

# Loading and Configuring Shepherd for Satellite Imagery

## Introduction

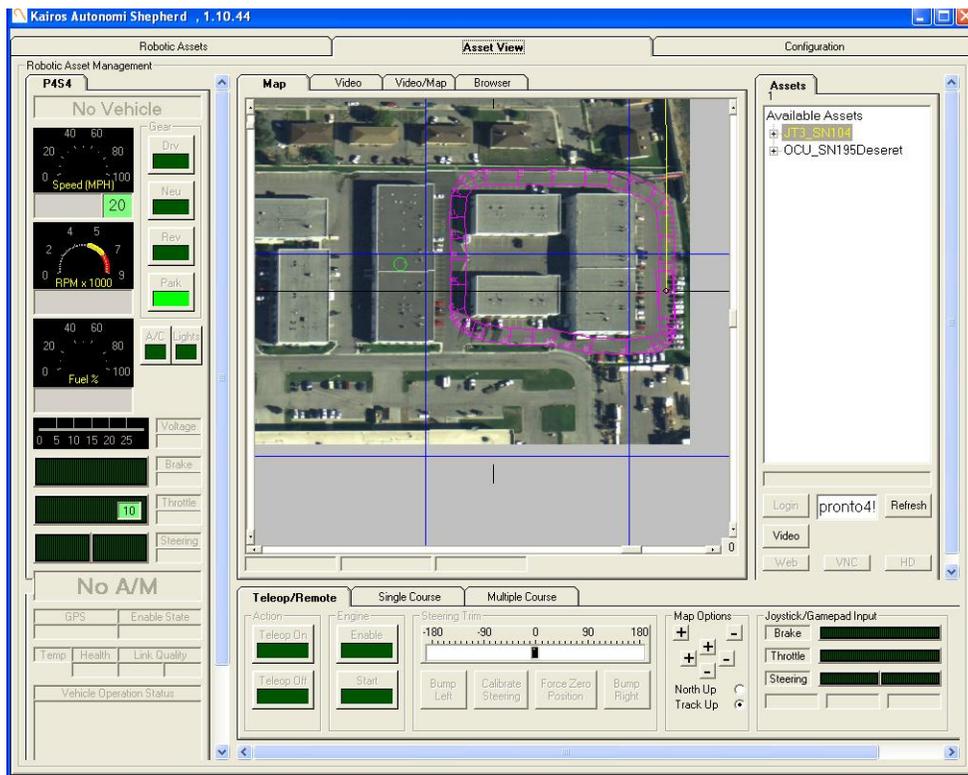
Shepherd, the Kairos OCU application, can overlay a robotic asset on a customer supplied satellite image using GPS position. The imagery files can be gathered from the internet using TerraServer, Bing, or Google Earth.

Once properly configured, Shepherd will show the position of the robotic asset on the image as a moving map referenced to earth.

This document provides information on how to configure Shepherd for the desired local and satellite/aerial images

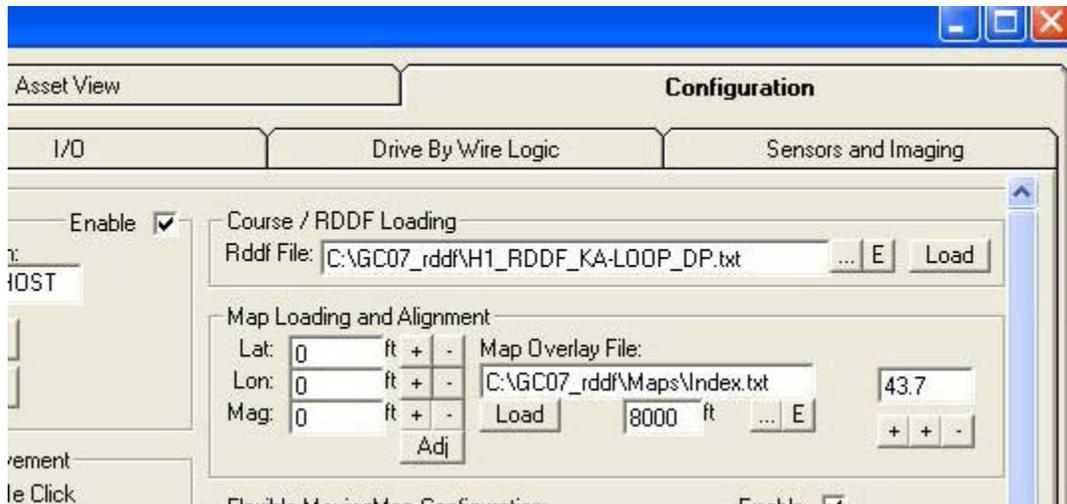
## Overview

The main Shepherd screen has a center display area that provides various data from the robotic asset, including video, GPS position, other data, or combinations thereof.



A GPS base course that can be followed by the robotic asset is shown in purple in the center of the Shepherd image. It is superimposed on an aerial image related to the course.

That course and the associated image files are defined and managed in the “Configuration” tab and “System” sub-tab. There are various configuration panels available on the Configuration tab. The two relevant panels are “Course / RDDF Loading” and “Map Loading and Alignment”.



## Course / RDDF Loading

When accessing the GPS course there are four relevant controls. They show the RDDF file to be accessed, find a desired file, edit the file to be accessed, and load the RDDF course into the system.

|            |  |
|------------|--|
| Rddf File: | The name of the RDDF file to access; the filename may be typed directly into the field |
| ...        | Search for a desired RDDF file   |
| E          | Open the indicated RDDF in Windows Notepad editor                                      |
| Load       | Load the indicated RDDF course file into Shepherd                                      |

## Map Loading and Alignment

The image index file management has many controls that provide for the loading and management of images associated with GPS positions

|                   |   |
|-------------------|---|
| Lat:              | Latitude adjust value, with + and - incrementers          |
| Lon:              | Longitude adjustment value, with + and - incrementers     |
| Mag:              | Magnification adjustment value, with + and - incrementers |
| Adj               | Perform the map adjustment                                |
| Map Overlay File: | Name of the index file referencing images and coordinates |
| ...               | Directory search for the desired image index file         |
| E                 | Launches Notepad editor to edit the image index file      |
| 8000 ft           | The radius to limit the search for images                 |

Three aerial images and an example INDEX.TXT file referencing those images are displayed below. The file references 3 aerial images and includes GPS corner coordinates, two from Kairos in Salt Lake City and one from Belarus. The index file may have hundreds of entries; only 3 are shown for simplicity.



**BelazMap\_1.JPG**



**image\_40\_599376x-  
111\_909571x40\_596933x-  
111\_905279.jpg**



**image\_40\_597857x-  
111\_908745x40\_595413x-  
111\_904453.jpg**

Content of INDEX.TXT for these three images:

```
BELAZMAP_1.jpg, 54.105838, 28.329549, 54.102942, 28.337876  
image_40_599376x-111_909571x40_596933x-111_905279.jpg, 40.599376453401696, -  
111.90957069396974, 40.59693255672161, -111.9052791595459  
image_40_597857x-111_908745x40_595413x-111_904453.jpg, 40.59785717480521, -  
111.908744457359314, 40.59541322258539, -111.90445303916932
```

The INDEX.TXT file contains a listing of all images and their GPS coordinates. The coordinates are of the upper left and the lower right of the image. The format of the file is as such:

```
Picture.jpg, upper left Latitude, upper left Longitude, lower right Latitude, lower  
right Longitude
```

Each line represents a single picture or image of an area. Only JPEG file formats are allowed. Although the name of some of the JPEG files are shown above with GPS coordinates in them, the JPG filename is only used for file location. For example, for the two files starting “image\_40...” the coordinates in the filename have no impact on the INDEX.TXT coordinates.

The GPS format is in decimal degrees. At least 8 significant digits are recommended.

## **djMapFetcher**

Kairos has a program call djMapFetcher. When the OCU has an internet connection, djMapFetcher can automatically pull images from TerraServer or Bing based upon the GPS coordinates from a course or current position.

The course file is stored as an RDDF file format. When Shepherd loads a course or resolves a current GPS location, it references the INDEX.TXT file for a GPS image that encompasses the loaded GPS course or the current GPS coordinate.

The shown RDDF file has the following contents:

```
1,40.599681,-111.904814,14,2.1,1.00, orig
2,40.599816,-111.904815,14,12.4,0.01
3,40.599951,-111.904815,14,12.4,0.01
4,40.600085,-111.904816,14,12.4,11.15
5,40.600205,-111.904825,14,9.1,14.12
.....
27,40.599589,-111.905474,14,10,0.01
28,40.599585,-111.905364,14,10,57.05
29,40.599567,-111.905274,14,7.9,0.01
30,40.599549,-111.905184,14,7.9,61.28
31,40.599542,-111.905009,14,7.5,65.36
32,40.599551,-111.904879,14,6.1,69.11
33,40.599565,-111.904846,14,5.5,70.39
34,40.599594,-111.904815,14,5.5,72.04
35,40.599615,-111.904806,14,4.6,73.14
36,40.599644,-111.904808,14,4,79.57, end
```

The first GPS coordinate identified as waypoint #1 is used to locate the related image file from the list contained in the INDEX.TXT file.

## **Overview**

Using the information supplied, aerial and satellite images may be configured to operate with Shepherd. There is also an automated tool, djMapFetcher, that can be used when there is a live internet connection on the OCU computer.

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## **Contact Information**

Kairos Autonomi  
498 W. 8360 S.  
Sandy, Utah 84070  
801-255-2950 (office)  
801-907-7870 (fax)  
[www.kairosautonomi.com](http://www.kairosautonomi.com)