Aircraft Search Patterns

Aircraft are well ingrained into the fabric of SAR response. They can provide a "bird's eye view of the search area that can greatly increase situational awareness and provide the ability to quickly search large areas. The future also holds the potential of incorporating Unmanned Aerial Systems / Vehicles into the workflow that could even further expand the response capabilities of any SAR team.

Often times aircraft are assigned to fly a pre-designated search pattern across an area in order to optimize the amount of area search as quickly as possible. One of several classic search patterns is selected based on the desired response and area to be searched. These patterns are also dependent on the sweep width of the intended aircraft.

The "Air Search Pattern" is a new tool in the Operations subset of the SAR_Toolbox10b in IGT4SAR that will automatically generate one of four pre-designated search patterns over a desired area. The dialog box for the Air Search Pattern tool is shown in Figure 1.

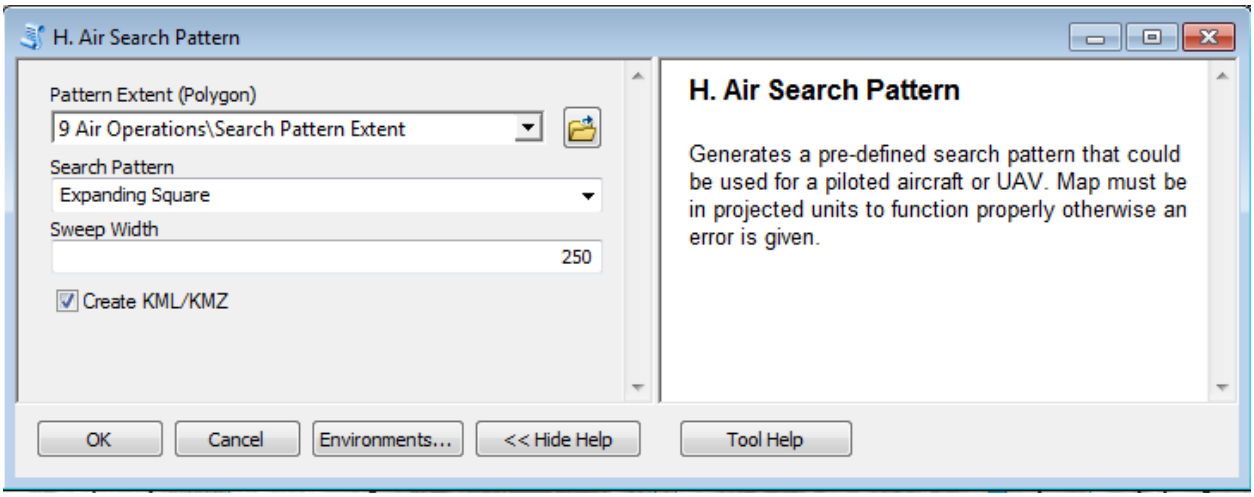


Figure 1: Dialog box for the Air Search Pattern tool within IGT4SAR.

The user must first define the extent of the desired search pattern using the Pattern Extent (Polygon) parameter. The default feature is the Search Pattern Extent polygon feature in the "9 Air Operations" data layer. This feature is best defined as a rectangle that covers the desired search area. Figure 2 shows an example of defining the pattern extent using the Search Pattern Extent polygon feature.

With the Pattern Extent defined, the user than must select one of five pre-designed search patterns: Expanding Square, Expanding Circle, Linked Circle, Longitudinal Traverse and Creeping Lines – Lateral Traverse. Each of these patterns will be shown below.

In next step the user must specify a Sweep Width in meters for the aircraft. This may be provided by various tables or experience. Please consult any standard text on search theory for a detailed description of Sweep Width.

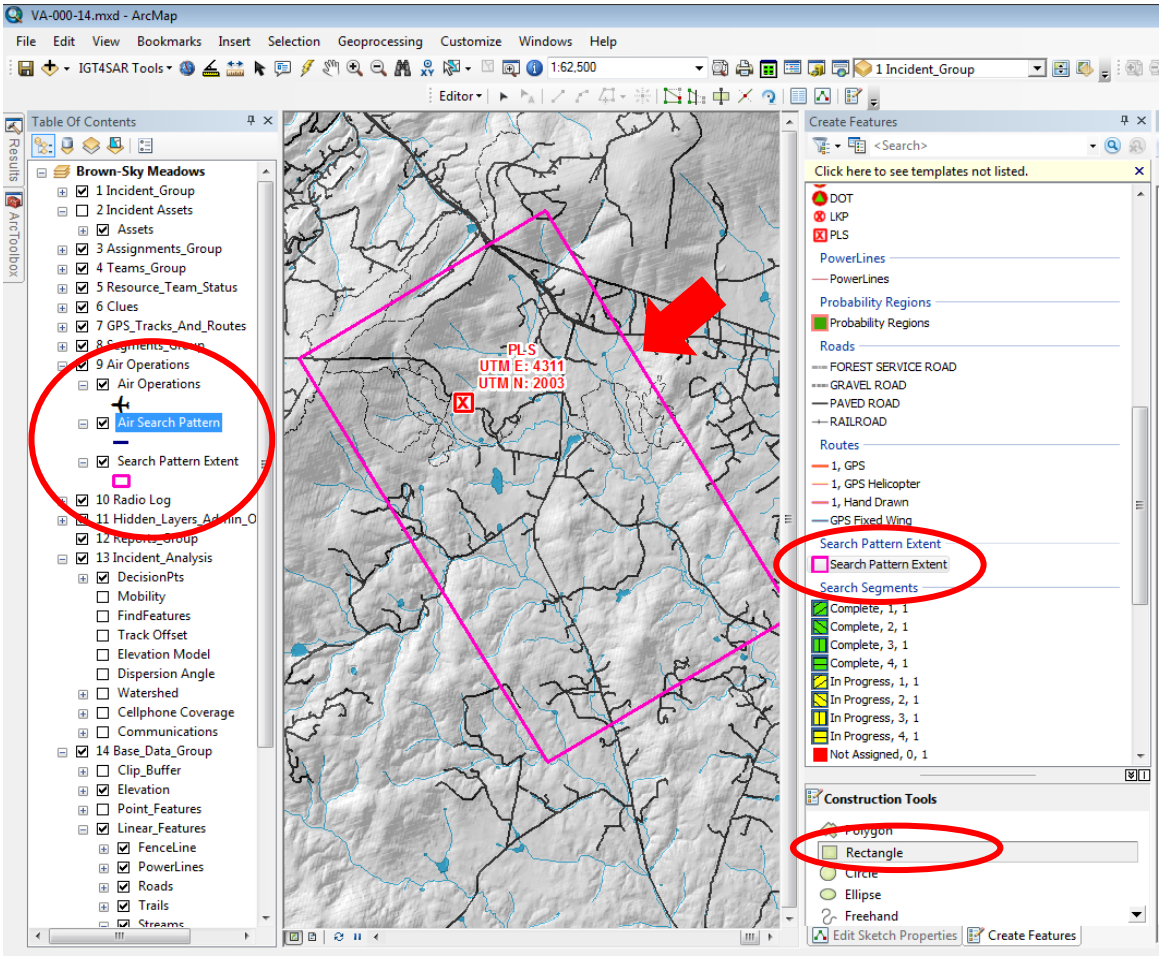
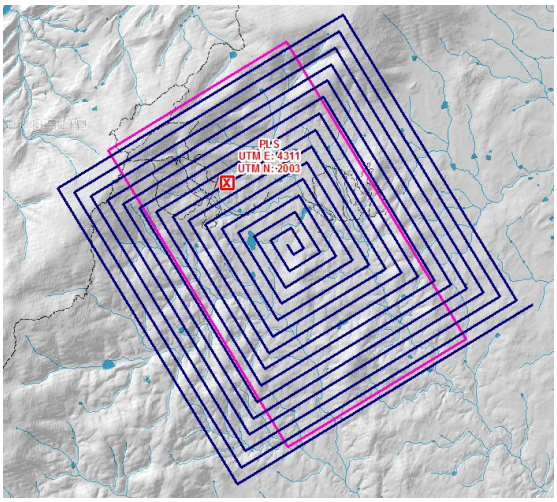


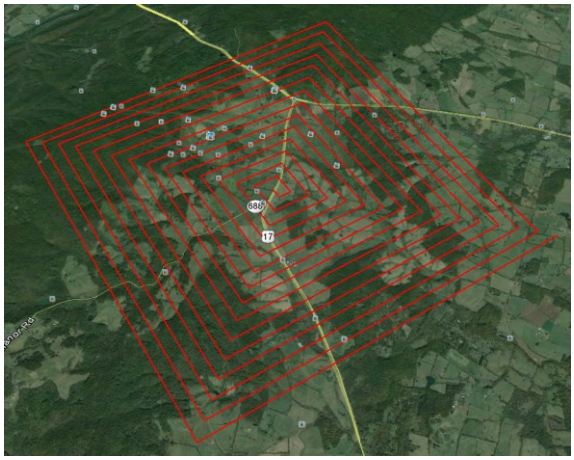
Figure 2: Defining the Search Pattern Extent in IGT4SAR.

Finally the user can specify whether to generate a Google Earth compatible KML/KMZ file of the search path. If selected, the tool will create a KMZ file and save it to the "Products" sub-directory for the Incident. The tool outputs a Polyline feature that is saved in the "Air Search Pattern" data layer within the "9 Air Operations" data layer group. Additionally, the tool saves the Search Pattern to the Search Area Names domain where it is made available to the "Create Assignment Form" tools. This allows an assignment to be generated for the defined search pattern thus creating a Task Assignment Form, a Task Map and a GPX file of the desired search path.

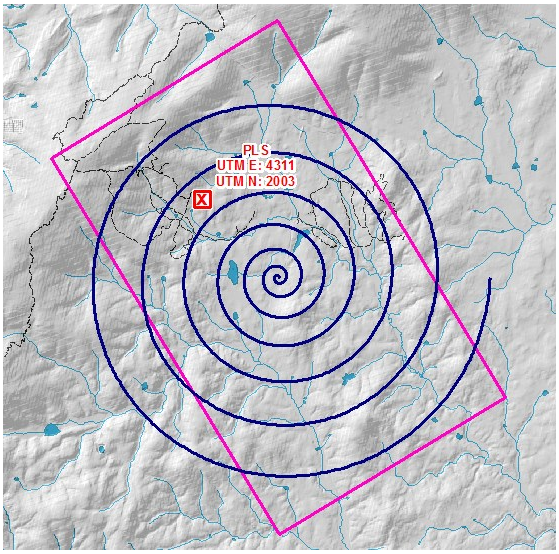
The following figures show examples of each of the five available search patterns with a Sweep Width of 250 meters (potential SW for UAV) along with the occupying aerial map from Google Earth.

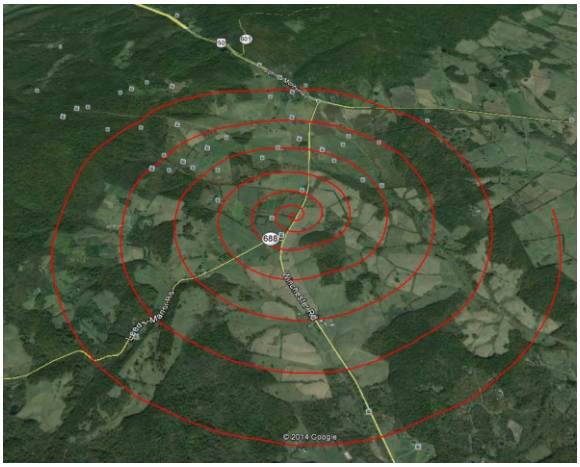
A) Expanding Square



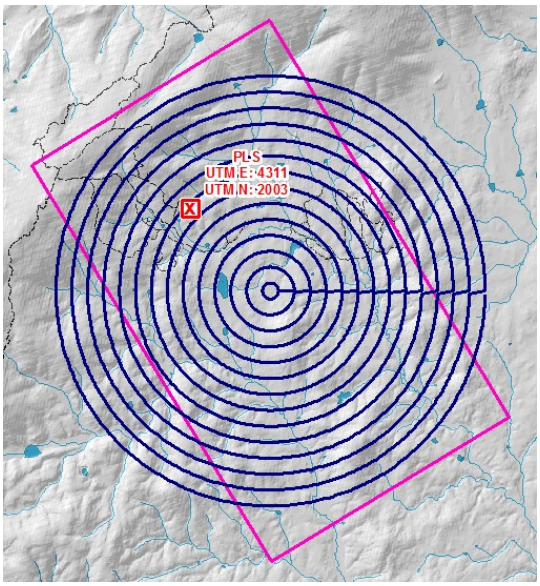


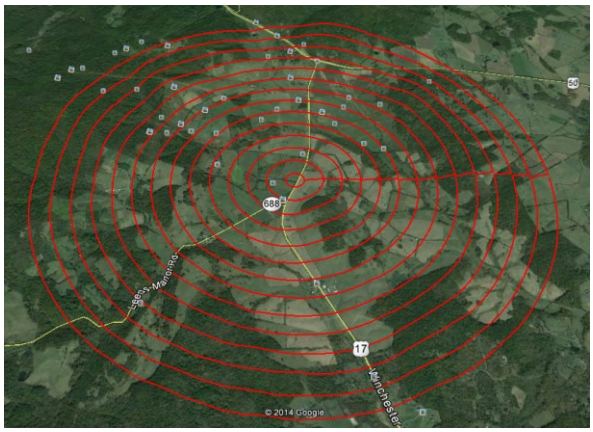
B) Expanding Circle



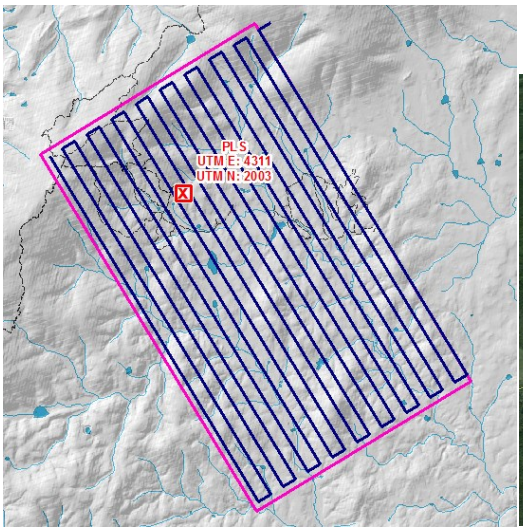


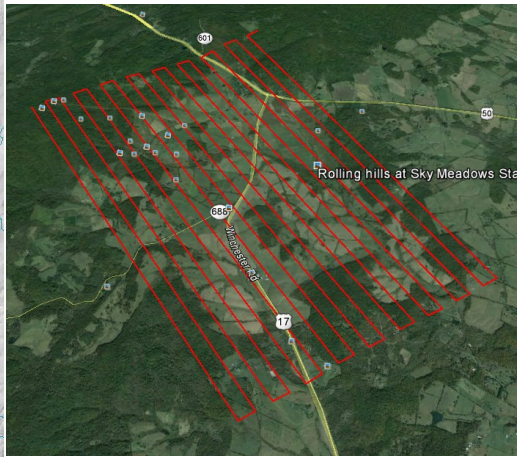
C) Linked Circle





D) Longitudinal Traverse





E) Creeping Lines – Lateral Traverse