STATIC AIRCRAFT .mdl MAKER ("SAMM") - Version 2

Please Remember

In most countries, a static scenery model converted with this program from a flyable or AI aircraft model is considered a derivative work of the original aircraft model author and is subject to the end-user license agreement (EULA) or other terms under which that author released the aircraft. Hence, your use and distribution of the static scenery model may be restricted.

Please observe those terms and, if you include these models in scenery you distribute, please give credit to the original aircraft author(s).

Tired of having to program AI (and suffer the overhead) just to have some "eye candy" sitting around your airport. No more! Static Aircraft .mdl Maker ("SAMM") will convert just about any Microsoft Flight Simulator® or Prepar3D® (collectively referred to as "FlightSim") flyable or AI aircraft into a scenery model. Just "point" SAMM to the aircraft you wish to convert, decide where to save the scenery file and, presto, "eye candy".

P3D Version 1 is handled in exactly the same way as FSX. All references in this manual to FSX are equally applicable to P3D v1 - with one exception. Model (.mdl) files in FSX format are always referred to as FSX, whether they are intended for use with FSX or P3D. P3D Version 3 and later are handled in an identical manner as P3Dv2. SAMM does not support new aircraft formats (if any) introduced in P3Dv3 or later.

INSTALLING, EXECUTING and UNINSTALLING SAMM

Installation - To install SAMM, simply copy all the files from the downloaded archive. SAMM does not affect the system registry.

SAMM is a Microsoft NET.Framework 3.5 application. If NET.Framework 3.5 or later is not already installed on your computer, the “redistributable” can be downloaded from the Microsoft website at no charge.

SAMM utilizes certain files in the relevant SDK. Due to Microsoft's and Lockheed's license terms, these files cannot be included in the SAMM archive. The files of interest are:

- for FS9 - "makeMDL.parts.xml" and "makemdl.exe" (MakeMDL SDK)
- for FSX and P3D - "modeldef.xml" (Environment Kit\Modeling SDK\bin"),
  - "BglComp.exe" and "bglcomp.xsd" (Environment Kit\BGL Compiler SDK), and
  - "XToMdl.exe" (Environment Kit\Modeling SDK\FSX_GmaxGamePack\Plugins).

The first time you attempt to convert an aircraft model for either version, if SAMM cannot find the relevant SDK file(s), you will be asked to locate them. In the case of FS9, "makeMDL.parts.xml" is not essential and SAMM will convert FS8/9 aircraft models without it (albeit, perhaps, with a little more effort on your part), but access is required to "makemdl.exe" if you wish to convert static models of FSX aircraft for use with FS9. For FSX models, access to the noted files is essential.

While SAMM can be used with P3D Version 4, to do so, you must obtain a copy of the FSX compiler included in the various FSX SDKs as well as the P3D SDKs prior to Version 4. (Even new aircraft in PV4 as shipped by Lockheed Martin are FSX-

based and are not compatible with the compiler supplied in the PV4 SDK.) Should you attempt to compile a FSX aircraft , you must "point" SAMM to the FSX compiler.

Certain ancillary features of SAMM are only available when Martin Wright's mwgfx.dll and mwdds.dll are installed. These are the same .dlls used by DXTbmp and other of Martin's utilities. So, if you currently have any of those utilities installed, you already have the required .dlls. If not, you may obtain them at no charge from http://www.mwgfx.co.uk. If you don't have Martin's .dlls, SAMM will still create static models, but those ancillary features (such as texture resizing and mipmap removal) will not be available. Thanks to Martin both for creating the .dlls and making available the development information to me.

SAMM also makes use of several ModelConverterX (MCX) .dlls. The required .dlls are included in the SAMM archive. To ensure continued compatibility with SAMM, it is recommended you do NOT update these with newer versions from MCX. **Please also note that some virus protection programs may object to the use of these .dlls - until you tell them not to**. If you already have MCX installed on your system and have used it, this should not be issue.

Execution - To execute SAMM, double-click on SAMM2.exe.

Vista and Windows 7 users must have and, depending on circumstances, others may require, administrator privileges when running SAMM. If you need but do not have administrator privileges, you will not be able to access the necessary files. To run SAMM with administrator privileges, right-click *SAMM.exe*, select "Run As …" and then "administrator".

Windows 7 users may wish to run SAMM in the XP compatibility mode. Running it otherwise results in a "this program may not have installed correctly" message when SAMM is shut-down. Despite the error message, there is no known problem - other than the annoyance factor.

The first time you run SAMM, four new folders will be created in your SAMM folder, namely *Models, Libraries, Listings* and *Work*. Their use is described throughout this manual. The *Models* folder will have *FS9* and *FSX* sub-folders. You must not change the names of any of these folders or of the files or folders in SAMM's *Models* folder.

Initialization - When you shut-down SAMM for the first time, an additional file, *SAMM.ini,* will be created and saved to the SAMM folder. SAMM "remembers" key settings from one session to the next. Those key settings, which include the last folder to which a static and scenery file is saved and your preferences for positional data entry, are saved in *SAMM.ini*. The next time SAMM is run, those settings are preselected based on this file.

Automatic Updates - Whenever SAMM is started, it checks the support server to determine if a more recent release is available. If so, it will download that release with your consent. The updated release must be manually installed in the normal manner.

If you decline an update, you will be asked if you wish to be advised of future updates. If you decline, the "No Automatic Updates" item in the *SAMM.ini* file will be set to "True". To reinstate automatic update checking, manually edit *SAMM.ini* to set this item to "False".

Un-Installation - To uninstall SAMM, just delete the SAMM folder and all its contents

Terminology -To avoid misunderstanding, when the following terms are used in this manual their meaning is as follows:

- **"aircraft"** - a FlightSim aircraft folder or a file or sub-folder in such folder
- **"aircraft title"** - the title assigned to a specific "Fltsim.x" variant of an aircraft
- **"base model name"** - the user-specified name for the subfolder (to be created) in SAMMs *Models* folder to/in which a static model and its related textures are saved
- **"static aircraft library"** – the folder holding/that will hold a collection of static aircraft models and associated files that SAMM generates and which it will process when creating the corresponding \scenery object library file
- **"static model"** - a static model generated or to be generated by SAMM
- **"static version name"** - a user-specified name (applied as a suffix to the base model name) to differentiate between individual static models in the same base model folder.

Caveats - Please be aware of the following:

- **SAMM will not convert aircraft models developed for FS2000 or earlier. If in doubt about the vintage of an FS9/9 aircraft model, check the file extension of its textures - which will be ".bmp" or ".dds" for FS8/FS2002 and later models.**
- **Certain aircraft models claimed to be for FSX are simply FS8/9 models with textures converted to ".dds" format. SAMM handles them as FS9 models. However, the textures are not rendered properly when used with FS9. (FSX is OK.)**
- **Aircraft to be converted must be in standard FlightSim aircraft folder format, but need not be in a FlightSim aircraft folder. The folder must include the Model folder, the applicable Texture folder, the base texture folder if the model uses a texture.cfg file and the *aircraft.cfg* file.**
- **Static models created with SAMM Version 1 are not compatible with SAMM version 2.**

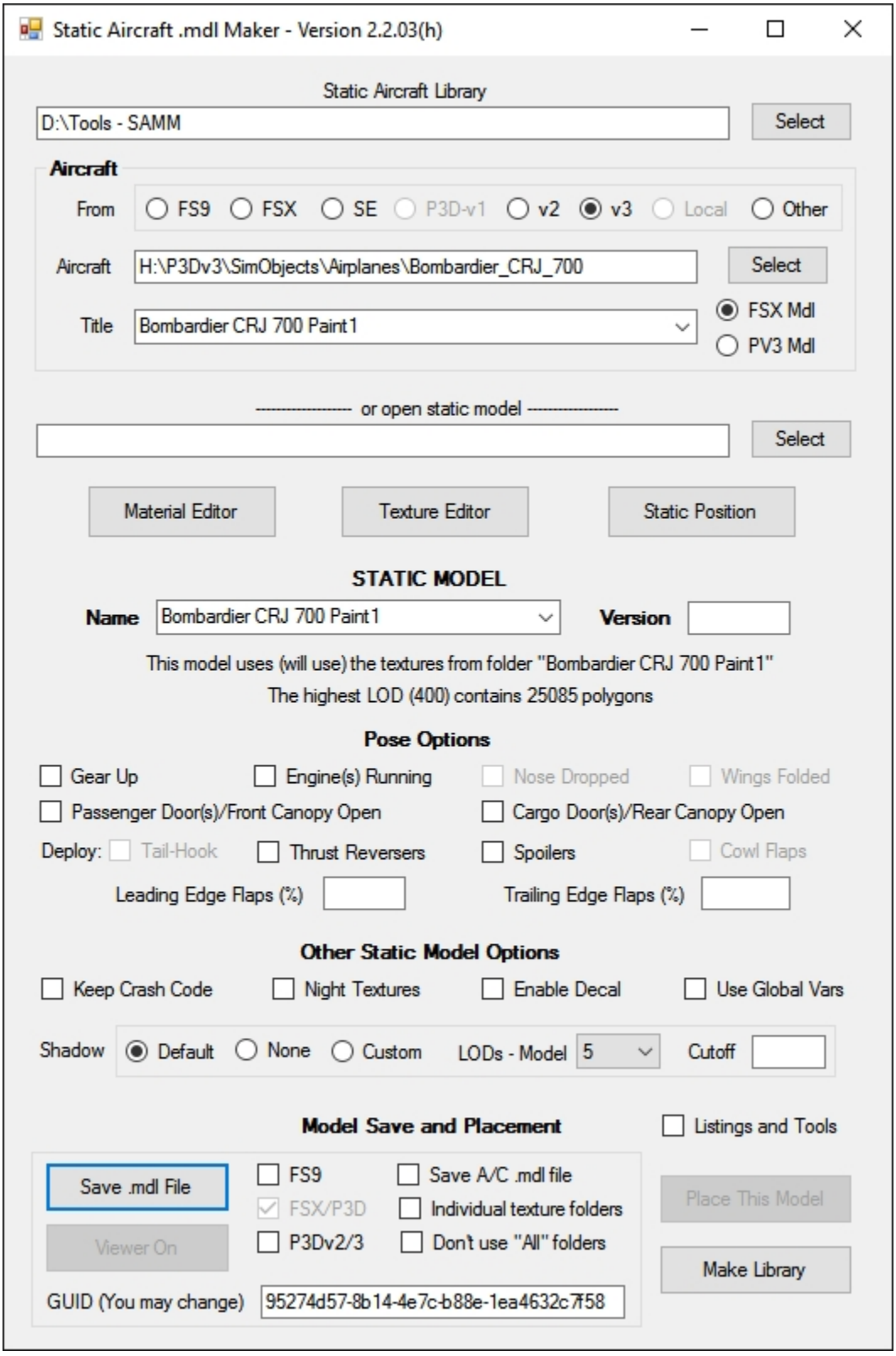
CREATING THE STATIC MODEL

On starting SAMM, a dialog box as shown on the following page appears.

SAMM Version 2 allows you to collect aircraft, static models and associated object libraries in multiple locations. Each such location is referred to as a "static aircraft library" (more fully defined above). You may select any folder to be a static aircraft library. SAMM will create the necessary sub-folder structure for you. (In my own case, I have developed several airports, each with its own complement of unique static aircraft. So, I have a static aircraft library in each airport development folder.) However, unless and until you have reason to do so, it is recommended you use the default location i.e., the SAMM folder. Also, at any time you may revert to the default location simply by clearing the Static Aircraft Library location.

To create a static model,

- either:
  - specify the set of aircraft folders containing the model of interest - FS9 (*Aircraft* folder) or FSX or, P3D (*SimObjects\Airplanes* folder), Local for aircraft saved in the selected static aircraft library or Other, or
  - click the Select button associated with the Aircraft Folder textbox and navigate to the aircraft of interest; and
- if more than one version/title of that aircraft exists, select the desired aircraft title in the Select Aircraft Title combobox.



Static Aircraft .mdl Maker Main Panel

As noted above, SAMM utilizes certain files included in the relevant SDK. Always for the FS9 SDK (its location is not recorded in the system registry) or if SAMM does not find the

FSX or P3D SDK, as applicable, the first time you attempt to convert an aircraft model for each FlightSim version, you will be asked to specify the location of the SDK file. (Access to the FS9 SDK is not essential, though certain aircraft may convert more readily if it is available. Should you not want to bother initially but later wish to specify it, delete the file "AnimDef_FS9.dat" from your SAMM folder. The next time you attempt to convert a FS9 model you will have another opportunity to locate the SDK file.)

The conversion occurs immediately upon selecting the aircraft of interest.

If there are no error messages:

- the static model (wheels down, engines quiet, shadow enabled and no crash-code) has been created and is ready to save;
- the FSX Model and P3Dv2 Model radio buttons will indicate for which particular Flightsim version the selected aircraft is designed; (P3Dv2 stock models are all FSX vintage; neither radiobutton illuminated means a FS8/9 model);
- the base model name (displayed in the STATIC MODEL Name textbox) will be the aircraft title; if the title contains characters not valid in a file name, like "-" or "/", they will be replaced or discarded;
- the name of the SAMM texture folder to be used and the number of polygons in the highest LOD is displayed; and.
- the checkboxes reflecting the animations available for the aircraft are enabled. (Please note, the Nose Dropped feature is not available for FSX aircraft).

If you want something other than the default configuration, select:

- the desired pose (animation) options, and
- Other Options as desired including:
  - night textures (if available),
  - Keep the crash code (normally deleted)
  - Enable Decal - to display a registration number (you must provide a small texture file containing the registration number to be displayed; it must be named *Decal_User_Decal.bmp* and should be of the same aspect ratio - but not necessarily the same size - as the original *Decal_NNumber.bmp* being replaced) , and/or
- Shadow: None to suppress the shadow or Shadow: Custom and select from the LODs: Model combobox the LOD of the model on which the shadow is to be based. The simplest shadow is obtained by selecting the lowest LOD. (Simpler shadows require less processing). Selecting anything higher than about 1/4 the highest LOD is unlikely to improve FPS. You may also specify a Cutoff LOD beyond which the shadow will no longer be displayed.

If you wish to save the model under a name other than the aircraft title, edit the STATIC MODEL Name textbox. This will be the "base model name". If you intend to create more than one version of static model, you may also - but need not - enter a version name in the STATIC MODEL Version textbox. Or, you may select one of, or review, the existing static model names using the STATIC MODEL combobox.

The base model and version names may be any character string that is legal as a file name under Windows. But, you should keep them short. Aircraft and scenery *.mdl* files limit texture filenames to 64 characters. Each static model texture reference includes the base model name. So, the total length of the base model name and static version name

may not exceed 63 minus the number of characters in the longest texture file name. (SAMM will warn you if the name you choose is too long and allow you to shorten it.)

The Guid to be assigned to the model is shown in a textbox below the Save .mdl File button. Normally, the system-assigned a Guid will be acceptable. However, when replacing models in existing libraries, you may want to use the Guid already assigned to the model in that library. To do so, simply copy and paste, or enter, the desired guid into the textbox.

Thanks to Arno Gerretsen's MCX .dlls, SAMM will create static models of FS9 aircraft for use with FSX and P3D v1, v2 and v3 (including material adjustments for transparency and illumination) and of FSX aircraft for use with FS9 and P3Dv2 or v3. To have it do so, check the applicable checkbox(es) beside the Save .mdl button.

Finally, check click Save .mdl File. The static model and associated textures will be saved to SAMM's *Models\FS9*, *Models\FSX* or *Models\P3Dv2* folder, based on the aircraft model's type, in a sub-folder named as the base model name. If additional copies of the static model are saved for other FlightSim versions, their filenames will be suffixed with "_9", "_x" or "_p" to indicate the version with which they are to be used. All versions of the static model are assigned the same Guid, so the same placement file can be used with all FlightSim versions. You will be notified of any missing textures - which may or may not be consequential.

To view the static model as it has been saved, check Display saved static model. Whenever the model is re-saved, the viewer will be updated. The viewer is from ModelConverterX. For documentation on its various display features, please see the MCX user manual. (But, for simply viewing the model, you won't need to adjust any of its controls.) Please be patient - especially with FS9 models. Depending on the power of your computer system, display of a static model may require ten seconds or more.

Should you wish to modify your static model at a later time, SAMM will need access to the original aircraft .mdl file. SAMM "remembers" where the aircraft .mdl file was when the static model was created and will attempt to retrieve the model from there. If you don't plan to keep the aircraft folder containing the .mdl file, check Save A/C .mdl file and SAMM will copy and save a local copy of the file for you.

The other two checkboxes on the lower part of the Main Panel pertaining to textures are discussed in later sections.

SAMM Version 2 utilizes *texture.cfg* files in a manner similar to FlightSim. So, for aircraft with a *texture.cfg* file, SAMM will spread the static model textures across two folders, both named for the aircraft but one suffixed with ";All". If you make static models of more than one variant of an aircraft, they will all use the same ";All" folder. As well, if the same texture appears in the base folder of more than one variant, you may specify that texture be moved to the ";All" folder again using the Texture Editor. If you plan to use only one variant of an aircraft, you may consolidate all the textures in the base folder using the Texture Editor (though doing so has no effect other than reducing clutter in your add-on scenery texture folder).

Except where the selected "pose" dictates otherwise, SAMM processes all animations in their default positions. However, aircraft designers have a great deal of flexibility and may have used non-standard key frame parameters. As well, in more complex user aircraft models, certain animations are controlled by the value of global variables which, in turn, reflect the position of certain cockpit controls. Unfortunately, there are no cockpit controls

in a static model. Should your model not be rendered as you have selected, these are the likely causes. To fix it, you will have to delve into the aircraft design and adjust one or more parameters that do control animations in order to get the static model to render properly. For further information, please see ANIMATIONS, MISSING PARTS AND OTHER ISSUES below.

Lastly, you may encounter an occasional FSX aircraft on which certain "appendages" fail to be offset in elevation by the static offsets. (Generally, the affected part will be otherwise positioned correctly.) The cause is unknown. If you really want to use such aircraft, the only solution appears to be to set the static offsets to 0 and apply them in the positioning XML instead.)

CREATION OF STATIC MODELS FOR USE WITH "OTHER" FLIGHTSIM VERSIONS

This conversion between FS9, FSX and P3D v2 versions of static aircraft requires access to "makemdl.exe" and "XToMdl.exe" for the target version, as mentioned in the INSTALLATION section. The first time you attempt to convert a static model of a FSX aircraft for use with FS9, for example, you will be asked to locate these files. Similarly, if SAMM cannot find the FSX SDK, for example, you will be asked to locate "XToMdl.exe" the first time you attempt to convert a static model of an FS9 aircraft for use with FSX or P3D. SAMM "remembers" the location of these files, so you'll only have to do this once for each process.

> **Please note, SAMM and the MCX .dlls call certain SDK utilities when converting a static model of an aircraft designed for one version of Flight Simulator to the format for another version. These utilities require that the decimal separator be a period, i.e., ".". Attempting such conversion when languages that don't use "." as the decimal separator will result in the rather non-specific message:**
>
> ***Unable to convert this model for use with FS version. MCX .dll issue.***
>
> **Should you experience this error when using a non-English version of Windows, try switching to English – or at least switching your decimal separator.**

Be forewarned, the conversion process is quite slow. Progress bars are displayed but they are rather coarse. Consider them advisory messages only. In the case of FSX->FS9 conversion, the MakeMDL dialog is also displayed. At times, it may seem that the system is "hung". (In fact, sometimes you will see "(not responding)" in the title bar of the MakeMDL dialog.) But, if you are patient, the process - which may take a minute or more - will complete.

Also, once the conversion process has started, allow it to complete and the confirmation messages to disappear before taking any further action. Otherwise, you may prompt a "SystemExecutionException", which is "fatal" (to the conversion). Should you get this exception, just repeat whatever conversion was in progress but, this time, be a little more patient.

But, what if you don't have the relevant SDK on your system?

SAMM generates static models of FS8/9 aircraft using the FS9 compiler - which is included in the SAMM archive. FSX and P3Dv1 will display FS9 scenery models up-close satisfactorily with two possible exceptions:

- transparency, and
- illumination.

The latter should not be a problem so long as you don't check Show Night Textures - and may not be a problem even if you do. Transparency shouldn't be an issue either with aircraft models intended for AI operation. But, with flyable models with transparent windows/canopies, those parts may not appear when the static model is used with FSX or P3D. As well, with aircraft textures, the alpha channel, if provided, is used for reflection, not transparency. Without further processing, parts that use such textures with a non-whire alpha channel may be semi-transparent when converted to FSX.

To avoid this situation, when Martin Wright's .dlls are installed, any DXT-3 or DXT-5 texture is converted to DXT-1 with a "white" alpha channel. If you don't have Martin's .dll's, you can do the same manually with ImageTool (provides in the Terrain section of both SDK's)

There is one other issue FSX-related issue you should be aware of. When FSX displays FS9 aircraft models at very long distances, it does not texture them. Instead, they are displayed using the a solid "fall-back" color of the material - the actual color depending on design parameters. SAMM can't do anything about this conversion to a solid color. What it can do, and does, is make that color medium-grey so that the transition is less obvious. You may override the medium-grey using the Texture Editor.

MAKING ADDITIONAL VERSIONS OF AND RE-SAVING A STATIC MODEL

Once you have saved a static model, you may save additional poses simply by checking the applicable pose options, specifying a new static version name and clicking Save .mdl File. If the static version name you enter has already been used (for that static model), you'll be asked to confirm that the previous static model is to be overwritten.

Perhaps you want to have several static versions of a particular aircraft in different liveries. To make a static model in a different livery:

- select the aircraft/aircraft title for the desired livery as before,
- specify the base model name (in the STATIC MODEL Name textbox) of the static model for which this is an additional livery,
- enter a version name in the Version textbox, and
- click Save .mdl File.

There is no need to place all liveries in the same base model folder. But, doing so gives you the opportunity for texture storage savings as noted in the next section.

Should you wish to make additional poses of a previously-saved static model:

- load the static model by entering its file path in the Static Model File textbox or using the associated Select button (the STATIC MODEL Name textbox will be disabled),
- enter a new static version name in the STATIC MODEL Version textbox,
- select the desired new pose options, and
- click Save .mdl File.

If this is the second time the static model is saved (or the second pose), you will be reminded that the model currently being saved will use the textures for the last-saved version.

Should you need to re-save a static model (as you may be directed later), you need only:

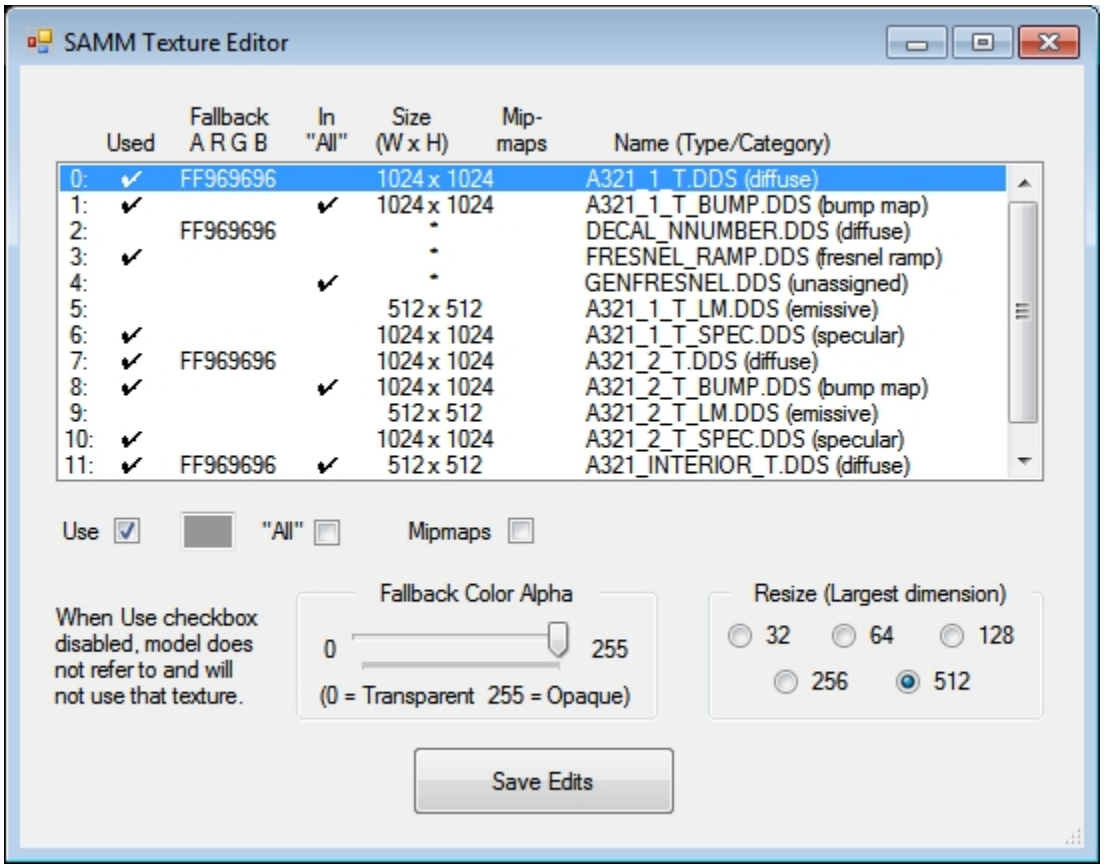
- load the static model by entering its file path in the Static Model File textbox or using the associated Select button (the STATIC MODEL Name textbox will be disabled), and
- click Save .mdl File.

Alternately, of course, you may re-create the static model from the aircraft

ADJUSTMENTS

Clicking on the Texture Editor button on SAMM's main dialog will open the Texture Editor dialog listing all the textures named in the aircraft .mdl file. To edit a texture, double-click on the corresponding line in the list. The various parameters will be displayed in the controls at the bottom of the dialog. Make whatever changes are necessary and click Save Edits. Any changes you make are saved in the *Model* folder, so they are preserved should you access the static model again.

The texture folder for flyable aircraft models often contains a number of textures for interior features or other hidden parts that are not used by or are not important for the static model and whose storage with the static model would simply be a waste of space. To avoid this, with the Texture Editor, simply uncheck the textures that are not to be used in the static model. (SAMM will copy into the static model texture folder only those textures indicated to be used.)



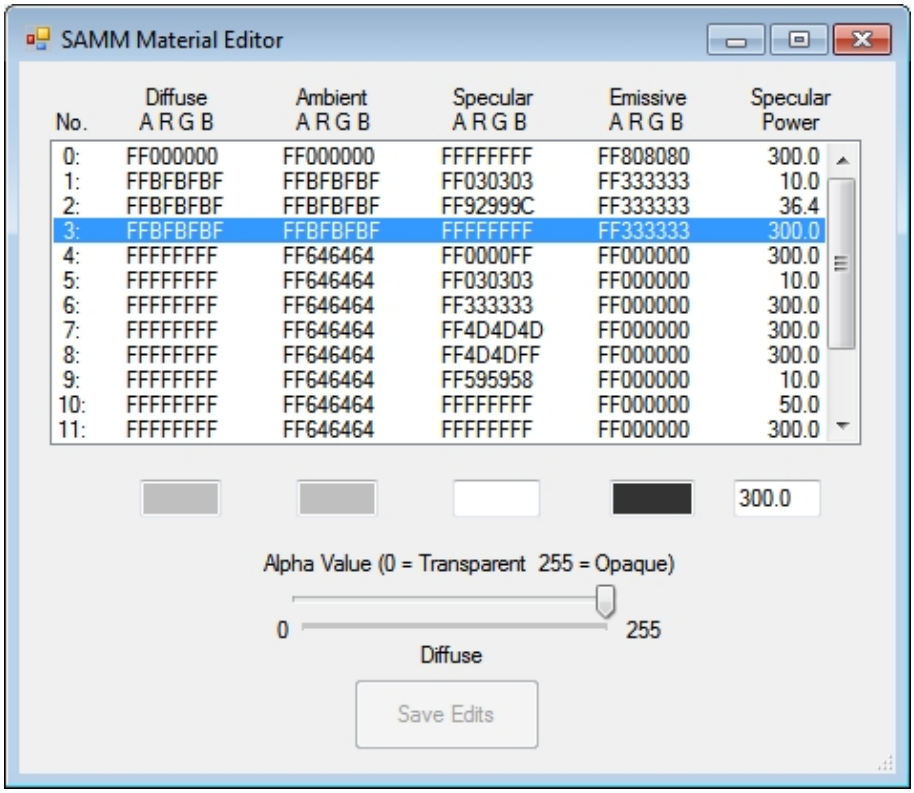
Texture Editor

If the aircraft .mdl file specifies use of a texture that is not available in the associated aircraft texture folder or that has been designated as not to be used with, SAMM will cause the parts that use that texture to be colored medium gray. If you want some other color, you may adjust the "fallback color" of the texture. To do so, click on the color box

immediately below the column of fallback colors. A standard Windows color dialog will pop-up with which you may specify the new color. Should you want to change the alpha value of the fallback color, do so using the Fallback Color Alpha trackbar.

Moving textures to/from the base texture folder from/to the corresponding ";All" folder is done using the "All" checkbox. (When checked, the texture file is placed in the ";All" folder.) When converting or updating a converted static aircraft, textures in the applicable ";All" folder take preference over the similarly-named texture the base texture folder, and the latter will be removed when the (updated) .mdl is saved.

If you have Martin Wright's .dlls installed on your system, you may specify mipmaps be added or removed to/from, and you may resize locally-saved textures, using the Texture Editor. (The original aircraft texture is not affected.) You may only resize smaller. Mipmap and size changes are not applied until the static model is saved. Before that, you may undo those changes. However, once the static model is saved and the changes applied, to restore the texture(s) to its/their original size, you must either copy the textures manually from the aircraft texture folder or reload the aircraft and recreate the static model. If Martin's .dlls are not installed, the Size column will show an asterisk (*) and the Mipmap column will be blank. Both will be and disabled (greyed-out).

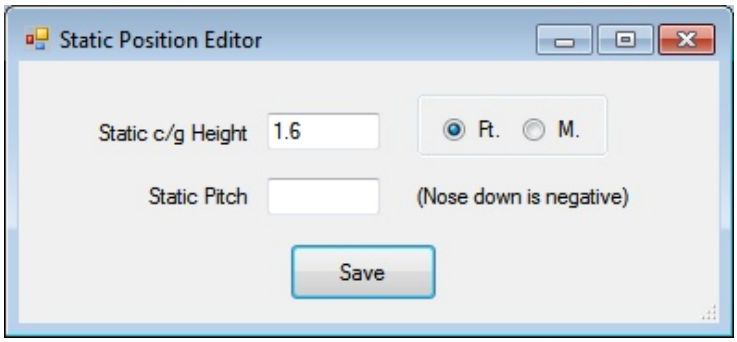


Material Editor

Please note, Martins' .dlls do not properly handle certain .dds files, especially those that are long and narrow. (Fresnel ramp files used by FSX models fall into this category.) The size of these files will be indicated as "*" and their mipmap status will be blank. These textures cannot be edited. Also, very occasionally while the textures are being processed, you may experience an exception that suggests memory may be corrupted. This is due to the same issue. Memory is not corrupted. But, regardless, this situation is "fatal" and SAMM must be restarted. However, the texture files should still be intact.

The general operation of the Material Editor is very similar to that of the Texture Editor. It provides a list of all materials used by the model. Double-clicking on the material of interest causes the material parameters to be expanded into the various controls below the list. Please note, however, some of the fields in the material editor are not used for FSX models and are disabled.

Prior to generating the static model on the ground, SAMM applies the offsets for *static_cg_height* and *static_pitch* specified the aircraft's *aircraft.cfg* file. (These are the values that FlightSim uses to render the aircraft when it is "at rest".) Because of differences in the way aircraft and scenery models are rendered (as an aircraft, the landing gear may be partially compressed due to the weight of the aircraft and its load; as a static model, only design parameters are considered), these values may require adjustment when you place the static model in order for it to sit "perfectly". You won't know whether or not this is necessary, however, until you first compile and view static scenery model as generated by SAMM. If adjustments are necessary and the flyable aircraft exhibits a similar problem, you should probably make any changes in the *aircraft.cfg* file. Otherwise, you can use the Static Position Editor to enter new values for these parameters that will be used only by SAMM.



Static Position Editor

To avoid creating separate textures of uniform color, aircraft designers often apply color to parts using the diffuse and ambient colors of the material. This should not be a problem so long as the converted static model uses the textures provided by the model designer. However, if you are applying repainted textures of a different base color, you may find the untextured parts much more prominent than before. Or, you may wish to adjust the opacity of, say, a windscreen to hide untextured interior parts. Material Editor to the rescue!

TEXTURE CONSIDERATIONS

Missing texture files are not necessarily indicative of a problem. I have encountered several aircraft that reference a texture but don't actually use it - at least not for anything apparent. Unfortunately SAMM can't make that determination, so they are simply reported as missing.

Aircraft textures tend to require a lot of storage space. You'll probably want to minimize the storage requirements.

SAMM operates in either of two modes:

- default - the full set of textures is saved for each "pose" of a static model; and

- texture conservation - multiple poses of the same aircraft/title use the same textures.

A checkbox near the bottom of SAMM's main panel controls which mode is used. If you plan to create static model libraries, the latter mode requires some organization on your part to ensure the proper textures are copied to the scenery folders.

Normally, the textures for a SAMM-generated static model are saved to a dedicated sub-folder in the *texture* folder associated with the *scenery* folder to which the model is saved. This sometimes causes difficulty with certain object placement tools. So, when SAMM places a static model or creates a library for use with object placement tools, you may specify that textures be saved individually in the *texture* folder - the texture file names being prefaced with the Static Model Name followed by "%". In either case, SAMM copies only those textures that are actually used by the static model to the scenery *texture* folder.

As noted earlier, SAMM handles *texture.cfg* files in a similar manner to Flightsim. (For a number of reasons, *texture.cfg* files cannot be used directly). When a *texture.cfg* file calls for use of a texture common to several variants of the same aircraft model, SAMM will save those textures in a folder named with the static model title followed by ";All". Like the other textures, this folder is located in the *texture* subfolder for the model. (To ensure it is in the correct location, the ";All" folder is created along with the model, whether or not it is used.)

Similarly, where use of a texture common to all aircraft is specified, SAMM will save it in the folder *texture_SAMM;All* in the SAMM\Models folder.

You need not accept SAMM's placement of common textures in the ";All" folders. Indeed, if you only plan to have one version of a particular aircraft model, use of that model's ";All" folder does not create any advantage (nor disadvantage). Conversely, you may place other files in the ";All" folder and realize memory savings. For example, the stock C172's, both FS9 and FSX, all have a dedicated prop texture. If you moved this texture to the model's ";All" folder, SAMM would discard the dedicated textures for each variant and always use the common texture.

In the texture conservation mode, SAMM only saves the aircraft textures for the first static model converted after selecting a particular aircraft/title. Any additional static models (poses) created for that aircraft/title use the texture files saved for the first model. While in the texture conservation mode, if you want a set of textures dedicated to a particular version/pose of a static model, re-select the aircraft/title first.

When converting older models, you may encounter a situation whereby Flight Simulator "complains" about a reference to a non-existent texture folder (no further details), yet all textures required by the model are available in the texture folder. The cause may be a texture format that is valid in aircraft files but not in FS9 scenery files. (In the case that prompted this note, the size of a texture was 768x768 - apparently OK for aircraft but certainly not for scenery.) If this happens to you, you'll have to identify the errant texture (probably by process of elimination) and re-format it.

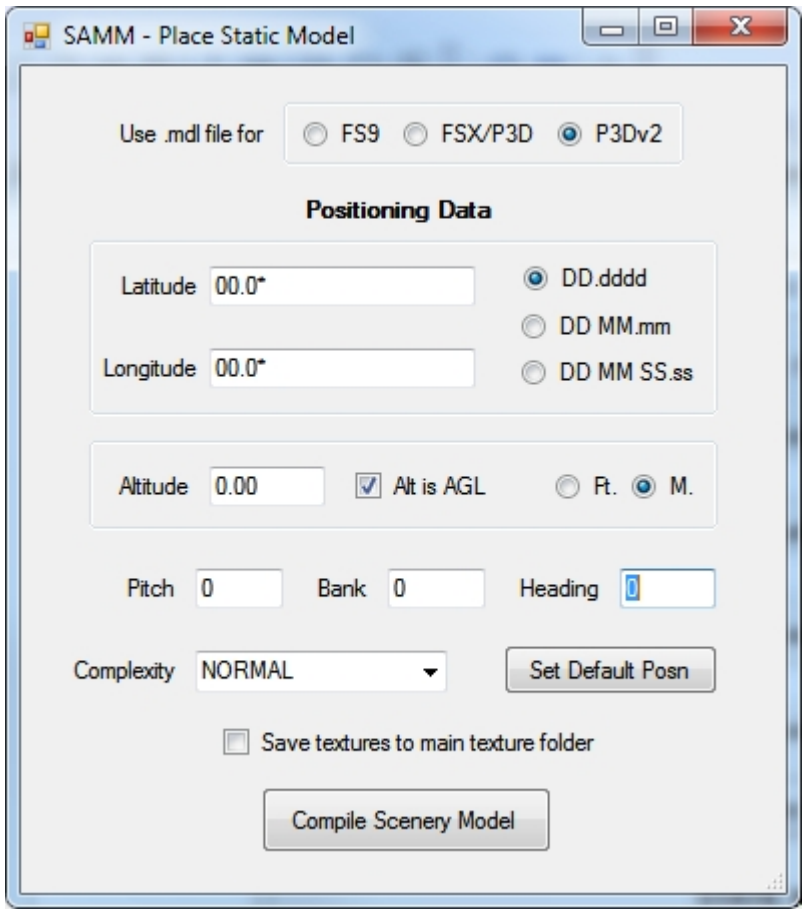
CREATING THE SCENERY FILES

You may place your static models using hand-prepared XML files, with the facility provided in SAMM or using one of the available object placement tools (see next section). To place your model with SAMM, click the Save .bgl File button on SAMM's main panel. (This button will not be enabled until you have saved the *.mdl* file for the first time.) A dialog box for entry of the positioning parameters pops up.

Select the version (FS9, FSX/P3D or P3Dv2) of the static model you wish to place. (These controls will be disabled if only one version of the static model is available, but will always be initialized for the version of the aircraft from which the static model(s) were created.)

If you have previously placed a static model, the data displayed will reflect the previous placement. (Positioning data is saved on a per Flightsim version basis.) Otherwise, default positioning data will be used. Altitude and Pitch are initialized to 0 since static models generally have the static offsets already applied. Adjust as necessary. You may use the most recently entered latitude, longitude and heading of this model as the default position for future placements of other static models by clicking the Set Default Posn button.

Check the Save textures to main texture folder checkbox as necessary. Be aware that if the Complexity selection is "higher" than your current FlightSim Scenery Complexity setting, you won't see the static aircraft.



Place Static Model Dialog

Finally, click the Compile Scenery Model button. A standard folder browser dialog will appear. Navigate to or enter the path to folder where the static model is to be saved. This would normally be an *Addon Scenery* subfolder, but may be any folder. If the designated folder is not or does not contain a subfolder named *scenery*, a folder named *scenery* will be create in it and the *.bgl* file will be saved there. Similarly, if there is no companion *texture* subfolder, one will be created and the textures saved in it. The *.mdl* file is compiled. If all is well, a confirmation message is displayed for a few seconds.

If you attempt to place a static model that cannot be displayed by the target version because, for example, you've chosen a FSX static model but your target system is FS9, SAMM will warn you of the incompatibility. If you wish to turn off this warning, close SAMM and edit SAMM.ini (with Notepad or any text editor) setting the line labeled "Warn if FSX Model->FS9 Scenery" to "False".

FS8/9 aircraft models are compiled with the FS9 compiler - included with SAMM. FSX and P3D aircraft models must be compiled with their own compilers which, as noted earlier, are not included with SAMM due to license restrictions. The compilers are in the applicable SDK. If you are converting a FSX model, for example, and SAMM cannot find the SDK, you will be asked to locate it or the compiler itself.

To see your static scenery aircraft, you need only create (if necessary) and enable a Scenery Library entry for the scenery folder holding the static aircraft and start FS or P3D as applicable. Your aircraft should be where you placed it (and you don't have to reserve parking).

CREATING LIBRARIES OF STATIC AIRCRAFT

The procedure for placement of static models from a library will depend on the placement tool(s) used. However, SAMM will create the object library for you.

To create an object library of previously-saved static models, click Make Library on the main panel. The Make Object Library Dialog will pop-up.

Specify:

- the name for the object library (the last 10 names used are available in the Object Library Name combobox),
- whether you want that name suffixed with the version of the static models it will contain, and
- the Flightsim version of the models to be used.

All the models for that version of FlightSim available in the currently-selected local library will be listed. Select the models you wish to include in the library. (All these settings are "remembered", so you won't have to repeat them the next time you open the Make Object Library dialog.)

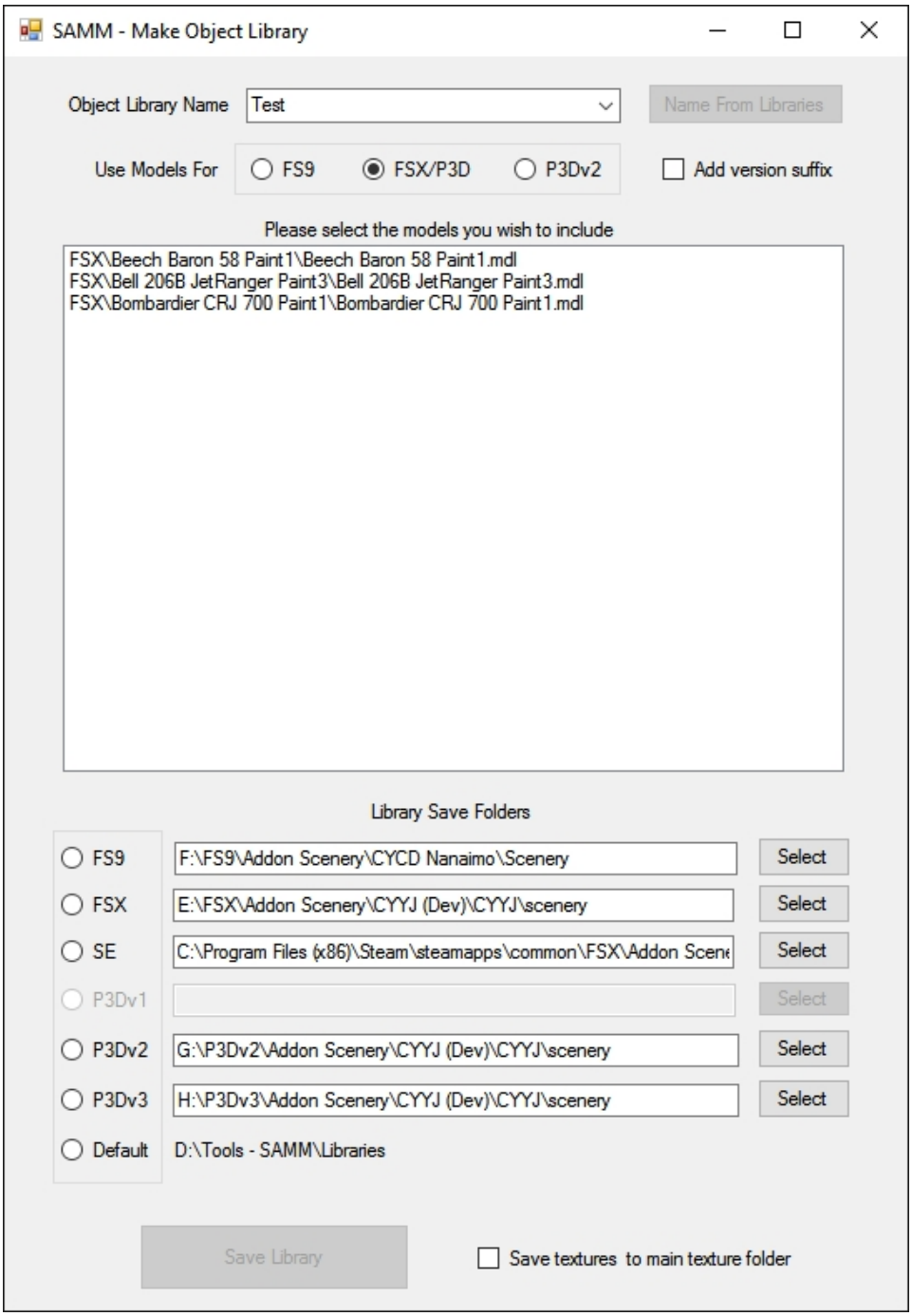
The object library and associated textures will always be placed in the Libraries folder of the currently-selected local library in a sub-folder named as the object library. If you wish them also to be copied to a FlightSim add-on scenery folder, specify the path to that scenery folder in the relevant textbox and then select the Flightsim version.

Some library managers and object placement tools do not "understand" SAMM's aircraft-like two-tier texture folder scheme. If you are using one of those utilities, check "Save textures to main texture folder".

Then, click Save Library .bgl. If there is already a subfolder in SAMM's *Libraries* folder with the name you specify, its contents will be deleted. (You'll be warned first.) If there is no such folder, one will be created. As well as the .bgl file and textures:

- the *.xml* file from which the library *.bgl* is compiled,
- a text file containing a list of required texture folder, and
- another text file showing the guid assigned to each model

are also saved in that sub-folder. (These may be helpful for troubleshooting if your library doesn't turn out as expected.) If all is well, a confirmation message is displayed for a short time.



Make Object Library Dialog

(During testing, I noticed that if the sub-folder of interest in SAMM's \Libraries folder was open on the desktop when an attempt was made to delete its contents, Windows issued a "directory not empty" error - but emptied the folder anyway.)

ANIMATIONS, MISSING PARTS AND OTHER ISSUES

Aircraft designers have a great deal more flexibility (and complexity) in creating their models than do scenery designers. While SAMM copes with most of it, you may find the odd aircraft that won't convert properly just by selecting the "poses" available from the main panel. Usually, these situations manifest themselves as missing or misplaced parts. However, during testing we encountered one aircraft for which the static model compiled without error but FlightSim (both FS9 and FSX) "hung" when we tried to use the static model. Such situations do no harm, other than the inconvenience of having to re-start FlightSim (after removing the problem aircraft). But, you should be aware of the possibility should SAMM encounter unusual circumstances.

Most of the appendages on an aircraft model are displayed via animation. Wheels down or wheels up (and all points in between), for example, is accomplished that way. These animations are expensive in terms of processing resources. Therefore, in the interests of FPS efficiency SAMM interprets the animation data, specifies a corresponding "transform" and then discards the animation entirely.

Microsoft provides a set of standard animation names (or keys). However, aircraft designers often "tie" their animations directly to cockpit controls rather than to standard animation keys. So, for example, you select wheels down (default) - and SAMM will set the appropriate animation key value - but the wheels may not appear if the wheels animation in the model is dependent also upon on the position of the cockpit gear lever. There's no way for SAMM to "know" this in advance. So, to get the model to render with wheels down, you may have to adjust the parameter that represents the position of the gear lever using the parameter adjustment tool described in the next section. Also, as noted earlier, some animations in FS8/FS9 models are controlled by global variables which you may have to initialize to an appropriate value (see next section).

Certain animations may also be "tied" to other animations. For example, in the stock Boeing 747, the axis about which the flaps and slats rotate depend on wing flex (which SAMM does not attempt to address). Once again, short of a full implementation of FlightSim's aircraft model processing, there's no way for SAMM to "know" this in advance. The default wing flex is 50%. Consequently, the flaps and slats are not aligned with the wing since the reference position in the modelfor the flaps and slats seems to be 0% wing flex. Fortunately, this issue is easily corrected by setting the wing flex parameter to 0%.

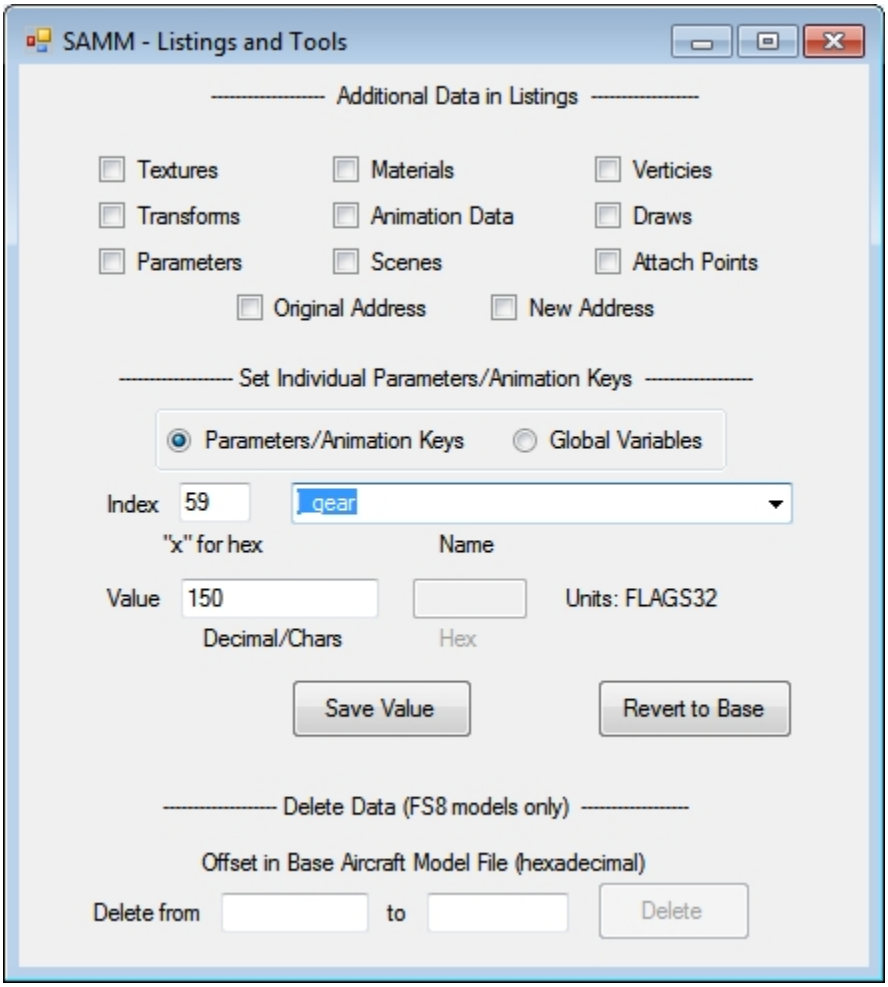
These sorts of relationship are only apparent from a close observation of the erroneous placements and an analysis of the model code - for which a general familiarity with aircraft model design techniques is necessary. SAMMs Listings and Tools dialog to the rescue! As a first step, select the Parameters listing. This listing includes a definition of every parameter and animation key used by the model. While it may look intimidating, the names of the parameters may give you some indication of what they do and, hence, a hint as to what might be causing - or how to correct - your problem. Every parameter may be changed from the Listing and Tools dialog. Don't be afraid to experiment. The worst you can do is move more parts out of place. And this is easily corrected with the Revert to Base button which resets all parameters (not just the ones you have changed) to their default values.

LISTINGS and TOOLS

Some of you will want your static models to adopt non-standard poses - or you may simply want to examine the code "behind" them. To do either, check the Listings and Tools checkbox. The Listings and Tools dialog pops-up.

Listing Content Control - The upper portion of the dialog contains a number of checkboxes to control the display of various categories of information in the listings. Listings are regenerated after every selection on the main panel that affects them. If you decide to display the individual vertices or draw code, please be patient. For a typical aircraft, generating the listing when either of these categories is selected may require a noticeable amount of time.

Two features you may find particularly useful when troubleshooting missing parts on FS8/9 models are Original Address and New Address. The first displays for each line in the static model listing the original address in the aircraft model listing. The other displays for each line in the aircraft model listing that is used in the static model the corresponding address in the static model listing. Where a part is missing from the static model with Animations: All enabled, the associated code in the aircraft model listing is often easily spotted as a large block of code without new addresses.



Listings and Tools Dialog

Individual Parameter Adjustment - In the central portion of this dialog are the controls for adjusting the parameters used by the model. These controls allow you to preset the value of any parameter or global variable used in the aircraft model and have the animations react accordingly. (Available parameters and their current values may be displayed at any time by checking the Parameters checkbox.) For example you could have one engine running with the others on a multi-engine aircraft off, or the nose-wheel up (on models

where the gear retracts) while the others remain down. You are unlikely to want to do either of these, but they are illustrations of what you could do with these controls. Something you may wish to do, however is have only one door open while the other(s) remain closed. As well, some designers tie the presence of ground support equipment to a custom parameter, often one that refers to the rotation of the nose wheel. But, you'll have to examine the listing to know that.

To SAMM, a model is just a bunch of unlabelled vertices whose display is controlled by the setting of some animation key or variable, collectively referred to as "parameters". SAMM does not "know" which vertices represent which parts. By default, SAMM displays vertices based on the default value of the relevant parameter (defined by the aircraft modeller). For standard animation keys/parameters, SAMM sets the appropriate default value. Otherwise, the value is set to 0. Hence, where the display of other parts in the position you want them is dependent upon a parameter value other than 0, it's up to you to determine and set the appropriate value.

The values of the various animation keys and related variables may be determined either from:

- the Parameters listing (Parameters checkbox), which displays all the keys and variables referenced by the aircraft model together with their values and other information, or
- by selecting the key/variable of interest from the Name combobox as detailed below, which displays only those parameters referenced by the static model.

To allow you complete control over animations that rely on the position of cockpit controls, SAMM2 simulates the full set of global variables which you may set as necessary from the Listings and Tools dialog. To have SAMM respond to these variables, check Use Global Vars. When Use Global Vars is unchecked or if you have not set a variable which is used to control an animation, the animation will be displayed in its "0" position. The determination of which global variables do what and their appropriate values is entirely up to you. SAMM generates listings of both the aircraft and static models which may be helpful. Examining the aircraft model with MCX may also prove useful. Other than discussions in various forums, the only documentation on the topic I am aware of is MDLFMT.doc, from the FS2002 SDK and MakeMDL.doc from the FS2002 and FS2004 SDKs .

To set a parameter/global variable value, either enter the parameter/variable number (in decimal or in hex preceded by "x") or, for parameters only, select the one of interest from the Parameter Name combobox. You may also key the parameter name into the combobox (the entered name must match exactly the parameter name). If you enter a parameter number, the corresponding name will be displayed in the combobox. If you select/enter a parameter name, the number will appear in the text box. In any case, the current value of that parameter/variable will be displayed in decimal form and, for variables and integer-based parameters, also in hexadecimal form. The internal data format for the parameter is also shown. Edit the value as desired.

For example, the parameter name on most aircraft for the left gear is "l_gear" and the animation key range is 0-200, with 0 being gear fully retracted, 100 being fully extended and values over 100 for various compression levels. (150 is gear-down and compressed for normal aircraft weight). Settings in between 0 and 100 will yield partial retraction. Similarly, in FS8/9 models, there are four engine parameters, named "engine0", "engine1" and so on. When set to 0, the engine is stopped and the prop is shown still. If set to x7fff0000, the "whirling-prop" texture is displayed. In FSX models, the variables are

named "A:ENG N1 RPM:*n*, percent" (jets) or "A:PROP MAX RPM PERCENT:*n*, percent" (props). Not surprisingly, their range is 0 to 100. Setting them to any value above the "prop*n*_slow" or "n1_*n*_slow" level set by the designer (you'll have to check the animation data listing to determine that, but the default level is 6.25%) will result in the blurred prop or turbine texture being displayed.

"Standard" aircraft animation key/parameters are a topic of the FS8 and FS9 MakeMdl SDKs and the FSX Modeling SDK. You should review those documents prior to making use of this feature. In addition, aircraft modelers have the ability to create custom animation keys/parameters. SAMM displays the associated code in the parameters listing; it's up to you to interpret it.)

Generally, the range of values for the parameter in any animation is mentioned in the applicable SDK. You may enter any value. SAMM will interpolate for the correct animation when the key is in the normal range. If outside the normal range, SAMM will pick the applicable end-value. What the model does with that key depends on the modeler.

Then, click Save Value button. The static model will be re-computed based on the new entry (but not saved) and the listings will be regenerated.

You may revert to the default animation keys at any time by clicking Revert to Base. Doing so will remove all your entered presets.

When you save the model, all your parameter changes are saved with it. When you reload the static model, it is initialized with those changes. Hence, you need not make all your parameter value presets in a single session.

Deleting Code - Some of you will want to perfect your static models to make them even more efficient. You may edit the aircraft model data for FS8/9 models only. The lowest portion of the Listings and Tools dialog allow you to do this. (In this release, editing is limited to deleting sections of code)

The delete function doesn't actually delete anything. Rather it overwrites the data in the aircraft file between the boundaries (inclusive) you specify with no-ops - to preserve absolute addressing. When the static model is next saved, the *.mdl* file will be re-created without the section of code previously overwritten. Since the edited aircraft *.mdl* file is re-saved with the static model, your changes will be preserved.

UNSUPPORTED OPCODES AND OTHER ISSUES

SAMM has been successfully tested on a wide variety of flyable and AI aircraft models. Most convert with no difficulty using SAMMs default settings. Of the others, the solution was to adjust individual parameters as discussed in the previous sections. But, you may encounter the odd aircraft where this doesn't work either. If the issue is an unrecognized FS8/9 BGL opcode, you will receive a message to that effect and have the option to continue or not. (The opcode might not even apply to the converted static model.) If you choose not to continue, SAMM will close.

If it's not an opcode problem and you really want that static aircraft "fixed", you've got some work to do. Should an aircraft not convert properly and the problem is not an unrecognized opcode, the first thing you should do is confirm that the aircraft model is rendered properly by MS Flight Simulator when used as the User Aircraft or in an AI role. If that's OK, then you should review the ANIMATIONS, MISSING PARTS AND OTHER

ISSUES section of this manual for suggestions of a possible cause. After that, turn to the listings.

Should you experience difficulty with an otherwise "good" aircraft that can't be fixed using the animation options/adjustment tools provided, I would like to know about it - after you make an honest effort to fix it yourself. Please note the address at which a faulty opcode occurs (if applicable) or the specific other issue, and e-mail that information together with the relevant aircraft folder (i.e., model file, texture folders and *aircraft.cfg* file) to me at the address below.

While I do want to know about problem aircraft, please do not ask me for help adjusting/ presetting animation parameters or otherwise troubleshooting individual aircraft. Satisfying (and successful) use of SAMMs advanced features will depend largely on your experience, your interest in learning something new and the extent to which you have studied and understand the model listings. There seem to be few hard-and-fast rules in aircraft design, so don't be surprised if something that worked for one model doesn't work for another. What I can tell you is that if you preset the right parameter to the right value and select the right set of animations, you should get good results. Figuring-out which is the right parameter/value and deciding which animations to use is up to you.

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Thanks in particular to:

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- Richard Ludowise (rhumbaflappy) for his work with BGL9,
- George (Golf-HotelDelta) and Gary (Gman) who tested repeated development releases of SAMM Version 1 and whose suggestions made it a much better utility than it might otherwise have been,
- Bill Leaming (ngix) for his advice on aircraft development techniques when things didn't work for me as expected, and
- Martin Wright for his graphics processing .dlls, design information and assistance.

SUPPORT

Thanks again to Arno, SAMM has a dedicated support forum in the Tools section at fsdeveloper.com, http://www.fsdeveloper.com/forum/forumdisplay.php?f=114 . Please direct your queries and suggestions there.

I also have a support website at http://stuff4fs.com for all my airports and development utilities. (Navigate to the User Applications / Static Aircraft .mdl Maker page.) Among other things, the site lists all known problems with the latest release. The most recent release of Static Aircraft .mdl Maker is available from that site as are occasional development releases of new features.

Don Grovestine
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http://stuff4fs.com

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