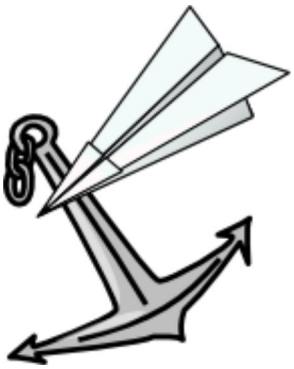

Flight Simulator X - Boat Traffic Compiler

bringing sea life to FSX !

AI Boat Traffic Compiler (AIBTC) is a software to create, edit and compile schedules for ships in Flight Simulator X. It is inspired by the venerable TTools of Lee Swordy to create AI aircrafts schedules. A prior knowledge of aircraft AI traffic is needed to understand this document. A good source of documentation is the help file of TTools 2.0

A big thank you to **Lee Swordy** who published the specification of the BGL traffic files which was very useful to create this tool.

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How boats works in FSX ? (technical)

There are multiple ways to get sea traffic in FSX:

1. Static boats. There are some static boats in main seaports around the world. As said, they are only static, they don't move. Their density depends on the "*scenery complexity*" ruler. You can add some static boats using standard scenery tools, like Rwy12 or the object placement tool included with the mission SDK (only in FSX deluxe).
2. LivingWorld boats: *LivingWorld* is the name of the FSX subsystem that deals with vehicles additions, like cars, airports ground vehicles and some boats. In FSX, it handles only inland and leisure boats. The boats managed by LivingWorld have no schedules or known paths. They just moves randomly near coastlines and on lakes. You can edit the density of LW boats using the "*Leisure boats*" ruler on the *"Traffic"* tab, but not manage each boat separately.

   You can also change the models of the boats used by editing the LWcfg.xml configuration file. Note that you must recompile this file to SPB format after editing. The concepts used by LivingWorld traffic generation is very similar to Autogen features, so I advise you to read autogen and terrain documentations included in the SDK (don't search documentation about LWcfg.xml it is yet undocumented)
3. Mission or SimConnect-managed boats : these boats are created ang managed by the mission system or some kind

of third-party add-on using simconnect. The developper must include a list of waypoints for each moving object he wants to include in the simulator. These boats are thus restricted to very special situations and not available in a general flying context.

4. AI boats: the AI boats (Artificial Intelligence) are managed by the same AI system that provides aerial traffic since FS2002. In FSX, it can also handles boats. The features offfered by AI boats are very powerful : you can add your own models, define accurate schedules and routes to follow. The AI Boat Traffic Compiler Tool address only this type of traffic.

Download / Installation

Last version : 0.1 release date: 4 december 2006. Download here. You must have Java 5.0 installed on your computer before. You can download it free here.
Unzip the file to a temporary directory and double click on **aibtc.jar.** If JRE 5.0 is correctly installed, the application should be launched automatically, otherwise please verify your java installation.
When you run the application for the first time, you should set up the correct paths as they are not automatically detected. Choose menu *Files->Set source folder* to change the path where you want to store the text files and working files.
Set up the traffic installation path with menu *Files->Set destination folder*. You should locate your FSX installation (generally c:\program files\microsoft games\flight simulator x) and then change to Scenery\World\scenery subdirectory. If you choose a different directory, your traffic files will not be visible by FSX.

Conceptual differences between boats and aircraft traffic

Globally, all the facts needed to create and understand boat traffic are the same as for aircrafts. However slight differences should be noted:

- Boats do not travel between two ports, but follow a route instead. All points on the route must be specified while creating the traffic. There are no known limitation on the number of points. If you create a traffic that places two boats on the same route, they will not collide or sink, but ignore themselves.
- When a boat arrive at the last point of a route, it can stay at this point until the departure of the next order (FERRY type) or can dispatch on a 300 meters circle around the last point (CARGO type). The cargo type allows to have than one boat at a terminal port at the same time. When designing cargo boat routes, it is recommended to place endpoints at least 300 meters away from land.
- Boat plans can have more than two legs in their orders, however if more than two different routes are used, the traffic may cause FSX to crash
- Schedules can be repeated on a periodic basis specified by the user. The frequency availables are the same as for aircrafts (1 hour - 1 week) plus 2 weeks, 5 weeks and 8 weeks to allow longer travels
- Aircraft-specific features are discarded (IFR/VFR, touch'n'goes, flight numbers, altitudes)
- No custom schedules can be used with the TrafficDatabaseBuilder tool shipped with Flight Simulator X. That's why AIBTC was developed.

Text traffic file formats

Boat traffic text files are very similar to AI aircraft. There are 3 distinct files needed to compile a valid traffic:

The boats file

(Boats*.txt). It specifies to model names of boats to use in this traffic. The format is the same as for aircrafts :

AC#7,25,"VEH_water_cargoG_sm"

- AC#7 introduce the id number of this entry. Please use different number for each entries. You can also use the BT# prefix to make a distinction between ships and aircrafts
- 25 is the boat speed. Acceptable values are around 15 and 25.
- VEH_water_cargoG_sm is the model name. The model name could be found in the sim.cfg of each boats directory in the SimObjects\Boats directory under the FSX installation. Each *title=* line specifiy a different model name. An invalid name will cause traffic to not appear

The routes file (CSV)

A basic file format for boat routes is specified in the Microsoft Flight Simulator X SDK. You can use it to compile your traffic. A route has the following format:

4721,483,482
{
-49.92155, 13.0301
-47.3103, 11.4020
-41.301, 19.90211
}

- The first number (4721) is the identifier of the route. It should be unique in the file and be a number
- The other numbers are terminal identifiers. They are not used by the traffic compiler
- Follows a block of latitude, longitude pairs. At least two points are needed in a route. Only decimal position is supported. Degree-Minute-Seconds notations are not supported yet

The order of the points on a route is important. A route is two-way as you can specify the travel sense in the boat orders. The *canonical* way is from the first point defined in a block to the last, the *reverse* is from the last to the first. Alternatively, you can use a KML file to specify routes instead of a CSV :

The routes file (KML/KMZ)

(Routes*.kml) The main format used by AIBTC is the GoogleEarth KML format. It can be viewed and edited using free versions of Google Earth, so it is more practical to use this format for routes. Only one route file format (KML or CSV) can be used to compile a route

KML is more stable than KMZ. If you encounter problem using KMZ routes, please save your file as KML instead.
All paths stored in a KML/KMZ file will be parsed to extract the routes, however only those referenced by plans will be compiled in the BGL.
The path name saved in Google Earth is used as the identifier of the route. If a name is non-numerical, the route will be skipped and could not be used for defining plans.
Path informations other than latitude and longitude are not used. If some parse errors are experienced with KML files, it is advised to remove all styles informations and keep only points coordinates.

Paths in Google Earth are shown undirected, however the canonical direction is from the first point added to the last point.

Schedule file (Plans*.txt)

Each line of the file specifiy a different boat. Lines starting with '//' are comments and not read by the program.
The line is split using the comma as a field separator. A plan starts by 4 fields then is followed by the list of plan orders (at least two)

AC#14,B60264,60%,2Hr

- AC#14 define the boat model identifier. Use the same identifiers as specified in Boats.txt
- B60264 is the boat name. It is not displayed or used by the traffic, but could help to distinguish plans. Only characters valid for an aircraft registration could be used here. Avoid punctuation marks and use no more than 10 leters.
- 60% is the minimum traffic percent that must be configured to see this boat in the simulator
- 2Hr is the repeat frequency. You can specifiy it as a number of hours or weeks, e.g. 1344Hr or 8WEEK

In each order, a departure time is given. The departure is relative from the start of the period. If a plan has a 4 hours periods, then an order that starts at 1:45 will be repeated at 5:45, 9:45, 13:45, 17:45, and 21:45 each day. Although all these times could be used to define a plan, the first one (between 0:00 and 4:00 the end of the period) should be used.

For periods that span multiple days, a day number is also used, followed by a '/' before the time. Day numbers starts at 0. For 1WEEK periods, 0 means Monday, so for instance 4/15:20:40 means 15:20:40 on friday.
For periods that span multiple weeks, the day number 0 is (apparently) the first monday of the year, though it remains unsure.

An order consists in 5 comma separated fields:

00:18:19,00:24:06,1754,reverse,ferry

1. The first field is the departure time or day/time if period is more than 24 hours. The time is always GMT.
2. The second field the arrival time. It is not used by the program since the arrival time is recalculated based on the route length and the boat speed. When a file is compiled, calculated arrival times are inserted back in the file. It's generally a good idea to check the calculated arrival time to see if the next leg does not starts before the arrival of the current leg. Otherwise the boat may conflict and not appear at correct times.
3. 1754 is the route number, as defined by the Boats.KML or Boats.CSV file. Only numerical identifiers are supported
4. The fourth field is a boolean indicating the travel direction on the route. If it is marked *reverse*, then the route is followed from the last point to its first point. Any other word in this position means normal direction
5. The last flag concern terminal parking type. As said before, a boat marked FERRY will stop at the endpoint of the route. The default behaviour is not FERRY, so any other word in the leg definition will cause the boat to find a parking spot on a circle around the endpoint.

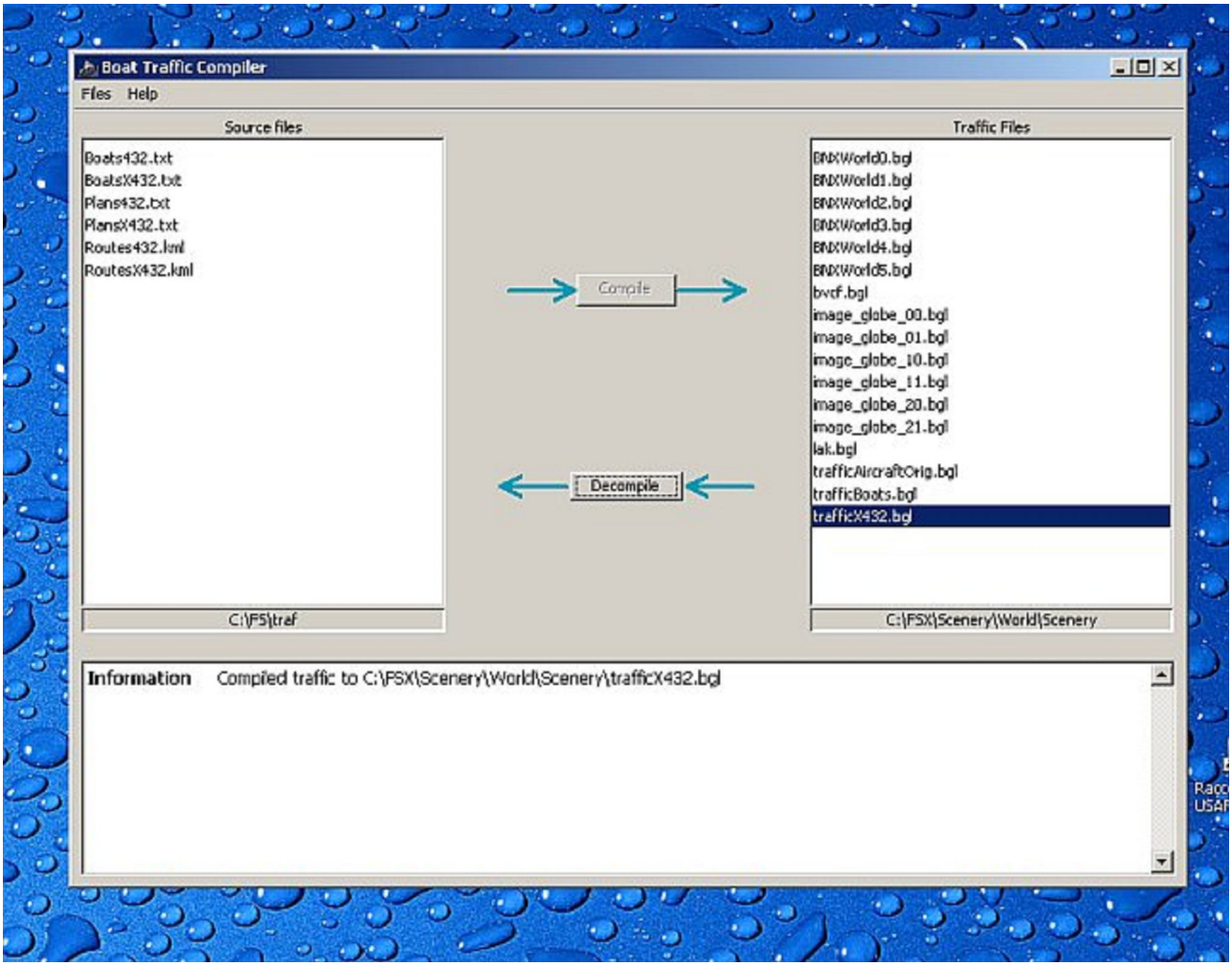
When designing flight plans, users should be very careful to the order and directions of the legs. Like aircrafts schedules, a boat schedule must loop back to its first point before the end of its period. However improper route definitions and direction may cause the circuit to break. AIBTC check circuit continuity and errors.
A complete plan definition looks like this:

AC#14,B60264,60%,2Hr,00:18:19,00:24:06,1754,reverse,ferry,01:18:19,01:24:06,1754,normal,ferry

Note that the plan use only one route with one leg marked as "normal" and the other as "reverse". This is the safest way of creating a boat plan. Due to some limitations in the AI subsystem, no more than two different routes (not including direction) could be used in one plan. The contrary may cause FSX to crash.
You can fortunately have more than two orders provided they use only two routes and makes a correct closed circuit.

Using the software

Users familiar with the TTools 2.0 graphical interface will have no problems using AIBTC:



First, path settings should be set correctly using the *Files* menu. Left and right file lists will only show file types appropriate for an operation (TXT/CSV/KML/KMZ files for compilation and BGL for decompilation).

To compile a traffic, select one of your text files on the left panel. Other text files needed for the compilation will be automatically selected base on the file names. If not please make sure that your traffic files are all named with the same suffix: BoatsProject.txt RoutesProject.kml PlansProject.txt
Click on the *compile* button and the traffic BGL will be generated. The output directory must be correctly set to the FSX Scenery/World/scenery directory.

To decompile a traffic, select a traffic file (bgl) and click on *Decompile*. 3 text files will be generated in the source directory.

Actually no other features or command line arguments are supported by AIBTC.

Example traffic

An example traffic is providen in the "Samples" subdirectory of AIBTC. It contains the source of an example aircraft carrier strike group. The ships depart Norfolk at 16:50Z and go to Napoli. The period of the traffic is 8 weeks, meaning that you can see the group departing at the following dates:

- 5 January 2006
- 2 March 2006
- 27 April 2006

- 22 June 2006
- 17 August 2006
- 12 October 2006
- 7 December 2006

If you experience problem, for example traffic not appearing; a good debugging tool is the TrafficExplorer toolbox. It can be installed with the FSX SDK. To activate it, edit the *dll.xml* file situated in *Document and settings\User \Application Data\Microsoft\FSX* and change the *Disabled* status to **false** in the configuration block of TrafficToolbox. In the traffic explorer or map, uncheck the *aircraft only* option to see all boats.

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