

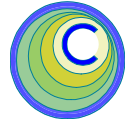
# The CEDRA Corporation's COMMAND OF THE MONTH

A monthly information bulletin

February 2009

FEATURED COMMAND

Breaking or Dividing a  
Line or Curve Feature



## Application Description

When one performs geometric layout work, whether it pertains to street centerlines, water lines, sewer lines or any other type of utility, the need to break or subdivide a feature often arises.

For example, a water main will have many spur lines or side water lines which branch off of the main line. These spur lines serve various subdivisions by taking water from the main line and making it available to the individual homes within the various subdivisions. Typically within the database of a GIS, the water main is broken at each of the locations where the spur lines intersect the water main.

The above example describes the application of breaking a line at a specific location. However, the user may also need to break a feature into an equal number of segments. This could be accomplished based upon a specific: (a) number of segments or (b) segment length.

Additionally, the user may also require the ability to take a multipart feature (a single feature which is composed of two or more individual features) and decompose the various parts into individual features. An example of a multipart feature is the state of Hawaii. That is, a single state which is comprised of many islands. So that, selecting one of the islands results in all of the islands being selected.

All of these examples highlight the application of breaking or decomposing a feature into two or more other features.



Figure 1  
CEDRA-Point-Tools Toolbar

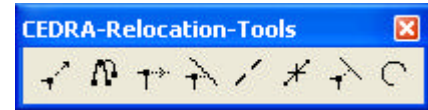







Figure 2  
CEDRA-Relocation-Tools Toolbar

## The CEDRA Solution


To address the application described above, the CEDRA-Point-Tools and CEDRA-Relocation-Tools toolbars, see Figures 1 and 2, can be employed. Although both toolbars contain a number of tools, the specific tools we will be discussing in this month's issue are the **Point 7**, , and **Relocation 6**, , tools.

### Command Of The Month bulletin

*This month's issue discusses the available tools for breaking a feature into an equal number of segments or at a specific location.*

These tools enable the user to break a feature (line or curve) into an equal number of segments, , or at a specific location, . The **Relocation 6**, , tool also offers the ability to decompose a multipart feature.

### Point 7 Tool - Overview


The **Point 7**, , tool enables the user to select one or more features and divide the feature(s) into a uniform number of smaller features based upon a number of segments or a segment length.


In addition to breaking a feature, this tool enables the user to create point features based upon a number of segments or a segment length. Note that these criteria are the same as those used to break a feature.

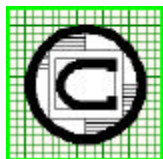
As a matter of fact, the same algorithms are used, the only difference is that rather than creating a point feature, the tool will break the feature at the location where the point feature would have been created.

Finally, the tool also offers the user the ability to create point features at the vertices of a polyline. That is to say, if the user desires to establish a point feature at each vertex within a polyline, the **Point 7** tool offers the functionality to accomplish this task.

### Point 7 Tool - Operation

To use the **Point 7** tool , the user should:

- **1 Click** at the **Point 7** tool  at which point a message in the status bar area will appear prompting the user to select a feature or define a rectangle.
- **2 Click** at the **feature** to be subdivided, or



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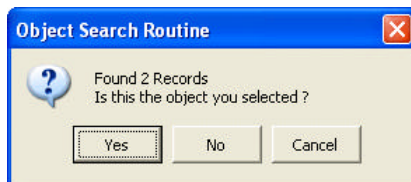
**click** and **drag** the mouse to form a rectangle that encompasses at least a part of each **feature** to be subdivided, and when the selection has been completed, **release** the **mouse**.

After the feature selection has been made:

- The conventional CEDRA feature selection confirmation query box is displayed (provided a feature has been found), in which case branch to **Step 3**. The same occurs when more than one feature has been selected.

- In the case where no feature can be found, the program displays the message prompting the user to select the line(s) and/or curve(s) to be processed, at which point, repeat **this step**.

- **3 Confirm, or not** the selection by selecting the appropriate button, see Figure 3.

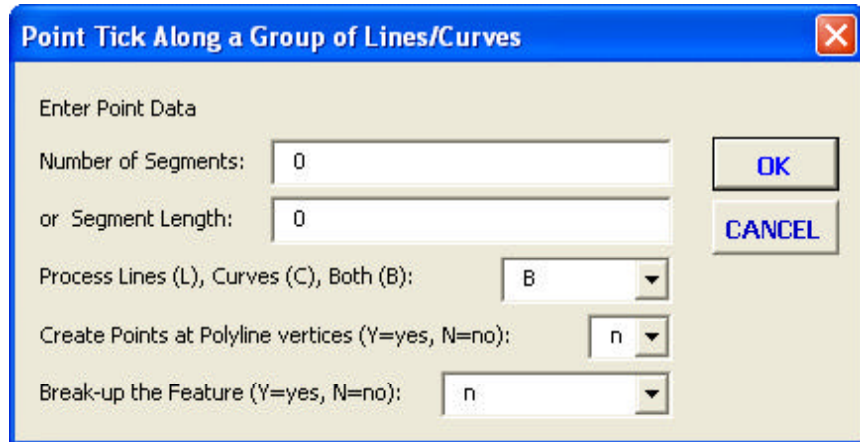


**Figure 3**  
Confirmation Query Box

Having confirmed the selection, by selecting the Yes button, the multi-input dialog box of Figure 4 is displayed.

Beginning at the top of the multi-input dialog box:

- **4 Enter** in the *Number of Segments*: data field the **number** of equal **segments** to create points along a selected feature, as well as at each endpoint, see Figure 5(a), or



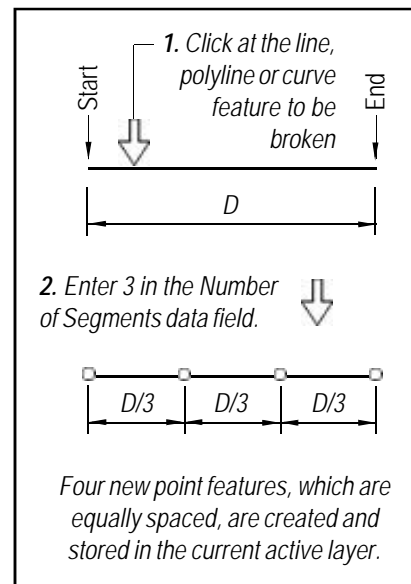
**Figure 4**  
Parameters for Dividing or Breaking a Feature

**enter** in the *or Segment Length*: data field the **length** of the **uniform spacing** of points to be created from the start endpoint of the selected element(s), or **enter the value of zero (0)** in both the *Number of Segments*: data field, and in the *Segment Length*: data field to create points only at each endpoint, see Figure 5(b).

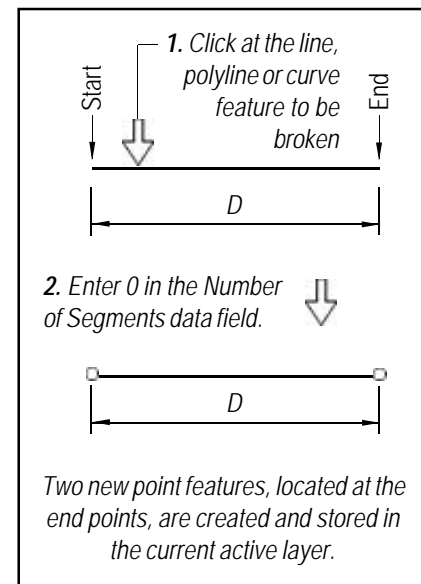
- **5 Enter** in the *Process Lines (L), Curves (C), or Both (B)*: data field the code letter:
- **L** or **l** to process only lines or polylines.

- **C** or **c** to process only curves.
- **B** or **b** to process lines, polylines and curves.

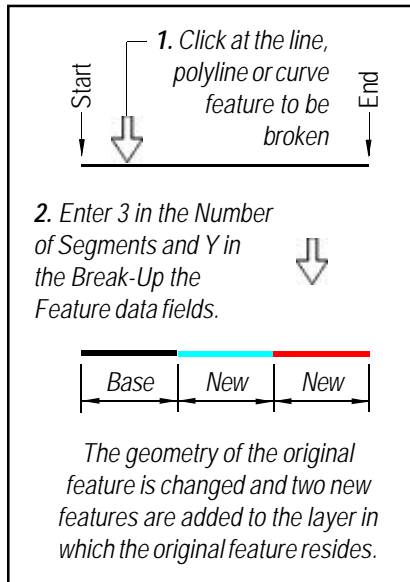
- **6 Enter** in the *Create Points at Polyline Vertices (Y=yes, N=no)*: data field:
- **Y** or **y** to create point features at each vertex of the selected polyline feature(s), regardless of the entry in either of the first two data fields.
  - **N** or **n** to create points as per the entry in either of the first two data fields.



**Figure 5(a)**  
Create Equally Spaced Points along a Feature



**Figure 5(b)**  
Create Points at the End Points of a Feature



**Figure 5(c)**  
**Divide a Feature into Three Equal Length Features**

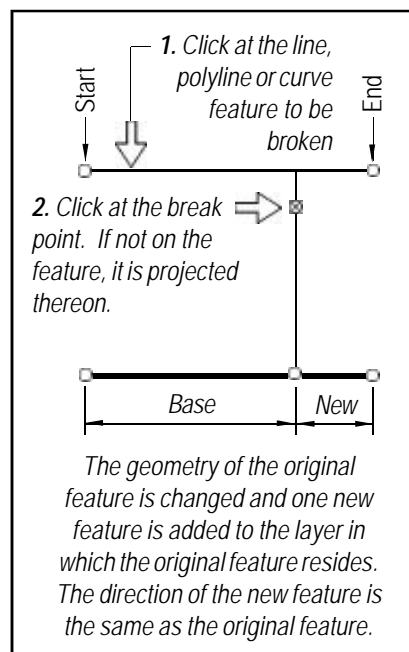
- **7 Enter** in the *Break-up the Feature* (*Y=yes, N=no*): data field:
  - **Y** or **y** to indicate that rather than creating points, the command should break the feature at the locations where the point features would have appeared, see Figure 5(c).
  - **N** or **n** to indicate that point features are to be created and that the selected feature is not to be broken.
- **8 Click** at the **OK** button to confirm the entry and perform the desired operation, or **click** at the **Cancel** button to abort the command.

The command remains active to repeat from the beginning. In so doing, the data last entered are remembered and used as the default display.

Summarizing, if the user wishes to break a feature, the user must specify **Y** or **y** in the *Break-up the Feature* data field along with a nonzero value in either the *Number of Segments:* or the *Segment Length:* data fields, but not both.


**Notes:**

1. If an invalid entry is made, a warning message is displayed, informing the user of the invalid entry. In this case, click at the **OK** button to acknowledge the message and close the warning window, and repeat the command from its very beginning.
2. It is not possible to create points and break a feature at the same time. If it is desired to create points and break the feature, it is recommended that the command be executed twice. The first time the user can create the point features and then during the second execution, the feature(s) can be broken.
3. When a feature is to be broken a nonzero value must be specified for either the *Number of Segments:* or the *Segment Length:* data fields.
4. When a feature is broken the information found in the Rule Definition File is used in determining the attribute values for the new features that are created.



**Figure 6**  
**Break Up of a Feature into Two Features**

**Relocation 6 Tool - Overview**


The Relocation 6, , tool enables the user to:

- a. break a line, polyline or curve, at a specific point, into two separate lines, polylines or curves, thus creating two individual lines, polylines or curves (see Figure 6), or
- b. decompose a multipart point, line, polyline, curve or polygon feature. If it is desired to break a line, polyline or curve part of a multipart feature, the user should first select the multipart feature and decompose it (as will be described in a subsequent subsection), and then break the desired feature part.

This tool uses the Rule Definition File in assigning attribute values when breaking a single part feature. The Rule Definition File has no effect in the breaking of a multipart feature.

Depending upon the type of feature that is selected (single part or multipart), the operation of this tool will vary. The discussion below presents the mode of operation for processing single and multipart features.

**Relocation 6 Tool - Operation**

To use the Relocation 6 tool , the user should:

**Breaking a Single-part Feature**

When breaking a line, polyline or curve (original feature), the program creates two features, one being the base feature and the other the new feature, with the start endpoint of the base feature being that of the original feature.


For certain applications it is desired not to loose the attributes of the original feature. In these cases the user may employ the use of the Rule Definition File, which causes the program to assign the object identification number (FID,

OID or OBJECTID) of the original feature to the base feature (see Figure 6) by changing the shape of the original feature to that of the base feature.

The new feature, however, is assigned a new identification number. In addition to the identification number attribute, the user may introduce in the Rule Definition File rules for controlling the assignment of attribute values of the original feature to those of the base and new features to user specified non-geometric attributes. The syntax of the Rule Definition File is described later on in this publication. Note that the user does not need to create a Rule Definition File, if one is not desired. As such, if the Rule Definition File:

- Is not present, the endpoints of the two new lines, polylines or curves to be created at the point of the break are assigned elevations, which are interpolated between those of the endpoints of the original line, polyline or curve
- Is present, the user may control whether these elevations should be interpolated, or not.

To break a line, polyline or curve in two, the user should:

- **1a** Click at the  *Break a line or curve at a specific point* tool.
- **2a** Click in the ArcMap display at the line, polyline or curve feature to be broken.

If the feature selection click is made where there is no nearby feature, the user is reminded to select a feature, else continue.

- **3a** Confirm, or not the selection by responding to the confirmation query box, see Figure 7. If the feature is not confirmed, the program informs the user to select a line, polyline or curve. That is to repeat the operation from Step 2a.



**Figure 7**  
**Confirmation Query Box**

If the confirmed feature is a multipart feature, branch to Step 4b below, otherwise go to Step 4a.

- **4a** Click in the active view document at the point at which the selected feature is to be broken. In selecting this point, note that:
  - The point need not lie on the selected feature. If the point does not, it is projected thereon to define the point at which the break is to occur.
  - If the point, or its projection falls at an endpoint or outside the limits of the selected feature, the command beeps, and aborts.


Having clicked at the break point, the original feature is broken into two features.

The command remains active to be repeated in its entirety.

The new feature that is created under this mode of operation is stored in the same layer as the original feature which was selected.

## Decompose a Multipart Feature

The subject tool may be used to decompose any multipart feature in one of the ways described below. To decompose a multipart feature, the user should:

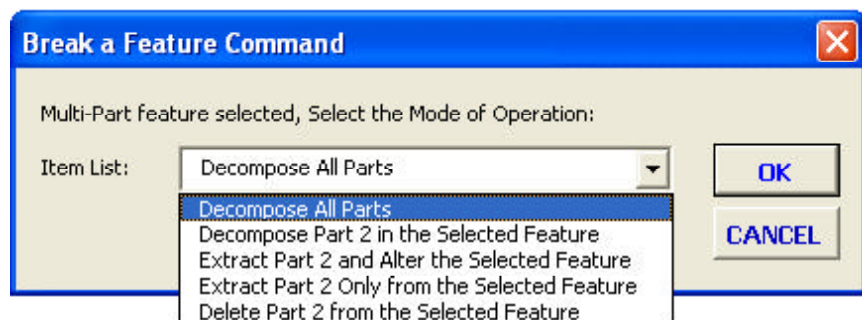
- **1b** Click at the  *Break a line or curve at a specific point* tool.
- **2b** Click in the ArcMap display at the multipart feature to be decomposed.

Depending on how the user wishes to decompose the multipart feature, the user may need to click at a specific part of the multipart feature, which said part is referred to as part X. The numeric value of X is displayed in the choice list dialog box discussed below.

If the feature selection click is made where there is no nearby feature, the user is reminded to select a feature, else continue.

- **3b** Confirm, or not the selection by responding to the confirmation query box, see Figure 7. If a single-part feature is selected, proceed to Step 4a.

If the confirmed feature is indeed a multipart feature, branch to Step 4b below. Upon confirmation of the multipart feature, the choice list dialog box of Figure 8 is displayed.



**Figure 8**  
**Decompose Multi-Part Feature Query Box**

► **4b** Scroll down in the **Item List:** data field, and select one of the options presented below. In all but the first of these options, reference is made to Part X, where X denotes the sequential number of part X identified in Step 2b above.

- **Decompose All Parts** option to create a new single-part feature for each part of the multipart feature, and leave the original multipart feature intact.
- **Decompose Part X in the Selected Feature** option to create a new single-part feature only of part X of the multipart feature, and leave the original multipart feature intact.
- **Extract Part X and Alter the Selected Feature** option to create a new single-part feature only of part X of the multipart feature, and delete it from the original multipart feature.
- **Extract Part X Only from the Selected Feature** option to create a new single-part feature only of part X of the multipart feature, and leave the original multipart feature intact.
- **Delete Part X from the Selected Feature** option to delete Part X from the original feature.

► **5b** Click at the **OK** button to confirm the selected option, and decompose the feature, or click at the **Cancel** button to abort the command.

The command remains active to be repeated in its entirety.

The new features that are created under this mode of operation are stored in the current active layer.

**Rule Definition File - Description**

The Rule Definition File is an ASCII based file that provides the user the ability to control the assignment of new values for specific attributes for the new features which are created when using the **Point 7, Relocation 5** and **Relocation 6** tools.

These tools will maintain the object id (FID, OID, OBJECTID) of the original feature. That is, the feature being broken or cutout. This is accomplished by not deleting the original feature, but rather, simply changing the shape or geometry of the original feature. All new features which are created as a result of using any of these tools will be assigned new object ids.

The Rule Definition File is a .txt file that resides in the current working directory, as defined with the [Set Working Directory] command, and must have the same name as the ArcMap document file that is being used. For example, if the current working directory is c:\abc\test and the ArcMap document file is called proj1.mxd, the Rule Definition File must be called proj1.txt and must reside in the c:\abc\test folder.

The structure of the file is as follows:

```
Theme (name of layer being defined)
Field_1
Operator
Field_2
Operator
.
.
.
Field_n
Operator
99999 (end of layer flag)
```

The above syntax is then repeated for each theme (layer) to appear in the file. There is no limit to the number of layers or fields that can be defined. The name that is specified for the Field may be either the source name of the field (attribute) or its alias name, except as noted below.

The /\* characters denote a comment line and have no effect upon the rules. These characters can be used to improve the readability of the file.

An example of a sample Rule Definition File is shown below:

```
/* Define the Layer
L_0ln
/* Attribute 1
map
2
/* Attribute 2
lst
2
/* Attribute 3
dsl
2
/* Attribute 4
dss
2
/* Attribute 5
clr
2
/* Attribute 6
ups_elev
3 LEN ups_elev dwn_elev
/* Attribute 7
dwn_elev
3 LEN ups_elev dwn_elev
/* End of Layer
99999
```

Valid Operator codes include the following:

- 0** Store zero or blank for the base feature, and the new feature if any is created.
- 1** Maintain the base feature original value, and store zero, or blank for the new feature, if any, that is created.
- 2** Maintain the base feature original value, and store the base feature original value for all new features, if any, that are created. In essence copy the base feature attribute value into all new features created.
- 3** Interpolate an elevation at the break points given the length and eleva-

tion fields. The elevation fields are specified in the order of the direction of the line. If the line is defined upstream to downstream, the upstream elevation field is specified first.

Note that the field names which are specified after the operator code 3 must be the source field names and not the alias name

- 4 Store the geometric length in both the base feature and new feature, if any is created.
- 5 Compute a number by adding a user-specified value to the largest value in a field for the subsequent features created, but use the value currently assigned to the base feature being processed for the first feature created. The field that is specified must be a field in the theme (layer) in which the base feature being processed resides in.

Note that the field names which are specified after the operator code 5 must be the source field names and not the alias name

An example of using the Operator 5 code is:

```
FeatureID
5 FeatureID 1
```

If the user wishes to control the number of digits to the right of the decimal point then the incremental value should include the decimal point and the desired number of digits to the right of the decimal point.

In the example below it is desired to have three digits to the right of the decimal point appear in the FeatureID field.

```
FeatureID
5 FeatureID 2.500
```

#### Notes:

1. A zero is assigned to numeric fields, and a blank is assigned to string fields.
2. If a theme (layer):
  - a. Is specified, then rules for all of its fields must be specified, excepting the reserved fields of ArcView GIS or ArcGIS such as, OID, OBJECTID, any geometric attributes and SHAPE.
  - b. Is not specified, then the original value of the field is stored for the first feature created, and a blank or zero is stored for all fields of any new features, if any, that are created.
3. If a field:
  - a. Is omitted, blanks or zeros will be assigned to the first feature created and any subsequent features, if any, that are created.
  - b. Is miss-spelled, the field will be treated having been omitted.

#### Summary

Note that the ability to break a feature using the **Point 6** tool has been recently added. Users with a software support agreement should check with The CEDRA Corporation on how to obtain a software update so as to be able to utilize this new functionality.

As always, should the reader have any suggestions on functionality that should be featured in Command of the Month, please feel free to forward them on to us.

*If you have a request for Command Of The Month, feel free to phone, fax or e-mail your request to The CEDRA Corporation.*