

# The CEDRA Corporation's COMMAND OF THE MONTH

A monthly information bulletin

May 2008

FEATURED COMMAND

Spiral Geometry



## Application Description

As an automobile travels along a straight stretch of a highway, or as a train speeds along a long straight pair of rails, or as a bicyclist or motorcyclist for that matter do the same, they all occasionally have to turn left or right. We all know that as that happens, the body that travels along such a straight course at high speeds builds a centrifugal force that pushes the body away from its path when the path has to veer to the left or right. The higher the speed and the higher the body's mass, the higher the centrifugal force. To compensate for this force, a cyclist leans left or right in the direction of the turn. Since an automobile or train cannot lean in such a manner, the engineers and contractors elevate one end of the travel path to induce such a tilt to the traveling vehicle.

When a travel path has to change direction, the change is provided by a circular curve. For safety and passenger comfort the radius of this curve has to be as large as possible. But a circular curve does not provide a smooth transition from a straight line having a radius of infinite value to a curve of a specific radius. Thus the need arises in providing a travel path the radius of which changes directly with respect to the distance from the start of the turn. This is provided by a spiral curve.

Many an automobile driver has noticed that when turning even at low or average speeds, one makes his or her own spiral within the pavement ribbon of the travel path. However, when traveling at high speeds, the driver may not be able

to keep the automobile within the ribbon of the travel path, which could be hazardous.

Thus the subject of this month's issue is the use of the various spiral geometry tools that are available within the CEDRA-AVland software.

### Command Of The Month bulletin

*This month's issue discusses the spiral geometry tools for creating and manipulating spiral curves within the CEDRA-AVland software.*

## The CEDRA Solution

Although not a staple problem of most engineering, surveying and GIS applications, the use of spirals comes into play in the design of highways and expressways, and in the transcription of parcel deeds that abut a highway or expressway. Towards this end, The CEDRA Corporation has introduced the {CEDRA-Spiral-Tools} toolbar shown in Figure 1.

The first four tools of this toolbar enable the user to introduce entering (back) or exiting (forward or ahead) spirals to an alignment defined by two tangent lines, or to a tangent line at a specific point. The remaining tools perform such geometric operations on an existing spiral such as creating offset spirals, projecting points, producing tangent lines, establishing points or radial lines along a spiral, or intersecting a spiral with lines, curves or other spirals.



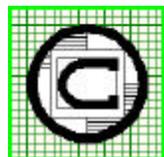
- Alignment with curve and spiral
- Alignment with Directions and Offset
- Spiral with Direction, Length and Angle
- Spiral Tangent to Line and Curve
- Offset Spiral (CEG88)
- Project a point on a spiral
- Line Tangent to a spiral
- Point or Radial Line along a spiral with plus and offset
- Spiral Intersections

Figure 1  
The CEDRA-Spiral-Tools Toolbar

Before proceeding with the description of the use of each of these tools below, the user should peruse Figure 2 which identifies the basic components of a spiral.

## Alignment with Curve and Spiral

With the  [Alignment with curve and spiral] tool command, the user is able to select in the ArcMap display two single lines to denote the back and forward (ahead) tangent line, and specify in a multi-input dialog box the radius of a circular curve and the length of an entering and/or an exiting spiral to be introduced between the two tangents (see Figure 3). It is noted that the two tangent lines need not intersect. To use this tool, the user should:



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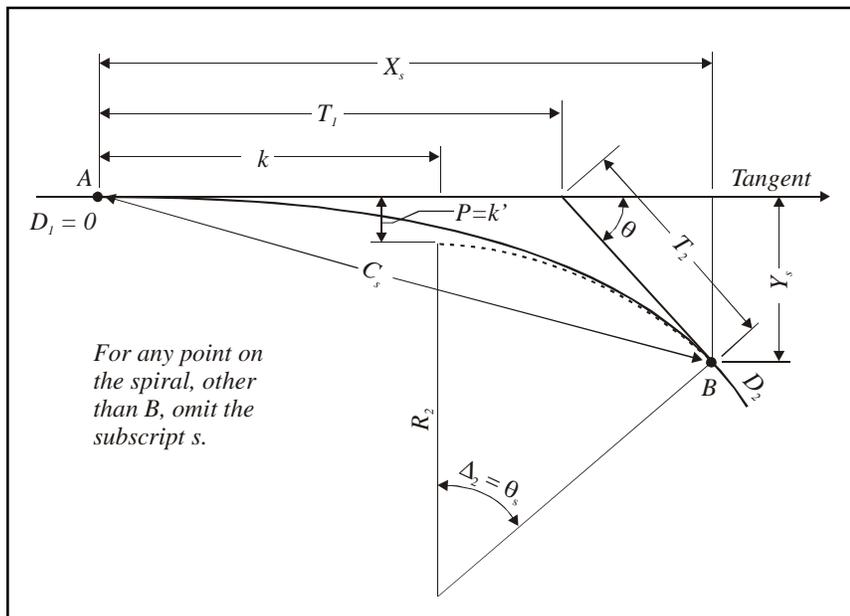


Figure 2 Elements Of A Spiral Between A Line And A Curve

zero indicates that there is no entering spiral.

- 6 **Enter** in the *Circular curve Radius - ft (m)*: data the radius of the circular curve.
- 7 **Enter** in the *Exiting Spiral Length - ft (m)*: data field the length of the exiting (ahead) spiral. An entry of zero indicates that there is no exiting spiral.
- 8 **Scroll** down in the *Create Points at Keynodes (Y=yes, N=no)*: data field, and select the:
  - Yes option to create point features at each of the four control points as shown in Figure 3, or the
  - No option to not create such points (TS, SC, CS, ST).

- 1 **Click** the [Alignment with curve and spiral] tool.

- 2 **Click** in the ArcMap display at a single (two-point) line (not a polyline) to select the entering (back) tangent line.

If this feature selection click is:

- Not made near any feature, the user is prompted in the status bar to select the back tangent, in which case repeat the above step.

- Made at a feature, the conventional CEDRA feature confirmation query box is displayed.

- 3 **Confirm**, or **not** the selection.

If confirmation is given to any feature type other than that of a single line, the user is prompted in the status bar to select the back tangent, in which case repeat Step 2.

Having selected the proper back tangent line, the user is prompted in the status bar to select the ahead tangent line.

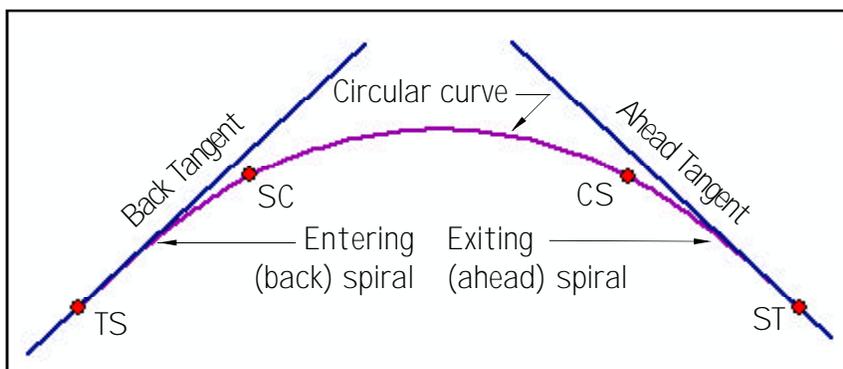


Figure 3  
Spiral - Curve - Spiral Between Two Tangent Lines

- 4 **Repeat** Steps 2 and 3 to select the exiting (ahead) tangent line.

Having selected the proper ahead tangent line, the input dialog box of Figure 4 is displayed.

- 5 **Enter** in the *Entering Spiral Length - ft (m)*: data field the length of the entering (back) spiral. An entry of

- 9 **Click** at the OK button to create the alignment, or click at the Cancel button to abort the command.



Figure 4  
Horizontal Alignment with Spirals

Having clicked at the *OK* button, the alignment is drawn as indicated in Figure 3. The command is now ready to be repeated from Step 2.

### Alignment w/Directions & Offset

With the  [Alignment with Directions and Offset] tool the user is able to introduce an alignment comprised of a circular curve and spirals. Alternatively to creating a base alignment as shown in Figure 3, the user may specify an offset value, in which case the program generates an alignment offset from a base alignment.

The differences between this tool and the  [Alignment with curve and spiral] tool is that with this tool the user is able to specify the start point (TS) of the alignment and that the ahead tangent direction is explicitly specified by the user. In so doing, the starting point of the spiral may be located on:

- The main alignment TS point, in which case the user's intent is to create a base back spiral, circular curve and ahead spiral along the base alignment.
- An offset line from the alignment, in which case the user's intent is to create an alignment offset from a base alignment by specifying an offset value, and the spiral lengths and circular curve radius adjusted for the offset.

For the above two cases, see Figure 5.

To use this tool, the user should:

- **1** Click the  [Alignment with Directions and Offset] tool.
- **2** Click in the ArcMap display at a
  - Single (two-point) line, polyline or curve feature to select the entering (back) tangent line. In this case, the endpoint of the feature is considered as the start of the new alignment.
  - Point feature to denote the start point of the alignment.

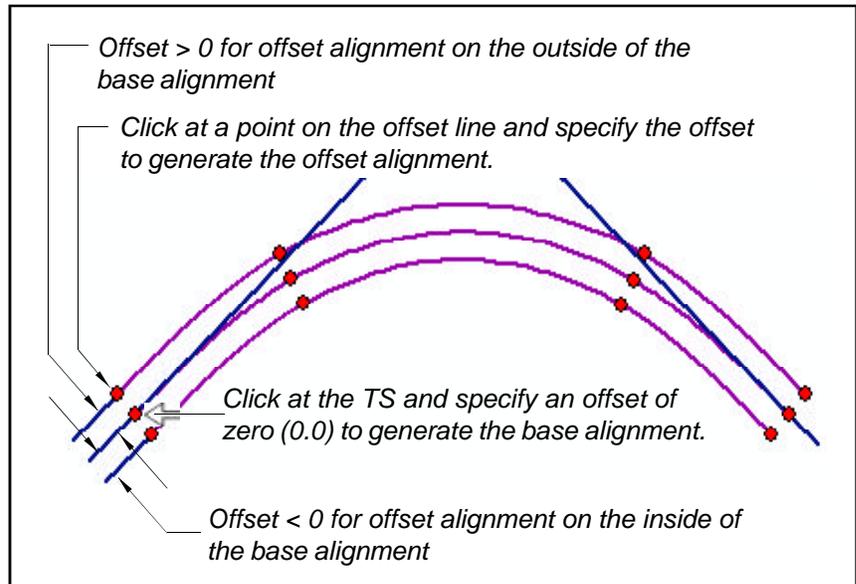


Figure 5  
Alignment with Direction and Offset

If this feature selection click is:

- Not made near any feature, the user is prompted in the status bar to select the back tangent, in which case repeat the above step.
- Made at a proper feature, the conventional CEDRA feature confirmation query box is displayed.

➤ **3 Confirm, or not the selection.**

If confirmation is given to a polygon feature, the user is prompted in the status bar to select the start point of the alignment, in which case repeat from Step 2.

Having selected the proper feature, the program displays the input dialog box of Figure 6.

In this figure the default value in the *Back Tangent Direction:* data



Figure 6  
Spiral - Curve - Spiral with Directions and Offset

field is: (a) NE 90 00 00 if a point feature has been selected, or (b) the direction of the selected feature, in which case the direction is:

- The direction of the line towards the endpoint nearest to the selection click,
- The direction of the tangent to a curve at the endpoint nearest to the selection click, or
- The direction of a polyline towards the endpoint nearest to the selection click from the opposite endpoint.

The default values to all other data fields are either zero (0.0), or the values entered during the preceding use of the subject or similar spiral tool command.

- **4** **Enter** in the *Back Tangent Direction*: data field the direction of the back tangent.
- **5** **Enter** in the *Forward Tangent Direction*: data field the direction of the forward tangent.
- **6** **Enter** in the *Spiral Offset - ft (m)*: data field the offset of the offset line to be created to the base alignment.

A positive value will place the offset alignment on the outside of the base alignment, while a negative value will place it on the inside.

The entries in the following three data fields are those corresponding to the base alignment (baseline), and not those at the offset alignment.

- **7** **Enter** in the *Entering Spiral Length @ Baseline - ft (m)*: data field the length of the entering (back) base spiral. An entry of zero indicates that there is no entering spiral.
- **8** **Enter** in the *Circular curve Radius @ Baseline - ft (m)*: data the radius of the circular curve along the base alignment.
- **9** **Enter** in the *Exiting Spiral Length @ Baseline - ft (m)*: data field the length of the exiting (ahead) spiral. An entry of zero indicates that there is no exiting spiral.
- **10** **Scroll** down in the *Create Points at Keynodes (Y=yes, N=no)*: data field, and select the:
  - Yes option to create point features at each of the control

points as shown in Figure 3, or the

- No option to not create such points (TS, SC, CS, ST).

- **11** **Click** at the **OK** button to create the alignment, or **click** at the **Cancel** button to abort the command.

Having clicked at the *OK* button, the alignment is drawn as indicated in Figure 3, if a value of zero is specified as an offset, or as in Figure 5 if a nonzero offset is specified. The command is now ready to be repeated from Step 2.

### Spiral w/Direction, Length & Angle

With the  [Spiral with Direction, Length and Angle] tool the user is able to introduce a back or forward spiral starting at a specified point. In general, the operation of this tool similar to the  [Alignment with Directions and Offset] tool. The differences include the following:

- Instead of creating a complete spiral-curve-spiral alignment, only the spiral is created.
- It is possible to create only a portion of the spiral, or offset spiral.
- The spiral angle  $T_s$  must be known.

To use this tool, the user should:

- **1** **Click** the  [Spiral with Direction, Length and Angle] tool.
- **2** **Click** in the ArcMap display at a
  - Single (two-point) line, polyline or curve feature to select the entering (back) tangent line. In this case, the endpoint of the feature is considered as the start of the new alignment.

- Point feature to denote the start point of the alignment.

If this feature selection click is:

- Not made near any feature, the user is prompted in the status bar to select the back tangent, in which case repeat the above step.
- Made at a proper feature, the conventional CEDRA feature confirmation query box is displayed.

- **3** **Confirm**, or **not** the selection.

If confirmation is given to a polygon feature, the user is prompted in the status bar to select the start point of the alignment, in which case repeat from Step 2.

Having selected the proper feature, the program displays the input dialog box of Figure 7.



Figure 7

### Spiral with Direction, Length and Spiral Angle

In this figure the default value in the *Back Tangent Direction*: data field is: (a) NE 90 00 00 if a point feature has been selected, or (b) the direction of the selected feature, which direction is:

- The direction of the line towards the endpoint nearest to the selection click,
- The direction of the tangent to a curve at the endpoint nearest to the selection click, or

- The direction of a polyline towards the endpoint nearest to the selection click from the opposite endpoint.

The default values to all other data fields are either zero (0.0), or the values entered during the preceding use of the subject or similar spiral tool command.

- **4** Enter in the *BackTangent Direction*: data field the direction of the back tangent.
- **5** Enter in the *Total Spiral Length -ft (m)*: data field the length of the whole spiral of the base alignment.
- **6** Enter in the *Length along the Spiral -ft (m)*: data field the length of the spiral to be generated from the spiral's end to a point on the spiral.
- **7** Enter in the *Spiral Angle in Degs, ord/m/s*: data field the spiral angle  $T_s$  expressed in terms of degrees and decimal thereof, or in degrees, minutes, seconds and decimals of a second. Note that if a negative angle is entered, its absolute value will be used.
- **8** Enter in the *Spiral Offset Distance -ft (m)*: data field the spiral offset distance if an offset spiral is to be created. A positive value will place the offset spiral on the outside of the base spiral, while a negative value will place it on the inside.
- **9** Scroll down in the *Create Points at Keynodes (Y=yes, N=no)*: data field, and select the:
  - Yes option to create point features at each of the control points as shown in Figure 3, or the
  - No option to not create such points (TS, SC, CS, ST).

- **10** Click at the **OK** button to create the alignment, or click at the **Cancel** button to abort the command.

Having clicked at the *OK* button, the spiral, or its offset spiral is drawn. The command is now ready to be repeated from Step 2.

### Spiral Tangent to a Line and Curve

With the  [Spiral tangent to a Line and Curve] tool the user is able to introduce a spiral tangent to a two-point line and to a curve. In so doing, the endpoint of the selected curve nearest to the selected line is considered as the SC or CS of the spiral to be created. To use this tool, the user should:

- **1** Click the  [Spiral tangent to a Line and Curve] tool.
- **2** Click in the ArcMap display at a single (two-point) line to define the line to which the spiral is to be tangent.

If this feature selection click is made where there is no nearby feature, the user is prompted in the status bar to select the tangent line, in which case repeat the above step; else continue with the next step.

- **3** Confirm, or not the selection.

If confirmation is given to a point, polyline, curve or polygon, the user is prompted in the status bar to select the e tangent line, in which case repeat from Step 2; else, if a two-point line has been selected, continue with the next step.

- **4** Click in the ArcMap display at a circular curve to define the curve to which the spiral is to be tangent.

Note that the endpoint of this curve nearest to the selected line is to represent the end of the spiral, that is the SC or CS point. Furthermore, the normal distance of this endpoint from the selected line is to denote the  $P=k'$  distance in Figure 2.

If this feature selection click is made where there is no nearby feature, the user is prompted in the status bar to select the tangent line, in which case repeat the above step; else continue with the next step.

- **5** Confirm, or not the selection.

If confirmation is given to a point, line, polyline, or polygon, the user is prompted in the status bar to select the curve, in which case repeat from Step 4; else, if a curve has been selected, the tool generates the tangent spiral.

The tool command remains active to repeat from Step 2.

### Offset Spiral

With the  [Offset Spiral] tool, the user is able to select an existing spiral and create an offset spiral thereto. It is important to note that although an offset circular curve (concentric curve) can be described by an equation, an offset spiral cannot. Thus an offset spiral is generated by traversing along the base spiral, determining the instantaneous radius, and then traversing to the left or right the specified offset distance, thus establishing a set of temporary points which are connected to form the offset spiral.

To use this tool, the user should:

- **1** Click the  [Offset Spiral] tool.
- **2** Click in the ArcMap display at a base or offset spiral to select it.

If this feature selection click is made where there is no nearby feature, the user is prompted in the status bar to select the spiral to be processed, in which case repeat the above step; else continue with the next step.

➤ **3 Confirm**, or not the selection.

If confirmation is given to a point, line, polyline, curve or polygon, the program beeps, and the user is prompted in the status bar to select the spiral to be processed, in which case repeat from Step 2; else, if a main spiral or an offset spiral has been selected, the input dialog box of Figure 8 is displayed, in which case continue with the next step.

➤ **4 Enter** in the *Spiral Offset Distance - ft (m)*: data field the offset distance from the main selected spiral. Note that:

- A positive offset will create an offset spiral on the outside of the main spiral, and a negative offset on the inside.
- If an offset, rather than a main spiral, has been selected, the offset spiral to be created will be created offset from the main spiral corresponding to the selected offset spiral. That is, an offset spiral keeps track of its origin main spiral.

➤ **5 Enter** in the *Distance Between Points - ft (m)*: data field a distance to denote how close to each other the points to define the offset spiral are to be located.

Regarding the above entry refer to the introduction of this tool command. The distance to be specified is along the main spiral.

The default distance is one (1) foot (meter).

- **6 Click** at the **OK** button to create the offset spiral, or **click** at the **Cancel** button to abort the command.

Having clicked at the *OK* button, the offset spiral is drawn, and the dialog box of Figure 8 is displayed again to introduce another offset spiral from the same main spiral.

- **7 Click** at the **Cancel** button to terminate the command.

### Project a Point on a Spiral

With the  [Project a point on a spiral] tool, the user is able to select an existing main or offset spiral (see Figure 9), and then project selected points to create point features at the point of projection on the selected main or offset spiral. In projecting points on a main or offset spiral, the following should be noted:

- The point to be projected may be any point, the endpoint or vertex of a line, polyline, curve or polygon nearest to the click of feature selection, or any click within the ArcMap display.
- If the point of projection of a selected point happens to project back of the start of the spiral, a warning message box is displayed, and the command aborts.
- If the point of projection of a selected point happens to project ahead of the end of the spiral, a point of projection may or may not

be created, depending on where the selected point is located with respect to the spiral.

To use this tool, the user should:

- **1 Click** the  [Project a point on a spiral] tool.

- **2 Click** in the ArcMap display at a base or offset spiral to select it.

If this feature selection click is made where there is no nearby feature, the user is prompted in the status bar to select the spiral to be processed, in which case repeat the above step; else continue with the next step.

- **3 Confirm**, or not the selection.

If confirmation is given to a point, line, polyline, curve or polygon, the program beeps, and the user is prompted in the status bar to select the spiral to be processed, in which case repeat from Step 2; else, if a main spiral or an offset spiral has been selected, continue with the next step.

- **4 Click** in the ArcMap display at a point, the endpoint or vertex of a line, polyline, curve or polygon nearest to the click of feature selection, or anywhere in the display to define the point to be projected.

Having selected the point, it is projected on the selected main or offset spiral, and a point feature is created at the point of projection. The command remains active to select another point to be projected.

### Line Tangent to a Spiral

With the  [Line Tangent to a spiral] tool, the user is able to select an existing main or offset spiral (see Figure 10), and then: (a) select points which are located on the outside of the spiral to create tangent

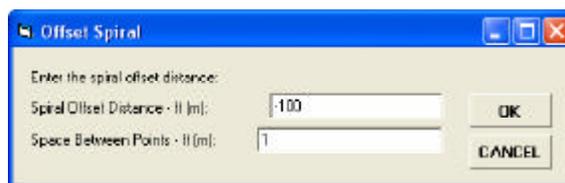


Figure 8  
Input Dialog Box for an Offset Spiral

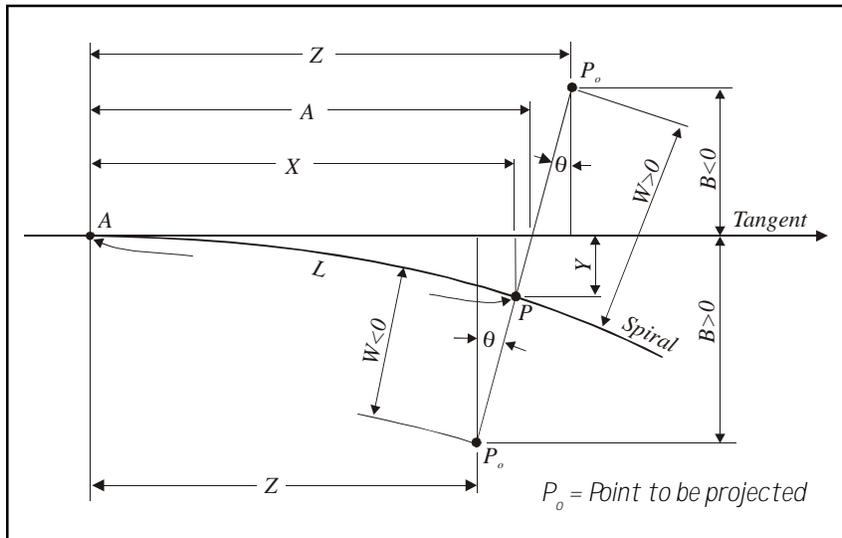


Figure 9  
Point Projected on a Spiral

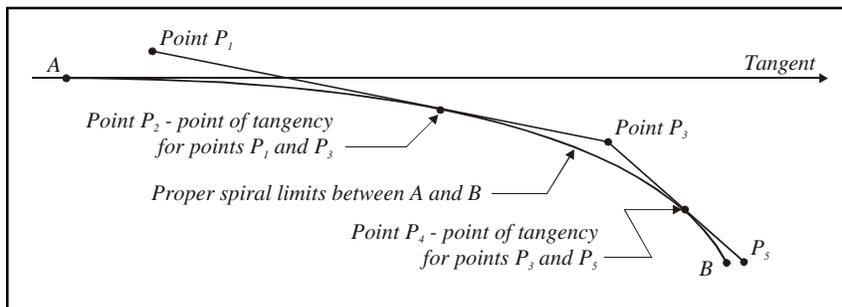


Figure 10  
Tangent to a Spiral from an External Point

lines to the spiral, or (b) select points which are located on the spiral to create tangent lines to the spiral at said points. In selecting these point from which, or at which the tangent lines are to commence, the following should be noted:

- A point from which a tangent is to emanate may be any point, the endpoint or vertex of a line, polyline, curve or polygon nearest to the click of feature selection, or any click within the ArcMap display.
- If the point is located on the inside of the spiral, a tangent line cannot be created.
- If the point is located on the spiral, the user should specify the length of the tangent line to the spiral at that point

- If the point is located on the outside of the spiral, a tangent line may, or may not be able to be created.

To use this tool, the user should:

- 1 Click the  [Line Tangent to a spiral] tool.
- 2 Click in the ArcMap display at a base or offset spiral to select it.

If this feature selection click is made where there is no nearby feature, the user is prompted in the status bar to select the spiral to be processed, in which case repeat the above step; else continue with the next step.

- 3 Confirm, or not the selection.

If confirmation is given to a point, line, polyline, curve or polygon, the program beeps, and the user is prompted in the status bar to select the spiral to be processed, in which case repeat from Step 2; else, if a main spiral or an offset spiral has been selected, continue with the next step.

- 4 Click in the ArcMap display at a point, the endpoint or vertex of a line, polyline, curve or polygon nearest to the click of feature selection, or anywhere in the display to define the point from which, or at which the tangent line is to commence.

Having selected the point, it is projected on the selected main spiral to determine the point's position with respect to the spiral. If the point is located on:

- The inside of the spiral, the warning message box of Figure 11 is displayed informing the user that a tangent line cannot be created.



Figure 11  
Unable to Create a Tangent Line

In this case, click at the OK button to acknowledge and repeat the command from Step 2.

- The outside of the spiral, the tangent line is created, as well as a point feature at the point of tangency. In this case, the command remains active to repeat from Step 4.

The command remains active to repeat from Step 4.

### Point or Radial Line at a Spiral

With the  [Point or Radial Line along a spiral with plus and offset] tool, the user is able to create point or line features along an existing main spiral by specifying a plus distance from the start of the spiral, and offset distance to the left or right of the spiral. If lines are to be created, they are created at the specified plus distance with a direction that is equal to the instantaneous radial direction having a length equal to that of the specified offset. The line commences at the spiral and proceeds to the right of the spiral if the offset value is positive, and to the left if negative.

Because an offset spiral cannot be represented by an equation, this tool cannot be used on an offset spiral. If an offset spiral is selected, the point or radial line to be created will be created about the offset spiral's origin spiral.

If it is desired to create a point along an offset spiral, the user has two choices.

- Use this subject tool, and specify plus and offset distances from the main spiral. If the offset distance is not known or cannot be remembered, use the  [Echo geometric data of an element] tool to echo the spiral offset value prior to the invocation of the subject tool.
- Use the  [Points along a line or curve with plus and offset] tool, instead of the subject tool, to create a point from the start of the offset spiral. In this case note that the offset spiral is treated as a polyline, which in this case is a series of chords. This spacing dictates the mathematical precision of creating such points. Reference is made to the  [Offset Spiral] tool regarding the spacing of points that constitute the offset spiral.

To use this tool, the user should:

- **1** Click the  [Point or Radial Line along a spiral with plus and offset] tool.

- **2** Click in the ArcMap display at a main spiral to select it.

If this feature selection click is made where there is no nearby feature, the user is prompted in the status bar to select the spiral to be processed, in which case repeat the above step; else continue with the next step.

- **3** Confirm, or not the selection.

If confirmation is given to a point, line, polyline, curve or polygon, the program beeps, and the user is prompted in the status bar to select the spiral to be processed, in which case repeat from Step 2; else, if a main spiral has been selected, the input dialog box of Figure 12 is displayed, in which case continue with the next step.

- **4** Enter in the *Plus Distance (positive) - ft (m)*: data field the distance denoting how far is the point or line to be created from the start of the spiral.

Note that a positive distance must be specified. If a negative distance is entered, a warning message is displayed to that effect. In this case, click at the *OK* button to acknowledge the message, and display the input dialog box of Figure 12 again. Repeat Step 4 to correct the data entry.

- **5** Enter in the *Offset Distance - ft (m)*: data field the distance denoting how far to the left or to the right of the spiral the point is to be located, or the line is to extend.

- **6** Scroll down in the *Type of Feature to Create*: data field, and select the:

- **Point** option to create a point, or the
- **Line** option to create a line.

- **7** Click at the **OK** button to create the point or line, or click at the **Cancel** button to abort the command.

Having clicked at the *OK* button, the point or line is drawn, and the input dialog box of Figure 12 is displayed again to repeat the process from Step 4.

- **8** Click at the **Cancel** button to terminate the command.

### Spiral Intersections

With the  [Spiral Intersections] tool, the user is able to select an existing main spiral, or offset spiral, and intersect it with a two-point line, curve or another main or offset spiral (see Figures 13, 14 and 15). When intersecting a main or offset spiral with a two-point line or curve, the line or curve need not necessarily intersect the main or offset spiral. They are extended to intersect. However, it is possible for a circular arc to not intersect a main or offset spiral even when extended. In this case the program beeps, but remains active to select another feature to be intersected. When

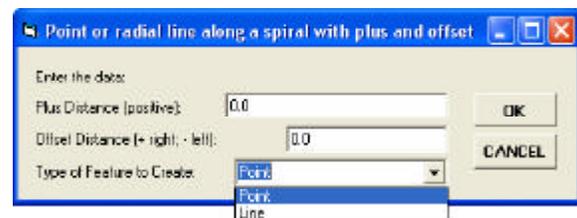


Figure 12  
Dialog Box for Points along a Spiral

intersecting a main or offset spiral with another main or offset spiral, the two spirals must actually intersect. Otherwise, the program assumes a no intersection condition much like that of a circular curve as stated above.



- Beeps informing the user that there is no possible intersection.

### CEDRA Layer Naming Convention

All of the features (points, lines and curves) that are created by the tools in the CEDRA-Spiral-Tools toolbar are stored in the current active layer. The [Set Active Layer] command within the CEDRA-AVcad-Menus toolbar can be used to define the current active layer.

Using this command, the user is able to: (a) select an existing layer as the current active layer, or (b) enter the name of a new layer which should be created.

In the case where the user enters the name of the current active layer, the user, for example, could enter L\_0 as the name of the current active layer. In this situation, when the program goes to store a point feature, the program will look for a layer called L\_0 in the map's Table of Contents.

If the layer exists and is defined to contain point features, the new point will be stored in the L\_0 layer.

If the L\_0 layer does not exist or exists but is not defined to contain point features, the program would create a new layer called L\_0pn, where the **pn** suffix denotes points. Likewise, if a line was to be created, the **ln** suffix would be used to denote lines. For curves, the **cv** suffix is used. The **pg** suffix is used to denote a layer containing polygon features.

This naming convention is referred to as the CEDRA Layer Name Convention and is employed when the current active layer does not exist and exists, but is not defined to contain the feature type being stored. Note when entering the name of the current active layer, it is not necessary to include the CEDRA Layer Name Convention suffix (pn, ln, cv, etc.). The software will take into account the suffix when storing information.

### Notes

- When starting a new document file, it is recommended that the user first defines the current working directory using the [Set Working Directory] command and then sets the current active layer with the [SetActive Layer] command. The [Set Working Directory] command within the CEDRA-AVcad-Menus toolbar can be used to define the default folder or directory where new data is to be stored.
- If the current active layer does not exist in the map's Table of Contents, the user is prompted to enter the name of the shapefile or featureclass of the new layer to be created. Reference is made to the **Creating a Personal Geodatabase** section in the February 2006 issue of Command of the Month for a detailed description of how to create a new shapefile or a featureclass within a Personal GeoDatabase (PGD).
- When creating a PGD, care should be given to ensure that the proper False X, False Y and False XY values are specified. Refer to the **GeoDatabase Considerations** section in the May 2005 issue of Command of the Month for a detailed description of these parameters.

### Summary

The various commands of the {CEDRA-Spiral-Tools} toolbar enable the user to perform a variety of geometric operations involving highway spirals. They may also prove of an invaluable assistance in transcribing deeds of parcels of land adjacent to highways and expressways which quite often employ roadway alignments with spirals.

As always, should the reader have any comments or suggestions they should feel free to forward them 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.*