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PLTS™ for ArcGIS—Aeronautical Solution: Managing Aeronautical Data with Feature Builder

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The Challenge

Managing navigation features, such as great circles, bearing distance, and arcs, in a spatial database presents a unique challenge to the standard geographic information system (GIS) user interface that is optimized for standard feature collection. While these conventional spatial data layers are usually derived through on-screen drawing operations, navigational features are defined primarily as bearings, distances, and geodesic curves related to significant points. These significant points can be either real-world features or other navigational features with no concrete existence beyond their formal definition in legal documents (e.g., airways, airspace, and shipping lanes).

The Need for a New Tool

Creating and maintaining navigational features, therefore, require a different user experience that optimizes the generation of geodesic features, which are often derived from textual descriptions contained in legal documents. Traditionally, the creation and maintenance of aeronautical features have been performed using computer-aided drafting (CAD) systems or database forms. The Feature Builder tool within Production Line Tool Set (PLTS™) for ArcGIS®—Aeronautical Solution has been specifically designed for more efficient creation and management of these complex geodesic features.

Feature Builder Overview

Feature Builder was developed to provide PLTS for ArcGIS users with an intuitive and efficient interface for creating, maintaining, and transforming complex geodetic and ellipsoid features associated with aeronautical features within a centralized database.

- Creating Features
  - When different parts of the tool are combined, the user can create features that represent complex items found on navigational charts.
  - Features created are determined by the functions available to the user (see table 1).

Table 1
Feature Builder Functions

Arc	Bearing	Circle	Segment
Arc (Azimuths)	Bearing Buffer	Circle	Segment Bearing
Arc (Azimuth and Endpoints)	Bearing Distance (Great Circle)	Circle Bearing Intersection	Segment Buffer
Arc (Endpoints)	Bearing Distance (Magnetic)	Circle Circle Intersection	Segment Distance
	Bearing Distance (Rhumbline)	Circle Section	Segment Segment Intersect
	Bearing Intersection		

Editing	Aeronautic Specific	Other
Convert Polylines to Polygons	Keyhole (Two Point)	Bearing Distance Calculator
Dice Polygons	Procedure Leg HA, HF, HM	Polyline (Simple)
Create Target Feature(s)	Keyhole (One Point)	Reference Latitude
Create Segment	Procedure Leg CA, FA, VA	Magnetic Course Calculator
Multidimensional Intersection	Procedure Leg PI	Polygon (Simple)
Merge		Reference Longitude
Update Feature Shape Using Feature		

- Editing Features
  - All features created are stored as geometries in a scratch database, which provides an editing environment separate from the original data to refine the form of the geometries.
  - The user can directly create features in a target database if an edit session is opened.
- Transforming Features
  - Once a geometry is refined, the user can convert it to a feature and add it to the target database or another editing workspace.
  - Transformation does not delete the geometry from the scratch database but adds a new feature to the target feature class.

Figures 1 and 2 are examples of outputs from the Arc (Azimuths) and Circle Bearing Intersection functions.

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Figure 1
Arc (Azimuths)

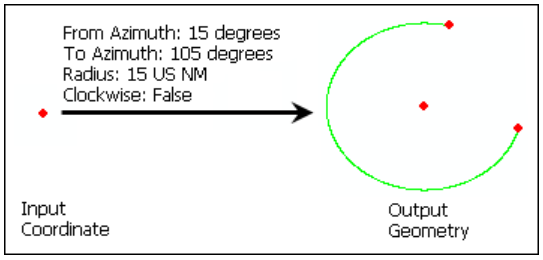
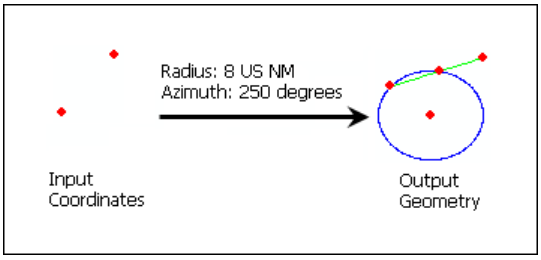


Figure 2
Circle Bearing Intersection



To further accommodate the needs of Feature Builder users, an application programming interface (API) is implemented to enable customers to extend Feature Builder. An API is a product that consists of interfaces and classes for outside consumption with documentation and product support containing methods, properties, descriptions, sample code, and other components. This allows custom functionality to be added easily without compromising the overall architecture.

Key Benefits of Using Feature Builder

- It provides a map-based visual editing workspace with precise control of feature parameters typically associated with nonspatial editing environments.
- Navigation-specific functions are designed for geometry creation and modification based on user-defined parameters and coordinates.
- Editing tools provide a variety of geometry modification options.
- Scratch database workspace allows feature creation and editing independent of the production database.
- Exposed functionality through an API provides potential for complete customization to customer specifications.
- It is one tool in a streamlined, database-driven, and efficient production environment.

Figure 3 shows the new keyhole airspace (outlined in blue) created using Feature Builder.

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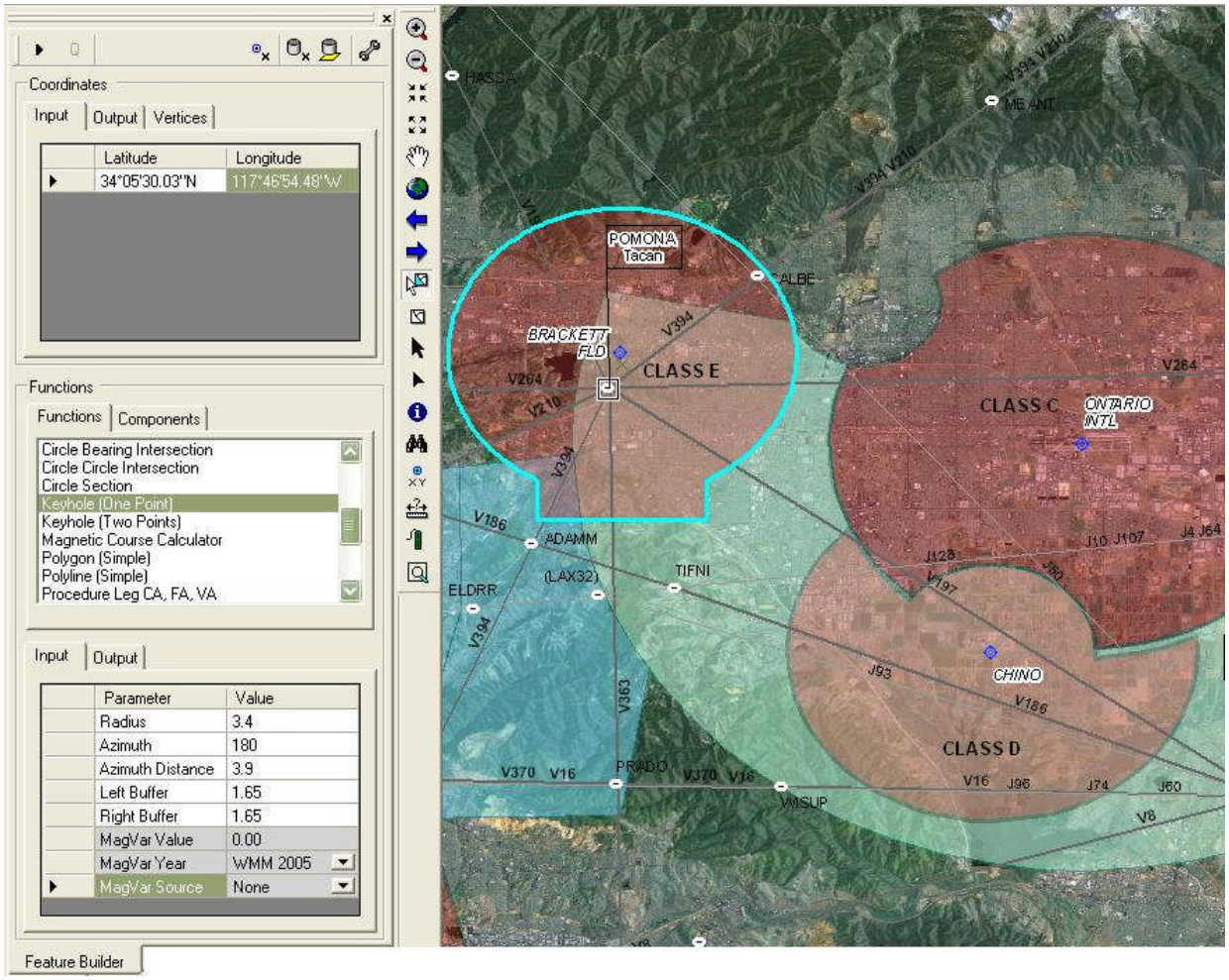
Figure 3
Feature Builder Interface



Part of PLTS for ArcGIS—Aeronautical Solution

Feature Builder provides PLTS for ArcGIS users with precise control over the creation, maintenance, and transformation of simple and complex navigational features based on user-defined parameters. Once created, these features can be used for analysis, cartographic output, or three-dimensional viewing. Feature Builder is just one of the many tools within Aeronautical Solution that manages the quality and integrity of navigational data and the various products and solutions derived from it such as charts. Aeronautical Solution also provides access to database models, aeronautical symbols and styles, and workflow management components.

For more information, visit www.esri.com/plts and www.esri.com/plts/aeronautical.

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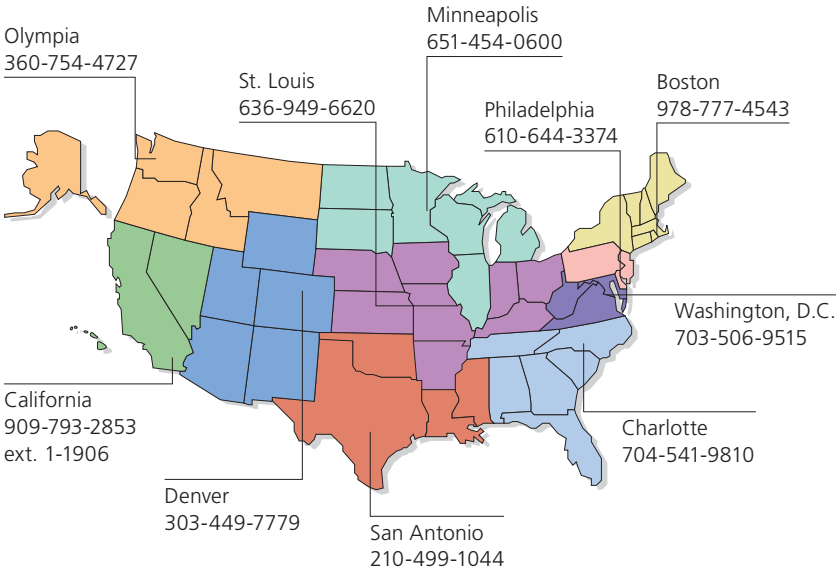

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