

MGL Central

Aviation database and Flight planner

Beta release, brief installation and users guide

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General

MGL Central is a Windows based application. It provides the following features:

Aviation database:

MGL Central operates around a central database that contains aviation related items from airport information, obstacles, navaids and similar.

The user is able to edit this database, import into the database from various sources and export the database into the MGL Avinics "Navidata" file format for use with an EFIS system.

MGL_Central can be used to maintain several independent databases if required, only one of which is active at any one time. The database is a relational database where all entries in the database are stored in a single file. The database used is "Absolute Database" from ComponentAce. The database is not encrypted and can be accessed by compatible third party applications is required.

Flight planning:

MGL Central provides basic flight planning and flight plan creation functions.

Central to MGL Central is a large map window that can render vector maps, raster maps and also be used as interface to Google maps for access to satellite views of interesting points such as airports.

Flight plans conform to the MGL "Enigma route" format.

Flight plans from third party applications can be imported via GPX file format as well as FDX (Seattle Avionics Voyager flight planner).

Flight Log:

A flight log created on an MGL EFIS can be imported to a flight log database. This database is kept in a single "DBase" table for easy compatibility with third party applications.

Installation

The executable files are normally stored in the Program Files directory under "Enigma Tools\MGL Central".

In order to conform to the Microsoft data location requirements, the database files and all other related files are stored under the "Application Data" folder of your system. The exact path can vary between operating systems.

MGL Central provides a convenient, integrated two-pane file manager to locate and operate with the data folders using simple drag and drop file operations.

Installation of maps

Map source files are either in vector or raster map format. Vector maps are single files

covering a region and are usually used together with terrain elevation data to form the map background. Vector maps have the file name "VMap.evd" are available for various locations such as "North America".

Raster maps are usually several files, each file contains one or more "degree tiles". Raster maps are created from scanned aviation or other map sources. Central to a cluster of raster map files is a matching "Mapindex.MMO" file which contains information on file names and contents for the batch of raster map files to allow a system easy knowledge of this without having to search through folders.

For larger area zoom levels MGL Central requires a file called "World.BMP". This forms the backdrop for these zoom levels. This file should also be copied into the "Maps" folder.

MGL Central includes a "special" raster map mode that can display a single raster map file without the aid of a "Mapindex.MMO" file. This is often used to create a single map file from a scanned image of a single airspace definition (such as is published from some aviation authorities). This allows easy tracing of the airspace boundary using the integrated airspace editor so it becomes possible to quickly define new airspaces or modify existing ones.

Summary of files to install into the "maps" folder

For raster maps:

All raster map data files (names such as "N33W100c.M23")
Matching MapIndex.MMO file that was created for your raster map files.

For Vector maps:

File VMap.evd for your area (for example "North America").

Terrain elevation data files:

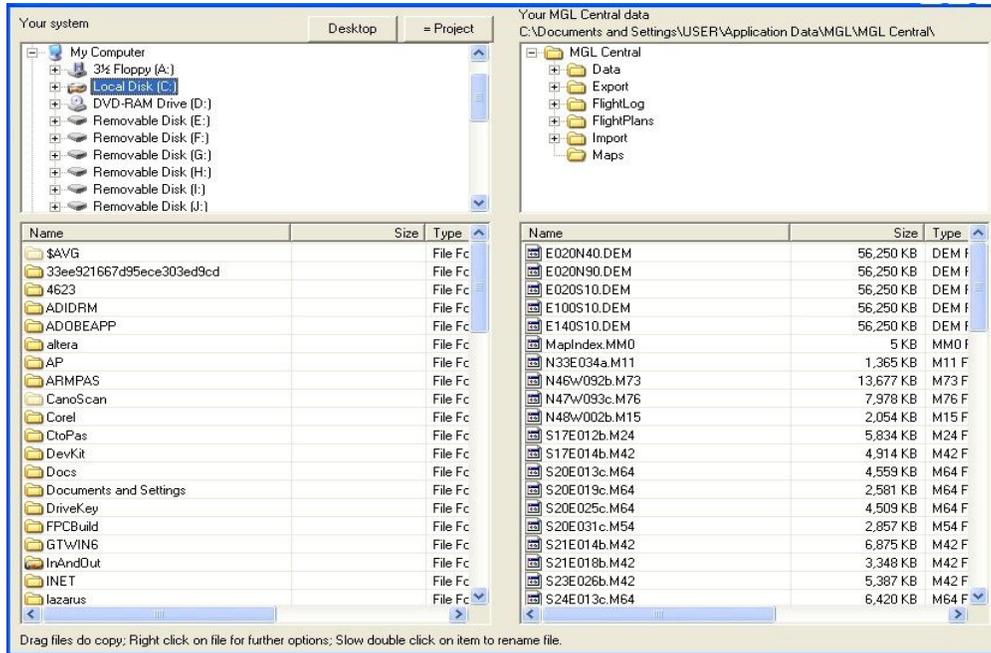
These have filenames such as E100N40.DEM. They are over 50MBytes of size each.

World file:

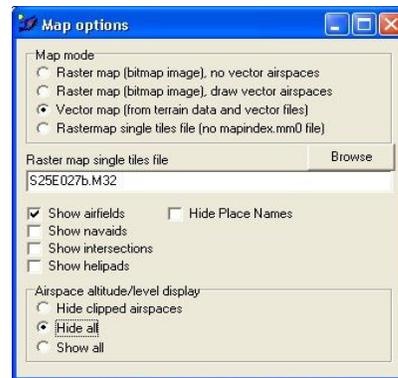
The file "World.bmp" is used for zoom levels that cover a large area where it would be too slow to load terrain "DEM" files.

Location of map and terrain data files:

Copy all of your map files as well as terrain data files (*.DEM) into your MGL Central "maps" folder. You can use the built in file manager as shown below or any other method you prefer.



Use the “Map options” dialog to select the map type you want to display and other options.



Using the map

Center the map at a position current on the map (MGL and Google maps): Click on the desired position, while the mouse button is down the mouse should not move. When releasing the mouse button the map will be centered around the position that you clicked on.

Pan the map (MGL maps): Click on a map position, hold the left mouse button down and drag the map as needed then release the button.

Pan the map (Google maps): Use the Google controls provided.

Zoom the map (MGL maps): Click on the zoom buttons on the right to select a desired zoom setting. Lower numbers zoom into the map.

Zoom the map (Google maps): Use the Google controls provided.

Right click on the MGL map to select various map related functions.

Quick distance and bearing

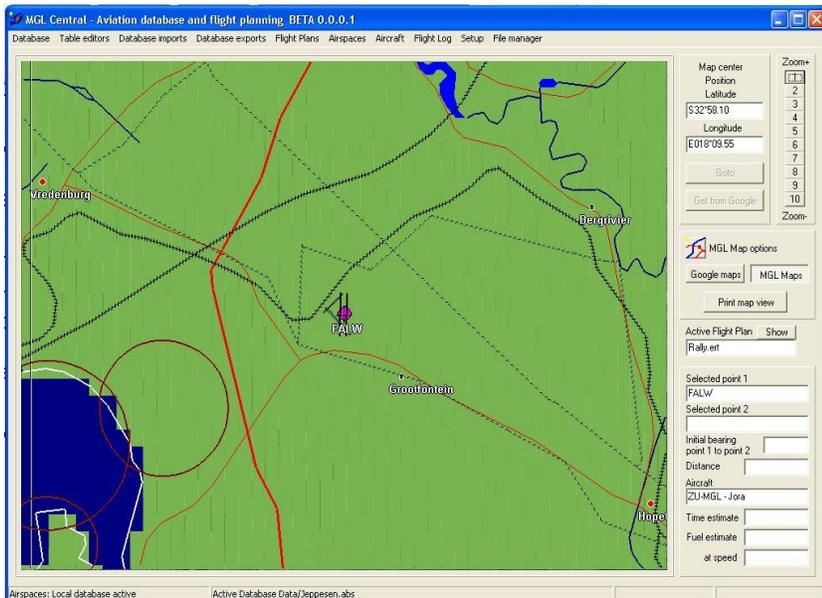
This function is not available with Google maps.

You can quickly calculate distance and bearing (true) by clicking on any two map points. If you have an aircraft definition selected, time and fuel estimates will be calculated.

Selected point 1	
S33°35.14 / E018°34.15	
Selected point 2	
S33°14.48 / E018°28.48	
Initial bearing point 1 to point 2	347°
Distance	24.0 sm
Aircraft	
ZU-MGL - Jora	
Time estimate	18m 02s
Fuel estimate	3.00lt
at speed	80mph

MGL and Google maps

Image showing airport "FALW" using MGL maps



And the same airport after switching to Google maps



Switching between MGL and Google maps



If you have an active internet connection you can switch to Google maps. The Google map view will default to the position in the center of the MGL Map at a zoom level most suitable for viewing airports or airfields.

The center position of the google map can be used for flight planning or to center the MGL



map at the same location. In order to do this the current Google map position has to be requested. This is done by clicking the “Get from Google” button.

This places the current Google map center position into the “Map center position”. This position can then be used as part of your flight plan if required and it will also be used as new center position if you switch back to the MGL maps.

Map center Position Latitude
S25°20.27
Longitude
E027°10.26

Printing a map view

Both the current MGL and Google map view can be printed, simply click:

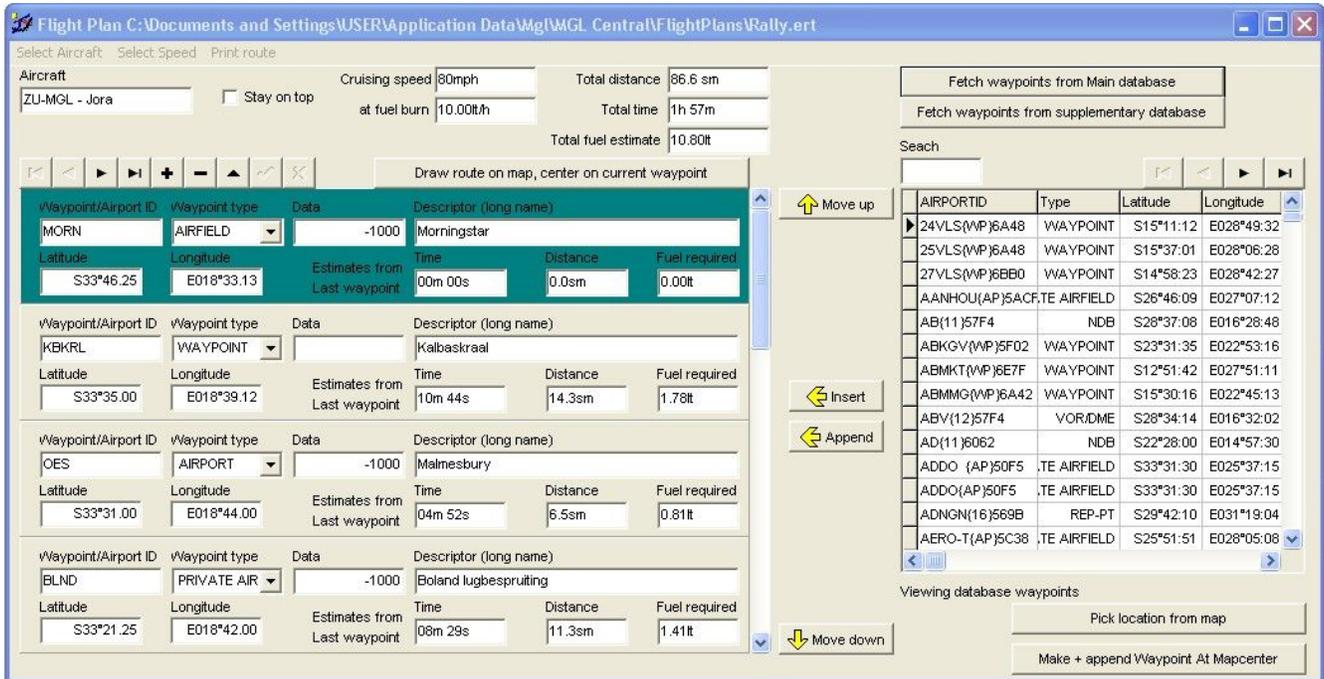


This will bring up a printer preview window where you can choose further options. The printer options for Google maps and MGL maps differs slightly.

It is recommended to use a color printer if possible.

Creating a Flight Plan.

You can edit existing flight plans in “Enigma Flight Plan” format or create new ones. You use the Flight Plan editor.



The Flight plan is shown on the left. Each waypoint can be created by filling in the fields manually, copying the information from the database window on the right, you can pick a location or waypoint/airport from the MGL map or you can create a new waypoint based on the current map center position (which you can also get from the Google map (see switching between MGL and Google map)).

Flight plans can be printed in several ways, forwards or backwards with or without airport information such as frequencies and runways. If you have an aircraft definition selected, fuel burn and time estimates are added to the flight plan.

To define a new aircraft use the “Aircraft menu” on the main window before opening the flight plan. You can then select the required aircraft and choose a cruising speed for fuel and range calculations.

Flight plans are saved in “*.ert” format and are directly compatible with any MGL EFIS systems. Copy the flight plan(s) to an SD card using the File manager as needed.

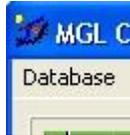
Importing data into the database

Before you can use the database, you need to get data. Various data sources are available. The following example shows how to import data using the NACO/FAA database that is based on ARINC 424 and then augment it using data from the website "www.Navaid.com".

Since this is a "big" import, it makes sense to start with an empty database.

Step 1:

First, either create a new database or empty the current one. You will find options for these operations under



Step 2:

Import the ARINC 424 data.

The data file can be imported from any location but we suggest that you use the File Manager to copy the file to the "Import" folder of MGL Central. The FAA ARINC version 18 file name is "FAANFD18". This file can be obtained from the FAA/NACO website for a small fee or via a subscription.

Import the file using the function "Import waypoints/navaids/airports/airspace from ARINC424 file. When prompted for "Data import options", choose "Delete all existing information for item, replace with current". It does not really matter – there should not be anything in the database currently.

During the next dialog, select your ARINC source file and click "Import"

Depending on the speed of your PC the import may take a few minutes.

As of writing this document, the FAA ARINC data does not include "Communication records", effectively records that contain airport frequencies and descriptions.

Because of this, we now do a further step:

Step 3:

Go to www.Navaid.com and download data in GPX format that approximately covers North America. To keep the download smaller, choose only airport information. This information includes frequencies.

Step 4:

Import the GPX file (it will have a name similar to "5f0bfbbed.gpx") using the import GPX function "Import Waypoints, Navaids, Airports from GPX".

When prompted for the import options, select "Only add frequencies to existing airfields, do not add new items".

This will try and match every airport now in the database with a similar definition in the GPX file and then import the frequencies only for that entry.

At this point you can import obstacle data if you have it. Obstacle data is available from the

FAA/NACO website as well for a small fee or subscription.

The filename for the FAA obstacle data is "DOF.DAT".

Import it using the "Import Obstacles" function.

If all goes well, you now have a complete database based on your FAA data and that of www.Navaid.com. At this point you can use it in your MGL Central for flight planning and you can export the data in Navidata format for use with an MGL EFIS system.

If you like, you can edit the data using the various database table editors in the system (perhaps you want to add a few of your own airfields that are not in the database).

Import data sources:

MGL Central includes imports for the following data sources:

CSV file format 1:

This file format is a text file in the following format:

```
/
/ Valid field separators are spaces, tabs, and commas. A comma should
/ be used when a nav/comm frequency is not known. See examples below.
/
/ +-- First character is db type (must begin in column one).
/ |
/ |+- Next five characters id (must be in columns two through six).
/ ||
/ -ABCDE Airport
/ ABCDE Navaid (space in column one)
/ +ABCDE Intersection
/ #ABCDE Winds aloft reporting location
/ / Comment field
/
/
/ LATITUDE / LONGITUDE
/ -----
/ Two formats are accepted - degrees, minutes, hundredths of minutes and
/ degrees, minutes, seconds, and tenths of seconds. For example:
/ 23 45.67 S (dd mm.hh - hundredths)
/ 23 45 67.8 S
/ 123 45.67 E (dd mm ss.t - tenths)
```

/ 123 45 67.8 E

/

/ MAGNETIC VARIATION (Note: Enigma Flight Planner ignores this field)

/ -----

/ One or two digits with a sign of either East or West (no spaces in
/ between). For example:

/ 12E

/ 03W

/ 5E

/ 1W

/

/ NAVAID TYPES (must be one of the following):

/ -----

/ LFR

/ NDB

/ NDB/DME

/ UHF-NDB

/ M-NDB(marine)

/ M-NDB/DME (marine)

/ VOR

/ VOR/DME

/ VORTAC

/ TACAN

/ FAN-MKR

/ LOM

/ LMM

/ LOC/SDF

/ MLS/ISMLS

/

/ RUNWAY descriptors

/ -----

/ 00-36 (heading)

/ L or R (in case of dual runways)

/ S,K,G,C,T or I (Sand,Gravel,Grass,Concrete,Tar,Ice)

/
/ AIRPORT record format
/ -----
/ ID up to five characters
/ LATITUDE
/ LONGITUDE
/ MAGVAR
/ FREQ 123.475 (MHz)
/ ELEVATION in feet above mean sea level
/ NAME up to 15 characters
/ RUNWAY1
/ RUNWAY2
/ RUNWAY3
/
/

/ NAVAID record format
/ -----
/ ID up to five characters
/ LATITUDE
/ LONGITUDE
/ MAGVAR
/ FREQ 123.475 (MHz)
/ TYPE See above.
/ PWR Service volume: *, T, L, or H.
/ ELEVATION in feet above mean sea level
/ NAME up to 15 characters
/
/

/ INTERSECTION record format
/ -----
/ ID up to five characters
/ LATITUDE
/ LONGITUDE
/ MAGVAR

/
/
/

/AIRPORTS

/SOUTH AFRICAN REPUBLIC

-CRAGI 29 11 28.0 S 030 17 47.0 E 20W 124.800, 4500 CRAIGIEBURN DAM

-FAAD 32 41.0 S 026 18.0 E 22W 124.800, 1966 ADELAIDE

-FAAG 29 16.8 S 018 49.1 E 20W 122.700, 2648 AGGENYS

-FAAB 28 34.4 S 016 32.1 E 20W 118.700, 98 ALEXANDER BAY

/NAVAIDS

HBV 25 40.5 S 027 50.0 E 16W 112.100, VOR * HARTEBEEPOORT DAM

LIV 25 56.9 S 027 54.8 E 16W 114.500, VOR/DME* LANSERIA

AGV 29 28.9 S 018 33.8 E 19W 116.700, VOR * AGGENEYS

ABV 28 34.2 S 016 32.1 E 21W 112.100, VOR/DME* ALEXANDER BAY

AB 28 37.1 S 016 28.9 E 21W 317.500, NDB * ALEXANDER BAY

BH 33 37.0 S 021 48.0 E 23W 392.000, NDB * BADSHOOGTE

/INTERSECTIONS

+3110S 31 10.0 S 025 00.0 E 22W /LA-FAPG FIR

+2318S 23 18.5 S 027 35.0 E 14W /GC-FBFT FIR

+2516S 25 16.0 S 029 38 49 E 14W /SKUKUZA/MALA MALA ETC LASS BOUNDARY

+MMWPT 25 50.0 S 026 40.0 E 17W /FALA-FAMM WAYPOINT

+2550S 25 50.0 S 029 57.0 E 17W /WK-FABN LASS BDRY

+2555S 25 55.0 S 028 23.0 E 17W /WATERKLOOF CTR TO
NELSPRUIT/BARBERTON

CSV File format 2:

This file format looks like:

"Aanhouer Wen",,"AANHOU",,"S 26°46.150","E027°07.200","Private.",,"09/27--XX-124.8"

"Aberdeen",,"FAAE",,"ABERDN",,"LICENCE WITHDRAWN.",,"S
32°28.000","E024°04.000","Municipal.",,"15/33--XX-124.8"

"Addo / Sunland",,"ADDO ",,"S 33°31.510","E025°37.260","Private.",,"04/22--XX-124.8"

"Adelaide",,"FAAD",,"ADELAD",,"LICENCE WITHDRAWN - AIRFIELD CLOSED.",,"S
32°41.000","E026°18.000","Municipal.",,"05/23--XX-124.8"

"Aero-57",,"AERO57",,"S 25°54.167","E028°04.904","Private",,"XX/XX--XX-125.8"

GPX file format from www.Navaid.com

This file format allows import of waypoints, nav aids and airports with runways (geo

referenced) and frequencies.

ARINC 424 file format

This file format contains waypoints, nav aids, airport information including runways and frequencies. It also includes airspace and many IFR related entries.

This file format is propriety to ARINC. A document describing the format can be purchased from www.ARINC.com.

Airspace.evd format

This is an older MGL format that is no longer used. You can use this function to import the airspaces contained in these files but by now many of the can be outdated. These files can still be downloaded from the MGL Avionics website (data server) and can form the bases of a modified and updated database using the MGL Central airspace editor.

Navidata.ewd

This is the file format that is exported from MGL Central. MGL Central can however also import data from it. Currently it can import all waypoints, nav aids and airports (with airport information) as well as airspaces. Obstacles cannot currently be imported from this file.

Please note that some third party products produce this file in an encrypted version. This version cannot be imported into MGL Central.

Waypoint.ewd or route.ert

You can import any waypoints defined in the Waypoint.ewd file (supplementary waypoint file, normally created in an EFIS), or directly from any route (Flight plan) in Enigma format.

Performance

Using a reasonably modern PC performance of the map engine is good. However, be aware that large databases can slow down the map engine as a lot of data may have to be scanned in order to pick out what needs to be drawn.

Generally this is not an issue but may slow down the system if you have a very large database for example containing many small airfields and other waypoints that cover a very large area (for example all of the World).

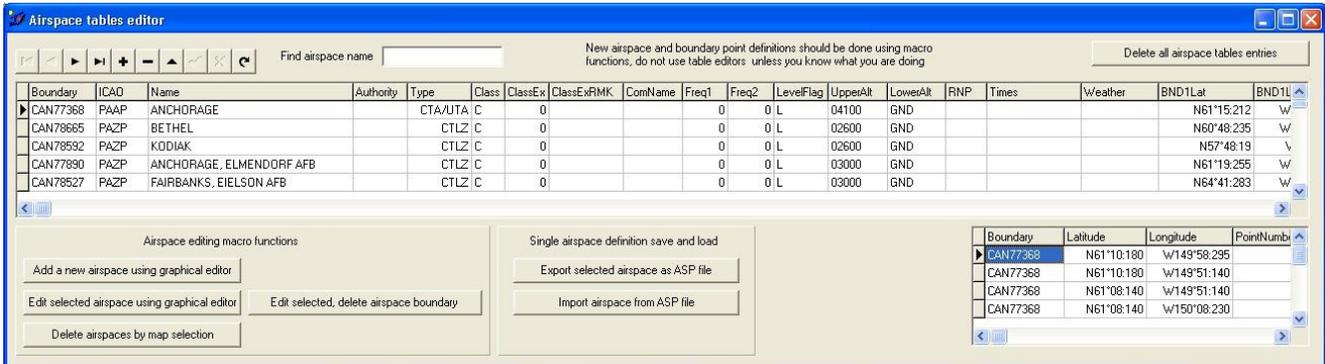
Editing airspaces

MGL Central includes the ability to edit airspaces.

This is normally done on an existing airspace database imported either from ARINC data or from either an Airspace.evd or Navidata.evd file.

You can create new airspaces, edit the details or boundary points of an existing airspace and delete airspaces.

You can also save and load single airspaces to files if you need to copy airspaces between databases.



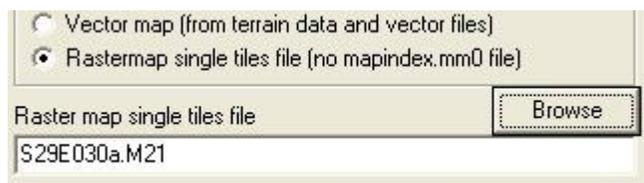
The airspace table editor allows you to view the details of an airspace. You can edit the items of an individual airspace but do not add, delete or modify the points of the boundary directly. You can do so but you need to be aware of the bounding box of the airspace that is defined in the main airspace table. This bounding box is used by the system and EFIS systems to evaluate if an airspace is possibly relevant for the current position.

It is recommended that the graphical editors are used to define or modify boundaries as this will ensure that bounding boxes are calculated.

Using the graphical editor is based on the premise that you would like to copy airspace definitions from a raster map. Raster maps are created by another application called "MapMaker" from MGL Avionics.

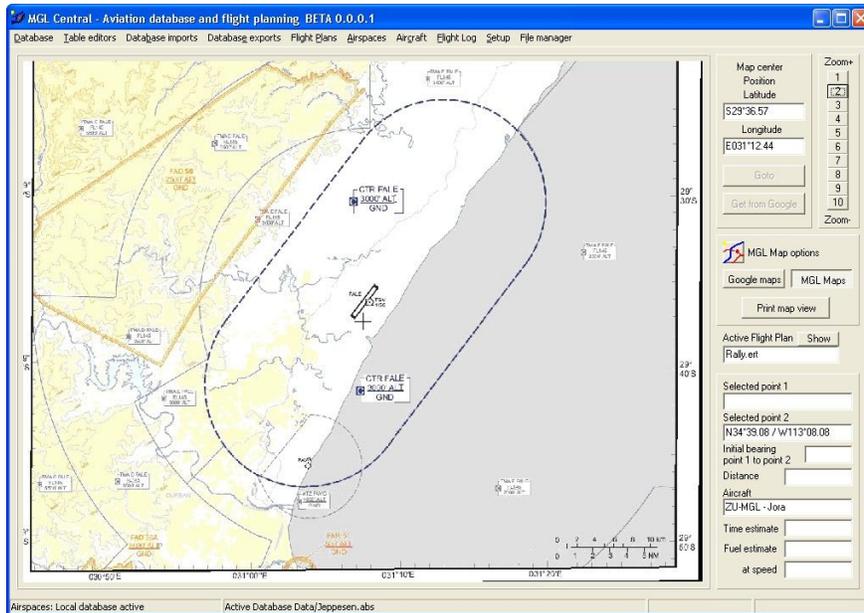
The following example defines a new airspace. For this a PDF file containing a map of the new airspace has been downloaded from the aviation authority. The PDF file was then converted into a JPEG image file using a utility to convert a screen image to an image file (Windows 7 provides a utility as part of the system). For earlier versions, we recommend a free program called "MWSnap". Find it with "Google search".

The image was then georeferenced and converted using the MGL Avionics "Mapmaker" program. This resulted in a single file called "S29E030a.M21". This means a file with top left coordinates at S29 and E030 with a resolution of 2400 pixels per degree. The map is 2 degrees wide and 1 degree high.



Using the single map file option under "Map options" the file is loaded.

After centering the map and zooming to size the following main map window is presented.

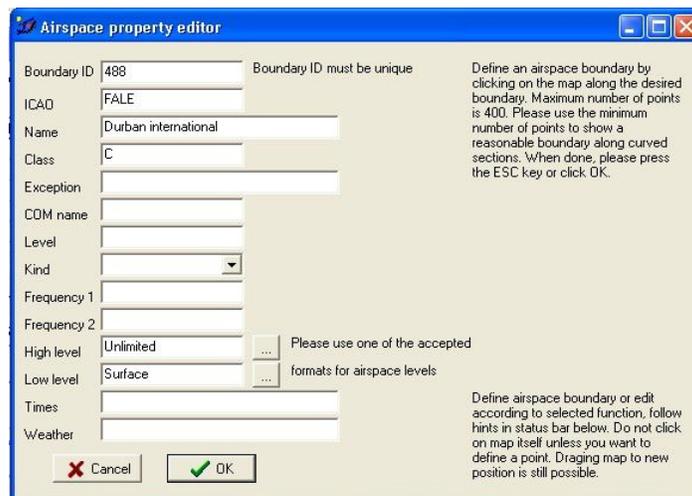


This shows the outline of the new airspace.

Using the airspace table editor a new airspace is selected:

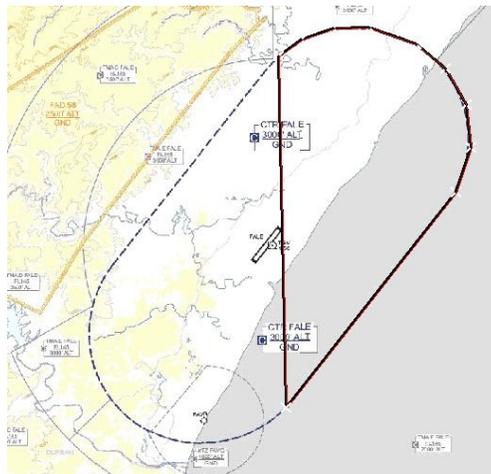


This results in the following screen:



The details are filled in (note that airspace altitude limits must follow fixed formats, click on the [...] for examples. Note that the "Boundary ID" must be unique for this airspace (no two airspaces must use the same ID). You can use anything you like, a number or text.

Now you are ready to define the the outline. Click on the main window (do not click on the map) to bring it into focus and start clicking around the boundary.



Here we are halfway done. Use as few points as possible. Straight lines should only have a start and end point, curves should be approximated. You can see the curve defined has 8 points. You can use up to 400 points per airspace but it is recommended to keep the number as small as possible as this enhances the performance of any equipment using this data.

Note the status bar – it gives information on the number of points and other information as needed. In this case, if you get a point wrong – just “backspace” it and try again.

Once you are finished, either press ESC or click OK on the airspace details editor. This will end the edit and your new airspace is now part of the database.

You can edit existing airspaces – to do so, select the airspace in the table editor and click “Edit selected airspace using graphical editor”.

The map will now only show the selected airspace in RED/Black. The airspace points are marked with a white X. Click on any of the points to bring up a small window to select options for that point. The selected point now gets a red box around it.



You can delete a point, move it to a new location or insert a new point before it. “Before” is taken in order of the points definition. In case of insertion, two red boxes are shown and the new point will be inserted between these boxes – just click on the map at the desired location for the new point. Press ESC if the two boxes are not the ones you wanted and try again (select one point before or after your original selection).