenced in the active map table which are to be described. If more than one map ID is entered the command will produce a table describing all of the maps specified.

(HARDCOPY) is an option to obtain a hardcopy listing of the PERIMETER table on a line printer. If HARDCOPY is specified output is written to a disk file called LINE.PRINTER. This file can be printed by exiting MOSS and issuing the operating system print command. If anything other than the characters HARDCOPY are specified in this option, the characters are used to specify a file name and the output is written to the file. If the file exists, the output is appended to the existing file. The name the operating system uses for the line printer can also be specified. This parameter can only be entered in un-prompted mode (see example below).

(non-sort option) is an option that allows the user to display a perimeter table for one or more active maps with subjects listed in the order digitized. If the perimeter for more than one map is requested the subjects are grouped in the order that the ID's are typed. This option is activated by typing an "N" after the ID numbers or HARDCOPY. A default would sort the subjects alphanumerically.

The following is an example of use of the PERIMETER command:

```
 ENTER COMMAND
? PERIMETER
 ENTER ACTIVE MAP I.D.(S)
? 1
```

To obtain a hardcopy listing:

```
 ENTER COMMAND
? PERIMETER 1 HARDCOPY
```

To obtain a non-sorted hardcopy:

```
 ENTER COMMAND
? PERIMETER 1 2 HARDCOPY N
```

The limitations of the PERIMETER command are as follows:

-- Input map must be an active polygon map.

-- No more than 2500 total unique subjects may be in the resultant perimeter table.

-- No more than 40 active ID's may be described at one time.

-- Items in table are not limited to those in display window.

-- If the LINE.PRINTER file created by the HARDCOPY option is to be saved it should be renamed since use of the HARDCOPY option deletes existing LINE.PRINTER files.

Examples of output from use of the PERIMETER command:

```
PERIMETER SUMMARY FOR MAP MDRWOLFRG  ACTIVE MAP NO.     1

             SUBJECT              PERIMETER     FREQUENCY    PERCENT
--------------------------------------------------------------------
 MULE DEER SUMMER RANGE                 1.74          1         2.36
 MULE DEER WINT CONC/WINT RANGE        23.94          3        32.58
 MULE DEER WINTER RANGE                47.82          1        65.06
--------------------------------------------------------------------
  TOTAL (IN MILES)                     73.5           5    100.00


ENTER COMMAND
? PERI 3 1


PERIMETER SUMMARY FOR MAP MLRWOLFRG  ACTIVE MAP NO.     3
PERIMETER SUMMARY FOR MAP MDRWOLFRG  ACTIVE MAP NO.     1

             SUBJECT              PERIMETER     FREQUENCY    PERCENT
--------------------------------------------------------------------
 MOUNTAIN LION SUMMER RANGE             1.75          1         1.64
 MOUNTAIN LION WINTER RANGE            31.46          1        29.48
 MULE DEER SUMMER RANGE                 1.74          1         1.63
 MULE DEER WINT CONC/WINT RANGE        23.94          3        22.44
 MULE DEER WINTER RANGE                47.82          1        44.82
--------------------------------------------------------------------
  TOTAL (IN MILES)                    106.7           7    100.00
```

Active map ID 1 is a polygon map of mule deer ranges on Wolf Ridge, CO. Active map ID 3 is a polygon map of mountain lion ranges on Wolf Ridge, CO. Note that the second table is a composite table with perimeter and frequency summed to give totals and percent.

The PLOT command is summarized as follows:

PLOT is a data display command that allows the user to display any active map. If the vector map has been cartographically assigned (see the ASSIGN command), the information stored in the database is used for enhanced plotting. For example, if line features representing railroads have been properly font assigned as railoads, then this font will be displayed.

Options in the command allow the user to specify that no border around the display window be plotted, that tics be plotted in a specified longitude/latitude increment, or that a previously constructed graphics display file be plotted.

The PLOT command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

PLOT (active ID's) (display range)* (noborder) (tics n)
(graphics file) (cancel)

The individual parameters of the PLOT command are described below:

(active ID's) are the ID numbers of one or more maps referenced in the active map table which are to be displayed.

(display range) is an option for continuous cell data. MOSS will prompt for an interval value which is similar to a contour interval. Beginning with the minimum cell value, interval borders will be calculated. The resulting plot represents these borders by plotting lines between cells which fall in different intervals.

(noborder) if this option is entered, then the border around the display window does not plot. This option can only be entered in an un-prompted mode.

(tics n) is an option that results in tics being plotted every n increments in x and y. The increment n is specified in minutes. The tic grid is plotted in the projection of the first active ID. This option can only be entered in an un-prompted mode.

(graphics file) is an option to plot a previously constructed graphics display file. This option can only be entered in an un-prompted mode and must must follow active I.D. specifications. This option will use the map's graphic representation instead of the actual map. To create a graphics display file first select the desired map(s) then set your output device to a file name plus a .DP extension. Then use the PLOT, SHADE, LEGEND, etc. commands to construct the graphics in this file. When the ENTER COMMAND prompt comes back, use the DEVICE command to set your output file back to your original graphics output device (such as @CON23). Please note that these graphics display files are the same as MAPS display files which are data type 18. Also note that these files are only graphics representations and that no matter what your current display window is set to these files will ignore the current window and use the window that was set at the time the display file was created.

(cancel) is an option that allows the user to stop a plot of active maps without stopping MOSS. Entering CAN or ABO while plotting causes the main prompt to again appear.

The following are examples of the use of the PLOT command:

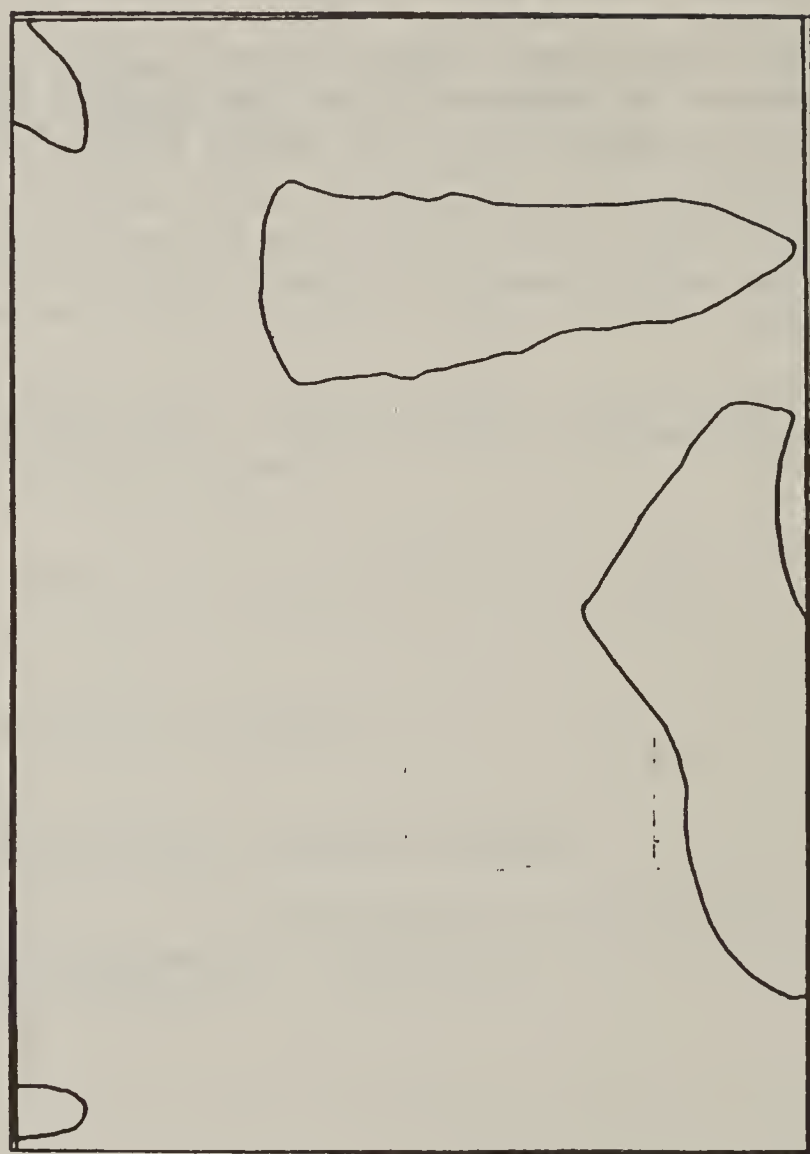
```
 ENTER COMMAND
? PLOT
 ENTER ACTIVE MAP I.D.(S) TO PLOT
? 1
 ENTER COMMAND
? PLOT 1 2 3 NOBORDER TICS 6 GRAPHICS MDRPLOT
 ENTER COMMAND
? PLOT 4                    (active ID 4 is a type 8 map)
 MINIMUM    XXXX.XXXX MAXIMUM    XXXX.XXXX
ENTER CONTOURING INTERVAL
? 100
```

The limitations of the PLOT command are as follows:

- -- No more than 20 active maps can be plotted at one time.
- -- Display window must be set.
- -- If the (graphics file) option is used, a display file must exist with a .DP extension. When the graphics display file is plotted, it is independent of the current display window.

Example of result of use of the PLOT command:

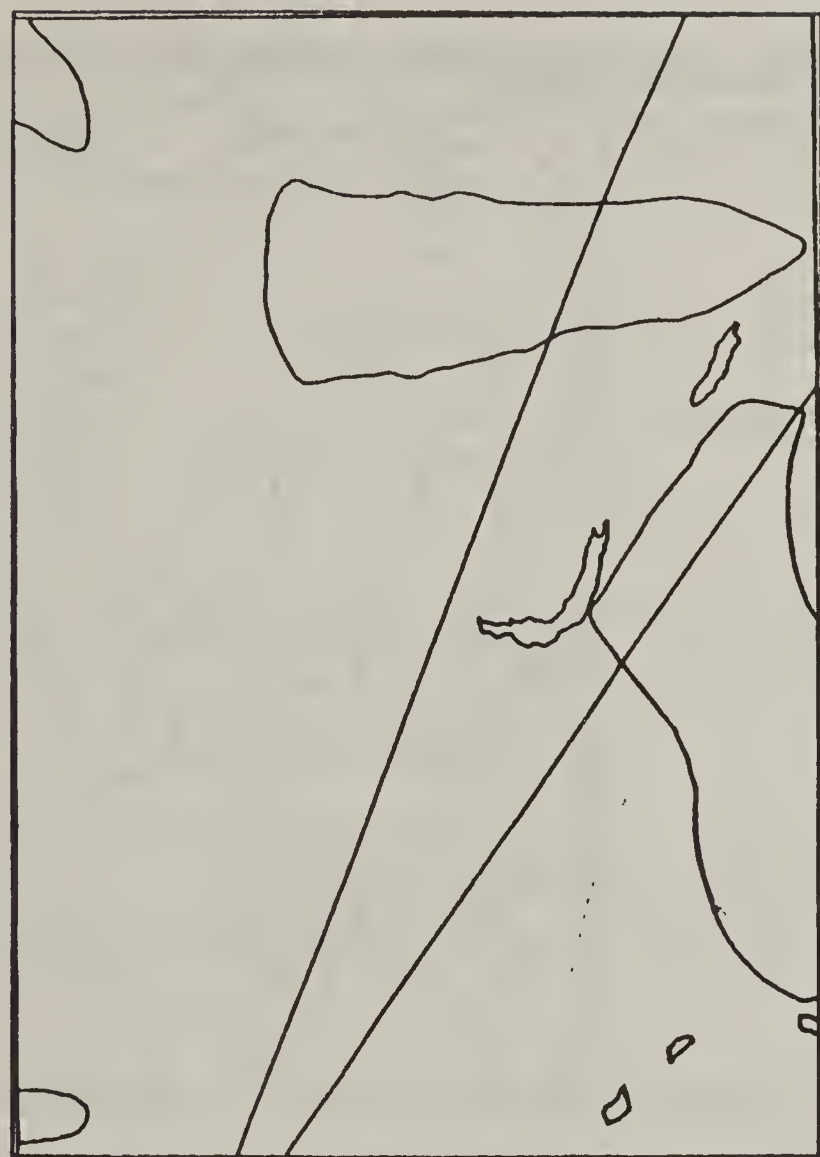
ENTER COMMAND
?



Active map ID 1 is a map of mule deer ranges on Wolf Ridge, CO.

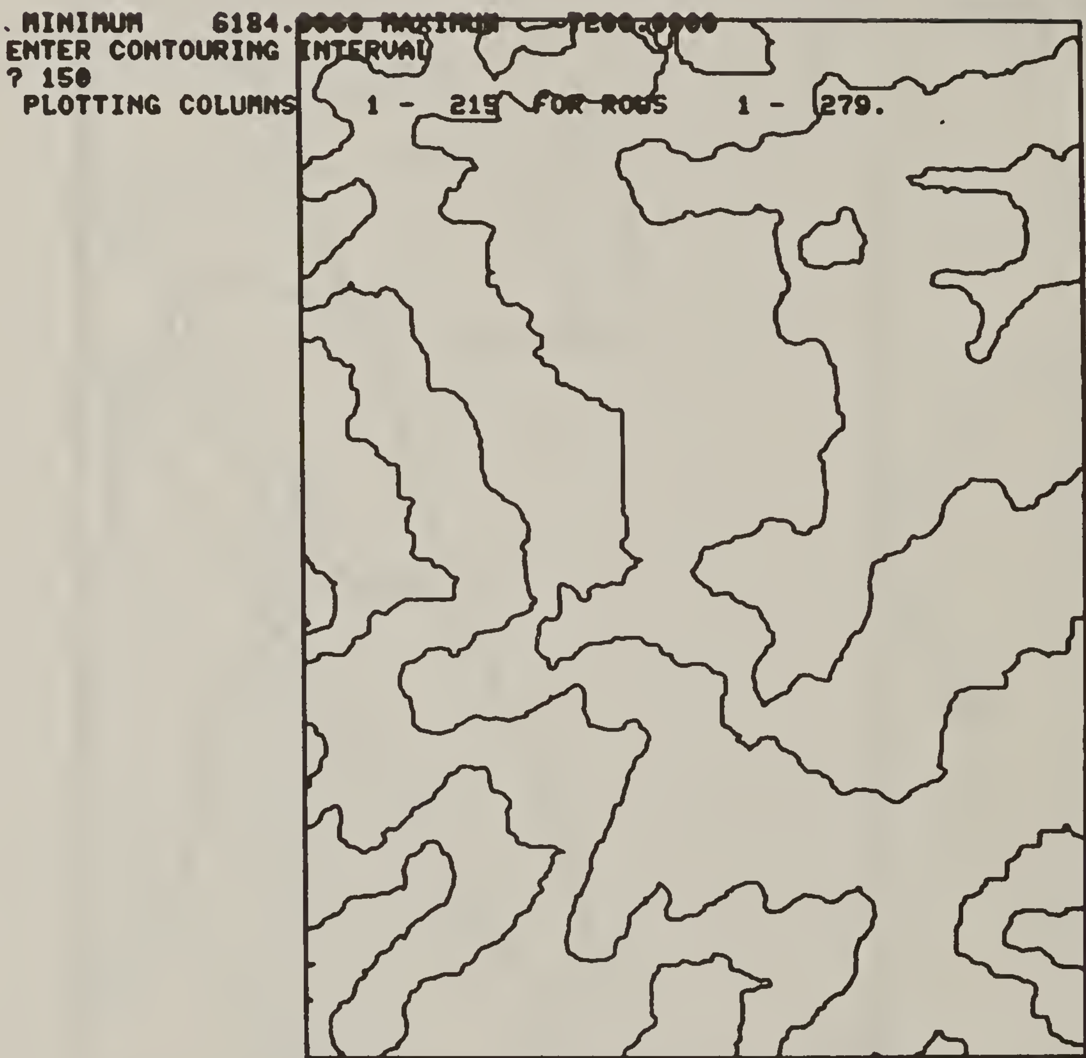
Example of result of use of the PLOT command:

```
ENTER COMMAND
? PL 1 3 2
```



In this case, several maps have been plotted together. Active map ID 1 is a polygon map of mule deer ranges, active map ID 2 is a polygon map of irrigated croplands, and active map ID 3 is a line map of mule deer migration routes, all on Wolf Ridge, CO.

Example of result of use of the PLOT command:




A plot of a digital elevation map of Wolf Ridge, CO. Note that with continuous cell maps the user is prompted for the contour interval to be displayed. In this case, a contour line is plotted every 200 feet.

The PROJECTION command is summarized as follows:

PROJECTION is a data manipulation command which allows the user to change the map projection of an active vector data set. Result of the command is a new map stored in the workfile.

The PROJECTION command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

PROJECTION (active ID) (new map name) (input type)* (output type)* (prompts)*

The individual parameters of the PROJECTION command are described below:

(active ID) is the ID number of a vector map referenced in the active map table which is the object of the command.

(new map name) is a name for the re-projected map.

(input type) is the map projection type currently being used. This information is automatically presented and no response is necessary.

(output type) is the desired map projection chosen from a menu of projection types. The user must enter 0-20.

(prompts) are a series of prompts, specific to each projection, which must be answered by the user. Details of prompts and responses can be found in: Lee, J.E. and J.M. Walsh. 1984. Map projections for use with the geographic information system. U.S. Fish Wildl. Serv. FWS/OBS-84/17. 60pp.

The following is an example of use of the PROJECTION command:

```
 ENTER COMMAND
? PROJECTION
 ENTER ACTIVE DATA SET I.D. TO PROJECT
? 1
 WHAT DO YOU WISH TO CALL THE NEW MAP
? NEWWOLFRG
```

The limitations of the PROJECTION command are as follows:

-- The user must be familiar with the various types of map projections available and their properties. Users requiring more information on this subject should consult the following source:

Lee, J.E. and J.M. Walsh. 1984. Map projections, or how I flattened the earth with a computer. U.S. Fish Wildl. Serv. FWS/OBS-84. 70pp. (in review).

-- Cannot use cell data.

-- The header is not changed to show the new projection type. The header can be edited by using the LABEL command in MAPS.

-- Can not be used to convert from a projection to geographic coordinates.

Example of use of the PROJECTION command:

```
. WHAT IS THE INPUT PROJECTION OF THE MAP ?

        MAP PROJECTION

  # 4 LAMBERT CONFORMAL CONIC
      COORDINATE UNITS ARE: METERS
 VALUES OF ENTERED PARAMETERS
 ----------------------------
 ELIPSOID SELECTED IS TYPE                           0
 SEMI-MAJOR AXIS OF ELLIPSOID                6378206.4000
 ECCENTRICITY SQUARED OF ELLIPSOID                 .0068
 LATITUDE OF 1ST STANDARD PARALLEL               37.0000
 LATITUDE OF 2ND STANDARD PARALLEL               42.0000
 LONGITUDE OF CENTRAL MERIDIAN                 -109.0000
 LATITUDE ORGIN OF PROJECTION                    36.0000
 FALSE EASTING                              5000000.0000
 FALSE NORTHING                                    .0000
 READY?
```

Information on the current map projection type is automatically presented. In this case, the map is a Lambert Conformal Conic projection of Wolf Ridge, CO. Note that degrees of longitude west of the prime meridian are negative.

Example of use of the PROJECTION command:

```
 WHAT IS THE OUTPUT PROJECTION FOR THE MAP ?

                               MAP PROJECTION MENU

  0 GEOGRAPHIC(LAT/LON)
  1 UNIVERSAL TRANSVERSE MERCATOR  11 LAMBERT AZIMUTHAL EQUAL AREA
  2 STATE PLANE                    12 AZIMUTHAL EQUIDISTANT
  3 ALBERS CONICAL EQUAL AREA      13 GNOMONIC
  4 LAMBERT CONFORMAL CONIC        14 ORTHOGRAPHIC
  5 MERCATOR                       15 VERTICAL NEAR SIDE PERSPECTIVE
  6 POLAR STEREOGRAPHIC            16 SINUSOIDAL
  7 POLYCONIC                      17 EQUIRECTANGULAR (PLATE CARREE)
  8 EQUIDISTANT CONIC A & B        18 MILLER CYLINDRICAL
  9 TRANSVERSE MERCATOR            19 VAN DER GRINTEN I
 10 STEREOGRAPHIC                  20 OBLIQUE MERCATOR (HOTINE)

 PROJECTION(0-20) ?
1
 LONGITUDE OF ANY POINT WITHIN THE UTM ZONE ?
-109
 LATITUDE OF ANY POINT WITHIN UTM ZONE   12 ?
36


         MAP PROJECTION

  # 1 UNIVERSAL TRANSVERSE MERCATOR
      COORDINATE UNITS ARE: METERS
 VALUES OF ENTERED PARAMETERS
 ----------------------------
ZONE                                                  12
LONGITUDE                                      -109.0000
LATITUDE                                         36.0000
 READY?

 PROJECTING...PLEASE WAIT
```

The map projection menu is used to choose the desired map projection. Prompts, specific to each projection, must then be answered. In this case, the user wants a UTM projection and enters a longitude and latitude value corresponding to the UTM zone that the map falls in.

The PROXIMITY command is summarized as follows:

PROXIMITY is a distance analysis command that activates data from a map based on its proximity or 'out-of-proximity' to some other map feature. A typical application of the command might be to find all grassland which is within 0.25 miles of mule deer winter concentration range. The PROXIMITY command uses two active maps as input and produces a new map in the workfile as output.

The PROXIMITY command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

PROXIMITY (active ID) (new map name)* (distance)* (crosshair input)*

The individual parameters of the PROXIMITY command are described below:

(active ID's) are the ID numbers of two maps referenced in the active map table. The first ID entered will be the origin of the search. The second ID entered will be the object of the search. The resultant map will be some set of features from the second map ID. Note, the single map proximity option has been removed. This can still be accomplished by using the GENERATE command and then using the PROXIMITY command.

(new map name) is the name for the map which results from PROXIMITY.

(distance) is the user-specified maximum search distance with units. The 'out-of-proximity' option is specified by entering a negative distance. The output map will consist of all features which do not meet the normal proximity requirements. Units may be miles (default), (K)ilometers, (F)eet, (M)eters or (I)nches. Units desired must be entered immediately after distance, for example, 0.25K.

The following is an example of use of the PROXIMITY command:

```
 ENTER COMMAND
? PROXIMITY
 Enter active map I.D.(s) to PROXIMITY ? 1 2
 What do you wish to call the new map

? DEERFOOD
 Enter maximum search distance (with units) ? 0.25

 NUMBER OF HITS =    16
```

The limitations of the PROXIMITY command are as follows:

-- Distance (tolerance) must be greater than 0.

-- Input maps must be active and window must be set.

-- Does not work with cell data.

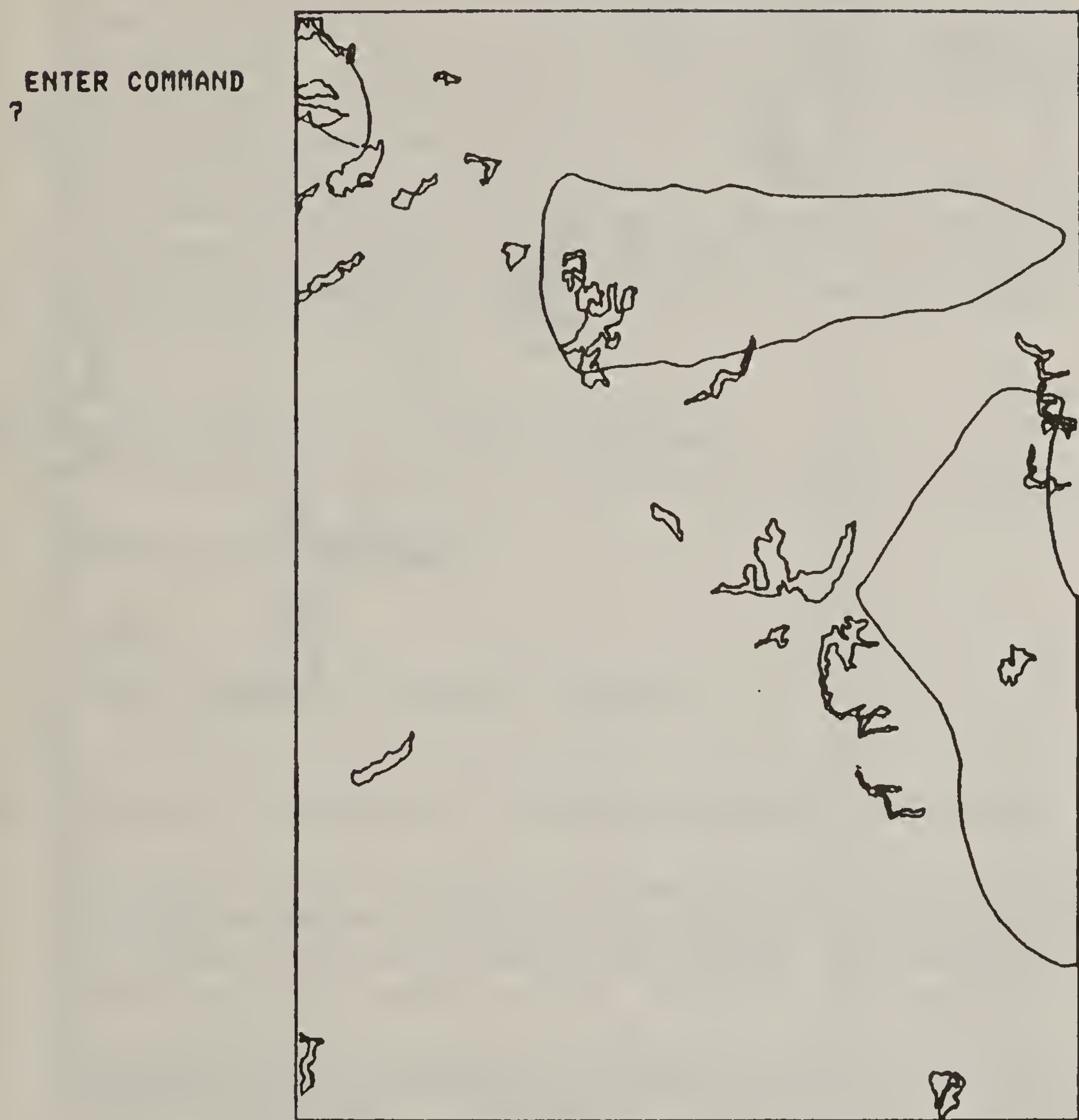
-- May not work well with large distances.

-- No more than 1000 subjects in the new map.

-- Subjects in new map will not be in alphabetical order.

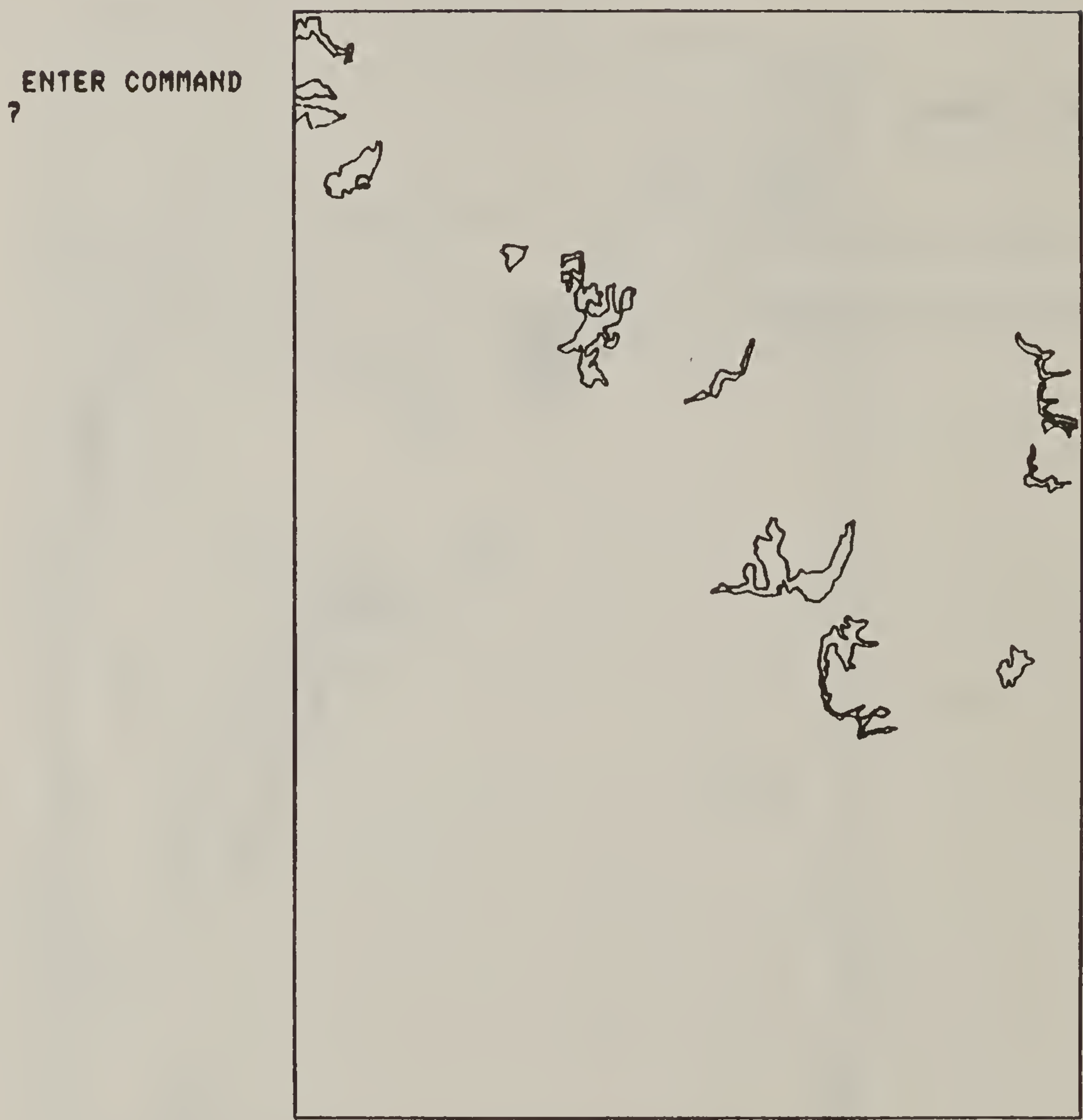
-- If one point of a feature is within the specified distance, the entire feature is considered in proximity.

Example of use of the PROXIMITY command:




Two maps are displayed: ID 1 is a map of mule deer winter concentration range and ID 2 is a map of grasslands on Wolf Ridge, CO. The command is used to find all grasslands within a quarter mile of mule deer winter concentration range as shown on the following page.

Example of result of use of the PROXIMITY command:




A map of all grasslands within a quarter mile of mule deer winter concentration range on Wolf Ridge, CO.

The QUERY command is summarized as follows:

QUERY is a data description command which, for vector maps, identifies the map name, subject, and item of any feature being displayed on the graphics display terminal. Items or features of interest are identified by the user via crosshair input. If the item is a polygon or a line, QUERY also displays area and length, respectively. If multiple active ID's with overlapping subjects are displayed simultaneously, the command will identify feature and subject from each individual map. If the displayed map has a multiple attributes file, the command will identify each multiple attribute associated with the feature of interest. QUERY can also process dichotomous, discrete, and continuous cell maps and displays northing and easting, row and column, cell value, and frequency and label for discrete cell maps.

The QUERY command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

QUERY (crosshair input)*

or

QUERY ATTRIBUTE (crosshair input)*

The individual parameters of the QUERY command are described below:

(crosshair input) is where the user points with the cursor to the feature for which information is desired. Once the crosshairs are positioned, the user "points" by hitting the SPACE key or the RETURN key. Any other key will terminate the command.

ATTRIBUTE is an option for the user to display information about the multiple attributes of a feature if the map has a multiple attributes file. This parameter must be entered in an unprompted mode.

The following is an example of use of the QUERY command:

```
 ENTER COMMAND
? QUERY
 POINT TO FEATURE, SPACE or RETURN will REPEAT.

  ITEM HAS FOLLOWING CHARACTERISTICS

 SUBJECT   = MULE DEER WINT CONC/WINT RANGE
 MAP NAME  = MDRWOLFRG ITEM NUMBER =     3
 AREA      =      3008.53 ACRES
```

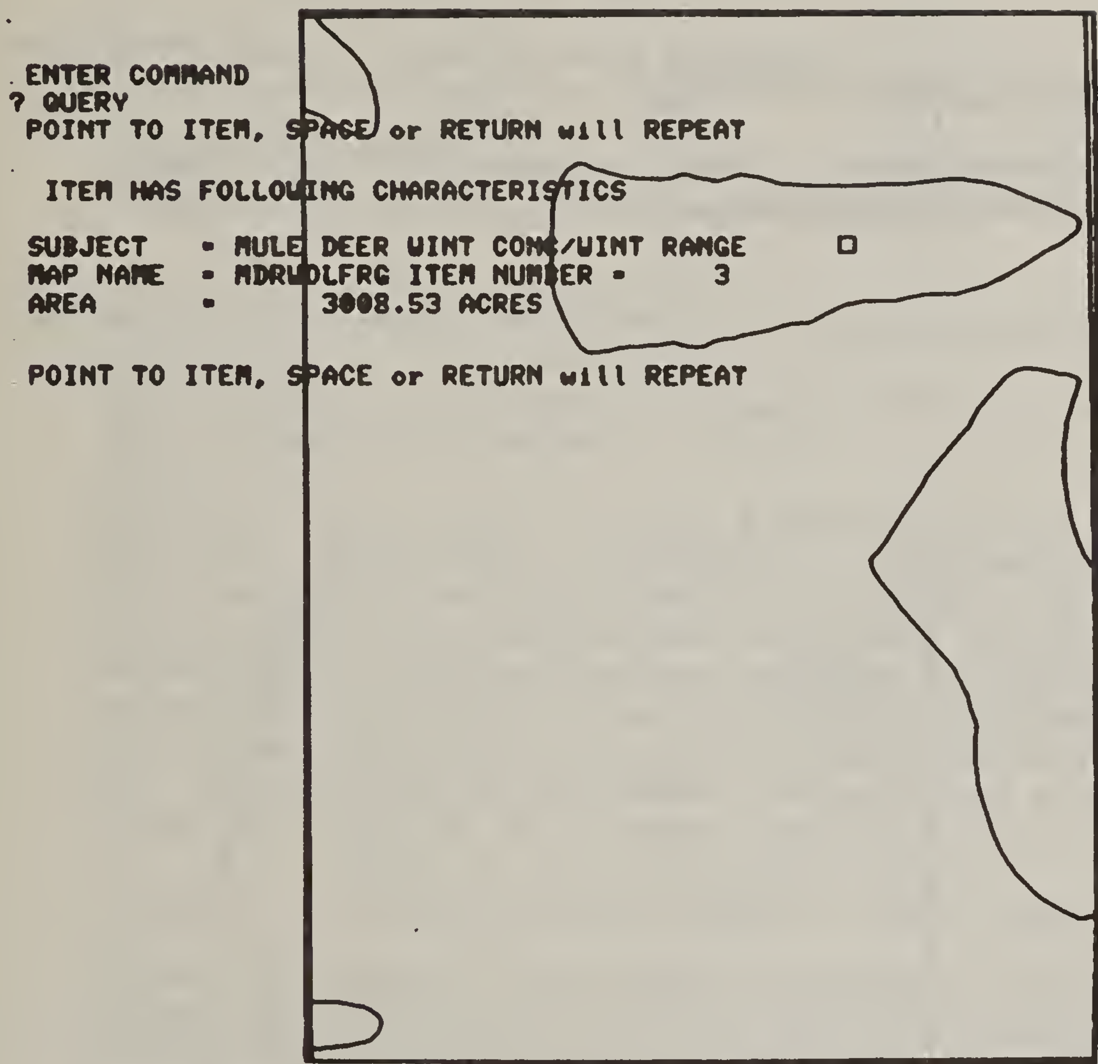
The limitations of the QUERY command are as follows:

-- QUERY can only be used to identify features from the last map ID that was plotted or shaded. Some commands issued between PLOT or SHADE and the QUERY command may cause the system to respond: NO ITEM FOUND. TRY AGAIN. In this case, the user should replot the map of interest and then re-issue the QUERY command.

-- Use of any key except SPACE or RETURN will cause the command to terminate.

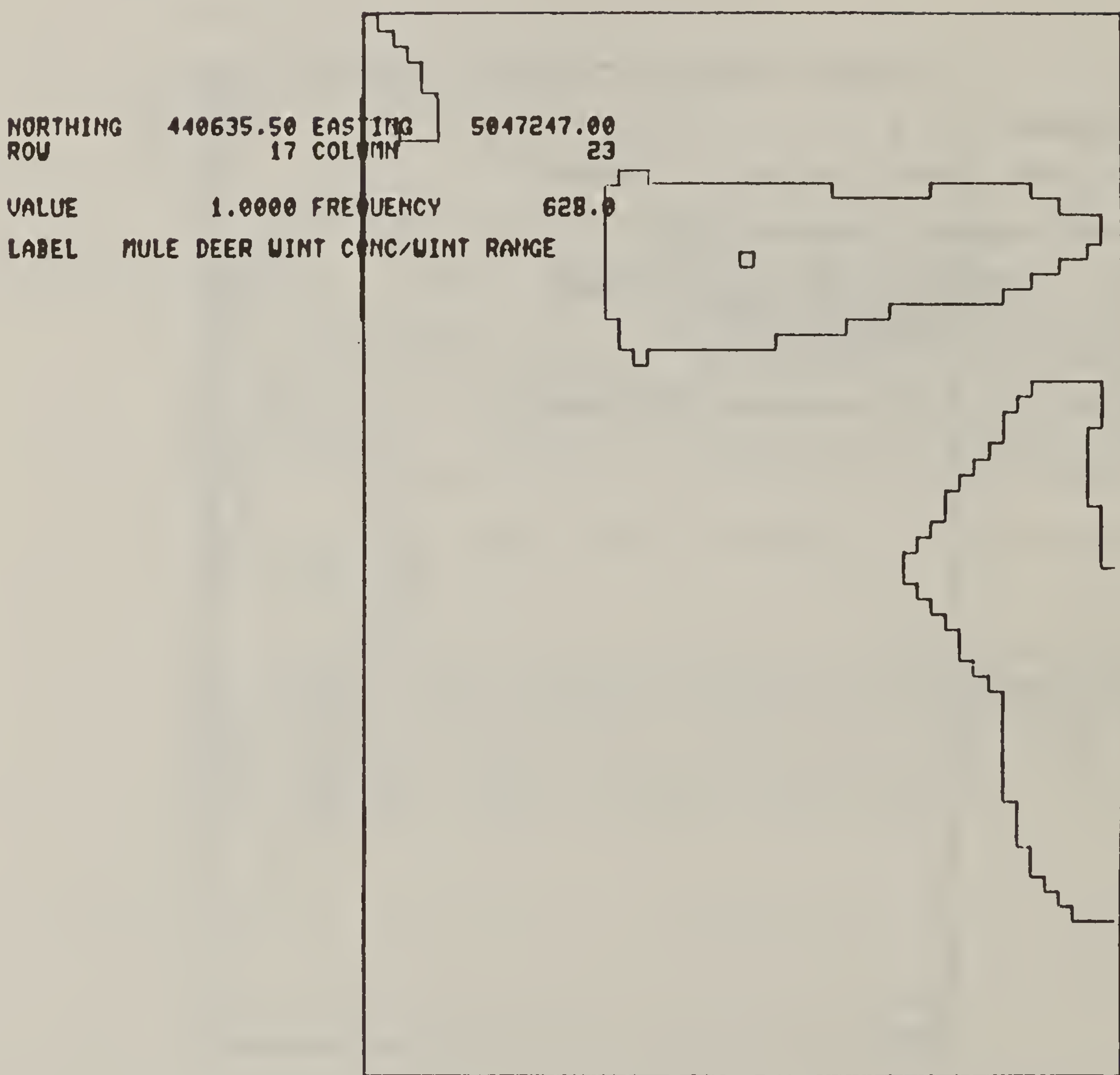
-- If the space bar or the return key is entered more than once ('bounced'), the command may hang up and/or give erroneous results. To exit, enter the 'T' key twice. If 'ENTER COMMAND' prompt does not appear, enter the 'T' key twice more. Repeat this procedure until the prompt does appear.

Example of result of use of the QUERY command:




The displayed map is a map of mule deer ranges on Wolf Ridge, CO. The item of interest was indicated by crosshair input and marked with a small square.

Example of result of use of the QUERY command:




The displayed map is a cell map of mule deer winter concentration range on Wolf Ridge, CO. Cell size is 10 acres. The item of interest was indicated by crosshair input and marked with a small square.

The REPORT command is summarized as follows:

REPORT is a data description command that generates tabular reports of the multiple attributes database. The tabular report is written to the screen or to a disk file.

The REPORT command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

REPORT (active ID) (HARDCOPY) (no label)* (number of columns)* (area/length)* (subject)* (column designators)*

The individual parameters of the REPORT command are described below:

(active ID) is the ID number of a map referenced in the active map table for which information is desired.

(HARDCOPY) is an option to obtain a hardcopy listing of the REPORT table on a line printer. If HARDCOPY is specified, output is written to a disk file called LINE.PRINTER. This file can be printed by exiting MOSS and issuing the operating system print command. If anything other than the characters HARDCOPY are specified in this option, the characters are used to specify a file name and the output is written to the file. If the file exists, the existing data in the file is overwritten by the report. The report can be directed to the screen by responding to the prompt with a return.

(no label) is an option which produces a table without column headings.

(number of columns) is the number of columns of attributes desired. If necessary, the report will be written in multiple sections. Each section will contain 6 columns if the output is directed to the screen. The hardcopy file will have 10 columns to a section. Each section is labeled but only the first section is titled.

(area/length) is an opportunity to include polygon area information for a polygon map or line length information for a line maps. This information will appear in the last column of the last section of the table.

(subjects) is an opportunity for subjects to be included as a column. If the answer is Yes, the subject appears as the first column in each section.

(column designators) are the attributes for the map of interest which are to be in the columns of the report table.

The following is an example of use of the REPORT command:

```
ENTER COMMAND
? REPORT
 ENTER ACTIVE MAP I.D. TO REPORT ? 1
 ENTER "HARD" OR <FILENAME> FOR HARDCOPY OUTPUT
 <RETURN> FOR SCREEN OUTPUT ?
 DO YOU WANT UNLABELED OUTPUT [No] ?
 ENTER NUMBER OF COLUMNS IN TABLE ? 3
 DO YOU WISH POLYGON AREAS OUTPUT ? Y
 DO YOU WISH SUBJECTS OUTPUT ? Y
 FOR COLUMN 1
 RETRIEVE ATRIBUTE FIELD BY:  0 - QUIT  1 - ID  2 - KEY ? 1
 ENTER THE ATTRIBUTE ID ? 8
 FOR COLUMN 2
 RETRIEVE ATRIBUTE FIELD BY:  0 - QUIT  1 - ID  2 - QUIT ? 2
 ENTER THE ATTRIBUTE KEY ? HOMERANGE
 FOR COLUMN 3
 RETRIEVE ATRIBUTE FIELD BY:  0 - QUIT  1 - ID  2 - QUIT ? 1
 ENTER THE ATTRIBUTE ID ? 3
```

The limitations of the REPORT command are as follows:

-- Map must have a multiple attributes file.

-- If the LINE.PRINTER file created by use of the command is to be saved, it should be renamed since existing LINE.PRINTER files are always overwritten by subsequent use.

-- Truncates character data to the first 10 characters.

Example of result of use of the REPORT command:

SUMMARY FOR MAP SGWWOLFRG

| I.D. | SUBJECT | SAGEWIDTH | HOMERANGE | ADULTSEXR | AREA |
|---|---|---|---|---|---|
| 1 | SAGE GROUS | 50.000 | 6.300 | 1.700 | 304.382 |
| 2 | SAGE GROUS | 46.000 | 7.100 | 1.900 | 595.630 |
| 3 | SAGE GROUS | 51.000 | 5.700 | 2.100 | 131.338 |

Information on the multiple attribute file of active map ID 1 is produced. This map is named SGWWOLFRG and is a map of sage grouse wintering areas on Wolf Ridge, CO.

The RESET command is summarized as follows:

RESET is a data display command that allows the user to return the data display to the original window specified by using the WINDOW command. The RESET command can be executed after performing one or more ZOOM commands and returns to the original window regardless of how many times the window has been changed by ZOOM.

The RESET command is specified as follows:

```
RESET
```

There are no individual parameters associated with the RESET command.

The following is an example of use of the RESET command:

```
 ENTER COMMAND
? RESET
```

The limitations of the RESET command are as follows:

-- None found to date.

The SAMPLE command is summarized as follows:

SAMPLE is a data reclassification command that takes a random sample of all items in a vector map and produces an active map including the sampled items. The user specifies the number of items out of the map to be sampled.

The SAMPLE command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

SAMPLE (active ID) (number of items)*

The individual parameters of the SAMPLE command are described below:

(active ID) is the active ID of a map referenced in the active map table which is to be sampled.

(number of items) is the number of items to be sampled.

The following is an example of use of the SAMPLE command:

```
 ENTER COMMAND
? SAMPLE
 ENTER ACTIVE MAP I.D. TO SAMPLE
? 2
 ENTER NUMBER OF SAMPLING ITEMS
? 50
    50 HITS FOR ACTIVE ID 3
```

The limitations of the SAMPLE command are as follows:

-- Cannot sample more than 1000 items.

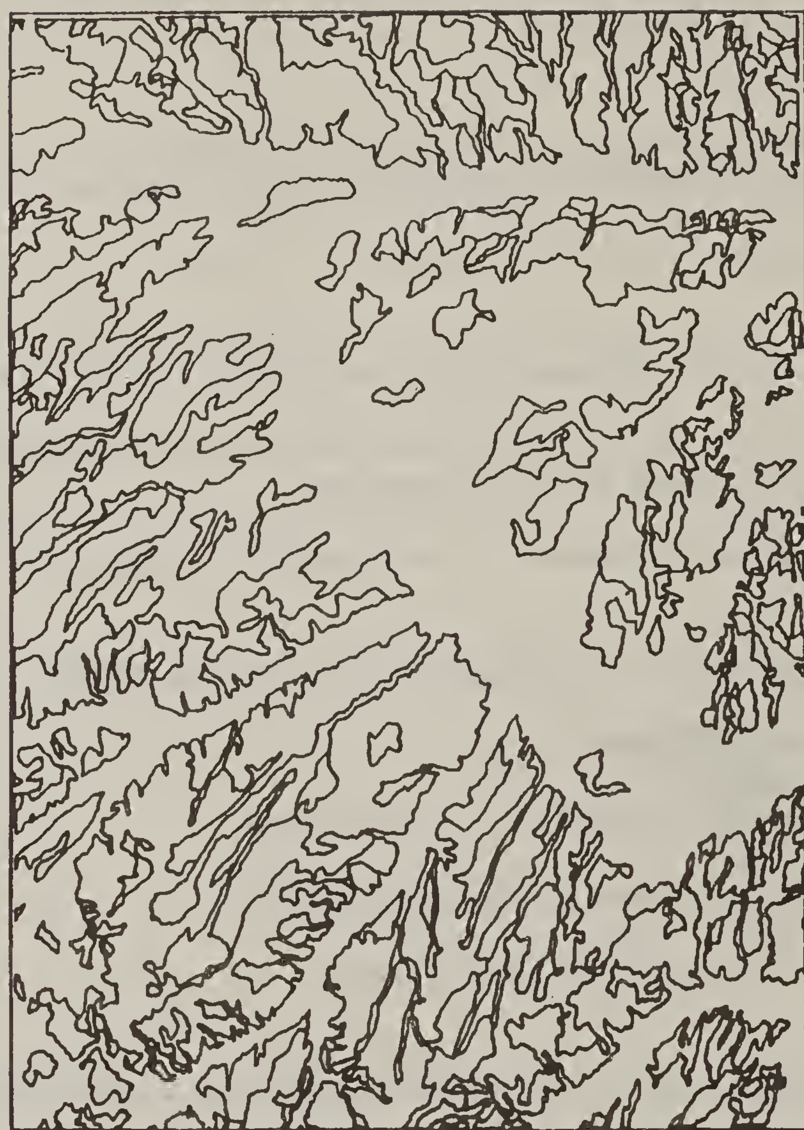
-- Can only use active vector data.

-- Cannot sample more items than exist in the active map.

-- All subjects are sampled together.

Example of use of the SAMPLE command:

ENTER COMMAND
?



A map of forest areas on Wolf Ridge, CO. Fifty items will be randomly sampled from the 233 items.

Example of result of use of the SAMPLE command:

ENTER COMMAND
?

THE FOLLOWING MAPS ARE CURRENTLY ACTIVE

| I.D. | ITEMS | SEARCH | | | FILE NAME/TYPE | |
|---|---|---|---|---|---|---|
| 1 | 233 | SUBJECTS | 42 | | SCTWOLFRG | 3 |
| 2 | 50 | SAMPLE | SCTWOLFRG | 50 | SCTWOLFRG | 3 |

TOTAL ITEMS 283

A map of a random sample of 50 forest areas on Wolf Ridge, CO. Note that the map is active as shown in the active table. If the user wishes to save the map as part of the workfile the SAVE command must be used.

The SAVE command is summarized as follows:

SAVE is a data manipulation command which is used to save any point, line, or polygon map referenced in the active map table as part of the polygon workfile. Once a map has been saved it can be accessed in subsequent sessions which eliminates the time and expense of having to recreate maps that will be used repetitively over a period of time. If the original map has multiple attributes, those attributes pertaining to the active items will be saved as well.

The SAVE command is specified as follows:

SAVE (active ID) (new map name)

The individual parameters of the SAVE command are described below:

(active ID) is the ID number of a map referenced in the active map table which is to be saved.

(new map name) is the new name of the map which is being saved.

The following is an example of use of the SAVE command:

```
 ENTER COMMAND
? SAVE
 ENTER ACTIVE DATA SET I.D. TO SAVE
? 1
 WHAT DO YOU WISH TO CALL THE NEW MAP

? NEWWOLFRG
 NUMBER OF DATA ITEMS TO BE SAVED     37
```

There are three variations for subject search. In the first the entire subject does not have to be entered, only the few characters that make it unique. For example, if you key 'A' this will match the subjects LAND and WATER. In the second variation, you select all but the string indicated by using a back slash (\) inserted in front of the string. In the third variation, specify more than one string to be matched by entering several separated by an exclamation point (!). For instance T1!T!T3. Do not use \ with multiple search strings since everything but the \subject is selected anyway.

-- For the ITEMS option, (search string) is a list of up to thirty item or feature numbers that are to be selected. Use of a back slash (\) causes all items that do not match the item number to be selected.

-- For the ATTRIBUTE option the user is prompted to select map data based on a multiple attribute ID number or keyword. The map must have a multiple attributes file in order to use this option.

-- For the FEATURES option, (search string) is the name of a file containing a list of feature numbers to select. There can be up to 32,000 feature numbers in this file and they do not have to be in sorted order. Each line of the file must contain a feature number and the last line in the file must be "STOP".

FROM is a special SELECT option that allows the user to select multiple subjects across multiple maps. (file 1) is a disk file created previously, which contains the names of the maps to be selected from. This list must be stored one name per line and end with the keyword STOP. Similarly, (file 2) contains the subject search strings that the user desires to select with, in the same format and with the same keyword as (file 1).

The following is an example of use of the SELECT command:

```
 ENTER COMMAND
? SELECT
 ENTER NAME OF MAP TO SELECT FROM ? MDRWOLFRG
 ENTER ACTION: ALL,SUBJECTS,ITEM,ATTRIBUTE,ELEVATION,FEATURES ? ALL
     5 HITS FOR ACTIVE ID 1
```

The limitations of the SELECT command are as follows:

- -- Cannot have more than 40 maps active at any one time. If this limit is about to be or has been exceeded, the following warning is recieved: ***** Active table is almost full. *****

- -- The total number of features activated can not be more than 32,000. The message *****WARNING. POINT.DT almost full.***** means that this limit has been exceeded.

- -- Cannot select on the basis of subject from a cell map, i.e., can only select ALL from cell maps.

- -- Blanks are not allowed in search strings. This may cause difficulties, for example, if the user desires those features labeled "1", features labelled "12", "13", and "134" will also be selected.

- -- Items cannot be selected inclusively, e.g., "2 6" will select items 2 and 6, not 2 through 6.

- -- The ELEVATION option only works on type 11, 12 and 13 maps.

- -- SELECT by subject does not work properly if any of the subject fields are blank.

The SHADE command is summarized as follows:

SHADE is a data display command that allows the user to plot active polygon or cell maps on the CRT screen and shade the maps with differential cross-hatching. If more than one active map ID number is entered following the SHADE command (see command format, below) each map will be plotted with different degrees of cross-hatching. This allows the user to differentiate between map data sets.

With polygon data, it is possible to use the ASSIGN command to physically set hatch patterns in the database by subject. If this procedure has been performed the SHADE command will ignore the default shade patterns and use the database assignments.

The SHADE command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

SHADE (active ID's) (display range)* (cancel)*

The individual parameters of the SHADE command are described below:

(active ID's) is the ID number(s) of one or more polygon or cell maps referenced in the active map table which are to be shaded.

(display range) is an option for cell data. If the active ID is a discrete map, a prompt displaying the number of levels will appear. This is the same as the number of subjects. If the map is continuous, the minimum and maximum values are displayed. Then the user is asked to enter the display range. Two values must be entered, a lower boundary and an upper boundary. All cells which contain a value which is greater than or equal to the lower value and less than or equal to the upper value will be shaded.

(cancel) is an option that allows the user to stop a plot of active maps without stopping MOSS. Entering CAN or ABO while shading causes the main prompt to again appear. This option is unprompted.

The following are examples of use of the SHADE command:

```
 ENTER COMMAND
? SHADE
 ENTER ACTIVE MAP I.D.(S) TO SHADE
? 1
 ENTER COMMAND
? SHADE 2 2 2        (active ID 2 is a discrete map)
 THERE ARE   6 LEVELS. ENTER RANGE TO DISPLAY
? 1 1
 THERE ARE   6 LEVELS. ENTER RANGE TO DISPLAY
? 2 4
 THERE ARE   6 LEVELS. ENTER RANGE TO DISPLAY
? 5 6
 ENTER COMMAND
? SHADE 3            (active ID 3 is a continuous map)
 MINIMUM    6184.0000 MAXIMUM    7200.000 ENTER RANGE TO DISPLAY
? 6400 6800
```

The limitations of the SHADE command are as follows:

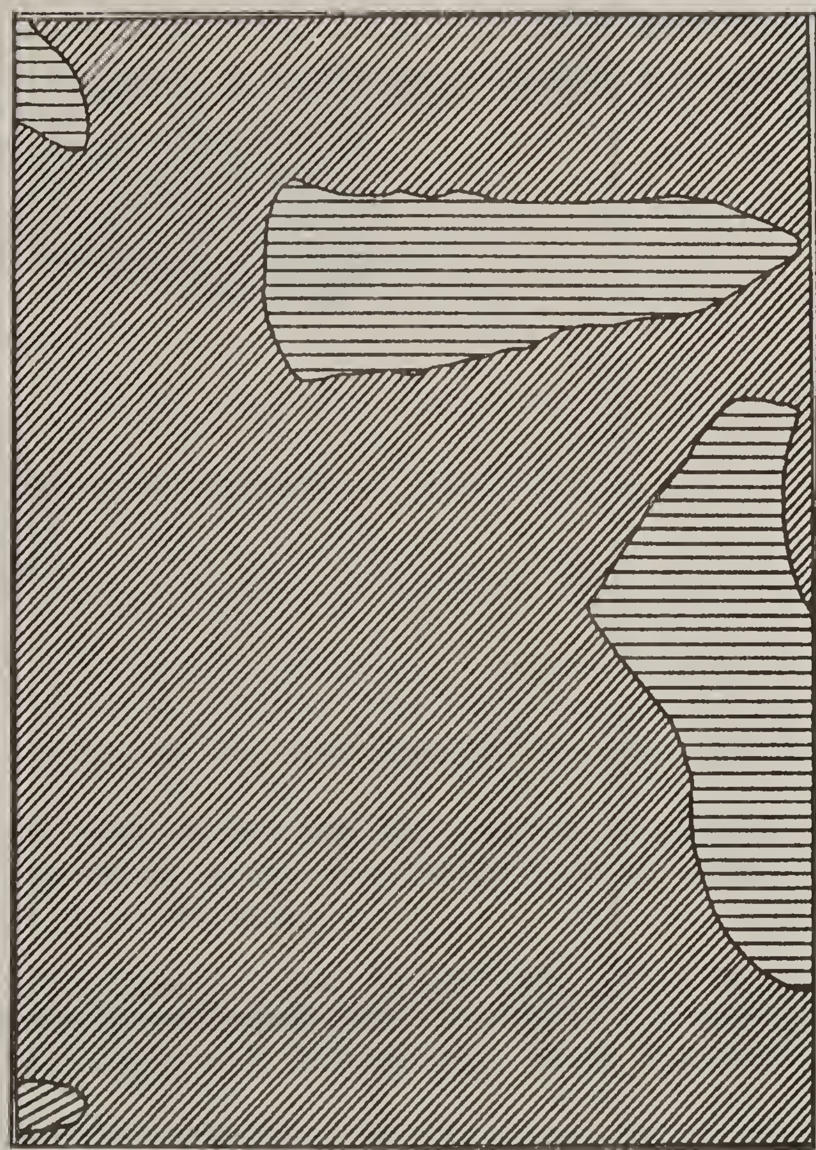
-- Display window must be set.

-- For visual effectiveness, no more than 10 shade patterns should be displayed.

-- If working with color display, a color display terminal is required.

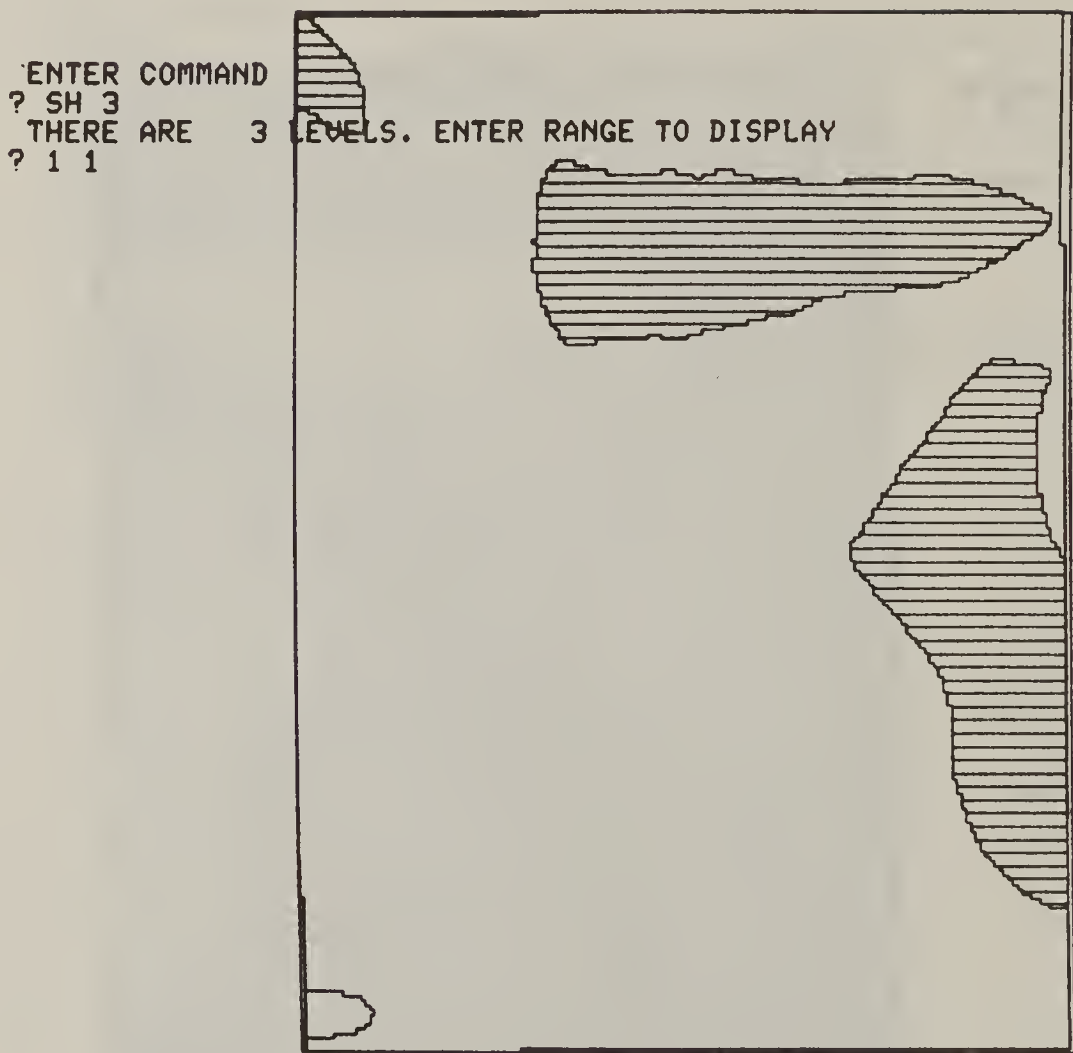
Example of result of use of the SHADE command:

```
 ENTER COMMAND
? SHADE 1 2 3

 ENTER COMMAND
?
```



The map is a composite plot of three mule deer range maps on Wolf Ridge, CO. Differential default shading has been applied to each map. Note that the order of map ID specification will determine which degree of cross-hatching the map receives.

Example of result of use of the SHADE command:




Active map ID 4 is a cell map of aspects on Wolf Ridge, CO. The command querys for a range of levels, or values, to display. In this case, only one level (1; no aspect) was shaded. Note that the SHADE command also functions in displaying cell maps, as shown.

The SHOW command is summarized as follows:

SHOW is a data display command that allows the user to have MOSS perform a number of individual commands in sequence. SHOW may be thought of as a higher level of interaction with MOSS. Currently, the various options allow the user to select, window, display, shade, and generate area tables. The effect is the same as user-issuance of the separate commands in sequence. SHOW can also produce a display of the colors of the color device if one is being used.

The SHOW command is specified as follows:

SHOW ME (mapname)

or

SHOW ME (mapname) WITH (option)

or

SHOW ME COLORS

The individual parameters of the SHOW command are described below:

(mapname) is the name of the map the user is interested in displaying. Entry of this parameter alone will cause SHOW to select the map, set the window, and plot the map.

WITH (option) will generate additional information about the map of interest. Currently, these options are AREAS and SHADING. AREAS generates an area table and SHADING will shade the map.

COLORS specifies that a display of the colors being used on the current color device be produced.

The following is an example of use of the SHOW command:

```
 ENTER COMMAND
? SHOW ME MDRWOLFRG
 5 HITS FOR ACTIVE I.D. 1
```

The limitations of the SHOW command are as follows:

-- All limitations pertaining to the SELECT, WINDOW, PLOT, SHADE, and AREA commands apply.

-- Always selects the entire map.

The SIZE command is summarized as follows:

SIZE is a data reclassification command that selects polygons or lines in an active map based on area of polygons or length of lines. For example, SIZE might be used to select pinyon-juniper forest stands between 50 and 100 acres in size from a vegetative cover map. The SIZE command uses an active map as input and produces an active map as output.

The SIZE command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

SIZE (active ID) (minimum)* (maximum)*

The individual parameters of the SIZE command are described below:

(active ID) is the ID number of a map referenced in the active table.

(minimum) is the minimum size of the polygon to be activated, in acres, or, the minimum length of the line to be activated, in miles.

(maximum) is the maximum size of the polygon to be activated, in acres, or, the maximum length of the line to be activated, in miles.

The following is an example of use of the SIZE command:

```
 ENTER COMMAND
? SIZE
 ENTER ACTIVE MAP I.D.
? 1
 ENTER MINIMUM POLYGON SIZE (IN ACRES)
? 50
 ENTER MAXIMUM POLYGON SIZE (IN ACRES)
? 100

    137 ITEMS BELOW RANGE AND    38 ITEMS ABOVE RANGE
     37 HITS FOR ACTIVE ID  2
```

The limitations of the SIZE command are as follows:

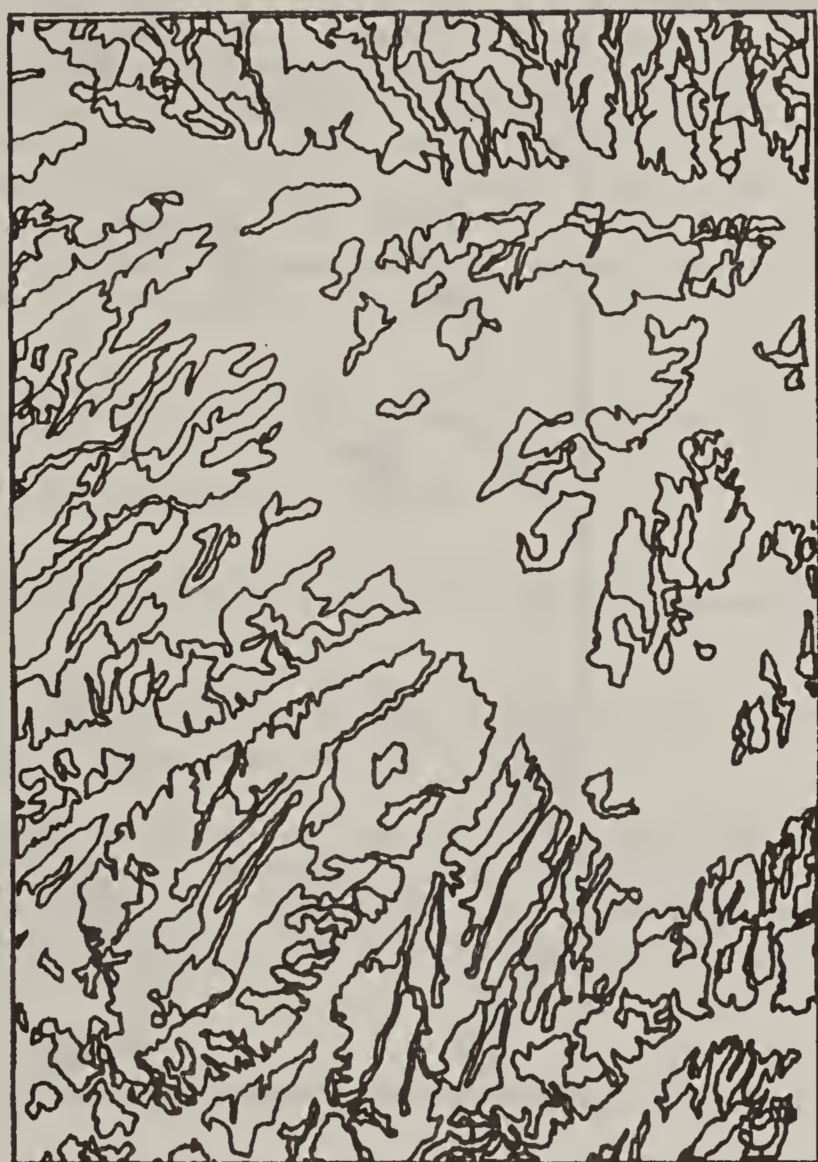
-- Map must be active and window must be set.

-- Since the features activated must be greater than or equal to the minimum value specified and less than or equal to the maximum specified, it may sometimes appear that some features which should have been included were not. When dealing with real numbers, it is difficult to make an exact match. The numbers displayed by the AREA and LENGTH commands have been rounded. Therefore, the actual size of the feature may differ slightly. With this in mind, slight changes in the minimum/maximum values may help achieve the desired results.

-- Cannot use cell data.

Example of use of the SIZE command:

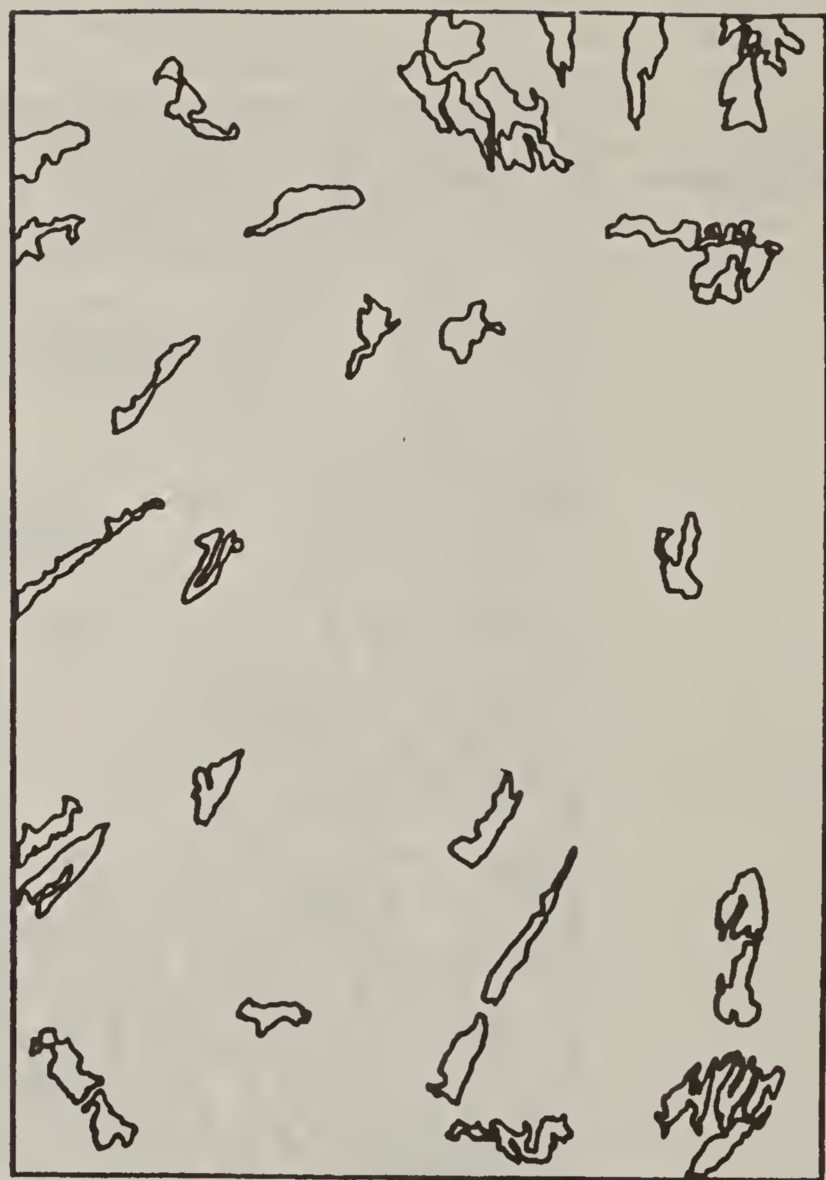
ENTER COMMAND
?



Active map ID 1 is a polygon map of all sparse cover pinyon-juniper stands on Wolf Ridge, CO before issuance of the SIZE command. The following page shows the result of the use of the command.

Example of result of use of the SIZE command:

ENTER COMMAND
?



THE FOLLOWING MAPS ARE CURRENTLY ACTIVE

| I.D. | ITEMS | SEARCH | | | FILE NAME/TYPE | |
|---|---|---|---|---|---|---|
| 1 | 212 | SUBJECTS 423PJ | | | SCTWOLFRG | 3 |
| 2 | 37 | SIZE | 50.0000 | 100.0000 | SCTWOLFRG | 3 |

TOTAL ITEMS 249

The map is the result of selecting sparse cover pinyon-juniper stands between 50 and 100 acres in size via the SIZE command. Note that the active map table now contains a new active map ID 2, showing a search string of SIZE...50.0... 100.0.

The STATISTICS DESCRIBE command is summarized as follows:

STATISTICS DESCRIBE is a data description command that produces summary statistics for any polygon, line, or discrete cell map referenced in the active map table. Specifically, for each primary attribute associated with a vector map, the command computes minimum area or length, maximum area or length, total area or length, range, mean, variance, and standard deviation. For a vector map with multiple attributes that has been SELECTED by attribute, or BSEARCHED, the minimum, maximum, total, mean, variance, and standard deviation is computed for a integer or real attribute field. For discrete cell maps, the command computes total number of cells, total number of non-zero cells, minimum and maximum cell values, range of cell values, and average cell values with and without zeros.

The STATISTICS DESCRIBE command is specified as follows:

STATISTICS (active ID) (statistics type)

The individual parameters of the STATISTICS DESCRIBE command are described below:

(active ID) is the ID number of a line, polygon, or discrete cell map referenced in the active map table.

(statistics type) is where the user specifies the type of function to be performed. Three functions are available, CROSSTABS (see Appendix C), DESCRIBE, and HISTOGRAM. If DESCRIBE is entered, a table of summary statistics for each subject in the specified active map is produced.

The following is an example of use of the STATISTICS DESCRIBE command:

```
 ENTER COMMAND
? STATISTICS
 ENTER ACTIVE MAP SETS TO USE FOR STATISTICS
? 1
 ENTER STAT TYPE (DESCRIBE,CROSSTABS,HISTOGRAM)
? DESCRIBE
```

The limitations of the STATISTICS DESCRIBE command are as follows:

-- Does not work with line maps.

-- Number of items within subjects must be greater than 3 for vector maps.

-- Separate tables are produced for each vector map subject thus increasing printing time.

-- Cannot use point maps, character attribute fields, nor dichotomous or continuous cell maps.

-- Map must be active.

STATISTICS DESCRIBE

Example of result of use of the STATISTICS DESCRIBE command:

```
DESCRIPTIVE STATISTICS FOR RASTER MAP CELLMLR
TOTAL NUMBER OF CELLS IN MAP      =    3657.
TOTAL NON-ZERO CELLS IN MAP       =    3657.
MINIMUM CELL VALUE IN MAP         =       1.00
MAXIMUM CELL VALUE IN MAP         =       2.00
RANGE OF VALUES IN MAP            =       1.
AVERAGE VALUE FOR MAP (WITH 0 S)  =       1.00
AVERAGE VALUE FOR MAP (NO 0 S)    =       1.00
```

Active ID 6 is a cell map of mountain lion ranges on Wolf Ridge, CO. Cell size is ten acres and there are two subjects.

Example of result of use of the STATISTICS DESCRIBE command:

```
 ENTER COMMAND
? STATI 6 DESC

DESCRIPTIVE STATISTICS FOR  423PJSG

TOTAL CASES =         111 OUT OF      =       212
MIN VALUE   =          .3 MAX VALUE   =    1264.2
RANGE       =        1263 MEAN        =      83.7
STAN. DEV.  =       172.9 VARIANCE    =  .2988092E 05
TOTAL               9290. DATA TYPE       POLYGON

DESCRIPTIVE STATISTICS FOR  423PJHR

TOTAL CASES =          81 OUT OF      =       212
MIN VALUE   =         1.5 MAX VALUE   =     766.0
RANGE       =         764 MEAN        =      88.6
STAN. DEV.  =       135.3 VARIANCE    =  .1831839E 05
TOTAL               7179. DATA TYPE       POLYGON

DESCRIPTIVE STATISTICS FOR  423PJBS

TOTAL CASES =          19 OUT OF      =       212
MIN VALUE   =         7.2 MAX VALUE   =      85.6
RANGE       =          78 MEAN        =      34.4
STAN. DEV.  =        20.9 VARIANCE    =  .4368604E 03
TOTAL                653. DATA TYPE       POLYGON

DESCRIPTIVE STATISTICS FOR  423PJHA

TOTAL CASES =           1 OUT OF      =       212
LESS THAN 3 CASES
```

Active map ID 1 is a map of pinyon-juniper forest on Wolf Ridge, CO. There are four subjects, one of which has less than three cases and is not processed.

The STATISTICS HISTOGRAM command is summarized as follows:

STATISTICS HISTOGRAM is a data description command that produces a histogram of the frequency distribution of the subjects in any active vector, discrete cell or continuous cell map.

The STATISTICS HISTOGRAM command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

STATISTICS (active ID) HISTOGRAM (title)* (number of intervals)* (minimum x value)* (maximum x value)* (range delimiters)*

The individual parameters of the STATISTICS HISTOGRAM command are desribed below:

(active ID) is the ID number of a vector, discrete cell or continuous cell map referenced in the active table.

HISTOGRAM is the funtion to be performed. Three funtions are available, CROSSTABS, DESCRIBE, and HISTOGRAM. Since HISTOGRAM is entered, a histogram of the frequency of the subjects in a map is output.

(title) is the title to be printed over the histogram. A default title is shown in parenthesis following the prompt and may selected by entering RETURN. To change the title, type in the desired text.

(number of intervals) is an option for cell data. It is used to determine the number of bars to be displayed on the histogram. It is possible to separate the bars by entering a number greater than the number of subjects on the map and specifying null ranges where spaces are desired.

(minimum x value) is an option for cell data. It represented the lowest value contained on the map which should be included in the calculations for the histogram.

(maximum x value) is an option for cell data. It represented the highest value contained on the map which should be included in the calculations for the histogram.

(range delimiters)is an option for cell data. It is used to indicate how the values within the specified bounds be divided among the bars. For example, a map with 4 values is to be plotted with 2 bars. The lower bound is 1 and the upper bound is 4. By specifying 3,4, the first 3 values are summed for the first bar and the 4th value is the second bar. Another way to specify the same thing would be:

    1 to 3,4

To skip a bar (leaving a blank space) enter a null range. (ie 1 to 3, ,4). This uses up one of the intervals specified previously.

The following is an example of use of the STATISTICS HISTOGRAM command using a discrete cell map which contains four subjects:

```
 ENTER COMMAND
? STATISTICS
 ENTER ACTIVE MAP I.D.(S) FOR STATISTICS
? 1
 ENTER STATISTICS TYPE (DESCRIBE,CROSSTABS,HISTOGRAM)
? HISTOGRAM
ENTER TITLE:
   ( LAND STATUS          WOLF RIDGE         COLORADO  1:24000)
?
 NUMBER OF INTERVALS (   4 ) : ?
 ENTER MINIMUM X VALUE (      1.00) :?
 ENTER MAXIMUM X VALUE (      4.00) :?
ENTER RANGE DELIMITERS ( EX: 2,4 TO 9, ,100 ):
     1,2,3,4
?
  HISTOGRAM RUNNING
```

The limitations of the STATISTICS HISTOGRAM command are as follows:

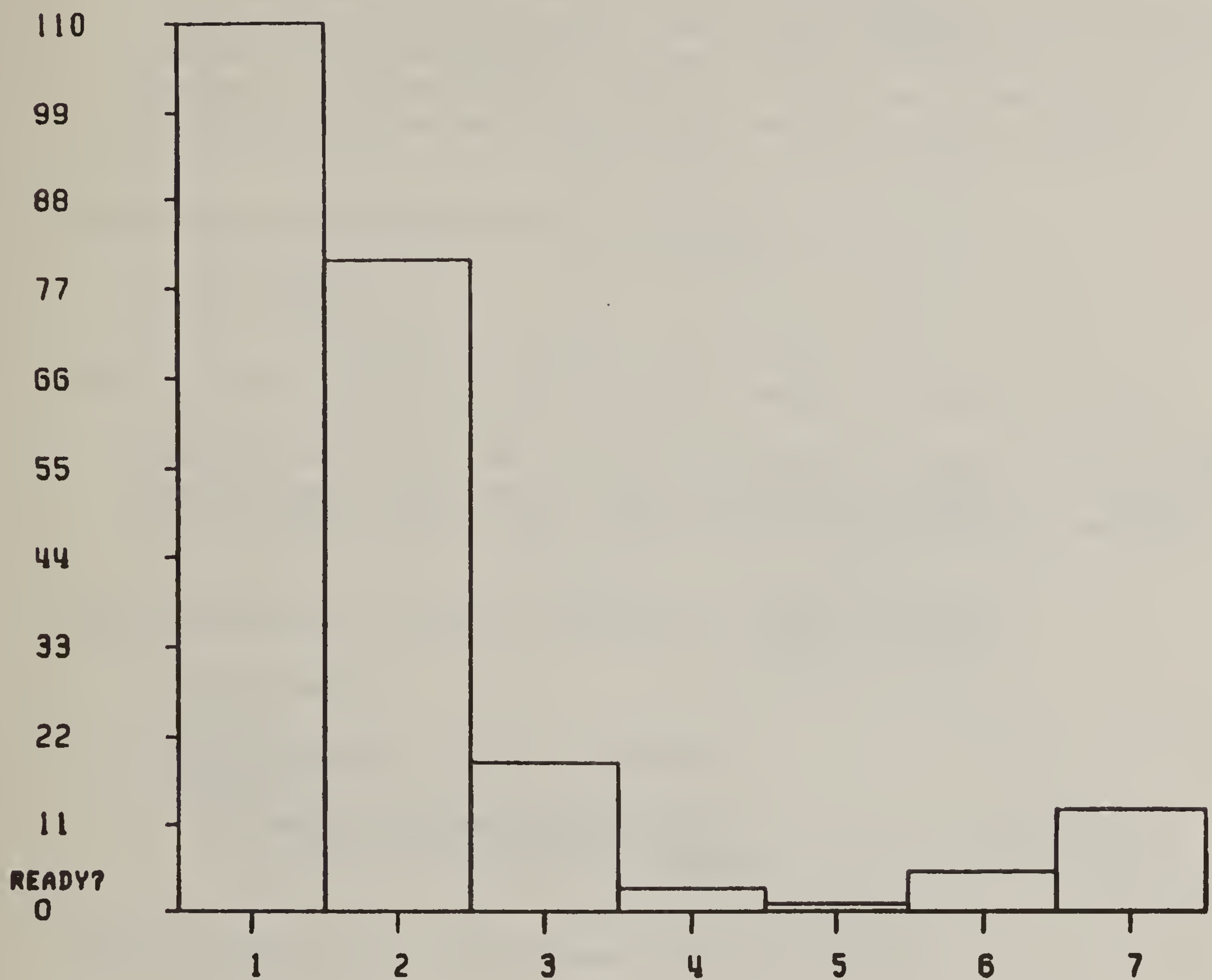
-- Map must be active.

-- User cannot define the intervals on the axis' of the histogram.

-- Can not produce Histograms for multiple attributes data.

STATISTICS HISTOGRAM

Example of result of use of the STATISTICS HISTOGRAM command:




```
LEGEND FOR HISTOGRAM OF SCTWOLFRQ

 1   423PJSQ
 2   423PJHR
 3   423PJBS
 4   422PJ
 5   423PJHA
 6   423JNHR
 7   423JNSG
```

A histogram of frequency of subjects in a map of forest cover types on Wolf Ridge, CO. The legend was produced after the histogram by entering <CR> after the READY? prompt.

The STATUS command is summarized as follows:

STATUS is a program control command that computes and prints out information on: a) numbers of maps in master and work files, b) data type, storage location (disk vs. tape), and numbers of items and coordinate pairs for a vector map, or c) number of active maps, display device, master mapfile name, display window for the current session, and characteristics of the of the color device if one is present. This information provides an index to volume and type of data associated with a particular mapfile, map, or session.

The STATUS command is specified as follows:

STATUS (type)

The individual parameters of the STATUS command are described below:

(type) is an option for the user to choose the object of the command. The user may request status information on all mapfiles (DATABASE), on the current MOSS session (JOB), or on a specific map (mapname).

The following is an example of use of the STATUS command:

```
 ENTER COMMAND
? STATUS
 ENTER: DATABASE, JOB, OR A <MAPNAME>
? DATABASE
    43 MAPS IN MASTER PROJECT WOLF
     7 MAPS IN WORK PROJECT   POLYGON
```

The limitations of the STATUS command are as follows:

-- None found to date.

Examples of result of use of the STATUS command:

```
 ENTER COMMAND
? STATUS
 ENTER: DATABASE, JOB, OR A <MAPNAME>
? JOB

 CURRENT MOSS RUNTIME STATUS INFORMATION

 CURRENT NUMBER OF ACTIVE MAPS    =      6
 CURRENT NO. OF ENTRIES IN POINT  =    312
 CURRENT DISPLAY DEVICE           = @CONSOLE
 CURRENT MASTER MAP NAMES FILE    = WOLF.DT
 CURRENT DISPLAY WINDOW           =
   MININUM X VALUE (WEST BORDER)  =  5042659.0
   MININUM Y VALUE (EAST BORDER)  =   430051.2
   MAXIMUM X VALUE (NORTH BORDER) =  5053406.0
   MAXIMUM Y VALUE (SOUTH BORDER) =   443980.6


 ENTER COMMAND
? STATUS MDRWOLFRG
  INFORMATION FOR MAP  MDRWOLFRG
STATUS OF MAP        = ON DISK
DATA TYPE            = POLYGON
NUMBER OF ITEMS   =     5
NUMBER OF COORDINATES =       740.
```

Information on the current MOSS session is requested. Then, information on a specific map (MDRWOLFRG) is requested. This is a map of mule deer ranges on Wolf Ridge, CO.

The SYMBOL command is summarized as follows:

SYMBOL is a data display command that allows the user to select one of 19 symbols and have that symbol plotted for point or polygon data. For example, the user may wish to plot winter, winter concentration, and summer deer range. By using the SYMBOL command, three different symbols can be used for the three different subjects within one map.

The SYMBOL command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

SYMBOL (active ID) (assign symbols) (symbol table)
(symbol assignment)*

The individual parameters of the SYMBOL command are described below:

(active ID) is the ID number of a map referenced in the active map table.

(assign symbols) is an option for user assignment of symbols to subjects in the map. The user can also assign one symbol to all the subjects in the map or use the MOSS default assignment. Only YES, ALL, or NO may be entered, respectively.

(symbol table) is an option for the user to view a table of symbol options if YES or ALL was chosen for the (assign symbol) option. The user must respond YES or NO.

(symbol assignment) is where the user specifies the symbol type to be used if YES or ALL was entered for the (assign symbols) option. The user must enter a symbol number 1-19 for each subject in the map or one number for all subjects in the map.

The following is an example of use of the SYMBOL command:

```
 ENTER COMMAND
? SYMBOL
 ENTER ACTIVE MAP SET NUMBER
? 2
 DO YOU WISH TO ASSIGN SYMBOLS ? (YES, NO, OR ALL)
? YES
 DISPLAY SYMBOL TABLE ? (YES OR NO)
? NO
 ENTER ASSIGNMENT VALUES
? 14 15 13
```

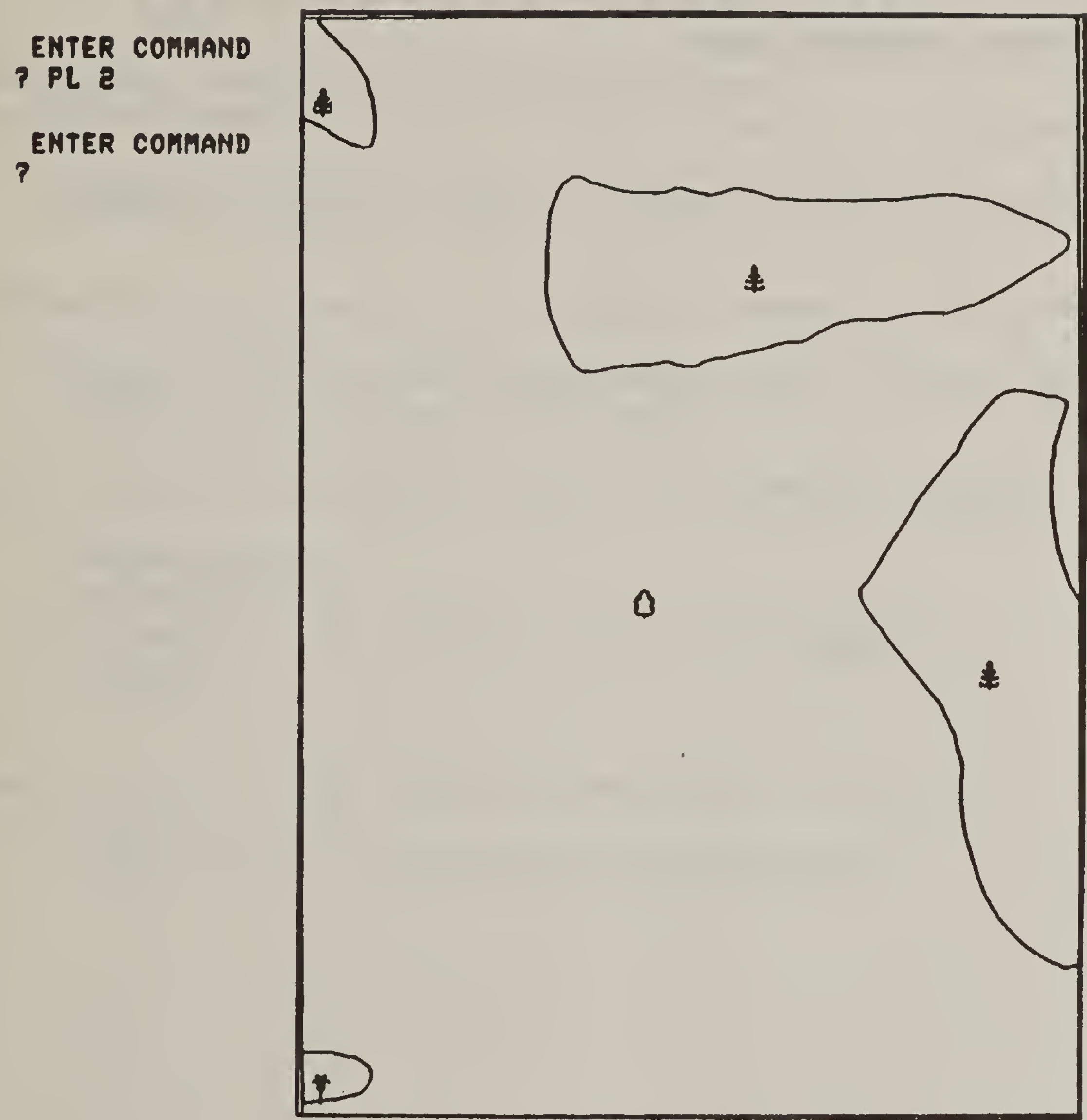
The limitations of the SYMBOL command are as follows:

-- Map must be active and window must be set.

-- Currently only 19 symbols available.

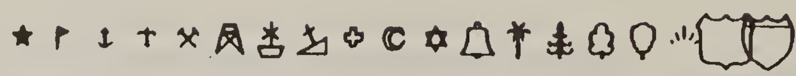
-- Can only use with point or polygon data.

Example of result of use of the SYMBOL command:




Active map ID 2 is a polygon map of mule deer ranges on Wolf Ridge, CO. Winter concentration range has been given symbol 14, a coniferous tree. Winter range has been given symbol 15, a deciduous tree. Summer range has been given symbol 13, a palm tree.

Example of the symbols available for use with the SYMBOL command:



```
ENTER ASSIGNMENT VALUES
?
```

There are 19 different symbols currently available, as shown.

The TERMINAL command is summarized as follows:

TERMINAL is a program control command which allows the user to specify the type of terminal that is being used. This allows for variations in terminals that are not truely Tektronix compatible. Currently, only Visual is available as an alternative to Tektronix.

The TERMINAL command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

TERMINAL (type)

The individual parameters of the TERMINAL command are described below:

(type) is the type of terminal being used. The user may enter TEK(tronix), the default, or VISUAL.

The following is an example of use of the TERMINAL command:

```
 ENTER COMMAND
? TERMINAL
 Please enter new terminal name (TEK or VISUAL) ?
? VISUAL
```

The limitations of the TERMINAL command are as follows:

-- Only Visual is available as an alternative.

The TESTGRID command is summarized as follows:

TESTGRID is a data display command which superimposes a cell grid over any map displayed on the graphics display terminal. Cell size can be specified in acres and height-to-width ratio or in cell width and height. TESTGRID is used to determine an appropriate cell size for converting a polygon map to a cell map.

The TESTGRID command is specified as follows:

TESTGRID (cell size/ratio) (export)

The individual parameters of the TESTGRID command are described below:

(cell size/ratio) is used to defined the cell size and the Y/X cell ratio. For metric units the user must enter M[eters] and then values for cell width and height. For English units the user must enter A[cres] and then cell ratio (Y/X) and cell size.

(export) is an option for the user to save the grid in export format in a file called "Export" by responding YES (Y) or NO (N).

The following are examples of use of the TESTGRID command:

```
 ENTER COMMAND
? TESTGRID
 ENTER [A]cres or [M]eters on a side ? M
 Please enter cell width in meters ? 1000
 Please enter cell height in meters ? 1000
 SAVE THE GRID AS A MOSS EXPORT FILE (Y/N, CR = N) ?


 ENTER COMMAND
? TESTGRID
 ENTER [A]cres or [M]eters on a side ? A
 ENTER CELL SIZE RATIO (Y/X I.E. 1.25;  CR = 1.) ? 1
 ENTER CELL SIZE IN ACRES ? 1
 SAVE THE GRID AS A MOSS EXPORT FILE (Y/N, CR = N) ? Y
```

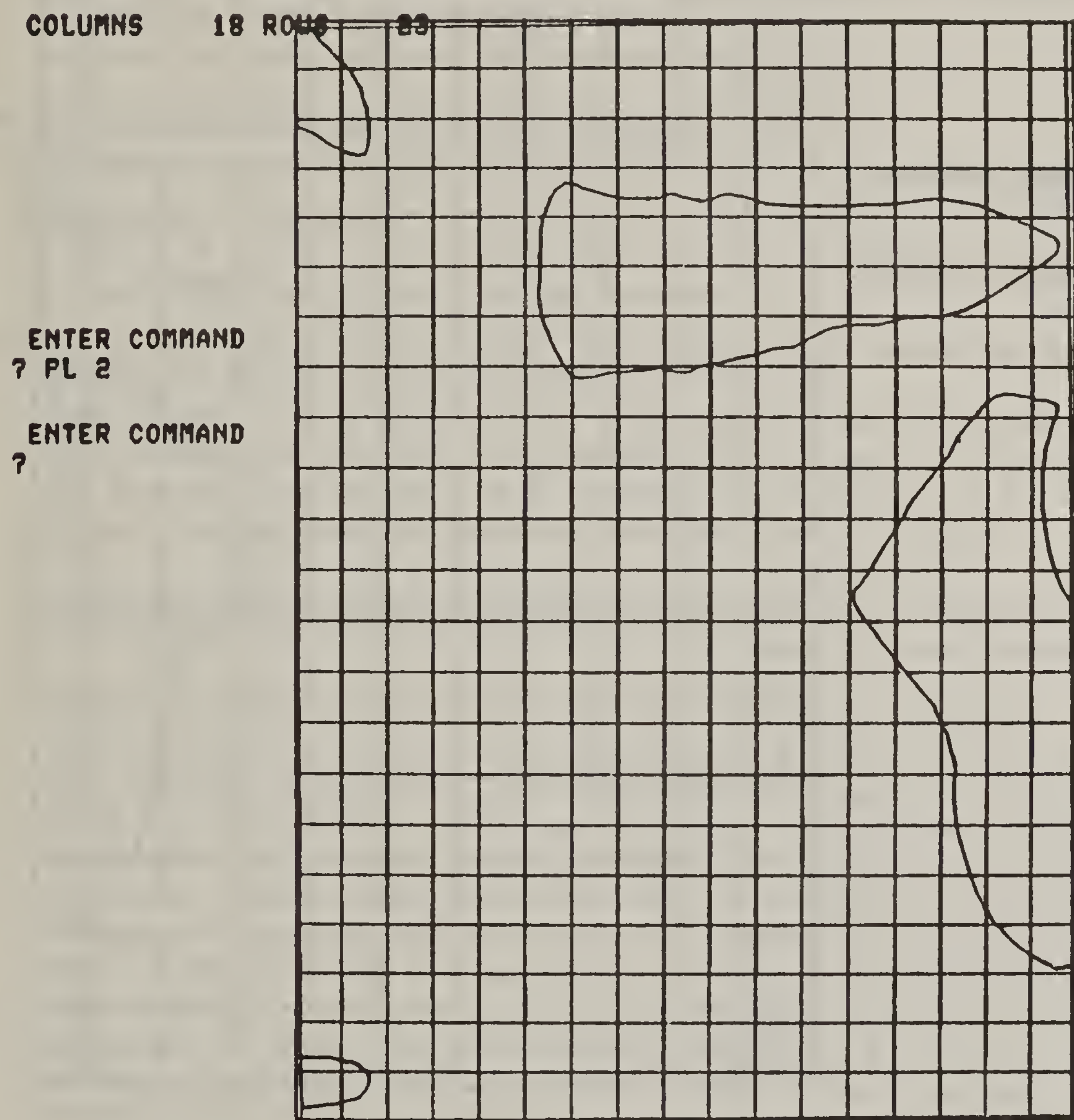
The limitations of the TESTGRID command are as follows:

-- Window must be set.

-- If the (export) option is used any existing "Export" file is deleted.

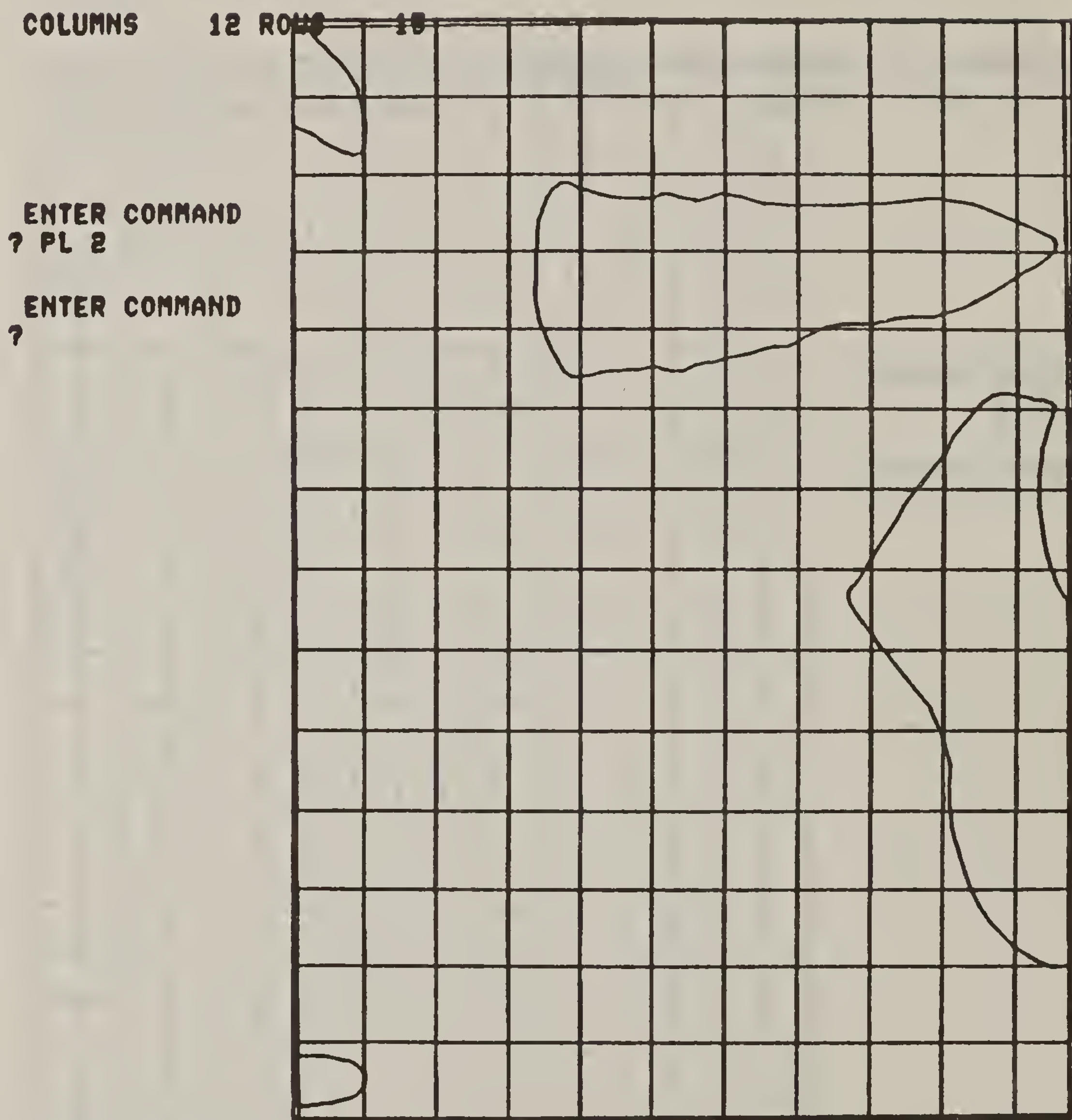
-- If a testgrid saved in an "Export" file is to be used as a new map in subsequent MOSS analyses, it must be added to the database (see ADD).

Example of result of use of the TESTGRID command:




Active map ID 2 is a map of mule deer ranges on Wolf Ridge, CO. Grid size is 100 acres with 23 rows and 18 columns.

Example of result of use of the TESTGRID command:




Active map ID 2 is a map of mule deer ranges on Wolf Ridge, CO. Grid size is 1 km on a side, with 15 rows and 12 columns.

The TEXT command is summarized as follows:

TEXT is a data manipulation command which allows the user to position text and select its angle, font, height, and width. Result of the command is a new text map (type 10) stored in the work project which may be displayed using the PLOT command. Fifteen text fonts are available (see accompanying graphic).

The TEXT command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

TEXT (map name) (map description)* (menu options)*

The individual parameters of the TEXT command are described below:

(map name) is the name of the text map. If the map does not exist, it is created and any text generated by this command is written to it. If the map does exist, it is opened for updating. Existing text can then be changed or deleted and new text can be added.

(new map description) is a description of the text map to be created. This prompt only appears if a new text map is being generated.

(menu option) is the option the user wishes to exercise. The user has six options which are displayed via a menu. Option 1 is FINISH and returns the user to the ENTER COMMAND prompt. Option 2, ADD, is used to add new text. The user points to two points. The first defines where the text starts and the second is used to indicate the slope of the text string. Then the user will be promted for font, character heigth and width. Existing text can be deleted with option 3, DELETE. When prompted to do so, move the crosshairs to the first character in the string to be deleted and enter <RETURN>. Option 4, CHANGE, permits the user to edit text and option 5, RE-DRAW, clears the screen and replots the map. The last option, COPY, is used to copy old text. Note, pointing is done with the crosshairs. Once they are in the proper location, 'point' by entering a <RETURN>. Entering any other key causes the command to continue but the results are not written to the output file.

The following is an example of use of the TEXT command:

```
 ENTER COMMAND
? TEXT
 WHAT DO YOU WISH TO CALL THE NEW MAP
  __________
? TEXTTEST
 Please enter 60 character or less descriptor
THIS IS A TEST OF THE TEXT COMMAND
  1-FINISH 2-ADD 3-DELETE 4-CHANGE 5-RE-DRAW 6-COPY  2
 Point to START text location
 Point for ROTATION
 Enter Label
? A rolling
 Enter Font
? 26
 Enter CHAR HEIGHT
? 0.5
 Enter CHAR WIDTH
? 0.3
 Is this O.K. ? (0=NO, 1=YES)
? 1

  1-FINISH 2-ADD 3-DELETE 4-CHANGE 5-RE-DRAW 6-COPY  2
 Point to START text location
 Point for ROTATION
 Enter Label
? MOSS
 Enter Font
? 26
 Enter CHAR HEIGHT
? 0.5
 Enter CHAR WIDTH
? 0.3
 Is this O.K. ? (0=NO, 1=YES)
? 1
```

```
 1-FINISH 2-ADD 3-DELETE 4-CHANGE 5-RE-DRAW 6-COPY  2
Point to START text location
Point for ROTATION
Enter Label
? gathers no stones...
Enter Font
? 26
Enter CHAR HEIGHT
? 0.5
Enter CHAR WIDTH
? 0.3
Is this O.K. ? (0=NO, 1=YES)
? 1

 1-FINISH 2-ADD 3-DELETE 4-CHANGE 5-RE-DRAW 6-COPY  1
```

The limitations of the TEXT command are as follows:

-- None found to date.

-- If a text map is updated, the map in the work project is updated but the active map is not. Therefore, in order to display the update, the map must be reselected.

Example of fonts available for use with the TEXT command:

FONT 01 CARTOGRAPHIC SIMPLEX
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG

FONT 11 CARTOGRAPHIC SIMPLEX SAN SERIF
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG

FONT 12 ROMAN SIMPLEX SAN SERIF
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
the quick brown fox jumps over the lazy dog

FONT 13 ROMAN COMPLEX SERIF
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
the quick brown fox jumps over the lazy dog

FONT 14 ROMAN SMALL COMLEX SERIF
**THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG**
**the quick brown fox jumps over the lazy dog**

FONT 15 ROMAN DUPLEX SAN SERIF
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
the quick brown fox jumps over the lazy dog

FONT 16 ROMAN TRIPLEX SERIF
**THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG**
**the quick brown fox jumps over the lazy dog**

FONT 23 ITALIC COMPLEX
*THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG*
*the quick brown fox jumps over the lazy dog*

FONT 24 ITALIC SMALL COMPLEX
*THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG*
*the quick brown fox jumps over the lazy dog*

FONT 26 ITALIC TRIPLEX
***THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG***
***the quick brown fox jumps over the lazy dog***

FONT 32 SCRIPT SIMPLEX
*THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG*
*the quick brown fox jumps over the lazy dog*

FONT 33 SCRIPT COMPLEX
*THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG*
*the quick brown fox jumps over the lazy dog*

FONT 51 GOTHIC GERMAN
**THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG**
**the quick brown fox jumps over the lazy dog**

FONT 52 GOTHIC ENGLISH
**THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG**
**the quick brown fox jumps over the lazy dog**

FONT 53 GOTHIC ITALIAN
**THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG**
**the quick brown fox jumps over the lazy dog**

Example of result of use of the TEXT command:

*A rolling*

*MOSS*

*gathers no stones...*

A text map using an Italic Triplex font (26), 0.5 inch high and 0.3 inch wide.

The TRANSLATE command is summarized as follows:

TRANSLATE is a data manipulation command which allows the user to perform a number of simple coordinate transformations on vector maps. These transformations are:

-- simple translation (offset) in x and/or y,
-- simple rotation,
-- simple translation and rotation,
-- "rubber sheeting", which includes x and y translation, rotation, and differential scaling in x and y.

The primary purpose of these transforms is to register data sets to one another. Mis-registered map data sets most often occur when poor control is used during the digitizing. Results of use of the command is a new map stored in the workfile. The program will compute a new minimum bounding rectangle and feature areas/lengths.

The TRANSLATE command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

TRANSLATE (active ID) (new map name) (transformation type)
(x offset)* (y offset)* (rotation)* (control point file name)*

The individual parameters of the TRANSLATE command are described below:

(active ID) is the ID number of a vector map referenced in the active map table which is to be transformed.

(new map name) is the name for the map resulting from TRANSLATE.

(transformation type) is the type of transformation desired. The user may enter TRANSLATE, TRANSROT, ROTATE, or RUBBER.

TRANSLATE is used to generate a new map by shifting the map coordinates horizontally, vertically or both. The axes of the new map will be parallel to those of the old map. This is done by adding the x and y offsets to the x and y coordinates of the old map.

ROTATE generates a new map by rotating the old map coordinates around the coordinates of the lower left corner of the current window. The angle of rotation is prompted for when this option is selected. The whole map is rotated regardless of how the window is set. It is possible to define the point around which to rotate by using the WIND METERS command or the ZOOM command. Just be sure that the coordinates of the lower left corner of the window are the same as the point to be rotated about.

TRANSROT creates a new map by combining the features of the ROTATE option and the TRANSLATE option. The coordinates are rotated first and then translated.

RUBBER is used to "rubber sheet" an old map to fit specified coordinates. These control points are read from a previously prepared disk file. The coordinates may be translated, rotated and scaled to make them fit.

All or some of the following data may be required depending on the of transformation selected:

(x offset) is the x offset in translation of x. This parameter is required for the TRANSLATE and TRANSROT options. Units of measure must be the same as the map. This value is added to all the x-coordinates in the oldmap to generate the x-coordinates of the new map. Negative values are subtracted.

(y offset) is the y offset in translation of y. This parameter is required for the TRANSLATE and TRANSROT options. Units of measure must be the same as the map. This value is added to all the y-coordinates in the oldmap to generate the y-coordinates for the new map. Negative values are subtracted.

(rotation) is the angle in decimal degrees to rotate the map. This parameter is required for the TRANSROT and ROTATE options. A positive value causes rotation in the clockwise direction. Conversely, a negative value causes counterclockwise rotation.

(control point file) is a one to ten character name of a disk file that contains the control point information for use with the RUBBER option. This file is a text file that must reside in the work area. The first line of the control file must contain the integer number of control points in the file, of which there must be three or more. Each line of information in this file contains four pieces of information. These are SOURCE X, SOURCE Y, TARGET X, and TARGET Y.

SOURCE refers to an (x,y) coordinate pair in the map to be transformed. TARGET refers to the desired SOURCE coordinates after the transform process. Actual data in the control point file is composed of free form real numbers with blanks between each number. Up to 15 control points are allowed in the file (see also DIGITIZE).

The following is an example of use of the TRANSLATE command:

```
 ENTER COMMAND
? WIND 1
 ENTER COMMAND
? TRANSLATE
 ENTER ACTIVE DATA SET I.D. TO TRANSLATE
? 1
 WHAT DO YOU WISH TO CALL THE NEW MAP

? MDRROTATE
 ENTER: TRANSLATE, ROTATE, TRANSROT, OR RUBBER
? ROTATE
 Please enter rotation in degrees ? 45
 Number of data items to be saved         5
```

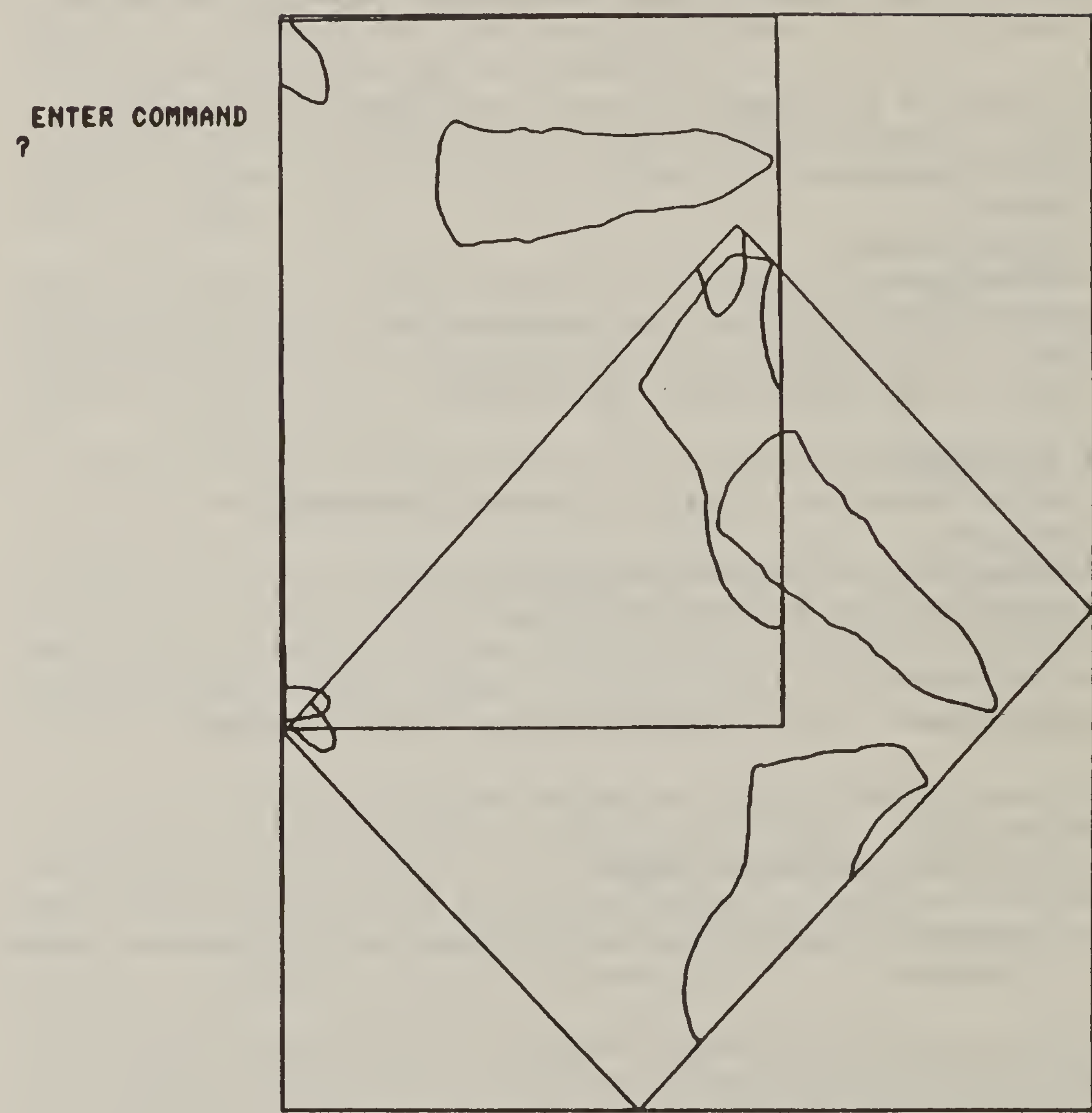
The limitations of the TRANSLATE command are as follows:

-- Map must be active and window must be set.

-- Can only use vector maps.

-- Can only rotate around the SW corner of the current window definition.

Example of result of use of the TRANSLATE command:




A map of mule deer ranges on Wolf Ridge, CO is rotated 45 degrees in a clockwise direction. Both maps are displayed.

The UTILITY command is summarized as follows:

UTILITY is a program control command which allows the user to access several ancillary utility routines. These routines are presented as a menu of choices as shown below. Details on each option are given in Appendix F.

The UTILITY command is specified as follows:

UTILITY

There are no individual parameters associated with the UTILITY command.

The following is an example of use of the UTILITY command:

```
 ENTER COMMAND
? UTILITY

ENTER MOSS UTILITY OPTION
  1  =  TERMINATE UTILITY SESSION
  2  =  DATABTEST   (MOSS MAP NAMES SUPPORT)
  3  =  ATTRIBUTE   (MOSS MULTIPLE ATTRIBUTE SUPPORT)
  4  =  APROJ       (MOSS MAP NAMES PROJECTION ASSIGNMENT)
  5  =  BROWZ       (MOSS MAP NAMES HEADER LISTING)
  6  =  ATTDESCRIBE (BUILD MULTIPLE ATTRIBUTE BATCH INPUT FILE)
  7  =  PLOT.LEGEND (BUILD CALCOMP LEGEND FILE)
  8  =  MAKE.LOGO   (BUILD CALCOMP LOGO FILE)
  9  =  COUNTITEMS  (COUNT NUMBER OF FEATURES IN MAP)
 10  =  DELETEITEM  (DELETE FEATURE FROM MAP)
 11  =  MODEL.EDIT  (CREATE AND MODIFY RASTER MODEL DEFINITION)
 12  =  SUBEDIT     (MAP SUBJECT EDIT PROGRAM)
 13  =  SET.LEVEL   (BUILD POLYCELL TRANSLATION FILE)
 14  =  TRANSFORM   (TRANSFORM COORDINATES TO A PROJECTION)
 15  =  QUAD        (MAKE A QUAD MAP IN IMPORT/EXPORT FORMAT)
 16  =  USGS DLG (ASCII) TO MOSS
 17  =  MAPIDX      (MAKE INDEX MAP OF PROJECT IN IMPORT/EXPORT
                    FORMAT)
 18  =  SUB2AT      (SUBJECT TO MULTIPLE ATTRIBUTE INPUT)
```

The limitations of the UTILITY command are as follows:

-- None found to date.

The VERSATEC command is summarized as follows:

VERSATEC is a data display command which allows the user to produce a file of an active map or maps for output to a VERSATEC plotter.

The VERSATEC command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

VERSATEC (output file name)* (active ID's)* (output scale)*
(border option)* (corner tic option)* (map title)*
(bar scale option)* (pen color)* (attribute option)*
(shade option)* (logo option)* (ancillary annotation option)*
(legend option)*

The individual parameters of the VERSATEC command are described below:

(output file name) is the name of a disk file to which the graphics are being routed. For assistance in plotting this file, see your systems manager.

(active ID's) are the ID numbers of maps referenced in the active map table which are to be plotted.

(output scale) is the scale for the plot. After entering a scale, MOSS will respond with the plot size in inches and query for acceptability.

(border option) is an opportunity for the user to specify a border around the plot. If a border is desired, the user will be prompted for corner tic, title, and bar scale options as below.

(corner tic option) is an opportunity for the user to have corner tics plotted if a border was requested as above.

(map title) is a title for the plot. This option is available if a border was requested as above.

(bar scale option) is an opportunity for the user to have a bar scale plotted if a border was requested as above. If a bar scale is desired the user will be prompted for units of measure (feet, miles, nautical), increment length, and bar divisions.

(pen color) is the desired pen color to be used on the plot. Available colors are 1-Black, 2-Blue, 3-Red, and 4-Green. If more than one active ID is to be plotted the user may specify different pen colors for each ID. For plotters equipped with more than four pens the user must define the colors beginning with pen five.

(attribute option) is an opportunity for the user to have attribute information or item numbers plotted. If attributes or item numbers are to be plotted, the user will be prompted for a pen color as above.

(shade option) is an opportunity for the user to have the plot shaded. If shading is desired the user will be prompted for shade density parameters and angle of rotation. If more than one active ID is to be plotted the user may specify various shade combinations for each ID.

(logo option) is an opportunity for the user to have a logo plotted. If desired, the user will be prompted for the name of a previously created file. This file must be in unit-square import/export format and may be created using a utility routine (see Appendix F).

(ancillary annotation option) is an opportunity for the user to have one or more lines of text plotted. This feature allows explanatory text to be added to enhance understandability of the plot.

(legend option) is an opportunity for the user to have a map legend plotted. If desired the user will be prompted for the name of a file containing the legend information. This file may be created prior to use of the command using a utility routine (see Appendix F).

The following is an example of use of the VERSATEC command:

```
 ENTER COMMAND
? VERSATEC
 VERSATEC OUTPUT FILE NAME ?
MDRPLOT
(At this point, a menu is displayed which is to allow the user to
define parameters associated with the VERSATEC plotter.)
 ENTER ACTIVE MAP I.D.(S) TO VERSATEC
? 1
OUTPUT MAP SCALE ?
? 24000
 PLOT WILL BE  12.49 BY   5.31 INCHES
******   SCALE ACCEPTABLE(Y OR N)?
? Y
```

```
 PLEASE ENTER PLOT BORDER OPTION
    0 = NO PLOT BORDER
    1 = NORMAL PLOT BORDER (DEFAULT)
    2 = THICK PLOT BORDER
? 1
 PLEASE ENTER CORNER TIC OPTION
    0 =   NO CORNER TICS, NO COLLAR
    1 =   CORNER TICS, NO COLLAR
    2 =   MAP COLLAR, NO TICS
    3 =   MAP COLLAR, TICS
? 1
 ENTER 60 CHARACTER OR LESS TITLE
? MULE DEER WINTER CONCENTRATION RANGE ON WOLF RIDGE
 PLEASE ENTER BAR SCALE OPTION
    0 =  NO BAR SCALE
    1 =  BAR SCALE
? 1
 PLEASE ENTER UNITS OF MEASURE ( FEET, MILES, NAUTICAL )
? MILES
 PLEASE ENTER INCREMENT LENGTH (DEFAULT= 1.0) ? 1.0
 PLEASE ENTER 3 BAR SCALE DIVISION VALUES ? .25 .5 .75
 ACCEPTING INPUT FOR MDRWOLFRG ACTIVE MAP   1 DATA TYPE   3

 ENTER PEN COLOR FOR ACTIVE MAP   3
 BLACK = 1, BLUE = 2, RED = 3, GREEN = 4
? 1
 ENTER ATTRIBUTE PLACEMENT OPTION
    0 =   NO ATTRIBUTE PLACEMENT
    1 =   FEATURE ATTRIBUTE AT CENTROID
    2 =   FEATURE ATTRIBUTE USING AUTOMATED PROCEDURE
    3 =   FEATURE ITEM NUMBER AT CENTROID
    4 =   FEATURE ITEM NUMBER USING AUTOMATED PROCEDURE
? 1
 PLEASE ENTER PEN COLOR FOR ATTRIBUTES ? 3
DO YOU WISH TO SHADE MAP MDRWOLFRG
? Y
 PLEASE ENTER 1 FOR SINGLE OR 2 FOR DOUBLE HATCH ? 1
DO YOU WISH THE SHADING DASHED ? ? N
 ENTER PERCENT SLOPE FOR HATCH ANGLE ? 45
 ENTER HATCH SPACING IN INCHES ? .1
 DO YOU WISH A LOGO TO BE PLOTTED ? Y
 PLEASE ENTER NAME OF LOGO FILE ? EXPORT
 DO YOU DESIRE ANCILLARY ANNOTATION (Y OR N) ? Y
```

```
DO YOU WISH ANCILLARY TEXT OUTPUT ? ? Y
BEGIN ENTERING TEXT. TERMINATE WITH A ZZ
  ____________________________________________
? THIS IS AN EXAMPLE OF ANCILLARY ANNOTATION
  ____________________________________________
? ZZ
DO YOU DESIRE A MAP LEGEND (Y OR N) ? Y
PLEASE ENTER NAME OF LEGEND FILE ? PLOT.LEGEND
```

The limitations of the VERSATEC command are as follows:

-- Input maps must be active.

-- Can not plot multivalue cell maps.

-- Window must be set.

-- Polygon outlines are not plotted if pen zero is selected.

The WEED command is summarized as follows:

WEED is a data manipulation command which allows the user to remove unneeded points from a line or polygon map. This is a process called "line generalization". The basic algorithm used takes two points, calculates a corridor of infinite length parallel to the line segment, and removes points from the line until a point falls outside the corridor. When this occurs, two new points are taken from the line, and the process is repeated. Result is a new map created in the workfile.

The WEED command is specified as follows:

WEED (active ID) (new map name) (tolerance range)

The individual parameters of the WEED command are described below:

(active ID) is the ID number of a map referenced in the active map table which will be generalized.

(new map name) is the name for the map resulting from WEED.

(tolerance range) is the width of the generalization corridor in meters.

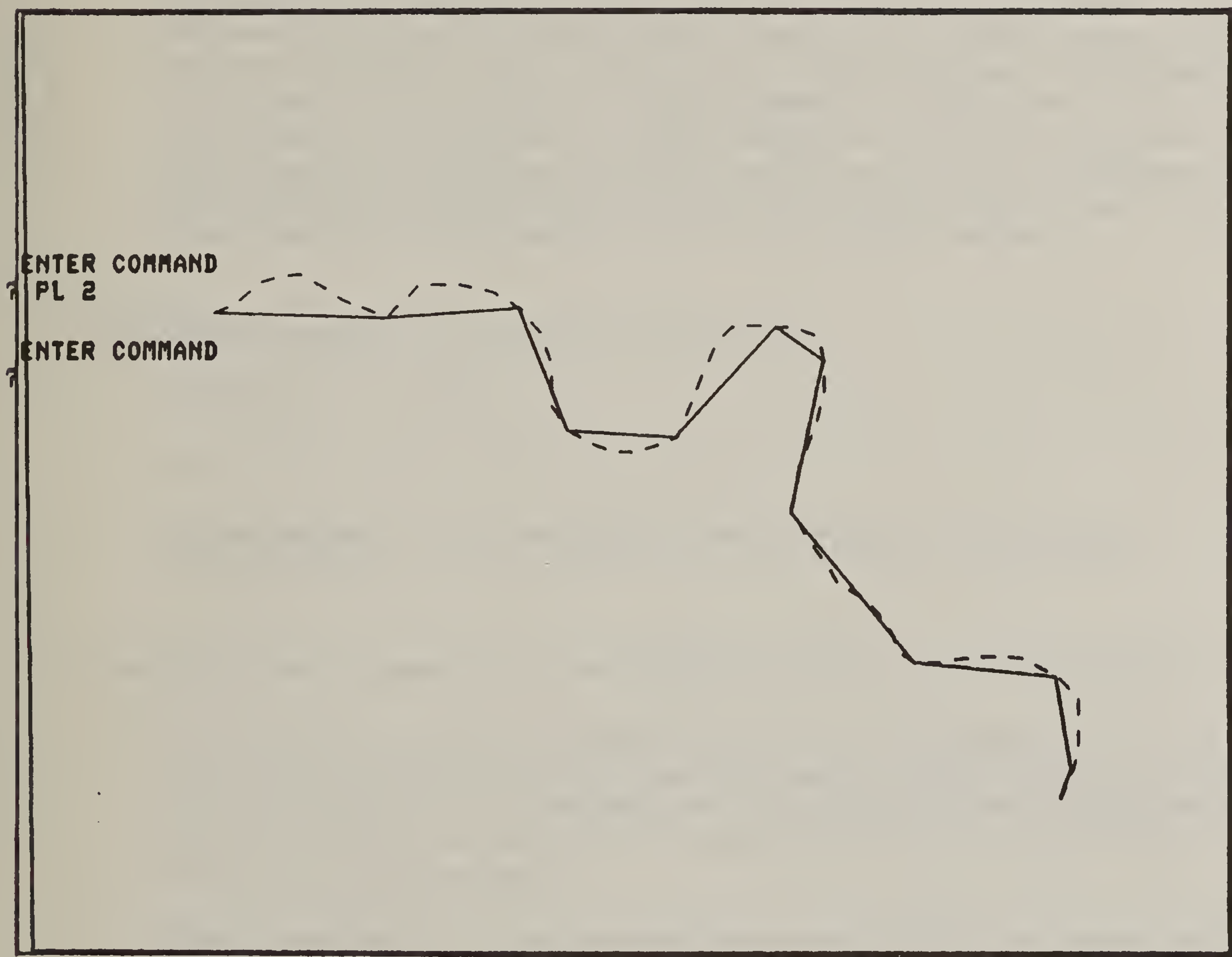
The following is an example of use of the WEED command:

```
 ENTER COMMAND
? WEED
 ENTER ACTIVE DATA SET I.D. TO WEED
? 1
 WHAT DO YOU WISH TO CALL THE NEW MAP
  __________
? SWSWEED
 PLEASE ENTER WEEDING TOLERANCE (IN METERS) ? 10
 NUMBER OF DATA ITEMS TO BE SAVED =     1
SUBJECT = EPHEMERAL STREAMS
 LINE THINNED FROM    51 POINTS TO    12 POINTS
```

The limitations of the WEED command are as follows:

- -- Map must be active line or polygon map and window must be set.
- -- It is possible to weed to a single point.
- -- If a polygon map is weeded, the lines between adjacent polygons will develop slivers and/or overlapping lines.
- -- The new map which is created is useful only for display purposes. If the map is to be used for data description or analysis it must be exported (see EXPORT) and re-added to the database (see ADD).

Example of result of use of the WEED command:




The map is an epheremal stream on Wolf Ridge, CO before and after line generalization, dashed and solid, respectively. Note the decrease in number of points and the increase in linearity of the weeded line.

The WINDOW command is summarized as follows:

WINDOW is a data display command that initiates a rectangular viewing window. Only those map features that fall within the specified window will be analyzed and displayed. The map database coordinate information is referenced to the coordinates of the map projection. Therefore, the window is also in map projection coordinates. The command can be used at any time to change the viewing window and must be executed before any activated maps can be plotted or displayed. There are two forms of the WINDOW command. In the first case, the the window is set using an active map(s) as reference. In the second case, the user specifies the exact coordinates of the southwest corner and number of meters X and Y extend from that corner. Exact coordinates may be determined by use of the LOCATE command.

The WINDOW command is specified as follows:

WINDOW (active ID's)

or

WINDOW METERS (SWX coordinate) (SWY coordinate) (X distance) (Y distance)

The individual parameters of the WINDOW command are described below:

(active ID's) is the ID number(s) of a map(s) referenced in the active map table which is to be used as the reference(s) for the viewing window. If more than one ID is entered the viewing window will be the largest north and west and the smallest south and east of all active maps.

(SWX coordinate) is the easting coordinate at the SW corner of the intended viewing rectangle.

(SWY coordinate) is the northing coordinate at the SW corner of the intended viewing rectangle.

(X distance) is the distance in meters from the SW corner to the SE corner of the intended viewing rectangle.

(Y distance) is the distance in meters from the SW corner to the NW corner of the intended viewing rectangle.

The following is an example of use of the WINDOW command:

```
 ENTER COMMAND
? WINDOW
 ENTER ACTIVE MAP I.D.S TO WINDOW
? 1
```

The limitations of the WINDOW command are as follows:

-- Cannot set a zero or negative window.

-- When working with point data (type 1 maps), best results are obtained by windowing on an area larger than the MBR of the point map.

The ZETA command is summarized as follows:

ZETA is a data display command which allows the user to produce a file of an active map or maps for output to a ZETA plotter.

The ZETA command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

ZETA (output file name)* (active ID's)* (output scale)*
(border option)* (corner tic option)* (map title)*
(bar scale option)* (pen color)* (attribute option)*
(shade option)* (logo option)* (ancillary annotation option)*
(legend option)*

The individual parameters of the ZETA command are described below:

(output file name) is the name of a disk file to which the graphics are being routed. The contents of this file can later be plotted. For assistance, see the system manager.

(active ID's) are the ID numbers of maps referenced in the active map table which are to be plotted.

(output scale) is the scale for the plot. After entering a scale, MOSS will respond with the plot size in inches and query for acceptability.

(border option) is an opportunity for the user to specify a border around the plot. If a border is desired, the user will be prompted for corner tic, title, and bar scale options as below.

(corner tic option) is an opportunity for the user to have corner tics plotted if a border was requested as above.

(map title) is a title for the plot. This option is available if a border was requested as above.

(bar scale option) is an opportunity for the user to have a bar scale plotted if a border was requested as above. If a bar scale is desired the user will be prompted for units of measure (feet, miles, nautical), increment length, and bar divisions.

(pen color) is the desired pen color to be used on the plot. Available colors are 1-Black, 2-Blue, 3-Red, and 4-Green. If more than one active ID is to be plotted the user may specify different pen colors for each ID. For plotters equipped with more than four pens the user must define the colors beginning with pen five.

(attribute option) is an opportunity for the user to have attribute information or item numbers plotted. If attributes or item numbers are to be plotted, the user will be prompted for a pen color as above.

(shade option) is an opportunity for the user to have the plot shaded. If shading is desired the user will be prompted for shade density parameters and angle of rotation. If more than one active ID is to be plotted the user may specify various shade combinations for each ID.

(logo option) is an opportunity for the user to have a logo plotted. If desired, the user will be prompted for the name of a previously created file. This file must be in unit-square import/export format and may be created using a utility routine (see Appendix F).

(ancillary annotation option) is an opportunity for the user to have one or more lines of text plotted. This feature allows explanatory text to be added to enhance understandability of the plot.

(legend option) is an opportunity for the user to have a map legend plotted. If desired the user will be prompted for the name of a file containing the legend information. This file may be created prior to use of the command using a utility routine (see Appendix F).

The following is an example of use of the ZETA command:

```
 ENTER COMMAND
? ZETA
 ZETA OUTPUT FILE NAME ?
MDRPLOT
 ENTER ACTIVE MAP I.D.(S) TO ZETA
? 1
OUTPUT MAP SCALE ?
? 24000
 PLOT WILL BE  12.49 BY   5.31 INCHES
******   SCALE ACCEPTABLE(Y OR N)?
? Y
```

```
 PLEASE ENTER PLOT BORDER OPTION
    0 = NO PLOT BORDER
    1 = NORMAL PLOT BORDER (DEFAULT)
    2 = THICK PLOT BORDER
? 1
 PLEASE ENTER CORNER TIC OPTION
    0 =   NO CORNER TICS, NO COLLAR
    1 =   CORNER TICS, NO COLLAR
    2 =   MAP COLLAR, NO TICS
    3 =   MAP COLLAR, TICS
? 1
 ENTER 60 CHARACTER OR LESS TITLE
? MULE DEER WINTER CONCENTRATION RANGE ON WOLF RIDGE
 PLEASE ENTER BAR SCALE OPTION
    0 =  NO BAR SCALE
    1 =  BAR SCALE
? 1
 PLEASE ENTER UNITS OF MEASURE ( FEET, MILES, NAUTICAL )
? MILES
 PLEASE ENTER INCREMENT LENGTH (DEFAULT= 1.0) ? 1.0
 PLEASE ENTER 3 BAR SCALE DIVISION VALUES ? .25 .5 .75
 ACCEPTING INPUT FOR MDRWOLFRG ACTIVE MAP   1 DATA TYPE   3

 ENTER PEN COLOR FOR ACTIVE MAP   3
 BLACK = 1, BLUE = 2, RED = 3, GREEN = 4
? 1
 ENTER ATTRIBUTE PLACEMENT OPTION
    0 =   NO ATTRIBUTE PLACEMENT
    1 =   FEATURE ATTRIBUTE AT CENTROID
    2 =   FEATURE ATTRIBUTE USING AUTOMATED PROCEDURE
    3 =   FEATURE ITEM NUMBER AT CENTROID
    4 =   FEATURE ITEM NUMBER USING AUTOMATED PROCEDURE
? 1
 PLEASE ENTER PEN COLOR FOR ATTRIBUTES ? 3
DO YOU WISH TO SHADE MAP MDRWOLFRG
? Y
 PLEASE ENTER 1 FOR SINGLE OR 2 FOR DOUBLE HATCH ? 1
DO YOU WISH THE SHADING DASHED ? ? N
 ENTER PERCENT SLOPE FOR HATCH ANGLE ? 45
 ENTER HATCH SPACING IN INCHES ? .1
 DO YOU WISH A LOGO TO BE PLOTTED ? Y
 PLEASE ENTER NAME OF LOGO FILE ? EXPORT
 DO YOU DESIRE ANCILLARY ANNOTATION (Y OR N) ? Y
```

```
DO YOU WISH ANCILLARY TEXT OUTPUT ? ? Y
BEGIN ENTERING TEXT. TERMINATE WITH A ZZ

? THIS IS AN EXAMPLE OF ANCILLARY ANNOTATION

? ZZ
DO YOU DESIRE A MAP LEGEND (Y OR N) ? Y
PLEASE ENTER NAME OF LEGEND FILE ? PLOT.LEGEND
```

The limitations of the ZETA command are as follows:

-- Input maps must be active.

-- Can not plot multivalue cell maps.

-- Window must be set.

-- Polygon outlines are not plotted if pen zero is selected.

The ZOOM command is summarized as follows:

ZOOM is a data display command that allows the user to magnify a portion of the display window specified by the WINDOW command. The user should display a map on the screen for orientation. The area to be magnified is indicated by pointing to two diagonal corners of a rectangle that bound the new area of interest. Pointing is accomplished with the CRT crosshair cursor. Effect of ZOOM can be reversed with the RESET command. If the GEOG option is used, the user may type in a geographic coordinate pair and set the display window with the coordinate pair as the center. In addition, if the POINT option is used, the user may set the magnification factor and locate a point at the center of the area to be enlarged.

The ZOOM command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

ZOOM (crosshair input)*

or,

ZOOM GEOG (latitude)* (longitude)* (window size)*

or,

ZOOM POINT (magnification factor)* (crosshair input)*

The individual parameters of the ZOOM command are described below:

(crosshair input) is where the user points with the CRT cursor to the opposite diagonal corners of the new viewing rectangle. This parameter is not used if the GEOG option is specified.

GEOG is an option where the user is prompted to type in a geographic coordinate pair which is the center of a viewing window also set by the user. This parameter may only be added in an un-prompted mode.

The following parameters are prompted for if the GEOG option is specified:

(latitude) and (longitude) are the coordinates of the a geographic pair used as the center of the window. Each will be prompted for seperately and should be entered in degrees, minutes and seconds.

(window size) is the height and width of the window entered in seconds of latitude and longitude.

POINT is an option where the user is prompted for a magnification factor and to point to the center of the area to be magnified. This parameter may only be added in an un-prompted mode.

The following parameter is prompted for if the POINT option is specified:

(magnification factor) is used to indicate the change in scale. For example, if 2 is entered and the map is replotted, the features on the resulting map will be shown twice as large.

The following are examples of use of the ZOOM commands:

```
 ENTER COMMAND
? ZOOM
 POINT TO CORNERS OF NEW DISPLAY WINDOW
```

or,

```
 ENTER COMMAND
? ZOOM GEOG
 ENTER LATITUDE TO ZOOM ON
? 39 56 8
 ENTER LONGITUDE TO ZOOM ON
 -108 24 43
 ENTER SECONDS OF LONGITUDE AND LATITUDE FOR WINDOW
? 180 180
```

or,

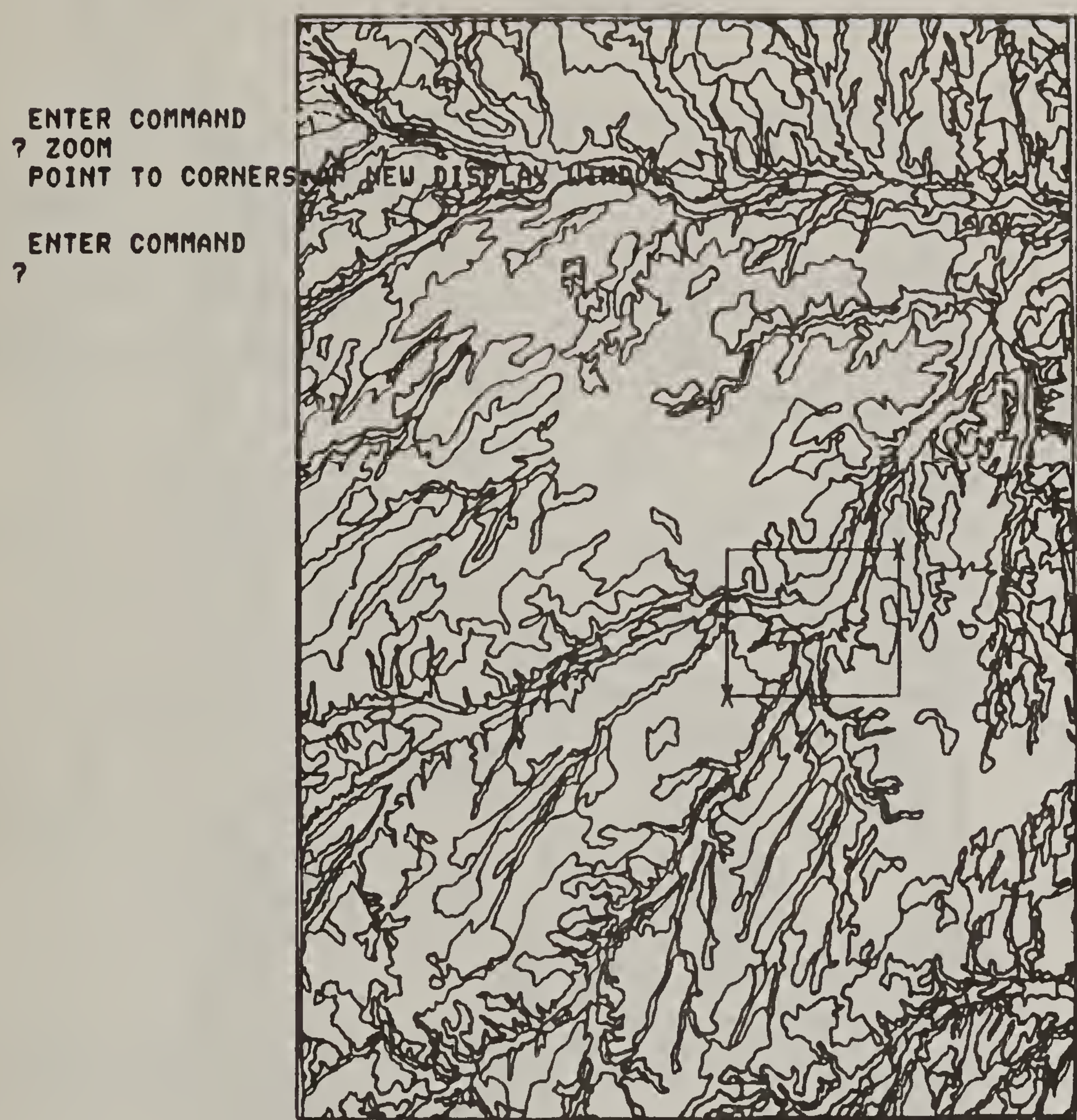
```
 ENTER COMMAND
? ZOOM POINT
 please enter MAGNIFICATION factor
? 2
 please point to ZOOM center
```

The limitations of the ZOOM command are as follows:

-- Cannot zoom to infinity, i.e., a point.

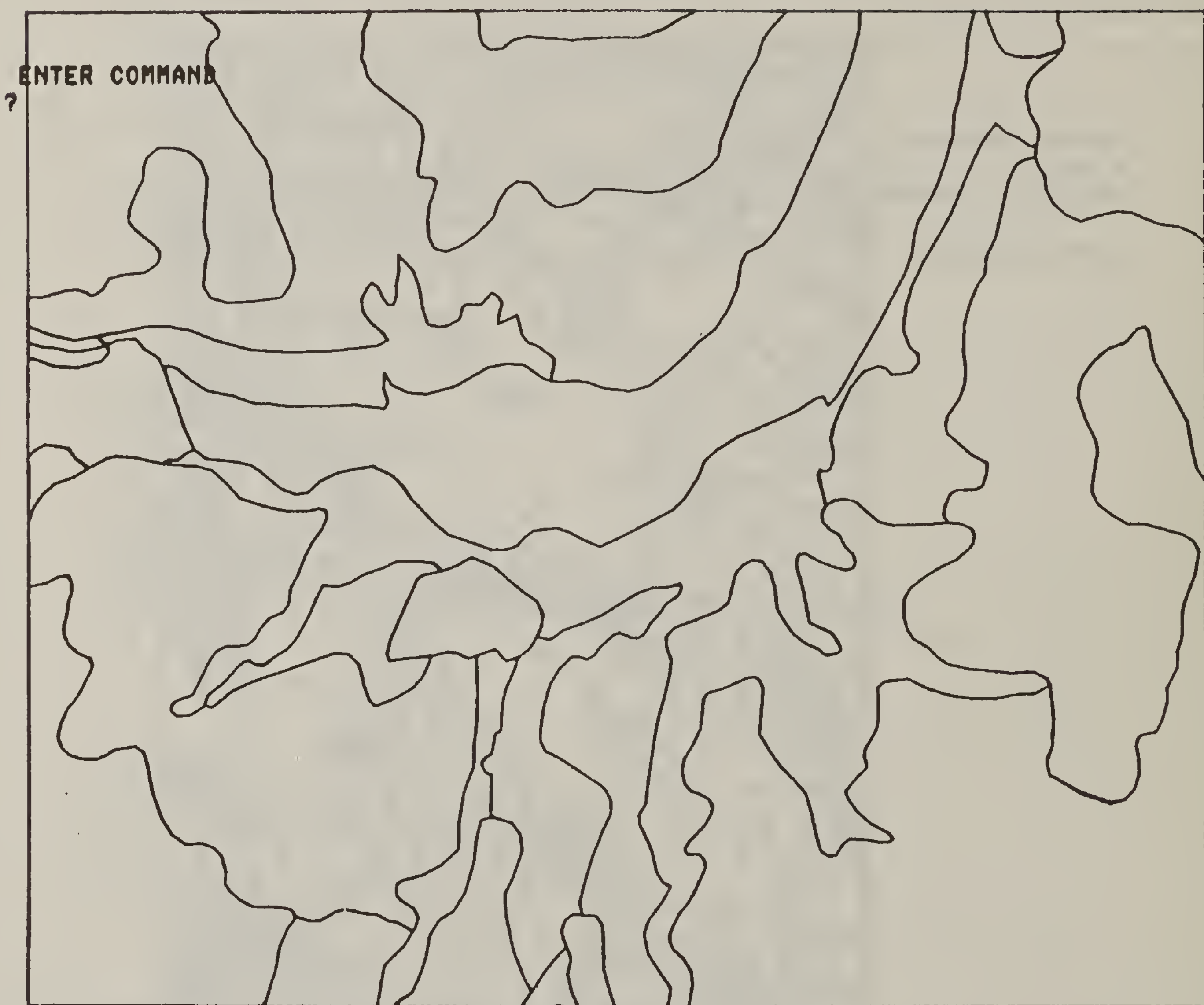
-- Cannot point outside of the viewing window, i.e., cannot use ZOOM to enlarge the viewing window.

Example of use of the ZOOM command:




The map of interest is of surface cover types on Wolf Ridge, CO. The area of interest is indicated by crosshair input, defined by the corners of a rectangle and subsequently enlarged as shown on the following page.

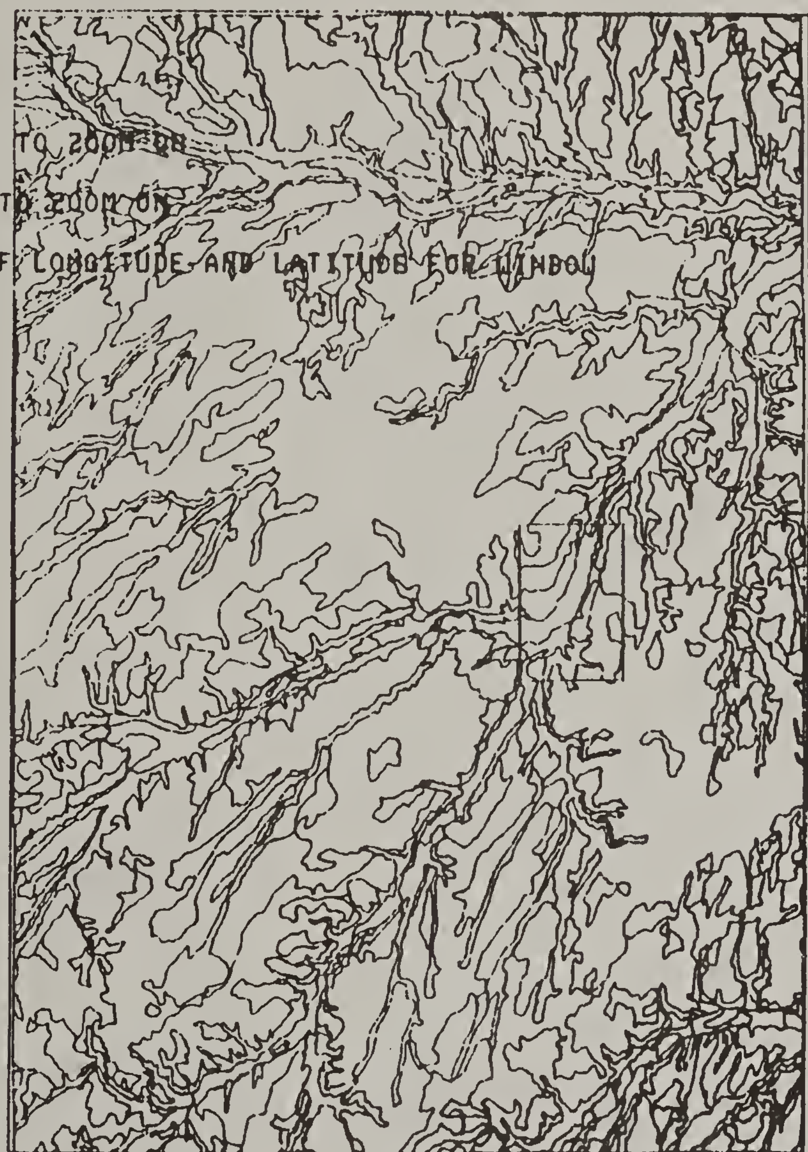
Result of use of the ZOOM command:




Resolution is increased over the previous plot.

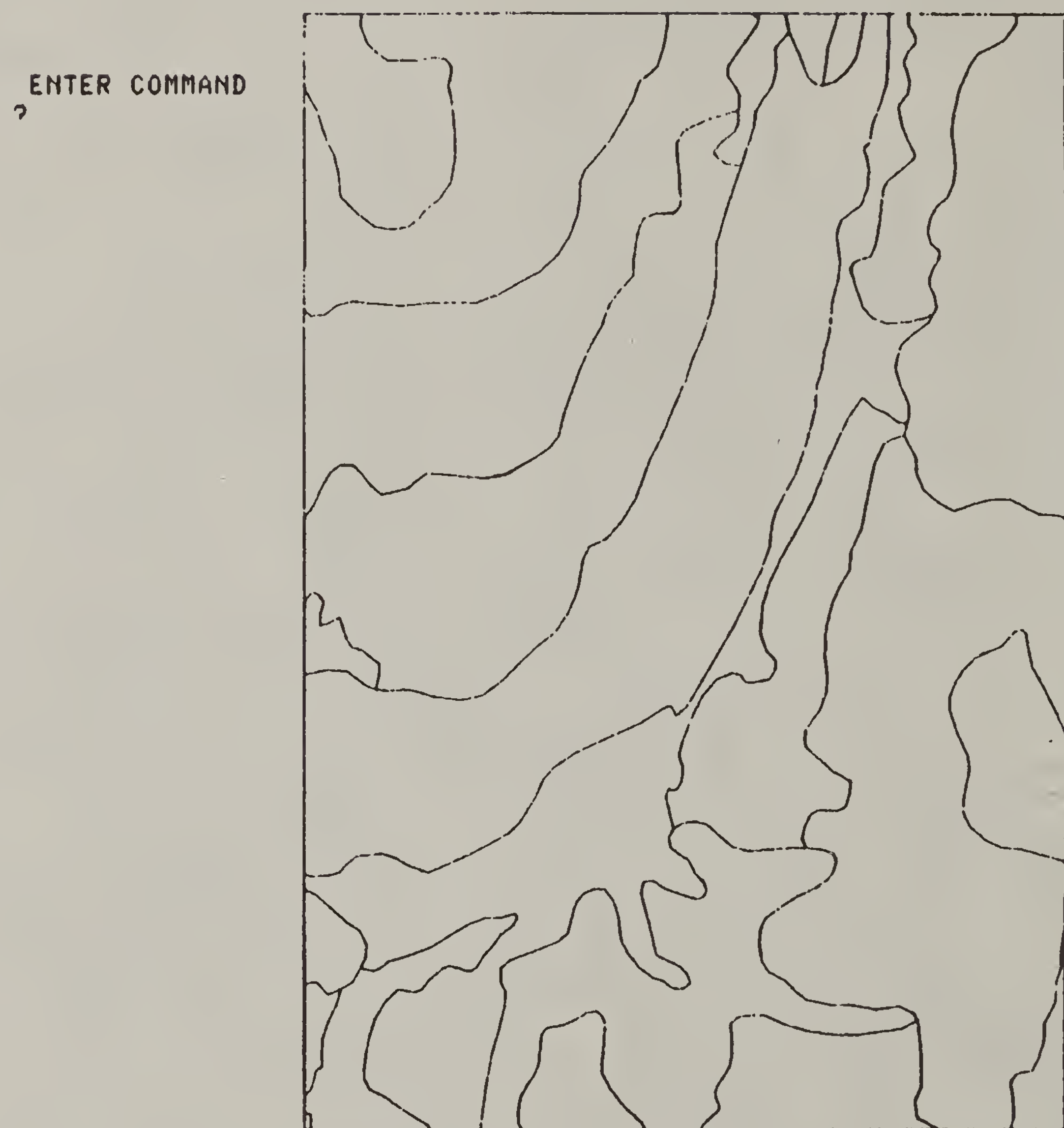
Example of the use of the ZOOM GEOG command:

```
 ENTER COMMAND
? ZOOM GEOG
 ENTER LONGITUDE TO ZOOM ON
? -180 24 43
 ENTER LATITUDE TO ZOOM ON
? 39 56 8
 ENTER SECONDS OF LONGITUDE AND LATITUDE FOR WINDOW
? 60 60
```



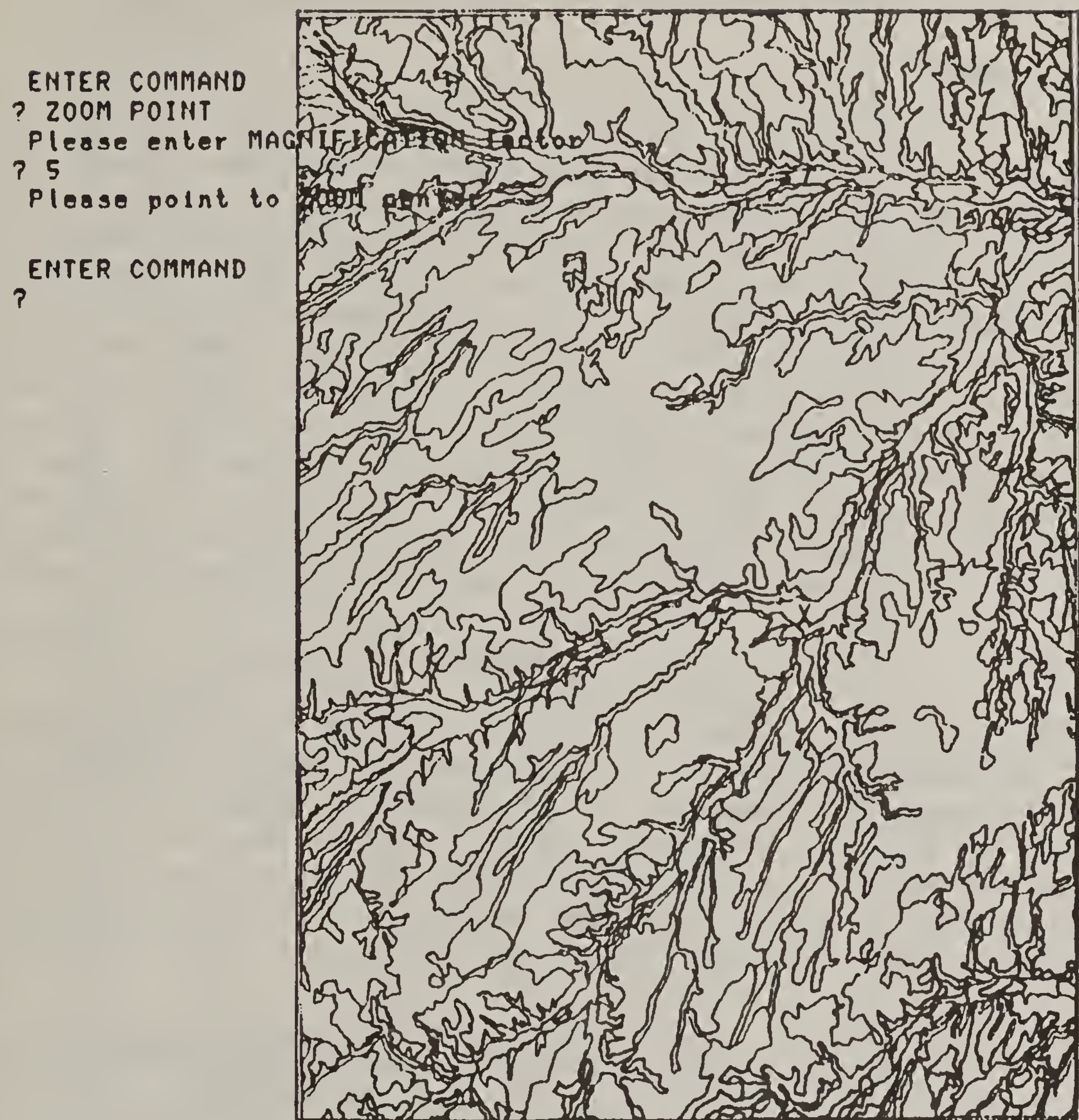
The map of interest is of surface cover types on Wolf Ridge, CO. The coordinate pair used for the center of the area to be enlarged can be obtained, if unknown, by the use of the LOCATE GEOG command. The area of interest is indicated by the boxed area on the map. Note that the size of enlargement is entered in seconds of longitude and latitude.

Result of use of the ZOOM GEOG command:




Resolution is increased over the previous plot.

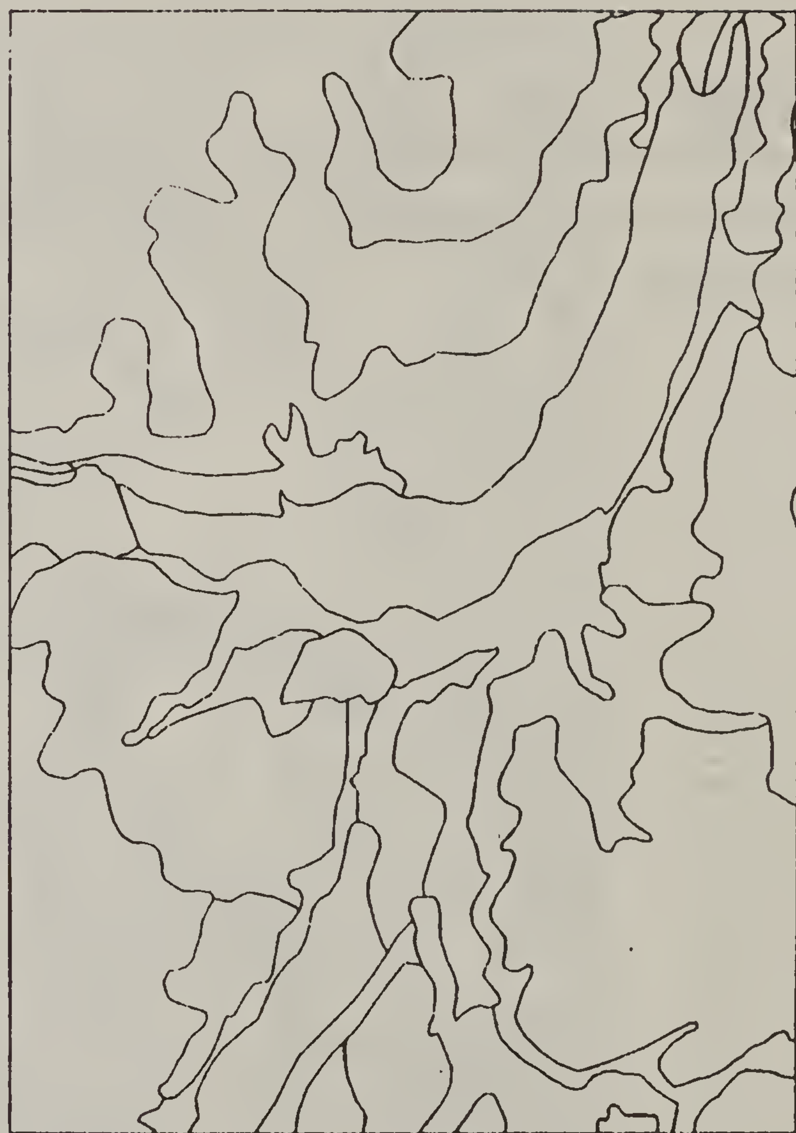
Example of use of the ZOOM POINT command:




The map of interest is of surface cover types on Wolf Ridge, CO. The crosshairs are simply centered on the area to be enlarged by the amount of magnification specified.

Example of use of the ZOOM POINT command:

ENTER COMMAND
?



Resolution is increased over the previous plot.

## GENERAL SYNTAX RULES

To perform a particular operation or function MAPS requires commands and phrases. All commands associated with processing operations of the system conform to the same general format. The individual components of this format are described below.

### Command Format

Each command must begin with a verb which defines the operation to be performed followed by any phrases that are associated with the command. A phrase is a particular name, value, or response that the user must provide along with the command verb. Most commands require additional phrases and these may only be entered in an un-prompted mode, i.e., all additional phrases must be entered along with the command verb. Most often, the first phrase required is the name of the map upon which the operation is to be performed, i.e., the object of the command verb. Additional phrases are called modifying phrases and are used to specify names of other maps to be retrieved as input, names of maps to be generated as output, and a variety of operations and numeric parameters. The command name and its phrases are specified in the form of an English-like sentence. The following, for example, is a valid command:

ADD THISMAP TO THATMAP FOR NEWMAP

A modifying phrase may be required, optional, cumulative, non-cumulative, mutually exclusive, and/or not applicable. A required modifying phrase must be specified at least once in a command. An optional modifying phrase is one which may be omitted and some standard value, operation, or name is then assumed. For example, if no map name is designated for a new map, the name "THATMAP" is automatically assumed. A cumulative modifying phrase is one which has a new modifying effect each time it is specified within a command. For example, the command:

AVERAGE MYMAP PLUS YOURMAP PLUS THEIRMAP FOR NEWMAP

is a cumulative modifying phrase because PLUS (mapname) has an individual contribution each time it is specified. In contrast, a non-cumulative modifying phrase, if specified more than once in a command, is simply replaced with each new specification. For example, the command:

RENAME MYMAP TO YOURMAP TO THEIRMAP TO OURMAP

would ultimately be interpreted as:

RENAME MYMAP TO OURMAP

A mutually exclusive phrase is one which may not be specified with other mutually exclusive phrases. Finally, a modifying phrase may simply not apply to a command, or may not have any effect if another phrase is specified.

Most commands call for two or more modifying phrases. The order in which these phrases is specified is flexible except in those instances where processing of a phrase is dependent upon an earlier phrase. Consider, for example, the difference between the following commands which include the same phrases but in different order:

```
AVERAGE THISMAP TIMES 20 MINUS THATMAP TIMES 80 FOR NEWMAP
AVERAGE THATMAP TIMES 80 MINUS THISMAP TIMES 20 FOR NEWMAP
```

Note that each command is read from left to right and that modifying phrases, like commands, are processed in the order in which they are specified.

Spacing

Words, numbers, and symbols may begin and end at any point along an eighty character input line as long as each is separated from the others by one or more blank spaces. All words, numbers, and symbols within a command are assumed to be made up entirely of non-blank characters, thus all blanks are assumed to mark the end of one word, number, or symbol and/or the beginning of another. Any characters past the sixteenth character of a word, number, or symbol are ignored. Furthermore, all non-blank characters (including incidental punctuation marks) are assumed to be part of the command.

Spelling

There is some flexibility in the way command names and phrases can be specified. Command names require at least four characters, more if these are not unique (e.g., EXPOSE and EXPONENTIATE). Most phrases may be abbreviated to two characters, where this is unique. Once enough characters have been read to identify the operation to be performed, any additional characters (up to the first blank space) are simply ignored. These additional characters may include misspellings. Map names and numbers may not be abbreviated and may not be misspelled.

Continuation Lines

Some commmands are short enough to be entered on a single input line. However, others are likely to require additional lines. Command lines may be extended by specifying a symbolic modifying phrase in the form of a comma (,). This indicates that the present line is to be continued by skipping immediately to the beginning of the next input line. Before the next line is read, the present line is checked for errors. If none occur, the new input line is prompted with a comma (rather than a question mark) and the command may be continued. Note that as a modifying phrase, all commas must be preceded by at least one blank space. Also note that a comma may not break up a logical phrase. Logical phrases are those modifying phrases grouped by paragraph in the command description. For example, the following is incorrect:

```
? RENUMBER THISMAP FOR NEWMAP ASSIGNING 1 TO 5 THROUGH ,
```

If a comma is used and a mistake has been made on the previous input line, the user can type in BACK as the first word of the new input line and be returned to the command prompt (?). For example:

```
? RENUMBER THISMAP FOR NEWMAP ASSIGNING 1 TO 5 THROUGH 10 ,
, ASSIGNING 0 TO 0 THROUGH 4 ,
, BACK (the user meant zero through three)
?
```

Command Concatenation

Several commands can be specified on a single input line by using a semi--colon (;) between commands. The semi-colon must be preceded by at least one blank space and followed by at least one blank space to be correctly interpreted. For example:

```
? SLOPE THISMAP FOR SLOPEMAP ; ASPECT THISMAP FOR ASPECTMAP ; INFORM
```

SUMMARY DESCRIPTION OF COMMANDS

The following is a list of MAPS commands in alphabetical order and a brief summary description of their function. Complete descriptions of commands follow in the next chapter.

| Command Name | Summary Description |
|---|---|
| 3D | Produces a 3-D display of any continuous elevation map. |
| ADD | Adds the cell values of two or more discrete or continuous maps to create a new continuous map. |
| AGGREGATE | Combines one or more dichotomous maps into a new discrete map. |
| ARCHIVE | Sets the file status indicator of an existing map to archived after removal from the database onto tape. |
| AREA | Provides an area table showing area by subject value and total area in acres or hectares for a dichotomous or a discrete map. |
| ASPECT | Computes azimuthal aspect, or direction of surface slope, of a continuous map to create a new continuous map. |
| AVERAGE | Averages the cell values of two or more discrete or continuous maps to create a new continuous map. |
| BAUD | Changes the default operating baud rate. |
| BOOLEAN | Performs logical operations (including AND, OR, XOR, or NOT) on one or more dichotomous maps to create a new dichotomous map. |
| BYE | Terminates the current session or stops execution of MAPS and returns the user to the MOSS program. |
| CATEGORIZE | Counts the occurrences of each cell value on a continuous map to create a new discrete map. |
| CLOSE | Closes the current master database. |
| CONSTANT | Assigns a single constant value to every cell in a discrete or continuous map to create a new discrete map. |
| CONTOUR | Generates a line-drawing of a continuous map by connecting those cells with equal values and which fall on a specified interval to represent a three-dimensional surface. |
| COPY | Copies a dichotomous, discrete, or continuous map to create a new, equal, dichotomous, discrete, or continuous map. |

| | |
|---|---|
| COST | Summarizes total units of resources (computer time, units of disk transfer, clock time, and total cost) incurred up to that point during the current session. |
| COVER | Combines two or more discrete or continuous maps by covering the cell values from the preceding map with the non-zero values from each succeeding map to create a new continuous map. |
| CROSS | Combines two discrete or continuous maps using the logical operations AND, OR, ANOT, or ONOT to create a new discrete map. |
| CUT | Cuts out a portion of a dichotomous, discrete, or continuous map according to the current viewing window or according to specified rows and columns to create a new, smaller dichotomous, discrete, or continuous map. |
| DEARCHIVE | Sets the file status indicator of an existing map from archived to exposed after entry into the database from tape. |
| DELETE | Deletes exposed maps from the database. |
| DESCRIBE | Provides a listing of header and projection information for a dichotomous or continuous cell map; or the header, projection, and subject information for a discrete cell or vector map. |
| DISPLAY | Allows graphics output to be sent to the log-on console or to a specified file. |
| DIVIDE | Divides the cell values of two or more discrete or continuous maps to create a new continuous map. |
| ERASE | Erases the console screen. |
| EXPLAIN | Provides a list of commands within functional group or provides a detailed explanation of a single command. |
| EXPONENTIATE | Raises the cell values from a discrete or continuous map by exponential powers represented by the cell values from one or more additional discrete or continuous maps to create a new continuous map. |
| EXPOSE | Sets the file status indicator of a map in the database to exposed which allows that map to be deleted, modified, or overwritten. |
| EXTRACT | Selects specified cell values and ranges of cell values from a discrete or continuous map and allows re-assignment to create a new discrete map. |
| FUNCTION | Performs a mathematical function (square root, logarithm, natural logarithm, rounded integral, truncated integral, absolute value, tangent, sine, cosine, arctangent, arcsine, or arccosine) on the cell values from a discrete or continuous map to create a new discrete or continuous map. |

| | |
|---|---|
| IMPORT | Creates MAPS compatible new maps from existing IDIMS cell maps, MOSS polycelled cell maps, and USGS digital elevation models. |
| INFORM | Provides a listing of current system status including date and time, working and master project names, read, write, and display files, whether the display window is set, number of soft errors incurred, the last seven commands specified, and total units of resources used. |
| INTERSECT | Produces an overlay intersection table and/or new discrete map from two existing discrete maps. |
| ISOLATE | Selects those cells with a specified value or range of values from a discrete map to create a new dichotomous map. |
| LABEL | Allows for entry or modification of header and projection information contained in a dichotomous or continuous cell map or of header, projection, and subject information contained in a discrete cell or vector map. |
| LIST | Provides an alphabetical listing of the map-name, indicator status, and map-type of maps in the working or master project. Optionally lists by map type or by a range of map names. |
| MATH | Performs mathematical operations or functions on cell values from one or a combination of discrete or continuous maps to create a new continuous map. |
| MAXIMIZE | Compares cell values from two or more discrete or continuous maps and selects the maximum value to create a new continuous map. |
| MERGE | Combines two or more dichotomous, discrete, or continuous maps whose areas may be adjacent or may intersect into a new dichotomous, discrete, or continuous map. |
| MINIMIZE | Compares cell values from two or more discrete or continuous maps and selects the minimum value to create a new continuous map. |
| MULTIPLY | Multiplies cell values of two or more discrete or continuous maps to create a new continuous map. |
| NEWS | Provides a narrative description of recent changes and other system information. |
| NOTE | Allows for the incorporation of non-command text during a session. |
| OPEN | Allows access to a different master database. |
| PAGE | Allows the default lines per page to be changed. |

| | |
|---|---|
| PLOT | Displays dichotomous, discrete, and continuous maps, or parts of maps, on the console or to a display file. |
| PRINT | Generates a character image of a discrete map on which may be sent to a line printer or to the log-on console. |
| PROTECT | Sets the file status indicator of a map in the database to protected which allows the map to be accessed but prevents it from being deleted, modified, or overwritten. |
| PROXIMITY | Selects those cells from a dichotomous, discrete, or continuous map which lie within, or outside of, a designated distance of cells of a specified range of values to create a new dichotomous, discrete, or continuous map. |
| QUERY | Provides information on a designated cell, or series of cells, from a dichotomous, discrete, or continuous map including cell value, northing and easting, row and column location and, if available, frequency and attribute descriptor. |
| RASTERIZE | Converts information from a point, line, or polygon vector map into cell format to create a new dichotomous, discrete, or continuous map. |
| READ | Allows command-input to be received from the console or from a specified file. |
| RENAME | Allows exposed, work project map names to be changed. |
| RENUMBER | Assigns new values to specified cell values or ranges of values and retains the old values of the remaining cells from a discrete or continuous map to create a new discrete map. |
| RESET | Resets the viewing window to that area specified by the most recent WINDOW command which counteracts the effect of previous ZOOM commands. |
| SCAN | Summarizes values of each cell from a continuous map with a summary statistic (average, total, maximum, minimum, most frequent, least frequent, diversity, deviation, or proportion) of the values surrounding that cell to create a new continuous map. |
| SCORE | Summarizes values of each cell from a discrete or continuous map with values of similar cells from a second discrete map according to a summary statistic (average, total, maximum, or minimum) to create a new discrete map. |
| SHADE | Displays a shaded plot of a dichotomous, discrete, or continuous map, or parts of maps, on the log-on console or to a display file. |

| | |
|---|---|
| SIZE | Counts the number of cells of each value from a discrete or continuous map and assigns these numbers to the cells of a new discrete map. |
| SLICE | Divides a range of cell values from a discrete or continuous map into an equal number of intervals and assigns each cell a value according to the ordinal position of the interval it falls into to create a new discrete map. |
| SLOPE | Computes the slope of a continuous map in percent rise over run to create a new continuous map. |
| SUBTRACT | Subtracts cell values of two or more discrete or continuous maps to create a new continuous map. |
| TOTAL | Generates a tabular summary for cell totals within one or more cell maps. |
| VIEW | Displays an existing read or write file on the output console or provides a plot of a display file on a graphics console. |
| VISTA | Determines the visibility of a specified viewing cell(s) with respect to a specified observer cell(s) from a discrete or continuous map to create a new discrete or continuous map of visible or invisible area. |
| WINDOW | Sets the viewing window to a particular area of the earth's surface represented by one or more specified vector or cell maps. |
| WRITE | Allows character output to be sent to either the console or to a specified file. |
| ZONE | Selects cells within a specified distance and range of values from a dichotomous, discrete, or continuous map to create a new discrete map. |
| ZOOM | Magnifies a specified portion of the viewing window. |

# 7. THE MAPS COMMANDS

3D
ADD
AGGREGATE
ARCHIVE
AREA
ASPECT
AVERAGE
BAUD
BOOLEAN
BYE
CATEGORIZE
CLOSE
CONSTANT
CONTOUR
COPY
COST
COVER
CROSS
CUT
DEARCHIVE
DELETE
DESCRIBE
DISPLAY
DIVIDE
ERASE
EXPLAIN
EXPONENTIATE
EXPOSE
EXTRACT
FUNCTION
IMPORT
INFORM
INTERSECT
ISOLATE
LABEL
LIST
MATH
MAXIMIZE
MERGE
MINIMIZE
MULTIPLY
NEWS
NOTE
OPEN
PAGE
PLOT
PRINT
PROTECT
PROXIMITY
QUERY
RASTERIZE
READ
RENAME
RENUMBER
RESET
SCAN
SCORE
SHADE
SIZE
SLICE
SLOPE
SUBTRACT
TOTAL
VIEW
VISTA
WINDOW
WRITE
ZONE
ZOOM

The 3D command is summarized as follows:

3D is a data display command which generates a line drawing of an existing integer-value continuous map by tracing the outline of the elevation row by row. The result is a three-dimensional display of the map. The map may be displayed from different directions by rotating it, from different height perspectives by varying the viewing angle above the surface, and with exaggerated depth by magnifying the vertical dimensions. The display may include an outline of every row in the map, or may skip rows and outline only each row which falls on a row increment.

The 3D command is specified as follows:

3D (oldmap) MAGNIFY (value) ROTATE (angle) ABOVE (angle) ,
INTERVAL (value)

The individual phrases of the 3D command are described below.

3D (oldmap) is a required phrase which specifies (oldmap) as the existing integer-value continuous map which is to be displayed.

MAGNIFY (value) is an optional modifying phrase which specifies (value) as a positive or negative real value which defines the magnification of the vertical dimensions of (oldmap). Specifying a negative (value) results in a mirror-image of the display resulting from the same positive (value) magnification.

ROTATE (angle) is an optional modifying phrase which specifies (angle) as a positive or negative integer, representing degrees from -180 to 180 that the map is to be rotated around its center for viewing. A positive (angle) results in the map being rotated counterclockwise from North, a negative (angle) results in the map being rotated clockwise from North, and a zero (angle) results in no rotation, i.e., the map is viewed directly from the South.

ABOVE (angle) is an optional modifying phrase which specifies (angle) as a positive integer, representing degrees from 0 to 180, indicating the angle above the surface from which the map is to be viewed. A positive (angle) results in the map being viewed from a perspective height above the surface, and a zero (angle) results in the map being viewed from a surface perspective.

INTERVAL (value) is an optional modifying phrase which specifies (value) as a positive integer which defines the increment of rows to be displayed. Specifying an increment of one results in every row being outlined. A larger (value) speeds up the display processing time by only displaying every nth row.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid 3D commands:

```
3D ELEVMAP  MAGNIFY 1.5  ROTATE -45  ABOVE 30  INTERVAL 20

3D ELEVMAP  ROT 40  MAG 2  INT 5

3D WYOELEV
```

The limitations of the 3D command are as follows:

-- Viewing window must be set.

-- Can only display continuous integer-value elevation maps.

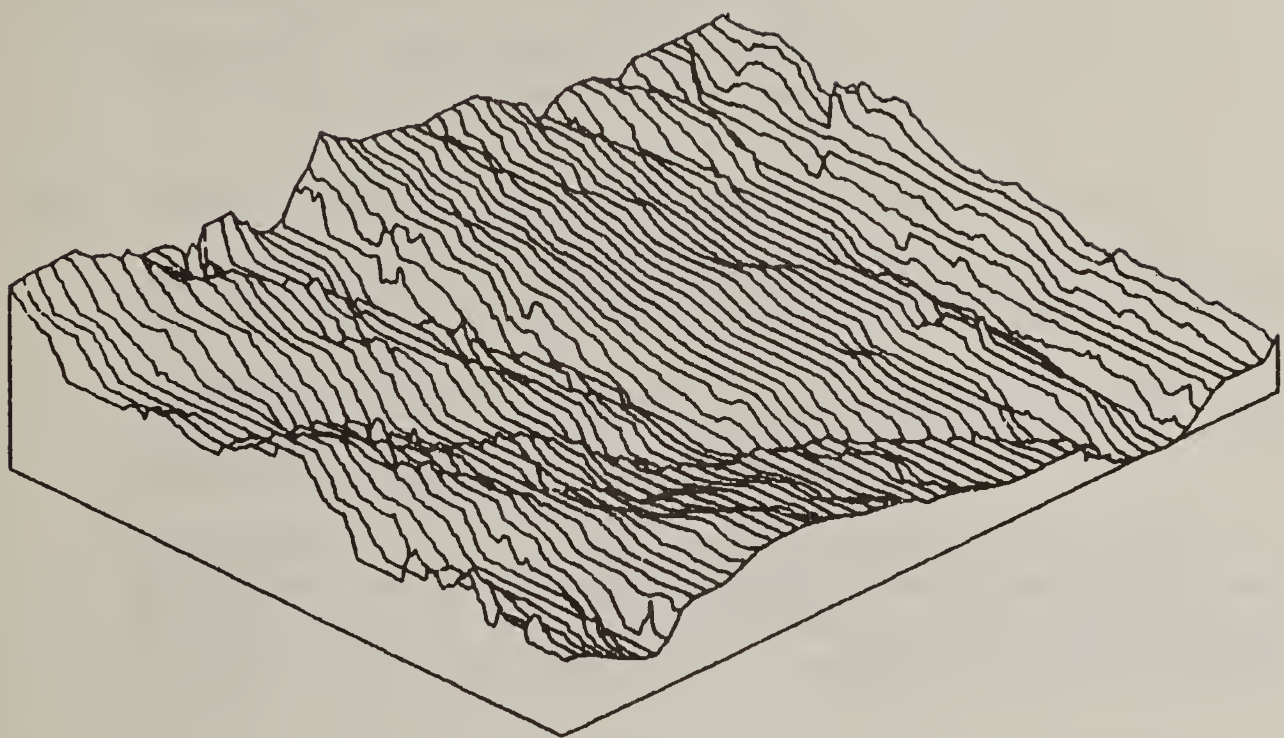
-- Can only display one map at a time.

-- If the angle the map is rotated is less than 0 degrees or more than 90 degrees, all of the borders will not be plotted.

-- If the map to be plotted was generated in MOSS, it will plot erratically. To 3D a MOSS cell map, convert it to integer format by using the FUNCTION command.

Example of use of the 3D command:

```
? 3D ELEVATION MAG 3 ROT -45 ABOV 35 INT 5
```



A three-dimensional plot of an integer-value continuous elevation map of Wolf Ridge, CO (ELEVATION). Vertical dimensions are magnified three times, the map is rotated 45 degrees clockwise, viewing perspective is 35 degrees above the surface, and every fifth row is displayed.

The ADD command is summarized as follows:

ADD is an overlay analysis command which creates a new continuous map by adding the cell values of two or more existing discrete or continuous maps on a cell-by-cell basis.

The ADD command is specified as follows:

```
ADD (oldmap)  TO (oldmap)  TO (oldmap)  ,
TO (oldmap)   TO (oldmap)  FOR (newmap)
```

The individual phrases of the ADD command are described below:

ADD (oldmap) is a required phrase which specifies (oldmap) as the name of an existing discrete or continuous map which is to be added.

TO (oldmap) is a required phrase which specifies (oldmap) as the name of an existing discrete or continuous map which is also to be added. This phrase is cumulative up to 63 times.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid ADD commands:

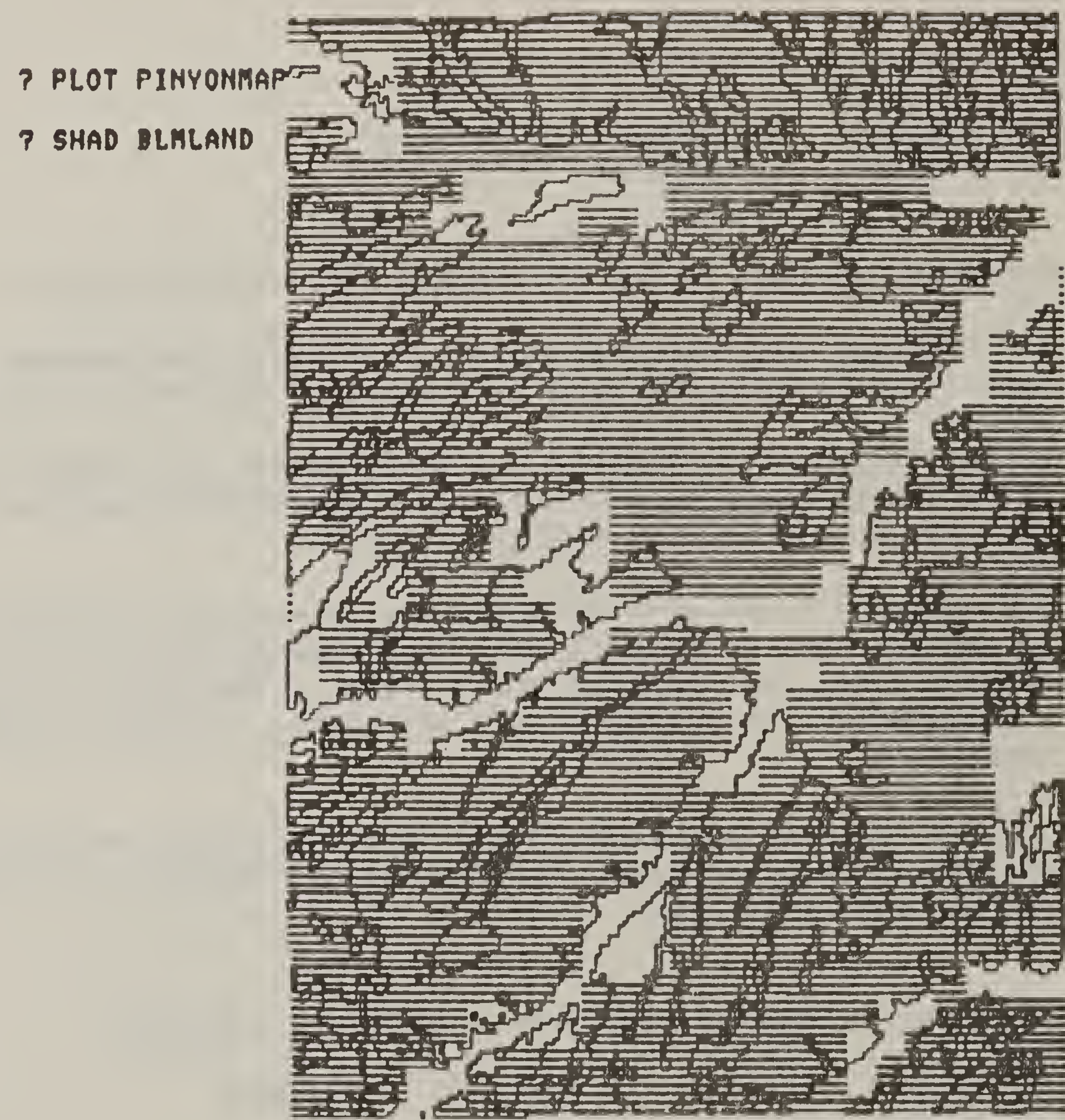
```
ADD MAPONE  TO MAPTWO  TO MAPTHREE  FOR NEWMAP

ADD MAPONE  TO MAPTWO  TO MAPTHREE ,
TO MAPFOUR  TO MAPFIVE
```

The limitations of the ADD command are as follows:

-- Cannot use dichotomous maps.

-- No more than 64 maps may be added with a single command.

Example of use of the ADD command:



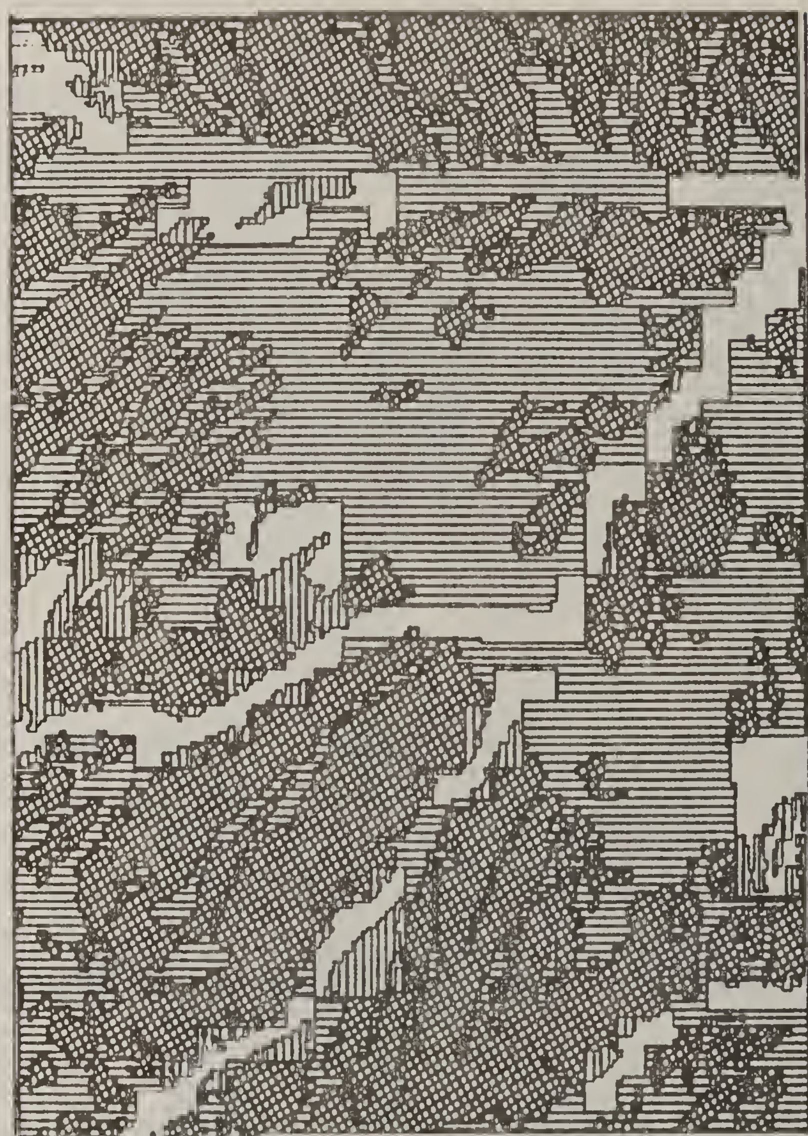

A plot of pinyon-juniper forest and a shaded display of BLM land. These two maps will be added together as in the following.

Example of result of use of the ADD command:

```
? DESC BLMLAND

    1 SUBJECTS IN MAP BLMLAND
   ID         VALUE    FREQUENCY    SUBJECT
    1        1.0000      30887.0    BLM

? DESC PINYONMAP

    4 SUBJECTS IN MAP PINYONMAP
   ID         VALUE    FREQUENCY    SUBJECT
    1        5.0000      16453.0    423PJSG
    2        5.0000        641.0    423PJBS
    3        5.0000        253.0    422PJ
    4        5.0000         11.0    423PJHA

? ADD BLMLAND TO PINYONMAP FOR BLMPINYON

OK  OPERATED FOR BLMPINYON

? DESC BLMPINYON

EXPOSED   MAP BLMPINYON
DESCRIPTION   LAND STATUS         WOLF RIDGE         COLORADO  1:24000
STUDY AREA    WHITER   PROJECTION LAMBERT
DATE          12/14/83  SOURCE WAMS                 VINTAGE 1982
TYPE    8 CONTINUOUS    SUBJECTS        0
CELL HEIGHT    63.6149  CELL WIDTH     63.6149
NUMBER OF ROWS     219  NUMBER OF COLUMNS  169
CELL ACRES      1.0000
MINIMUM VALUE          .0000      MAXIMUM VALUE        6.0000
MBR: SOUTH  430036.7000 NORTH  443968.4000 EAST 5053441.0900 WEST 5042690.0000
```

Two discrete maps are added together; a map of BLM land and a map of pinyon-juniper forest. The resulting map is continuous and contains background (value 0), BLM land without forest (value 1), forest not on BLM land (value 5), and forest on BLM land (value 6). This is illustrated on the following page.

Example of result of use of the ADD command:



A plot of the resulting map (BLMPINYON) showing BLM land without forest (horizontal shading), forest not on BLM land (vertical shading), and forest on BLM land (cross-hatch).

The AGGREGATE command is summarized as follows:

AGGREGATE is a data reclassification command which creates a discrete map from existing dichotomous maps, by assigning each dichotomous map a cell value to incorporate it into the new discrete map. In the case where more than one (oldmap) has the same cell turned on, that cell will receive the value assigned to the first map incurred.

The AGGREGATE command is specified as follows:

```
AGGREGATE  ASSIGNING (value)  TO (oldmap)  ,
ASSIGNING (value)  TO (oldmap)  FOR (newmap)
```

The individual phrases of the AGGREGATE command are described below:

AGGREGATE is the required verb which specifies the command.

ASSIGNING (value) is a required phrase which specifies (value) as the new cell value which will be assigned to the next dichotomous map specified by TO (oldmap) as it is incorporated into the new discrete map. This phrase is cumulative up to 64 times.

TO (oldmap) is a required phrase which specifies (oldmap) as an existing dichotomous map which will become part of the new discrete map. This phrase is cumulative up to 64 times.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the name of the new discrete map to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid AGGREGATE commands:

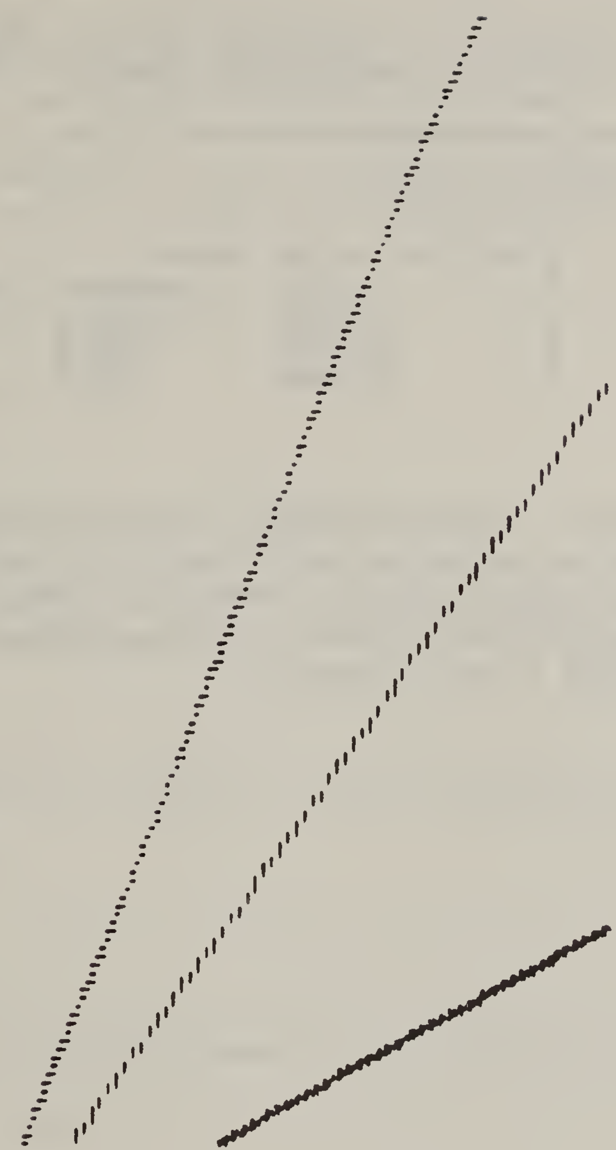
```
AGGREGATE ASSIGNING 1 TO THISMAP  ,
ASSIGNING 3 TO FIRSTMAP FOR NEWMAP

AGGR ASSI 23.5 TO THISMAP
```

The limitations of the AGGREGATE command are as follows:

-- Cannot use discrete or continuous maps.

-- Cannot input more than 64 maps per issuance of the command.

Example of use of the AGGREGATE command:



Three separate dichotomous maps of mule deer migration routes on Wolf Ridge, CO are displayed with different shading. The command is used to combine these maps into a single discrete map.

Example of result of use of the AGGREGATE command:

```
? AGGR AS 1 TO MIGRATION1 AS 2 TO MIGRATION3 ,
, AS 3 TO MIGRATION2 FOR MIGMAP

OK  AGGREGATED FOR MIGMAP

? DESC MIGMAP

    3 SUBJECTS IN MAP MIGMAP
   ID          VALUE    FREQUENCY   SUBJECT
    1         1.0000        311.0
    2         2.0000        258.0
    3         3.0000        122.0
```

The command is used to create a discrete (type 7) map of mule deer migration routes on Wolf Ridge, CO from three separate dichotomous (type 6) maps. Note that if any of these maps had overlapped, the value assigned would be that of the first map specified in the command.

The ARCHIVE command is summarized as follows:

ARCHIVE is a data manipulation command which sets the file status indicator of a map to archived. Before a map can be archived, the files associated with the map must be moved from disk to the archival storage medium and deleted from disk. After a map is archived its name will remain in the list of maps in the project, but the map cannot be used for processing. The map name remains in the map names list to serve as a reminder of its existence and the DESCRIBE command with the HEADER option provides additional information about the map. The DEARCHIVE command has the opposite effect of the ARCHIVE command.

The ARCHIVE command is specified as follows:

ARCHIVE (oldmap)

The individual phrase of the ARCHIVE command is described below:

ARCHIVE (oldmap) is a required phrase which specifies (oldmap) as the name of the existing exposed work project map to be archived.

The following are typical examples of valid ARCHIVE commands:

ARCHIVE THISMAP

ARCH THISMAP

The limitations of the ARCHIVE command are as follows:

-- None found to date.

The AREA command is summarized as follows:

AREA is a data description command which provides a tabular area summary for dichotomous and discrete cell maps. The area summary can be provided in acres or hectares. For dichotomous maps the area of the mapped value as well as the area of the absence or background is presented. For discrete maps the value, area, frequency, percent of the total non-background cells in the subject, and the attribute descriptor (if the map has descriptors) is presented. The total area, frequency, and percent is then presented along with the area of the background or absence of the mapped values. Optionally, this line of totals may be presented without listing each subject. The product of value multiplied by area can be substituted for frequency and the percent of the total product in the subject substituted for percent of area.

The AREA command is specified as follows:

AREA (oldmap) TALLYING TOTALING IN (option)

The individual phrases of the AREA command are specified below:

AREA (oldmap) is a required phrase which specifies (oldmap) as the name of an existing dichotomous or discrete map on which to perform the area summary.

TALLYING is an optional modifying phrase which specifies that the product of value multiplied by area and the percent of each subject in the total product is to be presented instead of frequency and percent of area for each subject. This option is useful when a rating is required for each subject based on quality(value) and quantity(area). TALLYING does not apply to dichotomous maps since there are no values or subjects.

TOTALING is an optional modifying phrase which specifies that the line of total frequency, area, and percent is to be presented without listing each subject. This phrase has no effect on dichotomous maps.

IN (option) is an optional modifying phrase which specifies that the area values are to be presented in terms of ACRES or HECTARES. Valid choices for (option) are:

ACRES to present area in units of acres.
HECTARES to present area in units of hectares.

If no IN (option) is specified the area is presented in units of ACRES.

The following are typical examples of valid AREA commands:

```
AREA  THISMAP  TOTALING  IN  HECTARES

AREA  THISMAP  TALLYING
```

The limitations of the AREA command are as follows:

-- Cannot use continuous maps.

Examples of output from use of the AREA command:

```
? AREA MDPUOLFRGC

   3 SUBJECTS IN AREA SUMMARY FOR MAP MDRUOLFRGC        05/31/85
  ID         VALUE        AREA FREQUENCY      %  SUBJECT

   1        1.0000     6371.00    6371.0 17.43  MULE DEER UINT CONC/UINT RANGE
   2        2.0000    30070.00   30070.0 82.25  MULE DEER UINTER RANGE
   3        3.0000      120.00     120.0   .33  MULE DEER SUMMER RANGE
---------------------------------------------
TOTAL ACRES          36561.0    36561.0 98.78  (       450.0 ACRES BACKGROUND)

? AREA MDRUOLFRGC IN HECTARES

   3 SUBJECTS IN AREA SUMMARY FOR MAP MDRUOLFRGC        05/31/85
  ID         VALUE        AREA FREQUENCY      %  SUBJECT

   1        1.0000     2578.25    6371.0 17.43  MULE DEER UINT CONC/UINT RANGE
   2        2.0000    12168.89   30070.0 82.25  MULE DEER UINTER RANGE
   3        3.0000       48.56     120.0   .33  MULE DEER SUMMER RANGE
---------------------------------------------
TOTAL HECTARES       14795.7    36561.0 98.78  (       182.1 HECTARES BACKGRND)

? AREA MDRUOLFRGC TALLYING

   3 SUBJECTS IN AREA SUMMARY FOR MAP MDRUOLFRGC        05/31/85
  ID         VALUE        AREA   PRODUCT      %  SUBJECT

   1        1.0000     6371.00    6371.0  9.53  MULE DEER UINT CONC/UINT RANGE
   2        2.0000    30070.00   60140.0 89.93  MULE DEER UINTER RANGE
   3        3.0000      120.00     360.0   .54  MULE DEER SUMMER RANGE
---------------------------------------------
TOTAL ACRES          36561.0    66871.0100.00  (       450.0 ACRES BACKGROUND)

? AREA MDRUOLFRGC TOTALING

   3 SUBJECTS IN AREA SUMMARY FOR MAP MDRUOLFRGC        05/31/85
  ID         VALUE        AREA FREQUENCY      %  SUBJECT

TOTAL ACRES          36561.0    36561.0 98.78  (       450.0 ACRES BACKGROUND)
```

MDRWOLFRGC is a raster map of mule deer ranges on Wolf Ridge, CO. The first table is in acres and the second is in hectares.

The ASPECT command is summarized as follows:

ASPECT is a neighborhood analysis command which creates a new continuous map from an existing continuous map, usually a topographic elevation map. The azimuthal aspect, or direction the surface slope faces, for each cell on the new map is calculated by first computing the slope values (the difference in the elevation of two points divided by the distance in meters between them) from the current point to each of its neighboring points within a roving matrix window of specified size. The resulting aspect is an integer value from 0 through 359 representing degrees clockwise from North. This indicates the direction the slope faces as determined from the minimum, maximum, or vector sum of this matrix of slope values. The matrix, whose size may range from a 3x3 to a 31x31 grid, specifies a roving window centered around the current cell which moves along the existing map's continuous surface to identify the neighborhood for each of the following cells from the existing map as they become the current one. If a cell lies such that its matrix extends beyond the edge of the map, the cell values from the edgemost row or column are used to fill the matrix where it extends beyond the edge of the map.

The ASPECT command is specified as follows:

ASPECT (oldmap) (option) MATRIX (value) FOR (newmap)

The individual phrases of the ASPECT command are described below:

ASPECT (oldmap) is a required phrase which specifies (oldmap) as the name of the existing continuous map upon which aspect is to be computed.

MATRIX (value) is an optional modifying phrase which specifies (value) as the row-column size of the square matrix, or grid, centered around the current cell which defines the neighboring cells. (Value) must be an odd whole number which is greater than or equal to 3 and less than or equal to 31. A larger matrix (value) will produce a different effect on the resultant (newmap) than will a smaller (value). If omitted, the matrix (value) is set to the default of 3.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map; a PROTECTED workfile map; or a read, write, or display file. If omitted, the name THATMAP is assumed.

The following phrases are the (options) available for computing the aspect. If omitted, the SUM phrase is used as the default.

MAXIMUM is an optional modifying phrase which specifies that the new map will be assigned the aspect of the absolute maximum of the slope values computed from the current cell to each of the neighboring cells within the specified matrix. If the slope is the same for all surrounding cells, aspect is assigned to the closest cell on the left.

MINIMUM is an optional modifying phrase which specifies that the new map will be assigned the aspect of the absolute minimum of the slope values computed from the current cell to each of the neighboring cells within the specified matrix. If the slope is the same for all surrounding cells, aspect is assigned to the closest cell on the left.

SUM is an optional modifying phrase which specifies that the new map will be assigned the aspect of the vector sums computed with a formula for regression coefficients. Using a 3x3 matrix for this example, the aspect of the vector sums is calculated as follows:

| | | |
|---|---|---|
| Z1 | Z2 | Z3 |
| Z4 | Z5 | Z6 |
| Z7 | Z8 | Z9 |

In the calculation, the cell values are designated as Z1, Z2, Z3,... Z9, as indicated above; the cell height is referred to as YSIDE; and the cell width as XSIDE. First, the slope of the north-south component (YSLOPE) and the slope of the east-west component (XSLOPE) are found.

YSLOPE = ((Z1 - Z7) + (Z2 - Z8) + (Z3 - Z9)) / (6 x YSIDE)
XSLOPE = ((Z3 - Z1) + (Z6 - Z4) + (Z9 - Z7)) / (6 x XSIDE)

Next, the resulting percent aspect is computed based on these slope components. If both the XSLOPE and YSLOPE are zero, the aspect is assigned the value 360.

ASPECT = ARCTAN2 (XSLOPE , YSLOPE)

The following are typical examples of valid ASPECT commands:

```
ASPECT THISMAP  MINIMUM  MATRIX 7  FOR MINASPECT7

ASPE THISMAP  FOR SUMASPECT3
```

The limitations of the ASPECT command are as follows:

-- Cannot input dichotomous or discrete maps.

Example of result of use of the ASPECT command:

A plot of azimuthal aspect values 157.5 - 202.5 (clear) and surface water streams (solid) on Wolf Ridge, CO. Direction of surface slope is in degrees clockwise from North and was calculated using the SUM option.

The AVERAGE command is summarized as follows:

AVERAGE is an overlay analysis command which creates a new continuous map by averaging the weighted values of two or more existing discrete or continuous maps on a cell-by-cell basis. New map values are computed by multiplying the values of each existing map by a constant weight value assigned to that map, adding the resultant values for each individual cell, then dividing each cell's total by the sum of all assigned weights. If no weight is assigned to a map, the default value of 1.0 is assumed.

The AVERAGE command is specified as follows:

```
AVERAGE (oldmap) TIMES (value)  ,
PLUS (oldmap)  TIMES (value)  FOR (newmap)
```

The individual phrases of the AVERAGE command are described below.

AVERAGE (oldmap) is a required phrase which specifies (oldmap) as the name of an existing continuous or discrete map which is to be averaged.

PLUS (oldmap) is a required phrase which specifies (oldmap) as the name of an existing continuous or discrete map which is also to be averaged. This phrase is cumulative up to 63 times.

TIMES (value) is an optional modifying phrase which specifies (value) as the weighted value assigned to the most recently indicated (oldmap). If omitted, a weight of 1.0 is assumed.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid AVERAGE commands.

AVERAGE MAPP1 PLUS MAPP2 TIMES 5 FOR NEWMAP

AVER MAPP1 PLUS MAPP2 PLUS MAPP3

The limitations of the AVERAGE command are as follows:

-- Cannot use dichotomous maps.

-- No more than 64 maps may be input per issuance of the command.

The BAUD command is summarized as follows:

BAUD is a program control command which sets the transmission baud rate. On initial entry into the system, the baud rate is 9600. If you are using a line to the computer that is not 9600 baud, set the baud rate to the rate of your line to the computer.

The BAUD command is specified as follows:

BAUD (rate)

The individual phrase of the BAUD command is described below.

BAUD (rate) is a required phrase which specifies (rate) as the value of the current baud rate.

The following are typical examples of valid BAUD commands.

BAUD 300

BAUD 1200

The limitations of the BAUD command are as follows:

-- Can only specify baud rates of 300, 1200, 2400, 4800, or 9600.

The BOOLEAN command is summarized as follows:

> BOOLEAN is an overlay analysis command which creates a new dichotomous map by performing Boolean operations on existing dichotomous maps. The Boolean expression may include phrases made up of map names and the available logical operations--AND, OR, XOR, NOT, ANOT and ONOT.

The BOOLEAN command is specified as follows:

```
BOOLEAN  FOR (newmap)  ,
( (oldmap) OR (oldmap) ) AND ( (oldmap) XOR (oldmap) )  ,
AND  NOT (oldmap)
```

The individual phrases of the BOOLEAN command are described below.

> BOOLEAN is the required verb which specifies the command. This must be followed by one or a combination of Boolean expressions, as explained below.

> FOR (newmap) is an optional modifying phrase which specifies (newmap) as the name of the new binary map to be created. If omitted, the name "THATMAP" is assumed.

> , is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The remaining phrases may be used repeatedly in various combinations to form Boolean expressions. These expressions may include up to 128 phrases, or up to 64 (oldmap) names, whichever comes first. To comply with legal syntax, each phrase specifies the legal choice of phrases which may follow it, and whether or not that phrase may legally begin or end a Boolean expression. Only those phrases which end an expression may be followed by the FOR phrase. In addition, it is legal to follow any of the phrases with the "," phrase to indicate continuation.

> (oldmap) is an optional modifying phrase which specifies (oldmap) as an existing binary map to be processed as an operator in a Boolean expression. This phrase is valid to either begin or end an expression. The legal phrases which may follow (oldmap) are: )  OR  AND  XOR  ANOT  ONOT.

> AND is an optional modifying phrase which specifies the operation of logical intersection. This operation requires two operators. The legal phrases which may follow AND are: (  NOT  (oldmap).

OR is an optional modifying phrase which specifies the operation of logical union. This operation requires two operators. The legal phrases which may follow OR are: ( NOT (oldmap).

XOR is an optional modifying phrase which specifies the operation of logical exclusive union. This operation requires two operators. The legal phrases which may follow XOR are: ( NOT (oldmap).

NOT is an optional modifying phrase which specifies the operation of logical negation. This operation requires a single operator. This phrase is valid to begin an expression. The legal phrases which may follow NOT are: ( NOT (oldmap).

ANOT is an optional modifying phrase which specifies the first condition be met and the second condition not be met. It is a valid contraction of AND NOT. It requires two operators. The legal phrases which may follow ANOT are: ( (oldmap).

ONOT is an optional modifying phrase which specifies that either the first condition be met or the second condition not be met, or both. It is a valid contraction of OR NOT. It requires two operators. The legal phrases which may follow ONOT are: ( (oldmap).

( is an optional modifying phrase which acts as a delimeter within a complex expression. This phrase is valid to begin an expression. Each ( phrase used must be matched with a corresponding ) phrase. The legal phrases which may follow ( are: ( NOT (oldmap).

) is an optional modifying phrase which acts as a delimeter within a complex expression. This phrase is valid to end an expression. Each ) phrase used must be preceded by a corresponding ( phrase. The legal phrases which may follow ) are: ) OR AND XOR (oldmap).

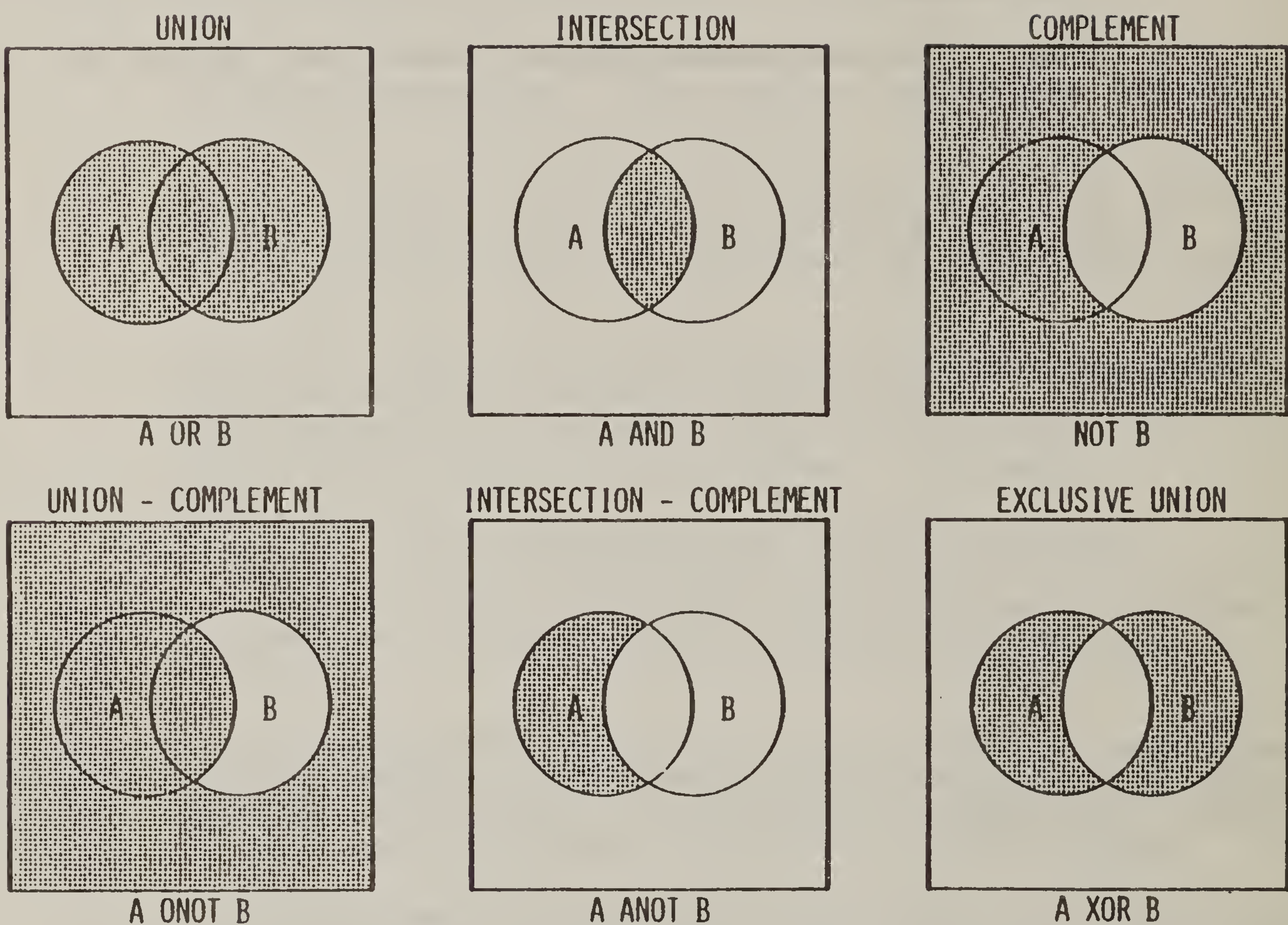
The following are typical examples of valid BOOLEAN commands.

```
BOOLEAN  NOT FIRSTMAP

BOOL FOR NEWMAP ( FIRSTMAP OR SECONDMAP ) AND ,
( THIRDMAP XOR FOURMAP ) AND NOT FIVEMAP

BOOL NOT ( MAPONE AND MAPTWO AND MAPTHREE ) FOR NEWMAP
```

The limitations of the BOOLEAN command are as follows:

- -- Cannot use discrete or continuous maps.
- -- No more than 64 maps or 128 phrases may be input per issuance of the command.
- -- Maps used in this command may not be named AND, OR, XOR, NOT, ONOT or ANOT.

Examples of Logical (or Boolean) Operations:



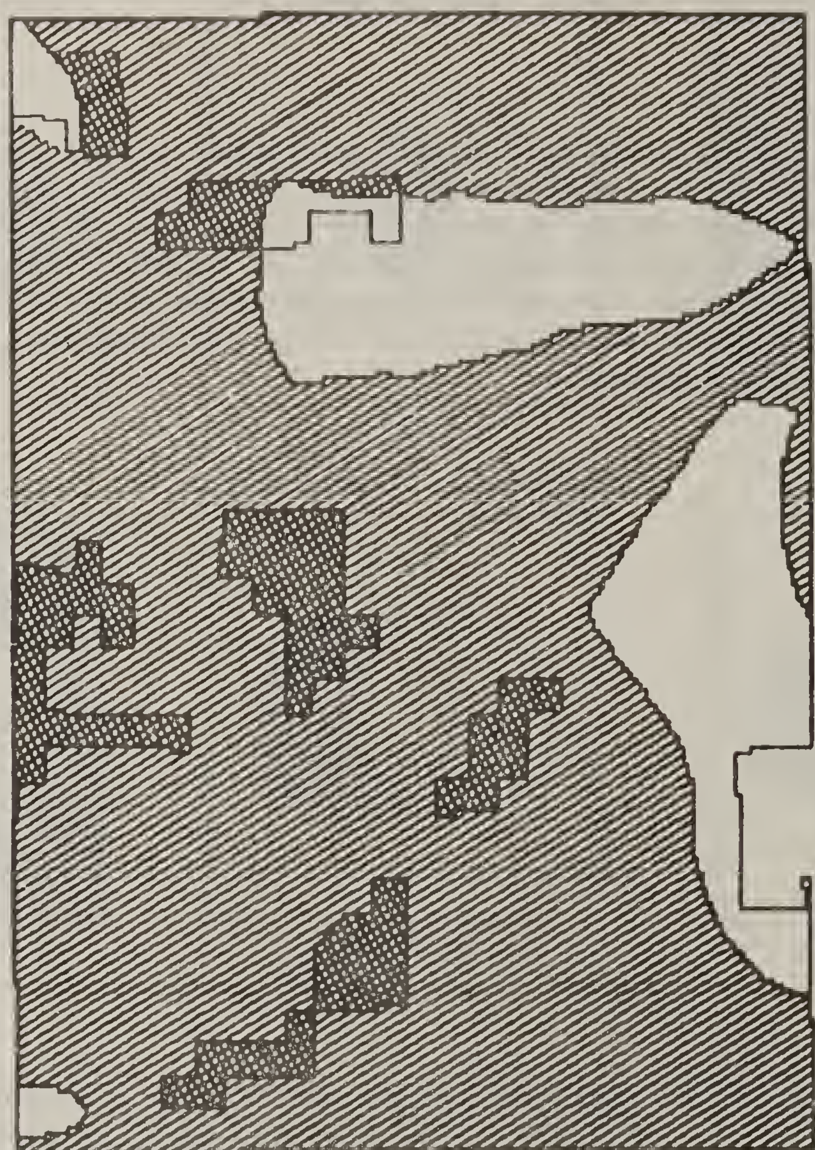

Several logical, or Boolean, operations may be performed on raster datasets (see also the CROSS command). Venn diagrams are used for illustration.

Example of use of the BOOLEAN command:

```
? BOOL ( DEERWINT AND LIONWINT ) ,
, AND NOT ( BLM OR CDOW ) FOR CONFLICT

OK  BOOLEANED FOR CONFLICT
```

The command is used to find all mule deer winter range (DEERWINT) which is also mountain lion winter range (LIONWINT) but which is not on Bureau of Land Management (BLM) or Colorado Division of Wildlife (CDOW) land. This information might be used in an assessment of winter game damage claims on private lands. This is illustrated on the following page.

Example of result of use of the BOOLEAN command:



Three maps are plotted: areas which are mule deer and mountain lion winter range (shaded); areas which are not mule deer and mountain lion winter range and which are also not BLM or CDOW land (clear), and areas which are mule deer and mountain lion winter range but are not on BLM or CDOW land.

The BYE command is summarized as follows:

BYE is a program control command which ends the session and stops program execution. If MAPS was accessed from MOSS, the command will return the user to MOSS. If MAPS was accessed directly from the computer operating system, the command will return the user to the operating system.

The BYE command is specified as follows:

BYE

The individual phrase of the BYE command is described below.

BYE is the required verb which specifies the command.

The following is a typical example of the BYE command.

BYE

The limitations of the BYE command are as follows:

-- None found to date.

The CATEGORIZE command is summarized as follows:

CATEGORIZE is a data reclassification command which creates a new discrete map by counting the occurrences of each cell value, or a user-specified range of values, in a continuous cell map.

The CATEGORIZE command is specified as follows:

CATEGORIZE (oldmap) FROM (value) THRU (value) FOR (newmap)

The individual phrases of the CATEGORIZE command are described below.

CATEGORIZE (oldmap) is a required phrase which specifies (oldmap) as the name of the existing continuous cell map to be categorized. The resulting (newmap) will be of type discrete.

FROM (value) is an optional modifying phrase which specifies (value) as the lowest of the range of cell values to be categorized from (oldmap). If omitted, the default is the minimum real value.

THROUGH (value) is an optional modifying phrase which specifies (value) as the highest of the range of cell values to be categorized from (oldmap). If omitted, the default is the maximum real value.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

The following are typical examples of valid CATEGORIZE commands.

CATEGORIZE THISMAP FROM 1.0 THROUGH 25.0 FOR NEWMAP

CATE THISMAP

The limitations of the CATEGORIZE command are as follows:

-- Cannot input dichotomous or discrete maps.

Example of result of use of the CATEGORIZE command:

```
? DESC VEGDIV

EXPOSED   MAP VEGDIV
DESCRIPTION   SURFACE COVER TYPE   WOLF RIDGE        COLORADO  1:24000
STUDY AREA    WHITER   PROJECTION LAMBERT
DATE          12/15/83  SOURCE VELUT/AMS           VINTAGE 1982
TYPE    8 CONTINUOUS    SUBJECTS       0
CELL HEIGHT    63.6149  CELL WIDTH     63.6149
NUMBER OF ROWS      25  NUMBER OF COLUMNS   26
CELL ACRES      1.0000
MINIMUM VALUE         1.0000      MAXIMUM VALUE        5.0000
MBR: SOUTH  437543.2000 NORTH  439133.6000 EAST 5050832.0000 WEST 5049178.0000

? CATE VEGDIV FOR VEGDIV7

OK  CATEGORIZED FOR VEQDIV7

? DESC VEGDIV7

    5 SUBJECTS IN MAP VEGDIV7
   ID           VALUE    FREQUENCY   SUBJECT
    1          1.0000        201.0
    2          2.0000        329.0
    3          3.0000         88.0
    4          4.0000         29.0
    5          5.0000          3.0
```

The command is used to group a continuous map of vegetation diversity indices into discrete categories to produce a discrete map. Utility of the command is restricted to those maps having a relatively small number of values. For example, categorizing a continuous elevation map may well result in a discrete elevation map with nearly as many values/categories as number of cells.

The CLOSE command is summarized as follows:

CLOSE is a program control command which closes the current master project previously specified by the OPEN command.

The CLOSE command is specified as follows:

CLOSE

The individual phrase of the CLOSE command is described below.

CLOSE is the required verb which specifies that the currently open master project is to be closed.

The following is a typical example of a valid CLOSE command.

CLOSE

The limitations of the CLOSE command are as follows:

-- None found to date.

The CONSTANT command is summarized as follows:

CONSTANT is a data manipulation command which creates a new discrete map by using the header information from an existing discrete or continuous map; and then assigning the single constant real value, specified by the user, to each cell in (newmap).

The CONSTANT command is specified as follows:

CONSTANT (oldmap) ASSIGNING (value) FOR (newmap)

The individual phrases of the CONSTANT command are described below.

CONSTANT (oldmap) is a required phrase which specifies (oldmap) as the name of an existing discrete or continuous cell map whose header information will be used to create (newmap).

ASSIGNING (value) is a required phrase which specifies (value) as the constant real value to be assigned to each cell in (newmap).

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

The following are typical examples of valid CONSTANT commands:

CONSTANT THISMAP ASSIGNING 10.0 FOR MAP10

CONS THISMAP ASS 100.0

The limitations of the CONSTANT command are as follows:

-- Cannot use dichotomous maps.

The CONTOUR command is summarized as follows:

CONTOUR is a data display command which generates a line drawing of an existing continuous map by tracing lines to connect those cells whose elevations are of equal value, resulting in a two-dimensional representation of a three-dimensional surface. The distance of the contour interval, specified by the INTERVAL phrase, is the vertical distance between those elevation values to be outlined. Any elevation values which are not an increment of this distance, are not traced on the resulting display. The minimum contour is equal to the truncated integer value of the minimum elevation in the oldmap.

The CONTOUR command is specified as follows:

CONTOUR (oldmap) INTERVAL (distance)

The individual phrases of the CONTOUR command are described below.

CONTOUR (oldmap) is a required phrase which specifies (oldmap) as the existing continuous map to be used in making the two-dimensional line-drawing.

INTERVAL (distance) is a required phrase which specifies (distance) as the distance of the contour interval, or the vertical distance between the elevation values to be outlined. Interval value must be an integer and must be greater than or equal to 1.

The following are typical examples of valid CONTOUR commands:

```
CONTOUR THISMAP  INTERVAL 50.0

CONT THISMAP  INT 100.0
```

The limitations of the CONTOUR command are as follows:

-- Can only use continuous map.

-- Viewing window must be set.

-- Distance of the contour interval cannot exceed the range of cell values.

Example of result of use of the CONTOUR command:

An elevation contour plot of Wolf Ridge, CO. Contour lines are displayed every 100 feet.

The COPY command is summarized as follows:

COPY is a data manipulation command which creates a new map by reproducing an existing work project or master project map. If the existing map is a discrete cell map with attribute description labels, the command will assign those same attribute descriptions to the new map.

The COPY command is specified as follows:

COPY (oldmap) FOR (newmap)

The individual phrases of the COPY command are described below.

COPY (oldmap) is a required phrase which specifies (oldmap) as the name of the existing map to be copied. The resulting (newmap) will be of the same type as (oldmap).

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a workfile map, a marterfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

The following are typical examples of valid COPY commands:

COPY THISMAP FOR FIRSTMAP

COPY THISMAP

The limitations of the COPY command are as follows:

-- Cannot copy read, write, or display files.

The COST command is summarized as follows:

COST is a program control command which informs the user of the total units of resources used up to that point in time during the current session. The units of resources that are displayed include computer time, units of disk transfer, clock time, and total cost. Cost is computed as computer time (seconds) multiplied by .009 cents.

The COST command is specified as follows:

COST

The individual phrase of the COST command is described below.

COST is the required verb which specifies the command.

The following is a typical example of a valid COST command:

COST

The limitations of the COST command are as follows:

-- The command must be changed whenever the host computer's system charging algorithm changes and a system manager should be consulted.

Example of result of use of the COST command:

```
? COST

   CURRENT USE OF RESOURCES

COMPUTER TIME        0: 5:44
DISK ACCESSES        4183.00
ELAPSED TIME         0:51:52
COST OF JOB     $       3.10
```

Information on current use of resources during the session is requested.

The COVER command is summarized as follows:

COVER is an overlay analysis command which creates a new continuous map by reproducing the values of one existing discrete or continuous map, then replacing or covering those values with the values of another discrete or continuous map on each cell where the second map value is non-zero. If more than two existing maps are specified, each is used to cover whatever values have previously been generated. Therefore, order in which the existing maps are specified within the command becomes significant.

The COVER command is specified as follows:

```
COVER (oldmap)  WITH (oldmap)  WITH (oldmap)  ,
WITH (oldmap)  FOR (newmap)
```

The individual phrases of the COVER command are described below.

COVER (oldmap) is a required phrase which specifies (oldmap) as the name of an existing continuous or discrete map which defines the initial values to be covered.

WITH (oldmap) is a cumulative modifying phrase which specifies (oldmap) as the name of an additional existing continuous or discrete map which defines replacement values. This phrase may be repeated up to 63 times.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid COVER commands:

```
COVER BASEMAP  WITH FIRST  WITH NEXT  WITH LAST ,
FOR NEWMAP

COVE BASEMAP WITH ONLY
```

The limitations of the COVER command are as follows:

-- Cannot use dichotomous maps.

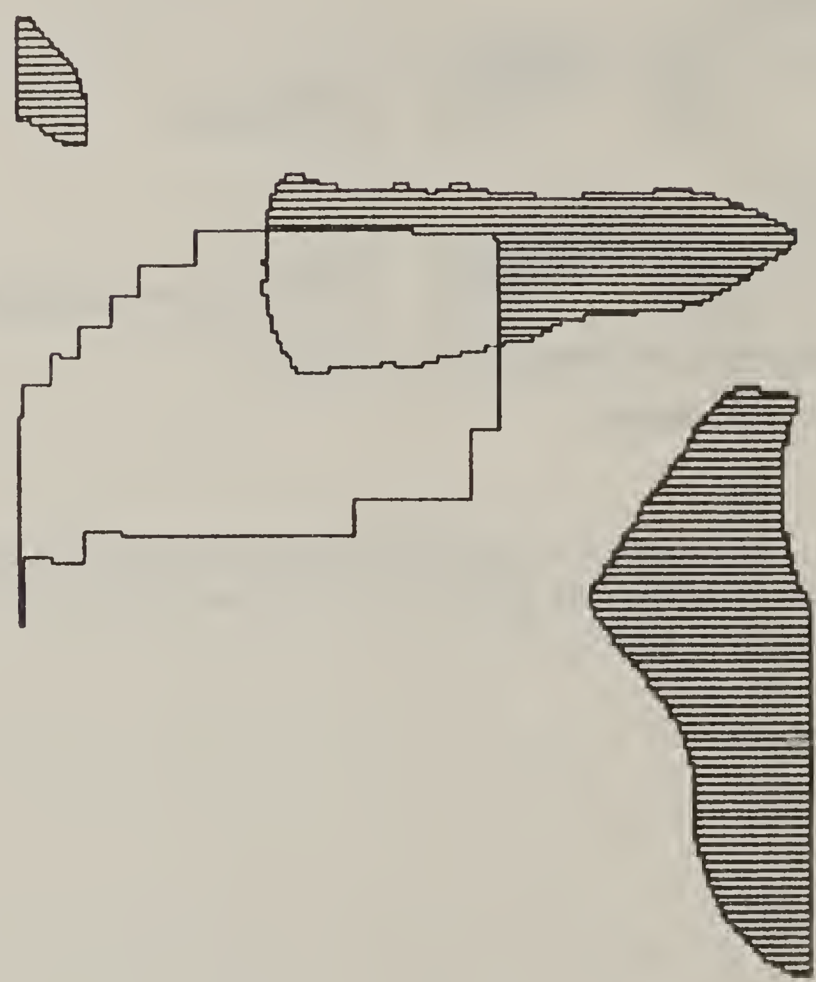
-- No more than 64 maps may be input per issuance of the command.

Example of use of the COVER command:

```
? DESC CADWOLFRGC

    1 SUBJECTS IN MAP CADWOLFRGC
   ID          VALUE    FREQUENCY   SUBJECT
    1         1.0000       5113.0   C_A_DISPOSAL

? DESC DEERCONC

    1 SUBJECTS IN MAP DEERCONC
   ID          VALUE    FREQUENCY   SUBJECT
    1       999.0000       6371.0   MULE DEER WINT CONC/WINT RANGE

? COVER DEERCONC WITH CADWOLFRGC FOR NODEER

OK  OPERATED FOR NODEER
```

The command is used to determine which areas of mule deer winter concentration range will be affected/lost by oil shale disposal on Wolf Ridge, CO.

Example of result of use of the COVER command:



A plot of mule deer winter concentration range and oil shale disposal sites on Wolf Ridge, CO. Range unaffected by disposal is shaded.

The CROSS command is summarized as follows:

CROSS is an overlay analysis command which creates a new discrete map by combining the subjects of two existing discrete or continuous maps on a cell-by-cell basis, and assigning a specified new value to all cells which meet the required conditions of each combination. A single method for combining, either AND, OR, ANOT, or ONOT, must correspond with each assigned new value. Values from the existing maps that do not meet any of the specified conditions at a given cell location are assigned background on the new map. Existing map values that meet more than one of the conditions at a given cell location are assigned the new value corresponding to the met condition which was input first.

The CROSS command is specified as follows:

```
CROSS (oldmap)  WITH (oldmap) ASSIGNING (newvalue) ,
TO (oldvalue)   THROUGH (oldvalue) ,
(operator) (oldvalue)  THROUGH (oldvalue)  FOR (newmap)
```

The individual phrases of the CROSS command are described below.

CROSS (oldmap) is a required phrase which specifies (oldmap) as the name of the first existing discrete or continuous map to be crossed.

WITH (oldmap) is a required phrase which specifies (oldmap) as the name of the second existing discrete or continuous map to be crossed.

ASSIGN (newvalue) is a required phrase which specifies (newvalue) as the numeric value which the cell of the (newmap) will receive when the corresponding cell values from both (oldmaps) meet the required conditions. This phrase is cumulative up to 64 times, but requires a matching TO phrase and combination phrase for each repetition. The same (newvalue) may be repeated in any number of ASSIGN phrases within a single command. Note that the existing map values at any given location may meet the requirements of more than one of the specified combinations. In this case, the new map value is assigned the (newvalue) which corresponds to the first condition, in order of input, which is met. It is important to keep this in mind so that higher priority combinations may be entered preceding lower priority combinations within each CROSS command.

TO (oldvalue) is a required phrase which specifies (oldvalue) as the cell value that the first (oldmap) must equal to meet the first condition of the requirements specified, whereupon the new map is assigned (newvalue). This phrase is cumulative and must be matched with each ASSIGN (newvalue) phrase.

THROUGH (oldvalue) is an optional modifying phrase which indicates an upper range for the (oldvalue) specified in either the most recent TO phrase or combination phrase. The cell value from the (oldmap) must be greater than or equal to the previous (oldvalue) from the TO or combination phrases, and less than or equal to the (oldvalue) in this phrase. If omitted, the default is merely the previous (oldvalue) as a constant rather than a range.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

(operator) indicates which combination method is to be used. One must be specified after each set of ASSIGN - TO phrases. (newmap) will be assigned (newvalue) where the indicated cells combine to satisfy the desired conditions. The following are valid operators:

AND (oldvalue) is an optional modifying phrase which specifies (old-value) as the numeric value that the cell from the second (oldmap) must equal to meet the second condition. The AND requires that the first condition must be met and the second condition must be met, for (newmap) to be assigned (newvalue).

OR (oldvalue) is an optional modifying phrase which specifies (old-value) as the numeric value that the cell from the second (oldmap) must equal to meet the second condition. The OR requires that either the first or the second condition be met, or both, for (newmap) to be assigned (newvalue).

ANOT (oldvalue) is an optional modifying phrase which specifies (old-value) as the numeric value that the cell from the second (oldmap) must equal to meet the second condition. The ANOT requires that the first condition be met and the second condition not be met, for (newmap) to be assigned (newvalue).

ONOT (oldvalue) is an optional modifying phrase which specifies (old-value) as the numeric value that the cell from the second (oldmap) must equal to meet the second condition. The ONOT requires that either the first condition be met or the second condition not be met, or both, for (newmap) to be assigned (newvalue).

The following are typical examples of valid CROSS commands:

```
CROSS FIRST  WITH SECOND  FOR NEWMAP ,
ASSI 50  TO 1 THROUGH 50  AND 50  THROUGH 100 ,
ASSI 150  TO 51 THROUGH 100  AND 101  THROUGH 200

CROS FIRST  WITH NEXT  FOR OTHER ,
ASSI 1  TO 1 THROUGH 15  ANOT 8  THROUGH 12
```

The limitations of the CROSS command are as follows:

-- Cannot use dichotomous maps.

-- No more than 64 new combinations are allowed per issuance of the command.

Example of use of the CROSS command:

```
? DESC PINYONMAP

    4 SUBJECTS IN MAP PINYONMAP
   ID          VALUE    FREQUENCY    SUBJECT
    1         5.0000      16453.0    423PJSG
    2         7.0000        641.0    423PJBS
    3         8.0000        253.0    422PJ
    4         6.0000         11.0    423PJHA

? DESC BLMLAND

    1 SUBJECTS IN MAP BLMLAND
   ID          VALUE    FREQUENCY    SUBJECT
    1         1.0000      30887.0    BLM

? CROSS PINYONMAP WITH BLMLAND AS 1 TO 5 AND 1 ,
, AS 1.5 TO 6 TH 7 AND 1 ,
, AS 2 TO 5 TH 7 ANOT 1 ,
, AS 3 TO 8 OR 1 FOR BLMPINYON

OK  CROSSED FOR BLMPINYON

? DESC BLMPINYON

    4 SUBJECTS IN MAP BLMPINYON
   ID          VALUE    FREQUENCY    SUBJECT
    1         1.0000      14873.0
    2         1.5000        631.0
    3         2.0000       1601.0
    4         3.0000      15402.0
```

The command is used to find all open-canopy pinyon-sagebrush forest (423PJSG) on BLM land, all open-canopy pinyon-shrub forest (423PJBS/HA) on BLM land, all open-canopy pinyon forest (423PJ) not on BLM land, and all land having closed-canopy pinyon forest (422PJ) or belonging to the BLM. This is illustrated on the following page.

Example of result of use of the CROSS command:

A plot of BLM land on Wolf Ridge, CO showing open-canopy pinyon-sage forest (horizontal shade) and open-canopy pinyon-shrub forest (vertical shade) on this land. Also shown is open-canopy pinyon forest not on BLM land (cross-hatch) and all land belonging to the BLM or having closed-canopy pinyon forest (solid).

The CUT command is summarized as follows:

CUT is a data reclassification command which creates a new map of the same type as an existing dichotomous, discrete, or continuous map by cutting out a portion of the original map according to user-specified top and bottom rows, and left and right columns; or according to the current viewing window. If the row and column specifications are used, the top row is row one and the left column is column one. The bottom row is the last row and the right column is the last column. If the window specification is used, size of the new map is determined by the intersection between the window and the existing map, not by the window alone.

The CUT command is specified as follows:

```
CUT (oldmap) AT TOP (row) AT BOTTOM (row) ,
AT LEFT (column) AT RIGHT (column)  FOR (newmap)

or

CUT (oldmap)  WINDOW  FOR (newmap)
```

The individual phrases of the CUT command are described below.

CUT (oldmap) is a required phrase which specifies (oldmap) as the name of an existing dichotomous, discrete, or continuous map which is to be cut.

AT is an optional modifying phrase preceding the row and column specifications. It has no effect other than to increase readability.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The user must specify at least one of the following phrases for the (newmap) to be cut. The WINDOW phrase cannot be used concurrently with TOP, BOTTOM, LEFT, or RIGHT. If the WINDOW phrase is not used, all or any combination of the TOP, BOTTOM, LEFT, or RIGHT phrases may be specified.

WINDOW is an optional modifying phrase which indicates that (oldmap) is to be "cut" to fit into the current viewing window. Prior to using the CUT command with the WINDOW phrase, the viewing window must be set with the WINDOW and ZOOM commands. This phrase cannot be used with the TOP, BOTTOM, LEFT, or RIGHT phrases.

TOP (row) is an optional modifying phrase which specifies (row) as the row number on (oldmap) to be used as the first row on (newmap). If omitted, the default is the first row on (oldmap). This phrase cannot be used with the WINDOW phrase.

BOTTOM (row) is an optional modifying phrase which specifies (row) as the row number on (oldmap) to be used as the last row on (newmap). If omitted, the default is the last row on (oldmap). This phrase cannot be used with the WINDOW phrase.

LEFT (column) is an optional modifying phrase which specifies (column) as the column number on (oldmap) to be used as the first column on (newmap). If omitted, the default is the first column on (oldmap). This phrase cannot be used with the WINDOW phrase.

RIGHT (column) is an optional modifying phrase which specifies (column) as the column number on (oldmap) to be used as the last column on (newmap). If omitted, the default is the last column on (oldmap). This phrase cannot be used with the WINDOW phrase.

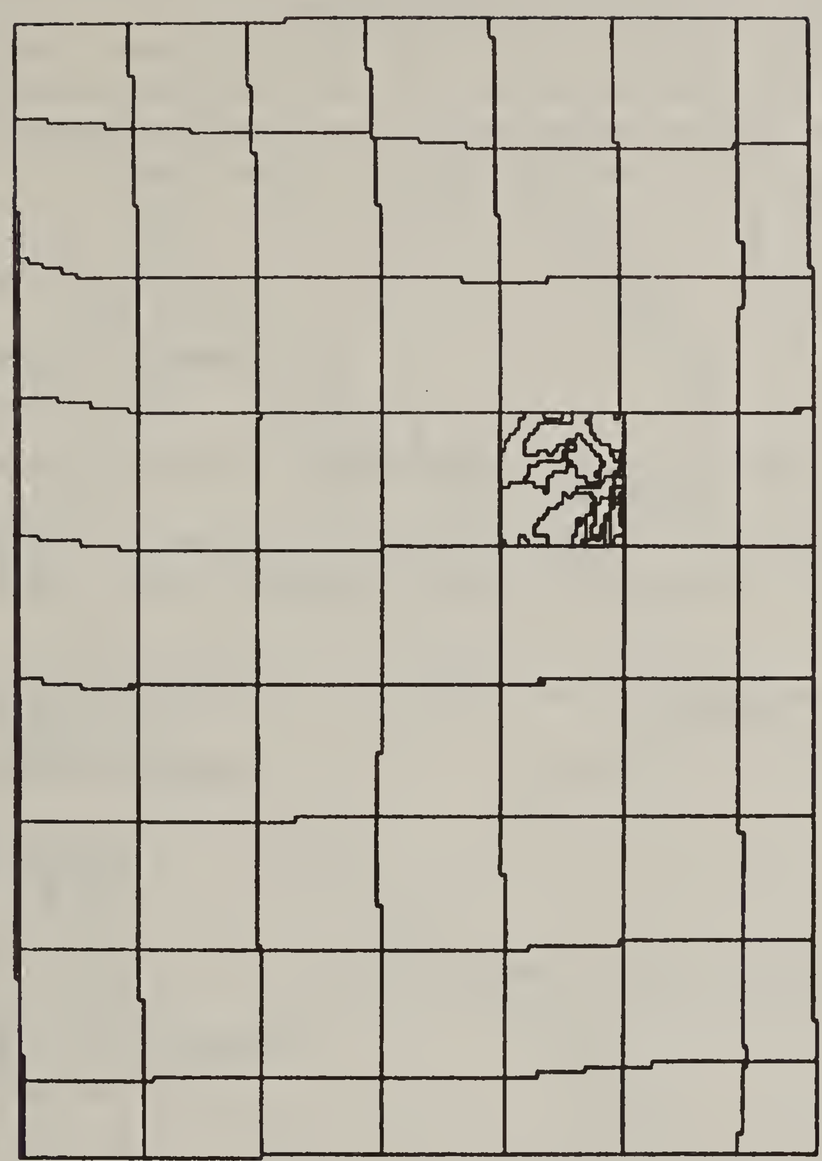
The following are typical examples of valid CUT commands:

```
CUT THISMAP AT TOP 30 BOTTOM 50 AT LEFT 10 RIGHT 20

CUT THISMAP AT TOP 30 FOR NEWMAP

CUT THISMAP  WINDOW  FOR NEWMAP
```

The limitations of the CUT command are as follows:

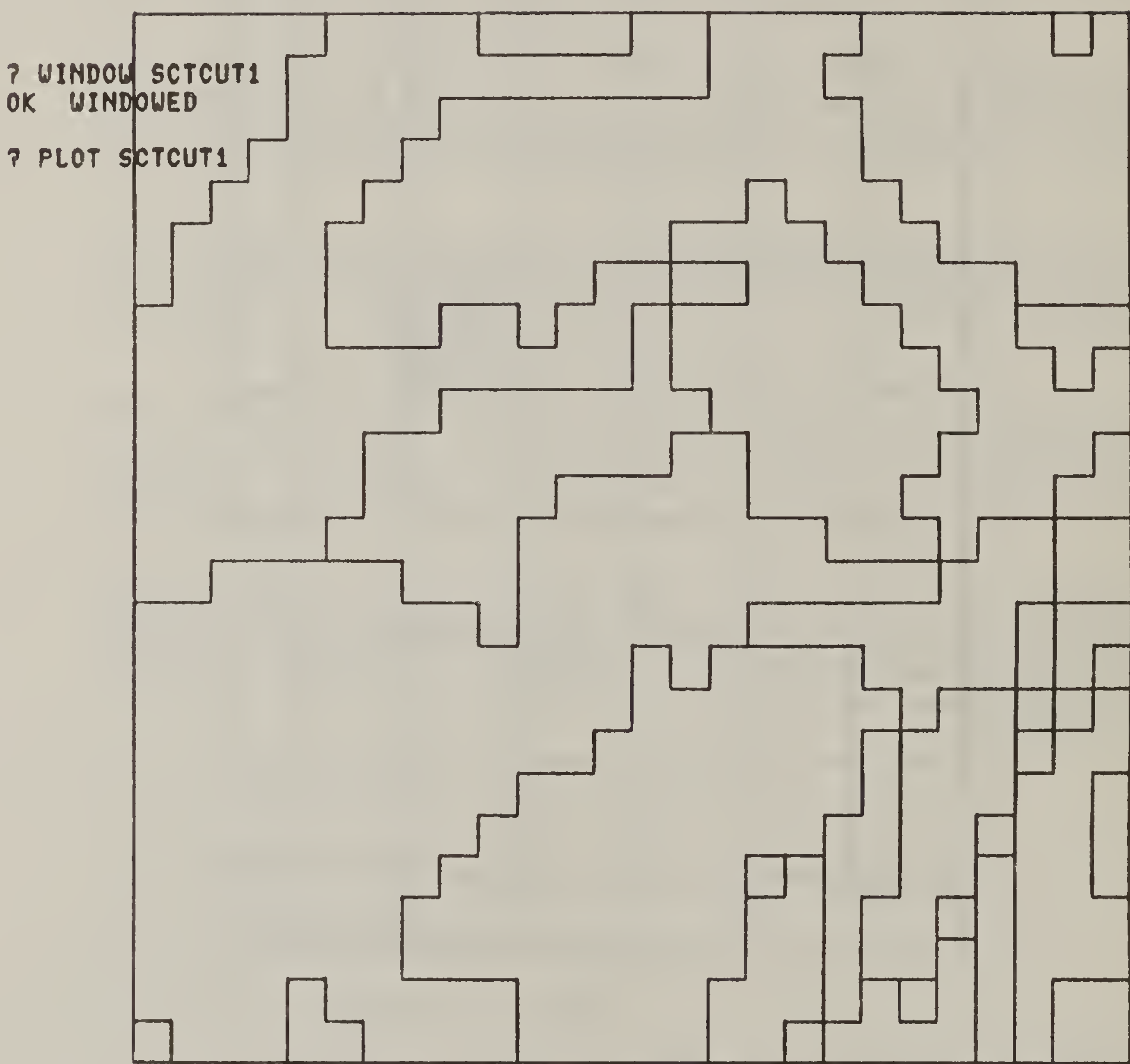
-- If the window specification is used, the viewing window must be set.

Example of use of the CUT command:



A plot of sections of Wolf Ridge, CO showing surface cover types in one section. The command is used to define this section as a new map by zooming in on the section and then cutting the surface cover map using the WINDOW option. The resultant map is shown on the following page.

Example of result of use of the CUT command:




A plot of surface cover types on one section of Wolf Ridge, CO. This new map (SCTCUT1) was created using the WINDOW option of the CUT command as on the previous page.

The DEARCHIVE command is summarized as follows:

DEARCHIVE ia a data manipulation command which resets the file status indicator of a map from archived to exposed. Before a map can be de-archived, the files associated with the map must be moved from the archival storgae medium into the proper area on disk. After a map has been dearchived, it is again available for processing. The ARCHIVE command has an opposite effect.

The DEARCHIVE command is specified as follows:

DEARCHIVE (oldmap)

The individual phrase of the DEARCHIVE command is described below.

DEARCHIVE (oldmap) is a required phrase which specifies (oldmap) as the name of the existing exposed work project map to be dearchived.

The following are typical examples of valid DEARCHIVE commands:

DEARCHIVE THISMAP

DEAR THISMAP

The limitations of the DEARCHIVE command are as follows:

-- None found to date.

The DELETE command is summarized as follows:

DELETE is a data manipulation command which removes the name of an existing exposed work project map from the work project map names list and deletes all disk files associated with the map.

The DELETE command is specified as follows:

DELETE (oldmap)

The individual phrase of the DELETE command is described below.

DELETE (oldmap) is a required phrase which specifies (oldmap) as the name of the existing exposed work project map to be deleted.

The following are typical examples of valid DELETE commands:

DELETE THISMAP

DELE THISMAP

The limitations of the DELETE command are as follows:

-- None found to date.

The DESCRIBE command is summarized as follows:

DESCRIBE is a data description command which displays header and projection information for an existing dichotomous or continuous cell map; and it displays header, projection, and subject information for an existing discrete cell map or vector map. For vector maps, the subject information includes the subject label and the number of items pertaining to each subject. For cell maps, the subject information includes the subject label and the number of cells, as well as the numeric value assigned to each subject. The header information includes a map's source, date, vintage, name of study area, projection description, map description, number of subjects, file status, map type, and the minimum bounding rectangle. In addition, the number of items is included for vector maps; and cell height and width, acres per cell, and number of rows and columns are included for cell maps. Projection information includes the various parameters that are associated with the particular map's projection. The LABEL command allows for modification of header, projection, or subject information.

The DESCRIBE command is specified as follows:

DESCRIBE (oldmap) (option)

The individual phrases of the DESCRIBE command are specified below.

DESCRIBE (oldmap) is a required phrase which specifies (oldmap) as the name of an existing cell or vector map which is to be described.

(option) is a modifying phrase which specifies whether header, projection, and/or subject information is to be displayed. All, one, or none of the options can be specified in a DESCRIBE command. If no option is specified, the default of SUBJECT is assumed for vector and discrete cell maps, and HEADER for dichotomous and continuous cell maps. Valid options include:

HEADER to describe an existing or archived map's header information.

PROJECTION to describe an existing or archived map's projection parameters.

SUBJECTS to describe an existing map's subject information.

The following are typical examples of valid DESCRIBE commands:

```
DESCRIBE  THISMAP  HEADER  PROJECTION  SUBJECTS

DESC  THISMAP
```

The limitations of the DESCRIBE command are as follows:

-- None found to date.

Example of result of use of the DESCRIBE command:

```
? DESC MDRWOLFRGC H P S

EXPOSED   MAP MDRWOLFRGC
DESCRIPTION   MULE DEER RANGE      WOLF RIDGE         COLORADO  1:24000
STUDY AREA    WHITER   PROJECTION LAMBERT
DATE          11/17/83  SOURCE WELUT/WAMS          VINTAGE 1982
TYPE    7 DISCRETE      SUBJECTS       3
CELL HEIGHT    63.6149  CELL WIDTH     63.6149
NUMBER OF ROWS     219  NUMBER OF COLUMNS  169
CELL ACRES      1.0000
MBR: SOUTH  430036.7000 NORTH  443968.4000 EAST 5053441.0000 WEST 5042690.0000

EXPOSED   MAP MDRWOLFRGC

        MAP PROJECTION

 # 4 LAMBERT CONFORMAL CONIC
     COORDINATE UNITS ARE: METERS
 VALUES OF ENTERED PARAMETERS
 ----------------------------
SEMI-MAJOR AXIS OF ELLIPSOID                               .0000
ECCENTRICITY SQUARED OF ELLIPSOID                          .0000
LATITUDE OF 1ST STANDARD PARALLEL                        37.0000
LATITUDE OF 2ND STANDARD PARALLEL                        42.0000
LONGITUDE OF CENTRAL MERIDIAN                          -109.0000
LATITUDE ORGIN OF PROJECTION                             36.0000
FALSE EASTING                                       5000000.0000
FALSE NORTHING                                             .0000

    3 SUBJECTS IN MAP MDRWOLFRGC
   ID          VALUE    FREQUENCY   SUBJECT
    1         1.0000       6371.0   MULE DEER WINT CONC/WINT RANGE
    2         2.0000      30070.0   MULE DEER WINTER RANGE
    3         3.0000        120.0   MULE DEER SUMMER RANGE
```

MDRWOLFRGC is a raster map of mule deer ranges on Wolf Ridge, CO. Information on map header, projection, and subjects is requested.

The DISPLAY command is summarized as follows:

DISPLAY is a program control command which sets or changes where graphics plotting is sent. The command can be used to send graphics to the default, which is your graphics console, or to send graphics to a file. In batch mode, you must set DISPLAY to a file other than the default at each session prior to using any graphics plotting commands. In interactive mode, the DISPLAY is automatically set to the default of your console screen.

The DISPLAY command is specified as follows:

DISPLAY TO (oldfile)

The individual phrases of the DISPLAY command are described below.

DISPLAY is the required command verb which sets or changes the current display file.

TO (oldfile) is an optional modifying phrase which specifies the name of the file which will be the current display file. The (oldfile) may be an existing map, if that map is exposed and is not a masterfile, or is not the current read or write file. If (oldfile) is non-existent, it will be created and included in the current workfile names list. If this phrase is omitted, the display file is set to the default of your graphics console.

The following are typical examples of valid DISPLAY commands:

DISPLAY TO THISFILE

DISP

The limitations of the DISPLAY command are as follows:

-- If output is to a disk file, commands which require crosshair input (e.g., ZOOM) cannot be used.

-- Use of the same display file name as previously specified will delete the contents of the previous file.

Example of use of the DISPLAY command:

```
? DISPLAY TO GRAPHOUT
OK  DISPLAYING TO GRAPHOUT
? PLOT PLSWOLFRGC
? SHAD PLSCUT1
? DISPLAY
OK  DISPLAYING TO DEFAULT
? VIEW GRAPHOUT
```

The command is used to send graphics output to a file named GRAPHOUT where one map is plotted, another is shaded, and then graphics output is routed back to the console device default. The created file may then be plotted using the VIEW command.

The DIVIDE command is summarized as follows:

DIVIDE is an overlay analysis command which creates a new continuous map by dividing the values of an existing discrete or continuous map by those of another existing discrete or continuous map on a cell-by-cell basis. If more than two existing maps are specified, each additional map is used to further divide the new map values computed up to that point. Therefore, the order in which the existing maps are specified within the command becomes significant.

The DIVIDE command is specified as follows:

```
DIVIDE (oldmap)  BY (oldmap)  BY (oldmap)  ,
BY (oldmap)  FOR (newmap)
```

The individual phrases of the DIVIDE command are described below.

DIVIDE (oldmap) is a required phrase which specifies (oldmap) as the name of an existing continuous or discrete map which defines the initial values to be divided.

BY (oldmap) is a cumulative modifying phrase which specifies (oldmap) as the name of an existing continuous or discrete map which defines divisors. This phrase may be repeated up to 63 times.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid DIVIDE commands:

```
DIVIDE BASEMAP  BY MAPP1  BY MAPP2  BY MAPP3 ,
FOR  NEWMAP

DIVI BASEMAP  BY MAPP1
```

The limitations of the DIVIDE command are as follows:

-- Cannot use dichotomous maps.

-- No more than 64 maps may be input per issuance of the command.

The ERASE command is summarized as follows:

ERASE is a data display command which sends erase characters to the current write and display files. After the erase the cursor will be positioned in the upper left-hand corner of the screen.

The ERASE command is specified as follows:

ERASE

The individual phrase of the ERASE command is described below.

ERASE is the required verb which specifies the command.

The following are typical examples of valid ERASE commands:

ERASE

ERAS

The limitations of the ERASE command are as follows:

-- None found to date.

The EXPLAIN command is summarized as follows:

EXPLAIN is a program control command which provides a list of all available commands grouped according to their general function; or a detailed explanation on any one of the available commands including its function, valid phrases, and legal syntax.

The EXPLAIN command is specified as follows:

EXPLAIN (command)

The individual phrase of the EXPLAIN command is described below.

EXPLAIN (command) is a required phrase which specifies (command) as the name of the command to be explained. If no (command) is specified, a list of all available commands is presented.

The following are typical examples of valid EXPLAIN commands:

EXPLAIN BOOLEAN

EXPL

The limitations of the EXPLAIN command are as follows:

-- None found to date.

The EXPONENTIATE command is summarized as follows:

> EXPONENTIATE is an overlay analysis command which creates a new continuous map by raising the values of an existing discrete or continuous map to exponential powers represented by the values from another existing discrete or continuous map on a cell-by-cell basis. If more than two existing maps are specified, each additional map is used to further exponentiate whatever map values have been computed up to that point. Therefore, the order in which the existing maps are specified within the command becomes significant.

The EXPONENTIATE command is specified as follows:

```
EXPONENTIATE (oldmap)  BY (oldmap)  BY (oldmap) ,
BY (oldmap)  FOR (newmap)
```

The individual phrases of the EXPONENTIATE command are described below.

> EXPONENTIATE (oldmap) is a required phrase which specifies (oldmap) as the name of an existing discrete or continuous map defining the initial values to be exponentiated.
>
> BY (oldmap) is a cumulative modifying phrase which specifies (oldmap) as the name of an additional existing discrete or continuous map defining exponents. This phrase may be repeated up to 63 times.
>
> FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.
>
> , is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid EXPONENTIATE commands:

```
EXPONENTIATE FIRSTMAP  BY SECONDMAP  BY THIRDMAP ,
BY FOURMAP  FOR NEWMAP

EXPON FIRSTMAP  BY SECONDMAP
```

The limitations of the EXPONENTIATE command are as follows:

-- Cannot use dichotomous maps.

-- No more than 64 maps may input per issuance of the command.

-- Erroneous results if the number to be exponentiated is negative.

The EXPOSE command is summarized as follows:

The EXPOSE command sets the file protection status indicator associated with an existing work project map to a protection status of "exposed". Once this is done, the map is no longer protected from being modified. The PROTECT command has an opposite effect.

The EXPOSE command is specified as follows:

EXPOSE (oldmap)

The individual phrase of the EXPOSE command is described below.

EXPOSE (oldmap) is an imperative phrase which specifies (oldmap) as the name of the existing protected work project map to be exposed.

The following are typical examples of valid EXPOSE commands:

EXPOSE THISMAP

EXPOS THISMAP

The EXTRACT command is summarized as follows:

EXTRACT is a data reclassification command which creates a new discrete map by assigning new values to the cell values of an existing discrete or continuous cell map. Values to which no new values are assigned will become background cells on the new map. If the existing map is a discrete map with attribute description labels, the command will assign to the new map the attribute description of the old attribute which has the smallest value for each new value assigned. The EXTRACT command is similar to the RENUMBER command in the way it assigns values except that cells which are not reassigned become background cells.

The EXTRACT command is specified as follows:

```
EXTRACT (oldmap)  FOR (newmap) ,
ASSIGNING (newvalue)  TO (oldvalue)  THROUGH (oldvalue) ,
ASSIGNING (newvalue)  TO (oldvalue)  TO (oldvalue)
```

The individual phrases of the EXTRACT command are described below.

EXTRACT (oldmap) is a required phrase which specifies (oldmap) as the name of the existing discrete or continuous cell map to be extracted. The resulting (newmap) will be discrete.

ASSIGNING (newvalue) is an optional modifying phrase which specifies (newvalue) as one of the new map values to be assigned. This phrase is cumulative only when a new TO (oldvalue) or THROUGH (oldvalue) phrase is specified before each repetition. A maximum of 64 ASSIGNING (newvalue) phrases can be included in each EXTRACT command. If the value of an old cell can satisfy more than one TO (oldvalue) or THROUGH (oldvalue), the new cell acquires the (newvalue) specified by the ASSIGNING phrase which corresponds to the satisfied condition which was input first.

TO (oldvalue) is an optional modifying phrase which indicates that the new map value specified in the most recent ASSIGNING (newvalue) phrase is to be assigned to all cells having a value of (oldvalue) in the existing map. If no ASSIGNING (newvalue) phrase has yet been specified, an error occurs. This phrase is cumulative.

THROUGH (oldvalue) is an optional modifying phrase which indicates that the new map value specified in the most recent ASSIGNING (newvalue) phrase is to be assigned to all cells having any value greater than whatever (oldvalue) was indicated in the most recent TO (oldvalue) or previous THROUGH (oldvalue) phrase, but less than or equal to the (oldvalue) indicated here. If no TO (oldvalue) or previous THROUGH (oldvalue) phrase has yet been specified, an error occurs. This phrase is cumulative.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid EXTRACT commands:

```
EXTRACT THISMAP FOR FIRSTMAP ASSIGNING 10 TO 25 ,
THROUGH 50 ASSIGNING 9 TO 30 TO 51 THRU 73

EXTR THISMAP AS 12 T 25 TH 50
```

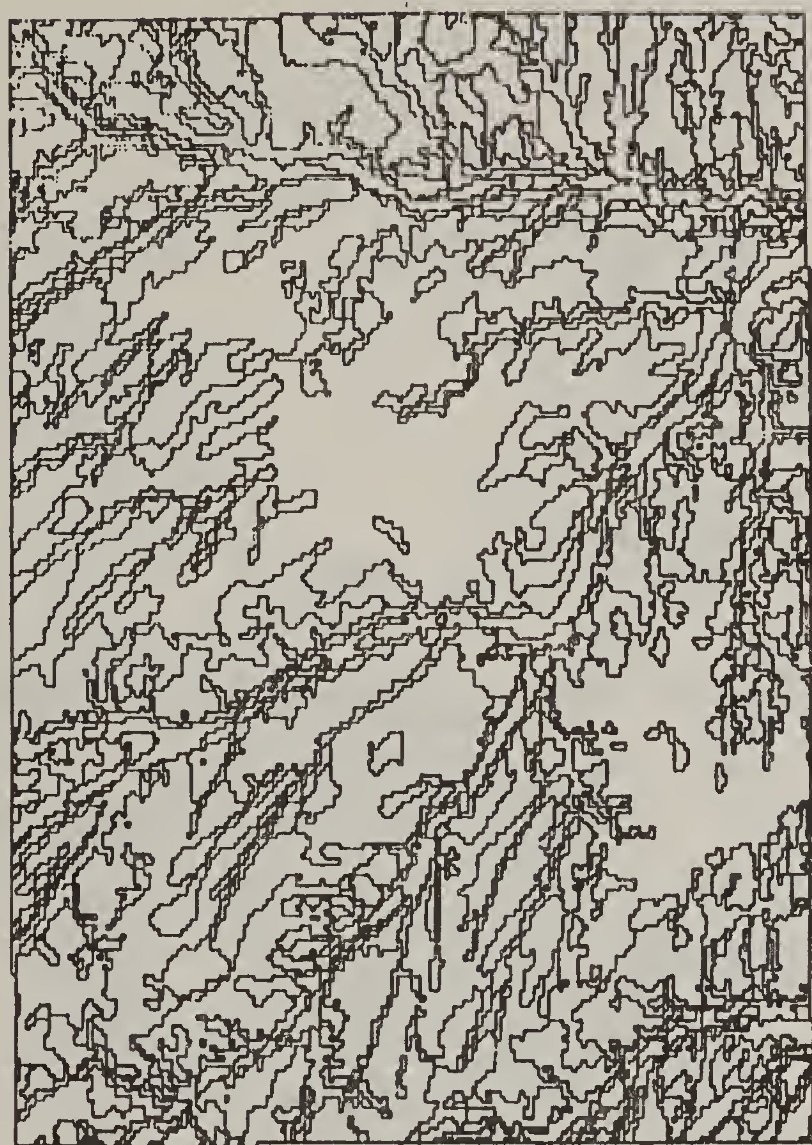
The limitations of the EXTRACT command are as follows:

-- Cannot use dichotomous maps.

-- No more than 64 reassignments per issuance of the command.

-- After reassignments on discrete maps, subjects are no longer seperate.

Example of use of the EXTRACT command:



A plot of surface cover types on Wolf Ridge, CO. This map (SCTWOLFRGC) has 46 subjects from which five types of pinyon-juniper forest are extracted, as on the following page.

Example of use of the EXTRACT command:

```
? EXTR SCTWOLFRGC FOR PINYONMAP ,
, ASSI 5 TO 4 TH 5 ASSI 5 TO 8 ,
. ASSI 5 TO 19 ASSI 5 TO 25

OK  EXTRACTED FOR PINYONMAP

? DESC PINYONMAP

    1 SUBJECTS IN MAP PINYONMAP
   ID          VALUE     FREQUENCY    SUBJECT
    1         5.0000       17358.0    423PJSG

? AREA PINYONMAP

   1 SUBJECTS IN AREA SUMMARY FOR MAP PINYONMAP          09/13/85
  ID          VALUE        AREA FREQUENCY      %  SUBJECT

   1        5.0000   17358.00   17358.0100.00  423PJSG
--------------------------------------------------------
TOTAL ACRES          17358.0    17358.0 46.90  (      19653.0 ACRES BACKGROUND)

?
```

Five types of pinyon-juniper forest (423PJ) are extracted from a map (SCTWOLFRGC) of surface cover types on Wolf Ridge, CO and combined into one value. Note that the new map (PINYONMAP) only has four subjects due to use of the TH(ROUGH) option in the command sequence and that remaining cells become background. This is illustrated on the following page.

Example of result of use of the EXTRACT command:

A plot of extracted pinyon-juniper forest.

The FUNCTION command is summarized as follows:

FUNCTION is a data reclassification command which creates a new map by performing a specified mathematical function on an existing discrete or continuous cell map. Available functions include: square root, logarithm, natural logarithm, rounded integer, truncated integer, absolute value, tangent, sine, cosine, arctangent, arcsine, or arccosine. If the existing map is a discrete map with attribute description labels, the command will assign those same attribute descriptions to the new map. If the existing map is a continuous map in the range of -32767 to +32767 and rounded integer or truncated integer is used, the new map will be a sixteen bit integer value map as opposed to a thirty-two bit real value map.

The FUNCTION command is specified as follows:

FUNCTION (oldmap) (function) FOR (newmap)

where (function) can be LOG NTLOG INT AINT ABS TAN SIN COS ATAN ASIN or ACOS

The individual phrases of the FUNCTION command are described below.

FUNCTION (oldmap) is a required phrase which specifies (oldmap) as the name of the existing discrete or continuous map to be used for the mathematical function specified. The resulting (newmap) will be of the same type as (oldmap).

(function) is a required phrase which specifies the particular mathematical function to be performed to create the new map. Only one (function) is allowed with a single command. If more than one (function) is input the last input (function) will be used. Valid choices for (function) include:

```
SQRT  for square root
LOG   for logarithm
NTLOG for natural logarithm
AINT  for rounded integer
INT   for truncated integer
ABS   for absolute value
TAN   for tangent
SIN   for sine
COS   for cosine
ATAN  for arctangent
ASIN  for arcsine
ACOS  for arccosine
```

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

The following are typical examples of valid FUNCTION commands:

```
FUNCTION OLDMAP ATAN FOR NEWMAP

FUNC OLDMAP AINT
```

The limitations of the FUNCTION command are as follows:

-- Cannot use dichotomous maps.

-- Only one function may be performed per issuance of the command

-- If an attempt is made to take the ACOS or ASIN of a number which is less than -1 or greater than 1, an error occurs. Then the cell is assigned a value of zero.

-- The LOG or NTLOG of a negative number causes the cell to be assigned a value of zero.

-- There is no way to distinguish between background cells and zero-valued cells.

The IMPORT command is summarized as follows:

IMPORT is a data manipulation command which creates a new map of type dichotomous, discrete, or continuous from an existing IDIMS byte map, IDIMS word map, MOSS discrete cell map, or MOSS continuous cell map; or creates a new map of type continuous from a USGS digital elevation map (DEM). The purpose of this command is to import, or to transfer, the information contained in an existing map which is located outside of the system (i.e. not included in the list of working or master project names) to a new map in a format acceptable to the system and its cell processing commands.

For an existing map which is an IDIMS byte or word map, the user will be prompted for the number of rows, number of columns, number of subjects (if the new map is of type discrete), cell height and width (in meters), minimum bounding rectangle (west, east, south, north), projection information, and map description information. For an existing map which is a MOSS discrete or continuous cell map, the user will be prompted for the projection information; the remaining information required is retrieved from the header of the MOSS map. For an existing map which is a USGS DEM map, the user will be prompted for a name; the header information for the new map is retrieved from the DEM map.

The IMPORT command is specified as follows:

IMPORT (oldmap) FORMAT (option) FOR (newmap) TYPE (value)

The individual phrases of the IMPORT command are described below.

IMPORT (oldmap) is a required phrase which specifies (oldmap) as the complete pathname, up to 64 characters, of an existing IDIMS byte or word map, MOSS discrete or continuous cell map, or USGS DEM map located outside of the system (i.e. not included in the list of working or master project names).

FORMAT (option) is a required phrase which specifies (option) as an identification of the format in which the specified (oldmap) is stored. The (option) requires one word to identify a DEM map, and requires two words to identify an IDIMS or MOSS map. Legal options following the FORMAT phrase are: DEM, identifies the (oldmap) as a USGS DEM map; IDIMS BYTE, identifies the (oldmap) as an IDIMS byte map; IDIMS WORD, identifies the (oldmap) as an IDIMS word map; MOSS DISCRETE, identifies the (oldmap) as a MOSS discrete cell map; and MOSS CONTINUOUS, identifies the (oldmap) as a MOSS continuous cell map.

TYPE (value) is a required phrase which specifies (value) as the type of (newmap) to create. Legal types created from an IDIMS or a MOSS (oldmap) are: 6-dichotomous, 7-discrete, or 8-continuous. The legal type created from a DEM (oldmap) is 8-continuous.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map; a PROTECTED workfile map; or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid IMPORT commands:

```
IMPORT :DSK3:MOSSDATA:USGS:ELEVMAP  FORMAT DEM  FOR ELEVATION  TYPE 8

IMPO :DSK3:MOSSDATA:WYOELEV  FORM MOSS DISCRETE  TYPE 7 ,
FOR WYELEVATION
```

The limitations of the IMPORT command are as follows:

-- IDIMS files require a lot of disk space. If there is any doubt as to the availability of space, contact the system manager. To calculate the number of bytes required, use the appropriate formula:

Byte image: # of bytes = (# of columns) * (# of rows)

Word image: # of bytes = 2 * (# of columns) * (# of rows)

Multiply this by two, since there will be two files, the IDIMS file and the generated file.

-- The maximum number of columns for IDIMS byte format is 8192 columns. The maximum number for IDIMS word image is 4096 columns.

-- Only the standard 30m x30m DEM maps can be imported.

The INFORM command is summarized as follows:

INFORM is a program control command which informs the user of the system status. This includes the current date and time; the work and master project names; the current read, write and display files; whether or not the viewing window is set; the total number of soft errors during the session; the last seven commands that have been used; and the total units of resources that the system has used during the session.

The INFORM command is specified as follows:

INFORM

The individual phrase of the INFORM command is described below.

INFORM is the required verb which specifies the command.

The following are typical examples of valid INFORM commands:

INFORM

INFO

The limitations of the INFORM command are as follows:

-- The listing of last commands used is in numeric code, not alphanumeric names.

Example of result of use of the INFORM command:

```
? INFORM

SYSTEM STATUS ON 12/09/83  AT 11:12:04

    5 MAPS IN WORK PROJECT   POLYGON
   51 MAPS IN MASTER PROJECT RAST
READING FROM DEFAULT
WRITING TO DEFAULT
DISPLAYING TO DEFAULT
WINDOW SET
TOTAL SOFT ERRORS    6
LAST COMMAND(S)    2    2   60    2   60    2   60

   CURRENT USE OF RESOURCES

COMPUTER TIME       0: 6: 0
DISK ACCESSES       4359.00
ELAPSED TIME        0:59:16
COST OF JOB     $      3.24
```

Information on current system status and use of resources during the session is requested.

The INTERSECT command is summarized as follows:

INTERSECT is an overlay analysis command that generates an overlay intersection table listing or creates a new discrete map. It produces the intersection overlay by combining the subjects of two existing discrete maps on a cell-by-cell basis to show all possible combinations of subjects from the two existing maps. INTERSECT is analagous to using the CROSS command with the AND phrase and specifying every possible combination.

When a tabular listing is generated, the listing shows each subject from the first map with each subject from the second map which intersected with the first map's subject, along with the frequency of cells occurring in that intersection.

When a new discrete map is created, each combination of intersecting subjects from the first and second map results in a separate subject on the new map. The value assigned to each subject is the subject number of the first map plus the subject number of the second map to the right of the decimal. The label for each subject in the new map is a concatenation of the original two maps labels.

The INTERSECT command is specified as follows:

```
INTERSECT (oldmap)  WITH (oldmap)  TABLE

or

INTERSECT (oldmap)  START(value)  STOP(value)
WITH (oldmap)  START(value)  STOP(value)  FOR (newmap)
```

The individual phrases of the INTERSECT command are described below.

INTERSECT (oldmap) is a required phrase which specifies (oldmap) as the name of the first existing discrete map to be intersected.

WITH (oldmap) is a required phrase which specifies (oldmap) as the name of the second existing discrete map to be intersected.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following phrases are used to select the form of output from the INTERSECT command. The TABLE phrase can be used concurrently with the FOR phrase, however either TABLE or FOR (newmap) must be specified.

TABLE is an optional modifying phrase which specifies the command to generate a tabular listing showing the combinations resulting from the cell-by-cell intersection of the subjects from each of the specified existing maps. The command lists each category of the first map along with the area in acres and the percent of the non-background cells contained in the subject. The command then lists each subject in the second map that intersects the subject in the first map along with the acres of intersection and the percent of the cells in the subject of the second map that were involved in the intersection.

START (value) is an optional modifying phrase that specifies the beginning character in the label of the previously mentioned map to concatenate into the new map label. If no START (value) is specified character one is assumed. The START (value) phrase only applies if the FOR (newmap) phrase is used.

STOP (value) is an optional modifying phrase that specifies the ending character in the label of the previously mentioned map to concatenate into the new map label. If no STOP (value) is specified character sixteen is assumed. To specify that no characters from the previously mentioned map should be used, enter STOP 0. The STOP (value) phrase only applies if the FOR (newmap) phrase is used.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file.

The following are typical examples of valid INTERSECT commands:

```
INTERSECT FIRSTMAP  WITH SECONDMAP  TABLE

INTE FIRSTMAP  STOP 10  WITH SECONDMAP  START 3  FOR NEWMAP

INTE FIRSTMAP  WITH SECONDMAP  TABLE  FOR NEWMAP
```

The limitations of the INTERSECT command are as follows:

-- No more than 64 characters in the new labels.

Example of the use of the INTERSECT command:

```
? DESC ALBWOLFRGC

   6 SUBJECTS IN MAP ALBWOLFRGC
  ID          VALUE    FREQUENCY    SUBJECT
   1         1.0000      12484.0    BOXELDER 6030
   2         2.0000      13214.0    SQUARE S 6027
   3         3.0000       4020.0    BARCUS-PINTO GULCH 6035
   4         4.0000       1191.0    DRY DUCK CREEK 6031
   5         5.0000        980.0    INDIAN SPRINGS 6034
   6         6.0000       4671.0    REAGLES 6028

?DESC MDRWOLFRGC

   3 SUBJECTS IN MAP MDRWOLFRGC
  ID          VALUE    FREQUENCY    SUBJECT
   1         1.0000       6371.0    MULE DEER WINT CONC/WINT RANGE
   2         2.0000      30070.0    MULE DEER WINTER RANGE
   3         3.0000        120.0    MULE DEER SUMMER RANGE

? INTERSECT ALBWOLFRGC STOP 8 WITH MDRWOLFRGC START 10 STOP 17 ,
, FOR ALBMDR TABLE

INTERSECTION SUMMARY
  ID        VALUE        AREA FREQUENCY      %   SUBJECT

   1       1.0000    12484.00    12484.0 34.15  BOXELDER 6030
   1       1.0000     2809.00     2809.0 44.09  MULE DEER WINT CONC/WINT RANGE
   2       2.0000     9675.00     9675.0 32.17  MULE DEER WINTER RANGE

   2       2.0000    13214.00    13214.0 36.14  SQUARE S 6027
   1       1.0000     3125.00     3125.0 49.05  MULE DEER WINT CONC/WINT RANGE
   2       2.0000     9968.00     9968.0 33.15  MULE DEER WINTER RANGE
   3       3.0000      120.00      120.0100.00  MULE DEER SUMMER RANGE

   3       3.0000     4020.00     4020.0 11.00  BARCUS-PINTO GULCH 6035
   1       1.0000      176.00      176.0  2.76  MULE DEER WINT CONC/WINT RANGE
   2       2.0000     3844.00     3844.0 12.78  MULE DEER WINTER RANGE

   4       4.0000     1191.00     1191.0  3.26  DRY DUCK CREEK 6031
   1       1.0000      231.00      231.0  3.63  MULE DEER WINT CONC/WINT RANGE
   2       2.0000      960.00      960.0  3.19  MULE DEER WINTER RANGE

   5       5.0000      980.00      980.0  2.68  INDIAN SPRINGS 6034
CONTINUE(NO) ?
   1       1.0000       30.00       30.0   .47  MULE DEER WINT CONC/WINT RANGE
   2       2.0000      950.00      950.0  3.16  MULE DEER WINTER RANGE

   6       6.0000     4671.00     4671.0 12.78  REAGLES 6028
   2       2.0000     4668.00     4668.0 15.52  MULE DEER WINTER RANGE

? DESC ALBMDR

  12 SUBJECTS IN MAP ALBMDR
  ID          VALUE    FREQUENCY    SUBJECT
   1         3.2000       3844.0    BARCUS-P WINTER
   2         5.1000         30.0    INDIAN S WINT CO
   3         5.2000        950.0    INDIAN S WINTER
   4         4.1000        231.0    DRY DUCK WINT CO
   5         4.2000        960.0    DRY DUCK WINTER
   6         1.2000       9675.0    BOXELDER WINTER
   7         3.1000        176.0    BARCUS-P WINT CO
   8         1.1000       2809.0    BOXELDER WINT CO
   9         2.2000       9968.0    SQUARE S WINTER
  10         2.1000       3125.0    SQUARE S WINT CO
  11         6.2000       4668.0    REAGLES  WINTER
  12         2.3000        120.0    SQUARE S SUMMER
```

Two maps are described, one of allotment boundaries and one of mule deer range on Wolf Ridge, CO. The command is used to create a new discrete map.

The ISOLATE command is summarized as follows:

ISOLATE is a data reclassification command which creates a new dichotomous map(s) from an existing discrete map, by specifying a value or range of values from the discrete map which will become the set cells on the new dichotomous map(s).

The ISOLATE command is specified as follows:

```
ISOLATE (oldmap)  ,
FROM (value)  THROUGH (value)  FOR (newmap)  ,
FROM (value)  THROUGH (value)  FOR (newmap)
```

The individual phrases of the ISOLATE command are described below.

ISOLATE (oldmap) is a required phrase which specifies (oldmap) as the name of the existing discrete map to be used as a basis for creating the dichotomous map(s).

FROM (value) is an optional modifying phrase which specifies (value) as the cell value from the old map which will become the set value on the new dichotomous map specified by the next FOR (newmap). If omitted, all of the old map cell values are assumed. This phrase is cumulative up to 64 times.

THROUGH (value) is an optional modifying phrase which indicates that the map value specified in the most recent FROM (value) phrase is extended to include the range of values greater than or equal to whatever (value) was specified by FROM, and less than or equal to the (value) just specified by the THROUGH. If omitted, the single (value) specified by FROM is used. This phrase is cumulative up to 64 times.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the name of the new dichotomous map to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid ISOLATE commands:

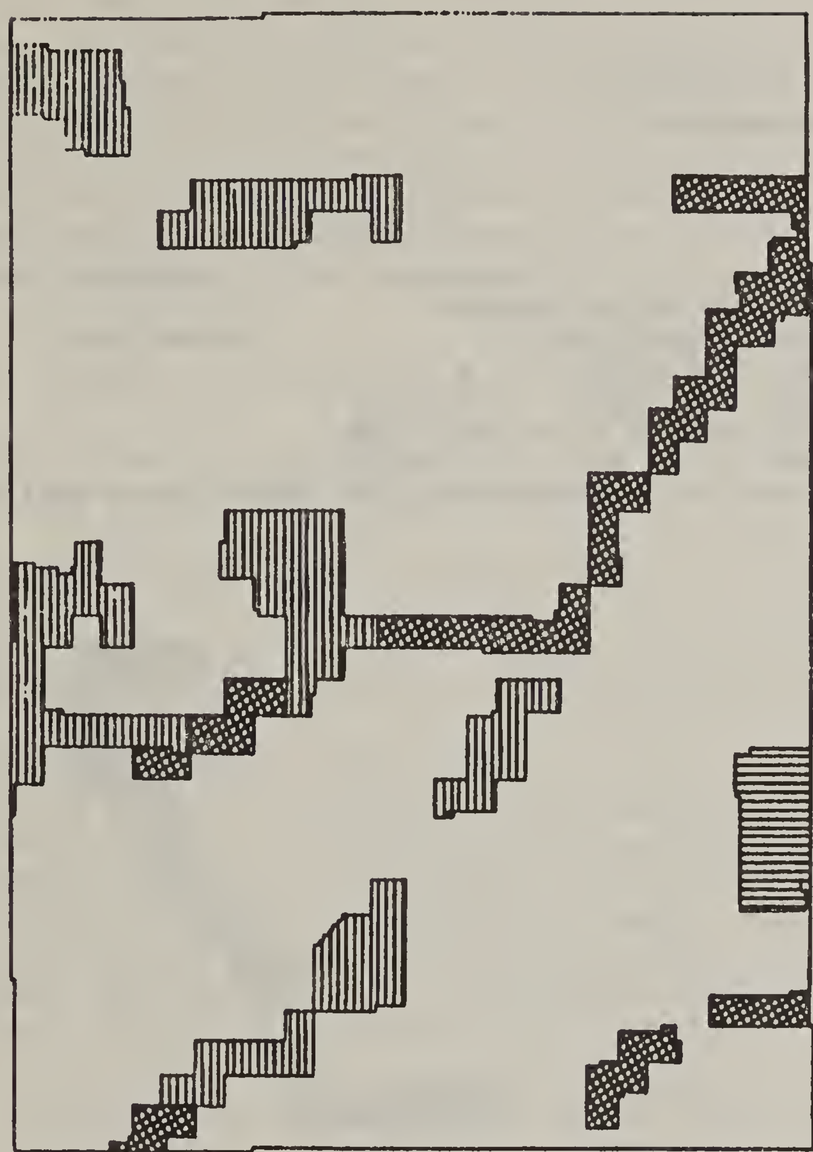
```
ISOLATE OLDMAP FROM 1 FOR FIRSTMAP ,
FROM 2 THROUGH 5 FOR SECONDMAP

ISOL OLDMAP
```

The limitations of the ISOLATE command are as follows:

-- Cannot use continuous maps as input.

-- No more than 64 new maps may be created per command.

Example of use of the ISOLATE command:

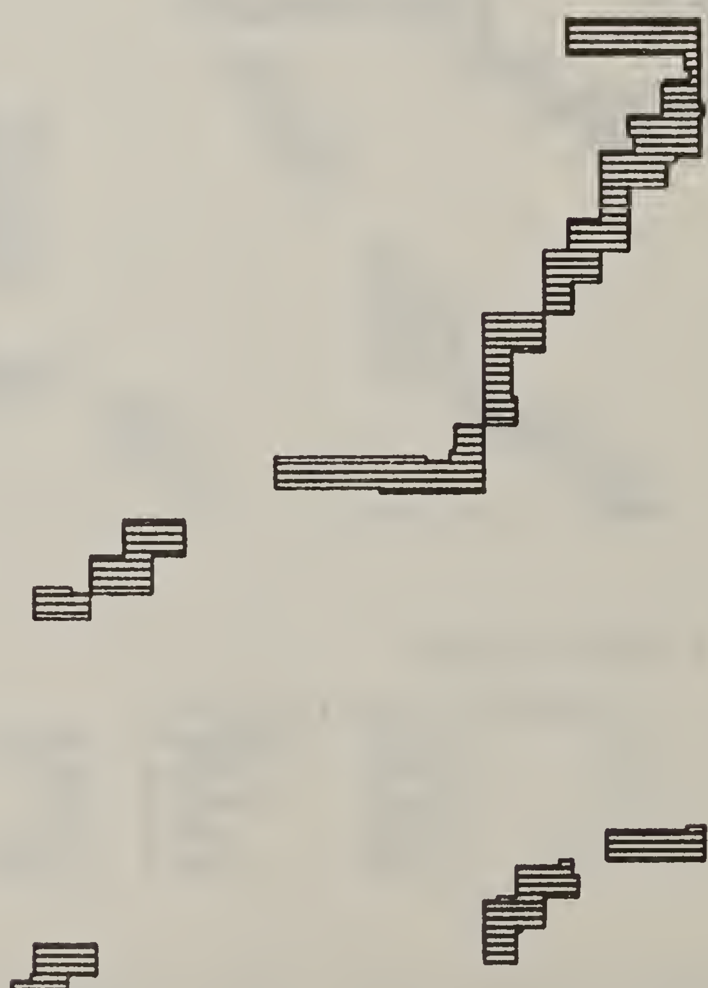


```
? DESC LSTWOLFRGC

    4 SUBJECTS IN MAP LSTWOLFRGC
  ID        VALUE    FREQUENCY   SUBJECT
   1       1.0000       1889.0   CDOW
   2       2.0000      30887.0   BLM
   3       3.0000        463.0   STATE
   4       4.0000       3324.0   PRIVATE
```

A plot of land ownership status on Wolf Ridge, CO (LSTWOLFRGC). There are four types of ownership, Bureau of Land Management (clear), private (vertical), Division of Wildlife (cross-hatch), and state (horizontal). Division of Wildlife land will be isolated as illustrated on the following page.

Example of result of use of the ISOLATE command:

```
? ISOL LSTWOLFRGC FR 1 FOR CDOW

OK  ISOLATED FROM LSTWOLFRGC

? DESC CDOW

EXPOSED   MAP CDOW
DESCRIPTION   LAND STATUS          WOLF RIDGE         COLORADO  1:24000
STUDY AREA    WHITER   PROJECTION LAMBERT
DATE          02/02/84  SOURCE WAMS                  VINTAGE 1982
TYPE    6 DICHOTOMOUS   SUBJECTS       0
CELL HEIGHT    63.6149  CELL WIDTH     63.6149
NUMBER OF ROWS     219  NUMBER OF COLUMNS  169
CELL ACRES      1.0000  CELLS SET       1889.0
MBR: SOUTH  430036.7000 NORTH  443968.4000 EAST 5053441.0000 WEST 5042690.0000

? PLOT CDOW

? SHAD CDOW
```



One subject (CDOW) is isolated from a discrete map of land ownership status on Wolf Ridge, CO (LSTWOLFRGC). The new map (CDOW) is dichotomous and is plotted and shaded.

The LABEL command is summarized as follows:

LABEL is a data manipulation command which allows for entry and modification of header and projection information on existing vector or cell maps, and subject information on vector and discrete cell maps. Information which may be modified includes the source, date, vintage, name of study area, map projection description, and map description for both vector and cell map headers. For vector maps, subject labels can be modified. For discrete cell maps, subject labels and values can be entered or modified. For vector and cell maps, projection parameters can be entered or modified. The DESCRIBE command displays a map's header, projection, and subject information.

The LABEL command is specified as follows:

LABEL (oldmap) (option)

The individual phrases of the LABEL command are described below.

LABEL (oldmap) is a required phrase which specifies (oldmap) as the name of an existing vector or cell map to be labeled.

(option) specifies whether header, projection, or subject information is to be entered or modified. Only one (option) may be specified in a LABEL command. If no (option) is specified, the default of SUBJECT is assumed for vector and discrete cell maps, and HEADER is assumed for dichotomous and continuous cell maps. The user will be prompted for each modification. By keying a carriage return in response to a prompt, the current value of the field being prompted will be retained. Valid choices for (option) include:

HEADER to label an existing map's header information.

PROJECTION to label an existing map's projection parameter information.

SUBJECT to label an existing map's subject information. When this option is chosen, the following menu appears:

```
LABEL SUBJECT MENU
  1 - FINISH
  2 - LIST
  3 - CHANGE
  4 - ENTER
```

The LIST and ENTER options prompt the user for the start and stop subject ID# to process. By keying a carriage return, the range defaults to all. The CHANGE option prompts the user for a single subject ID#. The ENTER option only appears when a discrete cell map has no labels. At that time the user can assign the number of characters for the label. The ENTER option will not appear in any LABEL command after the initial one in which the prompt for number of characters appears.

The following are typical examples of valid LABEL commands:

```
LABEL  THISMAP  HEADER
LABE  THISMAP
```

The limitations of the LABEL command are as follows:

-- Only that information which is not germaine for map processing may be modified.

Example of use of the LABEL command:

```
 ? LABEL ELEVCAT SUBJECTS

 THIS IS A MAP WITHOUT SUBJECT LABELS.  WHAT WILL
 BE THE CHARACTER LENGTH OF THE LABELS (16,32,64) ?
16

 LABEL SUBJECT MENU
      1 - FINISH
      2 - LIST
      3 - CHANGE
      4 - ENTER

 SELECT ?
2
    FROM ID# ?

 THROUGH ID# ?


     3 SUBJECTS IN MAP ELEVCAT
    ID          VALUE    FREQUENCY   SUBJECT
     1          1.0000     20927.0
     2          2.0000     31837.0
     3          3.0000      7221.0

 LABEL SUBJECT MENU
      1 - FINISH
      2 - LIST
      3 - CHANGE
      4 - ENTER

 SELECT ?
4
    FROM ID# ?
1
 THROUGH ID# ?
3

     3 SUBJECTS IN MAP ELEVCAT
    ID          VALUE    FREQUENCY   SUBJECT
     1          1.0000     20927.0
 VALUE ?

 SUBJECT ?
LOW
     2          2.0000     31837.0
 VALUE ?

 SUBJECT ?
MEDIUMMMMM
     3          3.0000      7221.0
 VALUE ?

 SUBJECT ?
HIGH
```

The command is used to assign labels to a map without subject labels. Note that with the LIST option (2), if no ID number is specified, the default will be the first and last ID's. In this case, there are three subjects whose labels will be a maximum of 16 characters long and which will be called "LOW", "MEDIUM", and "HIGH". However, the user has made a spelling error which must be corrected as on the following page.

Example of use of the LABEL command:

```
 LABEL SUBJECT MENU
      1 - FINISH
      2 - LIST
      3 - CHANGE
      4 - ENTER

 SELECT ?
2
    FROM ID# ?

 THROUGH ID# ?

     3 SUBJECTS IN MAP ELEVCAT
    ID          VALUE    FREQUENCY   SUBJECT
     1         1.0000      20927.0   LOW
     2         2.0000      31837.0   MEDIUMMMMM
     3         3.0000       7221.0   HIGH

 LABEL SUBJECT MENU
      1 - FINISH
      2 - LIST
      3 - CHANGE
      4 - ENTER

 SELECT ?
3
 CHANGE SUBJECT ID# ?
2

     3 SUBJECTS IN MAP ELEVCAT
    ID          VALUE    FREQUENCY   SUBJECT
     2         2.0000      31837.0   MEDIUMMMMM
 VALUE ?

 SUBJECT ?
MEDIUM
 CHANGE SUBJECT ID# ?

 LABEL SUBJECT MENU
      1 - FINISH
      2 - LIST
      3 - CHANGE
      4 - ENTER

 SELECT ?
1

 OK  LABELED ELEVCAT
```

The user has noted the spelling error from the previous graphic and has used the CHANGE option (3) to correct it.

The LIST command is summarized as follows:

LIST is a data manipulation command which produces an alphabetical listing of the map name, protection status, and map type of the maps from the work project or, if selected, from the master project. By using the modifying phrases, this list may be limited to maps within a specified alphabetic range of names, to maps that match a specified name template, to maps of a specified type, or to any combination of these.

The LIST command is specified as follows:

LIST FROM (mapname) THROUGH (mapname) TYPE (value)

or

LIST MASTER ALL (template)

The individual phrases of the LIST command are described below.

LIST is the required verb which specifies the command.

MASTER is an optional modifying phrase which specifies that the current master project is to be used for listing. If this phrase is omitted, the working project is used for listing. Prior to this phrase, the OPEN command must be specified to OPEN a master project.

FROM (mapname) is an optional modifying phrase which specifies (mapname) as the name of the first map to be listed. If omitted, listing begins with the first map in the alphabetically ordered list.

THROUGH (mapname) is an optional modifying phrase which specifies (mapname) as the name of the last map to be listed. If omitted, listing ends with the last map in the alphabetically ordered list.

TYPE (value) is an optional modifying phrase which specifies that only those maps of the specified type (value) are to be listed.

ALL (template) is an optional modifying phrase which specifies that only those maps whose name matches the specified (template) are to be listed. The valid formats for (template) are: A+ +A +A+ or A+A; where "A" may be any combination of those characters considered legal within a map name. The total number of characters in (template), including the "+", can not exceed 16. Note that use of the ALL (template) phrase along with the FROM (mapname) THROUGH (mapname) phrase may result in a meaningless instruction. For example, it is impossible to have a map name which would meet the criteria specified in a command such as LIST FROM D THROUGH M ALL B+ .

The following are typical examples of valid LIST commands:

```
LIST  MASTER  FROM FIRSTMAP THROUGH LASTMAP  TYPE 7

LIST  ALL +LAND+  FROM B THR G

LIST
```

The limitations of the LIST command are as follows:

-- The FROM and TH are used to specify map names. Therefore, if TH G is specified, no maps beginning with the letter G, unless there is map named G, will be listed. If all the maps whose names begin with G are desired, specify TH H.

Example of use of the LIST command:

```
PROJECT POLYGON
MAP NAME          STATUS TYPE          MAP NAME          STATUS TYPE
 AGRMAP              E     7            ASPCUT1             E     8
 ASPWOLFRQ           E     8            ASPWOLFRGC          P     8
 BLMLAND             E     7            BLMPINYON           E     8
 DEERGRASS           E     7            DEERHABMAP          E     7
 DEERWINT            E     6            ELEVCNT             E     7
 ELEVCUT1            E     8            GRASSMAP            E     7
 ONE                 E    18            OUTFILE             E    16
 PINYONMAP           E     7            PLSCUT1             E     7
 PLSCUT2             E     7            READ                E    17
 SAGEMAP             E     7            SCTCUT1             E     7
 SCTCUT1R            E     7            SCTCUT2             E     7
 SCTCUT2R            E     7            SCTMERGE            E     7
 SLPWOLFRGC          P     8            SWSCUT1             E     7
 SWSCUT2             E     7
NUMBER OF MAPS LISTED     27
```

Use of the command without modifying phrases produces information on maps in the workfile. AGRMAP has a status of E (exposed ;see EXPOSE) and is discrete (type 7). SLPWOLFRGC has a status of P (protected ;see PROTECT) and is continuous (type 8). DEERWINT is dichotomous (type 6), OUTFILE is a write file (type 16), READ is a read file (type 17), and ONE is a display file (type 18). Maps may also have status of A (archived ;see ARCHIVE).

Example of use of the LIST command:

```
? LIST MASTER

PROJECT RAST
MAP NAME          STATUS TYPE         MAP NAME          STATUS TYPE
 ALBWOLFRQC          E    7            ARCWOLFRQC          E    7
 BAMWOLFRQC          E    7            BQHWOLFRQC          E    7
 CADWOLFRQC          E    7            CLFWOLFRQC          E    7
 CNTWOLFRQC          E    7            DZNWOLFRQC          E    7
 ELEVATION           E    8            GOSWOLFRQC          E    7
 GOUWOLFRQC          E    7            KGSWOLFRQC          E    7
 LSTWOLFRQC          E    7            MDMWOLFRQC          E    7
 MDRWOLFRQC          E    7            MQTWOLFRQC          E    7
 MLRWOLFRQC          E    7            NALWOLFRQC          E    7
 NHRWOLFRQC          E    7            OPMWOLFRQC          E    7
 OSLWOLFRQC          E    7            OSWWOLFRQC          E    7
 PLFWOLFRQC          E    7            PLNWOLFRQC          E    7
 PLSWOLFRQC          E    7            POSWOLFRQC          E    7
 PPUWOLFRQC          E    7            PWRWOLFRQC          E    7
 RABWOLFRQC          E    7            RASWOLFRQC          E    7
 RDSWOLFRQC          E    7            SACWOLFRQC          E    7
 SCEWOLFRQC          E    7            SCLWOLFRQC          E    7
 SCPWOLFRQC          E    7            SCTWOLFRQC          E    7
 SGNWOLFRQC          E    7            SQWWOLFRQC          E    7
 SQZWOLFRQC          E    7            SLSWOLFRQC          E    7
CONTINUE(NO) ?
 SQRWOLFRQC          E    7            STYWOLFRQC          E    7
 SWSWOLFRQC          E    7            TEPWOLFRQC          E    7
 TIQWOLFRQC          E    7            TRNWOLFRQC          E    7
 VISWOLFRQC          E    7            WHBWOLFRQC          E    7
 WHWWOLFRQC          E    7            WTFWOLFRQC          E    7
 WTRWOLFRQC          E    7
NUMBER OF MAPS LISTED     51
```

The command is used to produce information on maps in the master file.

Example of use of the LIST command:

```
? LIST TYPE 8

PROJECT POLYGON
MAP NAME          STATUS TYPE          MAP NAME          STATUS TYPE
 ASPCUT1             E    8             ASPWOLFRG           E    8
 ASPWOLFRGC          P    8             BLMPINYON           E    8
 ELEVCUT1            E    8             SLPWOLFRGC          P    8
NUMBER OF MAPS LISTED      6


? LIST M ALL +RGC FR A TH G

PROJECT RAST
MAP NAME          STATUS TYPE          MAP NAME          STATUS TYPE
 ALBWOLFRGC          E    7             ARCWOLFRGC          E    7
 BAMWOLFRGC          E    7             BGHWOLFRGC          E    7
 CADWOLFRGC          E    7             CLFWOLFRGC          E    7
 CNTWOLFRGC          E    7             DZNWOLFRGC          E    7
NUMBER OF MAPS LISTED      8
```

The command is used to produce information on maps of a specific data type and to produce information on maps whose map name matches a template. In this case, the template specifies all maps from the master file from A through G which end in RGC.

The MATH command is summarized as follows:

MATH is an overlay analysis command which creates a new continuous map by performing mathematical operations or functions on existing discrete or continuous cell maps. The mathematical expression may contain map names, numerical values, mathematical operations, mathematical functions, and parentheses. The available math operations are addition, subtraction, multiplication, division, exponentiation, maximization, minimization, covering, and averaging. The available math functions are square root, logarithm, natural logarithm, truncated integer, rounded integer, absolute value, tangent, cosine, sine, arctangent, arccosine, and arcsine.

The MATH command is specified as follows:

```
MATH  (map or value)  (operation)  (map or value)  ,
(operation)  (function)  (  (map or value)  )  ,
FOR (newmap)
```

The individual phrases of the MATH command are described below.

MATH is the required verb which specifies the command. This must be followed by one or a combination of mathematical expressions, as explained below.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The remaining phrases may be used repeatedly in various combinations to form mathematical expressions. These expressions may include up to 128 phrases, or up to 64 map names or numerical values, whichever comes first. To comply with legal syntax, each phrase specifies the legal choice of phrases which may follow it, and whether or not that phrase may legally begin or end a mathematical expression. Only those phrases which may end an expression may be followed by the FOR phrase. It is legal to follow any of these with the "," phrase to indicate continuation.

(map or value) is an optional modifying phrase which specifies either a map name or a numerical value to be used as an operand in a mathematical operation or function. If a map name is specified, it must be an existing discrete or continuous map. This phrase is valid to either begin or end an expression. The legal phrases which may follow (map or value) are: ) (operation).

(function) is an optional modifying phrase which specifies the mathematical function to be performed. A function is performed upon one oprand. This phrase may be used to begin an expression. The available functions are listed below and must be typed exactly as specified to distinguish them from map names and other phrases. The only legal phrase which may follow (function) is: (.

SQRT - computes square root
LOG - computes logarithm
NLOG - computes natural logarithm
INT - computes truncated integer
ANINT - computes rounded integer
ABS - computes absolute value
TAN - computes tangent
COS - computes cosine
SIN - computes sine
ATAN - computes arctangent
ACOS - computes arccosine
ASIN - computes arcsine

(operation) is an optional modifying phrase which specifies the mathematical operation to be performed. An operation requires two operands. The available operations are listed below and must be typed exactly as specified to distinguish them from map names and other phrases. These operations are evaluated in order of precedence, with operators of equal precedence being evaluated from left to right. Use of parentheses may override this order. The legal phrases which may follow (operation) are: ) (map or value) (function).

+ - performs addition
- - performs subtraction
* - performs multiplication
/ - performs division
** - performs exponentiation
MAXI - performs maximization (returns attribute of larger value)
MINI - performs minimization (returns attribute of smaller value)
COVE - performs covering (reproduces the values of the first attribute, then replaces or covers them with the values of the second attribute where that attribute is non-zero)
AVER - performs averaging (returns the average of the two attributes)

( is an optional modifying phrase which acts as a delimiter within a complex expression. This phrase is valid to begin an expression. Each ( phrase used must be matched with a corresponding ) phrase. The legal phrases which may follow ( are: ( (map or value) (function).

) is an optional modifying phrase which acts as a delimiter within a complex expression. This phrase is valid to end an expression. Each ) phrase must be preceded by a corresponding ( phrase. The legal phrases which may follow ) are: ) (operation).

The following are typical examples of valid MATH commands:

```
MATH  MAPP1 + MAPP2 + 98.25 + SQRT ( MAPP3 )  ,
FOR NEWMAP

MATH  SQRT ( MAPP1 + MAPP2 + ABS ( MAPP3 ) )  ,
AVER ( MAPP4 * MAPP5 )  - MAPP6  FOR NEWMAP
```

The limitations of the MATH command are as follows:

-- Cannot use dichotomous maps.

-- No more than 64 maps may be input per issuance of the command.

-- No more than 128 phrases may be contained in the mathematical expression.

-- Maps used may not be named SQRT, LOG, NLOG, INT, ANINT, ABS, TAN, COS, SIN, ATAN, ACOS, ASIN, +, -, *, /, **, MAXI, MINI, COVE, or AVER.

-- If an attempt is made to take the ACOS or ASIN of a number which is less than -1 or greater than 1, an error occurs. Then the cell is assigned a value of zero.

-- The LOG or NTLOG of a negative number causes the cell to be assigned a value of zero.

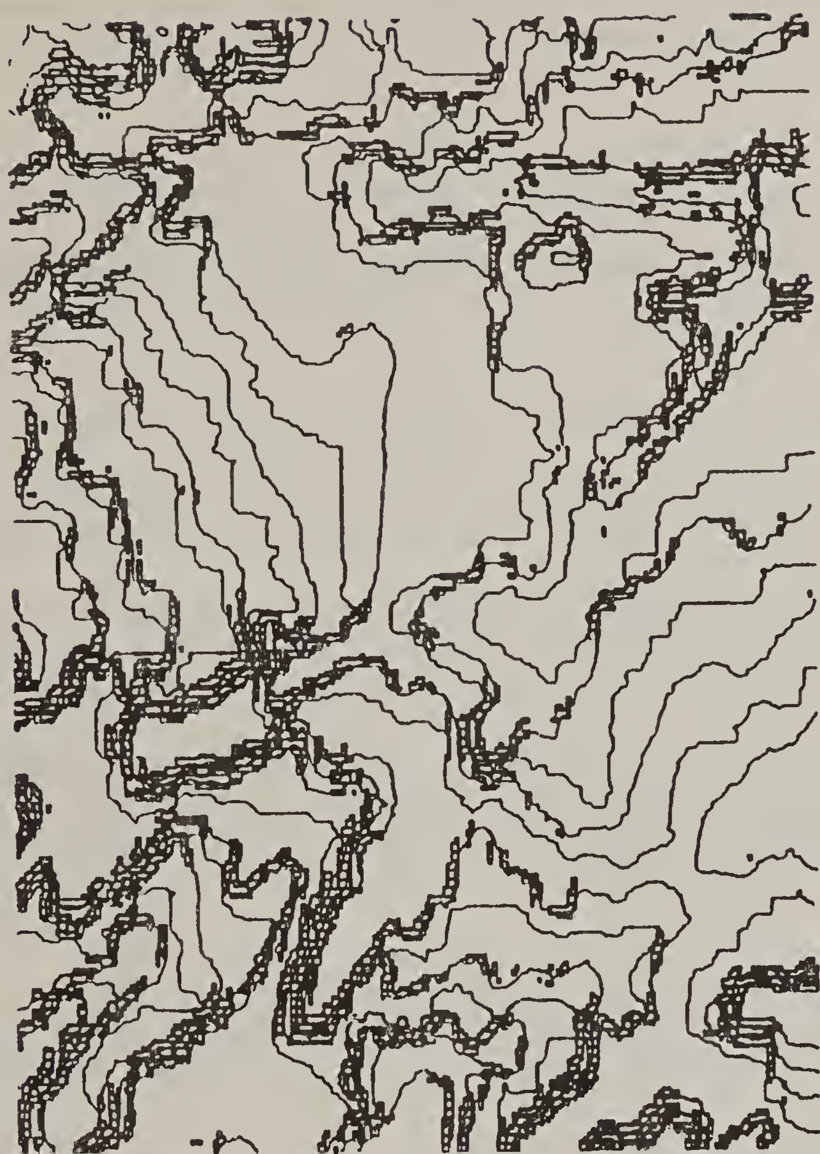
-- There is no way to distinguish between background cells and zero-valued cells.

Example of use of the MATH command:

```
? DESC SLPWOLFRGC

PROTECTED MAP SLPWOLFRGC
DESCRIPTION   ELEV IN METERS OF WOLFRIDGE CO QUAD FROM IDIMS
STUDY AREA    WHITE R   PROJECTION LAMBERT
DATE          12/12/83  SOURCE IDIMS                  VINTAGE 1982
TYPE    8 CONTINUOUS    SUBJECTS       0
CELL HEIGHT    50.0000  CELL WIDTH     50.0000
NUMBER OF ROWS     279  NUMBER OF COLUMNS  215
CELL ACRES       .6178
MINIMUM VALUE          .0000      MAXIMUM VALUE      211.0000
MBR: SOUTH  430050.0000 NORTH  444000.0000 EAST 5053400.0000 WEST 5042650.0000

? MATH ATAN ( SLPWOLFRGC / 100 ) ,
, * 360 * 7 / 22 / 2 FOR ANGLES

OK  MATHED FOR ANGLES

? DESC ANGLES

EXPOSED   MAP ANGLES
DESCRIPTION   ELEV IN METERS OF WOLFRIDGE CO QUAD FROM IDIMS
STUDY AREA    WHITE R   PROJECTION LAMBERT
DATE          12/30/83  SOURCE IDIMS                  VINTAGE 1982
TYPE    8 CONTINUOUS    SUBJECTS       0
CELL HEIGHT    50.0000  CELL WIDTH     50.0000
NUMBER OF ROWS     279  NUMBER OF COLUMNS  215
CELL ACRES       .6178
MINIMUM VALUE          .0000      MAXIMUM VALUE       64.6161
MBR: SOUTH  430050.0000 NORTH  444000.0000 EAST 5053400.0000 WEST 5042650.0000
```

The command is used to create a map of angle of slope from a map of percent slope on Wolf Ridge, CO. Percent slope is first converted into a decimal fraction by dividing by 100. The arctangent of these values is calculated to produce angle of slope in radians which are then converted to degrees through multiplication by 360 and division by two pi. Note that the FUNCTION, DIVIDE, and MULTIPLY commands could have been used separately to produce the same result.

Example of result of use of the MATH command:



A contour plot of Wolf Ridge, CO with 50 foot intervals.
Areas with angle of slope greater than 20 degrees are shaded
(see previous page).

The MAXIMIZE command is summarized as follows:

MAXIMIZE is an overlay analysis command which creates a new continuous by comparing the values of two or more existing discrete or continuous maps on a cell-by-cell basis, then assigning the new map the largest of all existing map values.

The MAXIMIZE command is specified as follows:

```
MAXIMIZE (oldmap)  VERSUS (oldmap)  VERSUS (oldmap) ,
VERSUS (oldmap)  FOR (newmap)
```

The individual phrases of the MAXIMIZE command are described below.

MAXIMIZE (oldmap) is a required phrase which specifies (oldmap) as the name of an existing discrete or continuous map to be maximized.

VERSUS (oldmap) is a cumulative modifying phrase which specifies (oldmap) as an additional existing discrete or continuous map to be maximized. This phrase may be repeated up to 63 times.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid MAXIMIZE commands:

```
MAXIMIZE FIRSTMAP  VERSUS SECONDMAP  VERSUS THIRDMAP ,
VERSUS FOURMAP  FOR NEWMAP

MAXI FIRSTMAP  VERSUS NEXTMAP
```

The limitations of the MAXIMIZE command are as follows:

-- Cannot use dichotomous maps.

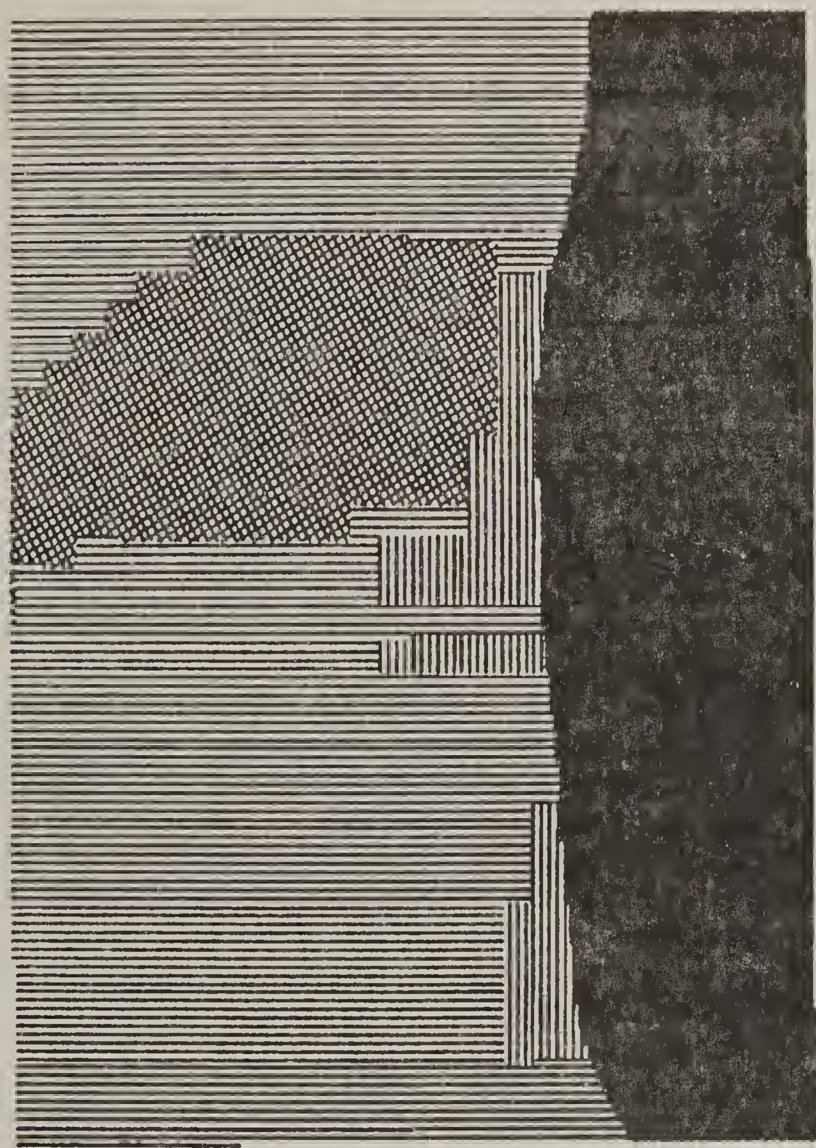
-- No more than 64 maps may be compared at once.

Example of use of the MAXIMIZE command:

```
? DESC SHALE

    4 SUBJECTS IN MAP SHALE
   ID           VALUE    FREQUENCY   SUBJECT
    1          1.0000       6020.0   225 BARRELS/ACRE
    2          2.0000      19185.0   275 BARRELS/ACRE
    3          5.0000      11341.0   325 BARRELS/ACRE
    4          6.0000         15.0   350 BARRELS/ACRE

? DESC DISPOSAL

    1 SUBJECTS IN MAP DISPOSAL
   ID           VALUE    FREQUENCY   SUBJECT
    1          4.0000       5113.0   C_A_DISPOSAL

? DESC SODIUM

    3 SUBJECTS IN MAP SODIUM
   ID           VALUE    FREQUENCY   SUBJECT
    1          3.0000       4059.0   C_0118326MMC
    2          3.0000       1325.0   C_0119985RKSCHJV
    3          3.0000       2104.0   C_0120057PRLA

? MAXI SHALE V DISPOSAL V SODIUM FOR LANDUSE

OK  OPERATED FOR LANDUSE
```

The command is used to prioritize various land uses on Wolf Ridge, CO. Oil shale production less than 300 barrels/acre has the lowest priority followed by sodium leases, oil shale disposal and oil shale production over 300 barrels/acre. Where these land uses are in conflict, the command is used to determine which use is of highest priority.

Example of result of use of the MAXIMIZE command:



A plot of prioritized land uses on Wolf Ridge, CO as determined On the previous page. Low oil shale production is horizontally shaded, sodium leases are vertically shaded, oil shale disposal sites are cross-hatched, and high oil shale production is solid.

The MERGE command is summarized as follows:

MERGE is a data reclassification command which creates a new map of the same type as the two or more existing dichotomous, discrete, or continuous cell maps which are to be merged. This command may be used to merge two or more adjacent maps to combine their information into a single large map; or it may be used to replace the information in a small portion of a map by merging that map with one or more smaller maps whose areas cover that portion of the large map which you want to replace. In the case where two or more existing maps include the same value, that value should have the same meaning on each of the maps because MERGE combines those cells into a single category with that value on the new map. If the existing maps are discrete cell maps with attribute description labels, the MERGE command will assign to the new map the attribute description from the first map encountered which contains that subject value. The window of the new map will include the maximum north and east bounds, and the minimum south and west bounds of the existing maps. Areas within this window that are not covered by an existing map will be assigned a background value.

In the case of overlapping maps, the values from each succeeding map will overwrite the values from any previous maps in the area of intersection. By using the modifying phrase COVER, the MERGE command allows you to specify whether background cells are to be included or ignored in this overwriting process when intersection occurs. Background in a discrete map are those cells which have been assigned no value; background in a dichotomous or continuous map are those cells assigned a value of zero.

The MERGE command is specified as follows:

MERGE (oldmap) COVER WITH (oldmap) WITH (oldmap) ,
WITH (oldmap) FOR (newmap)

The individual phrases of the MERGE command are described below.

MERGE (oldmap) is a required phrase which specifies (oldmap) as the name of an existing dichotomous, discrete, or continuous cell map which is to be merged.

COVER is an optional modifying phrase which specifies that, in the case of intersecting maps, the cells which have a background value will overwrite the values from any previous map in the area of intersection. If this phrase is not specified, the cells having a background value will not overwrite the value of any previously encountered cell. The background cells in a discrete map are those cells which have not been assigned a value; the background cells in a dichotomous or continuous map are those cells whose value is zero. This phrase should not be used when merging adjacent maps which are skewed because of the map projection.

WITH (oldmap) is a required phrase which specifies (oldmap) as the name of an existing dichotomous, discrete, or continuous cell map which is also to be merged. This phrase is cumulative up to 63 times.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed. The (newmap) will be of the same type as the specified (oldmaps).

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid MERGE commands:

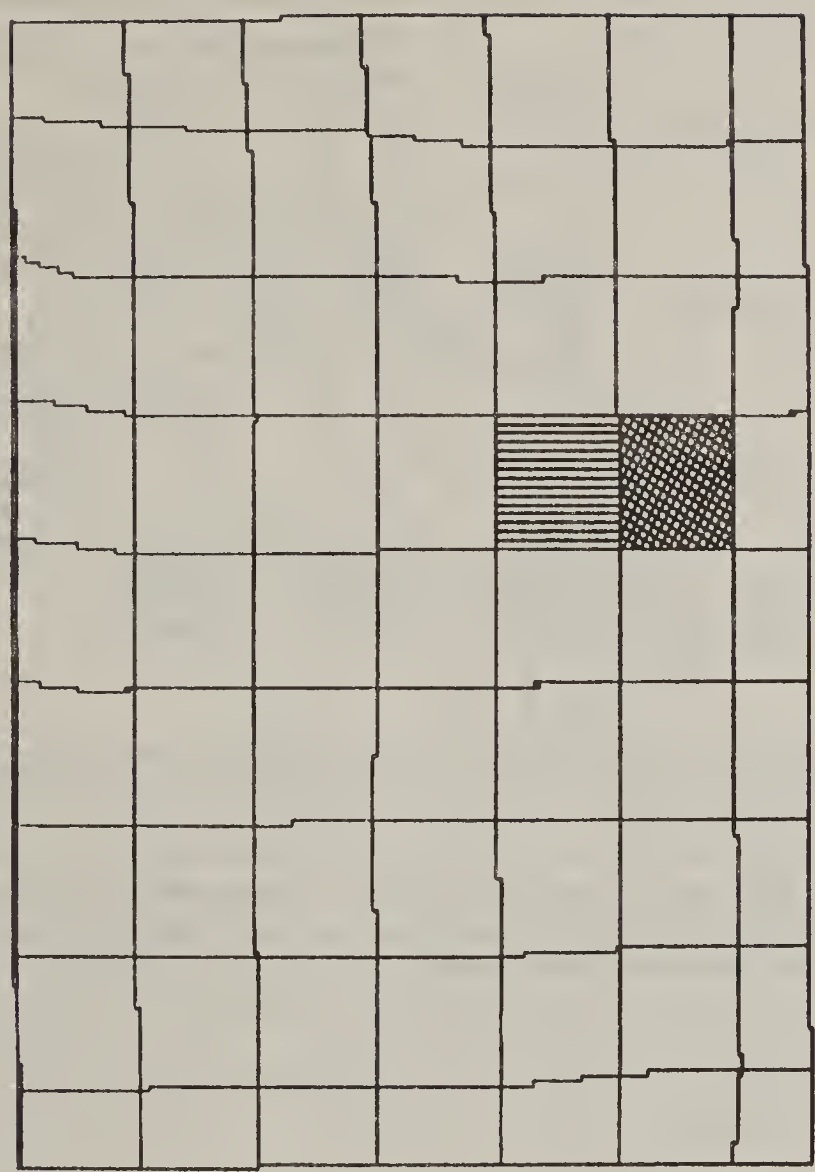
```
MERGE MAPONE  WITH MAPTWO  WITH MAPTHREE ,
WITH MAPFOUR  FOR NEWMAP

MERG MAPA  COVER  WITH MAPB
```

The limitations of the MERGE command are as follows:

-- No more than 64 maps may be merged at a time.

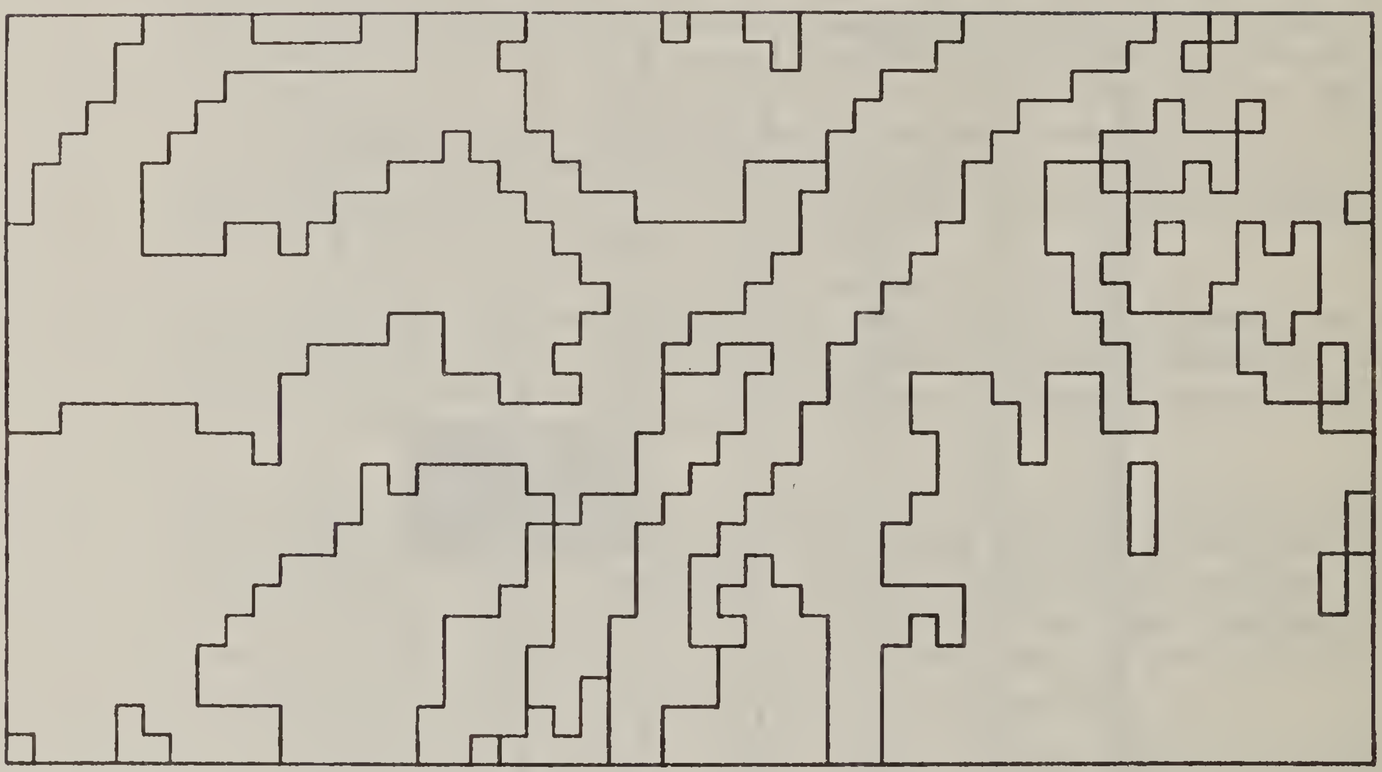
-- Maps to be merged must be of the same type and must have the same cell size.

Example of use of the MERGE command:



The command may be used to combine maps of adjoining regions or quadrangles. In this case, the command is used to combine data from adjoining sections within the Wolf Ridge, CO quadrangle. The sections are indicated with differential shading.

Example of result of use of the MERGE command:



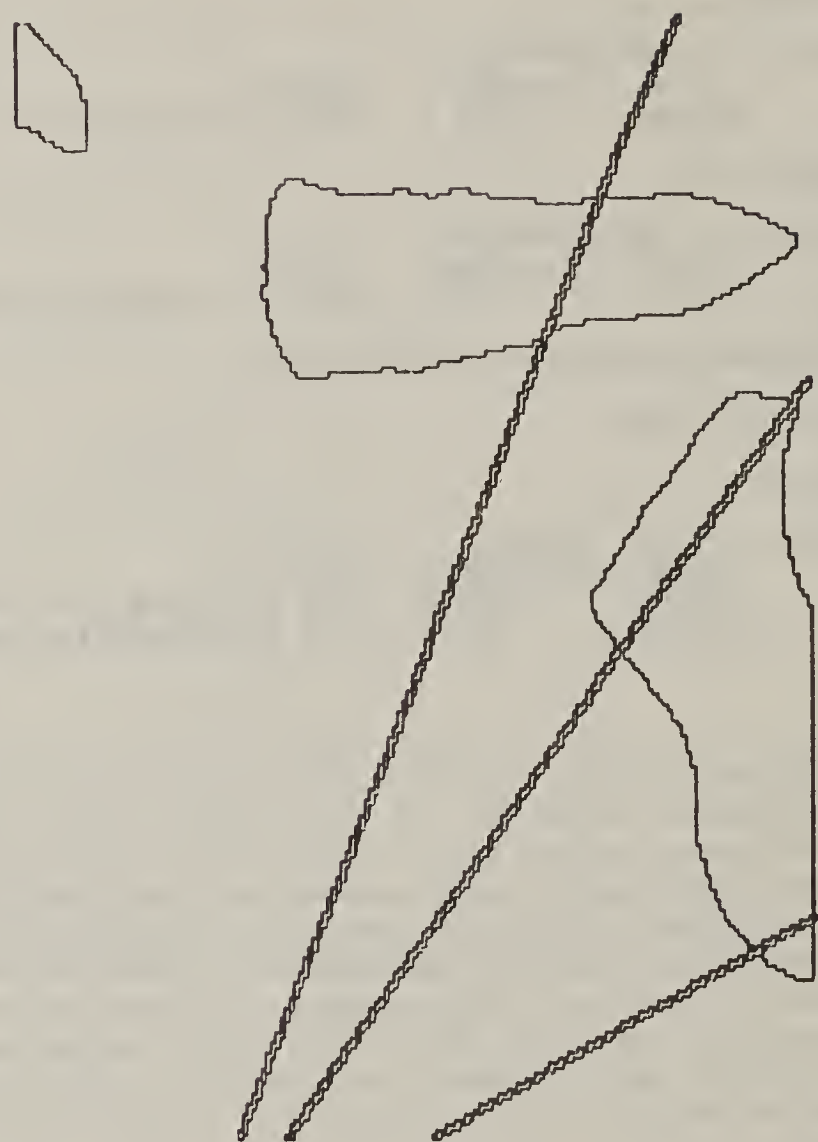
A plot of surface cover types on two adjoining sections of Wolf Ridge, CO created by merging the two separate sections indicated on the previous page.

Example of use of the MERGE command:

```
? DESC DEERCONC

    1 SUBJECTS IN MAP DEERCONC
   ID          VALUE    FREQUENCY   SUBJECT
    1         1.0000       6371.0   MULE DEER WINT CONC/WINT RANGE

? DESC MIGRATION

    1 SUBJECTS IN MAP MIGRATION
   ID          VALUE    FREQUENCY   SUBJECT
    1        99.0000        691.0   MULE DEER MIGRATION ROUTE

? MERGE DEERCONC WITH MIGRATION FOR DEERMAP

OK  MERGED FOR DEERMAP

? DESC DEERMAP

    2 SUBJECTS IN MAP DEERMAP
   ID          VALUE    FREQUENCY   SUBJECT
    1         1.0000       6229.0   MULE DEER WINT CONC/WINT RANGE
    2        99.0000        691.0   MULE DEER MIGRATION ROUTE
```

The command may also be used to combine maps of similar area but with different subjects. In this case, a map of mule deer winter concentration range on Wolf Ridge, CO is merged with a map of mule deer migration routes. The COVER option was not used so that background cells of the migration map did not overwrite values on the range map. Note the decrease in frequency of the range map caused by overwriting of values by the migration map. This decrease is order dependent, i.e., if the migration map had been specified first, its frequency would have decreased. The resultant map is shown on the following page.

Example of result of use of the MERGE command:



A plot of a merged map of mule deer winter concentration range and migration routes on Wolf Ridge, CO, created as on the previous page.

The MINIMIZE command is summarized as follows:

MINIMIZE is an overlay analysis command which creates a new continuous map by comparing the values of two or more existing discrete or continuous maps on a cell-by-cell basis, then assigning the new map the smallest of the existing map values.

The MINIMIZE command is specified as follows:

```
MINIMIZE (oldmap)  VERSUS (oldmap)  VERSUS (oldmap) ,
VERSUS (oldmap)  FOR (newmap)
```

The individual phrases of the MINIMIZE command are described below.

MINIMIZE (oldmap) is a required phrase which specifies (oldmap) as the name of an existing discrete or continuous map to be minimized.

VERSUS (oldmap) is a cumulative modifying phrase which specifies (oldmap) as an additional existing discrete or continuous map to be minimized. This phrase may be repeated up to 63 times.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid MINIMIZE commands:

```
MINIMIZE MAPP1  VERSUS MAPP2  VERSUS MAPP3 ,
VERSUS MAPP4  FOR NEWMAP

MINI MAPP1  VERSUS MAPP2
```

The limitations of the MINIMIZE command are as follows:

-- Cannot use dichotomous maps.

-- No more than 64 maps may be compared at a time.

The MULTIPLY command is summarized as follows:

MULTIPLY is an overlay analysis command which creates a new continuous map by multiplying the values of two or more existing discrete or continuous maps on a cell-by-cell basis.

The MULTIPLY command is specified as follows:

```
MULTIPLY (oldmap)  BY (oldmap)  BY (oldmap) ,
BY (oldmap)  FOR (newmap)
```

The individual phrases of the MULTIPLY command are described below.

MULTIPLY (oldmap) is a required phrase which specifies (oldmap) as the name of an existing discrete or continuous map to be multiplied.

BY (oldmap) is a cumulative modifying phrase which specifies (oldmap) as an additional existing discrete or continuous map to be multiplied. This phrase may be repeated up to 63 times.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid MULTIPLY commands:

```
MULTIPLY MAPP1  BY MAPP2  BY MAPP3 ,
BY MAPP4  FOR NEWMAP

MULTI MAPP1  BY MAPP2
```

The limitations of the MULTIPLY command are as follows:

-- Cannot use dichotomous maps.

-- No more than 64 maps may be multiplied at a time.

The NEWS command is summarized as follows:

NEWS is a program control command which provides a listing of the current news file. This file contains new capabilities, known inconsistencies, and known errors from the previous revision that have been fixed in the latest revision of the MAPS software. The news file is meant to be used as a means of communicating information from system programmers to system users, and may include any other pertinent information.

The NEWS command is specified as follows:

NEWS

The individual phrase of the NEWS command is described below.

NEWS is the required verb which specifies that the current news file is to be output.

The following are typical examples of valid NEWS commands:

NEWS

The limitations of the NEWS command are as follows:

-- None found to date.

The NOTE command is summarized as follows:

NOTE is a data display command which provides for the inclusion of non-command text during a session. The text following the NOTE command is not evaluated as a command string. The NOTE command allows the user to leave comments, messages, or reminders in his/her write file.

The NOTE command is specified as follows:

NOTE (text)

The individual phrase of the NOTE command is described below.

NOTE (text) is a required phrase which specifies (text) as a sequence of letters, numbers, or symbols. The phrase must be less than 76 characters in length.

The following are typical examples of valid NOTE commands:

```
NOTE  THIS MAP SHOWS WHERE THE BALD EAGLES ARE
NOTE  AND THE ANTELOPE ARE NOT.

NOTE: THIS IS REMINDER FOR ME.
```

The limitations of the NOTE command are as follows:

-- None found to date.

Example of use of the NOTE command:

```
NOTE
NOTE   OPEN THE MASTER DATABASE
NOTE
OPEN RAST
NOTE
NOTE   SET THE VIEWING WINDOW
NOTE
WIND MDRWOLFRGC
NOTE
NOTE   LIST ALL MAPS IN THE WORKFILE
NOTE
LIST
NOTE
NOTE   SET THE READ DEVICE BACK TO THE CONSOLE
NOTE
READ
```

The command may be used to document read files (type 17), write files (type 16), or batch input files.

The OPEN command is summarized as follows:

OPEN is a program control command which opens a specified project as the current master project and allows access to the maps and the read, write, and display files listed in that project. If another project has already been specified with the OPEN command, it will be closed prior to opening of the project most recently specified. Maps and files listed in the master project cannot be modified. New maps created during a session will not be entered into the master project, but are always entered into the working project.

The OPEN command is specified as follows:

OPEN (master)

The individual phrase of the OPEN command is described below.

OPEN (master) is a required phrase which specifies (master) as the name of the master project to be opened. If another master project is already opened, it will be closed prior to the new (master) being opened. Maps and files listed in the current (master) project cannot be modified. The name (master) accesses the file containing the master project map names list (.DT file) which in turn provides access to the disk file containing the master project maps whose directory location was specified at the time MAPS was accessed (see Appendix A).

The following is a typical example of a valid OPEN command:

OPEN WOLF

The limitations of the OPEN command are as follows:

-- Can only access one master project at a time.

The PAGE command is summarized as follows:

PAGE is a program control command which sets the lines per page for tabular output which comes to the log-on CRT. On initial entry into MAPS, the lines per page is set to 23. If a terminal is being used that allows fewer than, or more than, 23 lines per page, the lines per page should be reset, appropriately.

The PAGE command is specified as follows:

PAGE (lines)

The individual phrase of the PAGE command is described below.

PAGE (lines) is a required phrase which specifies (lines) as the value of the current page length.

The following are typical examples of valid PAGE commands:

PAGE 60

PAGE 40

The limitations of the PAGE command are as follows:

-- The lines per page must be between 1 and 120.

The PLOT command is summarized as follows:

PLOT is a data display command which generates a line drawing of an existing dichotomous, discrete, or continuous cell map by tracing boundaries between cells of different values. This command can be used in either of two ways. First, it can be used to plot dichotomous or discrete maps. This method involves plotting the entire map, including drawing boundaries to distinguish cells of different values. Second, it can be used to plot existing discrete or continuous maps. This method allows the user to selectively plot cell values from the map by specifying one or more cell values, or ranges of cell values. The resulting plot will draw boundaries to distinguish cells according to these specifications.

The PLOT command is specified as follows:

PLOT (oldmap)

or

PLOT (oldmap) FROM (oldvalue) FROM (oldvalue) ,
FROM (oldvalue) THROUGH (oldvalue)

The individual phrases of the PLOT command are described below.

PLOT (oldmap) is a required phrase which specifies (oldmap) as the name of an existing dichotomous, discrete, or continuous cell map to be plotted; (oldmap) must be of type dichotomous or discrete when using method one, and of type discrete or continuous when using method two.

FROM (oldvalue) is an optional modifying phrase which indicates that all cells having a value of (oldvalue) in the existing map are to be plotted. The FROM phrase is only to be used with plotting method two. This phrase is cumulative.

THROUGH (oldvalue) is an optional modifying phrase which indicates that all cells having any value greater than the (oldvalue) specified in the most recent FROM (oldvalue) phrase, but less than or equal to the (oldvalue) indicated here, are to be plotted. If no FROM (oldvalue) phrase has yet been specified, an error occurs. This phrase is cumulative.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid PLOT commands:

```
PLOT THISMAP

PLOT THISMAP FROM 10 THROUGH 20 FROM 30
```

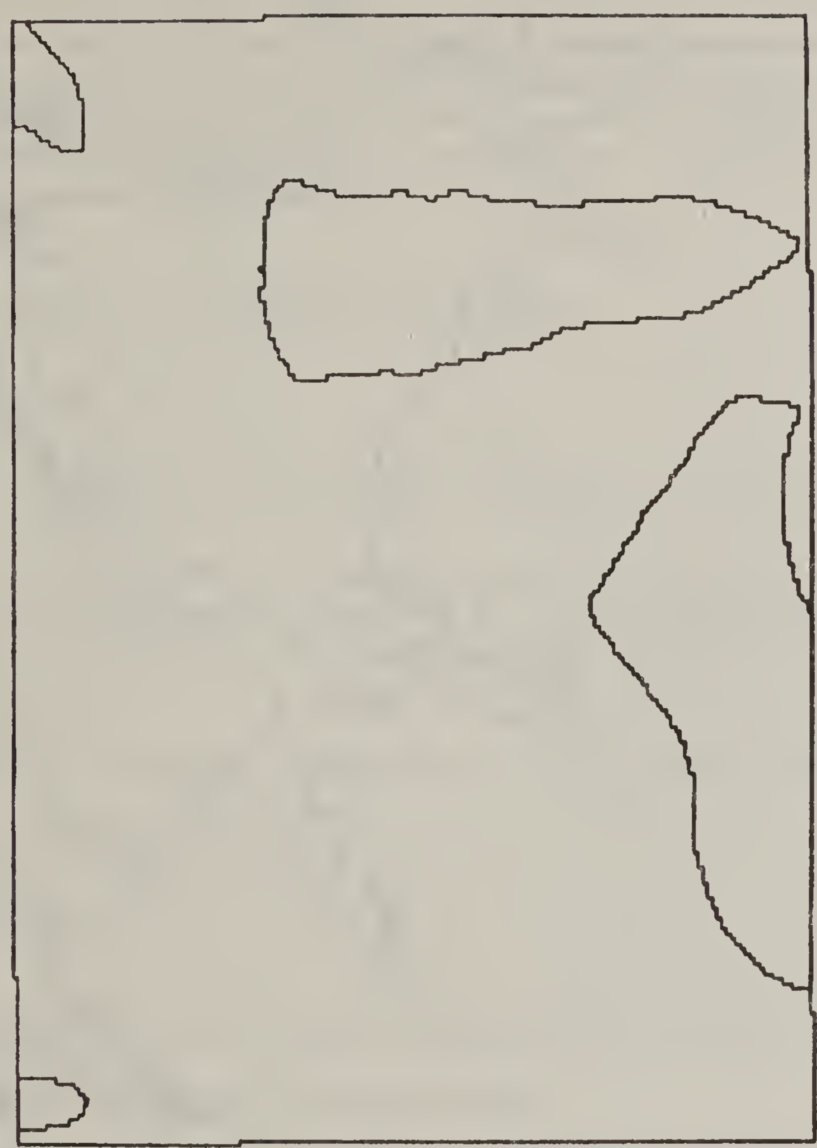
The limitations of the PLOT command are as follows:

-- Can only plot one map per issuance of the command.

-- Viewing window must be set.

-- No more than 64 specifications can be made for method two.

Example of result of use of the PLOT command:



A plot of mule deer range on Wolf Ridge, CO.

Example of result of use of the PLOT command:


A plot of elevation on Wolf Ridge, CO from 6400 to 6600 feet.

The PRINT command is summarized as follows:

PRINT is a data display command which produces a character display of a discrete map suitable for viewing at the log-on CRT or sending to a line printer. PRINT uses characters to represent categories of discrete map. Characters used are: 1-9, 0, A-Z, a-z, +, and - for categories 1-64 in the order they are stored for that particular map. If writing to the default, the log-on CRT, PRINT will produce 64-cell wide swaths of the map. If writing to a write file, PRINT will produce 128-cell wide swaths.

The PRINT command is specified as follows:

PRINT (oldmap)

The individual phrase of the PRINT command is described below.

PRINT (oldmap) is a required phrase which specifies (oldmap) as the name of the existing discrete cell map to be printed. The resulting display is sent to the current write device (see WRITE command).

The following are typical examples of valid PRINT commands:

PRINT THISMAP

PRIN THISMAP

The limitations of the PRINT command are as follows:

-- Can only display discrete maps.

-- No more than 64 categories may be represented.

Example of result of use of the PRINT command:

```
SCTCUT1            REQUIRES PRINTING     1 SWATH(S) OF UP TO   26 CELLS
AND CONTAINS   25 ROWS    26 COLUMNS AND    11 SUBJECTS

   ID          VALUE    FREQUENCY  SYMBOL
    1         6.0000        270.0       1  523SGHR
    2         4.0000        246.0       2  423PJSQ
    3         5.0000         37.0       3  423PJHR
    4        32.0000          4.0       4  522SGHR
    5        11.0000         11.0       5  522QR/SG
    6         2.0000         27.0       6  522SQ
    7        29.0000         22.0       7  PEM
    8        43.0000          7.0       8  PSS
    9        22.0000         17.0       9  523HAHR
   10        10.0000          7.0       0  211
   11         9.0000          2.0       A  623BNBS
   SWATH  1 COLUMN     1 THROUGH COLUMN   26
 1 11111222211112211112222212
 2 11112222222222221112222222
 3 11112222111111111112222222
 4 11122221111111111112222222
 5 11222211111111112111222222
 6 12222111111111222211122222
 7 12222111111122332221111222
 8 22222111221223222222111444
 9 22222222222223222222211141
10 22222222333333322222221111
11 22222233333333112222211115
12 22222233333111112222111155
13 22222333331111111122216677
14 22111113331111111111166677
15 11111111131111116666666788
16 11111111111112122226666785
17 11111111111112222222677859
18 11111111111122222226777599
```

A character display of a portion of a surface cover type map of Wolf Ridge, CO. Only the first 18 rows are shown.

The PROTECT command is summarized as follows:

PROTECT is a data manipulation command which sets the protection status indicator associated with an existing work project map to "protected". Once this is done, the map is protected from being modified. The EXPOSE command has an opposite effect.

The PROTECT command is specified as follows:

PROTECT (oldmap)

The individual phrase of the PROTECT command is described below.

PROTECT (oldmap) is a required phrase which specifies (oldmap) as the name of the existing exposed work project map to be protected.

The following are typical examples of valid PROTECT commands:

PROTECT THISMAP

PROT THISMAP

The limitations of the PROTECT command are as follows:

-- None found to date.

Example of use of the PROTECT command:

```
? PROTECT ASPWOLFRGC
OK  PROTECTED ASPWOLFRGC
? PROTECT SLPWOLFRGC
OK  PROTECTED SLPWOLFRGC
```

Two maps are "protected". Note that map status changes from E (exposed) to P (protected) (see EXPOSE and LIST).

The PROXIMITY command is summarized as follows:

PROXIMITY is a distance analysis command which creates a new map of the same type as the first of two existing dichotomous, discrete, or continuous maps by selecting those cells from the first map which are designated as target cells and which are located within (i.e., less than or equal to) a specified distance from any designated target cell contained on the second map. If the OUTSIDE phrase is used, the first map's target cells are selected if they are located outside of (i.e., greater than) a specified distance from the second map's target cells. Target cells are those whose values fall within the range of values indicated for each map. If no range is specified for a particular map, all non-background cells in that map are considered target cells. The value assigned to each selected cell on the new map is the value of that same cell from the first map. To use the command with only one existing map, specify the same map name following both the PROXIMITY and the WITH phrases, then differentiate the two sets of target cells by using the FROM-THROUGH phrases after each of these.

The PROXIMITY command is specified as follows:

```
PROXIMITY (oldmap)  FROM (value)  THROUGH (value) ,
WITH (oldmap)  FROM (value)  THROUGH (value) ,
TO (distance)  OUTSIDE  FOR (newmap)
```

The individual phrases of the PROXIMITY command are described below.

PROXIMITY (oldmap) is a required phrase which specifies (oldmap) as an existing dichotomous, discrete, or continuous map whose target cells are selected based on their proximity to cells from the second map. The (oldmap) specified here may be the same as the one specified in the WITH phrase.

WITH (oldmap) is a required phrase which specifies (oldmap) as the second existing dichotomous, discrete, or continuous map containing the target cells from which the proximity is determined. The (oldmap) specified here may be the same as the one specified by the PROXIMITY phrase.

FROM (value) is an optional modifying phrase which specifies (value) as the lowest value within the range of values to be used as target cells from the most recently specified (oldmap). If omitted, (value) is assigned the minimum real value. When (oldmap) is dichotomous, this phrase is ignored, and all set cells depicting presence are assumed.

THROUGH (value) is an optional modifying phrase which specifies (value) as the greatest value within the range of values to be used as target cells. If omitted, (value) is assigned the maximum real value. When (oldmap) is dichotomous, this phrase is ignored, and all set cells depicting presence are assumed.

TO (distance) is a required phrase which specifies (distance) as the real value to be used in figuring the proximity, or the distance around the perimeter of each target cell. The value of (distance) is specified in units of meters; there are 1609 meters in a mile. The larger the value of (distance), the greater the processing time for this command. If (distance) is zero, PROXIMITY will act like an overlay command and select those target cells from the first (oldmap) which intersect the target values from the second (oldmap).

OUTSIDE is an optional modifying phrase which allows the user to select only those cells on the first (oldmap) which are outside of i.e., greater than) the distance from the cells on the second (oldmap. If this phrase is not used, only those cells within (i.e., less than or equal to) this distance are selected.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid PROXIMITY commands:

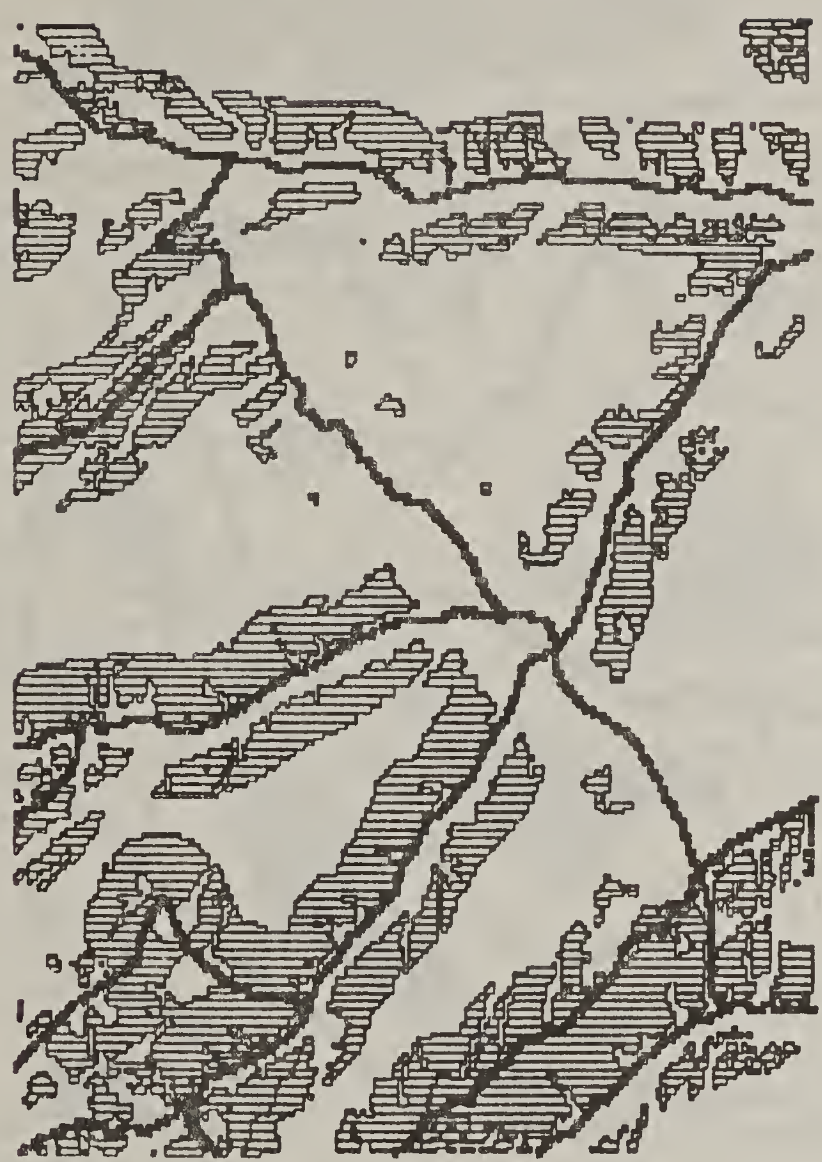
```
PROXIMITY THISMAP  FROM 87 THROUGH 100 ,
WITH THISMAP  FROM 25.5 THROUGH 47  TO 1609  FOR MYMAP

PROX THISMAP  WITH SECONDMAP  TO 923  OUTSIDE  FOR NEWMAP
```

The limitations of the PROXIMITY command are as follows:

-- The specified distance must be greater than or equal to zero.

-- Distance can be specified only in meters.

Example of result of use of the PROXIMITY command:



A plot of roads on Wolf Ridge, CO (solid) and all pinyon-juniper forest which is within 800 meters of a road (shaded). Compare with the plot on the following page.

Example of result of use of the PROXIMITY command:

A plot of roads on Wolf Ridge, CO (solid) and all pinyon-juniper forest which is outside 800 meters of a road (shaded). Compare with the plot on the previous page.

The QUERY command is summarized as follows:

QUERY is a data description command which allows the user to retrieve information on any given cell, contained within the current viewing window, from an existing dichotomous, discrete or continuous map. Prior to using the command it is suggested that the user display the map on the console screen to use as a reference for the queries. The point to be queried is selected by moving the terminal's crosshairs to the desired location, then pressing any key to register that position. The exact location of the point is marked on the plotted map with an "X" and the row-column boundaries of the map cell which contains that point are outlined. The information provided about the chosen point includes: the northing and easting of the point; the row and column position of the cell; the value of the cell; and, except for continuous maps, the frequency of occurance of that value. For discrete maps the attribute description of the cell, if it exists, will also be displayed.

To avoid re-typing this command when repeatedly querying the same map, the character "R" or the character "E" may be keyed in to register the crosshairs position. This causes the crosshairs to automatically reappear after each queried point until a character other than "R" or "E" is used in response. The character "E" gives the explanation described above for each queried point. The character "R" gives only the cell value which is output on the plot next to each queried point.

The QUERY command is specified as follows:

QUERY (oldmap)

The individual phrase of the QUERY command is described below.

QUERY (oldmap) is a required phrase which specifies (oldmap) as the name of an existing dichotomous, discrete, or continuous map to be queried. After the command is entered, a crosshair will appear on the screen. The terminal cursor is used to position the crosshair on the map, then any character may be used as input to indicate the desired crosshair location. If the character "R" or "E" is used as input, the crosshairs will repeatedly appear without re-typing the QUERY (oldmap) phrase. Using the character "E" will result in the full explanation repeated for each queried point. Using the character "R" will result in only the cell value being output on the plot next to each queried point. Any other character will give the full explanation and return the user to the "?" prompt.

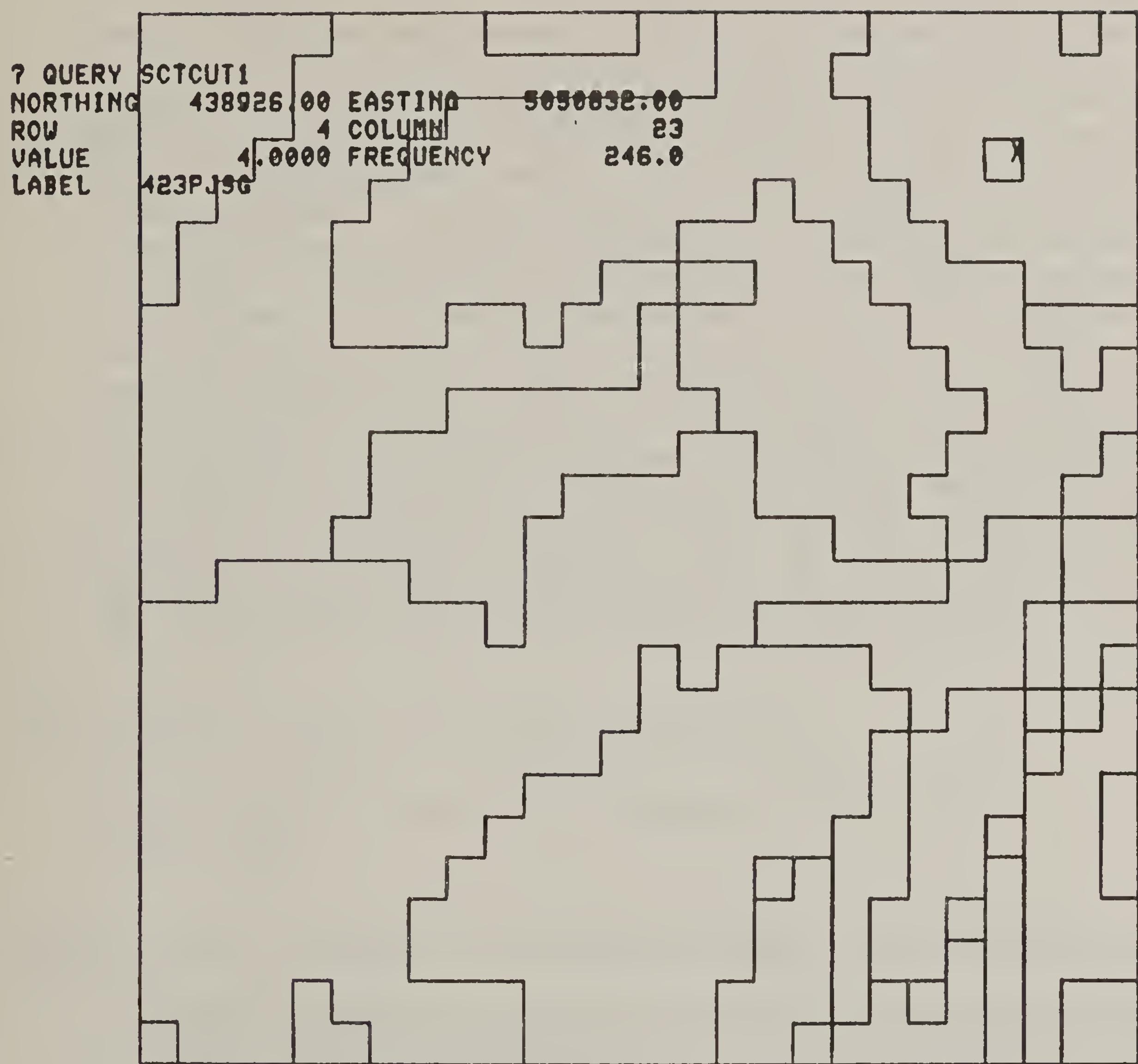
The following are typical examples of valid QUERY commands:

```
QUERY THISMAP

QUER  THISMAP
```

The limitations of the QUERY command are as follows:

-- Viewing window must be set.

Example of use of the QUERY command:




The displayed map is a portion of a surface cover type map of Wolf Ridge, CO. The feature of interest was indicated by crosshair input and marked with an X. Information on the corresponding cell is produced and the cell is plotted.

The RASTERIZE command is summarized as follows:

RASTERIZE is a data manipulation command which transforms a point, line or polygon vector map to create a new dichotomous, discrete, or continuous cell map. The values for either the acres per cell and the ratio of cell height to width, or the values for the cell height and width, must be specified to establish cell size. Prior to using the command, the viewing window must be set. The window can be set to an area larger than the source map or to only a portion of the vector map, but some portion of the map must be within the viewing window. The total number of cell rows and cell columns are established based on the dimensions of the viewing window and the cell size. The north and south bounds of the window are reset to even increments of the cell height and the east and west bounds of the window are reset to even increments of the cell width. For point and line vector maps, a cell is assigned the class of the first point or line that is inside that cell. For polygon maps, the cell is assigned the class of that polygon which covers more than half of the cell in the x-direction at a point half-way in the cell y-direction. Note that if multiple cell maps are to be used together for analyses they must all have the same cell size, the same projection and the same number of rows and columns. The user may also decide how to assign values to the cells with the BY phrase.

The RASTERIZE command is specified as follows:

```
RAST (oldmap) BY (option) FOR (newmap) TYPE (value) ,
(cell size)
```

The individual phrases of the RASTERIZE command are described below.

RASTERIZE (oldmap) is a required phrase which specifies (oldmap) as the name of an existing point, line or polygon vector map to be transformed into a new cell map.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

TYPE (value) is a required phrase which specifies (value) as the type of (newmap) to create. Legal types are: 6-dichotomous, 7-discrete, and 8-continuous. Note, maps generated by this command have integer values.

BY (option) is an optional phrase which specifies (option) as the method used to assign values to the cells of (newmap). Legal options are: SUBJECT, FEATURE, ATTRIBUTE (attribute I.D. number). Each (option) is mutually exclusive. If no BY (option) is specified the SUBJECT option is used as a default. TYPE (value) and BY (option) work in conjunction such that:

If the cell type is dichotomous the cells are set and the BY (option) has no affect.

If the cell type is discrete and the SUBJECT option is used, the cells are assigned the sequential subject number and the subject is used for the description. If the subject is numeric the cells are assigned the numeric value and the subject is used for the description. If the cell type is discrete and FEATURE number assignment is used the cells are assigned the sequential feature number and the feature subject is used for the description. If the cell type is discrete and multiple ATTRIBUTE assignment is used the cells are assigned the attribute value for type real and integer and sequential feature number for character. The attribute field is always used for the description regardless of attribute type.

If the cell type is continuous and the SUBJECT option is used, the cells are assigned the sequential subject number unless the subject is all numeric in which case the numeric value of the subject is assigned to the cells. If the cell type is continuous and FEATURE assignment is used the cells are assigned the sequential feature number. If the cell type is continuous and multiple ATTRIBUTE assignment is used the cells are assigned the atribute value for attribute type integer and real. Attribute assignment should not be used for continuous types if the attribute field is character, since only the sequential feature number is assigned to the cells.

(cell size) can be defined in one of two ways. The size of the cell in acres and the ratio of height to width may be specified or the height and width may be entered. This is accomplished by entering one of the following pairs of phrases, ACRES and RATIO or HEIGHT and WIDTH. Each pair is mutually exclusive. In addition, both the ACRE and RATIO phrases must be specified, or both the HEIGHT and WIDTH phrases must be specified.

Files containing cells which are equal in size may not be generated if one is created using the Acres/Ratio option and the other is generated by specifying Height/Width. If it is desired to compare files, they should be generated using the same cell size options.

If ACRES and RATIO are specified, the HEIGHT and WIDTH are calculated as:

WIDTH = SQUARE ROOT ((ACRE * SQUARE METERS PER ACRE) / RATIO)
HEIGHT = WIDTH * RATIO

ACRES (value) is a modifying phrase, to be paired with RATIO, which specifies (value) as the number of acres per cell for (newmap).

RATIO (value) is a modifying phrase, to be paired with ACRE, which specifies (value) as the ratio of cell height to cell width for (newmap).

If HEIGHT and WIDTH are specified, the ACRES and RATIO are calculated as:

RATIO = HEIGHT / WIDTH
ACRES = (((WIDTH**2) * RATIO) / SQUARE METERS PER ACRE)

HEIGHT (value) is a modifying phrase, to be paired with WIDTH, which specifies (value) as the cell height for (newmap).

WIDTH (value) is a modifying phrase, to be paired with HEIGHT, which specifies (value) as the cell width for (newmap).

The following are typical examples of valid RASTERIZE commands:

```
RASTERIZE VECTORMAP BY SUBJECT FOR CELLMAP TYPE 7 ,
ACRES 80 RATIO 1.25

RAST VECTORMAP BY ATTRIBUTE 4 FOR CELLMAP TYPE 6 ,
HEIGHT 50 WIDTH 50
```

The limitations of the RASTERIZE command are as follows:

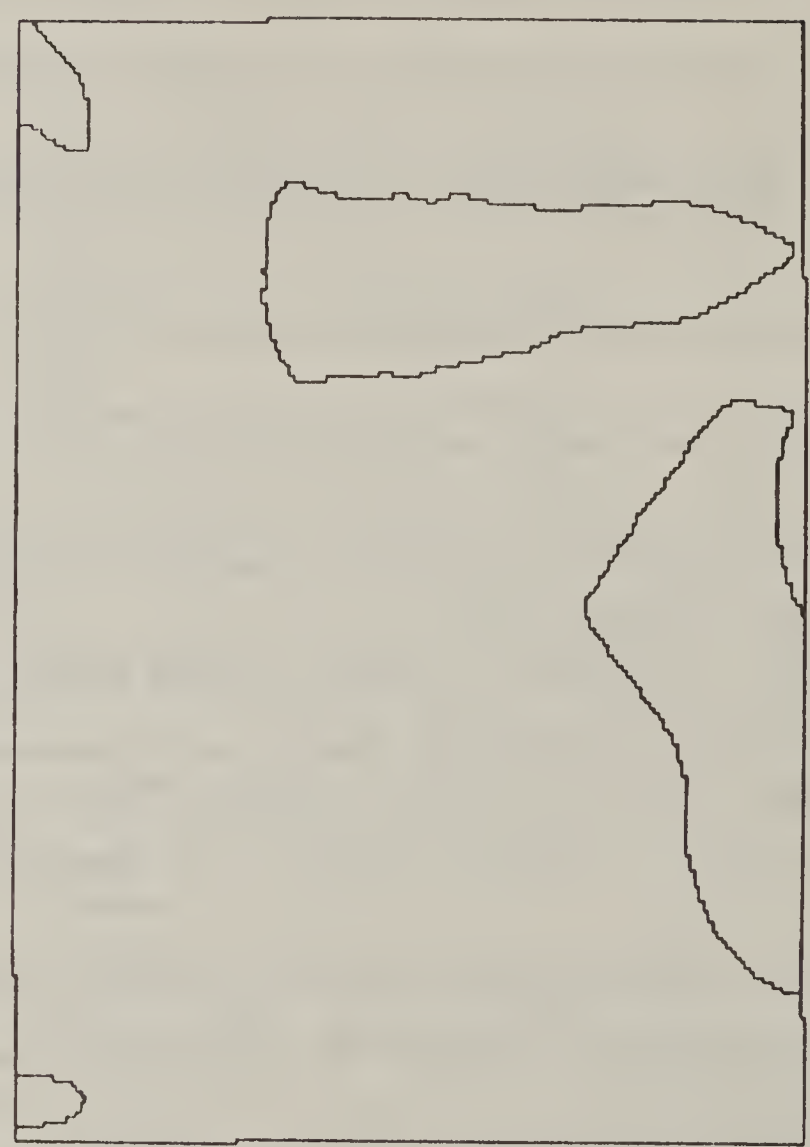
-- Viewing window must be set.

-- If the resulting map is to be used with other cell maps, it must be rasterized so that the cell sizes are equal.

-- Cell maps are limited to the following sizes:

| | | |
|---|---|---|
| Total cells | - | 9999999 maximum |
| Total rows | - | 32767 maximum |
| Total columns | - | 32767 maximum |

Example of result of use of the RASTERIZE command



A plot of mule deer ranges on Wolf Ridge, CO in cell format.
Cell size is a square one acre and map type is discrete.

Example of result of use of the RASTERIZE command

Note the difference in appearance with increased resolution between a line segment in vector versus cell format.

The READ command is summarized as follows:

READ is a program control command which changes the input file from which a sequence of commands is read. Normally the read file defaults to the log-on console or, in batch mode, the default is the specified input file. By using the command the user may have the system read commands from a file that has been created outside of the system instead of from the default.

The READ command is specified as follows:

READ FROM (filename)

The individual phrases of the READ command are described below.

READ is the required verb which specifies the command.

FROM (filename) is an optional modifying phrase which specifies (filename) as the current read file. This file must be an existing read file which has been created outside of the system, and must contain a valid sequence of commands. In order for the file to be recognized as a read file the (filename) must end with ".RD". The user should ensure that the last command in the read file is either BYE to end the session, READ to set the current read file back to the default, or READ FROM (filename) to set the current read file to another created read file. If the (filename) is not currently listed in the workfile names, this command will include it. If this phrase is omitted, the default read file is assumed.

The following are typical examples of valid READ commands:

READ FROM INPUT

READ

The limitations of the READ command are as follows:

-- Read file names must end in ".RD".

Example of use of the READ command:

```
? READ FR READ

OK  READING FROM READ

? NOTE

? NOTE   OPEN THE MASTER DATABASE

? NOTE

? OPEN RAST

OK  OPENED RAST
   51 MAPS IN MASTER PROJECT RAST

? NOTE

? NOTE   SET THE VIEWING WINDOW

? NOTE

? WIND MDRWOLFRGC
OK  WINDOWED

? NOTE

? NOTE   LIST ALL MAPS IN THE WORKFILE

? NOTE

? LIST

PROJECT POLYGON
MAP NAME          STATUS TYPE          MAP NAME          STATUS TYPE
 AGRMAP              E     7            ASPCUT1              E     8
 ASPWOLFRG           E     8            ASPWOLFRGC           P     8
 BLMLAND             E     7            BLMPINYON            E     8
 DEERGRASS           E     7            DEERHABMAP           E     7
 DEERWINT            E     6            ELEVCNT              E     7
 ELEVCUT1            E     8            GRASSMAP             E     7
 ONE                 E    18            OUTFILE              E    16
 PINYONMAP           E     7            PLSCUT1              E     7
 PLSCUT2             E     7            READ                 E    17
 SAGEMAP             E     7            SCTCUT1              E     7
 SCTCUT1R            E     7            SCTCUT2              E     7
 SCTCUT2R            E     7            SCTMERGE             E     7
 SLPWOLFRGC          P     8            SWSCUT1              E     7
 SWSCUT2             E     7
NUMBER OF MAPS LISTED     27

? NOTE

? NOTE   SET THE READ DEVICE BACK TO THE CONSOLE

? NOTE

? READ

OK  READING FROM DEFAULT

?
```

Several commands were read from a prepared text file named READ.RD. In this instance, the user has combined several commands ordinarily used in a session. The command might also be used to prepare complex commands (e.g., a lengthy RENUMBER or CROSS) where typing errors are likely to occur.

The RENAME command is summarized as follows:

RENAME is a data manipulation command which assigns a new name to an existing work project map that has a protection status of exposed. All disk files associated with the map will also be renamed.

The RENAME command is specified as follows:

RENAME (oldmap) TO (newmap)

The individual phrases of the RENAME command are described below.

RENAME (oldmap) is a required phrase which specifies (oldmap) as the name of the existing exposed work project map to be renamed.

TO (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a workfile map, a masterfile map or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

The following are typical examples of valid RENAME commands:

RENAME THISMAP TO FIRSTMAP

RENA THISMAP

The limitations of the RENAME command are as follows:

-- Cannot rename master project maps.

The RENUMBER command is summarized as follows:

RENUMBER is a data reclassification command which creates a new map by assigning new values to the cell values of an existing discrete or continuous map. Values to which no new values are assigned retain their existing value in the new map. If the existing map is a discrete map with attribute description labels, the command will assign those same attribute descriptions to the new map. The RENUMBER command performs much the same as the EXTRACT command except that cells which are not reassigned values retain their existing value and do not become background cells.

The RENUMBER command is specified as follows:

```
RENUMBER (oldmap)  FOR (newmap)  ,
ASSIGNING (newvalue)  TO (oldvalue)  THROUGH (oldvalue)  ,
ASSIGNING (newvalue)  TO (oldvalue)  TO (oldvalue)
```

The individual phrases of the RENUMBER command are described below.

RENUMBER (oldmap) is a required phrase which specifies (oldmap) as the name of the existing discrete or continuous cell map to be renumbered. The resulting (newmap) will be of the same type as (oldmap).

ASSIGNING (newvalue) is an optional modifying phrase which specifies (newvalue) as one of the new map values to be assigned. This phrase is cumulative only when a new TO (oldvalue) or TO (oldvalue) THROUGH (oldvalue) phrase is specified before each repetition. A maximum of 64 ASSIGNING (newvalue) phrases can be included in each RENUMBER command. If the value of an old cell can satisfy more than one TO (oldvalue) THROUGH (oldvalue) phrase, the new cell acquires the (newvalue) specified by the ASSIGNING phrase which corresponds to the satisfied condition which was input first.

TO (oldvalue) is an optional modifying phrase which indicates that the new map value specified in the most recent ASSIGNING (newvalue) phrase is to be assigned to all cells having a value of (oldvalue) in the existing map. If no ASSIGNING (newvalue) phrase has yet been specified, an error occurs. This phrase is cumulative.

THROUGH (oldvalue) is an optional modifying phrase which indicates that the new map value specified in the most recent ASSIGNING (newvalue) phrase is to be assigned to all cells having any value greater than whatever (oldvalue) was indicated in the most recent TO (oldvalue) phrase but less than or equal to the (oldvalue) indicated here. If no TO (oldvalue) phrase has yet been specified, an error occurs. This phrase is cumulative.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid RENUMBER commands:

```
RENUMBER THISMAP FOR FIRSTMAP ASSIGNING 10 TO 25 ,
THROUGH 50 ASSIGNING 9 TO 30 TO 51 THRU 73

RENU THISMAP AS 12 T 25 TH 50
```

The limitations of the RENUMBER command are as follows:

-- Cannot use dichotomous maps.

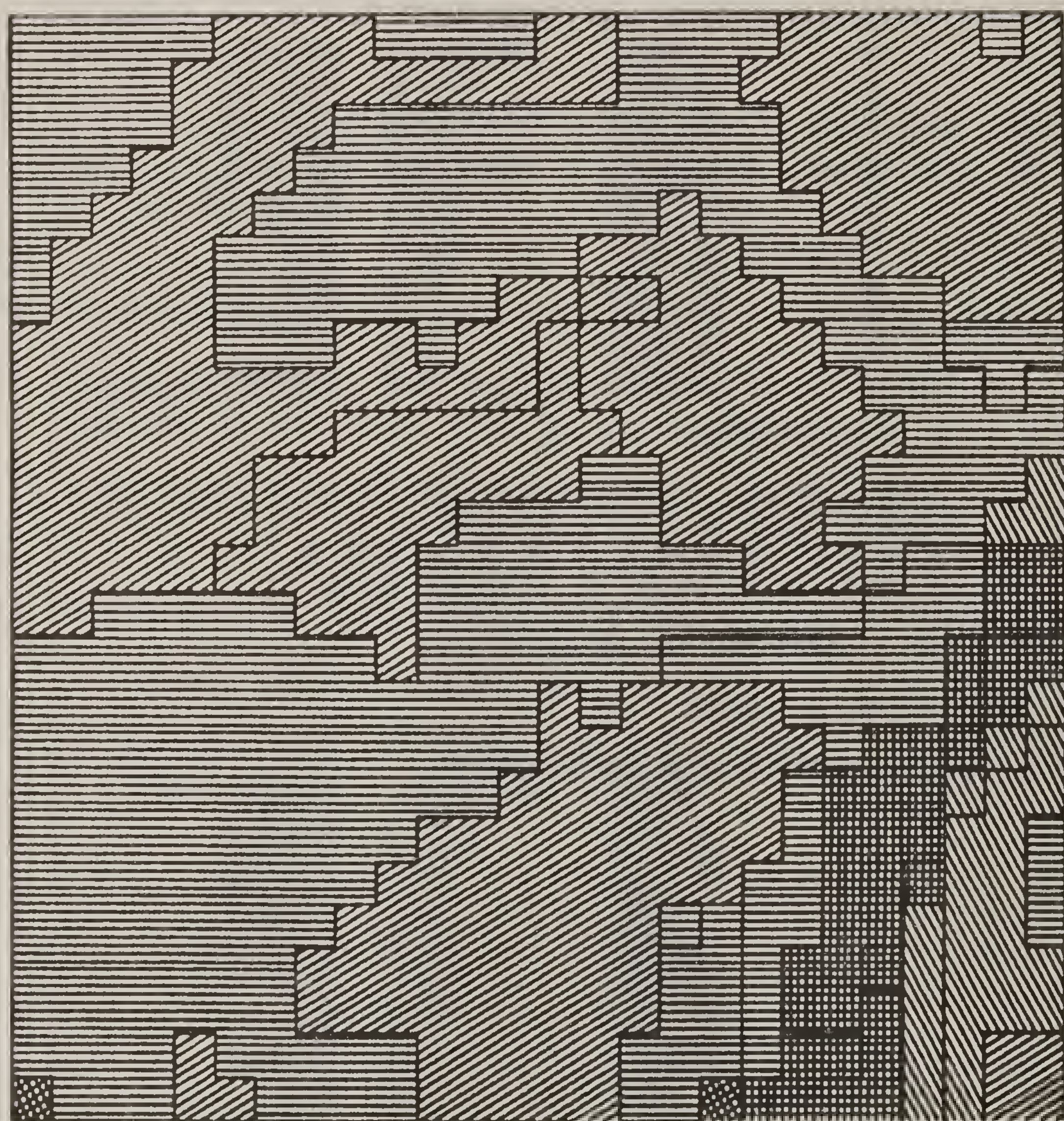
-- No more than 64 reassignments may be made per issuance of the command.

Example of result of use of the RENUMBER command:

```
? DESC SCTCUT1

   11 SUBJECTS IN MAP SCTCUT1
   ID          VALUE    FREQUENCY   SUBJECT
    1         6.0000        270.0   523SGHR
    2         4.0000        246.0   423PJSG
    3         5.0000         37.0   423PJHR
    4        32.0000          4.0   522SGHR
    5        11.0000         11.0   522GR/SG
    6         2.0000         27.0   522SG
    7        29.0000         22.0   PEM
    8        43.0000          7.0   PSS
    9        22.0000         17.0   523HAHR
   10        10.0000          7.0   211
   11         9.0000          2.0   623BNBS

? DESC SCTCUT1R

? RENU SCTCUT1 FOR SCTCUT1R AS 1 TO 6 ,
, AS 1 TO 32 AS 1 TO 2 AS 2 TO 11 ,
, AS 2 TO 22 AS 5 TO 9 AS 10 TO 4 TH 5 ,
, AS 15 TO 29 AS 15 TO 43 AS 20 TO 10

OK  RENUMBERED FOR SCTCUT1R

? DESC SCTCUT1R

   11 SUBJECTS IN MAP SCTCUT1R
   ID          VALUE    FREQUENCY   SUBJECT
    1         1.0000        270.0   523SGHR
    2        10.0000        246.0   423PJSG
    3        10.0000         37.0   423PJHR
    4         1.0000          4.0   522SGHR
    5         2.0000         11.0   522GR/SG
    6         1.0000         27.0   522SG
    7        15.0000         22.0   PEM
    8        15.0000          7.0   PSS
    9         2.0000         17.0   523HAHR
   10        20.0000          7.0   211
   11         5.0000          2.0   623BNBS
```

The command is used to combine similar subjects and to reassign values for surface cover types on one section of Wolf Ridge, CO. In this case, sagebrush shrubland (522SG and 523SG) is combined, other shrubland (523) is combined, grassland (6) is renumbered, open-canopy forest (423) is combined, riparian vegetation (P) is combined, and agricultural land (211) is renumbered. Note that if subject values are not reassigned they retain their original values.

Example of result of use of the RENUMBER command:



A plot of surface cover types on one section of Wolf Ridge, CO. Similar subjects have been combined, as shown on the previous page, and shaded. Note the overall decrease in subject types.

The RESET command is summarized as follows:

RESET ia a data display command which resets the current viewing window to the rectangular area specified by the most recent WINDOW command. This cancels the effect of any prior ZOOM commands.

The RESET command is specified as follows:

RESET

The individual phrase of the RESET command is described below.

RESET is the required verb which specifies the command.

The following are typical examples of valid RESET commands:

RESET

RESE

The limitations of the RESET command are as follows:

-- None found to date.

The SCAN command is summarized as follows:

SCAN is a neighborhood analysis command which creates a new continuous map from an existing continuous map by assigning a new value to each cell. This value is a summary statistic of the values surrounding each cell; either the average, total, maximum, minimum, most frequent, least frequent, diversity, deviation, or proportion of the cell values in the surrounding neighborhood of cells. The neighborhood, whose size may range from a 3x3 grid to a 31x31 grid, specifies a roving window matrix centered around each cell which moves along the existing map. If a cell lies such that the surrounding matrix extends beyond the edge of the map, the values from the edgemost row or column are used to fill the matrix where it extends beyond the edge of the map.

The SCAN command is specified as follows:

SCAN (oldmap) (operation) MATRIX (value) FOR (newmap)

The individual phrases of the SCAN command are described below.

SCAN (oldmap) is a required phrase which specifies (oldmap) as an existing continuous map which is to be scanned.

MATRIX (value) is an optional modifying phrase which specifies (value) as the row-column size of the square matrix, or grid, centered around the current cell which defines the neighboring cells. The (value) must be an odd whole number which is greater than or equal to 3 and less than or equal to 31. A larger (value) will produce a different effect on the resultant (newmap) than will a smaller (value). If omitted, (value) is set to the default of 3.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following phrases are the (operations) for summarizing. Each (operation) is a mutually exclusive phrase, however, one (operation) must be included in each SCAN command.

AVERAGE is an optional modifying phrase which specifies that the new value assigned to (newmap) is the average of the values of all target cells in the neighborhood of, and including the value of, the current target cell on (oldmap). The average is computed by dividing the total value of these target cells by the frequency in which they occur.

TOTAL is an optional modifying phrase which specifies that the new value assigned to (newmap) is the total sum of the values of all target cells in the neighborhood of, and including the value of, the current target cell on (oldmap).

MAXIMUM is an optional modifying phrase which specifies that the new value assigned to (newmap) is the maximum of the values of all target cells in the neighborhood of, and including the value of, the current target cell on (oldmap).

MINIMUM is an optional modifying phrase which specifies that the new value assigned to (newmap) is the minimum of the values of all target cells in the neighborhood of, and including the value of, the current target cell on (oldmap).

MOST is an optional modifying phrase which specifies that the new value assigned to (newmap) is the value which occurred most frequently among the values of all target cells in the neighborhood of, and including the value of, the current target cell on (oldmap).

LEAST is an optional modifying phrase which specifies that the new value assigned to (newmap) is the value which occurred least frequently among the values of all target cells in the neighborhood of, and including the value of, the current target cell on (oldmap).

DIVERSITY is an optional modifying phrase which specifies that the new value assigned to (newmap) is the diversity, or number of different existing values, between the values of all target cells in the neighborhood of, and including the value of, the current target cell on (oldmap).

DEVIATION is an optional modifying phrase which specifies that the new value assigned to (newmap) is the deviation, or difference between the average existing value, of the values of all target cells in the neighborhood of, and including the value of, the current target cell on (oldmap).

PROPORTION is an optional modifying phrase which specifies that the new value assigned to (newmap) is the proportion, or percentage of each neighborhood occupied by cells having the same value as the target cell, of the values of all target cells in the neighborhood of, and including the value of, the current target cell on (oldmap).

The following are typical examples of valid SCAN commands:

```
SCAN THISMAP  DIVERSITY  MATRIX 29  ,
FOR SCANMAP

SCAN THISMAP  AVE
```

The limitations of the SCAN command are as follows:

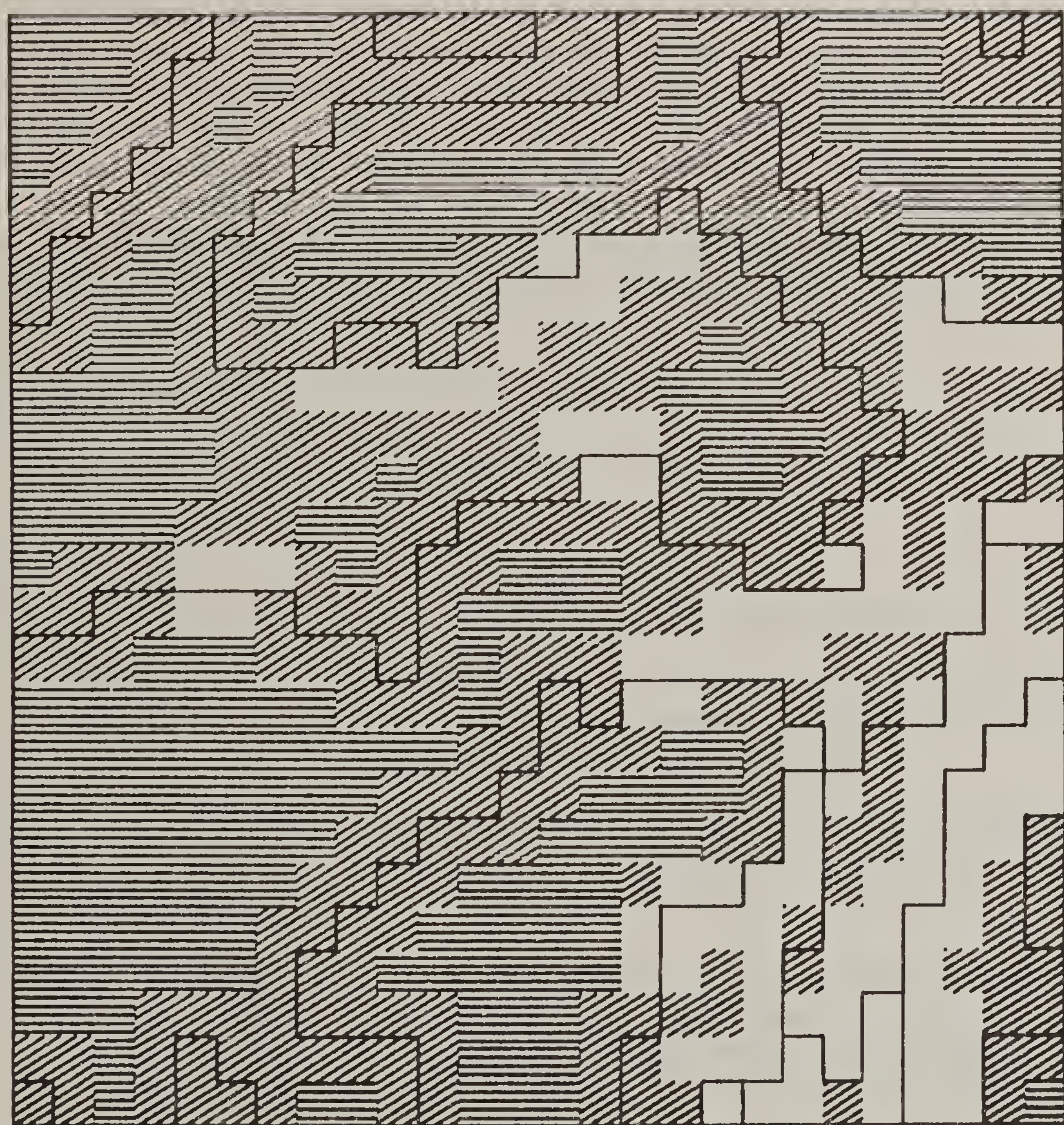
-- Cannot use dichotomous or discrete maps.

Example of use of the SCAN command:

```
? DESC VEGTYPES

EXPOSED   MAP VEGTYPES
DESCRIPTION   SURFACE COVER TYPE   WOLF RIDGE         COLORADO  1:24000
STUDY AREA    WHITER   PROJECTION LAMBERT
DATE          02/02/84  SOURCE WELUT/AMS            VINTAGE 1982
TYPE    8 CONTINUOUS    SUBJECTS       0
CELL HEIGHT    63.6149  CELL WIDTH     63.6149
NUMBER OF ROWS      25  NUMBER OF COLUMNS   26
CELL ACRES      1.0000
MINIMUM VALUE        1.0000      MAXIMUM VALUE       20.0000
MBR: SOUTH  437543.2000 NORTH  439133.6000 EAST 5050832.0000 WEST 5049178.0000

? SCAN VEGTYPES DIVERSITY FOR VEGDIV

OK  SCANNED FOR VEGDIV

? DESC VEGDIV

EXPOSED   MAP VEGDIV
DESCRIPTION   SURFACE COVER TYPE   WOLF RIDGE         COLORADO  1:24000
STUDY AREA    WHITER   PROJECTION LAMBERT
DATE          12/15/83  SOURCE WELUT/AMS            VINTAGE 1982
TYPE    8 CONTINUOUS    SUBJECTS       0
CELL HEIGHT    63.6149  CELL WIDTH     63.6149
NUMBER OF ROWS      25  NUMBER OF COLUMNS   26
CELL ACRES      1.0000
MINIMUM VALUE        1.0000      MAXIMUM VALUE        5.0000
MBR: SOUTH  437543.2000 NORTH  439133.6000 EAST 5050832.0000 WEST 5049178.0000

? CATE VEGDIV FOR VEGDIV7

OK  CATEGORIZED FOR VEGDIV7

? DESC VEGDIV7

    5 SUBJECTS IN MAP VEGDIV7
   ID          VALUE    FREQUENCY   SUBJECT
    1          1.0000       201.0
    2          2.0000       329.0
    3          3.0000        88.0
    4          4.0000        29.0
    5          5.0000         3.0
```

A portion of a map of surface cover types on Wolf Ridge, CO (VEGTYPES) is scanned for diversity. This creates a new continous map (VEGDIV) which may then be categorized into a discrete map of vegetative diversity (VEGDIV7, see also CATEGORIZE). This is illustrated on the following page.

Example of result of use of the SCAN command:



A plot of a portion of a map of surface cover types on Wolf Ridge, CO (VEGTYPES). Vegetative diversity values (VEGDIV7) of one and two are shaded. Note that a diversity value of one (lowest, horizontal shade) occurs in the center of homogeneous vegetation types. A diversity value of two (angled shade) occurs along a boundary between two vegetation types. Regions of greatest diversity (value >2) are not shaded.

The SCORE command is summarized as follows:

SCORE is an overlay analysis command which creates a new discrete map by comparing the cell values from one existing discrete map with those of another existing discrete or continuous map on a cell-by-cell basis. For each category of the first map, it then summarizes the values of the second map which occur over the same geographic area to determine the value which will be assigned to the new map. New map values may be assigned by determining either the total, average, maximum, or minimum of the second-map values associated with the cells from that first-map category. If the first existing discrete map includes attribute descriptor labels, the SCORE command will assign those same attribute descriptions to the new map.

The SCORE command is specified as follows:

```
SCORE (oldmap)  BY (oldmap)  (operation) ,
FOR (newmap)
```

The individual phrases of the SCORE command are described below.

SCORE (oldmap) is a required phrase which specifies (oldmap) as the name of an existing discrete map whose categories are to be used as the basis for summarizing the second (oldmap).

BY (oldmap) is a required phrase which specifies (oldmap) as the name of an existing discrete or continuous map whose cell values are to be summarized.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map or, a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following phrases are the (operations) for summarizing. One of these phrases must be included in each SCORE command.

AVERAGE is an optional modifying phrase which specifies that the new value to be assigned to (newmap) is the average of the second (old-map) values which occur over each category of the first (oldmap). The average is computed by dividing the total value of "on" cells in the second (oldmap) by their total count. If no cells are "on" in the second (oldmap) over an entire category of the first (oldmap), that category in (newmap) will be assigned background.

TOTAL is an optional modifying phrase which specifies that the new value to be assigned to (newmap) is the total of the second (oldmap) values which occur over each category of the first (oldmap). If no cells are "on" in the second (oldmap) over an entire category of the first (oldmap), that category in (newmap) will be assigned a value of zero.

MAXIMUM is an optional modifying phrase which specifies that the new value to be assigned to (newmap) is the maximum of the second (old-map) values which occur over each category of the first (oldmap). If no cells are "on" in the second (oldmap) over an entire category of the first (oldmap), that category in (newmap) will be assigned a value of -9999999.

MINIMUM is an optional modifying phrase which specifies that the new value to be assigned to (newmap) is the minimum of the second (old-map) values which occur over each category of the first (oldmap). If no cells are "on" in the second (oldmap) over an entire category of the first (oldmap), that category in (newmap) will be assigned a val-ue of 9999999.

The following are typical examples of valid SCORE commands:

```
SCORE FIRSTMAP  BY SECONDMAP  MAXIMIZE  FOR THISMAP

SCOR THISMAP  BY SECONDMAP  TOTAL  FOR TOTALMAP
```

The limitations of the SCORE command are as follows:

-- Cannot use dichotomous maps.

Example of use of the SCORE command:

```
? DESC MDCONC

    1 SUBJECTS IN MAP MDCONC
   ID          VALUE    FREQUENCY   SUBJECT
    1         1.0000      10397.0   MULE DEER WINT CONC/WINT RANGE

? DESC MDCONC H

EXPOSED    MAP MDCONC
DESCRIPTION    MULE DEER RANGE      WOLF RIDGE         COLORADO  1:24000
STUDY AREA     WHITER   PROJECTION LAMBERT
DATE           02/02/84  SOURCE WELUT/WAMS          VINTAGE 1982
TYPE    7 DISCRETE       SUBJECTS       1
CELL HEIGHT     50.0000  CELL WIDTH     50.0000
NUMBER OF ROWS      279  NUMBER OF COLUMNS  215
CELL ACRES        .6178
MBR: SOUTH  430050.0000 NORTH  444000.0000 EAST 5053400.0000 WEST 5042650.0000

? DESC ELEVATION

EXPOSED    MAP ELEVATION
DESCRIPTION    ELEV IN METERS OF WOLFRIDGE CO QUAD FROM IDIMS
STUDY AREA     WHITE R   PROJECTION LAMBERT
DATE           ??        SOURCE IDIMS                VINTAGE 1982
TYPE    8 CONTINUOUS     SUBJECTS       0
CELL HEIGHT     50.0000  CELL WIDTH     50.0000
NUMBER OF ROWS      279  NUMBER OF COLUMNS  215
CELL ACRES        .6178
MINIMUM VALUE     6184.0000      MAXIMUM VALUE     7200.0000
MBR: SOUTH  430050.0000 NORTH  444000.0000 EAST 5053400.0000 WEST 5042650.0000
```

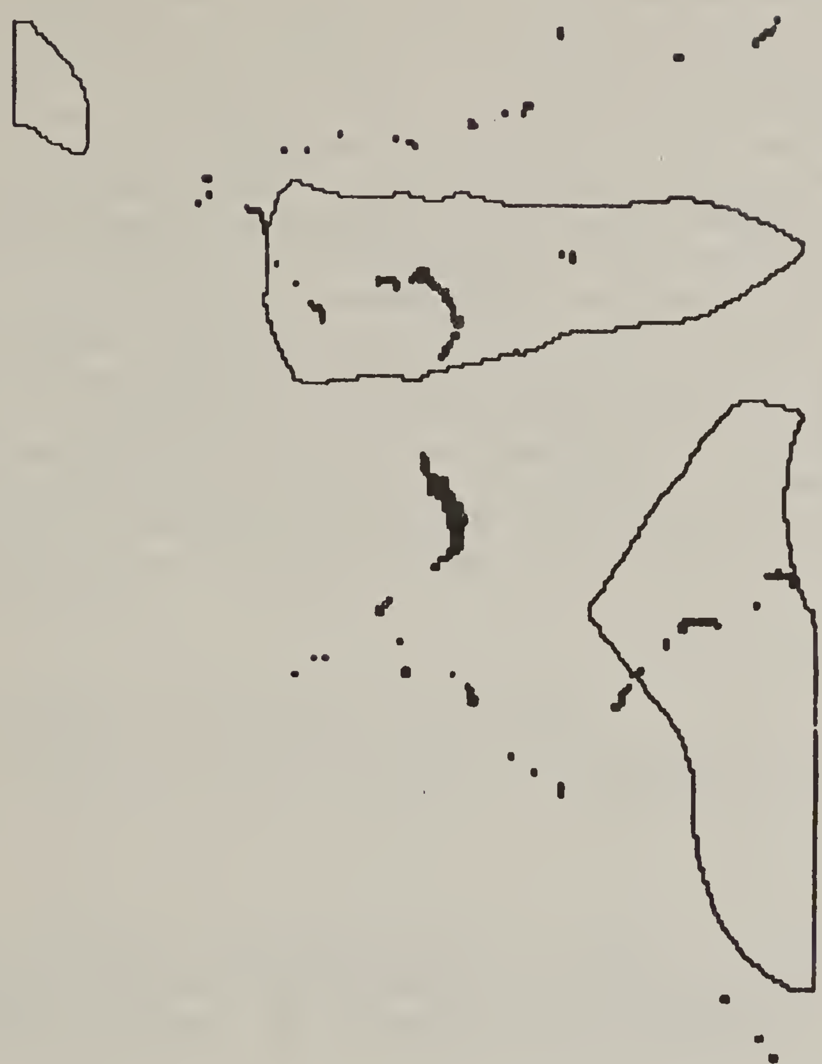
Two maps will be compared; a discrete map of mule deer winter concentration range on Wolf Ridge, CO (MDCONC) and a continuous elevation map of Wolf Ridge, CO (ELEVATION).

Example of result of use of the SCORE command:

```
? SCORE MDCONC BY ELEVATION ,
, MINIMUM FOR CONCELEVMN

OK  SCORED FOR CONCELEVMN

? SCORE MDCONC BY ELEVATION ,
, MAXIMUM FOR CONCELEVMX

OK  SCORED FOR CONCELEVMX

? SCORE MDCONC BY ELEVATION ,
, AVERAGE FOR CONCELEVAV

OK  SCORED FOR CONCELEVAV

? DESC CONCELEVMN

    1 SUBJECTS IN MAP CONCELEVMN
   ID          VALUE    FREQUENCY   SUBJECT
    1      6200.0000      10397.0   MULE DEER WINT CONC/WINT RANGE

? DESC CONCELEVMX

    1 SUBJECTS IN MAP CONCELEVMX
   ID          VALUE    FREQUENCY   SUBJECT
    1      6820.0000      10397.0   MULE DEER WINT CONC/WINT RANGE

? DESC CONCELEVAV

    1 SUBJECTS IN MAP CONCELEVAV
   ID          VALUE    FREQUENCY   SUBJECT
    1      6502.3320      10397.0   MULE DEER WINT CONC/WINT RANGE
```

The command is used to summarize the minimum, maximum, and average elevation of mule deer winter concentration range on Wolf Ridge, CO.

Example of result of use of the SCORE command:



A plot of mule deer winter concentration range on Wolf Ridge, CO and a shaded plot of elevations of 6502 feet on Wolf Ridge, CO (solid). This elevation is the average elevation of mule deer winter concentration range as determined in the previous example (CONCELEVAV).

The SHADE command is summarized as follows:

SHADE is a data display command which generates a plot of an existing dichotomous, discrete, or continuous cell map using shading specifications from entries in a predefined shade table. The command may be used in either of two ways. The first method shades existing dichotomous or discrete maps. It involves shading with a shade table and/or using an entry from that table. If no shade table is specified the default table is used. If no option to use a particular shade table entry is specified, the map is shaded by assigning to each cell category the corresponding entry from the shade table (i.e., category one is shaded with shade table entry one, category two is shaded with shade table entry two, etc...). If shading using a particular shade table entry is to be performed, all cell categories are shaded using the same shade pattern. The second method shades existing discrete or continuous maps. It also involves shading with a shade table but, in addition, allows the user to reclassify and selectively plot cell values in the map. To use this method, the user assigns a shade table entry to a cell value or range cell values.

The SHADE command is specified as follows:

```
SHADE (oldmap)  WITH (shadetable)  ASSIGNING (option)

or

SHADE (oldmap)  WITH (shadetable)  ,
ASSIGNING (option)  TO (oldvalue)  THROUGH (oldvalue)  ,
ASSIGNING (option)  TO (oldvalue)  TO (oldvalue)
```

The individual phrases of the SHADE command are described below.

SHADE (oldmap) is a required phrase which specifies (oldmap) as the name of an existing cell map to be shaded; (oldmap) must be dichotomous or discrete when using method one, and discrete or continuous when using method two.

WITH (shadetable) is an optional modifying phrase which specifies (shadetable) as an existing shade table that includes details for a number of shading patterns. Each attribute in (oldmap) is shaded with one of the shade patterns listed in the table. If the number of attributes within (oldmap) exceeds the number of shade patterns in (shadetable), then the remaining attributes will not be shaded. If omitted, the default shade table is assumed.

ASSIGNING (option) is an optional modifying phrase which specifies (option) as a valid shading pattern option from the shade table.

In method one, the ASSIGNING phrase specifies (option) as the single shading pattern which will be used to shade the entire map. If omitted, each attribute in (oldmap) will be shaded with a different shading pattern from the shade table as they correspond sequentially.

In method two, the ASSIGNING phrase specifies (option) as the shade pattern to be used in shading all cells whose values fall within the range specified by the corresponding TO (oldvalue) THROUGH (oldvalue) phrase. The ASSIGNING phrase is cumulative only when a new TO (oldvalue) or TO (oldvalue) THROUGH (oldvalue) phrase is specified before each repetition. A maximum of 64 ASSIGNING (option) phrases may be included in each SHADE command. If the value of an old cell can satisfy more than one TO (oldvalue) THROUGH (oldvalue) phrase, then that cell value is shaded using the (option) specified by the ASSIGNING phrase which corresponds to the satisfied condition which was input first.

TO (oldvalue) is an optional modifying phrase which indicates that the shading pattern specified in the most recent ASSIGNING (option) phrase is used to shade all cells having a value of (oldvalue) in the existing map. The TO phrase is only to be used with shading method two. If no ASSIGNING (option) phrase has yet been specified, or if (oldmap) is dichotomous, an error occurs. This phrase is cumulative.

THROUGH (oldvalue) is an optional modifying phrase which indicates that the shading pattern specified in the most recent ASSIGNING (option) phrase is to be used to shade all cells having any value greater than the (oldvalue) indicated in the most recent TO (oldvalue) phrase, but less than or equal to the (oldvalue) indicated here. If no TO (oldvalue) phrase has yet been specified, an error occurs. This phrase is cumulative.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid SHADE commands:

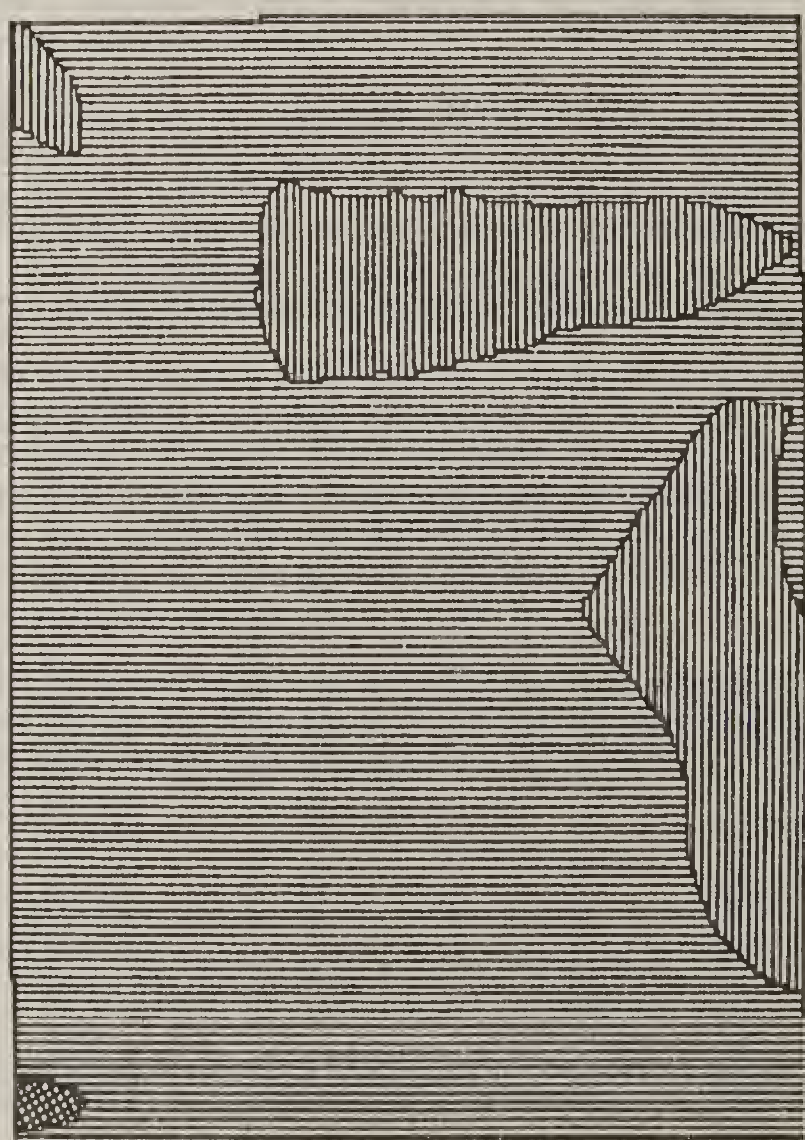
```
SHADE THISMAP

SHADE THISMAP WITH SHADE90

SHAD THISMAP ASSIGNING 7

SHAD ONEMAP WITH SHADE0 ASSI 1 TO 1 THROUGH 19 ,
ASSI 2 TO 20 TO 22 TO 24 TO 26
```

The limitations of the SHADE command are as follows:

-- No more than 64 shade assignments per issuance of the command.

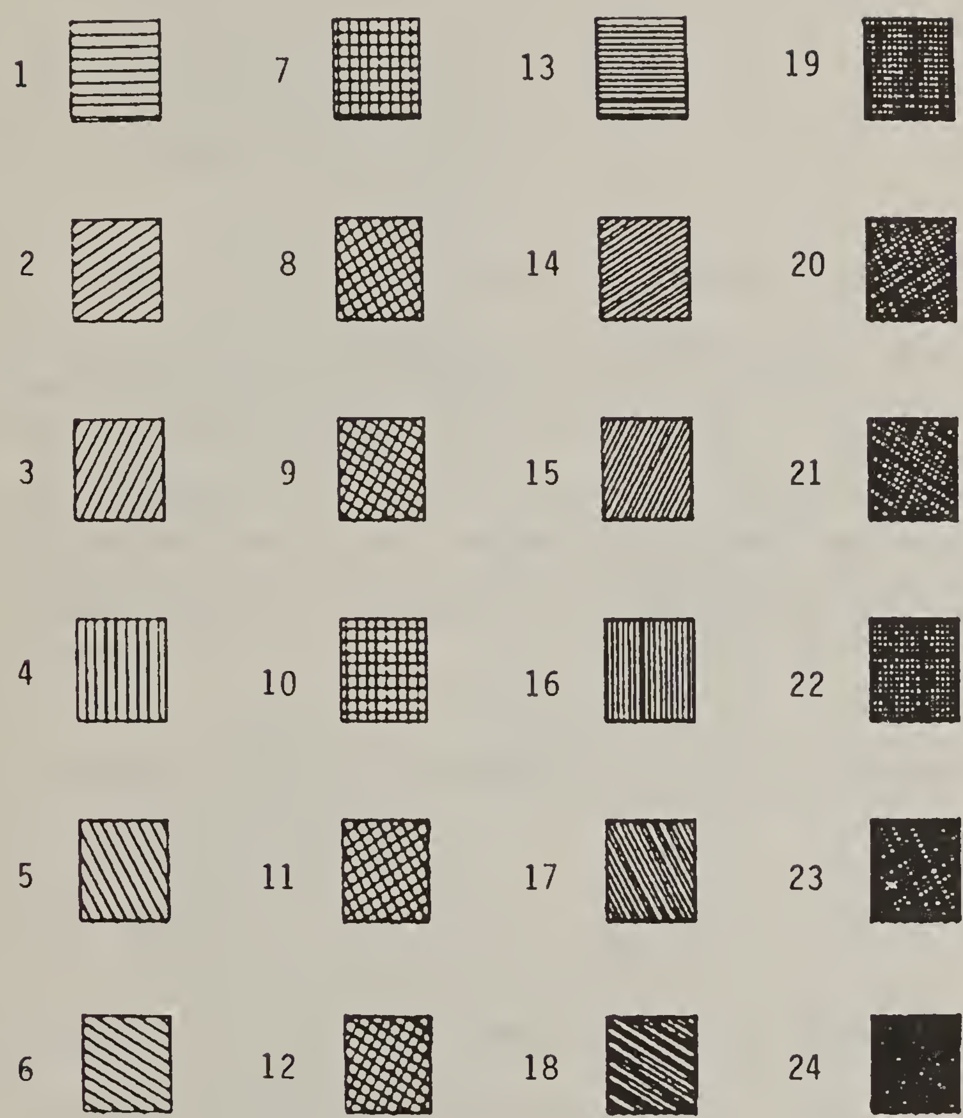
Example of use of the SHADE command:

```
? DESC MDRWOLFRGC

   3 SUBJECTS IN MAP MDRWOLFRGC
  ID           VALUE    FREQUENCY   SUBJECT
   1          1.0000       6371.0   MULE DEER WINT CONC/WINT RANGE
   2          2.0000      30070.0   MULE DEER WINTER RANGE
   3          3.0000        120.0   MULE DEER SUMMER RANGE

? SHAD MDRWOLFRGC AS 1 TO 2 ,
, AS 4 TO 1 AS 8 TO 3

? PLOT MDRWOLFRGC
```



A shaded plot of mule deer range on Wolf Ridge, CO (MDRWOLFRGC). There are three subjects and each is assigned a different shade pattern (vertical, horizontal, and cross-hatch).

Example of the default SHADE table:




Using the entry numbers above when assigning shading from the default shade table will result in the corresponding shade pattern.

The SIZE command is summarized as follows:

SIZE is a data reclassification command which creates a new discrete map by assigning a value to each category of the new map which indicates the number of occurences of cells in the existing discrete or continuous map of a particular value. If the existing map is a discrete map with attribute descriptor labels, the command will assign those same attribute descriptions to the new map.

The SIZE command is specified as follows:

SIZE (oldmap)  FOR (newmap)

The individual phrases of the SIZE command are described below.

SIZE (oldmap) is a required phrase which specifies (oldmap) as the name of the existing discrete or continuous cell map to be sized. The resulting (newmap) will be discrete.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map or, a read, write, or display file. If omitted, the name "THATMAP" is assumed.

The following are typical examples of valid SIZE commands:

SIZE THISMAP FOR NEWMAP

SIZE THISMAP

The limitations of the SIZE command are as follows:

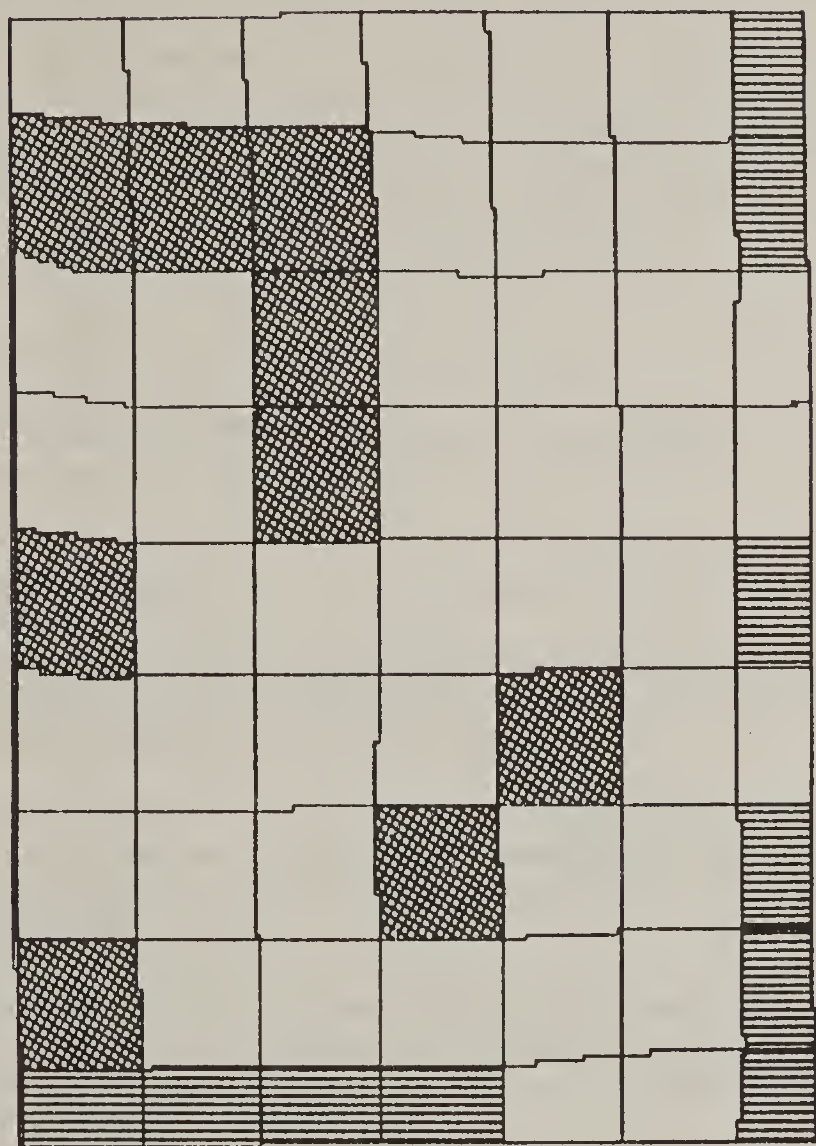
-- Cannot size dichotomous maps.

Example of use of the SIZE command:

```
? DESC PLSWOLFRGC

   71 SUBJECTS IN MAP PLSWOLFRGC
   ID           VALUE     FREQUENCY    SUBJECT
    1          1.0000         464.0    003T001SR099W6
    2          2.0000         511.0    S02T001SR099W6
    3          3.0000         545.0    S01T0010R099W6
    4          4.0000         626.0    S06T0010R093W6
    5          5.0000         630.0    S05T001SR098W6
    6          6.0000         640.0    S04T001SR090W6
    7          7.0000         360.0    S03T001SR096W6
    8          8.0000         385.0    S10T001SR090W0
    9          9.0000         406.0    S15T0010R098W0
   10         10.0000         403.0    S22T001SR090W6
   11         11.0000         400.0    S27T001SR090W0
   12         12.0000         416.0    S34T001SR090W6
   13         13.0000         363.0    003T002SR098W0
   14         14.0000         365.0    S10T002SR09SW0
   15         15.0000         291.0    015T002SR090W0
   16         16.0000         441.0    S16T002SR090W6
   17         17.0000         401.0    S17T002SR09SW6
   18         18.0000         390.0    S16T002SR098W0
   19         19.0000         375.0    S13T0020R099W6
   20         20.0000         390.0    014T002SR099W6
   21         21.0000         375.0    015T002SR099W0
CONTINUE(NO) ? NO

? SIZE PLSWOLFRGC FOR PLSSIZE

OK  SIZED FOR PLSSIZE

? DESC PLSSIZE

   71 SUBJECTS IN MAP PLSSIZE
   ID           VALUE     FREQUENCY    SUBJECT
    1        464.0000         464.0    S03T001SR099W0
    2        511.0000         511.0    S02T001SR099W0
    3        545.0000         545.0    S01T001SR099W0
    4        626.0000         626.0    S06T001SR09SW6
    5        630.0000         630.0    S05T001SR09SW6
    6        648.0000         648.0    S04T001SR090W0
    7        360.0000         360.0    S03T001SR090W0
    8        385.0000         365.0    S10T0010R090W6
    9        406.0000         406.0    S15T001SR090W6
   10        403.0000         403.0    022T0010R090W6
   11        400.0000         400.0    S27T001SR090W0
   12        416.0000         416.0    S34T001SR090W6
   13        363.0000         303.0    S03T002SR098W0
   14        365.0000         365.0    010T0020R090W6
   15        291.0000         291.0    S15T002SR090W6
   16        441.0000         441.0    S10T0020R090W6
   17        401.0000         401.0    S17T002SR090W6
   18        390.0000         390.0    S10T0020R090W6
   19        375.0000         375.0    S13T002SR099W0
   20        398.0000         398.0    S14T002SR099W0
   21        375.0000         375.0    S15T002SR099W6
CONTINUE(NO) ? NO
```

The command is used to assign values to a section map of Wolf Ridge, CO (PLSWOLFRGC) corresponding to the size of each section. Note that cell values in the new map (PLSSIZE) are identical to subject cell frequencies. This is illustrated on the following page.

Example of result of use of the SIZE command:



A plot of sections of Wolf Ridge, CO which have been ranked according to their area/size as in the previous graphic. Sections less than 400 acres have been shaded horizontally and sections larger than 660 acres are cross-hatched.

The SLICE command is summarized as follows:

SLICE is a data reclassification command which creates a new discrete map by sorting a range of values from an existing discrete or continuous cell map into equal intervals, then redefining each of those values according to the ordinal position of its interval. A value at a boundary of an interval is assigned to the interval above. On output, the new discrete map will have the same number of categories as intervals and the category value will be assigned a sequential value from one to the number of intervals. If no cell values fall into an interval there will still be a category for the interval, but the cell count will be zero.

The SLICE command is specified as follows:

```
SLICE (oldmap)  INTO (intervals)  FROM (value)  ,
THROUGH (value)  FOR (newmap)
```

The individual phrases of the SLICE command are described below.

SLICE (oldmap) is a required phrase which specifies (oldmap) as the name of the existing discrete or continuous map to be sliced. The resulting (newmap) will be discrete.

INTO (intervals) is an optional modifying phrase which specifies (intervals) as the number of intervals into which the map values are to be sliced. If omitted or specified as less than one, five intervals are assumed.

FROM (value) is an optional modifying phrase which specifies (value) as the lowest value within the range of values to be divided into equal intervals. If omitted, the actual minimum of all existing cell values is used.

THROUGH (value) is an optional modifying phrase which specifies (value) as the greatest value within the range of values to be divided into equal intervals. If omitted, the actual maximum of all existing cell values is used.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map or, a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid SLICE commands:

```
SLICE THISMAP INTO 6 FROM 100 THROUGH 650 FOR NEWMAP

SLIC THISMAP
```

The limitations of the SLICE command are as follows:

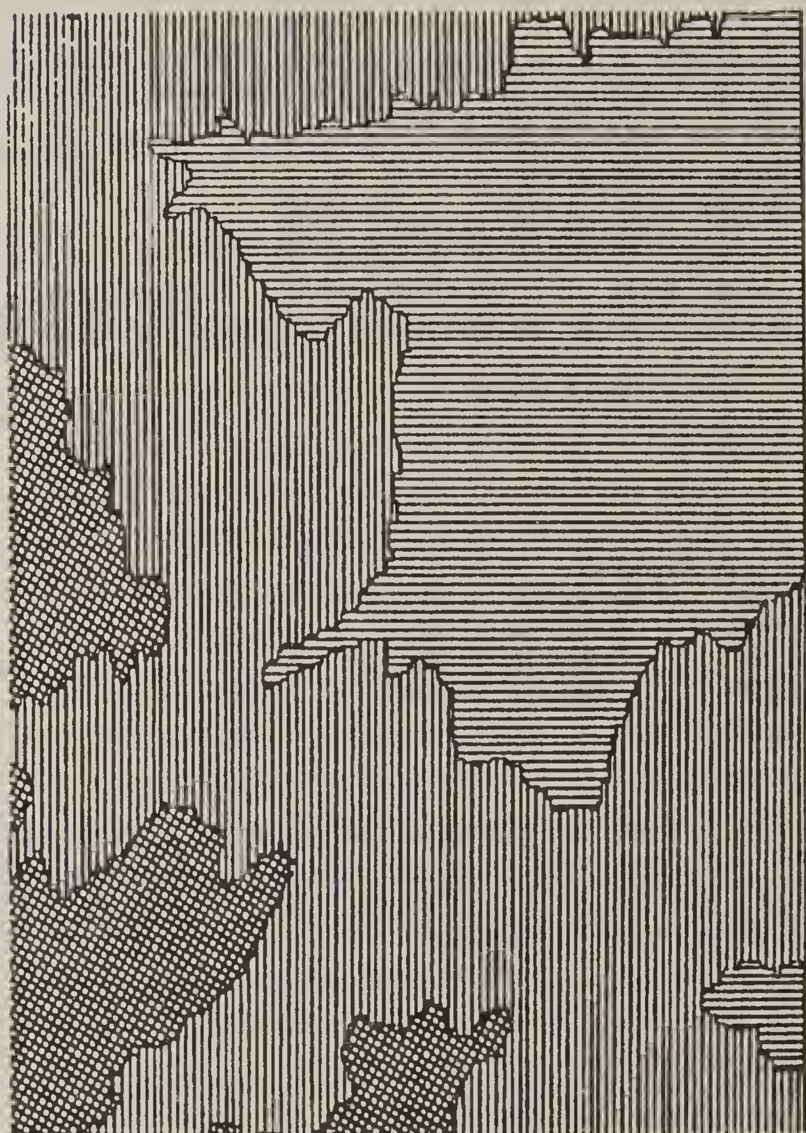
-- Cannot use dichotomous maps.

Example of use of the SLICE command:

```
? DESC ELEVATION

EXPOSED   MAP ELEVATION
DESCRIPTION   ELEV IN METERS OF WOLFRIDGE CO QUAD FROM IDIMS
STUDY AREA    WHITE R    PROJECTION LAMBERT
DATE          ??         SOURCE IDIMS                VINTAGE 1982
TYPE    8 CONTINUOUS     SUBJECTS       0
CELL HEIGHT    50.0000   CELL WIDTH     50.0000
NUMBER OF ROWS     279   NUMBER OF COLUMNS  215
CELL ACRES       .6178
MINIMUM VALUE     6184.0000      MAXIMUM VALUE     7200.0000
MBR: SOUTH  430050.0000 NORTH  444000.0000 EAST 5053400.0000 WEST 5042650.0000

? SLICE ELEVATION INTO 3 FOR ELEVCAT

OK  SLICED FOR ELEVCAT

? DESC ELEVCAT

    3 SUBJECTS IN MAP ELEVCAT
   ID         VALUE    FREQUENCY   SUBJECT
    1        1.0000      20927.0   LOW
    2        2.0000      31837.0   MEDIUM
    3        3.0000       7221.0   HIGH
```

The command is used to group a continuous elevation map of Wolf Ridge, CO into three equal intervals corresponding to low, medium, and high elevations. These subject labels were added using the LABEL command.

Example of result of use of the SLICE command:



A shaded plot of the discrete map created on the previous page showing low (horizontal), medium (vertical), and high elevations (cross-hatch).

The SLOPE command is summarized as follows:

SLOPE is a neighborhood analysis command which creates a new continuous map of percent slope from an existing continuous map, usually a topographic elevation map. The surface slope for each cell on the new map is found by first computing the slope values (the difference in the elevation of two points, divided by the distance in meters between them) from the current point to each of its neighboring points within a roving matrix window of a specified size. The resulting slope is an integer value determined by selecting the minimum, maximum, average, or vector sum of this matrix of slope values and is expressed as a percentage (units of rise per 100 units of run). The matrix, whose size may range from a 3x3 grid to a 31x31 grid, specifies a roving window centered around the current cell which moves along the existing map's continuous surface to identify the neighborhood for each of the following cells from the existing map as they become the current one. If a cell lies such that the surrounding matrix extends beyond the edge of the map, the values from the edgemost row or column are used to fill the matrix where it extends beyond the edge of the map.

The SLOPE command is specified as follows:

SLOPE (oldmap) (option) MATRIX (value) FOR (newmap)

The individual phrases of the SLOPE command are described below.

SLOPE (oldmap) is a required phrase which specifies (oldmap) as the name of the existing continuous map whose slope is to be computed.

MATRIX (value) is an optional modifying phrase which specifies (value) as the row-column size of the square matrix, or grid, centered around the current cell which defines the neighboring cells. (Value) must be an odd whole number which is greater than or equal to 3 and less than or equal to 31. A larger matrix (value) will produce a different effect on the resultant (newmap) than will a smaller (value). If omitted, the matrix (value) is set to the default of 3.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

The following phrases are the (options) available for computing the slope. If omitted, the SUM phrase is used as the default.

MAXIMUM is an optional modifying phrase which specifies that the new map will be assigned the absolute maximum of the slope values computed from the current cell to each of the neighboring cells within the specified matrix.

MINIMUM is an optional modifying phrase which specifies that the new map will be assigned the absolute minimum of the slope values computed from the current cell to each of the neighboring cells within the specified matrix.

AVERAGE is an optional modifying phrase which specifies that the new map will be assigned the absolute average of the slope values computed from the current cell to each of the neighboring cells within the specified matrix.

SUM is an optional modifying phrase which specifies that the new map will be assigned the slope of the vector sums computed with a formula for regression coefficients. Using a 3x3 matrix for this example, the slope of the vector sums is computed as follows:

```
Z1   Z2   Z3

Z4   Z5   Z6

Z7   Z8   Z9
```

In the calculation, the cell values are designated as Z1, Z2, Z3,..., Z9, as indicated above; the cell height is referred to as YSIDE; and the cell width as XSIDE. First, the slope of the north-south component (YSLOPE) and the slope of the east-west component (XSLOPE) are found.

```
YSLOPE = ((Z1 - Z7) + (Z2 - Z8) + (Z3 - Z9)) / (6 x YSIDE)
XSLOPE = ((Z3 - Z1) + (Z6 - Z4) + (Z9 - Z7)) / (6 x XSIDE)
```

Next, the resulting percent slope is computed based on these slope components.

```
PERCENT SLOPE = SQRT ((XSLOPE x XSLOPE) + (YSLOPE x YSLOPE))
```

The following are typical examples of valid SLOPE commands:

```
SLOPE THISMAP  AVERAGE  MATRIX 7  FOR AVESLOPE7

SLOP THISMAP  FOR SUMSLOPE3
```

The limitations of the SLOPE command are as follows:

-- Can only use continuous maps.

Example of result of use of the SLOPE command:

A plot of area on Wolf Ridge, CO with slope between zero and two percent.

Example of result of use of the SLOPE command:


An elevation contour plot of Wolf Ridge, CO showing the region of greatest slope (211% ; shaded cell). Contour interval is 50 feet. Note that this cell has an aspect of 72 degrees (see ASPECT) and occurs in an area of rapid elevation change between 6600 and 6800 feet.

The SUBTRACT command is summarized as follows:

SUBTRACT is an overlay analysis command which creates a new continuous map by subtracting the values of one or more existing discrete or continuous maps from those of another existing discrete or continuous map on a cell-by-cell basis.

The SUBTRACT command is specified as follows:

```
SUBTRACT (oldmap)  MINUS (oldmap)  MINUS (oldmap) ,
MINUS (oldmap)  FOR (newmap)
```

The individual phrases of the SUBTRACT command are described below.

SUBTRACT (oldmap) is a required phrase which specifies (oldmap) as the name of an existing discrete or continuous map defining the initial values from which other map values are to be subtracted.

MINUS (oldmap) is a cumulative modifying phrase which specifies (oldmap) as an additional existing discrete or continuous map to be subtracted. This phrase may be repeated up to 63 times.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid SUBTRACT commands:

```
SUBTRACT MAPONE  MINUS MAPTWO  MINUS MAPTHREE ,
MINUS MAPFOUR  FOR NEWMAP

SUBT MAPONE  MINUS MAPTWO
```

The limitations of the SUBTRACT command are as follows:

-- Cannot use dichotomous maps.

-- No more than 64 maps may be input per issuance of the command.

The TOTAL command is summarized as follows:

TOTAL is a data analysis command which generates a tabular summary for cell totals within one or more cell maps. The user may subtotal cell values by specifying a discrete or dichotomous map for subtotal categories. The output table contains the names of the maps used, the cell size of the source map(s), the weighting factor(s), the calculated totals, the frequency of cells, the calculated area, the product of FACTOR*TOTAL, and the average value per acre. The default 'PRODUCT' heading can optionally be changed by the user.

The TOTAL command is specified as follows:

TOTAL (thismapl) FACTOR (value) AND (thismap2) FACTOR (value) ,
BY (maskmap) LABEL (heading) FOR (output)

The individual phrases of the TOTAL command are specified below:

TOTAL (thismapl) is a required phrase which specifies the name of an existing dichotomous, discrete, or continuous map whose cells will be totaled.

AND (thismap2) is an optional phrase which identifies an additional map which covers the same geographic area as (thismapl). Each cell value will be added to the corresponding cell value in (thismapl). No more than 63 maps may be identified with this phrase.

FACTOR (value) is an optional phrase which specifies the value used to convert the subtotals and totals into different units, such as volume to tons. The units for this factor is dependent on the units in (thismapl) and the desired units to be listed in the table. Some typical conversion factors might be:

water = 1394 tons/acre-ft (64 lbs/cu ft)
coal = 1770 tons/acre-ft (varies with grade of coal)

FACTOR multiplies the value of each cell in the specified map. If omitted, it defaults to 1. If the FACTOR (value) is used, it will apply to all maps preceding the phrase, up to the previous FACTOR (value) phrase.

BY (maskmap) is a required phrase which specifies a discrete or dichotomous map which will be used to categorize summaries in the table. All calculations will be summarized by values or subjects in (maskmap).

LABEL (units) is an optional phrase which allows the user to replace the default 'PRODUCT' heading with (units). The maximum number of characters allowed is eight characters.

FOR (output) is an optional phrase which specifies the output device. The user has three options: (1) output to a file on disk by entering a filename, (2) output to the system printer by entering @LPT, or (3) output to the current display terminal being used. Option (3) is the default.

Examples:

```
TOTAL MAP1 BY MAP2
TOTAL MAP1 AND MAP3 BY MAP2
TOTAL MAP1 BY MAP2 LABEL TONS
TOTAL MAP1 FACTOR 1770 BY MAP2
TOTAL MAP1 FACTOR 1770 BY MAP2 FOR VOL_TABLE
TOTAL MAP1 AND MAP3 AND MAP4 FACTOR 1394 BY MAP2 FOR VOL_TABLE ,
, LABEL TONS
```

Sample output:

```
'TOTAL' REPORT                          08/09/85           PAGE  1

MAPNAME                FACTOR     CELL SIZE
WYCOAL                  1.000        1.000
BY LSTWOLFRGC
   (1)                  (2)       (3)        (4)          (5)          (6)
SUBJECTS               TOTAL    FREQUENCY   AREA        PRODUCT*     AVERAGE*
--------------------------------------------------------------------------
CDOW                   4290.      1889.     1889.       8103.810      4.290
BLM                   76686.     30887.    30887.    2368600.482     76.686
STATE                   926.       463.      463.        428.738       .926
PRIVATE                6756.      3324.     3324.      22456.944      6.756
--------------------------------------------------------------------------
TOTAL                 88658.     36563.    36563.    2399589.974     65.629

( BACKGROUND ACRES   =       448. )

* MULTIPLY BY 1,000 FOR ACTUAL AMOUNT
```

(1) Subjects - comes from the discrete or dichotomous map identified by the control word 'BY'.

(2) Total - subtotal of actual cell values of all input maps by category.

(3) Frequency - the number of cells in each category.

(4) Area - Frequency (3) times cell size.

(5) Product - User selected factor times total (2) times area (4). If product total is larger than the alloted number of columns, all values in the product column will be scaled, with a footnote indicating the scale factor (eg. x10, x100, x1000, etc.)

(6) Average - Product (5) divided by area (4).

The limitations of the TOTAL command are as follows:

-- Maximum number of input maps = 64.

-- Input maps must be dichotomous, discrete, or continuous.

-- The 'BY' map must be a dichotomous or discrete map.

-- Maximum number of subjects for a discrete 'BY' map = 90.

The VIEW command is summarized as follows:

VIEW is a data display command which prints an existing read or write file on the output console and plots a display file provided the user is at a graphics console.

The VIEW command is specified as follows:

VIEW (oldfile)

The individual phrase of the VIEW command is described below.

VIEW (oldfile) is a required phrase which specifies (oldfile) as the name of the existing read or write file to be printed or the display file to be plotted.

The following are typical examples of valid VIEW commands:

VIEW THISFILE

VIEW FIRSTFILE

The limitations of the VIEW command are as follows:

-- Must have a graphics terminal to plot display files.

Example of use of the VIEW command:

```
 ? VIEW READ
NOTE
NOTE   OPEN THE MASTER DATABASE
NOTE
OPEN RAST
NOTE
NOTE   SET THE VIEWING WINDOW
NOTE
WIND MDRWOLFRGC
NOTE
NOTE   LIST ALL MAPS IN THE WORKFILE
NOTE
LIST
NOTE
NOTE   SET THE READ DEVICE BACK TO THE CONSOLE
NOTE
READ
```

The command is used to list a read file (type 17). It may also be used to list write files (type 16) and to plot display files (type 18).

The VISTA command is summarized as follows:

VISTA is a neighborhood analysis command which determines whether or not a viewing cell(s) from an existing discrete or continuous map is visible from an observer cell(s) from the same map. Visibility is determined by first drawing a line-of-sight between the observer and the viewing cell. For each cell along this line, an angle of observation from the observer cell is computed using the elevation of the two cells and the distance between them. If this angle is greater than or equal to the maximum angle incurred previously along this line, then the current cell is visible; if this angle is less than the maximum angle, then the current cell is not visible. The output from this command depends upon the number of viewing cells. When a single viewing cell is specified, the output is a response of VISIBLE or NOT VISIBLE; when a group of viewing cells are specified, a new map of the same type as the existing map is created by selecting those cells from the specified map which are visible. These cells retain their original values and, if existing on a discrete map, their attribute descriptor labels.

VISTA appears to be a complicated command because of the number of options available, but it can be simplified by dividing its uses into four methods. Any one of the following methods may be used in a single VISTA command:

(1) OBSERVER POINT-TO-VIEWING POINT determines the visibility of a single viewing cell from a single observer cell resulting in a response.
(2) OBSERVER AREA-TO-VIEWING POINT determines the visibility of a single viewing cell from a group of observer cells resulting in a response.
(3) OBSERVER POINT-TO-VIEWING AREA determines the visibility of a group of viewing cells from a single observer cell resulting in a new map.
(4) OBSERVER AREA-TO-VIEWING AREA determines the visibility of a group of viewing cells from a group of observer cells resulting in a new map.

A single observer point or viewing point may be specified by row and column location, or by indicating location using the graphics terminal crosshairs. An observer area is indicated by defining a range of target values. A viewing area is indicated by specifying the radius of a circle (the distance to view) and a range of degrees defining a sector of that circle (the direction, or portion of circle which is to be viewed). A sector of 0-359 degrees, beginning at 0 which is North and moving clockwise, includes the full circle (see NOTE below).

Each of the four methods of using VISTA require both an observer and a viewing option. After determining the desired method, use the guidelines below which show each of the observer and viewing options followed by one or more of the correct phrase sequences for specifying that option:

(a) OBSERVER POINT
OBSERVER followed by ROW-COLUMN
OBSERVER followed by INPUT
(b) OBSERVER AREA
OBSERVER followed by FROM-THROUGH
(c) VIEWING POINT
FEATURE followed by ROW-COLUMN
FEATURE followed by INPUT
(d) VIEWING AREA
SECTOR followed by TO and DEGREES-THROUGH
SECTOR followed by TO and DEGREES-THROUGH and FROM-THROUGH

To adjust the elevation of the specified map, the OVER phrase may be used to specify a second existing discrete or continuous map whose cell values are added to the first map's cell values acting as a screen to further limit visibility. To adjust the elevation of the observer or viewing cells, the HEIGHT phrase may be used to specify an offset value which is added to the elevation value of the observer or viewing cells.

The number of times each viewing cell can be seen (i.e. the number of observer cells from which each viewing cell is visible) is tracked when the COUNT phrase is specified. Depending on the viewing option, this count value is included in the response, or is assigned as the cell value for each visible cell on the new map, which is always of type continuous when counting is specified.

The VISTA command is specified as follows:

```
VISTA (oldmap)  OVER (oldmap)  FOR (newmap) ,
OBSERVER  ROW (value)  COLUMN (value)  HEIGHT (elevation) ,
FEATURE  INPUT  HEIGHT (elevation)  COUNT
```

or

```
VISTA (oldmap)  OVER (oldmap)  FOR (newmap) ,
OBSERVER  FROM (value) THROUGH (value)  HEIGHT (elevation) ,
SECTOR  TO (distance)  DEGREES (degrees) THROUGH (degrees) ,
FROM (value)  THROUGH (value)  HEIGHT (elevation)  COUNT
```

The individual phrases of the VISTA command are described below.

VISTA (oldmap) is a required phrase which specifies (oldmap) as an existing discrete or continuous map whose values represent a three-dimensional surface which is to be used in viewing.

OBSERVER is a required phrase which specifies the information required for the observation point or area. This phrase must be followed by either the INPUT phrase or the ROW phrase, COLUMN phrase to indicate an observation point; or the FROM phrase, THROUGH phrase to indicate an observation area.

HEIGHT (elevation) is an optional modifying phrase which specifies (elevation) as an offset to the elevation value of the observer or viewing cells. (Elevation) may be a positive or negative value, and is considered to be the height offset of the OBSERVER point or area, the FEATURE point, or the SECTOR area, depending on which phrase was specified most recently prior to this HEIGHT phrase. In the case of an area, (elevation) is added to the value of each cell within that area. If omitted, the height offset is assigned a default value of zero.

OVER (oldmap) is an optional modifying phrase which specifies (oldmap) as a second existing discrete or continuous map whose values represent a three-dimensional surface which acts as a screen to further limit visibility. The elevation values of this (oldmap) are added to the values of the first (oldmap) prior to determining the visibility. Values from the screen map are not added to the elevation values of observer or viewing cells.

COUNT is an optional modifying phrase which specifies counting the number of times each viewing cell is seen from the observer point or area. If a viewing point is indicated, the output response will include this count. If a viewing area is indicated, the resulting new map will be a continuous map whose selected visible cells are assigned this count as their new value. This phrase is ignored if the observer point-to-viewing point method has been specified.

FROM (value) is an optional modifying phrase which specifies (value) as the lowest value within the range of elevation values from (oldmap) to be used as the target area for observation or viewing, depending on which phrase was specified most recently prior to this phrase. The FROM (value) must be followed by the THROUGH (value), and can only be used after the OBSERVER or the SECTOR phrases.

THROUGH (value) is an optional modifying phrase which specifies (value) as the greatest value within the range of elevation values from (oldmap) to be used as the target area for observation or viewing. The THROUGH phrase must follow the FROM phrase.

ROW (value) is an optional modifying phrase which specifies (value) as the row location of either the OBSERVER or FEATURE point, whichever phrase was most recently specified prior to this ROW phrase.

COLUMN (value) is an optional modifying phrase which specifies (value) as the column location of either the OBSERVER or FEATURE point, whichever phrase was most recently specified prior to this COLUMN phrase. The COLUMN phrase must follow the ROW phrase.

INPUT is an optional modifying phrase which specifies that a point is to be located by using the graphics terminal crosshairs. The point to be input may be the OBSERVER point or the FEATURE point, depending on which phrase was most recently specified prior to this INPUT phrase. After the VISTA command is entered, a crosshair will appear on the screen. The terminal cursor is used to position the crosshair on the screen, then any character may be used as input to indicate the desired location for the point. If the INPUT phrase is specified after both the OBSERVER phrase and the FEATURE phrase, you will be prompted for the OBSERVER point first, and then the sequence will be repeated to prompt you for the FEATURE point.

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The FEATURE phrase and the SECTOR phrase are mutually exclusive, but one of these must be specified in the VISTA command to define the viewing option, either point or area.

FEATURE is an optional modifying phrase which specifies the information required for a single viewing point to be observed. This phrase must be followed by either the INPUT phrase or the ROW phrase, COLUMN phrase. The FEATURE phrase cannot be used with the SECTOR phrase.

SECTOR is an optional modifying phrase which specifies the information required for a viewing area to be observed. This phrase must be followed by the TO phrase and the DEGREES phrase, THROUGH phrase. The SECTOR phrase cannot be used with the FEATURE phrase.

The TO phrase and the DEGREES phrase, THROUGH phrase are modifiers required following SECTOR to define a viewing area. These phrases cannot be used with the OBSERVER or the FEATURE phrase.

TO (distance) is an optional modifying phrase which specifies (distance) as a positive real value for the maximum distance which is to be viewed outward from the observer point. The (distance) is used as the radius to define a circle centered around the observer point, or circles centered around each cell in the observer area, which identify the area of viewing interest. The (distance) is specified in units of meters. There are 1609 meters in a mile. The larger the value of (distance), the greater the viewing processing time. The TO (distance) phrase may only be used if the SECTOR phrase was specified previously.

DEGREES (degrees) is an optional modifying phrase which specifies (degrees) as an integer value from 0 through 359, moving clockwise from the north, which defines the starting range of the sector to be viewed. This sector is cut from the circle that is centered around the observer point with radius specified by TO (distance). A range of DEGREES 0 THROUGH 359 indicates that the full circle is to be viewed. This phrase may only be used if the SECTOR phrase was specified previously. If omitted, the starting range of 0 degrees is assumed (see NOTE below).

THROUGH (degrees) is an optional modifying phrase which specifies (degrees) as an integer value from 0 through 359, moving clockwise from the north, which defines the ending range of the sector to be viewed. This sector is cut from the circle that is centered around the observer point with radius specified by TO (distance). A range of DEGREES 0 THROUGH 359 indicates that the full circle is to be viewed. This phrase may only be used following the DEGREES (degrees) phrase. If omitted, the ending range of 359 is assumed (see NOTE below).

NOTE: To further explain the circle concept used to determine the direction of viewing, picture a circle centered around the observer cell, numbered from 0 through 359 degrees with 0 at North, 90 at East, 180 at South, and 270 at West. If you wish to view in a specific northeastern direction, you may specify DEGREES 42 THROUGH 47 since directly northeast is at 45 degrees; similarly, if you wish to view in a specified northern direction, you may specify DEGREES 355 THROUGH 5 since directly North is at 0 degrees. Because of the clockwise direction of the numbering, the starting degree value may be greater than the ending degree value to specify the sector you desire. For example, specifying DEGREES 90 THROUGH 270 would indicate the entire southern direction from East to West, while specifying DEGREES 270 THROUGH 90 would indicate the entire northern direction from West to East.

The following are typical examples of valid VISTA commands:

Using observer point-to-viewing point:
```
VISTA ELEVMAP  OVER SCREENMAP  FOR MAPSEEN  ,
OBSERVER  INPUT  HEIGHT 200  COUNT,
FEATURE  ROW 5  COLUMN 23  HEIGHT -100
```

Using observer area-to-viewing point:
```
VISTA ELEVMAP  FOR MAPSEEN ,
OBSERVER  FROM 3000  THROUGH 3200 ,
FEATURE  INPUT
```

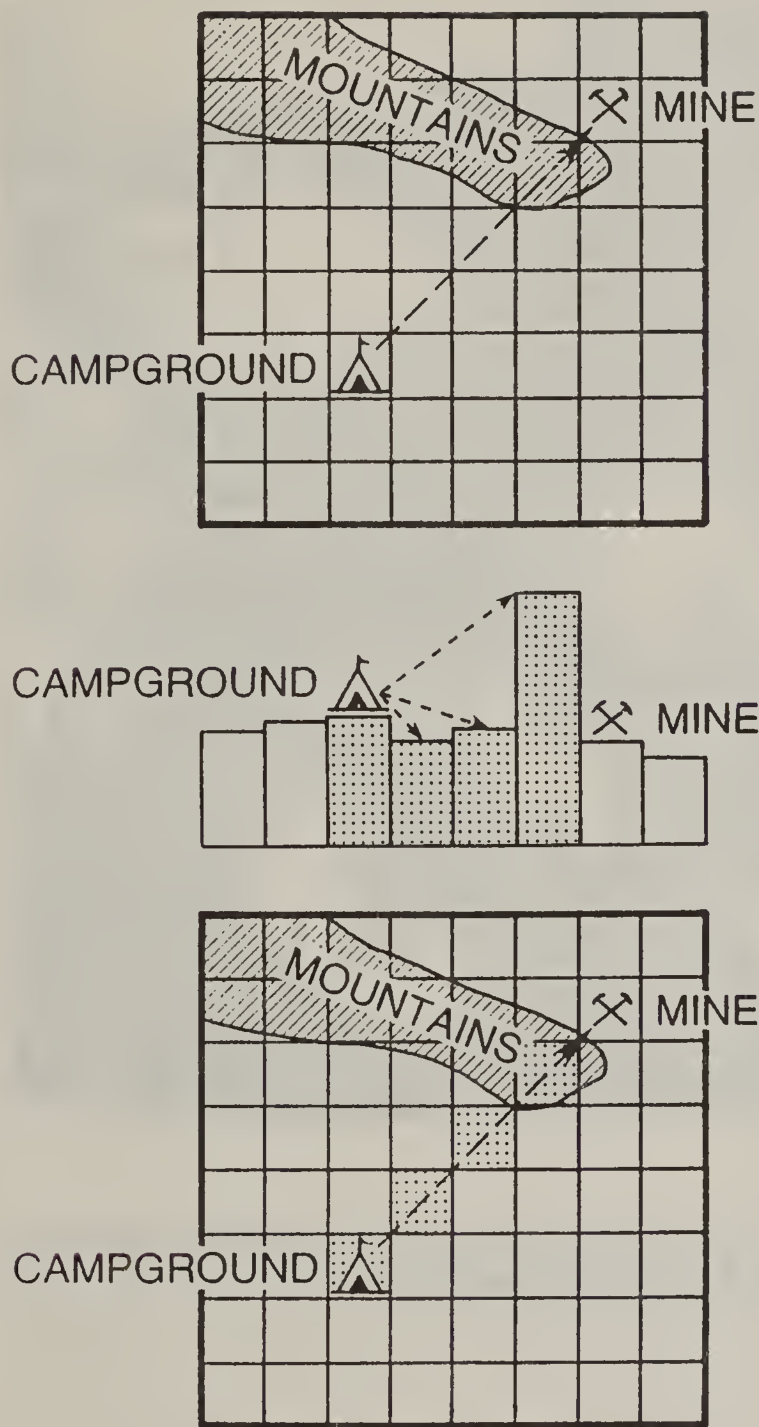
Using observer point-to-viewing area:
```
VISTA ELEVMAP  FOR MAPSEEN  COUNT ,
OBSERVER  ROW 35  COLUMN 9 ,
SECTOR  DEGREES 90  THROUGH 180  HEIGHT 150
```

Using observer area-to-viewing area:
```
VISTA ELEVMAP  FOR MAPSEEN  OVER SCREENMAP ,
OBSERVER  FROM 4500  THROUGH 5000  HEIGHT 500 ,
SECTOR  DEGREES 315  THROUGH 45  FROM 2500  THROUGH 3500
```

The limitations of the VISTA command are as follows:

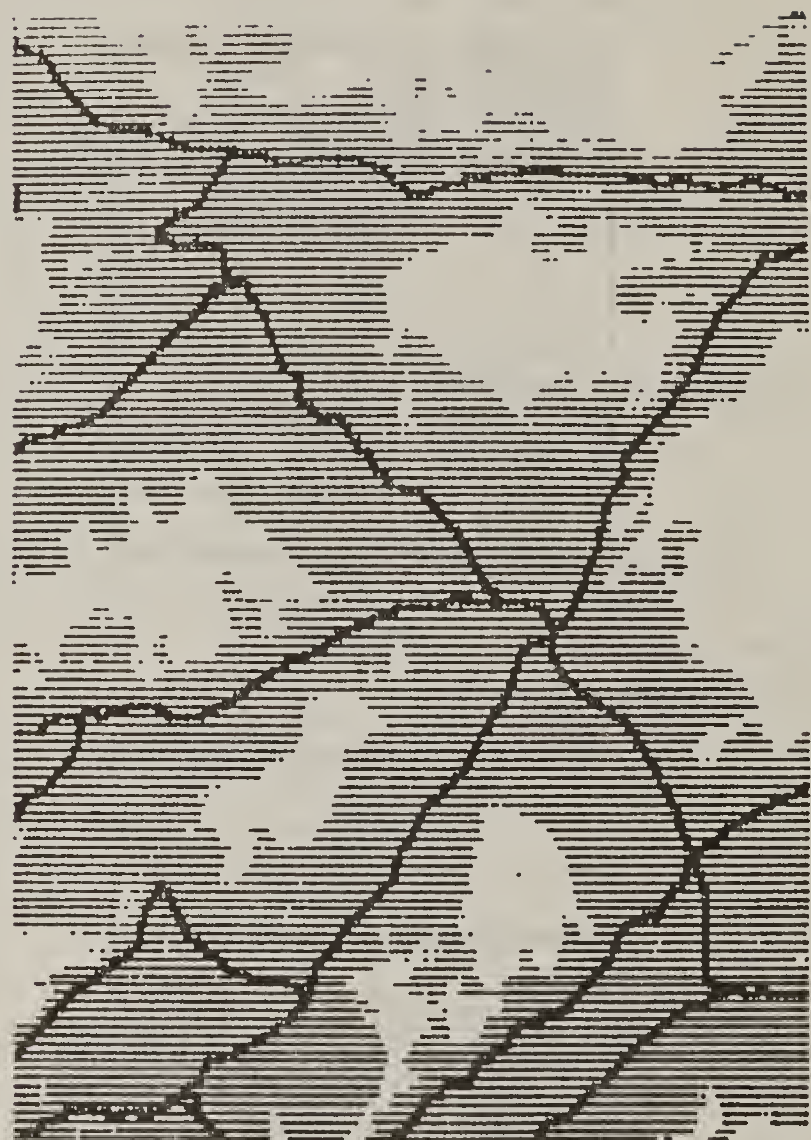
-- Cannot use dichotomous maps.

Example of use of the VISTA command:



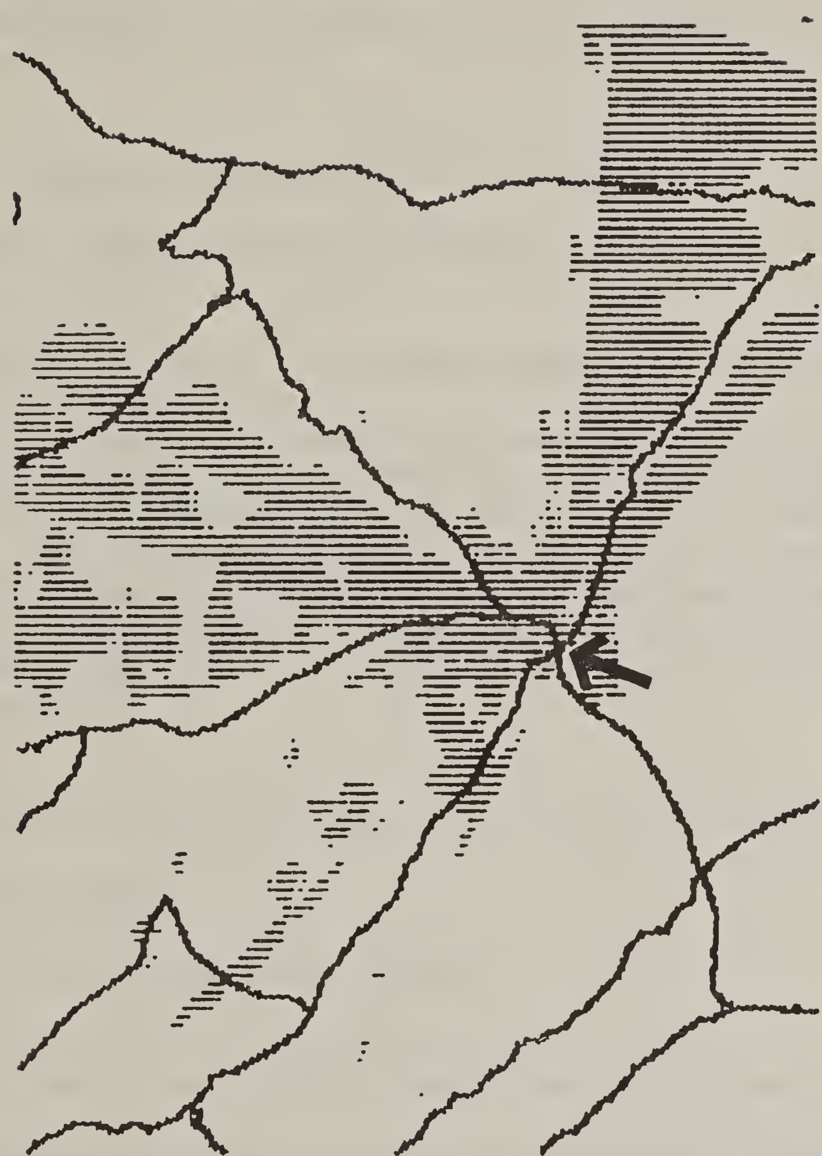

The command might be used to determine if a mine site is visible from a campground as illustrated. Since mountains are between the two, the mine site is not visible.

Example of result of use of the VISTA command:



A plot of roads on Wolf Ridge, CO (solid) and those areas visible from them (shaded).

Example of result of use of the VISTA command:



A plot of roads on Wolf Ridge, CO (solid). Areas visible from the road intersection indicated by the arrow are shaded. This is an example of point-to-area use of the VISTA command.

The WINDOW command is summarized as follows:

WINDOW is a data display command which sets or changes the current viewing window to encompass all of the existing maps specified in the command.

The WINDOW command is specified as follows:

WINDOW (oldmap) (oldmap) (oldmap)

The individual phrase of the WINDOW command is described below.

WINDOW (oldmap) is a required phrase which specifies (oldmap), or a list of (oldmaps), as the basis for setting or changing the viewing window. The (oldmap) list may be one or any combination of existing maps. The minimum bounding rectangle of each (oldmap) is considered, and the resultant viewing window encompasses the maximum north and east and the minimum south and west of the bounding rectangle of each (oldmap) specified (i.e., the logical union of the minimum bounding rectangles).

The following are typical examples of valid WINDOW commands:

WINDOW THISMAP

WIND FIRSTMAP SECONDMAP THIRDMAP

The limitations of the WINDOW command are as follows:

-- No more than 15 maps may be specified at a time.

The WRITE command is summarized as follows:

WRITE is a program control command which changes the write file to which output is sent. Normally the write file is set to the default, which is the log-on console. In batch mode, the default is an output file of the same name as the specified input file with the last four characters being ".OUT". By using the command, prompts, listings, tables, and all character output may be sent to a specified write file. This file may then be listed with the VIEW command or sent to a line printer. To resume sending character output to the default, specify the command without any TO (filename) phrase.

The WRITE command is specified as follows:

WRITE  TO (filename)

The individual phrases of the WRITE command are described below.

WRITE is the required verb which specifies the command.

TO (filename) is an optional modifying phrase which specifies (filename) as the current write file. All output, including prompts and error messages, are sent to this file. The (filename) may be an existing map if that map is an exposed workfile map and not a master map or the current read or display file. If (filename) already exists as a write file, the command will cause output to be appended to the existing contents of the file. If (filename) is non-existent, it will be created and included in the list of workfile names. If this phrase is omitted the default write file is assumed.

The following are typical examples of valid WRITE commands:

WRITE TO OUTFILE

WRIT

The limitations of the WRITE command are as follows:

-- None found to date.

The ZONE command is summarized as follows:

ZONE is a distance analysis command which creates a new discrete map from an existing dichotomous, discrete, or continuous map by assigning values to those cells which fall within a specified buffer zone distance of the designated target cells. If the buffer zone is divided into zone intervals, the target cells are surrounded by concentric zone areas whose cells are assigned sequentially higher values as the distance from the target cell increases, until the maximum zone distance is reached. The target cells are assigned a value of one; the first zone area is assigned a value of two, the second a value of three, etc... Any cells outside of the zone are assigned to the background. Optionally, the target cells may be dropped into the background by using the ELIMINATING phrase. In this case, the zone intervals are assigned sequential values beginning with the value one.

The ZONE command is specified as follows:

```
ZONE (oldmap)  INTO (intervals)  TO (distance) ,
FROM (value)  THROUGH (value)  ELIMINATING  FOR (newmap)
```

The individual phrases of the ZONE command are described below.

ZONE (oldmap) is a required phrase which specifies (oldmap) as the name of the existing dichotomous, discrete, or continuous cell map to be zoned. The resulting (newmap) will be discrete.

INTO (intervals) is an optional modifying phrase which specifies (intervals) as the number of intervals the zone is to be divided into as it diverges from each target cell. If omitted, a default of one interval is used. The maximum number of intervals is 63 if the target cells are retained, and 64 if the ELIMINATING option is specified.

TO (distance) is a required phrase which specifies (distance) as a real value for the maximum zone distance to be used around the perimeter of each target cell. The value of (distance) is specified in units of meters; there are 1609 meters in a mile. The larger the value of (distance), the greater the buffer zone generation processing time. The (distance) value must be greater than zero and greater than or equal to half of a single cell size for the minimum zone which is one cell.

FROM (value) is an optional modifying phrase which specifies (value) as the lowest value within the range of values to be used as target cells for zoning. If omitted, (value) is assigned the minimum real value. When (oldmap) is dichotomous, this phrase is ignored and all set cells depicting presence are assumed.

THROUGH (value) is an optional modifying phrase which specifies (value) as the greatest value within the range of values to be used as target cells for zoning. If omitted, (value) is assigned the maximum real value. When (oldmap) is dichotomous, this phrase is ignored and all set cells depicting presence are assumed.

ELIMINATING is an optional modifying phrase which allows the user to drop out the target cells and assign them to the background of the (newmap). If the phrase ELIMINATING is not used, the target cells are assigned a value of one and each subsequent zone assigned a value of two, three, four etc...

FOR (newmap) is an optional modifying phrase which specifies (newmap) as the new name to be assigned. This name may not be one which is already being used for a masterfile map, a PROTECTED workfile map, or a read, write, or display file. If omitted, the name "THATMAP" is assumed.

, is an optional modifying phrase which indicates that the present command is to be continued by skipping immediately to the beginning of the next input line.

The following are typical examples of valid ZONE commands:

```
ZONE THISMAP INTO 4 TO 320 FROM 5.8 THROUGH 100 ,
ELIMINATING FOR NEWMAP

ZONE THISMAP TO 80 FOR NEWMAP
```

The limitations of the ZONE command are as follows:

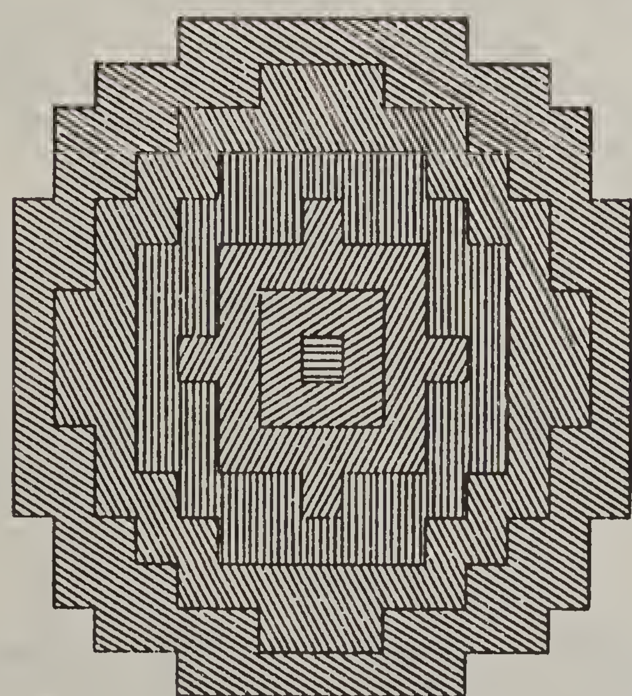
-- No more than 63 intervals if the target cells are retained, and no more than 64 intervals if the ELIMINATING option is used.

-- Distance must be specified in meters.

-- Distance must be greater than or equal to half of a single cell size.

Example of use of the ZONE command:

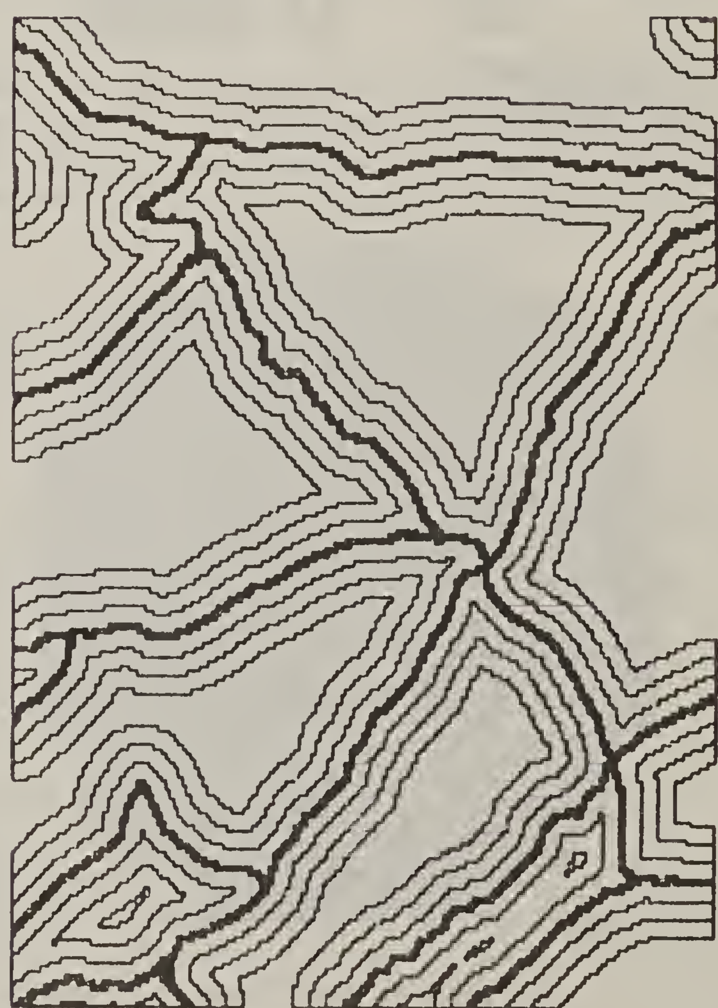
```
? DESC REDTAIL

    1 SUBJECTS IN MAP REDTAIL
   ID          VALUE    FREQUENCY   SUBJECT
   1          1.0000          1.0   RED-TAILED HAWK SITE

? ZONE REDTAIL INTO 5 TO 500 FOR REDTAILBUFF

OK  ZONED FOR REDTAILBUFF

? DESC REDTAILBUFF

    6 SUBJECTS IN MAP REDTAILBUFF
   ID          VALUE    FREQUENCY   SUBJECT
   1          1.0000          1.0   NEST SITE
   2          2.0000          8.0   0-100 METERS
   3          3.0000         20.0   100-200 METERS
   4          4.0000         40.0   200-300 METERS
   5          5.0000         52.0   300-400 METERS
   6          6.0000         72.0   400-500 METERS

? SHADE REDTAILBUFF

? PLOT REDTAILBUFF
```



A shaded plot of a map of five concentric buffer zones around a red-tailed hawk nest site on Wolf Ridge, CO (REDTAILBUFF). The maximum zone distance is 500 meters. Note that the nest site is included in the new map (horizontal shading) and is assigned a value of 1. Also note that zone intervals measure from cell center to cell center and are geometrically concentric although they may not be visually concentric. Subject labels were added using the LABEL command.

Example of use of the ZONE command:

```
? ZONE TRNWOLFRGC INTO 3 TO 804 ,
, ELIMINATING FOR ROADBUFF

OK  ZONED FOR ROADBUFF

? DESC ROADBUFF

    3 SUBJECTS IN MAP ROADBUFF
   ID          VALUE    FREQUENCY   SUBJECT
    1         1.0000       8518.0   HIGH DISTURBANCE
    2         2.0000       7783.0   MED DISTURBANCE
    3         3.0000       6466.0   LOW DISTURBANCE

? SHADE TRNWOLFRGC AS 84

? PLOT ROADBUFF
```



A plot of roads on Wolf Ridge, CO (TRNWOLFRGC, solid) and three zones of influence around them (ROADBUFF, clear). Zones are labeled LOW, MEDIUM, and HIGH (see LABEL command) and the maximum zone interval is 1/2 mile. Note that the roads are not included in the new map by using the ELIMINATING option (compare with the plot on the previous page).

The ZOOM command is summarized as follows:

ZOOM is a data display command which allows the user to magnify a portion of the current viewing window. The user should first display a map on the console screen with the PLOT or SHADE command to show what he/she wants to "zoom" in on. Following the ZOOM command, any map displayed will be plotted within the new window.

The ZOOM command is specified as follows:

ZOOM

The individual phrase of the ZOOM command is described below.

ZOOM is the required verb which specifies the command. The area to be enlarged is indicated by positioning the graphics terminal cross-hairs on two corners of a rectangle bounding the desired viewing window. After the command is entered, the crosshairs will appear on the screen one at a time. The terminal cursor is used to position the crosshair on the map, then any character may be used as input to indicate the desired crosshair position. The next crosshair is handled in the same manner. After the second crosshair is positioned a rectangle is drawn around the new viewing area.

The following is a typical example of a valid ZOOM command:

ZOOM

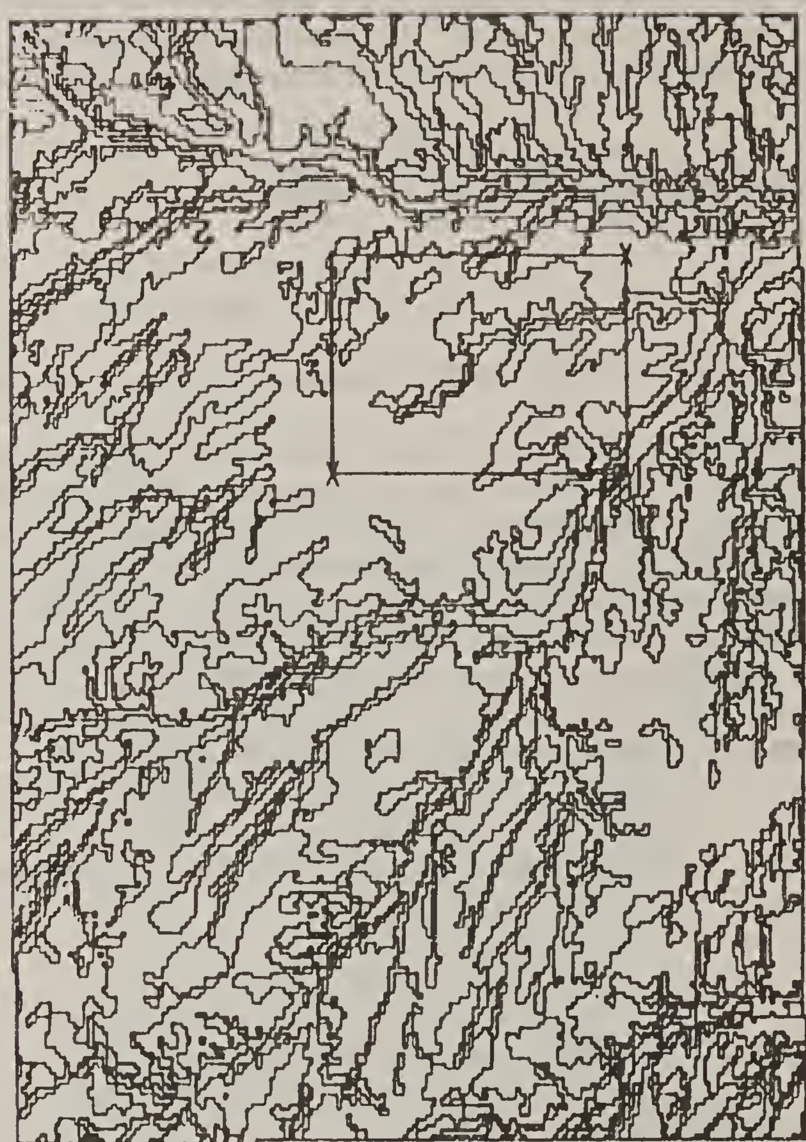
The limitations of the ZOOM command are as follows:

-- Viewing window must be set.

-- Cannot zoom to infinity, i.e., a point.

-- Cannot point outside of the viewing window, i.e., cannot use the command to enlarge the viewing window (see RESET).

Example of use of the ZOOM command:



The map of interest is a cell map of surface cover types on Wolf Ridge, CO. The area of interest is indicated by cross-hair input, defined by the corners of a rectangle, and subsequently enlarged as shown on the following page.

Example of result of use of the ZOOM command:

Resolution on this plot is increased over the previous plot.

APPENDICES

To access MOSS and MAPS via a remote terminal, several preliminary steps are necessary:

1) Turn on the power for the terminal and acoustical coupler (modem). Any alphanumeric terminal can be used if the user does not desire graphics output on the terminal. A number of terminals have been used successfully including the Lear Siegler ADM and the Anderson-Jacobson.

   To obtain graphics output, the user must have a graphics-compatible terminal such as the Textronix 4014. See the terminal operator's manual for instructions regarding terminal configuration switches.

2) Call the computer. Several alternative numbers are available for lines. Be sure to use the phone number that corresponds to the baud rate of your modem.

3) Place the telephone receiver in the modem connected to the terminal.

4) Enter <CR> within three seconds after establishing a connection.

From this point on, MOSS and MAPS is accessed in the same manner as from a main frame terminal. The user enters a <CR>, as above, then:

5) Enter the AOS user name and password, as prompted.

6) Enter any necessary CLI commands (see Appendix B). This is only required for more complex procedures and may usually be omitted.

7) Enter the MOSS work area/directory.

8) Execute MOSS as shown: MOSS "Pathname"

   Note: "Pathname" is a name which specifies the directory location of the disk file containing the desired master project database, e.g., WOLF.

   The MAPS component may be accessed directly in the same manner as above, e.g., MAPS WOLF (see also MAPS command).

9) Enter the MOSS user name. If RESTART is given as the user name, the active list, current master project, baud rate, and window from the previous session will be retained (see also BYE command). Note that entry of the user name automatically provides access to the user's work project (called POLYGON).

   Note: If MAPS is accessed directly, no user name is required. However, the user's work project is not automatically accessed. At this point, MAPS will prompt the user for a project name and the work project may be accessed by entering "POLYGON".

10) Access a master project (see OPEN command).

The CLI, Command Line Interpreter, is a powerful utility that gives the user access to many other programs. It provides over 100 commands and a macro facility so you can create still more. The CLI prompt is the right parenthesis. Following are descriptions for the most helpful CLI commands:

ACL — ACL displays or sets a file's access control list. If you simply type ACL/V + the system will display the control list. If you include the pathname, username, a comma, and then the user privileges, that user will then have those specific privileges concerning that file. It gives users any or all of the following privileges:

O Owner Access
W Write Access
A Append Access
R Read Access
E Execute Access

Generally, you must have owner access to change a file's ACL. Files that are dumped or moved retain their original ACL. So, if you receive a file, or transfer one to another person's directory, remember to change the ACL.

Format: ACL filename username,privileges
Example: ACL THISFILE DEMO,OWARE

Commonly used switches:

/V Displays the file name with the ACL. This is useful when checking ACL's of several files.

BYE — Terminates the CLI. This is used to log off the computer.

CHAR — The CHARACTERISTICS command allows you to change the display characteristics of your terminal. This is very useful when using the computer phone lines. The characteristics you will need to set will depend on what kind of terminal you are using and which computer you are using. If you want to see what characteristics your terminal is currently set to, type CHAR. This will list which characteristics are currently ON and OFF.
Commonly used switches:

/ON Turns the desired characteristic on. Characteristic stays on until you turn it off or log off the computer.

/OFF Turns the desired characteristic off.

/ULC Sets terminal in upper/lower case mode. (Note: some terminals do not have the capability to run upper and lower case. If you have any doubts about this check with your terminal's user manual or your system operator.)

/WRP Allows terminal to generate new lines for line-too-long. This switch has to be on when you display COS output for the Tektronix terminal.

/CRT4 Tells the computer that you are at something other than a Data General terminal. If you are dialing in you will need to use this to get the rub-out (back space, delete) key to work correctly.

COPY

COPY copies the contents of the file(s) named in the source-pathname to the file named in the destination-pathname.

Format: COPY destination source
example: COPY newname oldname

CREATE

CREATE creates new files or directories. Files created this way will be empty unless you use the /I switch.

Format: CREATE filename

Commonly used switches:

/I Use this switch to enter data into a file you are creating. The last line of your input must have a single right parenthesis.

```
example: ) CREATE/I NEWFILE
         )) THIS IS A NEW FILE.
         )) HOW DO YOU LIKE IT SO FAR?
         )))
```

/TYPE=XXX This switch is used to create files of a specific type. File types include TXT (text), UDF (user defined file), and PRG (program).

Format: CREATE/TYPE=UDF filename

/DIR The /DIR switch allows you to create new directories. Unless a specific pathname is given the new directory will be directly below the directory where you created the new directory.

Format: CREATE/DIR NEWDIR

DEL

The DELETE command allows you to delete both individual files and directories. Filename templates may be used (see F). This command should be used with caution as deletion is permanent. Files may be protected from accidental deletion (see PERM).

Commonly used switches:

/C By using the CONFIRM switch you can verify deletion of files by responding "Y" to a prompt for each file to be deleted.

/V By using the VERIFY switch the name of each file deleted will be displayed.

DIR

This command will set or display the current directory, depending on which switches you use with it. To display your current directory use the DIR command alone. To set your directory elsewhere use the DIR command with a pathname or use one of the switches listed below.

Format: DIR pathname
example: DIR :DSK3:MOSSDATA:WHITER

Commonly used switches:

/I Sets directory to the initial working directory. In most cases this puts you back to the directory where you logged on.

Sets the directory to the directory immediately above.

F

F, or FILESTATUS, displays status information about one or more files. When used without any switches FILESTATUS gives a listing of the file names in the directory. This listing is not in alphabetical order and tells nothing about the files.

Commonly Used Switches:

/S By using the SORTED switch you can get your FILESTATUS listing in alphabetical order.

/AS The ASSORTMENT switch displays an assortment of file information: file type, date and time of creation, and file length. If the file is a link, the file type and link resolution name are shown.

/L=listfile This switch writes the output from your FILESTATUS to a specified output file. You can then treat this file like a regular text file, either typing it out to the screen or sending it to the line printer.

+STRING STRING+ +STRING+ By using a plus sign and a text string you can obtain a listing of just the files with that template. This is very useful when you want to look at a few specific files in a directory containing many files.

HELP

To get an explanation of any CLI command type HELP *COMMAND If you are uncertain of the command name just type HELP and you will be able to get a listing of the commands.

MOVE — MOVE is used to move data from one directory to another. Data are copied into the new directory but not deleted from the source directory.

Commonly used switches:

/V This switch lists the name of each file the system has moved.

/R If there is a file in the destination directory with the same name as a source file, the source file is moved only if it is more recent than the existing file. This switch is useful for moving updates of files.

Format:
MOVE destination-directory source file
example: MOVE :UDD:JOHN:MOSS THISFILE

PERM — PERMANENCE sets or displays a file's permanence attribute. A permanent file cannot be deleted unless you turn its permanence OFF. With this command you can protect important files from accidental deletion.

Commonly used switches:

/V This switch lists the name of each file with its permanence attribute.

Format:
To check permanence on a file:
PERM filename
To change permanence on a file:
PERM filename ON (OR OFF)

POP — POP returns you to the previous environment level. This is used if you should be dumped out of a program and get a message about being at LEVEL 1. Typing POP will return you to where you should be operating, LEVEL 0.

QBATCH — To create or submit a batch job use the QBATCH command. When you use this command the CLI creates a batch job file in your working directory and enters your job into the batch queue. The batch job file name starts with ? and you should be careful not to delete it. The EXEC utility will delete the job file after the job runs.

Commonly Used Switches:

/I This switch lets you take the contents of the input file from subsequent lines of the input file. To terminate input mode use a single right parenthesis.

/NOT The NOTIFY switch causes EXEC to send a message back to your terminal when your batch job has finished running.

```
Format:
   Without /I switch
     QB PROGRAM
   example:  QB BATCHGEN CALCOMP MYMAP
   With /I switch
      ) QB/I
      )) PROGRAM
      )) INPUT FILE
      )))
   example:  ) QB/I
             )) MOSS.BATCH WHITER MERGE
             )) MOSS.IN
             )))
```

QCANCEL — The QCANCEL command is used to cancel a batch entry. To cancel a job use the QDISPLAY to find your sequence number. Then type QCANCEL sequence number. This will cancel inactive jobs and ones that have started processing. One limitation is that you can cancel only your own entries in the batch queue.

QDISPLAY — QDISPLAY displays the name and type of each queue. To see if your process is running check first under the BATCH_INPUT. If your job has been submitted but is not yet running, then it will be listed there. If your job is currently running it will have an asterisk in front of the sequence number. If you cannot find your job, look under BATCH_OUTPUT. Jobs listed under BATCH_OUTPUT have finished running. You can type the output file listed in the BATCH_OUTPUT area.

RENAME — This command allows you to change a file's name. The format is 'RENAME oldname newname'.

RUN — The RUNTIME command displays the following information about a specified process:

real-time elapsed since process started
central processer (CPU) time used
I/O blocks of data read
number of 2K byte memory pages used.

The format for RUN is 'RUN process number'. To find the process number use either the WHO command or '?'.

SEND — To send a message to another terminal use the SEND command. The format for sending a message is 'SEND process id message'. To find the process id number use the '?'.

SPACE — The SPACE command displays the ammount of space (in 512-byte disk blocks) you have allocated, used and remaining. If you discover you have run out of space and cannot delete or archive any files, please contact your systems manager.

| | |
|---|---|
| TRIPRINT or QPRINT | Both TRIPRINT and QPRINT send data to the line printer. The one you use will depend on how your system is set up. If you have a question about which one to use, please contact your system manager. The format for using TRIPRINT is 'TRIPRINT filename'. QPRINT works in the same way. A caution: this command does not print the file but just sends it to the printer. So don't modify or delete the file until the system prints it out. |
| TYPE | The TYPE command types the content of a file to your screen. The format is 'TYPE filename'. A word of caution: some files, like MOSS files, may print out what looks like gibberish, may ring the bell, and may even lock up your terminal. Try to have at least some idea of what a file is before you TYPE it. |
| WHO | WHO displays process information. If you type just 'WHO' at a terminal, you can see who is logged on the terminal, what the process id number is, what the process name is, and the program that is running. If you type 'WHO process number', you can get the same information for that process number. |
| ? | To get a listing of all the processes running on the computer at that time type '?'. The user name, process id, process name, and program running will be displayed. |

In general, raster data is processed by software referred to as MAPS whereas vector data is processed by software called MOSS. However, MOSS has some raster processing capabilities.

Map types are: 6 - dichotomous, 7 - discrete, and 8 - continuous, as in MAPS, and 9 - multi-value. A multi-value map is a cell map with multiple attributes or values for each cell.

The following is a list of MOSS raster processing commands in alphabetical order and a brief summary description of their funtion. Analogous commands in MAPS, if any, are noted in brackets [ ]. Complete descriptions of commands follow immediately. Note that the MOSS vector commands ACTIVE, AREA, FLOOD, LIST, PLOT, QUERY, SELECT, SHADE, STATISTICS, and ZOOM will also process MOSS and MAPS cell maps.

| Command Name | Summary Description |
|---|---|
| ASPECT | Produces a cell map of aspects from digital elevation maps. [ASPECT] |
| COMPOSITE | Performs cell map overlay using Boolean or arithmetic comparison criteria. [BOOLEAN, MATH] |
| CONTOUR | Produces a line map of contours from a digital elevation map. |
| GCONTOUR | Generates a contour display of DEM data or makes a new line map. [PLOT] |
| GRID | Performs grid interpolation of an elevation point map to create a new continuous cell map. |
| MODELG | Performs Boolean and arithmetic overlay on multi-value cell maps. |
| MULTIVAL | Creates a multi-value cell map from single value cell maps. |
| POLYCELL | Converts vector maps into cell maps. [RASTERIZE] |
| PROFILE | Generates a cross-section diagram between two points using type 8, continuous cell data. |
| SLOPE | Creates a cell map of slopes from DEM data. [SLOPE] |

| | |
|---|---|
| SNGVAL | Creates a single value cell map from a multi-value cell map. |
| SPSS | Prepares cell data for output to a file for later statistical analysis. |
| STATISTICS (CROSSTABS) | Produces a two-way frequency table of the contents of any two cell maps. |
| THREED | Produces a 3-D display of DEM data. [3D] |

The ASPECT command is summarized as follows:

ASPECT is a neighborhood analysis command which provides the user the capability to generate a continuous map of aspects using a continuous elevation map. Aspect is computed as the direction the slope faces. The command produces a new map which contains a matrix of cells assigned a value dependent upon their aspect. Aspects will range from 0 to 359 representing degrees clockwise from North. This indicates the direction of the slope value. 360 indicates no aspect.

The ASPECT command is specified as follows:

ASPECT (active ID) (new map name)

The individual parameters of the ASPECT command are described below:

(active ID) is the ID number of a continuous cell elevation map referenced in the active map table.

(new map name) is the name for the map which results from ASPECT.

The following is an example of use of the ASPECT command:

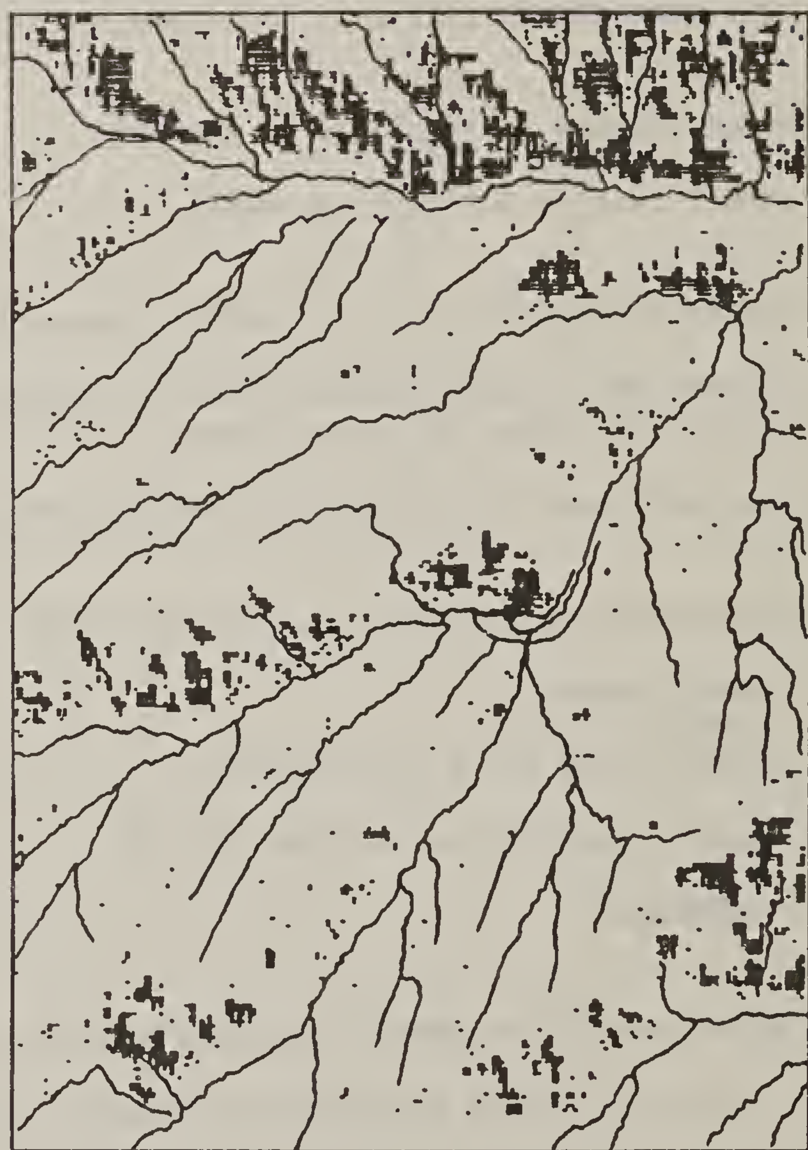
```
 ENTER COMMAND
? ASPECT
 ENTER ACTIVE MAP I.D. TO ASPECT
? 1
 WHAT DO YOU WISH TO CALL THE NEW MAP
? ASPECTMAP
```

The limitations of the ASPECT command are as follows:

-- Must use active continuous cell data as input.

Example of result of use of the ASPECT command:

```
 ENTER COMMAND
? SHAD 2
THERE ARE    9 LEVELS. ENTER RANGE TO DISPLAY?
? 5 5
```



A plot of southern aspects and surface water streams on Wolf Ridge, CO. Aspects were displayed using the SHADE command on one level; 5 (South).

The COMPOSITE command is summarized as follows:

COMPOSITE is an overlay analysis command that allows the user to perform cartographic modeling procedures on discrete and continuous cell maps. This is a between cell map process in which one to ten cell maps may be compared using logical or arithmetic criteria. Cartographic modeling of this nature allows the user to analyze multiple overlays of mapped information.

The COMPOSITE command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

```
COMPOSITE (active ID) (type of criteria) (new map name)*
(new map description)*

and

If LOGICAL: (model name)*

If ARITHMETIC: (active ID)* (weight)*
               (active ID)* (operator)* (weight)*
```

The individual parameters of the COMPOSITE command are described below:

(active ID) is the ID number of a discrete or continuous cell map referenced in the active map table.

(type of criteria) is a user option for specifying the type of composite to be performed, LOGICAL or ARITHMETIC (see below).

LOGICAL is a versatile option to manipulate maps using comparison and connecting operators. The model definition is stored on a file which has been previously created as a text file or throught the utility routine. The result of logical is a new discrete cell map. A typical model would look as follows:

```
( POS3 GE 1 AND POS3 LE 5 ) OR ( POS3 GE 20 AND POS3 LE 40 ) *
POS4 NE 10 &
OR POS4 NE 20 *
ENDMODEL
1
2
ENDCODES
LOW SUITABILITY
HIGH SUITABILITY
ENDSUBS
```

The above model has two criteria. Note that a single blank separates every element. The criterion section has the actual boolean expressions along with the active ID numbers of the cell files to be operated on. Each expression is terminated with an asterisk (*). Continuation lines may be specified using an ampersand (&) at the end of a line. Each element in a criterion must be separated by a single blank. Parentheses are allowed.

A relational expression may be used on any active ID to specify values of interest to the user. Valid relationals are: EQ, NE, LT, LE, GT, and GE.

The keyword ENDMODEL is used to indicate that all criteria have been read.

The "new codes" section are left-justified integers that will be used in creation of the new discrete file. Whenever a cell meets all boolean and relational requirements for a particular criterion, the cell in the resultant map will be assigned a new value based on the values in the "new codes" section. There must be as many values as there are criteria.

The keyword ENDCODES is used to indicate that all values have been read.

The "new subject" table is a list of alphanumeric text strings that specify what each of the values actually means. Up to 30 characters of text information may be entered and there must be as many new subjects as there are criteria.

The keyword ENDSUBS is used to indicate that all new subjects have been read.

ARITHMETIC is an option to manipulate maps which is important for many types of quantifiable suitability analyses. This option multilies a numeric weight times one of the maps. It then sequentially takes the previously computed value and either adds, subtracts, multiplies, or divides the specified active ID times a weight. The result of arithmetic is a new continuous cell map. A typical example of an ARITHMETIC model is:

    EROSION POTENTIAL = SOILS * 2.5 - VEGETATION * 3.2

Valid operators between maps include addition, subtraction, multiplication, or division. Up to 10 unique maps can be entered into an ARITHMETIC composite equation and the result is a new continuous cell map.

(new map name) is a name for the map resulting from COMPOSITE.

(new map description) is a description of the new map.

(model name) is the name of a file created previously which contains the LOGICAL model to be used.

(active ID) is the ID number of a cell map referenced in the active map table. This parameter is used in ARITHMETIC composite only.

(weight) is a decimal weight ranging from 0.00 to 999.9.

(operator) is an arithmetic sign, plus (+), minus (-), division (/), or multiplication (*).

The following is an example of use of the COMPOSITE command:

```
 ENTER COMMAND
? COMPOSITE
 ENTER ACTIVE MAP I.D.(S) TO COMPOSITE
? 3 4 5
 ENTER [A]RITHMETIC OR [L]OGICAL ?
? L
 WHAT DO YOU WISH TO CALL THE NEW MAP
  __________
? COMPOSITE
 ENTER  DESCRIPTION
 [ MDR AND SCT         WOLF RIDGE         COLORADO 1:24000    ]
  ____________________________________________________________
? HIGH AND LOW SUITABILITY


if logical:
  PLEASE ENTER NAME OF MODEL DEFINITION FILE
  ? MODEL1


if arithmetic:
  ENTER MAPID AND WEIGHT
 ? 3 1        (ID 4 has no weight)
  ENTERING MAIN COMPUTATION LOOP.  ENTER MAPID OF 0 TO STOP
  ENTER ACTIVE MAPDI, OPERATION(+-*/), AND WEIGHT
 ? 4 + .1     (ID 4 is multiplied by one-tenth and added to previous)
  ENTER ACTIVE MAPDI, OPERATION(+-*/), AND WEIGHT
 ? 5 / 500    (ID 5 is multiplied by 500 and divided into previous)
  ENTER ACTIVE MAPDI, OPERATION(+-*/), AND WEIGHT
 ? 0              (the end of the arithmetic model)
```

The limitations of the COMPOSITE command are as follows:

- -- Maps to composite must be active cell maps.
- -- Total number of cells and cell size in each map must be equal.
- -- No more than 10 maps may be composited in one pass.
- -- No more than 30 criteria are allowed.
- -- No more than 70 relations are allowed.

The CONTOUR command is summarized as follows:

CONTOUR is a data manipulation command that allows the user to create a contour map from continuous cell data. Result of the command is a line map stored in the polygon workfile (see also GCONTOUR). CONTOUR allows the user to specify start and finish elevations as well as contour increment. Thus, a contour map can be created which best displays the data set. Currently, a maximum of 50 contour intervals are allowed.

The contouring program uses local polynomials as the basis for the actual contouring process. In order to calculate these local polynomials the program needs to know how large a 'roving window' of cells needs to be processed. The roving window is square and there are actually two roving windows that move together across the data set. One is known as the boundary for the preliminary fit and the second is known as the boundary of the final fit. Preliminary fit must be larger than final fit. To simplify the process, the following values are suggested:

-- Simple maps (less than 60 rows and 60 columns)
Final fit = 4
Preliminary fit = 7

-- Complex maps ( more than 60 rows and 60 columns)
Final fit = 7
Preliminary fit = 11

Note that the final fit must be smaller than the preliminary fit, the preliminary fit can not be larger than sixteen, and both the final and preliminary fit must be two or more.

The CONTOUR command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

CONTOUR (active ID) (new map name)* (new map description)* (final fit)* (preliminary fit)* (minimum altitude)* (maximum altitude)* (contour increment)*

The individual parameters of the CONTOUR command are described below:

(active ID) is the ID number of a continuous cell map referenced in the active table

(new map name) is the name for the line map resulting from CONTOUR.

(new map description) is the description for the new line map.

(final fit) is the number of data points along a boundary of final fit.

(preliminary fit) is the number of points along a boundary of preliminary fit.

(minimum altitude) is the minimum altitude to be contoured.

(maximum altitude) is the maximum altitude to be contoured.

(contour increment) is the interval between contours.

The following is an example of use of the CONTOUR command:

```
 ENTER COMMAND
? CONTOUR
 ENTER ACTIVE MAP I.D. TO CONTOUR
? 1
 WHAT DO YOU WISH TO CALL THE NEW MAP
  __________
? CONTOURMAP
 ENTER  DESCRIPTION
 [ ELEVATION           WOLF RIDGE          COLORADO 1:24000     ]
  ____________________________________________________________
? AN ELEVATION CONTOUR MAP OF WOLF RIDGE, CO AT 200 FEET
 Please enter the number of data points along the
 boundary of the final FIT                          ? 7
 Please enter the number of data points along the
 boundary of the preliminary FIT                    ? 11
 Mimimum altitude is    6184.00
 Maximum altitude is    7200.00
 Please enter the minimum altitude to be contoured ? 6200
 Please enter the maximum altitude to be contoured ? 7200
 Please enter the contour increment                 ? 200

 EXECUTING...PLEASE WAIT
```

The limitations of the CONTOUR command are as follows:

-- Testing of this command raised serious doubts as to the validity of the contouring algorithms it uses. Until this is resolved, the GCONTOUR command should be used instead.

-- No more than 50 contour intervals are allowed.

-- Preliminary fit must be larger than final fit, preliminary fit must be sixteen or less, and preliminary and final must be greater than one.

-- Number of columns is limited such that the quantity (number of columns minus preliminary fit minus final fit) divided by final fit can not exceed 256. A final fit of seven will allow for approximately 1800 columns.

The GCONTOUR command is summarized as follows:

GCONTOUR is a data display command which generates a contour map of continuous elevation data. The result may be saved as a line map in the workfile and/or displayed on the CRT (see also CONTOUR). Note that as cell size decreases, processing time increases.

The GCONTOUR command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

GCONTOUR (active ID) (contour specification) (number of contours) (display) (save) (new map name) (contour values)*

The individual parameters of the GCONTOUR command are described below:

(active ID) is the ID number of a continuous map referenced in the active map table.

(contour specification) is an option for the user to specify values of contours. The user must enter [U]ser in order to specify values or [D]efault for default system specification. If the default option is chosen, contours will be at equal intervals.

(number of contours) is the number of contours to be generated. The user must enter 1-128. The larger the number of contours, the longer it will take to execute the command.

(display) is an option for the user to display the contours on the CRT. The user must respond YES or NO (Y/N). If this option is selected, the contour lines will be labeled.

(save) is an option for the user to save the resultant line map as part of the polygon workfile. The user must enter YES or NO (Y/N).

(new map name) is the name for the line map resulting from GCONTOUR. This parameter applies only if the new map is to be saved in the workfile.

(contour values) is where the user specifies the values of the contours unless default specification has been requested.

The following is an example of use of the GCONTOUR command:

```
 ENTER COMMAND
? GCONTOUR
 ENTER ACTIVE MAP I.D. TO CONTOUR
? 1
 USER ENTERED OR DEFAULT CONTOUR SPECIFICATION [U/D]? - ? D
 ENTER NUMBER OF CONTOUR INTERVALS (1-128) = ? 8
 DO YOU WNAT CONTOURS DISPLAYED ? (YES OR NO) - ? YES
 SAVE THE RESULT OF THIS TASK ? (YES OR NO) - ? YES
 WHAT DO YOU WISH TO CALL THE NEW MAP

? CONTOURMAP
```

The limitations of the GCONTOUR command are as follows:

-- Only active continuous cell maps may be used.

-- A maximum of 128 contour values may be specified.

-- The labeling algorithm may write labels over labels.

-- Contouring starts with the truncated integer value of the minimum elevation.

The GRID command is summarized as follows:

GRID is a neighborhood analysis command which performs point-to-grid interpolation. A sparse matrix of (x,y,z) triples is interpolated to a complete matrix in which each (x,y) element contains an interpolated (z) value. The result is saved as a continuous cell map which may be used as input for the ASPECT, CONTOUR, SLOPE, etc. commands. Note that the results of GRID are dependent upon the distribution of data on the original map. This command is usually used to convert point samples, such as rainfall data, to a complete matrix of estimates. This command generates real-valued maps.

The GRID command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

GRID (active ID) (new map name) (gridding option) (masking map)*
(scaler value)* (window size)* (new map description)*
(cell ratio)* (cell size)* (re-enter)*

The individual parameters of the GRID command are described below:

(active ID) is the ID number of a 3D-point map referenced in the active map table.

(new map name) is the name for the map resulting from the use of GRID.
(gridding option) is the type of gridding algorithm that the user wishes to apply to the (x,y,z) data. There are currently two algorithms available. The first, specified by the key word QUADRANT, determines the closest point to each cell in each of four quadrants about that cell and then takes the average of the four point samples to calculate the value for that cell. The second algorithm, specified by the key word WEIGHT, is a more complex algorithm. The WEIGHT algorithm searches for the eight closest points to each cell (regardless of where they are spatially located) and computes a weighted average based on distance from the cell. The WEIGHT algorithm produces a smoother map.

(masking map) is the name of a valid cell map which does not necessarily have to be active. Sometimes it is necessary to modify the generated grid to reflect actual conditions on the ground. An example of this would be in gridding bathymetric point data along coastal areas: grid cells located in the uplands should not have negative values. The grid can be modified using a masking map. The masking map must have the same number of rows and columns as the gridded map, and will contain a mask of values. Any cell that is non-zero will be used to override the results of the gridding process.

(scaler value) is the value all input values are multiplied by in order to scale them higher or lower.

(window size) is a value between 3 and 120 that defines the size of the roving window matrix. The size of the window effects how many points are considered when assigning a value to the cell at the center of the roving window. If the window size around a cell is not large enough to encounter at least three sample points, the cell is assigned the background value.

(new map description) is a description of the new cell map that is being created.

(cell ratio) is the ratio of the number of meters in y to the number of meters in x on an individual cell. The QUADRANT algorithm allows for any ratio while the WEIGHT algorithm requires a ratio of 1.0.

(cell size) is the cell size in acres.

The following is an example of use of the GRID command:

```
 ENTER COMMAND
? GRID
 ENTER ACTIVE MAP I.D. TO GRID
? 1
 WHAT DO YOU WISH TO CALL THE NEW MAP
  __________
? GRIDWELLS

 ENTER ONE OF THE FOLLOWING GRIDDING OPTIONS
    QUADRANT  FOR A 4 POINT QUADRANT WEIGHTED AVERAGE
    WEIGHT    FOR A  8 NEAREST POINTS WEIGHTED AVERAGE
? WEIGHT

 PLEASE ENTER MASKING FILE NAME (RETURN FOR NONE) ? <CR>
 PLEASE ENTER SCALER VALUE FOR Z DATA (RETURN FOR 1.0)
? <CR>
 PLEASE ENTER MOVING WINDOW SIZE ? 15
 ENTER  DESCRIPTION
 [ GAS AND OIL SITES   WOLF RIDGE         COLORADO 1:24000     ]
  _____________________________________________________________
? A GRID INTERPOLATION OF OIL WELL PRODUCTION @ 10 ACRES
 ENTER CELL SIZE RATIO (Y/X I.E. 1.25) ? 1
 ENTER CELL SIZE IN ACRES ? 10

 EXECUTING...PLEASE WAIT
```

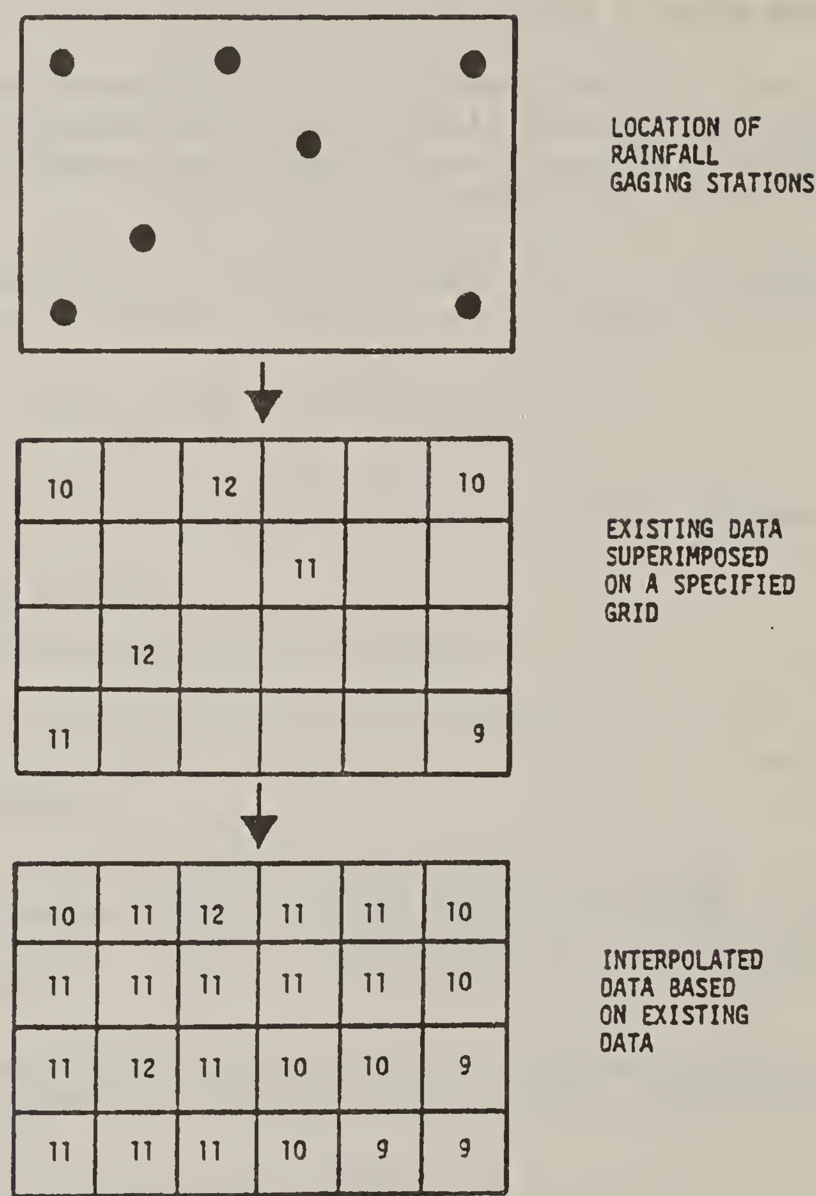
The limitations of the GRID command are as follows:

- -- GRID is extremely limited by the distribution of the original 3D-point data.

- -- Window must be set.

- -- Map must be a point map (type 1) with numeric values in the subject or numeric values as the selected attribute from a multiple attribute file, an numeric point map (type 5), a 3-D vector map (types 11, 12, or 13).

Example of point-to-grid interpolation:




An incomplete matrix of rainfall point data is interpolated into a complete gridded matrix of estimates.

The MODELG command is summarized as follows:

MODELG is an overlay analysis command which allows the user to perform raster modeling functions on a multi-value cell file. The model definition is stored on a file which has been previously created as a text file or through the utility routine (see Appendix F). Execution of the model results in creation of a single value continuous cell map that is stored in the workfile.

The MODELG command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

MODELG (active ID) (new map name) (model name) (new map description)*

The individual parameters of the MODELG command are described below:

(active ID) is the ID number of a multi-value cell file referenced in the active table on which the model is to be run.

(new map name) is the name for the single value cell file which results from MODELG.

(model name) is the name of the file containing the model definition. This name may not exceed 10 characters in length.

(new map description) is a description of the resultant map.

The following is an example of use of the MODELG command:

```
 ENTER COMMAND
? MODELG
 ENTER ACTIVE MAP I.D. TO MODELG
? 1
 WHAT DO YOU WISH TO CALL THE NEW MAP
 __________
? NEWMODEL
 PLEASE ENTER NAME OF MODEL DEFINITION FILE
? MODEL1
 ENTER  DESCRIPTION
 [ MDR AND SCT         WOLF RIDGE         COLORADO 1:24000     ]
 ____________________________________________________________
? HIGH AND LOW SUITABILITY
```

A typical model would look as follows:

```
( POS3 GE 1 AND POS3 LE 5 ) OR ( POS3 GE 20 AND POS3 LE 40 ) *
POS4 NE 10 &
OR POS4 NE 20 *
ENDMODEL
1
2
ENDCODES
LOW SUITABILITY
HIGH SUITABILITY
ENDSUBS
```

Note that variable positions 1 and 2 are reserved. Actual data begins in position 3. Hence, POS3 refers to position 3 which is really variable 1 and POS4 refers to position 4 which is variable 2 etc... The above model has two criteria. Note that a single blank separates every element.

The criterion section has the actual boolean expressions along with the variable position numbers in the multi-value cell file to be operated on. Each expression is terminated with an asterisk (*). Continuation lines may be specified using an ampersand (&) at the end of a line. Each element in a criterion must be separated by a single blank. Parentheses are allowed.

A relational expression may be used on any position number to specify values of interest to the user. Valid relationals are: EQ, NE, LT, LE, GT, and GE.

The keyword ENDMODEL is used to indicate that all criteria have been read.

The "new codes" section are left-justified integers that will be used in creation of the new single value file. Whenever a cell meets all boolean and relational requirements for a particular criterion, the cell in the resultant map will be assigned a new value based on the values in the "new codes" section. There must be as many values as there are criteria.

The keyword ENDCODES is used to indicate that all values have been read.

The "new subject" table is a list of alphanumeric text strings that specify what each of the values actually means. Up to 30 characters of text information may be entered and there must be as many new subjects as there are criteria.

The keyword ENDSUBS is used to indicate that all new subjects have been read.

The limitations of the MODELG command are as follows:

-- Can only use active multi-value cell maps.

-- No more than 10 criteria may be entered.

The MULTIVAL command is summarized as follows:

MULTIVAL is a data manipulation command which allows the user to take a number of single value cell files and create a multi-cell file. Multi-value grid-cell files are required as input to the MODELG command.

The MULTIVAL command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

MULTIVAL (active ID's) (empty cases option) (new map name) (new map description)

The individual parameters of the MULTIVAL command are described below:

(active ID1...n) is the ID number(s) of a cell map(s) referenced in the active map table which are to be used to build the multivalue cell file.

(empty cases option) is an option for the user to exclude zero values in new text file. If Y(es) is entered and the cell on a row and column of all maps is zero no record will be written in the cell file.

(new map name) is the name for the multi-value cell file which results from use of MULTIVAL.

(new map description) is a description of the resultant map.

The following is an example of use of the MULTIVAL command:

```
 ENTER COMMAND
? MULTIVAL
 ENTER ACTIVE MAP I.D.(S) TO MULTIVAL
? 1 2 3
 DO YOU WISH TO ELIMINATE EMPTY CASES (Y OR N)
? N
 WHAT DO YOU WISH TO CALL THE NEW MAP
  __________
? NEWMVMAP
 ENTER  DESCRIPTION
 [ PLS                   WOLF RIDGE          COLORADO 1:24000     ]
  ____________________________________________________________
? PLS MDR AND SCT
```

The limitations of the MULTIVAL command are as follows:

-- Can only use active cell maps.

-- No more than ten active ID's may be entered at a time.

-- All active ID's must have the same number of rows and columns, the same window, and map projection.

-- All real cell values are truncated to integers.

The POLYCELL command is specified as follows:

POLYCELL is a data manipulation command which allows the user to convert point, line, or polygon maps to cell maps. Certain decisions must be made before POLYCELL can be executed. One is cell size. Cell size is given in acres and is used to calculate the number of rows and columns in the cell matrix. Cell size can affect several functions: the amount of processing required; the wait-time at the terminal; and accuracy of results. It is suggested that the TESTGRID command be used to help the user select an appropriate cell size. The POLYCELL command generates real-valued maps.

The POLYCELL command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

POLYCELL (active ID) (new map name)* (new map description)*
(cell size ratio)* (cell size)* (cell type)* (cell assignment)*

The individual parameters of the POLYCELL command are described below:

(active ID) is the ID number of a point, line, or polygon map referenced in the active map table which is to be rasterized.

(new map name) is the name for the map which results from POLYCELL.

(new map description) is a description for the resultant map.

(cell size ratio) is the Y/X ratio of each cell on the new map. The ratio for a line printer of 8 lines per inch is 1.25.

(cell size) is the desired cell size for the new map in acres.

(cell type) is an option to specify the type of new cell map. Normally the type to select is discrete.

(cell assignment) is an option to specify how cell values and descriptions will be assigned. The user may enter 2, 3, 4, or 5 for subject assignment, item number assignment, user recode assignment, or multiple attribute assignment, respectively. Entering 1 will terminate the polycell process. If user recode assignment is to be used, a polycell translation file must be built (see Appendix F for SET.LEVEL). Option 5 will not be offered unless the active ID was selected using the ATTR option.

If the cell type is dichotomous, all cells are assigned a value of one and there is no description. If the cell type is discrete, the cells are assigned the sequential subject number and the subject is used for the description. If the subject is numeric, the cell is assigned the numeric value and the subject is used for the description. If the cell type is discrete and feature number assignment is used, the cells are assigned the sequential feature number and the features subject is used for the description. If the cell type is discrete and multiple attribute assignment is used, the cells are assigned the attribute value for type real and integer and sequential feature number for character. The attribute field is always used for the description regardless of attribute type. If the cell type is continuous and subject value assignment is used, the cells are assigned the sequential subject number unless the subject is all numeric in which case the numeric value of the subject is assigned to the cells. If the cell type is continuous and feature assignment is used, the cells are assigned the sequential feature number. If the cell type is continuous and multiple attribute assignment is used, the cells are assigned the attribute value for attribute type integer and real. Attribute assignment should not be used for continuous types if the attribute field is character, since only the sequential feature number is assigned to the cells.

The following is an example of use of the POLYCELL command:

```
 ENTER COMMAND
? POLYCELL
 ENTER ACTIVE MAP I.D. TO POLYCELL
? 1
 WHAT DO YOU WISH TO CALL THE NEW MAP
 __________
? RASTMDR
 ENTER  DESCRIPTION
 [ MULE DEER RANGE     WOLF RIDGE          COLORADO 1:24000    ]
 ______________________________________________________________
? A GRID MAP OF MULE DEER
 ENTER CELL SIZE RATIO (Y/X I.E. 1.25)
? 1
 ENTER CELL SIZE IN ACRES
? 10
 ENTER CELL MAP TYPE OPTION
   1 - DICHOTOMOUS (TYPE 6)
   2 - DISCRETE (TYPE 7)
   3 - CONTINOUS (TYPE 8)
? 2
```

```
ENTER CELL VALUE ASSIGNMENT OPTION
  1 - TERMINATE POLYCELL PROCESS
  2 - SUBJECT ASSIGNMENT
  3 - ITEM (FEATURE) NUMBER ASSIGNMENT
  4 - USER RECODE SUBJECT ASSIGNMENT
  5 - MULTIPLE ATTRIBUTE ASSIGNMENT
? 2

EXECUTING...PLEASE WAIT
```

The limitations of the POLYCELL command are as follows:

-- If the resulting map is to be used with other cell maps the same cell size and minimum bounding rectangle must be used in the POLYCELL command for all maps.

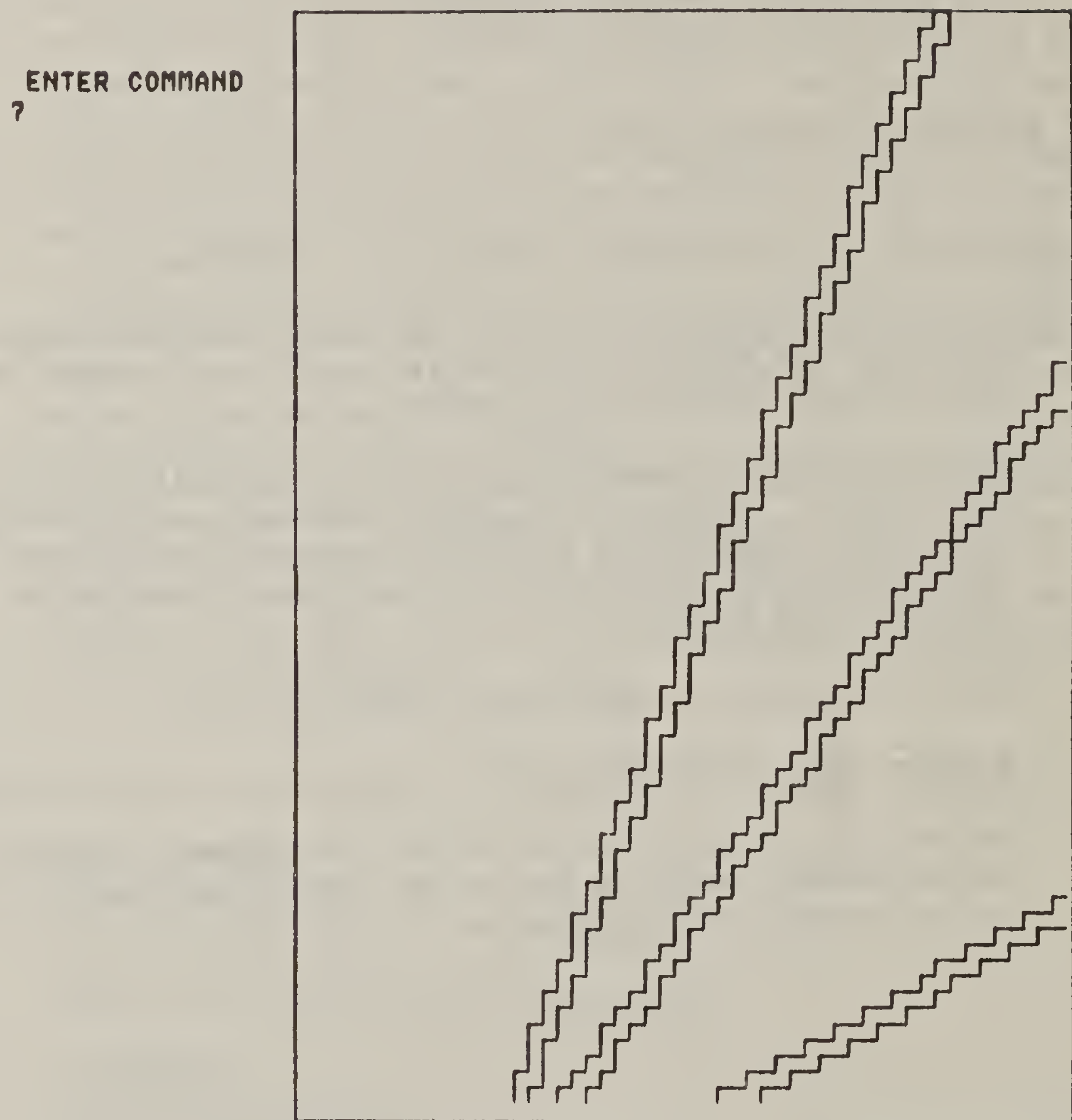
-- When features are converted to cells, each cell will be assigned the value of the feature occupying the majority of the area of that cell. However, if the features overlap each other due to poor digitizing, the cell will be assigned the value of the polygon digitized first.

-- Cell size cannot be specified in metric units.

-- No more than 10,000,000 cells.

-- Window must be set. Definition of the window, or minimum bounding rectangle, prior to use of the command will affect the result of the rasterization process.

Example of result of use of the POLYCELL command:




The map is a raster map of mule deer migration routes on Wolf Ridge, CO.

The POLYMVG command is specified as follows:

POLYMVG is a data manipulation command which allows the user to convert point, line, or polygon maps with multiple attributes to a multiple value cell file. Each attribute occupies one position in the new multiple value file. The value of character attributes is set to the value of the first character in the attribute. Certain decisions must be made before POLYMVG can be executed. One is cell size. Cell size is given in acres and used to calculate the number of rows and columns in the cell matrix. Cell size can affect several functions: the amount of processing required; the wait-time at the terminal; and accuracy of results. It is suggested that the TESTGRID command be used to help the user select an appropriate cell size. Note that if multiple cell maps are to be used together for analyses they must all have the same cell size and minimum bounding rectangle. The user must also decide how to assign descriptor codes to the cells.

The POLYMVG command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

POLYMVG (active ID) (new map name)* (new map description)*
(cell size ratio)* (cell size)*

The individual parameters of the POLYCELL command are described below:

(active ID) is the ID number of a point, line, or polygon map referenced in the active map table which is to be rasterized.

(new map name) is the name for the map which results from POLYMVG.

(new map description) is a description for the resultant map.

(cell size ratio) is the Y/X ratio of each cell on the new map. The ratio for a line printer of 8 lines per inch is 1.25.

(cell size) is the desired cell size for the new map in acres.

The following is an example of use of the POLYMVG command:

```
 ENTER COMMAND
? POLYMVG
 ENTER ACTIVE MAP I.D. TO POLYMVG
? 1
```

```
WHAT DO YOU WISH TO CALL THE NEW MAP

? RASTMDR
 ENTER  DESCRIPTION
 [ MULE DEER RANGE     WOLF RIDGE         COLORADO 1:24000     ]

? A GRID MAP OF THE ATTRIBUTES ASSOCIATED WITH MULE DEER
 ENTER CELL SIZE RATIO (Y/X I.E. 1.25)
? 1

 ENTER CELL SIZE IN ACRES
? 10


 EXECUTING...PLEASE WAIT
```

The limitations of the POLYMVG command are as follows:

- If the resulting map is to be used with other cell maps the same cell size and minimum bounding rectangle must be used in the POLYMVG command for all maps.

- When features are converted to cells, each cell will be assigned the value of the feature occupying the majority of the area of that cell. However, if the features overlap each other due to poor digitizing, the cell will be assigned the value of the polygon digitized first.

- Cell size cannot be specified in metric units.

- No more than 10,000,000 cells.

- Window must be set. Definition of the window, or minimum bounding rectangle, prior to use of the command will affect the result of the rasterization process.

- Real values(those with a decimal point) are truncated to integers. Character types in the attributes are assigned the value of the first character in the character attribute.

The PROFILE command is summarized as follows:

PROFILE is a data display command which allows the user to generate a cross-sectional diagram of continuous cell maps or line maps such as contour maps with values in the subjects. Line maps are limited to an east-west orientation. The extent of the cross-section is specified by crosshair input of two locations. It is suggested that the map be displayed, for reference, prior to use of the command. If the active ID is a cell map, the horizontal axis shows the distance along a line between the two digitized points. If it is a line map, the distance is calculated from the first line encounterd which crosses the line between the two digitized points to the last line which crosses. The XYZ distance is the distance along the surface.

The PROFILE command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

PROFILE (active ID) (vertical exaggeration)* (crosshair input)*

The individual parameters of the PROFILE command are described below:

(active ID) is the ID number of a continuous cell map or line map referenced in the active map table.

(vertical exaggeration) is a real number which specifies the vertical exaggeration of the values for the cross-section display.

(crosshair input) is where the user specifies the extent of the cross-section to be diagrammed. When the input map is a line map, the first point digitized must be to the east of the second point.

The following is an example of use of the PROFILE command:

```
 ENTER COMMAND
? PROFILE
 ENTER ACTIVE MAP I.D. TO PROFILE
? 1
 ENTER VERTICAL EXAGGERATION ?
? 10
 POINT TO TWO LOCATIONS
```

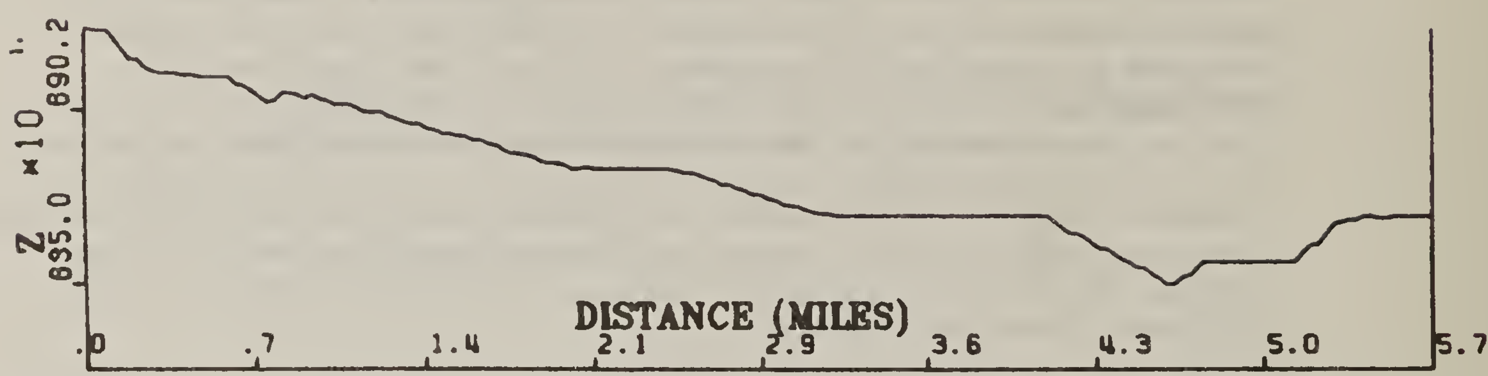
The limitations of the PROFILE command are as follows:

-- Map must be active and window must be set.

-- Works only with continuous cell or line maps.

-- No more than 512 points can be included in the cross-section.

Example of result of use of the PROFILE command:




MININUM Z = 6350.0 VERTICAL EXAGGERATION = 10.0

MAXIMUM Z = 6902.0 XYZ DISTANCE = 6.2 MILES

An elevation profile of a cross-section of Wolf Ridge, CO.

The SLOPE command is summarized as follows:

SLOPE is a neighborhood analysis command which creates a continuous cell map of the slope of continuous elevation data. Each cell in the new map is assigned a value depedent upon its slope, computed as rise over run in percent.

The SLOPE command is specified as follows:

SLOPE (active ID) (new map name)

The individual parameters of the SLOPE command are described below:

(active ID) is the ID number of a continuous cell elevation map referenced in the active map table.

(new map name) is the name for the map resulting from SLOPE.

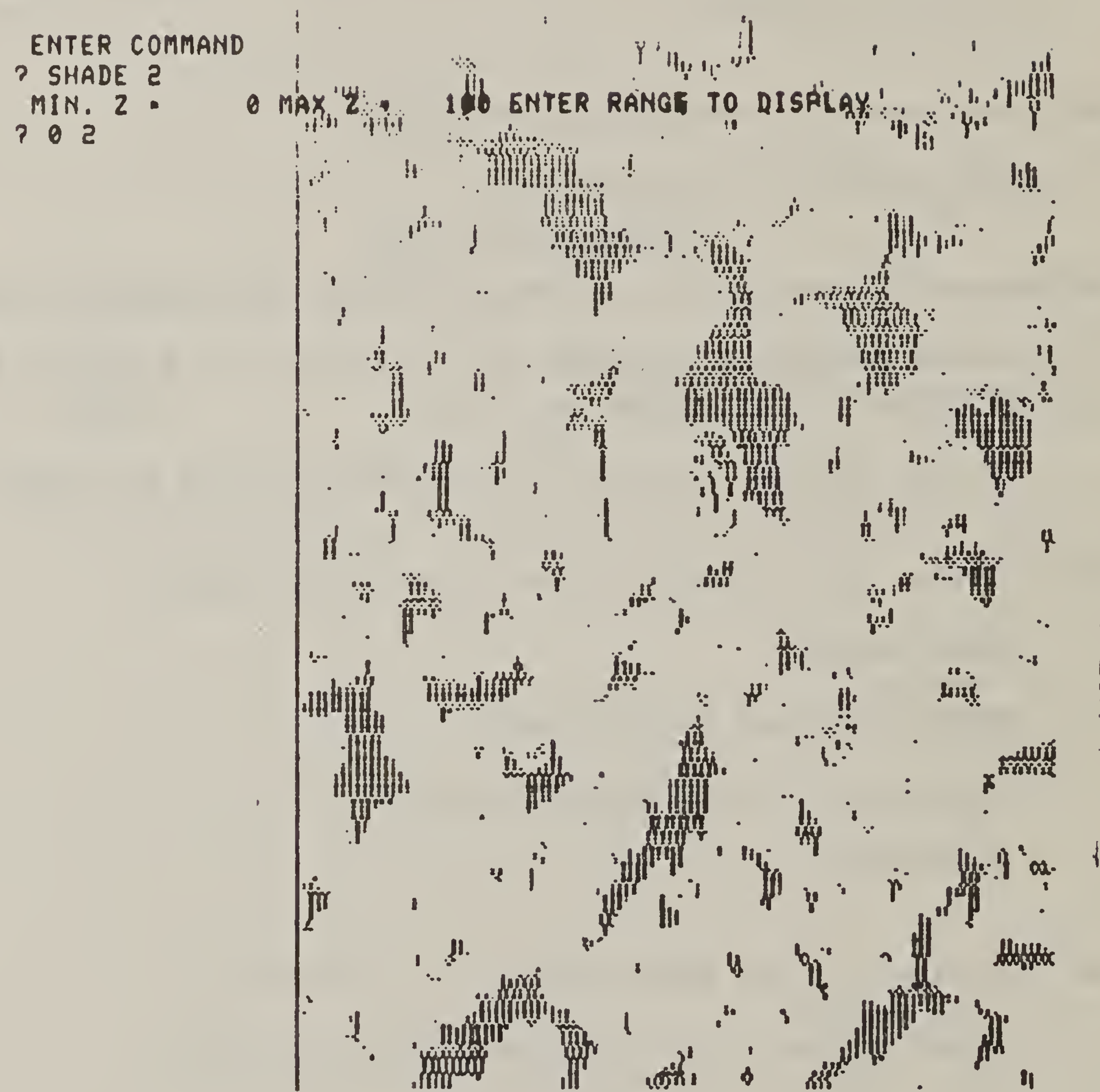
The following is an example of use of the SLOPE command:

```
 ENTER COMMAND
? SLOPE
 ENTER ACTIVE MAP I.D. TO SLOPE
? 1
 WHAT DO YOU WISH TO CALL THE NEW MAP
  __________
? SLPWOLFRG
```

The limitations of the SLOPE command are as follows:

-- Can only use active continuous elevation data.

Example of result of use of the SLOPE command:




A shaded plot of a cell map of slopes on Wolf Ridge, CO between zero and two percent.

The SNGVAL command is summarized as follows:

SNGVAL is a data manipulation command which allows the user to extract single variables or layers of cell data from a multi-value cell file. Execution of the command results in creation of a single value continuous cell file stored in the workfile.

The SNGVAL command is specified as follows:

SNGVAL (active ID) (new map name) (layer identifier) (new map description)*

The individual parameters of the SNGVAL command are described below: (* denotes parameters which can only be entered in a prompted mode)

(active ID) is the ID number of a multi-value cell file referenced in the active table from which the user wishes to extract a variable.

(new map name) is the name for the new single value cell map.

(layer identifier) is the integer number of the layer the user wishes to extract.

(new map description) is a description of the resultant map.

The following is an example of use of the SNGVAL command:

```
 ENTER COMMAND
? SNGVAL
 ENTER ACTIVE MAP I.D. TO SNGVAL
? 1
 WHAT DO YOU WISH TO CALL THE NEW MAP
 __________
? NEWSVMAP
 THERE ARE    5 LEVELS.  WHICH DO YOU WISH TO CONVERT
? 2
 ENTER  DESCRIPTION
 [ MDR AND SCT         WOLF RIDGE         COLORADO 1:24000    ]
 ____________________________________________________________
? SURFACE COVER TYPE
```

The limitations of the SNGVAL command are as follows:

-- Can only use active multi-value cell maps.

The SPSS command is specified as follows:

SPSS is a data manipulation command which produces a text file of cell data that can be used for later analysis with a statistical package or exported to another installation. This file is called "TAPE4" and is created in the user's work area. It consists of of records of row and column number along with the cell values from the active maps.

The SPSS command is specified as follows:

SPSS (active ID1) (active ID2)...(active IDn) (empty cases option)

The individual parameters of the SPSS command are described below:

(active ID1...n) is the ID number(s) of a cell map(s) referenced in the active map table which is to be exported.

(empty cases option) is an option for the user to exclude zero values in new text file. If Y(es) is entered and the cell on a row and column of all maps is zero no record will be written in the cell file.

The following is an example of use of the SPSS command:

```
 ENTER COMMAND
? SPSS
 ENTER ACTIVE MAP I.D(S) TO SPSS
? 1
 DO YOU WISH TO ELIMINATE EMPTY CASES (Y OR N)
? Y
```

The limitations of the SPSS command are as follows:

-- Can only use active cell maps.

-- No more than fifteen active ID's may be entered at a time.

-- If the text file named "TAPE4" is to be saved it should be renamed since use of the command deletes existing TAPE4 files.

-- All active ID's must have the same number of rows and columns, the same window, and map projection.

-- All real cell values are truncated to integers.

THE STATISTICS CROSSTABS command is summarized as follows:

STATISTICS CROSSTABS is a data description command which produces a two-way frequency (crosstabulation) table of the contents of two active discrete cell maps. The table produced is analagous to map intersection overlay. Crosstabulation (contingency table) is a joint frequency distribution of cases as defined by the categories of two or more variables. STATISTICS CROSSTABS produces a report either in the standard statistical package format or in an intersection table format.

The STATISTICS CROSSTABS command is specified as follows:

STATISTICS (active ID's) CROSSTABS (crosstabs type)

The individual parameters of the STATISTICS CROSSTABS command are described below:

(active ID's) are the ID numbers of two discrete cell maps referenced in the active map table.

CROSSTABS is the type of function to be performed. Three functions are available, CROSSTABS, DESCRIBE, and HISTOGRAM. Since CROSSTABS is entered, a two-way frequency table of the contents of the two active cell maps will be output.

(crosstabs type) is the report format, either INTERSECTION or STATPACK.

INTERSECTION lists each category of the first map along with the area in acres and the percent of the non-background cells contained in the category. The command then lists each category in the second map that intersects the category in the first map along with the acres of intersection and the percent of the cells in the category of the second map that were involved in the intersection.

STATPACK produces a row and column format table in which the subjects of the first map (listed vertically on the left) are crosstabulated with the subjects of the second map (listed horizontally across the top). Each cell in the table contains four values. The first is the frequency count which is the number of map cells associated with that subject in map 2 which intersect with the respective subject in map 1. The next three values represent various percentages of cells involved in the intersection. The first is the frequency count divided by the total number of cells on the map. The second is the frequency divided by the row total (all cells having this value on the first map). The last value is the frequency count divided by the column total (total cells on the second map having this value). The total row and column counts and row and column percent of total are also provided. Chi square with degrees of freedom and significance is listed after the table is printed. Chi square is used for testing the null hypothesis that there is no significant difference between the surfaces and is only meaningful for related surfaces such as soil and vegetation.

The following is an example of use of the STATISTICS CROSSTABS command:

```
 ENTER COMMAND
? STATISTICS
 ENTER ACTIVE MAP I.D.(S) FOR STATISTICS
? 1 2
 ENTER STATISTICS TYPE (DESCRIBE,CROSSTABS,HISTOGRAM)
? CROSSTABS
```

The limitations of the STATISTICS CROSSTABS command are as follows:

-- Can only use active discrete cell maps.

-- No more than 32,000 unique combinations.

The THREED command is summarized as follows:

THREED is a data display command which allows the user to create a three-dimensional display of a continuous elevation map.

The THREED command is specified as follows:
(* denotes parameters which can only be entered in a prompted mode)

THREED (active ID) (device)* (row increment)*
(vertical exaggeration)* (vertical rotation)* (horizontal rotation)*

The individual parameters of the THREED command are described below:

(active ID) is the ID number of a cell map of elevation data referenced in the active map table.

(device) is the desired graphics output device. The user should enter 1 for CRT output or 2 for plotter output.

(row increment) is an option to increase plotting speed by skipping rows to be displayed. For example, a value of 5 indicates every fifth row is to be plotted.

(vertical exaggeration) is an option to specify depth exaggeration. This can be a positive or negative value.

(vertical rotation) is an option to specify the viewing angle above the surface in positive degrees.

(horizontal rotation) is an option to specify the viewing angle from the center. Left rotation is positive, right is negative.

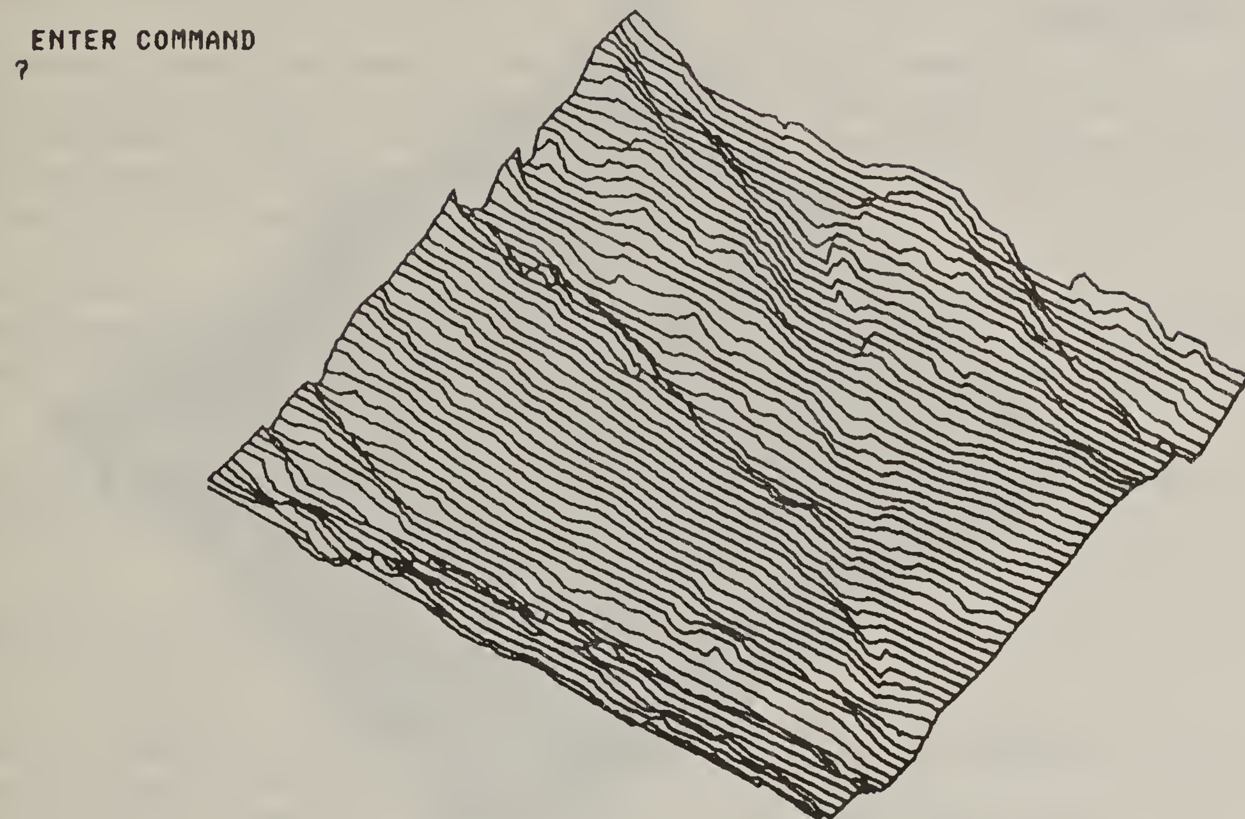
The following is an example of use of the THREED command:

```
 ENTER COMMAND
? THREED
 ENTER ACTIVE MAP I.D. TO 3-D ? 3
 ENTER 1 FOR TEKTRONIX  2 FOR PLOTTER OUTPUT ? 1
 ENTER ROW DISPLAY INCREMENT (1=DEFAULT) ? 5
 ENTER VERTICAL EXAGGERATION (1=NORMAL) ? 2
 ENTER ROTATION ANGLE ABOVE (+) SURFACE ? 35
 ENTER ANGLE FROM CENTER (+ LEFT - RIGHT) ? -30
```

The limitations of the THREED command are as follows:

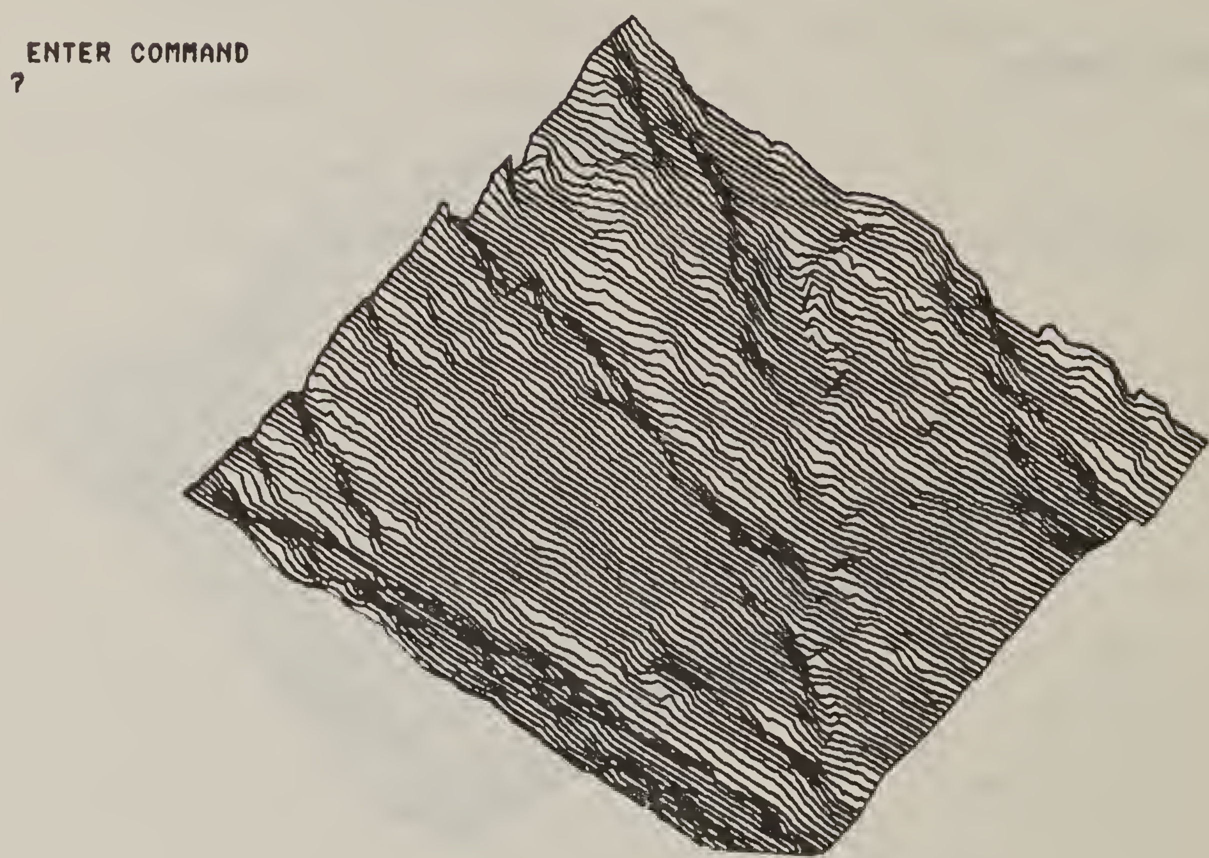
- -- Map is plotted 180 degrees backwards.
- -- Only active elevation cell data can be used.
- -- Can only plot one map at a time.
- -- The window setting has no effect.
- -- Cannot have more than 512 rows or columns in the map.

Example of result of use of the THREED command:




The map is an elevation map of Wolf Ridge, CO with every fifth row displayed.

Example of result of use of the THREED command:




The map is an elevation map of Wolf Ridge, CO with every third row displayed. Compare with the previous graphic of the same map where every fifth row was displayed.

## Appendix D. Running MOSS and MAPS in batch mode

The following is a set of instructions and examples for running MOSS and MAPS in batch mode. In batch mode, as opposed to interactive mode where input is submitted from a terminal, a set of commands is submitted from a pre-built input file. The set of commands in the input file is identical to those given in interactive mode. The batch job runs when a batch stream becomes available.

Two methods exist for running MOSS in batch mode. These methods are demonstrated by examples 1 and 2. The second method differs from the first in that a third argument, usually the command itself, is required to enter the batch job into the batch stream. Thirty-six commands require use of the third argument and are listed in example 2.

Running MAPS in batch mode is similar to running MOSS using the first method. Note that MAPS may not be entered through MOSS in batch mode but must be accessed directly (see Appendix A). Thus, no user name is required. Also note that it is not necessary to specify a DEVICE output file.

Commands in MOSS and MAPS that require crosshair input cannot be run in batch. Besides these, the MOSS command UTILITY cannot be used in batch.

### Example 1: Running the AREA command in batch

Step 1. Create an input file in the CLI.
- Line 1: Create an input file and name it anything you choose.
- Line 2: Identify MOSS user name.
- Line 3: Use the DEVICE command here for every MOSS batch run.
- Line 4: Identify DEVICE output file name.
- Line 5: Use the SELECT command to identify the map name and the map subjects to be activated for the AREA command.
- Line 6: Enter the AREA command and the active data set ID.
- Line 7: Enter the BYE command to end the MOSS session.
- Line 8: Enter a third right parenthesis to exit the CLI input mode.

```
) CREATE/INSERT AREA.MDRWOLFRG.IN
))JOHN
))DEVICE
))GRAPHOUT
))SELECT MDRWOLFRG ALL
))AREA 1
))BYE
)))
```

Step 2. Enter the job into the batch stream
- Line 1: Type QBATCH/INSERT.
- Line 2: Enter MOSS.BATCH and the project name.
- Line 3: Enter the input file name.
- Line 4: Enter a third right parenthesis.

A confirmation that the batch job has been entered will be presented.

```
)  QBATCH/INSERT
)) MOSS.BATCH WOLF
)) AREA.MDRWOLFRG.IN
)))
QUEUED, SEQ=2907, QPRI=127
```

Example 2. Running the OVERLAY command in batch

The example used here to run OVERLAY in batch demonstrates the second method required to run certain commands in batch. The following MOSS commands require use of a third argument to enter the input file into the batch stream:

| | | |
|---|---|---|
| ASSIGN | GRID | SAMPLE |
| AUDIT | LPOVER | SAVE |
| BSEARCH | MERGE | SNGVAL |
| BUFFER | MODELG | SPSS |
| CALCOMP | MULTIVAL | STATISTICS |
| COMPOSITE | NUMBER | SYMBOL |
| CONTIGUITY | POLYCELL | TEXT |
| EDGE | PROJECTION | THREED |
| EXPORT | PROXIMITY | TRANSLATE |
| GCALCOMP | REPORT | WEED |

In addition, there are eight other MOSS commands that require a third argument to enter the input file into the batch stream, but these commands use an argument different from the command itself. These commands and their corresponding arguments follow:

```
ADD ---------- STNDRD            LINE ------ LINCRT
ASPECT ------- SLOPPY            OVERLAY --- POVERLY (see example following)
CONTOUR ------ CONSAC            SHADE ----- SHADPR
GCONTOUR ----- CONTOUR           SLOPE ----- SLOPPY
GOVERLAY ----- GOVERLY           TESTGRID -- TESTG
HEWLETT ------ CALCOMP.HEWL      VERSATEC -- CALCOMP.VERS
HOUSTON ------ CALCOMP.HOUS      ZETA ------ CALCOMP.ZETA
```

Step 1. Use MOSS interactively to select the maps and set the window and device.

```
   MOSS - MAP OVERLAY AND STATISTICAL SYSTEM
 IF YOU HAVE ANY PROBLEMS, CALL (303) 226-3282
 PLEASE ENTER YOUR NAME ? REST
 ENTER COMMAND
? SELECT MDRWOLFRG ALL
NUMBER OF HITS =        5
 ENTER COMMAND
? SELECT BGHWOLFRG ALL
NUMBER OF HITS =        2
 ENTER COMMAND
? WINDOW 2
 ENTER COMMAND
? DEVICE GRAPHOUT
 ENTER COMMAND
? BYE

  USER  JOHN          LOGGED OFF FROM MOSS
```

Step 2. Create the input file in the CLI

Line 1: Create an input file and name it anything you choose; it is advisable to name the file similarly to the new map to be created.
Line 2: Identify the active map ID numbers to OVERLAY.
Line 3: Identify the new map name.
Line 4: Specify subject merge.
Line 5: Specify overlay process (intersection, union, or non-intersection).
Line 6: Enter a third right parenthesis to exit the CLI input mode.

```
) CREATE/INSERT OVERLAY.MDHWOLFRG.IN
))1 2
))MDHWOLFRG
))NO
))1
)))
```

Step 3. Enter the input file into the batch stream.

Line 1: Type QBATCH/I
Line 2: Enter MOSS.BATCH, the project name, and the program command name.
Line 3: Identify input file name.
Line 4: Again type in a third parenthesis.

A confirmation that the batch job has been entered will be presented.

```
)  QBATCH/I
)) MOSS.BATCH WOLF POVERLY
)) OVERLAY.MDHWOLFRG.IN
)))
QUEUED, SEQ=2904, QPRI=127
```

How to check a batch job that is processing:

1) Use the CQ Macro
In the CLI type CQ and the sequence number given when you submit the batch job.

2) Type in XEQ PED or a question mark (?)
You can identify which process is yours by looking for your user name, a stream number and the process you are running.

3) Type the output file
You can type out the output file while the job is running to get an idea of how far it has processed. When your job has finished you should always type the output file to check for errors.

Tolerances allow the user to calculate contiguities or edges for maps which have been digitized in polygon format. This format often produces edges between neighboring polygons which are not exactly identical. The degree to which neighboring polygon edges differ is a function of accuracy of data entry. To allow for a variety of data entry inaccuracies, EDGE and CONTIGUITY include a tolerance parameter.

To determine the best tolerance the user should know the characteristics of the mapped data and relative accuracy of the data entry process producing that map. As a general rule, maps with large minimum polygon size and inaccurate data entry should have a larger tolerance. Maps with small minimum polygon size and which were digitized quite accurately require small tolerances.

Since data entry accuracy is hard to quantify and/or is unknown to the user, the following formula can serve as a rough guide to determining tolerances:

For highly accurate data entry: $T = .5(M)^{1/2}$

For highly inaccurate data entry: $T = 1.5(M)^{1/2}$

where M = minimum polygon size in square miles.

Tolerances for selected minimum polygon sizes are listed in Table 3.

Table 3. Tolerances for distance analysis commands

| M = Minimum polygon size (sq. mi.) | | Recommended tolerance for accurately digitized data $T = .5\ (M)^{1/2}$ | Recommended tolerance for highly inaccurate data $T = 1.5\ (M)^{1/2}$ |
|---|---|---|---|
| 0.00156 sq. mi. | (1 acre) | .01976 miles | .05929 miles |
| 0.0156 sq. mi. | (10 acres) | .0625 miles | .1875 miles |
| 0.0625 sq. mi. | (40 acres) | .125 miles | .375 miles |
| 0.25 sq. mi. | (160 acres) | .250 miles | .75 miles |
| 1.00 sq. mi. | (640 acres) | .500 miles | 1.50 miles |
| 1.56 sq. mi. | (1000 acres) | .625 miles | 1.85 miles |
| 3.125 sq. mi. | (2000 acres) | .884 miles | 2.65 miles |
| 5.00 sq. mi. | (3200 acres) | 1.118 miles | 3.35 miles |

Ancillary to the MOSS software is a list of utility functions which allows the user to access several helpful utility routines. Although these routines are not germaine to the operation of MOSS or MAPS, they facilitate database construction and maintenance and will be of special interest to system managers. The utility routines available are presented as a menu of choices as shown below. A brief description of their function and operation follows.

To access the utility functions use the UTILITY command in MOSS or initiate the MOSS.UTIL macro from within any directory by specifying the complete directory pathname of the macro, for example;

```
) :IS:MOSS:MOSS.UTIL
```

The following menu is then presented:

```
ENTER MOSS UTILITY OPTION
  1  =  TERMINATE UTILITY SESSION
  2  =  DATABTEST   (MOSS MAP NAMES SUPPORT)
  3  =  ATTRIBUTE   (MOSS MULTIPLE ATTRIBUTE SUPPORT)
  4  =  APROJ       (MOSS MAP NAMES PROJECTION ASSIGNMENT)
  5  =  BROWZ       (MOSS MAP NAMES HEADER LISTING)
  6  =  ATTDESCRIBE (BUILD MULTIPLE ATTRIBUTE BATCH INPUT FILE)
  7  =  PLOT.LEGEND (BUILD CALCOMP LEGEND FILE)
  8  =  MAKE.LOGO   (BUILD CALCOMP LOGO FILE)
  9  =  COUNTITEMS  (COUNT NUMBER OF FEATURES IN MAP)
 10  =  DELETEITEM  (DELETE FEATURE FROM MAP)
 11  =  MODEL.EDIT  (CREATE AND MODIFY RASTER MODEL DEFINITION)
 12  =  SUBEDIT     (MAP SUBJECT EDIT PROGRAM)
 13  =  SET.LEVEL   (BUILD POLYCELL TRANSLATION FILE)
 14  =  TRANSFORM   (TRANSFORM COORDINATES TO A PROJECTION)
 15  =  QUAD        (MAKE A QUAD MAP IN IMPORT/EXPORT FORMAT)
 16  =  USGS DLG (ASCII) TO MOSS
 17  =  MAPIDX      (MAKE INDEX MAP OF PROJECT IN IMPORT/EXPORT FORMAT)
 18  =  SUB2AT      (SUBJECT TO MULTIPLE ATTRIBUTE INPUT)
```

Each option is described briefly as follows:

1 - TERMINATE UTILITY SESSION

This option allows the user to terminate the utility routine session and return to the operating system.

2 - DATABTEST

This option allows the user to look at, modify, or update a map names file (PROJECT file, see also OPEN command). This file may be a master project file or a work project (POLYGON) map names file. In order to access a master project file the user must have write access and must execute DATABTEST from within the directory containing the project file. The utility is used, for example, if a map from another installation is to be added to a master project. Reference to the map in the map names list is required to enable access to that map and DATABTEST provides a means of entering the map name into the project file.
The following is an example of use of DATABTEST:

```
? 1
 PLEASE ENTER THE PROJECT NAME

? POLYGON

     5 MAPS IN PROJECT
       1-FINISH 2-ADD 3-FIND 4-LIST 5-RENAME 6-DELETE 4

 NAME          BITS/STATUS TYPE HEAD ATTS ITRO COLS BYTE
 AGRMAP                2  1    7    2    2  219  169   32    0
 ASPWOLFRGC           16  1    8    3    0  279  215    0    0
 GRASSMAP              2  1    7    5    3  219  169   32    0
 TEST                  0  1    3   25    3    5    0    0    0
 TESTMAP               0  1    3   24    3    5    0    0    0

     5 MAPS IN PROJECT
       1-FINISH 2-ADD 3-FIND 4-LIST 5-RENAME 6-DELETE 6
 ENTER MAP NAME

? TEST

     4 MAPS IN PROJECT
       1-FINISH 2-ADD 3-FIND 4-LIST 5-RENAME 6-DELETE 2
 ENTER MAP NAME

? TEST
 TYPE IS     3  # OF ITEMS     5 # OF ATTS     3
 OK  MAP ADDED

     5 MAPS IN PROJECT
       1-FINISH 2-ADD 3-FIND 4-LIST 5-RENAME 6-DELETE 1
```

In this example, the user examines the map names list for his/her work project (POLYGON). There are five maps in the project. The LIST option provides information about each map as shown. The delete option is used to remove a map name (TEST) from the project and then the add option is used to replace it. The user may also search a project by map name (find option) or terminate DATABTEST (finish option). The rename option is not currently operational. Note that the delete option does not delete the map from disk, only the map name from the project file.

If several maps are on disk but no project file exists the DATABTEST ADD option can be used with a prepared input file. Use the operating system to build the list of map names (for AOS use F/S/CPL=30/L=ALIST), insert the name of the project at the beginning of the list, insert a 2 in front of the map names, and insert a 1 (for finish) at the end of the list. For cell maps, make a list of all +.HD files then remove the .HD with an editor. The prepared input file for example would look like:

```
POLYGON
2 MAPONE
2 MAPTWO
2 MAPTHREE
1
```

After the input file is built use the MOSS.BATCH macro to build the project file.

3 - ATTRIBUTE

This option provides a means of listing, modifying, and updating the multiple attribute file (.AT file) of a MOSS map. The following is an example of use of ATTRIBUTE:

```
? 2
 PLEASE ENTER NAME OF MAP ? TEST

 THE NUMBER OF ATTRIBUTES IS    3
 THE NUMBER OF FEATURES IS      5
 THE START LOCATION IS        203

 PLEASE ENTER DESIRED OPTION

  SEARCH AN ATTRIBUTE FIELD   = 1
  ADD A NEW ATTRIBUTE         = 2
  UPDATE AN EXISTING ATTRIBUTE= 3
  LIST AN ATTRIBUTE FIELD     = 4
  DELETE THE ATTRIBUTE FILE   = 5
  RESEQUENCE INPUT FILE       = 6
  EXIT THE ATTRIBUTE PROGRAM  = 7
```

In this example, the user desires information on the multiple attribute file of a map called TEST. This map contains five features with three secondary attributes per feature. The user may: 1-browse the attribute field by attribute ID or key word, 2-add new multiple attributes in batch or interactively, 3-modify existing attributes, 4-list the attribute field by attribute ID or key word, 5-delete the attribute file, 6-resequence the attribute file, or 7-terminate the ATTRIBUTE routine. Examples of use of options 2 and 4 are shown under the ATTDESCRIBE option (#6).

For examples of adding new attributes, see UTILITY 6, ATTDESCRIBE. The resequence option can be done by specifying option 2 first with a -1 parameter and then selecting option 6. However, the subjects must be numeric.

4 - APROJ

This option allows the user to assign a map projection type to all maps within a project. The following is an example of use of APROJ:

```
? 3
 ASSIGNS A PROJECTION TO ALL MAPS IN THE PROJECT.
 PLEASE ENTER THE PROJECT NAME

? POLYGON
```

At this point the map projection menu is presented (see PROJECTION command). The user choses the desired projection type to be assigned to the maps in the project and answers the prompts for definition of the projection.

5 - BROWZ

This option allows the user to generate a text file containing information on all maps listed by name in a .DT file. The output file is named after the project which was browsed and ends in .BL. The following is an example of use of BROWZ:

```
? 4
 PLEASE ENTER THE PROJECT NAME

? POLYGON

     6 MAPS TO BROWZ LIST TO FILE POLYGON.BL
 TOTAL NUMBER OF MAPS     6
```

In this example the user requests map header information on the maps listed in the polygon project. There are six map names in the project and the header information is written to a file called POLYGON.BL. The user may exit the MOSS utility routine, re-enter the operating system, and print the output file, for example:

```
) TY POLYGON.BL
 DEERCELL          6  219   MDR AT 1 ACRE
 DEERLION          8  219   MDR AT 1 ACRE
 LIONCELL          6  219   MLR AT 1 ACRE
 NEWMVMAP          8  219   MDR AT 1 ACRE
 NEWSVMAP          6  219   MLR AT 1 ACRE
 SLPWOLFRG         6  279   METERS OF ELEVATION FOR WOLF RIDGE FROM IDIMS

)
```

Information which is shown consists of map name, map type, number of features for vector maps or number of columns for cell maps, and map description.

6 - ATTDESCRIBE

This option allows the user to build a multiple attribute batch input file. This file may then be used with the ATTRIBUTE option (#3) to add up to 200 multiple attributes to a MOSS map, thus creating a .AT file. Prior to use of this option the user must prepare a data input file. This file must be in a fixed field matrix format with rows of features and columns of attributes. Integers must be right-justified and alphanumeric strings must be left-justified. Note that the order of features in the matrix must correspond to the same order of occurrence of the features in the MOSS map. For example, suppose a MOSS map has five polygons and three multiple attributes are to be assigned to each polygon. The data input file (called "MATRIX" in this example) might look as follows:

```
)TY MATRIX
20 0.9 1.6
17 0.8 1.7
22 0.9 1.5
20 0.8 1.7
12 0.6 2.0

)
```

Once the input matrix is complete, the ATTDESCRIBE option may be used to define the matrix format and associate the map data with a particular attribute and feature from the matrix. The following is an example of use of ATTDESCRIBE:

```
? 5
                    *** ATTRIBUTE DESCRIPTION PROGRAM ***

WHAT DO YOU WISH TO CALL THE DEFINITION FILE
________________________________________
MULTATTFILE
IS THIS OK? (Y OR N) Y

HOW MANY ATTRIBUTE KEYS DO YOU HAVE (1-200) 3
IS THIS OK? (Y OR N) Y

PROVIDE A TEN CHARACTER DECRIPTION FOR 'KEY'       1
__________
DENSITY
IS THIS OK? (Y OR N) Y

PROVIDE A 60 CHARACTER DESCRIPTION OF THIS KEY
____________________________________________________________
DEER DENSITY / 100 HA
IS THIS OK? (Y OR N) Y

IS THE VALUE OF THE ATTRIBUTE KEY
  1 - INTEGER
  2 - FLOATING POINT
  3 - CHARACTER

SELECT: 2
IS THIS OK? (Y OR N) Y
```

```
WHAT IS THE ACTUAL FIELD LENGTH OF THIS KEY VALUE? 3
IS THIS OK? (Y OR N) Y

HOW MANY DIGITS TO THE RIGHT OF THE DECIMAL POINT? 1
IS THIS OK? (Y OR N) Y

PROVIDE A TEN CHARACTER DECRIPTION FOR 'KEY'       2

__________
BUCK:DOE
IS THIS OK? (Y OR N) Y

PROVIDE A 60 CHARACTER DESCRIPTION OF THIS KEY

____________________________________________________________
BUCK TO DOE RATIO
IS THIS OK? (Y OR N) Y

IS THE VALUE OF THE ATTRIBUTE KEY
  1 - INTEGER
  2 - FLOATING POINT
  3 - CHARACTER

SELECT: 2
IS THIS OK? (Y OR N) Y

WHAT IS THE ACTUAL FIELD LENGTH OF THIS KEY VALUE? 3
IS THIS OK? (Y OR N) Y

HOW MANY DIGITS TO THE RIGHT OF THE DECIMAL POINT? 1
IS THIS OK? (Y OR N) Y

PROVIDE A TEN CHARACTER DECRIPTION FOR 'KEY'       3

__________
FAWN:DOE
IS THIS OK? (Y OR N) Y

PROVIDE A 60 CHARACTER DESCRIPTION OF THIS KEY

____________________________________________________________
FAWN TO DOE RATIO
IS THIS OK? (Y OR N) Y

IS THE VALUE OF THE ATTRIBUTE KEY
  1 - INTEGER
  2 - FLOATING POINT
  3 - CHARACTER

SELECT: 2
IS THIS OK? (Y OR N) Y

WHAT IS THE ACTUAL FIELD LENGTH OF THIS KEY VALUE? 3
IS THIS OK? (Y OR N) Y

HOW MANY DIGITS TO THE RIGHT OF THE DECIMAL POINT? 1
IS THIS OK? (Y OR N) Y
```

DO YOU WISH TO GO DIRECTLY TO THE "ADD" ATTRIBUTE PROGRAM
(Y OR N)? Y

In this example, the user defines the data input file called MATRIX. The definition file will be called MULTATTFILE. Three multiple attributes will be defined for each map feature: a deer density attribute, a buck:doe ratio attribute, and a fawn:doe ratio attribute. Each attribute is a 3 character long floating point number with 1 digit to the right of the decimal point. At this point the user may go directly to the ATTRIBUTE option (#3) or may terminate the ATTDESCRIBE option. In this example, the user wishes to add the multiple attribute data (consisting of both the data input file and the matrix definition file) to the MOSS map, thus building the .AT file, as follows:

```
 PLEASE ENTER NAME OF MAP ? TESTMAP

 THE NUMBER OF ATTRIBUTES IS      0
 THE NUMBER OF FEATURES IS        5
 THE START LOCATION IS          203

 PLEASE ENTER DESIRED OPTION

  SEARCH AN ATTRIBUTE FIELD    = 1
  ADD A NEW ATTRIBUTE          = 2
  UPDATE AN EXISTING ATTRIBUTE= 3
  LIST AN ATTRIBUTE FIELD      = 4
  DELETE THE ATTRIBUTE FILE    = 5
  RESEQUENCE INPUT FILE        = 6
  EXIT THE ATTRIBUTE PROGRAM   = 7

? 2
 IS THIS A MULTI VARIABLE BATCH ADD (Y OR N) ? ? Y
 PLEASE ENTER THE NAME OF THE INPUT DATA FILE MATRIX
 PLEASE ENTER THE NAME OF THE ATTRIBUTE DEFINITION FILE MULTATTFILE

 THE NUMBER OF ATTRIBUTES IS      3
 THE NUMBER OF FEATURES IS        5
 THE START LOCATION IS          206

 PLEASE ENTER DESIRED OPTION

  SEARCH AN ATTRIBUTE FIELD    = 1
  ADD A NEW ATTRIBUTE          = 2
  UPDATE AN EXISTING ATTRIBUTE= 3
  LIST AN ATTRIBUTE FIELD      = 4
  DELETE THE ATTRIBUTE FILE    = 5
  RESEQUENCE INPUT FILE        = 6
  EXIT THE ATTRIBUTE PROGRAM   = 7
```

In this example, the user has built the .AT file for the map TESTMAP, and now wishes to browse the database as follows:

```
? 4

     ID      DATA TYPE      KEY            DESCRIPTOR
___________________________________________________________________
      1      REAL           DENSITY        DEER DENSITY / 100 HA
      2      REAL           BUCK:DOE       BUCK TO DOE RATIO
      3      REAL           FAWN:DOE       FAWN TO DOE RATIO
___________________________________________________________________
 PLEASE ENTER OPTION:
  1 = LIST INDIVIDUAL ATTRIBUTE BASED ON KEY
  2 = LIST INDIVIDUAL ATTRIBUTE BASED ON I.D.
  3 = LIST ATTRIBUTE HEADER INFORMATION
  4 = TERMINATE ATTRIBUTE BROWSE

? 1

 PLEASE TYPE IN THE ATTRIBUTE KEY OF INTEREST
? DENSITY

 ATTRIBUTE LIST
___________________________________________________________________
 ID =        1
___________________________________________________________________
 KEY = DENSITY
___________________________________________________________________
 THE DESCRIPTOR =
 DEER DENSITY / 100 HA
___________________________________________________________________
  THE DATA TYPE IS REAL
___________________________________________________________________
 ENTER 1 FOR OBTAINING ALL ITEMS
 ENTER 2 FOR BOUNDED SEARCH
? 1
 FEATURE I.D.      1 HAS VALUE       20.000000
 FEATURE I.D.      2 HAS VALUE       17.000000
 FEATURE I.D.      3 HAS VALUE       22.000000
 FEATURE I.D.      4 HAS VALUE       20.000000
 FEATURE I.D.      5 HAS VALUE       12.000000
 PLEASE ENTER OPTION:
  1 = LIST INDIVIDUAL ATTRIBUTE BASED ON KEY
  2 = LIST INDIVIDUAL ATTRIBUTE BASED ON I.D.
  3 = LIST ATTRIBUTE HEADER INFORMATION
  4 = TERMINATE ATTRIBUTE BROWSE

? 4

 THE NUMBER OF ATTRIBUTES IS      3
 THE NUMBER OF FEATURES IS        5
 THE START LOCATION IS          206
```

```
PLEASE ENTER DESIRED OPTION

  SEARCH AN ATTRIBUTE FIELD    = 1
  ADD A NEW ATTRIBUTE          = 2
  UPDATE AN EXISTING ATTRIBUTE= 3
  LIST AN ATTRIBUTE FIELD      = 4
  DELETE THE ATTRIBUTE FILE    = 5
  RESEQUENCE INPUT FILE        = 6
  EXIT THE ATTRIBUTE PROGRAM   = 7

? 7

STOP
```

In this example, the user browsed the multiple attribute file for all items based on key word and then terminated the ATTRIBUTE option (#3)

7 - PLOT.LEGEND

This option allows the user to create a file for input to the legend option of the CALCOMP command. This file contains information to plot a map legend. Using this routine the user may create and position desired symbols/fonts and explanatory text. The following is an example of use of the PLOT.LEGEND option:

```
? 7
 PLEASE ENTER NAME OF LEGEND FILE ? LEGFILE
 GRID SIZE =    20        40
 ENTER LEGEND COMMAND ? HELP
     PLOT.LEGEND COMMAND
       REDRAW - REDRAW LEGEND FILE
       ZOOM   - ZOOM IN ON PLOTTED LEGEND
       CREATE - ADD NEW LABELS
       EDIT   - CHANGE EXISTING LABEL(S)
       HELP   - HELP
       BYE    - TERMINATE PLOT.LEGEND UTILITY

 ENTER LEGEND COMMAND ? CREATE
  POINT TO LOCATION FOR LEGEND ENTRY (HIT T KEY TO STOP)
  PLEASE ENTER DATA TYPE (POINT, LINE, POLY, RAST)
```

In this example, the user will create a file called LEGFILE. A legend grid is displayed and the user is prompted for one of six legend commands. To create a legend entry the user must point to the desired location of the entry on the legend grid and specify what type of entry it will be. Entries may be point symbols, line fonts, shaded rectangles, or clear rectangles. Depending on the entry type chosen , the user will be further prompted for font numbers, pen color, rotation and hatching of shading, and entry description.

8 - MAKE.LOGO

This option allows the user to create a file for input to the logo option of the CALCOMP command. This file contains a unit square import/export format map created from an active map I.D. in MOSS. Typically, these maps will be digitized agency/organization logos which will be plotted on maps for enhanced map display and presentation. The following is an example of use of the MAKE.LOGO option:

```
? 8
 ENTER ACTIVE DATA SET I.D. TO EXPORT
? 1
 NUMBER OF DATA ITEMS TO BE EXPORTED =      5
 EXECUTING.  PLEASE WAIT . . .
```

In this example, a file called "EXPORT" is created which contains active map I.D. 1 in unit square import/export format. Note that this utility routine functions similarly to the EXPORT command except that the EXPORT file created is unit square. As usual, the EXPORT file created should be renamed since re-use of the MAKE.LOGO deletes existing EXPORT files.

9 - COUNTITEMS

This option allows the user to determine the number of items in a map. The following is an example of use of the COUNTITEMS option:

```
? 9
 NAME OF MAP TO COUNT ITEMS ON ? STREAMS
 FOR MAP STREAMS
 THERE ARE    94 ITEMS
 THE LAST ITEM IS ON RECORD   299
```

This can also be done in MOSS by using the command, LIST (mapname) HE.

10 - DELETEITEM

This option allows the user to delete a specific feature from a map. Note that if more than one item is to be deleted, they must be deleted from the highest item number to lowest. The following is an example of use of the DELETEITEMS option:

```
? 10
 ENTER MAP NAME
? STREAMS
 PLEASE ENTER NAME OF .DT FILE (VECTOR DATA ONLY)
? POLYGON.DT
 ENTER NUMBER OF ITEM TO DELETE 26
```

In this example the user deletes item number 26 from the map STREAMS in the work project POLYGON.DT.

It has been reported that this command corrupts the maps. As an alternative, the map can be selected by item using the not (\) option and then saving the resulting map.

11 - MODEL.EDIT

This option allows the user to list, edit, create, and validate a raster model definition file for use as input to the MODELG command. The following is an example of use of the MODEL.EDIT option:

```
? 11

  CARTOGRAPHIC MODEL EDITOR (REV 1.0)

 Please enter name of model file
? MODELFILE
 MODEL MODELFILE DOES NOT EXIST
Do you wish to create this model (Y or N)
? Y

 Please enter 72 character or less model description

? THIS IS A RASTER MODEL DEFINITION FILE

 Please enter Model Edit command ? HELP

 The following are the MODEL.EDIT commands
    LIST   = List contents of the model file
    EDIT   = Edit content of the model file
    CREATE = Create new model file
    INTE   = Model validation
    HELP   = Print out help messages
    BYE    = Terminate program

 Please enter Model Edit command ? CREATE

 Model Creation

 First, we are going to enter the criteria
 (Remember to terminate criteria with ENDMODEL keyword)

 Please enter criteria (72 chars or less per line)

?
```

In this example the user creates a new model definition file called MODELFILE and lists out the model edit commands which are available. Model format is detailed in the MODELG command (Appendix C).

12 - SUBEDIT

This option allows the user to edit the primary subjects in a map. The following is an example of use of the SUBEDIT option:

```
? 12
ENTER NAME OF MAP TO EDIT
TESTMAP

1 = FINISH
2 = CHANGE BY SUBJECT STRING
3 = CHANGE BY SUBJECT NUMBER
4 = LIST SUBJECTS

SELECT ONE OF THE ABOVE 2
ENTER SEARCH STRING
++++++++++++++++++++++++++++++
MULE DEER SUMMER RANGE
 MATCH FOUND - ENTER REPLACEMENT STRING
++++++++++++++++++++++++++++++
MULE DEER HIKING TRAILS
     MULE DEER HIKING TRAILS
ENTER 1 TO UPDATE SUBJECT STRING,  2 TO LEAVE UNCHANGED 1

1 = FINISH
2 = CHANGE BY SUBJECT STRING
3 = CHANGE BY SUBJECT NUMBER
4 = LIST SUBJECTS

SELECT ONE OF THE ABOVE 1
```

In this example, the user changes the subject by specifying the subject to be changed. The menu also offers the user the opportunity to change subject by specifying the subject number. The fourth option enables the user to obtain a listing of all the subjects. The subject string is limited to 30 characters.

Note, an all blank subject will cause problems with many of the analysis commands.

13 - SET.LEVEL

This option allows the user to create, edit, and list a polycell translation file for input to the user-recode option of the POLYCELL command (Appendix C). This option allows the user to assign cell values to subjects in a map which is to be rasterized. Alternatively, cell values may be edited in a map which is already in cell format. The following is an example of use of the SET.LEVEL option:

```
? 13

 Please enter name of POLYCELL translation file ? CELLTRANS

 Creating new POLYCELL translation file CELLTRANS

 Enter command ? HELP

 Valid commands are:

    HELP   - Obtain help for commands
    CREA   - Create a new POLYCELL translation file
    EDIT   - Edit an existing POLYCELL translation file
    LIST   - List contents of translation file
    BYE    - Terminate session

 Enter command ? CREA
 Do you wish to use an existing MOSS map for template ? Y
 Please enter full pathname to MOSS map ? :UDD:JOHN:MOSS:TESTMAP

 We are now going to enter the translation codes

 Enter code for subject MULE DEER SUMMER RANGE         ? 30
 Enter code for subject MULE DEER WINT CONC/WINT RANGE? 45
 Enter code for subject MULE DEER WINTER RANGE         ? 32
 Enter command ? BYE
```

In this example the user creates a new polycell translation file called CELLTRANS. This file will assign cell values to the subjects in the map TESTMAP when it is rasterized using the POLYCELL command user-recode option.

14 - TRANSFORM

This option allows the user to calculate values of coordinate pairs for different map projections. The user defines two projections and may then translate a coordinate pair between either of these projections or the geographic coordinate system. The following is an example of use of the TRANSFORM option:

```
? 14
 ENTER VALUES FOR THE FIRST PROJECTION...# 1
 PROJECTION(0-20) ?
4
 (Note: at this point the user must define the projection parameters)

 ENTER VALUES FOR THE FIRST PROJECTION...# 2
 PROJECTION(0-20) ?
1
 (Note: at this point the user must define the projection parameters)

 ENTER  0 - STOP
        1 - FOR NEW POINT
        2 - TO REDEFINE PROJECTIONS
        3 - TO VIEW DEFINED PROJECTIONS

 SELECT: 1

 SOURCE(0,1,2) 1
 DESTINATION(0,1,2) 2

 ENTER METERS OF EASTING, NORTHING

 EASTING ? 5048066.0
 NORTHING ? 436925.0

 RESULT        71985.802883342       4423666.25783134

 ENTER  0 - STOP
        1 - FOR NEW POINT
        2 - TO REDEFINE PROJECTIONS
        3 - TO VIEW DEFINED PROJECTIONS

 SELECT: 0
```

In this example the user has defined projection #1 as Lambert Conformal Conic and projection #2 as UTM (see PROJECTION command). The coordinate pair is entered with a Lambert source value and transformed into a UTM destination value. Note that source and destination projection #0 is Geographic and does not need to be defined. Thus, coordinate pairs may be transformed in the following manner:

```
#0 (Geographic)  --->  #1 (User-defined)
#0               --->  #2 (User-defined)
#1               --->  #0
#1               --->  #2
#2               --->  #0
#2               --->  #1
```

15 - QUAD

This option allows the user to create a polygon map for a specified window and grid/geounit size in import/export format. This map file, which is called MAPFILE, may then be added to the MOSS database using the ADD command. The following is an example of use of the QUAD option:

```
? 15
 THIS CREATES AN ADDWAMS MAP ON FILE 'MAPFILE'
 FOR A SPECIFIED WINDOW AND GEOUNIT SIZE

 ENTER LATITUDE SIZE FOR GEOUNIT
0,7,30
 ENTER LONGITUDE SIZE FOR GEOUNIT
0,7,30

 GEOUNIT SIZE IS     0.    7. 30. LATITUDE, BY    0.    7. 30. LONGITUDE

DO YOU WISH TO RE-ENTER(Y) ?
N

 ENTER SOUTH BOUNDING LATITUDE
38
 ENTER NORTH BOUNDING LATITUDE
42
 ENTER EAST BOUNDING LONGITUDE
-106
 ENTER WEST BOUNDING LONGITUDE
-110

 SOUTH BOUND   38   0   0
 NORTH BOUND   42   0   0
 EAST  BOUND -106   0   0
 WEST  BOUND -110   0   0

DO YOU WISH TO RE-ENTER(Y) ?
N

 PLEASE ENTER THE VALUES TO DEFINE THE OUTPUT PROJECTION

 PROJECTION(0-20) ?
```

In this example the user creates a map of 7.5 min quadrangles over an area 4 degrees longitude by 4 degrees latitude in the western United States. This map may then be projected according to one of twenty map projections available (see PROJECTION command).

## 16 - USGS DLG (ASCII) TO MOSS

This option allows the user to transform a USGS DLG3 ASCII modified file into a MOSS import/export format file. The new file may then be added into MOSS as a new map using the ADD command. A DLG file is an arc/node (A/N) format digital line graph. These files consist of maps of several base themes "sandwiched" together in layers. Themes available include public land survey (PLS), boundaries (state, county, jurisdiction), cultural, hydro, and transportation. As such, data may be point, line, or polygon. Note that only DLG's which are in DLG3 ASCII modified format may be used. These files consist of topologically formed polygons whereby segment numbers are associated with their respective polygons. The following is an example of use of the USGS DLG TO MOSS option:

```
? 16

***READS USGS DLG EXPERIMENTAL FORMAT A/N FILES***
 PLEASE ENTER THE INPUT FILE NAME
DLGFILE
 PROCESS THIS FILE (Y OR N)?
Y
 PROJECTION OF THE INPUT DATA IS:
 PROJECTION(0-20) ?
(at this point key a return or redefine the input projection parameters)

 PLEASE CHOOSE DESIRED OUTPUT PROJECTION.
 PROJECTION (0-20) ?
(at this point the output projection parameters must be defined)

 IS THIS OUTPUT PROJECTION OK (Y OR N)?
Y
 TOTAL OVERLAYS 5
 PROCESS OVERLAY 1 (Y OR N)?
Y

 CONVERSION MENU
 1.. FINISH
 2.. POINT   DATA
 3.. LINE    DATA
 4.  POLYGON DATA

4

 NAME THE OUTPUT FILE?
DLGOUT

INCLUDE POLYGONS WITH NULL ATTRIBUTES (Y OR N)? NO
 PRESS RETURN KEY TO CONTINUE
```

In this example, the user transforms a USGS DLG 3 ASCII modified file called "DLGFILE" into a MOSS import/export file. After verifying that the correct file is to be processed, the user defines the input and output map projections. The total number of data theme layers is then presented and the user is given the option of processing layer 1. If N(o) is entered, the user is given the option of processing layer 2, etc... If a layer is to be processed, a menu of data types is presented. Upon choosing the correct data type, the user is asked to name the output file (called "DLGOUT" in this example). After processing, the data type conversion menu is re-presented. The user may then extract a different data type from the layer being processed or may enter FINISH and be returned to the PROCESS OVERLAY prompt where another layer may be chosen.

17 - MAPIDX

This option allows the user to generate an import/export text file that contains polygons defined by the minimum bounding rectangle of each map in a project. This import/export file can then be used with the ADD command to produce a map showing the coverage in the project. The subject of each polygon is the map name with the map type followed by a period followed by the the number of items of a vector map or rows of a cell map. For example:
MDRWOLFRG 3.5
The output file is named after the PROJECT which was indexed and ends in .MI. The following is an example of the use of MAPIDX:

```
? 17
 PLEASE ENTER THE PROJECT NAME

? POLYGON

     6 MAPS TO MAP INDEX TO FILE POLYGON.MI
 TOTAL NUMBER OF MAPS     6
```



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18 - SUB2AT

This option allows the user to generate a multiple attribute input and attribute batch input description file from the list of primary subjects in an existing vector map. The existing subjects can have several imbedded attributes separted by some delimiter or be in column format in a fixed number of positions. After the SUB2AT option is performed the ATTRIBUTE option (#3) is used to add the multiple attributes to the map and create the multiple attributes file. The following is an example of use of the SUB2AT option:

```
? 18

    MOSS SUBJECT TO ATTRIBUTE INPUT REFORMATTER

 Please enter the name of the desired MOSS map',

? MOSSMAP
 What do you wish to call the attribute input file?

? MMATIN


 We are now going to ask for the translation information
 How many attribute fields are contained in the subject?
? 2

 Enter information for field     1
 Please enter a key

? FIELD1
 Please enter a description
? THIS IS FIELD ONE
 Enter 1 for integer, 2 for real, or 3 for character
? 1
 Please enter delimiter for field OR a negative number
 if number of characters is being specified
? -5

 Enter information for field     2
 Please enter a key

? FIELD2
 Please enter a description
? THIS IS FIELD TWO
 Enter 1 for integer, 2 for real, or 3 for character
? 3
 Please enter delimiter for field OR a negative number
 if number of characters is being specified
? _


 THE RECORD LENGTH OF THE ATTRIBUTE INPUT FILE IS   20
 THE NAME OF THE BATCH ADD DEFINITION FILE IS MMATIN.AD
```