KANSAS GEOLOGICAL SURVEY
OPEN-FILE REPORT 88-45d

Digitizing & Operations with GIMMAP

by

Jorgina A. Ross
Charles G. Ross

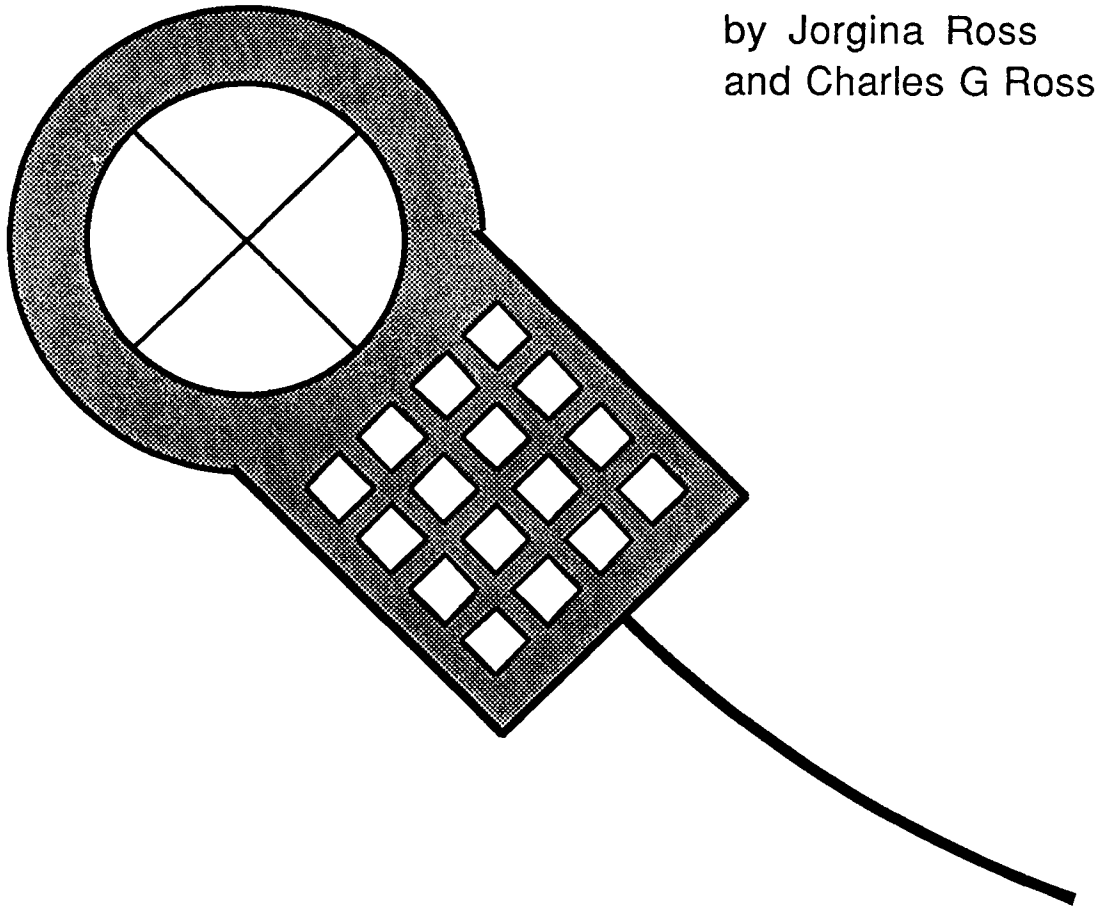
Disclaimer

The Kansas Geological Survey does not guarantee this document to be free from errors or inaccuracies and disclaims any responsibility or liability for interpretations based on data used in the production of this document or decisions based thereon. This report is intended to make results of research available at the earliest possible data, but is not intended to constitute final or formal publications.

KANSAS GEOLOGICAL SURVEY
1930 Constant Avenue
University of Kansas
Lawrence, KS 66047

Digitizing Operations with GIMMAP

by Jorgina Ross
and Charles G Ross



KANSAS GEOLOGICAL SURVEY

The GIMMAP Digitizing Manual

by

Jorgina Ross
Charles G. Ross

May, 1988

The Kansas Geological Survey

Lawrence, Kansas

ACKNOWLEDGEMENTS

Some portions of this manual were taken from the KGS Digitizers Manual written (approx. 1983) by Joseph Brentano.

Written and graphic contributions by digitizer operators Weng Wong, Wirote Tessali, and Michael Wong were most valuable to the construction of this manual.

MAPDIG, the digitizing program for GIMMAP, was written by Richard L. Brownrigg and Charles G. Ross. It is the software behind digitizing and this manual, that has served the needs of automated cartography well.

Without the interest of Director Lee Gerhard, and his willingness to allocate time and to prioritize documentation this manual could not have been completed.

CONTENT

INTRODUCTION

This manual is intended to introduce the discipline of map digitizing in the style of the GIMMAP (Geodata Interactive Management, Map-Analysis and Production) system, an automated cartography system developed at the Kansas Geological Survey. **Digitizing** is defined as the conversion of data from its initial graphical form into digital or computer form. In map digitizing, this means conversion of map features represented by point and line symbols to (X,Y) coordinate pairs (locations) in electronic, numerical or digital computer form. In the case of GIMMAP, the map features being converted into digital form are selected from input documents, often the 7.5′ quadrangle maps published by U.S. Geological Survey. The digital data is then stored in a cartographic database and can be retrieved, displayed and updated quickly. Thus, precise digitizing of map data is the first and possibly the most important step in the production of maps at the Kansas Geological Survey.

OVERVIEW OF GIMMAP

GIMMAP is a system of computer programs and databases developed at the Kansas Geological Survey (from initial concepts of Visiting Research Scientist Tho Trang Cao) by systems analyst Charles G. Ross. The major goal in development of GIMMAP was to produce, manage and manipulate cartographic databases covering the state of Kansas and to use these databases to provide cartographic production facilities. Among the other functions and capabilities of GIMMAP are (1) accurate data capture or transfer from paper document to computer usable form (digitizing), (2) construction of topologically-structured cartographic databases, (3) interactive graphical editing, (4) selective retrieval of map information based on location and feature type, (5) collation of a group of separate, but adjoining maps to form one map, (6) storage and retrieval of large quantities of map data.

GIMMAP has been used to produce many different types of maps for the staff of the KGS and for other agencies in the State. These range from published color maps (eg., The Oil and Gas Fields of Kansas map, and the Aeromagnetic Map of Kansas) to maps of base information for internal research.

HARDWARE OVERVIEW

The digitizing hardware consists of two Altek tables each with the following equipment or features: 16-button cursor, Data General D200 terminals, ALTEK Datatab Controllers and VEN-TEL interface to the Data General MV20000 computer.

The working surface of each table has a grid of fine closely-spaced wires embedded in it. Points are selected when the cursor button is pressed, generating a magnetic pulse which activates currents in the grid. The table surface is only sensitive to the cursor pulses within a rectangle which is 3" inside the frame of the table. Therefore, when maps are taped to the table care must be taken so that all of the map lies within this rectangle.

The cursor is the small rectangular piece of plastic connected to the table with a rubber coated wire. There are 16 buttons at the top of the cursor, some with their own special functions. There is also a circular piece of glass with cross-hairs in the center. The crossing point of the cross-hairs identifies the point to be digitized. Once the cursor has been aligned with the desired map feature, one of the cursor buttons is pressed causing the cursor to generate a magnetic pulse which is sensed in the table at the location beneath the intersection of the cross-hairs. This magnetic pulse generates an electric current in the wire grid inside the table, and an X,Y coordinate pair is calculated (actually located, as having the strongest induced electric current) and is transferred to the MV20000 computer. A point has then been digitized.

PRE-DIGITIZING MAP PREPARATION
(when using 7.5′ USGS quadrangle maps as input documents)

Before digitizing a map there are several steps which should be taken to help increase efficiency and reduce errors. The Kansas Index Map of the 7.5′ USGS quadrangle maps is covered with a grid of 26 rows and 61 columns. This is the grid of all the 7.5′ quadrangle maps of Kansas. Numbering the rows from south (1) to north (26) and the columns from west (1) to east (61), a unique pair of these numbers can be associated with each quadrangle. For example, The Lawrence East quadrangle (USGS 7.5′ quadrangle map) is at the intersection of row #17 and column #56.

The name of a quadrangle map may be found on the upper right hand corner of the map sheet. Write the row and column numbers above the name of the map. Next, determine the counties which appear on the map. The Lawrence East map contains parts of two counties, Douglas and Leavenworth. In the GIMMAP system this quadrangle will be viewed as two separate maps called "county patches". A county patch can be defined as the intersection of a county with a quadrangle map or as the portion of a county found in a quadrangle map. There are two separate county patches contained in the Lawrence East quadrangle. Each county patch has its own unique base name. There are four parts to each base name:

a. Two-letter County abbreviation (See County Codes in Appendix)
   DG, for Douglas county
   LV, for Leavenworth county

b. The row # from the Kansas Index grid (See Kansas Index grid in Appendix)
   17, for the Lawrence East quadrangle

c. The column # from the Kansas Index grid
   56, for the Lawrence East quadrangle

d. One-letter code designating the map layer or type of information
   B, for base map information
   G, for geology
   T, for topography

For the Lawrence East Quadrangle the two base names for base map information are:

DG1756B	for Douglas County
LV1756B	for Leavenworth County

The next step is to find the projection type and the map scale. The projection type is found in a paragraph located below the southwest corner of the map. All quadrangles in Kansas are either Modified Polyconic or Lambert Conformal Conic projections (except for a very few Transverse Mecator projection on the eastern border). The Lawrence East quadrangle is projected using the Modified Polyconic projection. The map scale is found above the bar scales. The scale of this map and of nearly all existing quadrangle maps is 1:24,000. However, this should always be checked because the USGS is gradually switching to a scale of 1:25,000.

The final step in pre-digitizing map preparation involves recognizing and marking NODES, recognizing and planning to digitize groups of features by FEATURE TYPES, and preparing to enter appropriate FEATURE CODES for all features to be digitized.

Nodes are locations where lines intersect with lines of the same type, where they cross the map boundary, and where they terminate within the map. Nodes are also where single point (isolated point) features such as section corners (see the Legal System in Appendix), city centers, and wells are located.

Nodes require digitization with a special cursor button and may be circled in the pre-digitizing preparation to remind the operator to digitize them in the proper way. In GIMMAP, only lines of like type intersect in nodes. (See rules for node recognition).

Feature codes are (four digit) numbers assigned to identify the different feature types (road, river...). Isolated point feature codes are from 1000 to 1999, line feature codes are from 2000 to 9999. (See list of feature codes in the appendix)

GIMMAP DIGITIZING SYNTAX

The syntax of a system is the structure of rules of operation within that system. Before discussing the GIMMAP digitizing syntax, several definitions will be given.

1. MAP HEADER

The map header may contain any desired information. It is the first record (line) of every GIMMAP digitized data format (DDF) file and normally contains the following:

a. Basename (see No. 3 below)
b. Session number, where the number indicates the number of digitizing sessions completed on the area to date
c. Operator's initials
d. Projection type, from the lower left corner of the USGS 7.5' map (LC= Lambert Conformal Conic, MP= Modified Polyconic)
d. Scale factor, found at the bottom of the USGS 7.5' map (if the scale is 1:24000, the scale factor is 24000)
e. Map edition year, found in the lower right corner of the USGS 7.5' map (this is the year published, photorevised or photoinspected)

2. CONTROL POINTS

The control points for the map are 5 pairs of X,Y coordinates which locate (in digitizer coordinates) the four corners of the map (or of a bounding rectangle) in counter-clockwise order beginning and ending with the southwest corner. The five records each contains one pair (in the order SW,SE,NE,NW,SW) and follow the map header in the DDF file.

3. BASE NAME

The base name is the root name which all files associated with the map use. The base name is a unique name given to each county patch. This name consists of 4 distinct parts:

a. The unique two-letter county abbreviation for the county containing the patch (see appendix)
b. Row # for the map containing the county patch from the GIMMAP grid imposed on the Kansas Index Map

c. Column # for the map containing the county patch from the GIMMAP grid imposed on the Kansas Index Map
d. One letter indicating type of feature content, the map "layer"

4. MAP LAYER

The map layer is part of the base name and describes what type of information is being digitized. B is used for base information (usually legal, transportation,etc.), G for geology, H for hydrology, and T for topography.

5. PROJECTION TYPE

The projection type describes the mathematical formulas which were used to represent a curved surface (the earth) on a flat piece of paper (the map). There are two projection types that are available to produced quadrangle maps in Kansas:

a. Lambert Conformal Conic
b. Modified Polyconic

A very few maps on the Missouri border use the Transverse Mecator Projection.

6. FEATURE CODE

The feature code is a four-digit number which uniquely identifies and separates groups of map features by types. Features are divided into types by codes:

Isolated Points	1000 - 1999
Linear Arcs	2000 - 3999
Areal boundaries	4000 - 4299
Unassigned	4400 - 9999

A list of feature codes is given in the appendix.

7. FEATURE CODE HEADER

A feature code header is a special X,Y coordinate pair in a DDF file where the X-value contains the feature code of the map feature that is to be digitized next. The Y-value equals zero. When the system is reading from the digitizing table, a feature code header is entered into a digitized file by pressing a special function cursor button which has been programmed to enter the desired feature code. If the desired feature code has not been programmed for one of the cursor buttons, system control

must be transferred to the keyboard by pressing button #0. The feature code may then be entered at the keyboard when prompted by the system.

GIMMAP has the capability to store up to seven (7) z-values associated with isolated point type arcs. To utilize this capability the isolated point arc feature code must be entered from the keyboard, followed immediately by an argument which specifies the number of z values assigned to each point. This can not be done using the programmed cursor buttons (see SPECIAL GIMMAP DIGITIZING RULES).

8. DISCONTINUITY FLAG

A discontinuity flag marks the end of one arc and the beginning of a second unconnected arc. It is an X,Y coordinate pair where both X and Y are negative. This flag signals that two consecutively digitized features have the same feature code but are not connected. An example would be two range lines within the same quadrangle map. After digitizing one of them, a discontinuity flag is entered and the next one is then digitized without re-entering the feature code header. Pressing button #1 on the cursor enters a disconyinuity flag in the DDF file.

9. FEATURE CODE HEADER FLAG

The feature code header flag consists of two consecutive X,Y coordinate pairs in which both X and Y are negative values. This flag comes at the end of feature data and signals that the next record (line) will be a new feature code header or that this is the end of the file. Button #1 on the cursor produces a record with X and Y values equal to -1.0. Pressing this button twice creates a feature code header flag in the DDF file. This is followed by a new feature code header, or by termination of the session. To terminate the session, press button #0 twice.

10. LINE TYPE ARCS

Line type arcs are those which require two or more points to describe their path. They are any linear map feature such as county lines, township lines, highways, railroads, streams, etc. Line type arcs have feature codes greater than 2000.

11. ISOLATED POINT TYPE ARC

The isolated point is any map feature represented as a symbol at a single location. It is any non-linear map feature, such as section corners, township corners, or well locations.

Although isolated point type arcs are considered to be "collapsed" line arcs with the same point for the start and end nodes and having no interior points, these features are digitized only once using button #3.

12. NODE

A node is the start/end point of linear features or the intersection point of two similar linear features. To signal that point as a node, the point is digitized twice consecutively or by positioning the cursor and pressing button #2 once (as are all nodes).

13. CONTINUE NODE

A continue node is a node taken at the intersection of two similar features, in effect the end node of one arc and the start node of another of the same type. A continue node is digitized once with button #2 following the interior points of the first arc. Then the interior points of the second arc are digitized to the end node. There is no discontinuity flag between the two arcs because they are connected by the continue node in the sequence they are digitized.

14. INTERIOR POINTS

Interior points are the points digitized between the start and end nodes of line type arcs which describe the path of that feature. Interior points are found only on linear type arcs. These points are digitized by aligning the cursor and pressing button #3 once for each point. These points must be digitized in the correct sequence from the start node to the end node.

The following detailed explanation of the GIMMAP digitizing syntax accompanies the flow chart which illustrates step by step how the data is captured. Refer to the previous definitions of capitalized terms.

Step 1. Insert the MAP HEADER and the CONTROL POINTS. The digitizing program MAPDIG will provide the operator with appropriate prompts to enter the map header and the control points.

Step 2. Insert the FEATURE CODE HEADER. The digitizing program MAPDIG will prompt the operator to enter the feature code header.

Step 3. Make a decision depending on the type of FEATURE CODE that was inserted in Step 2. If a LINE-TYPE ARC feature code header was entered, then go to Step 4. If an ISOLATED POINT-TYPE ARC feature code header was entered, then go to Step 15.

NOTE: the Syntax for digitizing LINE-TYPE ARCS is different from ISOLATED POINT-TYPE ARCS. The Syntax for a LINE-TYPE ARC will be followed first.

Step 4. To reach this point a LINE-TYPE ARC feature code header must have been entered in step 2. Position the cursor at one end of the feature. Create a start NODE by pressing button #2. Two duplicate pairs of X,Y coordinates are inserted into the digitized data format file.

Step 5. Determine if the arc will have any INTERIOR POINTS. Interior points generally should be taken on any curved arcs, regardless of length. For apparently straight line arcs less than one-half inch in length at 1:24000 it is not necessary to take an intermediate point.

Step 6. The INTERIOR POINTS of an arc are digitized by using button #3. A rather simple rule applies to digitizing INTERIOR POINTS of an apparent straight line arc. An INTERIOR POINT should be taken at least every 2 inches (the interior points must be digitized in sequence from the start node to the end node). However, when digitizing non-straight line features (i.e., rivers, contours, etc.) there is no hard and fast rule. The only help that can be given is that part of digitizing is an art, which can only be perfected by trial and error. The goal is for the digitized line to essentially duplicate the original with as few points digitized as possible.

Step 7. If there are to be no more interior points on the current arc, then go to STEP 8. For more interior points go to STEP 6.

Step 8. When the end point of the arc being digitized is reached, this point must be digitized as the end NODE. This is accomplished by positioning the cursor and pressing button #2.

Step 9. At this point it must be decided whether or not the next map feature to be digitized continues from the node just taken. Is this the intersection of two similar features or is the next feature to be digitized not connected to the NODE just digitized? If it is the intersection of similar features, the node is a CONTINUE NODE which is treated as the end NODE of the last arc and the start NODE of the next arc. Go to STEP 6 and start digitizing INTERIOR POINTS for the next arc.

Step 10. Decide whether there are more arcs of the same feature code or not. If there are, then go to Step 11. If there are not, go to STEP 12 to change the feature code.

Step 11. Insert a DISCONTINUITY FLAG by pressing button #1 and return to STEP 4.

Step 12. Enter a FEATURE CODE HEADER FLAG by pressing button #1 twice.

Step 13. Decide whether there are more features to digitize or not. If there are, then go to Step 2. If there are not, go to Step 14.

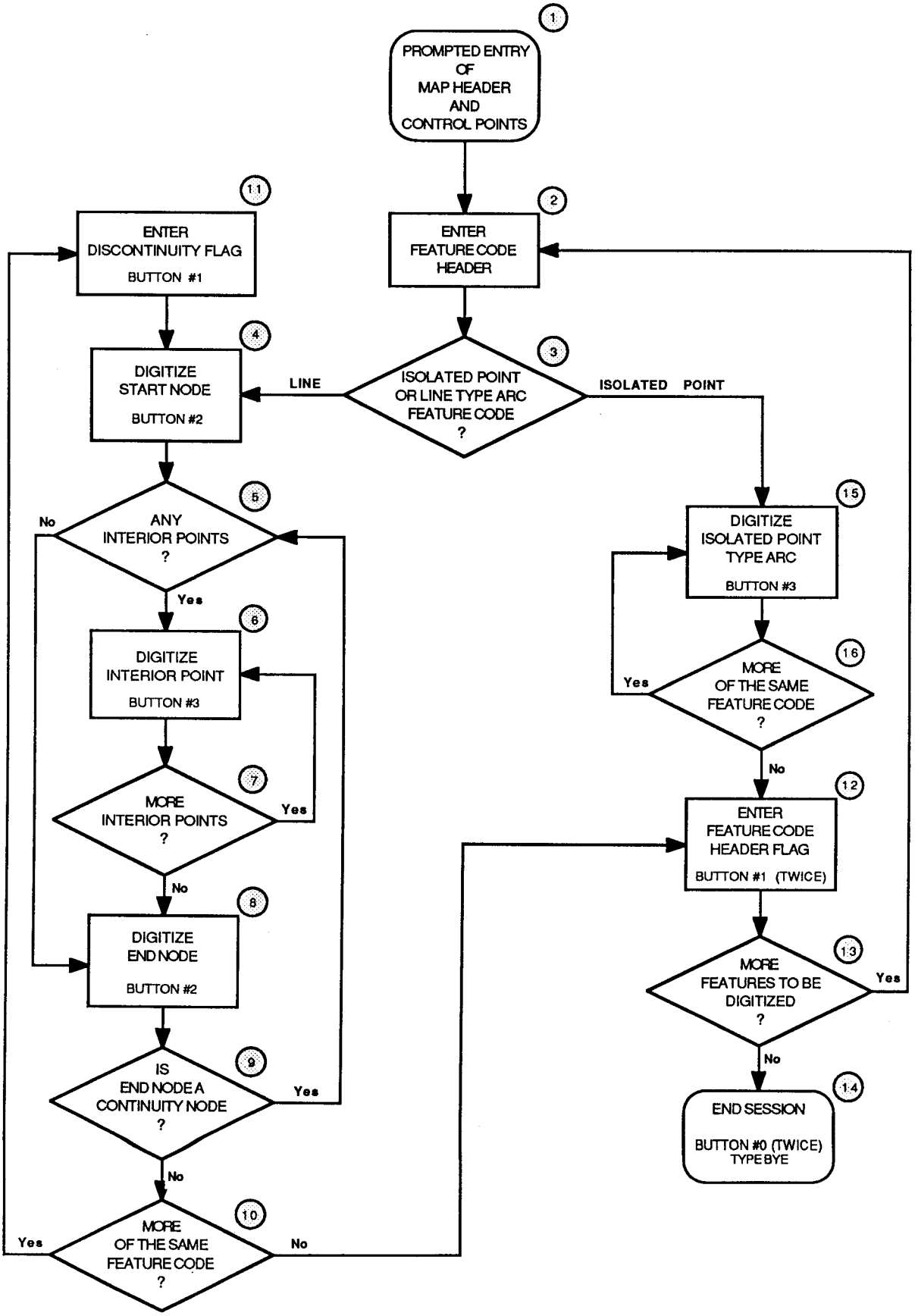
Step 14. If the digitizing session is finished, press button #0 twice and type BYE at the terminal. This terminates the program.

NOTE: Syntax for digitizing ISOLATED POINT-TYPE ARCS.

Step 15. To reach this step an ISOLATED POINT-TYPE ARC feature code header must have been entered in STEP 2. Digitizing ISOLATED POINT-TYPE ARCS is quite simple compared to LINE-TYPE ARCS. One after the other, all arcs (points) with the same feature code are aligned with the cursor and button #3 is pressed. It is suggested that the isolated points should be digitized in some logical order to avoid skipping or duplication.

Step 16. If there are more arcs of the same feature code go to STEP 15. If there are no more arcs of the same feature code, go to STEP 12.

GIMMAP Digitizing Syntax Flow Chart



INITIATING THE DIGITIZING PROGRAM

After preparing the map for digitization, the map should be taped to the digitizing table, with care taken to minimize wrinkling or stretching which will decrease the accuracy of the digitized data. Power up the equipment, and press <NEW LINE> at the terminal. The computer will respond with two questions in the sign-on procedure:

USERNAME: enter username <new line>
PASSWORD: enter password <new line>

Now everything is ready to begin digitizing.

NOTE: **Bold letters** indicate that the program is either prompting to receive an answer or is giving information about the digitized file that is being created. **Bold underlined letters** indicate explicit entries by the operator.

To initiate the digitizing program type:

)**MAPDIG** <new line>

The next 6 questions provide the information to MAPDIG to form the MAP HEADER for the digitized file.

BASE NAME? enter base name <new line>

The base name consists of the two-letter abbreviation of the county, followed by the row number, followed by the column number, and followed by a letter indicating the layer or type of information, such as **B** for base map information, **G** for geology, **T** for topography. In the map example for this documentation, the base name for the Douglas County patch is: DG1756B

SESSION NUMBER? enter session number <new line>

The session number distinguishes multiple digitized files for a single base by chronological order of their creation. Always begin with the number 1. If additional data from the same map is digitized then increase the number. If the number entered has already been used, the program will prompt the operator with the following message:

FILE ALREADY EXISTS
Type YES to overwrite the file enter **YES** or **NO** <new line>

If you do not wish to overwrite the file, then type **NO** and the program will terminate. You may begin another session by invoking the program again.

YOUR INITIALS? enter your initials <new line>

PROJECTION TYPE (MP LC OR NONE)?

Enter the same projection as it shows on the map. For the example map, the projection type is **MP** for Modified Polyconic, LC means Lambert Conformal Conic Projection.

DEFAULT MAP SCALE IS 24000.0

Type YES to change scale

Enter <new line> unless the scale is to be changed from 24000. If it is to be changed, type **YES** and enter the appropriate scale. The example map scale is 24000

YEAR OF MAP?

Enter the year on which the map was published or photorevised or photoinspected, found in the legend for the example map.

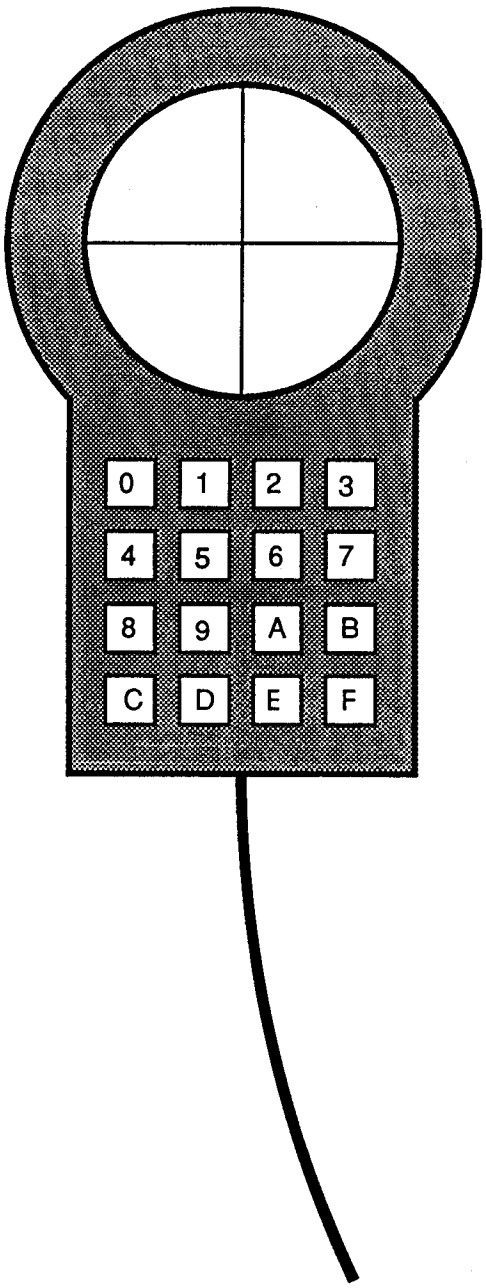
*****KDB Digitizing Control Program*****

Digitizer OUTPUT will be to:

<the program will enter the filename just opened>

Cursor Button Programming:
2 = Nodes
3 = Points
1 = Discontinuity Flags
0 = Feature Code Header Flags
D = Delete Function
4 = 2310
5 = 2320
6 = 2410
7 = 2420
8 = 4110
9 = 4120
A = 4130
B = 4140
C = 4150
D = 4360

(These are the functions and feature codes assigned to the Keys of the cursor if the defaults are used. Others may be assigned. The same key may be used for more than one purpose if the syntax makes the intended meaning clear.)



Cursor button arrangement

Type Y if not digitizing USGS 7.5' quadrangle:

When the answer is Y, please see the section on NON-STANDARD CONTROL MAPS on page 21. When the answer is N or <new line>, the program will assume that the map is a USGS 7.5' quadrangle map and it will prompt the operator with the following:

DIGITIZE THE SOUTHWEST CORNER:
DIGITIZE THE SOUTHEAST CORNER:
DIGITIZE THE NORTHEAST CORNER:
DIGITIZE THE NORTHWEST CORNER:
DIGITIZE THE SOUTHWEST CORNER AGAIN:

In that order, the program is asking you to align the cursor and press button #3. Be as accurate as possible. Control points are used in later programs to adjust for stretching/shrinking of the original quadrangle map due to humidity or heat or the printing process. The digitizing program takes the five control points and performs calculations on them to test for certain errors in set-up by the operator. The results are then displayed:

DIGITIZER COORDINATES		TRANSFORMED COORDINATES	
---	---	---	---
---	---	---	---
---	---	---	---
---	---	---	---
---	---	---	---

CONSISTENCY . . . .

If any of the five points (transformed coordinates) is beyond predetermined tolerance values, the message

UNACCEPTABLE - TRY AGAIN

will appear on the terminal and all the control points will have to be digitized again.

If any of the five points (transformed coordinates) show negative values or asterisks, it means that the source map is positioned on the table outside the limit on which the map should be positioned. Attention must be paid to this every time, because the program will allow the session to continue even if the transformed coordinates indicate there is a problem.

Now reading from digitizer table....
New feature code...

If the feature code is programmed on the cursor, press the appropriate button. Lets say that you press button #6 (feature code 2410 for perennial stream)

Now reading from the digitizer table...
NEW FEATURE CODE...2410

Begin digitizing

If the feature code is not programmed on the cursor, then press button 0 to transfer the control to the keyboard and enter the new feature code (3000) from the keyboard

NEW FEATURE CODE...
Now reading from the keyboard... **3000** <new line>
Now reading from the table...
NEW FEATURE CODE...3000

Begin digitizing

To end the session press button #0 twice and type BYE

NEW FEATURE CODE...
Now reading from the keyboard...BYE

Number of nodes/points digitized: #
Stop
File moved to KDB file system:
:UDD:KDB:DIGDATA.:D.:DG1756B_D1

This is the file created for the session #1 of the example map.

SPECIAL GIMMAP DIGITIZING RULES

A. STATE BOUNDARIES

Where a state boundary occurs, the county boundary, Township and Range lines are assumed to exist at the same location. Hence, these features should not be digitized in addition to the state line. Only a highway, road, section corner or township corner or other assigned features may be digitized on top of a state boundary.

B. DIGITIZING NODES

Nodes should be digitized in the following situations:

1. At the beginning and ending points of a line interior to the map or where a line falls on the map boundary (quad edge, county line, and state line).

2. The intersection of two lines of like types such as:

    a. Hydrology with hydrology
    b. Transportation with transportation
    c. Township lines with range lines
    d. Geology with geology
    e. County lines with county or state lines.

3. When a county line is coincident with any line (except quad edges).

4. Other intersections of unlike lines where nodes are needed for special projects.

Thus, the intersection points of county and state boundaries with lines of other types should be digitized as nodes along the county and state lines. They should not be digitized on the quadrangle edge. There is one exception to this rule. When the map edge is also a zone boundary as specified for special projects, nodes should be taken at the intersections of edges with other interior zone boundaries.

C. Z-VALUES FOR ISOLATED POINT-TYPE FEATURES

GIMMAP has the capability to store up to 7 z-values associated with isolated point type arcs. These z-values can represent anything from the depth of a well to the Richter scale reading of an earthquake.

The following is an example of the dialogue of the program MAPDIG when Z values need to be entered.

An argument entered after an isolated point arc feature code specifies the number of z values that will be assigned to a point.

(In the MAPDIG digitizing program)

NEW FEATURE CODE
Now reading from keyboard...1111 3<new line> (New isolated point
Now reading from table... feature code is
NEW FEATURE CODE...1111 1111 and 3 Z-values
for each point.)

Begin digitizing

Enter 3 z value(s): # # # <new line>

Enter the 3 Z-values for each digitized point

D. NON-STANDARD CONTROL MAPS

A non-standard control map can be defined as any map on which one or more of the standard control points (the four corners of the projection area) are not shown. In these cases, it is necessary to choose control points.

When given a non-standard map, check the projection, it must be either Lambert Conformal or Modified Polyconic. These are the only two projections that GIMMAP has at the present time. If the map is neither, it must be treated as if not projected.

To initiate the digitizing program type:

)**MAPDIG** <new line>

The next 7 questions form the MAP HEADER of the digitized file.

BASE NAME?

The output file name for maps that do not belong to the KCD is structured differently. The name should contain seven characters. These characters should be descriptive of the content of the file.

SESSION NUMBER?

Always begin with the number 1, if you digitize data from the map more than once then increase the number each time.

If the number entered has already been used, the program will prompt you with the following message

FILE ALREADY EXISTS

Type YES to overwrite the file.

If you do not wish to overwrite the file, then type **NO** and the program will terminate. You may begin another session by invoking the program again.

YOUR INITIALS? enter your initials <new line>

PROJECTION TYPE (MP LC OR NONE)?

Enter the projection as shown on the map.

DEFAULT MAP SCALE IS 24000.0
Type YES to change the scale

Enter new line unless the scale is to be changed from 24000. If it is to be changed, type **YES** and enter the appropriate scale.

YEAR OF MAP?

Enter the year on which the map was published or photorevised or photoinspected.

*****KDB Digitizing Control Program*****

Digitizer OUTPUT will be to:

<the program will enter the filename just opened>

Cursor Button Programming:
2 = Nodes
3 = Points
1 = Discontinuity Flags
0 = Feature Code Header Flags
D = Delete Function
4 = 2310
5 = 2320
6 = 2410
7 = 2420
8 = 4110
9 = 4120
A = 4130
B = 4140
C = 4150
D = 4360

(these are the functions and feature codes assigned to the cursor buttons if the default values are used. Others may be assigned.)

Type Y if not digitizing USGS 7.5′ quadrangle:

The non-standard map is not a USGS 7.5′ quadrangle so the answer should be **Y**

Type Y if control-points are non-standard:

For the maps with non-standard control-points the answer should be **Y**.

Digitize 1st:

Digitize the southwest corner of the four selected control points.

Enter X,Y (longitude/latitude,etc.):

Enter the value of that point in the appropriate reference system units. If longitude and latitude is selected, the value entered should be the longitude and latitude value of that point. If X,Y is selected, the value entered should be what is desired to have for that point. Generally, longitude/latitude is used to allow for correction of distortion and operator set-up error by comparison to the projected model of the map area.

Digitize 2nd:

Digitize the southeast corner.

Enter X,Y (longitude/latitude,etc.):

Follow the same criteria as above for this point. Be consistent in the units selected.

Digitize 3rd:

Digitize the northeast corner.

Enter X,Y (longitude/latitude,etc.)

Follow the same criteria as above for this point. Be consistent in the units selected.

Digitize 4th:

Digitize the northwest corner.

Enter X,Y (longitude/latitude,etc.)

Follow the same criteria as above for this point. Be consistent in the units selected.

Digitize 1st again:

Digitize the southwest corner.

Enter X,Y (longitude/latitude,etc.)

Enter the same value entered for the first control point taken.

Now reading from digitizer table....
New feature code...

E. NON-PROJECTED MAPS

This section deals with digitizing maps that have unknown projection or a projection type other than Lambert conformal or Modified Polyconic or for which projection is to be ignored. The format and digitizing rules are the same as when digitizing a Standard Control Point map. However there are limits to what can be done with these maps upon completion.

One of the first things to be done is the selection of a reference point and the control points. The reference point, as always, is the southwest corner of the area to be digitized. The control points should be the four corners of the area. Once the reference point is selected, the coordinate assigned to it should be 1.0, 1.0. To begin digitizing, follow the NON-STANDARD control digitizing instructions. If the map is non-rectangular any rectangle which encloses the map area may be used for control point digitizing. When projection is not used, Standard Control point digitizing is used, no second reference system coordinates are entered.

GRAND

This program processes digitized data. To initiate the program type:

GRAND <new line>
Enter BASE name?
Base name defined in page ???

Enter W(orking) or S(ave)?
Working and Save files defined in page ???

At this point the program will rename (which means the program creates a back-up of the files that are going to be used in the event that something goes wrong) the ARC, NODE, POINT, and QUICKPLOT files of the base that the operator is trying to use unless one of the two following messages is displayed.

***** BASE DOES NOT EXIST *****

Enter C to create E to exit?

This message indicates two possibilities. One is that the base is new. If this is the case enter C to create a new base. The other possibility is that a typo was made when entering the BASE NAME. If this is the case enter E to exit the program.

Sometimes at this point instead of the message above, the program will display the following menage:

**** This Base is Busy - Try again later.****

This means that some one else is using the same base. The program will exit and display the prompt of the operating system.

Enter YES to run SYNEDT?

This program should always be run on a digitized file. For this program checks the syntax and corrects errors in the digitized file. This program must be run prior to running PARGEN.

Enter the Digitizing SEQUENCE NUMBER?

Enter the same session number used when the file was digitized.

GINA.Base name
DIGITIZED FILE MAP HEADER =
Base name, Operator's Initials, Creation Date, Projection, Scale, Year edition of the map ...C

STOP
Enter 0 to change the Map header?

The map header is the first record of the digitized file and contains information pertinent to the base such as:

- Base name
- Operator's name
- Creation date of the base
- Projection type
- Scale
- Year edition of the input source map

If a mistake was made back at the digitizing table when the map header was created, a **0** must be entered. The following message will appear.

********** **WARNING!!!** **********

BEEP

*** DO NOT USE BLANKS OR COMMAS IN THE HEADER ***

Enter the new MAP HEADER using .. OR __?

The new map header should read either like this:

DG1756B_D1.GR.28-OCT-87.MP.24000.1987PR

or like this:

DG1756B_D1_GR_28_OCT_87_MP_24000_1978PR

The program will give one more opportunity to correct the error in case the above instructions were not followed.

***** IF YOU USED BLANKS OR COMMAS IN THE *****

****
HEADER
YOU
MUST
CANCEL
THIS
JOB!!!
****

At the end of the program the operator will have the opportunity to cancel the job.

For the next 4 questions use the DEFAULT unless told otherwise.

The default THRESHOLD value is 0.0025

Enter the THRESHOLD value? <new line>

The default OFFSETS are 0.0

Enter the X OFFSET? <new line>
Enter the Y OFFSET? <new line>

The default Z value is 0.0

Enter the default Z-VALUE? <new line>
Enter YES if there are more files for SYNEDT?

If there are more sessions digitized for this base **YES** should be entered and when the program asks to enter the digitized session number, the next number should be entered and go through the same routine as above.
If there are no more digitized sessions **NO** should be entered.

Enter YES to run PARGEN?

This program creates the arcs using the points in the digitized file. The answer should be **YES**.

****

... Enter negative value if map is not 7.5′ Quadrangle...

.... 0 = No Projection
.... 1 = Modified Polyconic
.... 2 = Lambert Conformal
****
Enter PROJECTION?

Enter the same projection shown in the source map and used in the digitized file. Enter the corresponding number.

Enter YES to initialize Point and Arc files?

If the base already exists that means that the Point and Arc file already exists, therefore the answer should be **NO**. Otherwise the files will be wipe out. If the base does not exist then it is necessary to open the Point and Arc files so the answer should be **YES**.

The suggested Threshold for PARGEN is 0.0025

Enter Threshold for PARGEN?

The answer should be what the program suggests unless told otherwise.

Enter the Digitizing SEQUENCE NUMBER?

The same session number(s) used in SYNEDT should be entered in PARGEN one by one and follow the same routine in Pargen for each session with the exception of the question about having the point and arc files initialized.

*** The default SCALE factor is 24000. ***

Enter the SCALE FACTOR?

Enter the scale shown in the source map and used in the digitized file.

Enter YES if the control points are NON-STANDARD?

For all the USGS 7.5′ maps the control points are STANDARD. This means that the program knows the latitude and longitude location of the control points of these maps. This is because the program can translate the row and the column number from the base map into latitude and longitude values. Enter **NO** when digitizing a USGS 7.5′ map.
When the control point are NON_STANDARD, (this is when the operator knows the latitude and longitude location of the control points) enter **YES** and the program will prompt with the following:

For the non-standard control points..

Enter the SOUTH Latitude in degrees?
Enter the NORTH Latitude in degrees?
Enter the WEST Longitude in degrees?
Enter the EAST Longitude in degrees?

Please response to the four above questions accordingly.

Enter YES if there are more files for PARGEN?

Enter **YES** if there are more digitized files.

Enter YES to run NODGEN?

This program generates nodes and numbers them. The answer should always be **YES**.

*** The default NODE matching THRESHOLD is 0.02 ***

Enter the NODE matching THRESHOLD?

Enter the default matching threshold unless told otherwise.

*** The GRFCHK Program will also be run ***

This program is not optional. It will always run any time GRAND

is run. It checks for graphic errors in the file and makes the appropriate corrections.

Enter YES to run PLTGEN for edit plot?

This program will create a plot file at the same scale and projection of the base. If the answer is YES the following will be display.

```
**********************************
* THIS WILL BE A FOUR PEN PLOT *
**********************************
```

Enter 1 = Node degrees 0 = numbers?

For checking purposes enter **1**, this will make it easier to see the degree of each node.

*** * * * * * * * * * * * * * ***

Enter NO if you made NO mistakes?

If no mistake was made while running GRAND the answer should be NO and the computer will execute the job. If a mistake was made the answer should be **YES** and a program named UNDO will be ran to fix the files so GRAND can be run again on the same base. The job will be sent to the queue batch and a sequence number will be assigned to it.

Queued, Sequence number = #####

If yes is used, the following message will appear to indicate the UNDO program is being run.

**** UNDO IS BEING DONE ON THESE FILES ****

UNDO is a program which renames the ARC, POINT, NODE, and QUICKPLOT files back to their original format. When UNDO is completed the computer will send a message to that effect.

From Pid # : (EXEC) BATCH_INPUT_4 Completed :dg0:<user's name>:?#.CLI.00002.JOB,
From Pid # : SEQ=#####

Enter YES if this is a long job?

If the answer is **NO** the job will be sent to the queue batch and a sequence number will be assigned to it. If the answer is **YES** the program will display the following:

```
***
.... Current CPU limit options are:

.... 0:05
.... 0:10
.... 0:30
.... 5:00

***
Enter CPU limit as HRS:MINS?
```

CPU time should be determined accordingly to the size of the job. After the time is entered the job will be sent to the queue batch and a sequence number will be assigned to it.

```
Queued, Sequence number = #####
```

The program will return the Operating System prompt.

GRFEDT

GRFEDT is the program used to correct digitizing errors.

To initiate the program type:

EDIT <new line>
Enter BASE name?
Base name defined in page ????

Enter W(orking) or S(ave) files?
Working and Save files defined in page ????

*** * * -> INITIALIZING.....**

? <program prompt>

When the ? appears it means that the files are initialized and editing may begin. At the bottom of the screen, the program prints some information about the base on display:

VERI PRO = MP SCALE = 24000 CODE MASK:(1) (2) (3) (4) X ##-##
DG1756B_D1 MP 24000 GR 28-OCT-87 1978PR ..C (5) (6) (7) Y ##-##

VERI — Indicates that the VERIFICATION MODE is on. This means that the program will verify to the user every operation before is executed.

PRO = MP — Indicates the type of projection of the base. The options available are:
MP = Modified Polyconic
LC = Lambert Conformal
NONE = No Projection

SCALE = 24000 — Indicates the scale of the base.

CODE MASK: (1)...(7) — These are seven ranges for feature codes which can be used to restrict the features that are going to display or edit.

X ##-## — Indicates the Xmin. and Xmax. of the view area.
Y ##-## — Indicates the Ymin. and Ymax. of the view area.

DG1756B_D1 MP 24000 GR 28-OCT-87 1978PR ..C — Displays the map header of the file.
The map header is the first record of the digitized file and contains information pertinent to the base such as: base name, projection type, scale, operator's initials, creation date of the base, and the year edition of the input source map.

This program has a HELP command which list the commands available:

```
All [NUMBER]                  Display all unmasked arcs.
BELL [ON/OFF]                 Flip or set (ON/OFF) the prompt bell.
BRIDGE node1 [node2]          Create arc, (bridge two nodes).
CODE node1 [node2]            Change the feature code of an arc.
DELETE node1 [node2]          Delete an interior point of an arc.
DISPLAY [MASK]                Display (all/unmasked) code groups.
END                           Stop execution of program.
FRESH [NUMBER]                Erase screen and display fresh view.
HELP [command]                Help by providing command information.
INSERT node1 node2            Insert interior point(s) on an arc.
JOIN node1 node2              Join (merge) two nodes together.
KILL node1 [node2]            Kill (delete) an arc.
LOCATE [node1 [node2]]        Locate cursor, node, or interior point.
MASK [FRESH/RESET] [RESET/FRESH]
                              Set code ranges in the code mask.
MOVE node1 [node2]            Move a node or an interior point.
NUMBER [node/DEGREE]          Number one/all nodes in view.
PATHS node                    List connected nodes and arcs.
POINT                         Create new isolated point.
RECLASSIFY oldcode newcode
                              Change the feature code for a group.
RELEASE lowcode-highcode      Release (delete) groups by codes.
REMOVE node/ALL               Remove a node, merging the arcs.
RESTORE [NUMBER]              Restore view saved by SAVE.
SAVE                          Save the current view for RESTORE.
SPLIT node1 node2             Split arc,creating a new node.
VERIFY [ON/OFF]               Flip or set (ON/OFF) verify mode.
WINDOW [NUMBER] [zone]        Select window for a new view.
ZOOM [NUMBER] [zone]          Select center and size for new view.
ZV                            Zone viewing
```

Commands may be abbreviated by 1 or more letters.
Arguments in UPPER CASE are literal arguments.
Arguments in lower case require a number or a name.
Commas may be used where blanks are shown as separators.
Options arguments are enclosed in [square brackets].
Optional are separated by a slash ([option1/option2]).

***** PAUSE *****
Type NEW-LINE to continue.

To end the editing session type:

END <new line>

Enter YES to save this session?

If the editing session was successful, type **YES**. If a mistake

was made or no change was performed to the base, type **NO**.

ALL [NUMBER]

Displays the entire base area with all the code-qualified arcs (unmasked arcs). If NUMBER option selected, all nodes which have code-qualified arcs are numbered.

BELL [ON/OFF]

If no argument is used then, the status is flipped (i.e. if ON it becomes OFF and vice versa). When the BELL mode is ON the program will prompt the bell every time the expects an answer from the user or when the program has executed an operation.

BRIDGE node1 [node2]

It creates a straight line arc (no interior points) between two existing nodes. If only node1 is given the arc goes from node1 to node1 as for an island. For such a case, interior points are to be added using INSERT. When two nodes given, an arc is created to star at node1 and go to node2 but without any interior points. If the line on the source map does not appear to be completely straight, that arc should be digitized instead. An example is shown in Figure 1.

Special Case, If an arc exits between the two nodes then, the user may duplicate the existing arc but with a different feature code, or may continue with the simple bridge as above.

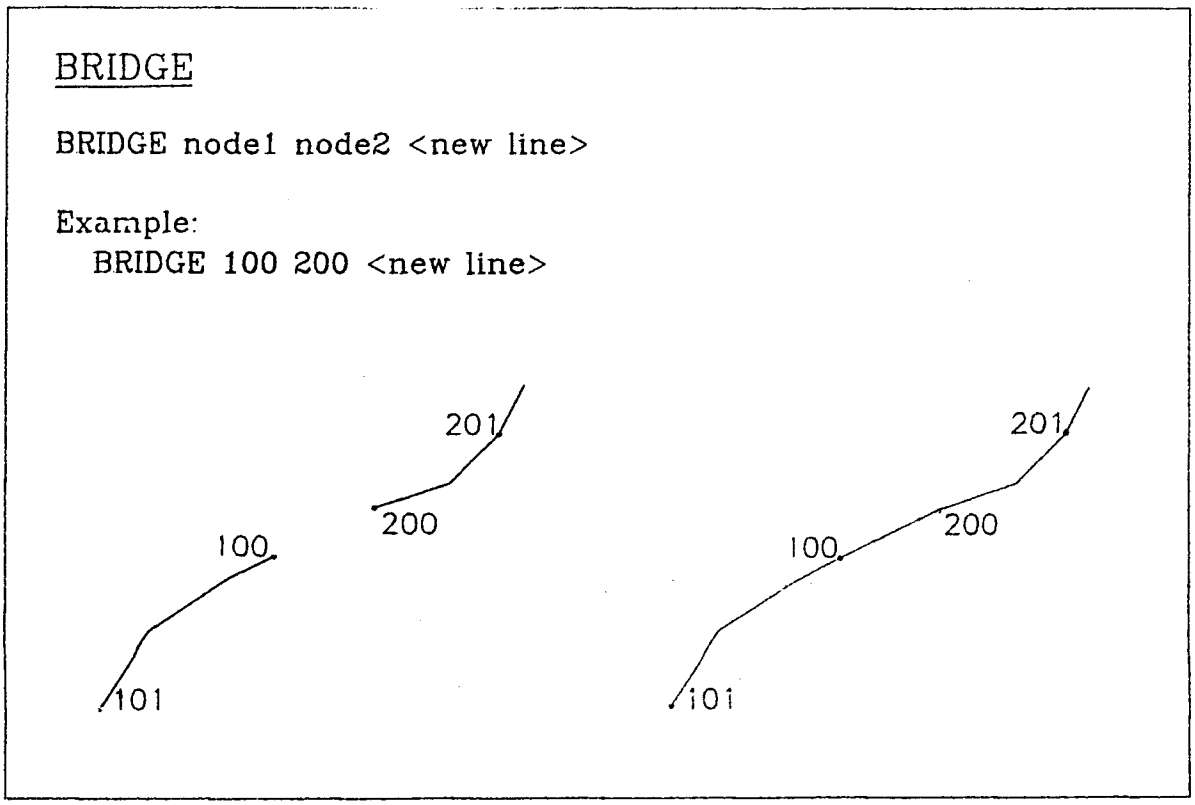


Figure 1. The BRIDGE Command

CODE node1 [node2]

Modify the feature code of an arc. The arc specified by only 1 node# is one from node1 to node1 or an isolated point arc. With two nodes, the arc to be changed is between node1 and node2. As with other commands, when more than 1 arc exists between the two nodes, only the last one in the record is selected. In such cases, verify mode should be on to be certain the correct arc is chosen. Also correct setting of the MASK can mask out other unwanted arcs between nodes. Sometimes this command comes handy when trying to split an arc which is one of the two arcs that share the same two nodes (beginning and ending nodes)and same feature code. In situations like this the program might not verify the desired arc. To avoid this you may change the feature code of the arc the program verifies so you can perform the intended operation on the desired arc.

DELETE node1 [node2]

To delete one re more interior points on an arc between node1 and node2 or on island type arc from node1 to node1. Correct selection of the arc is as in CODE for multiple arcs between the nodes. The interior point to be deleted as selected by cursor. The control character (1st typed) for the cursor selection can indicate the action of existing the command (E) or indicate the last point to be deleted (L). Other characters will cycle and delete other points. After entering the DELETE command, followed by the two node numbers, you have to position the cross hair at the desired interior point to be deleted (Figure 2). If the cross hair is not positioned at the location of an interior point, the DELETE command will delete the interior point that is closest to the cross hair.

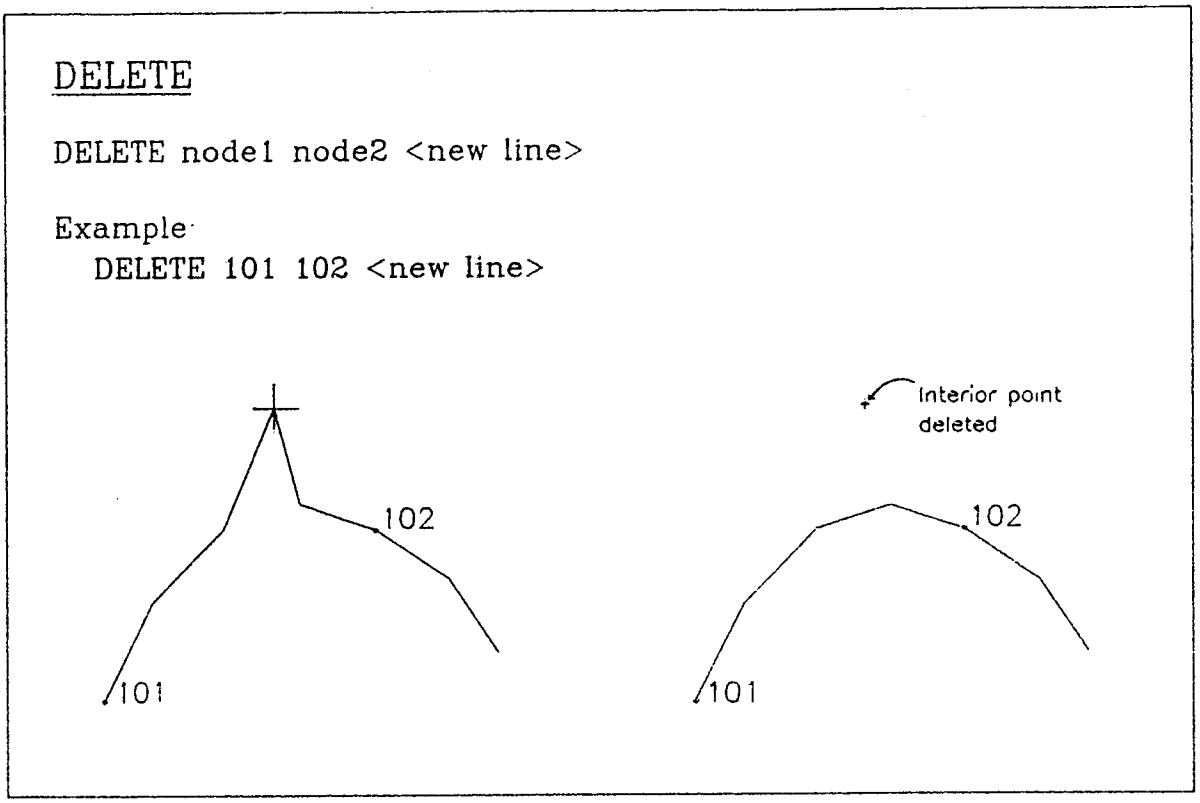


Figure 2. The DELETE Command

DISPLAY [MASK]

This command will display all the existing feature codes in the base one by one, starting from the lowest feature code in a numerical order. The nodes are numbered, and the program pauses after each code to allow for hard-copying. After it displays the last code, it goes back to unmasked range code. Once this command is initiated it will not stop until it reaches the last code or the operator types 0.

END

This command will stop execution of the program. If a mistake was made or no changes were made, it will give the option not to save the session and the data in the base will not be altered. If you save the session, the data in the data base will be updated.

FRESH [NUMBER]

Erases the screen and displays a fresh view of the same area with all the qualified arcs by the mask. If this command is combined with NUMBER command , it will display the node numbers as well.

HELP [command]

Displays a list of all the commands available along with a brief description of what each one does. When HELP is combined with another command, it will provide information of that particular command only.

INSERT node1 [node2]

To insert one or more interior points in the sequence for an arc between node1 and node2. Insertion of the point is selected by the cursor with cursor control characters, to exit (E) or specify the last point (L). Points are inserted between the closest point to the location selected, and the closer of that (closest) points next neighbors. Can also be done for island for type arc. An interior point is inserted when a node is needed at an exact location and an interior point was not digitized at that location, or when the shape of an arc needs to be modified. If the modification is extensive, for more accuracy and better use of time, it is recommended to digitize it instead. See Figure 3.

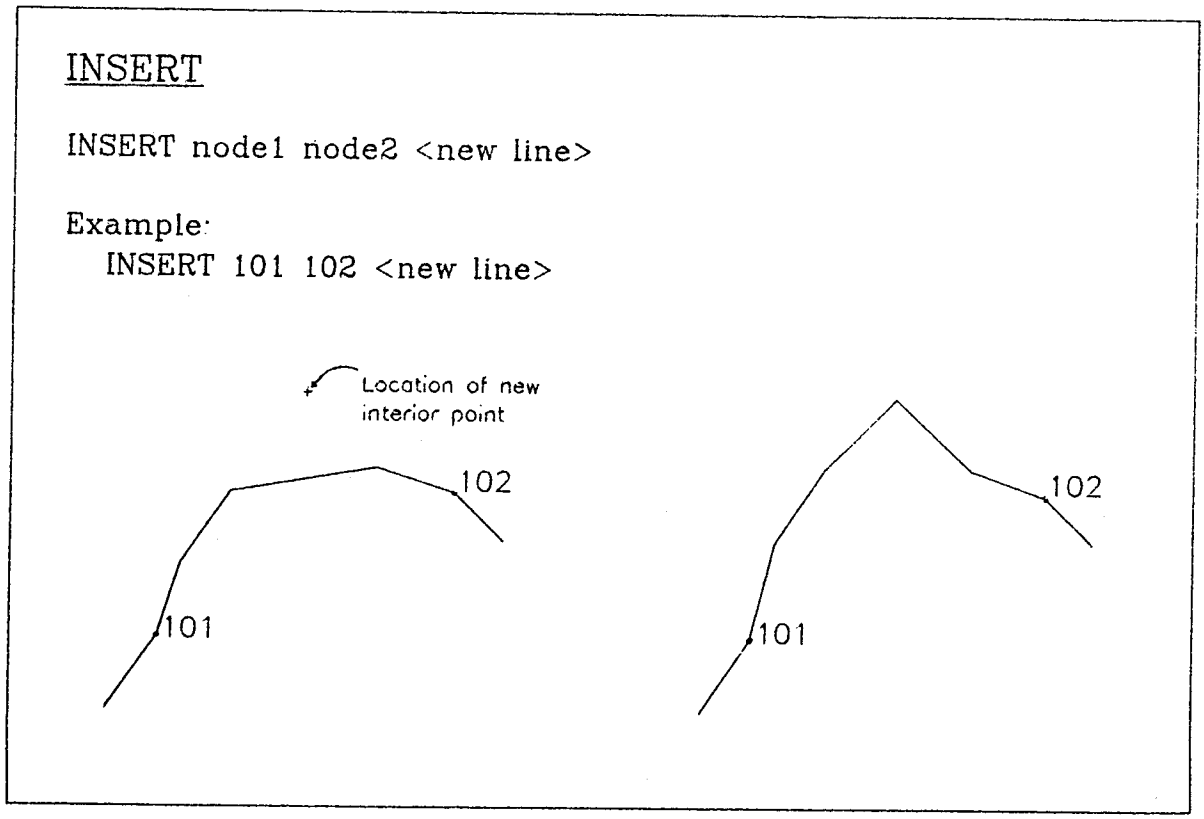


Figure 3. The INSERT Command

JOIN node1 node2

When two nodes should really be the same single node. They are joined by this command. The location of the resulting combined node is optionally specified as the original location of either node1 or node2, or as the average between the two. The resulting node is numbered node1.

Special Case.- A node lying on the "edge" (having at least one edge arc incident), can not be moved,except to be averaged with another edge node. In such cases, no options are allowed. After entering the JOIN command, the program will ask for the new location of the node. You will have three choices of the new location:

i) The location of node 101
ii) The location of node 201
iii) The average location of nodes 101 and 201.

Depending on what selection was chosen for the new location, the program will join the two nodes accordingly, as shown in Figure 4(b), Figure 4(c), and Figure 4(d).

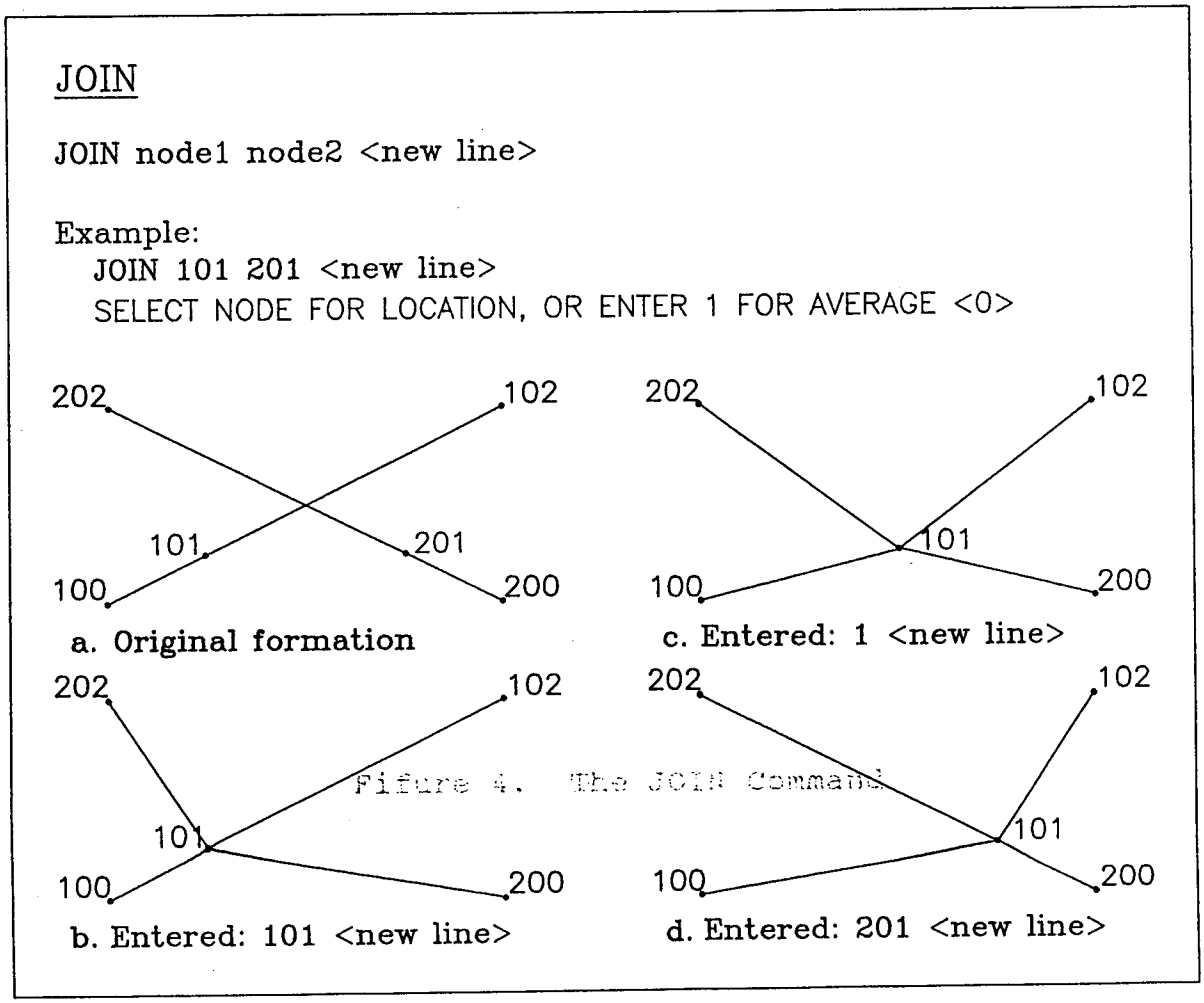


Figure 4. The JOIN Command

KILL node1 [node2]

To delete an isolated point arc (only node1), or an arc between node1 and node2. If multiple arcs exist between the two nodes, the arc selected should be verified, and can be affected by setting the MASK properly. This command removes the arc, its interior points, and associated paths for the two nodes. An example in Figure 5 shows how the KILL command is used to delete arc 100 102. Please note that although arc node100 node102 is deleted, the node 102 still remains because it is connected to node 101 and node 103.

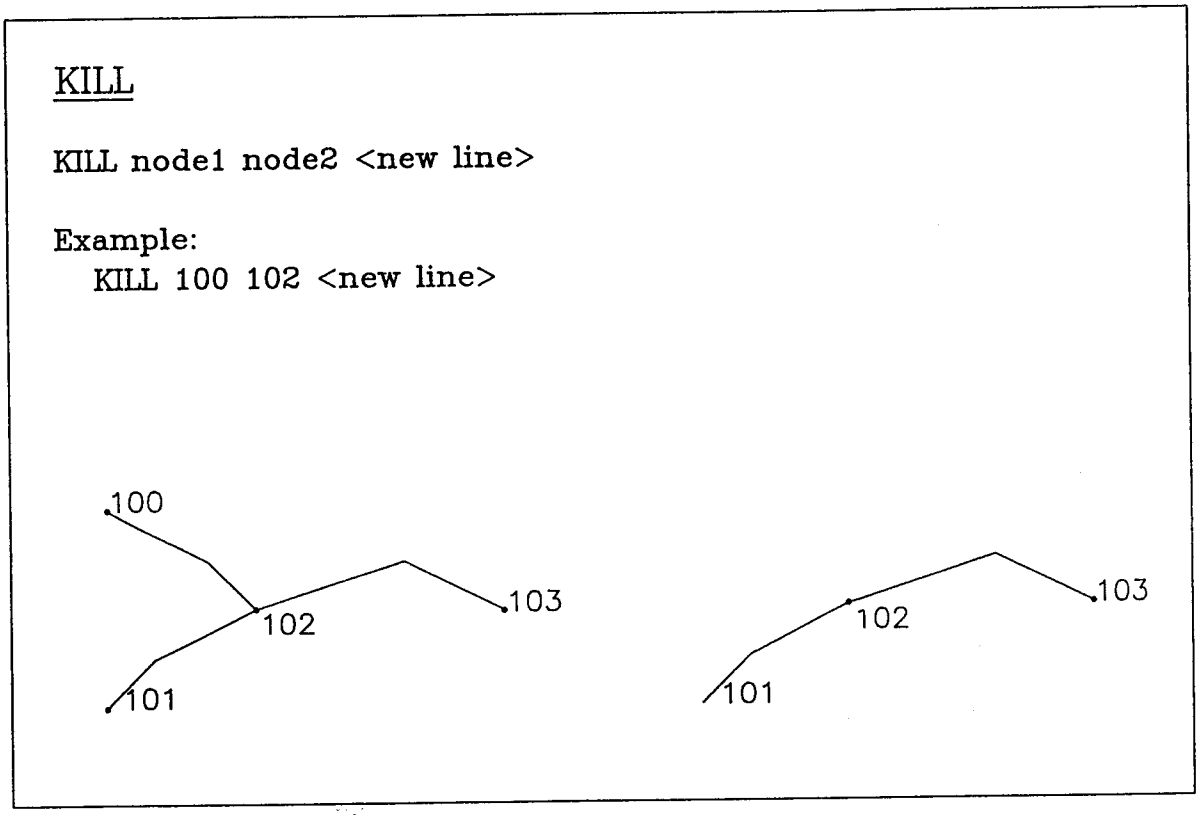


Figure 5. The KILL Command

LOCATE [node1 [node2]]

To provide the X,Y coordinates of a cursor selected point (no arguments), a node (one node number), or the interior point closest to the cursor to the arc between node1 and node2. Also shows it graphically if verify mode is on. Node or interior point must be in current view.

MASK [FRESH/RESET] [RESET/FRESH]

To set the mask values for positions 1-5. For positions 6-7 must have password. User is asked by the program to specify row, low and high code. This command may be combined with FRESH and RESET. RESET sets the range codes from 0 to 19999. FRESH displays a fresh view of the unmasked arcs. Both options may be specified at once.

MOVE node1 [node2]

To move a node (node 1 only) or to move one or more interior points on an arc between node1 and node2. User selects point to be moved with cursor, then selects new location for that point. Cursor control characters for existing (E) and last point (L) as before. See Figure 6.

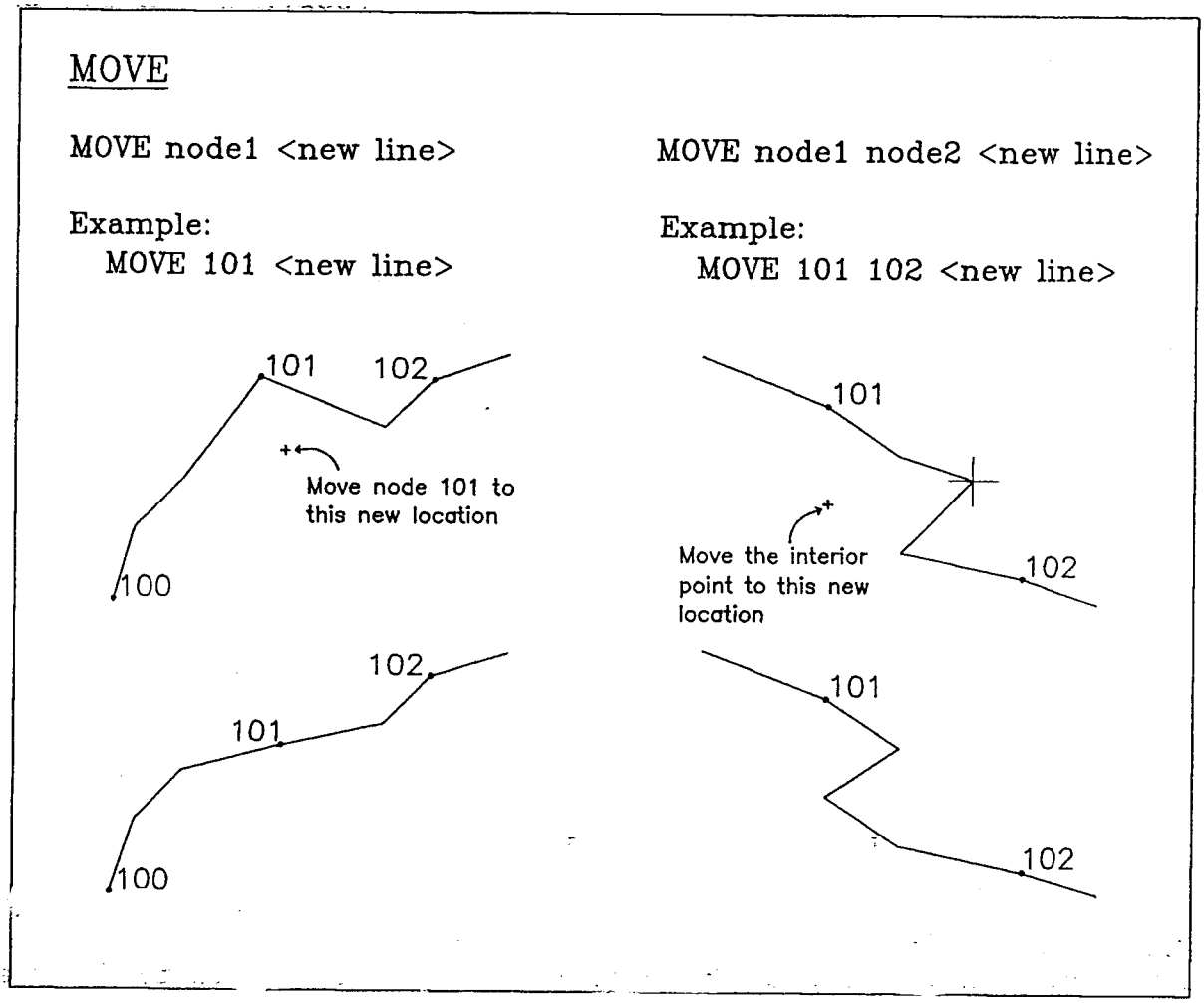


Figure 6. The MOVE Command

NUMBER [node /DEGREE]

To display numbers for various entities. With no arguments, all nodes which have at least one incident arc which is code-qualified, and which lie in the current view, are numbered. With a node number, only that node (node) is numbered. If DEGREE selected, node degrees are displayed. For ZONES, zone numbers are displayed but only if ZONE VIEWING was selected; and that only if an associated zone files exists. The DEGREE option tells how many arcs are incident t the node; useful

for finding intersections which were not digitized as nodes in both lines. For ZONES, the numbers are useful to select an area for the special zone viewing (see ZOOM).

PATHS node

Lists connected nodes,connecting arcs, the arc codes for these arcs, and tells if the arc is masked (Y=yes N=no) and if the connected node is in the current view (y=yes N=no). All for the specified node. This information is useful for sorting out some situations and for checking intersections. Figure 7 shows an example of the usefulness of the PATHS command. In this example, node 102 is the node in question. The first line of the program is response is the degree of the node, 4 in this case. This means that node 102 is connected to four nodes. The second line of the program response shows five column headings, namely NODE, ARC, CODE, IN VIEW, and MASKED. The first column shows the number of the nodes that node 102 is connected to. In this case, node 102 is connected to nodes 101, 103, 105, and node 104. The second column shows the arc number of the arcs. For instance, the arc number for arc 101 102 is -345 and the arc number for arc 102 103 is 346. The negative sign for arc 101 102 indicates that the arc 101 102 was digitized from node 101 to node 102. Similarly, the positive arc number for node 102 103 indicates that the arc 102 103 was digitized from node 102 to node 103. The third column shows the feature code of the arcs. The fourth column indicates whether the nodes connected to node 102 are in view (on the screen). In this example, all the four nodes are in view. The last column indicates whether the four arcs are masked or not. For further information about MASK, please refer to the MASK command.

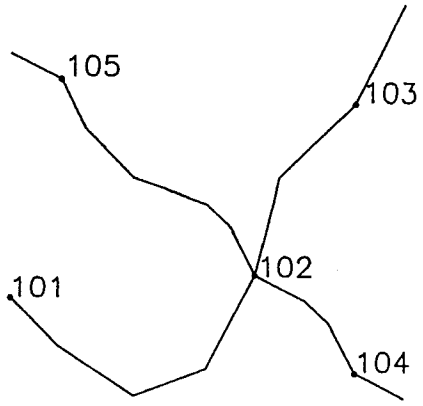
PATHS

PATHS node1 <new line>

Example:
PATHS 102 <new line>

PATHS OF NODE 102 DEGREE IS 4

NODE	ARC	CODE	IN VIEW	MASKED
101	-345	2410	YES	NO
103	346	2410	YES	NO
105	456	2420	YES	NO
104	-455	2420	YES	NO



POINT

To create a new isolated point arc at a cursor selected location. Not only creates a new isolated point arc but a new arc and a new node. See Figure 8.

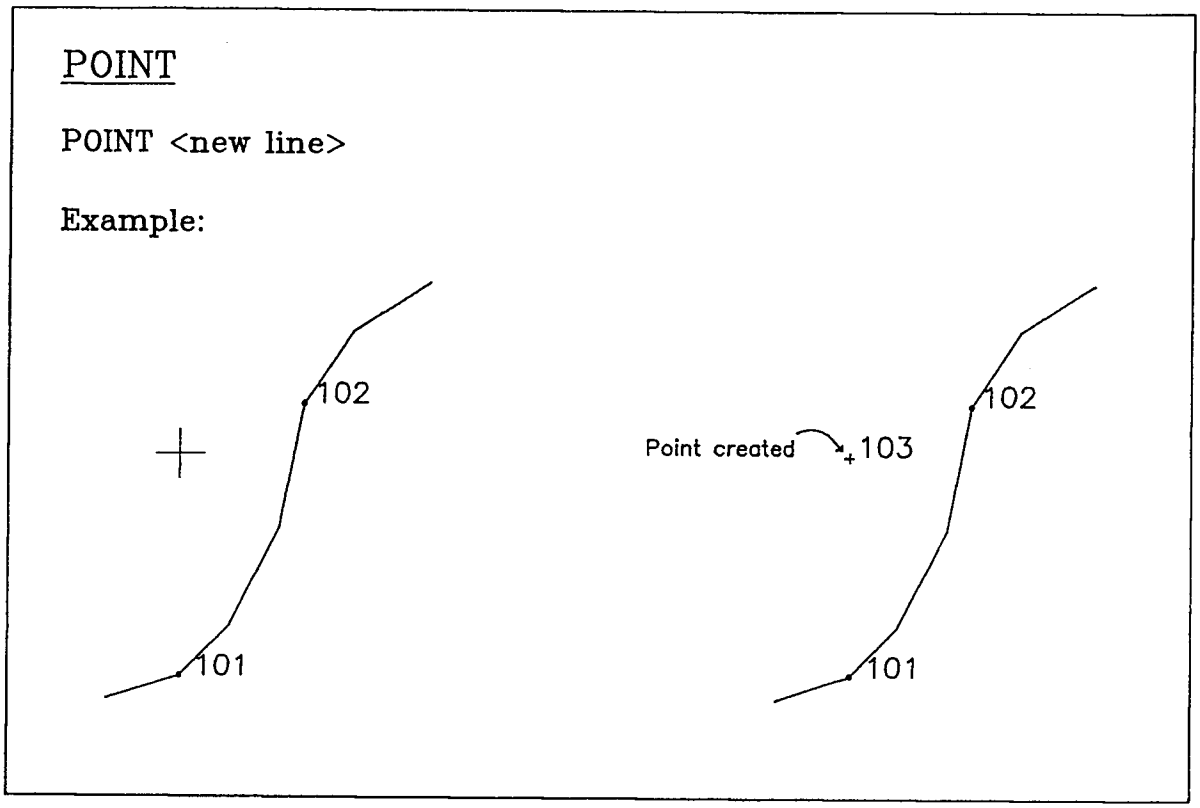


Figure 8. The POINT Command

RECLASSIFY oldcode newcode

To change the code of all arcs in the current view from oldcode to the specified newcode. With verify mode on, each arc must OK'd. There must be no separator other than a blank between oldcode and newcode; otherwise it may be interpreted as the RELEASE command. This command requires a password.

RELEASE lowcode-highcode

To delete all arcs in the current view whose code lie in the specified range from lowcode to highcode inclusive. With verify mode on, each arc MUST BE OK'd. The separator must be a hyphen (or minus)to distinguish this command from RECLASSIFY. This

command requires the password.

REMOVE node/ALL

To delete a node which connects exactly two arcs of the same feature code, thus usually making it necessary. Deletes the specified node, and merges the two arcs into one. If the ALL option is selected, then all such redundant nodes will be found and displayed one at a time for possible deletion (automatic if VERIFY OFF). In this case, an automatic moving view will zoom to each node for verification. The user can set the size of this view. Password procedure is required for this.

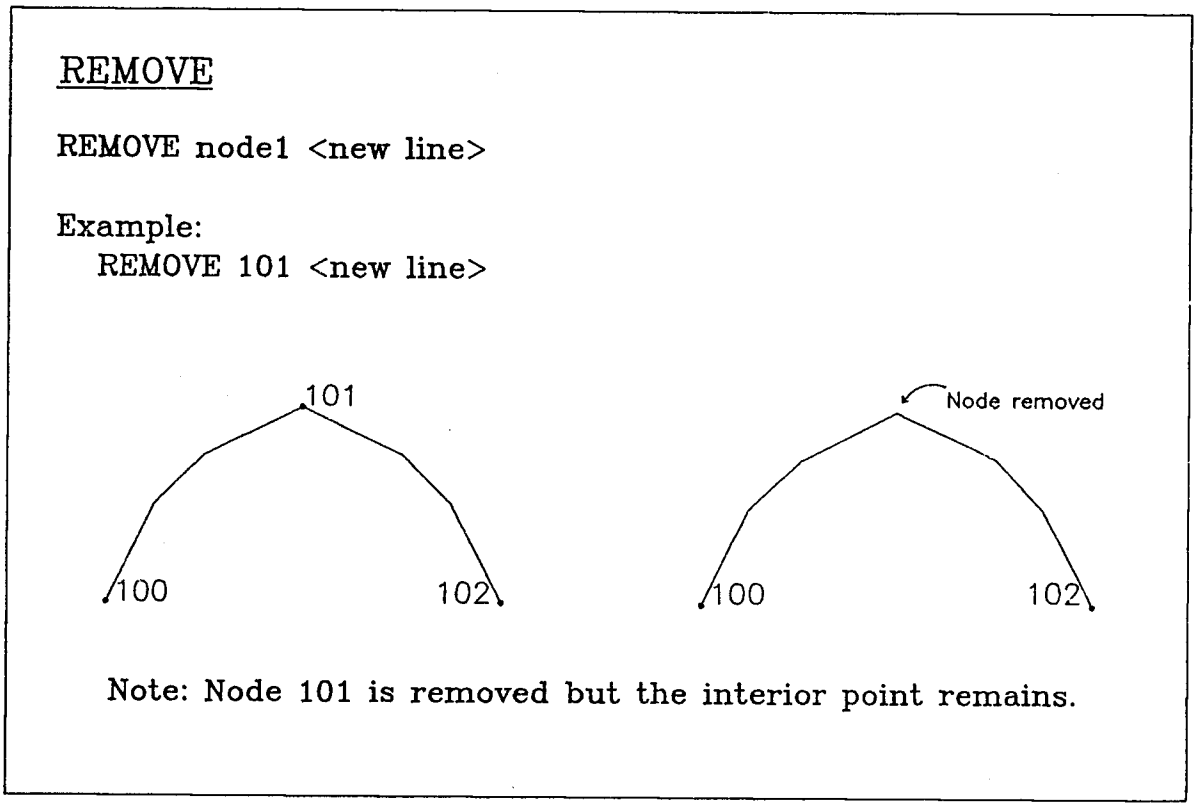


Figure 9. The Remove Command

RESTORE [NUMBER]

If a view has been saved via the SAVE command, it is hereby restored according to the current MASK. Node numbering occurs if that argument is selected.

SAVE

Save the current parameters to restore this view for later return via the RESTORE command.

SPLIT node1 node2

To create a node on an arc between the two specified nodes. For multiple arcs, the selection depends on the MASK. The user

may select any interior point to be used as the node. The arc is split into two arcs, and the interior point is now the end point node for both. This can be used to join two lines which intersect when one (or both) of them did not have a node digitized at the intersection. It can also be used, when part of an arc needs to be deleted. It should be noted that the desired location of the new node must be the location of an interior point within the arc. If the cross hair is not positioned on an interior point, the program will split the arc at the interior point that is closest to the position of the cross hair. Figure 10 shows an example of the SPLIT command.

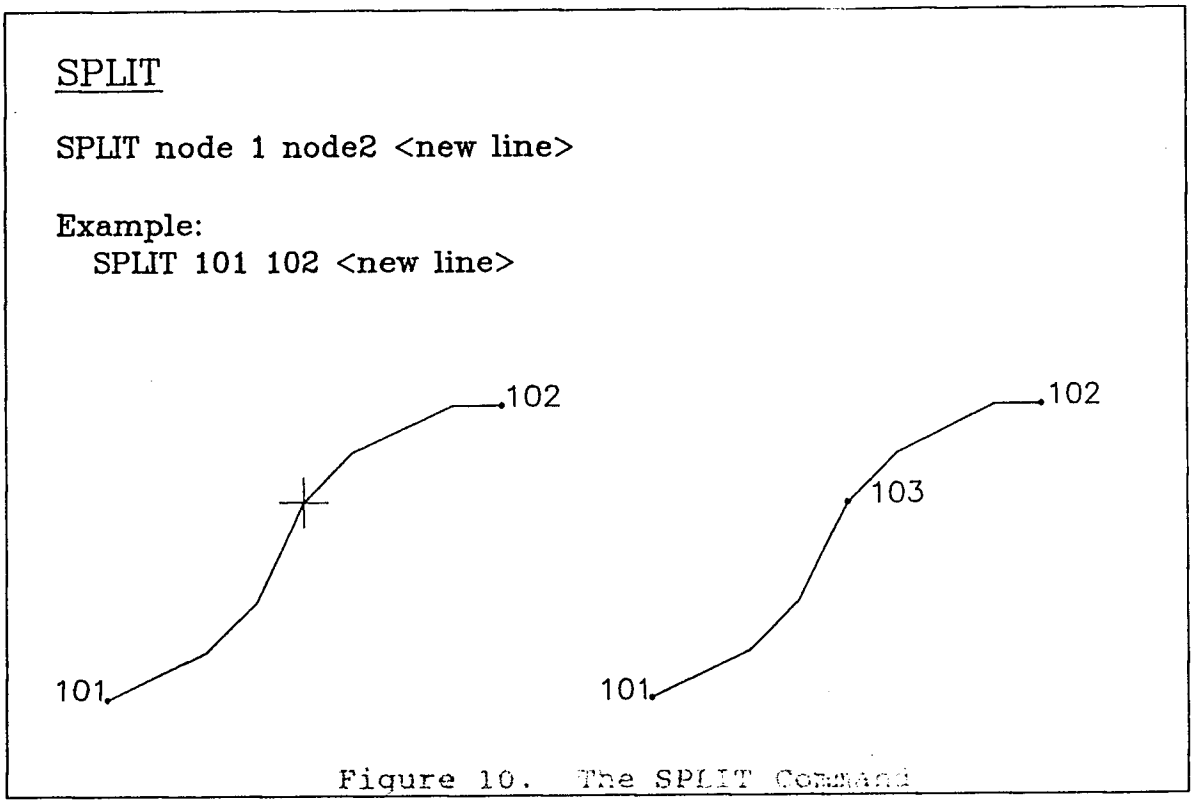


Figure 10. The SPLIT Command

VERIFY [ON/OFF]

With no argument, the VERIFY mode is flipped ON to OFF and vice versa. If ON or OFF specified, that is the new state. Verify mode on maximizes program explanation and prompting. When off, a minimum of such explanation is given. It is advisable to have VERIFY on when the user is new. It can prevent a lot of problems.

WINDOW [NUMBER]

Selection of new view relative to the current view. When new view is selected, a fresh view occurs with node numbering if

NUMBER is selected.

?WINDOW <NEW LINE>
SELECT CORNERS <0> (X-ENTER X,Y)
(N-NORTH,S-SOUTH,E-EAST,W-WEST,Z-ZONE)

As soon as the window command in entered the cross hair will appear on the screen. There are three ways to create a window. One is by using the cursor, the second one is by entering the X and Y coordinates of the new view, and the third one is by indicating the direction (N,S,E,W) for the new view.

USING THE CURSOR:

Position the cross hair on one corner of the desired area to window. **Press any key and new line.** Position the cross hair on the opposite corner of the previously picked corner. **Press any key and new line**. At this point the program will give the option to either reject or to accept the chosen window.

USING X,Y COORDINATES:

Type **X** and the program will prompt with the following:
ENTER XMIN,YMIN,XMAX,YMAX
Enter the X,Y coordinates and press new line. The program will change the view to the desired view.

USING N,S,E,W:

If an **N** is typed (the program will behave the same way with S,E, and W) this indicates to the program that NORTH is the desired direction to go from the present view. The program will prompt the following:
(E-NORTHEAST,W-NORTHWEST)
Depending on the letter (**E** or **W**) entered, that will be the direction that the new view will have. Type **N** to go straight north.
ENTER 1 FOR OVERLAP
Enter **1** if half of the present view and half of the new one is desired. Type **0** for a complete new view.

The command NUMBER may be used in combination with WINDOW. This is accomplished by typing NUMBER right after typing WINDOW. When the option ZONE needs to be used, it is necessary to type ZV before the command WINDOW is entered.

ZOOM [NUMBER]

?ZOOM <NEW LINE>
SELECT NEW CENTER <0>
(N-NODE,S-SAME,X-(X,Y) INPUT)

As soon as the ZOOM command is entered the cross hair will appear on the screen. The user will have three options:

a) Enter N to choose a node.
b) Enter S to keep the same view.
c) Enter X/Y location for new center by specifying the X

cursor control character.

SELECTING N-NODE:
Type **N** and the program will prompt with the following:
ENTER NODE NUMBER <0>
After the node number is entered the program will prompt with the following:
ENTER NEW VIEW SIZE IN INCHES <-1.>
Enter the size of the desired view.

SELECTING THE S-SAME:
Type **S** and the program will prompt with the following:
ENTER NEW VIEW SIZE IN INCHES <-1.>
Enter the size of the desired view.

SELECTING X-(X,Y):
Type **X** and the program will prompt with the following::
ENTER X,Y <-1.,-1.>
Enter the X,Y coordinates.
ENTER NEW VIEW SIZE IN INCHES <-1.>
Enter the size of the desired view.

The command NUMBER may be used in combination with ZOOM. It must be typed right after ZOOM.

MAPGEN

This program generates plotfiles, digitized data files in X,Y projected coordinates in inches, and digitized data files in longitude and latitudes values in degrees.

To execute the program type:

X MAPGEN <new line>

When maps whose Row/Column designations are outside the selected area the options are:

0 = Do not use the maps
1 = Ignore the location and use the map

Please enter your option?

This means that if the parameters of the map to make are outside the designated area for the State of Kansas, the program will not execute unless 1 is entered.

...Precede Names files names with '*' if files is direct.

Please enter Names File name?

The program expects as input the arc file. There are two ways to do this:

1.- Prepare a file listing of all the arc file names needed.

2.- Precede the arc file name with '*'. This is when only one arc file is needed.

The options for output form are:

0 = Plot with NO clipping.
1 = DDF with NO clipping.
10 = Plot with projected X/Y clipping.
11 = DDF with projected X/Y clipping.
20 = Plot with Lat/Long clipping.
21 = DDF with Lat/Long clipping.

Please enter the output FORM?

There are some restrictions on the size of the plot files due to the physical size of the two plotters available:

XYNETICS Plotter XMAX = 56.9 YMAX = 41.9

CALCOMP Plotter XMAX = No Limit YMAX = 43.9

When any of the plot options form (0, 10, 20) are used, the program will display the following:

The current plotter size is:

XMAX = 56.9 YMAX = 41.9

Enter 1 to accept, 0 to change?

If 1 is entered the program will go to the next step, which is to choose the output projection (page 3).

If 0 is entered the program will display the following:

Enter new plotter XMAX, YMAX?

Once the above question is answered accordingly, the program will display the information just entered for verification as follows:

The current plotter size is:

XMAX = ##.## YMAX = ##.##

Enter 1 to accept, 0 to change?

Please respond accordingly. If 1 is entered the program will go to the next step, which is to choose the output projection (page 3). If 0 is entered the program will allow you to enter a new plot file size until the desired size is obtained.

Explanation for the output form options:
Option 0 will produce a plot file of the same area of the arc file(s).

Option 1 will produce a digitized data file of the same area of the arc file(s).

Option 10 will produce a plot file and the program requires the X,Y coordinates of the desired area.

Option 11 will produce a digitized data file and the program requires the X,Y coordinates of the desired area.

Option 20 will produce a plot file and the program requires the Lat/Long (in degrees) values of the desired area.

Option 21 will produce a digitized data file and the program requires the Lat/Long (in degrees) values of the desired area.

WHEN THE OPTION 0 FOR THE OUTPUT FORM (page 1) IS SELECTED, and the maximum size for the plot has been chosen, the program will display the following:

The options for output projections are:

0 = No Projection
1 = Modified Polyconic
2 = Lambert Conformal
3 = STANDARD STATE OF KANSAS

Please select your Output Projection?

If selection 0 is chosen, the program will prompt the following:

Please enter Scale Factor?

The respond should be 1 and then the program will require the X,Y coordinates of the desired area.

Please enter X-Minimum, Y-Minimum?

Please enter X-Maximum, Y-Maximum?

Please respond accordingly to the two questions above.

Standard State of Kansas selection includes the Lambert Conformal Projection with a scale of 1:500,000. If this selection is chosen the next two (or three in the case the Lambert Conformal Projection (2)was selected) question will be skipped.

If selection 1 or 2 is chosen, the program will ask the operator to enter the SCALE FACTOR to which the operator should enter the scale the data will be projected at, and the program will prompt the following:

Please enter SOUTH, NORTH latitudes in degrees?

PLease enter WEST, EAST longitudes in degrees?

Please enter SOUTH, NORTH standard parallels?

The program will only ask the above question (standard parallels) when the option Lambert Conformal Projection is used.

Selected coverage includes the following Quad maps:
Rows # through #
Columns # through #

The program will display the coverage in terms of rows and columns according to the projection parameters.

***** Output projection parameters *****

At this point the program will list information for the programmer about the projection including the coordinates of the four corners of the projection.

Please enter 1 if offsets are non-zero, 0 otherwise?

If offsets are needed enter **1** and the program will prompt the following:

Please enter X-offset, Y-offset?

Enter the offsets needed.
If the plot size exceeds the maximum plot size chosen, the program will complain and it will display the following options:

**** MAXIMUM PLOT SIZE EXCEEDED ****

PLOT XMAX, YMAX = ######, ######

Your options are:

0 = RESET PARAMETERS
1 = STOP EXECUTION
2 = CONTINUE AS IS

Please select your recovery option?

At this point the operator should check if a mistake was made in entering the parameters or if a change is necessary. The program will go back to ask for the OUTPUT PROJECTION, THE SCALE FACTOR, THE SOUTH AND NORTH LATITUDES, THE WEST AND EAST LONGITUDES, AND THE OFFSETS.

If no mistakes were made entering the parameters and the plot file does not exceed the maximum size, the program will prompt the following:

The Plot minima in X, Y are: ##.##, ##.##

The Plot minima in X, Y are: ##.##, ##.##

The program is giving the exact size of the plot file in inches.

Weeding Threshold must be at least = 0.0001
Enter Weeding Threshold for excess point removal (0.005)

The threshold will depend on the level of generalization needed.

Please enter name of output file 1, NEWLINE to stop? =

Enter the file name.

Please enter LOW code, HIGH code (-1,0 to stop)? =

Enter the range of feature codes needed. The program will accept up to 15 ranges per output file. After the 15th range of codes, the program will ask for the LOW code, HIGH code to which the operator should enter -1,0 to stop.

File 1 Filename = (Pathname of the output file)

Feature code ranges selected:

Low Code	High Code
####	####
####	####
####	####

Please enter 1 to accept, 0 to retry? =

The program displays the full pathname of the output file and the ranges of feature codes used for that file to be checked. If 0 is entered the program will ask again to enter the OUTPUT FILE NAME for the first file. If everything is OK a 1 should be entered and the program will ask for the next output file. The program will accept up to 15 output files. When the operator is through creating plotfiles enter NEW LINE and the program will prompt the following:

You have selected ## output files.

1 = Add Registration marks
2 = Add a Map frame
3 = Add BOTH
0 = Add NEITHER

Please select your Mark/Frame option?

If Registration marks is selected, the program will ask the following:

For Registration marks....

0 = Use Projected Corners of Map Area
1 = See Current Min/max and Specify locations

Please select your Mark Location option?

If 0 is selected the program will use the projection parameters

entered previously. If 1 is selected the program will display the following:

The current Plot maxima INCLUDING offsets are:

XMIN = ## YMIN = ##
XMAX = ## YMAX = ##

The program is giving the projection parameters of the plotfile in inches, so those values could be used for the location of the registration marks.

Enter Registration Mark XMIN, YMIN with offsets?

Enter Registration Mark XMAX, YMAX with offsets?

Enter the desire location for the registration marks.

Please enter the SIZE of Registration marks (0.5)?

Enter the desire size for the registration mark.

Plot size at initialization is: ##.##(X) by ##.##(Y).

The location that the program is giving includes the size of the registration mark.

If selection 2 is chosen (Add a Map frame), the program will prompt the following:

Options for the Map Frame are:

0 = Use Projected or current Min/Max
1 = See current Min/Max and specify locations

Please select your Frame Location option?

If 0 is the answer, the program will display the following:

Plot size at initialization is: ##.##(X) by ##.##(Y).

If 1 is the answer, the program will prompt the following:

The current Plot maxima INCLUDING offsets are:

XMIN = ##.## YMIN = ##.##
XMAX = ##.## YMAX = ##.##

Enter the Map Frame XMIN, YMIN with offsets?

Enter the Map Frame XMAX, YMAX with offsets?

Please enter the coordinates where the MAP FRAME is desired.

Plot size at initialization is: ##.##(X) by ##.##(Y).

If selection 3 (Add Both) is chosen, the program will prompt the following:

For Registration marks...

0 = Use Projected Corners of Map Area
1 = See Current Min/Max and Specify locations

Please select your Mark Location option?

If 0 is selected the program will use the projection parameters entered. If 1 is selected the program will display the following:

The current Plot maxima INCLUDING offsets are:

XMIN = ## YMIN = ##
XMAX = ## YMAX = ##

The program is giving the projection parameters of the plot file in inches, so those values could be used for the location of the registration marks.

Enter Registration Mark XMIN, YMIN with offsets?

Enter Registration Mark XMAX, YMAX with offsets?

Please enter the SIZE of Registration marks (0.5)?

Enter the desire size for the registration mark.

Options for the Map Frame are:
0 = Use Projected or current Min/Max
1 = See current Min/Max and specify locations

Please select your Frame Location option?

If 0 is the answer, the program will use the existing min/max in the file and it will display the following:

Plot size at initialization is: ##.##(X) by ##.##(Y).

If 1 is the answer, the program will prompt the following:

The current Plot maxima INCLUDING offsets are:

XMIN = ##.## YMIN = ##.##
XMAX = ##.## YMAX = ##.##

Enter the Map Frame XMIN, YMIN with offsets?

Enter the Map Frame XMAX, YMAX with offsets?

Please enter the coordinates where the MAP FRAME is desired.

Plot size at initialization is: ##.##(X) by ##.##(Y).

Plot size at initialization is: ##.##(X) by ##.##(Y).

The location that the program is giving includes the size of the registration mark.

Enter 1 for Origin Mark, 0 to suppress?

For GIMMAP label, enter 1 = YES, 0 = NO?

If 1 is entered, the program will display ...

******* Creating the GIMMAP label *******

Enter 1 for Date/Time, 0 if not desired?

If 0 is entered, the program will display ...

LABEL = GIMMAP/KGS PROJECTION TYPE SCALE DATE TIME

*** Codes for Point Symbols:**

The following is a list of symbols available for point arcs:

CODE	SYMBOL	CODE	SYMBOL	CODE	SYMBOL
101	+ Plus (dflt.)	107	Fiducial	115	Misc. Well
102	Letter X	108	Hexagon	121	Inv.Triangle
103	Asterisk (*)	111	Oil Well	131	Solid Circle
104	Square	112	Gas Well	132	Solid Triangle
105	Circle	113	Oil & Gas Well	133	Solid Square
106	Triangle	114	Dry Hole		

*** Codes For Line Types:**

The following is a list of the different line types available for line type arcs:

CODE	SYMBOL	CODE	SYMBOL	CODE	SYMBOL
200	Solid (dftl.)	203	Hashed	206	Long/Short/Short
201	Dashed	204	Double-Dashed		
202	Double	205	Long/Short Dashed		

Enter (0,0,0) for Code list, (-1,0,0) to exit...

Enter LOW, HIGH, LINE/SYMBOL code?

If no selection from the two list above is made the line type arcs will be solid and the point type arcs will be .1 inches plus signs and the answer should be **-1,0,0**

Input Database Profiles:

1. Base: arc file name Input Pro. = # Scale: ##### Output Pro.= -#

Area = Projection Parameters in Lat/Long values

Standard Parallels = if Lambert Conformal Projection was used.

*** Row # Column # Used #Arcs *****

The program displays for each of the base(s) used as input data and gives the ARC FILE NAME of the input base, the type of PROJECTION of the input base, the SCALE of the input base, the type of PROJECTION for the output file, the SCALE for the output file. It also displays the projection parameters of the input base in lat/long values. The program shows the ROW # and the COLUMN # used if the area is within the designated area for the State of Kansas, and indicates the number of arcs created.

*** Output File Arc Count ***

1. # Arcs To File: Output file Pathname

*** * The number of Reject Points Is at least # * ***

The program will show the number of points rejected according to the threshold used for weeding.

STOP

WHEN OPTION 1 FOR THE OUTPUT FORM (page 1) IS SELECTED:

The DDF output may be in three forms:

0 = Projected X,Y coordinates
-1 = (Negative) Longitude, Latitude in degrees
1 = (Positive) Longitude, LAtitude in degrees

Please select your DDF output form?

If the answer is -1 or 1 (the difference is that one output will have negative values and the other output will have positive values) the program will display the following:

Do you want Feature Code headers in the file?

1 = YES, add Feature Code headers
0 = NO, do not add them to the file

Do you want Discontinuity flags in the file?

1 = YES, add Discontinuity flags
0 = NO, do not add them to the file

With regard to any existing Z-values..

1 = Place all Z-values in DDF files
0 = Ignore Z-values, do not put in DDF files

If the answer is 0 to select the DDF output form, the program will display the following:

The options for the output projection are:

0 = No Projection
1 = Modified Polyconic
2 = Lambert Conformal Conic
3 = STANDARD STATE OF KANSAS

If selection 0 is chosen, the program will prompt the following:

Please enter Scale Factor?

The respond should be 1 and then the program will require the X,Y coordinates of the desired area.

Please enter X-Minimum, Y-Minimum?

Please enter X-Maximum, Y-Maximum?

Please respond accordingly to the two questions above.

Standard State of Kansas selection includes the Lambert Conformal Projection with a scale of 1:500,000. If this selection is chosen the next two (or three in the case Lambert Conformal Projection (2)was selected) question will be skipped.

If selection 1 or 2 is chosen, the program will prompt the following:

Please enter SOUTH, NORTH latitudes in degrees?

PLease enter WEST, EAST longitudes in degrees?

Please enter SOUTH, NORTH standard parallels?

The program will only ask the above question (standard parallels) when the option Lambert Conformal Projection is used.

Selected coverage includes the following Quad maps:
Rows # through #
Columns # through #

The program will show the coverage in terms of rows and columns according to the projection parameters.

***** Output projection parameters *****

At this point the program will list information for the programmer about the projection, including the coordinates of the four corners of the projection.

Please enter 1 if offsets are non-zero, 0 otherwise?

If offsets are needed enter **1** and the program will prompt the following:

Please enter X-offset, Y-offset?

Enter the offsets needed.

Weeding Threshold must be at least = 0.0026
Enter Weeding Threshold for excess point removal (0.0026)?

The threshold will depend on the level of generalization needed.

With regard to any existing Z-values..

1 = Place all Z-values in DDF files
0 = Ignore Z-values, do not put in DDF files

Please select your Z-value option?

Depending on the answer given, the program will either place the Z values on the DDF file or not.

Please enter name of output file 1, NEWLINE to stop? =

Enter the full pathname of the output file.

Please enter the Header for this output file? =

Enter the BASENAME_SESSION#, PROJECTION TYPE, SCALE, DATE.

Please enter LOW code, HIGH code (-1,0 to stop) =

Enter the range of feature codes needed. The program will accept up to 15 ranges per output file. After the 15th range of codes, the program will ask for the LOW code, HIGH code to which should be entered -1,0 to stop.

File 1 Filename = (Pathname of the output file)

Feature code ranges selected:

Low Code -	High Code
####	####
####	####
####	####

Please enter 1 to accept, 0 to retry? =

The program displays the full pathname of the output file and the ranges of feature codes used for that file to be checked. If 0 is entered the program will ask again to enter the OUTPUT FILE NAME for the first file. If everything is OK a 1 should be entered and the program will ask for the name of the next output file. When the operator is through creating the DDF, enter NEW LINE and the program will prompt the following:

You have selected ## output files.

Input Database Profiles:

1. Base: arc file name Input Pro. = # Scale: ##### Output Pro.= -#

Area = Projection Parameters in Lat/Long values
Standard Parallels = if Lambert Conformal Projection was used.

*** Row # Column # Used #Arcs *****

The program displays for each of the base(s) used as input data and gives the ARC FILE NAME of the input base, the type of PROJECTION of the input base, the SCALE of the input base, the type of PROJECTION for the output file, the SCALE for the output file. It also displays the projection parameters of the input base in lat/long values. The program shows the ROW # and the COLUMN # used if the area is within the designated area for the State of Kansas, and indicates the number of arcs created.

*** Output File Arc Counts ***

1. # Arcs To File: Output file Pathname

*** * The number of Reject Points Is at least # * ***

The program will show the number of points rejected according to the threshold used for weeding.

STOP

WHEN THE OPTION **10** FOR THE OUTPUT FORM (page 1) IS SELECTED, and the maximum size for the plot has been chosen, the program will display the following:

For the Clipping Window...

Enter Minimum, Maximum X values?

Enter Minimum, Maximum Y values?

Please enter the values of the desire area to be clipped.

Clip window set at ##.## ##.## ##.## ##.##

From here on the questions are the same from page 2 to page 11.

WHEN THE OPTION **11** FOR THE OUTPUT FORM (page 1) IS SELECTED:

For the Clipping Window...

Enter Minimum, Maximum X values?

Enter Minimum, Maximum Y values?

Please enter the values of the desired area to be clipped.

Clip window set at ##.## ##.## ##.## ##.##

Please enter the values of the desire area to be clipped.

From here on the questions are the same from page 12 to page 15

WHEN THE OPTION **20** FOR THE OUTPUT FORM (page 1) IS SELECTED: and the maximum size for the plot has been chosen, the program will display the following:

For the Clipping Window...

Enter SOUTH, NORTH Latitudes in degrees?

Enter WEST, EAST Longitudes in degrees?

Clip window set at ##.## ##.## ##.## ##.##

The Clip Window boundaries in radians are:
##.## ##.## ##.## ##.##

The options for output projections are:

0 = No Projection
1 = Modified Polyconic
2 = Lambert Conformal
3 = STANDARD STATE OF KANSAS

Please select your output Projection?

If selection 0 is chosen, the program will prompt the following:

Please enter Scale Factor?

The respond should be 1 and then the program will require the X,Y coordinates of the desired area.

Please enter X-Minimum, Y-Minimum?

Please enter X-Maximum, Y-Maximum?

Please respond accordingly to the two questions above.

Standard State of Kansas selection includes the Lambert Conformal Projection with a scale of 1:500,000. If this selection is chosen the next two (or three in the case Lambert Conformal Projection 2 was selected) questions will be skipped.

If selection 1 or 2 is chosen, the program will ask for the SCALE FACTOR the data will be projected at, and the program will prompt the following:

To specify the output projection area...

1 = Specified by You
2 = Use Area set for Clipping Window

If 2 is entered, the program will use the parameters already

selected for the Clipping Window and it will skip the next two (or three if Lambert Conformal Projection was chosen) questions. If 1 is entered, the program will prompt you with the following:

Please enter SOUTH, NORTH latitudes in degrees?

Please enter WEST, EAST longitudes in degrees?

From here on the questions are the same from page 2 to page 11.

WHEN THE OPTION **21** FOR THE OUTPUT FORM (page 1) IS SELECTED:

For the CLIPPING Window...

Enter SOUTH, NORTH Latitudes in degrees?

Enter WEST, EAST Longitudes in degrees?

Clip window set at ##.## ##.## ##.## ##.##

The Clip Window boundaries in radians are:
##.## ##.## ##.## ##.##

From here on the questions are the same from page 12 to page 15.

DEFINITIONS

BASE NAME

When talking about the Kansas Cartographic Database (KCD), the base name consist of:

The county abbreviation
The row number
The column number
A letter which indicates the level of information

When is other than KCD, the base name consists of:

Seven characters which should be descriptive of the content of the base.

WORKING AND SAVE FILES

This means that there are two different versions of the data base. One of them is the current or working copy, and the other one is a backup or save.

SIMPLE ISLAND

It is a zone completely surrounded by another zone whose boundaries do not intersect.

COMPLEX ISLAND

It is the outer boundary of an island which is made of two or more separate zones.

NOTE:

Bold letters indicate that the program is either prompting to receive an answer or is giving information about the file that is being either created or used. Bold underlined letters indicate explicit entries by the operator.

ZONE

This program allows to give attributes to zones. By now the base that is going to be used should exist in the system. And ZONG should have been run on it prior to use the ZONE program. To initiate the program type:

<u>**ZONE**</u> <new line>
Enter BASE name?
Base name defined in page ?????

Enter W(orking) or S(ave) files?
Working and Save files defined in page ?????
Enter the letter that corresponds to the set of files that will be used.

**** Creating a Back-up Copy.... ****

*** * * -> INITIALIZING ....**

?

When the ? appears it means that the files are initialized and zone editing may begin.

This program has a HELP command which list the commands available:

?<u>**HELP**</u> <new line>

****

MENU FOR ZONE EDITING PROGRAM

ALL [COLOR/MARK/NUMBER] [LABEL]
Erase screen,reset view area to maximum, and draw all zones which are unmasked. If selected, add zone marks with number/colors and labels.

BELL [ON/OFF]
Turn the prompt bell ON or OFF, or flip it (ON <--> OFF.

COLOR [ALL/DICTIONARY/oldcolor,newcolor/zone]
Change the zone colors of all zones/all of an old color, a zone chosen by cursor (default) or number. Or convert % colors <--> color codes.

DELETE [islandzone]
Delete a selected simple island zone.

END
Stop the zone editing program.

FRESH [COLOR/MARK/NUMBER] [LABEL]]//[ISLAND [FREE]]
Erase screen, display same view,with same options as ALL above.

HELP [COMMAND]
List the menu of commands (no argument) or help with one command.

ISLAND [surrounding zone]
Add or remove islands to/from zones selected by number or cursor.

LABEL [ALL/zone] [hook]
Label all zones or one chosen by cursor or number, with optional hook.

MARK [ALL/zone/DISPLAY]
Move/change size of all zone marks or one chosen by cursor or number.

NUMBER [ALL/zone]
Number all zones or one chosen by cursor (default) or number.

PLOT [MARK]
Create plot file of zones selected by up to 5 code ranges. If selected, zone marks will be included. If not, user will be prompted.

RESTORE [COLOR/MARK/NUMBER] [LABEL]
Restore view from previous SAVE command with options as in ALL above.

SAVE
Save the current view parameters for a later RESTORE command.

VERIFY [ON/OFF]
Set verify mode ON or OFF, or flip it (ON <--> OFF).

WINDOW [COLOR/MARK/NUMBER] [LABEL]
Select corners of new view, move view by compass directions with overlap, or select zone min/max X,Y view. With same options as ALL above.

ZOOM [COLOR/MARK/NUMBER] [LABEL]
Select new view by center and size, with center selected by cursor, as unchanged, or at a zone mark, with same options as ALL above.

****

All commands except MARK and MASK may be abbreviated by their fist letters.
Arguments in UPPER CASE are literal, and those in lower case require a number (e.g. zone) or a name (e.g. command). Commas or blanks may be used as separators. Optional arguments are in [square brackets], with the options separated/by/slashes.

ALL [COLOR/MARK/NUMBER] [LABEL]

Erases the screen, resets the view area to maximum view area, and displays all the zones which are not masked. If selected, add zone marks with number/colors and labels.

BELL [ON/OFF]

Type the letter B to set the BELL mode ON or OFF. When the BELL mode is ON the program will prompt the bell every time t h e program expects an answer from the user or when the program has executed an operation.

COLOR [ALL/DICTIONARY/oldcolor,newcolor/zone]

When COLOR is combined with ALL the program will change the color of all the zones in the base one by one. The program needs to have specified the minimum zone number to start making the change of color. When there are a lot of zones colored the same and there is a need to change the color of those zones, the program can do it all at the same time if the option oldcolor-newcolor is used. To change the color of an specific zone, the number of the zone should be entered after the command. The DICTIONARY option gives two choices of color schemes of the primary colors. The first color scheme consists of Cyan, Magenta, and Yellow. The second color scheme consists of Cyan, Magenta, Yellow, and Black. After one color scheme is selected, the program asks the operator to enter the percentage of each color and in return it will give a color code for that particular combination of colors. That color code is the number that needs to be entered in the zones when a particular color combination is desired.

DELETE [islandzone]

When this command is entered without any arguments the program will ask to select the zones that are going to be deleted by using the cross hair. The other option is to enter the command followed by the zone number that is going to be deleted.

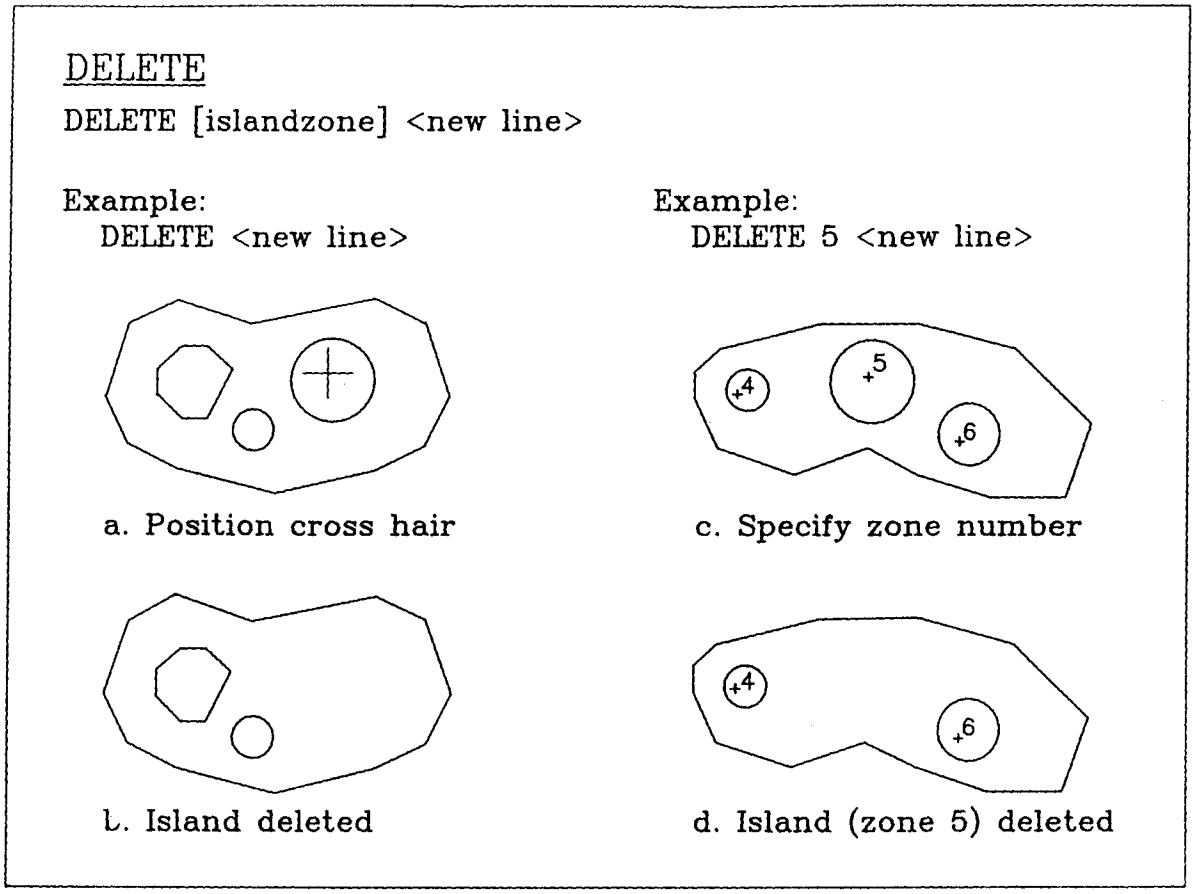


Figure 1. The DELETE Command

END

This command will stop execution of the program. If a mistake was made or no changes were made, it will give the option not to save the session and the data in the base will not be altered. If the session is saved, the data in the database will be updated.

FRESH [COLOR/MARK/NUMBER] [LABEL]//[ISLAND [FREE]]

Erases the screen and displays the same view. If the command is combined with COLOR, it will refresh the view and display the color numbers. If the command is combined with MARK, it will refresh the view and will display the marks. If the command is combined with NUMBER, it will refresh the view and will display the zone numbers. If the command is combined with ISLAND, it will refresh the view and will display all the islands.

HELP [command]

Displays a list of all the commands available along with a brief description of what each one does. When HELP is combined with another command, it will provide information of that particular command only.

ISLAND [surrounding zone]

When ever islands exist in the base they should be added to their surrounding zone. The islands may be added to or removed from zones selected by the number of the surrounding zone which contains simple islands or by the cursor.

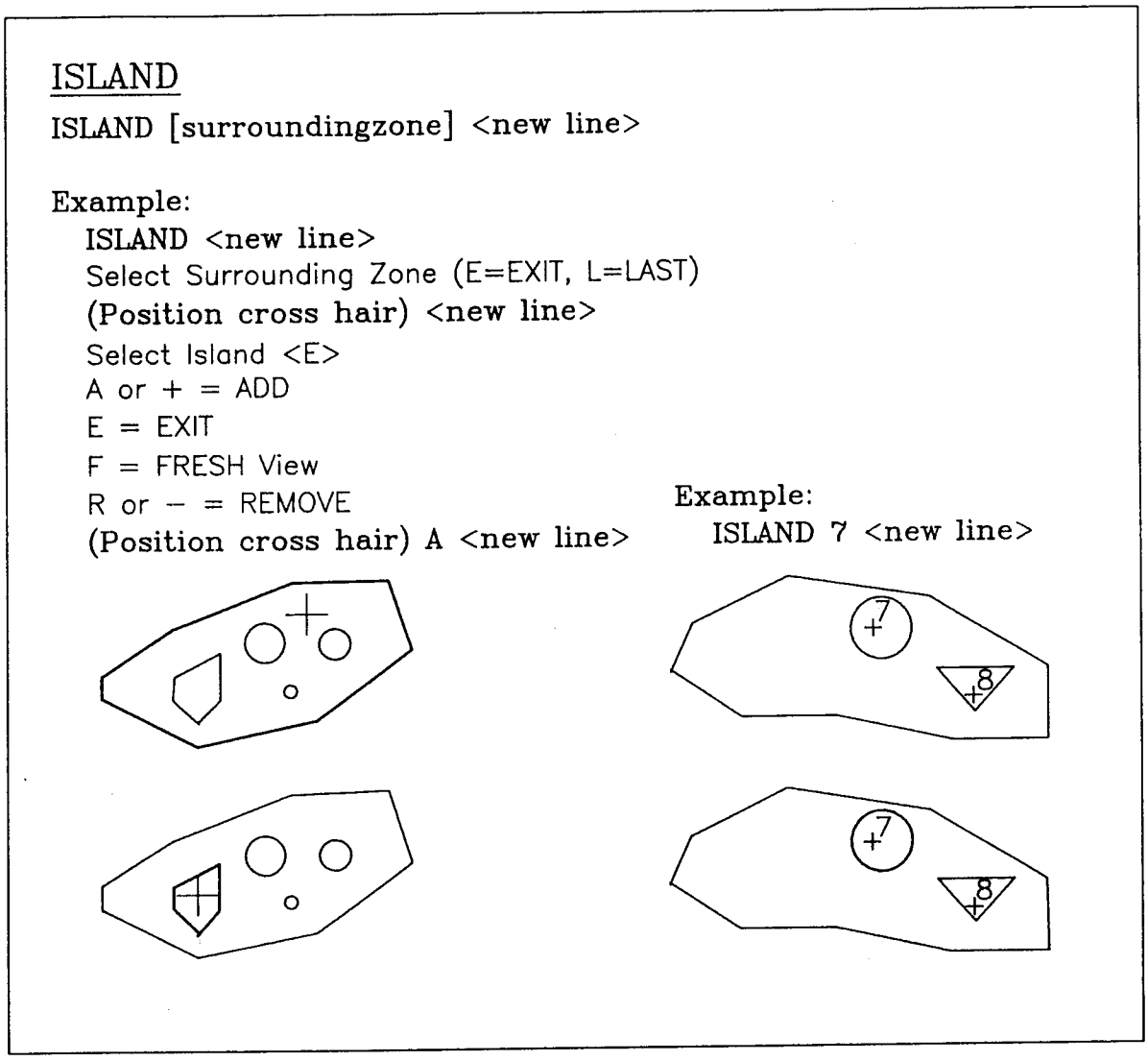


Figure 2. The ISLAND Command

LABEL [ALL/zone] [hook]

This option is not implemented yet.

MARK [ALL/zone/DISPLAY]

This command will allow to change the location and the size of all the zone marks. When MARK is combined with ALL, the program will require to have the minimum zone number to start with and if there is a default size for the mark. The program will display in a numerical order each zone along with the mark for any changes or confirmation of size and location until it reaches the last zone or the operator wishes to stop. When a single mark needs to be checked one can either enter the command MARK followed by the number of the zone or select the desired zone (when the zone in question is in view) with the cursor by just entering the command MARK by itself.

MARK

MARK [ALL/zone/DISPLAY] <new line>

Example:

MARK ALL <new line>
Enter MINIMUM ZONE number <-1>?
20 <new line>
For Default mark size 1=Yes 0=No ?
0 <new line>

Zone 20
MARK options:
Both, Exit, Ok, Position, Size

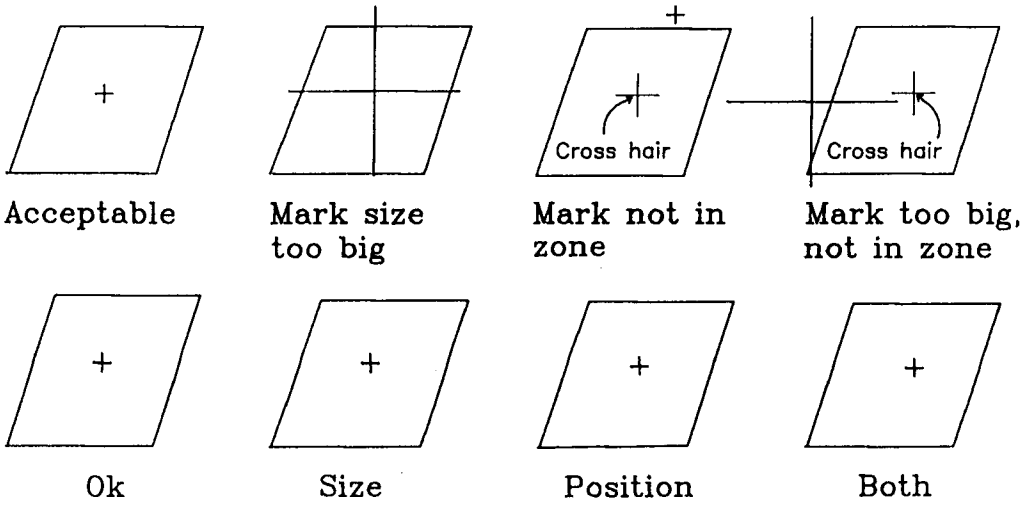


Figure 3. The MARK Command

NUMBER [ALL/zone]

This command numbers all the zones when combined with ALL . To know the number of a particular zone in view, it can be selected with the cursor by just entering NUMBER.

PLOT [MARK]

?PLOT <new line>

Enter LOW, HIGH Color <-1,0>?

The program expects to receive a color code range and it will accept up to 5 color code ranges.

Enter Plot File pathname?

Enter the full pathname for the plot file.

Enter Plot SCALE factor <-1,0>?

Enter a **1** to produce a plot file at the same scale as the base. To double the scale enter a **2**.

For offsets enter 1=YES, 0=NO <-1,0>?

Type **1** to enter offsets

Enter X, Y Offsets?

Enter the offsets. The program will the display the size of the plot in inches including the offsets.

Plot XMIN,YMIN = ##.####, ##.####
Plot XMAX,YMAX = ##.####, ##.####
For Zone MARKS enter 1=YES,0=NO <-1,0>?

To include the marks in the plot file enter 1

Enter minimum (scaled) Mark Size <-1,0>?

Enter the desired size for the zone marks.

Enter (additional) Mark Scaling Factor <-1,0>?

Some times the size of the zone is very small and the minimum size of the mark entered above might be too big. This question means that if the program finds a mark smaller than the minimum size entered above it should make the number that you respond to this question times bigger.

Where Zone colors on both sides are qualified should arcs be plotted 1=YES, 0=NO <-1,0>?

Respond accordingly

For Zone LABELS enter 1=YES, 0=NO <-1,0>?

If a 1 is entered symbology will be associated with that zone. This option is not implemented yet.

For Registration marks enter 1=YES, 0=NO <-1,0>

If a 1 is entered, the program will prompt the following.

Enter XMIN, YMIN for Registration marks?

Enter the desired location for the registration marks. Refer to the question "For offsets enter 1=YES, 0=NO <-1,0>" (page #9), when the size of the base is needed to answer to this question.

Enter XMAX, YMAX for Registration marks?

Enter the desired location for the registration marks. The program provides the information needed if the actual size of the base will be used

Enter Registration mark size?

The program does not accept anything less then .5

Enter 1 for Origin Mark, or 0 to suppress?

It is advisable to have the origin mark except when creating a plot that is going to be used for the final production.

There were # arcs plotted.

The program is reporting the number of arcs plotted.

RESTORE [COLOR/MARK/NUMBER] [LABEL]

If a view has been saved via the SAVE command, it is hereby restored according to the current MASK. This command may be used with all the options listed above.

SAVE

Saves the current view parameters on display for a later return via the RESTORE command.

VERIFY [ON/OFF]

With no argument, the VERIFY mode is flipped ON to OFF and vice versa. If ON or Off specified, that is the new state. Verify mode on maximizes program explanation and prompting. When OFF, a minimum of such explanation is given. It is advisable to have VERIFY on when the user is new. It can prevent a lot of

problems.

WINDOW

?WINDOW <NEW LINE>
SELECT CORNERS <0> (X-ENTER X,Y)
(N-NORTH, S-SOUTH, E-EAST, W-WEST, Z-ZONE)

As soon as the WINDOW command is entered the cross hair will appear on the screen. There are three ways to create a window. One is by using the cursor, the second one by entering the X and Y coordinates of the new view, and the third one is by indicating the direction (N,S,E,W) for the new view.

USING THE CURSOR:

Position the cross hair on one corner of the desired area to window. Press any key and new line. Position the cross hair on the opposite corner of the previously picked corner. Press any key and new line. At this point the program will give the option to either reject or accept the chosen window.

USING X,Y COORDINATES:

Type X and the program will prompt the following:

ENTER XMIN,YMIN,XMAX,YMAX

Enter the X,Y coordinates and press new line. The program will change the view to the desired view.

USING N,S,E,W:

If an N is typed (the program will behave the same way with S,E, and W) this indicates to the program that NORTH is the desired direction to go from the present view. The program will prompt the following:

(E-NORTHEAST,W-NORTHWEST)

Depending on the letter (E or W) entered, that will be the direction that the new view will have. Type N to go straight north.

ENTER 1 FOR OVERLAP

Enter 1 if half of the present view and half of the new one is desired. Type 0 for a complete new view.

ZOOM [COLOR/MARK/NUMBER] [LABEL]

Select new view by selecting a center point and size for the new view.

?ZOOM <NEW LINE>
Select New Center <0>
(S-Same,X-(X,Y) Input,Z-Zone Mark)

As soon as the ZOOM command is entered the cross hair will appear on the screen. The user will have three options:

a) Cursor selection of new center.

b) Enter X/Y location for new center by specifying the X cursor control character.
c) Use zone mark for center by specifying Z cursor control character.

USING THE CURSOR:

Position the cross hair in the center of the desired new view. Press any key and new line. At this point the program will give the operator the option to either reject or accept the chosen position. If the operator decides to accept the chosen position the program will prompt with the following:

Enter new View SIZE in inches <-1,>?

Enter the desire new view.

The program will highlight the new view giving the operator the option to either reject it or accept it. If accepted the program will display the chosen new view area.

USING X,Y COORDINATES:

Type X and the program will prompt the operator with the following:

Enter X,Y <-1.,_1.>?

Enter the X,Y coordinates (these are the coordinates of the center for the new view) and press new line. The program will then highlight the chosen point giving the option whether to reject it or accept it. If accepted the program will prompt the operator with the following:

Enter new View SIZE in inches <-1.>?

Enter the desire new view.

The program will highlight the new view giving the operator the option to either reject it or accept it. If accepted the program will display the chosen new view area.

USING THE ZONE MARK:

Type Z and the program will prompt the operator with the following:

Enter Zone Number <0>?

Enter the number of the desire zone. The program will verify the center of that zone giving the option whether to reject it or accept it. If accepted the program will prompt the operator with the following:

Enter new View SIZE in inches <-1.>?

Enter the desire new view.

The program will highlight the new view giving the operator the option to either reject it or accept it. If accepted the program will display the chosen zone.

WINDOW

?WINDOW <NEW LINE>
SELECT CORNERS <0> (X-ENTER X,Y)
(N-NORTH, S-SOUTH, E-EAST, W-WEST, Z-ZONE)
As soon as the WINDOW command is entered the cross hair will appear on the screen. There are three ways to create a window. One is by using the cursor, the second one by entering the X and Y coordinates of the new view, and the third one is by indicating the direction (N,S,E,W) for the new view.

USING THE CURSOR:
Position the cross hair on one corner of the desired area to window. Press any key and new line. Position the cross hair on the opposite corner of the previously picked corner. Press any key and new line. At this point the program will give the option to either reject or accept the chosen window.

USING X,Y COORDINATES:
Type X and the program will prompt the following:
ENTER XMIN,YMIN,XMAX,YMAX
Enter the X,Y coordinates and press new line. The program will change the view to the desired view.

USING N,S,E,W:
If an N is typed (the program will behave the same way with S,E, and W) this indicates to the program that NORTH is the desired direction to go from the present view. The program will prompt the following:
(E-NORTHEAST,W-NORTHWEST)
Depending on the letter (E or W) entered, that will be the direction that the new view will have. Type N to go straight north.
ENTER 1 FOR OVERLAP
Enter 1 if half of the present view and half of the new one is desired. Type 0 for a complete new view.

ZOOM [COLOR/MARK/NUMBER] [LABEL]
Select new view by selecting a center point and size for the new view.
?ZOOM <NEW LINE>
Select New Center <0>
(S-Same,X-(X,Y) Input,Z-Zone Mark)
As soon as the ZOOM command is entered the cross hair will appear on the screen. The user will have three options:

a) Cursor selection of new center.
b) Enter X/Y location for new center by specifying the X cursor control character.
c) Use zone mark for center by specifying Z cursor control

character.

USING THE CURSOR:

Position the cross hair in the center of the desired new view. Press any key and new line. At this point the program will give the operator the option to either reject or accept the chosen position. If the operator decides to accept the chosen position the program will prompt with the following:

Enter new View SIZE in inches <-1,>?

Enter the desire new view.

The program will highlight the new view giving the operator the option to either reject it or accept it. If accepted the program will display the chosen new view area.

USING X,Y COORDINATES:

Type X and the program will prompt the operator with the following:

Enter X,Y <-1.,_1.>?

Enter the X,Y coordinates (these are the coordinates of the center for the new view) and press new line. The program will then highlight the chosen point giving the option whether to reject it or accept it. If accepted the program will prompt the operator with the following:

Enter new View SIZE in inches <-1.>?

Enter the desire new view.

The program will highlight the new view giving the operator the option to either reject it or accept it. If accepted the program will display the chosen new view area.

USING THE ZONE MARK:

Type Z and the program will prompt the operator with the following:

Enter Zone Number <0>?

Enter the number of the desire zone. The program will verify the center of that zone giving the option whether to reject it or accept it. If accepted the program will prompt the operator with the following:

Enter new View SIZE in inches <-1.>?

Enter the desire new view.

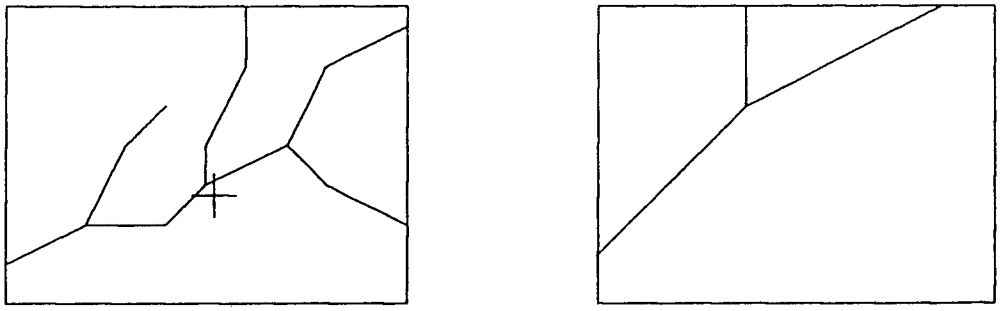
The program will highlight the new view giving the operator the option to either reject it or accept it. If accepted the program will display the chosen zone.

ZOOM

ZOOM <new line>

Example:

ZOOM <new line>
SELECT NEW CENTER <0>
(N–NODE, S–SAME, X–(X,Y) INPUT)
(Position cross hair) <new line>
New view size (inches)?
1 <new line>



a. Select center

b. New view

Figure 4. The ZOOM Command

ZONG

This program generates zones. To execute the program type the following:

ZONG <new line>
Enter BASE name?
Base name is defined in page ?????

Enter W(orking) or S(ave)?
Working and Save files are defined in page ?????

Enter number of Code ranges (1-5)?

The program accepts up to five different code ranges to generate zones. In this way the operator may include or exclude the code ranges needed. For each code range selected the program will prompt the following:

Enter Low, High codes for range 1?

Enter Verbosity Level (0=Low,1=Med,2=High)?

The verbosity level is how much information the program will display on the terminal about each node such as, the arcs joined to a node, the direction of the node, and the pointers of the node. It is recommended to select 0 unless there are problems with the file, then all the information about the nodes would be needed.

Enter default Mark Size for all new zones?

The marks are plus signs that the program will generate for each zone and the program will number each zone in a numerical order. These marks are very important for the location of attributes, such as colors. The mark should be smaller than the zone and it should not touch the zone boundary.

Color options are:

0 = Colors of new Zones set to Zone numbers
1 = Set a default Color for all new Zones

Enter option?

If the answer is 1, the program will prompt the following:

Enter Default COLOR for new Zones?

Enter the color number to have for all zones.

If the answer to COLOR OPTION is 0 the program will use as a color number the same number the program assigned to the zones

Enter approximate percentage of Simple Islands?

By entering a percentage of existing simple islands in the file helps the program to figure out how big to make the border and zone files. It is suggested to enter a small number, so there will be no waste of memory in the computer if not all the records were used. If the program needs more records because the number entered was not sufficient, the program itself will open the records that it needs.

Simple Island defined in page ??????
Complex Island defined in page ?????

Enter approximate percentage of Code-Qualified Arcs?
This refers to the percentage of the arcs specified in the code ranges entered earlier (ENTER NUMBER OF CODE RANGES (1-5)). It is suggested to enter a small number, so there will be no waste of memory in the computer if not all the records were used. If the program needs more records because the number entered was not sufficient, the program itself will open the records that it needs.

***** ZONE FILE INITIALIZATION *****

Suggested MAX file size = ### Recordlength = ##
Current MAX file size = ### Recordlength = #

MAX < 0 for Extension, MAX > 0 for initialization

Enter new MAX file size?

If the program has been run before on the same file you could use the current max size that the program displays otherwise enter what the program suggests.

0* LENGTHS ARE NOT EQUAL *****
FILE CODE # INITIALIZED TO ## RECORDS
WITH RECORD LENGTH = ##

***** BORDER FILE INITIALIZATION *****

Suggested MAX file size = ### Recordlength = ##
Current MAX file size = ### Recordlength = #

MAX < 0 for Extension, MAX > 0 for Initialization

Enter new MAX file size?

If the program has been run before on the same file you could use the current max size that the program displays otherwise enter what the program suggests.

```
0*** LENGTHS ARE NOT EQUAL ***
 FILE CODE 2 INITIALIZED TO   ## RECORDS
 WITH RECORD LENGTH =   ##
  * * * ->   PHASE I.....


  * * * ->   PHASE II....


  * * * ->   PHASE III.....


  * * * ->   PHASE IV.....


  *-*-*-*-*-*-*-*-* ZONGEN REPORT *-*-*-*-*-*-*-*-*
  ** TOTAL NUMBER OF ZONES = ##
  ** TOTAL NUMBER OF BORDER RECORDS = ##
  ** TOTAL NUMBER OF SIMPLE ISLANDS = ##
  ** NUMBER OF 1 LINK SIMPLE ISLANDS = ##
  ** NUMBER WITH MORE THAN 1 LINK = #
  ** NUMBER OF COMPLEX ISLANDS = #
  ** NUMBER OF ARCS REVERSED = #
  ** NUMBER OF ZONES WITH 0 AREA = #
  *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*

STOP
```

APPENDIX

STATE OF KANSAS COUNTY CODES

Code	County	Code	County	Code	County
AL	Allen	GL	Greeley	OB	Osborne
AN	Anderson	GW	Greenwood	OT	Ottawa
AT	Atchison	HM	Hamilton	PN	Pawnee
BA	Barber	HP	Harper	PL	Phillips
BT	Barton	HV	Harvey	PT	Pottawatomie
BB	Bourbon	HS	Haskell	PR	Pratt
BR	Brown	HG	Hodgeman	RA	Rawlins
BU	Butler	JA	Jackson	RN	Reno
CS	Chase	JF	Jefferson	RP	Republic
CQ	Chautauqua	JW	Jewell	RC	Rice
CK	Cherokee	JO	Johnson	RL	Riley
CN	Cheyenne	KE	Kearny	RO	Rooks
CA	Clark	KM	Kingman	RH	Rush
CY	Clay	KW	Kiowa	RS	Russell
CD	Cloud	LA	Labette	SA	Saline
CF	Coffey	LE	Lane	SC	Scott
CM	Comanche	LV	Leavenworth	SG	Sedgwick
CL	Cowley	LC	Lincoln	SW	Seward
CR	Crawford	LN	Linn	SN	Shawnee
DC	Decatur	LG	Logan	SD	Sheridan
DK	Dickinson	LY	Lyon	SH	Sherman
DP	Doniphan	MN	Marion	SM	Smith
DG	Douglas	MS	Marshall	SF	Stafford
ED	Edwards	MP	McPherson	ST	Stanton
EK	Elk	ME	Meade	SV	Stevens
EL	Ellis	MI	Miami	SU	Sumner
EW	Ellsworth	MC	Mitchell	TH	Thomas
FI	Finney	MG	Montgomery	TR	Trego
FO	Ford	MR	Morris	WB	Wabaunsee
FR	Franklin	MT	Morton	WA	Wallace
GE	Geary	NM	Nemaha	WS	Washington
GO	Gove	NO	Neosho	WH	Wichita
GH	Graham	NS	Ness	WL	Wilson
GT	Grant	NT	Norton	WO	Woodson
GY	Gray	OS	Osage	WY	Wyandotte

Feature Codes Used for Isolated Points: 1000 - 1999

1100 Control Points

- **1110** Land Grid
  - **1111** Section Corners
  - **1112** Township Corners
- **1120** Control Stations
  - **1121** Horizontal
  - **1122** Vertical

1200 Towns, City Centers

- **1210** Population < 500
- **1220** 500 < Population < 1000
- **1230** 1000 < Population < 3000
- **1240** 3000 < Population < 10000
- **1250** 10000 < Population < 25000
- **1260** 25000 < Population < 50000
- **1270** 50000 < Population < 100000
- **1280** 100000 < Population

Minor Code	Meaning
1	Unincorporated
2	Incorporated
3	County Seat
4	State Capitol

1300 Wells, Springs

- **1310** Water Well
- **1320** Spring
- **1330** Oil Well
- **1340** Gas Well
- **1350** Oil and Gas Well
- **1360** Dry Hole
- **1390** Miscellaneous

Minor Code	Meaning
1	Producing
2	Abandoned Dry
3	Abandoned Producing
4	Under Development

1400 Pits, Quarries, Mines

1410	Open Pit
1420	Mine
1430	Quarry
1440	Prospect
1450	Shaft or Tunnel Entrance

Minor Code	Meaning
0	Producing
1	Abandoned
2	Under Development

1500 Buildings

1510	Dwelling of Employment
1520	Church
1530	Cemetery (as a point location)
1540	Tower
1541	Radio
1542	Television
1543	Microwave Relay
1544	Transmission Line
1545	Water
1546	Observation
1550	Power Substation
1560	School (point location only)
1570	Compressor Station (pipeline)

Feature Codes Used For Linear Arcs: 2000-3999

2100 Borders, Boundaries

2110	U.S. Land Survey Lines
2111	Township Line
2112	Range Line
2113	Section Line
2120	Cemetery Boundary
2130	Fence or Field Line
2140	Reservation Boundary
2150	Park
2151	National
2152	State
2153	County
2154	City
2160	Geo-Reference Lines
2161	Latitude
2162	Longitude
2170	Wildlife Refuge

2200 Highways, Roads

2210	Primary Highway, Hard Surface
2220	Secondary Highway, Hard Surface
2230	Light-Duty Road
2240	Unimproved Road
2250	Road Under Construction or Proposed
2260	Highway Ramp
2270	Dual Highway, Dividing Strip < 25 Feet
2280	Dual Highway, Dividing Strip > 25 Feet
2290	Highway Spur (dead end)

Minor Code	Meaning
1	Interstate
2	Federal (U.S.)
3	State
4	County, City
5	Private
6	Interstate and Federal
7	Interstate, Federal, and State
8	Interstate and State
9	Federal and State

2300 Railroads, Airports

- 2310 Single Track Railroad
- 2320 Multiple Track Railroad
- 2330 Railroad Bridge
- 2340 Railroad Tunnel
- 2350 Airport Boundary
- 2360 Airport Runway
- 2370 Landing Strip

2400 Lineal Hydrology

- 2410 Perennial Stream
- 2420 Intermittent Stream
- 2430 Aqueduct
- 2440 Aqueduct Tunnel
- 2450 Dam
  - 2451 Dam with road
- 2460 Dike or Levee
  - 2461 Dike or Levee with road

2500 Transmission Lines

- 2510 Electrical Power
  - 2511 Power Line
  - 2512 Substation
- 2520 Pipeline
  - 2521 Gas
  - 2522 Oil
  - 2523 Water
- 2530 Telephone Line

2600 Intra-Formation Geology

- 2610 Actual Fault
  - 2611 Transverse
  - 2612 Thrust
  - 2613 Normal
- 2620 Approximate Fault
  - 2621 Transverse
  - 2622 Thrust
  - 2623 Normal

2600 Intra-Formation Geology (cont'd.)

2630	Intrusives
2640	Folds
2650	Intermittent Contact

2700 - 2999 Not Assigned

3000 Elevation Contours

Elevation contours are assigned (in Kansas) as:

3ABC

where ABC represents the elevation divided by 10. Thus, an elevation of 7340 feet would be coded as: 7340 / 10 = 734, ABC = 734, and the feature code = 3ABC = 3734. With this procedure, elevations in ten-foot intervals from 0 to 9990 feet can be represented in a four-digit feature code.

Feature Codes Used For Zone Boundary Arcs: 4000-4999

4100 Areal Hydrology

Note: Areal hydrology covers area requiring color fill on the map, such as a lake, reservoir or large river.

4110 Perennial Stream
4120 Permanent Lake
4130 Intermittent Stream
4140 Intermittent Lake
  4145 Land subject to controlled inundation

4150 Reservoir
4160 Aquifer
4170 Swamp

4200 Inter-Formation Geology

Note: Inter-formation geology consists of contact or fault lines which separate two different geologic formations.

4210 Actual Contact
  4211 Change of Facies
  4212 Non-distinguishing Contact (Undecided)

4220 Approximate Contact
  4221 Change of Facies

4230 Actual Faults
  4231 Transverse
  4232 Thrust
  4233 Normal

4240 Approximate Faults
  4241 Transverse
  4242 Thrust
  4243 Normal

4250 Folds

4300 Areal Boundaries

- **4310** State Boundary
- **4320** County Boundary
- **4330** Quadrangle Map Edge
- **4340** City Boundary
  - **4341** Population < 500
  - **4342** 500 < Population < 1000
  - **4343** 1000 < Population < 3000
  - **4344** 3000 < Population < 10000
  - **4345** 10000 < Population < 25000
  - **4346** 25000 < Population < 50000
  - **4347** 50000 < Population < 100000
  - **4348** 100000 < Population
- **4350** Groundwater Management District Boundary

Minor Code	Meaning
1-5	District Number

- **4360** County Seat - City Boundary
  - **4361** Population < 500
  - **4362** 500 < Population < 1000
  - **4363** 1000 < Population < 3000
  - **4364** 3000 < Population < 10000
  - **4365** 10000 < Population < 25000
  - **4366** 25000 < Population < 50000
  - **4367** 50000 < Population < 100000
  - **4368** 100000 < Population
- **4370** Hydrologic Basins (USGS Only)
  - **4373** Cataloging
  - **4374** Accounting
  - **4375** Sub-regional
  - **4375** Regional
- **4380** Hydrologic Basins (USGS and Kansas Plan)
  - **4383** Cataloging
  - **4384** Accounting
  - **4385** Sub-regional
  - **4385** Regional

4400 (Areal) Mineral Resource Boundaries

4440 Simple Resource Boundaries
- **4441** Oil Field
- **4442** Gas Field
- **4443** Oil and Gas Field
- **4444** Shallow Gas Field
- **4445** Storage Area
- **4446** Panoma Field
- **4447** Panoma and Hugoton Field

4450- Boundaries Between Two Resources
- **4451** Oil Field - Oil Field
- **4452** Oil Field - Gas Field
- **4453** Oil Field - Oil and Gas Field
- **4454** Oil Field - Shallow Gas Field
- **4455** Oil Field - Storage Area
- **4456** Gas Field - Gas Field
- **4457** Gas Field - Oil and Gas Field
- **4458** Gas Field - Shallow Gas Field
- **4459** Gas Field - Storage Area

- **4461** Oil and Gas Field - Oil and Gas Field
- **4462** Oil and Gas Field - Shallow Gas Field
- **4463** Oil and Gas Field - Storage Area
- **4464** Shallow Gas Field - Shallow Gas Field
- **4465** Shallow Gas Field - Storage Area

4480- User-defined Boundaries for Areal Resources

Feature Codes For Redigitized or Added Features: 10000+

The programs in the GIMMAP system which display the map data from cartographic databases on a graphics display screen for the purpose of editing have the ability to accept features with codes above the usual 9999 value. When such features are encountered, they are displayed in a unique manner such as special dotted lines for linear features. As such, these features stand out and may be compared directly to existing features in essentially the same locations.

The purpose of this special coding is to distinguish added or redigitized features from existing ones in the database to facilitate certain editing operations. For example, if a part of an existing line is in error and is redigitized, then only that part which is in error need be discarded. Or, a missing piece of a line may be digitized with such a code so that joining it to the nearly whole piece is made easier.

The usual convention for such coding is to code each such feature with the sum of its usual feature code and ten thousand. The editing program (GRFEDT) will then switch between the ten thousand plus code and the normal code very easily.

10000 + Redigitized or Added Features to have special displays in editing, where a code of **1XXXX** is used for arcs whose normal feature code is **XXXX**.

Caution: Features with 10000+ codes must have the feature codes reset in the editing program or they may be overlooked by subsequent programs performing zone generation and editing, color display and plotting, and selection for map generation or data transfer and archival.