Chapter 12 -- ATTRIBUTE OPERATIONS

An *attribute* is a characteristic associated with a given object. An attribute is generally equated to a unique character or string of characters known as an attribute code and this code is then assigned to every object to which the characteristic belongs. An attribute code may be from 1 to 30 characters in length. The attribute codes may be listed and defined in a *data dictionary*, which is an ascii file created by the user. The data dictionary contains more detailed information about the meaning of each attribute code.

An object may have an infinite number of unique attribute codes attached to it. There are seven commands which operate with attributes. **Atrbt_edit** and **atrbt_print** provide editing and display capabilities. A**trbt_thin** is a special function designed to eliminate duplicate entries per object and to allow removal of selected attributes. The **atrbt_concat** command will concatenate all attributes for an object in a named set into a single attribute string. The remaining three commands, **atrbt_rec, atrbt_serial** and **atrbt_set**, permit the user to modify, in a specified manner, the attribute(s) for an individual object, identified by its serial or record number, or for a named set of objects.

Note that attributes are initially assigned to objects using either the **atrbt_dig** or **atrbt_contur** mode (see *Chapter 9*).

COMBINING MULTIPLE ATTRIBUTES

The **atrbt_concat** command is useful for combining multiple attributes assigned to an object into a single string. Some GIS applications cannot handle multiple attributes; this command will make the entries palatable for such applications. The attributes may be concatenated for all objects within a user-specified set.

EDITING THE ATTRIBUTE FILE

The **atrbt_edit** command invokes an *ascii* editor (**vi**) for viewing and modifying the contents of the active map's attribute file. The user will use the appropriate system editor commands for the editing activities, including whatever key sequence is required for exiting the editor. Upon a legal exit from the editor, the user will be returned to LTPlus. Note that the actual attributes file, found in the active map's directory, is copied, as an ascii file, to a temporary file space (**/u[sr]/tmp**) where the user may make changes. The modified contents are then converted back to the attributes file format (under the active map's directory). The attributes file itself may not be simply edited with the system editor.

PRINTING THE ATTRIBUTES FILE

The attributes for a specified set may be displayed on the screen, routed to one of two system printers, or written to a designated ascii file with the **atrbt_print** command. The device type codes include:

0 = screen
1 = printer
2 = write to ascii file (requires file name)

MODIFYING ATTRIBUTES BY RECORD OR SERIAL NUMBER

The user may cause a specified action to occur to a designated attribute based on a user-supplied record or serial number. A *record number* is a sequential numeric id assigned to each map object during the assembly process. It represents the record location within the objects file (found under the active map's directory). When modifications are made to the raster and the map is reassembled, the objects are, once again, assigned record number values which may differ from the previous ones, since objects may have been added and/or deleted. In contrast, a *serial number* is a unique, sequentially-assigned numeric id which never changes for a given object. If the object is effectively deleted during a reassembly process, its serial number is retired and not re-used for any other object. The **atrbt_rec** and **atrbt_serial** commands require that the user also specify an action type code (what should be done to the attribute), a text string (what should it be done with) and a record or serial number (which object should be modified). The action codes include:

0 = Replace all attributes w/single new one.
1 = Replace/set 1st attribute, leave others.
2 = Replace/set 2nd attribute, leave others.
3 = Insert new 1st attribute, push others up by one.
4 = Prefix 1st existing attribute.
5 = Suffix 1st existing attribute.
6 = Add a new (additional) last attribute.
7 = Remove ALL attributes for one object.

NOTE: When entering the attribute text string for these commands, the following special variable sequences are allowed:

$record
This special attribute variable is converted to the object record number when the attribute is assigned. For example: if the attribute string entered by the user is **abc$record** and is assigned using **atrbt_dig, atrbt_rec, atrbt_serial**, or **atrbt_set** to object **123**, then the attribute assigned is **abc123**.

$serial
This special attribute variable is converted to the object serial number when the attribute is assigned. For example: if the attribute string entered by the user is **ab$serialzz** and is assigned using **atrbt_dig, atrbt_rec, atrbt_serial**, or **atrbt_set** to an object with a serial number of **999**, then the attribute assigned is **ab999zz**.

$++
This special attribute variable checks the last attribute assigned to see if it contains a number and stores it. The first number found is stored. If no number is found, then **0** is stored. When the attribute is assigned, the **$++** variable is replaced by the stored number incremented by **1**. For example: if the last attribute assigned was **a255 965zz** and the string entered with the command is **qbc$++ stupid**, then the next object is assigned an attribute of **qbc256 stupi**d. The next attribute will be **qbc257 stupid**, and so on.

ASSIGNING ATTRIBUTES BY SET NUMBER

The user may cause an action of a specified type to occur with a designated string for all of the attributes of objects in a specified set. A set is defined as a collection of one or more objects; membership in a particular set is defined by one or more criteria elements. The user may define, with **crit_** commands, up to 24 sets (stored at levels 1-24). Level 0 contains a global set of all map objects. Levels 25-31 contain special sets which have been predefined in LTPlus. The following is a summary of the levels and associated sets:

0	all map type objects (pts/lns/polys)
1-24	map objects in this set number
25	map objects with 1+ attributes
26	map objects without any attributes
27	map objects with 2+ attributes
28	map objects with less than 2 attributes
29	map objects w/out 2 identical attributes
30	segments w/same polygon on both sides
31	reserved

The acceptable action codes include:

0 = Replace all attributes w/single new one.
1 = Replace/set 1st attribute, leave others.
2 = Replace/set 2nd attribute, leave others.
3 = Insert new 1st attribute, push others up by one.
4 = Prefix 1st existing attribute.

5 = Suffix 1st existing attribute.
6 = Add a new (additional) last attribute.
7 = Remove ALL attributes for one object.

THINNING ATTRIBUTES

The user may initiate a reduction type of action on the attributes of all of the objects included in a specified set. The thinning type action codes include:

-2 = remove all redundant attributes
-1 = remove all attributes
0 = save last attribute
1 = save first attribute
. .
. .
. .
n = save nth attribute

The available set numbers lie within the range of 0-31, as defined in the **atrbt_set** discussion earlier in this chapter.